4-1-2000

Justification for Class III Permit Modification April 2000 ER Site 228A Centrifuge Dump Site Operable Unit 1309

Sandia National Laboratories/NM

Sandia National Laboratories

Justification for Class III Permit Modification

April 2000

ER Site 228A
Centrifuge Dump Site
Operable Unit 1309

NFA Originally Submitted August 31, 1999

Environmental Restoration Project

United States Department of Energy
Albuquerque Operations Office

Justification for Class III Permit Modification

April 2000

Solid Waste Management Unit 228A
Operable Unit 1309
Round 13

(RCRA Permit No. NM5890110518)

NFA Originally Submitted August 31, 1999

NFA

Justification for Class III Permit Modification

April 2000

Solid Waste Management Unit 228A
Operable Unit 1309
Round 13

NFA Originally Submitted August 31, 1999

3.0 SWMU 228A

3.0 ENVIRONMENTAL RESTORATION SWMU 228A, CENTRIFUGE DUMP SITE

3.1 Summary

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a risk-based No Further Action (NFA) decision for Solid Waste Management Unit (SWMU) 228A, Operable Unit 1309. SWMU 228A, the Centrifuge Dump Site, is located east of SNL/NM Technical Area (TA) II on the northern rim of the Tijeras Arroyo. Environmental concern for SWMU 228A is primarily based upon depleted uranium (DU) fragments that were present in a steep gully and an adjoining alluvial fan. The DU fragments had been dumped along the arroyo rim with other weapon debris and some construction debris. The DU fragments and debris were removed from SWMU 228A during 1998 and 1999 voluntary corrective measure (VCM) activities.

Review and analysis of all relevant data for SWMU 228A indicate that concentrations of contaminants of concern (COC) are less than applicable risk-assessment action levels. Thus, SWMU 228A is being proposed for an NFA decision based upon confirmatory sampling data demonstrating that COCs released from this SWMU into the environment pose an acceptable level of risk under current and projected future land use, as set forth by NFA Criterion 5, which states, "the SWMU/AOC [area of concern] has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicated that contaminants pose an acceptable level of risk under current and projected future land use" (NMED March 1998).

3.2 Description and Operational History

This section describes SWMU 228A and discusses its operational history.

3.2.1 SWMU Description

SWMU 228A, the Centrifuge Dump Site, covers 1.6 acres and is located about 500 feet east of the historic TA-II boundary on the northern rim of the Tijeras Arroyo (Figure 3.2.1-1). The recently constructed Explosive Components Facility (ECF) is located about 500 feet north of the SWMU. SWMU 228A is situated on land that is owned by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy (DOE). The site is situated on the steeply sloping rim of the Tijeras Arroyo and the nearly flat floodplain below (Figure 3.2.1-2). Ground elevations at SWMU 228A range from 5,405 feet at the northern site boundary to about 5,360 feet at the southern site boundary on the Tijeras Arroyo floodplain. The vicinity is unpaved and no storm sewers are used to direct surface water. The extreme southern end of SWMU 228A is located within the 100-year Tijeras Arroyo floodplain (Figure 3.2.1-3). However, the site is located approximately 800 feet from the active channel, which only flows several times each year at Powerline Road. The Tijeras Arroyo is the most significant surface-water drainage feature on KAFB. The arroyo originates in the Tijeras Canyon, which is bounded by the Sandia Mountains to the north and the Manzano Mountains to the south. The arroyo trends southwest along the southern edge of the site and eventually drains into the Rio Grande, approximately 9 miles west of SWMU 228A.

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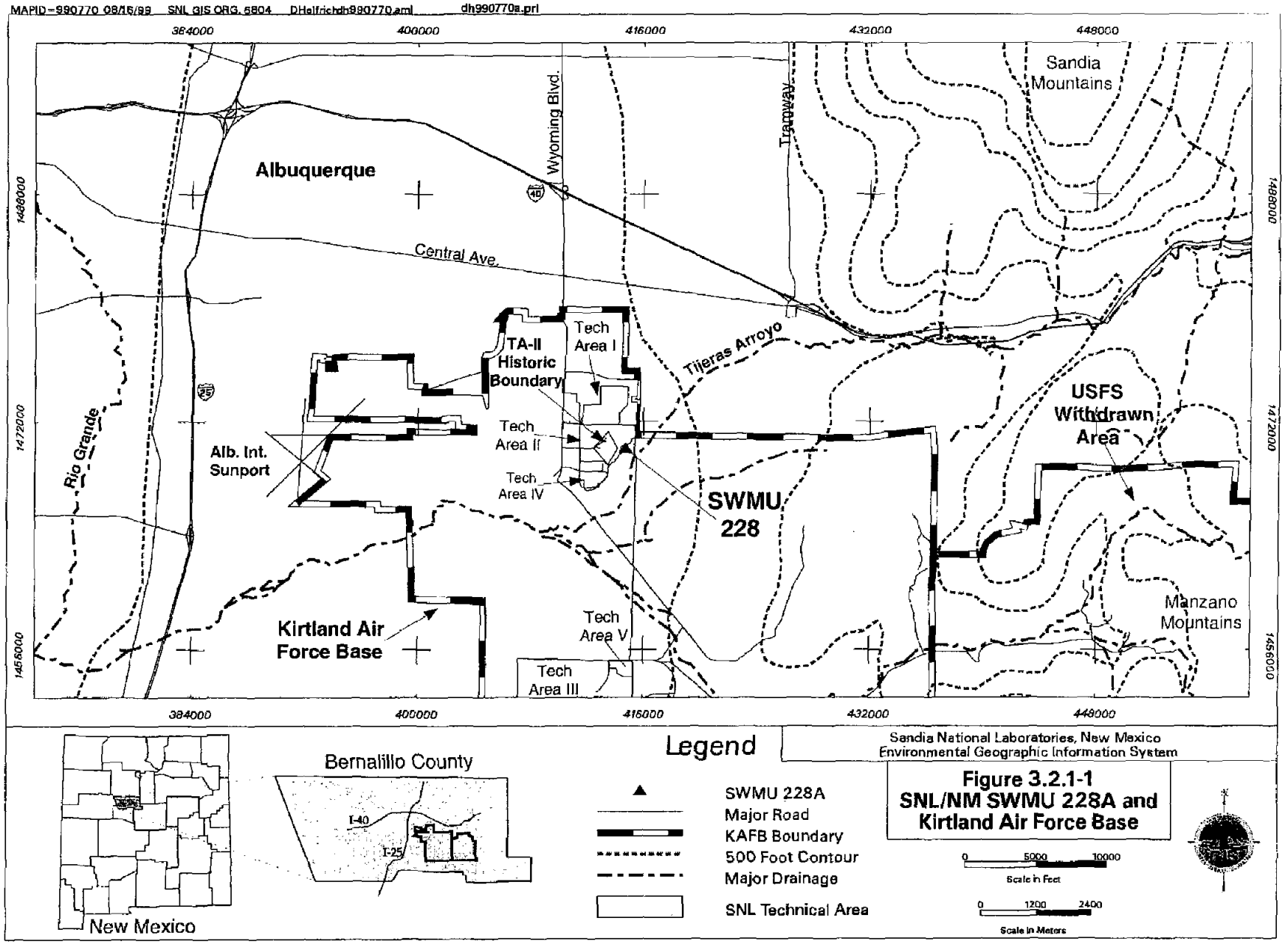
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384000
400000
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Albuquerque
Central Ave.
Wyoming Blvd.
Tramway
Sandia Mountains
Tijeras Arroyo
Rio Grande
TA-II Historic Boundary
Tech Area I
Tech Area II
Tech Area IV
Tech Area V
Tech Area III
Alb. Int. Sunport
Kirtland Air Force Base
SWMU 228
USFS Withdrawn Area
Manzano Mountains
Bernalillo County
I-40
I-25
New Mexico
Legend
SWMU 228A
Major Road
KAFB Boundary
500 Foot Contour
Major Drainage
SNL Technical Area
Sandia National Laboratories, New Mexico
Environmental Geographic Information System
Figure 3.2.1-1
SNL/NM SWMU 228A and
Kirtland Air Force Base
0 5000 10000
Scale in Feet
0 1200 2400
Scale in Meters

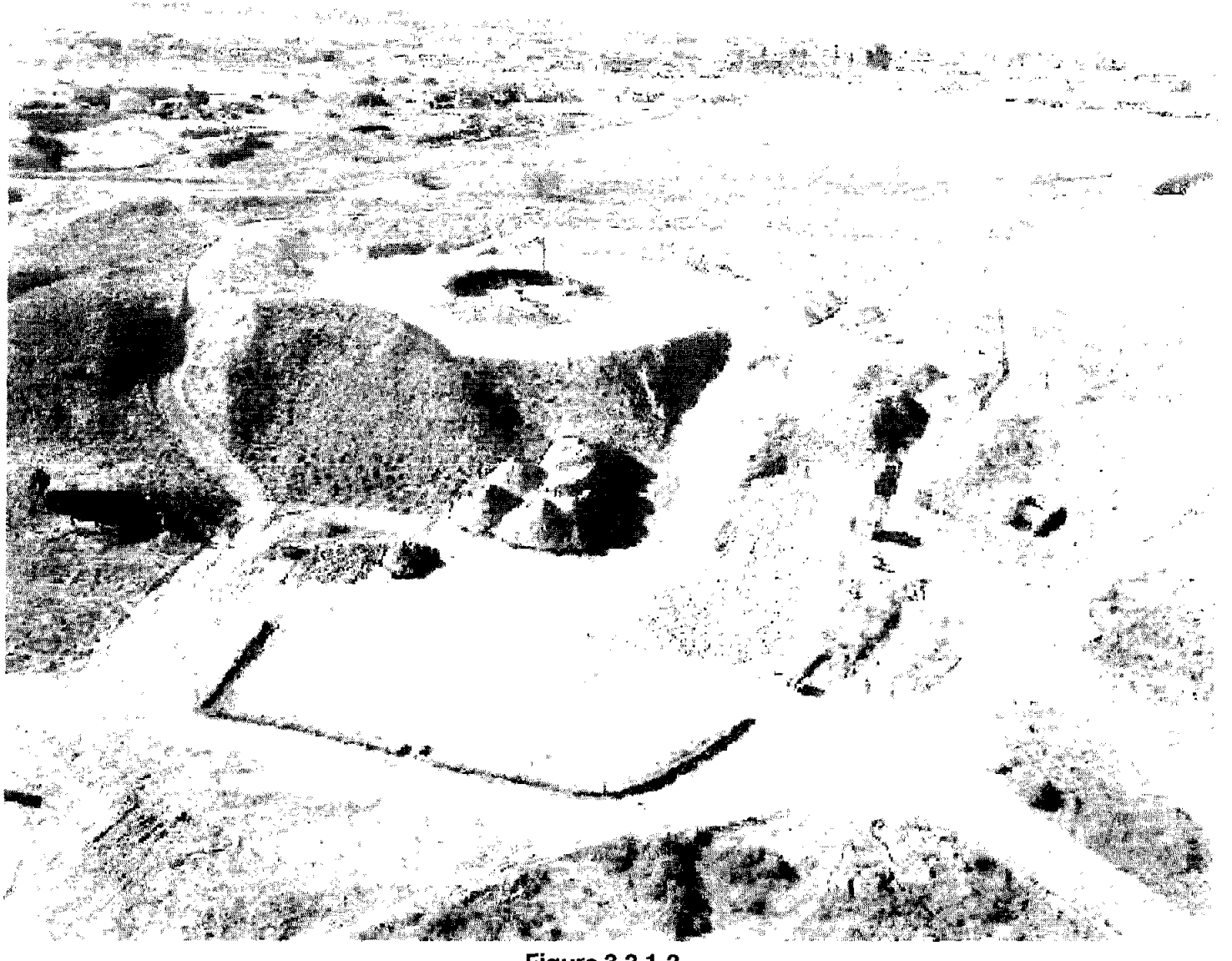
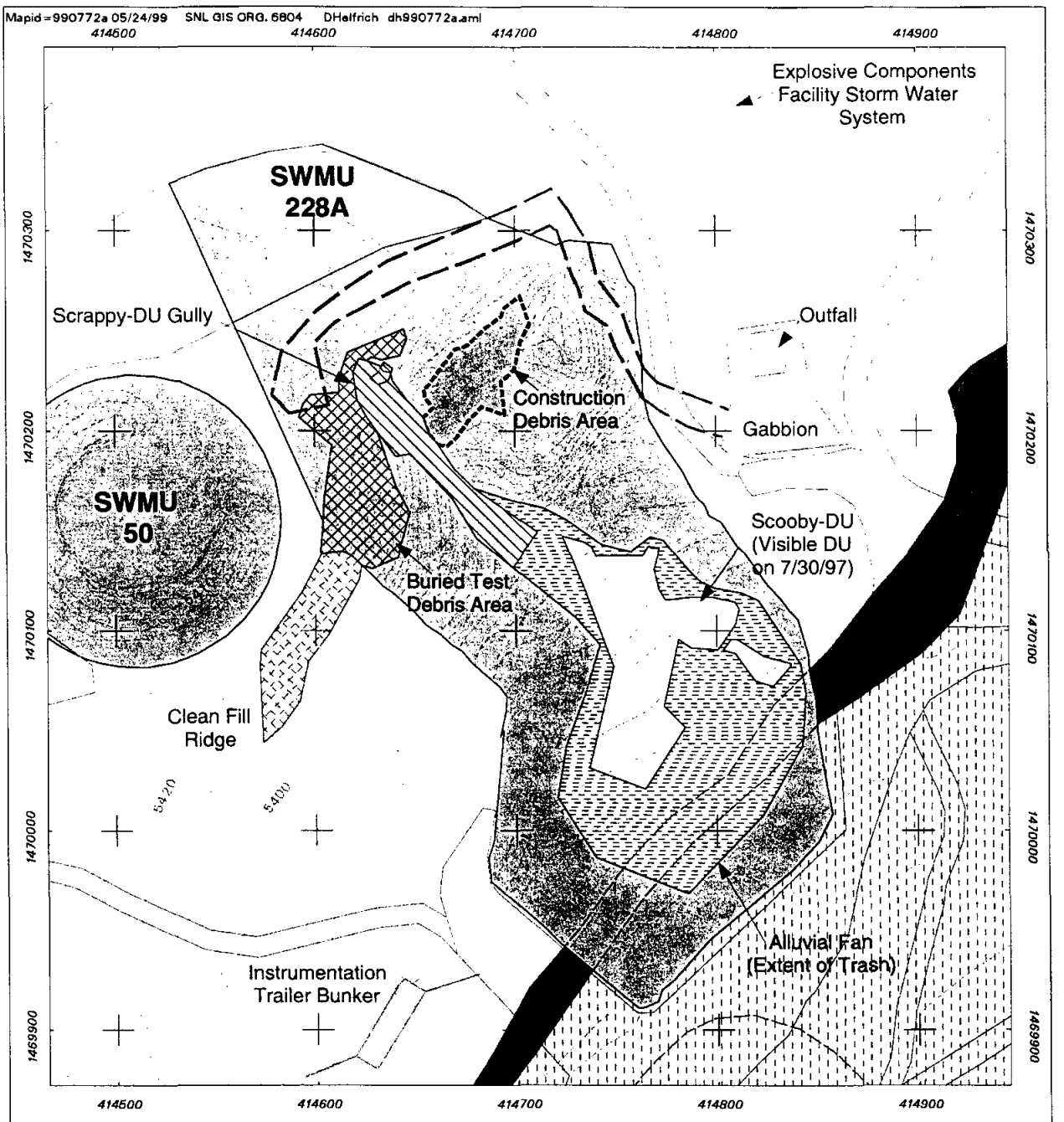


Figure 3.2.1-2
Aerial photograph of SWMU 228A, Sandia National Laboratories/New Mexico (February 1999) before final grading and revegetation work. View to the northwest with TA-II in left background. SWMU 50 and Scrappy-DU gully are in the center of photograph.



Legend

- 2 Foot Contour
- Unpaved Road
- Diversion Ditch
- Bunker / Outfall
- SWMU 228A & 50
- 100 Yr. Flood Plain
- 500 Yr. Flood Plain
- Clean Fill
- Buried Test Debris
- Constuction Debris
- Scooby-DU
- Scrappy-DU Gully
- Alluvial Fan

Figure 3.2.1-3
VCM Remediation Areas at SWMU 228A

0 40 80
Scale in Feet

0 9.6 19.2
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

The annual precipitation for the area, as measured at the Albuquerque International Sunport, is 8.1 inches (NOAA 1990). No springs or perennial surface-water bodies are located within 2 miles of the site. During most rainfall events, rainfall quickly infiltrates the soil at SWMU 228A. However, virtually all of the moisture undergoes evapotranspiration. Evapotranspiration estimates for the KAFB area range from 95 to 99 percent of the annual rainfall (Thompson and Smith 1985, SNL/NM February 1998a).

Groundwater monitoring for the area surrounding SWMU 228A is conducted as part of the Sandia North groundwater investigation (SNL/NM July 1999). Four monitoring wells (TA2-W-24, TA2-W-25, TA2-W-26, and TA2-W-27) are located within 400 feet of SWMU 228A. Two water-bearing zones, the shallow groundwater system and the regional aquifer, underlie SWMU 228A. The shallow groundwater system is not used for water supply. The depth to the shallow groundwater system is approximately 280 feet below ground surface (bgs) near the southern end of SWMU 228A. The depth to the regional aquifer is approximately 450 feet bgs. Both the City of Albuquerque and KAFB use the regional-aquifer for water supply. The nearest water-supply well, KAFB-11, is located approximately 0.7 mile east of SWMU 228A. The nearest downgradient water-supply well is KAFB-1, which is located approximately 1.4 miles northwest of the site.

Grasslands are the dominant plant community surrounding SWMU 228A and include species such as blue/black grama and western wheatgrass (SNL/NM December 1997). The site is principally vegetated by ruderal species such as Russian thistle (tumbleweed).

Soil at the site has been identified as the Bluepoint-Kokan Association (SNL/NM December 1997). For purposes of defining the background levels of metals and radionuclides in soil, this soil has been included as part of the North Supergroup (IT Corporation March 1996). The Bluepoint-Kokan Association consists of the Bluepoint loamy fine sand, which is developed on slopes of 5 to 15 percent, and the Kokan gravelly sand on slopes of 15 to 40 percent (SNL/NM December 1997). These soils are slightly calcareous and mildly to moderately alkaline. Runoff potential for these soils ranges from slow to very rapid, and the hazard of water erosion is slight to severe. Water permeability is moderate to very rapid. The surficial deposits are underlain by the upper unit of the Santa Fe Group. The upper Santa Fe Group consists of coarse- to fine-grained fluvial deposits from the ancestral Rio Grande that intertongues with coarse-grained alluvial fan/piedmont veneer facies, which extend westward from the Sandia and Manzanita Mountains. The upper Santa Fe unit is approximately 1,200 feet thick in the vicinity of the site.

Environmental concern about SWMU 228A was based upon weapons debris and construction debris that was dumped at the site in the 1950s. The weapons debris, including DU fragments, came from the adjacent centrifuge (SWMU 50). Following some centrifuge tests in the mid-1950s, weapons debris was dumped in a gully located about 80 feet east of the centrifuge. This gully eventually became part of SWMU 228A. The weapons debris was dumped next to construction debris from the demolition of KAFB barracks that had been previously dumped in the early 1950s. Except for a limited amount of cleanup in 1994, the weapons and construction debris remained near the upper end of the gully until 1997.

Unfortunately, heavy rainfall on July 28, 1997, washed some of the weapons and construction debris farther down the gully and onto the Tijeras Arroyo floodplain. On the following day, the ER Project discovered the DU fragments at SWMU 228A and the lateral extent of the new alluvial fan was mapped on the basis of visible DU fragments, trash, and sand deposition. The alluvial-fan deposit became known as Scooby-DU because of its distinctive outline

(Figure 3.2.1-3). Scooby-DU covered approximately 0.1 acre with an estimated maximum thickness of about 3 feet. During the planning stages of the VCM, the gully earned the nickname Scrappy-DU gully (Figure 3.2.1-4). At its northern end, the Scrappy-DU gully was about 10 feet wide and had steeply sloping walls about 8 feet high. The gully flared out southward on the Scooby-DU alluvial fan deposit.

Following the discovery of DU fragments in July 1997, the southern boundary for SWMU 228A was moved about 220 feet southward to encompass the alluvial-fan deposit (Scooby-DU). Just prior to the start of the VCM cleanup operation in June 1998, the northern boundary was moved about 100 feet northward so that a waste-staging area could be prepared. At present, SWMU 228A covers 1.6 acres.

3.2.2 Operational History

Historical records and technical memoranda have provided a significant level of process knowledge for the centrifuge testing activities. Weapons operations at the centrifuge are well documented in a series of classified memoranda written by SNL/NM engineers and scientists (Green January 1998). The centrifuge was constructed in 1952 within an abandoned meander-loop above the Tijeras Arroyo floodplain (Furman 1990). This rocket-powered centrifuge was not covered by a building or other structure. The centrifuge was used from 1952 through 1956 to test arming, fuzing, and firing components at high rates of centrifugal acceleration (Green January 1998). For test containment purposes, native soil was used to construct a 7-foot-high berm around the 80-foot-diameter concrete slab and to build up a nearby section of the arroyo rim. The centrifuge pivot was located in the center of the concrete slab. The centrifuge boom was 50 feet in length and held an experimental apparatus test jig on one end and rocket motors on the other end to provide rapid acceleration. During some tests, the test jigs contained DU and high explosive (HE) components. The most commonly used HE was probably 1,3,5-trinitrobenzene (RDX), also known as cyclonite. However, none of the HE spheres or detonators were apparently fired (expended) during the tests. Some test jigs used concrete spheres to simulate the HE spheres.

As mentioned earlier, the debris at SWMU 228A consisted of weapons debris from the SWMU 50 centrifuge and construction debris from the demolition of KAFB barracks. The weapons debris consisted mostly of DU fragments, rubber pads, aluminum pieces, concrete spheres, and small electrical components. Because SWMU 228A received weapons debris from centrifuge operations, the potential existed for unexploded ordnance (UXO)/HE material such as rocket motors or explosive charges also to be buried in or near the Scrappy-DU gully. However, no explosive materials were found during the VCM remediation. The construction debris consisted mostly of scrap metal and concrete rubble. The excavated debris is discussed in more detail in Section 3.4.5.2.2.

3.3 Land Use

This section discusses the current and projected future land use for SWMU 228A.

Figure 3.2.1-4
July 1997 photograph of the Scrappy-DU gully showing weapon and construction debris at SWMU 228A. The original dump site of the DU fragments was on left side of the gully near the skyline.

3.3.1 Current Land Use

SWMU 228A is located on federally owned land permitted to the DOE by the U.S. Air Force within the boundaries of KAFB (Figure 3.2.1-1). The current land use is industrial. After the cessation of centrifuge tests and debris burial in 1956, no significant land uses have occurred. Except for occasional Environmental Restoration (ER) Project activities in the 1990s, the vicinity of SWMU 228A has served as a buffer zone for TA-II and the ECF. The site is not fenced and, because of its remote location, is infrequently visited by non–ER Project personnel.

3.3.2 Future/Proposed Land Use

The projected land use for SWMU 228A is industrial (DOE et al. September 1995, SNL/NM November 1997). According to the SNL/NM 10-year Master Plan, no roads or buildings of any sort are planned for the vicinity of SWMU 228A (SNL/NM May 1999).

3.4 Investigatory Activities

The four investigations for SWMU 228A include the work that has been conducted at both SWMU 50 and SWMU 228A.

3.4.1 Summary

The vicinity of SWMU 228A 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). Investigation #2 included a cultural-resources survey, CEARP Phase 2 soil sampling at SWMU 50, and ER Project soil sampling. From 1994 through early 1998, various investigations such as surface radiological surveys and geophysical surveys were conducted at SWMU 228A (Investigation #3). From mid-1998 through early 1999, a thorough VCM with confirmatory sampling was conducted at SWMU 228A (Investigation #4).

3.4.2 Investigation #1—CEARP

3.4.2.1 Nonsampling Data Collection

SWMU 228A was not identified in the 1987 CEARP; however, the adjacent centrifuge and instrumentation bunker were identified as SWMU 50, the Centrifuge Test Site (DOE September 1987). The CEARP briefly discussed the testing activities that had occurred at the centrifuge. However, the CEARP did not identify the weapons debris that was buried in the gully directly east of the centrifuge. The presence of large concrete slabs and other construction debris had apparently hidden the weapons debris.

3.4.2.2 *Sampling Data Collection*

No sampling activities were conducted at SWMU 228A as part of the CEARP effort.

3.4.2.3 *Data Gaps*

SWMU 228A was not identified in the CEARP; therefore, no Hazard Ranking System (HRS) and Modified HRS migration mode scores were calculated. Furthermore, SWMU 228A was not investigated as part of the Resource Conservation and Recovery Act (RCRA) facility assessment (EPA April 1987).

3.4.2.4 *Results and Conclusions*

No CEARP findings were prepared for SWMU 228A.

3.4.3 Investigation #2—CEARP Phase 2/SWMU 50 NFA

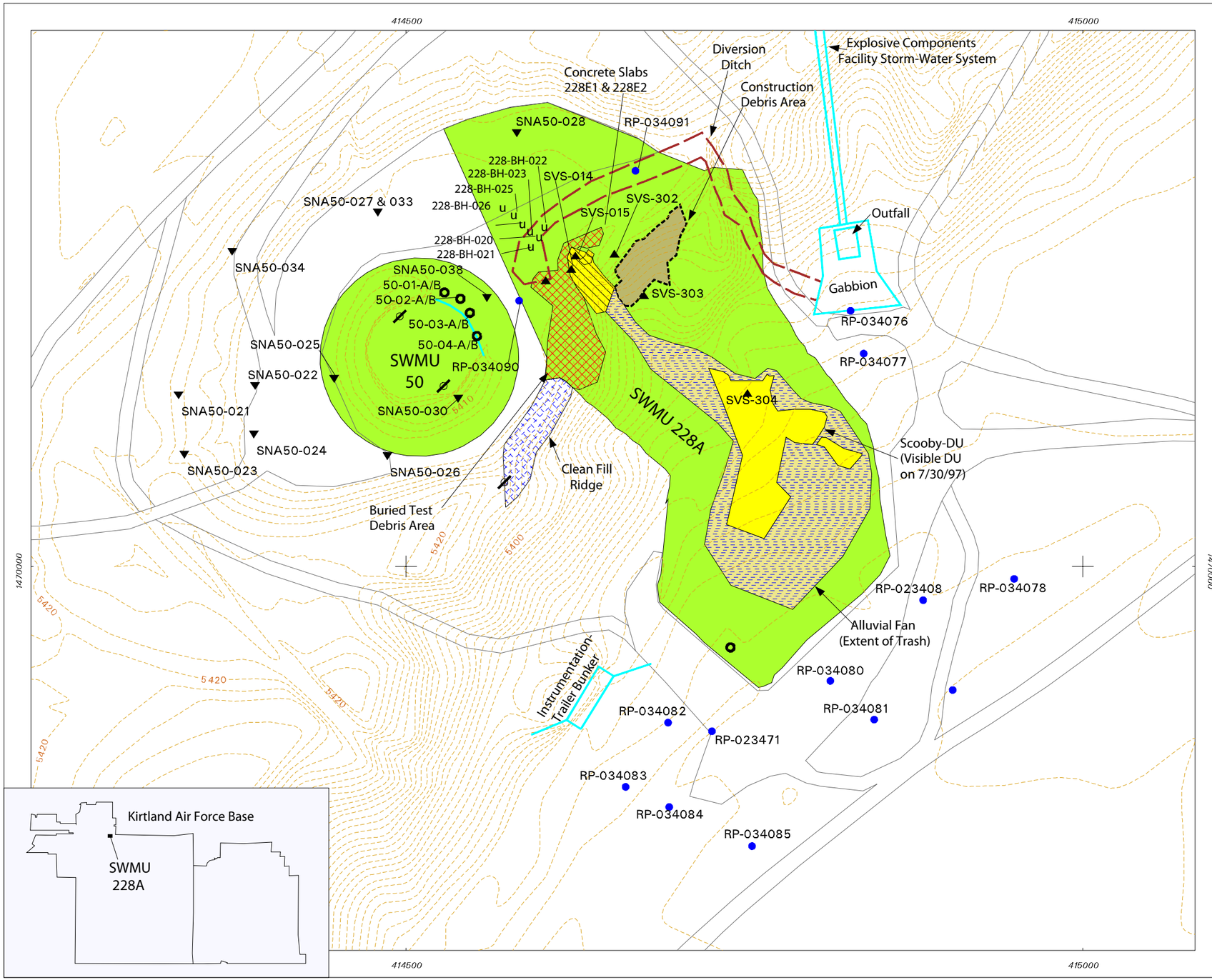
3.4.3.1 *Nonsampling Data Collection*

A cultural-resources survey was conducted in 1990 for SNL/NM Facilities Engineering. The survey area extended along the northern rim of Tijeras Arroyo from TA-IV to Powerline Road. No cultural resources such as archaeological artifacts were identified in the vicinity of the centrifuge or SWMU 228A (Chambers Group, Inc., March 1990).

3.4.3.2 *Sampling Data Collection*

Even though no samples were collected at SWMU 228A during Investigation #2, soil samples from SWMU 50 provided more insight for evaluating the potential COCs at SWMU 228A. As part of the 1989 CEARP Phase 2 Reconnaissance Data Report (DOE January 1989), surface soil samples were collected at 14 locations surrounding the centrifuge. A field inspection in November 1997 found wooden stakes at 11 of the 14 locations (Figure 3.4.3-1). The samples were collected from depths of less than 0.5 foot bgs. These SNA50-series samples were analyzed by a Roy F. Weston, Inc., laboratory for 11 suites of analytes: metals (target analyte list [TAL]; extraction procedure toxicity [EP-TOX]; and toxicity characteristic leachate procedure [TCLP]); pesticides (EP-TOX and TCLP); polychlorinated biphenyls (PCB); herbicides (EP-TOX and TCLP); semivolatile organic compounds (SVOC); 2,4,6-trinitrotoluene (TNT); and isotopic/total uranium. This lengthy and conservative list of analytes reflected the lack of process knowledge available during the CEARP effort, although DOE (January 1989) does state that "rocket propellant is the only known contaminant at this site" (page 2). The analytical results did not indicate any soil contamination in the vicinity of the centrifuge (Annex 3-A). Averaged values for the TAL metals and uranium are within the range of recently established New Mexico Environment Department (NMED) Hazardous and Radioactive Materials Bureau (HRMB) background values for the Sandia North Supergroup soil. The other metals results were nondetect and/or were below the RCRA TCLP and EP-TOX standards. No pesticides, PCBs, herbicides, SVOCs, or TNT were detected.

In 1994 soil samples were collected from four locations at the open side of the centrifuge berm. The soil-sampling results were used for the June 1995 NFA proposal for SWMU 50 (SNL/NM



Legend

Samples

- 1989 Soil Sample (SNA50-021)
- 1994 Soil Sample (50-01-A/B)
- 1995 Geoprobe Borehole (approx. location)
- 1997 Soil Sample (RP-023408)
- VaporTec or PETREX Collector (SVS-301)

- Instrumentation Pole
- 2 Foot Contour
- Unpaved Road
- Diversion Ditch
- Bunker / Outfall
- SWMU 228A & 50
- Clean Fill

REMEDIATION AREAS

- Buried Test Debris Area
- Constuction Debris Area
- Scooby-DU
- Scrappy-DU Gully
- Alluvial Fan

0 80 160
Scale in Feet

0 20 40
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Figure 3.4.3-1
Pre-VCM Sample Locations & VCM Remediation Areas at SWMU 228A

Transverse Mercator Projection, New Mexico State Plane Coordinate System, Central Zone, 1927 North American Horizontal Datum, 1929 North American Vertical Datum

		MAPID=990548a
Unclassified		SNL GIS ORG. 6804
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June 1995) and fully documented in the 1996 Notice of Deficiency response (SNL/NM October 1996). The eight soil samples (50-01-A, 50-01-B, 50-02-A, 50-02-B, 50-03-A, 50-03-B, 50-04-A, and 50-04-B) were analyzed for HE compounds, radionuclides, and RCRA metals. The *A* designator in the sample number denotes a sampling depth of 0 to 0.5 foot bgs, whereas the *B* designator denotes a sampling depth of 0.5 to 3 feet bgs. The ENCOTEC, Inc., laboratory analyzed the samples for HE compounds and RCRA metals using EPA Methods 8330 and 6010/7471 (EPA November 1986), respectively. The isotopic uranium, plutonium, and tritium analyses were conducted by Quanterra, Inc., using methods HASL-300 (EML February 1997) and EERF-H01. Gamma spectroscopy analyses were conducted by the SNL/NM Radiation Protection Sample Diagnostics (RPSD) laboratory.

No HE compounds were detected in any of the soil samples. Four (arsenic, barium, cadmium, and lead) of the eight RCRA metals slightly exceeded the HRMB-approved background value (Table 3.4.3-1). The uranium activities did not exceed the HRMB-approved background values. Plutonium-238 and plutonium-239/240 were not detected in any of the samples above the minimum detectable activities (MDA) of 0.008 and 0.004 picocurie (pCi) per gram (/g), respectively. The maximum tritium activity in soil was 0.038 pCi/g, which is equivalent to 380 pCi/liter (L) in soil with a soil moisture of 10 percent. None of the soil samples contained tritium in excess of the HRMB background value of 420 pCi/L (Tharp 1999). A complete set of analytical results for these samples was submitted to the NMED (SNL/NM October 1996). The NFA proposal for SWMU 50 is expected to be approved by the NMED in 1999 (Miller June 1999).

Table 3.4.3-1
Comparison of Maximum Metal Concentrations for SWMU 50 NFA Proposal Soil Samples to Background Values

RCRA Metal	Maximum Soil Concentrations at SWMU 50 (mg/kg, ppm)	Maximum Background Value[a] for North Supergroup Surface Soil (mg/kg, ppm)
Arsenic (As)	8	4.4
Barium (Ba)	220	200
Cadmium (Cd)	1.6	0.9
Chromium (Cr)-total	5	12.8
Lead (Pb)	25	11.2
Mercury (Hg)	<0.04	<0.1
Selenium (Se)	<0.025	<1
Silver (Ag)	<0.50	<1

Sample numbers: 50-01-A, 50-01-B, 50-02-A, 50-02-B, 50-03-A, 50-03-B, 50-04-A, 50-04-B.
[a]Dinwiddie 1997.
HRMB = Hazardous and Radioactive Materials Bureau.
mg/kg = Milligram(s) per kilogram.
NFA = No further action.
ppm = Parts per million.
RCRA = Resource Conservation and Recovery Act.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

3.4.3.3 Data Gaps

Investigation #2 did not characterize the debris and soil contamination at SWMU 228A.

3.4.3.4 Results and Conclusions

Investigation #2 provided a starting basis for future work at SWMU 228A. The investigation was useful for evaluating potential COCs.

3.4.4 Investigation #3—SNL/NM ER Project Preliminary Investigation

3.4.4.1 Nonsampling Data Collection

The non-sampling data-collection activities included a background review, a UXO/HE survey, radiological surveys, a cultural-resources survey, sensitive-species surveys, aerial photography interpretation, a soil-vapor survey, and geophysical surveys.

3.4.4.1.1 Background Review

Because of the over 40-year gap between the cessation of centrifuge tests and the preliminary investigations by the ER Project, personnel interviews were not conducted. Instead, a comprehensive records search was conducted for SWMU 228A in 1998. This archival research involved the records search and subsequent review of classified technical memoranda at the SNL/NM Technical Library Vault. A significant amount of process knowledge was identified. Over 100 memoranda were found that discuss centrifuge operations for the entire testing period of 1952 through 1956. Relevant memoranda were subsequently declassified (Green January 1998) and used as the basis for the weapons testing information discussed in Section 3.2.2. Furman (1990) also briefly discussed centrifuge operations.

3.4.4.1.2 UXO/HE Survey

Visual surveys for UXO/HE material were conducted at SWMUs 50 and 228A by KAFB Explosive Ordnance Disposal and ER staff in 1994. No UXO/HE was observed at either site. ER staff also conducted visual surveys following the July 1997 erosion and the VCM cleanup operation. Again, no UXO/HE material was observed.

3.4.4.1.3 SNL/NM ER Project Surface Radiological Surveys

As part of the 1994 Surface Radiological VCM that was conducted at many of the SNL/NM outdoor testing areas, RUST Geotech Inc. conducted a gamma radiation survey of the ground surface in the vicinity of SWMU 228A (SNL/NM September 1997). The survey included the area that is now the northern one-third of SWMU 228A. The southern two-thirds of the site had not yet been included as part of the site when the RUST Geotech Inc. survey was conducted. Two radioactive anomalies (228E1 and 228E2) were identified at the north end of the gully at SWMU 228A (Figure 3.4.3-1). The two anomalies were partially excavated with a backhoe and 13 drums of waste were generated by RUST Geotech Inc. Twelve drums were filled with DU-contaminated soil; the other drum was filled with about 200 pounds of DU fragments, including a 40-pound fragment informally called the "bowling ball" (Mitchell April 1999). The remainder of

the two anomalies was left for future remediation because of the steep gully walls and large concrete slabs that were beyond the capabilities of the backhoe.

During late 1997 and early 1998, a more elaborate surface radiological survey was conducted across most of SWMU 228A, excluding the Scrappy-DU gully (MDM/Lamb, Inc., February 1998). A DU-specific methodology was developed for the site using a Ludlum 44-10 sodium iodide scintillation detector coupled to a Ludlum 2350-1 ratemeter. A series of empirical tests was conducted using the typical weathered DU fragments found on site. The sensitivity of the sodium iodide detector was evaluated both vertically and laterally, and an optimal scanning height and sweeping pattern was determined for the site. Survey data from a nearby undisturbed plot were used to determine that background gamma radiation for the site was approximately 12,500 counts per minute (cpm). Gamma spectroscopy results for 14 soil samples collected from Scooby-DU and the background plot were used to determine a cpm to pCi/g conversion factor that was subsequently used for evaluating the extent of DU contamination. The radiological survey identified about 60 DU anomalies across Scooby-DU (Figure 3.4.4-1).

3.4.4.1.4 Project Cultural-Resources Survey

A 100-percent coverage, walk-over survey was conducted by an archaeologist in 1994. No cultural resources were found in the vicinity of SWMU 228A (Hoagland September 1994).

3.4.4.1.5 Sensitive-Species Surveys

In 1995 two biological surveys were conducted in the vicinity of SWMU 228A (IT Corporation February 1995). The area around SWMU 228A was originally desert grassland habitat but has been highly disturbed by its past use as a centrifuge test site and a dump (IT Corporation February 1995). Furthermore, TA-II and the ECF are located nearby. Grasslands species, primarily blue/black grama and western wheatgrass, surround SWMU 228A. However, the site is principally vegetated by ruderal species such as Russian thistle (tumbleweed). The indigenous wildlife includes reptiles, birds, and small mammals. However, wildlife use is limited by the degree of disturbance and its proximity to operational facilities. No riparian or wetland habitats are present within four miles of SWMU 228A. No federally listed endangered or threatened species (plants or animals) or state-listed endangered wildlife species (Group 1 or Group 2) are known to occur within the vicinity. No natural water bodies or wetlands are present, and all surface-water flows are intermittent, occurring during periods of precipitation.

3.4.4.1.6 Aerial Photography Interpretation

A comprehensive aerial photography report was completed in 1994 (Ebert and Associates November 1994). The aerial photographs show that noncentrifuge construction debris was dumped at SWMU 228A before November 1951. The centrifuge (SWMU 50) was constructed in 1952. Two concrete slabs that subsequently were labeled in 1994 as radioactive anomalies 228E1 and 228E2 are evident in a 1959 aerial photograph. Except for the construction of the ECF outfall system in the early 1990s and the erosion of the Scrappy-DU gully in July 1997, the vicinity of SWMUs 50 and 228A had not changed significantly from 1956 until the VCM cleanup operation.

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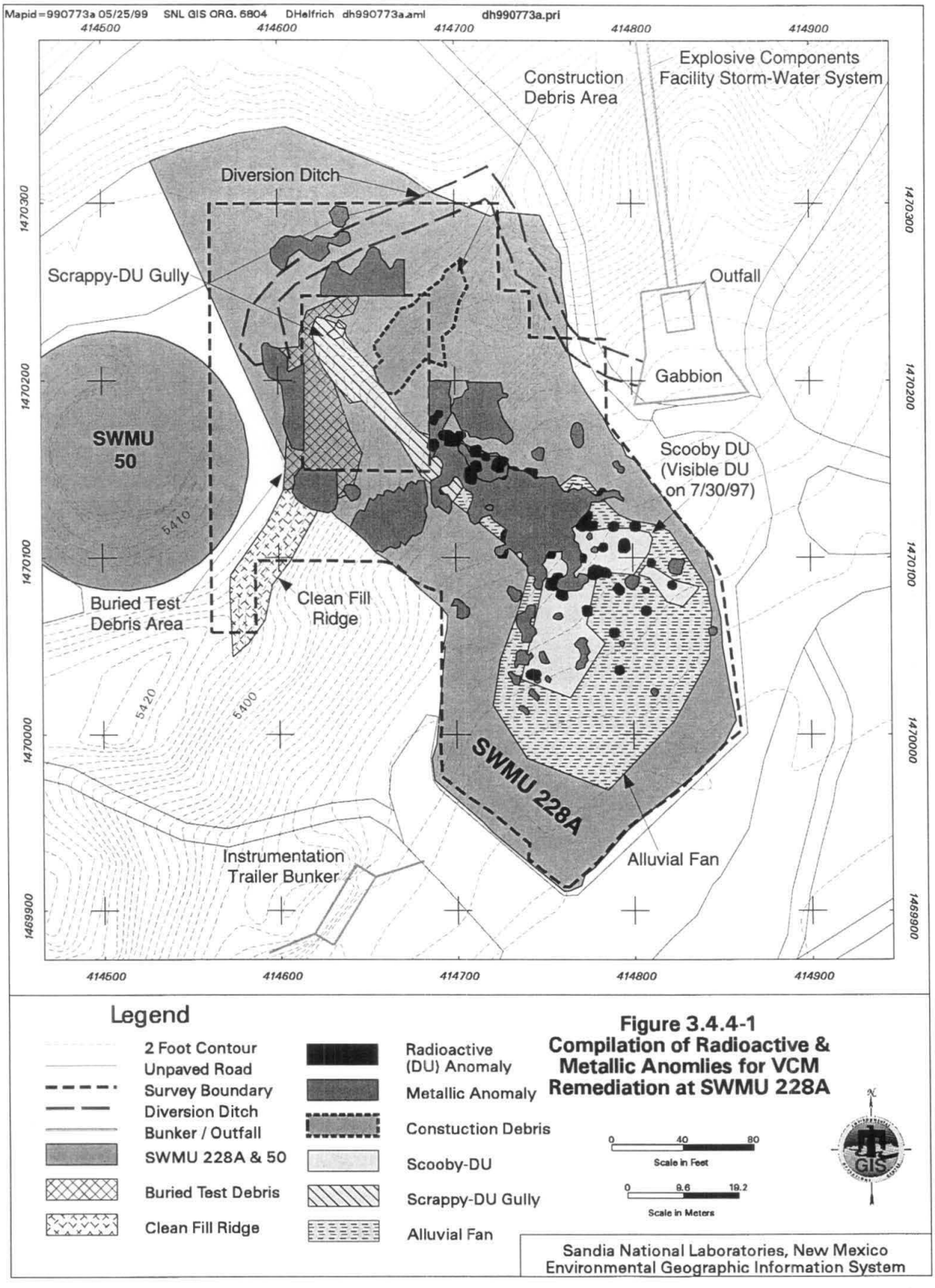

Figure 3.4.4-1
Compilation of Radioactive & Metallic Anomlies for VCM Remediation at SWMU 228A

3.4.4.1.7 Soil-Vapor Survey

Soil-vapor sampling was conducted at SWMU 228A in 1995. Two Petrex passive soil-vapor collectors (SVS-014 and SVS-015) were buried for 15 days near radioactive anomalies 228E1 and 228E2 at the north end of Scrappy-DU gully (Figure 3.4.3-1). After retrieval, the collectors were analyzed by thermal desorption/mass spectrometry (NERI October 1995). The analytes consisted of the two volatile organic compounds (VOC)—perchloroethylene (PCE) and trichloroethylene (TCE). Petrex location SVS-014 yielded low VOC levels, with 2,229 total ion counts (tics) for PCE; TCE was not detected. Petrex location SVS-015 yielded 1,929,050 tics of PCE and 309,448 tics of TCE.

In 1997 soil vapor samples were collected at four locations (SVS-301 through SVS-304) using VaporTec passive soil vapor collectors (Figure 3.4.3-1). The collectors were buried for 21 days. After retrieval, the collectors were analyzed by gas chromatography using modified EPA Methods 8021/8015 (EPA November 1986, TEG 1998). The collectors were analyzed for benzene, toluene, ethylbenzene, xylenes, total petroleum hydrocarbons (TPH) (gasoline range), TPH (diesel range), and chlorinated solvents. Benzene, toluene, and ethylbenzene were detected at a maximum of 1.12, 4.61, and 1.97 nanograms (trillionths of a gram), respectively. Xylenes were not detected. The reportings of TPH-gasoline and TPH-diesel values are not considered valid because these two analytes were also detected in the trip blank. Only one chlorinated solvent (1,1,2-trichloroethane [TCA]) was detected. However, the value of 4.4 nanograms for 1,1,2-TCA was not confirmed in the duplicate collector, which yielded no detectable VOCs.

The low levels of organic compounds detected by the Petrex and VaporTec collectors implied that corresponding soil samples would not contain concentrations of VOCs or SVOCs in excess of 1 milligram (mg)/kilogram (kg) parts per million (Viellenave June 1998).

3.4.4.1.8 Geophysical surveys

During late 1997 and early 1998, two geophysical surveys were conducted across most of SWMU 228A, excluding the Scrappy-DU gully (MDM/Lamb, Inc., February 1998). The gully was not surveyed because the steep walls were potentially unstable. To ensure continuous coverage across the remainder of the site, a grid spacing of 3 feet was used to guide the operator along each geophysical traverse. Two techniques, magnetic field strength mapping and electromagnetic (EM) metal detection, were used. The total magnetic field of ferrous (iron and steel) objects was measured with a hand-held Geometrics G-858 cesium vapor magnetometer. The G-858 data were acquired approximately every 0.75 foot along each traverse. Ferrous and nonferrous metallic objects were mapped with a Geonics EM-61 high-precision metal detector, which was mounted on a two-wheel carriage. The EM-61 data were acquired approximately every 0.6 foot along each traverse. Because the EM-61 is a bulkier instrument than the G-858, it was used to survey a slightly smaller portion of the site where the terrain was too steep for the carriage. The geophysical surveys identified several locations where metallic debris was buried (Figure 3.4.4-1).

3.4.4.2 *Project Sampling Data Collection*

3.4.4.2.1 *Site-Specific Background Sampling*

No site-specific background sampling was conducted for SWMU 228A. Instead, the HRMB-approved background values are used for this NFA proposal.

3.4.4.2.2 *Scoping Sampling*

No scoping sampling results are applicable to SWMU 228A. Recent geophysical surveys have shown that a series of 1995 GeoProbe boreholes previously reported in the SWMU 228A VCM Plan were in fact not useful. The boreholes were located too far north to characterize the true locations of buried debris and contaminated soil in the Scrappy-DU gully. Furthermore, the lack of field documentation and adequate laboratory quality assurance (QA)/quality control (QC) procedures for the borehole data rendered the scoping sampling results too unreliable for use.

3.4.4.2.3 *Boundary Sampling*

In August 1997 the SNL/NM Environmental Monitoring Department collected 14 surface soil samples outside the boundary of SWMU 228A. Most of these RP–series samples were collected on the floodplain below the site (Figure 3.4.3-1). The samples were analyzed for gamma emitters by the RPSD laboratory with MDAs for DU (uranium-238) that ranged from 1.72 to 4.29 pCi/g (Annex 3-B). No radioactive contamination was identified in the soil samples.

3.4.4.3 *Data Gaps*

This investigation provided a firm understanding of the remediation problems that remained at SWMU 228A.

3.4.4.4 *Results and Conclusions*

Investigation #3 identified the remediation areas for SWMU 228A.

3.4.5 Investigation #4—VCM Remediation

3.4.5.1 *Nonsampling Data Collection*

Investigation #4 consisted of the VCM remediation at SWMU 228A. No non-sampling data collection activities were conducted as part of Investigation #4.

3.4.5.1.1 *Archival research*

No additional archival research was conducted during this investigation.

3.4.5.2 *Sampling Data Collection*

The sampling data collection activities for Investigation #4 included VCM activities and NFA confirmatory sampling, as described in this section.

3.4.5.2.1 *VCM Remediation Activities*

The purpose of the SWMU 228A VCM was to completely remediate the entire site, rendering it suitable for continued industrial use as a buffer zone. Prior to the start of the VCM remediation, the SWMU 228A VCM Plan was submitted to the NMED in June 1998 (SNL/NM May 1998).

Permits

Interagency permits such as a Topsoil Disturbance Permit were obtained from the City of Albuquerque (COA). Even though part of the site is located on the Tijeras Arroyo floodplain, a U.S. Army Corps of Engineers permit was not required for excavating the site (Fink March 1998, Manger February 1998). However, the construction and maintenance of surface-water controls were conducted in accordance with NMED surface-water erosion guidance (NMED June 1993, NMED July 1997). In accordance with the National Environmental Policy Act, a review of the potential impacts of the VCM remediation was filed with SNL/NM (SNL/NM November 1997). Miscellaneous permits such as a penetration/dig permit were obtained from SNL/NM Facilities Engineering.

Strategy

The principal VCM activities were (1) the excavation of DU fragments, DU-contaminated soil, weapons debris, and construction debris; (2) segregation of waste into hazardous, radioactive, mixed, or nonregulated solid waste; and (3) confirmatory sampling.

Figure 3.4.4-1 is a compilation of the visual observations, aerial photography, geophysical surveys, and radiological surveys that defined the remediation area for SWMU 228A (SNL/NM May 1998). The remediation was conducted at four areas:

- The construction debris area,
- The buried test debris area,
- The Scrappy-DU gully, and
- Scooby-DU.

Before the excavation work began, the potential COCs for SWMU 228A were DU, nonfriable asbestos, cadmium, lead, RDX, VOCs, and SVOCs. These COCs were based upon sampling results, memoranda, and visual observations. DU is the only radionuclide known to have been used at the centrifuge (Green January 1998). Numerous gamma spectroscopy results for soil and debris had identified DU (uranium-238) as the sole radionuclide of concern. The potential VOCs were PCE; TCE; bromochloromethane; methylene chloride (dichloromethane); and

1,1,1-TCA. PCE and TCE were inferred from soil vapor results. The last three VOCs (bromochloromethane; methylene chloride; and 1,1,1-TCA) were inferred from recent Material Safety Data Sheets to have been the solvents present in the 1950s-vintage Stresscoat lacquer that had been painted on some test units prior to testing. The SVOCs were inferred from the soil-vapor TPH results.

The strategy for defining the vertical and lateral extent of each excavation or area was to continue excavating until:

- No visible DU or debris remained,
- Radiological surveys indicated that no radioactive contamination was present in excess of 1.3 times background,
- Metal detector surveys indicated that no metallic debris remained buried,
- No organic vapors were detected by a photoionization detector (PID), and
- Geologic evidence was found to distinguish natural deposits from fill material.

The principal VCM Proposed Cleanup Value was 271 pCi/g of DU in soil. The cleanup goals were risk-based preliminary remediation goals (PRG) from the VCM Plan (SNL/NM May 1998). Fortunately, the DU fragments were quite visible because the DU was typically weathered to a yellowish oxidized state known as *schöepite*. Similarly, DU fragments were easily detected in the field with radiation instruments. As a result, the VCM remediation achieved a site cleanup that was far below the PRG for DU.

Laydown work was conducted for all excavated material at SWMU 228A except for the soil and debris that was buried at the northern end of Scrappy-DU gully. Instead of being sorted through the grizzly, each load of this material was field-screened while in the excavator bucket. The material was then directly dumped into a series of 12 rectangular metal boxes. This material contained such significant amounts of DU that waste segregation was impractical.

The laydown work for separating the debris from soil was labor-intensive. After the visible debris was removed from a particular area, a backhoe was used to dump the soil and any remaining debris onto one of the two grizzlies. Each grizzly was 10 feet wide and constructed of steel bars set 6 inches apart. Cobbles and large pieces of debris were, thus, diverted from the bulk of the soil. The northernmost grizzly was used in the laydown area for sorting soil from the Buried Test Debris Area and the Construction Debris Area. The second grizzly was located at the southern part of the site in the oversize area and was used for removing large items from the DU-contaminated soil that was subsequently processed by the Segmented Gate System (SGS).

The laydown work allowed each load of soil to be spread out evenly in 3-inch lifts. Each lift of soil and debris was subsequently screened with radiation detectors and a PID. All radioactive material (DU fragments and DU-contaminated debris) was manually segregated from nonradioactive material and managed separately. Unique items such as the nonfriable asbestos pieces (Transite™ sheets and hardened Mastic™ glue) were quite distinctive and were hand-picked from the soil and subsequently containerized. Scrap metal and lead sheets were separately containerized for eventual recycling. Nonregulated material such as lumber, trash,

and glass also was containerized for off-site disposal. No debris of any sort was left at SWMU 228A. The remaining laydown soil was placed in various soil piles for subsequent sampling.

Most of the radiological screening of soil and debris was conducted by radiological control technicians (RCT) from SNL/NM Radiation Protection. A variety of hand-held instruments were used. All material was screened for radioactivity with a sodium iodide detector (ESP-2 with sodium iodide) and a Geiger-Mueller (GM) Pancake Probe/Frisker Model ASP-1 with HP-260. The sodium-iodide detector measured gamma emitters and the GM pancake frisker measured beta/gamma emitters. A Bicron B221L microrem meter also was used for surveying the beta/gamma levels of the material placed in the waste containers. Soil from the alluvial fan also was surveyed by an automated gamma detector array in the Thermo NUtech, Inc., SGS. For verification purposes, the field-screening results were compared to debris swipes that were analyzed by the RPSD laboratory.

Other field instruments aided the remediation effort. Soil and debris were screened for organic compounds using a PID (ThermoEnvironmental Inc. Organic Vapor Monitor Model 580B). Surveying for buried metal was conducted using a military-grade metal detector (Vallon Model ML-1620).

Chronology

Following site setup, the excavation work for the VCM remediation began in July 1998. Table 3.4.5-1 presents a chronology of the VCM activities at SWMU 228A. The VCM activities involved about 12 months of field work. Figures 3.4.5-1 through 3.4.5-6 are a series of photographs depicting some of the more interesting aspects of the VCM activities.

Heavy Equipment Activities Involving Debris Removal

The soil excavation work for excavating debris and DU fragments was conducted over a period of 6 weeks with heavy equipment: a trackhoe excavator, a backhoe, and three front-end loaders. The majority of the excavation work was concentrated at Scooby-DU and the Scrappy-DU gully. Remediation of these two areas primarily involved the excavation of approximately 1,400 cubic yards of soil, gravel, cobbles, weapons debris, and DU fragments. The visible DU fragments ranged from sand size to softball size.

The excavation of the Scrappy-DU gully was complicated because the gully was nearly surrounded by concrete slabs and had steeply sloping walls. The long reach of the trackhoe excavator was ideal for excavating the gully. Figure 3.4.5-7 presents a cross-sectional view of the gully. The original dump site for the DU fragments was found to underlie a series of black rubber pads that were located on the west side of the gully at an approximate elevation of 5,401 feet above mean sea level (amsl) (Figure 3.4.5-7). During the excavation work radiation surveys were conducted (Figure 3.4.5-3). The gully was excavated well below the original extent of debris and DU fragments to a final elevation of approximately 5,393 feet amsl. The total volume of soil and debris placed into the rectangular metal boxes was 48 cubic yards. Soil comprised about 41 cubic yards of this volume. Construction debris accounted for about 6 cubic yards; the remaining 1 cubic yard was weapons debris, including an estimated 300 pounds of DU.

Table 3.4.5-1
Chronology of VCM Remediation Activities Conducted at SWMU 228A

Remediation activity	Date of activity
• Excavation of the Construction Debris Area • Sorting of soil and construction debris • Building Soil Pile #1 • Containerizing waste	7/13/98–7/21/98
• Excavation of the Buried Test Debris Area • Sorting of soil and construction debris • Building Soil Pile #2 • Containerizing waste	7/22/98–7/28/98
• Excavation of the Scrappy-DU gully • Sorting of soil and construction and weapons debris • Building Soil Pile #3 • Containerizing waste	7/29/98–7/31/98
• Sorting of Scooby-DU soil to remove cobbles and debris • Building Soil Pile #4 with soil containing DU	8/3/98–8/13/98
• Waste management of debris containers at north end of site	7/13/98–9/14/98
• Collection of soil samples TJAOU-228A-GR-120-S through TJAOU-228A-GR-150-S at north end of site (Buried Test Debris Area, Construction Debris Area, Soil Piles #1, #2, and #3)	9/8/98
• SGS processing of Soil Pile #4 to remove DU • Contaminated soil and DU fragments placed in drums • Soil Pile #5 built with "cold" (clean) soil • Building Soil Pile #6 using soil from SGS loader ramp	11/6/98–11/17/98
• Collection of soil samples TJAOU-228A-GR-151-S through TJAOU-228A-GR-228-S along Scrappy-DU gully, across Scooby-DU fan and from Soil Piles #5 and #6	12/1/98–12/3/98
• Collection of soil samples TJAOU-228A-GR-229-S through TJAOU-228A-GR-249-S at nondebris areas	2/15/99
• Surveying of oversize material left from SGS operation	3/15/99–3/16/99
• Conducting confirmatory geophysics	2/25/99–3/5/99
• Redepositing Soil Piles #1, #2, #3 and regrading north part of site	3/18/99–3/19/99
• Waste management for Scooby-DU debris	8/3/98–6/30/99
• Redeposition of Soil Piles #5 and #6 across center part of SWMU 228A and final grading at SWMU 228A and SWMU 50	7/12/99–7/15/99
• Revegetating SWMU 228A and vicinity of SWMU 50	7/29/99–7/31/99

DU = Depleted uranium.
SGS = Segmented Gate System.
SWMU = Solid Waste Management Unit.
VCM = Voluntary corrective measure.

Figure 3.4.5-1
July 1998 photograph during the Voluntary Corrective Measure remedial activity at SWMU 228A. The excavator is removing weapon debris from the west side of Scrappy-DU gully.

Figure 3.4.5-2
July 1998 photograph with a Radiological Control Technician surveying SWMU 228A weapon debris at Scrappy-DU with a Bicron μrem radiation meter. The weapons debris consists of black rubber pads and yellow DU fragments.

Figure 3.4.5-3
July 1998 photograph with a Radiological Control Technician surveying the ground surface at SWMU 228A after the removal of the weapons debris shown in Figure 3.4.5-2. The technician is using a Sodium-Iodide radiation detector.

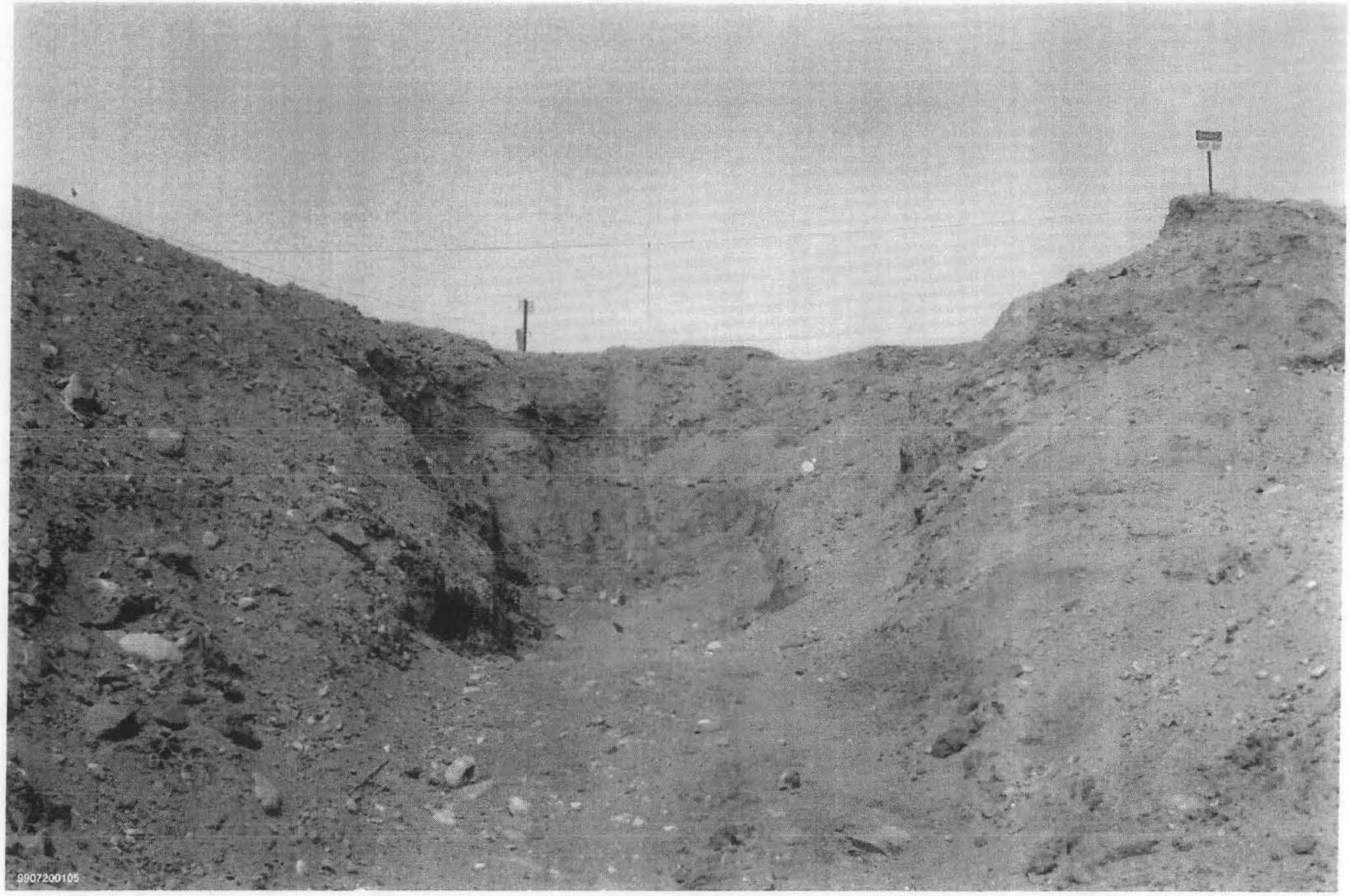

Figure 3.4.5-4
February 1999 photograph of the gully at SWMU 228A after all the debris was removed and confirmatory work conducted. Cobbles are scattered across the area.

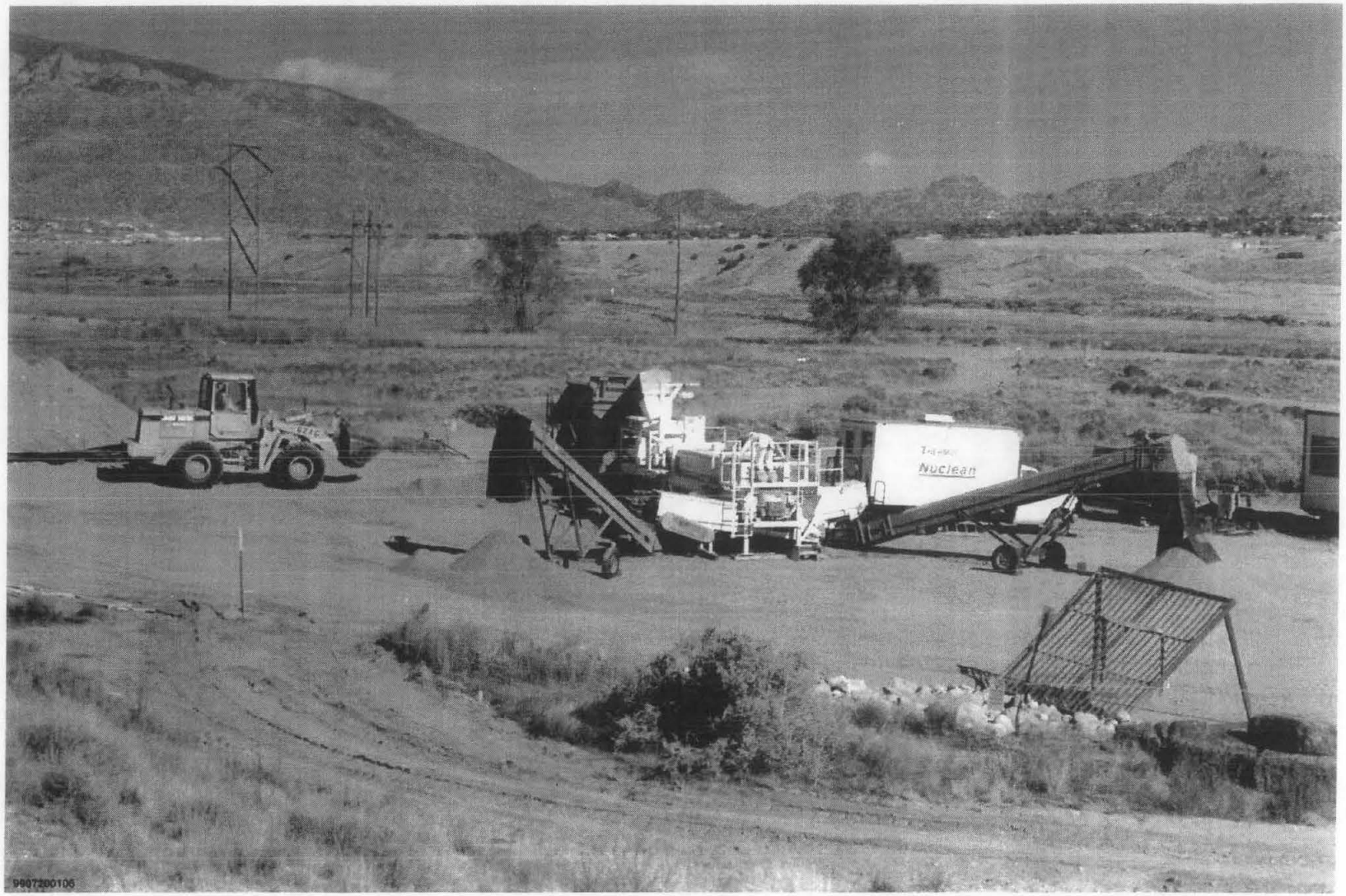

Figure 3.4.5-5
November 1998 photograph of the Thermo NUtech Inc. Segmented Gate System processing the DU-contaminated soil at SWMU 228A. Cold-pile soil is shown exiting the below-criteria conveyer belt in the center of the photograph. Hot-pile soil with DU fragments is discharging from the above-criteria conveyer belt on the right.

Figure 3.4.5-6
March 1999 photograph of the northern end of SWMU 228A after completion of the confirmatory work. A pair of backhoes are restoring the natural grade.

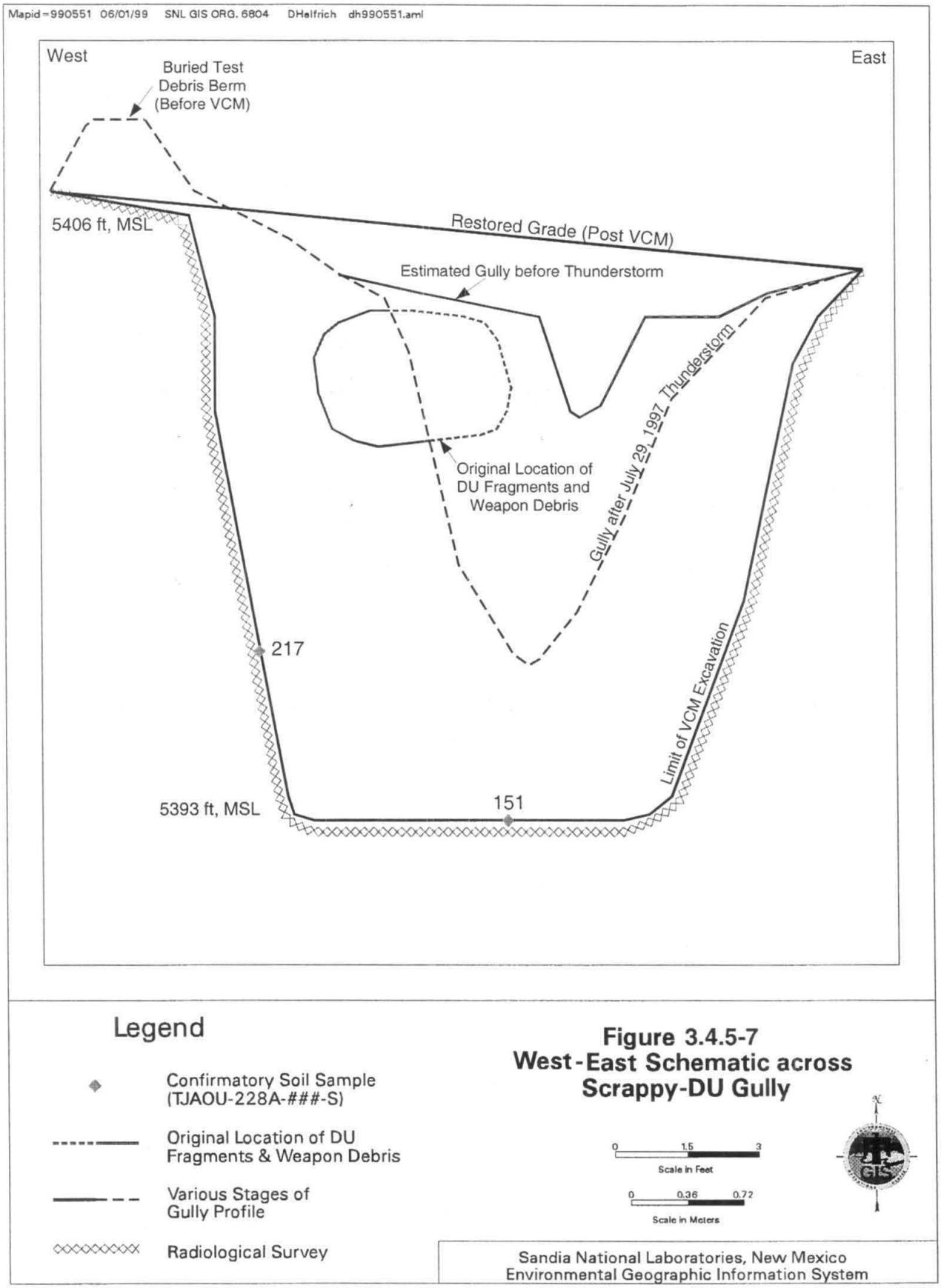

Figure 3.4.5-7
West-East Schematic across Scrappy-DU Gully

Excavating the vicinity of Scooby-DU was relatively straightforward because the alluvial fan was deposited on the nearly flat floodplain. The alluvial fan covered about 0.4 acre and had a maximum width of about 150 feet with a maximum thickness of about 3 feet. A pair of front-end loaders scraped up the DU-contaminated soil and dumped the soil into a grizzly. The grizzly sorted out about 100 cubic yards of cobbles and a few large pieces of debris from the soil. The sorted soil was stockpiled as Soil Pile #4 until the SGS was operational.

As various parts of SWMU 228A were excavated, surface-water runoff controls were used intermittently. The controls consisted of silt fences, straw bales, and a diversion ditch. Even though most of the excavation work was done during the monsoon season and thunderstorms were an occasional concern, the surface-water runoff controls were a superfluous precaution because virtually all of the rainfall quickly infiltrated the soil. For example, the 4 inches of rain that fell in July 1998 did not create enough surface-water runoff to affect the remediation areas adversely.

SGS Operation

In November 1998 Soil Pile #4 was processed with the Thermo NUtech, Inc., SGS. The SGS is a computer-controlled system of radiation detectors and conveyor belts that automatically segregates radioactively contaminated debris and soil from a moving feed supply of soil (Annex 3-C) (Thermo NUtech, Inc., December 1998). For SWMU 228A, the SGS was equipped with an array of gamma detectors that were calibrated to the radioactive signature of DU. The SGS segregation level was conservatively set at 27 pCi/g, which was one-tenth the VCM proposed cleanup value of 271 pCi/g (SNL/NM May 1998). The DU-contaminated soil was diverted by a series of segmented gates to a "hot" pile for subsequent containerization.

As a result of the SGS processing, the volume of Soil Pile #4 was reduced by 99.6 percent. The resulting "cold" pile had a volume of 1,347 cubic yards. The "hot" pile had a volume of 5 cubic yards. The "hot" pile soil was subsequently transferred to 21 55-gallon drums for eventual shipment to a permitted waste disposal facility.

Gamma spectroscopy data from General Engineering Laboratory (GEL) and the SNL/NM RPSD laboratory were used for characterizing the DU content of the "cold" pile. The gamma spectroscopy data from GEL yielded an average for the eight samples of 2.15 pCi/g. The two RPSD samples averaged 4.7 pCi/g of DU. Therefore, the average DU activity of all ten samples was 2.66 pCi/g. These ten samples represented the compositing of approximately 50 locations across the "cold" pile and are discussed further in the confirmatory soil sampling section. The averaged results from the SGS were similar at 14.77 pCi/g, which was based upon the continuous analysis of soil passing along the conveyor belt soil (Thermo NUtech, Inc., December 1998). A dose assessment using the gamma spectroscopy data and the DOE RESRAD computer code was performed for the "cold" pile (Miller May 1999) (Annex 3-G). The calculated dose for the soil was well below the standards set in DOE Order 5400.5 (DOE January 1993) and proposed EPA guidance (EPA August 1997). Following DOE concurrence (Soden and Rael July 1999) (Annex 3-H), the "cold" pile was used to grade the center portion of SWMU 228A. Grading activities are discussed in Section 3.4.5.2.3.

3.4.5.2.2 Waste Management

About 1,800 cubic yards of soil and debris were sorted with the grizzlies. Table 3.4.5-2 summarizes the types of debris handled during the segregation effort. The debris consisted of

Table 3.4.5-2
Types of Debris Generated at SWMU 228A

Construction Debris	Weapons Debris
Concrete rubble	DU fragments
Scrap metal (pipes, flat stock, wire, rebar, mesh)	12-inch-thick concrete slabs (228E1 and 228E2)
Scrap lumber	Weapons debris metal (mostly aluminum and steel)
Insulated wire	Rubber pads
Gypsum wallboard	Concrete sphere pieces
4-inch-thick concrete slabs	Nylon harness webbing and parachute material
Nonfriable asbestos (Transite™ and Mastic™)	Epoxy-encapsulated electrical junction boxes with micro electronics
Styrofoam™	Electrical wire cables
Glass bottles and window glass	Electrical connectors
Cloth scraps	Fiberglass sheets
Paper and cardboard	Nickel-cadmium (Ni-Cd) batteries

DU = Depleted uranium.
SWMU = Solid Waste Management Unit.

construction debris and weapons debris. Most of the weapons debris had been heavily damaged during the 1950s centrifuge tests. All of the debris was containerized and hauled to an off-site SNL/NM accumulation area pending shipment to an permitted disposal facility.

Several types of waste were not found during the VCM activities. For example, no UXO/HE was found at any of the remediation areas. No stained soil was observed and no organic vapors were detected with the PID. No friable asbestos was found. Likewise, no intact containers such as gas cylinders, drums, or paint cans were found during the excavation of SWMU 228A. No oil-filled electrical components were discovered.

From an approximate weight standpoint, the debris from SWMU 228A consisted of approximately 98 percent construction debris and approximately 2 percent weapons debris. Most of the construction debris consisted of concrete rubble and slabs. None of the construction debris (scrap metal, lumber, bricks, glass) was radioactively contaminated or oil-stained.

The total amount of DU fragments summarized in Table 3.4.5-3 represents five cleanup efforts. The first cleanup effort was conducted by RUST Geotech Inc., in which about 200 pounds of DU were collected (Section 3.4.4.1.3) (SNL/NM September 1997). In August 1997 another 25 pounds of DU fragments were collected from the ground surface of Scooby-DU. An estimated 300 pounds of DU fragments were placed in the rectangular metal boxes during the 1998 VCM activities. Another 10 pounds of DU fragments were manually picked out of the soil feed while the SGS was operating. During the final cleanup effort, about 70 pounds of DU fragments were gathered from the oversize area. The total weight of DU fragments removed from SWMU 228A was approximately 605 pounds. All of the DU fragments were collected from the Scrappy-DU gully or Scooby-DU. No DU fragments were found in the Buried Test Debris Area or the Construction Debris Area.

3.4.5.2.3 VCM Remediation Confirmatory Work

To verify that SWMU 228A was adequately remediated during the VCM, confirmatory work was conducted that consisted of soil sampling, geophysical surveys, and radiological surveys.

Table 3.4.5-3
Summary of Material Excavated During the Remediation of SWMU 228A

Excavated material	Approximate Volume or Weight	Waste Category
DU fragments	605 pounds	Low-level radioactive waste
DU-contaminated soil from gully	41 yd^3	Low-level radioactive waste
Weapons debris	2,350 pounds	Low-level radioactive waste
Construction debris (scrap metal, lumber, bricks, glass)	7 yd^3	Nonregulated
Concrete rubble	30 yd^3	Nonregulated
Concrete slabs	20 yd^3	Nonregulated
Lead piece with imbedded DU fragment	5 pounds	Mixed waste
Recyclable lead pieces	60 pounds	n.a., lead was recycled
Nonfriable asbestos pieces	1,000 pounds	Asbestos waste
Soil Piles #1, #2, #3	241 yd^3	n.a., soil was redeposited
Soil Pile #4 (Scooby-DU soil)	1,352 yd^3	n.a., soil was processed by SGS
Cobbles	100 yd^3	n.a., cobbles were redeposited
Soil Pile #5 ("cold" pile from SGS)	1,347 yd^3	n.a., soil was redeposited
"Hot"-pile soil (21 drums from SGS)	5 yd^3	Low-level radioactive waste
Soil Pile #6 (soil from loader ramp)	6 yd^3	n.a., soil was redeposited

DU = Depleted uranium.
n.a. = Not applicable.
SGS = Segmented Gate System.
SWMU = Solid Waste Management Unit.
yd^3 = Cubic yard(s).

Confirmatory Soil Sampling

Following the conclusion of VCM remediation activity (excavation, debris removal, and radiological/metal-detector surveying) at a particular area, a series of confirmatory soil samples was collected. Confirmatory sampling was performed to determine whether potential COCs were present at levels exceeding background limits at the site and/or at levels sufficient to pose a risk to human health or the environment. The sampling activities were performed in accordance with the rationale and procedures described in the Field Implementation Plan (FIP) (SNL/NM July 1998) for SWMU 228A (see Annex 3-D). SNL/NM chain-of-custody and sample documentation procedures were followed for all samples that were collected.

The list of COCs for the confirmatory sampling was based upon the information available when the SWMU 228A FIP (SNL/NM July 1998) was written. The excavation and subsequent evaluation of the debris has revealed that the COC list was overly conservative. For example, no UXO/HE material was found. Likewise, no stained soil indicative of VOC or SVOC contamination was observed or detected with the PID. A few pieces of debris with either cadmium or lead material were observed; however, no debris was found to contain the other six RCRA metals. DU was the only radionuclide detected with the field instrumentation.

Confirmatory soil samples were collected at 130 locations across SWMU 228A and the vicinity; these samples were identified as TJAOU-228A-GR-120-S through TJAOU-228A-GR-249-S (Figure 3.4.5-8). Except for three samples, all of the samples were surface soil samples

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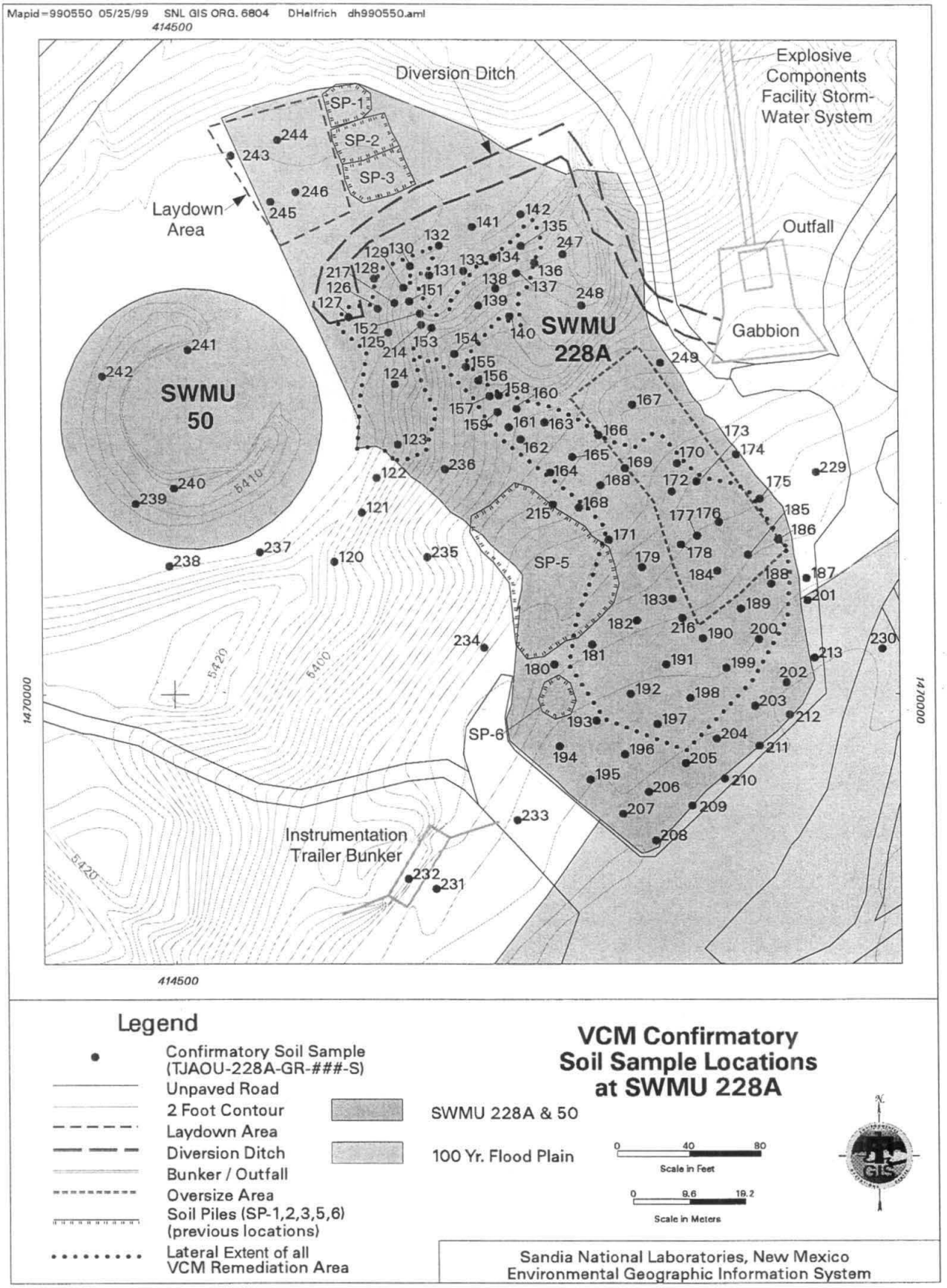
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414500
Diversion Ditch
Explosive Components Facility Storm-Water System
SP-1
SP-2
SP-3
Laydown Area
Outfall
Gabbion
SWMU 228A
SWMU 50
SP-5
SP-6
Instrumentation Trailer Bunker
5410
5420
5400
1470000
1470000
414500
Legend
Confirmatory Soil Sample (TJAOU-228A-GR-###-S)
Unpaved Road
2 Foot Contour
Laydown Area
Diversion Ditch
Bunker / Outfall
Oversize Area
Soil Piles (SP-1,2,3,5,6) (previous locations)
Lateral Extent of all VCM Remediation Area
SWMU 228A & 50
100 Yr. Flood Plain
0 40 80
Scale in Feet
0 9.6 19.2
Scale in Meters
VCM Confirmatory Soil Sample Locations at SWMU 228A
Sandia National Laboratories, New Mexico
Environmental Geographic Information System

collected using a hand trowel from a depth of 0 to 0.5 foot bgs. Three additional samples (TJAOU-228A-GR-214-S through TJAOU-228A-GR-216-S) were collected from random locations using a hand auger from a depth of 2 to 3 feet bgs.

A total of 118 soil samples (plus six equipment blanks) were analyzed off site for radionuclides using gamma spectroscopy. Isotopic uranium analyses were also performed off site on an additional 56 soil samples (plus five equipment blanks and one trip blank). Sixty-eight samples (plus five equipment blanks) were analyzed off site for RCRA metals; 22 of these samples included an analysis for total uranium. Thirty-five samples (plus five equipment blanks) were analyzed off site for HE and SVOC compounds. These same 35 samples (plus 4 equipment blanks and 4 trip blanks) were analyzed off site for VOC compounds. The RPSD Laboratory analyzed 56 samples (plus one equipment blank) for radionuclides using gamma spectroscopy.

QA/QC samples included nine duplicate soil samples, six equipment blanks, and four trip blanks. Duplicates were collected at 10 percent of the sampling locations in the former debris areas. Equipment-wash (aqueous rinsate) blanks were prepared at the end of each sampling day.

Two off-site laboratories conducted the analyses: GEL in Charleston, South Carolina, and Core Laboratories, Inc., in Denver, Colorado. Table 3.4.5-4 summarizes the analytical methods used by each laboratory.

Table 3.4.5-4
Summary of Analytical Methods Used for SWMU 228A
Confirmatory Soil Samples

Analyte	Analytical Method	Analytical Laboratory
Radionuclides	EPA 901.1[a] (gamma spectroscopy)	Core, GEL, RPSD
Isotopic uranium	SGAMMA, HASL300, EPI A-011B	Core, GEL
RCRA metals	6010/7000 series[a]	Core, GEL
Total uranium	908.1[a]	Core, GEL
VOCs	8260[a]	Core, GEL
SVOCs	8270[a]	Core, GEL
HE compounds	8330[a]	Core, GEL

[a]EPA November 1986.

EPA = U.S. Environmental Protection Agency.
GEL = General Engineering Laboratory.
HE = High explosives.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
VOC = Volatile organic compound.

Final Geophysical Survey

Following the heavy equipment work, a confirmatory geophysical survey was conducted across SWMU 228A (MDM/Lamb April 1999). The survey was conducted using both a Schonstedt 72-C magnetic locator and a Garrett CXII metal detector with depth multiplying antennae. During the survey work, several pieces of scrap metal were collected. At the conclusion of the survey, no metallic debris remained at SWMU 228A (MDM/Lamb April 1999).

Final Radiological Survey

Following the completion of the heavy equipment work, a final series of radiological surveys was conducted to verify that no radiological anomalies such as DU fragments remained at SWMU 228A. The walkover surveys were conducted by RCTs using sodium iodide detectors and a 3-foot grid spacing that ensured 100 percent coverage of the ground surface. The radiological surveys confirmed that no radioactive anomalies remained at SWMU 228A (SNL/NM August 1998, SNL/NM March 1999).

Final Site Grading, Surface-Water Controls, and Revegetation

After the soil sample results were reviewed and the final round of geophysical and radiological surveys were conducted, SWMU 228A was regraded. The 241 cubic yards of soil from Piles #1, #2, and 3 were used to fill in the gully so that it blended in with the surrounding arroyo rim. Soil Piles #5 and #6 were used to regrade the center portion of the site from the mouth of the gully down to the edge of the 500-year floodplain for Tijeras Arroyo. The total volume of Soil Piles #5 and #6 was 1,353 cubic yards of soil; the resulting layer of soil covered approximately 0.8 acre with an average thickness of approximately 1.2 feet.

The final grading at SWMU 228A was designed to eliminate the potential for surface-water runoff and run on. For example, the ground surface was sloped to divert water away from the gully. A bulldozer was used to extend the diversion ditch across the northern part of SWMU 228A and the eastern side of the SWMU 50 centrifuge (Figure 3.4.5-8). This diversion ditch has eliminated the potential for water to pond as it had during the July 1997 erosion and washout of debris.

After final grading was complete, revegetation work was performed in accordance with COA guidance (COA February 1996). The Feed Bin, Inc., a COA-approved contractor, conducted the work during July 29-31, 1999. The seed mix was prepared by Curtis & Curtis, Inc. and included six native grasses (*Paloma* Indian rice grass, Sand dropseed, Florets *Viva* Galleta grass, Lehmanns lovegrass, Alkali Sacaton, and Four-wing Saltbush) and two wildflowers (Aristata Firewheel Gaillardia and Appar Lewis Blue Flax). A total of three acres was revegetated (Figures 3.4.5-9 and 3.4.5-10). In addition to revegetating the SWMU 228A excavated/disturbed areas which totaled about 1.5 acres, an additional 1.5 acres west and northwest of SWMU 228A in the vicinity of the SWMU 50 centrifuge were revegetated. Depending on the slope, either drill seeding or hydroseeding was done. Level areas and areas with slopes less than 3:1 (horizontal versus vertical) were drill seeded using a series of farm implements to disc, fertilize, and lastly crimp the seed and straw mulch to a depth of 0.5 inch.

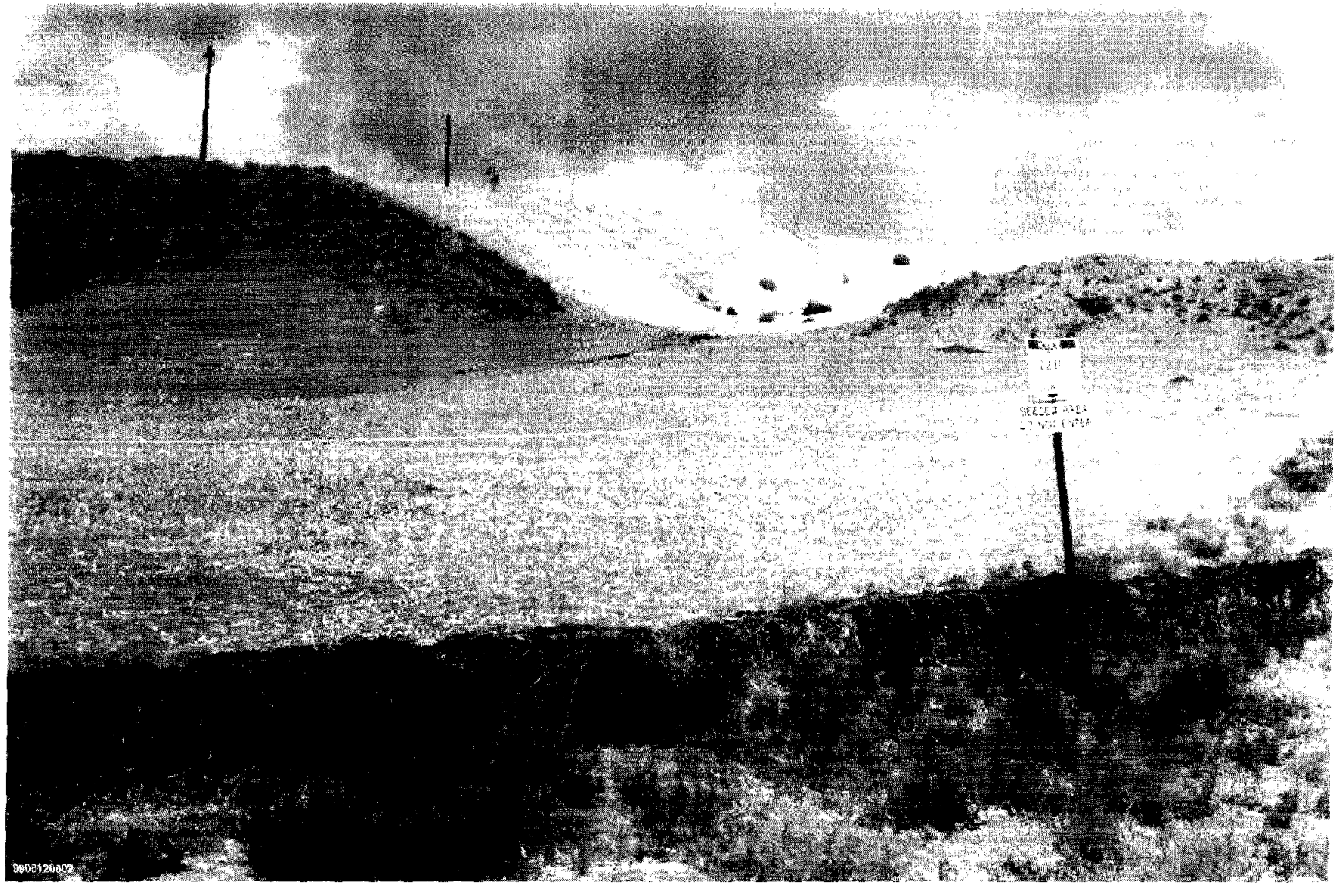

Figure 3.4.5-9
August 1999 photograph of SWMU 228A after final grading and revegetation work. View is to the northwest. Straw mulch is visible across the center of the site. Erosion control mats are visible in the gully.

Figure 3.4.5-10
August 1999 photograph of SWMU 228A after final grading and revegetation work. View is to the southwest along the rim of Tijeras Arroyo. The Explosives Components Facility outfall is visible in the left foreground with the centrifuge at SWMU 50 being visible in the right foreground.

Slopes steeper than 3:1 were revegetated using the broadcast method in which a hydroseed mixture of fertilizer, wood fiber, seed, and tackifier was sprayed across the slopes. The broadcast areas were then hand raked to a depth of 0.5 inch and covered with Excelsior™ erosion-control mats consisting of wood shavings enclosed in fiber mesh. The mats were secured to the ground with six-inch long wire staples.

The surface-water controls at SWMU 228A consist of the diversion ditch, the revegetated areas, and the erosion-control mats. Numerous site inspections during the unusually wet August 1999, monsoon season confirm that no off-site surface-water runoff or run on occurs at SWMU 228A; the rainfall infiltrates the soil well before off-site runoff or run on occurs. As a result of the approximately three inches of rain that fell during the two weeks following the revegetation work, the grass sprouted and grew nearly two inches in some locations. No significant erosion occurred.

3.4.5.3 Data Gaps

No data gaps remain for SWMU 228A.

3.4.5.4 Results and Conclusions

In September and December 1998 and February 1999, representative soil samples were collected from 130 confirmatory locations at SWMU 228A, all but three of which were surface soil samples. Tables 3.4.5-5 through 3.4.5-17 summarize the metals, HE, VOCs, SVOCs, and radionuclide (gamma spectroscopy and isotopic uranium) analytical results. Annex 3-E contains complete results for the gamma spectroscopy and isotopic analyses. Confirmatory sampling was performed across the site; each summary table of these samples include *site-confirmatory* in the title. Confirmatory sampling was also performed on the soil piles generated during VCM activities which were later used to regrade the site; each summary table for these samples includes *soil piles* in the title. For each analyte group, the site-confirmatory summary table is followed by the soil piles summary table.

An example sample identification (ID) in the ER sample ID column of the data summary tables is TJAOU-228A-GR-120-S. This ID reflects that the sample was collected from SWMU 228A within the Tijeras Arroyo Operable Unit (TJAOU). The soil sample (S) was a grab sample (GR) from Location 120. The following section briefly describes the results of confirmatory sampling at SWMU 228A.

<u>Metals</u>

Tables 3.4.5-5 and 3.4.5-6 summarize the off-site metals analytical results for both the site-confirmatory sampling (46 surface soil samples, 8 duplicate samples, and 5 equipment blank samples) and the soil piles sampling (13 surface soil samples and 1 duplicate sample).

Table 3.4.5-5
Summary of SWMU 228A Site-Confirmatory Sampling RCRA Metals Analytical Results, September–December 1998
(Off-Site Laboratories)

Sample Attributes				Metals (EPA Method 6010/7000[a]) (mg/kg)								
Record Number[b]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Uranium
600799	TJAOU-228A-GR-120-S	9/8/98	0–0.5	2.79	138	ND (0.275)	7.97	6.04	ND (0.0078)	ND (0.0891)	ND (0.301)	**31.7**
600799	TJAOU-228A-GR-122-S	9/8/98	0–0.5	2.43	159	0.375 J (0.5)	7.30	7.89	ND (0.0078)	ND (0.0891)	ND (0.301)	**22.3**
600799	TJAOU-228A-GR-123-S	9/8/98	0–0.5	1.95	161	0.472 J (0.5)	9.33	7.76	ND (0.0078)	ND (0.0891)	ND (0.301)	**32.6**
600799	TJAOU-228A-GR-123-DU	9/8/98	0–0.5	2.05	137	ND (0.275)	8.21	6.83	ND (0.0078)	ND (0.0891)	ND (0.301)	**20.7**
600799	TJAOU-228A-GR-125-S	9/8/98	0–0.5	2.44	170	0.582	8.54	8.01	ND (0.0078)	ND (0.0891)	ND (0.301)	**23.8**
600799	TJAOU-228A-GR-127-S	9/8/98	0–0.5	2.11	160	0.452 J (0.5)	8.71	6.28	ND (0.0078)	ND (0.0891)	ND (0.301)	**12.9**
600799	TJAOU-228A-GR-129-S	9/8/98	0–0.5	2.14	133	**1.28**	8.97	**40.5**	ND (0.0078)	ND (0.0891)	ND (0.301)	**83.9**
600799	TJAOU-228A-GR-131-S	9/8/98	0–0.5	1.60	120	0.377 J (0.5)	10.8	7.60	ND (0.0078)	ND (0.0891)	ND (0.301)	**16.8**
600835	TJAOU-228A-GR-133-S	9/8/98	0–0.5	2.68	**213**	0.528	12.0	**20.7**[c]	0.0080 J (0.10)	ND (0.0891)[c]	ND (0.301)	**32.3**
600835	TJAOU-228A-GR-133-DU	9/8/98	0–0.5	2.76	184	ND (0.275)	10.4	0.217 J (1)[c]	0.0122 J (0.10)	ND (0.0891)[c]	ND (0.301)	**19.4**
600835	TJAOU-228A-GR-135-S	9/8/98	0–0.5	2.07	160	ND (0.275)	10.6	5.48[c]	ND (0.0078)	0.127 J (0.5)[c]	ND (0.00301)	**18.6**
600835	TJAOU-228A-GR-137-S	9/8/98	0–0.5	1.88	156	0.403 J (0.5)	10.7	5.90[c]	0.0097 J (0.10)	0.108 J (0.5)[c]	ND (0.301)	**45.7**
600835	TJAOU-228A-GR-139-S	9/8/98	0–0.5	2.77	194	0.442 J (0.5)	11.1	7.89[c]	0.0081 J (0.10)	0.106 J (0.5)[c]	ND (0.301)	**28.1**
600835	TJAOU-228A-GR-140-S	9/8/98	0–0.5	2.63	**216**	0.348 J (0.5)	11.3	**20.1**[c]	0.0117 J (0.10)	0.109 J (0.5)[c]	ND (0.301)	**29.9**
601188	TJAOU-228A-GR-151-S	12/1/98	0–0.5	2.69	102	ND (0.019)	8.02	8.33	0.0394	0.605	ND (0.031)	NR
601188	TJAOU-228A-GR-153-S	12/1/98	0–0.5	2.70	136	0.433 J (0.472)	7.59	7.89	0.0345	0.366 J (0.472)	0.155 J (0.472)	NR
601188	TJAOU-228A-GR-155-S	12/1/98	0–0.5	3.15	119	ND (0.019)	6.93	6.48	0.0315	0.531	ND (0.031)	NR
601188	TJAOU-228A-GR-157-S	12/1/98	0–0.5	2.74	125	ND (0.019)	6.43	6.99	0.0394	0.567	ND (0.031)	NR
601188	TJAOU-228A-GR-159-S	12/1/98	0–0.5	3.08	107	ND (0.019)	6.13	9.96	0.0296	0.540	0.103 J (0.476)	NR
601188	TJAOU-228A-GR-161-S	12/1/98	0–0.5	3.15	143	ND (0.019)	7.28	9.04	0.0246 J (0.0273)	0.918	ND (0.031)	NR
601188	TJAOU-228A-GR-161-DU	12/1/98	0–0.5	2.65	119	ND (0.019)	5.20	7.54	0.0260 J (0.0304)	0.506	ND (0.031)	NR
601189	TJAOU-228A-GR-163-S	12/1/98	0–0.5	1.98	89.7	ND (0.019)	6.72	**36.5**	0.0187 J (0.0251)[c]	0.602	ND (0.031)	NR
601189	TJAOU-228A-GR-165-S	12/1/98	0–0.5	2.88	105	0.124 J (0.476)	6.15	6.55	0.0216 J (0.0309)[c]	0.869	ND (0.031)	NR
601189	TJAOU-228A-GR-167-S	12/1/98	0–0.5	2.20	101	ND (0.019)	5.27	4.43	0.0213 J (0.0265)[c]	0.528	ND (0.031)	NR
601189	TJAOU-228A-GR-169-S	12/1/98	0–0.5	2.09	117	ND (0.019)	5.70	5.88	0.0227 J (0.0297)[c]	0.640	ND (0.031)	NR
601189	TJAOU-228A-GR-171-S	12/1/98	0–0.5	2.31	100	ND (0.019)	7.33	6.39	0.0252 J (0.0295)[c]	0.875	ND (0.031)	NR
601189	TJAOU-228A-GR-171-DU	12/1/98	0–0.5	2.10	98.4	ND (0.019)	5.11	5.61	0.0252 J (0.0309)	0.813	ND (0.031)	NR
601189	TJAOU-228A-GR-173-S	12/1/98	0–0.5	2.25	98.9	ND (0.019)	5.66	5.54	0.0227 J (0.0313)[c]	0.615	ND (0.031)	NR
601189	TJAOU-228A-GR-175-S	12/1/98	0–0.5	2.17	76.9	ND (0.019)	5.10	5.17	0.0220 J (0.0298)[c]	0.774	ND (0.031)	NR
601190	TJAOU-228A-GR-177-S	12/2/98	0–0.5	2.29	135	ND (0.019)	6.49	5.56	0.0135 J (0.0314)	ND (0.135)	0.142 J (0.481)	NR
601190	TJAOU-228A-GR-179-S	12/2/98	0–0.5	2.14	104	ND (0.019)	5.20	8.54	0.00785 J (0.0302)	ND (0.135)	0.127 J (0.495)	NR
601190	TJAOU-228A-GR-181-S	12/2/98	0–0.5	2.21	110	ND (0.019)	5.52	7.65	0.0116 J (0.0304)	ND (0.135)	0.153 J (0.481)	NR
601190	TJAOU-228A-GR-181-DU	12/2/98	0–0.5	2.76	109	0.134 J (0.019)	6.20	7.66	0.0151 J (0.0297)	ND (0.135)	0.384 J (0.481)	NR
601190	TJAOU-228A-GR-183-S	12/2/98	0–0.5	2.81	144	0.115 J (0.500)	6.96	10.9	0.0182 J (0.0325)	ND (0.135)	0.144 J (0.500)	NR
601190	TJAOU-228A-GR-185-S	12/2/98	0–0.5	2.07	99.7	0.380 J (0.490)	5.92	8.42	0.0171 J (0.0328)	ND (0.135)	0.116 J (0.490)	NR

Refer to footnotes at end of table.

Table 3.4.5-5 (Continued)
Summary of SWMU 228A Site-Confirmatory Sampling RCRA Metals Analytical Results, September–December 1998
(Off-Site Laboratories)

Sample Attributes				Metals (EPA Method 6010/7000[a]) (mg/kg)								
Record Number[b]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Uranium
601190	TJAOU-228A-GR-187-S	12/2/98	0–0.5	2.57	98.2	ND (0.019)	6.81	6.94	0.00956 J (0.0313)	ND (0.135)	ND (0.031)	NR
601191	TJAOU-228A-GR-189-S	12/2/98	0–0.5	2.28	85.4[c]	ND (0.019)	5.97	6.06	0.0204 J (0.0324)[c]	ND (0.135)	0.125 J (0.485)[c]	NR
601191	TJAOU-228A-GR-191-S	12/2/98	0–0.5	2.40	102[c]	0.124 J (0.481)	6.85	7.68	0.0165 J (0.0292)[c]	ND (0.135)	0.209 J (0.481)[c]	NR
601191	TJAOU-228A-GR-191-DU	12/2/98	0–0.5	2.32	101[c]	ND (0.019)	6.10	8.13	0.0185 J (0.0261)[c]	ND (0.135)	0.127 J (0.485)[c]	NR
601191	TJAOU-228A-GR-193-S	12/2/98	0–0.5	2.15	96.3[c]	ND (0.019)	5.69	6.28	0.0327[c]	ND (0.135)	0.154 J (0.481)[c]	NR
601191	TJAOU-228A-GR-195-S	12/2/98	0–0.5	2.53	97.1[c]	ND (0.019)	6.96	5.55	0.0152 J (0.0314)[c]	ND (0.135)	0.118 (0.490)[c]	NR
601191	TJAOU-228A-GR-197-S	12/2/98	0–0.5	2.28	101[c]	ND (0.019)	5.94	6.50	0.0158 J (0.0329)[c]	ND (0.135)	0.168 J (0.490)[c]	NR
601191	TJAOU-228A-GR-199-S	12/2/98	0–0.5	2.62	99.3[c]	0.337 J (0.495)	6.85	7.45	0.0138 J (0.0301)[c]	ND (0.135)	0.151 J (0.495)[c]	NR
601192	TJAOU-228A-GR-201-S	12/3/98	0–0.5	2.34	98.4	ND (0.019)	6.80	9.12	ND (0.00225)	0.494 J (0.495)	0.0685 J (0.495)	NR
601192	TJAOU-228A-GR-201-DU	12/3/98	0–0.5	2.34	88.5	ND (0.019)	6.58	8.71	ND (0.00225)	0.374 J (0.495)	ND (0.031)	NR
601192	TJAOU-228A-GR-203-S	12/3/98	0–0.5	2.27	119	ND (0.019)	8.33	6.65	ND (0.00225)	0.381 J (0.500)	ND (0.031)	NR
601192	TJAOU-228A-GR-205-S	12/3/98	0–0.5	2.15	95.6	0.0584 J (0.500)	5.65	7.03	0.00234 J (0.0275)	0.365 J (0.500)	0.0773 J (0.500)	NR
601192	TJAOU-228A-GR-207-S	12/3/98	0–0.5	2.38	138	ND (0.019)	6.47	6.36	ND (0.00225)	0.333 J (0.495)	0.0605 J (0.495)	NR
601192	TJAOU-228A-GR-209-S	12/3/98	0–0.5	3.25	168	1.77	9.48	21.9	ND (0.00225)	0.465 J (0.490)	0.436 J (0.490)	NR
601192	TJAOU-228A-GR-211-S	12/3/98	0–0.5	2.28	116	ND (0.019)	7.01	6.37	ND (0.00225)	0.311 J (0.490)	ND (0.031)	NR
601192	TJAOU-228A-GR-211-DU	12/3/98	0–0.5	2.67	113	ND (0.019)	5.42	6.54	ND (0.00225)	0.581	ND (0.031)	NR
601212	TJAOU-228A-GR-213-S	12/3/98	0–0.5	2.44	122	ND (0.019)	6.35	7.00	ND (0.00225)	0.402 J (0.495)	ND (0.031)	NR
601212	TJAOU-228A-GR-215-S	12/3/98	2–3	1.79	84.3	ND (0.019)	4.62	4.81	ND (0.00225)	0.358 J (0.495)	ND (0.031)	NR
601212	TJAOU-228A-GR-217-S	12/3/98	0–0.5	1.69	80.9	ND (0.019)	7.47	5.26	ND (0.00225)	0.275 J (0.485)	ND (0.031)	NR
Background Soil Concentrations—North Supergroup[d]				4.4	200	0.9	12.8	11.2	<0.1	<1	<1	2.3
Quality Assurance/Quality Control Samples (mg/L)												
600836	TJAOU-228A-GR-EB	9/8/98	NA	ND (0.000827)	ND (0.000885)	ND (0.002752)	0.00216 J (0.01)	0.00138 J (0.002)	ND (0.000047)	ND (0.000891)	ND (0.003007)	NR
600836	TJAOU-228A-GR-EB	9/9/98	NA	ND (0.000827)	ND (0.000885)	ND (0.002752)	ND (0.001985)	ND (0.000929)	ND (0.000047)	ND (0.000891)	ND (0.003007)	NR
601189	TJAOU-228A-EB	12/1/98	NA	ND (0.00451)	0.00189 J (0.00500)	ND (0.00044)	0.00532	0.00924	ND (0.000035)	ND (0.00271)	0.00105 J (0.00500)	NR
601191	TJAOU-228A-EB	12/2/98	NA	ND (0.00451)	0.00126 J (0.00500)	ND (0.00044)	0.00209 J (0.00500)	0.00401 J (0.00500)	ND (0.000035)	ND (0.00271)	0.00104 J (0.00500)	NR
601212	TJAOU-228A-EB	12/3/98	NA	ND (0.00451)	0.00200 J (0.00500)	ND (0.00044)	0.00148 J (0.00500)[d]	0.00427 J (0.00500)[d]	ND (0.000035)	ND (0.00271)	ND (0.00073)	NR

Refer to footnotes at end of table.

Table 3.4.5-5 (Concluded)
Summary of SWMU 228A Site-Confirmatory Sampling RCRA Metals Analytical Results, September–December 1998
(Off-Site Laboratories)

Note: Values in **bold** exceed background soil concentrations.

[a]EPA November 1986.

[b]Analysis request/chain of custody record.

[c]Estimated value; see data validation reports (Annex 3-F).

[d]From Dinwiddie September 1997. The minimum background concentration between surface and subsurface values is used.

DU = Duplicate 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 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 method detection limit, shown in parentheses.
NR = Not reported.
RCRA = Resource Conservation and Recovery Act.
S = Soil sample.
SWMU = Solid Waste Management Unit.
TJAOU = Tijeras Arroyo Operable Unit.

Table 3.4.5-6
Summary of SWMU 228A Soil Piles Confirmatory Sampling RCRA Metals Analytical Results, September–December 1998
(Off-Site Laboratories)

Sample Attributes				Metals (EPA Method 6010/7000[a]) (mg/kg)								
Record Number[b]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Uranium
600835	TJAOU-228A-GR-143-S	9/9/98	0–0.5	3.03	200	0.426 J (0.5)	10.1	**17.3**[c]	0.0089 J (0.10)	0.108 J (0.5)[c]	ND (0.301)	**7.2**
600835	TJAOU-228A-GR-144-S	9/9/98	0–0.5	2.81	**203**	ND (0.275)	8.85	**20.3**[c]	0.0084 J (0.10)	0.0960 J (0.5)[c]	ND (0.301)	**14.8**
600835	TJAOU-228A-GR-145-S	9/9/98	0–0.5	2.43	151	0.369 J (0.5)	9.60	**9.93**[c]	0.0079 J (0.10)	0.104 J (0.5)[c]	ND (0.301)	**20.3**
600835	TJAOU-228A-GR-146-S	9/9/98	0–0.5	3.32	155	0.306 J (0.5)	9.57	**8.87**[c]	ND (0.0078)	0.121 J (0.5)[c]	ND (0.301)	**19.6**
600835	TJAOU-228A-GR-147-S	9/9/98	0–0.5	2.28	131	0.711	10.2	**32.4**[c]	0.0630 J (0.10)	ND (0.0891)[c]	ND (0.301)	**21.9**
600835	TJAOU-228A-GR-148-S	9/9/98	0–0.5	2.29	138	0.742	10.4	**32.5**[c]	0.0569 J (0.10)	0.139 J (0.5)[c]	ND (0.301)	**20.9**
600835	TJAOU-228A-GR-149-S	9/9/98	0–0.5	1.76	158	0.518	9.90	**7.50**[c]	ND (0.0078)	ND (0.0891)[c]	ND (0.301)	**34.5**
600835	TJAOU-228A-GR-150-S	9/9/98	0–0.5	2.01	140	0.706	11.8	**8.67**[c]	ND (0.0078)	ND (0.0891)[c]	ND (0.301)	**69.1**
601212	TJAOU-228A-GR-219-S	12/3/98	0–0.5	2.42	109	ND (0.019)	6.16	7.26	ND (0.00225)	0.279 J (0.500)	ND (0.031)	NR
601212	TJAOU-228A-GR-221-S	12/3/98	0–0.5	2.35	105	ND (0.019)	5.79	8.64	ND (0.00225)	0.473 J (0.485)	0.0733 J (0.485)	NR
601212	TJAOU-228A-GR-221-DU	12/3/98	0–0.5	1.84	81.0	ND (0.019)	5.21	6.64	ND (0.00225)	0.365 J (0.495)	ND (0.031)	NR
601212	TJAOU-228A-GR-223-S	12/3/98	0–0.5	1.98	70.0	ND (0.019)	6.78	6.50	ND (0.00225)	0.275 J (0.490)	ND (0.031)	NR
601212	TJAOU-228A-GR-225-S	12/3/98	0–0.5	2.73	105	0.564	6.28	8.57	ND (0.00225)	0.451 J (0.485)	0.0591 J (0.485)	NR
601212	TJAOU-228A-GR-227-S	12/3/98	0–0.5	2.69	128	ND (0.019)	7.44	9.91	ND (0.00225)	0.662	0.129 J (0.485)	NR
Background Soil Concentrations—North Supergroup[d]				4.4	200	0.9	12.8	11.2	<0.1	<1	<1	2.3

Note: Values in **bold** exceed background soil concentrations.

[a]EPA November 1986.

[b]Analysis request/chain of custody record.

[c]Estimated value; see data validation reports (Annex 3-F).

[d]From Dinwiddie September 1997. The minimum background concentration between surface and subsurface values is used.

DU = Duplicate 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, but is less than the practical quantitation limit, shown in parentheses.
mg/kg = Milligram(s) per kilogram.
ND( ) = Not detected above the method detection limit, shown in parentheses.
NR = Not reported.
RCRA = Resource Conservation and Recovery Act.
S = Soil sample.
SWMU = Solid Waste Management Unit.
TJAOU = Tijeras Arroyo Operable Unit.

Table 3.4.5-7
HE Analytical Method Detection Limits (EPA Method 8330[a])
Used for SWMU 228A Confirmatory Sampling
September–December 1998
(Off-Site Laboratories)

Analyte	Soil Sample MDL (µg/kg)	Aqueous EB Sample MDL (µg/L)
4-amino-2,6-dinitrotoluene	5.5–79	0.02–0.16
2-amino-4,6-dinitrotoluene	6.6–17	0.019–0.14
1,3-dinitrobenzene	4.1–16	0.02–0.11
2,4-dinitrotoluene	6.2–17	0.014–0.10
2,6-dinitrotoluene	6.5–17	0.043–0.13
HMX	5.3–24	0.046–0.095
Nitrobenzene	5.2–9.0	0.016–0.12
2-nitrotoluene	7.8–41	0.024–0.16
3-nitrotoluene	11–30	0.031–0.39
4-nitrotoluene	11–31	0.034–0.19
RDX	9.7–31	0.018–0.12
Tetryl	7.5–94	0.022–0.18
1,3,5-trinitrobenzene	6.6–32	0.021–0.32
2,4,6-trinitrotoluene	5.7–19	0.029–0.11

[a]EPA November 1986.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
HE = High explosive.
HMX = 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane.
MDL = Method detection limit.
RDX = 1,3,5-trinitro-1,3,5-triazacyclohexane.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
SWMU = Solid Waste Management Unit.
Tetryl = 2,4,6-trinitrophenylmethylnitramine.

Table 3.4.5-8
Summary of SWMU 228A Site-Confirmatory Sampling VOC Analytical Results[a]
September–December 1998
(Off-Site Laboratories)

Sample Attributes				VOCs (EPA Method 8260[b]) (µg/kg)	
Record Number[c]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Benzene	Methylene Chloride
600799	TJAOU-228A-GR-120-S	9/8/98	0–0.5	ND (0.98)	**1.1 J (5)**
600799	TJAOU-228A-GR-123-S	9/8/98	0–0.5	ND (0.98)	**1.2 J (5)**
600799	TJAOU-228A-GR-123-DU	9/8/98	0–0.5	ND (0.98)	**1.0 J (5)**
600799	TJAOU-228A-GR-129-S	9/8/98	0–0.5	ND (0.98)	**1.3 J (5)**
600835	TJAOU-228A-GR-133-S	9/8/98	0–0.5	**1.2**	ND (0.48)
600835	TJAOU-228A-GR-133-DU	9/8/98	0–0.5	ND (0.98)	ND (0.48)
600835	TJAOU-228A-GR-137-S	9/8/98	0–0.5	ND (0.98)	ND (0.48)
600835	TJAOU-228A-GR-140-S	9/8/98	0–0.5	ND (0.98)	ND (0.48)
601188	TJAOU-228A-GR-151-S	12/1/98	0–0.5	ND (0.25)	ND (0.25)
601188	TJAOU-228A-GR-156-S	12/1/98	0–0.5	ND (0.25)	ND (0.25)
601188	TJAOU-228A-GR-161-S	12/1/98	0–0.5	ND (0.25)	**3.2 J (5.00)[d]**
601188	TJAOU-228A-GR-161-DU	12/1/98	0–0.5	ND (0.25)	ND (0.25)
601189	TJAOU-228A-GR-166-S	12/1/98	0–0.5	ND (0.25)	ND (0.25)
601189	TJAOU-228A-GR-171-S	12/1/98	0–0.5	ND (0.25)	ND (0.25)
601189	TJAOU-228A-GR-171-DU	12/1/98	0–0.5	ND (0.25)	ND (0.25)
601190	TJAOU-228A-GR-176-S	12/2/98	0–0.5	ND (0.25)	ND (0.25)
601190	TJAOU-228A-GR-181-S	12/2/98	0–0.5	ND (0.25)	ND (0.25)
601190	TJAOU-228A-GR-181-DU	12/2/98	0–0.5	ND (0.25)	ND (0.25)
601190	TJAOU-228A-GR-186-S	12/2/98	0–0.5	ND (0.25)	ND (0.25)
601191	TJAOU-228A-GR-191-S	12/2/98	0–0.5	ND (0.25)	ND (0.25)
601191	TJAOU-228A-GR-191-DU	12/2/98	0–0.5	ND (0.25)	ND (0.25)
601191	TJAOU-228A-GR-196-S	12/2/98	0–0.5	ND (0.25)	ND (0.25)
601192	TJAOU-228A-GR-201-S	12/3/98	0–0.5	ND (0.25)	ND (0.25)
601192	TJAOU-228A-GR-201-DU	12/3/98	0–0.5	ND (0.25)	ND (0.25)
601192	TJAOU-228A-GR-206-S	12/3/98	0–0.5	ND (0.25)	ND (0.25)
601192	TJAOU-228A-GR-211-S	12/3/98	0–0.5	ND (0.25)	ND (0.25)
601192	TJAOU-228A-GR-211-DU	12/3/98	0–0.5	ND (0.25)	ND (0.25)
601212	TJAOU-228A-GR-216-S	12/3/98	2–3	ND (0.25)	**7.2**
Quality Assurance/Quality Control Samples (all in µg/L)					
600836	TJAOU-228A-GR-TB	9/8/98	NA	ND (0.98)	ND (0.48)
600836	TJAOU-228A-GR-EB	9/8/98	NA	ND (0.98)	ND (0.48)
601189	TJAOU-228A-EB	12/1/98	NA	ND (0.3)	**1.5 J (5.00)[d]**
601189	TJAOU-228A-TB	12/1/98	NA	ND (0.3)	**3.4 J (5.00)[d]**
601191	TJAOU-228A-EB	12/2/98	NA	ND (0.3)	ND (1.2)

Refer to footnotes at end of table.

Table 3.4.5-8 (Concluded)
Summary of SWMU 228A Site-Confirmatory Sampling VOC Analytical Results[a]
September–December 1998
(Off-Site Laboratories)

Sample Attributes				VOCs (EPA Method 8260[b]) (µg/kg)	
Record Number[c]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Benzene	Methylene Chloride
601191	TJAOU-228A-TB	12/2/98	NA	ND (0.3)	**1.6 J (5.00)**
601212	TJAOU-228A-EB	12/3/98	NA	ND (0.3)	ND (1.2)
601212	TJAOU-228A-TB	12/3/98	NA	ND (0.3)	ND (1.2)

Note: Values in **bold** represent detected VOCs.

[a]Detected VOCs only.

[b]EPA November 1986.

[c]Analysis request/chain of custody record.

[d]*Estimated value; see data validation reports (Annex 3-F).*

DU = Duplicate 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 but is less than the practical quantitation limit, shown in parentheses.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
NA = Not applicable.
ND( ) = Not detected above the method detection limit, shown in parentheses.
S = Soil sample.
SWMU = Solid Waste Management Unit.
TB = Trip blank.
TJAOU = Tijeras Arroyo Operable Unit.
VOC = Volatile organic compound.

Table 3.4.5-9
Summary of SWMU 228A Soil Piles Confirmatory Sampling VOC Analytical Results[a]
September–December 1998
(Off-Site Laboratories)

Sample Attributes				VOCs (EPA Method 8260[b]) (µg/kg)	
Record Number[c]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Benzene	Methylene Chloride
600835	TJAOU-228A-GR-143-S	9/8/98	0–0.5	ND (0.98)	ND (0.48)
600835	TJAOU-228A-GR-145-S	9/8/98	0–0.5	ND (0.98)	ND (0.48)
600835	TJAOU-228A-GR-147-S	9/8/98	0–0.5	ND (0.98)	ND (0.48)
600835	TJAOU-228A-GR-149-S	9/8/98	0–0.5	ND (0.98)	ND (0.48)
601212	TJAOU-228A-GR-221-S	12/3/98	0–0.5	ND (0.25)	**1.5 J (5.00)**
601212	TJAOU-228A-GR-221-DU	12/3/98	0–0.5	ND (0.25)	ND (0.25)
601212	TJAOU-228A-GR-226-S	12/3/98	0–0.5	ND (0.25)	ND (0.25)

Note: Values in **bold** represent detected VOCs.

[a]Detected VOCs only.

[b]EPA November 1986.

[c]Analysis request/chain of custody record.

DU = Duplicate 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 but is less than the practical quantitation limit, shown in parentheses.
µg/kg = Microgram(s) per kilogram.
ND ( ) = Not detected above the method detection limit, shown in parentheses.
S = Soil sample.
SWMU = Solid Waste Management Unit.
TJAOU = Tijeras Arroyo Operable Unit.
VOC = Volatile organic compound.

Table 3.4.5-10
VOC Analytical Method Detection Limits (EPA Method 8260[a]) Used for SWMU 228A Confirmatory Sampling, September–December 1998
(Off-Site Laboratories)

Analyte	Soil Sample MDL (µg/kg)	Aqueous EB and TB Sample MDL (µg/L)
Acetone	2.2	3.7
Benzene	0.25–0.98	0.3–0.98
Bromobenzene	0.94	0.94
Bromochloromethane	0.67	0.67
Bromodichloromethane	0.24–0.80	0.4–0.80
Bromoform	0.27–0.48	0.4–0.48
2-butanone	2.1	5.9
n-butylbenzene	2.1	2.1
sec-butylbenzene	2.0	2.0
tert-butylbenzene	1.8	1.8
Carbon disulfide	2.2	1.8
Carbon tetrachloride	0.22–1.9	0.2–1.9
Chlorobenzene	0.25–1.1	0.3–1.1
Chloroethane	0.72–1.6	0.3–1.6
Chloroform	0.24–1.1	0.7–1.1
2-chlorotoluene	2.1	2.1
4-chlorotoluene	1.6	1.6
1,2-dibromo-3-chloropropane	0.96	0.96
Dibromochloromethane	0.21–0.59	0.3–0.59
1,2-dibromoethane	0.46	0.46
Dibromomethane	5.0	5.0
1,2-dichlorobenzene	0.85	0.85
1,3-dichlorobenzene	1.1	1.1
1,4-dichlorobenzene	1.0	1.0
Dichlorodifluoromethane	1.8	1.8
1,1-dichloroethane	0.2–1.2	0.4–1.2
1,2-dichloroethane	0.23–0.46	0.2–0.46
1,1-dichloroethene	0.25–2.1	0.7–2.1
cis-1,2-dichloroethene	0.25–1.2	0.7–1.2
trans-1,2-dichloroethene	0.19–1.6	0.3–1.6
1,2-dichloropropane	0.23–0.81	0.2–0.81
1,3-dichloropropane	0.44	0.44
2,2-dichloropropane	3.4	3.4
1,1-dichloropropene	2.0	2.0
cis-1,3-dichloropropene	0.25	0.3
trans-1,3-dichloropropene	0.22	0.3
Ethyl benzene	0.23–1.6	0.3–1.6
Hexachlorobutadiene	1.8	1.8
2-hexanone	4.4	3.2
Isopropylbenzene	1.7	1.7
4-isopropyltoluene	1.8	1.8
Methyl bromide	0.67–1.0	0.4–1.0
Methyl chloride	0.43–1.9	0.2–1.9
Methylene chloride	0.25–0.48	0.48–1.2

Refer to footnotes at end of table.

Table 3.4.5-10 (Concluded)
VOC Analytical Method Detection Limits (EPA Method 8260[a]) Used for SWMU 228A
Confirmatory Sampling, September–December 1998
(Off-Site Laboratories)

Analyte	Soil Sample MDL (µg/kg)	Aqueous EB and TB Sample MDL (µg/L)
Naphthalene	0.61	0.61
4-methyl-2-pentanone	2.9	1.6
n-propylbenzene	1.8	1.8
Styrene	0.22–2.1	0.2–2.1
1,1,1,2-tetrachloroethane	0.90	0.90
1,1,2,2-tetrachloroethane	0.46–0.96	0.5–0.96
Tetrachloroethene	0.23–1.6	0.7–1.6
Toluene	0.22–1.5	0.5–1.5
1,2,3-trichlorobenzene	1.0	1.0
1,2,4-trichlorobenzene	0.90	0.90
1,1,1-trichloroethane	0.18–1.7	0.2–1.7
1,1,2-trichloroethane	0.24–0.62	0.4–0.62
Trichloroethene	0.27–1.2	0.6–1.2
Trichlorofluoromethane	5.0	5.0
1,2,3-trichloropropane	0.46	0.46
1,2,4-trimethylbenzene	1.5	1.5
1,3,5-trimethylbenzene	1.6	1.6
Vinyl acetate	1.8	1.8
Vinyl chloride	0.4–1.8	0.4–1.8
Xylenes	0.62–3.1	1.1–3.1

[a]EPA November 1986.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
SWMU = Solid Waste Management Unit.
TB = Trip blank.
VOC = Volatile organic compound.

Table 3.4.5-11
Summary of SWMU 228A Site-Confirmatory Sampling SVOC Analytical Results[a]
September–December 1998
(Off-Site Laboratories)

Sample Attributes				SVOCs (EPA Method 8270[b]) (µg/kg)				
Record Number[c]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene
600799	TJAOU-228A-GR-120-S	9/8/98	0–0.5	ND (20)	ND (20)	ND (20)	ND (20)	ND (30)
600799	TJAOU-228A-GR-123-S	9/8/98	0–0.5	ND (20)	ND (20)	**40 J (330)**	ND (20)	ND (30)
600799	TJAOU-228A-GR-123-DU	9/8/98	0–0.5	ND (20)	ND (20)	**140 J (330)**	**110 J (330)**	**140 J (330)**
600799	TJAOU-228A-GR-129-S	9/8/98	0–0.5	**70 J (330)**	**90 J (330)**	**200 J (330)**	**190 J (330)**	**140 J (330)**
600835	TJAOU-228A-GR-133-S	9/8/98	0–0.5	ND (20)	**30 J (330)**	**320 J (330)**	**250 J (330)**	**330**
600835	TJAOU-228A-GR-133-DU	9/8/98	0–0.5	ND (20)	**110 J (330)**	**190 J (330)**	**180 J (330)**	**250 J (330)**
600835	TJAOU-228A-GR-137-S	9/8/98	0–0.5	ND (20)	ND (20)	ND (10)	ND (10)	ND (20)
600835	TJAOU-228A-GR-140-S	9/8/98	0–0.5	ND (20)	**90 J (330)**	**250 J (330)**	**260 J (330)**	**370**
601188	TJAOU-228A-GR-151-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601188	TJAOU-228A-GR-156-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601188	TJAOU-228A-GR-161-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601188	TJAOU-228A-GR-161-DU	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601189	TJAOU-228A-GR-166-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601189	TJAOU-228A-GR-171-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601189	TJAOU-228A-GR-171-DU	12/1/98	0–0.5	ND (10)	**95 J (333)**	**270 J (333)**	**180 J (333)**	**360**
601190	TJAOU-228A-GR-176-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601190	TJAOU-228A-GR-181-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601190	TJAOU-228A-GR-181-DU	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601190	TJAOU-228A-GR-186-S	12/2/98	0–0.5	ND (10)	ND (10)	**200 J (333)**	ND (10)	**250 J (333)**
601191	TJAOU-228A-GR-191-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601191	TJAOU-228A-GR-191-DU	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601191	TJAOU-228A-GR-196-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-201-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-201-DU	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-206-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-211-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-211-DU	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601212	TJAOU-228A-GR-216-S	12/3/98	2-3	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Quality Assurance/Quality Control Samples (all in µg/L)								
600836	TJAOU-228A-GR-EB	9/8/98	NA	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.7)	ND (0.9)
600836	TJAOU-228A-GR-EB	9/9/98	NA	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.7)	ND (0.9)
601189	TJAOU-228A-EB	12/1/98	NA	ND (2.2)	ND (2.3)	ND (2.8)	ND (2)	ND (4.7)
601191	TJAOU-228A-EB	12/2/98	NA	ND (2.2)	ND (2.3)	ND (2.8)	ND (2)	ND (4.7)
601212	TJAOU-228A-EB	12/3/98	NA	ND (2.2)	ND (2.3)	ND (2.8)	ND (2)	ND (4.7)

Refer to footnotes at end of table.

Table 3.4.5-11 (Continued)
Summary of SWMU 228A Site-Confirmatory Sampling SVOC Analytical Results[a]
September–December 1998
(Off-Site Laboratories)

Sample Attributes				SVOCs (EPA Method 8270[b]) (µg/kg)				
Record Number[c]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Benzo(ghi)perylene	Benzo(k)fluoranthene	Chrysene	Di-n-butyl phthalate	Bis(2-ethylhexyl)phthalate
600799	TJAOU-228A-GR-120-S	9/8/98	0–0.5	ND (53)	ND (30)	ND (20)	**60 J (330)**	**50 J (330)**
600799	TJAOU-228A-GR-123-S	9/8/98	0–0.5	ND (53)	ND (30)	**170 J (330)**	**50 J (330)**	**40 J (330)**
600799	TJAOU-228A-GR-123-DU	9/8/98	0–0.5	ND (53)	ND (30)	**40 J (330)**	ND (20)	**70 J (330)**
600799	TJAOU-228A-GR-129-S	9/8/98	0–0.5	ND (53)	ND (30)	**220 J (330)**	**40 J (330)**	ND (20)
600835	TJAOU-228A-GR-133-S	9/8/98	0–0.5	**240 J (330)**	**280 J (330)**	**370**	ND (10)	**33 J (330)**
600835	TJAOU-228A-GR-133-DU	9/8/98	0–0.5	**180 J (330)**	**150 J (330)**	**220 J (330)**	ND (10)	**48 J (330)**
600835	TJAOU-228A-GR-137-S	9/8/98	0–0.5	ND (49)	ND (30)	ND (10)	ND (10)	**33 J (330)**
600835	TJAOU-228A-GR-140-S	9/8/98	0–0.5	**250 J (330)**	**230 J (330)**	**280 J (330)**	ND (10)	**34 J (330)**
601188	TJAOU-228A-GR-151-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601188	TJAOU-228A-GR-156-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601188	TJAOU-228A-GR-161-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601188	TJAOU-228A-GR-161-DU	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601189	TJAOU-228A-GR-166-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601189	TJAOU-228A-GR-171-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601189	TJAOU-228A-GR-171-DU	12/1/98	0–0.5	**130 J (333)**	ND (10)	**300 J (333)**	ND (10)	ND (10)
601190	TJAOU-228A-GR-176-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601190	TJAOU-228A-GR-181-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601190	TJAOU-228A-GR-181-DU	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601190	TJAOU-228A-GR-186-S	12/2/98	0–0.5	ND (10)	ND (10)	**230 J (333)**	ND (10)	ND (10)
601191	TJAOU-228A-GR-191-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601191	TJAOU-228A-GR-191-DU	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601191	TJAOU-228A-GR-196-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-201-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-201-DU	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-206-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-211-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-211-DU	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601212	TJAOU-228A-GR-216-S	12/3/98	2–3	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Quality Assurance/Quality Control Samples (all in µg/L)								
600836	TJAOU-228A-GR-EB	9/8/98	NA	ND (1.6)	ND (0.8)	ND (0.5)	ND (0.5)	ND (0.6)
600836	TJAOU-228A-GR-EB	9/9/98	NA	ND (1.6)	ND (0.8)	ND (0.5)	ND (0.5)	ND (0.6)
601189	TJAOU-228A-EB	12/1/98	NA	ND (2.5)	ND (2.6)	ND (2.2)	ND (2.9)	ND (3.7)
601191	TJAOU-228A-EB	12/2/98	NA	ND (2.5)	ND (2.6)	ND (2.2)	ND (2.9)	ND (3.7)
601212	TJAOU-228A-EB	12/3/98	NA	ND (2.5)	ND (2.6)	ND (2.2)	ND (2.9)	ND (3.7)

Refer to footnotes at end of table.

Table 3.4.5-11 (Continued)
Summary of SWMU 228A Site-Confirmatory Sampling SVOC Analytical Results[a]
September–December 1998
(Off-Site Laboratories)

Sample Attributes				SVOCs (EPA Method 8270[b]) (µg/kg)				
Record Number[c]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene
600799	TJAOU-228A-GR-120-S	9/8/98	0–0.5	ND (20)	ND (20)	ND (57)	ND (20)	**40 J (330)**
600799	TJAOU-228A-GR-123-S	9/8/98	0–0.5	**70 J (330)**	ND (20)	ND (56)	**40 J (330)**	**80 J (330)**
600799	TJAOU-228A-GR-123-DU	9/8/98	0–0.5	**280 J (330)**	ND (20)	ND (56)	**110 J (330)**	**320 J (330)**
600799	TJAOU-228A-GR-129-S	9/8/98	0–0.5	**460**	**50 J (330)**	ND (56)	**420**	**560**
600835	TJAOU-228A-GR-133-S	9/8/98	0–0.5	**330 J (330)**	ND (10)	ND (10)	**35 J (330)**	**600**
600835	TJAOU-228A-GR-133-DU	9/8/98	0–0.5	**320 J (330)**	ND (10)	**41 J (330)**	**110 J (330)**	**390**
600835	TJAOU-228A-GR-137-S	9/8/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (20)	ND (33)
600835	TJAOU-228A-GR-140-S	9/8/98	0–0.5	**380**	ND (10)	**40 J (330)**	**94 J (330)**	**360**
601188	TJAOU-228A-GR-151-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601188	TJAOU-228A-GR-156-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601188	TJAOU-228A-GR-161-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601188	TJAOU-228A-GR-161-DU	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601189	TJAOU-228A-GR-166-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601189	TJAOU-228A-GR-171-S	12/1/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601189	TJAOU-228A-GR-171-DU	12/1/98	0–0.5	**630**	ND (10)	**99 J (333)**	**420**	**490**
601190	TJAOU-228A-GR-176-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601190	TJAOU-228A-GR-181-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601190	TJAOU-228A-GR-181-DU	12/2/98	0–0.5	**190 J (333)**	ND (10)	ND (10)	ND (10)	ND (10)
601190	TJAOU-228A-GR-186-S	12/2/98	0–0.5	**420**	ND (10)	ND (10)	ND (10)	**320 J (333)**
601191	TJAOU-228A-GR-191-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601191	TJAOU-228A-GR-191-DU	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601191	TJAOU-228A-GR-196-S	12/2/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-201-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-201-DU	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-206-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-211-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601192	TJAOU-228A-GR-211-DU	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601212	TJAOU-228A-GR-216-S	12/3/98	2–3	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Quality Assurance/Quality Control Samples (all in µg/L)								
600836	TJAOU-228A-GR-EB	9/8/98	NA	ND (0.6)	ND (0.7)	ND (1.7)	ND (0.6)	ND (0.6)
600836	TJAOU-228A-GR-EB	9/9/98	NA	ND (0.6)	ND (0.7)	ND (1.7)	ND (0.6)	ND (0.6)
601189	TJAOU-228A-EB	12/1/98	NA	ND (3.1)	ND (2.1)	ND (3.4)	ND (1.8)	ND (2.5)
601191	TJAOU-228A-EB	12/2/98	NA	ND (3.1)	ND (2.1)	ND (3.4)	ND (1.8)	ND (2.5)
601212	TJAOU-228A-EB	12/3/98	NA	ND (3.1)	ND (2.1)	ND (3.4)	ND (1.8)	ND (2.5)

Refer to footnotes at end of table.

Table 3.4.5-11 (Concluded)
Summary of SWMU 228A Site-Confirmatory Sampling SVOC Analytical Results[a]
September–December 1998
(Off-Site Laboratories)

Note: Values in **bold** represent detected SVOCs.

[a]Detected SVOCs only.

[b]EPA November 1986.

[c]Analysis request/chain of custody record.

DU	= Duplicate sample.
EB	= Equipment blank.
EPA	= U.S. Environmental Protection Agency.
ER	= Environmental Restoration.
GR	= Grab sample.
ft	= Foot (feet).
ID	= Identification.
J ( )	= The reported value is greater than or equal to the method detection limit, but is less than the practical quantitation limit, shown in parentheses.
µg/kg	= Microgram(s) per kilogram.
µg/L	= Microgram(s) per liter.
NA	= Not applicable.
ND ( )	= Not detected above the method detection limit, shown in parentheses.
S	= Soil sample.
SVOC	= Semivolatile organic compound.
SWMU	= Solid Waste Management Unit.
TJAOU	= Tijeras Arroyo Operable Unit.

Table 3.4.5-12
Summary of SWMU 228A Soil Piles Confirmatory Sampling SVOC Analytical Results[a]
September–December 1998
(Off-Site Laboratories)

Sample Attributes				SVOCs (EPA Method 8270[b]) (µg/kg)				
Record Number[c]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene
600835	TJAOU-228A-GR-143-S	9/8/98	0–0.5	ND (20)	ND (20)	ND (10)	ND (10)	ND (20)
600835	TJAOU-228A-GR-145-S	9/8/98	0–0.5	ND (20)	ND (20)	**80 J (330)**	**70 J (330)**	**90 J (330)**
600835	TJAOU-228A-GR-147-S	9/8/98	0–0.5	ND (20)	**30 J (330)**	**70 J (330)**	**80 J (330)**	ND (20)
600835	TJAOU-228A-GR-149-S	9/8/98	0–0.5	ND (20)	ND (20)	**40 J (330)**	**40 J (330)**	**40 J (330)**
601212	TJAOU-228A-GR-221-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601212	TJAOU-228A-GR-221-DU	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601212	TJAOU-228A-GR-226-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)

Sample Attributes				SVOCs (EPA Method 8270[b]) (µg/kg)				
Record Number[c]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Benzo(ghi) perylene	Benzo(k) fluoranthene	Chrysene	Di-n-butyl phthalate	Bis(2-ethylhexyl) phthalate
600835	TJAOU-228A-GR-143-S	9/8/98	0–0.5	ND (49)	ND (30)	ND (10)	ND (10)	**75 J (330)**
600835	TJAOU-228A-GR-145-S	9/8/98	0–0.5	ND (50)	ND (30)	**100 J (330)**	ND (10)	**38 J (330)**
600835	TJAOU-228A-GR-147-S	9/8/98	0–0.5	**50 J (330)**	ND (30)	**90 J (330)**	**40 J (330)**	**110 J (330)**
600835	TJAOU-228A-GR-149-S	9/8/98	0–0.5	ND (49)	**40 J (330)**	**50 J (330)**	ND (10)	**73 J (330)**
601212	TJAOU-228A-GR-221-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601212	TJAOU-228A-GR-221-DU	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601212	TJAOU-228A-GR-226-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)

Refer to footnotes at end of table.

Table 3.4.5-12 (Concluded)
Summary of SWMU 228A Soil Piles Confirmatory Sampling SVOC Analytical Results[a]
September–December 1998
(Off-Site Laboratories)

Sample Attributes				SVOCs (EPA Method 8270[b]) (µg/kg)				
Record Number[c]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene
600835	TJAOU-228A-GR-143-S	9/8/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (20)	ND (33)
600835	TJAOU-228A-GR-145-S	9/8/98	0–0.5	**170 J (330)**	ND (10)	ND (10)	**70 J (330)**	**140 J (330)**
600835	TJAOU-228A-GR-147-S	9/8/98	0–0.5	**180 J (330)**	ND (10)	**50 J (330)**	**160 J (330)**	**160 J (330)**
600835	TJAOU-228A-GR-149-S	9/8/98	0–0.5	**80 J (330)**	ND (10)	ND (10)	**60 J (330)**	**75 J (330)**
601212	TJAOU-228A-GR-221-S	12/3/98	0–0.5	**170 J (333)**	ND (10)	ND (10)	ND (10)	ND (10)
601212	TJAOU-228A-GR-221-DU	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
601212	TJAOU-228A-GR-226-S	12/3/98	0–0.5	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)

Note: Values in **bold** represent detected SVOCs.

[a]Detected SVOCs only.

[b]EPA November 1986.

[c]Analysis request/chain of custody record.

DU = Duplicate 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 but is less than the practical quantitation limit, shown in parentheses.
µg/kg = Microgram(s) per kilogram.
ND( ) = Not detected above the method detection limit, shown in parentheses.
S = Soil sample.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
TJAOU = Tijeras Arroyo Operable Unit.

Table 3.4.5-13
SVOC Analytical Method Detection Limits
(EPA Method 8270[a]) Used for SWMU 228A Confirmatory Sampling
September–December 1998
(Off-Site Laboratories)

Analyte	Soil Sample MDL (µg/kg)	Aqueous EB Sample MDL (µg/L)
Acenaphthene	10–20	0.6–2.2
Acenaphthylene	10–20	0.5–1.3
Anthracene	10–20	0.6–2.3
Benzidine	10–1700	0.4
Benzo(a)anthracene	10–20	0.5–2.8
Benzo(a)pyrene	10–20	0.7–2
Benzo(b)fluoranthene	10–30	0.9–4.7
Benzo(ghi)perylene	10–53	1.7–2.5
Benzo(k)fluoranthene	10–30	0.8–2.6
Benzoic acid	20–1700	0.5–9.3
Benzyl alcohol	10–93	0.6–2.5
4-bromophenyl phenyl ether	10–30	0.03–0.6
Butylbenzyl phthalate	10–20	0.5–3.7
4-chloro-3-methylphenol	10–30	0.5–3.1
4-chlorobenzenamine	20–66	0.5–1.5
bis(2-chloroethoxy)methane	10–20	0.3–2.5
bis(2-chloroethyl)ether	10–20	0.6–2
bis-chloroisopropyl ether	10	0.61
2-chloronaphthalene	10–20	0.7–2.4
2-chlorophenol	10–20	0.4–2.1
4-chlorophenyl phenyl ether	10–20	0.6–2.8
Chrysene	10–20	0.5–2.2
m,p-cresol	10	1.8
o-cresol	10–33	0.5–2.1
Di-n-butyl phthalate	10–20	0.5–2.9
Di-n-octyl phthalate	10–46	0.6–4.2
Dibenzo[a,h]anthracene	10–60	1.9–2.2
Dibenzofuran	7–20	0.5–4.3
1,2-dichlorobenzene	10–33	0.5–2.7
1,3-dichlorobenzene	10–20	0.5–2.5
1,4-dichlorobenzene	10–43	0.6–2.3
3,3-dichlorobenzidine	20	0.7–4.2
2,2-dichlorodisopropyl ether	20–53	0.6
2,4-dichlorophenol	10–110	0.3–1.4
Diethylphthalate	10–20	0.7–2.1
2,4-dimethylphenol	10–30	0.5–6.1
Dimethylphthalate	10–20	0.5–2.1
Dinitro-o-cresol	10–110	0.67–0.8
2,4-dinitrophenol	20–260	1.1–7.9

Refer to footnotes at end of table.

Table 3.4.5-13 (Concluded)
SVOC Analytical Method Detection Limits
(EPA Method 8270[a]) Used for SWMU 228A Confirmatory Sampling
September–December 1998
(Off-Site Laboratories)

Analyte	Soil Sample MDL (µg/kg)	Aqueous EB Sample MDL (µg/L)
2,4-dinitrotoluene	10–20	0.7–1.4
2,6-dinitrotoluene	10–20	0.6–1.1
1,2-diphenylhydrazine	10	2.3
bis(2-ethylhexyl)phthalate	10–33	0.6–3.7
Fluoranthene	10–20	0.6–3.1
Fluorene	10–20	0.7–2.1
Hexachlorobenzene	10–30	0.5–2.9
Hexachlorobutadiene	10–30	0.5–3.8
Hexachlorocyclopentadiene	10–190	2.1–4.4
Hexachloroethane	10–36	0.8–3.4
Indeno(1,2,3-c,d)pyrene	10–57	1.8–3.4
Isophorone	10–30	0.5–2.6
2-methylnaphthalene	10–33	0.5–3.2
4-methylphenol	20–99	0.6
Naphthalene	10–20	0.5–2
Nitro-benzene	10–33	0.5–3.3
2-nitroaniline	10–20	0.6–2.8
3-nitroaniline	10–30	0.6–1.8
4-nitroaniline	10–53	0.6–1
2-nitrophenol	10–33	0.5–2.9
4-nitrophenol	10–69	0.6–3.5
n-nitrosodiphenylamine	10–20	0.6–5
n-nitrosodipropylamine	10–30	0.7–5
Pentachlorophenol	20–120	2.4–2.8
Phenanthrene	10–20	0.6–1.8
Phenol	10–43	0.5–0.8
Pyrene	10–33	0.6–2.5
1,2,4-trichlorobenzene	10–20	0.5–2.4
2,4,5-trichlorophenol	10–30	0.8–2.5
2,4,6-trichlorophenol	10–76	0.6–0.96

[a]EPA November 1986.
EB = Equipment blank.
EPA = United State Environmental Protection Agency.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.

Table 3.4.5-14
Summary of SWMU 228A Site-Confirmatory Sampling Gamma Spectroscopy Analytical Results, September 1998–February 1999
(Off-Site Laboratories, except where indicated)

Sample Attributes				Activity (pCi/g)							
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Uranium-235		Uranium-238		Thorium-232		Cesium-137	
				Result	Error[b]	Result	Error[b]	Result	Error[b]	Result	Error[b]
600799	TJAOU-228A-GR-120-S	9/8/98	0–0.5	**0.3**	0.2	**5.1**	7.2	NR	--	0.1	0.0
600800	TJAOU-228A-GR-120-S (on-site laboratory)	9/8/98	0–0.5	**0.202**	0.194	0.987	0.558	0.846	0.402	ND (0.0292)	--
600799	TJAOU-228A-GR-121-S	9/8/98	0–0.5	**0.6**	0.2	**4.8**	3.1	NR	--	0.2	0.1
600799	TJAOU-228A-GR-122-S	9/8/98	0–0.5	**0.4**	0.2	**2.6**	5.3	NR	--	0.0	0.0
600799	TJAOU-228A-GR-123-S	9/8/98	0–0.5	**0.6**	0.2	**11.4**	3.6	NR	--	0.3	0.2
600800	TJAOU-228A-GR-123-S (on-site laboratory)	9/8/98	0–0.5	ND (0.215)	--	0.884	0.542	0.963	0.448	0.0124	0.00883
600799	TJAOU-228A-GR-123-DU	9/8/98	0–0.5	**0.4**	0.2	**2.2**	3.4	NR	--	0.1	0.0
600800	TJAOU-228A-GR-123-DU (on-site laboratory)	9/8/98	0–0.5	0.0909	0.0890	0.596	0.398	0.875	1.38	0.00764	0.00719
600799	TJAOU-228A-GR-124-S	9/8/98	0–0.5	**0.6**	0.2	**4.2**	2.7	NR	--	0.1	0.4
600799	TJAOU-228A-GR-125-S	9/8/98	0–0.5	**0.2**	0.1	**1.6**	2.0	NR	--	0.2	0.1
600799	TJAOU-228A-GR-126-S	9/8/98	0–0.5	**0.5**	0.2	**7.0**	2.4	NR	--	0.4	0.3
600799	TJAOU-228A-GR-127-S	9/8/98	0–0.5	0.1	0.2	1.1	6.9	NR	--	0.4	0.2
600799	TJAOU-228A-GR-128-S	9/8/98	0–0.5	**0.4**	0.1	**7.3**	3.0	NR	--	0.0	0.1
600799	TJAOU-228A-GR-129-S	9/8/98	0–0.5	**0.2**	0.1	**6.0**	2.8	NR	--	0.3	0.1
600800	TJAOU-228A-GR-129-S (on-site laboratory)	9/8/98	0–0.5	0.131	0.194	**4.37**	0.912	ND (0.127)	--	0.0500	0.0293
600799	TJAOU-228A-GR-130-S	9/8/98	0–0.5	**0.4**	0.2	**6.6**	2.4	NR	--	0.0	0.0
600799	TJAOU-228A-GR-131-S	9/8/98	0–0.5	**0.2**	0.1	**2.4**	3.1	NR	--	0.1	0.0
600799	TJAOU-228A-GR-132-S	9/8/98	0–0.5	**0.3**	0.2	**4.3**	1.5	NR	--	0.2	0.2
600800	TJAOU-228A-GR-133-S (on-site laboratory)	9/8/98	0–0.5	ND (0.215)	--	0.584	0.424	0.780	0.372	ND (0.0291)	--
600835	TJAOU-228A-GR-133-S	9/8/98	0–0.5	**0.8**	0.3	**8.0**	4.6	NR	--	0.4	0.3
600800	TJAOU-228A-GR-133-DU (on-site laboratory)	9/8/98	0–0.5	ND (0.238)	--	0.808	0.604	0.970	0.477	ND (0.0325)	--
600835	TJAOU-228A-GR-133-DU	9/8/98	0–0.5	**0.2**	0.3	**5.4**	6.0	NR	--	0.3	0.2
600835	TJAOU-228A-GR-134-S	9/8/98	0–0.5	**0.3**	0.3	**5.0**	2.9	NR	--	0.3	0.1
600835	TJAOU-228A-GR-135-S	9/8/98	0–0.5	**0.3**	0.1	**4.7**	3.6	NR	--	0.2	0.1
600835	TJAOU-228A-GR-136-S	9/8/98	0–0.5	**0.4**	0.2	**6.4**	5.6	NR	--	0.4	0.1
600800	TJAOU-228A-GR-137-S (on-site laboratory)	9/8/98	0–0.5	ND (0.216)	--	0.941	0.413	1.21	0.616	ND (0.0342)	--
600835	TJAOU-228A-GR-137-S	9/8/98	0–0.5	**0.3**	0.2	**8.2**	4.7	NR	--	0.2	0.1

Refer to footnotes at end of table.

Table 3.4.5-14 (Continued)
Summary of SWMU 228A Site-Confirmatory Sampling Gamma Spectroscopy Analytical Results, September 1998–February 1999
(Off-Site Laboratories, except where indicated)

Sample Attributes				Activity (pCi/g)							
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Uranium-235		Uranium-238		Thorium-232		Cesium-137	
				Result	Error[b]	Result	Error[b]	Result	Error[b]	Result	Error[b]
600835	TJAOU-228A-GR-138-S	9/8/98	0–0.5	**0.7**	0.2	**6.6**	1.9	NR	--	0.0	0.0
600835	TJAOU-228A-GR-139-S	9/8/98	0–0.5	**0.2**	0.1	**5.6**	4.7	NR	--	0.3	0.1
600835	TJAOU-228A-GR-140-S	9/8/98	0–0.5	**0.4**	0.1	**5.4**	1.9	NR	--	0.2	0.2
600800	TJAOU-228A-GR-140-S (on-site laboratory)	9/8/98	0–0.5	0.108	0.176	0.390	0.419	0.942	0.503	0.0132	0.00815
600835	TJAOU-228A-GR-141-S	9/8/98	0–0.5	**0.4**	0.1	**3.6**	3.4	NR	--	0.2	0.1
600835	TJAOU-228A-GR-142-S	9/8/98	0–0.5	**0.4**	0.1	**5.3**	2.0	NR	--	0.3	0.2
601188	TJAOU-228A-GR-151-S	12/1/98	0–0.5	**0.321**	0.189	**1.31**	1.13	0.990	0.123	ND (0.0119)	--
601213	TJAOU-228A-GR-151-S (on-site laboratory)	12/1/98	0–0.5	**0.323**	0.198	0.941	0.583	1.03	0.554	ND (0.0393)	--
601188	TJAOU-228A-GR-152-S	12/1/98	0–0.5	0.106	0.153	0.845	1.28	0.974	0.117	0.0545	0.0315
601188	TJAOU-228A-GR-153-S	12/1/98	0–0.5	0.0696	0.0979	1.26	0.494	0.960	0.131	ND (0.0115)	--
601188	TJAOU-228A-GR-154-S	12/1/98	0–0.5	**0.297**	0.352	**1.72**	2.21	1.08	0.165	ND (0.0157)	--
601188	TJAOU-228A-GR-155-S	12/1/98	0–0.5	0.165	0.213	0.518	1.2	1.08	0.133	ND (0.0127)	--
601188	TJAOU-228A-GR-156-S	12/1/98	0–0.5	0.113	0.14	**1.42**	1.35	1.13	0.145	ND (0.0118)	--
601213	TJAOU-228A-GR-156-S (on-site laboratory)	12/1/98	0–0.5	0.101	0.179	**2.26**	0.614	0.895	0.469	ND (0.0364)	--
601188	TJAOU-228A-GR-157-S	12/1/98	0–0.5	ND (0.0560)	--	0.941	1.09	1.10	0.138	0.0212	0.0251
601188	TJAOU-228A-GR-158-S	12/1/98	0–0.5	0.0844	0.121	**1.50**	0.639	ND (0.0178)	--	0.0259	0.0304
601188	TJAOU-228A-GR-159-S	12/1/98	0–0.5	0.0864	0.121	**1.70**	2.01	0.971	0.126	0.0393	0.0324
601188	TJAOU-228A-GR-160-S	12/1/98	0–0.5	ND (0.0530)	--	**1.66**	1.12	0.972	0.124	0.0973	0.0345
601188	TJAOU-228A-GR-161-S	12/1/98	0–0.5	ND (0.0535)	--	**1.59**	1.15	0.904	0.113	0.0291	0.0348
601213	TJAOU-228A-GR-161-S (on-site laboratory)	12/1/98	0–0.5	0.136	0.183	**1.80**	1.25	0.918	0.463	0.0570	0.0319
601188	TJAOU-228A-GR-161-DU	12/1/98	0–0.5	ND (0.0552)	--	0.857	1.33	1.06	0.132	0.0734	0.0332
601213	TJAOU-228A-GR-161-DU (on-site laboratory)	12/1/98	0–0.5	0.117	0.185	**2.08**	0.584	0.794	0.447	0.0421	0.0345
601213	TJAOU-228A-GR-166-S (on-site laboratory)	12/1/98	0–0.5	ND (0.191)	--	0.582	0.463	0.873	0.479	ND (0.0334)	--
601189	TJAOU-228A-GR-162-S	12/1/98	0–0.5	0.126	0.166	**1.75**	1.47	0.891	0.109	0.0553	0.0334
601189	TJAOU-228A-GR-163-S	12/1/98	0–0.5	**0.416**	0.198	**8.04**	1.69	1.20	0.157	0.0215	0.0438
601189	TJAOU-228A-GR-164-S	12/1/98	0–0.5	0.141	0.155	**1.49**	1.05	1.04	0.122	0.0106	0.0169
601189	TJAOU-228A-GR-165-S	12/1/98	0–0.5	**0.450**	0.38	**4.23**	2.76	0.995	0.15	0.0412	0.0459

Refer to footnotes at end of table.

Table 3.4.5-14 (Continued)
Summary of SWMU 228A Site-Confirmatory Sampling Gamma Spectroscopy Analytical Results, September 1998–February 1999
(Off-Site Laboratories, except where indicated)

Sample Attributes				Activity (pCi/g)							
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Uranium-235		Uranium-238		Thorium-232		Cesium-137	
				Result	Error[b]	Result	Error[b]	Result	Error[b]	Result	Error[b]
601189	TJAOU-228A-GR-166-S	12/1/98	0–0.5	0.132	0.104	0.924	0.985	0.804	0.102	ND (0.00999)	--
601189	TJAOU-228A-GR-167-S	12/1/98	0–0.5	0.152	0.17	**1.35**	1.24	1.02	0.133	0.0128	0.0207
601189	TJAOU-228A-GR-168-S	12/1/98	0–0.5	0.0579	0.15	**1.77**	1.22	1.05	0.135	0.0185	0.0224
601189	TJAOU-228A-GR-169-S	12/1/98	0–0.5	0.118	0.235	**2.78**	1.77	0.970	0.125	0.0295	0.0297
601189	TJAOU-228A-GR-170-S	12/1/98	0–0.5	0.0689	0.104	**1.75**	1.48	0.919	0.111	0.144	0.0452
601189	TJAOU-228A-GR-171-S	12/1/98	0–0.5	0.163	0.19	**2.83**	1.36	0.890	0.113	0.0555	0.0309
601213	TJAOU-228A-GR-171-S (on-site laboratory)	12/1/98	0–0.5	ND (0.204)	--	**1.72**	0.556	0.846	0.476	0.0251	0.0329
601189	TJAOU-228A-GR-171-DU	12/1/98	0–0.5	0.171	0.208	**3.25**	1.5	0.976	0.127	0.0296	0.0237
601213	TJAOU-228A-GR-171-DU (on-site laboratory)	12/1/98	0–0.5	0.115	0.172	**1.62**	0.528	0.832	0.445	0.0260	0.0251
601189	TJAOU-228A-GR-172-S	12/1/98	0–0.5	0.0681	0.101	0.853	1	0.943	0.12	ND (0.00910)	--
601189	TJAOU-228A-GR-173-S	12/1/98	0–0.5	0.105	0.11	**1.47**	0.698	0.984	0.14	0.0315	0.0254
601189	TJAOU-228A-GR-174-S	12/1/98	0–0.5	0.172	0.168	0.816	1.79	1.00	0.129	0.0588	0.028
601189	TJAOU-228A-GR-175-S	12/1/98	0–0.5	ND (0.0534)	--	1.04	1.08	0.922	0.119	0.0775	0.0341
601190	TJAOU-228A-GR-176-S	12/2/98	0–0.5	0.132	0.102	1.00	1.14	1.01	0.12	ND (0.00882)	--
601214	TJAOU-228A-GR-176-S (on-site laboratory)	12/2/98	0–0.5	ND (0.187)	--	0.823	0.350	0.886	0.444	0.0165	0.0326
601190	TJAOU-228A-GR-177-S	12/2/98	0–0.5	0.0792	0.162	**1.67**	1.34	0.942	0.116	ND (0.0122)	--
601190	TJAOU-228A-GR-178-S	12/2/98	0–0.5	0.106	0.154	**2.74**	1.54	1.11	0.14	0.189	0.0738
601190	TJAOU-228A-GR-179-S	12/2/98	0–0.5	0.102	0.175	**2.47**	1.37	1.03	0.125	0.0691	0.0341
601190	TJAOU-228A-GR-180-S	12/2/98	0–0.5	0.162	0.105	**1.33**	1.37	0.930	0.118	0.169	0.0356
601190	TJAOU-228A-GR-181-S	12/2/98	0–0.5	0.167	0.225	**2.18**	1.5	1.24	0.151	0.114	0.0375
601214	TJAOU-228A-GR-181-S (on-site laboratory)	12/2/98	0–0.5	0.108	0.169	**3.40**	0.903	0.781	0.413	0.0617	0.0378
601190	TJAOU-228A-GR-181-DU	12/2/98	0–0.5	0.150	0.143	**2.75**	0.762	1.01	0.133	0.0823	0.0402
601214	TJAOU-228A-GR-181-DU (on-site laboratory)	12/2/98	0–0.5	0.157	0.166	**1.51**	0.618	0.776	0.417	0.0811	0.0392
601190	TJAOU-228A-GR-182-S	12/2/98	0–0.5	0.122	0.105	1.25	1.1	1.13	0.133	0.105	0.0327
601190	TJAOU-228A-GR-183-S	12/2/98	0–0.5	0.159	0.173	**1.59**	1.19	0.941	0.115	0.106	0.0387
601190	TJAOU-228A-GR-184-S	12/2/98	0–0.5	ND (0.0631)	--	**1.53**	1.41	0.774	0.124	0.0889	0.0392
601190	TJAOU-228A-GR-185-S	12/2/98	0–0.5	ND (0.0560)	--	**3.13**	1.29	0.940	0.121	0.135	0.0445
601190	TJAOU-228A-GR-186-S	12/2/98	0–0.5	0.141	0.121	**1.72**	1.75	0.920	0.121	0.141	0.0369
601214	TJAOU-228A-GR-186-S (on-site laboratory)	12/2/98	0–0.5	0.136	0.167	**1.88**	0.520	0.712	0.337	0.108	0.0426

Refer to footnotes at end of table.

Table 3.4.5-14 (Continued)
Summary of SWMU 228A Site-Confirmatory Sampling Gamma Spectroscopy Analytical Results, September 1998–February 1999
(Off-Site Laboratories, except where indicated)

Sample Attributes				Activity (pCi/g)							
				Uranium-235		Uranium-238		Thorium-232		Cesium-137	
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Result	Error[b]	Result	Error[b]	Result	Error[b]	Result	Error[b]
601190	TJAOU-228A-GR-187-S	12/2/98	0–0.5	ND (0.0638)	--	**3.46**	1.52	0.977	0.125	0.0620	0.0317
601191	TJAOU-228A-GR-188-S	12/2/98	0–0.5	0.177	0.178	**1.35**	1.06	0.844	0.107	0.132	0.0416
601191	TJAOU-228A-GR-189-S	12/2/98	0–0.5	0.0612	0.11	**2.70**	1.65	0.836	0.109	0.0860	0.0364
601191	TJAOU-228A-GR-190-S	12/2/98	0–0.5	ND (0.0629)	--	1.26	0.632	0.873	0.157	0.218	0.0746
601191	TJAOU-228A-GR-191-S	12/2/98	0–0.5	0.0494	0.147	**1.41**	1.49	0.861	0.106	0.114	0.037
601214	TJAOU-228A-GR-191-S (on-site laboratory)	12/2/98	0–0.5	0.102	0.173	**2.53**	0.817	0.815	0.425	0.0983	0.0442
601191	TJAOU-228A-GR-191-DU	12/2/98	0–0.5	0.136	0.125	**1.43**	0.583	0.930	0.124	0.0848	0.0472
601214	TJAOU-228A-GR-191-DU (on-site laboratory)	12/2/98	0–0.5	0.171	0.166	**1.65**	0.674	0.827	0.455	0.108	0.0679
601191	TJAOU-228A-GR-192-S	12/2/98	0–0.5	**0.343**	0.314	0.830	2.2	0.863	0.136	0.0445	0.057
601191	TJAOU-228A-GR-193-S	12/2/98	0–0.5	0.128	0.226	**1.89**	1.46	0.948	0.116	0.104	0.0494
601191	TJAOU-228A-GR-194-S	12/2/98	0–0.5	**0.207**	0.164	**1.50**	1.36	0.915	0.115	0.230	0.0547
601191	TJAOU-228A-GR-195-S	12/2/98	0–0.5	**0.327**	0.211	**2.28**	1.52	1.09	0.14	0.0432	0.034
601191	TJAOU-228A-GR-196-S	12/2/98	0–0.5	0.124	0.169	**2.29**	1.41	0.955	0.125	0.0982	0.0358
601214	TJAOU-228A-GR-196-S (on-site laboratory)	12/2/98	0–0.5	ND (0.192)	--	**1.73**	0.529	0.667	0.374	ND (0.0231)	--
601191	TJAOU-228A-GR-197-S	12/2/98	0–0.5	0.114	0.201	**1.87**	0.734	ND (0.0165)	--	0.0676	0.0374
601191	TJAOU-228A-GR-198-S	12/2/98	0–0.5	0.0584	0.0992	**1.92**	1.75	0.849	0.111	0.108	0.0368
601191	TJAOU-228A-GR-199-S	12/2/98	0–0.5	ND (0.0540)	--	**2.28**	1.34	0.835	0.11	0.107	0.0512
601191	TJAOU-228A-GR-200-S	12/2/98	0–0.5	0.0894	0.126	**1.92**	1.37	0.938	0.123	0.115	0.0313
601192	TJAOU-228A-GR-201-S	12/3/98	0–0.5	**0.198**	0.123	1.03	1.2	0.862	0.111	0.215	0.0504
601215	TJAOU-228A-GR-201-S (on-site laboratory)	12/3/98	0–0.5	0.0638	0.0695	**2.84**	0.811	0.689	0.352	0.165	0.0414
601192	TJAOU-228A-GR-201-DU	12/3/98	0–0.5	0.0852	0.172	**1.32**	1.38	0.916	0.117	0.285	0.0524
601215	TJAOU-228A-GR-201-DU (on-site laboratory)	12/3/98	0–0.5	**0.230**	0.200	**1.71**	0.545	0.747	0.376	0.169	0.0438
601192	TJAOU-228A-GR-202-S	12/3/98	0–0.5	**0.220**	0.214	**2.64**	1.22	0.999	0.122	0.250	0.0551
601192	TJAOU-228A-GR-203-S	12/3/98	0–0.5	ND (0.0574)	--	1.28	0.584	0.979	0.13	0.0919	0.0407
601192	TJAOU-228A-GR-204-S	12/3/98	0–0.5	0.0869	0.151	**1.48**	0.945	0.819	0.099	0.119	0.0391
601192	TJAOU-228A-GR-205-S	12/3/98	0–0.5	ND (0.0749)	--	**2.08**	2.04	0.768	0.126	0.139	0.056
601192	TJAOU-228A-GR-206-S	12/3/98	0–0.5	0.147	0.16	**1.45**	0.658	1.08	0.142	0.119	0.0659
601215	TJAOU-228A-GR-206-S (on-site laboratory)	12/3/98	0–0.5	ND (0.225)	--	0.979	0.504	0.911	0.599	0.143	0.0397

Refer to footnotes at end of table.

Table 3.4.5-14 (Continued)
Summary of SWMU 228A Site-Confirmatory Sampling Gamma Spectroscopy Analytical Results, September 1998–February 1999
(Off-Site Laboratories, except where indicated)

Sample Attributes				Activity (pCi/g)							
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Uranium-235		Uranium-238		Thorium-232		Cesium-137	
				Result	Error[b]	Result	Error[b]	Result	Error[b]	Result	Error[b]
601192	TJAOU-228A-GR-207-S	12/3/98	0–0.5	ND (0.0644)	--	0.866	1.21	0.949	0.118	0.0955	0.0496
601192	TJAOU-228A-GR-208-S	12/3/98	0–0.5	0.139	0.215	**3.28**	1.77	0.986	0.131	0.252	0.0641
601192	TJAOU-228A-GR-209-S	12/3/98	0–0.5	**0.234**	0.239	**2.15**	1.87	0.973	0.135	0.286	0.0583
601192	TJAOU-228A-GR-210-S	12/3/98	0–0.5	0.169	0.118	1.29	1.25	0.819	0.112	0.341	0.0599
601192	TJAOU-228A-GR-211-S	12/3/98	0–0.5	ND (0.0715)	--	0.635	1.52	0.870	0.117	0.0517	0.0318
601215	TJAOU-228A-GR-211-S (on-site laboratory)	12/3/98	0–0.5	ND (0.236)	--	0.541	0.495	0.704	0.371	0.0433	0.0184
601192	TJAOU-228A-GR-211-DU	12/3/98	0–0.5	ND (0.0735)	--	1.17	1.26	0.882	0.119	0.0819	0.0489
601215	TJAOU-228A-GR-211-DU (on-site laboratory)	12/3/98	0–0.5	ND (0.248)	--	0.713	0.453	0.715	0.390	0.0449	0.0203
601212	TJAOU-228A-GR-212-S	12/3/98	0–0.5	ND (0.0760)	--	0.449	0.979	1.02	0.128	0.121	0.0384
601212	TJAOU-228A-GR-213-S	12/3/98	0–0.5	ND (0.0953)	--	ND (0.572)	--	0.785	0.111	0.0751	0.034
601212	TJAOU-228A-GR-214-S	12/3/98	2–3	0.0842	0.11	**1.42**	1.77	0.656	0.0919	ND (0.0121)	--
601212	TJAOU-228A-GR-215-S	12/3/98	2–3	ND (0.0732)	--	0.971	1.91	1.08	0.159	ND (0.0127)	--
601212	TJAOU-228A-GR-216-S	12/3/98	2–3	0.135	0.186	1.13	0.717	0.969	0.146	ND (0.0132)	--
601215	TJAOU-228A-GR-216-S (on-site laboratory)	12/3/98	2–3	0.157	0.237	0.923	0.497	0.767	0.387	ND (0.0401)	--
601212	TJAOU-228A-GR-217-S	12/3/98	0–0.5	0.113	0.176	**3.08**	1.6	1.00	0.122	ND (0.0110)	--
601619	TJAOU-228A-GR-229-S (on-site laboratory)	2/15/99	0–0.5	ND (0.200)	--	ND (0.695)	--	0.882	0.452	0.0531	0.0307
601619	TJAOU-228A-GR-230-S (on-site laboratory)	2/15/99	0–0.5	0.107	0.164	0.592	0.534	0.832	0.425	0.0428	0.0263
601619	TJAOU-228A-GR-231-S (on-site laboratory)	2/15/99	0–0.5	ND (0.240)	--	ND (0.796)	--	0.835	0.453	0.621	0.109
601619	TJAOU-228A-GR-232-S (on-site laboratory)	2/15/99	0–0.5	0.0903	0.150	ND (0.628)	--	0.907	0.442	0.0959	0.0331
601619	TJAOU-228A-GR-233-S (on-site laboratory)	2/15/99	0–0.5	ND (0.189)	--	ND (0.651)	--	0.828	0.424	0.104	0.0370

Refer to footnotes at end of table.

Table 3.4.5-14 (Continued)
Summary of SWMU 228A Site-Confirmatory Sampling Gamma Spectroscopy Analytical Results, September 1998–February 1999
(Off-Site Laboratories, except where indicated)

Sample Attributes				Activity (pCi/g)							
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Uranium-235		Uranium-238		Thorium-232		Cesium-137	
				Result	Error[b]	Result	Error[b]	Result	Error[b]	Result	Error[b]
601619	TJAOU-228A-GR-234-S (on-site laboratory)	2/15/99	0–0.5	ND (0.199)	--	ND (0.668)	--	0.853	0.779	0.0254	0.0238
601619	TJAOU-228A-GR-235-S (on-site laboratory)	2/15/99	0–0.5	ND (0.221)	--	ND (0.736)	--	0.961	0.506	0.456	0.0836
601619	TJAOU-228A-GR-236-S (on-site laboratory)	2/15/99	0–0.5	0.108	0.164	ND (0.709)	--	0.738	1.44	0.119	0.0392
601619	TJAOU-228A-GR-237-S (on-site laboratory)	2/15/99	0–0.5	ND (0.206)	--	ND (0.691)	--	0.754	0.404	0.0380	0.0243
601619	TJAOU-228A-GR-238-S (on-site laboratory)	2/15/99	0–0.5	ND (0.206)	--	ND (0.723)	--	0.806	0.426	ND (0.0280)	--
601620	TJAOU-228A-GR-239-S (on-site laboratory)	2/15/99	0–0.5	ND (0.218)	--	ND (0.732)	--	0.799	0.445	0.190	0.0500
601620	TJAOU-228A-GR-240-S (on-site laboratory)	2/15/99	0–0.5	ND (0.207)	--	ND (0.736)	--	0.787	0.429	0.0210	0.0272
601620	TJAOU-228A-GR-241-S (on-site laboratory)	2/15/99	0–0.5	ND (0.225)	--	ND (0.796)	--	0.760	0.430	ND (0.0311)	--
601620	TJAOU-228A-GR-242-S (on-site laboratory)	2/15/99	0–0.5	ND (0.199)	--	ND (0.659)	--	0.746	0.398	0.0420	0.0322
601620	TJAOU-228A-GR-243-S (on-site laboratory)	2/15/99	0–0.5	ND (0.223)	--	ND (0.781)	--	0.733	0.423	0.277	0.0638
601620	TJAOU-228A-GR-244-S (on-site laboratory)	2/15/99	0–0.5	0.105	0.174	ND (0.751)	--	0.820	0.416	0.0766	0.0373
601620	TJAOU-228A-GR-245-S (on-site laboratory)	2/15/99	0–0.5	ND (0.200)	--	ND (0.687)	--	0.841	0.436	0.0368	0.0182
601620	TJAOU-228A-GR-246-S (on-site laboratory)	2/15/99	0–0.5	ND (0.200)	--	ND (0.687)	--	0.825	0.440	0.0366	0.0244
601620	TJAOU-228A-GR-247-S (on-site laboratory)	2/15/99	0–0.5	ND (0.204)	--	ND (0.682)	--	0.865	0.433	ND (0.0281)	--
601620	TJAOU-228A-GR-248-S (on-site laboratory)	2/15/99	0–0.5	ND (0.226)	--	ND (0.785)	--	1.21	0.616	0.0247	0.0215
601620	TJAOU-228A-GR-249-S (on-site laboratory)	2/15/99	0–0.5	0.0912	0.153	ND (0.647)	--	0.839	0.0424	0.0150	0.0273
Background Soil Concentrations - North Supergroup[c]				0.18		1.3		1.54		0.836 (surface) 0.084 (subsurface)	

Refer to footnotes at end of table.

Table 3.4.5-14 (Concluded)
Summary of SWMU 228A Site-Confirmatory Sampling Gamma Spectroscopy Analytical Results, September 1998–February 1999
(Off-Site Laboratories, except where indicated.)

Sample Attributes				Activity (pCi/g)							
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Uranium-235		Uranium-238		Thorium-232		Cesium-137	
				Result	Error[b]	Result	Error[b]	Result	Error[b]	Result	Error[b]
Quality Assurance/Quality Control Samples (all in pCi/L)											
600836	TJAOU-228A-GR-EB	9/8/98	NA	8.4	3.8	93.2	91.2	NR	--	2.4	1.7
600836	TJAOU-228A-GR-EB	9/9/98	NA	18.9	4.8	323	31.8	NR	--	1.3	1.9
601189	TJAOU-228A-EB	12/1/98	NA	ND (11.5)	--	ND (136)	--	ND (3.26)	--	ND (2.27)	--
601191	TJAOU-228A-EB	12/2/98	NA	ND (10.1)	--	ND (72.4)	--	4.67	7.6	ND (2.10)	--
601212	TJAOU-228A-EB	12/3/98	NA	13.2	28.3	143	98.3	ND (3.80)	--	ND (2.20)	--
601620	TJAOU-228A-GR-EB2 (on-site laboratory)	2/15/99	NA	ND (0.113)	--	ND (0.332)	--	ND (0.113)	--	ND (0.0180)	--

Note: Values in **bold** exceed background soil activities.

[a]Analysis request/chain of custody.

[b]Two standard deviations about the mean detected activity.

[c]From Dinwiddie September 1997. The minimum background activity between surface and subsurface values is used.

DU = Duplicate sample.
EB = Equipment blank.
ER = Environmental Restoration.
ft = Foot (feet).
GR = Grab sample.
ID = Identification.
NA = Not applicable.
ND ( ) = Not detected above the minimum detectable activity, shown in parentheses.
NR = Not reported.
pCi/g = Picocurie(s) per gram.
pCi/L = Picocurie(s) per liter.
S = Soil sample.
SWMU = Solid Waste Management Unit.
TJAOU = Tijeras Arroyo Operable Unit.
-- = Error not calculated for nondetectable results.

Table 3.4.5-15
Summary of SWMU 228A Soil Piles Confirmatory Sampling Gamma Spectroscopy Analytical Results, September–December 1998 (Off-Site Laboratories, except where indicated)

Sample Attributes				Activity (pCi/g)							
				Uranium-235		Uranium-238		Thorium-232		Cesium-137	
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Result	Error[b]	Result	Error[b]	Result	Error[b]	Result	Error[b]
600800	TJAOU-228A-GR-143-S (on-site laboratory)	9/9/98	0–0.5	0.135	0.164	ND (0.457)	--	0.809	0.419	0.0243	0.0250
600835	TJAOU-228A-GR-143-S	9/9/98	0–0.5	**0.2**	0.2	**4.0**	3.9	NR	--	0.1	0.1
600835	TJAOU-228A-GR-144-S	9/9/98	0–0.5	**0.2**	0.1	**2.9**	3.6	NR	--	0.2	0.1
600800	TJAOU-228A-GR-145-S (on-site laboratory)	9/9/98	0–0.5	0.145	0.169	ND (0.524)	--	0.941	0.505	ND (0.0342)	--
600835	TJAOU-228A-GR-145-S	9/9/98	0–0.5	**0.4**	0.1	**8.4**	2.4	NR	--	0.4	0.2
600835	TJAOU-228A-GR-146-S	9/9/98	0–0.5	**0.2**	0.4	**6.1**	4.3	NR	--	0.1	0.0
600800	TJAOU-228A-GR-147-S (on-site laboratory)	9/9/98	0–0.5	0.119	0.157	ND (0.495)	--	0.845	0.440	0.0770	0.0464
600835	TJAOU-228A-GR-147-S	9/9/98	0–0.5	**0.4**	0.2	**6.8**	2.8	NR	--	0.4	0.2
600835	TJAOU-228A-GR-148-S	9/9/98	0–0.5	0.1	0.1	**6.7**	5.3	NR	--	0.2	0.1
600800	TJAOU-228A-GR-149-S (on-site laboratory)	9/9/98	0–0.5	ND (0.101)	--	**4.71**	0.978	0.946	0.502	0.0396	0.0315
600835	TJAOU-228A-GR-149-S	9/9/98	0–0.5	**0.4**	0.2	**4.1**	4.3	NR	--	0.2	0.1
600835	TJAOU-228A-GR-150-S	9/9/98	0–0.5	0.1	0.2	**5.3**	3.3	NR	--	0.2	0.1
601212	TJAOU-228A-GR-218-S	12/3/98	0–0.5	**0.239**	0.19	**2.65**	1.35	0.893	0.11	0.0641	0.0338
601212	TJAOU-228A-GR-219-S	12/3/98	0–0.5	0.138	0.118	**2.67**	1.43	0.970	0.127	0.0552	0.0326
601212	TJAOU-228A-GR-220-S	12/3/98	0–0.5	0.129	0.18	**1.42**	0.981	0.961	0.123	0.0650	0.0444
601212	TJAOU-228A-GR-221-S	12/3/98	0–0.5	ND (0.0587)	--	**1.60**	0.757	ND (0.0192)	--	0.0111	0.02
601215	TJAOU-228A-GR-221-S (on-site laboratory)	12/3/98	0–0.5	**0.209**	0.376	**8.22**	1.94	0.904	1.63	0.0518	0.0271
601212	TJAOU-228A-GR-221-DU	12/3/98	0–0.5	0.0750	0.159	**1.96**	1.85	0.918	0.119	0.0224	0.0226
601215	TJAOU-228A-GR-221-DU (on-site laboratory)	12/3/98	0–0.5	ND (0.223)	--	1.18	0.498	0.852	0.398	0.0443	0.0244
601212	TJAOU-228A-GR-222-S	12/3/98	0–0.5	**0.284**	0.201	**2.05**	1.32	1.00	0.126	0.0996	0.038
601212	TJAOU-228A-GR-223-S	12/3/98	0–0.5	0.103	0.101	**1.98**	1.18	0.882	0.11	0.0660	0.0444
601212	TJAOU-228A-GR-224-S	12/3/98	0–0.5	0.0553	0.113	**1.83**	1.2	1.13	0.139	0.0707	0.051
601212	TJAOU-228A-GR-225-S	12/3/98	0–0.5	ND (0.0412)	--	**2.64**	0.764	1.08	0.151	0.0928	0.0455
601212	TJAOU-228A-GR-226-S	12/3/98	0–0.5	**0.217**	0.168	**1.61**	0.775	0.934	0.128	0.162	0.0108
601215	TJAOU-228A-GR-226-S (on-site laboratory)	12/3/98	0–0.5	0.121	0.209	0.929	0.605	0.944	0.748	0.153	0.0384
601212	TJAOU-228A-GR-227-S	12/3/98	0–0.5	0.0747	0.163	0.994	1.18	0.965	0.118	0.184	0.0487
601212	TJAOU-228A-GR-228-S	12/3/98	0–0.5	0.0685	0.182	0.702	1.2	0.959	0.121	0.194	0.0593
Background Soil Concentrations—North Supergroup[c]				0.18		1.3		1.54		0.836 (surface) 0.084 (subsurface)	

Refer to footnotes at end of table.

Table 3.5.5-15 (Concluded)
Summary of SWMU 228A Soil Piles Confirmatory Sampling Gamma Spectroscopy Analytical Results, September–December 1998
(Off-Site Laboratories, except where indicated)

Note: Values in **bold** exceed background soil activities.

[a]Analysis request/chain of custody.

[b]Two standard deviations about the mean detected activity.

[c]From Dinwiddie September 1997. The minimum background activity between surface and subsurface values is used.

DU = Duplicate sample.
ER = Environmental Restoration.
ft = Foot (feet).
GR = Grab Sample.
ID = Identification.
ND ( ) = Not detected above the minimum detectable activity, shown in parentheses.
NR = Not reported.
pCi/g = Picocurie(s) per gram.
S = Soil sample.
SWMU = Solid Waste Management Unit.
TJAOU = Tijeras Arroyo Operable Unit.
-- = Error not calculated for nondetectable results.

Table 3.4.5-16
Summary of SWMU 228A Site-Confirmatory Sampling
Isotopic Uranium (Alpha Spectroscopy) Analytical Results, September–December 1998
(Off-Site Laboratories)

Sample Attributes				Activity (pCi/g)					
				Uranium-233/234		Uranium-235		Uranium-238	
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Result	Error[b]	Result	Error[b]	Result	Error[b]
600799	TJAOU-228A-GR-120-S	9/8/98	0–0.5	0.670	0.250	0.0300	0.0500	0.750	0.250
600799	TJAOU-228A-GR-121-S	9/8/98	0–0.5	0.460	0.200	0.0400	0.0600	0.530	0.200
600799	TJAOU-228A-GR-122-S	9/8/98	0–0.5	0.790	0.280	0.0100	0.0300	0.880	0.290
600799	TJAOU-228A-GR-123-S	9/8/98	0–0.5	0.790	0.300	0.0500	0.0800	1.14	0.350
600799	TJAOU-228A-GR-123-DU	9/8/98	0–0.5	0.760	0.270	0.0300	0.0600	0.930	0.300
600799	TJAOU-228A-GR-124-S	9/8/98	0–0.5	1.32	0.370	0.110	0.100	1.19	0.340
600799	TJAOU-228A-GR-125-S	9/8/98	0–0.5	0.680	0.240	0.0200	0.0400	0.930	0.280
600799	TJAOU-228A-GR-126-S	9/8/98	0–0.5	1.08	0.320	0.00	0.0100	**1.36**	0.370
600799	TJAOU-228A-GR-127-S	9/8/98	0–0.5	0.790	0.270	0.100	0.0900	1.21	0.340
600799	TJAOU-228A-GR-128-S	9/8/98	0–0.5	0.840	0.290	0.0700	0.0800	0.830	0.280
600799	TJAOU-228A-GR-129-S	9/8/98	0–0.5	0.630	0.270	0.0100	0.0400	1.25	0.380
600799	TJAOU-228A-GR-130-S	9/8/98	0–0.5	0.480	0.210	0.0400	0.0600	0.920	0.300
600799	TJAOU-228A-GR-131-S	9/8/98	0–0.5	0.680	0.270	0.0600	0.0800	0.760	0.280
600799	TJAOU-228A-GR-132-S	9/8/98	0–0.5	0.970	0.300	0.00	0.0100	0.610	0.220
600835	TJAOU-228A-GR-133-S	9/8/98	0–0.5	0.830	0.300	0.0600	0.0800	0.900	0.300
600835	TJAOU-228A-GR-133-DU	9/8/98	0–0.5	0.820	0.270	0.0500	0.0600	0.840	0.270
600835	TJAOU-228A-GR-134-S	9/8/98	0–0.5	0.640	0.240	0.00	0.0100	0.890	0.290
600835	TJAOU-228A-GR-135-S	9/8/98	0–0.5	1.33	0.380	0.0700	0.0800	0.870	0.290
600835	TJAOU-228A-GR-136-S	9/8/98	0–0.5	0.830	0.290	0.0700	0.0800	1.05	0.320
600835	TJAOU-228A-GR-137-S	9/8/98	0–0.5	1.37	0.380	0.110	0.100	**1.57**	0.410
600835	TJAOU-228A-GR-138-S	9/8/98	0–0.5	1.14	0.360	0.0800	0.0800	0.990	0.320
600835	TJAOU-228A-GR-139-S	9/8/98	0–0.5	0.830	0.270	0.0900	0.0900	0.770	0.260
600835	TJAOU-228A-GR-140-S	9/8/98	0–0.5	1.03	0.330	0.0100	0.0400	1.09	0.330
600835	TJAOU-228A-GR-141-S	9/8/98	0–0.5	0.800	0.290	0.0100	0.0300	1.00	0.320
600835	TJAOU-228A-GR-142-S	9/8/98	0–0.5	0.850	0.300	0.110	0.100	0.850	0.290
601188	TJAOU-228A-GR-151-S	12/1/98	0–0.5	0.798	0.137	0.0533	0.03	0.786	0.135
601188	TJAOU-228A-GR-156-S	12/1/98	0–0.5	0.831	0.133	0.0721	0.0329	0.958	0.147
601188	TJAOU-228A-GR-161-S	12/1/98	0–0.5	0.871	0.142	0.0690	0.0358	1.30	0.187
601188	TJAOU-228A-GR-161-DU	12/1/98	0–0.5	1.15	0.181	0.0655	0.0367	**1.62**	0.23
601189	TJAOU-228A-GR-166-S	12/1/98	0–0.5	0.911	0.149	0.0658	0.0335	0.848	0.143
601189	TJAOU-228A-GR-171-S	12/1/98	0–0.5	1.17	0.187	0.0714	0.0375	**2.25**	0.297
601189	TJAOU-228A-GR-171-DU	12/1/98	0–0.5	1.30	0.192	0.0975	0.0417	**2.28**	0.29
601190	TJAOU-228A-GR-176-S	12/2/98	0–0.5	0.734	0.21	0.0371	0.043	0.888	0.231
601190	TJAOU-228A-GR-181-S	12/2/98	0–0.5	0.976	0.257	0.0821	0.0677	**2.62**	0.481
601190	TJAOU-228A-GR-181-DU	12/2/98	0–0.5	0.856	0.243	0.0793	0.0717	**1.59**	0.353
601190	TJAOU-228A-GR-186-S	12/2/98	0–0.5	0.760	0.229	0.0541	0.0583	**2.01**	0.411
601191	TJAOU-228A-GR-191-S	12/2/98	0–0.5	0.976	0.251	0.0389	0.0451	**1.38**	0.309

Refer to footnotes at end of table.

Table 3.4.5-16 (Concluded)
Summary of SWMU 228A Site-Confirmatory Sampling
Isotopic Uranium (Alpha Spectroscopy) Analytical Results, September–December 1998
(Off-Site Laboratories)

Sample Attributes				Activity (pCi/g)					
				Uranium-233/234		Uranium-235		Uranium-238	
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Result	Error[b]	Result	Error[b]	Result	Error[b]
601191	TJAOU-228A-GR-191-DU	12/2/98	0–0.5	0.770	0.227	ND (0.0250)	--	**1.60**	0.349
601191	TJAOU-228A-GR-196-S	12/2/98	0–0.5	0.884	0.333	ND (0.0211)	--	**1.33**	0.415
601192	TJAOU-228A-GR-201-S	12/3/98	0–0.5	0.702	0.168	0.0371	0.0361	1.16	0.226
601192	TJAOU-228A-GR-201-DU	12/3/98	0–0.5	0.694	0.149	0.0675	0.0441	1.28	0.215
601192	TJAOU-228A-GR-206-S	12/3/98	0–0.5	0.863	0.165	0.0318	0.0324	0.869	0.165
601192	TJAOU-228A-GR-211-S	12/3/98	0–0.5	0.677	0.137	0.0366	0.0358	0.680	0.137
601192	TJAOU-228A-GR-211-DU	12/3/98	0–0.5	0.842	0.159	0.0433	0.0309	0.758	0.148
601212	TJAOU-228A-GR-216-S	12/3/98	2–3	0.657	0.137	0.0354	0.0296	0.584	0.126
Background Soil Concentrations—North Area Supergroup[c]				1.6	NA	0.18	NA	1.3	NA
Quality Assurance/Quality Control Samples (all in pCi/L)									
600836	TJAOU-228A-GR-EB	9/8/98	NA	0.0400	0.130	0.0700	0.110	0.140	0.150
600836	TJAOU-228A-GR-EB	9/8/98	NA	0.0500	0.130	0.0100	0.0600	0.00	0.0100
601189	TJAOU-228A-EB	12/2/98	NA	0.0638	0.032	ND (0.0209)	--	0.0366	0.0238
601191	TJAOU-228A-EB	12/2/98	NA	0.0384	0.0323	0.0385	0.0239	0.0438	0.027
601212	TJAOU-228A-TB	12/3/98	NA	0.0504	0.0288	0.0323	0.0245	0.0383	0.0259

Note: Values in **bold** exceed background soil activities.

[a]Analysis request/chain of custody.

[b]Two standard deviations about the mean detected activity.

[c]From Dinwiddie September 1997. The minimum background activity between surface and subsurface values is used.

DU = Duplicate sample.
EB = Equipment blank.
ER = Environmental Restoration.
ft = Foot (feet).
GR = Grab sample.
ID = Identification.
NA = Not applicable.
ND ( ) = Not detected above the minimum detectable activity, shown in parentheses.
pCi/g = Picocurie(s) per gram.
pCi/L = Picocurie(s) per liter.
S = Soil sample.
SWMU = Solid Waste Management Unit.
TB = Trip blank.
TJAOU = Tijeras Arroyo Operable Unit.
-- = Error not calculated for nondetectable results.

Table 3.4.5-17
Summary of SWMU 228A Soil Piles Confirmatory Sampling
Isotopic Uranium (Alpha Spectroscopy) Analytical Results,
September–December 1998
(Off-Site Laboratories)

Sample Attributes				Activity (pCi/g)					
				Uranium-233/234		Uranium-235		Uranium-238	
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Date Sampled	Sample Depth (ft)	Result	Error[b]	Result	Error[b]	Result	Error[b]
600835	TJAOU-228A-GR-143-S	9/9/98	0–0.5	0.780	0.280	0.0600	0.0700	0.630	0.240
600835	TJAOU-228A-GR-144-S	9/9/98	0–0.5	0.670	0.240	0.0500	0.0600	0.680	0.240
600835	TJAOU-228A-GR-145-S	9/9/98	0–0.5	0.960	0.310	0.140	0.110	0.870	0.290
600835	TJAOU-228A-GR-146-S	9/9/98	0–0.5	0.720	0.260	0.0500	0.0700	0.800	0.270
600835	TJAOU-228A-GR-147-S	9/9/98	0–0.5	0.820	0.280	0.0300	0.0500	0.700	0.240
600835	TJAOU-228A-GR-148-S	9/9/98	0–0.5	0.570	0.250	0.100	0.0900	0.950	0.310
600835	TJAOU-228A-GR-149-S	9/9/98	0–0.5	**1.64**	0.440	0.0400	0.0700	**2.38**	0.560
600835	TJAOU-228A-GR-150-S	9/9/98	0–0.5	1.19	0.370	0.0900	0.100	**2.47**	0.580
601212	TJAOU-228A-GR-221-S	12/3/98	0–0.5	1.23	0.209	0.101	0.0519	**1.68**	0.258
601212	TJAOU-228A-GR-221-DU	12/3/98	0–0.5	1.06	0.183	0.0711	0.04	**1.71**	0.255
601212	TJAOU-228A-GR-226-S	12/3/98	0–0.5	0.832	0.16	0.0286	0.0257	1.06	0.187
Background Soil Concentrations—North Area Supergroup[c]				1.6	NA	0.18	NA	1.3	NA

Note: Values in **bold** exceed background soil activities.

[a]Analysis request/chain of custody.

[b]Two standard deviations about the mean detected activity.

[c]From Dinwiddie September 1997. The minimum background activity between surface and subsurface values is used.

DU = Duplicate sample.
ER = Environmental Restoration.
ft = Foot (feet).
GR = Grab sample.
ID = Identification.
NA = Not applicable.
pCi/g = Picocurie(s) per gram.
S = Soil sample.
SWMU = Solid Waste Management Unit.
TJAOU = Tijeras Arroyo Operable Unit.

Arsenic, chromium, mercury, selenium, and silver were not detected above the background concentration limit in any of the soil samples collected at SWMU 228A. Barium was detected at slightly above the background concentration limit in two samples from site-confirmatory locations (TJAOU-228A-GR-133-S and TJAOU-228A-GR-140-S) but was not detected above background in the duplicate sample TJAOU-228A-GR-133-DU. Barium was also detected at slightly above the background concentration limit in one soil pile sample (TJAOU-228A-GR-144-S). Cadmium was detected at levels above the background concentration limit in two site-confirmatory samples (TJAOU-228A-GR-129-S and TJAOU-228A-GR-209-S). Lead was detected at levels above the background concentration limit in five site-confirmatory samples (TJAOU-228A-GR-129-S, TJAOU-228A-GR-133-S, TJAOU-228A-GR-140-S, TJAOU-228A-GR-163-S, and TJAOU-228A-GR-209-S). However, lead was not detected above background in the duplicate sample TJAOU-228A-GR-133-DU. Additionally, two of the samples were laboratory estimated values (TJAOU-228A-GR-133-S and TJAOU-228A-GR-140-S). Lead was detected at levels above the background concentration limit in four soil pile samples (TJAOU-228A-GR-143-S, TJAOU-228A-GR-144-S, TJAOU-228A-GR-147-S, and TJAOU-228A-GR-148-S), although all of these were laboratory estimated values. Total uranium was detected above the background concentration limit in all soil samples for which uranium analyses were performed (14 site-confirmatory samples and 8 soil pile samples).

HE

No HE compounds were detected in any of the soil samples collected at SWMU 228A. Because there are no background concentrations for HE compounds in soil, any detectable HE compounds in the samples collected at SWMU 228A would have been considered an indication of contamination. Table 3.4.5-7 summarizes the detection limits for analysis of HE compounds by the off-site laboratories.

VOCs

Tables 3.4.5-8 and 3.4.5-9 summarize the off-site VOC analytical results for both the site-confirmatory sampling (19 surface soil samples, 1 subsurface soil sample, 8 duplicate samples, 4 equipment blank samples, and 4 trip blank samples) and the soil piles sampling (6 surface soil samples and 1 duplicate sample), respectively. Only two VOCs, benzene and methylene chloride, were detected in soil. However, the detections were in the single-digit µg/kg range and most were 'J' values. The maximum benzene and methylene chloride concentrations were 1.2 and 7.2 µg/kg, respectively. Methylene chloride is a common analytical laboratory contaminant (Bleyler February 1988), and was detected in three of the QA/QC samples.

Because there are no established background concentrations for VOC compounds in soil, any detectable VOCs in the samples collected at SWMU 228A were considered an indication of contamination for risk assessment purposes. Benzene was detected in one site-confirmatory soil sample (TJAOU-228A-GR-133-S), although it was not detected in the duplicate soil sample from that location (TJAOU-228A-GR-133-DU). Methylene chloride was detected in six site-confirmatory soil samples (TJAOU-228A-GR-120-S, TJAOU-228A-GR-123-S, TJAOU-228A-GR-123-DU, TJAOU-228A-GR-129-S, TJAOU-228A-GR-161-S, and TJAOU-228A-GR-216-S); all but sample TJAOU-228A-GR-216-S were estimated values. Methylene chloride was not detected in the duplicate sample TJAOU-228A-GR-161-DU. Two trip blanks and one equipment blank yielded levels above the minimum detection limit (MDL) but below the practical

quantitation limit (PQL) (TJAOU-228A-TB sampled December 1, 1998, and December 2, 1998, and TJAOU-228A-EB sampled December 1, 1998). Methylene chloride was also detected above the MDL but below the PQL in one soil pile sample (TJAOU-228A-GR-221-S). Table 3.4.5-10 summarizes the VOCs analyzed and the associated MDLs used for off-site analyses.

SVOCs

Tables 3.4.5-11 and 3.4.5-12 summarize the off-site SVOC analytical results for the results for both the site-confirmatory sampling (19 surface soil samples, 1 subsurface soil sample, 8 duplicate samples, and 5 equipment blank samples) and the soil piles sampling (6 surface soil samples and 1 duplicate sample).

Because there are no established background concentrations for SVOC compounds in soil, any detectable SVOCs in the samples collected at SWMU 228A were considered an indication of contamination. Fifteen different SVOCs were detected in some of the confirmatory samples from SWMU 228A: acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, di-n-butyl phthalate, bis(2-ethylhexyl)phthalate, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene. With the exceptions of benzo(b)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene, the detected SVOCs were estimated 'J' values greater than or equal to the MDL but less than the PQL for all the site-confirmatory samples. For all soil pile samples, the detected SVOCs were estimated 'J' values greater than or equal to the MDL but less than the PQL. None of the SVOCs exceeded 1 part per million. Table 3.4.5-13 summarizes the SVOCs analyzed and the associated MDLs used for off-site analyses.

Radionuclides

Tables 3.4.5-14 and 3.4.5-15 summarize the off-site and on-site gamma spectroscopy analysis results for both the site-confirmatory sampling (127 surface soil samples, 4 subsurface soil samples, 16 duplicate samples, and 6 equipment blanks) and the soil piles sampling (25 surface soil samples and 2 duplicate samples), respectively. Tables 3.4.5-16 and 3.4.5-17 summarize the off-site isotopic uranium (alpha spectroscopy) analysis results for both the site-confirmatory sampling (36 surface soil samples, 1 subsurface soil sample, 8 duplicate samples, 4 equipment blanks, and 1 trip blank) and the soil piles sampling (10 surface soil samples and 1 duplicate sample). Thorium-232 and cesium-237 were not detected at levels above the background activity limit in any of the confirmatory samples. Uranium-235 and uranium-238 were detected at levels above the background activity limit in many of the site-confirmatory surface soil samples and soil pile samples. Uranium-238 was detected at a level slightly above the background activity limit in one site-confirmatory subsurface soil sample. Uranium-233/234 was not detected above the background activity limit in any of the site-confirmatory samples but was detected in one soil pile sample.

Soil sample TJAOU-228A-GR-123-S yielded the highest uranium-238 activity at 11.4 pCi/g. However, the duplicate sample TJAOU-228A-GR-123-DU and the on-site split sample TJAOU-228A-GR-123-S yielded uranium-238 activities of 2.2 and 0.884 pCi/g, respectively. These two lower values are more reasonable because location GR-123 is situated in an area

that had no DU fragments or weapons debris. All of the uranium-238 values were well below the PRG of 271 pCi/g set forth in the VCM plan (SNL/NM July 1998).

Data Quality

Tables 3.4.5-5, 3.4.5-8, 3.4.5-11, 3.4.5-14, and 3.4.5-16 show the results of the analyses of metals, VOC, SVOC, and radionuclide QA/QC samples that were collected during the confirmatory sampling at SWMU 228A. These QA/QC samples consisted of six equipment blanks and four trip blanks. All of the equipment blanks and trip blanks were analyzed off site for metals, VOCs, and SVOCs. For radionuclides, one of the equipment blanks was analyzed on site and all other blanks were analyzed off site.

The QA/QC samples for metals yielded either no detections or extremely low estimated values. To assess the precision of laboratory analytical procedures, nine samples were collected and analyzed for metals in replicate. Relative percent differences (RPD) were calculated from the data and are included in Table 3.4.5-18. Because many of the sample pairs are nondetect, RPDs could not be calculated for cadmium, mercury, or silver.

The RPDs range from 0 to 24.3 percent for arsenic, 0.9 to 25.8 for barium, 3.3 to 35.7 for chromium, 0.1 to 26.2 for lead, 7.3 to 57.9 for selenium, and 44.7 to 49.9 for uranium. In general, the results obtained for the sample duplicates are in satisfactory agreement for a soil matrix.

None of the QA/QC samples for VOCs yielded detectable levels of benzene, although three of the samples (one equipment blank and two trip blanks) yielded estimated values of methylene chloride that were above the MDL and below the PQL. Methylene chloride is a common analytical laboratory contaminant (Bleyler February 1988). No SVOCs were detected in any of the QA/QC samples. The on-site QA/QC sample for radionuclides yielded no detections. The off-site QA/QC samples for radionuclides yielded detections in one or more of the samples.

Data Validation

All off-site laboratory results were reviewed and verified/validated according to SNL/NM (July 1994). In addition, all gamma spectroscopy results were reviewed according to SNL/NM (July 1996). Annex 3-F contains summaries of the off-site data validation results. The verification/validation process confirmed that the data are acceptable for use in this NFA proposal for SWMU 228A.

3.5 Site Conceptual Model

The site conceptual model for SWMU 228A is based upon the residual COCs identified in soil samples from the surface and subsurface of the Centrifuge Dump Site following the VCM remedial activities. Residual COCs identified in samples from soil piles generated during VCM remediation activities also contribute to the site conceptual model for SWMU 228A. This section summarizes the nature and extent of contamination and the environmental fate of COCs.

Table 3.4.5-18
Summary of SWMU 228A Field Duplicate Relative Percent Differences
(Off-Site Laboratories)

Sample Attributes			Relative Percent Difference								
Record Number[a]	ER Sample ID (Figure 3.4.5-8)	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Uranium
600799	TJAOU-228A-GR-123-S TJAOU-228A-GR-123-DU	0–0.5	5.0	16.1	NC	12.8	12.7	NC	NC	NC	44.7
600835	TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU	0–0.5	2.9	14.6	NC	14.3	NC	NC	NC	NC	49.9
601188	TJAOU-228A-GR-161-S TJAOU-228A-GR-161-DU	0–0.5	17.2	18.3	NC	33.3	18.1	NC	57.9	NC	NC
601189	TJAOU-228A-GR-171-S TJAOU-228A-GR-171-DU	0–0.5	9.5	1.6	NC	35.7	13.0	NC	7.3	NC	NC
601190	TJAOU-228A-GR-181-S TJAOU-228A-GR-181-DU	0–0.5	22.1	0.9	NC	11.6	0.1	NC	NC	NC	NC
601191	TJAOU-228A-GR-191-S TJAOU-228A-GR-191-DU	0–0.5	3.4	1.0	NC	11.6	5.7	NC	NC	NC	NC
601192	TJAOU-228A-GR-201-S TJAOU-228A-GR-201-DU	0–0.5	0.0	10.6	NC	3.3	4.6	NC	NC	NC	NC
601192	TJAOU-228A-GR-211-S TJAOU-228A-GR-211-DU	0–0.5	15.8	2.6	NC	25.6	2.6	NC	NC	NC	NC
601212	TJAOU-228A-GR-221-S TJAOU-228A-GR-221-DU	0–0.5	24.3	25.8	NC	10.5	26.2	NC	NC	NC	NC

[a]Analysis request/chain of custody.
DU = Duplicate sample.
ER = Environmental Restoration.
ft = Foot (feet).
GR = Grab sample.
ID = Identification.
NC = Not calculated for estimated values or nondetected results.
S = Soil sample.
SWMU = Solid Waste Management Unit.
TJAOU = Tijeras Arroyo Operable Unit.

3.5.1 Nature and Extent of Contamination

The COCs at SWMU 228A were DU, metals, VOCs, SVOCs, and HE associated with construction debris and DU-contaminated weapons debris that had been dumped at the site in the 1950s (Section 3.2). No HE compounds were detected at SWMU 228A. Because background concentrations for VOCs and SVOCs were not applicable, any detectable VOCs or SVOCs were considered potential contamination. Two VOC and 15 SVOC compounds (11 of which were estimated) were detected in a few samples (Section 3.4.5).

Metal and radionuclide COCs were determined by comparing sample results to background concentrations and activities that had been established for the surface soils in the North Supergroup Area (Dinwiddie September 1997). Any metals or radionuclides found to exceed background in any sample were considered potential COCs for the site. Consequently, metal COCs included barium, cadmium, lead, mercury, selenium, and silver. The radiological COCs include uranium-235 and uranium-238. Table 3.5.1-1 summarizes the COCs for SWMU 228A.

The confirmatory soil samples were collected to a maximum depth of 3 feet. Extensive sampling at other depths was not deemed important primarily because the VCM removed all DU fragments and debris from the site and confirmatory surveys (visual, geophysical, and radiological) did not identify any remaining remediation targets. Additionally, the vertical rate of contamination migration was expected to be extremely low for SWMU 228A because of the low precipitation, high evapotranspiration, impermeable vadose zone soils, and the relatively low solubility of DU and metals. Therefore, the confirmatory soil samples are considered to be representative of the soil potentially contaminated with COCs and sufficient to determine the vertical extent, if any, of COCs.

Radionuclide and metal COCs exceeded background activities or concentrations in numerous surface soil samples and one subsurface soil sample. With the exception of methylene chloride in one subsurface sample, VOCs and SVOCs were detected only in surface soil samples. The horizontal extent of residual contamination is limited to areas known to have contained DU fragments and/or other debris. Thus, the areas with residual contamination occur sporadically with no particular COC associations or correlation to other locations or areas that could be delineated as contaminated.

3.5.2 Environmental Fate

The primary source of COCs for SWMU 228A was the disposal of construction debris and DU-contaminated weapons debris at the site in the 1950s. The primary release mechanism of COCs to the surface and subsurface soils is the degradation of debris that occurred prior to debris removal during the VCM.

After the removal of weapons and construction debris, possible secondary release mechanisms include suspension and/or dissolution of trace levels of residual COCs in surface-water runoff and percolation to the vadose zone, direct contact with soil (radionuclides only), dust emissions, and uptake of COCs in the soil by biota (Figure 3.5.2-1). The depth to groundwater at the site (at approximately 280 feet bgs) precludes migration of residual COCs to the shallow groundwater system. The pathways to receptors are soil ingestion, inhalation, and direct exposure (radionuclides). Plant uptake was also considered as a pathway for the residential scenario only. Annex 3-I provides additional discussion of the fate and transport of COCs at SWMU 228A.

Table 3.5.1-1
Summary of Residual COCs for SWMU 228A

COC Type	Number of Samples	COCs Greater Than Background	Maximum Background Limit/North Supergroup[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	59 environmental; 9 duplicates	Arsenic	4.4	3.32	2.40	None
		Barium	200	216	125	TJAOU-228A-GR-133-S TJAOU-228A-GR-140-S TJAOU-228A-GR-144-S
		Cadmium	<1	1.77	0.22	TJAOU-228A-GR-129-S TJAOU-228A-GR-209-S
		Chromium	12.8	12.0	7.5	None
		Lead	11.2	40.5	9.7	TJAOU-228A-GR-129-S TJAOU-228A-GR-133-S TJAOU-228A-GR-140-S TJAOU-228A-GR-143-S TJAOU-228A-GR-144-S TJAOU-228A-GR-147-S TJAOU-228A-GR-148-S TJAOU-228A-GR-163-S TJAOU-228A-GR-209-S
		Mercury	<0.1	0.063 J	0.014	All samples below nonquantified background value
		Selenium	<1	0.918	0.304	All samples below nonquantified background value
		Silver	<1	0.436 J	0.152	All samples below nonquantified background value
	20 environmental; 2 duplicates	Uranium	2.3	83.9	28.5	All samples above background value
Radionuclides	121 environmental; 18 duplicates; 35 splits	Cs-137	0.836 pCi/g	0.621 pCi/g	Not calculated[d]	None
	121 environmental; 18 duplicates; 35 splits	Th-232	1.54 pCi/g	1.24 pCi/g	Not calculated[d]	None
	47 environmental; 9 duplicates	U-233/234	1.6 pCi/g	1.64 pCi/g	Not calculated[d]	TJAOU-228A-GR-149-S
	168 environmental; 27 duplicates; 35 splits	U-235	0.18 pCi/g	0.8 pCi/g	Not calculated[d]	47 samples above background level, plus an additional 28 samples with nondetect results where the MDA exceeds background
	168 environmental; 27 duplicates; 35 splits	U-238	1.3 pCi/g	11.4 pCi/g	Not calculated[d]	123 samples above background level

Refer to footnotes at end of table.

Table 3.5.1-1 (Continued)
Summary of COCs for SWMU 228A

COC Type	Number of Samples	COCs Greater Than Background	Maximum Background Limit/North Supergroup[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]
Volatile Organic Compounds	26 environmental; 9 duplicates	Benzene	NA	1.2 µg/kg	0.51 µg/kg	TJAOU-228A-GR-133-S
		Methylene chloride	NA	7.2 µg/kg	0.72 µg/kg	TJAOU-228A-GR-120-S TJAOU-228A-GR-123-S TJAOU-228A-GR-123-DU TJAOU-228A-GR-129-S TJAOU-228A-GR-161-S TJAOU-228A-GR-216-S TJAOU-228A-GR-221-S
Semivolatile Organic Compounds	26 environmental; 9 duplicates	Acenaphthene	NA	70 J µg/kg	15 µg/kg	TJAOU-228A-GR-129-S
		Anthracene	NA	110 J µg/kg	23 µg/kg	TJAOU-228A-GR-129-S TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU TJAOU-228A-GR-140-S TJAOU-228A-GR-147-S TJAOU-228A-GR-171-DU
		Benzo(a)anthracene	NA	320 J µg/kg	59 µg/kg	TJAOU-228A-GR-123-S TJAOU-228A-GR-123-DU TJAOU-228A-GR-129-S TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU TJAOU-228A-GR-140-S TJAOU-228A-GR-145-S TJAOU-228A-GR-147-S TJAOU-228A-GR-149-S TJAOU-228A-GR-171-DU TJAOU-228A-GR-186-S
		Benzo(a)pyrene	NA	260 J µg/kg	47 µg/kg	TJAOU-228A-GR-123-DU TJAOU-228A-GR-129-S TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU TJAOU-228A-GR-140-S TJAOU-228A-GR-145-S TJAOU-228A-GR-147-S TJAOU-228A-GR-149-S TJAOU-228A-GR-171-DU

Refer to footnotes at end of table.

Table 3.5.1-1 (Continued)
Summary of COCs for SWMU 228A

COC Type	Number of Samples	COCs Greater Than Background	Maximum Background Limit/North Supergroup[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]
Semivolatile Organic Compounds (Continued)		Benzo(b)fluoranthene	NA	370 µg/kg	65 µg/kg	TJAOU-228A-GR-123-DU TJAOU-228A-GR-129-S TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU TJAOU-228A-GR-140-S TJAOU-228A-GR-145-S TJAOU-228A-GR-149-S TJAOU-228A-GR-171-DU TJAOU-228A-GR-186-S
		Benzo(ghi)perylene	NA	250 J µg/kg	42 µg/kg	TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU TJAOU-228A-GR-140-S TJAOU-228A-GR-147-S TJAOU-228A-GR-171-DU
		Benzo(k)fluoranthene	NA	280 J µg/kg	33 µg/kg	TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU TJAOU-228A-GR-140-S TJAOU-228A-GR-149-S
		Chrysene	NA	370 µg/kg	66 µg/kg	TJAOU-228A-GR-123-S TJAOU-228A-GR-123-DU TJAOU-228A-GR-129-S TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU TJAOU-228A-GR-140-S TJAOU-228A-GR-145-S TJAOU-228A-GR-147-S TJAOU-228A-GR-149-S TJAOU-228A-GR-171-DU TJAOU-228A-GR-186-S
		Di-n-butylphthalate	NA	60 J µg/kg	15 µg/kg	TJAOU-228A-GR-120-S TJAOU-228A-GR-123-S TJAOU-228A-GR-129-S TJAOU-228A-GR-147-S

Refer to footnotes at end of table.

Table 3.5.1-1 (Continued)
Summary of COCs for SWMU 228A

COC Type	Number of Samples	COCs Greater Than Background	Maximum Background Limit/North Supergroup[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]
Semivolatile Organic Compounds (Continued)		Bis(2-ethylhexyl) phthalate	NA	110 J µg/kg	24 µg/kg	TJAOU-228A-GR-120-S TJAOU-228A-GR-123-S TJAOU-228A-GR-123-DU TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU TJAOU-228A-GR-137-S TJAOU-228A-GR-140-S TJAOU-228A-GR-143-S TJAOU-228A-GR-145-S TJAOU-228A-GR-147-S TJAOU-228A-GR-149-S
		Fluoranthene	NA	630 µg/kg	112 µg/kg	TJAOU-228A-GR-123-S TJAOU-228A-GR-123-DU TJAOU-228A-GR-129-S TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU TJAOU-228A-GR-140-S TJAOU-228A-GR-145-S TJAOU-228A-GR-147-S TJAOU-228A-GR-149-S TJAOU-228A-GR-171-DU TJAOU-228A-GR-181-DU TJAOU-228A-GR-186-S TJAOU-228A-GR-221-S
		Fluorene	NA	50 J µg/kg	12 µg/kg	TJAOU-228A-GR-129-S
		Ideno(1,2,3-c,d) pyrene	NA	99 J µg/kg	21 µg/kg	TJAOU-228A-GR-133-S TJAOU-228A-GR-140-S TJAOU-228A-GR-147-S TJAOU-228A-GR-171-DU

Refer to footnotes at end of table.

Table 3.5.1-1 (Continued)
Summary of COCs for SWMU 228A

COC Type	Number of Samples	COCs Greater Than Background	Maximum Background Limit/North Supergroup[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]
Semivolatile Organic Compounds (Continued)		Phenanthrene	NA	420 µg/kg	51 µg/kg	TJAOU-228A-GR-123-S TJAOU-228A-GR-123-DU TJAOU-228A-GR-129-S TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU TJAOU-228A-GR-140-S TJAOU-228A-GR-145-S TJAOU-228A-GR-147-S TJAOU-228A-GR-149-S TJAOU-228A-GR-171-DU
		Pyrene	NA	600 µg/kg	109 µg/kg	TJAOU-228A-GR-120-S TJAOU-228A-GR-123-S TJAOU-228A-GR-123-DU TJAOU-228A-GR-129-S TJAOU-228A-GR-133-S TJAOU-228A-GR-133-DU TJAOU-228A-GR-140-S TJAOU-228A-GR-145-S TJAOU-228A-GR-147-S TJAOU-228A-GR-149-S TJAOU-228A-GR-171-DU TJAOU-228A-GR-186-S

[a]From Dinwiddie September 1997.

[b]Average concentration includes all samples. For nondetectable results, the detection limit is used to calculate the average.

[c]Includes all samples with detectable concentrations (VOCs and SVOCs) or all samples with nondetectable results where the MDA exceeds background (radionuclides).

[d]An average MDA is not calculated because of the variability in instrument counting error and the number of reported nondetectable activities.

COC = Constituent of concern.
DU = Duplicate sample.
GR = Grab sample.
J = The reported value is greater than or equal to the method detection limit, but is less than the practical quantitation limit.
µg/kg = Microgram(s) per kilogram.
MDA = Minimum detectable activity.
mg/kg = Milligrams per kilogram.
NA = Not applicable.
pCi/g = Picocurie(s) per gram.
S = Soil sample.
SVOC = Semivolatile organic compounds.
SWMU = Solid Waste Management Unit.
TJAOU = Tijeras Arroyo Operable Unit.
VOC = Volatile organic compounds.

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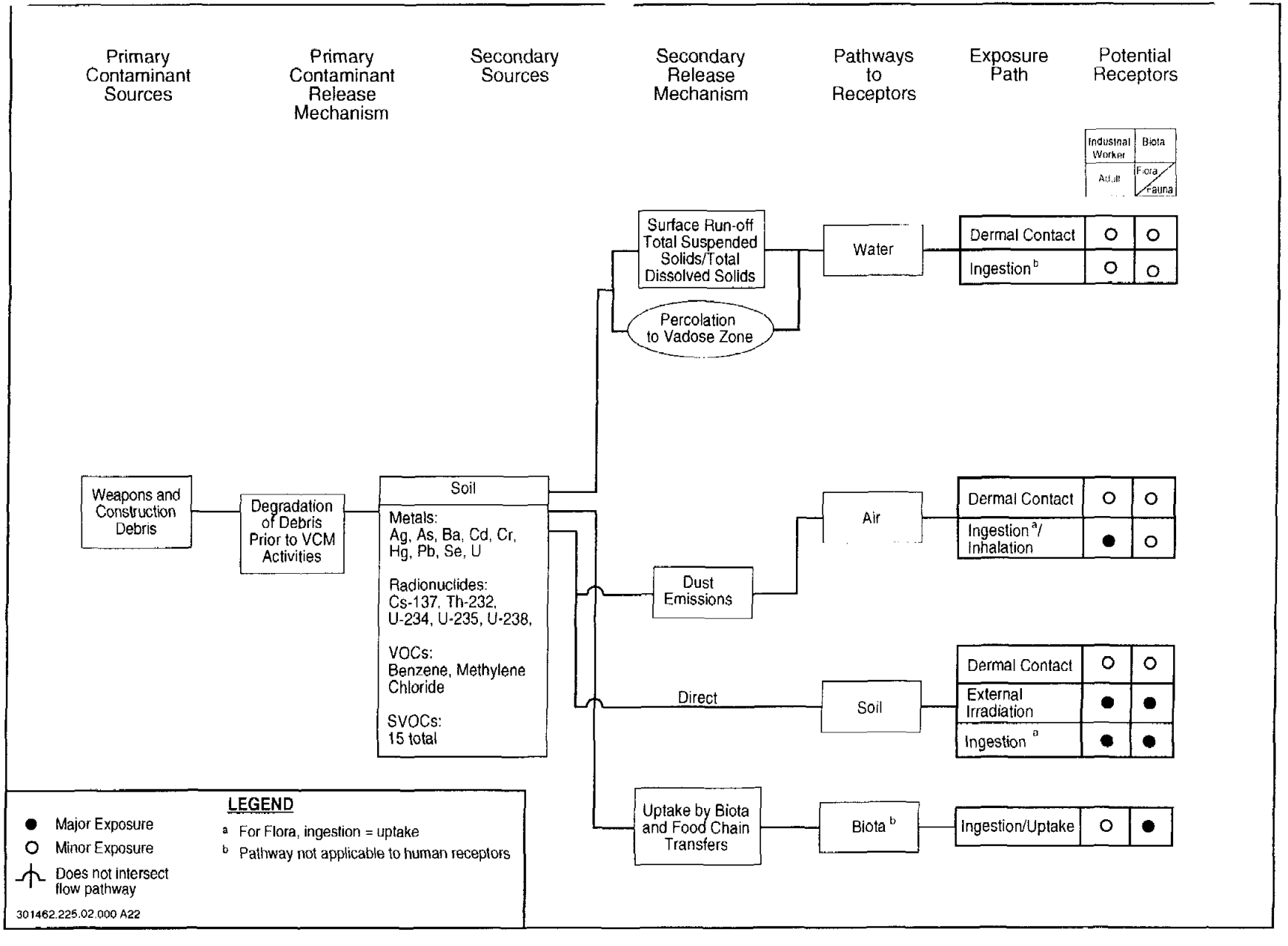

Figure 3.5.2-1

Conceptual Model Flow Diagram for SWMU 228A, Centrifuge Dump Site

Table 3.5.1-1 summarizes residual COCs for SWMU 228A. Based upon the nature and extent of contamination at the site (Section 3.5.1), metals, VOCs, SVOCs, and radionuclide COCs occur sporadically at low concentrations in the surface soils, generally at areas known to have contained visible DU fragments and/or other debris. Other than this, no distinct vertical or horizontal distribution of contamination is present. All potential COCs were retained in the conceptual model and were evaluated in the human health and ecological risk assessments.

The current land use for SWMU 228A is industrial. The future land use for SWMU 228A is also industrial (DOE et al. September 1995). The potential human receptor is considered an industrial worker at the site. For all applicable pathways, the exposure route for the industrial worker is dermal contact and ingestion/inhalation. Major exposure routes modeled in the human health risk assessment include soil ingestion for nonradiological and radiological COCs and direct gamma exposure for the radiological COCs. The inhalation pathway for both nonradiological and radiological COCs is also 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. Only soil ingestion is considered a primary contributor to exposure for the industrial worker. Potential biota receptors include flora and fauna at the site. Direct soil ingestion is considered a major exposure route for biota, in addition to ingesting COCs through food chain transfers, the direct contact with COCs in soil, and direct gamma exposure from radiological COCs. Section V, Annex 3-I provides additional discussion of the exposure routes and receptors at SWMU 228A.

3.6 Site Assessments

Site assessment at SWMU 228A 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, and Annex 3-I provides details of the site assessment.

3.6.1 Summary

The site assessment concludes that SWMU 228A has no significant potential to affect human health under the industrial land-use scenario recommended by DOE et al. (October 1995). After considering the uncertainties associated with the available data and modeling assumptions, ecological risks associated with SWMU 228A were found to be very low. Section 3.6.2 briefly describes and Annex 3-I provides details of the site assessments.

3.6.2 Screening Assessments

Risk screening assessments were performed for both human health risk and ecological risk for SWMU 228A. This section summarizes the results.

3.6.2.1 Human Health

SWMU 228A has been recommended for industrial land-use (DOE et al. September 1995). Annex 3-I provides a complete discussion of the risk assessment process, results, and uncertainties. Because of the presence of COCs in concentrations or activities greater than

background levels, it was necessary to perform a health risk assessment analysis for the site. This assessment included metals and radionuclide COCs detected above background and any organic compounds detected above their detection limits. The risk assessment process provides a quantitative evaluation of the potential adverse human health effects caused by constituents in soil at the site. 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 228A nonradiological COCs is 0.03 for the industrial land-use setting, which is less than the numerical standard of 1.0 suggested by risk assessment guidance (EPA 1989). Excess cancer risk was estimated at 2E-6 for SWMU 228A nonradiological COCs for an industrial land-use setting. Guidance from the NMED indicates that excess lifetime risk of developing cancer by an individual must be less than 1E-6 for Class A and B carcinogens and less than 1E-5 for Class C carcinogens (NMED March 1998). For this risk assessment, the excess cancer risk was driven by benzo(a)pyrene, benzo(b)fluoranthene, and benzo(g,h,i)perylene. All three of these organics are Class B2 carcinogens. Thus, the excess cancer risk for SWMU 228A was above the suggested acceptable risk value of 1E-6. Incremental risk was determined by subtracting risk associated with background from potential COC risk. The incremental HI is 0.03. Incremental cancer risk was 1.52E-6 for the industrial land-use scenario, a value above the proposed guidelines.

The calculated HI for the nonradiological COCs was within the human health acceptable range for the industrial land-use scenario compared to established numerical guidance. Although the excess cancer risk was above proposed guidelines, the excess cancer risk was conservatively estimated by using maximum concentrations of the detected COCs. Because the site was adequately characterized, average concentrations were more representative of actual site conditions. If the 95th upper confidence limit of the mean for benzo(a) pyrene (0.13 mg/kg), benzo(b) fluoranthene (0.18 mg/kg), and benzo(g,h,i) perylene (0.11 mg/kg) are used in place of maximum concentrations, the excess cancer risk is reduced to 8E-7 which is within proposed guidelines considering an industrial land-use scenario.

The incremental total effective dose equivalent for radionuclides for an industrial land-use setting for SWMU 228A is 7.0E-1 millirems (mrem)/year (yr), which is significantly less than the recommended dose limit of 15 mrem/yr found in EPA (August 1997) reflected in SNL/NM (February 1998b).

The residential land-use scenarios for this site are provided only for comparison in the Risk Screening Assessment Report (Annex 3-I). The report concludes that SWMU 228A does not have potential to affect human health under a residential land-use scenario.

A close examination of the exposure assumptions revealed an overestimation of risk from nonradiological COCs, primarily attributable to the use of maximum exposure concentrations. Based upon an evaluation of this uncertainty, human health risks associated with this site are expected to be within the proposed guidelines and do not have the potential to affect human health under an industrial land-use scenario (see Sections VI.8 and VI.9, Annex 3-I).

3.6.2.2 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 to background and identifying potentially bioaccumulative constituents (see Annex 3-I, Sections V, VII.2, and VII.3). This methodology also requires that a site conceptual model and a food web model be developed and that ecological receptors be selected. Each of these items is presented in IT (July 1998) and will not be duplicated here. The screening also includes the estimation of exposure and ecological risk.

Annex 3-I presents 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 initially predicted for uranium, barium and a number of organic compounds. A close examination of the exposure assumptions revealed an overestimation of risk, primarily attributable to treatment of exposure concentration, conservative exposure modeling assumptions, and conservative toxicity benchmark values. Based upon an evaluation of these uncertainties, ecological risks associated with this site are expected to be low.

3.7 No Further Action Proposal

Based upon field investigation data and the human-health risk assessment analysis, an NFA decision is being recommended for SWMU 228A for the following reasons:

- The VCM remediation has removed the DU fragments, weapon debris, and construction debris.
- The soil has been sampled for all relevant COCs.
- No residual nonradiological or radiological COCs are present in soil at levels considered hazardous to human health for an industrial land-use scenario.
- None of the nonradiological or radiological constituents warrant ecological concern.

Based upon the evidence provided above, SWMU 228A is proposed for NFA according to Criterion 5 (NMED March 1998).

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Annex 3-A

ANNEX 3-A
Reconnaissance Data Report
Sandia National Laboratories, Albuquerque, New Mexico
(DOE January 1989)

[Note: Only the pages pertinent to SWMU 50 are reproduced in this Annex.]

ENVIRONMENTAL RESTORATION PROGRAM

RECONNAISSANCE DATA REPORT
SANDIA NATIONAL LABORATORIES ALBUQUERQUE

January 1989

DEPARTMENT OF ENERGY

ALBUQUERQUE OPERATIONS OFFICE

ENVIRONMENT AND HEALTH DIVISION

ER PROGRAM PROJECT GROUP

DRAFT

INFORMATION ONLY

1. INTRODUCTION

An Environmental Restoration (ER) Program reconnaissance investigation was conducted at five potential release sites at Sandia National Laboratories Albuquerque in September 1987 (DOE 1987). The potential release sites investigated include

- the bunker outfall site (SNA47),
- the old centrifuge site (SNA50),
- the red towers site (SNA~~50~~55),
- the boxcar site (SNA66), and
- the south Kirtland Air Force Base (KAFB) boundary site (SNA69).

Figure 1 shows the approximate locations of the potential release sites.

Surface soil samples were collected from several locations at each potential release site and analyzed for uranium (total and isotopic), 2,4,6-trinitrotoluene (2,4,6-TNT), Hazardous Substance List (HSL) inorganics (total), toxic characteristic leaching procedure constituents (TCLP), and extraction procedure toxicity (EP Toxicity) constituents. Appendix A provides a more detailed description of the types and methods of analyses performed. This report presents the data obtained during the investigation at the five potential release sites.

A total of 50 soil samples were collected at the 5 potential release sites. At the time of sampling, all locations were marked with wooden stakes labeled with the location identification number. Many of the samples analyzed were composites of several locations. This was done at the request of the ER Program Technical Support Office (TSO) to characterize a larger area of each potential release in a more cost-effective manner. Single samples were taken at biased locations when a variation in soil color or an unusual feature (such as a pit) was present.

2. POTENTIAL RELEASE SITES

The following sections provide a brief description of the potential release sites, including the site history and reconnaissance sampling activities. The figures included for each potential release site are taken from field logbook sketches and are not to scale.

2.1. BUNKER OUTFALL

2.1.1. Site History

The bunker outfall (SNA47) is located at the southern boundary of KAFB near the United States Geologic Survey facility. The site consists of two underground bunker facilities and a cable line to a nearby arroyo from one of the bunkers. The site was used for treaty verification, so it is doubtful that any wastes were ever produced here. There is also a small pit at the site.

2.1.2. Sample Locations

Figure 2 shows the approximate sampling locations in relation to the present structures. The bunker outfall identification numbers include

- SNA47-001,
- SNA47-002,
- SNA47-003,
- SNA47-004 (composite sample of locations -004 and -005),
- SNA47-006 (composite sample of locations -006, -007, -008, -009 and -010),
- SNA47-011, and
- SNA47-012.

2.2. OLD CENTRIFUGE SITE

2.2.1. Site History

The old centrifuge site (SNA50) is on the bank of the Tijeras Arroyo near Technical Area II. The rocket-powered centrifuge was used to conduct acceleration tests. Little remained of the original centrifuge structure, except for a concrete pad and berm when the site was completed. The sides of Tijeras arroyo appeared to have been used as a dump for domestic trash. Rocket propellant is the only known possible contaminant at this site.

2.2.2. Sample Locations

The approximate sampling locations at the old centrifuge are shown in Figure 3. The location identification numbers include

- SNA50-021 (composite sample of locations -021 and -022),
- SNA50-023 (composite sample of locations -023 and -024),
- SNA50-025 (composite sample of locations -025 and -026),
- SNA50-027 (composite sample of locations -027, -028 and -029),
- SNA50-030,
- SNA50-033 (duplicate sample of 027),
- SNA50-034,
- SNA50-035,
- SNA50-036,
- SNA50-037 (rinsate blank), and
- SNA50-038.

2.3. RED TOWERS SITE

2.3.1. Site History

The red towers site (SNA55) is in the Thunder Range area and consists of eight red and white towers or poles surrounding a concrete pad. The site has been used for a variety of tests, including firing depleted uranium cases with explosives. The potential contaminants include depleted uranium, high-explosive residues, lead, beryllium, and other metals. Many pieces of shrapnel and old detonation wires were observed during the reconnaissance sampling. In addition, the concrete pad in the center of the towers was damaged, and a small pit is present.

2.3.2. Sample Locations

The approximate sampling locations at the red towers site are shown in Figure 4. The location identification numbers include

- SNA55-041 (composite sample of locations -041 and -042),

5.2. OLD CENTRIFUGE SITE (SNA50)

5.2.1. HSL Inorganics

Table II presents the data obtained from the HSL inorganics analysis of the SNA50 samples. All of the sampling locations showed detectable levels of aluminum, barium, calcium, chromium, copper, iron, potassium, magnesium, manganese, lead, titanium, vanadium, and zinc. The following locations also had detectable levels of arsenic: SNA50-027 (2.3 mg/kg), SNA50-038 (2.3 mg/kg), and SNA50-034 (2.8 mg/kg). In addition, sodium was detected at SNA50-034 (5880 mg/kg) and nickel was detected at SNA50-038 (7.9 mg/kg).

5.2.2. TCLP Metals

Table XI presents the data obtained from the TCLP metals analysis of the SNA50 samples. Barium was detected at all of the sampling locations, with the exception of SNA50-034, in levels ranging from 1210 to 3410 μg/L. No other constituents were detected.

5.2.3. EP Toxicity Metals

Table XI presents the data obtained from the EP Toxicity metals analysis of the SNA50 samples. Barium was detected at all locations, in levels ranging from 1180 to 4980 μg/L. No other constituents were detected.

5.2.4. Total and Isotopic Uranium

Table XII presents the data obtained from the total and isotopic uranium analysis of the SNA50 samples. Total uranium concentrations ranged from 0.65 μg/g at SNA50-034 to 1.6 μg/g at SNA50-035.

5.2.5. 2,4,6-TNT

Table XII presents the data obtained from analysis of the SNA50 samples for 2,4,6-TNT. There were no detectable levels.

5.2.6. Pesticides/PCBs and Herbicides

Table XIII presents the data obtained from analysis of the SNA50 samples for pesticides, PCBs and herbicides. There were no detectable levels of any of the constituents.

5.2.7. Semivolatile TCLP Compounds

Table XIV presents the data obtained from the semivolatile TCLP compounds analysis of the SNA50 samples. There were no detectable levels of any of the constituents.

5.3. RED TOWERS SITE (SNA55)

5.3.1. HSL Inorganics

The results of HSL inorganics analysis on the SNA55 samples are presented in Table III. All of the sampling locations showed detectable concentrations of aluminum, barium, calcium, chromium, iron, potassium, magnesium, manganese, lead, titanium, and zinc.

Detectable levels of copper were found in samples from locations SNA55-041, -043, -051, -053, -055, -059, and -060. These levels ranged from 4.7 to 8.0 mg/kg. In addition, detectable levels of vanadium were found in samples from locations SNA55-041, -051, -053, -055, -057, -059, -060, and -137. These levels ranged from 9.1 to 15.8 mg/kg. Nickel was detected in the sample from SNA55-060. The concentration measured was 9.2 mg/kg (Table III).

5.3.2. TCLP Metals

Table XV presents the TCLP metals analysis of the SNA55 samples. Barium was found in detectable concentrations in the samples from locations SNA55-043 (1090 μg/L), SNA55-057 (1660 μg/L), and SNA55-137 (1790 μg/L), which was a duplicate sample of SNA55-057. No other constituents were detected.

5.3.3. EP Toxicity Metals

Table XV presents the results of EP Toxicity metals analysis performed on the SNA55 samples. Barium was detected in the samples from SNA55-057 (1540 μg/L), and in the duplicate sample SNA55-137 (1470 μg/L). No other constituents were detected.

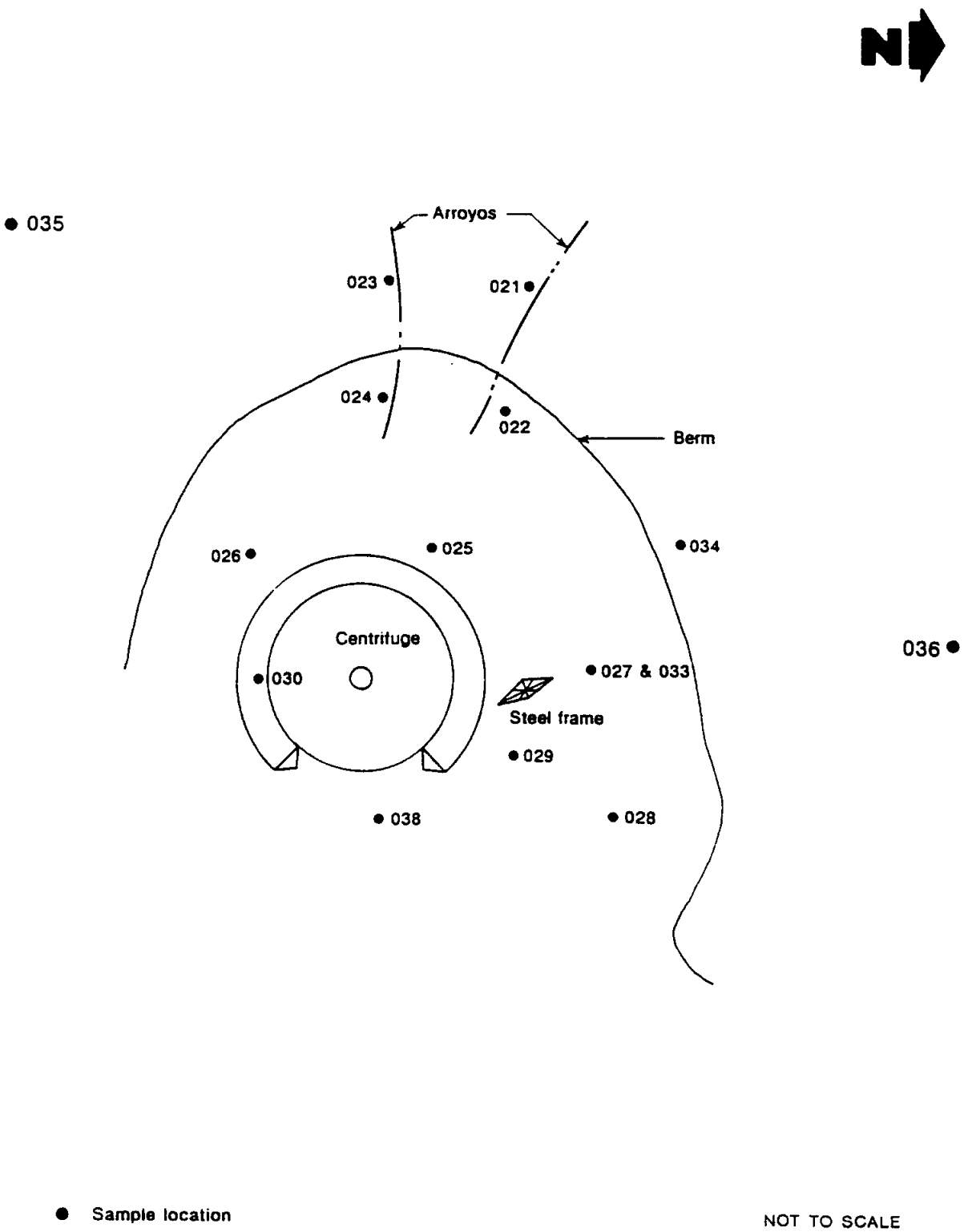

Figure 3. Old Centrifuge - SNA50.

Table I. Rinsate Blanks Total HSL Inorganics (µg/l)

Location ID SNA	Ag	Al	As	Ba	Be	Ca	Cd	Ce	Co	Cr	Cu	Fe	Hg
50-037	10.0u	200u	10.0u	200u	5.0u	5000u	5.0u	100u	50.0u	10.0u	25.0u	100u	0.2u
55-136	10.0u	200u	10.0u	200u	5.0u	5000u	5.0u	100u	50.0u	10.0u	25.0u	100u	0.2u
66-134[a]	10.0u	200u	10.0u	200u	5.0u	5000u	5.0u	100u	50.0u	10.0u	25.0u	100u	0.2u
69-FB	10.0u	200u	10.0u	200u	5.0u	5000u	5.0u	100u	50.0u	10.0u	25.0u	100u	0.2u

Table 1. (continued)

Location ID SNA	K	Mg	Mn	Na	Ni	Pb	Sb	Se	Ti	Tl	V	Zn	Zr
50-037	675	5000u	15.0u	5000u	40.0u	5.0u	60.0u	5.0u	100u	10.0u	50.0u	20.0u	100u
55-136	1250	5000u	15.0u	5000u	40.0u	5.0u	60.0u	5.0u	100u	10.0u	50.0u	10.0u	100u
66-134[a]	969	5000u	15.0u	5000u	40.0u	5.0u	60.0u	5.0u	100u	10.0u	50.0u	20.0u	100u
69-FB	5000u	5000u	15.0u	11600	40.0u	5.0u	60.0u	33.7	100u	10.0u	50.0u	20.0u	100u

a - Herbicide analysis was also performed on SNA66-134; nothing was detected.
HSL - Hazardous Substance List
u - not detected; the number given is the sample minimum detection limit
FB - field blank

Table II. Old Centrifuge Site (SNA50) Total HSL Inorganics (mg/kg)

Location ID SNA50	Ag	Al	As	Ba	Be	Ca	Cd	Ce	Co	Cr	Cu	Fe	Hg
-021	1.9u	4310	1.9u	230	0.96u	63100	0.96u	19.1u	9.6u	3.5	9.4	6350	0.1u
-023	2.0u	3780	2.0u	286	0.98u	51800	0.98u	19.5u	9.8u	3.8	7.7	4710	0.1u
-025	2.0u	4950	2.0u	206	1.0u	84700	1.0u	20.0u	10.0u	3.9	10.7	5540	0.1u
-027	2.0u	4190	2.3	184	1.0u	53000	1.0u	20.1u	10.0u	3.3	10.3	4860	0.1u
-030	2.0u	4440	2.0u	212	0.99u	73600	0.99u	19.8u	9.9u	4.2	12.2	5630	0.1u
-033	2.0u	4380	1.9u	181	0.99u	59600	0.99u	19.8u	9.9u	4.1	10.4	5350	0.1u
(Dup 027)													
-034	2.0u	3570	2.8	237	0.99u	157000	0.99u	19.7u	9.9u	2.5	8.6	3060	0.1u
-035	1.9u	5260	2.0u	89.8	0.96u	24800	0.96u	19.1u	9.6u	5.3	10.8	6850	0.1u
-036	1.8u	5110	2.0u	86.8	0.91u	22500	0.91u	18.2u	9.1u	4.9	9.6	7020	0.1u
-038	2.0u	8750	2.3	234	0.98u	86500	0.98u	19.6u	9.8u	7.7	16.3	8880	0.1u
RPD	NC	4.4	NC	1.6	NC	11.7	NC	NC	NC	21.6	1.0	9.6	NC

Table II. (continued)

Location ID SNA50	K	Mg	Mn	Na	Ni	Pb	Sb	Se	Ti	Tl	V	Zn	Zr
-021	1000	3840	149	957u	7.7u	3.2	11.5u	0.94u	369	1.9u	18.5	15.1	19.1u
-023	976	2770	86.3	976u	7.8u	2.9	11.7u	1.0u	262	2.0u	15.3	12.3	19.5u
-025	1080	4020	134	1000u	8.0u	5.9	12.0u	1.0u	260	2.0u	15.6	16.7	20.0u
-027	1100	3140	122	1000u	8.0u	5.7	12.0u	0.98u	253	2.0u	14.8	16.8	20.1u
-030	1410	3930	151	988u	7.9u	3.1	11.9u	1.0u	332	2.0u	18.5	18.2	19.8u
-033 (Dup 027)	1280	3440	138	991u	7.9u	5.1	11.9u	0.94u	270	1.9u	16.2	17.6	19.8u
-034	985u	4900	50.1	5880	7.9u	1.8	11.8u	0.95u	104	1.9u	14.1	7.3	19.7u
-035	1940	2810	201	957u	7.7u	6.1	11.5u	1.0u	301	2.0u	16.0	18.1	19.1u
-036	1940	2800	205	908u	7.3u	6.5	10.9u	0.98u	234	2.0u	14.7	19.5	18.2u
-038	2160	5620	282	981u	7.9	11.2	11.8u	0.98u	38.3	2.0u	25.2	25.3	19.6u
RPD	15.1	9.2	12.3	NC	NC	11.1	NC	NC	6.5	NC	9.0	4.7	NC

HSL - Hazardous Substance List

u - not detected; the number given is the sample minimum detection limit

Dup - duplicate sample

RPD - relative percent difference between the original sample and the duplicate sample.

$$RPD = \frac{O - D}{(O + D)/2} \times 100$$, where O = original sample and D = duplicate sample.

NC - not calculable

Table XI. Old Centrifuge Site (SNA50) TCLP Metals and EP Toxicity Metals (µg/l)

Location ID	TCLP METALS								EP TOXICITY METALS							
SNA50	Ag	As	Ba	Cd	Cr	Hg	Pb	Se	Ag	As	Ba	Cd	Cr	Hg	Pb	Se
-021	500u	500u	1330	100u	500u	0.2u	500u	100u	100u	500u	2100	100u	500u	0.2u	500u	100u
-023	500u	500u	1690	100u	500u	0.2u	500u	100u	500u	500u	1970	100u	500u	0.2u	500u	100u
-025	500u	500u	2620	100u	500u	0.2u	500u	100u	500u	500u	3370	100u	500u	0.2u	500u	100u
-027	500u	500u	2230	100u	500u	0.2u	500u	100u	500u	500u	2240	100u	500u	0.2u	500u	100u
-030	500u	500u	2320	100u	500u	0.2u	500u	100u	500u	500u	2360	100u	500u	0.3u	500u	100u
-033	500u	500u	2330	100u	500u	0.2u	500u	100u	500u	500u	2400	100u	500u	0.2u	500u	100u
(Dup 027)																
-034	500u	500u	1000u	100u	500u	0.2u	500u	100u	500u	500u	1960	100u	500u	0.2u	500u	100u
-035	500u	500u	1530	100u	500u	0.2u	500u	100u	500u	500u	1580	100u	500u	0.2u	500u	100u
-036	500u	500u	1210	100u	500u	0.2u	500u	100u	500u	500u	1180	100u	500u	0.2u	500u	100u
-038	500u	500u	3410	100u	500u	0.2u	500u	100u	500u	500u	4980	100u	500u	0.2u	500u	100u
RPD	NC	NC	4.4	NC	NC	NC	NC	NC	NC	NC	6.9	NC	NC	NC	NC	NC

TCLP - toxic characteristic leaching procedure
EP Toxicity - Extraction procedure toxicity
u - not detected; the number given is the sample minimum detection limit
Dup - duplicate sample
RPD - relative percent difference between the original sample and the duplicate sample.

$$RPD = \frac{O - D}{(O + D)/2} \times 100$$, where O = original sample and D = duplicate sample.

NC - not calculable

Table XII. Old Centrifuge Site (SNA50) Uranium and 2,4,6-TNT Analysis

	URANIUM				2,4,6-TNT
Location ID SNA50	U-234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)	Total U (µg/g)	2,4,6-TNT (µg/g)
-021	0.9± 0.2	0.00± 0.02	0.8± 0.2	1.4	<1.92
-023	0.6± 0.1	0.04± 0.02	0.5± 0.1	0.78	<1.92
-025	0.8± 0.2	0.06± 0.06	0.8± 0.2	1.0	<1.92
-027	1.0± 0.2	0.00± 0.03	1.1± 0.2	1.2	<1.92
-030	0.7± 0.1	0.03± 0.03	0.6± 0.1	0.91	<1.92
-033 (Dup 027)	0.7± 0.2	0.05± 0.05	0.5± 0.1	1.0	<1.92
-034	0.6± 0.1	0.00± 0.02	0.5± 0.1	0.65	<1.92
-035	0.7± 0.2	0.00± 0.04	0.8± 0.2	1.6	<1.92
-036	0.6± 0.2	0.00± 0.05	0.6± 0.2	1.4	<1.92
-038	0.4± 0.2	0.00± 0.02	0.4± 0.1	1.3	<1.92
RPD	NA	NA	NA	18.2	NC

Dup - duplicate sample
RPD - relative percent difference between the original sample and the duplicate sample.

$$RPD = \frac{O - D}{(O + D)/2} \times 100,$$ where O = original sample and D = duplicate sample.

NA - not applicable
NC - not calculable

Table XIII. Old Centrifuge Site (SNA50) Pesticides/PCBs and Herbicides (TCLP and EP Toxicity) (µg/l)

Location ID SNA 50	PESTICIDES/PCBs Gamma BHC	Hepta-chlor	Chlor-dane	Endrin	Toxa-phene	Methoxy-chlor	HERBICIDES 2,4-D	2,4,5-TP	2,4,5-T
-021	0.05u	0.05u	0.5u	0.1u	1u	0.5u	1.0u	0.5u	0.5u
-023	0.05u	0.05u	0.5u	0.1u	1u	0.5u	1.0u	0.5u	0.5u
-025	0.05u	0.05u	0.5u	0.1u	1u	0.5u	1.0u	0.5u	0.5u
-027	0.05u	0.05u	0.5u	0.1u	1u	0.5u	1.0u	0.5u	0.5u
-030	0.05u	0.05u	0.5u	0.1u	1u	0.5u	1.0u	0.5u	0.5u
-033 (Dup 027)	0.05u	0.05u	0.5u	0.1u	1u	0.5u	1.0u	0.5u	0.5u
-034	0.05u	0.05u	0.5u	0.1u	1u	0.5u	1.0u	0.5u	0.5u
-035	0.05u	0.05u	0.5u	0.1u	1u	0.5u	1.0u	0.5u	0.5u
-036	0.05u	0.05u	0.5u	0.1u	1u	0.5u	1.0u	0.5u	0.5u
-038	0.05u	0.05u	0.5u	0.1u	1u	0.5u	1.0u	0.5u	0.5u

TCLP - toxic characteristic leaching procedure
EP Toxicity - Extraction procedure toxicity
BHC - hexaclorocyclohexane
2,4-D - 2,4-Dichlorophenoxyacetic acid
2,4,5-T,P - 2,4,5-Trichlorophenoxypropionic acid
2,4,5-T - 2,4,5-Trichlorophenoxyacetic acid
u - not detected; the number given is the sample minimum detection limit
Dup - duplicate sample

Table XIV. Old Centrifuge Site (SNA50) Semivolatile TCLP Compounds (µg/l)

Location ID SNA50	Phenol	Pyridine	bis (2-chloro-ethyl) ether	1,4-Dichloro benzene	1,2-Dichloro-benzene	2-Methyl-phenol	3-Methyl-phenol	4-Methyl-phenol	Hexachloro-ethane
-021	10u	10u	10u	10u	10u	10u	10u	10u	10u
-023	10u	10u	10u	10u	10u	10u	10u	10u	10u
-025	10u	10u	10u	10u	10u	10u	10u	10u	10u
-027	10u	10u	10u	10u	10u	10u	10u	10u	10u
-030	10u	10u	10u	10u	10u	10u	10u	10u	10u
-033 (Dup 027)	10u	10u	10u	10u	10u	10u	10u	10u	10u
-034	10u	10u	10u	10u	10u	10u	10u	10u	10u
-035	10u	10u	10u	10u	10u	10u	10u	10u	10u
-036	10u	10u	10u	10u	10u	10u	10u	10u	10u
-038	10u	10u	10u	10u	10u	10u	10u	10u	10u

Table XIV. (continued)

Location ID SNA50	Nitro-benzene	Hexachloro-butadiene	2,4,6-Tri-chlorophenol	2,4,5-Tri-chlorophenol (2)	2,4-Dinitro-toluene	2,3,4,6-Terra-chlorophenol	Hexachloro-benzene	Pentachloro-phenol (2)
-021	10u	10u	10u	50u	10u	10u	10u	50u
-023	10u	10u	10u	50u	10u	10u	10u	50u
-025	10u	10u	10u	50u	10u	10u	10u	50u
-027	10u	10u	10u	50u	10u	10u	10u	50u
-030	10u	10u	10u	50u	10u	10u	10u	50u
-033 (Dup 027)	10u	10u	10u	50u	10u	10u	10u	50u
-034	10u	10u	10u	50u	10u	10u	10u	50u
-035	10u	10u	10u	50u	10u	10u	10u	50u
-036	10u	10u	10u	50u	10u	10u	10u	50u
-038	10u	10u	10u	50u	10u	10u	10u	50u

u - not detected; the number given is the sample minimum detection limit
Dup - duplicate sample

APPENDIX A

ANALYTICAL METHODS AND CONSTITUENTS

Constituents	Method
Total HSL Inorganics (Field Blanks)	
silver, aluminum, barium, beryllium, calcium, cadmium, cobalt, chromium, copper, iron, manganese, vandium, zinc.	EPA 200.7 (ICP)
arsenic	EPA 206.2 (AA furnace)
selenium	EPA 270.2 (AA furnace)
lead	EPA 239.2 (AA furnace)
thallium	EPA 279.2 (AA furnace)
antimony	EPA 204.2 (AA furnace)
sodium	EPA 200.7 (flame emission)
potassium	EPA 200.7 (flame emission)
mercury	EPA 245.1 (cold vapor)
Additional Metals (Field Blanks)	
titanium, cerium, zirconium	EPA 200.7 (ICP)
Total HSL Inorganics (soils)	
silver, aluminum, barium, beryllium, calcium, cadmium, cobalt, chromium, copper, iron manganese, vandium, zinc.	EPA 6010 (ICP)
arsenic	EPA 7060 (AA furnace)
selenium	EPA 7741 (AA furnace)
lead	EPA 7421 (AA furnace)
thallium	EPA 7841 (AA furnace)
antimony	EPA 7041 (AA furnace)
sodium	EPA 6010 (flame emission)
potassium	EPA 6010 (flame emission)
mercury	EPA 7471 (cold vapor)
Additional Metals (soils)	
titanium, cerium, zirconium	EPA 6010 (ICP)

Constituents	Method
EP-Tox and TCLP Metals (leachates)	
mercury	EPA 245.1 (cold vapor)
lead	EPA 239.2 (AA furnace)
selenium	EPA 270.2 (AA furnace)
silver	EPA 200.7 (ICP)
arsenic	EPA 206.2 (AA furnace)
barium	EPA 200.7 (ICP)
cadmium	EPA 200.7 (ICP)
chromium	EPA 200.7 (ICP)
2,4,6-TNT (soil)	USATHAMA LW02
2,4,6-TNT (water blank)	USATHAMA LW01
EP-Tox and TCLP Pesticides/PCBs (leachates)	EPA 509B
gamma-hexachlorocyclohexane (BHC) (Lindane), heptachlor, chlordane, endrin, toxaphene, methoxychlor	
EP-Tox and TCLP Herbicides (leachates)	EPA 509B
2,4-dichlorophenoxyacetic acid (2,4-D)	
2,4,5-trichlorophenoxypropionic acid (2,4,5-TP) (silvex)	
2,4,5-trichlorophenoxyacetic acid (2,4,5-T)	
Semivolatile TCLP compounds	EPA, CLP, GC/MS (10/86 SOW)
phenol	
pyridine	
bis (2-chlorethyl) ether	
1,4-dichlorobenzene	
2-methylphenol	
hexachlorobutadiene	
2,4,6-trichlorophenl (2)	
2,4-dinitrotoluene	
2,3,4,6-tetrachlorphenol	
hexachlorbenzene	
pentachlorophenol (2)	

Uranium

isotopic uranium (U)	Alpha spectrometry
U-234	
U-235	
U-238	
total uranium	Fluorometry

ICP - inductively coupled plasma
AA - atomic absorption
USATHAMA - United States Army Toxic and Hazardous Materials Agency
GC - gas chromatography
MS - mass spectrometry
CLP - Contract Laboratory Program
SOW - statement of work

APPENDIX B

QUALITY ASSURANCE AUDIT REPORT FOR

OLD CENTRIFUGE SITE

RECONNAISSANCE INVESTIGATION PLAN

Activity Audited:	Soil Sampling
Applicable Documents:	CEARP CGMP SNLA Reconnaissance Investigation Plan SOPs: 1.3, Sample Control and Documentation 1.5, Handling, Packing, and Shipping of Samples 1.6, General Equipment Decontamination 5.2, Soil Sampling with a Spade and Scoop
Audit Team:	S. J. Ramos
Sampling Team:	D. Anderson S. Wilson
Audit Scope:	On September 24, 1987, an audit was conducted to verify compliance to the SOPs cited above.
Audit Proceedings:	No findings were noted; however, it is recommended that at the completion of the sampling activities, the field logbook data should be copied and archived.

SNLA RIP Audit Checklist

1. Are the amount and documentation of QC samples correct?

2. Do the field logbooks contain the proper information? (date and name of recorder, location, depth of sample, grain size, color, odor, etc.) Is there a backup copy?

3. Is the soil sample label completed properly?

4. Are proper equipment decontamination procedures followed?

5. Are proper chain-of-custody procedures followed? Copy kept for field records?

APPENDIX C

LABORATORY QUALITY ASSURANCE/QUALITY CONTROL DATA

Method Blanks

Method blanks are deionized, distilled water samples that are processed through each laboratory sample preparation step. The analysis of method blanks serves to identify any contamination that is introduced in the laboratory.

Method blanks were prepared with each of the four reconnaissance sample batches and analyzed for total HSL inorganics, metals leachates (TCLP and EP-Tox), pesticides/PCBs, herbicides, and 2,4,6-TNT. Analysis of each method blank did not always include all of the constituents listed in Appendix A. However, several method blanks were included in each batch, and analysis was performed for all of the constituents at least once for each batch.

There were no detectable contaminants in any of the method blanks. The total number of method blanks included in the four reconnaissance sample batchees is as follows:

Analyte	Number of Method Blanks
Total HSL inorganics	54
Metals leachates	17
Pesticides/PCBs	13
Herbicides	8
2,4,6-TNT	4
Semivolatile TCLP compounds	5

Spike Samples

Several types of spike samples were prepared and analyzed with the reconnaissance samples. Spike samples are prepared by adding a known amount of contaminant(s) to reagent-grade water or to a soil matrix. The sample is then analyzed and the percent recovery calculated. The purpose of spike samples is to determine the recovery efficiency of specific analytes, and the effect of sample matrix on analyte recovery.

EPA Contract Laboratory Program (CLP) provides guidelines for spike sample percent recoveries for some analytes. If the percent recovery does not fall within the acceptable range, the sample data from the same batch is flagged.

The laboratory analyses of the reconnaissance samples was performed according to a standard commercial package, not CLP. However, in order to interpret the laboratory spike samples, CLP acceptable percent recoveries are used. Table C-I presents the results of the sample analyses that did not fall within the applicable CLP percent recovery ranges. The corresponding sample data in section 5 has not been flagged because CLP was not followed. For example, CLP requires repeat sample analyses for unacceptable ranges. The corresponding sample data may therefore be considered suspect, but not invalid.

Table C-I. Spike Samples

Corresponding Location	Sample Type	Lab ID	Analysis Type	Parameter	Percent Recovery	Acceptable Percent Recovery
Total HSL Inorganics						
SNA50	MS	SNA50	MSR	arsenic	65.2	75-125
(All locations)		-027		lead	46.5	75-125
				selenium	61.0	75-125
				thallium	48.4	75-125
				zirconium	70.2	75-125
SNA55	MS	SNA55	MSR	arsenic	60.2	75-125
(All locations)		-041		calcium	618.0	75-125
SNA66-097,				manganese	289.0	75-125
099,101,107,				selenium	50.0	75-125
109,132,133,				zirconium	62.8	75-125
134,135						
SNA66-091,	MS	SNA66	MSR	arsenic	71.7	75-125
093,095,103,		-091		manganese	0.0	75-125
105; SNA69-				lead	57.3	75-125
120,122				titanium	38.3	75-125
SNA47-001,	MS	SNA69	MSR	magnesium	133.0	75-125
002,003,004,		-111		lead	145.0	75-125
006,011,012;				selenium	38.0	75-125
SNA69-111,				thallium	66.2	75-125
112,114,117						
SNA50	LCS	871				
(All locations)		743-LC1	LCSR	cerium	67.0	80-120
	LCS	736-LC1	LCSR	cerium	0.0	80-120
	LCS	736-LC2	LCSR	cerium	0.0	80-120
	LCS	743-LC1	LCSR	zirconium	1.6	80-120
	LCS	743-LC2	LCSR	cerium	75.4	80-120
SNA55	LCS	871				
(All locations)		736-LC1	LCSR	cerium	0.0	80-120
SNA66-097,	LCS	736-LC2	LCSR	cerium	0.0	80-120
099,101,107,	LCS	727-LC2	LCSR	lead	127.0	80-120
109,132,133,	LCS	729-LC2	LCSR	cerium	75.2	80-120
134,135						
SNA66-091,	LCS	871				
093,095,103,	LCS	746-LC3	LCSR	barium	19.9	80-120
105;	LCS	727-LC1	LCSR	lead	127.0	80-120
SNA69-120,	LCS	746-LC1	LCSR	lead	134.0	80-120
122	LCS	746-LC3	LCSR	lead	131.0	80-120
	LCS	727-LC2	LCSR	lead	127.0	80-120

Semivolatile TCLP Compounds

SNA66-091,	MS	SNA66-091	SSR	nitrobenzene-d5	32.0	35-114
093,095,103,	MS	SNA66-091	MSR	pentachlorophenol	120.0	9-103
105; SNA69-	BS	BS8709-327	BSR	1,4-dichloro-		
120,122				benzene	30.0	36-97
SNA55	WB	Blank(068)	SSR	2-fluorobiphenyl	42.0	43-116
(All locations)	WB	Blank(346)	SSR	2-fluorobiphenol	137.0	21-100
SNA66-101,				phenol-d5	162.0	10-94
109,107,135	BS	BS (346)	SSR	nitrobenzene-d5	124.0	35-114
				2-fluorobiphenyl	119.0	43-116
	BS	BS (346)	BSR	1,4-dichloro-		
				benzene	98.0	36-97
				2,4-dinitrotoluene	144.0	24-96
SNA50	FS	SNA50-021	SSR	2-fluorophenol	103.0	21-100
(All locations)				phenol-d5	101.0	10-94
	BS	BS8709-346	SSR	nitrobenzene-d5	124.0	35-114
				2-fluorobiphenyl	118.0	43-116
	BS	BS8709-346	BSR	1,4-dichloro-		
				benzene	98.0	36-97
				2,4-dinitrotoluene	144.0	24-96

Pesticides/PCBs

SNA50-021; SNA55-041,043, 045,047,049,050, 051,053, 057,059,060,137; SNA66-101,107, 109,135; SNA69- 97,99,116,121, 132,133	BS	BS (150)	BSR	endrin	127.0	56-121

Sample Type

MS - matrix spike
LCS - laboratory control sample, prepared by spiking reagent grade water with USEPA CLP LCS solution
BS - blank spike
WB - water blank
FS - field sample

Analysis Type

MSR - matrix spike recovery
LCSR - laboratory control sample recovery
SSR - surrogate sample recovery
BSR - blank spike recovery

Laboratory Replicate Samples

Matrix spike replicate samples were prepared by the laboratory and analyzed in order to provide information on the precision of the method utilized as well as the sample homogeneity. As noted earlier, soil samples may not be homogenous.

The following matrix spike replicate samples had greater than 20 percent difference. Once replicate was prepared and analyzed for each sample batch.

Matrix Spike Sample	Parameter	Percent Difference
SNA50-027 and SNA50-027 Rep	aluminum (HSL inorganic)	22.5
SNA55-041 and SNA55-042 Rep	calcium (HSL inorganic)	22.3
SNA66-091 and SNA66-091 Rep	aluminum (HSL inorganic)	31.6
	chromium (HSL inorganic)	30.2
	iron (HSL inorganic)	26.2
	titanium (HSL inorganic)	25.8
	vanadium (HSL inorganic)	22.9
	zinc (HSL inorganic)	31.7

Annex 3-B

ANNEX 3-B
Radiological Analysis Results—Boundary Sampling

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-20-97 6:20:44 PM

Analyzed by: 8/21/97 Reviewed by: 8/21/97

Customer : H.OLDEWAGE (7575)
Customer Sample ID : 023408
Lab Sample ID : 70147102

Sample Description : E.R.SITE 228 MARINELLI SOIL SAMPLE
Sample Quantity : 804.000 gram
Sample Date/Time : 8-20-97 2:00:00 PM
Acquire Start Date/Time : 8-20-97 4:37:12 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	----------	3.42E+00
TH-234	1.41E+00	5.33E-01	6.80E-01
RA-226	2.00E+00	6.27E-01	5.60E-01
PB-214	7.96E-01	1.41E-01	6.46E-02
BI-214	7.48E-01	1.38E-01	4.77E-02
TH-232	7.94E-01	4.02E-01	1.49E-01
[illegible]-228	9.80E-01	1.22E+00	1.33E-01
[illegible]228	8.91E-01	1.94E-01	6.74E-02
TH-228	8.59E-01	2.55E-01	4.51E-01
RA-224	7.78E-01	2.59E-01	6.73E-02
PB-212	8.52E-01	1.42E-01	3.98E-02
BI-212	8.82E-01	3.15E-01	2.70E-01
TL-208	7.91E-01	1.52E-01	6.13E-02
U-235	Not Detected	---------	2.44E-01
TH-231	Not Detected	---------	1.31E+01
PA-231	Not Detected	---------	1.45E+00
TH-227	Not Detected	---------	3.47E-01
RA-223	Not Detected	---------	2.04E-01
RN-219	~~3.86E-01~~	~~3.24E-01~~	3.89E-01 Not detected 8/21/97
PB-211	Not Detected	---------	8.81E-01
TL-207	Not Detected	---------	1.31E+01
AM-241	Not Detected	---------	4.90E-01
PU-239	Not Detected	---------	4.56E+02
NP-237	Not Detected	---------	2.95E-01
PA-233	Not Detected	---------	5.89E-02
TH-229	Not Detected	---------	2.53E-01

[Summary Report] - Sample ID: : 70147102

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
108m	Not Detected	---------	3.90E-02
AG-110m	Not Detected	---------	4.75E-02
BA-133	Not Detected	---------	6.75E-02
BE-7	Not Detected	---------	1.74E-01
CD-109	~~1.83E+00~~	~~6.15E-01~~	9.98E-01 Not detected 8/21/97
CD-115	Not Detected	---------	6.88E-02
CE-139	Not Detected	---------	2.91E-02
CE-141	Not Detected	---------	5.23E-02
CE-144	Not Detected	---------	2.47E-01
CO-56	Not Detected	---------	9.21E-02
CO-57	Not Detected	---------	3.12E-02
CO-58	Not Detected	---------	2.98E-02
CO-60	Not Detected	---------	3.41E-02
CR-51	Not Detected	---------	2.29E-01
CS-134	Not Detected	---------	4.86E-02
CS-137	2.14E-01	5.16E-02	2.43E-02
EU-152	Not Detected	---------	9.40E-02
EU-154	Not Detected	---------	1.79E-01
EU-155	Not Detected	---------	8.92E-02
FE-59	Not Detected	---------	6.71E-02
GD-153	Not Detected	---------	1.04E-01
HG-203	Not Detected	---------	3.19E-02
I-131	Not Detected	---------	2.83E-02
IR-192	Not Detected	---------	2.74E-02
K-40	1.69E+01	2.50E+00	2.13E-01
MN-52	Not Detected	---------	2.59E-02
MN-54	Not Detected	---------	3.37E-02
-99	Not Detected	---------	2.30E-01
-22	Not Detected	---------	4.02E-02
NA-24	Not Detected	---------	3.43E-02
NB-95	Not Detected	---------	1.63E-01
ND-147	Not Detected	---------	1.96E-01
NI-57	Not Detected	---------	2.30E-02
PB-210	Not Detected	---------	3.57E+01
RU-103	Not Detected	---------	2.88E-02
RU-106	Not Detected	---------	2.78E-01
SB-122	Not Detected	---------	4.07E-02
SB-124	Not Detected	---------	2.94E-02
SB-125	Not Detected	---------	8.15E-02
SN-113	Not Detected	---------	3.69E-02
SR-85	Not Detected	---------	3.55E-02
TA-182	Not Detected	---------	1.47E-01
TA-183	Not Detected	---------	4.23E-01
TC-99m	Not Detected	---------	3.98E-02
TL-201	Not Detected	---------	1.84E-01
XE-133	Not Detected	---------	1.51E-01
Y-88	Not Detected	---------	2.38E-02
ZN-65	Not Detected	---------	1.03E-01
ZR-95	Not Detected	---------	5.31E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-20-97 8:06:50 PM

Analyzed by: 8/21/97 Reviewed by: 8/21/97

Customer : H.OLDEWAGE (7575)
Customer Sample ID : 023471
Lab Sample ID : 70147103

Sample Description : E.R.SITE 228 MARINELLI SOIL SAMPLE
Sample Quantity : 679.000 gram
Sample Date/Time : 8-20-97 2:05:00 PM
Acquire Start Date/Time : 8-20-97 6:23:03 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~~	~~2.87E+00~~	~~8.21E-01~~	~~7.80E-01~~
RA-226	2.70E+00	8.82E-01	6.65E-01
PB-214	8.37E-01	1.33E+00	7.27E-02
BI-214	7.44E-01	2.18E-01	5.27E-02
TH-232	9.44E-01	7.85E-01	1.59E-01
RA-228	9.98E-01	3.37E-01	1.68E-01
-228	1.00E+00	2.59E-01	7.87E-02
-228	8.36E-01	2.85E-01	5.33E-01
RA-224	9.09E-01	3.02E-01	8.35E-02
PB-212	9.18E-01	1.55E-01	4.54E-02
BI-212	6.68E-01	5.76E-01	3.33E-01
TL-208	8.11E-01	1.70E-01	7.01E-02
U-235	Not Detected	---------	2.72E-01
TH-231	Not Detected	---------	1.45E+01
PA-231	Not Detected	---------	1.58E-00
TH-227	Not Detected	---------	3.90E-01
RA-223	Not Detected	---------	2.27E-01
RN-219	Not Detected	---------	4.09E-01
PB-211	Not Detected	---------	9.22E-01
TL-207	Not Detected	---------	1.44E+01
AM-241	Not Detected	---------	5.34E-01
PU-239	Not Detected	---------	5.07E+02
NP-237	Not Detected	---------	4.43E-01
PA-233	Not Detected	---------	6.62E-02
TH-229	Not Detected	---------	2.80E-01

[Summary Report] - Sample ID: : 70147103

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
108m	Not Detected	---------	4.38E-02
AG-110m	Not Detected	---------	5.37E-02
BA-133	Not Detected	---------	7.56E-02
BE-7	8.34E-01	2.41E-01	1.63E-01
CD-109	~~1.95E+00~~	~~7.14E-01~~	1.11E+00 not detected 8/21/[illegible]
CD-115	Not Detected	---------	7.81E-02
CE-139	Not Detected	---------	3.32E-02
CE-141	Not Detected	---------	5.89E-02
CE-144	Not Detected	---------	2.71E-01
CO-56	Not Detected	---------	3.60E-02
CO-57	Not Detected	---------	3.43E-02
CO-58	Not Detected	---------	3.23E-02
CO-60	Not Detected	---------	3.58E-02
CR-51	Not Detected	---------	2.61E-01
CS-134	Not Detected	---------	5.32E-02
CS-137	2.41E-01	5.59E-02	2.57E-02
EU-152	Not Detected	---------	1.03E-01
EU-154	Not Detected	---------	2.01E-01
EU-155	Not Detected	---------	1.63E-01
FE-59	Not Detected	---------	7.42E-02
GD-153	Not Detected	---------	1.20E-01
HG-203	Not Detected	---------	3.47E-02
I-131	Not Detected	---------	3.22E-02
IR-192	Not Detected	---------	3.05E-02
K-40	1.64E+01	2.47E+00	2.65E-01
MN-52	Not Detected	---------	3.31E-02
MN-54	Not Detected	---------	3.85E-02
-99	Not Detected	---------	2.61E-01
-22	Not Detected	---------	4.31E-02
NA-24	Not Detected	---------	4.19E-02
NB-95	Not Detected	---------	1.85E-01
ND-147	Not Detected	---------	2.16E-01
NI-57	Not Detected	---------	3.20E-02
PB-210	Not Detected	---------	4.05E+01
RU-103	Not Detected	---------	3.15E-02
RU-106	Not Detected	---------	3.25E-01
SB-122	Not Detected	---------	4.57E-02
SB-124	Not Detected	---------	3.28E-02
SB-125	Not Detected	---------	9.22E-02
SN-113	Not Detected	---------	4.22E-02
SR-85	Not Detected	---------	4.05E-02
TA-182	Not Detected	---------	1.63E-01
TA-183	Not Detected	---------	4.74E-01
TC-99m	Not Detected	---------	5.32E-02
TL-201	Not Detected	---------	2.12E-01
XE-133	Not Detected	---------	1.71E-01
Y-88	Not Detected	---------	2.83E-02
ZN-65	Not Detected	---------	1.14E-01
ZR-95	Not Detected	---------	6.06E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-25-97 6:10:45 PM

Analyzed by: KA 8/26/97 Reviewed by: 8/26/97

Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034076
Lab Sample ID : 70149201

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 972.000 gram
Sample Date/Time : 8-25-97 10:30:00 AM
Acquire Start Date/Time : 8-25-97 4:27:53 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	---------	3.07E+00	
TH-234	1.15E+00	4.22E-01	5.79E-01	
RA-226	1.71E+00	8.64E-01	5.59E-01	
PB-214	7.76E-01	1.33E-01	5.38E-02	
BI-214	7.22E-01	1.37E-01	3.95E-02	
TH-232	8.56E-01	4.17E-01	1.32E-01	
RA-228	9.96E-01	2.23E-01	1.30E-01	
AC-228	9.02E-01	4.02E-01	7.81E-02	
TH-228	1.00E+00	2.23E-01	4.11E-01	
RA-224	1.00E+00	2.98E-01	5.71E-02	
PB-212	9.11E-01	1.50E-01	3.62E-02	
BI-212	9.34E-01	3.18E-01	2.62E-01	
TL-208	8.46E-01	1.53E-01	5.42E-02	
U-235	Not Detected	---------	2.26E-01	
TH-231	Not Detected	---------	1.18E+01	
PA-231	Not Detected	---------	1.33E+00	
TH-227	Not Detected	---------	3.26E-01	
RA-223	Not Detected	---------	1.84E-01	
RN-219	~~2.08E-01~~	~~2.87E-01~~	~~3.41E-01~~	NOT DETECTED KA 8/26/97
PB-211	Not Detected	---------	7.69E-01	
TL-207	Not Detected	---------	1.18E+01	
AM-241	Not Detected	---------	4.33E-01	
PU-239	Not Detected	---------	4.16E+02	
NP-237	Not Detected	---------	3.56E-01	
PA-233	Not Detected	---------	5.21E-02	
TH-229	Not Detected	---------	2.37E-01	

[Summary Report] - Sample ID: : 70149201

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)	
-108m	Not Detected	---------	3.62E-02	
AG-110m	Not Detected	---------	2.85E-02	
BA-133	Not Detected	---------	6.05E-02	
BE-7	3.07E-01	1.31E-01	1.45E-01	
CD-109	~~1.53E+00~~	~~5.66E-01~~	~~9.54E-01~~	NOT DETECTED KG 8/26/97
CD-115	Not Detected	---------	6.42E-02	
CE-139	Not Detected	---------	2.72E-02	
CE-141	Not Detected	---------	4.87E-02	
CE-144	Not Detected	---------	2.23E-01	
CO-56	Not Detected	---------	3.05E-02	
CO-57	Not Detected	---------	2.81E-02	
CO-58	Not Detected	---------	2.83E-02	
CO-60	Not Detected	---------	3.17E-02	
CR-51	Not Detected	---------	2.08E-01	
CS-134	Not Detected	---------	4.36E-02	
CS-137	Not Detected	---------	3.12E-02	
EU-152	Not Detected	---------	8.48E-02	
EU-154	Not Detected	---------	1.66E-01	
EU-155	Not Detected	---------	1.38E-01	
FE-59	Not Detected	---------	6.28E-02	
GD-153	Not Detected	---------	9.92E-02	
HG-203	Not Detected	---------	2.86E-02	
I-131	Not Detected	---------	2.54E-02	
IR-192	Not Detected	---------	2.45E-02	
K-40	2.02E+01	2.87E+00	2.21E-01	
MN-52	Not Detected	---------	2.64E-02	
MN-54	Not Detected	---------	2.97E-02	
-99	Not Detected	---------	2.24E-01	
NA-22	Not Detected	---------	3.88E-02	
NA-24	Not Detected	---------	3.68E-02	
NB-95	Not Detected	---------	1.57E-01	
ND-147	Not Detected	---------	1.86E-01	
NI-57	~~5.27E-02~~	~~2.97E-02~~	~~2.35E-02~~	NOT DETECTED KG 8/26/97
PB-210	Not Detected	---------	3.17E+01	
RU-103	Not Detected	---------	2.49E-02	
RU-106	Not Detected	---------	2.58E-01	
SB-122	Not Detected	---------	3.73E-02	
SB-124	Not Detected	---------	2.57E-02	
SB-125	Not Detected	---------	7.24E-02	
SN-113	Not Detected	---------	3.33E-02	
SR-85	Not Detected	---------	3.16E-02	
TA-182	Not Detected	---------	1.30E-01	
TA-183	Not Detected	---------	3.79E-01	
TC-99m	Not Detected	---------	5.36E-02	
TL-201	Not Detected	---------	1.75E-01	
XE-133	Not Detected	---------	1.45E-01	
Y-88	Not Detected	---------	2.18E-02	
ZN-65	Not Detected	---------	9.08E-02	
ZR-95	Not Detected	---------	4.89E-02	

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-25-97 7:55:48 PM

nalyzed by: 8/25/97 Reviewed by: 8/26/97

Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034077
Lab Sample ID : 70149202

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 1100.000 gram
Sample Date/Time : 8-25-97 10:35:00 AM
Acquire Start Date/Time : 8-25-97 6:12:57 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	---------	2.73E+00	
TH-234	7.98E-01	3.46E-01	4.88E-01	
RA-226	1.36E+00	1.01E+00	5.10E-01	
PB-214	6.06E-01	1.61E-01	4.86E-02	
BI-214	5.83E-01	1.15E-01	3.84E-02	
TH-232	7.50E-01	3.57E-01	1.26E-01	
PA-228	7.63E-01	1.90E-01	1.25E-01	
[illegible]-228	7.21E-01	1.57E-01	7.04E-02	
[illegible]-228	6.81E-01	2.17E-01	4.03E-01	
RA-224	7.70E-01	2.33E-01	4.09E-02	
PB-212	6.67E-01	1.20E-01	3.36E-02	
BI-212	7.40E-01	3.84E-01	2.52E-01	
TL-208	6.36E-01	1.26E-01	5.26E-02	
U-235	Not Detected	---------	2.05E-01	
TH-231	Not Detected	---------	1.08E+01	
PA-231	Not Detected	---------	1.18E+00	
TH-227	Not Detected	---------	2.72E-01	
RA-223	Not Detected	---------	1.71E-01	
RN-219	~~2.67E-01~~	~~2.50E-01~~	~~2.99E-01~~	NOT DETECTED 8/30/97
PB-211	Not Detected	---------	6.70E-01	
TL-207	Not Detected	---------	1.12E+01	
AM-241	Not Detected	---------	4.00E-01	
PU-239	Not Detected	---------	3.84E+02	
NP-237	Not Detected	---------	3.23E-01	
PA-233	Not Detected	---------	4.61E-02	
TH-229	Not Detected	---------	2.21E-01	

[Summary Report] - Sample ID: : 70149202

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)	
-108m	Not Detected	---------	3.20E-02	
AG-110m	Not Detected	---------	2.57E-02	
BA-133	Not Detected	---------	5.13E-02	
BE-7	Not Detected	---------	2.02E-01	
CD-109	~~1.07E+00~~	~~4.98E-01~~	~~7.88E-01~~	NOT DETECTED KAS 8/30/97
CD-115	Not Detected	---------	5.74E-02	
CE-139	Not Detected	---------	2.43E-02	
CE-141	Not Detected	---------	4.46E-02	
CE-144	Not Detected	---------	2.09E-01	
CO-56	Not Detected	---------	2.81E-02	
CO-57	Not Detected	---------	2.57E-02	
CO-58	Not Detected	---------	2.58E-02	
CO-60	Not Detected	---------	2.98E-02	
CR-51	Not Detected	---------	1.88E-01	
CS-134	Not Detected	---------	3.79E-02	
CS-137	Not Detected	---------	2.82E-02	
EU-152	Not Detected	---------	7.76E-02	
EU-154	Not Detected	---------	1.47E-01	
EU-155	Not Detected	---------	1.30E-01	
FE-59	Not Detected	---------	6.07E-02	
GD-153	Not Detected	---------	9.23E-02	
HG-203	Not Detected	---------	2.61E-02	
I-131	Not Detected	---------	2.30E-02	
IR-192	Not Detected	---------	2.20E-02	
K-40	2.31E+01	3.24E+00	1.81E-01	
MN-52	Not Detected	---------	2.35E-02	
MN-54	Not Detected	---------	2.80E-02	
-99	Not Detected	---------	2.07E-01	
A-22	Not Detected	---------	3.52E-02	
NA-24	Not Detected	---------	3.64E-02	
NB-95	Not Detected	---------	1.33E-01	
ND-147	Not Detected	---------	1.63E-01	
NI-57	~~3.83E-02~~	~~2.14E-02~~	~~2.31E-02~~	NOT DETECTED KAS 8/30/97
PB-210	Not Detected	---------	2.89E+01	
RU-103	Not Detected	---------	2.33E-02	
RU-106	Not Detected	---------	2.35E-01	
SB-122	Not Detected	---------	3.44E-02	
SB-124	Not Detected	---------	2.41E-02	
SB-125	Not Detected	---------	6.60E-02	
SN-113	Not Detected	---------	3.01E-02	
SR-85	Not Detected	---------	2.78E-02	
TA-182	Not Detected	---------	1.23E-01	
TA-183	Not Detected	---------	3.56E-01	
TC-99m	Not Detected	---------	5.86E-02	
TL-201	Not Detected	---------	1.63E-01	
XE-133	Not Detected	---------	1.33E-01	
Y-88	Not Detected	---------	2.05E-02	
ZN-65	Not Detected	---------	8.56E-02	
ZR-95	Not Detected	---------	4.64E-02	

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-25-97 9:40:47 PM

Analyzed by: 8/26/97 Reviewed by: 8/26/97

Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034078
Lab Sample ID : 70149203

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 532.000 gram
Sample Date/Time : 8-25-97 10:40:00 AM
Acquire Start Date/Time : 8-25-97 7:57:59 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	4.18E+00
TH-234	1.19E+00	1.72E+00	8.03E-01
RA-226	1.75E+00	6.42E-01	6.98E-01
PB-214	7.72E-01	1.50E-01	8.94E-02
BI-214	7.35E-01	1.58E-01	5.90E-02
TH-232	9.44E-01	5.06E-01	1.88E-01
RA-228	9.15E-01	3.64E-01	1.85E-01
AC-228	9.81E-01	2.58E-01	8.99E-02
TH-228	7.86E-01	3.07E-01	6.01E-01
RA-224	9.80E-01	3.48E-01	8.58E-02
PB-212	9.35E-01	5.31E-01	4.73E-02
BI-212	9.42E-01	4.78E-01	3.73E-01
TL-208	8.40E-01	2.06E-01	8.14E-02
U-235	Not Detected	---------	2.98E-01
TH-231	Not Detected	---------	1.60E-01
PA-231	Not Detected	---------	1.77E+00
TH-227	Not Detected	---------	4.41E-01
RA-223	Not Detected	---------	2.50E-01
RN-219	Not Detected	---------	4.75E-01
PB-211	Not Detected	---------	1.08E+00
TL-207	Not Detected	---------	1.58E+01
AM-241	Not Detected	---------	5.97E-01
PU-239	Not Detected	---------	5.55E+02
NP-237	Not Detected	---------	3.30E-01
PA-233	Not Detected	---------	7.45E-02
TH-229	Not Detected	---------	3.13E-01

[Summary Report] - Sample ID: : 70149203

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)	
108m	Not Detected	---------	4.91E-02	
AG-110m	Not Detected	---------	6.24E-02	
BA-133	Not Detected	---------	8.34E-02	
BE-7	6.35E-01	3.20E-01	2.05E-01	
CD-109	~~2.03E+00~~	~~1.76E+00~~	~~2.12E+00~~	NOT DETECTED KAT 8/26/97
CD-115	Not Detected	---------	9.30E-02	
CE-139	Not Detected	---------	3.60E-02	
CE-141	Not Detected	---------	6.54E-02	
CE-144	Not Detected	---------	2.96E-01	
CO-56	Not Detected	---------	1.39E-01	
CO-57	Not Detected	---------	3.78E-02	
CO-58	Not Detected	---------	3.88E-02	
CO-60	Not Detected	---------	3.90E-02	
CR-51	Not Detected	---------	3.01E-01	
CS-134	Not Detected	---------	5.97E-02	
CS-137	2.49E-01	1.08E-01	2.89E-02	
EU-152	Not Detected	---------	1.14E-01	
EU-154	Not Detected	---------	2.26E-01	
EU-155	Not Detected	---------	1.79E-01	
FE-59	Not Detected	---------	8.03E-02	
GD-153	Not Detected	---------	1.31E-01	
HG-203	Not Detected	---------	3.97E-02	
I-131	Not Detected	---------	3.85E-02	
IR-192	Not Detected	---------	3.50E-02	
K-40	1.27E+01	1.99E+00	2.88E-01	
MN-52	Not Detected	---------	3.61E-02	
MN-54	Not Detected	---------	4.34E-02	
-99	Not Detected	---------	3.09E-01	
-22	Not Detected	---------	4.82E-02	
NA-24	Not Detected	---------	5.65E-02	
NB-95	Not Detected	---------	2.18E-01	
ND-147	Not Detected	---------	2.45E-01	
NI-57	~~6.54E-02~~	~~3.43E-02~~	~~2.97E-02~~	NOT DETECTED KAT 8/26/97
PB-210	Not Detected	---------	4.28E+01	
RU-103	Not Detected	---------	3.49E-02	
RU-106	Not Detected	---------	3.57E-01	
SB-122	Not Detected	---------	5.70E-02	
SB-124	Not Detected	---------	3.86E-02	
SB-125	Not Detected	---------	1.05E-01	
SN-113	Not Detected	---------	4.74E-02	
SR-85	Not Detected	---------	4.72E-02	
TA-182	Not Detected	---------	1.74E-01	
TA-183	Not Detected	---------	5.37E-01	
TC-99m	Not Detected	---------	1.04E-01	
TL-201	Not Detected	---------	2.44E-01	
XE-133	Not Detected	---------	2.08E-01	
Y-88	Not Detected	---------	3.40E-02	
ZN-65	Not Detected	---------	1.22E-01	
ZR-95	Not Detected	---------	6.52E-02	

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program (881 Laboratory)
8-25-97 11:25:41 PM

nalyzed by: 8/26/97 Reviewed by: 8/26/97

Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034079
Lab Sample ID : 70149204

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 496.000 gram
Sample Date/Time : 8-25-97 10:50:00 AM
Acquire Start Date/Time : 8-25-97 9:43:02 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	4.29E+00
TH-234	Not Detected	---------	9.90E-01
RA-226	Not Detected	---------	7.69E-01
PB-214	6.50E-01	2.62E-01	9.13E-02
BI-214	6.89E-01	1.58E-01	6.11E-02
TH-232	Not Detected	---------	1.94E-01
PA-228	8.36E-01	2.48E-01	1.76E-01
[illegible]-228	9.68E-01	2.40E-01	8.73E-02
[illegible]-228	1.03E+00	3.52E-01	6.38E-01
RA-224	8.86E-01	3.55E-01	9.80E-02
PB-212	8.26E-01	1.49E-01	5.20E-02
BI-212	9.09E-01	6.30E-01	4.01E-01
TL-208	7.78E-01	1.60E-01	7.48E-02
U-235	Not Detected	---------	1.22E-01
TH-231	Not Detected	---------	1.58E+01
PA-231	Not Detected	---------	1.83E+00
TH-227	Not Detected	---------	4.45E-01
RA-223	Not Detected	---------	2.51E-01
RN-219	Not Detected	---------	4.78E-01
PB-211	Not Detected	---------	1.07E+00
TL-207	Not Detected	---------	1.72E+01
AM-241	Not Detected	---------	5.97E-01
PU-239	Not Detected	---------	5.67E+02
NP-237	Not Detected	---------	3.52E-01
PA-233	Not Detected	---------	7.25E-02
TH-229	Not Detected	---------	3.17E-01

[Summary Report] - Sample ID: : 70149204

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)	
-108m	Not Detected	---------	5.11E-02	
AG-110m	Not Detected	---------	5.80E-02	
BA-133	Not Detected	---------	8.14E-02	
BE-7	Not Detected	---------	3.40E-01	
CD-109	~~1.25E+00~~	~~9.21E-01~~	~~2.19E+00~~	NOT DETECTED [illegible] 5/22/97
CD-115	Not Detected	---------	9.54E-02	
CE-139	Not Detected	---------	3.67E-02	
CE-141	Not Detected	---------	6.46E-02	
CE-144	Not Detected	---------	2.98E-01	
CO-56	Not Detected	---------	1.48E-01	
CO-57	Not Detected	---------	3.70E-02	
CO-58	Not Detected	---------	3.98E-02	
CO-60	Not Detected	---------	4.15E-02	
CR-51	Not Detected	---------	2.85E-01	
CS-134	Not Detected	---------	6.23E-02	
CS-137	1.74E-01	3.93E-02	3.35E-02	
EU-152	Not Detected	---------	1.12E-01	
EU-154	Not Detected	---------	2.35E-01	
EU-155	Not Detected	---------	1.89E-01	
FE-59	Not Detected	---------	8.33E-02	
GD-153	Not Detected	---------	1.32E-01	
HG-203	Not Detected	---------	3.98E-02	
I-131	Not Detected	---------	3.71E-02	
IR-192	Not Detected	---------	3.39E-02	
K-40	1.25E+01	2.19E+00	3.34E-01	
MN-52	Not Detected	---------	4.12E-02	
MN-54	Not Detected	---------	4.34E-02	
-99	Not Detected	---------	3.14E-01	
-22	Not Detected	---------	5.00E-02	
NA-24	Not Detected	---------	6.34E-02	
NB-95	Not Detected	---------	2.23E-01	
ND-147	Not Detected	---------	2.54E-01	
NI-57	Not Detected	---------	7.07E-02	
PB-210	Not Detected	---------	4.56E+01	
RU-103	Not Detected	---------	3.54E-02	
RU-106	Not Detected	---------	3.83E-01	
SB-122	Not Detected	---------	5.72E-02	
SB-124	Not Detected	---------	3.85E-02	
SB-125	Not Detected	---------	1.09E-01	
SN-113	Not Detected	---------	4.75E-02	
SR-85	Not Detected	---------	4.93E-02	
TA-182	Not Detected	---------	1.74E-01	
TA-183	Not Detected	---------	5.44E-01	
TC-99m	Not Detected	---------	1.27E-01	
TL-201	Not Detected	---------	2.55E-01	
XE-133	Not Detected	---------	2.10E-01	
Y-88	Not Detected	---------	3.19E-02	
ZN-65	Not Detected	---------	1.18E-01	
ZR-95	Not Detected	---------	6.83E-02	

```
*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [881 Laboratory]       *
*                        8-26-97  1:10:31 AM                                *
*****************************************************************************
*                                                                           *
 nalyzed by:  8/26/97                Reviewed by:  8/26/97                 *
*****************************************************************************
Customer                  : H.OLDEWAGE (7575)
Customer Sample ID        : 034080
Lab Sample ID             : 70149205

Sample Description        : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity           :   691.000  gram
Sample Date/Time          :  8-25-97  10:55:00 AM
Acquire Start Date/Time   :  8-25-97  11:27:46 PM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6003 seconds

Comments:
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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	3.62E+00
TH-234	1.53E+00	5.51E-01	7.26E-01
RA-226	Not Detected	---------	6.18E-01
PB-214	7.49E-01	1.44E-01	7.06E-02
BI-214	6.36E-01	1.21E-01	5.14E-02
TH-232	8.20E-01	4.27E-01	1.49E-01
RA-228	9.33E-01	2.74E-01	1.46E-01
AC-228	8.33E-01	2.42E-01	8.56E-02
TH-228	9.18E-01	2.77E-01	5.03E-01
RA-224	9.11E-01	2.97E-01	7.43E-02
PB-212	8.31E-01	1.40E-01	4.12E-02
BI-212	Not Detected	---------	2.94E-01
TL-208	7.15E-01	1.45E-01	6.75E-02
U-235	Not Detected	---------	1.56E-01
TH-231	Not Detected	---------	1.34E+01
PA-231	Not Detected	---------	1.53E+00
TH-227	Not Detected	---------	3.74E-01
RA-223	Not Detected	---------	2.15E-01
RN-219	Not Detected	---------	4.11E-01
PB-211	Not Detected	---------	9.39E-01
TL-207	Not Detected	---------	1.39E+01
AM-241	Not Detected	---------	5.11E-01
PU-239	Not Detected	---------	4.83E+02
NP-237	Not Detected	---------	4.12E-01
PA-233	Not Detected	---------	6.11E-02
TH-229	Not Detected	---------	2.71E-01

[Summary Report] - Sample ID: : 70149205

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
----	---	---	---
108m	Not Detected	---------	4.16E-02
AG-110m	Not Detected	---------	6.22E-02
BA-133	Not Detected	---------	7.11E-02
BE-7	7.14E-01	2.83E-01	1.89E-01
CD-109	~~1.53E+00~~	~~5.89E-01~~	~~1.05E+00~~ NOT DETECTED KA 8/22/97
CD-115	Not Detected	---------	8.39E-02
CE-139	Not Detected	---------	3.15E-02
CE-141	Not Detected	---------	5.62E-02
CE-144	Not Detected	---------	2.60E-01
CO-56	Not Detected	---------	3.69E-02
CO-57	Not Detected	---------	3.19E-02
CO-58	Not Detected	---------	3.24E-02
CO-60	Not Detected	---------	3.50E-02
CR-51	Not Detected	---------	2.43E-01
CS-134	Not Detected	---------	5.22E-02
CS-137	4.14E-01	6.28E-02	2.00E-02
EU-152	Not Detected	---------	9.60E-02
EU-154	Not Detected	---------	1.89E-01
EU-155	Not Detected	---------	1.59E-01
FE-59	Not Detected	---------	7.04E-02
GD-153	Not Detected	---------	1.16E-01
HG-203	Not Detected	---------	1.97E-02
I-131	Not Detected	---------	3.22E-02
IR-192	Not Detected	---------	2.82E-02
K-40	1.44E+01	2.23E+00	2.67E-01
MN-52	Not Detected	---------	3.35E-02
-54	Not Detected	---------	3.72E-02
-99	Not Detected	---------	2.74E-01
NA-22	Not Detected	---------	3.84E-02
NA-24	Not Detected	---------	5.76E-02
NB-95	Not Detected	---------	1.90E-01
ND-147	Not Detected	---------	2.10E-01
NI-57	Not Detected	---------	6.44E-02
PB-210	Not Detected	---------	3.79E+01
RU-103	Not Detected	---------	3.17E-02
RU-106	Not Detected	---------	3.05E-01
SB-122	Not Detected	---------	4.68E-02
SB-124	Not Detected	---------	3.21E-02
SB-125	Not Detected	---------	8.52E-02
SN-113	Not Detected	---------	4.03E-02
SR-85	Not Detected	---------	3.85E-02
TA-182	Not Detected	---------	1.55E-01
TA-183	Not Detected	---------	4.69E-01
TC-99m	Not Detected	---------	1.29E-01
TL-201	Not Detected	---------	2.20E-01
XE-133	Not Detected	---------	1.80E-01
Y-88	Not Detected	---------	2.78E-02
ZN-65	Not Detected	---------	1.04E-01
ZR-95	Not Detected	---------	5.81E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-28-97 10:03:13 AM

Analyzed by: 8/28/97 Reviewed by: 8/29/97

Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034080 (RECOUNT)
Lab Sample ID : 70149225

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 691.000 gram
Sample Date/Time : 8-25-97 10:55:00 AM
Acquire Start Date/Time : 8-27-97 7:53:37 PM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	1.72E+00
TH-234	1.77E+00	4.78E-01	5.12E-01
RA-226	1.75E+00	8.74E-01	5.90E-01
PB-214	7.81E-01	1.52E-01	5.45E-02
BI-214	7.47E-01	2.46E-01	5.89E-02
TH-232	8.41E-01	4.29E-01	2.38E-01
RA-228	7.84E-01	2.42E-01	1.83E-01
[illegible]-228	8.33E-01	2.45E-01	9.67E-02
[illegible]-228	6.85E-01	2.50E-01	5.21E-01
RA-224	8.70E-01	3.76E-01	1.05E-01
PB-212	8.53E-01	2.51E-01	4.18E-02
BI-212	9.81E-01	4.58E-01	3.68E-01
TL-208	7.76E-01	2.35E-01	8.04E-02
U-235	Not Detected	---------	2.32E-01
TH-231	Not Detected	---------	9.76E+00
PA-231	Not Detected	---------	1.58E+00
TH-227	Not Detected	---------	4.07E-01
RA-223	Not Detected	---------	1.78E-01
RN-219	Not Detected	---------	4.80E-01
PB-211	Not Detected	---------	1.09E+00
TL-207	Not Detected	---------	1.73E+01
AM-241	Not Detected	---------	2.14E-01
PU-239	Not Detected	---------	3.94E+02
NP-237	Not Detected	---------	3.26E-01
PA-233	Not Detected	---------	6.69E-02
TH-229	Not Detected	---------	2.20E-01

[Summary Report] - Sample ID: : 70149225

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
-108m	Not Detected	---------	4.96E-02
-110m	Not Detected	---------	7.11E-02
BA-133	Not Detected	---------	6.24E-02
BE-7	7.05E-01	2.78E-01	2.45E-01
BI-207	Not Detected	---------	3.58E-02
CD-109	~~2.54E+00~~	~~6.64E-01~~	8.16E-01 Not detected 8/28/97
CD-115	Not Detected	---------	1.57E-01
CE-139	Not Detected	---------	2.85E-02
CE-141	Not Detected	---------	5.32E-02
CE-144	Not Detected	---------	2.07E-01
CO-56	Not Detected	---------	3.88E-02
CO-57	Not Detected	---------	2.71E-02
CO-58	Not Detected	---------	3.85E-02
CO-60	Not Detected	---------	4.13E-02
CR-51	Not Detected	---------	2.73E-01
CS-134	Not Detected	---------	5.23E-02
CS-137	3.98E-01	8.91E-02	3.24E-02
EU-152	Not Detected	---------	8.14E-02
EU-154	Not Detected	---------	2.28E-01
EU-155	Not Detected	---------	1.26E-01
FE-59	Not Detected	---------	9.12E-02
GD-153	Not Detected	---------	8.87E-02
HG-203	Not Detected	---------	3.68E-02
I-131	Not Detected	---------	4.05E-02
IR-192	Not Detected	---------	3.07E-02
K-40	1.37E+01	2.24E+00	3.75E-01
MN-52	Not Detected	---------	5.29E-02
N-54	Not Detected	---------	4.22E-02
-99	Not Detected	---------	5.17E-01
NA-22	Not Detected	---------	5.22E-02
NA-24	Not Detected	---------	5.83E-01
NB-95	Not Detected	---------	2.67E-01
ND-147	Not Detected	---------	2.81E-01
NI-57	Not Detected	---------	1.83E-01
PB-210	Not Detected	---------	8.69E+00
RU-103	Not Detected	---------	3.52E-02
RU-106	Not Detected	---------	3.24E-01
SB-122	Not Detected	---------	8.38E-02
SB-124	Not Detected	---------	3.58E-02
SB-125	Not Detected	---------	1.08E-01
SN-113	Not Detected	---------	4.37E-02
SR-85	Not Detected	---------	4.49E-02
TA-182	Not Detected	---------	1.93E-01
TA-183	Not Detected	---------	2.51E-01
TC-99m	Not Detected	---------	1.96E+01
TL-201	Not Detected	---------	2.11E-01
XE-133	Not Detected	---------	2.23E-01
Y-88	Not Detected	---------	3.18E-02
ZN-65	Not Detected	---------	1.30E-01
ZR-95	Not Detected	---------	6.53E-02

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [881 Laboratory] *
* 8-26-97 2:55:30 AM *
****

Analyzed by: 8/26/97 Reviewed by: 8/26/97

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Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034081
Lab Sample ID : 70149206

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 781.000 gram
Sample Date/Time : 8-25-97 10:56:00 AM
Acquire Start Date/Time : 8-26-97 1:12:43 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	3.24E+00
TH-234	9.97E-01	4.16E-01	6.31E-01
RA-226	1.35E+00	6.39E-01	5.79E-01
PB-214	6.93E-01	2.16E-01	6.39E-02
BI-214	6.57E-01	1.20E-01	4.65E-02
TH-232	7.24E-01	3.49E-01	1.37E-01
[illegible]-228	6.25E-01	2.11E-01	1.36E-01
[illegible]-228	7.27E-01	2.02E-01	8.27E-02
[illegible]H-228	6.62E-01	2.63E-01	4.51E-01
RA-224	6.56E-01	2.09E-01	8.07E-02
PB-212	7.19E-01	1.22E-01	3.84E-02
BI-212	6.01E-01	2.98E-01	2.87E-01
TL-208	6.89E-01	1.81E-01	6.73E-02
U-235	Not Detected	---------	2.34E-01
TH-231	Not Detected	---------	1.25E+01
PA-231	Not Detected	---------	1.40E+00
TH-227	Not Detected	---------	3.29E-01
RA-223	Not Detected	---------	1.99E-01
RN-219	~~3.13E-01~~	~~3.16E-01~~	~~3.81E-01~~ NOT DETECTED [illegible] 9/26/97
PB-211	Not Detected	---------	8.34E-01
TL-207	Not Detected	---------	1.30E+01
AM-241	Not Detected	---------	4.70E-01
PU-239	Not Detected	---------	4.30E+02
NP-237	Not Detected	---------	3.80E-01
PA-233	Not Detected	---------	5.72E-02
TH-229	Not Detected	---------	2.50E-01

[Summary Report] - Sample ID: : 70149206

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
-108m	Not Detected	---------	3.45E-02
AG-110m	Not Detected	---------	5.78E-02
BA-133	Not Detected	---------	6.53E-02
BE-7	3.44E-01	2.60E-01	1.47E-01
CD-109	~~1.58E+00~~	~~7.06E-01~~	~~9.59E-01~~ NOT DETECTED AFTER 2/20/99
CD-115	Not Detected	---------	7.67E-02
CE-139	Not Detected	---------	2.85E-02
CE-141	Not Detected	---------	5.12E-02
CE-144	Not Detected	---------	2.38E-01
CO-56	Not Detected	---------	9.52E-02
CO-57	Not Detected	---------	2.95E-02
CO-58	Not Detected	---------	2.90E-02
CO-60	Not Detected	---------	3.17E-02
CR-51	Not Detected	---------	2.31E-01
CS-134	Not Detected	---------	4.85E-02
CS-137	3.86E-01	7.49E-02	2.20E-02
EU-152	Not Detected	---------	8.88E-02
EU-154	Not Detected	---------	1.59E-01
EU-155	Not Detected	---------	1.44E-01
FE-59	Not Detected	---------	6.48E-02
GD-153	Not Detected	---------	1.05E-01
HG-203	Not Detected	---------	3.04E-02
I-131	Not Detected	---------	3.08E-02
IR-192	Not Detected	---------	2.73E-02
K-40	1.51E+01	2.27E+00	2.06E-01
MN-52	Not Detected	---------	2.88E-02
N-54	Not Detected	---------	3.27E-02
-99	Not Detected	---------	2.52E-01
NA-22	Not Detected	---------	3.68E-02
NA-24	Not Detected	---------	5.78E-02
NB-95	Not Detected	---------	1.69E-01
ND-147	Not Detected	---------	1.99E-01
NI-57	Not Detected	---------	3.26E-02
PB-210	Not Detected	---------	3.40E+01
RU-103	Not Detected	---------	2.83E-02
RU-106	Not Detected	---------	2.71E-01
SB-122	Not Detected	---------	4.34E-02
SB-124	Not Detected	---------	2.92E-02
SB-125	Not Detected	---------	8.18E-02
SN-113	Not Detected	---------	3.63E-02
SR-85	Not Detected	---------	3.53E-02
TA-182	Not Detected	---------	1.41E-01
TA-183	Not Detected	---------	4.33E-01
TC-99m	Not Detected	---------	1.44E-01
TL-201	Not Detected	---------	1.98E-01
XE-133	Not Detected	---------	1.71E-01
Y-88	Not Detected	---------	2.65E-02
ZN-65	Not Detected	---------	9.64E-02
ZR-95	Not Detected	---------	5.41E-02

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* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [881 Laboratory] *
* 8-26-97 4:40:29 AM *
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Analyzed by: Reviewed by: 8/26/97

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Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034082
Lab Sample ID : 70149207

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 798.000 gram
Sample Date/Time : 8-25-97 11:45:00 AM
Acquire Start Date/Time : 8-26-97 2:57:41 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	3.25E+00
TH-234	7.48E-01	3.51E-01	5.74E-01
RA-226	1.62E+00	7.45E-01	5.39E-01
PB-214	7.08E-01	1.33E-01	6.31E-02
BI-214	6.12E-01	7.00E-01	4.60E-02
TH-232	8.18E-01	4.16E-01	1.45E-01
PA-228	8.00E-01	2.53E-01	1.32E-01
-228	Not Detected	---------	7.72E-02
TH-228	4.64E-01	4.37E-01	4.65E-01
RA-224	8.26E-01	2.85E-01	5.05E-02
PB-212	7.36E-01	1.27E-01	3.92E-02
BI-212	Not Detected	---------	2.99E-01
TL-208	Not Detected	---------	5.82E-02
U-235	Not Detected	---------	2.36E-01
TH-231	Not Detected	---------	1.22E+01
PA-231	Not Detected	---------	1.38E+00
TH-227	Not Detected	---------	3.31E-01
RA-223	Not Detected	---------	1.98E-01
RN-219	Not Detected	---------	3.64E-01
PB-211	Not Detected	---------	8.29E-01
TL-207	Not Detected	---------	1.29E+01
AM-241	Not Detected	---------	4.41E-01
PU-239	Not Detected	---------	4.32E+02
NP-237	Not Detected	---------	3.75E-01
PA-233	Not Detected	---------	5.69E-02
TH-229	Not Detected	---------	2.44E-01

[Summary Report] - Sample ID: : 70149207

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)	
-108m	Not Detected	---------	3.83E-02	
AG-110m	Not Detected	---------	4.11E-02	
BA-133	Not Detected	---------	6.44E-02	
BE-7	3.24E-01	1.54E-01	1.55E-01	
CD-109	~~1.47E+00~~	~~5.32E-01~~	~~9.03E-01~~	NOT DETECTED 8/20/97 KM
CD-115	Not Detected	---------	7.71E-02	
CE-139	Not Detected	---------	2.92E-02	
CE-141	Not Detected	---------	5.16E-02	
CE-144	Not Detected	---------	2.40E-01	
CO-56	Not Detected	---------	3.24E-02	
CO-57	Not Detected	---------	3.00E-02	
CO-58	Not Detected	---------	3.08E-02	
CO-60	Not Detected	---------	3.34E-02	
CR-51	Not Detected	---------	2.29E-01	
CS-134	Not Detected	---------	4.78E-02	
CS-137	1.43E-01	3.44E-02	2.09E-02	
EU-152	Not Detected	---------	9.04E-02	
EU-154	Not Detected	---------	1.77E-01	
EU-155	Not Detected	---------	1.45E-01	
FE-59	Not Detected	---------	6.82E-02	
GD-153	Not Detected	---------	1.03E-01	
HG-203	Not Detected	---------	3.00E-02	
I-131	Not Detected	---------	2.88E-02	
IR-192	Not Detected	---------	2.64E-02	
K-40	1.64E+01	2.43E+00	2.16E-01	
MN-52	Not Detected	---------	2.85E-02	
N-54	Not Detected	---------	3.27E-02	
-99	Not Detected	---------	2.67E-01	
NA-22	Not Detected	---------	3.98E-02	
NA-24	Not Detected	---------	6.21E-02	
NB-95	Not Detected	---------	1.72E-01	
ND-147	Not Detected	---------	1.97E-01	
NI-57	~~4.91E-02~~	~~5.33E-02~~	~~3.42E-02~~	NOT DETECTED 8/20/97 KM
PB-210	Not Detected	---------	3.38E+01	
RU-103	Not Detected	---------	2.89E-02	
RU-106	Not Detected	---------	2.67E-01	
SB-122	Not Detected	---------	4.24E-02	
SB-124	Not Detected	---------	2.94E-02	
SB-125	Not Detected	---------	7.70E-02	
SN-113	Not Detected	---------	3.65E-02	
SR-85	Not Detected	---------	3.56E-02	
TA-182	Not Detected	---------	1.40E-01	
TA-183	Not Detected	---------	4.12E-01	
TC-99m	Not Detected	---------	1.63E-01	
TL-201	Not Detected	---------	2.01E-01	
XE-133	Not Detected	---------	1.69E-01	
Y-88	Not Detected	---------	2.72E-02	
ZN-65	Not Detected	---------	9.52E-02	
ZR-95	Not Detected	---------	5.41E-02	

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* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [881 Laboratory] *
* 8-26-97 9:22:11 AM *
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* Analyzed by: 8/26/97 Reviewed by: 8/26/97 *
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Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034083
Lab Sample ID : 70149208

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 674.000 gram
Sample Date/Time : 8-25-97 11:47:00 AM
Acquire Start Date/Time : 8-26-97 7:33:03 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	3.63E+00
TH-234	1.31E+00	5.48E-01	7.31E-01
RA-226	1.57E+00	9.74E-01	6.58E-01
PB-214	8.44E-01	1.44E-01	7.06E-02
BI-214	7.24E-01	5.15E-01	5.48E-02
TH-232	7.97E-01	3.87E-01	1.58E-01
[illegible]-228	8.35E-01	3.00E-01	1.58E-01
[illegible]-228	8.18E-01	1.98E-01	8.80E-02
TH-228	9.21E-01	4.32E-01	5.53E-01
RA-224	7.70E-01	2.57E-01	8.09E-02
PB-212	8.35E-01	1.36E-01	4.10E-02
BI-212	1.06E+00	5.52E-01	3.22E-01
TL-208	6.98E-01	1.52E-01	7.56E-02
U-235	Not Detected	---------	2.66E-01
TH-231	Not Detected	---------	1.38E+01
PA-231	Not Detected	---------	1.58E+00
TH-227	Not Detected	---------	3.79E-01
RA-223	Not Detected	---------	2.26E-01
RN-219	Not Detected	---------	4.23E-01
PB-211	Not Detected	---------	9.64E-01
TL-207	Not Detected	---------	1.49E+01
AM-241	Not Detected	---------	5.34E-01
PU-239	Not Detected	---------	4.88E+02
NP-237	~~4.50E-01~~	~~1.72E-01~~	~~3.05E-01~~ NOT DETECTED KT 8/26/97
PA-233	Not Detected	---------	6.67E-02
TH-229	Not Detected	---------	2.80E-01

[Summary Report] - Sample ID: : 70149208

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)	
-108m	Not Detected	---------	4.36E-02	
AG-110m	Not Detected	---------	6.77E-02	
BA-133	Not Detected	---------	7.55E-02	
BE-7	4.35E-01	2.93E-01	1.87E-01	
CD-109	Not Detected	---------	1.03E+00	
CD-115	Not Detected	---------	9.34E-02	
CE-139	Not Detected	---------	3.23E-02	
CE-141	Not Detected	---------	5.82E-02	
CE-144	Not Detected	---------	2.69E-01	
CO-56	Not Detected	---------	1.10E-01	
CO-57	Not Detected	---------	3.29E-02	
CO-58	Not Detected	---------	3.37E-02	
CO-60	Not Detected	---------	3.75E-02	
CR-51	Not Detected	---------	2.61E-01	
CS-134	Not Detected	---------	5.40E-02	
CS-137	4.71E-01	1.98E-01	2.50E-02	
EU-152	Not Detected	---------	9.92E-02	
EU-154	Not Detected	---------	2.00E-01	
EU-155	Not Detected	---------	1.64E-01	
FE-59	Not Detected	---------	7.64E-02	
GD-153	Not Detected	---------	1.13E-01	
HG-203	Not Detected	---------	3.48E-02	
I-131	Not Detected	---------	3.35E-02	
IR-192	Not Detected	---------	3.09E-02	
K-40	1.66E+01	4.58E+00	2.66E-01	
MN-52	Not Detected	---------	3.23E-02	
N-54	Not Detected	---------	2.20E-02	
-99	Not Detected	---------	3.00E-01	
NA-22	Not Detected	---------	4.49E-02	
NA-24	Not Detected	---------	8.03E-02	
NB-95	Not Detected	---------	2.04E-01	
ND-147	Not Detected	---------	2.33E-01	
NI-57	~~6.86E-02~~	~~6.86E-02~~	~~3.75E-02~~	NOT DETECTED 8/6/07
PB-210	Not Detected	---------	4.04E+01	
RU-103	Not Detected	---------	3.27E-02	
RU-106	Not Detected	---------	3.21E-01	
SB-122	Not Detected	---------	5.37E-02	
SB-124	Not Detected	---------	3.29E-02	
SB-125	Not Detected	---------	9.49E-02	
SN-113	Not Detected	---------	4.25E-02	
SR-85	Not Detected	---------	4.12E-02	
TA-182	Not Detected	---------	1.62E-01	
TA-183	Not Detected	---------	5.08E-01	
TC-99m	Not Detected	---------	3.11E-01	
TL-201	Not Detected	---------	2.40E-01	
XE-133	Not Detected	---------	2.02E-01	
Y-88	Not Detected	---------	2.97E-02	
ZN-65	Not Detected	---------	1.14E-01	
ZR-95	Not Detected	---------	6.05E-02	

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-26-97 11:08:10 AM

Analyzed by: [illegible] Reviewed by: [illegible] 8/26/97

Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034084
Lab Sample ID : 70149209

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 641.000 gram
Sample Date/Time : 8-25-97 11:50:00 AM
Acquire Start Date/Time : 8-26-97 9:24:52 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	---------	2.70E+00
TH-234	2.27E+00	6.96E-01	7.66E-01
RA-226	2.50E+00	7.76E-01	6.44E-01
PB-214	8.34E-01	1.63E-01	7.55E-02
BI-214	7.60E-01	2.17E-01	5.46E-02
TH-232	9.39E-01	4.65E-01	1.71E-01
AC-228	9.86E-01	2.73E-01	1.53E-01
PB-228	9.68E-01	2.22E-01	8.37E-02
TH-228	8.26E-01	2.85E-01	5.21E-01
RA-224	9.55E-01	2.97E-01	7.58E-02
PB-212	8.54E-01	1.55E-01	4.43E-02
BI-212	9.90E-01	4.91E-01	3.16E-01
TL-208	7.48E-01	2.38E-01	7.40E-02
U-235	Not Detected	---------	2.71E-01
TH-231	Not Detected	---------	1.45E+01
PA-231	Not Detected	---------	1.60E+00
TH-227	Not Detected	---------	3.93E-01
RA-223	Not Detected	---------	2.39E-01
RN-219	Not Detected	---------	4.21E-01
PB-211	Not Detected	---------	9.52E-01
TL-207	Not Detected	---------	1.46E+01
AM-241	Not Detected	---------	5.34E-01
PU-239	Not Detected	---------	5.05E+02
NP-237	Not Detected	---------	4.54E-01
PA-233	Not Detected	---------	6.56E-02
TH-229	Not Detected	---------	2.88E-01

[Summary Report] - Sample ID: : 70149209

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
-108m	Not Detected	---------	4.54E-02
AG-110m	Not Detected	---------	5.11E-02
BA-133	Not Detected	---------	7.57E-02
BE-7	3.69E-01	1.73E-01	1.84E-01
CD-109	~~1.27E+00~~	~~5.45E-01~~	~~1.11E+00~~ NOT DETECTED KA 8/24/07
CD-115	Not Detected	---------	1.01E-01
CE-139	Not Detected	---------	3.36E-02
CE-141	Not Detected	---------	5.89E-02
CE-144	Not Detected	---------	2.77E-01
CO-56	Not Detected	---------	1.16E-01
CO-57	Not Detected	---------	3.39E-02
CO-58	Not Detected	---------	3.41E-02
CO-60	Not Detected	---------	4.03E-02
CR-51	Not Detected	---------	2.68E-01
CS-134	Not Detected	---------	5.56E-02
CS-137	1.87E-01	4.32E-02	2.57E-02
EU-152	Not Detected	---------	1.02E-01
EU-154	Not Detected	---------	2.08E-01
EU-155	Not Detected	---------	1.67E-01
FE-59	Not Detected	---------	7.59E-02
GD-153	Not Detected	---------	1.24E-01
HG-203	Not Detected	---------	3.56E-02
I-131	Not Detected	---------	3.46E-02
IR-192	Not Detected	---------	3.13E-02
K-40	1.58E+01	2.50E+00	2.61E-01
MN-52	Not Detected	---------	3.53E-02
MN-54	Not Detected	---------	3.74E-02
-99	Not Detected	---------	3.31E-01
NA-22	Not Detected	---------	4.33E-02
NA-24	Not Detected	---------	9.32E-02
NB-95	Not Detected	---------	2.15E-01
ND-147	Not Detected	---------	2.23E-01
NI-57	Not Detected	---------	8.04E-02
PB-210	Not Detected	---------	4.02E+01
RU-103	Not Detected	---------	3.30E-02
RU-106	Not Detected	---------	3.30E-01
SB-122	Not Detected	---------	5.56E-02
SB-124	Not Detected	---------	3.29E-02
SB-125	Not Detected	---------	9.03E-02
SN-113	Not Detected	---------	4.24E-02
SR-85	Not Detected	---------	4.18E-02
TA-182	Not Detected	---------	1.66E-01
TA-183	Not Detected	---------	5.14E-01
TC-99m	Not Detected	---------	3.94E-01
TL-201	Not Detected	---------	2.52E-01
XE-133	Not Detected	---------	2.15E-01
Y-88	Not Detected	---------	2.96E-02
ZN-65	Not Detected	---------	1.14E-01
ZR-95	Not Detected	---------	6.57E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-26-97 12:53:55 PM

Analyzed by: 8/26/97 Reviewed by: 8/26/97

Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034085
Lab Sample ID : 70149210

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 800.000 gram
Sample Date/Time : 8-25-97 11:52:00 AM
Acquire Start Date/Time : 8-26-97 11:10:27 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	---------	3.35E+00
TH-234	1.25E+00	8.89E-01	6.28E-01
RA-226	1.76E+00	5.76E-01	5.29E-01
PB-214	7.60E-01	1.31E-01	6.33E-02
BI-214	7.23E-01	4.56E-01	4.52E-02
TH-232	7.35E-01	3.61E-01	1.47E-01
[illegible]-228	7.84E-01	1.89E-01	1.40E-01
[illegible]-228	8.59E-01	2.21E-01	8.21E-02
TH-228	7.11E-01	2.83E-01	4.97E-01
RA-224	8.65E-01	2.72E-01	6.50E-02
PB-212	8.35E-01	1.45E-01	4.02E-02
BI-212	8.49E-01	3.45E-01	3.13E-01
TL-208	7.44E-01	1.46E-01	6.40E-02
U-235	Not Detected	---------	2.45E-01
TH-231	Not Detected	---------	1.30E+01
PA-231	Not Detected	---------	1.47E+00
TH-227	Not Detected	---------	3.51E-01
RA-223	Not Detected	---------	2.11E-01
RN-219	Not Detected	---------	3.82E-01
PB-211	Not Detected	---------	8.67E-01
TL-207	Not Detected	---------	1.30E+01
AM-241	Not Detected	---------	4.84E-01
PU-239	Not Detected	---------	4.53E+02
NP-237	Not Detected	---------	2.56E-01
PA-233	Not Detected	---------	5.93E-02
TH-229	Not Detected	---------	2.60E-01

[Summary Report] - Sample ID: : 70149210

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)	
-108m	Not Detected	---------	4.04E-02	
AG-110m	Not Detected	---------	5.93E-02	
BA-133	Not Detected	---------	6.57E-02	
BE-7	7.00E-01	2.21E-01	1.67E-01	
CD-109	~~1.54E+00~~	~~5.38E-01~~	~~8.67E-01~~	NOT DETECTED HG 8/20/97
CD-115	Not Detected	---------	8.73E-02	
CE-139	Not Detected	---------	2.93E-02	
CE-141	Not Detected	---------	5.39E-02	
CE-144	Not Detected	---------	2.47E-01	
CO-56	Not Detected	---------	3.50E-02	
CO-57	Not Detected	---------	3.13E-02	
CO-58	Not Detected	---------	2.97E-02	
CO-60	Not Detected	---------	3.48E-02	
CR-51	Not Detected	---------	2.42E-01	
CS-134	Not Detected	---------	4.92E-02	
CS-137	Not Detected	---------	2.15E-02	
EU-152	Not Detected	---------	9.43E-02	
EU-154	Not Detected	---------	1.87E-01	
EU-155	Not Detected	---------	1.54E-01	
FE-59	Not Detected	---------	7.01E-02	
GD-153	Not Detected	---------	1.09E-01	
HG-203	Not Detected	---------	3.22E-02	
I-131	Not Detected	---------	3.15E-02	
IR-192	Not Detected	---------	2.83E-02	
K-40	1.78E+01	2.67E+00	2.41E-01	
MN-52	Not Detected	---------	3.17E-02	
-54	Not Detected	---------	3.40E-02	
-99	Not Detected	---------	2.91E-01	
NA-22	Not Detected	---------	3.82E-02	
NA-24	Not Detected	---------	9.23E-02	
NB-95	Not Detected	---------	1.94E-01	
ND-147	Not Detected	---------	2.15E-01	
NI-57	~~6.54E-02~~	~~4.30E-02~~	~~3.95E-02~~	NOT DETECTED 8/20/97 HG
PB-210	Not Detected	---------	3.51E+01	
RU-103	Not Detected	---------	2.93E-02	
RU-106	Not Detected	---------	2.83E-01	
SB-122	Not Detected	---------	4.89E-02	
SB-124	Not Detected	---------	3.00E-02	
SB-125	Not Detected	---------	8.14E-02	
SN-113	Not Detected	---------	3.82E-02	
SR-85	Not Detected	---------	3.64E-02	
TA-182	Not Detected	---------	1.48E-01	
TA-183	Not Detected	---------	4.77E-01	
TC-99m	Not Detected	---------	4.35E-01	
TL-201	Not Detected	---------	2.25E-01	
XE-133	Not Detected	---------	1.97E-01	
Y-88	Not Detected	---------	2.37E-02	
ZN-65	Not Detected	---------	1.03E-01	
ZR-95	Not Detected	---------	5.64E-02	

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-26-97 3:39:35 PM

Analyzed by: KA 8/26/97 Reviewed by: 8/26/97

Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034090
Lab Sample ID : 70149215

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 575.000 gram
Sample Date/Time : 8-25-97 11:20:00 AM
Acquire Start Date/Time : 8-26-97 1:56:16 PM
Detector Name : LAB03
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	1.55E+00
TH-234	9.39E-01	3.85E-01	4.65E-01
RA-226	1.75E+00	7.81E-01	6.22E-01
PB-214	7.09E-01	1.50E-01	6.43E-02
BI-214	6.45E-01	1.54E-01	6.19E-02
TH-232	8.29E-01	4.31E-01	1.96E-01
-228	6.51E-01	2.58E-01	1.96E-01
-228	7.98E-01	3.86E-01	1.09E-01
TH-228	7.14E-01	4.27E-01	5.33E-01
RA-224	9.30E-01	3.20E-01	1.06E-01
PB-212	8.50E-01	1.57E-01	4.81E-02
BI-212	1.10E+00	6.57E-01	4.50E-01
TL-208	8.45E-01	1.95E-01	8.99E-02
U-235	Not Detected	---------	2.12E-01
TH-231	Not Detected	---------	8.68E+00
PA-231	Not Detected	---------	1.62E+00
TH-227	Not Detected	---------	4.37E-01
RA-223	Not Detected	---------	1.51E-01
RN-219	Not Detected	---------	5.29E-01
PB-211	Not Detected	---------	1.17E+00
TL-207	Not Detected	---------	1.66E+01
AM-241	Not Detected	---------	1.84E-01
PU-239	Not Detected	---------	4.04E+02
NP-237	~~4.81E-01~~	~~1.75E-01~~	~~2.25E-01~~ NOT DETECTED KA 8/26/97
PA-233	Not Detected	---------	7.47E-02
TH-229	Not Detected	---------	2.09E-01

[Summary Report] - Sample ID: : 70149215

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
-108m	Not Detected	---------	5.04E-02
AG-110m	Not Detected	---------	1.00E-01
BA-133	Not Detected	---------	7.12E-02
BE-7	8.16E-01	3.73E-01	2.31E-01
CD-109	Not Detected	---------	1.02E+00
CD-115	Not Detected	---------	1.15E-01
CE-139	Not Detected	---------	2.95E-02
CE-141	Not Detected	---------	4.82E-02
CE-144	Not Detected	---------	2.13E-01
CO-56	Not Detected	---------	4.00E-02
CO-57	Not Detected	---------	2.67E-02
CO-58	Not Detected	---------	4.11E-02
CO-60	Not Detected	---------	4.46E-02
CR-51	Not Detected	---------	2.97E-01
CS-134	Not Detected	---------	4.93E-02
CS-137	7.52E-01	3.30E-01	3.19E-02
EU-152	Not Detected	---------	8.10E-02
EU-154	Not Detected	---------	2.36E-01
EU-155	Not Detected	---------	1.21E-01
FE-59	Not Detected	---------	8.66E-02
GD-153	Not Detected	---------	8.56E-02
HG-203	Not Detected	---------	3.59E-02
I-131	Not Detected	---------	4.09E-02
IR-192	Not Detected	---------	3.54E-02
K-40	1.23E+01	2.22E+00	4.03E-01
MN-52	Not Detected	---------	4.77E-02
N-54	Not Detected	---------	4.33E-02
-99	Not Detected	---------	3.81E-01
NA-22	Not Detected	---------	4.88E-02
NA-24	Not Detected	---------	1.51E-01
NB-95	Not Detected	---------	2.46E-01
ND-147	Not Detected	---------	2.78E-01
NI-57	Not Detected	---------	1.04E-01
PB-210	4.57E+00	2.96E+00	4.31E+00
RU-103	Not Detected	---------	3.79E-02
RU-106	Not Detected	---------	3.62E-01
SB-122	Not Detected	---------	6.51E-02
SB-124	Not Detected	---------	3.73E-02
SB-125	Not Detected	---------	1.17E-01
SN-113	Not Detected	---------	4.86E-02
SR-85	Not Detected	---------	4.74E-02
TA-182	Not Detected	---------	1.97E-01
TA-183	Not Detected	---------	1.81E-01
TC-99m	Not Detected	---------	5.56E-01
TL-201	Not Detected	---------	1.29E-01
XE-133	Not Detected	---------	1.33E-01
Y-88	Not Detected	---------	3.77E-02
ZN-65	Not Detected	---------	1.31E-01
ZR-95	Not Detected	---------	6.93E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [881 Laboratory]
8-26-97 4:24:58 PM

Analyzed by: 8/26/97 Reviewed by: 8/27/97

Customer : H.OLDEWAGE (7575)
Customer Sample ID : 034091
Lab Sample ID : 70149216

Sample Description : E.R.228 MARINELLI SOIL SAMPLE
Sample Quantity : 940.000 gram
Sample Date/Time : 8-25-97 11:25:00 AM
Acquire Start Date/Time : 8-26-97 2:42:11 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	---------	2.91E+00	
TH-234	9.52E-01	3.91E-01	5.57E-01	
RA-226	2.59E-01	4.81E-01	5.06E-01	
PB-214	6.66E-01	1.17E-01	5.59E-02	
BI-214	5.76E-01	1.21E-01	4.32E-02	
TH-232	6.90E-01	3.50E-01	1.26E-01	
-228	8.01E-01	2.24E-01	1.34E-01	
-228	7.32E-01	1.79E-01	6.83E-02	
TH-228	7.65E-01	2.27E-01	4.40E-01	
RA-224	8.71E-01	2.56E-01	4.81E-02	
PB-212	7.21E-01	1.17E-01	3.61E-02	
BI-212	7.57E-01	3.06E-01	2.40E-01	
TL-208	7.07E-01	1.52E-01	6.13E-02	
U-235	7.17E-02	5.90E-02	1.40E-01	
TH-231	Not Detected	---------	1.13E+01	
PA-231	Not Detected	---------	1.26E+00	
TH-227	Not Detected	---------	3.03E-01	
RA-223	Not Detected	---------	1.86E-01	
RN-219	~~1.73E-01~~	~~2.78E-01~~	3.31E-01	not detected 8/26/97
PB-211	Not Detected	---------	7.28E-01	
TL-207	Not Detected	---------	1.18E+01	
AM-241	Not Detected	---------	4.23E-01	
PU-239	Not Detected	---------	3.92E+02	
NP-237	~~3.20E-01~~	~~1.32E-01~~	2.62E-01	not detected 8/26/97
PA-233	Not Detected	---------	5.06E-02	
TH-229	Not Detected	---------	2.27E-01	

[Summary Report] - Sample ID: : 70149216

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
-108m	Not Detected	---------	3.54E-02
AG-110m	Not Detected	---------	3.00E-02
BA-133	Not Detected	---------	5.69E-02
BE-7	3.16E-01	1.57E-01	1.57E-01
CD-109	Not Detected	---------	8.88E-01
CD-115	Not Detected	---------	8.03E-02
CE-139	Not Detected	---------	2.65E-02
CE-141	Not Detected	---------	4.76E-02
CE-144	Not Detected	---------	2.12E-01
CO-56	Not Detected	---------	3.22E-02
CO-57	Not Detected	---------	2.74E-02
CO-58	Not Detected	---------	2.77E-02
CO-60	Not Detected	---------	3.23E-02
CR-51	Not Detected	---------	2.03E-01
CS-134	Not Detected	---------	4.08E-02
CS-137	3.80E-02	4.62E-02	2.20E-02
EU-152	Not Detected	---------	8.25E-02
EU-154	Not Detected	---------	1.63E-01
EU-155	Not Detected	---------	1.33E-01
FE-59	Not Detected	---------	6.51E-02
GD-153	Not Detected	---------	9.40E-02
HG-203	Not Detected	---------	2.81E-02
I-131	Not Detected	---------	2.76E-02
IR-192	Not Detected	---------	2.36E-02
K-40	2.03E+01	2.89E+00	2.08E-01
MN-52	Not Detected	---------	2.88E-02
N-54	Not Detected	---------	3.07E-02
-99	Not Detected	---------	2.75E-01
A-22	Not Detected	---------	3.87E-02
NA-24	Not Detected	---------	1.02E-01
NB-95	Not Detected	---------	1.73E-01
ND-147	Not Detected	---------	1.87E-01
NI-57	Not Detected	---------	3.73E-02
PB-210	Not Detected	---------	3.01E+01
RU-103	Not Detected	---------	2.57E-02
RU-106	Not Detected	---------	2.59E-01
SB-122	Not Detected	---------	4.58E-02
SB-124	Not Detected	---------	2.60E-02
SB-125	Not Detected	---------	6.94E-02
SN-113	Not Detected	---------	3.27E-02
SR-85	Not Detected	---------	3.21E-02
TA-182	Not Detected	---------	1.34E-01
TA-183	Not Detected	---------	4.25E-01
TC-99m	Not Detected	---------	6.00E-01
TL-201	Not Detected	---------	2.07E-01
XE-133	Not Detected	---------	1.80E-01
Y-88	Not Detected	---------	2.12E-02
ZN-65	Not Detected	---------	9.07E-02
ZR-95	Not Detected	---------	4.82E-02

Annex 3-C

ANNEX 3-C
Segmented Gate System
ER Site 228A Remediation Project
Thermo NUtech (December 15, 1998)

THERMO NUTECH

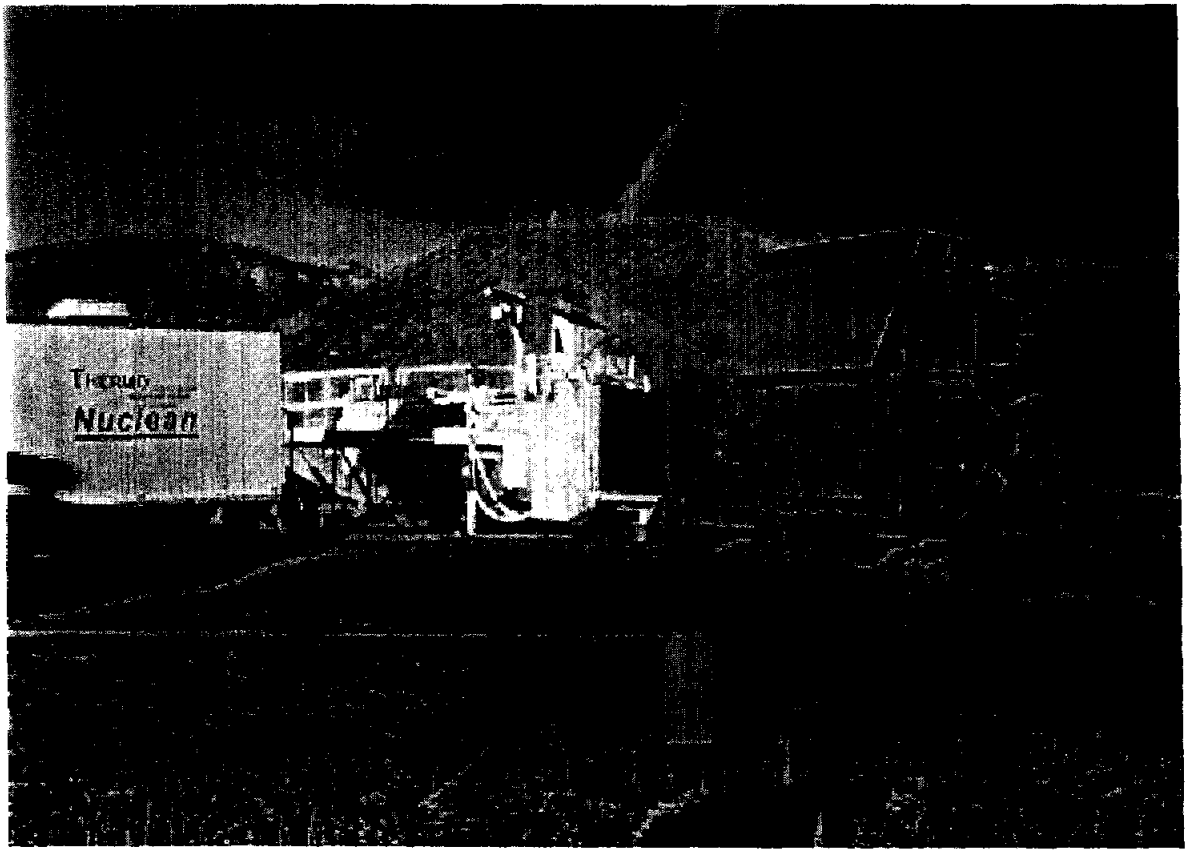
A ThermoRetec Company
4501 Indian School Road NE, Suite G105
Albuquerque, NM 87110

SEGMENTED GATE SYSTEM
ER SITE 228A REMEDIATION PROJECT

SANDIA NATIONAL LABORATORIES

Final Report

December 15, 1998



A Subsidiary of Thermo TerraTech, Inc.,
a Thermo Electron Company

SUMMARY

Thermo NUtech conducted a radioactive material volume reduction project for Sandia National Laboratories (Contract Number BC-0276) at ER Site 228A located east of TA-II complex on the northern rim of the arroyo. The goal of the project was to reduce the volume of contaminated soil that would require off-site storage and disposal. The soil at the site was contaminated with depleted uranium (DU).

The Thermo NUtech Segmented Gate System (SGS) was mobilized to ER Site 228A on November 2, 1998, to an area that had been previously prepared by Thermo NUtech personnel in August 1998. Excavation and pre-screening of the soil to remove the large debris was accomplished in August. Assembly and calibration were accomplished over a four-day period. Soil processing began on Friday, November 6, 1998. Soil was processed from November 6th through November 17th, with actual processing taking place on 11 of those days. A total of 49.18 hours of processing time were logged.

A total of 1,352 cubic yards were processed through the SGS. Total volume reduction reported by the SGS was 99.56 percent. Actual volume reduction for the first pass was still in excess of 99 percent after accounting for the volume of soil that was sent to the above-criteria path due to unscheduled operational halts. Total volume of the above-criteria soil pile was 4.68 cubic yards diverted by SGS between November 6–17 plus approximately 11.68 cubic yards due to unscheduled halts. The approximately 16 cubic yards in the above-criteria pile was processed again on November 17 to remove the soil generated from unscheduled operational halts, and resulted in approximately 5 cubic yards of above-criteria soil (contents of 21 55-gallon drums) requiring off-site disposal. An estimated 5.9 percent volume (or 80 cubic yards: 10 cubic yards in August pre-screening, and 70 cubic yards during SGS processing) in oversize material, was not sorted through the SGS.

Demobilization of the system was completed on November 24, 1998 when the equipment was shipped to the Thermo NUtech Laboratory Facility at 7021 Pan American HWY NE, Albuquerque, NM.

Total cost of SGS operations at Sandia National Laboratories was $220,040 including $29,400 for excavation and pre-screening, $41,300 for mobilization, $117,000 for operations and $32,340 for demobilization.

SECTION 1

1.0 SITE INFORMATION

1.1 GENERAL

This report provides the results of Thermo NUtech's soil remediation project for the DU contaminated soil at the Sandia National Laboratories using the Segmented Gate System (SGS). Thermo NUtech performed this work as a subcontractor to Sandia National Laboratories (SNL) as a contaminated soil volume reduction project in the remediation of Environmental Restoration (ER) Site 228A.

1.2 SITE BACKGROUND

Environmental Restoration Site 228A, the Centrifuge Dump Site and Tijeras Arroyo Operative Unit-ADS 1309, is located about 500 ft east of Technical Area II (TA-II). This site is on the northern rim of Tijeras Arroyo within the boundaries of Kirtland Air Force Base immediately southwest of Albuquerque, New Mexico. In July 1997 heavy rains eroded a portion of a depleted-uranium burial from the Tijeras Arroyo rim. Depleted uranium mixed with soil and some debris washed down the slope creating an alluvial fan deposit that extended as far as 300 feet from its original source.

1.3 SITE CHARACTERISTICS

Characterization of the site indicated that depleted uranium was the only contaminant present at the site. The volume of possibly contaminated soil was estimated at around 1800 cubic yards, including an estimated 20 percent of oversize material. This soil was excavated from 4 tenths of an acre from the arroyo side and bottom, followed by the removal of the larger debris elements using a pre-screen. Characterization of the site included the removal by hand of visible depleted uranium fragments.

1.4 SITE CONTACTS

Site management is provided by the DOE Albuquerque Operations Office (DOE/AL). The Managing and Operating contractor for SNL is the Sandia Corporation, a subsidiary of Lockheed Martin Corporation. The technical contact for the SNL segmented gate project is Sue Collins at Sandia National Laboratories [(505) 284-2546)].

SECTION 2

2.0 MATRIX AND CONTAMINANT DESCRIPTION

The type of matrix treated by the SGS at ER Site 228A was DU contaminated soil (ex situ) mixed with sands and river rock. Most concrete and metal debris was removed by others for SNL. On November 16, Sandia National Laboratories asked Thermo NUtech to process approximately 5 cubic yards of DU contaminated soil from the SNL Burn Site. The Burn Site soil was similar to that at this site except void of the large oversized rocks.

2.1 NATURE AND EXTENT OF CONTAMINATION

The SGS was designed to separate soils based on the radioactive contaminant content. The only radioactive contaminant found in the characterization of ER Site 228A was depleted uranium. Previous contractors removed the DU burial site in the arroyo rim and water run-off gully. Depleted uranium contamination was estimated to exist in approximately 1,385 cubic yards of soil, based on 4 tenths of an acre to a depth of 2-feet in the fan deposit. Field surveys by Sandia personnel defined the extent of contamination as the excavation progressed.

2.2 MATRIX CHARACTERISTICS AFFECTING TREATMENT COST OR PERFORMANCE

This project did not perform any sieve analysis on the soils to be treated at ER Site 228A. The soil moisture content appeared to be about optimal for SGS processing, and was estimated to be approximately 10% by weight, although actual measurements were not made for moisture content. On one windy day, water was added to the soil for processing and no drying process was used. There were some evening rain showers and some snow on November 9, which didn't cause any problems since the sandy soil drained very well.

The oversize debris and rock was estimated to be 360 cubic yards (20 percent of the volume) requiring pre-screening using a field grizzly. The field grizzly is a vertical bar grate measuring 10-feet on a side, mounted at a 45-degree angle to the plane of the ground surface. The vertical grate spacing was 6-inches center to center, and the bars were made of 2-inch by 1-inch plate steel. The soil was dropped onto the field grizzly directly from excavation, which separated debris with a minimum 6-inch dimension from the soil. Smaller debris and soil passed through the grate, while the larger debris slid down and were deposited in front of the grate. The larger debris were collected and spread out for SNL hand survey later. Actual volumes of oversize material were 10 cubic yards during pre-screening (>6 inches) and 70 cubic yards during SGS processing (>1.5 inches).

Of the debris and rocks that passed through the field grizzly, only round river rocks approximately 3-inches in diameter caused any processing difficulties. This size of rock would occasionally fall between the drag feed chain drive gear and chain, which would jam the chain and halt the flow of soil from the screen plant to the SGS. If this resulted in an emptying of the surge feed bin, the lack of soil on the conveyor would be halt the SGS operation.

2.3 TECHNOLOGY DESCRIPTION

The Thermo NUtech Segmented Gate System (SGS) is a combination of sophisticated conveyor systems, radiation detectors and computer controls that remove contaminated soil from a moving feed supply on a conveyor belt. Contaminated soil is diverted by segmented gates to a conveyor belt that deposits the soil on an appropriate ground cloth or other container system for stockpiling and later removal.

Contamination of soils by radionuclides is often heterogeneous. Excavation typically results in significant volumes of clean soil combined with the contaminated soil. The SGS provides a method of separating the clean soil from the contaminated soil based on a criterion supplied by the client.

Thermo NUtech's SGS removes a minimum amount of below-criteria soil with the above-criteria soil, significantly reducing the overall amount of material that requires disposal. The system works by conveying radionuclide-contaminated soil on moving conveyor belts under arrays of sensitive radiation detectors. The moving material is assayed and radioactivity content is logged by computer. The computer then calculates when the elevated activities will reach the end of the conveyor belt and activates the segmented gates to divert the above-criteria soil to a separate conveyor, which deposits the soil on the ground or in a container, where it can be segregated and readied for disposal.

The treatment of contaminated soils using the SGS offers the following advantages:

- the system physically surveys the entire volume of soil to be processed;
- no chemicals or other additives are used; and
- generation of secondary waste is limited to Personnel Protective Equipment (PPE) and decontamination rinse water.

The SGS is primarily a gamma detection system. The two sets of detectors allow for the radiation measurement of two gamma energy regions of interest (ROI). Beta detectors have also been installed on another Department of Energy project and were successfully used under the limited requirements of that application. Prior knowledge of the primary radioactive contaminants is required based on accurate analysis of the soil to be processed. Since the SGS currently sorts soil based on a maximum of two

ROIs, these ROIs must be accurately set for the actual contaminants. Oversize rocks and cobbles cannot be processed by the SGS without pre-crushing.

2.4 SYSTEM SCHEMATIC AND OPERATION

Figure 1 depicts the process flow diagram for the SGS. During system operation, contaminated soil is excavated with standard heavy equipment and relocated to the feed point of the mobile SGS processing plant. Feed soil is screened by the SGS mobile screen/hammermill plant, and all rocks and debris with a minimum dimension greater than approximately 75 percent of the thickness of the soil layer deposited on the main conveyor belt are removed. The soil that passes through the screen/hammermill plant is stored in the feed surge bin, which is a reservoir for soil deposited on the main conveyor belt. A mechanical screed allows soil to flow out onto the conveyor belt in a thickness appropriate for the radioisotope(s) of interest and the soil characteristics.

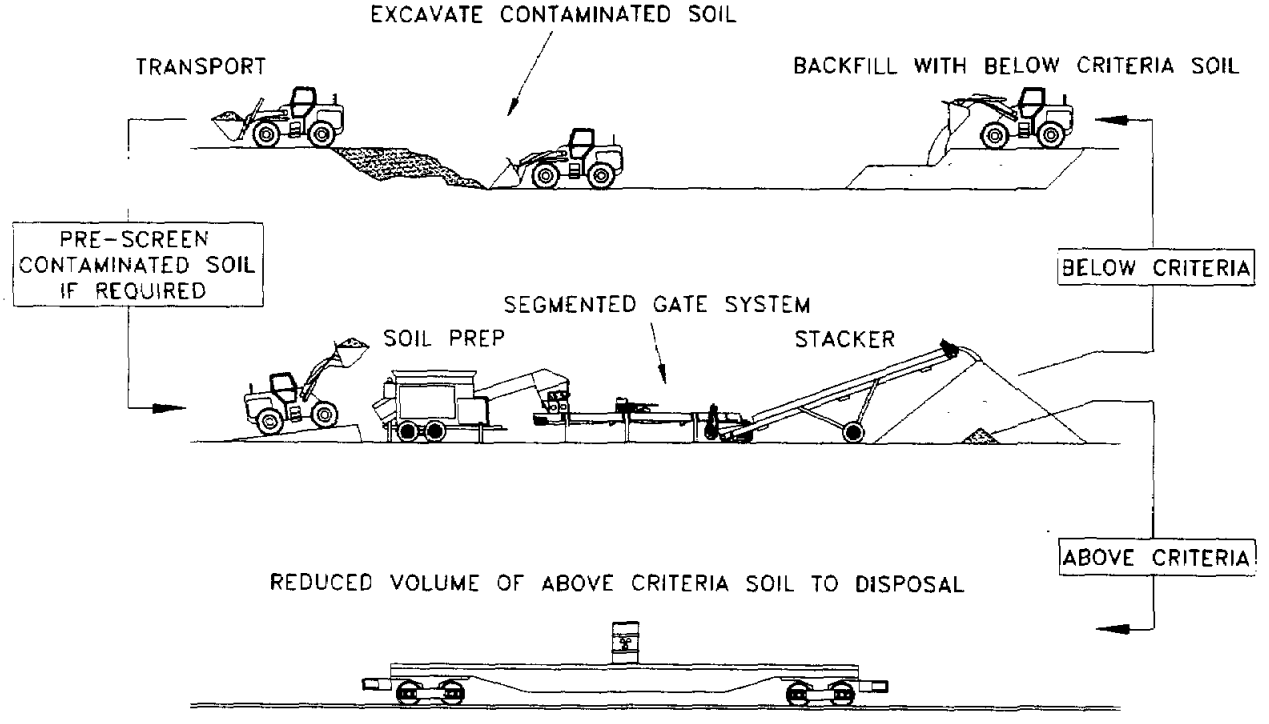


Figure 1. SGS process flow diagram

The soil is then passed under two sets of gamma radiation detector arrays housed in shielded enclosures. The thin detector array is designed for NaI detectors that are 0.160 thick, and incorporates a 0.75-inch poured lead shield fully encased by 3/16-inch thick painted steel. The thick detector array uses NaI detectors with a 2.0-inch thick crystal, and is housed in a similar shield with a 1.0-inch thick poured lead shield. Each detector array spans the width of the belt with two rows of detectors, one row

containing 8 detectors and the other row containing 7 detectors in an offset arrangement. The two detector arrays operate simultaneously.

The process material is conveyed at a pre-selected speed underneath the detector arrays. Counts from the detectors are collected by an on-board computer, which actuates the pneumatic gates based on the analysis of the activity in the soil by several separate computer algorithms. Contaminated material that exceeds the separation criterion for radioactivity is diverted from the normal soil flow stream and deposited by the above-criteria stacking conveyor either in a container or on the ground where it can be packaged for disposal. The below-criteria soil is routed to another stacking conveyor and is piled on the ground, where it may be used to backfill the excavation.

2.5 SYSTEM REQUIREMENTS

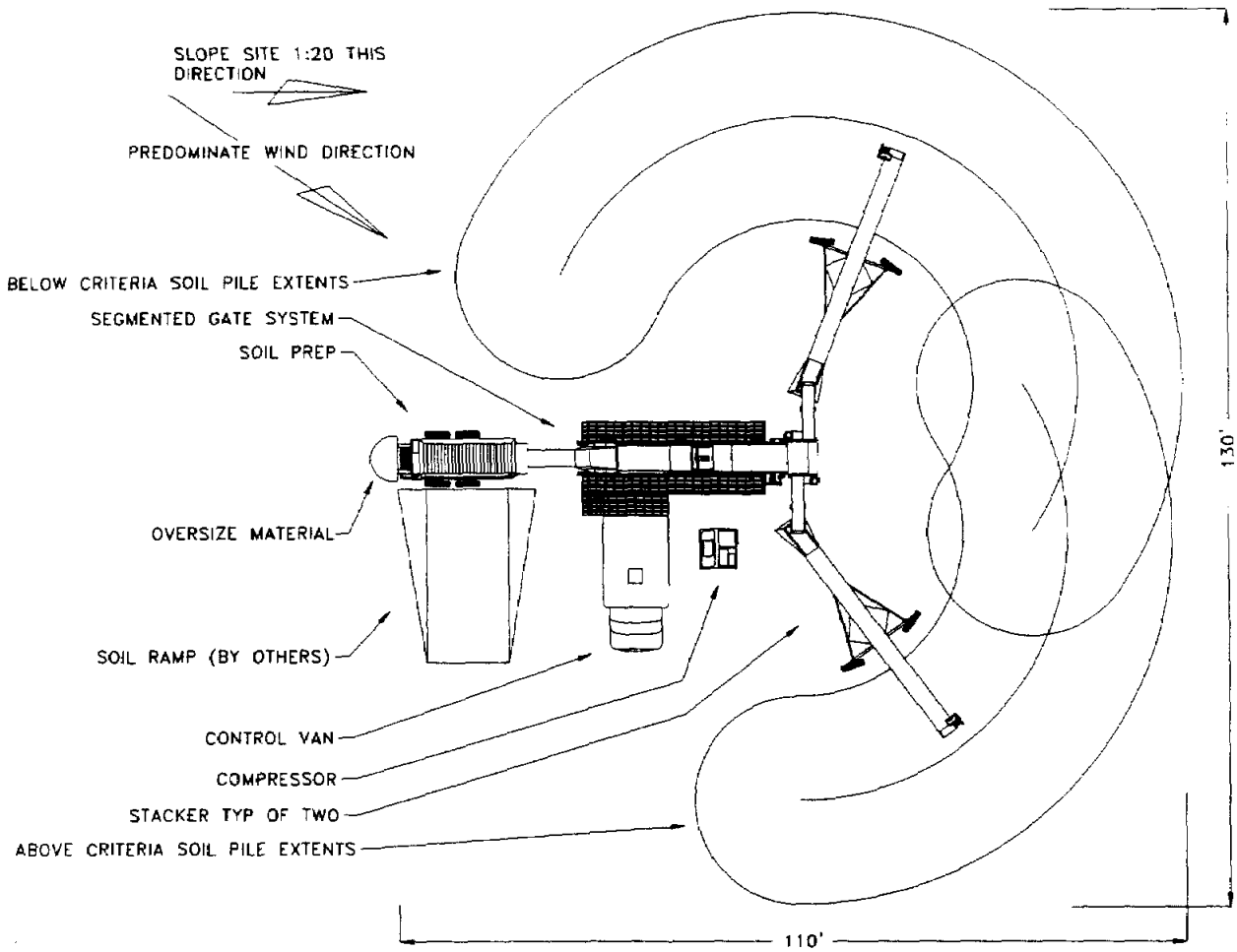
The SGS typically requires a footprint of 110 feet by 130 feet, as shown in Figure 2.

If the radial stacking conveyors are not needed, this footprint may be reduced significantly. The minimum operating surface is a flat dirt pad, free of debris and vegetation. Compaction of the surface is not normally required unless the soil is unusually soft. The screen/hammermill plant is towed into place. The remaining SGS components are removed from the flatbed trucks used to deliver the system and placed in position using a crane with a minimum capacity of 35 tons.

The SGS is completely electrically operated, requiring 208 volts, 3-phase power at approximately 200 amperes. Power can be supplied from site electrical service if available, or using fuel powered electrical generators. The SGS uses a single phase of the 3-phase power to provide any needed 115-volt single-phase service during operational hours. If generators are used, it is usually desirable to have a large generator for operating power, and a small 115-volt generator which is used during non-operating hours to supply power for the environmental control unit to maintain a constant temperature environment for the detectors.

A water source is normally required for the decontamination process. Water may also be required for dust suppression, both for the dirt pad and as an addition to the soil to be processed if necessary.

A local or temporary office building is used for project management and record keeping, as well as for breaks and relief of heat stress or other conditions caused by the local climate. Telephone and fax support are not crucial, but significantly add to the convenience of operations, allowing for the transmission of daily reports, client communications, and support from the corporate office for supplies, repairs, etc. Other required amenities are toilet facilities and a potable water supply.



SEGMENTED GATE SYSTEM FOOTPRINT

Figure 2

Soil is usually delivered to the SGS via a front-end loader. The front-end loader is often also used to excavate the site and to move any accumulated soil piles. Front-end loader operations necessitate the availability of fuel and lubrication services, as do the use of any fuel powered electrical generators.

While health physics support is typically provided by the client, Thermo NUtech can provide senior health physics technicians and full radiation safety support. Personal Protective Equipment (PPE) requirements are determined by the entity providing the radiation safety support, and PPE can be provided by Thermo NUtech or the client as site conditions dictate.

2.6 OPERATING PARAMETERS

The operating parameters for the SGS at ER Site 228A were selected to provide the optimum sensitivity for the contaminant of interest, depleted uranium. The belt speed and soil layer thickness were chosen to maximize production for the sensitivity required to achieve the client specified criteria, which were developed using risk-based calculations for the anticipated future use of the site. The thick detector array was not used during the project. The operating parameters and detector settings are summarized in Tables 1 and 2 below.

Table 1. Operating parameters affecting treatment cost or performance

Parameter	Value or Specification
Processing speed	30 fpm (sorting conveyor belt speed)
Belt length from detectors to conveyor end	Thin array: 16.0 ft (4.88 m) Thick array: 18.0 ft (5.5 m)
Soil layer thickness	2 inches (5.08 cm)
Soil layer width	30.75 inches (78.1 cm)
Soil density (on the conveyor belt)	1.29 g/cm^3
Detector type	Sodium iodide (NaI) 1/16 inch thick crystal

Table 2. SGS detector settings at ER Site 228A

Contaminant	Detector Array	Gamma Energy Region of Interest	Distributed Alarm Setpoint	Multiple Hot Particle Factor
Depleted U	thin	40-110 keV	27 pCi/g	4 (108 pCi/g)

Sandia provided on-site radiation worker safety support. SGS operators were required to wear Level II PPE but were not required to wear respirators.

SECTION 3

3.0 SEGMENTED GATE SYSTEM PERFORMANCE

3.1 PROJECT OBJECTIVES AND APPROACH

The primary objectives of the Segmented Gate System project were:

- Excavate and prepare soil for segmented gate processing;
- Reduce the volume of soil at ER Site 228A requiring off-site disposal;

- Reduce the overall ER Site 228A remediation costs; and
- Provide a basis from which to estimate SGS cost/performance for similar sites projected for future operations.

The SGS was used to sort 1,352 cubic yards of soil suspected of depleted uranium contamination excavated from ER Site 228A at Sandia National Laboratories. The reduction in the volume of contaminated soil was determined based upon the total soil processed versus the amount of soil that was determined to be below the release criteria for the site. The radionuclide activity of the below-criteria soil was compared to the pre-determined risk based release criteria.

3.2 PERFORMANCE SUMMARY

The period of performance for the project demonstration was from July 22, 1998 through November 24, 1998.

Thermo NUtech completed site preparation and soil excavation the first two weeks in August prior to mobilization of the SGS. The SGS was mobilized to the SNL ER Site 228A and arrived on November 2nd. Assembly of the system started while it was being off-loaded. Mobilization and calibration of the system were accomplished by November 6, including detector and operational quality checks. This period also included any SNL site specific training necessary for Thermo NUtech personnel. There were no weather-related delays during the mobilization phase. The SGS was completely operational and ready to process soil on November 6.

A 5-day per week, 10-hour per day schedule was set for processing soil. Soil was processed until November 17, 1998. Work on Saturday and Sunday was allowed based on weather forecast and to ensure completion of soil processing before November 24th. On November 16th, a feasibility study was conducted using 5 cubic yards of soil brought in a dump truck from the SNL Burn Site. The results of that feasibility study are included in the data for ER Site 228A. The system was then decontaminated, surveyed by SNL personnel, loaded onto trucks for transportation to the Thermo NUtech Albuquerque Laboratory on November 24, 1998.

Thermo NUtech personnel using two front-end loaders began the excavation work in August 1998. Excavation included pre-screening of all the soil using a vertical bar field grizzly to remove objects whose minimum dimension was greater than 6 inches. After pre-screening, the soil was stockpiled for processing. The stockpiled soil was identified by SNL personnel as soil pile number 4. The oversize material was spread out in a single layer in preparation for hand survey by SNL personnel. Excavation and pre-screening were completed on August 14th.

Soil was processed using the SGS for 11 days in November. Figure 3 depicts the daily volumes processed.

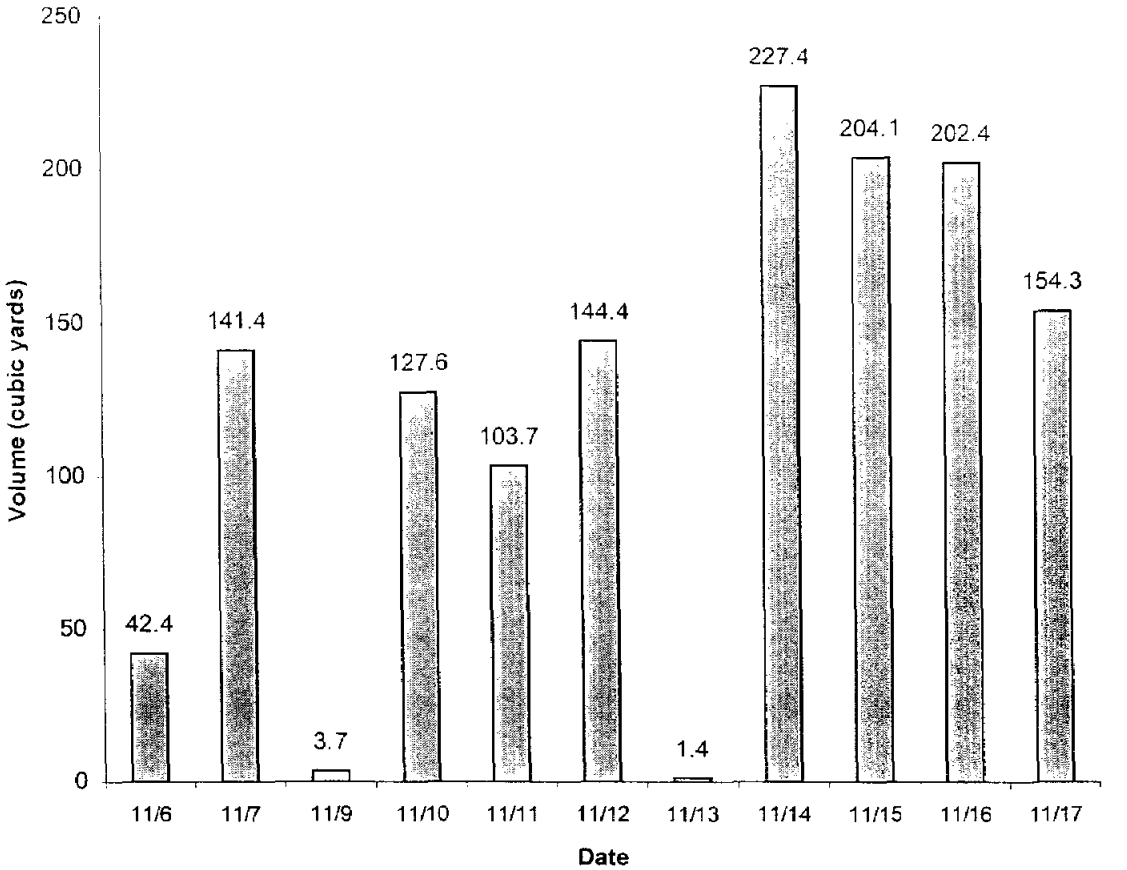


Figure 3. Daily processing volumes

Average daily operational time was 4.47 hours. The average daily operational time was impacted by provisions for a pre-job briefing, snow and wind delay on November 9th, equipment malfunctions due to rocks, concern with radon interference on November 13th, and completion of calibration on November 6th.

An overall volume reduction of 99.56 percent was realized after processing the entire volume of soil including the 5 cubic yards of Burn Site soil and approximately 4.68 cubic yards of above-criteria soil that was reprocessed. This included soil that was diverted for excessive activity (including soil that was diverted due to periodic source checks), and soil that was diverted due to unscheduled pauses in operations. Unscheduled pauses due to soil flow difficulties or other operational problems resulted in approximately 151 kg being diverted each time, with a total unrecorded mass diverted of approximately 11,200 kg (about 11.7 cubic yards). (Number of pauses 74 times 151.2 kg).

On November 17, 1998, final cleanup of the site was accomplished by processing 154 cubic yards of soil that included the reprocessing of the above-criteria pile. The above-criteria pile was approximately 16 cubic yards, consisting of 4.68 cubic yards diverted by SGS (including soil that was diverted due to periodic source checks) and soil that was diverted due to unscheduled pauses (approximately 11.68 cubic yards) in operations.

Overall volume reduction including reprocessing the hot pile was 99.56 percent, resulting in twenty-one 55-gallon drums of material requiring off-site disposal.

3.3 RADIOLOGICAL DATA

Depleted uranium was the only radionuclide processed in this project. The contamination was predicted to be very heterogeneous. SGS operations substantiated this prediction with data that indicated that the elevated activity could be removed by taking very little soil from the process and that the activities for the above and below-criteria soils exhibited dramatically different levels of activity, as shown in Table 3. While the sorting criteria for distributed contamination was set at 27 pCi/g, the below-criteria soil average was well below that level, at 14.77 pCi/g. The above-criteria soil average was 205.92 pCi/g. The above-criteria average activity excludes the large chucks of DU (see Figure 4 below) collected by hand from the ground, feed pile, or the oversize pile. Also, the above-criteria average activity excludes any activity seen by the SGS during periodic source checking of the system that verified both detector response and gate operation while soil was being processed.

Table 3

Date	Average Above-criteria Activity (pCi/g)	Average Below-criteria Activity (pCi/g)	Distributed Sorting Criteria (pCi/g)
11/6/98	367.7	14.9	27
11/7/98	180.0	12.7	27
11/9/98	242.3	13.7	27
11/10/98	218.5	13.0	27
11/11/98	134.0	15.0	27
11/12/98	194.6	12.7	27
11/13/98	115.0	24.4	27
11/14/98	198.4	12.1	27
11/15/98	228.9	15.9	27
11/16/98	210	16.9	27
11/16/98 Burn Site	169	12.2	27
11/17/98	223.5	14.7	27

Reprocessing of the above-criteria pile resulted primarily in the removal of most of the below-criteria soil that was generated due to the unscheduled pauses in operation as previously reported. The average activity of the below-criteria soil removed from the

above-criteria pile was 14.77 pCi/g, while the activity of the above-criteria soil after reprocessing remained relatively constant at 223 pCi/g.

No hazardous wastes were generated by SGS processing. Dry decontamination of the system resulted in no wastewater generation. Other wastes remaining were approximately two barrels of personal protective equipment (PPE). The soil remaining was packaged into twenty-one 55-gallon drums awaiting final disposition.

Figure 4

3.4 BURN SITE SUMMARY

In addition to the soil sorting activities for soil from ER Site 228A, a dump truck containing 5 cubic yards of soil from the Burn Site was brought to ER Site 228A for a pilot study. The contamination at the Burn Site was judged to be similar to that at ER Site 228A.

A total of 5.2 cubic yards of Burn Site soil was processed. A volume reduction of 99.4 percent was reported by the SGS. The average above-criteria activity reported by the SGS was 169 pCi/g, while the average below-criteria activity was reported as 12.2 pCi/g. The distributed contamination criteria for the Burn Site soil was set to 27 pCi/g and multiple particle factor of 4.

SECTION 4

4.0 SEGMENTED GATE SYSTEM COSTS

4.1 CONTRACTING METHOD

The SGS project was contracted by Sandia National Laboratories on a lump sum fixed price, with an optional production rate for a volume greater than 1800 cubic yards. Total invoiced cost for this project was $220,000.

4.2 COST BREAKDOWN

Excavation costs included rental of two front-end loaders, shipment of field grizzly, and labor to excavate, pre-screen and stock pile approximately 1400 cubic yards of soil (1352 CY thru SGS, 10 CY oversize from pre-screening, and 70 CY oversize from SGS).

Mobilization costs included trucking and crane costs to deliver the SGS and delivery charges for heavy equipment, mobile office space, etc. Demobilization charges included pickup charges for the various equipment and facilities, crane services to load the SGS onto the trucks, and funding for preparation of the final report. Mobilization costs for transportation of the crew to the work site were invoiced at cost plus G&A and were not included in the defined mobilization costs.

Daily operational costs included crew wages, per diem, equipment rentals, PPE and daily operating supplies. Operational days included equipment unloading, assembly and calibration, site excavation, operation during soil processing, and disassembly, decontamination and loading of the equipment for shipment to the next job site. Truck transportation charges to the next site were considered part of the mobilization charges for the next client. In cases where the SGS is not scheduled for another project, trucking charges would be considered part of the demobilization.

Table 4

Cost element	Description	Subtotals
Task 1	Excavation	$29,000
Task 2	Mobilization	$41,300
Task 3	Processing	$117,000
Task 4	Demobilization	$32,340

Additional costs incurred by Sandia included ER Site 228A gully excavation, oversight

labor, health physics support, procurement of a water supply, fuel services, generator support, sample analysis, and waste disposal.

Processing costs for SGS operations provided by Thermo NUtech were approximately $82 per cubic yard ($117,000 divided by 1,432 cubic yards), including all soils. Overall costs for services provided by Thermo NUtech averaged about $154 per yard. Processing costs reflect the relatively small volume processed. Increased volumes would leverage the mobilization and demobilization costs and should result in increased daily production volumes as a daily routine develops and soil is available for processing for full days.

SECTION 5

5.0 SCHEDULE

Figure 5 shows the tasks and schedule associated with the SGS project at SNL ER Site 228A. Since only one radionuclide was processed, only one calibration interval was required. The operations interval was not increased when the soil from the Burn Site was brought in since there was no requirement to isolate the soil from the surrounding site.

ID	Task Name	Start	Finish
1	**Sandia ER Site 228A**	**Mon 8/3/98**	**Wed 11/25/98**
2	**Excavation & Pre-screening**	**Mon 8/3/98**	**Fri 8/14/98**
3	Excavate site	Mon 8/3/98	Fri 8/14/98
4	Pre-screen Stockpile	Fri 8/7/98	Fri 8/14/98
5	**Mobilization**	**Mon 11/2/98**	**Thu 11/5/98**
6	Deliver Control Van and Trailer	Mon 11/2/98	Mon 11/2/98
7	Transport Equipment	Mon 11/2/98	Mon 11/2/98
8	Assemble Equipment	Mon 11/2/98	Thu 11/5/98
9	Calibrate System	Wed 11/4/98	Thu 11/5/98
10	**Operation**	**Fri 11/6/98**	**Tue 11/17/98**
11	Process Soil	Fri 11/6/98	Tue 11/17/98
12	**Demobilization**	**Wed 11/18/98**	**Wed 11/25/98**
13	Disassemble Equipment	Wed 11/18/98	Thu 11/19/98
14	Decontaminate Equipment	Fri 11/20/98	Tue 11/24/98
15	Load Equipment	Wed 11/25/98	Wed 11/25/98

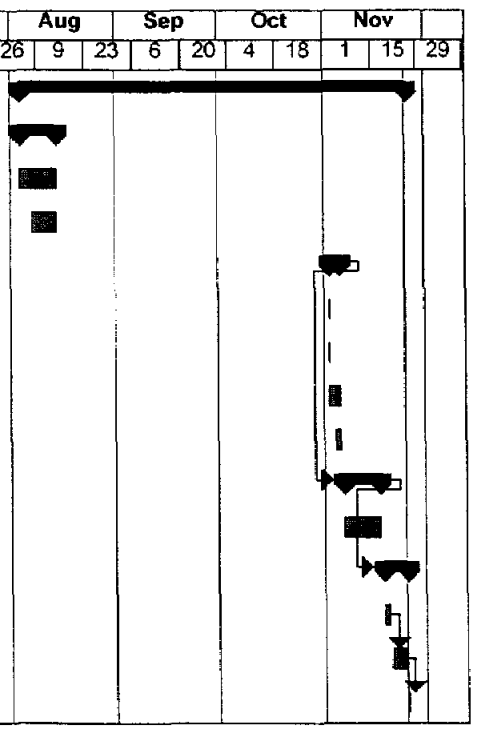


Figure 5. Project Schedule

SECTION 6

6.0 OBSERVATIONS AND LESSONS LEARNED

6.1 COST OBSERVATIONS AND LESSONS LEARNED

The unit cost for processing soil at Sandia ER Site 228A was approximately $82 per cubic yard. The average daily processing time was 4.47 hours, significantly below the target of 7 hours per 10-hour day. There were two days when more than 7 hours of processing was achieved. The major impacts were from weather delays and equipment concerns. The impact of these factors would be significantly reduced on a larger project. The soil was very heterogeneous, containing only sporadic hot spots. This was the primary reason for the excellent volume reduction, which is the primary driver for overall cost reduction.

Operating time for larger projects may be impacted by any time required to reprocess the above-criteria pile to remove soil placed there by unscheduled operational pauses. Cost benefits could be achieved by analyzing the pause records and addressing the root causes.

6.2 PERFORMANCE OBSERVATIONS AND LESSONS LEARNED

Several factors impacted the performance and throughput of the SGS at ER Site 228A. The use of the field grizzly was a positive contributor to the ease of processing soil containing large oversize debris. By removing large debris before processing the soil, many of the challenges of keeping a uniform soil flow in the system were eliminated. While use of the field grizzly can sometimes lead to homogenization of the soil, the contaminant was very localized and appeared to be in actual fragments that were not dispersed as the soil was filtered through the grizzly.

The exception to uniform soil flow was the occurrence of screen/hammermill plant jams caused by rocks approximately 3 inches in diameter. These rocks would occasionally lodge between the feed chain and the feed chain drive gear, causing a lack of soil to the SGS, which in turn caused an unscheduled pause. This event had been observed during previous operations, but measures taken to limit the occurrence of this event were not successful, and will require more research.

The moisture content of the soil was near optimum, requiring less monitoring of soil flow through the gates.

6.3 SUMMARY

The application of the SGS to the remediation of Sandia National Laboratories ER Site 228A resulted in significantly reducing the volume of radionuclide contaminated soil that would require off-site disposal. The application of the SGS to the remediation of

radionuclide contaminated soils can be very effective in situations where the contaminant is heterogeneously distributed, the contaminant is well characterized and provides a suitable gamma signature for the SGS, and the soil type is amenable to processing on a conveyorized system in a layer one to two inches thick after removal of any significant debris. Figure 6 shows the clean pile in comparison to the drum of waste now requiring off-site disposal. Figure 7 shows the oversize rocks spread out in a 6-inch layer to be surveyed and released by Sandia personnel.

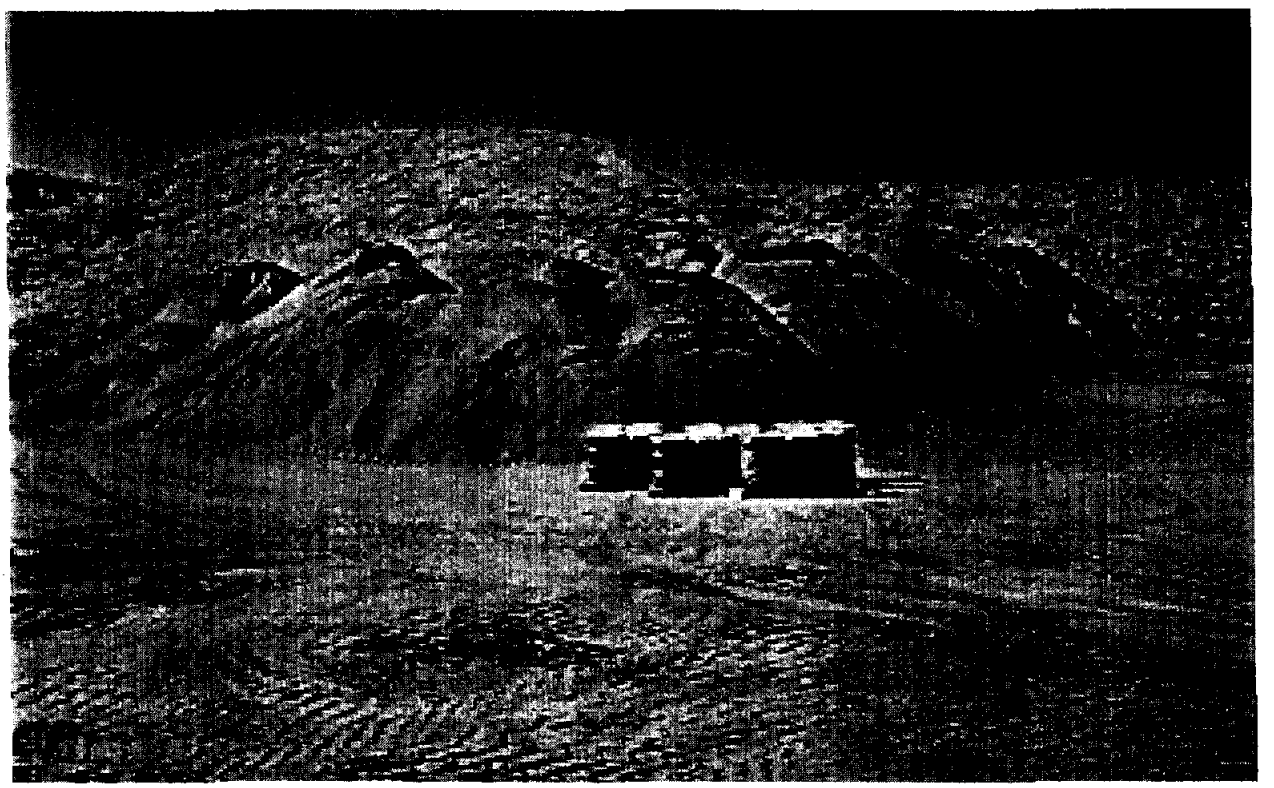


Figure 6

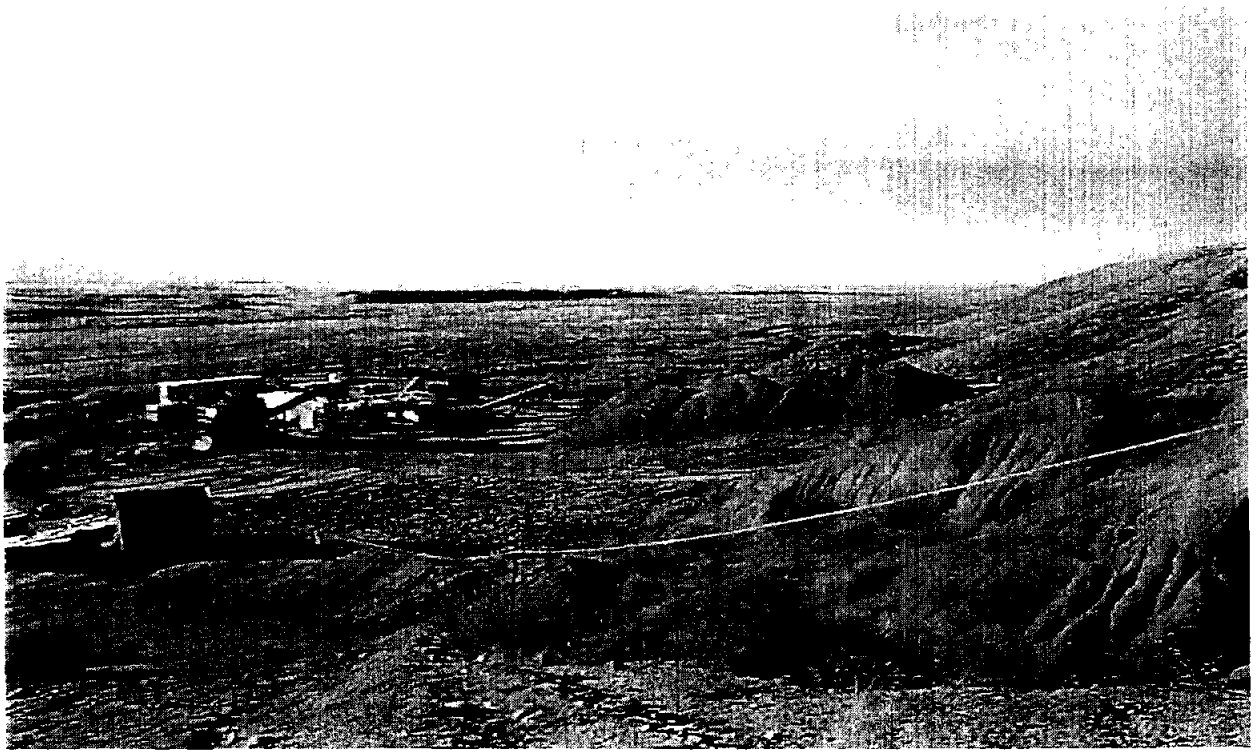


Figure 7

Annex 3-D

ANNEX 3-D
Field Implementation Plan
ER Site 228A, Centrifuge Dump Site
(July 1998)

Field Implementation Plan (FIP)
ER Site 228A - Centrifuge Dump Site
SNL/NM Environmental Restoration Project

Plan Authorization and Implementation

Prepared by John R. Copland Date 7/9/98
John Copland, 6133
Assistant Task Leader, Tijeras Arroyo Operable Unit

Reviewed by Sue Collins Date 7/9/98
Sue Collins, 6133
Task Leader, Tijeras Arroyo Operable Unit

Approved by F B Nimick Date 7/10/98
Fran Nimick, 6133
Department Manager

1. Project Information

Task Description: Collect soil samples and conduct remediation at Site 228A
Department No. 6133 Case No. 7225.2203 VCM Field Team Leader: John Copland
Work Plan Title: Voluntary Corrective Measures (VCM) Plan ER Project Site 228A – Centrifuge Dump Site, April 1998
Scheduled Start Date of VCM: July 13, 1998 Estimated Completion Date: December 1, 1998

2. Site Information

Operations/Technical Area: OU 1309, Tijeras Arroyo Site: 228A – Centrifuge Dump Site

Site 228A, the Centrifuge Dump Site, is located about 500 ft east of SNL/NM Technical Area II on the northern rim of Tijeras Arroyo (Figure 1). The site is approximately 1.3 acres in size. Site 228A is designated as a Radioactive Materials Management Area (RMMA) and a Contamination Area (CA). Environmental concern at Site 228A is primarily based upon depleted uranium (DU) fragments that were dumped along the arroyo rim along with other test debris from the nearby rocket-powered centrifuge, which was used from 1952 through 1956 for testing the reliability of nuclear-weapon components.

The majority of the test debris remained covered by soil and concrete slabs until heavy rainfall in July 1997 caused significant erosion in the gully. As a result, DU fragments were washed down onto a small alluvial fan on the edge of the arroyo (Figure 2). As a result, DU is present at two remediation areas (Scrappy-DU gully and Scooby-DU). DU is not present at the other two remediation areas (the construction-debris area and the buried-test-debris area). These four remediation areas will be excavated as part of the VCM. Another area, the clean-fill-ridge, also will be excavated.

3. Previous Investigations

3.1 Soil Sampling

A total of 312 samples including 306 soil samples and 6 soil-vapor samples have been collected during eight phases of soil sampling at or near Site 228A (Table 1). The results are discussed below in chronological order.

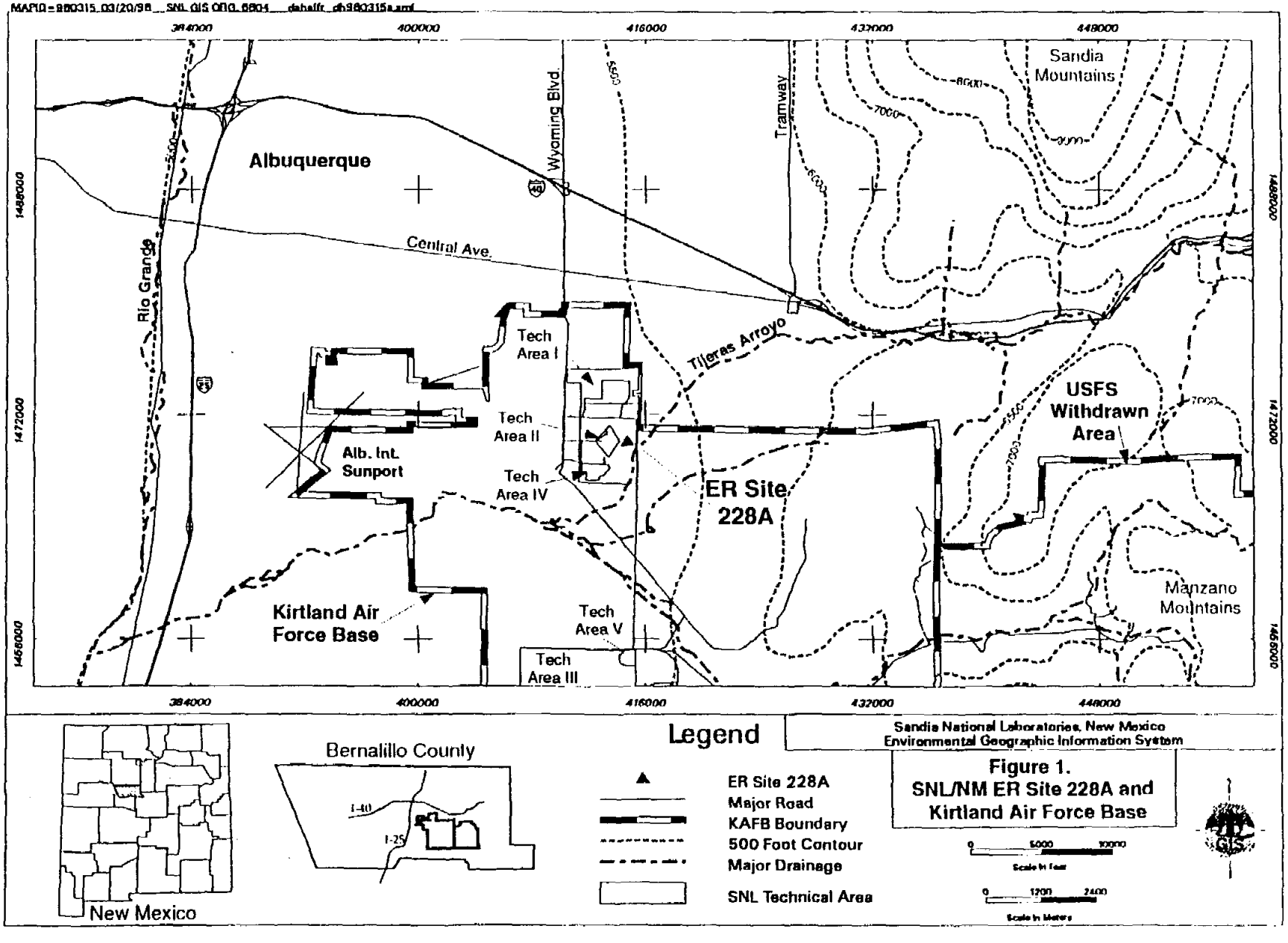


Figure 1.
SNL/NM ER Site 228A and
Kirtland Air Force Base

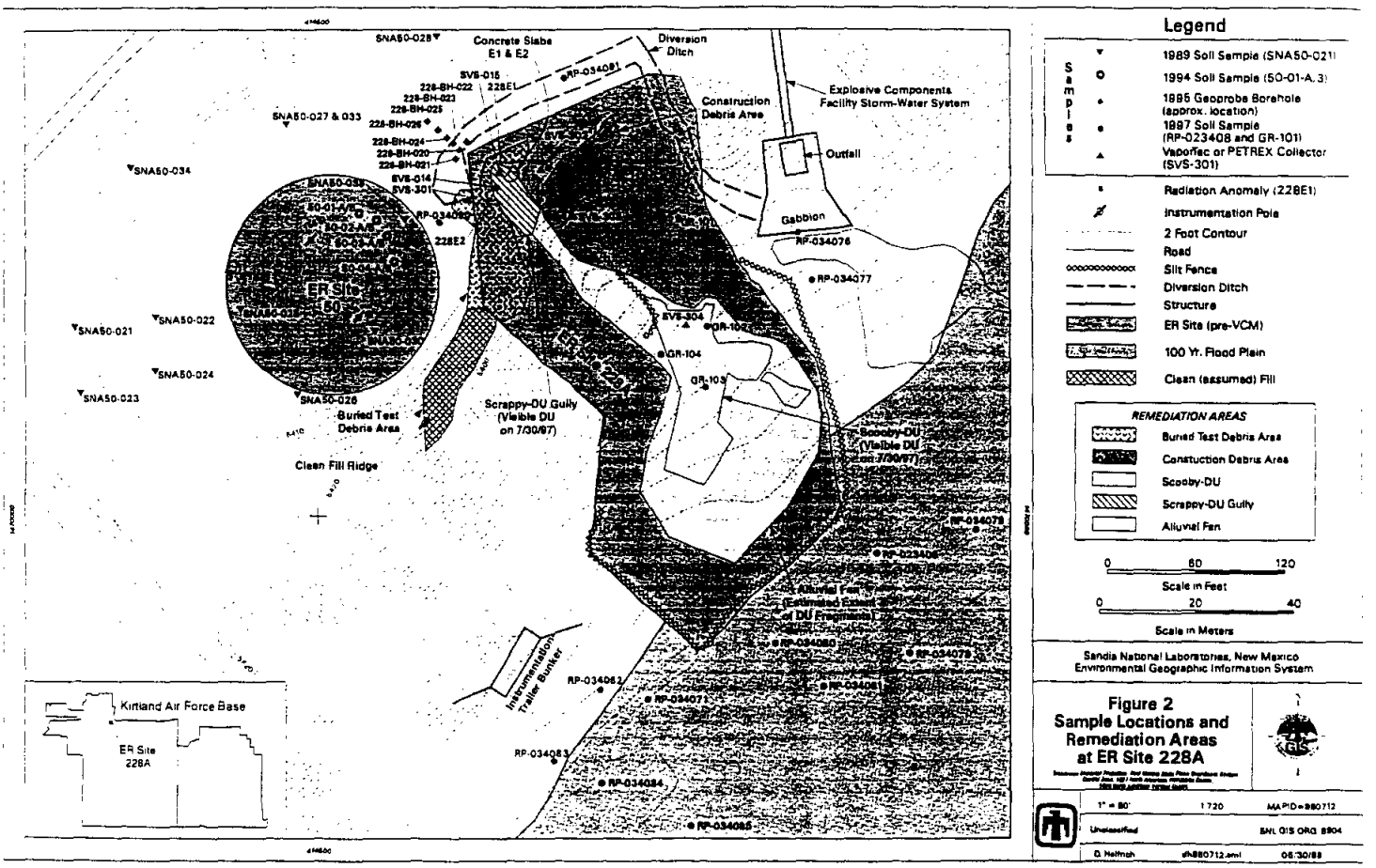

Legend
Samples
1989 Soil Sample (SNA50-021)
1994 Soil Sample (50-01-A, 3)
1995 Geoprobe Borehole (approx. location)
1997 Soil Sample (RP-023408 and GR-101)
Vaporfac or PETREX Collector (SVS-301)
Radiation Anomaly (228E1)
Instrumentation Pole
2 Foot Contour
Road
Silt Fence
Diversion Ditch
Structure
ER Site (pre-VCM)
100 Yr. Flood Plain
Clean (assumed) Fill
REMEDIATION AREAS
Buried Test Debris Area
Construction Debris Area
Scooby-DU
Scrappy-DU Gully
Alluvial Fan
0 60 120
Scale in Feet
0 20 40
Scale in Meters
Sandia National Laboratories, New Mexico
Environmental Geographic Information System
Figure 2
Sample Locations and Remediation Areas at ER Site 228A
1" = 80'
1:720
MAPID=980712
Unclassified
SNL GIS ORG 8904
D. Hellmich
sh980712.aml
06/30/98
Concrete Slabs E1 & E2
Diversion Ditch
Construction Debris Area
Explosive Components Facility Storm-Water System
Outfall
Gabbion
ER Site 50
Buried Test Debris Area
Scrappy-DU Gully (Visible DU on 7/30/97)
Scooby-DU (Visible DU on 7/30/97)
Clean Fill Ridge
Alluvial Fan (Estimated Extent of DU Fragments)
Instrumentation Trailer Bunker
Kirtland Air Force Base
ER Site 228A
SNA50-028
SNA50-027 & 033
SNA50-034
SNA50-021
SNA50-022
SNA50-024
SNA50-023
SNA50-026
SVS-015
228E1
228-BH-022
228-BH-023
228-BH-025
228-BH-026
228-BH-024
228-BH-020
228-BH-021
SVS-014
SVS-301
RP-034081
RP-034082
228E2
SVS-304
GR-104
GR-103
RP-034076
RP-034077
RP-034078
RP-023408
RP-034080
RP-034079
RP-034081
RP-034063
RP-034071
RP-034083
RP-034084
RP-034085

Table 1. Number of Soil and Soil-vapor Samples Collected at Sites 50 and 228A since 1989.

	Investigation									
	Reconnaissance Data Report	Site 50 NFA Proposal	Initial Debris Removal	GeoProbe by Scrappy-DU gully	Tijeras Arroyo floodplain	Scooby-DU [RCTs]	Scooby-DU [TJAOU]	Geophysical Survey	Soil Piles from Segmented Gate System	Total Samples
Analytical Suite										
DU / gamma-emitters[a]	--	8	3	28	14	12	4	14	2	85
Isotopic U	10	8	--	--	--	--	--	--	--	18
Isotopic Pu	--	8	--	--	--	--	--	--	--	8
Total U	10	--	--	--	--	--	--	--	--	10
Tritium	--	8	--	--	--	--	--	--	--	8
TAL Metals	10	8	--	28	--	--	4	--	2	52
TCLP Metals	10	--	3	--	--	--	--	--	2	15
EP-TOX Metals	10	--	--	--	--	--	--	--	--	10
HE Compounds	10	8	--	--	--	--	4	--	--	22
VOCs	--	--	--	28	--	--	2[b]	--	--	30
SVOCs	10	--	--	--	--	--	4[b]	--	--	14
EP-TOX Pesticides	10	--	--	--	--	--	--	--	--	10
TCLP Pesticides	10	--	--	--	--	--	--	--	--	10
Herbicides	10	--	--	--	--	--	--	--	--	10
PCBs	10	--	--	--	--	--	--	--	--	10
Total Samples	110	48	6	84	14	12	18	14	6	312
Sampling Date	9/89	9/94	9/94	8/95	8/97	8/97	12/97	1/98	3/98	--

[a]Gamma Spectroscopy quantifies three decay series (U-235, U-238, and Th-232).

[b]Includes soil-vapor results (two Petrex results from 5/95 and four VaporTec results from 9/97).

The first sampling occurred in 1989 when surface-soil samples were collected at 10 locations around the centrifuge (Site 50) as part of the SNL/NM Reconnaissance Data Report that supplemented the CEARP effort (Figure 2). These SNA50-series samples were analyzed by a Roy F. Weston Inc. laboratory for 11 suites of analytes: metals (target analyte list [TAL], extraction procedure toxicity [EP-TOX], and toxicity characteristic leachate procedure [TCLP]), pesticides (EP-TOX and TCLP), polychlorinated biphenyls (PCBs), herbicides (EP-TOX and TCLP), semi-volatile organic compounds (SVOCs), 2,4,6-trinitrotoluene (2,4,6-TNT), and isotopic/total uranium. The analytical results did not indicate any soil contamination in the vicinity of the centrifuge. Both TAL metals and uranium are within the range of recently established New Mexico Environment Department (NMED) Hazardous and Radioactive Materials Bureau (HRMB) background values for the Sandia North Supergroup soil. The other metal results were non-detect and/or were below the Resource Conservation and Recovery Act (RCRA) TCLP and EP-TOX standards. No pesticides, PCBs, herbicides, SVOCs, or 2,4,6-TNT were detected.

Soil samples were collected at the open side of the centrifuge berm in 1994. The soil-sampling results were used for the June 1995 No Further Action (NFA) proposal for Site 50. The eight soil samples (50-01-A, 50-01-B, 50-02-A, 50-02-B, 50-03-A, 50-03-B, 50-04-A, and 50-04-B) were analyzed for HE compounds, TAL metals, and radionuclides. The ENCOTEC Inc. laboratory analyzed the samples for HE compounds and TAL metals using EPA Methods 8330 and 6010/7471, respectively. The isotopic U, Pu, and tritium analyses were conducted by Quanterra Inc. using methods HASL-300 and EERF-H01. Gamma spectroscopy was conducted by the Department 7578 Personnel Monitoring and Laboratory Services. No HE compounds were detected in any of the soil samples. As shown in Table 2, three metals (arsenic, barium, and cadmium) of the eight RCRA metals slightly exceeded the HRMB background value. The uranium activities did not exceed the HRMB background values. Pu-238 and Pu-239/240 were not detected in any of the samples above the MDAs of 0.008 and 0.004 pCi/g, respectively. The greatest tritium activity was 0.038 pCi/g.

Table 2. Comparison of Total Metal Concentrations for Site 50 Soil Samples to Background Values.

RCRA Metals	Maximum concentration in Site 50 soil (mg/kg, ppm)	HRMB maximum background value for Sandia North Supergroup surface soil (mg/kg, ppm)
Arsenic (As)	8	5.6
Barium (Ba)	220	200
Cadmium (Cd)	1.6	<1
Chromium (Cr)-total	5	17.3
Lead (Pb)	25	39
Mercury (Hg)	<0.04	<0.25
Selenium (Se)	<0.025	<1
Silver (Ag)	<0.50	<1

Sample numbers: 50-01-A, 50-01-B, 50-02-A, 50-02-B, 50-03-A, 50-03-B, 50-04-A, 50-04-B.
Sampling date: September, 1994.
Analytical laboratory: ENCOTEC Inc.

Metal-debris and composite-soil samples were collected by Rust Geotech in September 1994. The analytical results for these samples are discussed in Section 3.2 (Debris Removal). Soil–vapor sampling results are also discussed elsewhere (Section 3.3 Soil-vapor Sampling). Additional results from soil samples collected during the comprehensive radiological survey and operation of the Segmented Gate System (SGS) are discussed in Section 3.4 (Comprehensive Radiological Survey) and Section 3.5 (Automated Radiological Segregation), respectively.

During July and August 1995, seven GeoProbe boreholes were sampled for gamma emitters, volatile organic compounds (VOCs), and RCRA metals. The boreholes were located at the north end of the Scrappy-DU gully (Figure 2). The soil samples were collected at depths of 4, 9, 14, and 19 ft BGL. Gamma spectroscopy was conducted by Department 7578 Personnel Monitoring and Laboratory Services. U-238 was not detected above the MDAs that ranged from 1.34 to 6.69 pCi/g. The samples also were analyzed by the Environmental Restoration Chemistry Laboratory (ERCL) for VOCs and TAL metals using EPA Methods 8240/8260 and 6010-modified. No VOCs were detected. A single "J" value was reported; the 4-ft sample from borehole 228-BH-020 tentatively contained 14 µg/kg (ppb) of acetone. The metal analyses were conducted using rather high scoping-sampling

detection limits at ERCL. The eight RCRA metals were either non-detect or were below the HRMB background values.

In August 1997, the ER Project and the SNL/NM Environmental Monitoring Department collected 14 surface-soil samples around ER Site 228A. Most of these RP-series samples were collected on the floodplain below the site. The samples were analyzed for gamma emitters by Department 7578 Personnel Monitoring and Laboratory Services with minimum detectable activities (MDAs) for DU that ranged from 1.72 to 4.29 picocuries per gram (pCi/g). No radioactive contamination was identified in the soil samples.

Also during August 1997, SNL/NM radiological control technicians (RCTs) picked up all the visible DU fragments at Scooby-DU and collected twelve soil samples (M-1 through M-12). Half of the soil samples were collected on Scooby-DU, while the other half were collected from a 10-ft wide zone that surrounded Scooby-DU. Gamma spectroscopy was conducted by Department 7578 Personnel Monitoring and Laboratory Services. The U-238 activities for the six Scooby-DU soil samples (M-1, M-2, M-3, M-4, M-5, and M-11) ranged from 8 to 6,000 pCi/g. The six surrounding-zone samples (M-6, M-7, M-8, M-9, M-10, and M-12) had U-238 activities in soil that ranged from <1.54 to 24.7 pCi/g.

In December 1997, four surface-soil samples (GR-101 through GR-104) were collected from randomly selected locations at Scooby-DU (Figure 2). However, these soil samples were not collected at 'hot spots.' The samples were analyzed for gamma-emitters, HE compounds, and TAL metals. Gamma spectroscopy was conducted by Department 7578 Personnel Monitoring and Laboratory Services. The range of U-238 activities in soil was <2.87 to 25.5 pCi/g, which exceeds the HRMB background value of 1.3 pCi/g. The samples also were analyzed by Environmental Restoration Chemistry Laboratory (ERCL) for 14 HE compounds and the 23 TAL metals (including the 8 RCRA metals) using EPA Methods 8330-modified and 6020, respectively. No HE compounds were detected in excess of the detection limits that ranged from 0.097 to 0.31 mg/kg (ppm). Except for cadmium and selenium, none of the RCRA metals exceeded the HRMB background values (Table 3). The cadmium concentrations ranged from 0.16 to 9.8 mg/kg (ppm), but just one of the four cadmium concentrations exceeded the HRMB background value of <1 mg/kg (ppm). Only one of the four selenium concentrations exceeded HRMB background value of 1 mg/kg (ppm); the selenium concentrations ranged from 0.64 J to 1.1 J mg/kg (ppm). All of the selenium values had a "J" qualifier (the values were greater than the method detection limit (MDL) but were less than the practical quantation limit [PQL]).

Table 3. Comparison of Metal Concentrations for Site 228A Soil Samples to Background Values.

RCRA Metal	Maximum total-metal concentration in Site 228A soil [mg/kg, ppm]	HRMB maximum background value for Sandia North Supergroup surface soil [mg/kg, ppm]
Arsenic (As)	1.8 J[a]	5.6
Barium (Ba)	91	200
Cadmium (Cd)	9.8	<1
Chromium (Cr)-total	7.9	17.3
Lead (Pb)	11	39
Mercury (Hg)	<0.04	<0.25
Selenium (Se)	1.1 J	<1
Silver (Ag)	0.86	<1

[a]*J = result is greater than or equal to the MDL but is less than the PQL.*
Sample numbers: TJAOU-228A-GR-101-0.1-S through TJAOU-228A-GR-104-0.1-S.
Sampling date: December, 1997.
Analytical laboratory: ERCL.

3.2 Debris Removal

In 1994, Rust Geotech identified and partially remediated radioactive anomalies 228E1 and 228E2, and collected four samples. Unfortunately, these two anomalies were partially covered by 1-ft thick concrete slabs, which limited the Rust Geotech effort. Some of the soil beneath the slabs was excavated and 12 drums of DU-contaminated soil

were generated. The largest DU fragment weighed about 40 pounds and was placed in a separate drum along with other DU fragments and metal debris. One of the pieces of metal debris was analyzed by gamma spectroscopy and had an U-238 activity of 24,300 pCi/g. The metal-debris sample did not pass the TCLP test because the sample yielded a cadmium concentration of 1.62 mg/l (ppm), which is slightly above the cadmium criterion of 1 mg/l (ppm) for hazardous waste determination (Table 4). This sample did not fail the TCLP test for six other RCRA metals (arsenic, barium, chromium, lead, selenium, and silver). Mercury was not considered to be a contaminant of concern (COC) and was therefore not an analyte. The results of the TCLP analyses and radiological screening required that the drum of DU-fragments be categorized as mixed waste.

Table 4. Concentrations of TCLP Metals in Metal-Debris and Composite-Soil Samples.

Metal	Concentration for metal-debris sample 228-031995-1-FR [mg/l, ppm]	Concentration for soil sample 228–042895-1-SS [mg/l, ppm]	Concentration for soil sample 228-042995–3-SS soil [mg/l, ppm]	Concentration for soil sample 228-042895-4-SS soil [mg/l, ppm]	RCRA Regulatory Level [mg/l, ppm]
Arsenic (As)	<0.127	<0.127	<0.127	<0.127	5
Barium (Ba)	<0.0033	0.889	0.880	0.784	100
Cadmium (Cd)	1.620	1.100	1.470	0.742	1
Chromium (Cr)	2.670	<0.0033	0.010	0.0089	5
Lead (Pb)	2.340	0.934	0.569	0.876	5
Selenium (Se)	1.680	<0.147	<0.147	0.172	1
Silver (Ag)	1.920	<0.0044	<0.0044	<0.0044	5

Sample numbers: 228–042895-1-SS, 228-042995–3-SS, 228-042895-4-SS, 228-031995-1-FR.
Sampling date: September, 1994.
Analytical laboratory: Grand Junction Project Office.

Using a 'one in five' container strategy, three composite soil samples were collected from the twelve soil drums and analyzed for gamma emitters and for TCLP metals. The U-238 activities for the three soil samples ranged from 9.95 to 72.90 pCi/g with a weighted average of 32.25 pCi/g. Only one soil sample passed the TCLP test. The three soil samples yielded cadmium concentrations ranging from 0.742 to 1.47 mg/l (ppm). The average cadmium concentration in soil was 1.104 mg/l (ppm), which is slightly above the RCRA regulatory level of 1 mg/l (ppm). The soil samples with elevated cadmium were apparently associated with a cadmium plated electrical-control box. The soil did not fail the TCLP tests for six other RCRA metals (Table 4). Mercury was not considered to be a COC and was therefore not an analyte. The 12 drums of soil were categorized as mixed waste.

3.3 Soil-vapor Sampling

Two phases of passive soil-vapor sampling (SVS) have been conducted at Site 228A. The first phase used Petrex™ collectors and the second phase used VaporTec™ collectors. The first SVS phase was conducted in May 1995 using two Petrex™ collectors near radioactive anomalies 228E1 and 228E2. The Petrex™ collectors were analyzed by thermal desorption/mass spectrometry for only two VOCs (perchloroethylene [PCE] and trichloroethylene [TCE]). Petrex location SVS-014 yielded 2,229 total ion counts (tics) for PCE; TCE was not detected. Petrex™ location SVS-015 yielded 1,929,050 tics of PCE, and 309,448 tics of TCE. In September 1997, additional soil-vapor samples were collected at four locations (SVS-301 through SVS-304) using VaporTec™ collectors, which were subsequently analyzed by gas chromatography using EPA Methods 8021/8015-modified. The collectors were analyzed for benzene, toluene, ethylbenzene, xylenes, total petroleum hydrocarbons (TPH) - gasoline, TPH-diesel, and chlorinated solvents. The maximum values for benzene, toluene, and ethylbenzene were 1.12, 4.61, and 1.97 nanograms (trillionth of a gram), respectively. Xylenes were not detected. The reportings of TPH-gasoline and TPH-diesel values were not considered valid because these two analytes also were detected in the trip blank. Only one chlorinated solvent, 1,1,2-trichloroethane (1,1,2-TCA), was detected. However, the value of 4.4 nanograms for 1,1,2-TCA was not confirmed in the duplicate collector. The low levels of organic compounds measured in both soil-vapor surveys imply that corresponding soil samples are not expected to contain concentrations of either VOCs or SVOCs in excess of 1 mg/kg (ppm).

3.4 Comprehensive Radiological Survey

In conjunction with geophysical surveys, a comprehensive and quantitative radiological survey was conducted across most of Site 228A in January 1998. A DU-specific methodology was developed for the site. A Ludlum 44-10 sodium-iodide (NaI) scintillation detector coupled to a Ludlum 2350-1 ratemeter was used for measuring gamma radiation. A series of empirical tests was conducted using the typical, weathered DU fragments found onsite. The sensitivity of the NaI detector was evaluated both vertically and laterally, and an optimal scanning height and sweeping pattern was determined for the site. A grid spacing of 3 ft was used; therefore, each radioactive anomaly represented an integrated value for a 3 ft by 3 ft area. Because of the relatively low energy level of gamma radiation inherent to DU and the shielding capacity of the soil, the detector was determined to be sensitive to DU that was buried shallower than 0.5 ft. Survey data from an undisturbed, nearby plot was used to determine that background gamma radiation for the site was approximately 12,500 counts per minute (cpm). Gamma spectroscopy results for 14 soil samples collected from Scooby-DU and the background plot were used to determine a cpm to pCi/g conversion factor. The radiological survey identified numerous DU anomalies across Scooby-DU with approximately 60 of the DU anomalies being above the VCM Proposed Cleanup Value of 271 pCi/g. The cleanup goal is a risk-based Preliminary Remediation Goal (PRG) from the VCM Plan.

3.5 Automated Radiological Screening

During March 1998, approximately 2.6 cubic yards of DU-contaminated soil was screened for radionuclides with the automated Segmented Gate System (SGS), which was operated by Thermo NUtech™, Inc. The soil passed through a series of computerized detectors and was segregated into a 'hot' pile and a 'cold' pile according to DU content. A 38-percent volume reduction was achieved using a U-238 screening-level of 30.5 pCi/g. Total-metal analyses also were conducted on two soil samples. One sample each was collected from the hot pile and the cold pile. Neither soil sample exceeded the HRMB background values (Table 5).

Table 5. Comparison of Total Metal Concentrations in Hot-Pile and Cold-Pile Soil Samples to background.

Metal	Concentration in Site 228A Hot-Pile soil [mg/kg, ppm]	Concentration in Site 228A Cold-Pile soil [mg/kg, ppm]	HRMB Maximum Background for Sandia North Supergroup surface soil [mg/kg, ppm]
Arsenic (As)	2.5	1.3 J	5.6
Barium (Ba)	95	75	200
Cadmium (Cd)	0.47	0.47	<1
Chromium (Cr) -total	10	6.2	17.3
Lead (Pb)	11	7.4	39
Mercury (Hg)	<0.04	<0.04	<0.25
Selenium (Se)	0.4 J	0.32	<1
Silver (Ag)	0.12 J	0.069 J	<1

[a]J = result is greater than or equal to the MDL but is less than the PQL.
Sample numbers: hot pile (037365-002), cold pile (037366-002).
Sampling date: March, 1998.
Analytical laboratory: ERCL.

The two soil samples from the SGS also were analyzed for gamma emitters and TCLP metals. The samples were analyzed for gamma emitters by Department 7578 Personnel Monitoring and Laboratory Services. The U-238 activities in soil were 174 and 12 pCi/g for the hot-pile and cold-pile samples, respectively. As shown in Table 6, the samples also were analyzed for TCLP metals by Core Laboratories using EPA Methods 6010A/7470. Only two metals (barium and cadmium) were detected by the TCLP method. However, the concentrations of barium and cadmium were well below the RCRA regulatory levels.

Table 6. Comparison of TCLP Metal Concentrations in Hot-Pile and Cold-Pile Soil Samples to RCRA Regulatory Levels.

Metal	Concentration in Hot Pile soil [mg/l, ppm]	Concentration in Cold Pile soil [mg/l, ppm]	RCRA Regulatory Level [mg/l, ppm]
Arsenic (As)	0.0489 Ja	<0.033079	5
Barium (Ba)	0.889	0.951	100
Cadmium (Cd)	0.0173	0.0254	1
Chromium (Cr)-total	<0.003826	<0.003826	5
Lead (Pb)	0.0392 J	<0.024842	5
Mercury (Hg)	<0.000047	<0.000047	0.2
Selenium (Se)	<0.054874	<0.054874	1
Silver (Ag)	0.00424 J	<0.002914	5

[a]J = result is greater than or equal to the MDL but is less than the PQL.
Sample numbers: hot-pile (037365-003), cold-pile (037366-003)
Sampling date: March, 1998.
Analytical laboratory: Core Labs, Inc.

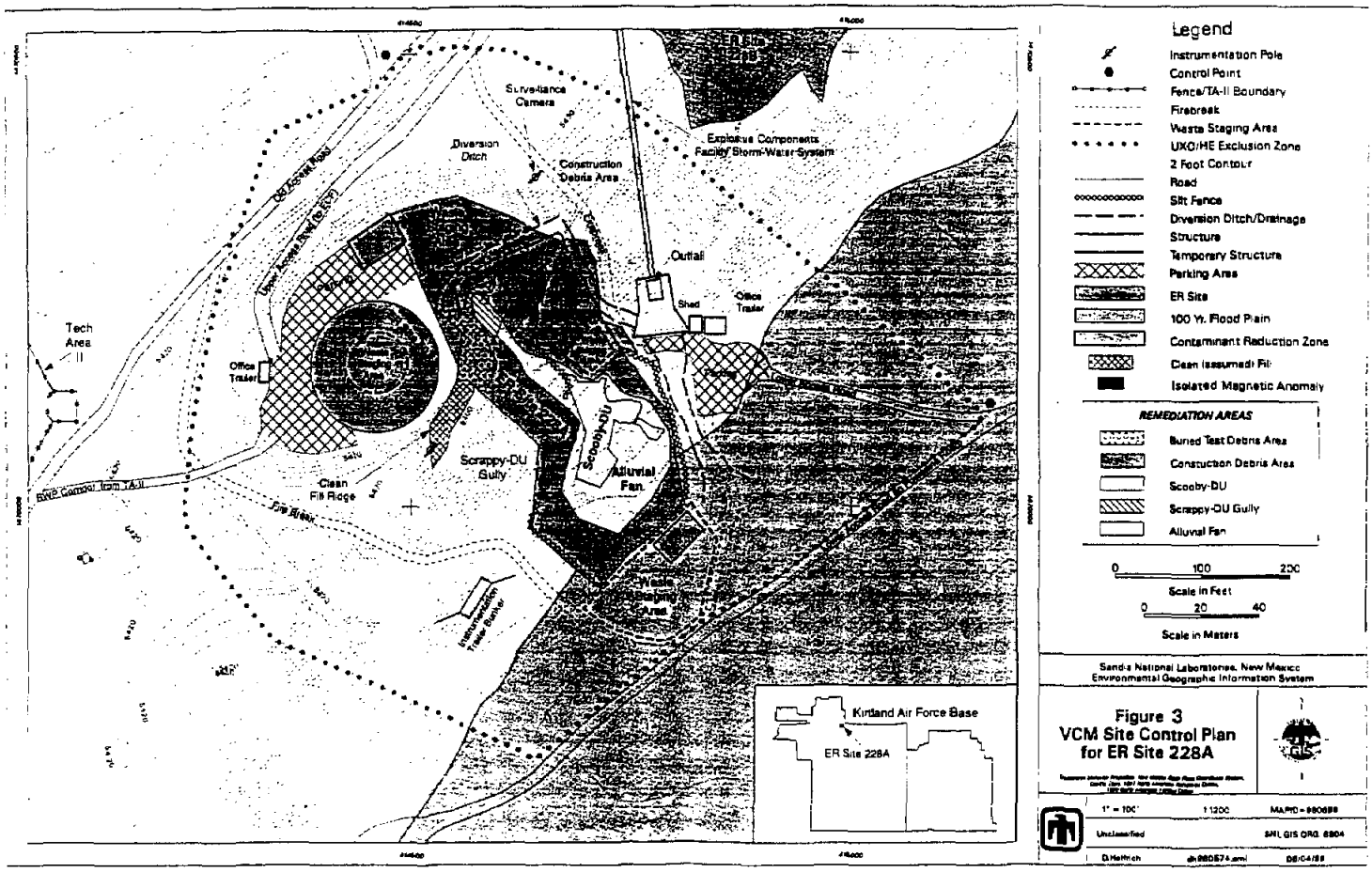
4.0 Contaminants of Concern and Types of Debris

The COCs for Site 228A are: DU, asbestos, cadmium, HE compounds, VOCs, and SVOCs. These COCs are based upon sampling results, memoranda, and visual observations. DU is the only radionuclide known to have been used at the centrifuge. The potential VOCs are PCE, TCE, bromochloromethane, methylene chloride (dichloromethane), and 1,1,1-trichloroethane (1,1,1-TCA). Bromochloromethane, methylene chloride, and 1,1,1-TCA are inferred from recent Material Safety Data Sheets (MSDSs) to have been the solvents present in 1950s-vintage Stresscoat™ lacquer, which had been painted on some test units prior to testing. The SVOCs are inferred from soil-vapor results. The results of soil-sampling and radiological surveys indicate that the locations of DU and other COCs are coincident.

The Site 228A debris includes: weathered DU fragments (schoepite); concrete slabs; black rubber pads; test-debris metal (aluminum and steel); concrete sphere pieces; nylon harness webbing; epoxy-encapsulated electrical junction boxes; electrical wire cables and connectors; concrete rubble with steel rebar/mesh; miscellaneous construction debris including wire mesh, glass pieces, and lumber; fragments of non-friable Transite™ asbestos sheets; steel mesh and rebar; a thermal-battery case; and an electrical control box. No oil-stained soil has been seen at the site. The potential also exists for buried unexploded ordnance/high explosive (UXO/HE) material to still be in or near the Scrappy-DU gully. Four types of UXO/HE hazards may be present: rocket motors, HE-warhead components, instrumentation-cable release charges, and thermal batteries (a RCRA-reactive hazard).

The physical, chemical, and radioactive hazards with respect to worker safety are well understood for Site 228A. As shown on Figure 3, the Site 228A VCM activities will be concentrated at five areas:

- clean-fill ridge;
- the construction-debris area;
- the buried-test-debris area;
- the Scrappy-DU gully; and
- Scooby-DU.


Legend
Instrumentation Pole
Control Point
Fence/TA-II Boundary
Firebreak
Waste Staging Area
UXO/HE Exclusion Zone
2 Foot Contour
Road
Silt Fence
Diversion Ditch/Drainage
Structure
Temporary Structure
Parking Area
ER Site
100 Yr. Flood Plain
Contaminant Reduction Zone
Clean (assumed) Fill
Isolated Magnetic Anomaly
REMEDIATION AREAS
Buried Test Debris Area
Construction Debris Area
Scooby-DU
Scrappy-DU Gully
Alluvial Fan
0 100 200
Scale in Feet
0 20 40
Scale in Meters
Sandia National Laboratories, New Mexico
Environmental Geographic Information System
Figure 3
VCM Site Control Plan
for ER Site 228A
Kirtland Air Force Base
ER Site 228A
ER Site 228
Surveillance Camera
Diversion Ditch
Construction Debris Area
Explosive Components Facility Storm-Water System
Outfall
Shed
Office Trailer
Tech Area II
Office Trailer
Scrappy-DU Gully
Scooby-DU
Alluvial Fan
Clean Fill Ridge
Fire Break
Waste Staging Area
Instrumentation Trailer Shelter
Old Access Road
New Access Road (to SCP)
SNL Control from TA-II
Unclassified
SNL GIS ORG. 6804
D.Helfrich

5.0 Scope of Work

The field work at Site 228A will consist of:

- excavating DU-contaminated soil, DU fragments, and test debris;
- loading grossly elevated DU-contaminated soil and test debris directly into 744 boxes;
- stockpiling soil piles that will screened by the SGS;
- separating cobbles from soil prior the SGS operation;
- operating the SGS for DU-waste-reduction purposes;
- loading DU-contaminated soil into 55-gallon drums;
- segregating non-radioactive construction and test debris;
- moving concrete slabs;
- possible scraping or brushing of concrete slabs to remove DU fragments;
- implementing waste-management procedures;
- collecting soil samples (grab, hand auger, or GeoProbe™);
- collecting debris samples;
- inspecting debris for UXO/HE material;
- excavating and benching clean soil;
- installing site-control measures;
- installing and maintaining surface-water controls;
- conducting radiological and geophysical surveys;
- decontaminating workers and equipment;
- final-verification sampling; and
- contouring and reseeding the site.

6. Objectives

This FIP contains the procedures, requirements, and specific instructions for performing field work at Site 228A and supplements the VCM Plan and Waste Management Plan (WMP). The specific objectives of this FIP are:

- Sampling: Collect samples for guiding the excavation of DU-contaminated soil, characterizing waste, and preparing final-verification soil samples.
- Analytical: To obtain sufficient analytical data for achieving the VCM Proposed Cleanup Values and to satisfy the waste acceptance criteria (WAC) for either Envirocare, Inc. or the Nevada Test Site (NTS). The VCM Proposed Cleanup Values are derived from the Preliminary Remediation Goals (PRGs), which are listed below in Table 7. The primary cleanup goal for the VCM is 271 pCi/g of DU in soil, which is based upon a human health risk assessment. The other cleanup goal relevant to DU is based upon the ecological-risk based goal of 100 ppm total uranium in soil; this value is approximately equivalent to 33 pCi/g of DU in soil. However, the assumptions inherent in the ecological risk assessment are so unreasonable that the 100 ppm value is probably not appropriate to Site 228A.

Table 7. Compilation of Risk-Based PRGs and the VCM Proposed Cleanup Values.
(Units of mg/kg [ppm] for inorganics and organics; units of pCi/g for radionuclides.)

Potential COC	Human Health Risk-Based PRG[1]	Ecological Risk-Based PRG	VCM Proposed Cleanup Value
Inorganics (metals)			
Arsenic	1.9	20	5.6[2]
Barium	66,502	510	510
Cadmium	510	210	210
Chromium III	3,837	42,000	3,837
Chromium VI	450	1,900	450
Chromium-total	n.a.[3]	n.a.	450
Lead	2,000	12,000	2,000
Mercury	306	260	260
Selenium	5,110	5.9	5.9
Silver	5,110	1,600	1,600
Uranium-total	3,066	100	100
Organics			
Benzene	1.4	230	1.4
Bromochloromethane	n.a.	200	200
Ethylbenzene	8,779	800	800
Methylene Chloride (Dichloromethane)	15	61	15
Tetrachloroethene (Perchloroethylene)	15	6.3	6.3
1,1,1-Trichloroethane (Methyl Chloroform)	3,117	9,300	3,117
1,1,2-Trichloroethane	17	26	17
TCE (Trichloroethene)	8.7	6.3	6.3
Toluene	2,697	230	230
RDX (Cyclonite)	260	19	19
Acenaphthene	35,630	29	29
Anthracene	255,337	800	800
Benzo(a)pyrene	0.39	6.6	0.39
Fluoranthene	38,904	18	18
Naphthalene	10,661	7.4	7.4
Phenanthrene	35,630	7.9	7.9
Pyrene	29,474	9.1	9.1
Radionuclides			
U-234	330	n.a.	330
U-235	121	n.a.	121
U-238	271	n.a.	271

[1]The human health risk-based PRG is the lower of the noncarcinogenic (HQ=1) PRG or the excess-cancer-risk PRG (10^{-5} for Class C carcinogens, 10^{-6} for Class A and B carcinogens, 10^{-6} for unclassed carcinogens).
[2]The cleanup level for arsenic is the HRMB background value.
[3]n.a. = not applicable.

7. Data Use

Regulatory Program RCRA SNL/NM ER Project: Site 228A VCM Plan

8. Organization

Management:	Department Manager	Fran Nimick	Organization	6133
	OU 1309 Task Leader	Sue Collins	Organization	6133
	Assistant Task Leader	John Copland	Organization	6133
Sampling:	Field Team Leader	John Copland	Organization	6133
	ERFO Coordinator	Nelson Capitan	Organization	6131
Analytical:	Sample Management	Doug Salmi	Organization	7578
	Analytical Laboratory	CORE Denver	Lab Contact	Tim Kellogg
	Analytical Laboratory	SNL/NM RP	Lab Contact	Amir Mohagheghi

9. Health and Safety

Health and Safety Plan: HASP for Site 228A – Centrifuge Dump Site
Date: April 1998

Notifications and Communications

One adjacent facility requires notification before field works begins at Site 228A. The Classified Waste Landfill (Site 2) project at TA-II shall be notified by calling Paula Slavin (284-2496) or Bob Galloway (844-0922).

10. Sample Collection

Sample Media: X Environmental X Waste **Matrix Type:** Soil, metal, concrete, other debris

Sampling Approach and Method

Three types of samples (excavation-work, waste-characterization, and final-verification) will be collected. Because DU is the primary COC at Site 228A and can be readily detected by field instruments, the required number of soil samples will be minimized. The planned sampling frequency is also based on the fact that previous soil-sampling results indicate that any other possible contaminants, such as cadmium, will be co-located with DU.

Excavation Work

Soil samples will be collected during the excavation work for guiding the remediation activity. Many of these samples will be analyzed on a overnight-rush basis by the onsite SNL/NM Personnel Monitoring and Laboratory Services laboratory (Amir's lab). Approximately 30 grab samples will be collected.

Waste Characterization

Samples will be collected for waste-characterization purposes. These samples (soil and debris) are discussed in the Site 228A Waste Management Plan. The Site 228A team will work with the ER Waste Management Coordinator to ensure that adequate samples are collected. The WAC for both Envirocare, Inc. and NTS will be considered.

Final Verification

After the excavation work has been completed and analytical results have been reviewed for both the excavation-work and waste-characterization samples, a final round of verification samples will be collected to demonstrate that the VCM Proposed Cleanup Values have been achieved. Table 8 lists the number of soil samples that will be collected at various areas across the site. Soil samples for radionuclide analyses will collected at each final-

verification location, while samples for other analyses will be collected at either 50 or 20 percent of the final-verification locations (Table 8). Only unique, not composite, samples will be collected.

Final-verification samples will be collected according to the following criteria.

- No visible DU or debris remains in the excavation(s).
- A sampling-grid spacing of 25 ft will be used at the alluvial fan and Scooby-DU.
- A sampling-grid spacing of 10 ft will be used at the Scrappy-DU gully.
- Verification radiological surveys indicate that no anomalies exceed the VCM Proposed Cleanup values.
- Verification geophysical surveys indicate that no metallic debris remain buried in the excavation(s).
- No VOC or SVOC contamination greater than 5 ppm by volume is detected by a PID or FID.
- Geologic evidence is found to distinguish natural deposits from fill material, if possible.

Table 8. Estimated Number of Final-verification Soil Samples for the Site 228A VCM.

Area	Sample Locations	Radionuclides (100%)	RCRA Metals (50%)	HE (20%)	VOCs (20%)	SVOCs (20%)
Scooby-DU and the Scrappy-DU gully	55	55	28	11	11	11
Construction Debris	7	7	4	2	2	2
Buried Test Debris	10	10	5	2	2	2
Floodplain below Scooby-DU	10	10	5	2	2	2
Clean-Fill Ridge (non-debris area)	5	5	3	1	1	1
Vicinity of Centrifuge	10	10	5	2	2	2
Total	97	97	50	20	20	20

Sampling Procedures

The sampling procedures are listed in Table 9; however, this site-specific FIP should be used as the primary guidance for the field work. Soil samples will be collected using grab, hand-auger, and GeoProbe™ techniques. All samples will be immediately labeled and placed in a cooler. Samples for radiological analyses will be stored at ambient temperatures; samples for non-radiological analyses will be stored at 4°C. A chain-of-custody will be completed using the sample nomenclature in Section 14. A Radiological Control Technician (RCT) will frisk and swipe the sample containers before allowing them to be removed from the site. The cooler(s) and samples will be stored at the ERFO RMMA until released by RP. Samples for off-site analyses will be delivered to the Sample Management Office (SMO) for processing and shipment to the appropriate analytical laboratory. Samples for on-site analyses will be hand delivered by ER or RP staff. A completed Analysis Request and Chain-of-Custody form (ARCOC) will accompany each shipment.

Decontamination

Decontamination will entail cleaning a wide variety of equipment ranging from hand trowels to heavy equipment. Dry-decontamination techniques, such as scraping with a wire brush and wiping with paper towels, will be the preferred method. The sampling equipment will be decontaminated after each sample is collected (FOP 94-26). Before removal from the site, all cleaned equipment will be frisked and released by an RCT. In accordance with Jim Fish's memorandum of June 25, 1996, decontamination water may be discharged directly to the ground surface without being sampled, provided that there is reason to believe that the sampling equipment has not brought up any new contamination that does not already exist on the ground surface. Discharges of decontamination water to the ground surface will be less than 50 gallons per week and less than 5 gallons per hour. Water will not be discharged in areas prone to erosion. Also, because soil sampling will occur in many areas of the site, water will not discharged in an area that will be sampled later. Decontamination water also may be placed in open-top drums or left on a temporary decontamination pad for evaporation; an RCT will survey any resulting residue.

Table 9. Applicable Operating Procedures for Sampling Activities.

Procedure #	Procedure Title
FOP 92-04	Field Operating Procedure for Field Logbook Content and Control
FOP 94-01	Safety Meetings, Inspections, and Pre-Entry Briefings
FOP 94-25	Documentation of Field Activities
FOP 94-26	General Equipment Decontamination
FOP 94-28	Health and Safety Monitoring of Organic Vapors (FID and PID)
FOP 94-34	Field Sample Management and Custody
FOP 94-54	Surface Sediment/Soil Sampling
FOP 94-57	Decontaminating Drilling and Other Field Equipment
FOP 94-68	Field Change Control
FOP 94-69	Personnel Decontamination (Level D, C, and B Protection)
FOP 94-78	Environmental Restoration Project Waste Management and Characterization Procedure
TOP 94-03	Verification and Validation of Chemical and Radiochemical Data
AOP 94-22	Sample Management Office User's Guide
AOP 94-24	System and Performance Audits
AOP 94-25	Deficiency Reporting
AOP 95-16	Administrative Operating Procedure for Sample Management and Custody
RPOP 04-0411	Contamination Survey of Materials, Equipment and Portable Facilities to be Released for Unrestricted Use
RPOP 04-412	Contamination Survey of Vehicles and Heavy Equipment to be Released for Unrestricted Use

Waste Disposal

The soil at Site 228A will be managed using the Site 228A WMP which includes the SNL/NM Soil Pile Management Plan. Most of the other waste will initially be labeled as 'mixed waste' because of the DU and possible metals content; it is anticipated that most waste will subsequently be labeled as 'low level radioactive waste' after TCLP metal results are received. A less-than-90-day waste accumulation area (WAA) will be established in the Site 228A waste-staging area. Waste containers shall be clearly labeled with the date and sample reference numbers. A copy of the waste log with the sample reference numbers and ARCOC numbers will be delivered to the ER Waste Management Coordinator. The ARCOC shall clearly identify the sample as 'waste characterization' so that the analytical laboratories can perform the analysis in a timely manner to ensure the 90-day waste accumulation period is not exceeded. Personal Protective Equipment (PPE) will be handled in accordance with the Site 228A HASP and Radiological Work Permits (RWPs).

11. Analytical Requirements

The detection limit for each COC (chemical or radionuclide) will be lower than the respective VCM Proposed Cleanup Value and the HRMB Maximum Background value. These values are specified in the Site 228A VCM Plan. The detection limits will be verified by contacting each of the appropriate laboratories. Samples for off-site analyses will be shipped via the SMO. Samples for on-site analyses will be hand delivered by ER staff. A bottle order for sample containers will be made through the SMO contact at least two weeks prior to sampling; a copy of this FIP will be provided to the SMO. Table 10 lists the analytical methods for soil and debris. As needed, the soil samples will be analyzed for gamma-emitting radionuclides, gross alpha/beta, isotopic uranium, total uranium, RCRA metals, TCLP metals/VOCs/SVOCs, HE compounds, VOCs, and SVOCs.

Table 10. Analytical Methods for Soil and Debris Samples.

Analyte	Purpose	Analytical Method
Gamma-emitting radionuclides	Cleanup Verification and Waste Characterization	EPA 901.1 (gamma spectroscopy)
Gross alpha/beta	Cleanup Verification	EPA 900.0 (or SW 846 9310)
Isotopic uranium	Cleanup Verification and Waste Characterization	Lab specific
Total uranium	Cleanup Verification	Lab specific
Tritium	Waste Characterization	Lab specific
RCRA metals	Cleanup Verification	EPA 6010/7000 Series
TCLP metals + Cu, Zn, Hg	Waste Characterization	EPA 1311
TCLP VOCs	Waste Characterization	EPA 1311
TCLP SVOCs	Waste Characterization	EPA 1311
HE compounds	Cleanup Verification and Waste Characterization	EPA 8330
VOCs	Cleanup Verification and Waste Characterization	EPA 8260
SVOCs	Cleanup Verification and Waste Characterization	EPA 8270
Specific WAC for Envirocare, Inc.	Waste Characterization	Lab specific
Specific WAC for NTS	Waste Characterization	Lab specific

Listed in Table 11 are the calibration requirements for the field-screening instruments. VOCs and SVOCs will be monitored with the use of either a Photoionization Detector (PID) or a Flame Ionization Detector (FID). Radiological surveys will be conducted using radiation meters supplied by RP. Geophysical instruments such as a metal detector will be used.

Table 11. Calibration Requirements for Field Instruments.

Instrument	Calibration	Frequency	Acceptance Criteria	Corrective Action
PID or FID	• Calibration for accuracy • Duplicate sample for precision	• Daily	• ± 10% of gas standard • < 20% Relative Percent Difference (RPD)	• Recalibrate: repair/replace instrument
Radiation Meter	• Calibration for accuracy	• Daily	• RP procedures	• Replace meter
Geophysical Instruments	• Calibration for accuracy	• Daily	• Instrument manual	• Recalibrate: repair/replace instrument

12. Quality Control

Additional samples for quality assurance/quality control (QA/QC) purposes will be collected during the final-verification sampling. These samples will be collected according to the ER Project Quality Assurance Plan (QAP). The ratios for collecting/preparing the QA/QC samples are specified in Table 12. Debris and other waste-characterization sampling will not need to adhere to Table 12.

Table 12. Collection/preparation Ratios for QA/QC Samples collected during final-verification sampling.

Field		Laboratory	
X Duplicate samples	5% of soil samples	Replicate	5% or n.a.
X Equipment Blank	1 per day	X LCS	5% or 1 per batch
X Trip Blank for VOCs	1 per shipment	X MS	5% or 1 per batch
Other		X MSD	5% or 1 per batch
		X Method blank	1 per analytical batch
		X Surrogate spike	all GC/MS samples

Equipment wash (rinsate) samples are the only type of water samples that will be collected during the VCM. Table 13 lists the analytical methods for the rinsate samples.

Table 13. Analytical Methods for Equipment Wash (Rinsate) Samples.

Analyte	Analytical Method
Gamma-emitting radionuclides	Lab Specific
RCRA metals	EPA 6010/7000 Series (200 series or 200.7)
HE compounds	EPA 8330 /
VOCs	EPA 8240 / 624
SVOCs	EPA 8270 / 625

13. Data Validation

Analytical reports will be reviewed using the data-validation procedure TOP 94-03.

14. Sample Nomenclature

The "ER Sample ID" nomenclature in Table 13 will be used to identify the samples collected at Site 228A. For example, a typical 'ER Sample ID' will be TJAOU-228A-GR-120-1.5-S for a grab sample of soil collected at a depth of 1-1.5 ft at location 120. The location number of 120 will be the starting point for the VCM soil samples. A block of 'random SMO numbers' will be obtained from the automated phone number 284-5514.

Table 13. ER Sample ID nomenclature.

Operable Unit[1]		Site		Location Category		Location Number		Sample depth[2] (ft)	-	Sampling Media
AAAAA				NNN		AAA		NNNN.N	-	AAA
3 to 5 digits				2 to 3 digits		3 digits		5 digits	-	1 to 3 digits
Example:										
Tijeras Arryo		228A		Grab		120		5.5		soil
Nomenclature:										
TJAOU	-	228A	-	GR	-	120	-	5.5	-	S

Choices for Location Category	Choices for Sampling Media Category
ARY = Arroyo	AIR = Air
AS = Air Sampler	GW = Ground Water
BH = Borehole (Drilled or hand augured)	GWD = Ground Water Duplicate
BT = Biota	GWS = Ground Water Split
CH = Channel	PW = Purge Water
DP = Drive Point	S = Soil and rock (includes cores and cuttings)
DRM = Drum	SS = Surface Soil (optional use, soil < than 0.5 ft)
DW = Dry Well or French Drain	SVA = Soil Vapor - Active
GR = Grab	SVX = Soil Vapor - Passive
LYS = Lysimeter	SM = Soil Moisture
LG = Lagoon/Pond	SW = Surface Water
MW = Monitor Well	VG = Vegetation
PD = Production Well Water - Drinking (potable)	WD = Well Development
PX = Production Well Water - Non-drinking	DB = Debris
SD = Sediment	
SP = Seepage Pit	
SPR = Spring	
ST = Septic Tank	
SVS = Soil Vapor Survey	
TP = Test Pit	
TR = Trench	
WB = Wrangler Bag	

15. Mapping

Soil sample locations at the excavations will be mapped using the Global Positioning System. This will ensure that the sample locations are accurately mapped and the location data archived.

Annex 3-E

ANNEX 3-E
Radiological Analysis Results—Confirmatory Sampling

GR-12 → 132

SF 2001-C (97)
Supersedes (5 97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab Batch No. SAR/WR No.

AR/COC- 600799

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: 228A/John Gopland
Project Name: 228A
Record Center Code: 1309/228A/DAT
Logbook Ref. No.: ER-014
Service Order No.: CFO596

Date Samples Shipped: 9/11/98 SMO USE
Carrier/Waybill No.: 709136
Lab Contact: Tim Kellogg
Lab Destination: Core/Denver/Casper
SMO Contact/Phone: Doug Salmi
Send Report to SMO: Suzi Montano

Contract No.: AJ-2480C
Case No.: 7225.2202
SMO Authorization: Doug Salmi
Bill to: Sandia National Laboratories
Supplier Services, Dept. _____
P.O. Box 5800 MS 0154

Location Tech Area NA
Building NA Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
042495-001	TJAOU-228A-GR-120-S	0	228A	9/8/98 1030	soil	G	16oz	none	G	SA	gamma spec; iso U	
042495-002	TJAOU-228A-GR-120-S	0	228A	9/8/98 1030	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042495-003	TJAOU-228A-GR-120-S	0	228A	9/8/98 1030	soil	G	16oz	4 C	G	SA	VOC'S	
042496-001	TJAOU-228A-GR-121-S	0	228A	9/8/98 1035	soil	G	16oz	none	G	SA	gamma spec; iso U	
042497-001	TJAOU-228A-GR-122-S	0	228A	9/8/98 1040	soil	G	16oz	none	G	SA	gamma spec; iso U	
042497-005	TJAOU-228A-GR-122-S	0	228A	9/8/98 1040	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042498-001	TJAOU-228A-GR-123-S	0	228A	9/8/98 1045	soil	G	16oz	none	G	SA	gamma spec; iso U	
042498-002	TJAOU-228A-GR-123-S	0	228A	9/8/98 1045	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042498-003	TJAOU-228A-GR-123-S	0	228A	9/8/98 1045	soil	G	4oz	4 C	G	SA	VOC'S	
042527-001	TJAOU-228A-GR-123-DU	0	228A	9/8/98 1046	Soi	G	16oz	None	G	DU	Gamma spec; iso U	

RMMA ☒Yes ☐No Ref. No. _____
Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 9/11/98
Entered by: [illegible]

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
* Send as separate report
* Please note hold times on VOC samples
* COC# 600800 replaces COC# 600799

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date _____

QC Inits [illegible]

Sample Team Members	Name	Signature	Init	Company/Organization/Phon
	Nelson Capilam	[illegible]	NC	IT/6131 284-3307

1. Relinquished by	[illegible]	Org. IT/6131	Date 9-10-98	Time 1500	4. Relinquished by	Org.	Date
1. Received by	[illegible]	Org. 7578	Date 9-10-98	Time 1500	4. Received by	Org	Date
2. Relinquished by	[illegible]	Org. 7577	Date 9/11/98	Time 1300	5. Relinquished by	Org	Date
2. Received by		Org.	Date	Time	5. Received by	Org	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org	Date
3. Received by		Org.	Date	Time	6. Received by	Org.	Date

Original To Accompany Samples, Laboratory Copy (White) | 1st Copy To Accompany Samples, Return to SMO (Blue) | 2nd Copy SMO Suspense Copy (Yellow) | 3rd Copy Field Copy (Pink)

SF 2001 (10-95)

Supersedes (5-92) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600799

Project Name: 228A Project/Task Manager: 228A/John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preser-vative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE: Lab Sample ID
042527-002	TJAOU-228A-GR-123-DU	0	228A	9/8/98 1046	soil	G	16oz	4 C	G	DU	RCRA Metals/Total U; HE; SVOC	
042527-003	TJAOU-228A-GR-123-DU	0	228A	9/8/98 1046	soil	G	4oz	4 C	G	DU	VOC'S	
042499-001.	TJAOU-228A-GR-124-S	0	228A	9/8/98 1050	soil	G	16oz	none	G	SA	gamma spec; iso U	
042500-001	TJAOU-228A-GR-125-S	0	228A	9/8/98 1055	soil	G	16oz	none	G	SA	gamma spec; iso U	
042500-005	TJAOU-228A-GR-125-S	0	228A	9/8/98 1055	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042501-001	TJAOU-228A-GR-126-S	0	228A	9/8/98 1100	soil	G	16oz	none	G	SA	gamma spec; iso U	
042502-001	TJAOU-228A-GR-127-S	0	228A	9/8/98 1105	soil	G	16oz	none	G	SA	gamma spec; iso U	
042502-005	TJAOU-228A-GR-127-S	0	228A	9/8/98 1105	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042503-001	TJAOU-228A-GR-128-S	0	228A	9/8/98 1110	soil	G	16oz	none	G	SA	gamma spec; iso U	
042504-001	TJAOU-228A-GR-129-S	0	228A	9/8/98 1115	soil	G	16oz	none	G	SA	gamma spec; iso U	
042504-002	TJAOU-228A-GR-129-S	0	228A	9/8/98 1115	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042504-003	TJAOU-228A-GR-129-S	0	228A	9/8/98 1115	soil	G	4oz	4 C	G	SA	VOC'S	
042505-001	TJAOU-228A-GR-130-S	0	228A	9/8/98 1120	soil	G	16oz	none	G	SA	gamma spec; iso U	
042506-001	TJAOU-228A-GR-131-S	0	228A	9/8/98 1125	soil	G	16oz	none	G	SA	gamma spec; iso U	
042506-005	TJAOU-228A-GR-131-S	0	228A	9/8/98 1125	soil	G	16oz	4 C	G	SA	RCRA Metals; Total U	
042507-001	TJAOU-228A-GR-132-S	0	228A	9/8/98 1130	soil	G	16oz	none	G	SA	gamma spec; iso U	

Abnormal Conditions on Receipt LAB USE

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) **1st Copy** To Accompany Samples, Return to SMO (Blue) **2nd Copy** SMO Suspense Copy (Yellow) **3rd Copy** Field Copy (Pink)

CORELAB

REVISE

CORE LABORATORIES

AMENDED REPORT

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042495-001
Laboratory Sample ID: 982439-1

Date Sampled.....: 09/08/98 Time Sampled.....: 10:30 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.670						pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.250						pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0300						pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0500						pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.750						pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.250						pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100						pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100						pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100						pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100						pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200						pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200						pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.9						pCi/g	10308	09/27/98 1104	* ca
	Actinium-228, error +/-, Solid	0.5						pCi/g	10308	09/27/98 1104	* ca
	Actinium-228, MDA, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Actinium-228, Lc, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Americium-241, Activity, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Americium-241, error +/-, Solid	0.4						pCi/g	10308	09/27/98 1104	* ca
	Americium-241, MDA, Solid	0.4						pCi/g	10308	09/27/98 1104	* ca
	Americium-241, Lc, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Cerium-144, Activity, Solid	0.4						pCi/g	10308	09/27/98 1104	* ca
	Cerium-144, Error, +/-, Solid	0.6						pCi/g	10308	09/27/98 1104	* ca
	Cerium-144, MDA, Solid	0.4						pCi/g	10308	09/27/98 1104	* ca
	Cerium-144, Lc, Solid	0.3						pCi/g	10308	09/27/98 1104	* ca
	Cobalt-60, Activity, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Cobalt-60, Error, +/-, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Cobalt-60, MDA, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Cobalt-60, Lc, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Chromium-51, Activity, Solid	0.3						pCi/g	10308	09/27/98 1104	* ca
	Chromium-51, Error, +/-, Solid	0.7						pCi/g	10308	09/27/98 1104	* ca
	Chromium-51, MDA, Solid	0.6						pCi/g	10308	09/27/98 1104	* ca

CORELAB

AMENDED REPORT

REVISED

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042496-001
Laboratory Sample ID: 982439-4

Date Sampled.....: 09/08/98 Time Sampled.....: 10:35 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.460					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0400					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0600					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.530					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	0.8					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, error +/-, Solid	0.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, MDA, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, Lc, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Activity, Solid	0.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, Activity, Solid	0.6					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, Error, +/-, Solid	0.7					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, MDA, Solid	0.7					1.00	pCi/g	10308	09/27/98 1216	* ca

CORELAB

AMENDED REPORT

REVISED

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042497-001
Laboratory Sample ID: 982439-5

Date Sampled.....: 09/08/98 Time Sampled.....: 10:40 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.790					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.280					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.880					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.290					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, error +/-, Solid	0.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, MDA, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, Activity, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, error +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, MDA, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Activity, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Lc, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, Activity, Solid	0.7					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, Error, +/-, Solid	0.6					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca

CORELAB

AMENDED REPORT

REVISED

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439 Date: 01/25/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600799 ATTN: Suzi Jensen

Customer Sample ID..: 042498-001 Date Sampled.....: 09/08/98 Time Sampled.....: 10:45 Sample Matrix.....: Soil
Laboratory Sample ID: 982439-7 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.790					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.300					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0500					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0800					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	1.14					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.350					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0300					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.5					1	pCi/g	10308	09/27/98 1318	* ca
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10308	09/27/98 1318	* ca
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Americium-241, Activity, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Americium-241, error +/-, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Americium-241, Lc, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Cerium-144, Activity, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Cerium-144, Error, +/-, Solid	0.3					1	pCi/g	10308	09/27/98 1318	* ca
	Cerium-144, MDA, Solid	0.3					1	pCi/g	10308	09/27/98 1318	* ca
	Cerium-144, Lc, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Cobalt-60, Activity, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Chromium-51, Activity, Solid	1.5					1	pCi/g	10308	09/27/98 1318	* ca
	Chromium-51, Error, +/-, Solid	1.8					1	pCi/g	10308	09/27/98 1318	* ca
	Chromium-51, MDA, Solid	1.0					1	pCi/g	10308	09/27/98 1318	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042527-001
Laboratory Sample ID: 982439-10

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 10:46
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.760					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.270					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0600					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.930					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.300					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.8					1.00	pCi/g	10308	09/27/98 1319	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10308	09/27/98 1319	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Americium-241, error +/-, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Americium-241, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cerium-144, Error, +/-, Solid	0.5					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Chromium-51, Activity, Solid	1.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Chromium-51, Error, +/-, Solid	1.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Chromium-51, MDA, Solid	0.8					1.00	pCi/g	10308	09/27/98 1319	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042499-001
Laboratory Sample ID: 982439-13

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 10:50
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.32					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.370					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.110					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	1.19					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.340					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.5					1.00	pCi/g	10308	09/28/98 0756	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 0756	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Americium-241, error +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Americium-241, Lc, Solid	0.6					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cerium-144, Activity, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cobalt-60, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Chromium-51, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Chromium-51, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Chromium-51, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042500-001
Laboratory Sample ID: 982439-14

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 10:55
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.680					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.240					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0400					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.930					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.280					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 0757	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Americium-241, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Americium-241, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cerium-144, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cerium-144, Error, +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Chromium-51, Activity, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Chromium-51, Error, +/-, Solid	0.5					1.00	pCi/g	10308	09/28/98 0757	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10308	09/28/98 0757	* ca

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LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042501-001
Laboratory Sample ID: 982439-16

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 11:00
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.08					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.320					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.00					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	1.36					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.370					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.3					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, error +/-, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, error +/-, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Activity, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Error, +/-, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, Error, +/-, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042502-001
Laboratory Sample ID: 982439-17

Date Sampled.....: 09/08/98 Time Sampled.....: 11:05 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.790					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.270					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0900					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	1.21					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.340					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.0					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, Activity, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, error +/-, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, Activity, Solid	0.9					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, Error, +/-, Solid	0.7					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042503-001
Laboratory Sample ID: 982439-19

Date Sampled.....: 09/08/98 Time Sampled.....: 11:10 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.840					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.290					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0700					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0800					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.830					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.280					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.1					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, error +/-, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, error +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Activity, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Error, +/-, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, Activity, Solid	0.9					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, Error, +/-, Solid	0.8					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, MDA, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042504-001
Laboratory Sample ID: 982439-20

Date Sampled.....: 09/08/98 Time Sampled.....: 11:15 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.630					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.270					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0400					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	1.25					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.380					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0300					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.6					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, error +/-, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, Activity, Solid	1.1					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, error +/-, Solid	0.6					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Activity, Solid	0.7					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Error, +/-, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042505-001
Laboratory Sample ID: 982439-23

Date Sampled.....: 09/08/98 Time Sampled.....: 11:20 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.480					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.210					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0400					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0600					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.920					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.300					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.8					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, error +/-, Solid	0.7					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, error +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, Lc, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Activity, Solid	0.6					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, Activity, Solid	1.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, Error, +/-, Solid	1.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, MDA, Solid	0.8					1.00	pCi/g	10308	09/28/98 1110	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042506-001
Laboratory Sample ID: 982439-24

Date Sampled.....: 09/08/98 Time Sampled.....: 11:25 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.680					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.270					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0600					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0800					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.760					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.280					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	0.9					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, error +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Error, +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, Activity, Solid	1.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, Error, +/-, Solid	0.5					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042507-001
Laboratory Sample ID: 982439-26

Date Sampled.....: 09/08/98 Time Sampled.....: 13:30 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.970					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.300					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.00					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.610					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.220					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.2					1	pCi/g	10308	09/28/98 1307	* ca
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10308	09/28/98 1307	* ca
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Americium-241, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Americium-241, error +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Americium-241, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Cerium-144, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Cerium-144, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Cerium-144, MDA, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Cerium-144, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Chromium-51, Activity, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Chromium-51, Error, +/-, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Chromium-51, MDA, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca

GK-12C => 132

SF 2001-F (5-97)
Supersedes (5-87) Issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

AR/COC- 600799

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: 228A/John Copland
Project Name: 228A
Record Center Code: 1309/228A/DAT
Logbook Ref. No.: ER-014
Service Order No.: CFO596

Date Samples Shipped: 9/11/98 SMO USE
Carrier/Waybill No.: 709136
Lab Contact: Tim Kellogg
Lab Destination: Core/Denver/Casper
SMO Contact/Phone: Doug Salmi
Send Report to SMO: Suzi Montano

Contract No.: AJ-2480C
Case No.: 7225.2202
SMO Authorization: Douglas Salmi
Bill to: Sandia National Laboratories
Supplier Services, Dept. _____
P.O. Box 5800 MS 0154

Location: Tech Area NA; Building NA; Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample ID
042495-001	TJAOU-228A-GR-120-S	0	228A	9/8/98 1030	soil	G	16oz	none	G	SA	gamma spec; iso U	
042495-002	TJAOU-228A-GR-120-S	0	228A	9/8/98 1030	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042495-003	TJAOU-228A-GR-120-S	0	228A	9/8/98 1030	soil	G	16oz	4 C	G	SA	VOC'S	
042496-001	TJAOU-228A-GR-121-S	0	228A	9/8/98 1035	soil	G	16oz	none	G	SA	gamma spec; iso U	
042497-001	TJAOU-228A-GR-122-S	0	228A	9/8/98 1040	soil	G	16oz	none	G	SA	gamma spec; iso U	
042497-005	TJAOU-228A-GR-122-S	0	228A	9/8/98 1040	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042498-001	TJAOU-228A-GR-123-S	0	228A	9/8/98 1045	soil	G	16oz	none	G	SA	gamma spec; iso U	
042498-002	TJAOU-228A-GR-123-S	0	228A	9/8/98 1045	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042498-003	TJAOU-228A-GR-123-S	0	228A	9/8/98 1045	soil	G	4oz	4 C	G	SA	VOC'S	
042527-001	TJAOU-228A-GR-123-DU	0	228A	9/8/98 1046	Sol	G	16oz	None	G	DU	Gamma spec; iso U	

RMMA ☒Yes ☐No Ref. No. _____

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking (SMO USE)
Date Entered (mm/dd/yy) 9/11/98
Entered by: [illegible]

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
*Send as separate report
* Please note hold times on VOC samples
* COC# 600500 replaces COC# 600799

Abnormal Conditions on Receipt (LAB USE)

Turnaround Time ☒Normal ☐Rush Required Report Date _____

QC inits: [illegible]

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Nelson Capilam	[illegible]	NC	IT/6131 284-3307

1. Relinquished by	[illegible]	Org. IT/6131	Date 9-10-98	Time 1500	4. Relinquished by	Org.	Date
1. Received by	[illegible]	Org. 7538	Date 9-10-98	Time 1500	4. Received by	Org.	Date
2. Relinquished by	[illegible]	Org. 7577	Date 9/11/98	Time 1300	5. Relinquished by	Org.	Date
2. Received by		Org.	Date	Time	5. Received by	Org	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org.	Date
3. Received by		Org.	Date	Time	6. Received by	Org	Date

Original To Accompany Samples, Laboratory Copy (White) | **1st Copy** To Accompany Samples, Return to SMO (Blue) | **2nd Copy** SMO Suspense Copy (Yellow) | **3rd Copy** Field Copy (Pink)

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600799

228A | Project/Task Manager: 228A/John Copland | Case No.: 7225.2203

tion | Tech Area NA | Room NA

o. -	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID	D	TECH
	TJAOU-228A-GR-123-DU	0	228A	9/8/98 1046	soil	G	16oz	4 C	G	DU	RCRA Metals/Total U; HE; SVOC			* ca
	TJAOU-228A-GR-123-DU	0	228A	9/8/98 1046	soil	G	4oz	4 C	G	DU	VOC'S			* ca
	TJAOU-228A-GR-124-S	0	228A	9/8/98 1050	soil	G	16oz	none	G	SA	gamma spec; Iso U			* ca
	TJAOU-228A-GR-125-S	0	228A	9/8/98 1055	soil	G	16oz	none	G	SA	gamma spec; Iso U			* ca
	TJAOU-228A-GR-125-S	0	228A	9/8/98 1055	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U			* ca
	TJAOU-228A-GR-126-S	0	228A	9/8/98 1100	soil	G	16oz	none	G	SA	gamma spec; Iso U			* ca
	TJAOU-228A-GR-127-S	0	228A	9/8/98 1105	soil	G	16oz	none	G	SA	gamma spec; Iso U			* ca
	TJAOU-228A-GR-127-S	0	228A	9/8/98 1105	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U			* ca
	TJAOU-228A-GR-128-S	0	228A	9/8/98 1110	soil	G	16oz	none	G	SA	gamma spec; Iso U			* ca
	TJAOU-228A-GR-129-S	0	228A	9/8/98 1115	soil	G	16oz	none	G	SA	gamma spec; Iso U			* ca
	TJAOU-228A-GR-129-S	0	228A	9/8/98 1115	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC			* ca
	TJAOU-228A-GR-129-S	0	228A	9/8/98 1115	soil	G	4oz	4 C	G	SA	VOC'S			* ca
	TJAOU-228A-GR-130-S	0	228A	9/8/98 1120	soil	G	16oz	none	G	SA	gamma spec; Iso U			* ca
	TJAOU-228A-GR-131-S	0	228A	9/8/98 1125	soil	G	16oz	none	G	SA	gamma spec; Iso U			* ca
	TJAOU-228A-GR-131-S	0	228A	9/8/98 1125	soil	G	16oz	4 C	G	SA	RCRA Metals; Total U			* ca
	TJAOU-228A-GR-132-S	0	228A	9/8/98 1130	soil	G	16oz	none	G	SA	gamma spec; Iso U			* ca

LAB USE

ditions on Receipt

ls _____

Accompany Samples, boratory Copy (White) | 1st Copy To Accompany Samples, Return to SMO (Blue) | 2nd Copy SMO Suspense Copy (Yellow) | 3rd Copy Field Copy (Pink)

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REVISED

CORE LABORATORIES

AMENDED REPORT

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042495-001
Laboratory Sample ID: 982439-1

Date Sampled.....: 09/08/98 Time Sampled.....: 10:30 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.670						pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.250						pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0300						pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0500						pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.750						pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.250						pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100						pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100						pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100						pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100						pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200						pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200						pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.9						pCi/g	10308	09/27/98 1104	* ca
	Actinium-228, error +/-, Solid	0.5						pCi/g	10308	09/27/98 1104	* ca
	Actinium-228, MDA, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Actinium-228, Lc, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Americium-241, Activity, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Americium-241, error +/-, Solid	0.4						pCi/g	10308	09/27/98 1104	* ca
	Americium-241, MDA, Solid	0.4						pCi/g	10308	09/27/98 1104	* ca
	Americium-241, Lc, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Cerium-144, Activity, Solid	0.4						pCi/g	10308	09/27/98 1104	* ca
	Cerium-144, Error, +/-, Solid	0.6						pCi/g	10308	09/27/98 1104	* ca
	Cerium-144, MDA, Solid	0.4						pCi/g	10308	09/27/98 1104	* ca
	Cerium-144, Lc, Solid	0.3						pCi/g	10308	09/27/98 1104	* ca
	Cobalt-60, Activity, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Cobalt-60, Error, +/-, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Cobalt-60, MDA, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Cobalt-60, Lc, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Chromium-51, Activity, Solid	0.3						pCi/g	10308	09/27/98 1104	* ca
	Chromium-51, Error, +/-, Solid	0.7						pCi/g	10308	09/27/98 1104	* ca
	Chromium-51, MDA, Solid	0.6						pCi/g	10308	09/27/98 1104	* ca

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AMENDED REPORT

REVISED

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042495-001
Laboratory Sample ID: 982439-1

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 10:30
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Cesium-134, Activity, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Cesium-134, Error, +/-, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Cesium-134, MDA, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Cesium-134, Lc, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Cesium-137, Activity, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Cesium-137, Error, +/-, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Cesium-137, MDA, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Cesium-137, Lc, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Iron-59, Activity, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Iron-59, Error, +/-, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Iron-59, MDA, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Iron-59, Lc, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Potassium-40, Activity, Solid	19.5						pCi/g	10308	09/27/98 1104	* ca
	Potassium-40, error +/-, Solid	3.5						pCi/g	10308	09/27/98 1104	* ca
	Potassium-40, MDA, Solid	0.6						pCi/g	10308	09/27/98 1104	* ca
	Potassium-40, Lc, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Lead-212, Activity, Solid	1.1						pCi/g	10308	09/27/98 1104	* ca
	Lead-212, error +/-, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Lead-212, MDA, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Lead-212, Lc, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Lead-214, Activity, Solid	1.6						pCi/g	10308	09/27/98 1104	* ca
	Lead-214, error +/-, Solid	0.5						pCi/g	10308	09/27/98 1104	* ca
	Lead-214, MDA, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Lead-214, Lc, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Radium-226, Activity, Solid	1.1						pCi/g	10308	09/27/98 1104	* ca
	Radium-226, Error, +/-, Solid	0.3						pCi/g	10308	09/27/98 1104	* ca
	Radium-226, MDA, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Radium-226, Lc, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Radium-228, Activity, Solid	1.9						pCi/g	10308	09/27/98 1104	* ca
	Radium-228, Error, +/-, Solid	0.5						pCi/g	10308	09/27/98 1104	* ca
	Radium-228, MDA, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Radium-228, Lc, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Ruthenium-103, Activity, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Ruthenium-103, Error, +/-, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439 Date: 01/25/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600799 ATTN: Suzi Jensen

Customer Sample ID..: 042495-001 GR-120
Laboratory Sample ID: 982439-1

Date Sampled.....: 09/08/98 Time Sampled.....: 10:30 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Ruthenium-103, Lc, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Ruthenium-106, Activity, Solid	1.2						pCi/g	10308	09/27/98 1104	* ca
	Ruthenium-106, Error, +/-, Solid	0.6						pCi/g	10308	09/27/98 1104	* ca
	Ruthenium-106, MDA, Solid	0.9						pCi/g	10308	09/27/98 1104	* ca
	Ruthenium-106, Lc, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca
	Thorium-231, Activity, Solid	0.4						pCi/g	10308	09/27/98 1104	* ca
	Thorium-231, error +/-, Solid	1.0						pCi/g	10308	09/27/98 1104	* ca
	Thorium-231, MDA, Solid	0.8						pCi/g	10308	09/27/98 1104	* ca
	Thorium-231, Lc, Solid	0.3						pCi/g	10308	09/27/98 1104	* ca
	Thorium-232, Solid	41.6						pCi/g	10308	09/27/98 1104	* ca
	Thorium-232, Error +/-, Solid	70.1						pCi/g	10308	09/27/98 1104	* ca
	Thorium-232, MDA, Solid	63.9						pCi/g	10308	09/27/98 1104	* ca
	Thorium-232, Lc, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Uranium-235, Activity, Solid	0.3						pCi/g	10308	09/27/98 1104	* ca
	Uranium 235, error +/-, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Uranium-235, MDA, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Uranium-235, Lc, Solid	0.3						pCi/g	10308	09/27/98 1104	* ca
	Uranium-238, Activity, Solid	5.1			5.1 ± 7.2			pCi/g	10308	09/27/98 1104	* ca
	Uranium 238, error +/-, Solid	7.2						pCi/g	10308	09/27/98 1104	* ca
	Uranium-238, MDA, Solid	4.6						pCi/g	10308	09/27/98 1104	* ca
	Uranium-238, Lc, Solid	0.4						pCi/g	10308	09/27/98 1104	* ca
	Zirconium-95, Activity, Solid	0.5						pCi/g	10308	09/27/98 1104	* ca
	Zirconium-95, Error, +/-, Solid	0.2						pCi/g	10308	09/27/98 1104	* ca
	Zirconium-95, MDA, Solid	0.1						pCi/g	10308	09/27/98 1104	* ca
	Zirconium-95, Lc, Solid	0.0						pCi/g	10308	09/27/98 1104	* ca

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AMENDED REPORT

REVISED

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439 Date: 01/25/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600799 ATTN: Suzi Jensen

Customer Sample ID..: 042496-001 Date Sampled.....: 09/08/98 Time Sampled.....: 10:35 Sample Matrix.....: Soil
Laboratory Sample ID: 982439-4 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.460					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0400					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0600					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.530					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	0.8					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, error +/-, Solid	0.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, MDA, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, Lc, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Activity, Solid	0.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, Activity, Solid	0.6					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, Error, +/-, Solid	0.7					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, MDA, Solid	0.7					1.00	pCi/g	10308	09/27/98 1216	* ca

CORELAB

AMENDED REPORT

CORE LABORATORIES REVISED

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042496-001
Laboratory Sample ID: 982439-4

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 10:35
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-134, Activity, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-134, Error, +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-134, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-134, Lc, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-137, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-137, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-137, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-137, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Iron-59, Activity, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Iron-59, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Potassium-40, Activity, Solid	19.9					1.00	pCi/g	10308	09/27/98 1216	* ca
	Potassium-40, error +/-, Solid	3.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Potassium-40, MDA, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-212, Activity, Solid	0.8					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-212, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-214, Activity, Solid	1.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-214, error +/-, Solid	0.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-214, MDA, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-214, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-226, Activity, Solid	0.9					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-226, Error, +/-, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-226, MDA, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-226, Lc, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-228, Activity, Solid	0.8					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-228, Error, +/-, Solid	0.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-228, MDA, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-228, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-103, Activity, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439 Date: 01/25/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600799 ATTN: Suzi Jensen

Customer Sample ID..: 042496-001 Date Sampled.....: 09/08/98 Time Sampled.....: 10:35 Sample Matrix.....: Soil
Laboratory Sample ID: 982439-4 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-103, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-106, Activity, Solid	2.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-106, Error, +/-, Solid	1.9					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-106, MDA, Solid	1.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-106, Lc, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-231, Activity, Solid	1.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-231, error +/-, Solid	1.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-231, MDA, Solid	0.8					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-231, Lc, Solid	0.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-232, Solid	31.7					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-232, Error +/-, Solid	33.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-232, MDA, Solid	26.9					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-232, Lc, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-235, Activity, Solid	0.6					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium 235, error +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-235, Lc, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-238, Activity, Solid	4.8					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium 238, error +/-, Solid	3.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-238, MDA, Solid	1.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-238, Lc, Solid	0.6					1.00	pCi/g	10308	09/27/98 1216	* ca
	Zirconium-95, Activity, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Zirconium-95, Error, +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Zirconium-95, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Zirconium-95, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042497-001
Laboratory Sample ID: 982439-5

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 10:40
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.790					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.280					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.880					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.290					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, error +/-, Solid	0.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, MDA, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, Activity, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, error +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, MDA, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Activity, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cerium-144, Lc, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, Activity, Solid	0.7					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, Error, +/-, Solid	0.6					1.00	pCi/g	10308	09/27/98 1216	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042497-001
Laboratory Sample ID: 982439-5

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 10:40
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-134, Activity, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-134, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-134, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-134, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-137, Activity, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-137, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Cesium-137, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Iron-59, Activity, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Iron-59, Error, +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Potassium-40, Activity, Solid	19.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Potassium-40, error +/-, Solid	3.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Potassium-40, MDA, Solid	0.6					1.00	pCi/g	10308	09/27/98 1216	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-212, Activity, Solid	0.8					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-212, Lc, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-214, Activity, Solid	1.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-214, error +/-, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-214, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Lead-214, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-226, Activity, Solid	1.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-226, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-226, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-226, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-228, Activity, Solid	1.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-228, Error, +/-, Solid	0.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-228, MDA, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Radium-228, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-103, Activity, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042497-001
Laboratory Sample ID: 982439-5

Date Sampled.....: 09/08/98 Time Sampled.....: 10:40 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-103, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-106, Activity, Solid	3.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-106, Error, +/-, Solid	0.9					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-106, MDA, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-231, Activity, Solid	0.5					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-231, error +/-, Solid	0.9					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-231, MDA, Solid	0.9					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-231, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-232, Solid	113					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-232, Error +/-, Solid	98.8					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-232, MDA, Solid	71.9					1.00	pCi/g	10308	09/27/98 1216	* ca
	Thorium-232, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-235, Activity, Solid	0.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium 235, error +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-235, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-238, Activity, Solid	2.6					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium 238, error +/-, Solid	5.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-238, MDA, Solid	3.4					1.00	pCi/g	10308	09/27/98 1216	* ca
	Uranium-238, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1216	* ca
	Zirconium-95, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1216	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Zirconium-95, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1216	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1216	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042498-001
Laboratory Sample ID: 982439-7

Date Sampled.....: 09/08/98 Time Sampled.....: 10:45 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.790					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.300					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0500					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0800					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	1.14					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.350					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0300					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.5					1	pCi/g	10308	09/27/98 1318	* ca
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10308	09/27/98 1318	* ca
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Americium-241, Activity, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Americium-241, error +/-, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Americium-241, Lc, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Cerium-144, Activity, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Cerium-144, Error, +/-, Solid	0.3					1	pCi/g	10308	09/27/98 1318	* ca
	Cerium-144, MDA, Solid	0.3					1	pCi/g	10308	09/27/98 1318	* ca
	Cerium-144, Lc, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Cobalt-60, Activity, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Chromium-51, Activity, Solid	1.5					1	pCi/g	10308	09/27/98 1318	* ca
	Chromium-51, Error, +/-, Solid	1.8					1	pCi/g	10308	09/27/98 1318	* ca
	Chromium-51, MDA, Solid	1.0					1	pCi/g	10308	09/27/98 1318	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042498-001
Laboratory Sample ID: 982439-7

Date Sampled.....: 09/08/98 Time Sampled.....: 10:45 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.3					1	pCi/g	10308	09/27/98 1318	* ca
	Cesium-134, Activity, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Cesium-134, Error, +/-, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Cesium-134, MDA, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Cesium-134, Lc, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Cesium-137, Activity, Solid	0.3					1	pCi/g	10308	09/27/98 1318	* ca
	Cesium-137, Error, +/-, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Cesium-137, MDA, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Cesium-137, Lc, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Iron-59, Activity, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Iron-59, Error, +/-, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Iron-59, MDA, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Iron-59, Lc, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Potassium-40, Activity, Solid	29.3					1	pCi/g	10308	09/27/98 1318	* ca
	Potassium-40, error +/-, Solid	3.9					1	pCi/g	10308	09/27/98 1318	* ca
	Potassium-40, MDA, Solid	0.4					1	pCi/g	10308	09/27/98 1318	* ca
	Potassium-40, Lc, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Lead-212, Activity, Solid	1.0					1	pCi/g	10308	09/27/98 1318	* ca
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Lead-212, MDA, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Lead-212, Lc, Solid	0.3					1	pCi/g	10308	09/27/98 1318	* ca
	Lead-214, Activity, Solid	1.3					1	pCi/g	10308	09/27/98 1318	* ca
	Lead-214, error +/-, Solid	0.4					1	pCi/g	10308	09/27/98 1318	* ca
	Lead-214, MDA, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Lead-214, Lc, Solid	0.3					1	pCi/g	10308	09/27/98 1318	* ca
	Radium-226, Activity, Solid	1.8					1	pCi/g	10308	09/27/98 1318	* ca
	Radium-226, Error, +/-, Solid	0.5					1	pCi/g	10308	09/27/98 1318	* ca
	Radium-226, MDA, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Radium-226, Lc, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Radium-228, Activity, Solid	1.5					1	pCi/g	10308	09/27/98 1318	* ca
	Radium-228, Error, +/-, Solid	0.5					1	pCi/g	10308	09/27/98 1318	* ca
	Radium-228, MDA, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Radium-228, Lc, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Ruthenium-103, Activity, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042498-001
Laboratory Sample ID: 982439-7

Date Sampled.....: 09/08/98 Time Sampled.....: 10:45 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Ruthenium-103, Lc, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Ruthenium-106, Activity, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Ruthenium-106, Error, +/-, Solid	0.0					1	pCi/g	10308	09/27/98 1318	* ca
	Ruthenium-106, MDA, Solid	0.5					1	pCi/g	10308	09/27/98 1318	* ca
	Ruthenium-106, Lc, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Thorium-231, Activity, Solid	0.9					1	pCi/g	10308	09/27/98 1318	* ca
	Thorium-231, error +/-, Solid	0.5					1	pCi/g	10308	09/27/98 1318	* ca
	Thorium-231, MDA, Solid	0.6					1	pCi/g	10308	09/27/98 1318	* ca
	Thorium-231, Lc, Solid	0.3					1	pCi/g	10308	09/27/98 1318	* ca
	Thorium-232, Solid	4.3					1	pCi/g	10308	09/27/98 1318	* ca
	Thorium-232, Error +/-, Solid	8.8					1	pCi/g	10308	09/27/98 1318	* ca
	Thorium-232, MDA, Solid	13.2					1	pCi/g	10308	09/27/98 1318	* ca
	Thorium-232, Lc, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Uranium-235, Activity, Solid	0.6					1	pCi/g	10308	09/27/98 1318	* ca
	Uranium 235, error +/-, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Uranium-235, Lc, Solid	0.4					1	pCi/g	10308	09/27/98 1318	* ca
	Uranium-238, Activity, Solid	11.4					1	pCi/g	10308	09/27/98 1318	* ca
	Uranium 238, error +/-, Solid	3.6					1	pCi/g	10308	09/27/98 1318	* ca
	Uranium-238, MDA, Solid	1.5					1	pCi/g	10308	09/27/98 1318	* ca
	Uranium-238, Lc, Solid	0.5					1	pCi/g	10308	09/27/98 1318	* ca
	Zirconium-95, Activity, Solid	0.2					1	pCi/g	10308	09/27/98 1318	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Zirconium-95, MDA, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca
	Zirconium-95, Lc, Solid	0.1					1	pCi/g	10308	09/27/98 1318	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042527-001
Laboratory Sample ID: 982439-10

Date Sampled.....: 09/08/98 Time Sampled.....: 10:46 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.760					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.270					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0600					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.930					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.300					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.8					1.00	pCi/g	10308	09/27/98 1319	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10308	09/27/98 1319	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Americium-241, error +/-, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Americium-241, Lc, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cerium-144, Error, +/-, Solid	0.5					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Chromium-51, Activity, Solid	1.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Chromium-51, Error, +/-, Solid	1.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Chromium-51, MDA, Solid	0.8					1.00	pCi/g	10308	09/27/98 1319	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439 Date: 01/25/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600799 ATTN: Suzi Jensen

Customer Sample ID..: 042527-001 Date Sampled.....: 09/08/98 Time Sampled.....: 10:46 Sample Matrix.....: Soil
Laboratory Sample ID: 982439-10 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cesium-134, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cesium-134, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cesium-134, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cesium-134, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cesium-137, Activity, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cesium-137, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Cesium-137, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Iron-59, Activity, Solid	0.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Iron-59, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Potassium-40, Activity, Solid	19.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Potassium-40, error +/-, Solid	3.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Potassium-40, MDA, Solid	0.5					1.00	pCi/g	10308	09/27/98 1319	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Lead-212, Activity, Solid	0.9					1.00	pCi/g	10308	09/27/98 1319	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Lead-212, Lc, Solid	0.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Lead-214, Activity, Solid	1.3					1.00	pCi/g	10308	09/27/98 1319	* ca
	Lead-214, error +/-, Solid	0.3					1.00	pCi/g	10308	09/27/98 1319	* ca
	Lead-214, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Lead-214, Lc, Solid	0.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Radium-226, Activity, Solid	1.6					1.00	pCi/g	10308	09/27/98 1319	* ca
	Radium-226, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/27/98 1319	* ca
	Radium-226, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Radium-226, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Radium-228, Activity, Solid	1.8					1.00	pCi/g	10308	09/27/98 1319	* ca
	Radium-228, Error, +/-, Solid	0.4					1.00	pCi/g	10308	09/27/98 1319	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Ruthenium-103, Activity, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042527-001
Laboratory Sample ID: 982439-10

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 10:46
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Ruthenium-103, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Ruthenium-106, Activity, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Ruthenium-106, Error, +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Ruthenium-106, MDA, Solid	0.4					1.00	pCi/g	10308	09/27/98 1319	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Thorium-231, Activity, Solid	1.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Thorium-231, error +/-, Solid	1.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Thorium-231, MDA, Solid	0.9					1.00	pCi/g	10308	09/27/98 1319	* ca
	Thorium-231, Lc, Solid	0.4					1.00	pCi/g	10308	09/27/98 1319	* ca
	Thorium-232, Solid	58.8					1.00	pCi/g	10308	09/27/98 1319	* ca
	Thorium-232, Error +/-, Solid	58.6					1.00	pCi/g	10308	09/27/98 1319	* ca
	Thorium-232, MDA, Solid	47.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Thorium-232, Lc, Solid	0.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Uranium-235, Activity, Solid	0.4					1.00	pCi/g	10308	09/27/98 1319	* ca
	Uranium 235, error +/-, Solid	0.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Uranium-235, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1319	* ca
	Uranium-238, Activity, Solid	2.2					1.00	pCi/g	10308	09/27/98 1319	* ca
	Uranium 238, error +/-, Solid	3.4					1.00	pCi/g	10308	09/27/98 1319	* ca
	Uranium-238, MDA, Solid	3.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Uranium-238, Lc, Solid	0.3					1.00	pCi/g	10308	09/27/98 1319	* ca
	Zirconium-95, Activity, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Zirconium-95, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca
	Zirconium-95, MDA, Solid	0.1					1.00	pCi/g	10308	09/27/98 1319	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10308	09/27/98 1319	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042499-001
Laboratory Sample ID: 982439-13

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 10:50
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.32					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.370					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.110					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	1.19					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.340					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.5					1.00	pCi/g	10308	09/28/98 0756	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 0756	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Americium-241, error +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Americium-241, Lc, Solid	0.6					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cerium-144, Activity, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cobalt-60, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Chromium-51, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Chromium-51, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Chromium-51, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042499-001
Laboratory Sample ID: 982439-13

Date Sampled.....: 09/08/98 Time Sampled.....: 10:50 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cesium-134, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cesium-134, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cesium-134, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cesium-134, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cesium-137, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cesium-137, Error, +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cesium-137, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Cesium-137, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Iron-59, Activity, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Iron-59, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Iron-59, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Potassium-40, Activity, Solid	27.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Potassium-40, error +/-, Solid	3.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Potassium-40, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Lead-212, Activity, Solid	0.9					1.00	pCi/g	10308	09/28/98 0756	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Lead-212, Lc, Solid	0.4					1.00	pCi/g	10308	09/28/98 0756	* ca
	Lead-214, Activity, Solid	1.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Lead-214, error +/-, Solid	0.6					1.00	pCi/g	10308	09/28/98 0756	* ca
	Lead-214, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Lead-214, Lc, Solid	0.5					1.00	pCi/g	10308	09/28/98 0756	* ca
	Radium-226, Activity, Solid	1.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Radium-226, Error, +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 0756	* ca
	Radium-226, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Radium-226, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Radium-228, Activity, Solid	1.5					1.00	pCi/g	10308	09/28/98 0756	* ca
	Radium-228, Error, +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 0756	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Ruthenium-103, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042499-001
Laboratory Sample ID: 982439-13

Date Sampled.....: 09/08/98 Time Sampled.....: 10:50 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Ruthenium-103, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Ruthenium-106, Activity, Solid	0.7					1.00	pCi/g	10308	09/28/98 0756	* ca
	Ruthenium-106, Error, +/-, Solid	0.6					1.00	pCi/g	10308	09/28/98 0756	* ca
	Ruthenium-106, MDA, Solid	0.7					1.00	pCi/g	10308	09/28/98 0756	* ca
	Ruthenium-106, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Thorium-231, Activity, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Thorium-231, error +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 0756	* ca
	Thorium-231, MDA, Solid	0.5					1.00	pCi/g	10308	09/28/98 0756	* ca
	Thorium-231, Lc, Solid	0.4					1.00	pCi/g	10308	09/28/98 0756	* ca
	Thorium-232, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Thorium-232, Error +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca
	Thorium-232, MDA, Solid	16.8					1.00	pCi/g	10308	09/28/98 0756	* ca
	Thorium-232, Lc, Solid	0.4					1.00	pCi/g	10308	09/28/98 0756	* ca
	Uranium-235, Activity, Solid	0.6					1.00	pCi/g	10308	09/28/98 0756	* ca
	Uranium 235, error +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Uranium-235, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 0756	* ca
	Uranium-238, Activity, Solid	4.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Uranium 238, error +/-, Solid	2.7					1.00	pCi/g	10308	09/28/98 0756	* ca
	Uranium-238, MDA, Solid	1.2					1.00	pCi/g	10308	09/28/98 0756	* ca
	Uranium-238, Lc, Solid	0.6					1.00	pCi/g	10308	09/28/98 0756	* ca
	Zirconium-95, Activity, Solid	0.4					1.00	pCi/g	10308	09/28/98 0756	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 0756	* ca
	Zirconium-95, MDA, Solid	0.4					1.00	pCi/g	10308	09/28/98 0756	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0756	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042500-001
Laboratory Sample ID: 982439-14

Date Sampled.....: 09/08/98 Time Sampled.....: 10:55 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.680					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.240					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0400					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.930					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.280					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 0757	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Americium-241, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Americium-241, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cerium-144, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cerium-144, Error, +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Chromium-51, Activity, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Chromium-51, Error, +/-, Solid	0.5					1.00	pCi/g	10308	09/28/98 0757	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10308	09/28/98 0757	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042500-001
Laboratory Sample ID: 982439-14

Date Sampled.....: 09/08/98 Time Sampled.....: 10:55 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cesium-134, Activity, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cesium-134, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cesium-134, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cesium-134, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cesium-137, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cesium-137, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Cesium-137, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Iron-59, Activity, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Iron-59, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Potassium-40, Activity, Solid	22.4					1.00	pCi/g	10308	09/28/98 0757	* ca
	Potassium-40, error +/-, Solid	3.4					1.00	pCi/g	10308	09/28/98 0757	* ca
	Potassium-40, MDA, Solid	0.5					1.00	pCi/g	10308	09/28/98 0757	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Lead-212, Activity, Solid	0.7					1.00	pCi/g	10308	09/28/98 0757	* ca
	Lead-212, error +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Lead-212, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Lead-214, Activity, Solid	1.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Lead-214, error +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Lead-214, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Lead-214, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Radium-226, Activity, Solid	1.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Radium-226, Error, +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Radium-226, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Radium-226, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Radium-228, Activity, Solid	1.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Radium-228, Error, +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 0757	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Ruthenium-103, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042500-001
Laboratory Sample ID: 982439-14

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 10:55
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Ruthenium-103, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Ruthenium-106, Activity, Solid	1.4					1.00	pCi/g	10308	09/28/98 0757	* ca
	Ruthenium-106, Error, +/-, Solid	0.6					1.00	pCi/g	10308	09/28/98 0757	* ca
	Ruthenium-106, MDA, Solid	0.9					1.00	pCi/g	10308	09/28/98 0757	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Thorium-231, Activity, Solid	1.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Thorium-231, error +/-, Solid	1.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Thorium-231, MDA, Solid	0.9					1.00	pCi/g	10308	09/28/98 0757	* ca
	Thorium-231, Lc, Solid	0.4					1.00	pCi/g	10308	09/28/98 0757	* ca
	Thorium-232, Solid	18.4					1.00	pCi/g	10308	09/28/98 0757	* ca
	Thorium-232, Error +/-, Solid	51.6					1.00	pCi/g	10308	09/28/98 0757	* ca
	Thorium-232, MDA, Solid	61.4					1.00	pCi/g	10308	09/28/98 0757	* ca
	Thorium-232, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Uranium-235, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 0757	* ca
	Uranium 235, error +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Uranium-235, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Uranium-238, Activity, Solid	1.6					1.00	pCi/g	10308	09/28/98 0757	* ca
	Uranium 238, error +/-, Solid	2.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Uranium-238, MDA, Solid	2.5					1.00	pCi/g	10308	09/28/98 0757	* ca
	Uranium-238, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 0757	* ca
	Zirconium-95, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 0757	* ca
	Zirconium-95, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Zirconium-95, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 0757	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042501-001
Laboratory Sample ID: 982439-16

Date Sampled.....: 09/08/98 Time Sampled.....: 11:00 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.08					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.320					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.00					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	1.36					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.370					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.3					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, error +/-, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, error +/-, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Activity, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Error, +/-, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, Error, +/-, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042501-001
Laboratory Sample ID: 982439-16

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 11:00
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-134, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-134, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-134, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-134, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-137, Activity, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-137, Error, +/-, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-137, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-137, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Iron-59, Activity, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Iron-59, Error, +/-, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Iron-59, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Iron-59, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Potassium-40, Activity, Solid	22.8					1	pCi/g	10308	09/28/98 0904	* ca
	Potassium-40, error +/-, Solid	3.0					1	pCi/g	10308	09/28/98 0904	* ca
	Potassium-40, MDA, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Potassium-40, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-212, Activity, Solid	0.8					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-212, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-212, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-214, Activity, Solid	1.5					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-214, error +/-, Solid	0.5					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-214, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-214, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-226, Activity, Solid	1.2					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-226, Error, +/-, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-226, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-226, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-228, Activity, Solid	1.3					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-228, Error, +/-, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-103, Activity, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042501-001
Laboratory Sample ID: 982439-16

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 11:00
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-103, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-106, Activity, Solid	0.7					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-106, Error, +/-, Solid	0.7					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-106, MDA, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-106, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-231, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-231, error +/-, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-231, MDA, Solid	0.7					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-231, Lc, Solid	0.5					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-232, Solid	6.4					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-232, Error +/-, Solid	30.3					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-232, MDA, Solid	20.9					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-232, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-235, Activity, Solid	0.5					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium 235, error +/-, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-235, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-238, Activity, Solid	7.0					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium 238, error +/-, Solid	2.4					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-238, MDA, Solid	1.3					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-238, Lc, Solid	0.6					1	pCi/g	10308	09/28/98 0904	* ca
	Zirconium-95, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Zirconium-95, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Zirconium-95, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Zirconium-95, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042502-001
Laboratory Sample ID: 982439-17

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 11:05
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.790					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.270					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0900					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	1.21					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.340					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.0					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, Activity, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, error +/-, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Americium-241, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cerium-144, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, Activity, Solid	0.9					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, Error, +/-, Solid	0.7					1	pCi/g	10308	09/28/98 0904	* ca
	Chromium-51, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042502-001
Laboratory Sample ID: 982439-17

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 11:05
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-134, Activity, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-134, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-134, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-134, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-137, Activity, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-137, Error, +/-, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-137, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Cesium-137, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Iron-59, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Iron-59, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Iron-59, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Iron-59, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Potassium-40, Activity, Solid	24.3					1	pCi/g	10308	09/28/98 0904	* ca
	Potassium-40, error +/-, Solid	3.9					1	pCi/g	10308	09/28/98 0904	* ca
	Potassium-40, MDA, Solid	0.6					1	pCi/g	10308	09/28/98 0904	* ca
	Potassium-40, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-212, Activity, Solid	0.8					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-212, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-212, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-214, Activity, Solid	1.4					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-214, error +/-, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-214, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Lead-214, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-226, Activity, Solid	1.2					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-226, Error, +/-, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-226, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-226, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-228, Activity, Solid	2.0					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-228, Error, +/-, Solid	0.5					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Radium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-103, Activity, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042502-001
Laboratory Sample ID: 982439-17

Date Sampled.....: 09/08/98 Time Sampled.....: 11:05 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-103, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-106, Activity, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-106, Error, +/-, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-106, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Ruthenium-106, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-231, Activity, Solid	0.6					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-231, error +/-, Solid	0.8					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-231, MDA, Solid	0.9					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-231, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-232, Solid	67.9					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-232, Error +/-, Solid	65.4					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-232, MDA, Solid	54.4					1	pCi/g	10308	09/28/98 0904	* ca
	Thorium-232, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-235, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium 235, error +/-, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-235, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-238, Activity, Solid	1.1					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium 238, error +/-, Solid	6.9					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-238, MDA, Solid	3.6					1	pCi/g	10308	09/28/98 0904	* ca
	Uranium-238, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 0904	* ca
	Zirconium-95, Activity, Solid	0.8					1	pCi/g	10308	09/28/98 0904	* ca
	Zirconium-95, Error, +/-, Solid	0.2					1	pCi/g	10308	09/28/98 0904	* ca
	Zirconium-95, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 0904	* ca
	Zirconium-95, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 0904	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042503-001
Laboratory Sample ID: 982439-19

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 11:10
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.840					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.290					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0700					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0800					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.830					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.280					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	*Gamma Scan (HPGe gamma)*										
	Actinium-228, Activity, Solid	1.1					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, error +/-, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, error +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Activity, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Error, +/-, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, Activity, Solid	0.9					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, Error, +/-, Solid	0.8					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, MDA, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439 Date: 01/25/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600799 ATTN: Suzi Jensen

Customer Sample ID..: 042503-001 Date Sampled.....: 09/08/98 Time Sampled.....: 11:10 Sample Matrix.....: Soil
Laboratory Sample ID: 982439-19 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-134, Activity, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-134, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-134, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-134, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-137, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-137, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-137, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-137, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Iron-59, Activity, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Iron-59, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Iron-59, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Iron-59, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Potassium-40, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Potassium-40, error +/-, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Potassium-40, MDA, Solid	3.4					1	pCi/g	10308	09/28/98 1005	* ca
	Potassium-40, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-212, Activity, Solid	0.9					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-212, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-212, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-214, Activity, Solid	1.3					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-214, error +/-, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-214, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-214, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-226, Activity, Solid	1.2					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-226, Error, +/-, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-226, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-226, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-228, Activity, Solid	1.1					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-228, Error, +/-, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-103, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042503-001
Laboratory Sample ID: 982439-19

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 11:10
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-103, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-106, Activity, Solid	1.8					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-106, Error, +/-, Solid	0.6					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-106, MDA, Solid	0.9					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-106, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-231, Activity, Solid	1.2					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-231, error +/-, Solid	0.8					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-231, MDA, Solid	0.6					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-231, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-232, Solid	8.7					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-232, Error +/-, Solid	16.4					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-232, MDA, Solid	16.4					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-232, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-235, Activity, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium 235, error +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-235, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-238, Activity, Solid	7.3					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium 238, error +/-, Solid	3.0					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-238, MDA, Solid	1.4					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-238, Lc, Solid	0.6					1	pCi/g	10308	09/28/98 1005	* ca
	Zirconium-95, Activity, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Zirconium-95, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Zirconium-95, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042504-001
Laboratory Sample ID: 982439-20

Date Sampled.....: 09/08/98 Time Sampled.....: 11:15 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.630					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.270					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0400					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	1.25					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.380					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0300					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.6					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, error +/-, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, Activity, Solid	1.1					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, error +/-, Solid	0.6					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Americium-241, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Activity, Solid	0.7					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Error, +/-, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Cerium-144, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Chromium-51, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca

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ASSIGNED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439 Date: 01/25/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600799 ATTN: Suzi Jensen

Customer Sample ID..: 042504-001 Date Sampled.....: 09/08/98 Time Sampled.....: 11:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982439-20 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-134, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-134, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-134, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-134, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-137, Activity, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-137, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-137, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Cesium-137, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Iron-59, Activity, Solid	0.6					1	pCi/g	10308	09/28/98 1005	* ca
	Iron-59, Error, +/-, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Iron-59, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Iron-59, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Potassium-40, Activity, Solid	24.8					1	pCi/g	10308	09/28/98 1005	* ca
	Potassium-40, error +/-, Solid	3.7					1	pCi/g	10308	09/28/98 1005	* ca
	Potassium-40, MDA, Solid	0.5					1	pCi/g	10308	09/28/98 1005	* ca
	Potassium-40, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-212, Activity, Solid	0.9					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-212, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-212, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-214, Activity, Solid	1.6					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-214, error +/-, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-214, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Lead-214, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-226, Activity, Solid	1.2					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-226, Error, +/-, Solid	0.6					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-226, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-226, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-228, Activity, Solid	1.6					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-228, Error, +/-, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-228, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Radium-228, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-103, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042504-001
Laboratory Sample ID: 982439-20

Date Sampled.....: 09/08/98 Time Sampled.....: 11:15 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-103, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-106, Activity, Solid	1.2					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-106, Error, +/-, Solid	0.5					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-106, MDA, Solid	0.4					1	pCi/g	10308	09/28/98 1005	* ca
	Ruthenium-106, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-231, Activity, Solid	1.1					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-231, error +/-, Solid	1.1					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-231, MDA, Solid	0.8					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-231, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-232, Solid	219					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-232, Error +/-, Solid	128					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-232, MDA, Solid	58.1					1	pCi/g	10308	09/28/98 1005	* ca
	Thorium-232, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-235, Activity, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium 235, error +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-235, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-238, Activity, Solid	6.0					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium 238, error +/-, Solid	2.8					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-238, MDA, Solid	2.2					1	pCi/g	10308	09/28/98 1005	* ca
	Uranium-238, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 1005	* ca
	Zirconium-95, Activity, Solid	0.2					1	pCi/g	10308	09/28/98 1005	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1005	* ca
	Zirconium-95, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca
	Zirconium-95, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1005	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042505-001
Laboratory Sample ID: 982439-23

Date Sampled.....: 09/08/98 Time Sampled.....: 11:20 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.480					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.210					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0400					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0600					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.920					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.300					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.8					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, error +/-, Solid	0.7					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, error +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, Lc, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Activity, Solid	0.6					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, Activity, Solid	1.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, Error, +/-, Solid	1.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, MDA, Solid	0.8					1.00	pCi/g	10308	09/28/98 1110	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439 Date: 01/25/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600799 ATTN: Suzi Jensen

Customer Sample ID..: 042505-001 Date Sampled.....: 09/08/98 Time Sampled.....: 11:20 Sample Matrix.....: Soil
Laboratory Sample ID: 982439-23 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-134, Activity, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-134, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-134, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-134, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-137, Activity, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-137, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-137, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-137, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Iron-59, Activity, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Iron-59, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Iron-59, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Iron-59, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Potassium-40, Activity, Solid	24.9					1.00	pCi/g	10308	09/28/98 1110	* ca
	Potassium-40, error +/-, Solid	3.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Potassium-40, MDA, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-212, Activity, Solid	0.8					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-212, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-214, Activity, Solid	1.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-214, error +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-214, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-214, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-226, Activity, Solid	1.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-226, Error, +/-, Solid	0.5					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-226, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-226, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-228, Activity, Solid	1.8					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-228, Error, +/-, Solid	0.7					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-228, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-228, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-103, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-103, Error, +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca

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AMENDED REPORT

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042505-001
Laboratory Sample ID: 982439-23

Date Sampled.....: 09/08/98
Date Received.....: 09/12/98

Time Sampled.....: 11:20
Time Received.....: 11:00

Sample Matrix.....: Soil

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-103, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-106, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-106, Error, +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-106, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-231, Activity, Solid	0.6					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-231, error +/-, Solid	0.6					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-231, MDA, Solid	0.6					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-231, Lc, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-232, Solid	6.9					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-232, Error +/-, Solid	17.9					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-232, MDA, Solid	18.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-232, Lc, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-235, Activity, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium 235, error +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-235, Lc, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-238, Activity, Solid	6.6					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium 238, error +/-, Solid	2.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-238, MDA, Solid	1.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-238, Lc, Solid	0.5					1.00	pCi/g	10308	09/28/98 1110	* ca
	Zirconium-95, Activity, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Zirconium-95, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439 Date: 01/25/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600799 ATTN: Suzi Jensen

Customer Sample ID..: 042506-001 Date Sampled.....: 09/08/98 Time Sampled.....: 11:25 Sample Matrix.....: Soil
Laboratory Sample ID: 982439-24 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.680					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.270					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.0600					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0800					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.760					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.280					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	0.9					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, error +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Error, +/-, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, Activity, Solid	1.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, Error, +/-, Solid	0.5					1.00	pCi/g	10308	09/28/98 1110	* ca
	Chromium-51, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca

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AMENDED REPORT

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439 Date: 01/25/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600799 ATTN: Suzi Jensen

Customer Sample ID..: 042506-001 Date Sampled.....: 09/08/98 Time Sampled.....: 11:25 Sample Matrix.....: Soil
Laboratory Sample ID: 982439-24 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-134, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-134, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-134, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-134, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-137, Activity, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-137, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Cesium-137, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Iron-59, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Iron-59, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Potassium-40, Activity, Solid	22.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Potassium-40, error +/-, Solid	3.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Potassium-40, MDA, Solid	0.5					1.00	pCi/g	10308	09/28/98 1110	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-212, Activity, Solid	0.8					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-212, error +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-212, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-214, Activity, Solid	1.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-214, error +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-214, MDA, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Lead-214, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-226, Activity, Solid	1.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-226, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-226, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-226, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-228, Activity, Solid	0.9					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-228, Error, +/-, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-103, Activity, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca

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AMENDED REPORT

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042506-001
Laboratory Sample ID: 982439-24

Date Sampled.....: 09/08/98 Time Sampled.....: 11:25 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-103, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-106, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-106, Error, +/-, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-106, MDA, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-231, Activity, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-231, error +/-, Solid	0.6					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-231, MDA, Solid	0.7					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-231, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-232, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-232, Error +/-, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-232, MDA, Solid	29.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Thorium-232, Lc, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-235, Activity, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium 235, error +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-235, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-235, Lc, Solid	0.2					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-238, Activity, Solid	2.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium 238, error +/-, Solid	3.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-238, MDA, Solid	2.7					1.00	pCi/g	10308	09/28/98 1110	* ca
	Uranium-238, Lc, Solid	0.3					1.00	pCi/g	10308	09/28/98 1110	* ca
	Zirconium-95, Activity, Solid	0.4					1.00	pCi/g	10308	09/28/98 1110	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1.00	pCi/g	10308	09/28/98 1110	* ca
	Zirconium-95, MDA, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10308	09/28/98 1110	* ca

CORELAB

AMENDED REPORT

REVISED

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042507-001
Laboratory Sample ID: 982439-26

Date Sampled.....: 09/08/98 Time Sampled.....: 13:30 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.970					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 234, error +/-, Solid	0.300					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Activity, Solid	0.00					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 235, error +/-, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Activity, Solid	0.610					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium 238, error +/-, Solid	0.220					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1	pCi/g	10279	10/07/98 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.2					1	pCi/g	10308	09/28/98 1307	* ca
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10308	09/28/98 1307	* ca
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Americium-241, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Americium-241, error +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Americium-241, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Cerium-144, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Cerium-144, Error, +/-, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Cerium-144, MDA, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Cerium-144, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Chromium-51, Activity, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Chromium-51, Error, +/-, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Chromium-51, MDA, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca

CORELAB

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439

Date: 01/25/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600799

ATTN: Suzi Jensen

Customer Sample ID..: 042507-001
Laboratory Sample ID: 982439-26

Date Sampled.....: 09/08/98 Time Sampled.....: 13:30 Sample Matrix.....: Soil
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Cesium-134, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Cesium-134, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Cesium-134, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Cesium-134, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Cesium-137, Activity, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Cesium-137, Error, +/-, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Cesium-137, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Cesium-137, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Iron-59, Activity, Solid	0.6					1	pCi/g	10308	09/28/98 1307	* ca
	Iron-59, Error, +/-, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Iron-59, MDA, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Iron-59, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Potassium-40, Activity, Solid	22.9					1	pCi/g	10308	09/28/98 1307	* ca
	Potassium-40, error +/-, Solid	3.0					1	pCi/g	10308	09/28/98 1307	* ca
	Potassium-40, MDA, Solid	0.3					1	pCi/g	10308	09/28/98 1307	* ca
	Potassium-40, Lc, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Lead-212, Activity, Solid	0.9					1	pCi/g	10308	09/28/98 1307	* ca
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Lead-212, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Lead-212, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Lead-214, Activity, Solid	1.6					1	pCi/g	10308	09/28/98 1307	* ca
	Lead-214, error +/-, Solid	0.6					1	pCi/g	10308	09/28/98 1307	* ca
	Lead-214, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Lead-214, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Radium-226, Activity, Solid	1.4					1	pCi/g	10308	09/28/98 1307	* ca
	Radium-226, Error, +/-, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Radium-226, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Radium-226, Lc, Solid	0.3					1	pCi/g	10308	09/28/98 1307	* ca
	Radium-228, Activity, Solid	1.2					1	pCi/g	10308	09/28/98 1307	* ca
	Radium-228, Error, +/-, Solid	0.5					1	pCi/g	10308	09/28/98 1307	* ca
	Radium-228, MDA, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Radium-228, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Ruthenium-103, Activity, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca

CORELAB

AMENDED REPORT

REVISED

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982439 Date: 01/25/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600799 ATTN: Suzi Jensen

Customer Sample ID..: 042507-001 Date Sampled.....: 09/08/98 Time Sampled.....: 13:30 Sample Matrix.....: Soil
Laboratory Sample ID: 982439-26 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Ruthenium-103, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Ruthenium-106, Activity, Solid	1.1					1	pCi/g	10308	09/28/98 1307	* ca
	Ruthenium-106, Error, +/-, Solid	1.2					1	pCi/g	10308	09/28/98 1307	* ca
	Ruthenium-106, MDA, Solid	1.0					1	pCi/g	10308	09/28/98 1307	* ca
	Ruthenium-106, Lc, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Thorium-231, Activity, Solid	3.6					1	pCi/g	10308	09/28/98 1307	* ca
	Thorium-231, error +/-, Solid	1.4					1	pCi/g	10308	09/28/98 1307	* ca
	Thorium-231, MDA, Solid	1.0					1	pCi/g	10308	09/28/98 1307	* ca
	Thorium-231, Lc, Solid	0.6					1	pCi/g	10308	09/28/98 1307	* ca
	Thorium-232, Solid	17.8					1	pCi/g	10308	09/28/98 1307	* ca
	Thorium-232, Error +/-, Solid	22.9					1	pCi/g	10308	09/28/98 1307	* ca
	Thorium-232, MDA, Solid	20.3					1	pCi/g	10308	09/28/98 1307	* ca
	Thorium-232, Lc, Solid	0.4					1	pCi/g	10308	09/28/98 1307	* ca
	Uranium-235, Activity, Solid	0.3					1	pCi/g	10308	09/28/98 1307	* ca
	Uranium 235, error +/-, Solid	0.2					1	pCi/g	10308	09/28/98 1307	* ca
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Uranium-235, Lc, Solid	0.5					1	pCi/g	10308	09/28/98 1307	* ca
	Uranium-238, Activity, Solid	4.3					1	pCi/g	10308	09/28/98 1307	* ca
	Uranium 238, error +/-, Solid	1.5					1	pCi/g	10308	09/28/98 1307	* ca
	Uranium-238, MDA, Solid	1.0					1	pCi/g	10308	09/28/98 1307	* ca
	Uranium-238, Lc, Solid	0.5					1	pCi/g	10308	09/28/98 1307	* ca
	Zirconium-95, Activity, Solid	0.0					1	pCi/g	10308	09/28/98 1307	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Zirconium-95, MDA, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca
	Zirconium-95, Lc, Solid	0.1					1	pCi/g	10308	09/28/98 1307	* ca

6k 120 → 149 (20%)

(I-COC (10-97)
Supersedes (5-97) Issue

Internal Lab Batch No. 801881

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

AR/COC- 600800

Dept. No./Mail Stop: 6133 1147
Project/Task Manager: 228A - John Copland
Project Name: 228A
Record Center Code: 1309/228A/DAT
Logbook Ref. No.: GR-014
Service Order No.: CFO-8MC596

Date Samples Shipped: 9/10/98 SMO USE
Carrier/Waybill No.: HC
Lab Contact: Fernando - 844-7683
Lab Destination: AMIR Lab/RSPD/881
SMO Contact/Phone: D. Sulmi/844-3110
Send Report to SMO: D. Sulmi/844-3110

Contract No.:
Case No.: 7225, 2205
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services, Dept. _____
P.O. Box 5800 MS 0154

Location: Tech Area N/A; Building N/A; Room N/A

Reference LOV (available at SMO)

If some > bkg.

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample ID
042495-004	TJAOU-228A-GR-120-S	0	228A	9/8/98 - 1030	soil	M	500ml	none	G	SA	gamma spec	
042498-004	TJAOU-228A-GR-123-S	0	228A	9/8/98 1045	soil	M	500ml	none	G	SA	gamma spec	
042527-004	TJAOU-228A-GR-123-DU	0	228A	1046	soil	M	500ml	none	G	DU	gamma spec	
042504-004	TJAOU-228A-GR-129-S	0	228A	1115	soil	M	500ml	none	G	SA	gamma spec	
042508-004	TJAOU-228A-GR-133-S	0	228A	1400	soil	M	500ml	none	G	SA	gamma spec	
042526-004	TJAOU-228A-GR-133-DU	0	228A	1400	soil	M	500ml	none	G	DU	gamma spec	
042512-004	TJAOU-228A-GR-137-S	0	228A	1420	soil	M	500ml	none	G	SA	gamma spec	
042515-004	TJAOU-228A-GR-140-S	0	228A	1435	soil	M	500ml	none	G	SA	gamma spec	
042518-004	TJAOU-228A-GR-143-S	0	228A	9-9-98 1000	soil	M	500ml	none	G	SA	gamma spec	
042520-004	TJAOU-228A-GR-145-S	0	228A	1020	soil	M	500ml	none	G	SA	gamma spec	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☒Return to Client ☐Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy)
Entered by

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
*COC# 600800 releases
COC# 600799

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☐Normal ☒Rush Required Report Date

QC Inits

	Name	Signature	Init	Company/Organization/Phon
Sample Team Members	NELSON CHPTAIN	[signature]	NC	IT/6131 284-3507
	ANH LAI	[signature]	AL	SNL/6133/284-2597
	JOHN COPLAND	John R. Copland	JRC	SNL/6133/284-2548

1. Relinquished by	[signature]	Org. IT/6131	Date 9-10-98	Time 1140	4. Relinquished by		Org.	Date
1. Received by	[signature]	Org. 7577	Date 9-10-98	Time 1140	4. Received by		Org.	Date
2. Relinquished by	[signature]	Org. 7577	Date 9-10-98	Time 1248	5. Relinquished by		Org.	Date
2. Received by	[signature]	Org. SNL7578	Date 9/10/98	Time 1248	5. Received by		Org.	Date
3. Relinquished by	[signature]	Org. SNL7578	Date 9/11/98	Time 955	6. Relinquished by		Org	Date
3. Received by	[signature]	Org. 7577	Date 9/11/98	Time 955	6. Received by		Org	Date

Original: To Accompany Samples, Laboratory Copy (White)
1st Copy: To Accompany Samples, Return to SMO (Blue)
2nd Copy: SMO Suspense Copy (Yellow)
3rd Copy: Field ((Pink)

SF 2001-COC (10-97)
Supersedes (5-97) Issue

BATCH #801881

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600800

Project Name: 228A | Project/Task Manager: John Copland | Case No.: 7225.2203

Location | Tech Area N/A | Building N/A | Room N/A

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE: Lab Sample ID
042522-004	TJAOU-228A-GR-147-S	0	228A	9-9-98 1100	soil	M	500ml	None	GR	SA	Gamma spec	
042524-004	TJAOU-228A-GR-149-S	0	228A	9-9-98 1115	soil	M	500ml	None	GR	SA	Gamma spec	

Abnormal Conditions on Receipt | **LAB USE**

Recipient Initials: _____

Original To Accompany Samples, Laboratory Copy (White) | **1st Copy** To Accompany Samples, Return to SMO (Blue) | **2nd Copy** SMO Suspense Copy (Yellow) | **3rd Copy** Field Copy (Pink)

Sandia National Laboratories
Radiation Protection Sample Diagnostics

RUSH

Sample Analysis Request Form
Page 1 of 1

To be completed by Customer

Shaded areas are for RPSD use only

Customer: John Copland
Organization: 6133 1147
Project Location: 228 A
Phone: 284-2548
Date Results Needed: 9-11-98
Suspect Isotopes: UNK
Case Number: 7225.2203

Hazards/Special Instructions:
* These samples listed below release samples (off-site) via SMO.
* Hold times pending.
* RMMA samples.

C.O.C 600800

Batch Log Number: 801881
Logged By: JM

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
042495-004	Soil	9-8-98 1030	500ml	Gamma Spec	01	<300	847 g	
042498		9-8-98 1045			02		960 g	
042527		1046			03		861 g	
042504		1115			04		892 g	
042508		1400			05		916 g	
042526		1400			06		817 g	
042512		1420			07		927 g	
042515		1435			08		874 g	
042518		9-9-98 1000			09		886 g	
042520		1020			10		975 g	
042522		1100			11		918 g	
042524		1115			12	<300	918 g	
LCS	—	[illegible]	—	γ spec	13	N/A	N/A	

Relinquished by	[signature]	Date 9-10-98	Received by	[signature]	Date 9/10/98
Relinquished by	[signature]	Date 9/11/98	Received by	[signature]	Date 9/11/98
Relinquished by		Date	Received by		Date
Relinquished by		Date	Received by		Date

RUSH

RPSD-0602-02 3

```
*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]        *
*                        9-10-98  5:12:32 PM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:                 9/11/98   Reviewed by:  9/11/98              *
*****************************************************************************
Customer                  : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID        : 042495-004
Lab Sample ID             : 80188101

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   847.000  gram
Sample Date/Time          :  9-08-98  10:30:00 AM
Acquire Start Date/Time   :  9-10-98   3:29:07 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	9.87E-01	5.58E-01	5.75E-01
RA-226	1.52E+00	5.87E-01	5.08E-01
PB-214	7.77E-01	5.83E-01	4.51E-02
BI-214	7.29E-01	1.82E-01	3.86E-02
PB-210	Not Detected	---------	3.31E+01
TH-232	8.46E-01	4.02E-01	1.35E-01
RA-228	9.36E-01	2.63E-01	1.28E-01
AC-228	8.96E-01	2.49E-01	2.18E-01
TH-228	6.83E-01	4.81E-01	4.73E-01
RA-224	9.87E-01	2.95E-01	5.03E-02
PB-212	8.75E-01	5.44E-01	3.47E-02
BI-212	9.91E-01	4.05E-01	3.01E-01
TL-208	7.78E-01	2.81E-01	6.22E-02
U-235	2.02E-01	1.94E-01	2.26E-01
TH-231	Not Detected	---------	2.14E+00
PA-231	Not Detected	---------	3.71E+00
TH-227	Not Detected	---------	3.36E-01
RA-223	Not Detected	---------	2.13E-01
RN-219	Not Detected	---------	3.34E-01
PB-211	Not Detected	---------	7.91E-01
TL-207	Not Detected	---------	1.27E+01
AM-241	Not Detected	---------	4.58E-01
PU-239	Not Detected	---------	4.25E+02
NP-237	Not Detected	---------	2.93E-01
PA-233	Not Detected	---------	5.40E-02
TH-229	Not Detected	---------	2.40E-01

check to the six NMED bkg....

✓ = OK

[Summary Report] - Sample ID: : 80188101

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.84E-02
AG-110m	Not Detected	---------	2.67E-02
BA-133	Not Detected	---------	6.39E-02
BE-7	Not Detected	---------	2.33E-01
CD-109	~~2.01E+00~~	~~7.47E-01~~	9.94E-01 Not detected
CD-115	Not Detected	---------	1.26E-01
CE-139	Not Detected	---------	2.86E-02
CE-141	Not Detected	---------	5.24E-02
CE-144	Not Detected	---------	2.32E-01
CO-56	Not Detected	---------	3.12E-02
CO-57	Not Detected	---------	2.92E-02
CO-58	Not Detected	---------	2.87E-02
CO-60	Not Detected	---------	3.22E-02
CR-51	Not Detected	---------	2.26E-01
CS-134	Not Detected	---------	4.61E-02
CS-137	Not Detected	---------	2.92E-02
EU-152	Not Detected	---------	8.75E-02
EU-154	Not Detected	---------	1.76E-01
EU-155	Not Detected	---------	1.45E-01
FE-59	Not Detected	---------	6.36E-02
GD-153	Not Detected	---------	9.93E-02
HG-203	Not Detected	---------	3.05E-02
I-131	Not Detected	---------	3.13E-02
IR-192	Not Detected	---------	2.57E-02
K-40	1.80E+01	2.61E+00	2.37E-01
KR-85	Not Detected	---------	7.70E+00
MN-52	Not Detected	---------	3.05E-02
MN-54	Not Detected	---------	3.28E-02
MO-99	Not Detected	---------	3.86E-01
NA-22	Not Detected	---------	4.06E-02
NA-24	Not Detected	---------	3.49E-01
NB-95	Not Detected	---------	2.38E-01
ND-147	Not Detected	---------	2.04E-01
NI-57	Not Detected	---------	7.83E-02
NP-239	Not Detected	---------	1.30E-01
RU-103	Not Detected	---------	2.74E-02
RU-106	Not Detected	---------	2.53E-01
SB-122	Not Detected	---------	6.38E-02
SB-124	Not Detected	---------	2.84E-02
SB-125	Not Detected	---------	7.37E-02
SN-113	Not Detected	---------	3.52E-02
TA-182	Not Detected	---------	1.41E-01
TA-183	Not Detected	---------	5.32E-01
TC-99m	Not Detected	---------	1.38E+01
TL-201	Not Detected	---------	2.89E-01
XE-133	Not Detected	---------	2.74E-01
Y-88	Not Detected	---------	2.24E-02
ZN-65	Not Detected	---------	9.83E-02
ZR-95	Not Detected	---------	5.51E-02

5/11/98

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
9-11-98 7:59:22 AM

Analyzed by: 9/11/98 Reviewed by: 9/11/98

Customer : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID : 042498-004
Lab Sample ID : 80188102

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 960.000 gram
Sample Date/Time : 9-08-98 10:45:00 AM
Acquire Start Date/Time : 9-10-98 5:14:44 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	8.84E-01	5.42E-01	5.68E-01
RA-226	1.96E+00	6.77E-01	5.24E-01
PB-214	8.20E-01	4.97E-01	4.04E-02
BI-214	7.30E-01	1.30E-01	3.81E-02
PB-210	Not Detected	---------	3.12E+01
TH-232	9.63E-01	4.48E-01	1.29E-01
RA-228	8.71E-01	2.96E-01	1.25E-01
AC-228	9.24E-01	2.19E-01	1.94E-01
TH-228	9.32E-01	2.51E-01	4.21E-01
RA-224	1.02E+00	3.11E-01	6.32E-02
PB-212	9.25E-01	1.48E-01	3.35E-02
BI-212	1.20E+00	6.95E-01	2.88E-01
TL-208	8.23E-01	1.45E-01	5.78E-02
U-235	Not Detected	---------	2.15E-01
TH-231	Not Detected	---------	2.10E+00
PA-231	Not Detected	---------	3.53E+00
TH-227	Not Detected	---------	3.24E-01
RA-223	Not Detected	---------	2.07E-01
RN-219	Not Detected	---------	3.26E-01
PB-211	Not Detected	---------	7.33E-01
TL-207	Not Detected	---------	1.20E+01
AM-241	Not Detected	---------	4.24E-01
PU-239	Not Detected	---------	4.14E+02
NP-237	~~7.06E-01~~	~~2.28E-01~~	3.18E-01 Not detected
PA-233	Not Detected	---------	5.11E-02
TH-229	Not Detected	---------	2.32E-01

9/11/98

[Summary Report] - Sample ID: : 80188102

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.66E-02
AG-110m	Not Detected	---------	2.80E-02
BA-133	Not Detected	---------	6.13E-02
BE-7	Not Detected	---------	2.29E-01
CD-109	Not Detected	---------	1.08E+00
CD-115	Not Detected	---------	1.23E-01
CE-139	Not Detected	---------	2.70E-02
CE-141	Not Detected	---------	5.08E-02
CE-144	Not Detected	---------	2.27E-01
CO-56	Not Detected	---------	2.92E-02
CO-57	Not Detected	---------	2.86E-02
CO-58	Not Detected	---------	2.86E-02
CO-60	Not Detected	---------	3.11E-02
CR-51	Not Detected	---------	2.20E-01
CS-134	Not Detected	---------	4.30E-02
CS-137	1.24E-02	8.83E-03	1.50E-02
EU-152	Not Detected	---------	8.57E-02
EU-154	Not Detected	---------	1.69E-01
EU-155	Not Detected	---------	1.41E-01
FE-59	Not Detected	---------	6.44E-02
GD-153	Not Detected	---------	9.75E-02
HG-203	Not Detected	---------	2.90E-02
I-131	Not Detected	---------	3.10E-02
IR-192	Not Detected	---------	2.41E-02
K-40	2.03E+01	2.90E+00	2.05E-01
KR-85	Not Detected	---------	7.10E+00
MN-52	Not Detected	---------	3.48E-02
MN-54	Not Detected	---------	3.07E-02
MO-99	Not Detected	---------	3.78E-01
NA-22	Not Detected	---------	3.80E-02
NA-24	Not Detected	---------	3.62E-01
NB-95	Not Detected	---------	2.32E-01
ND-147	Not Detected	---------	2.05E-01
NI-57	Not Detected	---------	6.94E-02
NP-239	Not Detected	---------	1.27E-01
RU-103	Not Detected	---------	2.62E-02
RU-106	Not Detected	---------	2.48E-01
SB-122	Not Detected	---------	6.11E-02
SB-124	Not Detected	---------	2.59E-02
SB-125	Not Detected	---------	7.07E-02
SN-113	Not Detected	---------	3.25E-02
TA-182	Not Detected	---------	1.36E-01
TA-183	Not Detected	---------	4.98E-01
TC-99m	Not Detected	---------	1.56E+01
TL-201	Not Detected	---------	2.81E-01
XE-133	Not Detected	---------	2.75E-01
Y-88	Not Detected	---------	1.93E-02
ZN-65	Not Detected	---------	8.99E-02
ZR-95	Not Detected	---------	5.05E-02

```
*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]        *
*                      9-10-98  8:43:55 PM                                  *
*****************************************************************************
*                                                                           *
* Analyzed by:                 9/11/98  Reviewed by:                 9/11/98 *
*****************************************************************************
Customer                  : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID        : 042527-004
Lab Sample ID             : 80188103

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   861.000  gram
Sample Date/Time          :  9-08-98  10:46:00 AM
Acquire Start Date/Time   :  9-10-98   7:00:58 PM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6003 seconds

Comments:
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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	5.96E-01	3.98E-01	5.81E-01
RA-226	Not Detected	---------	5.44E-01
PB-214	8.16E-01	1.41E-01	4.12E-02
BI-214	7.73E-01	3.64E-01	4.08E-02
PB-210	Not Detected	---------	3.35E+01
TH-232	8.75E-01	1.38E+00	1.38E-01
RA-228	Not Detected	---------	1.35E-01
AC-228	9.20E-01	3.85E-01	2.15E-01
TH-228	1.06E+00	2.90E-01	4.38E-01
RA-224	9.21E-01	3.46E-01	5.68E-02
PB-212	9.30E-01	1.56E-01	3.58E-02
BI-212	1.08E+00	3.35E-01	2.94E-01
TL-208	8.77E-01	1.75E-01	6.13E-02
U-235	9.09E-02	8.90E-02	1.38E-01
TH-231	Not Detected	---------	2.20E+00
PA-231	Not Detected	---------	3.79E+00
TH-227	Not Detected	---------	3.45E-01
RA-223	Not Detected	---------	2.20E-01
RN-219	Not Detected	---------	3.53E-01
PB-211	Not Detected	---------	7.93E-01
TL-207	Not Detected	---------	1.27E+01
AM-241	Not Detected	---------	4.43E-01
PU-239	Not Detected	---------	4.39E+02
NP-237	Not Detected	---------	3.20E-01
PA-233	Not Detected	---------	5.52E-02
TH-229	Not Detected	---------	2.45E-01

[Summary Report] - Sample ID: : 80188103

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.98E-02
AG-110m	Not Detected	---------	2.84E-02
BA-133	Not Detected	---------	6.49E-02
BE-7	Not Detected	---------	2.39E-01
CD-109	Not Detected	---------	1.09E+00
CD-115	Not Detected	---------	1.32E-01
CE-139	Not Detected	---------	2.86E-02
CE-141	Not Detected	---------	5.48E-02
CE-144	Not Detected	---------	2.39E-01
CO-56	Not Detected	---------	3.14E-02
CO-57	Not Detected	---------	3.00E-02
CO-58	Not Detected	---------	2.89E-02
CO-60	Not Detected	---------	3.42E-02
CR-51	Not Detected	---------	2.37E-01
CS-134	Not Detected	---------	4.71E-02
CS-137	7.64E-03	7.19E-03	1.36E-02
EU-152	Not Detected	---------	9.01E-02
EU-154	Not Detected	---------	1.83E-01
EU-155	Not Detected	---------	1.45E-01
FE-59	Not Detected	---------	6.86E-02
GD-153	Not Detected	---------	1.03E-01
HG-203	Not Detected	---------	3.19E-02
I-131	Not Detected	---------	3.25E-02
IR-192	Not Detected	---------	2.68E-02
K-40	2.11E+01	3.04E+00	2.27E-01
KR-85	Not Detected	---------	7.63E+00
MN-52	Not Detected	---------	3.69E-02
MN-54	Not Detected	---------	3.33E-02
MO-99	Not Detected	---------	3.93E-01
NA-22	Not Detected	---------	4.13E-02
NA-24	Not Detected	---------	4.33E-01
NB-95	Not Detected	---------	2.51E-01
ND-147	Not Detected	---------	2.21E-01
NI-57	Not Detected	---------	7.41E-02
NP-239	Not Detected	---------	1.31E-01
RU-103	Not Detected	---------	2.71E-02
RU-106	Not Detected	---------	2.77E-01
SB-122	Not Detected	---------	6.94E-02
SB-124	Not Detected	---------	2.89E-02
SB-125	Not Detected	---------	7.64E-02
SN-113	Not Detected	---------	3.61E-02
TA-182	Not Detected	---------	1.45E-01
TA-183	Not Detected	---------	5.25E-01
TC-99m	Not Detected	---------	2.06E+01
TL-201	Not Detected	---------	2.99E-01
XE-133	Not Detected	---------	2.94E-01
Y-88	Not Detected	---------	2.13E-02
ZN-65	Not Detected	---------	9.76E-02
ZR-95	Not Detected	---------	5.64E-02

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 9-10-98 10:30:20 PM *
****

* Analyzed by: 9/11/98 Reviewed by: 9/11/98 *

****

Customer : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID : 042504-004
Lab Sample ID : 80188104

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 892.000 gram
Sample Date/Time : 9-08-98 11:15:00 AM
Acquire Start Date/Time : 9-10-98 8:46:12 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	4.37E+00	9.12E-01	6.14E-01
RA-226	2.81E+00	8.45E-01	5.03E-01
PB-214	7.64E-01	1.27E-01	4.23E-02
BI-214	6.38E-01	1.25E-01	4.00E-02
PB-210	Not Detected	---------	3.24E+01
TH-232	Not Detected	---------	1.27E-01
RA-228	8.46E-01	2.61E-01	1.35E-01
AC-228	8.01E-01	2.17E-01	2.07E-01
TH-228	8.64E-01	2.40E-01	4.23E-01
RA-224	8.12E-01	2.44E-01	5.44E-02
PB-212	7.55E-01	1.97E-01	3.83E-02
BI-212	1.01E+00	4.61E-01	2.92E-01
TL-208	7.11E-01	1.36E-01	5.60E-02
U-235	1.31E-01	1.94E-01	2.25E-01
TH-231	Not Detected	---------	2.15E+00
PA-231	Not Detected	---------	3.56E+00
TH-227	Not Detected	---------	3.17E-01
RA-223	Not Detected	---------	2.32E-01
RN-219	Not Detected	---------	3.32E-01
PB-211	Not Detected	---------	7.73E-01
TL-207	Not Detected	---------	1.27E+01
AM-241	Not Detected	---------	4.46E-01
PU-239	Not Detected	---------	4.25E+02
NP-237	Not Detected	---------	3.37E-01
PA-233	Not Detected	---------	5.21E-02
TH-229	Not Detected	---------	2.51E-01

exceeds bkg of 1.5

4.37 ± 0.912

exceeds bkg of 2.3σ

[Summary Report] - Sample ID: : 80188104

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.67E-02
AG-110m	Not Detected	---------	3.21E-02
BA-133	Not Detected	---------	6.20E-02
BE-7	Not Detected	---------	2.26E-01
CD-109	~~1.64E+00~~	~~5.70E-01~~	1.15E+00 Not detected 9/11/98
CD-115	Not Detected	---------	1.28E-01
CE-139	Not Detected	---------	2.82E-02
CE-141	Not Detected	---------	5.32E-02
CE-144	Not Detected	---------	2.33E-01
CO-56	Not Detected	---------	2.95E-02
CO-57	Not Detected	---------	2.98E-02
CO-58	Not Detected	---------	2.92E-02
CO-60	Not Detected	---------	3.28E-02
CR-51	Not Detected	---------	2.28E-01
CS-134	Not Detected	---------	4.25E-02
CS-137	5.00E-02	2.93E-02	2.17E-02
EU-152	Not Detected	---------	8.94E-02
EU-154	Not Detected	---------	1.70E-01
EU-155	Not Detected	---------	1.48E-01
FE-59	Not Detected	---------	6.72E-02
GD-153	Not Detected	---------	1.08E-01
HG-203	Not Detected	---------	2.93E-02
I-131	Not Detected	---------	3.14E-02
IR-192	Not Detected	---------	2.52E-02
K-40	1.99E+01	2.87E+00	2.16E-01
KR-85	Not Detected	---------	7.31E+00
MN-52	Not Detected	---------	3.28E-02
MN-54	Not Detected	---------	1.23E-02
MO-99	Not Detected	---------	3.99E-01
NA-22	Not Detected	---------	3.82E-02
NA-24	Not Detected	---------	3.97E-01
NB-95	Not Detected	---------	2.33E-01
ND-147	Not Detected	---------	2.05E-01
NI-57	Not Detected	---------	5.96E-02
NP-239	Not Detected	---------	1.32E-01
RU-103	Not Detected	---------	2.62E-02
RU-106	Not Detected	---------	2.66E-01
SB-122	Not Detected	---------	6.52E-02
SB-124	Not Detected	---------	2.63E-02
SB-125	Not Detected	---------	7.33E-02
SN-113	Not Detected	---------	3.29E-02
TA-182	Not Detected	---------	1.37E-01
TA-183	Not Detected	---------	5.25E-01
TC-99m	Not Detected	---------	2.31E+01
TL-201	Not Detected	---------	3.10E-01
XE-133	Not Detected	---------	3.06E-01
Y-88	Not Detected	---------	2.23E-02
ZN-65	Not Detected	---------	9.39E-02
ZR-95	Not Detected	---------	5.06E-02

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]        *
*                        9-11-98 12:16:51 AM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:                 9/11/98   Reviewed by:                 9/11/98 *
*****************************************************************************
Customer                  : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID        : 042508-004
Lab Sample ID             : 80188105

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   916.000  gram
Sample Date/Time          :  9-08-98   2:10:00 PM
Acquire Start Date/Time   :  9-10-98  10:32:44 PM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6003 seconds

Comments:
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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	5.84E-01	4.24E-01	5.25E-01
RA-226	1.87E+00	5.85E-01	5.31E-01
PB-214	Not Detected	---------	4.76E-02
BI-214	7.76E-01	6.02E-01	3.81E-02
PB-210	Not Detected	---------	3.19E+01
TH-232	7.80E-01	3.72E-01	1.23E-01
RA-228	8.52E-01	2.38E-01	1.41E-01
AC-228	9.43E-01	2.39E-01	2.03E-01
TH-228	7.39E-01	2.20E-01	4.34E-01
RA-224	8.77E-01	2.39E-01	5.75E-02
PB-212	8.57E-01	1.41E-01	3.64E-02
BI-212	8.16E-01	2.95E-01	2.35E-01
TL-208	8.36E-01	6.69E-01	5.78E-02
U-235	Not Detected	---------	2.15E-01
TH-231	Not Detected	---------	2.12E+00
PA-231	Not Detected	---------	3.50E+00
TH-227	Not Detected	---------	3.26E-01
RA-223	Not Detected	---------	2.13E-01
RN-219	Not Detected	---------	3.38E-01
PB-211	Not Detected	---------	7.73E-01
TL-207	Not Detected	---------	1.21E+01
AM-241	Not Detected	---------	4.35E-01
PU-239	Not Detected	---------	4.19E+02
NP-237	~~4.96E-01~~	~~1.89E-01~~	2.86E-01 Not detected
PA-233	Not Detected	---------	5.23E-02
TH-229	Not Detected	---------	2.36E-01

9/11/98

[Summary Report] - Sample ID: : 80188105

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.55E-02
AG-110m	Not Detected	---------	2.71E-02
BA-133	Not Detected	---------	6.33E-02
BE-7	Not Detected	---------	2.23E-01
CD-109	Not Detected	---------	9.73E-01
CD-115	Not Detected	---------	1.23E-01
CE-139	Not Detected	---------	2.69E-02
CE-141	Not Detected	---------	5.00E-02
CE-144	Not Detected	---------	2.26E-01
CO-56	Not Detected	---------	3.14E-02
CO-57	Not Detected	---------	2.83E-02
CO-58	Not Detected	---------	2.96E-02
CO-60	Not Detected	---------	3.15E-02
CR-51	Not Detected	---------	2.15E-01
CS-134	Not Detected	---------	4.43E-02
CS-137	Not Detected	---------	2.91E-02
EU-152	Not Detected	---------	8.50E-02
EU-154	Not Detected	---------	1.64E-01
EU-155	Not Detected	---------	1.39E-01
FE-59	Not Detected	---------	6.56E-02
GD-153	Not Detected	---------	9.86E-02
HG-203	Not Detected	---------	2.94E-02
I-131	Not Detected	---------	3.08E-02
IR-192	Not Detected	---------	2.45E-02
K-40	1.89E+01	2.71E+00	2.19E-01
KR-85	Not Detected	---------	7.27E+00
MN-52	Not Detected	---------	3.46E-02
MN-54	Not Detected	---------	3.11E-02
MO-99	Not Detected	---------	3.69E-01
NA-22	Not Detected	---------	4.01E-02
NA-24	Not Detected	---------	3.90E-01
NB-95	Not Detected	---------	2.37E-01
ND-147	Not Detected	---------	2.06E-01
NI-57	Not Detected	---------	8.33E-02
NP-239	Not Detected	---------	1.25E-01
RU-103	Not Detected	---------	2.64E-02
RU-106	Not Detected	---------	2.55E-01
SB-122	Not Detected	---------	6.31E-02
SB-124	Not Detected	---------	2.56E-02
SB-125	Not Detected	---------	6.86E-02
SN-113	Not Detected	---------	3.41E-02
TA-182	Not Detected	---------	1.36E-01
TA-183	Not Detected	---------	5.09E-01
TC-99m	Not Detected	---------	1.95E+01
TL-201	Not Detected	---------	2.80E-01
XE-133	Not Detected	---------	2.81E-01
Y-88	Not Detected	---------	2.09E-02
ZN-65	Not Detected	---------	9.16E-02
ZR-95	Not Detected	---------	5.09E-02

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 9-11-98 2:03:23 AM *
****
* *
* Analyzed by: 9/11/98 Reviewed by: 9/11/98 *
****

Customer : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID : 042526-004
Lab Sample ID : 80188106

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 817.000 gram
Sample Date/Time : 9-08-98 2:10:00 PM
Acquire Start Date/Time : 9-11-98 12:19:13 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	8.08E-01	6.04E-01	7.07E-01
RA-226	2.20E+00	1.01E+00	5.30E-01
PB-214	8.38E-01	1.22E-01	4.40E-02
BI-214	7.59E-01	4.46E-01	4.03E-02
PB-210	Not Detected	---------	3.45E+01
TH-232	9.70E-01	4.77E-01	1.39E-01
RA-228	Not Detected	---------	1.41E-01
AC-228	1.02E+00	2.60E-01	2.27E-01
TH-228	8.25E-01	2.42E-01	4.72E-01
RA-224	9.49E-01	2.93E-01	5.76E-02
PB-212	9.22E-01	1.58E-01	3.90E-02
BI-212	1.05E+00	4.17E-01	3.13E-01
TL-208	7.99E-01	1.64E-01	6.21E-02
U-235	Not Detected	---------	2.38E-01
TH-231	Not Detected	---------	2.30E+00
PA-231	Not Detected	---------	3.82E+00
TH-227	Not Detected	---------	3.55E-01
RA-223	Not Detected	---------	2.25E-01
RN-219	Not Detected	---------	3.74E-01
PB-211	Not Detected	---------	8.22E-01
TL-207	Not Detected	---------	1.31E+01
AM-241	Not Detected	---------	4.74E-01
PU-239	Not Detected	---------	4.38E+02
NP-237	Not Detected	---------	3.62E-01
PA-233	Not Detected	---------	5.53E-02
TH-229	Not Detected	---------	2.46E-01

[Summary Report] - Sample ID: : 80188106

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.04E-02
AG-110m	Not Detected	---------	3.06E-02
BA-133	Not Detected	---------	6.82E-02
BE-7	Not Detected	---------	2.47E-01
CD-109	~~2.65E+00~~	~~1.39E+00~~	1.23E+00 Not detected
CD-115	Not Detected	---------	1.43E-01
CE-139	Not Detected	---------	2.97E-02
CE-141	Not Detected	---------	5.60E-02
CE-144	Not Detected	---------	2.44E-01
CO-56	Not Detected	---------	3.30E-02
CO-57	Not Detected	---------	3.05E-02
CO-58	Not Detected	---------	3.10E-02
CO-60	Not Detected	---------	3.35E-02
CR-51	Not Detected	---------	2.41E-01
CS-134	Not Detected	---------	4.73E-02
CS-137	Not Detected	---------	3.25E-02
EU-152	Not Detected	---------	9.16E-02
EU-154	Not Detected	---------	1.86E-01
EU-155	Not Detected	---------	1.49E-01
FE-59	Not Detected	---------	7.17E-02
GD-153	Not Detected	---------	1.04E-01
HG-203	Not Detected	---------	3.15E-02
I-131	Not Detected	---------	3.42E-02
IR-192	Not Detected	---------	2.66E-02
K-40	2.01E+01	2.95E+00	2.30E-01
KR-85	Not Detected	---------	7.72E+00
MN-52	Not Detected	---------	3.61E-02
MN-54	Not Detected	---------	3.65E-02
MO-99	Not Detected	---------	4.25E-01
NA-22	Not Detected	---------	4.01E-02
NA-24	Not Detected	---------	4.79E-01
NB-95	Not Detected	---------	2.62E-01
ND-147	Not Detected	---------	2.23E-01
NI-57	Not Detected	---------	7.71E-02
NP-239	Not Detected	---------	1.34E-01
RU-103	Not Detected	---------	2.70E-02
RU-106	Not Detected	---------	2.69E-01
SB-122	Not Detected	---------	6.89E-02
SB-124	Not Detected	---------	2.83E-02
SB-125	Not Detected	---------	7.88E-02
SN-113	Not Detected	---------	3.65E-02
TA-182	Not Detected	---------	1.49E-01
TA-183	Not Detected	---------	5.60E-01
TC-99m	Not Detected	---------	2.60E+01
TL-201	Not Detected	---------	3.02E-01
XE-133	Not Detected	---------	3.01E-01
Y-88	Not Detected	---------	2.36E-02
ZN-65	Not Detected	---------	1.01E-01
ZR-95	Not Detected	---------	5.64E-02

5/11/98

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
9/10/98 6:05:44 PM

Analyzed by: 9/11/98 Reviewed by: 9/11/98

Customer : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID : 042512-004
Lab Sample ID : 80188107

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 927.000 gram
Sample Date/Time : 9/08/98 2:20:00 PM
Acquire Start Date/Time : 9/10/98 4:25:26 PM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	9.41E-001	4.13E-001	5.03E-001
RA-226	2.26E+000	2.46E+000	5.61E-001
PB-214	1.08E+000	1.94E-001	4.52E-002
BI-214	9.11E-001	1.69E-001	6.35E-002
PB-210	Not Detected	---------	8.33E+000
TH-232	1.21E+000	6.16E-001	1.54E-001
RA-228	1.25E+000	8.12E-001	1.50E-001
AC-228	Not Detected	---------	9.05E-002
TH-228	9.07E-001	2.84E-001	4.95E-001
PA-224	1.58E+000	4.52E-001	7.03E-002
PB-212	1.20E+000	1.01E+000	4.33E-002
BI-212	1.46E+000	6.76E-001	3.59E-001
TL-208	1.11E+000	2.33E-001	7.46E-002
U-235	Not Detected	---------	2.16E-001
~~TH-231~~	~~3.53E+000~~	~~3.20E+000~~	7.51E+000 Not Detected 9/11/98
PA-231	Not Detected	---------	1.40E+000
TH-227	Not Detected	---------	3.26E-001
RA-223	Not Detected	---------	1.43E-001
RN-219	Not Detected	---------	3.76E-001
PB-211	Not Detected	---------	8.51E-001
TL-207	Not Detected	---------	1.45E+001
AM-241	Not Detected	---------	2.07E-001
PU-239	Not Detected	---------	3.90E+002
NP-237	Not Detected	---------	2.74E-001
PA-233	Not Detected	---------	5.90E-002
TH-229	Not Detected	---------	1.80E-001

[Summary Report] - Sample ID: : 80188107

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.32E-002
AG-110m	Not Detected	---------	3.08E-002
BA-133	Not Detected	---------	4.96E-002
BE-7	Not Detected	---------	2.53E-001
CD-109	Not Detected	---------	8.97E-001
CD-115	Not Detected	---------	1.38E-001
CE-139	Not Detected	---------	2.55E-002
CE-141	Not Detected	---------	4.92E-002
CE-144	Not Detected	---------	2.07E-001
CO-56	Not Detected	---------	3.48E-002
CO-57	Not Detected	---------	2.65E-002
CO-58	Not Detected	---------	3.44E-002
CO-60	Not Detected	---------	3.87E-002
CR-51	Not Detected	---------	2.55E-001
CS-134	Not Detected	---------	3.56E-002
CS-137	Not Detected	---------	3.42E-002
EU-152	Not Detected	---------	7.97E-002
EU-154	Not Detected	---------	2.07E-001
EU-155	Not Detected	---------	1.22E-001
FE-59	Not Detected	---------	8.08E-002
GD-153	Not Detected	---------	7.25E-002
HG-203	Not Detected	---------	3.20E-002
I-131	Not Detected	---------	3.34E-002
IR-192	Not Detected	---------	2.84E-002
K-40	1.65E+001	2.54E+000	3.39E-001
MN-52	Not Detected	---------	4.91E-002
MN-54	Not Detected	---------	1.97E-002
MO-99	Not Detected	---------	4.14E-001
NA-22	Not Detected	---------	4.51E-002
NA-24	Not Detected	---------	3.58E-001
NB-95	Not Detected	---------	1.71E-001
ND-147	Not Detected	---------	2.32E-001
NI-57	Not Detected	---------	1.55E-001
RU-103	Not Detected	---------	2.87E-002
RU-106	Not Detected	---------	2.97E-001
SB-122	Not Detected	---------	6.96E-002
SB-124	Not Detected	---------	2.89E-002
SB-125	Not Detected	---------	8.23E-002
SN-113	Not Detected	---------	3.66E-002
SR-85	Not Detected	---------	3.69E-002
TA-182	Not Detected	---------	1.70E-001
TA-183	Not Detected	---------	2.35E-001
TC-99m	Not Detected	---------	8.72E+000
TL-201	Not Detected	---------	1.55E-001
XE-133	Not Detected	---------	1.67E-001
Y-88	Not Detected	---------	3.41E-002
ZN-65	Not Detected	---------	1.18E-001
ZR-95	Not Detected	---------	6.26E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
9/10/98 7:48:04 PM

Analyzed by: 9/11/98 Reviewed by: 9/11/98

Customer : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID : 042515-004
Lab Sample ID : 80188108

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 874.000 gram
Sample Date/Time : 9/08/98 2:35:00 PM
Acquire Start Date/Time : 9/10/98 6:07:46 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	3.90E-001	4.19E-001	5.01E-001
RA-226	1.88E+000	3.11E+000	5.47E-001
PB-214	9.06E-001	2.72E-001	5.03E-002
BI-214	7.96E-001	1.89E-001	6.55E-002
PB-210	Not Detected	---------	8.20E+000
TH-232	9.42E-001	5.03E-001	1.51E-001
RA-228	9.59E-001	3.02E-001	1.62E-001
AC-228	9.21E-001	2.59E-001	8.83E-002
TH-228	1.05E+000	7.27E-001	4.50E-001
RA-224	1.15E+000	4.08E-001	6.82E-002
PB-212	9.84E-001	2.04E-001	3.94E-002
BI-212	1.19E+000	5.89E-001	3.73E-001
TL-208	8.44E-001	2.00E-001	6.56E-002
U-235	1.08E-001	1.76E-001	2.04E-001
TH-231	Not Detected	---------	7.38E+000
PA-231	Not Detected	---------	1.36E+000
TH-227	Not Detected	---------	3.12E-001
RA-223	Not Detected	---------	1.38E-001
RN-219	Not Detected	---------	3.53E-001
PB-211	Not Detected	---------	8.16E-001
TL-207	Not Detected	---------	1.45E+001
AM-241	Not Detected	---------	2.05E-001
PU-239	Not Detected	---------	3.71E+002
NP-237	Not Detected	---------	2.58E-001
PA-233	Not Detected	---------	5.65E-002
TH-229	Not Detected	---------	1.76E-001

[Summary Report] - Sample ID: : 80188108

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.15E-002
AG-110m	Not Detected	---------	3.49E-002
BA-133	Not Detected	---------	4.90E-002
BE-7	Not Detected	---------	2.39E-001
CD-109	Not Detected	---------	8.46E-001
CD-115	Not Detected	---------	1.34E-001
CE-139	Not Detected	---------	2.53E-002
CE-141	Not Detected	---------	4.67E-002
CE-144	Not Detected	---------	1.97E-001
CO-56	Not Detected	---------	3.46E-002
CO-57	Not Detected	---------	2.62E-002
CO-58	Not Detected	---------	3.33E-002
CO-60	Not Detected	---------	4.25E-002
CR-51	Not Detected	---------	2.40E-001
CS-134	Not Detected	---------	3.62E-002
CS-137	1.32E-002	8.15E-003	1.73E-002
EU-152	Not Detected	---------	7.84E-002
EU-154	Not Detected	---------	2.01E-001
EU-155	Not Detected	---------	1.20E-001
FE-59	Not Detected	---------	8.24E-002
GD-153	Not Detected	---------	6.97E-002
HG-203	Not Detected	---------	3.17E-002
I-131	Not Detected	---------	3.46E-002
IR-192	Not Detected	---------	2.67E-002
K-40	1.89E+001	2.77E+000	3.89E-001
MN-52	Not Detected	---------	4.28E-002
MN-54	Not Detected	---------	2.25E-002
MO-99	Not Detected	---------	4.11E-001
NA-22	Not Detected	---------	4.71E-002
NA-24	Not Detected	---------	4.01E-001
NB-95	~~5.48E-002~~	~~3.93E-002~~	9.40E-002 Not detected
ND-147	Not Detected	---------	2.34E-001
NI-57	Not Detected	---------	1.50E-001
RU-103	Not Detected	---------	2.73E-002
RU-106	Not Detected	---------	2.95E-001
SB-122	Not Detected	---------	6.79E-002
SB-124	Not Detected	---------	2.88E-002
SB-125	Not Detected	---------	7.91E-002
SN-113	Not Detected	---------	3.69E-002
SR-85	Not Detected	---------	3.75E-002
TA-182	Not Detected	---------	1.83E-001
TA-183	Not Detected	---------	2.35E-001
TC-99m	Not Detected	---------	9.83E+000
TL-201	Not Detected	---------	1.54E-001
XE-133	Not Detected	---------	1.66E-001
Y-88	Not Detected	---------	3.08E-002
ZN-65	Not Detected	---------	1.25E-001
ZR-95	Not Detected	---------	5.81E-002

9/11/98

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*****************************************************************************
*                        Sandia National Laboratories                       *
*     Radiation Protection Sample Diagnostics Program [806 Laboratory]      *
*                          9/10/98  9:30:10 PM                              *
*****************************************************************************
*                                                                           *
* Analyzed by:                 9/11/98   Reviewed by:                 9/11/98 *
*****************************************************************************
Customer                  : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID        : 042518-004
Lab Sample ID             : 80188109

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   886.000  gram
Sample Date/Time          :  9/09/98  10:00:00 AM
Acquire Start Date/Time   :  9/10/98   7:49:55 PM
Detector Name             : LAB01
Elapsed Live/Real Time    :   6000 /   6003 seconds

Comments:
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6R-143

Soil Pile #1

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	4.57E-001
RA-226	1.73E+000	8.84E-001	5.13E-001
PB-214	7.55E-001	2.82E-001	4.45E-002
BI-214	7.10E-001	1.47E-001	6.55E-002
PB-210	Not Detected	---------	7.65E+000
TH-232	8.09E-001	4.19E-001	1.41E-001
RA-228	8.20E-001	2.93E-001	1.66E-001
AC-228	8.50E-001	2.51E-001	8.51E-002
TH-228	9.59E-001	3.04E-001	4.69E-001
RA-224	1.12E+000	4.10E-001	7.48E-002
PB-212	8.34E-001	1.53E-001	3.84E-002
BI-212	8.43E-001	5.45E-001	3.65E-001
TL-208	7.35E-001	1.85E-001	7.08E-002
U-235	1.35E-001	1.64E-001	1.91E-001
TH-231	Not Detected	---------	7.02E+000
PA-231	Not Detected	---------	1.27E+000
TH-227	Not Detected	---------	2.84E-001
RA-223	Not Detected	---------	1.23E-001
RN-219	Not Detected	---------	3.47E-001
PB-211	Not Detected	---------	7.70E-001
TL-207	Not Detected	---------	1.31E+001
AM-241	Not Detected	---------	1.96E-001
PU-239	Not Detected	---------	3.44E+002
NP-237	Not Detected	---------	2.39E-001
PA-233	Not Detected	---------	5.54E-002
TH-229	Not Detected	---------	1.62E-001

[Summary Report] - Sample ID: : 80188109

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.89E-002
AG-110m	Not Detected	---------	3.37E-002
BA-133	Not Detected	---------	4.50E-002
BE-7	1.15E-001	1.71E-001	1.33E-001
CD-109	Not Detected	---------	7.91E-001
CD-115	Not Detected	---------	1.00E-001
CE-139	Not Detected	---------	2.36E-002
CE-141	Not Detected	---------	4.27E-002
CE-144	Not Detected	---------	1.88E-001
CO-56	Not Detected	---------	3.36E-002
CO-57	Not Detected	---------	2.39E-002
CO-58	Not Detected	---------	3.26E-002
CO-60	Not Detected	---------	4.28E-002
CR-51	Not Detected	---------	2.30E-001
CS-134	Not Detected	---------	3.49E-002
CS-137	2.43E-002	2.50E-002	2.19E-002
EU-152	Not Detected	---------	7.17E-002
EU-154	Not Detected	---------	1.87E-001
EU-155	Not Detected	---------	1.11E-001
FE-59	Not Detected	---------	7.77E-002
GD-153	Not Detected	---------	6.62E-002
HG-203	Not Detected	---------	2.97E-002
I-131	Not Detected	---------	2.92E-002
IR-192	Not Detected	---------	2.60E-002
K-40	2.00E+001	3.03E+000	3.64E-001
MN-52	Not Detected	---------	4.01E-002
MN-54	Not Detected	---------	1.79E-002
MO-99	Not Detected	---------	3.29E-001
NA-22	Not Detected	---------	4.72E-002
NA-24	Not Detected	---------	1.57E-001
NB-95	Not Detected	---------	1.34E-001
ND-147	Not Detected	---------	2.13E-001
NI-57	Not Detected	---------	1.06E-001
RU-103	Not Detected	---------	2.72E-002
RU-106	Not Detected	---------	2.80E-001
SB-122	Not Detected	---------	5.14E-002
SB-124	Not Detected	---------	2.90E-002
SB-125	Not Detected	---------	7.50E-002
SN-113	Not Detected	---------	3.40E-002
SR-85	Not Detected	---------	3.39E-002
TA-182	Not Detected	---------	1.72E-001
TA-183	Not Detected	---------	2.03E-001
TC-99m	Not Detected	---------	1.24E+000
TL-201	Not Detected	---------	1.22E-001
XE-133	Not Detected	---------	1.24E-001
Y-88	Not Detected	---------	2.59E-002
ZN-65	Not Detected	---------	1.14E-001
ZR-95	Not Detected	---------	5.93E-002

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]        *
*                      9/10/98 11:12:41 PM                                  *
*****************************************************************************
*                                                                           *
* Analyzed by:  9/11/98    Reviewed by: 9/11/98                             *
*****************************************************************************
Customer                  : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID        : 042520-004
Lab Sample ID             : 80188110

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   975.000  gram
Sample Date/Time          :  9/09/98  10:20:00 AM
Acquire Start Date/Time   :  9/10/98   9:32:24 PM
Detector Name             : LAB01
Elapsed Live/Real Time    :   6000 /   6004 seconds

Comments:
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GR-145

Soil Pile #2

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	5.24E-001
RA-226	1.95E+000	8.13E-001	4.72E-001
PB-214	8.14E-001	1.61E-001	4.76E-002
BI-214	7.37E-001	2.27E-001	5.77E-002
PB-210	Not Detected	---------	7.58E+000
TH-232	9.41E-001	5.05E-001	1.32E-001
RA-228	8.44E-001	7.09E-001	1.60E-001
AC-228	1.00E+000	2.57E-001	8.06E-002
TH-228	8.15E-001	2.58E-001	4.98E-001
RA-224	1.22E+000	7.63E-001	7.90E-002
PB-212	9.48E-001	7.46E-001	3.84E-002
BI-212	9.55E-001	5.28E-001	3.52E-001
TL-208	8.80E-001	1.98E-001	6.45E-002
U-235	1.45E-001	1.69E-001	1.96E-001
TH-231	Not Detected	---------	7.08E+000
PA-231	Not Detected	---------	1.29E+000
TH-227	Not Detected	---------	2.91E-001
RA-223	Not Detected	---------	1.28E-001
RN-219	Not Detected	---------	3.44E-001
PB-211	Not Detected	---------	7.81E-001
TL-207	Not Detected	---------	1.46E+001
AM-241	Not Detected	---------	1.87E-001
PU-239	Not Detected	---------	3.51E+002
NP-237	Not Detected	---------	2.44E-001
PA-233	Not Detected	---------	5.53E-002
TH-229	Not Detected	---------	1.65E-001

<0.524

[Summary Report] - Sample ID: : 80188110

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.77E-002
AG-110m	Not Detected	---------	3.08E-002
BA-133	Not Detected	---------	4.47E-002
BE-7	Not Detected	---------	2.34E-001
CD-109	Not Detected	---------	8.09E-001
CD-115	Not Detected	---------	1.03E-001
CE-139	Not Detected	---------	2.43E-002
CE-141	Not Detected	---------	4.39E-002
CE-144	Not Detected	---------	1.88E-001
CO-56	Not Detected	---------	3.14E-002
CO-57	Not Detected	---------	2.42E-002
CO-58	Not Detected	---------	3.30E-002
CO-60	Not Detected	---------	3.82E-002
CR-51	Not Detected	---------	2.23E-001
CS-134	Not Detected	---------	3.37E-002
CS-137	Not Detected	---------	3.42E-002
EU-152	Not Detected	---------	7.19E-002
EU-154	Not Detected	---------	1.81E-001
EU-155	Not Detected	---------	1.11E-001
FE-59	Not Detected	---------	7.46E-002
GD-153	Not Detected	---------	6.58E-002
HG-203	Not Detected	---------	2.91E-002
I-131	Not Detected	---------	2.89E-002
IR-192	Not Detected	---------	2.63E-002
K-40	2.20E+001	3.23E+000	3.34E-001
MN-52	Not Detected	---------	4.09E-002
MN-54	Not Detected	---------	3.60E-002
MO-99	Not Detected	---------	3.32E-001
NA-22	Not Detected	---------	4.75E-002
NA-24	Not Detected	---------	1.90E-001
NB-95	Not Detected	---------	1.38E-001
ND-147	Not Detected	---------	2.09E-001
NI-57	Not Detected	---------	1.08E-001
RU-103	Not Detected	---------	2.63E-002
RU-106	Not Detected	---------	2.78E-001
SB-122	Not Detected	---------	5.73E-002
SB-124	Not Detected	---------	2.82E-002
SB-125	Not Detected	---------	7.74E-002
SN-113	Not Detected	---------	3.45E-002
SR-85	Not Detected	---------	3.45E-002
TA-182	Not Detected	---------	1.64E-001
TA-183	Not Detected	---------	1.95E-001
TC-99m	Not Detected	---------	1.44E+000
TL-201	Not Detected	---------	1.24E-001
XE-133	Not Detected	---------	1.24E-001
Y-88	Not Detected	---------	2.88E-002
ZN-65	Not Detected	---------	1.12E-001
ZR-95	Not Detected	---------	5.66E-002

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]        *
*                        9/11/98 12:55:13 AM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:                9/11/98     Reviewed by:          9/11/98     *
*****************************************************************************
Customer                  : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID        : 042522-004
Lab Sample ID             : 80188111

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   918.000  gram
Sample Date/Time          :  9/09/98  11:00:00 AM
Acquire Start Date/Time   :  9/10/98  11:14:55 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	---------	4.95E-001
RA-226	1.56E+000	7.27E-001	4.64E-001
PB-214	6.41E-001	1.34E-001	4.73E-002
BI-214	6.52E-001	1.44E-001	6.04E-002
PB-210	Not Detected	---------	7.22E+000
TH-232	8.45E-001	4.40E-001	1.35E-001
RA-228	8.67E-001	3.93E-001	1.46E-001
AC-228	7.69E-001	1.40E+000	9.45E-002
TH-228	6.49E-001	2.29E-001	4.10E-001
RA-224	9.81E-001	3.66E-001	9.30E-002
PB-212	7.68E-001	6.38E-001	3.78E-002
BI-212	Not Detected	---------	2.91E-001
TL-208	7.02E-001	1.77E-001	6.37E-002
U-235	1.19E-001	1.57E-001	1.83E-001
TH-231	Not Detected	---------	6.70E+000
PA-231	Not Detected	---------	1.20E+000
TH-227	Not Detected	---------	2.68E-001
RA-223	Not Detected	---------	1.21E-001
RN-219	Not Detected	---------	3.34E-001
PB-211	Not Detected	---------	7.78E-001
TL-207	Not Detected	---------	1.26E+001
AM-241	Not Detected	---------	1.87E-001
PU-239	Not Detected	---------	3.39E+002
NP-237	Not Detected	---------	2.28E-001
PA-233	Not Detected	---------	5.27E-002
TH-229	Not Detected	---------	1.58E-001

[Summary Report] - Sample ID: : 80188111

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.62E-002
AG-110m	Not Detected	---------	3.78E-002
BA-133	Not Detected	---------	4.35E-002
BE-7	Not Detected	---------	2.13E-001
CD-109	Not Detected	---------	7.51E-001
CD-115	Not Detected	---------	9.84E-002
CE-139	Not Detected	---------	2.34E-002
CE-141	Not Detected	---------	4.00E-002
CE-144	Not Detected	---------	1.85E-001
CO-56	Not Detected	---------	3.17E-002
CO-57	Not Detected	---------	2.31E-002
CO-58	Not Detected	---------	3.33E-002
CO-60	Not Detected	---------	3.76E-002
CR-51	Not Detected	---------	2.22E-001
CS-134	Not Detected	---------	3.04E-002
CS-137	7.70E-002	4.64E-002	2.25E-002
EU-152	Not Detected	---------	6.89E-002
EU-154	Not Detected	---------	1.75E-001
EU-155	Not Detected	---------	1.05E-001
FE-59	Not Detected	---------	7.01E-002
GD-153	Not Detected	---------	6.30E-002
HG-203	Not Detected	---------	2.62E-002
I-131	Not Detected	---------	2.87E-002
IR-192	Not Detected	---------	2.60E-002
K-40	1.84E+001	2.78E+000	3.40E-001
MN-52	Not Detected	---------	3.54E-002
MN-54	Not Detected	---------	3.45E-002
MO-99	Not Detected	---------	3.45E-001
NA-22	Not Detected	---------	4.33E-002
NA-24	Not Detected	---------	1.89E-001
NB-95	Not Detected	---------	1.30E-001
ND-147	Not Detected	---------	2.07E-001
NI-57	Not Detected	---------	1.03E-001
RU-103	Not Detected	---------	2.62E-002
RU-106	Not Detected	---------	2.78E-001
SB-122	Not Detected	---------	5.38E-002
SB-124	Not Detected	---------	2.56E-002
SB-125	Not Detected	---------	7.35E-002
SN-113	Not Detected	---------	3.31E-002
SR-85	Not Detected	---------	3.30E-002
TA-182	Not Detected	---------	1.54E-001
TA-183	Not Detected	---------	1.97E-001
TC-99m	Not Detected	---------	1.57E+000
TL-201	Not Detected	---------	1.18E-001
XE-133	Not Detected	---------	1.21E-001
Y-88	Not Detected	---------	2.85E-002
ZN-65	Not Detected	---------	1.06E-001
ZR-95	Not Detected	---------	5.26E-002

```
*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]        *
*                        9/11/98  2:37:47 AM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:  9/11/98      Reviewed by: JDM 9/11/98                       *
*****************************************************************************
Customer                  : J.COPLUND/R.PARKER (6133/SMO)
Customer Sample ID        : 042524-004
Lab Sample ID             : 80188112

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   918.000  gram
Sample Date/Time          :  9/09/98  11:15:00 AM
Acquire Start Date/Time   :  9/11/98  12:57:27 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	4.71E+000	9.78E-001	5.04E-001
RA-226	3.26E+000	1.00E+000	5.51E-001
PB-214	8.81E-001	1.63E-001	4.82E-002
BI-214	7.80E-001	1.54E-001	6.45E-002
PB-210	Not Detected	---------	8.24E+000
TH-232	9.46E-001	5.02E-001	1.51E-001
RA-228	9.68E-001	3.21E-001	1.54E-001
AC-228	9.28E-001	9.59E-001	9.57E-002
TH-228	9.85E-001	3.13E-001	5.00E-001
RA-224	1.31E+000	6.64E-001	7.22E-002
PB-212	9.50E-001	2.02E-001	3.94E-002
BI-212	9.07E-001	4.89E-001	3.95E-001
TL-208	9.26E-001	1.93E-001	6.71E-002
U-235	Not Detected	---------	1.01E-001
TH-231	4.53E+000	4.53E+000	7.94E+000
PA-231	Not Detected	---------	1.32E+000
TH-227	Not Detected	---------	3.02E-001
RA-223	Not Detected	---------	1.41E-001
RN-219	Not Detected	---------	3.63E-001
PB-211	Not Detected	---------	8.25E-001
TL-207	Not Detected	---------	1.44E+001
AM-241	Not Detected	---------	2.18E-001
PU-239	Not Detected	---------	3.70E+002
NP-237	Not Detected	---------	2.66E-001
PA-233	Not Detected	---------	5.71E-002
TH-229	Not Detected	---------	1.88E-001

4.17 ± 0.978
> bkg. & 1.3

3.26 ± 1.0
> bks & 2.30

Not detected
9/11/98

[Summary Report] - Sample ID: : 80188112

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.89E-002
AG-110m	Not Detected	---------	3.64E-002
BA-133	Not Detected	---------	4.52E-002
BE-7	Not Detected	---------	2.42E-001
CD-109	Not Detected	---------	8.95E-001
CD-115	Not Detected	---------	1.11E-001
CE-139	Not Detected	---------	2.57E-002
CE-141	Not Detected	---------	4.74E-002
CE-144	Not Detected	---------	2.02E-001
CO-56	Not Detected	---------	3.54E-002
CO-57	Not Detected	---------	2.52E-002
CO-58	Not Detected	---------	3.32E-002
CO-60	Not Detected	---------	3.93E-002
CR-51	Not Detected	---------	2.28E-001
CS-134	Not Detected	---------	3.61E-002
CS-137	3.96E-002	3.15E-002	2.35E-002
EU-152	Not Detected	---------	7.65E-002
EU-154	Not Detected	---------	1.82E-001
EU-155	Not Detected	---------	1.20E-001
FE-59	Not Detected	---------	7.72E-002
GD-153	Not Detected	---------	7.73E-002
HG-203	Not Detected	---------	2.99E-002
I-131	Not Detected	---------	3.02E-002
IR-192	Not Detected	---------	2.68E-002
K-40	1.90E+001	2.88E+000	3.63E-001
MN-52	Not Detected	---------	4.53E-002
MN-54	Not Detected	---------	3.59E-002
MO-99	Not Detected	---------	3.60E-001
NA-22	Not Detected	---------	4.47E-002
NA-24	Not Detected	---------	2.24E-001
NB-95	Not Detected	---------	1.46E-001
ND-147	Not Detected	---------	2.11E-001
NI-57	Not Detected	---------	1.19E-001
RU-103	Not Detected	---------	2.78E-002
RU-106	Not Detected	---------	2.77E-001
SB-122	Not Detected	---------	5.73E-002
SB-124	Not Detected	---------	2.80E-002
SB-125	Not Detected	---------	7.73E-002
SN-113	Not Detected	---------	3.53E-002
SR-85	Not Detected	---------	3.61E-002
TA-182	Not Detected	---------	1.67E-001
TA-183	Not Detected	---------	2.31E-001
TC-99m	Not Detected	---------	2.01E+000
TL-201	Not Detected	---------	1.42E-001
XE-133	Not Detected	---------	1.49E-001
Y-88	Not Detected	---------	3.16E-002
ZN-65	Not Detected	---------	1.17E-001
ZR-95	Not Detected	---------	5.80E-002

GR-133 - > GR-150

SF 2001-COC (10-97)

Supersedes (5 97) issue

Internal Lab Batch No. per Schedule

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

AR/COC- 600835

Dept. No./Mail Stop: 6133/MS 1147 Williams
Project/Task Manager: 228A/John Copland
Project Name: 228A
Record Center Code: 1309/228A/DAT
Logbook Ref. No.: ER-014
Service Order No.: CFO596

Date Samples Shipped: 9/11/98 SMO USE
Carrier/Waybill No.: 709136
Lab Contact: Tim Kellogg
Lab Destination: Core/Denver/Casper
SMO Contact/Phone: Doug Salmi
Send Report to SMO: Suzi Montano

Contract No.: AJ-2480C
Case No.: 7225.2203
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No. (use 228 per Pam P.)	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID (LAB USE)
042508-001	TJAOU-228A-GR-133-S	0	228A	9/8/98 1400	soil	G	16oz	none	G	SA	gamma spec; iso U	
042508-002	TJAOU-228A-GR-133-S	0	228A	9/8/98 1400	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042508-003	TJAOU-228A-GR-133-S	0	228A	9/8/98 1400	soil	G	4oz	4 C	G	SA	VOC'S	
042526-001	TJAOU-228A-GR-133-DU	0	228A	9/8/98 1400	soil	G	16oz	none	G	DU	gamma spec; iso U	
042526-002	TJAOU-228A-GR-133-DU	0	228A	9/8/98 1400	soil	G	16oz	4 C	G	DU	RCRA Metals/Total U; HE; SVOC	
042526-003	TJAOU-228A-GR-133-DU	0	228A	9/8/98 1400	soil	G	4oz	4 C	G	DU	VOC'S	
042509-001	TJAOU-228A-GR-134-S	0	228A	9/8/98 1410	soil	G	16oz	none	G	SA	gamma spec; iso U	
042510-001	TJAOU-228A-GR-135-S	0	228A	9/8/98 1405	soil	G	16oz	none	G	SA	gamma spec; iso U	
042510-005	TJAOU-228A-GR-135-S	0	228A	9/8/98 1405	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042511-001	TJAOU-228A-GR-136-S	0	228A	9/8/98 1415	soil	G	16oz	none	G	SA	gamma spec; iso U	

RMMA ☒Yes ☐No Ref. No. _____

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking (SMO USE) Date Entered (mm/dd/yy) 9/16/98 Entered by [illegible]

Turnaround Time ☒Normal ☐Rush Required Report Date _____ QC Inits: UI

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
* Send a separate report
* Please note hold times on VOC samples
* COC #600800 releases #600835

Abnormal Conditions on Receipt (LAB USE)

Sample Team Members	Name	Signature	Init	Company/Organization/Phon
	Nelson Capitan	[signature]	NC	FT/6131 284-5507

1. Relinquished by [signature]	Org. FT/6131	Date 9-10-98	Time 1500	4. Relinquished by	Org.	Date	
1. Received by [signature]	Org. 7578	Date 9-10-98	Time 1500	4. Received by	Org.	Date	
2. Relinquished by [signature]	Org. 7577	Date 9/11/98	Time 1300	5. Relinquished by	Org.	Date	
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	
3. Relinquished by	Org.	Date	Time	6. Relinquished by	Org.	Date	
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	

Original — To Accompany Samples, Laboratory Copy (White)
1st Copy — To Accompany Samples, Return to SMO (Blue)
2nd Copy — SMO Suspense Copy (Yellow)
3rd Copy — Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600835

Project Name: 228A Project/Task Manager: 228A/John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preser-vative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE: Lab Sample ID
042512-001	TJAOU-228A-GR-137-S	0	228A	9/8/98 1420	soil	G	16oz	none	G	SA	gamma spec; iso U	
042512-002	TJAOU-228A-GR-137-S	0	228A	9/8/98 1420	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042512-003	TJAOU-228A-GR-137-S	0	228A	9/8/98 1420	soil	G	4oz	4 C	G	SA	VOC'S	
042513-001	TJAOU-228A-GR-138-S	0	228A	9/8/98 1430	soil	G	16oz	none	G	SA	gamma spec; iso U	
042514-001	TJAOU-228A-GR-139-S	0	228A	9/8/98 1433	soil	G	16oz	none	G	SA	gamma spec; iso U	
042514-005	TJAOU-228A-GR-139-S	0	228A	9/8/98 1433	soil	G	16oz	4 C	G	SA	RCRA Metal; Total U	
042515-001	TJAOU-228A-GR-140-S	0	228A	9/8/98 1435	soil	G	16oz	none	G	SA	gamma spec; iso U	
042515-002	TJAOU-228A-GR-140-S	0	228A	9/8/98 1435	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042515-003	TJAOU-228A-GR-140-S	0	228A	9/8/98 1435	soil	G	4oz	4 C	G	SA	VOC'S	
042516-001	TJAOU-228A-GR-141-S	0	228A	9/8/98 1445	soil	G	16oz	none	G	SA	gamma spec; iso U	
042517-001	TJAOU-228A-GR-142-S	0	228A	9/8/98 1450	soil	G	16oz	none	G	SA	gamma spec; iso U	
042518-001	TJAOU-228A-GR-143-S	0	228A	9/9/98 1000	soil	G	16oz	none	G	SA	gamma spec; iso U	
042518-002	TJAOU-228A-GR-143-S	0	228A	9/9/98 1000	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042518-003	TJAOU-228A-GR-143-S	0	228A	9/9/98 1000	soil	G	4oz	4 C	G	SA	VOC'S	
042519-001	TJAOU-228A-GR-144-S	0	228A	9/9/98 1015	soil	G	16oz	none	G	SA	gamma spec; iso U	
042519-005	TJAOU-228A-GR-144-S	0	228A	9/9/98 1015	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042520-001	TJAOU-228A-GR-145-S	0	228A	9/9/98 1020	soil	G	16oz	none	G	SA	gamma spec; iso U	
042520-002	TJAOU-228A-GR-145-S	0	228A	9/9/98 1020	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042520-003	TJAOU-228A-GR-145-S	0	228A	9/9/98 1020	soil	G	4oz	4 C	G	SA	VOC'S	
042521-001	TJAOU-228A-GR-146-S	0	228A	9/9/98 1022	soil	G	16oz	none	G	SA	gamma spec; iso U	
042521-005	TJAOU-228A-GR-146-S	0	228A	9/9/98 1022	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042522-001	TJAOU-228A-GR-147-S	0	228A	9/9/98 1100	soil	G	16oz	none	G	SA	gamma spec; iso U	
042522-002	TJAOU-228A-GR-147-S	0	228A	9/9/98 1100	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042522-003	TJAOU-228A-GR-147-S	0	228A	9/9/98 1100	soil	G	4oz	4 C	G	SA	VOC'S	
042523-001	TJAOU-228A-GR-148-S	0	228A	9/9/98 1105	soil	G	16oz	none	G	SA	gamma spec; iso U	

LAB USE

Abnormal Conditions on Receipt

Recipient Initials: _____

Original To Accompany Samples, Laboratory Copy (White) 1st Copy To Accompany Samples, Return to SMO (Blue) 2nd Copy SMO Suspense Copy (Yellow) 3rd Copy Field Copy (Pink)

SF 2001-COC
Supersedes (5-97) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600835

Project Name: 228A Project/Task Manager: 228A/John Copland Case No.: 7225.2203

Location Tech Area NA
Building NA Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample ID
042523-005	TJAOU-228A-GR-148-S	0	228A	9/9/98 1105	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042524-001	TJAOU-228A-GR-149-S	0	228A	9/9/98 1115	soil	G	16oz	none	G	SA	gamma spec; Iso U	
042524-002	TJAOU-228A-GR-149-S	0	228A	9/9/98 1115	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042524-003	TJAOU-228A-GR-149-S	0	228A	9/9/98 1115	soil	G	4oz	4 C	G	SA	VOC'S	
042525-001	TJAOU-228A-GR-150-S	0	228A	9/9/98 1120	soil	G	16oz	none	G	SA	gamma spec; Iso U	
042525-005	TJAOU-228A-GR-150-S	0	228A	9/9/98 1120	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	

Abnormal Conditions on Receipt LAB USE
Recipient Initials

Original To Accompany Samples, Laboratory Copy (White) 1st Copy To Accompany Samples, Return to SMO (Blue) 2nd Copy SMO Suspense Copy (Yellow) 3rd Copy Field Copy (Pink)

CORELAB

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042508-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-1 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.830						pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.300						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0600						pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0800						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.900						pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.300						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100						pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.4						pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, error +/-, Solid	1.2						pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, MDA, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, Lc, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, Activity, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, error +/-, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, MDA, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, Lc, Solid	0.4						pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Activity, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Error, +/-, Solid	0.6						pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, MDA, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Lc, Solid	0.5						pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Activity, Solid	0.5						pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Error, +/-, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, MDA, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Lc, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, Activity, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, Error, +/-, Solid	0.5						pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, MDA, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042526-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-4 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.820					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.270					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0500					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0600					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.840					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.270					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, error +/-, Solid	0.8					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Error, +/-, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, Error, +/-, Solid	1.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0258	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042509-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:10 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-7 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.640					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.240					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.00					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.890					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.290					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.5					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Americium-241, error +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Americium-241, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Americium-241, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cerium-144, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cobalt-60, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Chromium-51, Activity, Solid	2.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Chromium-51, Error, +/-, Solid	1.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Chromium-51, MDA, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0820	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042510-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:05 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-8 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.33					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.380					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0700					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0800					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.870					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.290					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Americium-241, error +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Americium-241, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Americium-241, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cerium-144, Error, +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cobalt-60, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cobalt-60, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Chromium-51, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Chromium-51, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0829	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440

Date: 03/31/1999

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600835

ATTN: Suzi Jensen

Customer Sample ID..: 042511-001
Laboratory Sample ID: 982440-10

Date Sampled.....: 09/08/1998 Time Sampled.....: 14:15 Sample Matrix.....: Soil
Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.830					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.290					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0700					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0800					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	1.05					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.320					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Americium-241, Activity, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Americium-241, error +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Americium-241, Lc, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Cerium-144, Activity, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Cerium-144, Error, +/-, Solid	0.8					1	pCi/g	10293	09/26/1998 0931	* ca
	Cerium-144, MDA, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Cerium-144, Lc, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Chromium-51, Activity, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Chromium-51, Error, +/-, Solid	1.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Chromium-51, MDA, Solid	0.8					1	pCi/g	10293	09/26/1998 0931	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042512-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:20 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-11 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TEC
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.37					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium 234, error +/-, Solid	0.380					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-235, Activity, Solid	0.110					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium 235, error +/-, Solid	0.100					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-238, Activity, Solid	1.57					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium 238, error +/-, Solid	0.410					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-235, MDA, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-235, Lc, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-238, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-238, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* c
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.4					1	pCi/g	10293	09/26/1998 0931	* c
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* c
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* c
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* c
	Americium-241, Activity, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Americium-241, error +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Americium-241, MDA, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Americium-241, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Cerium-144, Activity, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* c
	Cerium-144, Error, +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Cerium-144, MDA, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Cerium-144, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* c
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* c
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* c
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* c
	Chromium-51, Activity, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* c
	Chromium-51, Error, +/-, Solid	0.6					1	pCi/g	10293	09/26/1998 0931	* c
	Chromium-51, MDA, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* c

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440

Date: 03/31/1999

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600835

ATTN: Suzi Jensen

Customer Sample ID..: 042513-001
Laboratory Sample ID: 982440-14

Date Sampled.....: 09/08/1998 Time Sampled.....: 14:30 Sample Matrix.....: Soil
Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.14					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.360					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0800					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0800					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.990					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.320					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.9					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, error +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Activity, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, Activity, Solid	1.8					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, Error, +/-, Solid	1.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, MDA, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1033	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042514-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:33 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-15 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.830					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.270					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0900					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0900					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.770					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.260					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.7					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Activity, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, Activity, Solid	1.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, Error, +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca

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LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042515-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:35 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-17 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.03					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.330					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0400					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	1.09					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.330					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, error +/-, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, Activity, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, error +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, Lc, Solid	0.5					1	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Activity, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Error, +/-, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, MDA, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Lc, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Activity, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, Activity, Solid	1.6					1	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, Error, +/-, Solid	1.9					1	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, MDA, Solid	1.0					1	pCi/g	10293	09/26/1998 1140	* ca

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LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042516-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:45 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-20 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.800					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.290					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0300					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	1.00					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.320					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.6					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, error +/-, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, MDA, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1140	* ca

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LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042517-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:50 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-21 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TE
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.850					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 234, error +/-, Solid	0.300					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, Activity, Solid	0.110					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 235, error +/-, Solid	0.100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, Activity, Solid	0.850					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 238, error +/-, Solid	0.290					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.2					1.00	pCi/g	10293	09/26/1998 1249	*
	Actinium-228, error +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	*
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	*
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	*
	Americium-241, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	*
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	*
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	*
	Americium-241, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1249	*
	Cerium-144, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	*
	Cerium-144, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	*
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	*
	Cerium-144, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	*
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	*
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	*
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	*
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	*
	Chromium-51, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1249	*
	Chromium-51, Error, +/-, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1249	*
	Chromium-51, MDA, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1249	*

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LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042518-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-22 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.780					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.280					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0600					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0700					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.630					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.240					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Americium-241, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Americium-241, error +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Americium-241, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Americium-241, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cerium-144, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cobalt-60, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Chromium-51, Activity, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Chromium-51, Error, +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca

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LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042519-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-25 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	T
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.670					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 234, error +/-, Solid	0.240					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, Activity, Solid	0.0500					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 235, error +/-, Solid	0.0600					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, Activity, Solid	0.680					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 238, error +/-, Solid	0.240					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1359	*
	Actinium-228, error +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	*
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Americium-241, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1359	*
	Americium-241, error +/-, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1359	*
	Americium-241, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1359	*
	Americium-241, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	*
	Cerium-144, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	*
	Cerium-144, Error, +/-, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1359	*
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1359	*
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	*
	Cobalt-60, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Cobalt-60, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Cobalt-60, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Chromium-51, Activity, Solid	1.7					1.00	pCi/g	10293	09/26/1998 1359	*
	Chromium-51, Error, +/-, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1359	*
	Chromium-51, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042520-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:20 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-27 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TE
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.960					1	pCi/g	10279	10/07/1998 1458	*
	Uranium 234, error +/-, Solid	0.310					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-235, Activity, Solid	0.140					1	pCi/g	10279	10/07/1998 1458	*
	Uranium 235, error +/-, Solid	0.110					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-238, Activity, Solid	0.870					1	pCi/g	10279	10/07/1998 1458	*
	Uranium 238, error +/-, Solid	0.290					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-238, Lc, Solid	0.0300					1	pCi/g	10279	10/07/1998 1458	*
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.3					1	pCi/g	10306	09/26/1998 1504	*
	Actinium-228, error +/-, Solid	0.7					1	pCi/g	10306	09/26/1998 1504	*
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	*
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	*
	Americium-241, Activity, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	*
	Americium-241, error +/-, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	*
	Americium-241, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	*
	Americium-241, Lc, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	*
	Cerium-144, Activity, Solid	0.3					1	pCi/g	10306	09/26/1998 1504	*
	Cerium-144, Error, +/-, Solid	0.6					1	pCi/g	10306	09/26/1998 1504	*
	Cerium-144, MDA, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	*
	Cerium-144, Lc, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	*
	Cobalt-60, Activity, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	*
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	*
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	*
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	*
	Chromium-51, Activity, Solid	0.9					1	pCi/g	10306	09/26/1998 1504	*
	Chromium-51, Error, +/-, Solid	0.8					1	pCi/g	10306	09/26/1998 1504	*
	Chromium-51, MDA, Solid	0.5					1	pCi/g	10306	09/26/1998 1504	*

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LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042521-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:22 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-30 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.720					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 234, error +/-, Solid	0.260					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Activity, Solid	0.0500					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 235, error +/-, Solid	0.0700					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Activity, Solid	0.800					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 238, error +/-, Solid	0.270					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1.00	pCi/g	10279	10/07/1998 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.8					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Actinium-228, error +/-, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Americium-241, Activity, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Americium-241, error +/-, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Americium-241, MDA, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cerium-144, Activity, Solid	1.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cerium-144, Error, +/-, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cerium-144, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Chromium-51, Activity, Solid	1.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Chromium-51, Error, +/-, Solid	0.7					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1501	* ca

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LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042522-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-32 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TEC
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.820					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium 234, error +/-, Solid	0.280					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, Activity, Solid	0.0300					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium 235, error +/-, Solid	0.0500					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, Activity, Solid	0.700					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium 238, error +/-, Solid	0.240					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, Lc, Solid	0.0200					1	pCi/g	10279	10/07/1998 1458	* c
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.2					1	pCi/g	10306	09/26/1998 1939	* c
	Actinium-228, error +/-, Solid	0.6					1	pCi/g	10306	09/26/1998 1939	* c
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	* c
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* c
	Americium-241, Activity, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	* c
	Americium-241, error +/-, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	* c
	Americium-241, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* c
	Americium-241, Lc, Solid	0.5					1	pCi/g	10306	09/26/1998 1939	* c
	Cerium-144, Activity, Solid	0.8					1	pCi/g	10306	09/26/1998 1939	* c
	Cerium-144, Error, +/-, Solid	0.5					1	pCi/g	10306	09/26/1998 1939	* c
	Cerium-144, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	* c
	Cerium-144, Lc, Solid	0.3					1	pCi/g	10306	09/26/1998 1939	* c
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* c
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* c
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10306	09/26/1998 1939	* c
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 1939	* c
	Chromium-51, Activity, Solid	1.3					1	pCi/g	10306	09/26/1998 1939	* c
	Chromium-51, Error, +/-, Solid	0.9					1	pCi/g	10306	09/26/1998 1939	* c
	Chromium-51, MDA, Solid	0.4					1	pCi/g	10306	09/26/1998 1939	* c

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LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042523-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:05 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-35 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.570					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 234, error +/-, Solid	0.250					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Activity, Solid	0.100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 235, error +/-, Solid	0.0900					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Activity, Solid	0.950					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 238, error +/-, Solid	0.310					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/1998 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Actinium-228, error +/-, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Actinium-228, MDA, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Americium-241, Activity, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Americium-241, error +/-, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Americium-241, MDA, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Americium-241, Lc, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cerium-144, Activity, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cerium-144, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cerium-144, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cobalt-60, Activity, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Chromium-51, Activity, Solid	1.8					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Chromium-51, Error, +/-, Solid	1.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Chromium-51, MDA, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1940	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042524-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-37 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.64					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 234, error +/-, Solid	0.440					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Activity, Solid	0.0400					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 235, error +/-, Solid	0.0700					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Activity, Solid	2.38					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 238, error +/-, Solid	0.560					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1	pCi/g	10279	10/07/1998 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.5					1	pCi/g	10306	09/26/1998 2047	* ca
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10306	09/26/1998 2047	* ca
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* ca
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, Activity, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, error +/-, Solid	0.3					1	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, Lc, Solid	0.6					1	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, Activity, Solid	0.5					1	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, Error, +/-, Solid	0.4					1	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, MDA, Solid	0.3					1	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, Lc, Solid	0.4					1	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* ca
	Chromium-51, Activity, Solid	0.8					1	pCi/g	10306	09/26/1998 2047	* ca
	Chromium-51, Error, +/-, Solid	0.5					1	pCi/g	10306	09/26/1998 2047	* ca
	Chromium-51, MDA, Solid	0.3					1	pCi/g	10306	09/26/1998 2047	* ca

CORELAB

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440

Date: 03/31/1999

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600835

ATTN: Suzi Jensen

Customer Sample ID..: 042525-001
Laboratory Sample ID: 982440-40

Date Sampled.....: 09/09/1998 Time Sampled.....: 11:20 Sample Matrix.....: Soil
Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.19					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 234, error +/-, Solid	0.370					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Activity, Solid	0.0900					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 235, error +/-, Solid	0.100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Activity, Solid	2.47					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 238, error +/-, Solid	0.580					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, MDA, Solid	0.0300					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/1998 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.3					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, Activity, Solid	1.0					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, error +/-, Solid	0.6					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, MDA, Solid	0.3					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, Error, +/-, Solid	0.5					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Chromium-51, Activity, Solid	1.5					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Chromium-51, Error, +/-, Solid	0.7					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Chromium-51, MDA, Solid	0.3					1.00	pCi/g	10306	09/26/1998 2047	* ca

GR-133 - > GR-150

Core

SF 2001-COC (10 97)

Supersedes (5 87) issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

AR/COC- 600835

Dept. No./Mail Stop: 6133/MS 1147

Project/Task Manager: 228A/John Copland

Project Name: 228A

Record Center Code: 1309/228A/DAT

Logbook Ref. No.: ER-014

Service Order No.: CFO596

Date Samples Shipped: 9/11/98 SMO USE

Carrier/Waybill No.: 709136

Lab Contact: Tim Kellogg

Lab Destination: Core/Denver/Casper

SMO Contact/Phone: Doug Salmi

Send Report to SMO: Suzi Montano

Contract No.: AJ-2480C

Case No.: 7225.2203

SMO Authorization

Bill to: Sandia National Laboratories

Supplier Services, Dept.

P.O. Box 5800 MS 0154

Location Tech Area NA

Building NA Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample ID
042508-001	TJAOU-228A-GR-133-S	0	228A	9/8/98 1400	soil	G	16oz	none	G	SA	gamma spec; iso U	
042508-002	TJAOU-228A-GR-133-S	0	228A	9/8/98 1400	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042508-003	TJAOU-228A-GR-133-S	0	228A	9/8/98 1400	soil	G	4oz	4 C	G	SA	VOC'S	
042526-001	TJAOU-228A-GR-133-DU	0	228A	9/8/98 1400	soil	G	16oz	none	G	DU	gamma spec; iso U	
042526-002	TJAOU-228A-GR-133-DU	0	228A	9/8/98 1400	soil	G	16oz	4 C	G	DU	RCRA Metals/Total U; HE; SVOC	
042526-003	TJAOU-228A-GR-133-DU	0	228A	9/8/98 1400	soil	G	4oz	4 C	G	DU	VOC'S	
042509-001	TJAOU-228A-GR-134-S	0	228A	9/8/98 1410	soil	G	16oz	none	G	SA	gamma spec; iso U	
042510-001	TJAOU-228A-GR-135-S	0	228A	9/8/98 1405	soil	G	16oz	none	G	SA	gamma spec; iso U	
042510-005	TJAOU-228A-GR-135-S	0	228A	9/8/98 1405	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042511-001	TJAOU-228A-GR-136-S	0	228A	9/8/98 1415	soil	G	16oz	none	G	SA	gamma spec; iso U	

RMMA ☒Yes ☐No Ref. No. ____

Sample Disposal ☐Return to Client ☒Disposal by lab

Turnaround Time ☒Normal ☐Rush Required Report Date ____

Sample Tracking SMO USE

Date Entered (mm/dd/yy) 9/11/98

Entered by

QC inits

Special Instructions/QC Requirements

EDD ☒Yes ☐No

Raw data package ☒Yes ☐No

* Send a separate report
* Please note hold times on VOC samples
* COC #600800 releases #600835

Abnormal Conditions on Receipt LAB USE

Sample Team Members	Name	Signature	Init	Company/Organization/Phon
	Nelson Capilan			ET/6131 284-5507

	Org.	Date	Time		Org.	Date
1. Relinquished by	ET/6131	9-10-98	1500	4. Relinquished by		
1. Received by	7578	9-10-98	1500	4. Received by		
2. Relinquished by	7577	9/11/98	1300	5. Relinquished by		
2. Received by				5. Received by		
3. Relinquished by				6. Relinquished by		
3. Received by				6. Received by		

Original To Accompany Samples, Laboratory Copy (White)

1st Copy To Accompany Samples, Return to SMO (Blue)

2nd Copy SMO Suspense Copy (Yellow)

3rd Copy Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600835

Project Name: 228A Project/Task Manager: 228A/John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preser-vative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE: Lab Sample ID
042512-001	TJAOU-228A-GR-137-S	0	228A	9/8/98 1420	soil	G	16oz	none	G	SA	gamma spec; iso U	
042512-002	TJAOU-228A-GR-137-S	0	228A	9/8/98 1420	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042512-003	TJAOU-228A-GR-137-S	0	228A	9/8/98 1420	soil	G	4oz	4 C	G	SA	VOC'S	
042513-001	TJAOU-228A-GR-138-S	0	228A	9/8/98 1430	soil	G	16oz	none	G	SA	gamma spec; iso U	
042514-001	TJAOU-228A-GR-139-S	0	228A	9/8/98 1433	soil	G	16oz	none	G	SA	gamma spec; iso U	
042514-005	TJAOU-228A-GR-139-S	0	228A	9/8/98 1433	soil	G	16oz	4 C	G	SA	RCRA Metal; Total U	
042515-001	TJAOU-228A-GR-140-S	0	228A	9/8/98 1435	soil	G	16oz	none	G	SA	gamma spec; iso U	
042515-002	TJAOU-228A-GR-140-S	0	228A	9/8/98 1435	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042515-003	TJAOU-228A-GR-140-S	0	228A	9/8/98 1435	soil	G	4oz	4 C	G	SA	VOC'S	
042516-001	TJAOU-228A-GR-141-S	0	228A	9/8/98 1445	soil	G	16oz	none	G	SA	gamma spec; iso U	
042517-001	TJAOU-228A-GR-142-S	0	228A	9/8/98 1450	soil	G	16oz	none	G	SA	gamma spec; iso U	
042518-001	TJAOU-228A-GR-143-S	0	228A	9/9/98 1000	soil	G	16oz	none	G	SA	gamma spec; iso U	
042518-002	TJAOU-228A-GR-143-S	0	228A	9/9/98 1000	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042518-003	TJAOU-228A-GR-143-S	0	228A	9/9/98 1000	soil	G	4oz	4 C	G	SA	VOC'S	
042519-001	TJAOU-228A-GR-144-S	0	228A	9/9/98 1015	soil	G	16oz	none	G	SA	gamma spec; iso U	
042519-005	TJAOU-228A-GR-144-S	0	228A	9/9/98 1015	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042520-001	TJAOU-228A-GR-145-S	0	228A	9/9/98 1020	soil	G	16oz	none	G	SA	gamma spec; iso U	
042520-002	TJAOU-228A-GR-145-S	0	228A	9/9/98 1020	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042520-003	TJAOU-228A-GR-145-S	0	228A	9/9/98 1020	soil	G	4oz	4 C	G	SA	VOC'S	
042521-001	TJAOU-228A-GR-146-S	0	228A	9/9/98 1022	soil	G	16oz	none	G	SA	gamma spec; iso U	
042521-005	TJAOU-228A-GR-146-S	0	228A	9/9/98 1022	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042522-001	TJAOU-228A-GR-147-S	0	228A	9/9/98 1100	soil	G	16oz	none	G	SA	gamma spec; iso U	
042522-002	TJAOU-228A-GR-147-S	0	228A	9/9/98 1100	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042522-003	TJAOU-228A-GR-147-S	0	228A	9/9/98 1100	soil	G	4oz	4 C	G	SA	VOC'S	
042523-001	TJAOU-228A-GR-148-S	0	228A	9/9/98 1105	soil	G	16oz	none	G	SA	gamma spec; iso U	

Abnormal Conditions on Receipt LAB USE

Recipient Initials

Original To Accompany Samples, Laboratory Copy (White) 1st Copy To Accompany Samples, Return to SMO (Blue) 2nd Copy SMO Suspense Copy (Yellow) 3rd Copy Field Copy (Pink)

SF 2001-COC

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600835

Project Name: 228A Project/Task Manager: 228A/John Copland Case No.: 7225.2203

Location: Tech Area NA; Building NA; Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preser-vative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample ID
042523-005	TJAOU-228A-GR-148-S	0	228A	9/9/98 1105	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	
042524-001	TJAOU-228A-GR-149-S	0	228A	9/9/98 1115	soil	G	16oz	none	G	SA	gamma spec; iso U	
042524-002	TJAOU-228A-GR-149-S	0	228A	9/9/98 1115	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	
042524-003	TJAOU-228A-GR-149-S	0	228A	9/9/98 1115	soil	G	4oz	4 C	G	SA	VOC'S	
042525-001	TJAOU-228A-GR-150-S	0	228A	9/9/98 1120	soil	G	16oz	none	G	SA	gamma spec; iso U	
042525-005	TJAOU-228A-GR-150-S	0	228A	9/9/98 1120	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	

Abnormal Conditions on Receipt LAB USE

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) 1st Copy To Accompany Samples, Return to SMO (Blue) 2nd Copy SMO Suspense Copy (Yellow) 3rd Copy Field Copy (Pink)

CORELAB

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042508-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-1 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.830						pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.300						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0600						pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0800						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.900						pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.300						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100						pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100						pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.4						pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, error +/-, Solid	1.2						pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, MDA, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, Lc, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, Activity, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, error +/-, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, MDA, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, Lc, Solid	0.4						pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Activity, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Error, +/-, Solid	0.6						pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, MDA, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Lc, Solid	0.5						pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Activity, Solid	0.5						pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Error, +/-, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, MDA, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Lc, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, Activity, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, Error, +/-, Solid	0.5						pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, MDA, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca

CORELAB

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042508-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-1 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca
	Cesium-134, Activity, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Cesium-134, Error, +/-, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Cesium-134, MDA, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Cesium-134, Lc, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Cesium-137, Activity, Solid	0.4						pCi/g	10293	09/26/1998 0258	* ca
	Cesium-137, Error, +/-, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca
	Cesium-137, MDA, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Cesium-137, Lc, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca
	Iron-59, Activity, Solid	0.6						pCi/g	10293	09/26/1998 0258	* ca
	Iron-59, Error, +/-, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Iron-59, MDA, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Iron-59, Lc, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Potassium-40, Activity, Solid	41.3						pCi/g	10293	09/26/1998 0258	* ca
	Potassium-40, error +/-, Solid	4.7						pCi/g	10293	09/26/1998 0258	* ca
	Potassium-40, MDA, Solid	0.5						pCi/g	10293	09/26/1998 0258	* ca
	Potassium-40, Lc, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Lead-212, Activity, Solid	1.5						pCi/g	10293	09/26/1998 0258	* ca
	Lead-212, error +/-, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Lead-212, MDA, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Lead-212, Lc, Solid	0.4						pCi/g	10293	09/26/1998 0258	* ca
	Lead-214, Activity, Solid	2.4						pCi/g	10293	09/26/1998 0258	* ca
	Lead-214, error +/-, Solid	0.5						pCi/g	10293	09/26/1998 0258	* ca
	Lead-214, MDA, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Lead-214, Lc, Solid	0.4						pCi/g	10293	09/26/1998 0258	* ca
	Radium-226, Activity, Solid	3.2						pCi/g	10293	09/26/1998 0258	* ca
	Radium-226, Error, +/-, Solid	1.0						pCi/g	10293	09/26/1998 0258	* ca
	Radium-226, MDA, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Radium-226, Lc, Solid	0.4						pCi/g	10293	09/26/1998 0258	* ca
	Radium-228, Activity, Solid	2.4						pCi/g	10293	09/26/1998 0258	* ca
	Radium-228, Error, +/-, Solid	1.2						pCi/g	10293	09/26/1998 0258	* ca
	Radium-228, MDA, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Radium-228, Lc, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-103, Activity, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-103, Error, +/-, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042508-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-1 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0						pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-103, Lc, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-106, Activity, Solid	2.9						pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-106, Error, +/-, Solid	1.8						pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-106, MDA, Solid	0.7						pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-106, Lc, Solid	0.2						pCi/g	10293	09/26/1998 0258	* ca
	Thorium-231, Activity, Solid	1.4						pCi/g	10293	09/26/1998 0258	* ca
	Thorium-231, error +/-, Solid	0.7						pCi/g	10293	09/26/1998 0258	* ca
	Thorium-231, MDA, Solid	0.4						pCi/g	10293	09/26/1998 0258	* ca
	Thorium-231, Lc, Solid	0.6						pCi/g	10293	09/26/1998 0258	* ca
	Thorium-232, Solid	17.4						pCi/g	10293	09/26/1998 0258	* ca
	Thorium-232, Error +/-, Solid	44.3						pCi/g	10293	09/26/1998 0258	* ca
	Thorium-232, MDA, Solid	15.7						pCi/g	10293	09/26/1998 0258	* ca
	Thorium-232, Lc, Solid	0.7						pCi/g	10293	09/26/1998 0258	* ca
	Uranium-235, Activity, Solid	0.8						pCi/g	10293	09/26/1998 0258	* ca
	Uranium 235, error +/-, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca
	Uranium-235, MDA, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Uranium-235, Lc, Solid	0.6						pCi/g	10293	09/26/1998 0258	* ca
	Uranium-238, Activity, Solid	8.0						pCi/g	10293	09/26/1998 0258	* ca
	Uranium 238, error +/-, Solid	4.6						pCi/g	10293	09/26/1998 0258	* ca
	Uranium-238, MDA, Solid	1.0						pCi/g	10293	09/26/1998 0258	* ca
	Uranium-238, Lc, Solid	0.9						pCi/g	10293	09/26/1998 0258	* ca
	Zirconium-95, Activity, Solid	0.4						pCi/g	10293	09/26/1998 0258	* ca
	Zirconium-95, Error, +/-, Solid	0.4						pCi/g	10293	09/26/1998 0258	* ca
	Zirconium-95, MDA, Solid	0.1						pCi/g	10293	09/26/1998 0258	* ca
	Zirconium-95, Lc, Solid	0.3						pCi/g	10293	09/26/1998 0258	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042526-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-4 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.820					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.270					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0500					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0600					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.840					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.270					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, error +/-, Solid	0.8					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Error, +/-, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, Error, +/-, Solid	1.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0258	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440

Date: 03/31/1999

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600835

ATTN: Suzi Jensen

Customer Sample ID..: 042526-001
Laboratory Sample ID: 982440-4

Date Sampled.....: 09/08/1998 Time Sampled.....: 14:00 Sample Matrix.....: Soil
Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cesium-134, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cesium-134, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cesium-134, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cesium-134, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cesium-137, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cesium-137, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Cesium-137, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Iron-59, Activity, Solid	1.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Iron-59, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Iron-59, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Potassium-40, Activity, Solid	45.7					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Potassium-40, error +/-, Solid	5.7					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Potassium-40, MDA, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Lead-212, Activity, Solid	1.8					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Lead-212, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Lead-214, Activity, Solid	2.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Lead-214, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Lead-214, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Lead-214, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Radium-226, Activity, Solid	1.9					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Radium-226, Error, +/-, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Radium-226, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Radium-226, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Radium-228, Activity, Solid	2.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Radium-228, Error, +/-, Solid	0.8					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Radium-228, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Radium-228, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-103, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042526-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-4 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-103, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-106, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-106, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-106, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Thorium-231, Activity, Solid	1.4					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Thorium-231, error +/-, Solid	2.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Thorium-231, MDA, Solid	0.8					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Thorium-231, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Thorium-232, Solid	16.8					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Thorium-232, Error +/-, Solid	46.5					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Thorium-232, MDA, Solid	33.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Thorium-232, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Uranium-235, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Uranium 235, error +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Uranium-235, Lc, Solid	0.6					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Uranium-238, Activity, Solid	5.4					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Uranium 238, error +/-, Solid	6.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Uranium-238, MDA, Solid	2.6					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Uranium-238, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Zirconium-95, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Zirconium-95, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Zirconium-95, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0258	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042509-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:10 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-7 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.640					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.240					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.00					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.890					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.290					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.5					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Americium-241, error +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Americium-241, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Americium-241, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cerium-144, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cobalt-60, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Chromium-51, Activity, Solid	2.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Chromium-51, Error, +/-, Solid	1.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Chromium-51, MDA, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0820	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042509-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:10 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-7 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cesium-134, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cesium-134, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cesium-134, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cesium-134, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cesium-137, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cesium-137, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Cesium-137, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Iron-59, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Iron-59, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Iron-59, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Potassium-40, Activity, Solid	21.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Potassium-40, error +/-, Solid	3.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Potassium-40, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Lead-212, Activity, Solid	1.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Lead-212, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Lead-214, Activity, Solid	1.8					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Lead-214, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Lead-214, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Lead-214, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Radium-226, Activity, Solid	1.7					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Radium-226, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Radium-226, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Radium-226, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Radium-228, Activity, Solid	1.5					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Radium-228, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Ruthenium-103, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Ruthenium-103, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042509-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:10 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-7 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Ruthenium-103, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Ruthenium-106, Activity, Solid	2.5					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Ruthenium-106, Error, +/-, Solid	1.3					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Ruthenium-106, MDA, Solid	1.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Ruthenium-106, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Thorium-231, Activity, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Thorium-231, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Thorium-231, MDA, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Thorium-231, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Thorium-232, Solid	7.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Thorium-232, Error +/-, Solid	64.6					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Thorium-232, MDA, Solid	28.7					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Thorium-232, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Uranium-235, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Uranium 235, error +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Uranium-235, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Uranium-235, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Uranium-238, Activity, Solid	5.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Uranium 238, error +/-, Solid	2.9					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Uranium-238, MDA, Solid	1.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Uranium-238, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Zirconium-95, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Zirconium-95, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Zirconium-95, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0820	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0820	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042510-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:05 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-8 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.33					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.380					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0700					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0800					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.870					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.290					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Americium-241, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Americium-241, error +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Americium-241, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Americium-241, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cerium-144, Error, +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cobalt-60, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cobalt-60, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Chromium-51, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Chromium-51, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0829	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440

Date: 03/31/1999

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600835

ATTN: Suzi Jensen

Customer Sample ID..: 042510-001
Laboratory Sample ID: 982440-8

Date Sampled.....: 09/08/1998 Time Sampled.....: 14:05 Sample Matrix.....: Soil
Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cesium-134, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cesium-134, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cesium-134, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cesium-134, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cesium-137, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cesium-137, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Cesium-137, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Iron-59, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Iron-59, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Potassium-40, Activity, Solid	19.5					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Potassium-40, error +/-, Solid	3.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Potassium-40, MDA, Solid	0.5					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Lead-212, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Lead-212, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Lead-214, Activity, Solid	1.8					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Lead-214, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Lead-214, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Lead-214, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Radium-226, Activity, Solid	1.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Radium-226, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Radium-226, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Radium-226, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Radium-228, Activity, Solid	1.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Radium-228, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Ruthenium-103, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042510-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:05 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-8 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Ruthenium-103, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Ruthenium-106, Activity, Solid	2.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Ruthenium-106, Error, +/-, Solid	0.7					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Ruthenium-106, MDA, Solid	1.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Thorium-231, Activity, Solid	1.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Thorium-231, error +/-, Solid	1.4					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Thorium-231, MDA, Solid	1.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Thorium-231, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Thorium-232, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Thorium-232, Error +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Thorium-232, MDA, Solid	51.6					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Thorium-232, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Uranium-235, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Uranium 235, error +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Uranium-235, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Uranium-238, Activity, Solid	4.7					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Uranium 238, error +/-, Solid	3.6					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Uranium-238, MDA, Solid	2.7					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Uranium-238, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Zirconium-95, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Zirconium-95, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 0829	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042511-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-10 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.830					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.290					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0700					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0800					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	1.05					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.320					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Americium-241, Activity, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Americium-241, error +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Americium-241, Lc, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Cerium-144, Activity, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Cerium-144, Error, +/-, Solid	0.8					1	pCi/g	10293	09/26/1998 0931	* ca
	Cerium-144, MDA, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Cerium-144, Lc, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Chromium-51, Activity, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Chromium-51, Error, +/-, Solid	1.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Chromium-51, MDA, Solid	0.8					1	pCi/g	10293	09/26/1998 0931	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042511-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-10 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-134, Activity, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-134, Error, +/-, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-134, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-134, Lc, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-137, Activity, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-137, Error, +/-, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-137, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-137, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Iron-59, Activity, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Iron-59, Error, +/-, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Iron-59, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Iron-59, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Potassium-40, Activity, Solid	23.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Potassium-40, error +/-, Solid	3.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Potassium-40, MDA, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Potassium-40, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-212, Activity, Solid	1.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-212, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-212, Lc, Solid	0.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-214, Activity, Solid	1.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-214, error +/-, Solid	0.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-214, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-214, Lc, Solid	0.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-226, Activity, Solid	1.9					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-226, Error, +/-, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-226, MDA, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-226, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-228, Activity, Solid	1.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-228, Error, +/-, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-228, MDA, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-228, Lc, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-103, Activity, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042511-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-10 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-103, Lc, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-106, Activity, Solid	1.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-106, Error, +/-, Solid	1.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-106, MDA, Solid	0.9					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-106, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-231, Activity, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-231, error +/-, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-231, MDA, Solid	0.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-231, Lc, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-232, Solid	7.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-232, Error +/-, Solid	45.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-232, MDA, Solid	23.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-232, Lc, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-235, Activity, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium 235, error +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-235, Lc, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-238, Activity, Solid	6.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium 238, error +/-, Solid	5.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-238, MDA, Solid	1.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-238, Lc, Solid	0.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Zirconium-95, Activity, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Zirconium-95, Error, +/-, Solid	0.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Zirconium-95, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Zirconium-95, Lc, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042512-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:20 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-11 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TEC
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.37					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium 234, error +/-, Solid	0.380					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-235, Activity, Solid	0.110					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium 235, error +/-, Solid	0.100					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-238, Activity, Solid	1.57					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium 238, error +/-, Solid	0.410					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-235, MDA, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-235, Lc, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-238, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* c
	Uranium-238, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* c
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.4					1	pCi/g	10293	09/26/1998 0931	* c
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* c
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* c
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* c
	Americium-241, Activity, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Americium-241, error +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Americium-241, MDA, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Americium-241, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Cerium-144, Activity, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* c
	Cerium-144, Error, +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Cerium-144, MDA, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Cerium-144, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* c
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* c
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* c
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* c
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* c
	Chromium-51, Activity, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* c
	Chromium-51, Error, +/-, Solid	0.6					1	pCi/g	10293	09/26/1998 0931	* c
	Chromium-51, MDA, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* c

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042512-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:20 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-11 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-134, Activity, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-134, Error, +/-, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-134, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-134, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-137, Activity, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-137, Error, +/-, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-137, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Cesium-137, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Iron-59, Activity, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Iron-59, Error, +/-, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Iron-59, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Iron-59, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Potassium-40, Activity, Solid	18.9					1	pCi/g	10293	09/26/1998 0931	* ca
	Potassium-40, error +/-, Solid	3.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Potassium-40, MDA, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Potassium-40, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-212, Activity, Solid	1.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-212, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-212, Lc, Solid	0.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-214, Activity, Solid	1.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-214, error +/-, Solid	0.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-214, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Lead-214, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-226, Activity, Solid	1.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-226, Error, +/-, Solid	0.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-226, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-226, Lc, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-228, Activity, Solid	2.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-228, Error, +/-, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-228, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Radium-228, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-103, Activity, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042512-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:20 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-11 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-103, Lc, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-106, Activity, Solid	0.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-106, Error, +/-, Solid	0.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-106, MDA, Solid	0.7					1	pCi/g	10293	09/26/1998 0931	* ca
	Ruthenium-106, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-231, Activity, Solid	1.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-231, error +/-, Solid	1.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-231, MDA, Solid	0.9					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-231, Lc, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-232, Solid	16.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-232, Error +/-, Solid	60.7					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-232, MDA, Solid	54.5					1	pCi/g	10293	09/26/1998 0931	* ca
	Thorium-232, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-235, Activity, Solid	0.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium 235, error +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-235, Lc, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-238, Activity, Solid	8.2					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium 238, error +/-, Solid	4.7					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-238, MDA, Solid	2.6					1	pCi/g	10293	09/26/1998 0931	* ca
	Uranium-238, Lc, Solid	0.3					1	pCi/g	10293	09/26/1998 0931	* ca
	Zirconium-95, Activity, Solid	0.4					1	pCi/g	10293	09/26/1998 0931	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1	pCi/g	10293	09/26/1998 0931	* ca
	Zirconium-95, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca
	Zirconium-95, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 0931	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440

Date: 03/31/1999

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600835

ATTN: Suzi Jensen

Customer Sample ID..: 042513-001
Laboratory Sample ID: 982440-14

Date Sampled.....: 09/08/1998 Time Sampled.....: 14:30 Sample Matrix.....: Soil
Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.14					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.360					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0800					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0800					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.990					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.320					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.9					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, error +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Activity, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, Activity, Solid	1.8					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, Error, +/-, Solid	1.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, MDA, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1033	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042513-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:30 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-14 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-134, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-134, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-134, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-134, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-137, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-137, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-137, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Iron-59, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Iron-59, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Potassium-40, Activity, Solid	23.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Potassium-40, error +/-, Solid	3.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Potassium-40, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-212, Activity, Solid	1.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-212, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-214, Activity, Solid	1.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-214, error +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-214, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-214, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-226, Activity, Solid	1.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-226, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-226, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-226, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-228, Activity, Solid	1.9					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-228, Error, +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-228, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-228, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-103, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-103, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042513-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:30 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-14 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-103, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-106, Activity, Solid	1.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-106, Error, +/-, Solid	1.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-106, MDA, Solid	1.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-106, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-231, Activity, Solid	0.9					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-231, error +/-, Solid	0.8					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-231, MDA, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-231, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-232, Solid	49.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-232, Error +/-, Solid	43.9					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-232, MDA, Solid	26.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-232, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-235, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium 235, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-235, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-238, Activity, Solid	6.6					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium 238, error +/-, Solid	1.9					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-238, MDA, Solid	1.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-238, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Zirconium-95, Activity, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Zirconium-95, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Zirconium-95, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca

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LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042514-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:33 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-15 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.830					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.270					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0900					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0900					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.770					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.260					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.7					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Americium-241, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Activity, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cerium-144, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, Activity, Solid	1.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, Error, +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Chromium-51, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440

Date: 03/31/1999

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600835

ATTN: Suzi Jensen

Customer Sample ID..: 042514-001
Laboratory Sample ID: 982440-15

Date Sampled.....: 09/08/1998 Time Sampled.....: 14:33 Sample Matrix.....: Soil
Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-134, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-134, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-134, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-134, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-137, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-137, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Cesium-137, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Iron-59, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Iron-59, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Potassium-40, Activity, Solid	23.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Potassium-40, error +/-, Solid	3.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Potassium-40, MDA, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-212, Activity, Solid	0.9					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-212, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-214, Activity, Solid	1.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-214, error +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-214, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Lead-214, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-226, Activity, Solid	1.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-226, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-226, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-226, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-228, Activity, Solid	1.7					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-228, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-103, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042514-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:33 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-15 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-103, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-106, Activity, Solid	1.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-106, Error, +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-106, MDA, Solid	0.9					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-231, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-231, error +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-231, MDA, Solid	0.9					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-231, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-232, Solid	66.6					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-232, Error +/-, Solid	77.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-232, MDA, Solid	70.6					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Thorium-232, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-235, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium 235, error +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-235, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-235, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-238, Activity, Solid	5.6					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium 238, error +/-, Solid	4.7					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-238, MDA, Solid	2.8					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Uranium-238, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Zirconium-95, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Zirconium-95, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1033	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042515-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:35 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-17 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.03					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.330					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0400					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	1.09					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.330					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, error +/-, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, Activity, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, error +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, Lc, Solid	0.5					1	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Activity, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Error, +/-, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, MDA, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Lc, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Activity, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, Activity, Solid	1.6					1	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, Error, +/-, Solid	1.9					1	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, MDA, Solid	1.0					1	pCi/g	10293	09/26/1998 1140	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042515-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:35 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-17 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-134, Activity, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-134, Error, +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-134, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-134, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-137, Activity, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-137, Error, +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-137, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-137, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Iron-59, Activity, Solid	0.6					1	pCi/g	10293	09/26/1998 1140	* ca
	Iron-59, Error, +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Iron-59, MDA, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Iron-59, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Potassium-40, Activity, Solid	25.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Potassium-40, error +/-, Solid	3.3					1	pCi/g	10293	09/26/1998 1140	* ca
	Potassium-40, MDA, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Potassium-40, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Lead-212, Activity, Solid	1.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Lead-212, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Lead-212, Lc, Solid	0.3					1	pCi/g	10293	09/26/1998 1140	* ca
	Lead-214, Activity, Solid	2.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Lead-214, error +/-, Solid	0.5					1	pCi/g	10293	09/26/1998 1140	* ca
	Lead-214, MDA, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	* ca
	Lead-214, Lc, Solid	0.3					1	pCi/g	10293	09/26/1998 1140	* ca
	Radium-226, Activity, Solid	1.9					1	pCi/g	10293	09/26/1998 1140	* ca
	Radium-226, Error, +/-, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Radium-226, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Radium-226, Lc, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Radium-228, Activity, Solid	2.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Radium-228, Error, +/-, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	* ca
	Radium-228, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	* ca
	Radium-228, Lc, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Ruthenium-103, Activity, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1	pCi/g	10293	09/26/1998 1140	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042515-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:35 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-17 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TE
	Ruthenium-103, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	*
	Ruthenium-103, Lc, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	*
	Ruthenium-106, Activity, Solid	1.1					1	pCi/g	10293	09/26/1998 1140	*
	Ruthenium-106, Error, +/-, Solid	0.7					1	pCi/g	10293	09/26/1998 1140	*
	Ruthenium-106, MDA, Solid	0.9					1	pCi/g	10293	09/26/1998 1140	*
	Ruthenium-106, Lc, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	*
	Thorium-231, Activity, Solid	2.0					1	pCi/g	10293	09/26/1998 1140	*
	Thorium-231, error +/-, Solid	1.3					1	pCi/g	10293	09/26/1998 1140	*
	Thorium-231, MDA, Solid	0.8					1	pCi/g	10293	09/26/1998 1140	*
	Thorium-231, Lc, Solid	0.6					1	pCi/g	10293	09/26/1998 1140	*
	Thorium-232, Solid	36.3					1	pCi/g	10293	09/26/1998 1140	*
	Thorium-232, Error +/-, Solid	43.6					1	pCi/g	10293	09/26/1998 1140	*
	Thorium-232, MDA, Solid	26.9					1	pCi/g	10293	09/26/1998 1140	*
	Thorium-232, Lc, Solid	0.5					1	pCi/g	10293	09/26/1998 1140	*
	Uranium-235, Activity, Solid	0.4					1	pCi/g	10293	09/26/1998 1140	*
	Uranium 235, error +/-, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	*
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	*
	Uranium-235, Lc, Solid	0.3					1	pCi/g	10293	09/26/1998 1140	*
	Uranium-238, Activity, Solid	5.4					1	pCi/g	10293	09/26/1998 1140	*
	Uranium 238, error +/-, Solid	1.9					1	pCi/g	10293	09/26/1998 1140	*
	Uranium-238, MDA, Solid	1.1					1	pCi/g	10293	09/26/1998 1140	*
	Uranium-238, Lc, Solid	0.5					1	pCi/g	10293	09/26/1998 1140	*
	Zirconium-95, Activity, Solid	0.2					1	pCi/g	10293	09/26/1998 1140	*
	Zirconium-95, Error, +/-, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	*
	Zirconium-95, MDA, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	*
	Zirconium-95, Lc, Solid	0.1					1	pCi/g	10293	09/26/1998 1140	*

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042516-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:45 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-20 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.800					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.290					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0300					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	1.00					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.320					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.6					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, error +/-, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, MDA, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Americium-241, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Chromium-51, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1140	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440

Date: 03/31/1999

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600835

ATTN: Suzi Jensen

Customer Sample ID..: 042516-001
Laboratory Sample ID: 982440-20

Date Sampled.....: 09/08/1998 Time Sampled.....: 14:45 Sample Matrix.....: Soil
Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-134, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-134, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-134, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-134, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-137, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-137, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Cesium-137, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Iron-59, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Iron-59, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Potassium-40, Activity, Solid	22.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Potassium-40, error +/-, Solid	3.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Potassium-40, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Lead-212, Activity, Solid	0.8					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Lead-212, error +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Lead-212, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Lead-214, Activity, Solid	1.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Lead-214, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Lead-214, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Lead-214, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Radium-226, Activity, Solid	1.2					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Radium-226, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Radium-226, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Radium-226, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Radium-228, Activity, Solid	1.6					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Radium-228, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Ruthenium-103, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042516-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:45 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-20 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Ruthenium-103, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Ruthenium-106, Activity, Solid	1.5					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Ruthenium-106, Error, +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Ruthenium-106, MDA, Solid	0.9					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Thorium-231, Activity, Solid	1.8					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Thorium-231, error +/-, Solid	1.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Thorium-231, MDA, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Thorium-231, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Thorium-232, Solid	135					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Thorium-232, Error +/-, Solid	134					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Thorium-232, MDA, Solid	59.8					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Thorium-232, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Uranium-235, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Uranium 235, error +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Uranium-235, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Uranium-238, Activity, Solid	3.6					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Uranium 238, error +/-, Solid	3.4					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Uranium-238, MDA, Solid	2.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Uranium-238, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Zirconium-95, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Zirconium-95, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1140	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042517-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:50 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-21 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TE
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.850					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 234, error +/-, Solid	0.300					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, Activity, Solid	0.110					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 235, error +/-, Solid	0.100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, Activity, Solid	0.850					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 238, error +/-, Solid	0.290					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.2					1.00	pCi/g	10293	09/26/1998 1249	*
	Actinium-228, error +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	*
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	*
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	*
	Americium-241, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	*
	Americium-241, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	*
	Americium-241, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	*
	Americium-241, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1249	*
	Cerium-144, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	*
	Cerium-144, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	*
	Cerium-144, MDA, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	*
	Cerium-144, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	*
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	*
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	*
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	*
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	*
	Chromium-51, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1249	*
	Chromium-51, Error, +/-, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1249	*
	Chromium-51, MDA, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1249	*

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042517-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:50 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-21 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-134, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-134, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-134, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-134, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-137, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-137, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-137, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-137, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Iron-59, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Iron-59, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Iron-59, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Potassium-40, Activity, Solid	24.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Potassium-40, error +/-, Solid	3.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Potassium-40, MDA, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-212, Activity, Solid	0.8					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-212, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-214, Activity, Solid	1.6					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-214, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-214, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-214, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-226, Activity, Solid	1.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-226, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-226, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-226, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-228, Activity, Solid	1.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-228, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-103, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042517-001 Date Sampled.....: 09/08/1998 Time Sampled.....: 14:50 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-21 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-103, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-106, Activity, Solid	1.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-106, Error, +/-, Solid	1.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-106, MDA, Solid	0.8					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-106, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-231, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-231, error +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-231, MDA, Solid	0.8					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-231, Lc, Solid	0.8					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-232, Solid	23.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-232, Error +/-, Solid	28.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-232, MDA, Solid	21.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-232, Lc, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-235, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium 235, error +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-235, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-238, Activity, Solid	5.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium 238, error +/-, Solid	2.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-238, MDA, Solid	1.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-238, Lc, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Zirconium-95, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Zirconium-95, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Zirconium-95, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Zirconium-95, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042518-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-22 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECI
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.780					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 234, error +/-, Solid	0.280					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Activity, Solid	0.0600					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 235, error +/-, Solid	0.0700					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Activity, Solid	0.630					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium 238, error +/-, Solid	0.240					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Americium-241, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Americium-241, error +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Americium-241, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Americium-241, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cerium-144, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cerium-144, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cobalt-60, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Chromium-51, Activity, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Chromium-51, Error, +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042518-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-22 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-134, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-134, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-134, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-134, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-137, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-137, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-137, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Cesium-137, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Iron-59, Activity, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Iron-59, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Potassium-40, Activity, Solid	19.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Potassium-40, error +/-, Solid	3.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Potassium-40, MDA, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-212, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-212, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-214, Activity, Solid	1.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-214, error +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-214, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Lead-214, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-226, Activity, Solid	1.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-226, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-226, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-226, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-228, Activity, Solid	1.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-228, Error, +/-, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-103, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042518-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-22 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-103, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-106, Activity, Solid	1.6					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-106, Error, +/-, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-106, MDA, Solid	1.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-231, Activity, Solid	1.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-231, error +/-, Solid	1.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-231, MDA, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-231, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-232, Solid	145					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-232, Error +/-, Solid	124					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-232, MDA, Solid	80.8					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Thorium-232, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-235, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium 235, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-235, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-238, Activity, Solid	4.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium 238, error +/-, Solid	3.9					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-238, MDA, Solid	2.5					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Uranium-238, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Zirconium-95, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Zirconium-95, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1249	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042519-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-25 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TE
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.670					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 234, error +/-, Solid	0.240					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, Activity, Solid	0.0500					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 235, error +/-, Solid	0.0600					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, Activity, Solid	0.680					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium 238, error +/-, Solid	0.240					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, MDA, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-235, Lc, Solid	0.0200					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, MDA, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
	Uranium-238, Lc, Solid	0.0100					1.00	pCi/g	10281	10/07/1998 1719	*
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1359	*
	Actinium-228, error +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	*
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Americium-241, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1359	*
	Americium-241, error +/-, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1359	*
	Americium-241, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1359	*
	Americium-241, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	*
	Cerium-144, Activity, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	*
	Cerium-144, Error, +/-, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1359	*
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1359	*
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	*
	Cobalt-60, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Cobalt-60, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Cobalt-60, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Chromium-51, Activity, Solid	1.7					1.00	pCi/g	10293	09/26/1998 1359	*
	Chromium-51, Error, +/-, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1359	*
	Chromium-51, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042519-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-25 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	T
	Chromium-51, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Cesium-134, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Cesium-134, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Cesium-134, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Cesium-134, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Cesium-137, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1359	*
	Cesium-137, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Cesium-137, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Iron-59, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1359	*
	Iron-59, Error, +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Potassium-40, Activity, Solid	20.6					1.00	pCi/g	10293	09/26/1998 1359	*
	Potassium-40, error +/-, Solid	3.5					1.00	pCi/g	10293	09/26/1998 1359	*
	Potassium-40, MDA, Solid	0.5					1.00	pCi/g	10293	09/26/1998 1359	*
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Lead-212, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1359	*
	Lead-212, error +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Lead-212, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1359	*
	Lead-214, Activity, Solid	1.2					1.00	pCi/g	10293	09/26/1998 1359	*
	Lead-214, error +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1359	*
	Lead-214, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Lead-214, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Radium-226, Activity, Solid	1.4					1.00	pCi/g	10293	09/26/1998 1359	*
	Radium-226, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	*
	Radium-226, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Radium-226, Lc, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Radium-228, Activity, Solid	0.7					1.00	pCi/g	10293	09/26/1998 1359	*
	Radium-228, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	*
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	*
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Ruthenium-103, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*
	Ruthenium-103, Error, +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	*

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042519-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-25 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Ruthenium-103, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Ruthenium-106, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Ruthenium-106, Error, +/-, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Ruthenium-106, MDA, Solid	0.6					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Thorium-231, Activity, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Thorium-231, error +/-, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Thorium-231, MDA, Solid	1.0					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Thorium-231, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Thorium-232, Solid	35.3					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Thorium-232, Error +/-, Solid	55.7					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Thorium-232, MDA, Solid	64.7					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Thorium-232, Lc, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Uranium-235, Activity, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Uranium 235, error +/-, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Uranium-235, Lc, Solid	0.3					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Uranium-238, Activity, Solid	2.9					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Uranium 238, error +/-, Solid	3.6					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Uranium-238, MDA, Solid	3.4					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Uranium-238, Lc, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Zirconium-95, Activity, Solid	0.4					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Zirconium-95, Error, +/-, Solid	0.2					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Zirconium-95, MDA, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10293	09/26/1998 1359	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042520-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:20 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-27 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TE
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.960					1	pCi/g	10279	10/07/1998 1458	*
	Uranium 234, error +/-, Solid	0.310					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-235, Activity, Solid	0.140					1	pCi/g	10279	10/07/1998 1458	*
	Uranium 235, error +/-, Solid	0.110					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-238, Activity, Solid	0.870					1	pCi/g	10279	10/07/1998 1458	*
	Uranium 238, error +/-, Solid	0.290					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/1998 1458	*
	Uranium-238, Lc, Solid	0.0300					1	pCi/g	10279	10/07/1998 1458	*
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	2.3					1	pCi/g	10306	09/26/1998 1504	*
	Actinium-228, error +/-, Solid	0.7					1	pCi/g	10306	09/26/1998 1504	*
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	*
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	*
	Americium-241, Activity, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	*
	Americium-241, error +/-, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	*
	Americium-241, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	*
	Americium-241, Lc, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	*
	Cerium-144, Activity, Solid	0.3					1	pCi/g	10306	09/26/1998 1504	*
	Cerium-144, Error, +/-, Solid	0.6					1	pCi/g	10306	09/26/1998 1504	*
	Cerium-144, MDA, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	*
	Cerium-144, Lc, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	*
	Cobalt-60, Activity, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	*
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	*
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	*
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	*
	Chromium-51, Activity, Solid	0.9					1	pCi/g	10306	09/26/1998 1504	*
	Chromium-51, Error, +/-, Solid	0.8					1	pCi/g	10306	09/26/1998 1504	*
	Chromium-51, MDA, Solid	0.5					1	pCi/g	10306	09/26/1998 1504	*

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440

Date: 03/31/1999

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600835

ATTN: Suzi Jensen

Customer Sample ID..: 042520-001
Laboratory Sample ID: 982440-27

Date Sampled.....: 09/09/1998 Time Sampled.....: 10:20 Sample Matrix.....: Soil
Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	* ca
	Cesium-134, Activity, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Cesium-134, Error, +/-, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Cesium-134, MDA, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	* ca
	Cesium-134, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Cesium-137, Activity, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	* ca
	Cesium-137, Error, +/-, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	* ca
	Cesium-137, MDA, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	* ca
	Cesium-137, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Iron-59, Activity, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Iron-59, Error, +/-, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Iron-59, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Iron-59, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	* ca
	Potassium-40, Activity, Solid	24.4					1	pCi/g	10306	09/26/1998 1504	* ca
	Potassium-40, error +/-, Solid	3.3					1	pCi/g	10306	09/26/1998 1504	* ca
	Potassium-40, MDA, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	* ca
	Potassium-40, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	* ca
	Lead-212, Activity, Solid	0.9					1	pCi/g	10306	09/26/1998 1504	* ca
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	* ca
	Lead-212, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Lead-212, Lc, Solid	0.3					1	pCi/g	10306	09/26/1998 1504	* ca
	Lead-214, Activity, Solid	1.6					1	pCi/g	10306	09/26/1998 1504	* ca
	Lead-214, error +/-, Solid	0.5					1	pCi/g	10306	09/26/1998 1504	* ca
	Lead-214, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	* ca
	Lead-214, Lc, Solid	0.3					1	pCi/g	10306	09/26/1998 1504	* ca
	Radium-226, Activity, Solid	1.5					1	pCi/g	10306	09/26/1998 1504	* ca
	Radium-226, Error, +/-, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	* ca
	Radium-226, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Radium-226, Lc, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	* ca
	Radium-228, Activity, Solid	2.3					1	pCi/g	10306	09/26/1998 1504	* ca
	Radium-228, Error, +/-, Solid	0.7					1	pCi/g	10306	09/26/1998 1504	* ca
	Radium-228, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	* ca
	Radium-228, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Ruthenium-103, Activity, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042520-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:20 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-27 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	* ca
	Ruthenium-103, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 1504	* ca
	Ruthenium-106, Activity, Solid	1.2					1	pCi/g	10306	09/26/1998 1504	* ca
	Ruthenium-106, Error, +/-, Solid	1.0					1	pCi/g	10306	09/26/1998 1504	* ca
	Ruthenium-106, MDA, Solid	0.9					1	pCi/g	10306	09/26/1998 1504	* ca
	Ruthenium-106, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Thorium-231, Activity, Solid	0.6					1	pCi/g	10306	09/26/1998 1504	* ca
	Thorium-231, error +/-, Solid	0.8					1	pCi/g	10306	09/26/1998 1504	* ca
	Thorium-231, MDA, Solid	0.7					1	pCi/g	10306	09/26/1998 1504	* ca
	Thorium-231, Lc, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	* ca
	Thorium-232, Solid	35.7					1	pCi/g	10306	09/26/1998 1504	* ca
	Thorium-232, Error +/-, Solid	28.9					1	pCi/g	10306	09/26/1998 1504	* ca
	Thorium-232, MDA, Solid	18.6					1	pCi/g	10306	09/26/1998 1504	* ca
	Thorium-232, Lc, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	* ca
	Uranium-235, Activity, Solid	0.4					1	pCi/g	10306	09/26/1998 1504	* ca
	Uranium 235, error +/-, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Uranium-235, Lc, Solid	0.2					1	pCi/g	10306	09/26/1998 1504	* ca
	Uranium-238, Activity, Solid	8.4					1	pCi/g	10306	09/26/1998 1504	* ca
	Uranium 238, error +/-, Solid	2.4					1	pCi/g	10306	09/26/1998 1504	* ca
	Uranium-238, MDA, Solid	1.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Uranium-238, Lc, Solid	0.5					1	pCi/g	10306	09/26/1998 1504	* ca
	Zirconium-95, Activity, Solid	0.3					1	pCi/g	10306	09/26/1998 1504	* ca
	Zirconium-95, Error, +/-, Solid	0.3					1	pCi/g	10306	09/26/1998 1504	* ca
	Zirconium-95, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca
	Zirconium-95, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1504	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042521-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:22 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-30 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.720					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 234, error +/-, Solid	0.260					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Activity, Solid	0.0500					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 235, error +/-, Solid	0.0700					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Activity, Solid	0.800					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 238, error +/-, Solid	0.270					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Lc, Solid	0.0200					1.00	pCi/g	10279	10/07/1998 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.8					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Actinium-228, error +/-, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Americium-241, Activity, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Americium-241, error +/-, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Americium-241, MDA, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cerium-144, Activity, Solid	1.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cerium-144, Error, +/-, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cerium-144, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Chromium-51, Activity, Solid	1.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Chromium-51, Error, +/-, Solid	0.7					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Chromium-51, MDA, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1501	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042521-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:22 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-30 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cesium-134, Activity, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cesium-134, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cesium-134, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cesium-134, Lc, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cesium-137, Activity, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cesium-137, Error, +/-, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Cesium-137, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Iron-59, Activity, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Iron-59, Error, +/-, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Potassium-40, Activity, Solid	20.8					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Potassium-40, error +/-, Solid	3.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Potassium-40, MDA, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Lead-212, Activity, Solid	1.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Lead-212, Lc, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Lead-214, Activity, Solid	1.7					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Lead-214, error +/-, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Lead-214, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Lead-214, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Radium-226, Activity, Solid	1.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Radium-226, Error, +/-, Solid	0.6					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Radium-226, MDA, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Radium-226, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Radium-228, Activity, Solid	1.8					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Radium-228, Error, +/-, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Ruthenium-103, Activity, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042521-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 10:22 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-30 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Ruthenium-103, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Ruthenium-106, Activity, Solid	2.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Ruthenium-106, Error, +/-, Solid	0.7					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Ruthenium-106, MDA, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Thorium-231, Activity, Solid	1.3					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Thorium-231, error +/-, Solid	1.3					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Thorium-231, MDA, Solid	0.8					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Thorium-231, Lc, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Thorium-232, Solid	72.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Thorium-232, Error +/-, Solid	73.3					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Thorium-232, MDA, Solid	67.5					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Thorium-232, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Uranium-235, Activity, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Uranium 235, error +/-, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Uranium-235, Lc, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Uranium-238, Activity, Solid	6.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Uranium 238, error +/-, Solid	4.3					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Uranium-238, MDA, Solid	3.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Uranium-238, Lc, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Zirconium-95, Activity, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Zirconium-95, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1501	* ca

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LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042522-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-32 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TEC
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.820					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium 234, error +/-, Solid	0.280					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, Activity, Solid	0.0300					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium 235, error +/-, Solid	0.0500					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, Activity, Solid	0.700					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium 238, error +/-, Solid	0.240					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, Lc, Solid	0.0200					1	pCi/g	10279	10/07/1998 1458	* c
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.2					1	pCi/g	10306	09/26/1998 1939	* c
	Actinium-228, error +/-, Solid	0.6					1	pCi/g	10306	09/26/1998 1939	* c
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	* c
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* c
	Americium-241, Activity, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	* c
	Americium-241, error +/-, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	* c
	Americium-241, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* c
	Americium-241, Lc, Solid	0.5					1	pCi/g	10306	09/26/1998 1939	* c
	Cerium-144, Activity, Solid	0.8					1	pCi/g	10306	09/26/1998 1939	* c
	Cerium-144, Error, +/-, Solid	0.5					1	pCi/g	10306	09/26/1998 1939	* c
	Cerium-144, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	* c
	Cerium-144, Lc, Solid	0.3					1	pCi/g	10306	09/26/1998 1939	* c
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* c
	Cobalt-60, Error, +/-, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* c
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10306	09/26/1998 1939	* c
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 1939	* c
	Chromium-51, Activity, Solid	1.3					1	pCi/g	10306	09/26/1998 1939	* c
	Chromium-51, Error, +/-, Solid	0.9					1	pCi/g	10306	09/26/1998 1939	* c
	Chromium-51, MDA, Solid	0.4					1	pCi/g	10306	09/26/1998 1939	* c

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042522-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-32 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TE
	Chromium-51, Lc, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	*
	Cesium-134, Activity, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	*
	Cesium-134, Error, +/-, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	*
	Cesium-134, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	*
	Cesium-134, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	*
	Cesium-137, Activity, Solid	0.4					1	pCi/g	10306	09/26/1998 1939	*
	Cesium-137, Error, +/-, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	*
	Cesium-137, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	*
	Cesium-137, Lc, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	*
	Iron-59, Activity, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	*
	Iron-59, Error, +/-, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	*
	Iron-59, MDA, Solid	0.0					1	pCi/g	10306	09/26/1998 1939	*
	Iron-59, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 1939	*
	Potassium-40, Activity, Solid	25.3					1	pCi/g	10306	09/26/1998 1939	*
	Potassium-40, error +/-, Solid	3.2					1	pCi/g	10306	09/26/1998 1939	*
	Potassium-40, MDA, Solid	0.3					1	pCi/g	10306	09/26/1998 1939	*
	Potassium-40, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 1939	*
	Lead-212, Activity, Solid	0.9					1	pCi/g	10306	09/26/1998 1939	*
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	*
	Lead-212, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	*
	Lead-212, Lc, Solid	0.3					1	pCi/g	10306	09/26/1998 1939	*
	Lead-214, Activity, Solid	1.4					1	pCi/g	10306	09/26/1998 1939	*
	Lead-214, error +/-, Solid	0.4					1	pCi/g	10306	09/26/1998 1939	*
	Lead-214, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	*
	Lead-214, Lc, Solid	0.3					1	pCi/g	10306	09/26/1998 1939	*
	Radium-226, Activity, Solid	1.6					1	pCi/g	10306	09/26/1998 1939	*
	Radium-226, Error, +/-, Solid	0.5					1	pCi/g	10306	09/26/1998 1939	*
	Radium-226, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	*
	Radium-226, Lc, Solid	0.3					1	pCi/g	10306	09/26/1998 1939	*
	Radium-228, Activity, Solid	1.2					1	pCi/g	10306	09/26/1998 1939	*
	Radium-228, Error, +/-, Solid	0.6					1	pCi/g	10306	09/26/1998 1939	*
	Radium-228, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	*
	Radium-228, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	*
	Ruthenium-103, Activity, Solid	0.0					1	pCi/g	10306	09/26/1998 1939	*
	Ruthenium-103, Error, +/-, Solid	0.0					1	pCi/g	10306	09/26/1998 1939	*

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042522-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:00 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-32 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1	pCi/g	10306	09/26/1998 1939	* ca
	Ruthenium-103, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* ca
	Ruthenium-106, Activity, Solid	1.2					1	pCi/g	10306	09/26/1998 1939	* ca
	Ruthenium-106, Error, +/-, Solid	0.7					1	pCi/g	10306	09/26/1998 1939	* ca
	Ruthenium-106, MDA, Solid	0.8					1	pCi/g	10306	09/26/1998 1939	* ca
	Ruthenium-106, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* ca
	Thorium-231, Activity, Solid	1.0					1	pCi/g	10306	09/26/1998 1939	* ca
	Thorium-231, error +/-, Solid	0.6					1	pCi/g	10306	09/26/1998 1939	* ca
	Thorium-231, MDA, Solid	0.4					1	pCi/g	10306	09/26/1998 1939	* ca
	Thorium-231, Lc, Solid	0.3					1	pCi/g	10306	09/26/1998 1939	* ca
	Thorium-232, Solid	30.1					1	pCi/g	10306	09/26/1998 1939	* ca
	Thorium-232, Error +/-, Solid	31.9					1	pCi/g	10306	09/26/1998 1939	* ca
	Thorium-232, MDA, Solid	23.4					1	pCi/g	10306	09/26/1998 1939	* ca
	Thorium-232, Lc, Solid	0.5					1	pCi/g	10306	09/26/1998 1939	* ca
	Uranium-235, Activity, Solid	0.4					1	pCi/g	10306	09/26/1998 1939	* ca
	Uranium 235, error +/-, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	* ca
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* ca
	Uranium-235, Lc, Solid	0.4					1	pCi/g	10306	09/26/1998 1939	* ca
	Uranium-238, Activity, Solid	6.8					1	pCi/g	10306	09/26/1998 1939	* ca
	Uranium 238, error +/-, Solid	2.8					1	pCi/g	10306	09/26/1998 1939	* ca
	Uranium-238, MDA, Solid	1.4					1	pCi/g	10306	09/26/1998 1939	* ca
	Uranium-238, Lc, Solid	0.6					1	pCi/g	10306	09/26/1998 1939	* ca
	Zirconium-95, Activity, Solid	0.2					1	pCi/g	10306	09/26/1998 1939	* ca
	Zirconium-95, Error, +/-, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* ca
	Zirconium-95, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* ca
	Zirconium-95, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 1939	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440

Date: 03/31/1999

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600835

ATTN: Suzi Jensen

Customer Sample ID..: 042523-001
Laboratory Sample ID: 982440-35

Date Sampled.....: 09/09/1998 Time Sampled.....: 11:05 Sample Matrix.....: Soil
Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TEC
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	0.570					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium 234, error +/-, Solid	0.250					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, Activity, Solid	0.100					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium 235, error +/-, Solid	0.0900					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, Activity, Solid	0.950					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium 238, error +/-, Solid	0.310					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, MDA, Solid	0.0200					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/1998 1458	* c
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.1					1.00	pCi/g	10306	09/26/1998 1940	* c
	Actinium-228, error +/-, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1940	* c
	Actinium-228, MDA, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* c
	Actinium-228, Lc, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* c
	Americium-241, Activity, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* c
	Americium-241, error +/-, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1940	* c
	Americium-241, MDA, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1940	* c
	Americium-241, Lc, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1940	* c
	Cerium-144, Activity, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* c
	Cerium-144, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* c
	Cerium-144, MDA, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* c
	Cerium-144, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* c
	Cobalt-60, Activity, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1940	* c
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* c
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* c
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* c
	Chromium-51, Activity, Solid	1.8					1.00	pCi/g	10306	09/26/1998 1940	* c
	Chromium-51, Error, +/-, Solid	1.2					1.00	pCi/g	10306	09/26/1998 1940	* c
	Chromium-51, MDA, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1940	* c

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042523-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:05 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-35 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cesium-134, Activity, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cesium-134, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cesium-134, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cesium-134, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cesium-137, Activity, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cesium-137, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cesium-137, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Cesium-137, Lc, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Iron-59, Activity, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Iron-59, Error, +/-, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Potassium-40, Activity, Solid	21.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Potassium-40, error +/-, Solid	3.5					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Potassium-40, MDA, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Lead-212, Activity, Solid	0.8					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Lead-212, error +/-, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Lead-212, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Lead-212, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Lead-214, Activity, Solid	1.4					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Lead-214, error +/-, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Lead-214, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Lead-214, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Radium-226, Activity, Solid	1.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Radium-226, Error, +/-, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Radium-226, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Radium-226, Lc, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Radium-228, Activity, Solid	1.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Radium-228, Error, +/-, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Radium-228, MDA, Solid	0.2					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Radium-228, Lc, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Ruthenium-103, Activity, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Ruthenium-103, Error, +/-, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440

Date: 03/31/1999

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600835

ATTN: Suzi Jensen

Customer Sample ID..: 042523-001
Laboratory Sample ID: 982440-35

Date Sampled.....: 09/09/1998 Time Sampled.....: 11:05 Sample Matrix.....: Soil
Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Ruthenium-103, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Ruthenium-106, Activity, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Ruthenium-106, Error, +/-, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Ruthenium-106, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Thorium-231, Activity, Solid	0.5					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Thorium-231, error +/-, Solid	1.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Thorium-231, MDA, Solid	0.9					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Thorium-231, Lc, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Thorium-232, Solid	20.5					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Thorium-232, Error +/-, Solid	74.5					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Thorium-232, MDA, Solid	76.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Thorium-232, Lc, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Uranium-235, Activity, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Uranium 235, error +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Uranium-235, Lc, Solid	0.3					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Uranium-238, Activity, Solid	6.7					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Uranium 238, error +/-, Solid	5.3					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Uranium-238, MDA, Solid	3.3					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Uranium-238, Lc, Solid	0.4					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Zirconium-95, Activity, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Zirconium-95, Error, +/-, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Zirconium-95, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 1940	* ca
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 1940	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042524-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-37 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.64					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 234, error +/-, Solid	0.440					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Activity, Solid	0.0400					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 235, error +/-, Solid	0.0700					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Activity, Solid	2.38					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium 238, error +/-, Solid	0.560					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-234, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, MDA, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-235, Lc, Solid	0.0100					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, MDA, Solid	0.0200					1	pCi/g	10279	10/07/1998 1458	* ca
	Uranium-238, Lc, Solid	0.0300					1	pCi/g	10279	10/07/1998 1458	* ca
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.5					1	pCi/g	10306	09/26/1998 2047	* ca
	Actinium-228, error +/-, Solid	0.5					1	pCi/g	10306	09/26/1998 2047	* ca
	Actinium-228, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* ca
	Actinium-228, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, Activity, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, error +/-, Solid	0.3					1	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* ca
	Americium-241, Lc, Solid	0.6					1	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, Activity, Solid	0.5					1	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, Error, +/-, Solid	0.4					1	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, MDA, Solid	0.3					1	pCi/g	10306	09/26/1998 2047	* ca
	Cerium-144, Lc, Solid	0.4					1	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, Activity, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, Error, +/-, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, MDA, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* ca
	Cobalt-60, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* ca
	Chromium-51, Activity, Solid	0.8					1	pCi/g	10306	09/26/1998 2047	* ca
	Chromium-51, Error, +/-, Solid	0.5					1	pCi/g	10306	09/26/1998 2047	* ca
	Chromium-51, MDA, Solid	0.3					1	pCi/g	10306	09/26/1998 2047	* ca

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042524-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-37 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Cesium-134, Activity, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* c
	Cesium-134, Error, +/-, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Cesium-134, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Cesium-134, Lc, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* c
	Cesium-137, Activity, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* c
	Cesium-137, Error, +/-, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Cesium-137, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Cesium-137, Lc, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* c
	Iron-59, Activity, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* c
	Iron-59, Error, +/-, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* c
	Iron-59, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Iron-59, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* c
	Potassium-40, Activity, Solid	22.2					1	pCi/g	10306	09/26/1998 2047	* c
	Potassium-40, error +/-, Solid	3.0					1	pCi/g	10306	09/26/1998 2047	* c
	Potassium-40, MDA, Solid	0.4					1	pCi/g	10306	09/26/1998 2047	* c
	Potassium-40, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* c
	Lead-212, Activity, Solid	1.2					1	pCi/g	10306	09/26/1998 2047	* c
	Lead-212, error +/-, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* c
	Lead-212, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Lead-212, Lc, Solid	0.3					1	pCi/g	10306	09/26/1998 2047	* c
	Lead-214, Activity, Solid	1.5					1	pCi/g	10306	09/26/1998 2047	* c
	Lead-214, error +/-, Solid	0.3					1	pCi/g	10306	09/26/1998 2047	* c
	Lead-214, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Lead-214, Lc, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* c
	Radium-226, Activity, Solid	1.2					1	pCi/g	10306	09/26/1998 2047	* c
	Radium-226, Error, +/-, Solid	0.4					1	pCi/g	10306	09/26/1998 2047	* c
	Radium-226, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* c
	Radium-226, Lc, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* c
	Radium-228, Activity, Solid	1.5					1	pCi/g	10306	09/26/1998 2047	* c
	Radium-228, Error, +/-, Solid	0.5					1	pCi/g	10306	09/26/1998 2047	* c
	Radium-228, MDA, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* c
	Radium-228, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Ruthenium-103, Activity, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Ruthenium-103, Error, +/-, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042524-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:15 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-37 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TEC
	Ruthenium-103, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Ruthenium-103, Lc, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* c
	Ruthenium-106, Activity, Solid	0.6					1	pCi/g	10306	09/26/1998 2047	* c
	Ruthenium-106, Error, +/-, Solid	0.4					1	pCi/g	10306	09/26/1998 2047	* c
	Ruthenium-106, MDA, Solid	0.6					1	pCi/g	10306	09/26/1998 2047	* c
	Ruthenium-106, Lc, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Thorium-231, Activity, Solid	0.7					1	pCi/g	10306	09/26/1998 2047	* c
	Thorium-231, error +/-, Solid	0.6					1	pCi/g	10306	09/26/1998 2047	* c
	Thorium-231, MDA, Solid	0.7					1	pCi/g	10306	09/26/1998 2047	* c
	Thorium-231, Lc, Solid	0.5					1	pCi/g	10306	09/26/1998 2047	* c
	Thorium-232, Solid	12.4					1	pCi/g	10306	09/26/1998 2047	* c
	Thorium-232, Error +/-, Solid	54.2					1	pCi/g	10306	09/26/1998 2047	* c
	Thorium-232, MDA, Solid	27.3					1	pCi/g	10306	09/26/1998 2047	* c
	Thorium-232, Lc, Solid	0.6					1	pCi/g	10306	09/26/1998 2047	* c
	Uranium-235, Activity, Solid	0.4					1	pCi/g	10306	09/26/1998 2047	* c
	Uranium 235, error +/-, Solid	0.2					1	pCi/g	10306	09/26/1998 2047	* c
	Uranium-235, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Uranium-235, Lc, Solid	0.5					1	pCi/g	10306	09/26/1998 2047	* c
	Uranium-238, Activity, Solid	4.1					1	pCi/g	10306	09/26/1998 2047	* c
	Uranium 238, error +/-, Solid	4.3					1	pCi/g	10306	09/26/1998 2047	* c
	Uranium-238, MDA, Solid	1.8					1	pCi/g	10306	09/26/1998 2047	* c
	Uranium-238, Lc, Solid	0.7					1	pCi/g	10306	09/26/1998 2047	* c
	Zirconium-95, Activity, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* c
	Zirconium-95, Error, +/-, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* c
	Zirconium-95, MDA, Solid	0.1					1	pCi/g	10306	09/26/1998 2047	* c
	Zirconium-95, Lc, Solid	0.0					1	pCi/g	10306	09/26/1998 2047	* c

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CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042525-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:20 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-40 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TEC
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Solid	1.19					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium 234, error +/-, Solid	0.370					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, Activity, Solid	0.0900					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium 235, error +/-, Solid	0.100					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, Activity, Solid	2.47					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium 238, error +/-, Solid	0.580					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-234, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-234, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, MDA, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-235, Lc, Solid	0.0100					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, MDA, Solid	0.0300					1.00	pCi/g	10279	10/07/1998 1458	* c
	Uranium-238, Lc, Solid	0.0300					1.00	pCi/g	10279	10/07/1998 1458	* c
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Solid	1.3					1.00	pCi/g	10306	09/26/1998 2047	* c
	Actinium-228, error +/-, Solid	0.4					1.00	pCi/g	10306	09/26/1998 2047	* c
	Actinium-228, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* c
	Actinium-228, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* c
	Americium-241, Activity, Solid	1.0					1.00	pCi/g	10306	09/26/1998 2047	* c
	Americium-241, error +/-, Solid	0.6					1.00	pCi/g	10306	09/26/1998 2047	* c
	Americium-241, MDA, Solid	0.3					1.00	pCi/g	10306	09/26/1998 2047	* c
	Americium-241, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	* c
	Cerium-144, Activity, Solid	0.4					1.00	pCi/g	10306	09/26/1998 2047	* c
	Cerium-144, Error, +/-, Solid	0.5					1.00	pCi/g	10306	09/26/1998 2047	* c
	Cerium-144, MDA, Solid	0.4					1.00	pCi/g	10306	09/26/1998 2047	* c
	Cerium-144, Lc, Solid	0.3					1.00	pCi/g	10306	09/26/1998 2047	* c
	Cobalt-60, Activity, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	* c
	Cobalt-60, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* c
	Cobalt-60, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* c
	Cobalt-60, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* c
	Chromium-51, Activity, Solid	1.5					1.00	pCi/g	10306	09/26/1998 2047	* c
	Chromium-51, Error, +/-, Solid	0.7					1.00	pCi/g	10306	09/26/1998 2047	* c
	Chromium-51, MDA, Solid	0.3					1.00	pCi/g	10306	09/26/1998 2047	* c

CORELAB

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042525-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:20 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-40 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Chromium-51, Lc, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cesium-134, Activity, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cesium-134, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cesium-134, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cesium-134, Lc, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cesium-137, Activity, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cesium-137, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cesium-137, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Cesium-137, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Iron-59, Activity, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Iron-59, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Iron-59, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Iron-59, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Potassium-40, Activity, Solid	25.2					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Potassium-40, error +/-, Solid	3.9					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Potassium-40, MDA, Solid	0.5					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Potassium-40, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Lead-212, Activity, Solid	45.7					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Lead-212, error +/-, Solid	5.7					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Lead-212, MDA, Solid	0.3					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Lead-212, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Lead-214, Activity, Solid	0.9					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Lead-214, error +/-, Solid	0.5					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Lead-214, MDA, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Lead-214, Lc, Solid	0.3					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Radium-226, Activity, Solid	1.2					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Radium-226, Error, +/-, Solid	0.4					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Radium-226, MDA, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Radium-226, Lc, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Radium-228, Activity, Solid	1.3					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Radium-228, Error, +/-, Solid	0.4					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Radium-228, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Radium-228, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Ruthenium-103, Activity, Solid	0.3					1.00	pCi/g	10306	09/26/1998 2047	* ca
	Ruthenium-103, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	* ca

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982440 Date: 03/31/1999

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600835 ATTN: Suzi Jensen

Customer Sample ID..: 042525-001 Date Sampled.....: 09/09/1998 Time Sampled.....: 11:20 Sample Matrix.....: Soil
Laboratory Sample ID: 982440-40 Date Received.....: 09/12/1998 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TE
	Ruthenium-103, MDA, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	*
	Ruthenium-103, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	*
	Ruthenium-106, Activity, Solid	1.4					1.00	pCi/g	10306	09/26/1998 2047	*
	Ruthenium-106, Error, +/-, Solid	0.6					1.00	pCi/g	10306	09/26/1998 2047	*
	Ruthenium-106, MDA, Solid	1.0					1.00	pCi/g	10306	09/26/1998 2047	*
	Ruthenium-106, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	*
	Thorium-231, Activity, Solid	2.5					1.00	pCi/g	10306	09/26/1998 2047	*
	Thorium-231, error +/-, Solid	1.8					1.00	pCi/g	10306	09/26/1998 2047	*
	Thorium-231, MDA, Solid	0.8					1.00	pCi/g	10306	09/26/1998 2047	*
	Thorium-231, Lc, Solid	0.3					1.00	pCi/g	10306	09/26/1998 2047	*
	Thorium-232, Solid	193					1.00	pCi/g	10306	09/26/1998 2047	*
	Thorium-232, Error +/-, Solid	115					1.00	pCi/g	10306	09/26/1998 2047	*
	Thorium-232, MDA, Solid	55.7					1.00	pCi/g	10306	09/26/1998 2047	*
	Thorium-232, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	*
	Uranium-235, Activity, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	*
	Uranium 235, error +/-, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	*
	Uranium-235, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	*
	Uranium-235, Lc, Solid	0.4					1.00	pCi/g	10306	09/26/1998 2047	*
	Uranium-238, Activity, Solid	5.3					1.00	pCi/g	10306	09/26/1998 2047	*
	Uranium 238, error +/-, Solid	3.3					1.00	pCi/g	10306	09/26/1998 2047	*
	Uranium-238, MDA, Solid	2.2					1.00	pCi/g	10306	09/26/1998 2047	*
	Uranium-238, Lc, Solid	0.2					1.00	pCi/g	10306	09/26/1998 2047	*
	Zirconium-95, Activity, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	*
	Zirconium-95, Error, +/-, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	*
	Zirconium-95, MDA, Solid	0.1					1.00	pCi/g	10306	09/26/1998 2047	*
	Zirconium-95, Lc, Solid	0.0					1.00	pCi/g	10306	09/26/1998 2047	*

GR-1D (OR GH GR-120 → GR-150)

SF 2001 (10-97)

Supersedes (5-97) Issue

Internal Lab Batch No.

per schedule

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

AR/COC- 600836

Core

Dept. No./Mail Stop: 6133/MS 1147 Collins

Project/Task Manager: 228A/John Copland

Project Name: 228A

Record Center Code: 1309/228A/DAT

Logbook Ref. No.: ER-014

Service Order No.: CFO596

Date Samples Shipped: [redacted] SMO Use

Carrier/Waybill No.: [redacted]

Lab Contact: Tim Kellogg

Lab Destination: Core/Denver/Casper

SMO Contact/Phone: Doug Salmi

Send Report to SMO: Suzi Montano

Contract No.: AJ-2480C

Case No.: 7225.2203

SMO Authorization: [signature]

Bill to: Sandia National Laboratories

Supplier Services, Dept. _____

P.O. Box 5800 MS 0154

Location Tech Area NA

Building NA Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB US Lab Sampl ID
042528-003	TJAOU-228A-GR-TB	0	228A	9/8/98 1510	DIW	G	3 x 40ml	HCl; 4 C	G	TB	VOC'S	[redacted]
~~042528-003~~	~~TJAOU-228A-GR-TB~~	~~0~~	~~228A~~	~~9/8/98 1510~~	~~DIW~~	~~G~~	~~40ml~~	~~HCl; 4 C~~	~~G~~	~~TB~~	~~VOC'S~~	[redacted]
~~042528-003~~	~~TJAOU-228A-GR-TB~~	~~0~~	~~228A~~	~~9/8/98 1510~~	~~DIW~~	~~G~~	~~40ml~~	~~HCl; 4 C~~	~~G~~	~~TB~~	~~VOC'S~~	[redacted]
042529-003	TJAOU-228A-GR-EB	0	228A	9/8/98 1500	DIW	G	3 x 40ml	HCl; 4 C	G	EB	VOC'S	[redacted]
~~042529-003~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1500~~	~~DIW~~	~~G~~	~~40ml~~	~~HCl; 4 C~~	~~G~~	~~EB~~	~~VOC'S~~	[redacted]
~~042529-003~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1500~~	~~DIW~~	~~G~~	~~40ml~~	~~HCl; 4 C~~	~~G~~	~~EB~~	~~VOC'S~~	[redacted]
042530-006	TJAOU-228A-GR-EB	0	228A	9/8/98 1506	DIW	AG	1 x 1L	4 C	G	EB	SVOC (8270)	[redacted]
~~042530-006~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1506~~	~~DIW~~	~~AG~~	~~1L~~	~~4 C~~	~~G~~	~~EB~~	~~SVOC (8270)~~	[redacted]
042531-007	TJAOU-228A-GR-EB	0	228A	9/8/98 1505	DIW	AG	4 x 1L	4 C	G	EB	HE	[redacted]
~~042531-007~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1505~~	~~DIW~~	~~AG~~	~~1L~~	~~4 C~~	~~G~~	~~EB~~	~~HE~~	[redacted]

RMMA ☒Yes ☐No Ref. No. _____

Sample Disposal ☐Return to Client ☒Disposal by lab

Turnaround Time ☒Normal ☐Rush Required Report Date _____

Sample Tracking [redacted] SMO Use

Date Entered (mm/dd/yy) [redacted]

Entered by [redacted]

QC Initials [redacted]

Special Instructions/QC Requirements

EDD ☒Yes ☐No

Raw data package ☒Yes ☐No

* Send a separate report
* Please note hold times on VOC samples
* COC #600800 releases #600836

Abnormal Conditions on Receipt [redacted]

Sample Team Members	Name	Signature	Init	Company/Organization/Phon
	Nelson Cipriani	[signature]	NC	FT/6131 284-3307

1. Relinquished by	[signature]	Org. FT/6131	Date 9-10-98	Time 1500	4. Relinquished by	Org.	Date
1. Received by	[signature]	Org. 7578	Date 9/10/98	Time 1500	4. Received by	Org.	Date
2. Relinquished by	[signature]	Org. 7577	Date 9/11/98	Time 1300	5. Relinquished by	Org.	Date
2. Received by		Org.	Date	Time	5. Received by	Org.	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org.	Date
3. Received by		Org.	Date	Time	6. Received by	Org.	Date

Original To Accompany Samples, Laboratory Copy (White) **1st Copy** To Accompany Samples, Return to SMO (Blue) **2nd Copy** SMO Suspense Copy (Yellow) **3rd Copy** Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600836

Project Name: 228A | Project/Task Manager: 228A/John Copland | Case No.: 7225.2203

Location | Tech Area NA | Building NA | Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE: Lab Sample ID
~~042531-007~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1505~~	~~DIW~~	~~AG~~	~~1L~~	~~4 C~~	~~G~~	~~EB~~	~~HE~~	
~~042531-007~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1505~~	~~DIW~~	~~AG~~	~~1L~~	~~4 C~~	~~G~~	~~EB~~	~~HE~~	
042532-008	TJAOU-228A-GR-EB	0	228A	9/8/98 1507	DIW	P	500ml	HNO3; 4 C	G	EB	RCRA METALS	
~~042532-008~~ 043068-001	TJAOU-228A-GR-EB	0	228A	9/9/98 1310	DIW	P	500ml	HNO3; 4 C	G	EB	RCRA METALS	
042533-009	TJAOU-228A-GR-EB	0	228A	9/8/98 1509	DIW	P	1L	HNO3; 4 C	G	EB	GAMMA SPEC	
~~042533-009~~ 043069-001	TJAOU-228A-GR-EB	0	228A	9/9/98 1305	DIW	P	1L	HNO3; 4 C	G	EB	GAMMA SPEC	
042534-010	TJAOU-228A-GR-EB	0	228A	9/8/98 1508	DIW	P	1L	HNO3; 4 C	G	EB	ISO U	
~~042534-010~~ 043070-001	TJAOU-228A-GR-EB	0	228A	9/9/98 1300	DIW	P	1L	HNO3; 4 C	G	EB	ISO U	
042535-007	TJAOU-228A-GR-EB	0	228A	9/9/98 1315	DIW	AG	4x1L	4 C	G	EB	HE	
042536-006	TJAOU-228A-GR-EB	0	228A	9/9/98 1320	DIW	AG	2x1L	4 C	G	EB	SVOC	

Abnormal Conditions of Receipt | LAB USE

Recipient Initials

Original To Accompany Samples, Laboratory Copy (White) | 1st Copy To Accompany Samples, Return to SMO (Blue) | 2nd Copy SMO Suspense Copy (Yellow) | 3rd Copy Field Copy (Pink)

2032 PC

AMENDED REPORT

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982441

Date: 01/20/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600836

ATTN: Suzi Jensen

Customer Sample ID..: 042533-009
Laboratory Sample ID: 982441-6

Date Sampled.....: 09/08/98 Time Sampled.....: 15:09 Sample Matrix.....: Water
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Total	20.6						pCi/L	10325	09/30/98 1804	* ca
	Actinium-228, error +/-, Total	16.3						pCi/L	10325	09/30/98 1804	* ca
	Actinium-228, MDA, Total	7.9						pCi/L	10325	09/30/98 1804	* ca
	Actinium-228, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Americium-241, Activity, Total	1.2						pCi/L	10325	09/30/98 1804	* ca
	Americium-241, error +/-, Total	5.1						pCi/L	10325	09/30/98 1804	* ca
	Americium-241, MDA, Total	5.6						pCi/L	10325	09/30/98 1804	* ca
	Americium-241, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Cerium-144, Activity, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Cerium-144, Error, +/-, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Cerium-144, MDA, Total	6.9						pCi/L	10325	09/30/98 1804	* ca
	Cerium-144, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Cobalt-60, Activity, Total	6.3						pCi/L	10325	09/30/98 1804	* ca
	Cobalt-60, Error, +/-, Total	2.9						pCi/L	10325	09/30/98 1804	* ca
	Cobalt-60, MDA, Total	1.3						pCi/L	10325	09/30/98 1804	* ca
	Cobalt-60, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Chromium-51, Activity, Total	29.2						pCi/L	10325	09/30/98 1804	* ca
	Chromium-51, Error, +/-, Total	16.9						pCi/L	10325	09/30/98 1804	* ca
	Chromium-51, MDA, Total	10.9						pCi/L	10325	09/30/98 1804	* ca
	Chromium-51, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Cesium-134, Activity, Total	1.8						pCi/L	10325	09/30/98 1804	* ca
	Cesium-134, Error, +/-, Total	2.2						pCi/L	10325	09/30/98 1804	* ca
	Cesium-134, MDA, Total	2.4						pCi/L	10325	09/30/98 1804	* ca
	Cesium-134, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Cesium-137, Activity, Total	2.4						pCi/L	10325	09/30/98 1804	* ca
	Cesium-137, Error, +/-, Total	1.7						pCi/L	10325	09/30/98 1804	* ca
	Cesium-137, MDA, Total	1.1						pCi/L	10325	09/30/98 1804	* ca
	Cesium-137, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Iron-59, Activity, Total	13.2						pCi/L	10325	09/30/98 1804	* ca
	Iron-59, Error, +/-, Total	8.2						pCi/L	10325	09/30/98 1804	* ca
	Iron-59, MDA, Total	3.8						pCi/L	10325	09/30/98 1804	* ca
	Iron-59, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Potassium-40, Activity, Total	171						pCi/L	10325	09/30/98 1804	* ca

CORELAB

AMENDED REPORT

REVISED

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982441 Date: 01/20/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600836 ATTN: Suzi Jensen

Customer Sample ID..: 042533-009 Date Sampled.....: 09/08/98 Time Sampled.....: 15:09 Sample Matrix.....: Water
Laboratory Sample ID: 982441-6 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Potassium-40, error +/-, Total	91.8						pCi/L	10325	09/30/98 1804	* ca
	Potassium-40, MDA, Total	29.0						pCi/L	10325	09/30/98 1804	* ca
	Potassium-40, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Lead-212, Activity, Total	8.7						pCi/L	10325	09/30/98 1804	* ca
	Lead-212, error +/-, Total	2.9						pCi/L	10325	09/30/98 1804	* ca
	Lead-212, MDA, Total	2.6						pCi/L	10325	09/30/98 1804	* ca
	Lead-212, Lc, Total	0.1						pCi/L	10325	09/30/98 1804	* ca
	Lead-214, Activity, Total	38.3						pCi/L	10325	09/30/98 1804	* ca
	Lead-214, error +/-, Total	13.1						pCi/L	10325	09/30/98 1804	* ca
	Lead-214, MDA, Total	5.0						pCi/L	10325	09/30/98 1804	* ca
	Lead-214, Lc, Total	0.1						pCi/L	10325	09/30/98 1804	* ca
	Radium-226, Activity, Total	38.5						pCi/L	10325	09/30/98 1804	* ca
	Radium-226, Error, +/-, Total	12.8						pCi/L	10325	09/30/98 1804	* ca
	Radium-226, MDA, Total	5.3						pCi/L	10325	09/30/98 1804	* ca
	Radium-226, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Radium-228, Activity, Total	20.6						pCi/L	10325	09/30/98 1804	* ca
	Radium-228, Error, +/-, Total	16.3						pCi/L	10325	09/30/98 1804	* ca
	Radium-228, MDA, Total	7.9						pCi/L	10325	09/30/98 1804	* ca
	Radium-228, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Ruthenium-103, Activity, Total	1.3						pCi/L	10325	09/30/98 1804	* ca
	Ruthenium-103, Error, +/-, Total	7.3						pCi/L	10325	09/30/98 1804	* ca
	Ruthenium-103, MDA, Total	2.4						pCi/L	10325	09/30/98 1804	* ca
	Ruthenium-103, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Ruthenium-106, Activity, Total	18.1						pCi/L	10325	09/30/98 1804	* ca
	Ruthenium-106, Error, +/-, Total	26.9						pCi/L	10325	09/30/98 1804	* ca
	Ruthenium-106, MDA, Total	21.7						pCi/L	10325	09/30/98 1804	* ca
	Ruthenium-106, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Thorium-231, Activity, Total	7.9						pCi/L	10325	09/30/98 1804	* ca
	Thorium-231, error +/-, Total	13.2						pCi/L	10325	09/30/98 1804	* ca
	Thorium-231, MDA, Total	14.4						pCi/L	10325	09/30/98 1804	* ca
	Thorium-231, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca
	Thorium-232, Total	229						pCi/L	10325	09/30/98 1804	* ca
	Thorium-232, Error +/-, Total	1020						pCi/L	10325	09/30/98 1804	* ca
	Thorium-232, MDA, Total	1110						pCi/L	10325	09/30/98 1804	* ca
	Thorium-232, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca

CORELAB

AMENDED REPORT

REVISED

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982441 Date: 01/20/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600836 ATTN: Suzi Jensen

Customer Sample ID..: 042533-009 Date Sampled.....: 09/08/98 Time Sampled.....: 15:09 Sample Matrix.....: Water
Laboratory Sample ID: 982441-6 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Uranium-235, Activity, Total	8.4						pCi/L	10325	09/30/98 1804	* ca
	Uranium 235, error +/-, Total	3.8						pCi/L	10325	09/30/98 1804	* ca
	Uranium-235, MDA, Total	2.1						pCi/L	10325	09/30/98 1804	* ca
	Uranium-235, Lc, Total	0.1						pCi/L	10325	09/30/98 1804	* ca
	Uranium-238, Activity, Total	93.2						pCi/L	10325	09/30/98 1804	* ca
	Uranium 238, error +/-, Total	91.2						pCi/L	10325	09/30/98 1804	* ca
	Uranium-238, MDA, Total	72.1						pCi/L	10325	09/30/98 1804	* ca
	Uranium-238, Lc, Total	0.1						pCi/L	10325	09/30/98 1804	* ca
	Zirconium-95, Activity, Total	10.6						pCi/L	10325	09/30/98 1804	* ca
	Zirconium-95, Error, +/-, Total	9.4						pCi/L	10325	09/30/98 1804	* ca
	Zirconium-95, MDA, Total	3.9						pCi/L	10325	09/30/98 1804	* ca
	Zirconium-95, Lc, Total	0.0						pCi/L	10325	09/30/98 1804	* ca

CORELAB

AMENDED REPORT

REVISED

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982441

Date: 01/20/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600836

ATTN: Suzi Jensen

Customer Sample ID..: 043069-001
Laboratory Sample ID: 982441-11

Date Sampled.....: 09/09/98 Time Sampled.....: 13:05 Sample Matrix.....: Water
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
EPA 901.1	Gamma Scan (HPGe gamma)										
	Actinium-228, Activity, Total	12.1						pCi/L	10325	09/30/98 1653	* ca
	Actinium-228, error +/-, Total	9.5						pCi/L	10325	09/30/98 1653	* ca
	Actinium-228, MDA, Total	6.2						pCi/L	10325	09/30/98 1653	* ca
	Actinium-228, Lc, Total	0.0						pCi/L	10325	09/30/98 1653	* ca
	Americium-241, Activity, Total	3.6						pCi/L	10325	09/30/98 1653	* ca
	Americium-241, error +/-, Total	3.3						pCi/L	10325	09/30/98 1653	* ca
	Americium-241, MDA, Total	2.4						pCi/L	10325	09/30/98 1653	* ca
	Americium-241, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Cerium-144, Activity, Total	18.7						pCi/L	10325	09/30/98 1653	* ca
	Cerium-144, Error, +/-, Total	15.3						pCi/L	10325	09/30/98 1653	* ca
	Cerium-144, MDA, Total	8.5						pCi/L	10325	09/30/98 1653	* ca
	Cerium-144, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Cobalt-60, Activity, Total	3.9						pCi/L	10325	09/30/98 1653	* ca
	Cobalt-60, Error, +/-, Total	4.5						pCi/L	10325	09/30/98 1653	* ca
	Cobalt-60, MDA, Total	2.6						pCi/L	10325	09/30/98 1653	* ca
	Cobalt-60, Lc, Total	0.0						pCi/L	10325	09/30/98 1653	* ca
	Chromium-51, Activity, Total	35.0						pCi/L	10325	09/30/98 1653	* ca
	Chromium-51, Error, +/-, Total	20.3						pCi/L	10325	09/30/98 1653	* ca
	Chromium-51, MDA, Total	11.7						pCi/L	10325	09/30/98 1653	* ca
	Chromium-51, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Cesium-134, Activity, Total	1.0						pCi/L	10325	09/30/98 1653	* ca
	Cesium-134, Error, +/-, Total	1.9						pCi/L	10325	09/30/98 1653	* ca
	Cesium-134, MDA, Total	1.7						pCi/L	10325	09/30/98 1653	* ca
	Cesium-134, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Cesium-137, Activity, Total	1.3						pCi/L	10325	09/30/98 1653	* ca
	Cesium-137, Error, +/-, Total	1.9						pCi/l	10325	09/30/98 1653	* ca
	Cesium-137, MDA, Total	1.7						pCi/L	10325	09/30/98 1653	* ca
	Cesium-137, Lc, Total	0.0						pCi/L	10325	09/30/98 1653	* ca
	Iron-59, Activity, Total	16.1						pCi/L	10325	09/30/98 1653	* ca
	Iron-59, Error, +/-, Total	9.8						pCi/L	10325	09/30/98 1653	* ca
	Iron-59, MDA, Total	3.4						pCi/L	10325	09/30/98 1653	* ca
	Iron-59, Lc, Total	0.0						pCi/L	10325	09/30/98 1653	* ca
	Potassium-40, Activity, Total	184						pCi/L	10325	09/30/98 1653	* ca

AMENDED REPORT

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982441 Date: 01/20/99

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600836 ATTN: Suzi Jensen

Customer Sample ID..: 043069-001 Date Sampled.....: 09/09/98 Time Sampled.....: 13:05 Sample Matrix.....: Water
Laboratory Sample ID: 982441-11 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Potassium-40, error +/-, Total	93.9						pCi/L	10325	09/30/98 1653	* ca
	Potassium-40, MDA, Total	30.7						pCi/L	10325	09/30/98 1653	* ca
	Potassium-40, Lc, Total	0.0						pCi/L	10325	09/30/98 1653	* ca
	Lead-212, Activity, Total	6.1						pCi/L	10325	09/30/98 1653	* ca
	Lead-212, error +/-, Total	2.3						pCi/L	10325	09/30/98 1653	* ca
	Lead-212, MDA, Total	2.2						pCi/L	10325	09/30/98 1653	* ca
	Lead-212, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Lead-214, Activity, Total	19.9						pCi/L	10325	09/30/98 1653	* ca
	Lead-214, error +/-, Total	8.5						pCi/L	10325	09/30/98 1653	* ca
	Lead-214, MDA, Total	4.6						pCi/L	10325	09/30/98 1653	* ca
	Lead-214, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Radium-226, Activity, Total	23.8						pCi/L	10325	09/30/98 1653	* ca
	Radium-226, Error, +/-, Total	10.2						pCi/L	10325	09/30/98 1653	* ca
	Radium-226, MDA, Total	5.0						pCi/L	10325	09/30/98 1653	* ca
	Radium-226, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Radium-228, Activity, Total	12.1						pCi/L	10325	09/30/98 1653	* ca
	Radium-228, Error, +/-, Total	9.5						pCi/L	10325	09/30/98 1653	* ca
	Radium-228, MDA, Total	6.2						pCi/L	10325	09/30/98 1653	* ca
	Radium-228, Lc, Total	0.0						pCi/L	10325	09/30/98 1653	* ca
	Ruthenium-103, Activity, Total	6.2						pCi/L	10325	09/30/98 1653	* ca
	Ruthenium-103, Error, +/-, Total	5.1						pCi/L	10325	09/30/98 1653	* ca
	Ruthenium-103, MDA, Total	1.8						pCi/L	10325	09/30/98 1653	* ca
	Ruthenium-103, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Ruthenium-106, Activity, Total	35.8						pCi/L	10325	09/30/98 1653	* ca
	Ruthenium-106, Error, +/-, Total	43.0						pCi/L	10325	09/30/98 1653	* ca
	Ruthenium-106, MDA, Total	23.9						pCi/L	10325	09/30/98 1653	* ca
	Ruthenium-106, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Thorium-231, Activity, Total	29.1						pCi/L	10325	09/30/98 1653	* ca
	Thorium-231, error +/-, Total	18.8						pCi/L	10325	09/30/98 1653	* ca
	Thorium-231, MDA, Total	11.8						pCi/L	10325	09/30/98 1653	* ca
	Thorium-231, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Thorium-232, Total	679						pCi/L	10325	09/30/98 1653	* ca
	Thorium-232, Error +/-, Total	630						pCi/L	10325	09/30/98 1653	* ca
	Thorium-232, MDA, Total	469						pCi/L	10325	09/30/98 1653	* ca
	Thorium-232, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca

CORELAB

AMENDED REPORT

REVISED

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982441

Date: 01/20/99

CUSTOMER: Sandia National Laboratory

PROJECT: AR/COC-600836

ATTN: Suzi Jensen

Customer Sample ID..: 043069-001
Laboratory Sample ID: 982441-11

Date Sampled.....: 09/09/98 Time Sampled.....: 13:05 Sample Matrix.....: Water
Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TECH
	Uranium-235, Activity, Total	18.9						pCi/L	10325	09/30/98 1653	* ca
	Uranium 235, error +/-, Total	4.8						pCi/L	10325	09/30/98 1653	* ca
	Uranium-235, MDA, Total	2.2						pCi/L	10325	09/30/98 1653	* ca
	Uranium-235, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Uranium-238, Activity, Total	323						pCi/L	10325	09/30/98 1653	* ca
	Uranium 238, error +/-, Total	31.8						pCi/L	10325	09/30/98 1653	* ca
	Uranium-238, MDA, Total	20.8						pCi/L	10325	09/30/98 1653	* ca
	Uranium-238, Lc, Total	0.1						pCi/L	10325	09/30/98 1653	* ca
	Zirconium-95, Activity, Total	4.1						pCi/L	10325	09/30/98 1653	* ca
	Zirconium-95, Error, +/-, Total	5.5						pCi/L	10325	09/30/98 1653	* ca
	Zirconium-95, MDA, Total	3.3						pCi/L	10325	09/30/98 1653	* ca
	Zirconium-95, Lc, Total	0.0						pCi/L	10325	09/30/98 1653	* ca

GR-1D (for QA, GR-120 → GR-150)

SF 2001-COC (10-97)

Supersedes (5-97) Issue

Internal Lab Batch No.

per schedule

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

AR/COC- 600836

Dept. No./Mail Stop: 6133/MS 1147 (Collins)
Project/Task Manager: 228A/John Copland
Project Name: 228A
Record Center Code: 1309/228A/DAT
Logbook Ref. No.: ER-014
Service Order No.: CFO596

Date Samples Shipped: [redacted] SMO USE
Carrier/Waybill No.: [redacted]
Lab Contact: Tim Kellogg
Lab Destination: Core/Denver/Casper
SMO Contact/Phone: Doug Salmi
Send Report to SMO: Suzi Montano

Contract No.: AJ-2480C
Case No.: 7225.2203
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services, Dept. _____
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
042528-003	TJAOU-228A-GR-TB	0	228A	9/8/98 1510	DIW	G	3 x 40ml	HCl; 4 C	G	TB	VOC'S	[redacted]
~~042528-003~~	~~TJAOU-228A-GR-TB~~	~~0~~	~~228A~~	~~9/8/98 1510~~	~~DIW~~	~~G~~	~~40ml~~	~~HCl; 4 C~~	~~G~~	~~TB~~	~~VOC'S~~	[redacted]
~~042528-003~~	~~TJAOU-228A-GR-TB~~	~~0~~	~~228A~~	~~9/8/98 1510~~	~~DIW~~	~~G~~	~~40ml~~	~~HCl; 4 C~~	~~G~~	~~TB~~	~~VOC'S~~	[redacted]
042529-003	TJAOU-228A-GR-EB	0	228A	9/8/98 1500	DIW	G	3 x 40ml	HCl; 4 C	G	EB	VOC'S	[redacted]
~~042529-003~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1500~~	~~DIW~~	~~G~~	~~40ml~~	~~HCl; 4 C~~	~~G~~	~~EB~~	~~VOC'S~~	[redacted]
~~042529-003~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1500~~	~~DIW~~	~~G~~	~~40ml~~	~~HCl; 4 C~~	~~G~~	~~EB~~	~~VOC'S~~	[redacted]
042530-006	TJAOU-228A-GR-EB	0	228A	9/8/98 1506	DIW	AG	1 x 1L	4 C	G	EB	SVOC (8270)	[redacted]
~~042530-006~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1506~~	~~DIW~~	~~AG~~	~~1L~~	~~4 C~~	~~G~~	~~EB~~	~~SVOC (8270)~~	[redacted]
042531-007	TJAOU-228A-GR-EB	0	228A	9/8/98 1505	DIW	AG	4 x 1L	4 C	G	EB	HE	[redacted]
~~042531-007~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1505~~	~~DIW~~	~~AG~~	~~1L~~	~~4 C~~	~~G~~	~~EB~~	~~HE~~	[redacted]

see 2nd pg

RMMA ☒Yes ☐No Ref. No. _____

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking — SMO USE ONLY
Date Entered (mm/dd/yy): [redacted]
Entered by: [redacted]

Turnaround Time ☒Normal ☐Rush Required Report Date _____

QC Initials: [redacted]

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
* Send a separate report
* Please note hold times on VOC samples
* COC #600800 releases #600836

Abnormal Condition on Receipt: [redacted]

Sample Team Members	Name	Signature	Init	Company/Organization/Phon
	Nelson Capitan	[signature]	NC	ET/6131 284-3307

	Org.	Date	Time		Org.	Date
1. Relinquished by [signature]	ET/6131	9-10-98	1500	4. Relinquished by		
1. Received by [signature]	7578	9/10/98	1500	4. Received by		
2. Relinquished by [signature]	7577	9/11/98	1300	5. Relinquished by		
2. Received by				5. Received by		
3. Relinquished by				6. Relinquished by		
3. Received by				6. Received by		

Original — To Accompany Samples, Laboratory Copy (White)
1st Copy — To Accompany Samples, Return to SMO (Blue)
2nd Copy — SMO Suspense Copy (Yellow)
3rd Copy — Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600836

Project Name: 228A | Project/Task Manager: 228A/John Copland | Case No.: 7225.2203

Location: Tech Area NA; Building NA; Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preser-vative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample ID
~~042531-007~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1505~~	~~DIW~~	~~AG~~	~~1L~~	~~4 C~~	~~G~~	~~EB~~	~~HE~~	
~~042531-007~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1505~~	~~DIW~~	~~AG~~	~~1L~~	~~4 C~~	~~G~~	~~EB~~	~~HE~~	
042532-008	TJAOU-228A-GR-EB	0	228A	9/8/98 1507	DIW	P	500ml	HNO3; 4 C	G	EB	RCRA METALS	
~~042532-008~~ 043068-001	TJAOU-228A-GR-EB	0	228A	9/9/98 1310	DIW	P	500ml	HNO3; 4 C	G	EB	RCRA METALS	
042533-009	TJAOU-228A-GR-EB	0	228A	9/8/98 1609	DIW	P	1L	HNO3; 4 C	G	EB	GAMMA SPEC	
~~042533-009~~ 043069-001	TJAOU-228A-GR-EB	0	228A	9/9/98 1305	DIW	P	1L	HNO3; 4 C	G	EB	GAMMA SPEC	
042534-010	TJAOU-228A-GR-EB	0	228A	9/8/98 1508	DIW	P	1L	HNO3; 4 C	G	EB	ISO U	
~~042534-010~~ 043070-001	TJAOU-228A-GR-EB	0	228A	9/9/98 1300	DIW	P	1L	HNO3; 4 C	G	EB	ISO U	
042535-007	TJAOU-228A-GR-EB	0	228A	9/9/98 1315	DIW	AG	4x1L	4 C	G	EB	HE	
042536-006	TJAOU-228A-GR-EB	0	228A	9/9/98 1320	DIW	AG	2x1L	4 C	G	EB	SVOC	

Abnormal Conditions on Receipt: LAB USE

Recipient Initials:

Original: To Accompany Samples, Laboratory Copy (White) | 1st Copy: To Accompany Samples, Return to SMO (Blue) | 2nd Copy: SMO Suspense Copy (Yellow) | 3rd Copy: Field Copy (Pink)

2032

CORELAB

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982441 Date: 10/28/98

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600836 ATTN: Suzi Jensen

Customer Sample ID..: 042534-010 Date Sampled.....: 09/08/98 Time Sampled.....: 15:08 Sample Matrix.....: Water
Laboratory Sample ID: 982441-7 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TEC
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Total	0.0400					1	pCi/L	10283	10/06/98 1600	* c
	Uranium 234, error +/-, Total	0.130					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-235, Activity, Total	0.0700					1	pCi/L	10283	10/06/98 1600	* c
	Uranium 235, error +/-, Total	0.110					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-238, Activity, Total	0.140					1	pCi/L	10283	10/06/98 1600	* c
	Uranium 238, error +/-, Total	0.150					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-234, MDA, Total	0.0400					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-234, Lc, Total	0.0400					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-235, MDA, Total	0.0200					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-235, Lc, Total	0.0200					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-238, MDA, Total	0.0500					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-238, Lc, Total	0.0600					1	pCi/L	10283	10/06/98 1600	* c

CORE LABORATORIES

LABORATORY TEST RESULTS

Job Number: 982441 Date: 10/28/98

CUSTOMER: Sandia National Laboratory PROJECT: AR/COC-600836 ATTN: Suzi Jensen

Customer Sample ID..: 043070-001 Date Sampled.....: 09/09/98 Time Sampled.....: 13:00 Sample Matrix.....: Water
Laboratory Sample ID: 982441-12 Date Received.....: 09/12/98 Time Received.....: 11:00

TEST METHOD	PARAMETER/TEST DESCRIPTION	SAMPLE RESULT	Q	FLAGS	MDL	PQL	DILUTION	UNITS	BATCH	DATE ANALYZED	TEC
CA-GLR-R405	Uranium-234, 235, 238										
	Uranium-234, Total	0.0500					1	pCi/L	10283	10/06/98 1600	* c
	Uranium 234, error +/-, Total	0.130					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-235, Activity, Total	0.0100					1	pCi/L	10283	10/06/98 1600	* c
	Uranium 235, error +/-, Total	0.0600					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-238, Activity, Total	0.00					1	pCi/L	10283	10/06/98 1600	* c
	Uranium 238, error +/-, Total	0.0100					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-234, MDA, Total	0.0400					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-234, Lc, Total	0.0400					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-235, MDA, Total	0.0200					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-235, Lc, Total	0.0200					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-238, MDA, Total	0.0500					1	pCi/L	10283	10/06/98 1600	* c
	Uranium-238, Lc, Total	0.0600					1	pCi/L	10283	10/06/98 1600	* c

GR-151 thru GR-161

SF 2001-COC (10-97)
Supersedes (8-97) Issue

Internal Lab Batch No.

lai, Anh per Schedule

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- 601188

Dept. No./Mail Stop: 8133/MS1147
Project/Task Manager: John Copland
Project Name: Site 228A VCM
Record Center Code: ER/1329/228A/OAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO USE
Carrier/Waybill No.: 715751
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi/ 844-3110
Send Report to SMO: Suzi Jaramillo

Contract No.: AJ-2480A
Case No.: 7225.2203
SMO Authorization: Doug Salmi
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE
043711 – 001	TJAOU-228A-GR-161-S	0	228A	120198/1015	S	G	500 ml	4 C	G	SA	Gamma Spec/Iso U	
043711 - 002	TJAOU-228A-GR-161-S	0	228A	120198/1015	S	G	500 ml	4 C	G	SA	RCRA metals,HE,SVOCs	
043711 - 003	TJAOU-228A-GR-161-S	0	228A	120198/1015	S	G	4 oz	4 C	G	SA	VOCs	
043712 - 001	TJAOU-228A-GR-162-S	0	228A	120198/1020	S	G	500 ml	4 C	G	SA	Gamma Spec	
043713 – 001	TJAOU-228A-GR-163-S	0	228A	120198/1025	S	G	↓	4 C	G	SA	Gamma Spec	
043713 - 002	TJAOU-228A-GR-163-S	0	228A	120198/1025	S	G		4 C	G	SA	RCRA metals	
043714 - 001	TJAOU-228A-GR-164-S	0	228A	120198/1030	S	G		4 C	G	SA	Gamma Spec	
043715 – 001	TJAOU-228A-GR-166-S	0	228A	120198/1035	S	G		4 C	G	SA	Gamma Spec	
043715 - 002	TJAOU-228A-GR-166-S	0	228A	120198/1035	S	G		4 C	G	SA	RCRA metals	
043716 - 001	TJAOU-228A-GR-166-S	0	228A	120198/1045	S	G	↓	4 C	G	SA	Gamma Spec/Iso U	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/08/98
Entered by: UH

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
Released by COC 601213
Please list as separate report

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits. UH

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	C. Catechis	CC	MDM/6131/881-3196
	Gill Baltazar	GB	GB	Weston/6131/977/2269

1. Relinquished by	C. Catechis	Org. 6131	Date 12/03/98	Time 0920	4. Relinquished by	Org.	Date
1. Received by	[illegible]	Org. 7777	Date 12/3/98	Time 0920	4. Received by	Org.	Date
2. Relinquished by	[illegible] (SMO)	Org. 7578	Date 12/7/98	Time 1255	5. Relinquished by	Org.	Date
2. Received by		Org.	Date	Time	5. Received by	Org.	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org.	Date
3. Received by		Org.	Date	Time	6. Received by	Org.	Date

Original — To Accompany Samples, Laboratory Copy (White)
1st Copy — To Accompany Samples, Return to SMO (Blue)
2nd Copy — SMO Suspense Copy (Yellow)
3rd Copy — Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601188

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB UI Lab Samp
043716 – 002	TJAOU-228A-GR-166-S	0	228A	120198/1045	S	G	500 ml	4 C	G	SA	~~RCRA metals~~,HE,SVOCs CL	
043716 - 003	TJAOU-228A-GR-166-S	0	228A	120198/1045	S	G	4 oz	4 C	G	SA	VOCs	
043717 – 001	TJAOU-228A-GR-167-S	0	228A	120198/1050	S	G	500 ml	4 C	G	SA	Gamma Spec	
043717 - 002	TJAOU-228A-GR-167-S	0	228A	120198/1050	S	G		4 C	G	SA	RCRA metals	
043718 - 001	TJAOU-228A-GR-168-S	0	228A	120198/1053	S	G		4 C	G	SA	Gamma Spec	
043719 – 001	TJAOU-228A-GR-169-S	0	228A	120198/1100	S	G		4 C	G	SA	Gamma Spec	
043719 - 002	TJAOU-228A-GR-169-S	0	228A	120198/1100	S	G		4 C	G	SA	RCRA metals	
043720 - 001	TJAOU-228A-GR-160-S	0	228A	120198/1203	S	G		4 C	G	SA	Gamma Spec	
043721 - 001	TJAOU-228A-GR-161-S	0	228A	120198/1115	S	G		4 C	G	SA	Gamma Spec/Iso U	
043721 - 002	TJAOU-228A-GR-161-S	0	228A	120198/1115	S	G		4 C	G	SA	RCRA metals,HE,SVOCs	
043721 - 003	TJAOU-228A-GR-161-S	0	228A	120198/1115	S	G	4 oz	4 C	G	SA	VOCs	
043722 - 001	TJAOU-228A-GR-161-DU	0	228A	120198/1115	S	G	500 ml	4 C	G	SA	Gamma Spec/Iso U	
043722 - 002	TJAOU-228A-GR-161-DU	0	228A	120198/1115	S	G	500 ml	4 C	G	SA	RCRA metals,HE,SVOCs	
043722 - 003	TJAOU-228A-GR-161-DU	0	228A	120198/1115	S	G	4 oz	4 C	G	SA	VOCs	
-												
-												
-												
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-												
-												
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-												
-												
-												

Abnormal Conditions on Receipt LAB USE

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) **1st Copy** To Accompany Samples, Return to SMO (Blue) **2nd Copy** SMO Suspense Copy (Yellow) **3rd Copy** Field Copy (Pink)

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043711-001 TJAOU-228A-GR-151-S
Lab ID	: 9812298-01
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.137				pCi/g		LDM	12/21/98	2040	138241	1
Accuracy, Uranium-235		0.0300				pCi/g						
Accuracy, Uranium-238		0.135				pCi/g						
Uranium-233/234		0.798	+/- 0.137	0.0140	0.0284	pCi/g	1.0					
Uranium-235		0.0533	+/- 0.03	0.00	0.0123	pCi/g	1.0					
Uranium-238		0.786	+/- 0.135	0.00570	0.0284	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		1.10	+/- 0.246	0.0525	0.143	pCi/g	1.0	EJB	12/17/98	1230	137659	2
Americium-241	U	0.00512	+/- 0.0927	0.0337	0.154	pCi/g	1.0					
Cerium-144	U	0.0261	+/- 0.115	0.0651	0.207	pCi/g	1.0					
Cesium-134	U	-0.0171	+/- 0.0217	0.0137	0.0315	pCi/g	1.0					
Cesium-137	U	0.00440	+/- 0.0234	0.0119	0.0422	pCi/g	1.0					
Chromium-51	U	-0.0672	+/- 0.227	0.124	0.383	pCi/g	1.0					
Cobalt-60	U	0.00268	+/- 0.0239	0.0130	0.0446	pCi/g	1.0					
Iron-59	U	0.0152	+/- 0.0585	0.0292	0.104	pCi/g	1.0					
Lead-212		1.01	+/- 0.125	0.0212	0.0601	pCi/g	1.0					
Lead-214		0.995	+/- 0.154	0.0247	0.0731	pCi/g	1.0					
Potassium-40		17.4	+/- 2.05	0.169	0.351	pCi/g	1.0					
Radium-226		0.937	+/- 0.155	0.0308	0.0682	pCi/g	1.0					
Radium-228		1.10	+/- 0.246	0.0525	0.143	pCi/g	1.0					
Ruthenium-103	U	-0.00226	+/- 0.0225	0.0144	0.0406	pCi/g	1.0					
Ruthenium-106	U	0.0509	+/- 0.195	0.112	0.355	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.161	0.0572	0.229	pCi/g	1.0					
Thorium-232		0.990	+/- 0.123	0.0209	0.0591	pCi/g	1.0					
Thorium-234		1.31	+/- 1.13	0.382	1.27	pCi/g	1.0					
Uranium-235		0.321	+/- 0.189	0.0586	0.229	pCi/g	1.0					
Uranium-238		1.31	+/- 1.13	0.382	1.27	pCi/g	1.0					

9812298-01

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043716-001 TJAOU-228A-GR-156-S
Lab ID	: 9812298-10
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.133				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0329				pCi/g						
Accuracy, Uranium-238		0.147				pCi/g						
Uranium-233/234		0.831	+/- 0.133	0.0118	0.0108	pCi/g	1.0					
Uranium-235		0.0721	+/- 0.0329	0.00	0.0108	pCi/g	1.0					
Uranium-238		0.958	+/- 0.147	0.00502	0.0250	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.914	+/- 0.276	0.0521	0.152	pCi/g	1.0	EJB	12/17/98	1231	137659	2
Americium-241		0.0409	+/- 0.0975	0.0332	0.157	pCi/g	1.0					
Cerium-144	U	-0.0767	+/- 0.148	0.0663	0.218	pCi/g	1.0					
Cesium-134	U	0.0129	+/- 0.0249	0.0136	0.0387	pCi/g	1.0					
Cesium-137	U	0.0116	+/- 0.0269	0.0118	0.0468	pCi/g	1.0					
Chromium-51	U	-0.212	+/- 0.24	0.125	0.404	pCi/g	1.0					
Cobalt-60	U	0.0107	+/- 0.0267	0.0129	0.0487	pCi/g	1.0					
Iron-59	U	0.00812	+/- 0.0626	0.0290	0.111	pCi/g	1.0					
Lead-212		1.15	+/- 0.148	0.0216	0.0620	pCi/g	1.0					
Lead-214		1.04	+/- 0.166	0.0248	0.0744	pCi/g	1.0					
Potassium-40		19.0	+/- 2.44	0.168	0.464	pCi/g	1.0					
Radium-226		0.821	+/- 0.163	0.0305	0.0781	pCi/g	1.0					
Radium-228		0.914	+/- 0.276	0.0521	0.152	pCi/g	1.0					
Ruthenium-103	U	-0.00142	+/- 0.0252	0.0143	0.0436	pCi/g	1.0					
Ruthenium-106	U	0.0766	+/- 0.208	0.111	0.365	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.157	0.0580	0.233	pCi/g	1.0					
Thorium-232		1.13	+/- 0.145	0.0213	0.0610	pCi/g	1.0					
Thorium-234		1.42	+/- 1.35	0.377	1.33	pCi/g	1.0					
Uranium-235		0.113	+/- 0.14	0.0641	0.241	pCi/g	1.0					
Uranium-238		1.42	+/- 1.35	0.377	1.33	pCi/g	1.0					

9812298-10

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AI2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043721-001 TJAOU-228A-GR-161-S
Lab ID	: 9812298-19
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.142				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0358				pCi/g						
Accuracy, Uranium-238		0.187				pCi/g						
Uranium-233/234		0.871	+/- 0.142	0.0135	0.0272	pCi/g	1.0					
Uranium-235		0.0690	+/- 0.0358	0.00776	0.0337	pCi/g	1.0					
Uranium-238		1.30	+/- 0.187	0.00	0.0118	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.951	+/- 0.207	0.0437	0.124	pCi/g	1.0	EJB	12/17/98	1235	137659	2
Americium-241	U	-0.00127	+/- 0.084	0.0279	0.133	pCi/g	1.0					
Cerium-144	U	-0.101	+/- 0.104	0.0553	0.181	pCi/g	1.0					
Cesium-134	U	-0.00563	+/- 0.0188	0.0114	0.0286	pCi/g	1.0					
Cesium-137		0.0291	+/- 0.0348	0.00990	0.0388	pCi/g	1.0					
Chromium-51		0.175	+/- 0.197	0.104	0.357	pCi/g	1.0					
Cobalt-60	U	-0.00401	+/- 0.022	0.0108	0.0389	pCi/g	1.0					
Iron-59	U	0.0185	+/- 0.0548	0.0243	0.101	pCi/g	1.0					
Lead-212		0.918	+/- 0.114	0.0180	0.0510	pCi/g	1.0					
Lead-214		0.996	+/- 0.15	0.0207	0.0619	pCi/g	1.0					
Potassium-40		21.7	+/- 2.56	0.141	0.315	pCi/g	1.0					
Radium-226		0.806	+/- 0.128	0.0256	0.0603	pCi/g	1.0					
Radium-228		0.951	+/- 0.207	0.0437	0.124	pCi/g	1.0					
Ruthenium-103	U	-0.00506	+/- 0.0208	0.0120	0.0372	pCi/g	1.0					
Ruthenium-106	U	-0.116	+/- 0.182	0.0933	0.266	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.194	0.0483	0.200	pCi/g	1.0					
Thorium-232		0.904	+/- 0.113	0.0177	0.0502	pCi/g	1.0					
Thorium-234		1.59	+/- 1.15	0.316	1.07	pCi/g	1.0					
Uranium-235	U	0.0206	+/- 0.106	0.0535	0.194	pCi/g	1.0					
Uranium-238		1.59	+/- 1.15	0.316	1.07	pCi/g	1.0					

9812298-19

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043722-001 TJAOU-228A-GR-161-D
Lab ID	: 9812298-22
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.181				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0367				pCi/g						
Accuracy, Uranium-238		0.230				pCi/g						
Uranium-233/234		1.15	+/- 0.181	0.0135	0.0137	pCi/g	1.0					
Uranium-235		0.0655	+/- 0.0367	0.00640	0.0319	pCi/g	1.0					
Uranium-238		1.62	+/- 0.23	0.00639	0.0318	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.981	+/- 0.219	0.0485	0.138	pCi/g	1.0	EJB	12/17/98	1235	137659	2
Americium-241	U	-0.0151	+/- 0.114	0.0344	0.178	pCi/g	1.0					
Cerium-144	U	-0.0907	+/- 0.108	0.0613	0.188	pCi/g	1.0					
Cesium-134	U	-0.00282	+/- 0.0223	0.0126	0.0348	pCi/g	1.0					
Cesium-137		0.0734	+/- 0.0332	0.0110	0.0388	pCi/g	1.0					
Chromium-51	U	-0.0211	+/- 0.215	0.115	0.371	pCi/g	1.0					
Cobalt-60	U	-0.0108	+/- 0.0249	0.0120	0.0435	pCi/g	1.0					
Iron-59	U	-0.0462	+/- 0.0594	0.0270	0.0949	pCi/g	1.0					
Lead-212		1.07	+/- 0.134	0.0199	0.0567	pCi/g	1.0					
Lead-214		0.969	+/- 0.15	0.0229	0.0660	pCi/g	1.0					
Potassium-40	U	0.00	+/- 2.11	0.119	2.33	pCi/g	1.0					
Radium-226		0.865	+/- 0.136	0.0284	0.0651	pCi/g	1.0					
Radium-228		0.981	+/- 0.219	0.0485	0.138	pCi/g	1.0					
Ruthenium-103	U	-0.00684	+/- 0.0237	0.0133	0.0424	pCi/g	1.0					
Ruthenium-106		0.162	+/- 0.176	0.104	0.336	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.185	0.0535	0.217	pCi/g	1.0					
Thorium-232		1.06	+/- 0.132	0.0196	0.0558	pCi/g	1.0					
Thorium-234		0.857	+/- 1.33	0.386	1.52	pCi/g	1.0					
Uranium-235	U	0.0511	+/- 0.143	0.0552	0.201	pCi/g	1.0					
Uranium-238		0.857	+/- 1.33	0.386	1.52	pCi/g	1.0					

9812298-22

GR-151 thru GR-161

SF 2001-COC (10-97)
Supersedes (8-97) issue

Internal Lab Batch No.

Lai, Ank per Schedule

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- 601188

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland
Project Name: Site 228A VCM
Record Center Code: ER/1309/228A/OAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO USE
Carrier/Waybill No.: 75751
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi/ 844-3110
Send Report to SMO: Sue Jarisch

Contract No.: AJ-2480A
Case No.: 7225.2203
SMO Authorization: Doug Salmi
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample #
043711 – 001	TJAOU-228A-GR-161-S	0	228A	120198/1015	S	G	500 ml	4 C	G	SA	Gamma Spec/Iso U	
043711 - 002	TJAOU-228A-GR-161-S	0	228A	120198/1015	S	G	500 ml	4 C	G	SA	RCRA metals,HE,SVOCs	
043711 - 003	TJAOU-228A-GR-161-S	0	228A	120198/1015	S	G	4 oz	4 C	G	SA	VOCs	
043712 - 001	TJAOU-228A-GR-162-S	0	228A	120198/1020	S	G	500 ml	4 C	G	SA	Gamma Spec	
043713 – 001	TJAOU-228A-GR-163-S	0	228A	120198/1025	S	G	↓	4 C	G	SA	Gamma Spec	
043713 - 002	TJAOU-228A-GR-163-S	0	228A	120198/1025	S	G		4 C	G	SA	RCRA metals	
043714 - 001	TJAOU-228A-GR-164-S	0	228A	120198/1030	S	G		4 C	G	SA	Gamma Spec	
043715 – 001	TJAOU-228A-GR-165-S	0	228A	120198/1035	S	G		4 C	G	SA	Gamma Spec	
043715 - 002	TJAOU-228A-GR-165-S	0	228A	120198/1035	S	G		4 C	G	SA	RCRA metals	
043716 - 001	TJAOU-228A-GR-166-S	0	228A	120198/1045	S	G	↓	4 C	G	SA	Gamma Spec/Iso U	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/08/98
Entered by: UH

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits. UH

Released by COC 601213

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	Ch. Catechis	CC	MDM/6131/881-3196
	Gill Baltazar	GB	GB	Weston/6131/977-2769

Please list as separate report.

	Org.	Date	Time		Org.	Date
1. Relinquished by Ch. Catechis	6131	12/03/98	0920	4. Relinquished by		
1. Received by [illegible]	7577	12/3/98	0920	4. Received by		
2. Relinquished by [illegible] (SMO)	7578	12/7/98	1255	5. Relinquished by		
2. Received by				5. Received by		
3. Relinquished by				6. Relinquished by		
3. Received by				6. Received by		

Original — To Accompany Samples, Laboratory Copy (White)
1st Copy — To Accompany Samples, Return to SMO (Blue)
2nd Copy — SMO Suspense Copy (Yellow)
3rd Copy — Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601188

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB UI: Lab Samp
043716 – 002	TJAOU-228A-GR-166-S	0	228A	120198/1045	S	G	500 ml	4 C	G	SA	~~RCRA~~ metals,HE,SVOCs CF	
043716 - 003	TJAOU-228A-GR-166-S	0	228A	120198/1045	S	G	4 oz	4 C	G	SA	VOCs	
043717 – 001	TJAOU-228A-GR-167-S	0	228A	120198/1050	S	G	500 ml	4 C	G	SA	Gamma Spec	
043717 - 002	TJAOU-228A-GR-167-S	0	228A	120198/1050	S	G		4 C	G	SA	RCRA metals	
043718 - 001	TJAOU-228A-GR-168-S	0	228A	120198/1053	S	G		4 C	G	SA	Gamma Spec	
043719 – 001	TJAOU-228A-GR-169-S	0	228A	120198/1100	S	G		4 C	G	SA	Gamma Spec	
043719 - 002	TJAOU-228A-GR-169-S	0	228A	120198/1100	S	G		4 C	G	SA	RCRA metals	
043720 - 001	TJAOU-228A-GR-160-S	0	228A	120198/1203	S	G		4 C	G	SA	Gamma Spec	
043721 - 001	TJAOU-228A-GR-161-S	0	228A	120198/1115	S	G		4 C	G	SA	Gamma Spec/Iso U	
043721 - 002	TJAOU-228A-GR-161-S	0	228A	120198/1115	S	G		4 C	G	SA	RCRA metals,HE,SVOCs	
043721 - 003	TJAOU-228A-GR-161-S	0	228A	120198/1115	S	G	4 oz	4 C	G	SA	VOCs	
043722 - 001	TJAOU-228A-GR-161-DU	0	228A	120198/1115	S	G	500 ml	4 C	G	SA	Gamma Spec/Iso U	
043722 - 002	TJAOU-228A-GR-161-DU	0	228A	120198/1115	S	G	500 ml	4 C	G	SA	RCRA metals,HE,SVOCs	
043722 - 003	TJAOU-228A-GR-161-DU	0	228A	120198/1115	S	G	4 oz	4 C	G	SA	VOCs	
-												
-												
-												
-												
-												
-												
-												
-												
-												
-												
-												

Abnormal Conditions on Receipt **LAB USE**

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) **1st Copy** To Accompany Samples, Return to SMO (Blue) **2nd Copy** SMO Suspense Copy (Yellow) **3rd Copy** Field Copy (Pink)

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043711-001 TJAOU-228A-GR-151-S
Lab ID	: 9812298-01
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.137				pCi/g		LDM	12/21/98	2040	138241	1
Accuracy, Uranium-235		0.0300				pCi/g						
Accuracy, Uranium-238		0.135				pCi/g						
Uranium-233/234		0.798	+/- 0.137	0.0140	0.0284	pCi/g	1.0					
Uranium-235		0.0533	+/- 0.03	0.00	0.0123	pCi/g	1.0					
Uranium-238		0.786	+/- 0.135	0.00570	0.0284	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		1.10	+/- 0.246	0.0525	0.143	pCi/g	1.0	EJB	12/17/98	1230	137659	2
Americium-241	U	0.00512	+/- 0.0927	0.0337	0.154	pCi/g	1.0					
Cerium-144	U	0.0261	+/- 0.115	0.0651	0.207	pCi/g	1.0					
Cesium-134	U	-0.0171	+/- 0.0217	0.0137	0.0315	pCi/g	1.0					
Cesium-137	U	0.00440	+/- 0.0234	0.0119	0.0422	pCi/g	1.0					
Chromium-51	U	-0.0672	+/- 0.227	0.124	0.383	pCi/g	1.0					
Cobalt-60	U	0.00268	+/- 0.0239	0.0130	0.0446	pCi/g	1.0					
Iron-59	U	0.0152	+/- 0.0585	0.0292	0.104	pCi/g	1.0					
Lead-212		1.01	+/- 0.125	0.0212	0.0601	pCi/g	1.0					
Lead-214		0.995	+/- 0.154	0.0247	0.0731	pCi/g	1.0					
Potassium-40		17.4	+/- 2.05	0.169	0.351	pCi/g	1.0					
Radium-226		0.937	+/- 0.155	0.0308	0.0682	pCi/g	1.0					
Radium-228		1.10	+/- 0.246	0.0525	0.143	pCi/g	1.0					
Ruthenium-103	U	-0.00226	+/- 0.0225	0.0144	0.0406	pCi/g	1.0					
Ruthenium-106	U	0.0509	+/- 0.195	0.112	0.355	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.161	0.0572	0.229	pCi/g	1.0					
Thorium-232		0.990	+/- 0.123	0.0209	0.0591	pCi/g	1.0					
Thorium-234		1.31	+/- 1.13	0.382	1.27	pCi/g	1.0					
Uranium-235		0.321	+/- 0.189	0.0586	0.229	pCi/g	1.0					
Uranium-238		1.31	+/- 1.13	0.382	1.27	pCi/g	1.0					

9812298-01

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043711-001 TJAOU-228A-GR-151-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.00619	+/- 0.019	0.0135	0.0387	pCi/g	1.0					
Zirconium-95		0.0405	+/- 0.0443	0.0238	0.0835	pCi/g	1.0	EJB	12/17/98	1230	137659	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812298-01

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043712-001 TJAOU-228A-GR-152-S
Lab ID	: 9812298-04
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.08	+/- 0.25	0.0384	0.108	pCi/g	1.0	EJB	12/17/98	0811	137659	1
Americium-241		0.0944	+/- 0.101	0.0301	0.174	pCi/g	1.0					
Cerium-144	U	-0.0694	+/- 0.0917	0.0494	0.168	pCi/g	1.0					
Cesium-134	U	0.00551	+/- 0.0167	0.00993	0.0276	pCi/g	1.0					
Cesium-137		0.0545	+/- 0.0315	0.00864	0.0307	pCi/g	1.0					
Chromium-51	U	0.0632	+/- 0.18	0.0907	0.326	pCi/g	1.0					
Cobalt-60	U	-0.00783	+/- 0.018	0.00959	0.0319	pCi/g	1.0					
Iron-59		0.0252	+/- 0.0478	0.0214	0.0867	pCi/g	1.0					
Lead-212		0.989	+/- 0.119	0.0158	0.0452	pCi/g	1.0					
Lead-214		0.926	+/- 0.136	0.0181	0.0545	pCi/g	1.0					
Potassium-40		24.4	+/- 2.72	0.125	0.274	pCi/g	1.0					
Radium-226		0.734	+/- 0.125	0.0223	0.0564	pCi/g	1.0					
Radium-228		1.08	+/- 0.25	0.0384	0.108	pCi/g	1.0					
Ruthenium-103	U	-0.0119	+/- 0.0202	0.0104	0.0334	pCi/g	1.0					
Ruthenium-106	U	-0.0145	+/- 0.144	0.0813	0.262	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.127	0.0424	0.181	pCi/g	1.0					
Thorium-232		0.974	+/- 0.117	0.0156	0.0445	pCi/g	1.0					
Thorium-234		0.845	+/- 1.28	0.336	1.26	pCi/g	1.0					
Uranium-235		0.106	+/- 0.153	0.0444	0.182	pCi/g	1.0					
Uranium-238		0.845	+/- 1.28	0.336	1.26	pCi/g	1.0					
Yttrium-88	U	0.00138	+/- 0.0149	0.00979	0.0285	pCi/g	1.0					
Zirconium-95	U	-0.000566	+/- 0.0325	0.0173	0.0586	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812298-04

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043713-001 TJAOU-228A-GR-153-S
Lab ID	: 9812298-05
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.978	+/- 0.231	0.0506	0.128	pCi/g	1.0	EJB	12/17/98	0811	137659	1
Americium-241	U	-0.0200	+/- 0.0301	0.0180	0.0496	pCi/g	1.0					
Cerium-144	U	0.00861	+/- 0.0924	0.0596	0.168	pCi/g	1.0					
Cesium-134	U	-0.0303	+/- 0.0203	0.0132	0.0324	pCi/g	1.0					
Cesium-137	U	0.00213	+/- 0.0441	0.0115	0.0410	pCi/g	1.0					
Chromium-51	U	0.0747	+/- 0.2	0.116	0.352	pCi/g	1.0					
Cobalt-60	U	0.0103	+/- 0.0245	0.0124	0.0464	pCi/g	1.0					
Iron-59	U	0.00799	+/- 0.0577	0.0279	0.101	pCi/g	1.0					
Lead-212		0.976	+/- 0.133	0.0198	0.0493	pCi/g	1.0					
Lead-214		0.848	+/- 0.143	0.0232	0.0594	pCi/g	1.0					
Potassium-40		21.6	+/- 2.26	0.161	0.287	pCi/g	1.0					
Radium-226		0.793	+/- 0.147	0.0296	0.0663	pCi/g	1.0					
Radium-228		0.978	+/- 0.231	0.0506	0.128	pCi/g	1.0					
Ruthenium-103	U	0.0115	+/- 0.021	0.0137	0.0394	pCi/g	1.0					
Ruthenium-106	U	-0.0280	+/- 0.186	0.108	0.329	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.166	0.0536	0.191	pCi/g	1.0					
Thorium-232		0.960	+/- 0.131	0.0195	0.0485	pCi/g	1.0					
Thorium-234		1.26	+/- 0.494	0.224	0.503	pCi/g	1.0					
Uranium-235		0.0696	+/- 0.0979	0.0580	0.179	pCi/g	1.0					
Uranium-238		1.26	+/- 0.494	0.224	0.503	pCi/g	1.0					
Yttrium-88	U	-0.000858	+/- 0.0182	0.0129	0.0343	pCi/g	1.0					
Zirconium-95		0.0559	+/- 0.0518	0.0229	0.0761	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812298-05

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043714-001 TJAOU-228A-GR-154-S
Lab ID	: 9812298-07
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.21	+/- 0.333	0.0686	0.243	pCi/g	1.0	EJB	12/17/98	0812	137659	1
Americium-241	U	-0.00440	+/- 0.217	0.0369	0.252	pCi/g	1.0					
Cerium-144	U	-0.119	+/- 0.218	0.0821	0.375	pCi/g	1.0					
Cesium-134	U	-0.316	+/- 0.0655	0.0180	0.0690	pCi/g	1.0					
Cesium-137	U	-0.0377	+/- 0.0408	0.0157	0.0666	pCi/g	1.0					
Chromium-51	U	0.0787	+/- 0.411	0.155	0.709	pCi/g	1.0					
Cobalt-60	U	0.0134	+/- 0.0391	0.0167	0.0742	pCi/g	1.0					
Iron-59	U	-0.0283	+/- 0.086	0.0377	0.152	pCi/g	1.0					
Lead-212		1.09	+/- 0.167	0.0264	0.112	pCi/g	1.0					
Lead-214		0.965	+/- 0.193	0.0313	0.126	pCi/g	1.0					
Potassium-40		15.7	+/- 2.27	0.217	0.708	pCi/g	1.0					
Radium-226		0.868	+/- 0.203	0.0404	0.153	pCi/g	1.0					
Radium-228		1.21	+/- 0.333	0.0686	0.243	pCi/g	1.0					
Ruthenium-103	U	-0.0331	+/- 0.045	0.0187	0.0761	pCi/g	1.0					
Ruthenium-106	U	-0.146	+/- 0.357	0.147	0.612	pCi/g	1.0					
Thorium-231		0.360	+/- 0.288	0.0716	0.368	pCi/g	1.0					
Thorium-232		1.08	+/- 0.165	0.0260	0.110	pCi/g	1.0					
Thorium-234		1.72	+/- 2.21	0.436	2.17	pCi/g	1.0					
Uranium-235		0.297	+/- 0.352	0.0737	0.401	pCi/g	1.0					
Uranium-238		1.72	+/- 2.21	0.436	2.17	pCi/g	1.0					
Yttrium-88	U	0.0103	+/- 0.0394	0.0176	0.0765	pCi/g	1.0					
Zirconium-95		0.130	+/- 0.118	0.0313	0.150	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812298-07

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043715-001 TJAOU-228A-GR-155-S
Lab ID	: 9812298-08
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.15	+/- 0.255	0.0561	0.155	pCi/g	1.0	EJB	12/17/98	1332	137659	1
Americium-241	U	-0.0247	+/- 0.104	0.0350	0.157	pCi/g	1.0					
Cerium-144	U	-0.0559	+/- 0.12	0.0692	0.208	pCi/g	1.0					
Cesium-134	U	-0.0134	+/- 0.0247	0.0146	0.0357	pCi/g	1.0					
Cesium-137	U	-0.00613	+/- 0.0267	0.0127	0.0455	pCi/g	1.0					
Chromium-51	U	0.0819	+/- 0.245	0.131	0.421	pCi/g	1.0					
Cobalt-60	U	-0.00224	+/- 0.0274	0.0139	0.0483	pCi/g	1.0					
Iron-59	U	0.0285	+/- 0.0686	0.0313	0.125	pCi/g	1.0					
Lead-212		1.10	+/- 0.135	0.0225	0.0598	pCi/g	1.0					
Lead-214		1.15	+/- 0.174	0.0261	0.0732	pCi/g	1.0					
Potassium-40		20.2	+/- 2.37	0.181	0.388	pCi/g	1.0					
Radium-226		0.898	+/- 0.152	0.0327	0.0843	pCi/g	1.0					
Radium-228		1.15	+/- 0.255	0.0561	0.155	pCi/g	1.0					
Ruthenium-103	U	0.00535	+/- 0.027	0.0153	0.0482	pCi/g	1.0					
Ruthenium-106		0.123	+/- 0.216	0.119	0.389	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.175	0.0607	0.217	pCi/g	1.0					
Thorium-232		1.08	+/- 0.133	0.0222	0.0589	pCi/g	1.0					
Thorium-234		0.518	+/- 1.2	0.397	1.32	pCi/g	1.0					
Uranium-235		0.165	+/- 0.213	0.0623	0.235	pCi/g	1.0					
Uranium-238		0.518	+/- 1.2	0.397	1.32	pCi/g	1.0					
Yttrium-88	U	-0.00587	+/- 0.0226	0.0144	0.0413	pCi/g	1.0					
Zirconium-95	U	0.0174	+/- 0.0475	0.0254	0.0843	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812298-08

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043716-001 T3AOU-228A-GR-156-S
Lab ID	: 9812298-10
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.133				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0329				pCi/g						
Accuracy, Uranium-238		0.147				pCi/g						
Uranium-233/234		0.831	+/- 0.133	0.0118	0.0108	pCi/g	1.0					
Uranium-235		0.0721	+/- 0.0329	0.00	0.0108	pCi/g	1.0					
Uranium-238		0.958	+/- 0.147	0.00502	0.0250	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.914	+/- 0.276	0.0521	0.152	pCi/g	1.0	EJB	12/17/98	1231	137659	2
Americium-241		0.0409	+/- 0.0975	0.0332	0.157	pCi/g	1.0					
Cerium-144	U	-0.0767	+/- 0.148	0.0663	0.218	pCi/g	1.0					
Cesium-134	U	0.0129	+/- 0.0249	0.0136	0.0387	pCi/g	1.0					
Cesium-137	U	0.0116	+/- 0.0269	0.0118	0.0468	pCi/g	1.0					
Chromium-51	U	-0.212	+/- 0.24	0.125	0.404	pCi/g	1.0					
Cobalt-60	U	0.0107	+/- 0.0267	0.0129	0.0487	pCi/g	1.0					
Iron-59	U	0.00812	+/- 0.0626	0.0290	0.111	pCi/g	1.0					
Lead-212		1.15	+/- 0.148	0.0216	0.0620	pCi/g	1.0					
Lead-214		1.04	+/- 0.166	0.0248	0.0744	pCi/g	1.0					
Potassium-40		19.0	+/- 2.44	0.168	0.464	pCi/g	1.0					
Radium-226		0.821	+/- 0.163	0.0305	0.0781	pCi/g	1.0					
Radium-228		0.914	+/- 0.276	0.0521	0.152	pCi/g	1.0					
Ruthenium-103	U	-0.00142	+/- 0.0252	0.0143	0.0436	pCi/g	1.0					
Ruthenium-106	U	0.0766	+/- 0.208	0.111	0.365	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.157	0.0580	0.233	pCi/g	1.0					
Thorium-232		1.13	+/- 0.145	0.0213	0.0610	pCi/g	1.0					
Thorium-234		1.42	+/- 1.35	0.377	1.33	pCi/g	1.0					
Uranium-235		0.113	+/- 0.14	0.0641	0.241	pCi/g	1.0					
Uranium-238		1.42	+/- 1.35	0.377	1.33	pCi/g	1.0					

9812298-10

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043716-001 TJAOU-228A-GR-156-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	-0.0118	+/- 0.0207	0.0132	0.0353	pCi/g	1.0					
Zirconium-95	U	0.0206	+/- 0.0461	0.0236	0.0847	pCi/g	1.0	EJB	12/17/98	1231	137659	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812298-10

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043717-001 TJAOU-228A-GR-157-S
Lab ID : 9812298-13
Matrix : SOIL
Date Collected : 12/01/98
Date Received : 12/08/98
Priority : Routine
Collector : Client

GR-157

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.01	+/- 0.226	0.0460	0.131	pCi/g	1.0	EJB	12/17/98	1232	137659	1
Americium-241	U	0.0202	+/- 0.0944	0.0289	0.149	pCi/g	1.0					
Cerium-144	U	-0.0393	+/- 0.109	0.0579	0.194	pCi/g	1.0					
Cesium-134	U	0.00227	+/- 0.0203	0.0119	0.0321	pCi/g	1.0					
Cesium-137		0.0212	+/- 0.0251	0.0104	0.0417	pCi/g	1.0					
Chromium-51	U	-0.112	+/- 0.213	0.109	0.357	pCi/g	1.0					
Cobalt-60	U	-0.00317	+/- 0.0235	0.0115	0.0420	pCi/g	1.0					
Iron-59	U	0.00931	+/- 0.058	0.0257	0.106	pCi/g	1.0					
Lead-212		1.12	+/- 0.141	0.0189	0.0506	pCi/g	1.0					
Lead-214		0.890	+/- 0.137	0.0217	0.0695	pCi/g	1.0					
Potassium-40		21.3	+/- 2.64	0.150	0.396	pCi/g	1.0					
Radium-226		0.758	+/- 0.126	0.0267	0.0701	pCi/g	1.0					
Radium-228		1.01	+/- 0.226	0.0460	0.131	pCi/g	1.0					
Ruthenium-103	U	-0.00116	+/- 0.0225	0.0125	0.0405	pCi/g	1.0					
Ruthenium-106	U	-0.110	+/- 0.158	0.0975	0.268	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.189	0.0507	0.203	pCi/g	1.0					
Thorium-232		1.10	+/- 0.138	0.0186	0.0498	pCi/g	1.0					
Thorium-234		0.941	+/- 1.09	0.326	1.16	pCi/g	1.0					
Uranium-235	U	0.0276	+/- 0.114	0.0560	0.207	pCi/g	1.0					
Uranium-238		0.941	+/- 1.09	0.326	1.16	pCi/g	1.0					
Yttrium-88	U	0.00789	+/- 0.0208	0.0118	0.0404	pCi/g	1.0					
Zirconium-95		0.0513	+/- 0.0406	0.0208	0.0774	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812298-13

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043718-001 TJAOU-228A-GR-158-S
Lab ID	: 9812298-15
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.0856	+/- 0.093	0.0457	0.157	pCi/g	1.0	EJB	12/17/98	1233	137659	1
Americium-241	U	-0.00601	+/- 0.0307	0.0163	0.0557	pCi/g	1.0					
Cerium-144	U	-0.0149	+/- 0.125	0.0545	0.194	pCi/g	1.0					
Cesium-134	U	0.00	+/- 0.0364	0.0120	0.0602	pCi/g	1.0					
Cesium-137		0.0259	+/- 0.0304	0.0104	0.0358	pCi/g	1.0					
Chromium-51		0.230	+/- 0.288	0.106	0.365	pCi/g	1.0					
Cobalt-60	U	0.00813	+/- 0.0318	0.0112	0.0465	pCi/g	1.0					
Iron-59		0.0641	+/- 0.0625	0.0253	0.110	pCi/g	1.0					
Lead-212		1.06	+/- 0.16	0.0181	0.0767	pCi/g	1.0					
Lead-214		1.03	+/- 0.158	0.0211	0.0712	pCi/g	1.0					
Potassium-40	U	0.0472	+/- 0.23	0.111	0.381	pCi/g	1.0					
Radium-226	U	0.00	+/- 0.0733	0.0254	0.120	pCi/g	1.0					
Radium-228		0.0856	+/- 0.093	0.0457	0.157	pCi/g	1.0					
Ruthenium-103	U	0.00829	+/- 0.0295	0.0125	0.0463	pCi/g	1.0					
Ruthenium-106	U	0.0219	+/- 0.312	0.0979	0.342	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.215	0.0488	0.220	pCi/g	1.0					
Thorium-232	U	0.00	+/- 0.157	0.0178	0.140	pCi/g	1.0					
Thorium-234		1.50	+/- 0.639	0.203	0.543	pCi/g	1.0					
Uranium-235		0.0844	+/- 0.121	0.0531	0.213	pCi/g	1.0					
Uranium-238		1.50	+/- 0.639	0.203	0.543	pCi/g	1.0					
Yttrium-88		0.0244	+/- 0.0234	0.0117	0.0460	pCi/g	1.0					
Zirconium-95	U	-0.0300	+/- 0.0443	0.0208	0.0764	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812298-15

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043719-001 TJAOU-228A-GR-159-S
Lab ID	: 9812298-16
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.984	+/- 0.231	0.0509	0.131	pCi/g	1.0	EJB	12/17/98	1233	137659	1
Americium-241	U	-0.149	+/- 0.178	0.0454	0.262	pCi/g	1.0					
Cerium-144	U	0.0296	+/- 0.121	0.0657	0.220	pCi/g	1.0					
Cesium-134	U	-0.00243	+/- 0.0223	0.0132	0.0347	pCi/g	1.0					
Cesium-137		0.0393	+/- 0.0324	0.0115	0.0401	pCi/g	1.0					
Chromium-51	U	0.0766	+/- 0.233	0.121	0.408	pCi/g	1.0					
Cobalt-60	U	0.0125	+/- 0.025	0.0127	0.0476	pCi/g	1.0					
Iron-59		0.0971	+/- 0.0764	0.0285	0.115	pCi/g	1.0					
Lead-212		0.987	+/- 0.128	0.0211	0.0585	pCi/g	1.0					
Lead-214		1.00	+/- 0.162	0.0241	0.0650	pCi/g	1.0					
Potassium-40		21.6	+/- 2.89	0.166	0.317	pCi/g	1.0					
Radium-226		0.815	+/- 0.137	0.0296	0.0674	pCi/g	1.0					
Radium-228		0.984	+/- 0.231	0.0509	0.131	pCi/g	1.0					
Ruthenium-103	U	-0.00491	+/- 0.0229	0.0139	0.0410	pCi/g	1.0					
Ruthenium-106	U	-0.0367	+/- 0.19	0.108	0.334	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.16	0.0566	0.212	pCi/g	1.0					
Thorium-232		0.971	+/- 0.126	0.0207	0.0576	pCi/g	1.0					
Thorium-234		1.70	+/- 2.01	0.485	1.97	pCi/g	1.0					
Uranium-235		0.0864	+/- 0.121	0.0632	0.221	pCi/g	1.0					
Uranium-238		1.70	+/- 2.01	0.485	1.97	pCi/g	1.0					
Yttrium-88	U	-0.00894	+/- 0.0197	0.0130	0.0337	pCi/g	1.0					
Zirconium-95		0.0320	+/- 0.0801	0.0230	0.0866	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

"9812298-16"

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043720-001 TJAOU-228A-GR-160-S
Lab ID	: 9812298-18
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.987	+/- 0.221	0.0433	0.116	pCi/g	1.0	EJB	12/17/98	1234	137659	1
Americium-241	U	0.0259	+/- 0.0779	0.0282	0.150	pCi/g	1.0					
Cerium-144	U	0.0247	+/- 0.106	0.0547	0.195	pCi/g	1.0					
Cesium-134	U	0.00969	+/- 0.0187	0.0113	0.0313	pCi/g	1.0					
Cesium-137		0.0973	+/- 0.0345	0.00983	0.0345	pCi/g	1.0					
Chromium-51	U	0.0108	+/- 0.208	0.104	0.365	pCi/g	1.0					
Cobalt-60	U	0.00709	+/- 0.0217	0.0107	0.0413	pCi/g	1.0					
Iron-59	U	-0.0362	+/- 0.0525	0.0241	0.0854	pCi/g	1.0					
Lead-212		0.988	+/- 0.126	0.0179	0.0544	pCi/g	1.0					
Lead-214		1.05	+/- 0.158	0.0206	0.0638	pCi/g	1.0					
Potassium-40		19.6	+/- 2.25	0.140	0.318	pCi/g	1.0					
Radium-226		0.760	+/- 0.131	0.0254	0.0688	pCi/g	1.0					
Radium-228		0.987	+/- 0.221	0.0433	0.116	pCi/g	1.0					
Ruthenium-103	U	0.00111	+/- 0.0215	0.0119	0.0397	pCi/g	1.0					
Ruthenium-106	U	0.0132	+/- 0.159	0.0927	0.291	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.184	0.0482	0.198	pCi/g	1.0					
Thorium-232		0.972	+/- 0.124	0.0176	0.0535	pCi/g	1.0					
Thorium-234		1.66	+/- 1.12	0.318	1.24	pCi/g	1.0					
Uranium-235	U	0.0175	+/- 0.105	0.0530	0.193	pCi/g	1.0					
Uranium-238		1.66	+/- 1.12	0.318	1.24	pCi/g	1.0					
Yttrium-88		0.0138	+/- 0.0147	0.0110	0.0334	pCi/g	1.0					
Zirconium-95	U	-0.0123	+/- 0.0384	0.0197	0.0673	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812298-18

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043721-001 TJAOU-228A-GR-161-S
Lab ID	: 9812298-19
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.142				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0358				pCi/g						
Accuracy, Uranium-238		0.187				pCi/g						
Uranium-233/234		0.871	+/- 0.142	0.0135	0.0272	pCi/g	1.0					
Uranium-235		0.0690	+/- 0.0358	0.00776	0.0337	pCi/g	1.0					
Uranium-238		1.30	+/- 0.187	0.00	0.0118	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.951	+/- 0.207	0.0437	0.124	pCi/g	1.0	EJB	12/17/98	1235	137659	2
Americium-241	U	-0.00127	+/- 0.084	0.0279	0.133	pCi/g	1.0					
Cerium-144	U	-0.101	+/- 0.104	0.0553	0.181	pCi/g	1.0					
Cesium-134	U	-0.00563	+/- 0.0188	0.0114	0.0286	pCi/g	1.0					
Cesium-137		0.0291	+/- 0.0348	0.00990	0.0388	pCi/g	1.0					
Chromium-51		0.175	+/- 0.197	0.104	0.357	pCi/g	1.0					
Cobalt-60	U	-0.00401	+/- 0.022	0.0108	0.0389	pCi/g	1.0					
Iron-59	U	0.0185	+/- 0.0548	0.0243	0.101	pCi/g	1.0					
Lead-212		0.918	+/- 0.114	0.0180	0.0510	pCi/g	1.0					
Lead-214		0.996	+/- 0.15	0.0207	0.0619	pCi/g	1.0					
Potassium-40		21.7	+/- 2.56	0.141	0.315	pCi/g	1.0					
Radium-226		0.806	+/- 0.128	0.0256	0.0603	pCi/g	1.0					
Radium-228		0.951	+/- 0.207	0.0437	0.124	pCi/g	1.0					
Ruthenium-103	U	-0.00506	+/- 0.0208	0.0120	0.0372	pCi/g	1.0					
Ruthenium-106	U	-0.116	+/- 0.182	0.0933	0.266	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.194	0.0483	0.200	pCi/g	1.0					
Thorium-232		0.904	+/- 0.113	0.0177	0.0502	pCi/g	1.0					
Thorium-234		1.59	+/- 1.15	0.316	1.07	pCi/g	1.0					
Uranium-235	U	0.0206	+/- 0.106	0.0535	0.194	pCi/g	1.0					
Uranium-238		1.59	+/- 1.15	0.316	1.07	pCi/g	1.0					

9812298-19

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043721-001 TJAOU-228A-GR-161-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.00585	+/- 0.0181	0.0111	0.0362	pCi/g	1.0					
Zirconium-95	U	-0.00173	+/- 0.0419	0.0198	0.0732	pCi/g	1.0	EJB	12/17/98	1235	137659	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812298-19

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043722-001 TJAOU-228A-GR-161-D
Lab ID	: 9812298-22
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.181				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0367				pCi/g						
Accuracy, Uranium-238		0.230				pCi/g						
Uranium-233/234		1.15	+/- 0.181	0.0135	0.0137	pCi/g	1.0					
Uranium-235		0.0655	+/- 0.0367	0.00640	0.0319	pCi/g	1.0					
Uranium-238		1.62	+/- 0.23	0.00639	0.0318	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.981	+/- 0.219	0.0485	0.138	pCi/g	1.0	EJB	12/17/98	1235	137659	2
Americium-241	U	-0.0151	+/- 0.114	0.0344	0.178	pCi/g	1.0					
Cerium-144	U	-0.0907	+/- 0.108	0.0613	0.188	pCi/g	1.0					
Cesium-134	U	-0.00282	+/- 0.0223	0.0126	0.0348	pCi/g	1.0					
Cesium-137		0.0734	+/- 0.0332	0.0110	0.0388	pCi/g	1.0					
Chromium-51	U	-0.0211	+/- 0.215	0.115	0.371	pCi/g	1.0					
Cobalt-60	U	-0.0108	+/- 0.0249	0.0120	0.0435	pCi/g	1.0					
Iron-59	U	-0.0462	+/- 0.0594	0.0270	0.0949	pCi/g	1.0					
Lead-212		1.07	+/- 0.134	0.0199	0.0567	pCi/g	1.0					
Lead-214		0.969	+/- 0.15	0.0229	0.0660	pCi/g	1.0					
Potassium-40	U	0.00	+/- 2.11	0.119	2.33	pCi/g	1.0					
Radium-226		0.865	+/- 0.136	0.0284	0.0651	pCi/g	1.0					
Radium-228		0.981	+/- 0.219	0.0485	0.138	pCi/g	1.0					
Ruthenium-103	U	-0.00684	+/- 0.0237	0.0133	0.0424	pCi/g	1.0					
Ruthenium-106		0.162	+/- 0.176	0.104	0.336	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.185	0.0535	0.217	pCi/g	1.0					
Thorium-232		1.06	+/- 0.132	0.0196	0.0558	pCi/g	1.0					
Thorium-234		0.857	+/- 1.33	0.386	1.52	pCi/g	1.0					
Uranium-235	U	0.0511	+/- 0.143	0.0552	0.201	pCi/g	1.0					
Uranium-238		0.857	+/- 1.33	0.386	1.52	pCi/g	1.0					

9812298-22

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043722-001 TJAOU-228A-GR-161-D

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	-0.00761	+/- 0.0166	0.0123	0.0290	pCi/g	1.0					
Zirconium-95	U	-0.0124	+/- 0.0402	0.0220	0.0699	pCi/g	1.0	EJB	12/17/98	1235	137659	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812298-22

GR-162 thru GR-175

Site 228A VCM per schedule

SF 2001-COC (10-97)

Supersedes (5-97) issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- **601189**

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland / Lai, Anh
Project Name: Site 228 VCM
Record Center Code: ER/1309/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO USE
Carrier/Waybill No.: 715751
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi
Send Report to SMO: Suzi Jensen

Contract No.: AJ-2480A
Case No.: 7225.2203
SMO Authorization
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location Tech Area NA
Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Samp #
043723 - 001	TJAOU-228A-GR-162-S	0	228A	120198/1255	S	G	500ml	4 C	G	SA	Gamma Spec	
043724 - 001	TJAOU-228A-GR-163-S			120198/1300							Gamma Spec	
043724 - 002	TJAOU-228A-GR-163-S			120198/1300							RCRA Metals	
043725 - 001	TJAOU-228A-GR-164-S			120198/1303							Gamma Spec	
043726 - 001	TJAOU-228A-GR-165-S			120198/1307							Gamma Spec	
043726 - 002	TJAOU-228A-GR-165-S			120198/1307							RCRA Metals	
043727 - 001	TJAOU-228A-GR-166-S			120198/1312							Gamma Spec/Iso U	
043727 - 002	TJAOU-228A-GR-166-S			120198/1312							HE, SVOCs	
043727 - 003	TJAOU-228A-GR-166-S			120198/1312			4 oz				VOC	
043728 - 001	TJAOU-228A-GR-167-S			120198/1320			500ml				Gamma Spec	

RMMA ☒Yes ☐No Ref. No.
Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/09/98
Entered by: UP

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC 601213 ~~and~~ releases this COC

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date
QC inits. UP

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	Ch. Catech.	CC	MDM/6131/881-3196

Please list as separate report

1 Relinquished by	Ch. Catech.	Org. 6131	Date 12/4/98	Time 1025	4. Relinquished by	Org.	Date
1 Received by	[illegible]	Org. 7578 (SMO)	Date 12/4/98	Time 1025	4. Received by	Org.	Date
2 Relinquished by	[illegible] (SMO)	Org. 7578	Date 12/7/98	Time 1300	5. Relinquished by	Org.	Date
2 Received by		Org.	Date	Time	5. Received by	Org.	Date
3 Relinquished by		Org.	Date	Time	6. Relinquished by	Org.	Date
3 Received by		Org.	Date	Time	6. Received by	Org.	Date

Original To Accompany Samples, Laboratory Copy (White) | 1st Copy To Accompany Samples, Return to SMO (Blue) | 2nd Copy SMO Suspense Copy (Yellow) | 3rd Copy Field Copy (Pink)

SF ..001-COC (10-97)

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- **601189**

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location: Tech Area NA; Building NA; Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative (all at 4°C)	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Samp
043728 - 002	TJAOU-228A-GR-167-S	0	228A	120198/1320	S	AG	500 ml	4 C	G	SA	RCRA Metals	
043729 - 001	TJAOU-228A-GR-168-S			120198/1325							Gamma Spec	
043730 – 001	TJAOU-228A-GR-169-S			120198/1327							Gamma Spec	
043730 - 002	TJAOU-228A-GR-169-S			120198/1327							RCRA Metals	
043731 - 001	TJAOU-228A-GR-170-S			120198/1330							Gamma Spec	
043732 – 001	TJAOU-228A-GR-171-S			120198/1340							Gamma Spec/Iso U	
043732 - 002	TJAOU-228A-GR-171-S			120198/1340							RCRA Metals, HE, SVOCs	
043732 - 003	TJAOU-228A-GR-171-S			120198/1340			40z				VOC	
043733 – 001	TJAOU-228A-GR-171-DU			120198/1340			500 ml			DU	Gamma Spec/Iso U	
043733 – 002	TJAOU-228A-GR-171-DU			120198/1340			500 ml			DU	RCRA Metals, HE, SVOCs	
043733 - 003	TJAOU-228A-GR-171-DU			120198/1340			40z			DU	VOC	
043734 - 001	TJAOU-228A-GR-172-S			120198/1400			500 ml			SA	Gamma Spec	
043735 – 001	TJAOU-228A-GR-173-S			120198/1440							Gamma Spec	
043735 - 002	TJAOU-228A-GR-173-S			120198/1440							RCRA Metals	
043736 - 001	TJAOU-228A-GR-174-S			120198/1445							Gamma Spec	
043737 – 001	TJAOU-228A-GR-175-S			120198/1450							Gamma Spec	
043737 - 002	TJAOU-228A-GR-175-S			120198/1450							RCRA Metals	
043737 - 005	TJAOU-228A-TB			120198/1520	DW	G	3x 40ml	HCl	G	TB	VOC	
043737 - 006	TJAOU-228A-EB			120198/1520	DW	G	3x 40ml	HCl	G	EB	VOC	
043737 - 007	TJAOU-228A-EB			120198/1520	DW	AG	2x1L	4C	G		SVOC (8270)	
043737 - 008	TJAOU-228A-EB			120198/1520	DW	AG	4x1L	4C	G		HE	
043737 - 009	TJAOU-228A-EB			120198/1520	DW	P	500 ml	HNO3	G		RCRA Metals	
043737 - 010	TJAOU-228A-EB			120198/1520	DW	P	1L	HNO3	G		Gamma Spec	
043737 011	TJAOU-228A-EB			120198/1520	DW	P	1L	HNO3	G		Iso U	
										C.C.		

Abnormal Conditions on Receipt **LAB USE**

Recipient Initials _____

Original: To Accompany Samples, Laboratory Copy (White) 1st Copy: To Accompany Samples, Return to SMO (Blue) 2nd Copy: SMO Suspense Copy (Yellow) 3rd Copy: Field Copy (Pink)

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043727-001 TJAOU-228-GR-166-S
Lab ID	: 9812299-07
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.149				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0335				pCi/g						
Accuracy, Uranium-238		0.143				pCi/g						
Uranium-233/234		0.911	+/- 0.149	0.0128	0.0123	pCi/g	1.0					
Uranium-235		0.0658	+/- 0.0335	0.00	0.0123	pCi/g	1.0					
Uranium-238		0.848	+/- 0.143	0.00992	0.0403	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.820	+/- 0.183	0.0440	0.121	pCi/g	1.0	EJB	12/17/98	1715	137659	2
Americium-241		0.0351	+/- 0.0793	0.0283	0.139	pCi/g	1.0					
Cerium-144	U	-0.0638	+/- 0.0953	0.0547	0.170	pCi/g	1.0					
Cesium-134	U	0.00183	+/- 0.0186	0.0115	0.0301	pCi/g	1.0					
Cesium-137	U	-0.00383	+/- 0.0199	0.00999	0.0355	pCi/g	1.0					
Chromium-51	U	0.0659	+/- 0.194	0.104	0.347	pCi/g	1.0					
Cobalt-60	U	-0.0174	+/- 0.0224	0.0109	0.0380	pCi/g	1.0					
Iron-59	U	0.0155	+/- 0.0602	0.0245	0.106	pCi/g	1.0					
Lead-212		0.817	+/- 0.103	0.0178	0.0508	pCi/g	1.0					
Lead-214		0.737	+/- 0.117	0.0207	0.0631	pCi/g	1.0					
Potassium-40		23.5	+/- 2.58	0.142	0.285	pCi/g	1.0					
Radium-226		0.672	+/- 0.12	0.0258	0.0640	pCi/g	1.0					
Radium-228		0.820	+/- 0.183	0.0440	0.121	pCi/g	1.0					
Ruthenium-103	U	0.000213	+/- 0.0206	0.0121	0.0380	pCi/g	1.0					
Ruthenium-106	U	-0.0697	+/- 0.157	0.0942	0.277	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.193	0.0481	0.183	pCi/g	1.0					
Thorium-232		0.804	+/- 0.102	0.0176	0.0500	pCi/g	1.0					
Thorium-234		0.924	+/- 0.985	0.321	1.03	pCi/g	1.0					
Uranium-235		0.132	+/- 0.104	0.0528	0.193	pCi/g	1.0					
Uranium-238		0.924	+/- 0.985	0.321	1.03	pCi/g	1.0					

9812299-07

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043732-001 TJAOU-228A-GR-171-S
Lab ID	: 9812299-16
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.187				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0375				pCi/g						
Accuracy, Uranium-238		0.297				pCi/g						
Uranium-233/234		1.17	+/- 0.187	0.0178	0.0467	pCi/g	1.0					
Uranium-235	–	- 0.0714	+/- 0.0375	0.00	0.0143	pCi/g	1.0					
Uranium-238		2.25	+/- 0.297	0.00663	0.0330	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.872	+/- 0.217	0.0477	0.141	pCi/g	1.0	EJB	12/18/98	0828	137660	2
Americium-241		0.0502	+/- 0.086	0.0289	0.140	pCi/g	1.0					
Cerium-144	U	-0.0936	+/- 0.103	0.0517	0.179	pCi/g	1.0					
Cesium-134	U	0.00530	+/- 0.0221	0.0116	0.0349	pCi/g	1.0					
Cesium-137		0.0555	+/- 0.0309	0.0113	0.0362	pCi/g	1.0					
Chromium-51		0.153	+/- 0.204	0.113	0.366	pCi/g	1.0					
Cobalt-60	U	0.00277	+/- 0.0225	0.0126	0.0409	pCi/g	1.0					
Iron-59	U	-0.00562	+/- 0.0519	0.0247	0.0925	pCi/g	1.0					
Lead-212		0.905	+/- 0.115	0.0177	0.0501	pCi/g	1.0					
Lead-214		0.911	+/- 0.148	0.0211	0.0637	pCi/g	1.0					
Potassium-40		20.5	+/- 2.38	0.107	0.375	pCi/g	1.0					
Radium-226		0.720	+/- 0.138	0.0246	0.0679	pCi/g	1.0					
Radium-228		0.872	+/- 0.217	0.0477	0.141	pCi/g	1.0					
Ruthenium-103	U	-0.0139	+/- 0.0225	0.0119	0.0387	pCi/g	1.0					
Ruthenium-106	U	0.0691	+/- 0.182	0.0999	0.330	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.176	0.0518	0.200	pCi/g	1.0					
Thorium-232		0.890	+/- 0.113	0.0174	0.0492	pCi/g	1.0					
Thorium-234		2.83	+/- 1.36	0.350	1.06	pCi/g	1.0					
Uranium-235		0.163	+/- 0.19	0.0558	0.203	pCi/g	1.0					
Uranium-238		2.83	+/- 1.36	0.350	1.06	pCi/g	1.0					

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043733-001 TJAOU-228A-GR-171-D
Lab ID	: 9812299-19
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.192				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0417				pCi/g						
Accuracy, Uranium-238		0.290				pCi/g						
Uranium-233/234		1.30	+/- 0.192	0.0142	0.0293	pCi/g	1.0					
Uranium-235		0.0975	+/- 0.0417	0.00	0.0127	pCi/g	1.0					
Uranium-238		2.28	+/- 0.29	0.00834	0.0362	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.947	+/- 0.248	0.0451	0.130	pCi/g	1.0	EJB	12/18/98	0829	137660	2
Americium-241		0.0751	+/- 0.0951	0.0279	0.159	pCi/g	1.0					
Cerium-144	U	-0.0602	+/- 0.121	0.0504	0.206	pCi/g	1.0					
Cesium-134	U	-0.0174	+/- 0.022	0.0110	0.0308	pCi/g	1.0					
Cesium-137		0.0296	+/- 0.0237	0.0107	0.0405	pCi/g	1.0					
Chromium-51	U	-0.0530	+/- 0.246	0.110	0.383	pCi/g	1.0					
Cobalt-60	U	-0.000446	+/- 0.023	0.0119	0.0406	pCi/g	1.0					
Iron-59	U	-0.0445	+/- 0.0573	0.0234	0.0944	pCi/g	1.0					
Lead-212		0.992	+/- 0.129	0.0173	0.0552	pCi/g	1.0					
Lead-214		0.922	+/- 0.149	0.0204	0.0645	pCi/g	1.0					
Potassium-40		20.0	+/- 2.48	0.116	0.337	pCi/g	1.0					
Radium-226		0.731	+/- 0.144	0.0234	0.0627	pCi/g	1.0					
Radium-228		0.947	+/- 0.248	0.0451	0.130	pCi/g	1.0					
Ruthenium-103	U	0.00386	+/- 0.0213	0.0114	0.0381	pCi/g	1.0					
Ruthenium-106	U	0.0382	+/- 0.183	0.0949	0.322	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.186	0.0504	0.208	pCi/g	1.0					
Thorium-232		0.976	+/- 0.127	0.0170	0.0542	pCi/g	1.0					
Thorium-234		3.25	+/- 1.5	0.336	1.29	pCi/g	1.0					
Uranium-235		0.171	+/- 0.208	0.0544	0.236	pCi/g	1.0					
Uranium-238		3.25	+/- 1.5	0.336	1.29	pCi/g	1.0					

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043737-011 TJAOU-228A-EB
Lab ID	: 9812299-34
Matrix	: AQUEOUS
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.0320				pCi/l		NVN	12/24/98	0933	138289	1
Accuracy, Uranium-235		0.0206				pCi/l						
Accuracy, Uranium-238		0.0238				pCi/l						
Uranium-233/234		0.0638	+/- 0.032	0.0227	0.0316	pCi/l	1.0					
Uranium-235	U	0.0174	+/- 0.0206	0.0209	0.0317	pCi/l	1.0					
Uranium-238		0.0366	+/- 0.0238	0.0180	0.0251	pCi/l	1.0					

M = Method	Method-Description
M 1	EPI A-011

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514

9812299-34

GR-.12 thru GR-175

Site 228A VCM per schedule

2001-COC (10-97)

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- 601189

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland / Lai, Anh
Project Name: Site 228 VCM
Record Center Code: ER/1309/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO USE
Carrier/Waybill No.: 715751
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi
Send Report to SMO: 5021 Jensen

Contract No.: AJ-2480A
Case No.: 7225.2205
SMO Authorization
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Samp.
043723 - 001	TJAOU-228A-GR-162-S	0	228A	120198/1255	S	G	500ml	4 C	G	SA	Gamma Spec	
043724 - 001	TJAOU-228A-GR-163-S			120198/1300							Gamma Spec	
043724 - 002	TJAOU-228A-GR-163-S			120198/1300							RCRA Metals	
043725 - 001	TJAOU-228A-GR-164-S			120198/1303							Gamma Spec	
043726 - 001	TJAOU-228A-GR-165-S			120198/1307							Gamma Spec	
043726 - 002	TJAOU-228A-GR-165-S			120198/1307							RCRA Metals	
043727 - 001	TJAOU-228A-GR-166-S			120198/1312							Gamma Spec/Iso U	
043727 - 002	TJAOU-228A-GR-166-S			120198/1312							HE, SVOCs	
043727 - 003	TJAOU-228A-GR-166-S			120198/1312			4 oz				VOC	
043728 - 001	TJAOU-228A-GR-167-S			120198/1320			500ml				Gamma Spec	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/09/98
Entered by: LH

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC 601213 ~~and~~ releases this COC

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits. LH

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	Ch. Catech.	CC	MDM/6131/881-3196

Please list as separate report.

1 Relinquished by Ch. Catech.	Org. 6131	Date 12/4/98	Time 1025	4. Relinquished by	Org.	Date
1 Received by	Org. 7578 (SMO)	Date 12/4/98	Time 1025	4. Received by	Org.	Date
2 Relinquished by (SMO)	Org. 7578	Date 12/7/98	Time 1300	5. Relinquished by	Org.	Date
2 Received by	Org.	Date	Time	5. Received by	Org.	Date
3 Relinquished by	Org.	Date	Time	6. Relinquished by	Org.	Date
3 Received by	Org.	Date	Time	6. Received by	Org.	Date

Original — To Accompany Samples, Laboratory Copy (White)
1st Copy — To Accompany Samples, Return to SMO (Blue)
2nd Copy — SMO Suspense Copy (Yellow)
3rd Copy — Field Copy (Pink)

SF-.601 COC (10.97)

Supersedes (5.97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- **601189**

Project Name: Site 228A VCM | Project/Task Manager: John Copland | Case No.: 7225.2203

Location: Tech Area NA; Building NA; Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative (all at 4°C)	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Samp
043728 - 002	TJAOU-228A-GR-167-S	0	228A	120198/1320	S	AG	500 ml	4 C	G	SA	RCRA Metals	
043729 - 001	TJAOU-228A-GR-168-S			120198/1325							Gamma Spec	
043730 - 001	TJAOU-228A-GR-169-S			120198/1327							Gamma Spec	
043730 - 002	TJAOU-228A-GR-169-S			120198/1327							RCRA Metals	
043731 - 001	TJAOU-228A-GR-170-S			120198/1330							Gamma Spec	
043732 - 001	TJAOU-228A-GR-171-S			120198/1340							Gamma Spec/Iso U	
043732 - 002	TJAOU-228A-GR-171-S			120198/1340							RCRA Metals, HE, SVOCs	
043732 - 003	TJAOU-228A-GR-171-S			120198/1340			40 ml				VOC	
043733 - 001	TJAOU-228A-GR-171-DU			120198/1340			500 ml			DU	Gamma Spec/Iso U	
043733 - 002	TJAOU-228A-GR-171-DU			120198/1340			500 ml			DU	RCRA Metals, HE, SVOCs	
043733 - 003	TJAOU-228A-GR-171-DU			120198/1340			40 ml			DU	VOC	
043734 - 001	TJAOU-228A-GR-172-S			120198/1400			500 ml			SA	Gamma Spec	
043735 - 001	TJAOU-228A-GR-173-S			120198/1440							Gamma Spec	
043735 - 002	TJAOU-228A-GR-173-S			120198/1440							RCRA Metals	
043736 - 001	TJAOU-228A-GR-174-S			120198/1445							Gamma Spec	
043737 - 001	TJAOU-228A-GR-175-S			120198/1450							Gamma Spec	
043737 - 002	TJAOU-228A-GR-175-S			120198/1450							RCRA Metals	
~~043737-005~~ 043737-005	TJAOU-228A-TB			120198/1520	DW	G	3x 40 ml	HCl	G	TB	VOC	
043737-006	TJAOU-228A-EB			120198/1520	DW	G	3x 40 ml	HCl	G	EB	VOC	
043737-007	TJAOU-228A-EB			120198/1520	DW	AG	2x1 L	4C	G		SVOC (8270)	
043737-008	TJAOU-228A-EB			120198/1520	DW	AG	4x1 L	4C	G		HE	
043737-009	TJAOU-228A-EB			120198/1520	DW	P	500 ml	HNO3	G		RCRA Metals	
043737-010	TJAOU-228A-EB			120198/1520	DW	P	1 L	HNO3	G		Gamma Spec	
043737-011	TJAOU-228A-EB			120198/1520	DW	P	1 L	HNO3	G		Iso U	
										C.C.		

Abnormal Conditions on Receipt | **LAB USE**

Recipient Initials _____

Original: To Accompany Samples, Laboratory Copy (White) | 1st Copy: To Accompany Samples, Return to SMO (Blue) | 2nd Copy: SMO Suspense Copy (Yellow) | 3rd Copy: Field Copy (Pink)

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043723-001 TJAOU-228-GR-162-S
Lab ID	: 9812299-01
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.01	+/- 0.222	0.0367	0.110	pCi/g	1.0	EJB	12/17/98	1236	137659	1
Americium-241	U	-0.0137	+/- 0.105	0.0289	0.173	pCi/g	1.0					
Cerium-144	U	-0.00537	+/- 0.0889	0.0473	0.168	pCi/g	1.0					
Cesium-134	U	-0.0354	+/- 0.016	0.00950	0.0252	pCi/g	1.0					
Cesium-137		0.0553	+/- 0.0334	0.00827	0.0316	pCi/g	1.0					
Chromium-51	U	-0.0605	+/- 0.192	0.0869	0.302	pCi/g	1.0					
Cobalt-60		0.0100	+/- 0.0186	0.00918	0.0357	pCi/g	1.0					
Iron-59	U	0.00747	+/- 0.0479	0.0205	0.0847	pCi/g	1.0					
Lead-212		0.906	+/- 0.111	0.0151	0.0474	pCi/g	1.0					
Lead-214		0.881	+/- 0.131	0.0173	0.0574	pCi/g	1.0					
Potassium-40		25.2	+/- 2.8	0.120	0.302	pCi/g	1.0					
Radium-226		0.768	+/- 0.115	0.0214	0.0516	pCi/g	1.0					
Radium-228		1.01	+/- 0.222	0.0367	0.110	pCi/g	1.0					
Ruthenium-103	U	0.00121	+/- 0.018	0.00999	0.0315	pCi/g	1.0					
Ruthenium-106	U	-0.00197	+/- 0.127	0.0779	0.234	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.168	0.0406	0.170	pCi/g	1.0					
Thorium-232		0.891	+/- 0.109	0.0149	0.0466	pCi/g	1.0					
Thorium-234		1.75	+/- 1.47	0.319	1.28	pCi/g	1.0					
Uranium-235		0.126	+/- 0.166	0.0425	0.178	pCi/g	1.0					
Uranium-238		1.75	+/- 1.47	0.319	1.28	pCi/g	1.0					
Yttrium-88	U	0.000362	+/- 0.0146	0.00937	0.0275	pCi/g	1.0					
Zirconium-95		0.0367	+/- 0.0423	0.0165	0.0568	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AI2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043724-001 TJAOU-228-GR-163-S
Lab ID	: 9812299-02
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.37	+/- 0.263	0.0447	0.125	pCi/g	1.0	EJB	12/17/98	1236	137659	1
Americium-241	U	-0.00295	+/- 0.0388	0.0159	0.0616	pCi/g	1.0					
Cerium-144	U	-0.133	+/- 0.104	0.0527	0.179	pCi/g	1.0					
Cesium-134	U	-0.00710	+/- 0.0197	0.0117	0.0303	pCi/g	1.0					
Cesium-137		0.0215	+/- 0.0438	0.0102	0.0372	pCi/g	1.0					
Chromium-51		0.181	+/- 0.189	0.102	0.339	pCi/g	1.0					
Cobalt-60	U	0.00234	+/- 0.0236	0.0109	0.0433	pCi/g	1.0					
Iron-59	U	0.00547	+/- 0.0532	0.0247	0.0932	pCi/g	1.0					
Lead-212		1.22	+/- 0.16	0.0176	0.0503	pCi/g	1.0					
Lead-214		1.07	+/- 0.154	0.0205	0.0621	pCi/g	1.0					
Potassium-40		18.2	+/- 1.94	0.142	0.323	pCi/g	1.0					
Radium-226		1.03	+/- 0.17	0.0262	0.0610	pCi/g	1.0					
Radium-228		1.37	+/- 0.263	0.0447	0.125	pCi/g	1.0					
Ruthenium-103	U	-0.0114	+/- 0.0212	0.0122	0.0377	pCi/g	1.0					
Ruthenium-106	U	-0.150	+/- 0.173	0.0955	0.292	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.149	0.0474	0.163	pCi/g	1.0					
Thorium-232		1.20	+/- 0.157	0.0173	0.0495	pCi/g	1.0					
Thorium-234		8.04	+/- 1.69	0.198	0.566	pCi/g	1.0					
Uranium-235		0.416	+/- 0.198	0.0478	0.222	pCi/g	1.0					
Uranium-238		8.04	+/- 1.69	0.198	0.566	pCi/g	1.0					
Yttrium-88	U	-0.00523	+/- 0.0193	0.0114	0.0344	pCi/g	1.0					
Zirconium-95	U	0.0139	+/- 0.0416	0.0203	0.0757	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Saimi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043725-001 TJAOU-228-GR-164-S
Lab ID	: 9812299-04
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.05	+/- 0.223	0.0344	0.0977	pCi/g	1.0	EJB	12/17/98	1237	137659	1
Americium-241	U	0.0206	+/- 0.0491	0.0209	0.0828	pCi/g	1.0					
Cerium-144	U	-0.0625	+/- 0.0964	0.0490	0.164	pCi/g	1.0					
Cesium-134	U	0.00387	+/- 0.0173	0.00911	0.0267	pCi/g	1.0					
Cesium-137		0.0106	+/- 0.0169	0.00789	0.0248	pCi/g	1.0					
Chromium-51	–	0.129	+/- 0.193	0.0864	0.287	pCi/g	1.0					
Cobalt-60	U	-0.00823	+/- 0.0357	0.00838	0.0308	pCi/g	1.0					
Iron-59	U	0.00684	+/- 0.0423	0.0190	0.0744	pCi/g	1.0					
Lead-212		1.05	+/- 0.124	0.0154	0.0422	pCi/g	1.0					
Lead-214		0.981	+/- 0.129	0.0171	0.0497	pCi/g	1.0					
Potassium-40		20.9	+/- 2.2	0.109	0.271	pCi/g	1.0					
Radium-226		0.822	+/- 0.132	0.0205	0.0501	pCi/g	1.0					
Radium-228		1.05	+/- 0.223	0.0344	0.0977	pCi/g	1.0					
Ruthenium-103	U	-0.00432	+/- 0.0166	0.00968	0.0294	pCi/g	1.0					
Ruthenium-106	U	-0.0877	+/- 0.135	0.0745	0.229	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.136	0.0408	0.167	pCi/g	1.0					
Thorium-232		1.04	+/- 0.122	0.0151	0.0416	pCi/g	1.0					
Thorium-234		1.49	+/- 1.05	0.246	0.715	pCi/g	1.0					
Uranium-235		0.141	+/- 0.155	0.0441	0.171	pCi/g	1.0					
Uranium-238		1.49	+/- 1.05	0.246	0.715	pCi/g	1.0					
Yttrium-88	U	-0.00385	+/- 0.0151	0.00845	0.0263	pCi/g	1.0					
Zirconium-95	U	0.00	+/- 0.0448	0.0157	0.0534	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812299-04

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043726-001 TJAOU-228-GR-165-S
Lab ID	: 9812299-05
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.939	+/- 0.41	0.0597	0.227	pCi/g	1.0	EJB	12/17/98	1238	137659	1
Americium-241	U	0.0131	+/- 0.156	0.0321	0.257	pCi/g	1.0					
Cerium-144		0.313	+/- 0.246	0.0715	0.360	pCi/g	1.0					
Cesium-134	U	-0.00827	+/- 0.0367	0.0156	0.0557	pCi/g	1.0					
Cesium-137		0.0412	+/- 0.0459	0.0136	0.0703	pCi/g	1.0					
Chromium-51	U	0.0432	+/- 0.382	0.135	0.666	pCi/g	1.0					
Cobalt-60		0.0275	+/- 0.0408	0.0145	0.0784	pCi/g	1.0					
Iron-59	U	0.0311	+/- 0.0917	0.0328	0.171	pCi/g	1.0					
Lead-212		1.01	+/- 0.152	0.0230	0.0990	pCi/g	1.0					
Lead-214		0.932	+/- 0.192	0.0272	0.134	pCi/g	1.0					
Potassium-40		18.6	+/- 2.33	0.189	0.722	pCi/g	1.0					
Radium-226		0.967	+/- 0.214	0.0351	0.110	pCi/g	1.0					
Radium-228		0.939	+/- 0.41	0.0597	0.227	pCi/g	1.0					
Ruthenium-103	U	-0.00638	+/- 0.0408	0.0163	0.0730	pCi/g	1.0					
Ruthenium-106		0.161	+/- 0.308	0.128	0.571	pCi/g	1.0					
Thorium-231		0.211	+/- 0.202	0.0622	0.325	pCi/g	1.0					
Thorium-232		0.995	+/- 0.15	0.0226	0.0975	pCi/g	1.0					
Thorium-234		4.23	+/- 2.76	0.377	2.16	pCi/g	1.0					
Uranium-235		0.450	+/- 0.38	0.0641	0.391	pCi/g	1.0					
Uranium-238		4.23	+/- 2.76	0.377	2.16	pCi/g	1.0					
Yttrium-88		0.0268	+/- 0.0372	0.0153	0.0704	pCi/g	1.0					
Zirconium-95	U	0.0199	+/- 0.0705	0.0272	0.128	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812299-05

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043727-001 TJAOU-228-GR-166-S
Lab ID	: 9812299-07
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.149				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0335				pCi/g						
Accuracy, Uranium-238		0.143				pCi/g						
Uranium-233/234		0.911	+/- 0.149	0.0128	0.0123	pCi/g	1.0					
Uranium-235		0.0658	+/- 0.0335	0.00	0.0123	pCi/g	1.0					
Uranium-238		0.848	+/- 0.143	0.00992	0.0403	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.820	+/- 0.183	0.0440	0.121	pCi/g	1.0	EJB	12/17/98	1715	137659	2
Americium-241		0.0351	+/- 0.0793	0.0283	0.139	pCi/g	1.0					
Cerium-144	U	-0.0638	+/- 0.0953	0.0547	0.170	pCi/g	1.0					
Cesium-134	U	0.00183	+/- 0.0186	0.0115	0.0301	pCi/g	1.0					
Cesium-137	U	-0.00383	+/- 0.0199	0.00999	0.0355	pCi/g	1.0					
Chromium-51	U	0.0659	+/- 0.194	0.104	0.347	pCi/g	1.0					
Cobalt-60	U	-0.0174	+/- 0.0224	0.0109	0.0380	pCi/g	1.0					
Iron-59	U	0.0155	+/- 0.0602	0.0245	0.106	pCi/g	1.0					
Lead-212		0.817	+/- 0.103	0.0178	0.0508	pCi/g	1.0					
Lead-214		0.737	+/- 0.117	0.0207	0.0631	pCi/g	1.0					
Potassium-40		23.5	+/- 2.58	0.142	0.285	pCi/g	1.0					
Radium-226		0.672	+/- 0.12	0.0258	0.0640	pCi/g	1.0					
Radium-228		0.820	+/- 0.183	0.0440	0.121	pCi/g	1.0					
Ruthenium-103	U	0.000213	+/- 0.0206	0.0121	0.0380	pCi/g	1.0					
Ruthenium-106	U	-0.0697	+/- 0.157	0.0942	0.277	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.193	0.0481	0.183	pCi/g	1.0					
Thorium-232		0.804	+/- 0.102	0.0176	0.0500	pCi/g	1.0					
Thorium-234		0.924	+/- 0.985	0.321	1.03	pCi/g	1.0					
Uranium-235		0.132	+/- 0.104	0.0528	0.193	pCi/g	1.0					
Uranium-238		0.924	+/- 0.985	0.321	1.03	pCi/g	1.0					

9812299-07

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID : 043727-001 TJAOU-228-GR-166-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.00370	+/- 0.0171	0.0113	0.0340	pCi/g	1.0					
Zirconium-95	U	0.00915	+/- 0.0372	0.0200	0.0682	pCi/g	1.0	EJB	12/17/98	1715	137659	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812299-07

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043728-001 TJAOU-228-GR-167-S
Lab ID	: 9812299-10
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.06	+/- 0.235	0.0391	0.120	pCi/g	1.0	EJB	12/17/98	1715	137659	1
Americium-241	U	-0.0655	+/- 0.0867	0.0249	0.140	pCi/g	1.0					
Cerium-144	U	-0.112	+/- 0.112	0.0497	0.190	pCi/g	1.0					
Cesium-134		0.0159	+/- 0.0204	0.0102	0.0330	pCi/g	1.0					
Cesium-137		0.0128	+/- 0.0207	0.00887	0.0373	pCi/g	1.0					
Chromium-51		0.142	+/- 0.184	0.0937	0.347	pCi/g	1.0					
Cobalt-60	U	0.000688	+/- 0.0216	0.00969	0.0383	pCi/g	1.0					
Iron-59	U	-0.0395	+/- 0.052	0.0218	0.0865	pCi/g	1.0					
Lead-212		1.04	+/- 0.135	0.0162	0.0520	pCi/g	1.0					
Lead-214		0.879	+/- 0.14	0.0186	0.0687	pCi/g	1.0					
Potassium-40		20.4	+/- 2.49	0.126	0.305	pCi/g	1.0					
Radium-226		0.952	+/- 0.15	0.0229	0.0648	pCi/g	1.0					
Radium-228		1.06	+/- 0.235	0.0391	0.120	pCi/g	1.0					
Ruthenium-103	U	0.00589	+/- 0.0205	0.0108	0.0371	pCi/g	1.0					
Ruthenium-106	U	0.0352	+/- 0.163	0.0836	0.291	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.197	0.0435	0.201	pCi/g	1.0					
Thorium-232		1.02	+/- 0.133	0.0160	0.0512	pCi/g	1.0					
Thorium-234		1.35	+/- 1.24	0.282	1.15	pCi/g	1.0					
Uranium-235		0.152	+/- 0.17	0.0449	0.207	pCi/g	1.0					
Uranium-238		1.35	+/- 1.24	0.282	1.15	pCi/g	1.0					
Yttrium-88	U	-0.0120	+/- 0.0192	0.00994	0.0325	pCi/g	1.0					
Zirconium-95	U	-0.00641	+/- 0.0365	0.0178	0.0659	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812299-10

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043729-001 TJAOU-228-GR-168-S
Lab ID	: 9812299-12
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.917	+/- 0.235	0.0437	0.137	pCi/g	1.0	EJB	12/17/98	1716	137659	1
Americium-241	U	0.0169	+/- 0.0892	0.0275	0.143	pCi/g	1.0					
Cerium-144	U	-0.0382	+/- 0.103	0.0551	0.186	pCi/g	1.0					
Cesium-134	U	-0.00174	+/- 0.0191	0.0113	0.0298	pCi/g	1.0					
Cesium-137		0.0185	+/- 0.0224	0.00984	0.0358	pCi/g	1.0					
Chromium-51	U	-0.0781	+/- 0.212	0.104	0.361	pCi/g	1.0					
Cobalt-60	U	-0.00783	+/- 0.0241	0.0109	0.0422	pCi/g	1.0					
Iron-59	U	-0.0325	+/- 0.054	0.0245	0.0933	pCi/g	1.0					
Lead-212		1.07	+/- 0.137	0.0180	0.0546	pCi/g	1.0					
Lead-214		1.06	+/- 0.162	0.0206	0.0587	pCi/g	1.0					
Potassium-40		22.7	+/- 2.8	0.142	0.406	pCi/g	1.0					
Radium-226		0.816	+/- 0.128	0.0254	0.0635	pCi/g	1.0					
Radium-228		0.917	+/- 0.235	0.0437	0.137	pCi/g	1.0					
Ruthenium-103	U	-0.0142	+/- 0.021	0.0119	0.0365	pCi/g	1.0					
Ruthenium-106	U	0.0573	+/- 0.176	0.0928	0.321	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.235	0.0483	0.212	pCi/g	1.0					
Thorium-232		1.05	+/- 0.135	0.0177	0.0537	pCi/g	1.0					
Thorium-234		1.77	+/- 1.22	0.310	1.16	pCi/g	1.0					
Uranium-235		0.0579	+/- 0.15	0.0497	0.205	pCi/g	1.0					
Uranium-238		1.77	+/- 1.22	0.310	1.16	pCi/g	1.0					
Yttrium-88	U	-0.00609	+/- 0.0201	0.0112	0.0350	pCi/g	1.0					
Zirconium-95	U	-0.0114	+/- 0.0402	0.0198	0.0695	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9817299-12

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043730-001 TIAOU-228-GR-169-S
Lab ID	: 9812299-13
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.952	+/- 0.229	0.0439	0.131	pCi/g	1.0	EJB	12/17/98	1717	137659	1
Americium-241	U	0.0360	+/- 0.146	0.0391	0.239	pCi/g	1.0					
Cerium-144	U	-0.0267	+/- 0.105	0.0567	0.192	pCi/g	1.0					
Cesium-134	U	0.00291	+/- 0.0198	0.0114	0.0318	pCi/g	1.0					
Cesium-137		0.0295	+/- 0.0297	0.00989	0.0337	pCi/g	1.0					
Chromium-51	U	0.0255	+/- 0.203	0.105	0.359	pCi/g	1.0					
Cobalt-60	U	0.00826	+/- 0.0212	0.0110	0.0404	pCi/g	1.0					
Iron-59	U	-0.0419	+/- 0.0523	0.0246	0.0894	pCi/g	1.0					
Lead-212		0.985	+/- 0.127	0.0182	0.0519	pCi/g	1.0					
Lead-214		0.944	+/- 0.147	0.0208	0.0600	pCi/g	1.0					
Potassium-40		20.8	+/- 2.78	0.143	0.313	pCi/g	1.0					
Radium-226		0.770	+/- 0.121	0.0256	0.0630	pCi/g	1.0					
Radium-228		0.952	+/- 0.229	0.0439	0.131	pCi/g	1.0					
Ruthenium-103	U	0.00620	+/- 0.0209	0.0120	0.0391	pCi/g	1.0					
Ruthenium-106	U	-0.101	+/- 0.153	0.0931	0.263	pCi/g	1.0					
Thorium-231		0.161	+/- 0.168	0.0488	0.192	pCi/g	1.0					
Thorium-232		0.970	+/- 0.125	0.0179	0.0510	pCi/g	1.0					
Thorium-234		2.78	+/- 1.77	0.422	1.74	pCi/g	1.0					
Uranium-235		0.118	+/- 0.235	0.0508	0.206	pCi/g	1.0					
Uranium-238		2.78	+/- 1.77	0.422	1.74	pCi/g	1.0					
Yttrium-88	U	-0.00631	+/- 0.0216	0.0112	0.0378	pCi/g	1.0					
Zirconium-95		0.0474	+/- 0.0501	0.0198	0.0740	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AI2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043731-001 TJAOU-228-GR-170-S
Lab ID	: 9812299-15
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.01	+/- 0.222	0.0443	0.113	pCi/g	1.0	EJB	12/18/98	0828	137660	1
Americium-241		0.0754	+/- 0.0739	0.0277	0.133	pCi/g	1.0					
Cerium-144	U	0.0229	+/- 0.0964	0.0484	0.179	pCi/g	1.0					
Cesium-134	U	-0.0144	+/- 0.0193	0.0108	0.0286	pCi/g	1.0					
Cesium-137		0.144	+/- 0.0452	0.0105	0.0398	pCi/g	1.0					
Chromium-51	U	0.103	+/- 0.205	0.106	0.369	pCi/g	1.0					
Cobalt-60	U	-0.000531	+/- 0.0218	0.0117	0.0400	pCi/g	1.0					
Iron-59	U	-0.0189	+/- 0.056	0.0229	0.0948	pCi/g	1.0					
Lead-212		0.934	+/- 0.113	0.0166	0.0493	pCi/g	1.0					
Lead-214		0.936	+/- 0.14	0.0198	0.0647	pCi/g	1.0					
Potassium-40		18.3	+/- 2.05	0.0993	0.332	pCi/g	1.0					
Radium-226		0.794	+/- 0.141	0.0230	0.0602	pCi/g	1.0					
Radium-228		1.01	+/- 0.222	0.0443	0.113	pCi/g	1.0					
Ruthenium-103	U	-0.00748	+/- 0.0199	0.0112	0.0358	pCi/g	1.0					
Ruthenium-106	U	0.0300	+/- 0.161	0.0933	0.297	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.167	0.0485	0.194	pCi/g	1.0					
Thorium-232		0.919	+/- 0.111	0.0163	0.0485	pCi/g	1.0					
Thorium-234		1.75	+/- 1.48	0.336	1.09	pCi/g	1.0					
Uranium-235		0.0689	+/- 0.104	0.0521	0.193	pCi/g	1.0					
Uranium-238		1.75	+/- 1.48	0.336	1.09	pCi/g	1.0					
Yttrium-88	U	0.00889	+/- 0.018	0.0139	0.0369	pCi/g	1.0					
Zirconium-95		0.0367	+/- 0.0603	0.0185	0.0688	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812299-15

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043732-001 TJAOU-228A-GR-171-S
Lab ID	: 9812299-16
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.187				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0375				pCi/g						
Accuracy, Uranium-238		0.297				pCi/g						
Uranium-233/234		1.17	+/- 0.187	0.0178	0.0467	pCi/g	1.0					
Uranium-235	–	- 0.0714	+/- 0.0375	0.00	0.0143	pCi/g	1.0					
Uranium-238		2.25	+/- 0.297	0.00663	0.0330	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.872	+/- 0.217	0.0477	0.141	pCi/g	1.0	EJB	12/18/98	0828	137660	2
Americium-241		0.0502	+/- 0.086	0.0289	0.140	pCi/g	1.0					
Cerium-144	U	-0.0936	+/- 0.103	0.0517	0.179	pCi/g	1.0					
Cesium-134	U	0.00530	+/- 0.0221	0.0116	0.0349	pCi/g	1.0					
Cesium-137		0.0555	+/- 0.0309	0.0113	0.0362	pCi/g	1.0					
Chromium-51		0.153	+/- 0.204	0.113	0.366	pCi/g	1.0					
Cobalt-60	U	0.00277	+/- 0.0225	0.0126	0.0409	pCi/g	1.0					
Iron-59	U	-0.00562	+/- 0.0519	0.0247	0.0925	pCi/g	1.0					
Lead-212		0.905	+/- 0.115	0.0177	0.0501	pCi/g	1.0					
Lead-214		0.911	+/- 0.148	0.0211	0.0637	pCi/g	1.0					
Potassium-40		20.5	+/- 2.38	0.107	0.375	pCi/g	1.0					
Radium-226		0.720	+/- 0.138	0.0246	0.0679	pCi/g	1.0					
Radium-228		0.872	+/- 0.217	0.0477	0.141	pCi/g	1.0					
Ruthenium-103	U	-0.0139	+/- 0.0225	0.0119	0.0387	pCi/g	1.0					
Ruthenium-106	U	0.0691	+/- 0.182	0.0999	0.330	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.176	0.0518	0.200	pCi/g	1.0					
Thorium-232		0.890	+/- 0.113	0.0174	0.0492	pCi/g	1.0					
Thorium-234		2.83	+/- 1.36	0.350	1.06	pCi/g	1.0					
Uranium-235		0.163	+/- 0.19	0.0558	0.203	pCi/g	1.0					
Uranium-238		2.83	+/- 1.36	0.350	1.06	pCi/g	1.0					

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID : 043732-001 TJAOU-228A-GR-171-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.00171	+/- 0.0189	0.0149	0.0367	pCi/g	1.0					
Zirconium-95	U	0.00	+/- 0.0861	0.0199	0.0711	pCi/g	1.0	EJB	12/18/98	0828	137660	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812209-16

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043733-001 TJAOU-228A-GR-171-D
Lab ID	: 9812299-19
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.192				pCi/g		LDM	12/21/98	2104	138241	1
Accuracy, Uranium-235		0.0417				pCi/g						
Accuracy, Uranium-238		0.290				pCi/g						
Uranium-233/234		1.30	+/- 0.192	0.0142	0.0293	pCi/g	1.0					
Uranium-235		0.0975	+/- 0.0417	0.00	0.0127	pCi/g	1.0					
Uranium-238		2.28	+/- 0.29	0.00834	0.0362	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.947	+/- 0.248	0.0451	0.130	pCi/g	1.0	EJB	12/18/98	0829	137660	2
Americium-241		0.0751	+/- 0.0951	0.0279	0.159	pCi/g	1.0					
Cerium-144	U	-0.0602	+/- 0.121	0.0504	0.206	pCi/g	1.0					
Cesium-134	U	-0.0174	+/- 0.022	0.0110	0.0308	pCi/g	1.0					
Cesium-137		0.0296	+/- 0.0237	0.0107	0.0405	pCi/g	1.0					
Chromium-51	U	-0.0530	+/- 0.246	0.110	0.383	pCi/g	1.0					
Cobalt-60	U	-0.000446	+/- 0.023	0.0119	0.0406	pCi/g	1.0					
Iron-59	U	-0.0445	+/- 0.0573	0.0234	0.0944	pCi/g	1.0					
Lead-212		0.992	+/- 0.129	0.0173	0.0552	pCi/g	1.0					
Lead-214		0.922	+/- 0.149	0.0204	0.0645	pCi/g	1.0					
Potassium-40		20.0	+/- 2.48	0.116	0.337	pCi/g	1.0					
Radium-226		0.731	+/- 0.144	0.0234	0.0627	pCi/g	1.0					
Radium-228		0.947	+/- 0.248	0.0451	0.130	pCi/g	1.0					
Ruthenium-103	U	0.00386	+/- 0.0213	0.0114	0.0381	pCi/g	1.0					
Ruthenium-106	U	0.0382	+/- 0.183	0.0949	0.322	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.186	0.0504	0.208	pCi/g	1.0					
Thorium-232		0.976	+/- 0.127	0.0170	0.0542	pCi/g	1.0					
Thorium-234		3.25	+/- 1.5	0.336	1.29	pCi/g	1.0					
Uranium-235		0.171	+/- 0.208	0.0544	0.236	pCi/g	1.0					
Uranium-238		3.25	+/- 1.5	0.336	1.29	pCi/g	1.0					

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID : 043733-001 TJAOU-228A-GR-171-D

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.00498	+/- 0.0202	0.0139	0.0390	pCi/g	1.0					
Zirconium-95	U	0.0171	+/- 0.0394	0.0188	0.0733	pCi/g	1.0	EJB	12/18/98	0829	137660	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - 1-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812299-19

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043734-001 TJAOU-228A-GR-172-S
Lab ID	: 9812299-22
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.904	+/- 0.198	0.0386	0.113	pCi/g	1.0	EJB	12/18/98	0830	137660	1
Americium-241	U	-0.0395	+/- 0.0792	0.0236	0.126	pCi/g	1.0					
Cerium-144	U	0.0414	+/- 0.0948	0.0428	0.180	pCi/g	1.0					
Cesium-134	U	-0.000350	+/- 0.018	0.00933	0.0286	pCi/g	1.0					
Cesium-137	U	-0.00664	+/- 0.0181	0.00910	0.0319	pCi/g	1.0					
Chromium-51	U	0.0210	+/- 0.179	0.0931	0.320	pCi/g	1.0					
Cobalt-60	U	-0.00578	+/- 0.0228	0.0103	0.0348	pCi/g	1.0					
Iron-59	U	-0.0343	+/- 0.0459	0.0201	0.0789	pCi/g	1.0					
Lead-212		0.959	+/- 0.122	0.0147	0.0476	pCi/g	1.0					
Lead-214		0.892	+/- 0.134	0.0173	0.0574	pCi/g	1.0					
Potassium-40		21.2	+/- 2.6	0.0875	0.329	pCi/g	1.0					
Radium-226		0.652	+/- 0.105	0.0199	0.0582	pCi/g	1.0					
Radium-228		0.904	+/- 0.198	0.0386	0.115	pCi/g	1.0					
Ruthenium-103	U	0.00403	+/- 0.0187	0.00966	0.0351	pCi/g	1.0					
Ruthenium-106	U	-0.0714	+/- 0.156	0.0806	0.275	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.184	0.0428	0.187	pCi/g	1.0					
Thorium-232		0.943	+/- 0.12	0.0144	0.0468	pCi/g	1.0					
Thorium-234		0.853	+/- 1	0.283	1.04	pCi/g	1.0					
Uranium-235		0.0681	+/- 0.101	0.0461	0.191	pCi/g	1.0					
Uranium-238		0.853	+/- 1	0.283	1.04	pCi/g	1.0					
Yttrium-88	U	0.00279	+/- 0.0153	0.0121	0.0296	pCi/g	1.0					
Zirconium-95	U	0.0153	+/- 0.0345	0.0161	0.0637	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812299-22

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Saimi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043735-001 TJAOU-228A-GR-173-S
Lab ID	: 9812299-23
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.01	+/- 0.217	0.0441	0.129	pCi/g	1.0	EJB	12/18/98	0830	137660	1
Americium-241	U	-0.00959	+/- 0.0282	0.0153	0.0515	pCi/g	1.0					
Cerium-144	U	0.0237	+/- 0.103	0.0463	0.184	pCi/g	1.0					
Cesium-134	U	0.00248	+/- 0.0235	0.0108	0.0360	pCi/g	1.0					
Cesium-137		0.0315	+/- 0.0254	0.0105	0.0380	pCi/g	1.0					
Chromium-51	U	-0.0797	+/- 0.206	0.104	0.366	pCi/g	1.0					
Cobalt-60		0.0146	+/- 0.0274	0.0115	0.0445	pCi/g	1.0					
Iron-59		0.0518	+/- 0.101	0.0227	0.100	pCi/g	1.0					
Lead-212		1.00	+/- 0.143	0.0162	0.0505	pCi/g	1.0					
Lead-214		0.949	+/- 0.156	0.0194	0.0638	pCi/g	1.0					
Potassium-40		20.5	+/- 2.17	0.112	0.269	pCi/g	1.0					
Radium-226		0.835	+/- 0.153	0.0229	0.0706	pCi/g	1.0					
Radium-228		1.01	+/- 0.217	0.0441	0.129	pCi/g	1.0					
Ruthenium-103	U	0.0111	+/- 0.0314	0.0111	0.0448	pCi/g	1.0					
Ruthenium-106	U	0.0223	+/- 0.182	0.0931	0.320	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.165	0.0474	0.198	pCi/g	1.0					
Thorium-232		0.984	+/- 0.14	0.0159	0.0496	pCi/g	1.0					
Thorium-234		1.47	+/- 0.698	0.202	0.511	pCi/g	1.0					
Uranium-235		0.105	+/- 0.11	0.0503	0.196	pCi/g	1.0					
Uranium-238		1.47	+/- 0.698	0.202	0.511	pCi/g	1.0					
Yttrium-88		0.0161	+/- 0.00905	0.0138	0.0337	pCi/g	1.0					
Zirconium-95	U	-0.000139	+/- 0.0493	0.0185	0.0780	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043736-001 TJAOU-228A-GR-174-S
Lab ID	: 9812299-25
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.10	+/- 0.245	0.0455	0.120	pCi/g	1.0	EJB	12/18/98	0831	137660	1
Americium-241	U	0.00529	+/- 0.141	0.0395	0.247	pCi/g	1.0					
Cerium-144	U	-0.0846	+/- 0.105	0.0517	0.187	pCi/g	1.0					
Cesium-134	U	-0.0199	+/- 0.0197	0.0110	0.0331	pCi/g	1.0					
Cesium-137		0.0588	+/- 0.028	0.0107	0.0353	pCi/g	1.0					
Chromium-51	U	-0.0192	+/- 0.217	0.111	0.377	pCi/g	1.0					
Cobalt-60	U	0.0113	+/- 0.0235	0.0121	0.0446	pCi/g	1.0					
Iron-59	U	-0.0178	+/- 0.0543	0.0237	0.0968	pCi/g	1.0					
Lead-212		1.02	+/- 0.132	0.0175	0.0560	pCi/g	1.0					
Lead-214		1.00	+/- 0.155	0.0205	0.0618	pCi/g	1.0					
Potassium-40		19.7	+/- 2.63	0.103	0.336	pCi/g	1.0					
Radium-226		0.881	+/- 0.13	0.0235	0.0679	pCi/g	1.0					
Radium-228		1.10	+/- 0.245	0.0455	0.120	pCi/g	1.0					
Ruthenium-103	U	0.000379	+/- 0.0211	0.0114	0.0388	pCi/g	1.0					
Ruthenium-106	U	0.0104	+/- 0.156	0.0952	0.285	pCi/g	1.0					
Thorium-231		0.152	+/- 0.166	0.0508	0.192	pCi/g	1.0					
Thorium-232		1.00	+/- 0.129	0.0172	0.0551	pCi/g	1.0					
Thorium-234		0.816	+/- 1.79	0.440	1.74	pCi/g	1.0					
Uranium-235		0.172	+/- 0.168	0.0555	0.209	pCi/g	1.0					
Uranium-238		0.816	+/- 1.79	0.440	1.74	pCi/g	1.0					
Yttrium-88	U	-0.00191	+/- 0.017	0.0141	0.0315	pCi/g	1.0					
Zirconium-95	U	0.00	+/- 0.0565	0.0189	0.0787	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043737-001 TJAOU-228A-GR-175-S
Lab ID	: 9812299-26
Matrix	: SOIL
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.847	+/- 0.202	0.0445	0.137	pCi/g	1.0	EJB	12/18/98	0832	137660	1
Americium-241	U	-0.0165	+/- 0.0838	0.0281	0.143	pCi/g	1.0					
Cerium-144		0.183	+/- 0.167	0.0495	0.193	pCi/g	1.0					
Cesium-134	U	-0.00491	+/- 0.0199	0.0109	0.0310	pCi/g	1.0					
Cesium-137		-0.0775	+/- 0.0341	0.0106	0.0388	pCi/g	1.0					
Chromium-51	U	-0.00586	+/- 0.21	0.108	0.368	pCi/g	1.0					
Cobalt-60		0.0229	+/- 0.0328	0.0117	0.0385	pCi/g	1.0					
Iron-59	U	-0.0297	+/- 0.0573	0.0230	0.0949	pCi/g	1.0					
Lead-212		0.937	+/- 0.121	0.0170	0.0547	pCi/g	1.0					
Lead-214		0.913	+/- 0.15	0.0201	0.0665	pCi/g	1.0					
Potassium-40		24.6	+/- 2.73	0.114	0.330	pCi/g	1.0					
Radium-226		0.749	+/- 0.128	0.0231	0.0647	pCi/g	1.0					
Radium-228		0.847	+/- 0.202	0.0445	0.137	pCi/g	1.0					
Ruthenium-103	U	-0.00783	+/- 0.0219	0.0113	0.0393	pCi/g	1.0					
Ruthenium-106	U	0.00654	+/- 0.164	0.0937	0.299	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.163	0.0497	0.201	pCi/g	1.0					
Thorium-232		0.922	+/- 0.119	0.0167	0.0538	pCi/g	1.0					
Thorium-234		1.04	+/- 1.08	0.336	1.20	pCi/g	1.0					
Uranium-235	U	0.00512	+/- 0.108	0.0534	0.198	pCi/g	1.0					
Uranium-238		1.04	+/- 1.08	0.336	1.20	pCi/g	1.0					
Yttrium-88		0.0150	+/- 0.0221	0.0138	0.0411	pCi/g	1.0					
Zirconium-95		0.0275	+/- 0.0583	0.0186	0.0698	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: January 05, 1999

Sample ID	: 043737-010 TJAOU-228A-EB
Lab ID	: 9812299-33
Matrix	: AQUEOUS
Date Collected	: 12/01/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		16.1	+/- 10.1	9.12	20.0	pCi/L	1.0	EJB	12/14/98	2048	137444	1
Americium-241	U	-9.42	+/- 13.7	9.71	21.3	pCi/L	1.0					
Cerium-144	U	-15.5	+/- 14.1	11.3	23.1	pCi/L	1.0					
Cesium-134	U	-1.10	+/- 2.73	2.07	4.61	pCi/L	1.0					
Cesium-137	U	-0.634	+/- 2.86	2.27	4.89	pCi/L	1.0					
Chromium-51	U	-9.25	+/- 27.5	19.9	45.2	pCi/L	1.0					
Cobalt-60	U	-2.99	+/- 2.72	1.59	4.18	pCi/L	1.0					
Iron-59	U	4.21	+/- 5.68	4.53	11.0	pCi/L	1.0					
Lead-212	U	0.00	+/- 4.58	3.81	8.14	pCi/L	1.0					
Lead-214		6.35	+/- 8.39	5.68	9.70	pCi/L	1.0					
Potassium-40		62.0	+/- 32.1	32.0	66.1	pCi/L	1.0					
Radium-226		8.60	+/- 6	4.11	11.0	pCi/L	1.0					
Radium-228		16.1	+/- 10.1	9.12	20.0	pCi/L	1.0					
Ruthenium-103	U	-2.65	+/- 3.2	2.32	5.29	pCi/L	1.0					
Ruthenium-106	U	-17.0	+/- 26.3	19.3	43.2	pCi/L	1.0					
Thorium-231	U	-3.10	+/- 13.6	10.9	22.7	pCi/L	1.0					
Thorium-232	U	0.00	+/- 4.52	3.26	8.04	pCi/L	1.0					
Thorium-234	U	79.9	+/- 218	136	201	pCi/L	1.0					
Uranium-235	U	-5.22	+/- 15.1	11.5	25.8	pCi/L	1.0					
Uranium-238	U	79.9	+/- 218	136	175	pCi/L	1.0					
Yttrium-88	U	0.0516	+/- 2.66	2.13	5.13	pCi/L	1.0					
Zirconium-95	U	-1.59	+/- 4.95	4.17	8.35	pCi/L	1.0					

M = Method	Method-Description
M 1	EPI A-013

9812299-33

SF 2001-COC (10-97)

Supersedes (5-97) Issue

Sue Collin per schedule

GR-176 thru GR-187

Internal Lab Batch No. N/A

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- 601190

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland / Lai, Anh
Project Name: Site 228A VCM
Record Center Code: ER/300/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO USE
Carrier/Waybill No.: 715750
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi / 844-3110
Send Report to SMO: Suzi Jensen

Contract No.: AJ-2480A
Case No.: 7225.2203
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area: NA — Building: NA — Room: NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample #
043738 - 001	TJAOU-228A-GR-176-S	0	228A	120298 / 0950	S	G	500 ml	4 C	G	SA	Gamma Spec, Iso U	
043738 - 002	TJAOU-228A-GR-176-S			120298 / 0950			500 ml				HE, SVOCs	
043738 - 003	TJAOU-228A-GR-176-S			120298 / 0950			40z				VOC	
043739 - 001	TJAOU-228A-GR-177-S			120298 / 0955			500 ml				Gamma Spec	
043739 - 002	TJAOU-228A-GR-177-S			120298 / 0955			500 ml				RCRA Metals	
043740 - 001	TJAOU-228A-GR-178-S			120298 / 1000			500 ml				Gamma Spec	
043741 - 001	TJAOU-228A-GR-179-S			120298 / 1003			500 ml				Gamma Spec	
043741 - 002	TJAOU-228A-GR-179-S			120298 / 1003			500 ml				RCRA Metals	
043742 - 001	TJAOU-228A-GR-180-S			120298 / 1005			500 ml				Gamma Spec	
043743 - 001	TJAOU-228A-GR-181-S			120298 / 1010			500 ml				Gamma Spec, Iso U	

Reference LOV (available at SMO)

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/8/98
Entered by: UY

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC 601214 releases this COC

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits. UY

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	Ch. Catechis	CC	MDM/6131/881-3196

Please list as separate report

	Org.	Date	Time		Org.	Date
1. Relinquished by Ch. Catechis	6131	12/04/98	1040	4. Relinquished by		
1. Received by [signature]	7578 (SMO)	12/04/98	1040	4. Received by		
2. Relinquished by [signature]	SMO 7577	12/7/98	1200	5. Relinquished by		
2. Received by				5. Received by		
3. Relinquished by				6. Relinquished by		
3. Received by				6. Received by		

Original To Accompany Samples, Laboratory Copy (White) — **1st Copy** To Accompany Samples, Return to SMO (Blue) — **2nd Copy** SMO Suspense Copy (Yellow) — **3rd Copy** Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601190

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample
043743 – 002	TJAOU-228A-GR-181-S	0	228A	120298/1010	S	G	500 ml	4 C	G	SA	RCRA Metals, HE, SVOCs	
043743 - 003	TJAOU-228A-GR-181-S			120298/1010			40z				VOC	
043744 – 001	TJAOU-228A-GR-181-DU			120298/1010			500 ml				Gamma Spec, Iso U	
043744 – 002	TJAOU-228A-GR-181-DU			120298/1010			500 ml			DU	RCRA Metals, HE, SVOCs	
043744 - 003	TJAOU-228A-GR-181-DU			120298/1010			40z				VOC	
043745 - 001	TJAOU-228A-GR-182-S			120298/1025			500 ml				Gamma Spec	
043746 – 001	TJAOU-228A-GR-183-S			120298/1030							Gamma Spec	
043746 - 002	TJAOU-228A-GR-183-S			120298/1030							RCRA Metals	
043747 - 001	TJAOU-228A-GR-184-S			120298/1033							Gamma Spec	
043748 – 001	TJAOU-228A-GR-185-S			120298/1037							Gamma Spec	
043748 - 002	TJAOU-228A-GR-185-S			120298/1037							RCRA Metals	
043749 – 001	TJAOU-228A-GR-186-S			120298/1045							Gamma Spec, Iso U	
043749 – 002	TJAOU-228A-GR-186-S			120298/1045							HE, SVOCs	
043749 - 003	TJAOU-228A-GR-186-S			120298/1045			40z				VOC	
043750 – 001	TJAOU-228A-GR-187-S			120298/1052			500 ml				Gamma Spec	
043750 - 002	TJAOU-228A-GR-187-S			120298/1052			500 ml				RCRA Metals	
-												
-												
-												
-												
-												
-												
-												
-												
-												

Abnormal Conditions on Receipt LAB USE

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) 1st Copy To Accompany Samples, Return to SMO (Blue) 2nd Copy SMO Suspense Copy (Yellow) 3rd Copy Field Copy (Pink)

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043738-001 TJAOU-228A-GR-176-S
Lab ID	: 9812309-01
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.210				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0430				pCi/g						
Accuracy, Uranium-238		0.231				pCi/g						
Uranium-233/234		0.734	+/- 0.21	0.0328	0.106	pCi/g	1.0					
Uranium-235		0.0371	+/- 0.043	0.00	0.0371	pCi/g	1.0					
Uranium-238		0.888	+/- 0.231	0.00	0.0370	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.925	+/- 0.212	0.0403	0.140	pCi/g	1.0	EJB	12/23/98	0901	137661	2
Americium-241	U	-0.00456	+/- 0.069	0.0257	0.134	pCi/g	1.0					
Cerium-144		0.0555	+/- 0.0989	0.0453	0.187	pCi/g	1.0					
Cesium-134	U	0.00231	+/- 0.018	0.0106	0.0294	pCi/g	1.0					
Cesium-137	U	0.00751	+/- 0.0229	0.00882	0.0374	pCi/g	1.0					
Chromium-51	U	-0.0135	+/- 0.216	0.118	0.381	pCi/g	1.0					
Cobalt-60	U	0.00447	+/- 0.0195	0.0101	0.0370	pCi/g	1.0					
Iron-59	U	-0.0534	+/- 0.0549	0.0248	0.0872	pCi/g	1.0					
Lead-212		1.03	+/- 0.123	0.0175	0.0498	pCi/g	1.0					
Lead-214		0.840	+/- 0.138	0.0201	0.0638	pCi/g	1.0					
Potassium-40		23.7	+/- 2.56	0.140	0.315	pCi/g	1.0					
Radium-226		0.814	+/- 0.13	0.0240	0.0597	pCi/g	1.0					
Radium-228		0.925	+/- 0.212	0.0403	0.140	pCi/g	1.0					
Ruthenium-103	U	0.0113	+/- 0.0208	0.0117	0.0398	pCi/g	1.0					
Ruthenium-106	U	0.0289	+/- 0.154	0.0875	0.285	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.175	0.0434	0.197	pCi/g	1.0					
Thorium-232		1.01	+/- 0.12	0.0171	0.0488	pCi/g	1.0					
Thorium-234		1.00	+/- 1.14	0.260	1.10	pCi/g	1.0					
Uranium-235		0.132	+/- 0.102	0.0562	0.192	pCi/g	1.0					
Uranium-238		1.00	+/- 1.14	0.260	1.10	pCi/g	1.0					

9812309-01

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Sahni,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043743-001 TJACU-228A-GR-181-S
Lab ID	: 9812309-10
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.257				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0677				pCi/g						
Accuracy, Uranium-238		0.481				pCi/g						
Uranium-233/234		0.976	+/- 0.257	0.0280	0.0849	pCi/g	1.0					
Uranium-235		0.0821	+/- 0.0677	0.00	0.0411	pCi/g	1.0					
Uranium-238		2.62	+/- 0.481	0.0110	0.0720	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		1.02	+/- 0.249	0.0440	0.137	pCi/g	1.0	EJB	12/23/98	0909	137661	2
Americium-241	U	-0.0255	+/- 0.0856	0.0283	0.161	pCi/g	1.0					
Cerium-144	U	-0.00650	+/- 0.113	0.0504	0.206	pCi/g	1.0					
Cesium-134	U	-0.0940	+/- 0.0245	0.0115	0.0312	pCi/g	1.0					
Cesium-137		0.114	+/- 0.0375	0.0111	0.0374	pCi/g	1.0					
Chromium-51	U	-0.0428	+/- 0.252	0.131	0.435	pCi/g	1.0					
Cobalt-60	U	0.00571	+/- 0.0236	0.0111	0.0395	pCi/g	1.0					
Iron-59	U	-0.0173	+/- 0.0682	0.0271	0.115	pCi/g	1.0					
Lead-212		1.26	+/- 0.154	0.0195	0.0546	pCi/g	1.0					
Lead-214		0.906	+/- 0.156	0.0222	0.0737	pCi/g	1.0					
Potassium-40		23.4	+/- 2.61	0.153	0.324	pCi/g	1.0					
Radium-226		0.863	+/- 0.131	0.0262	0.0624	pCi/g	1.0					
Radium-228		1.02	+/- 0.249	0.0440	0.137	pCi/g	1.0					
Ruthenium-103	U	-0.00943	+/- 0.0233	0.0128	0.0417	pCi/g	1.0					
Ruthenium-106	U	-0.0609	+/- 0.174	0.0956	0.307	pCi/g	1.0					
Thorium-231		0.193	+/- 0.194	0.0484	0.212	pCi/g	1.0					
Thorium-232		1.24	+/- 0.151	0.0191	0.0534	pCi/g	1.0					
Thorium-234		2.18	+/- 1.5	0.288	1.31	pCi/g	1.0					
Uranium-235		0.167	+/- 0.225	0.0584	0.220	pCi/g	1.0					
Uranium-238		2.18	+/- 1.5	0.288	1.31	pCi/g	1.0					

9812309-10

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043744-001 TJAOU-228A-GR-181-D
Lab ID	: 9812309-13
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.243				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0717				pCi/g						
Accuracy, Uranium-238		0.353				pCi/g						
Uranium-233/234		0.856	+/- 0.243	0.0263	0.0756	pCi/g	1.0					
Uranium-235		0.0793	+/- 0.0717	0.0164	0.0894	pCi/g	1.0					
Uranium-238		1.59	+/- 0.353	0.0115	0.0756	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		1.01	+/- 0.222	0.0409	0.106	pCi/g	1.0	EJB	12/21/98	1814	137661	2
Americium-241	U	0.0115	+/- 0.0262	0.0144	0.0470	pCi/g	1.0					
Cerium-144	U	-0.0467	+/- 0.0839	0.0435	0.153	pCi/g	1.0					
Cesium-134	U	0.00382	+/- 0.0165	0.0107	0.0272	pCi/g	1.0					
Cesium-137		0.0823	+/- 0.0402	0.0103	0.0359	pCi/g	1.0					
Chromium-51	U	-0.00639	+/- 0.191	0.112	0.339	pCi/g	1.0					
Cobalt-60	U	-0.0140	+/- 0.0193	0.0101	0.0329	pCi/g	1.0					
Iron-59	U	-0.0264	+/- 0.0527	0.0244	0.0877	pCi/g	1.0					
Lead-212		1.03	+/- 0.136	0.0172	0.0458	pCi/g	1.0					
Lead-214		1.00	+/- 0.143	0.0199	0.0526	pCi/g	1.0					
Potassium-40		20.8	+/- 2.16	0.140	0.258	pCi/g	1.0					
Radium-226		0.911	+/- 0.154	0.0243	0.0531	pCi/g	1.0					
Radium-228		1.01	+/- 0.222	0.0409	0.106	pCi/g	1.0					
Ruthenium-103	U	0.00422	+/- 0.0193	0.0114	0.0363	pCi/g	1.0					
Ruthenium-106	U	-0.0535	+/- 0.16	0.0884	0.286	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.192	0.0427	0.182	pCi/g	1.0					
Thorium-232		1.01	+/- 0.133	0.0168	0.0449	pCi/g	1.0					
Thorium-234		2.75	+/- 0.762	0.162	0.448	pCi/g	1.0					
Uranium-235		0.150	+/- 0.143	0.0509	0.176	pCi/g	1.0					
Uranium-238		2.75	+/- 0.762	0.162	0.448	pCi/g	1.0					

9812309-13

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Sahmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043749-001 TJAOU-228A-GR-186-S
Lab ID	: 9812309-22
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.229				pCi/g		LDM	12/22/98	0759	138241	1
Accuracy, Uranium-235		0.0583				pCi/g						
Accuracy, Uranium-238		0.411				pCi/g						
Uranium-233/234		0.760	+/- 0.229	0.0330	0.108	pCi/g	1.0					
Uranium-235		0.0541	+/- 0.0583	0.0116	0.0759	pCi/g	1.0					
Uranium-238		2.01	+/- 0.411	0.00	0.0430	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.936	+/- 0.233	0.0479	0.120	pCi/g	1.0	EJB	12/16/98	1853	137661	2
Americium-241	U	-0.0770	+/- 0.166	0.0424	0.254	pCi/g	1.0					
Cerium-144	U	-0.0385	+/- 0.109	0.0552	0.195	pCi/g	1.0					
Cesium-134	U	-0.0176	+/- 0.021	0.0124	0.0356	pCi/g	1.0					
Cesium-137		0.141	+/- 0.0369	0.0120	0.0349	pCi/g	1.0					
Chromium-51	U	0.0713	+/- 0.204	0.120	0.360	pCi/g	1.0					
Cobalt-60	U	-0.0232	+/- 0.0298	0.0122	0.0416	pCi/g	1.0					
Iron-59	U	-0.0150	+/- 0.055	0.0268	0.0980	pCi/g	1.0					
Lead-212		0.933	+/- 0.123	0.0212	0.0592	pCi/g	1.0					
Lead-214		0.898	+/- 0.154	0.0241	0.0703	pCi/g	1.0					
Potassium-40		19.0	+/- 2.56	0.168	0.367	pCi/g	1.0					
Radium-226		0.803	+/- 0.131	0.0283	0.0733	pCi/g	1.0					
Radium-228		0.936	+/- 0.233	0.0479	0.120	pCi/g	1.0					
Ruthenium-103	U	0.00560	+/- 0.0214	0.0123	0.0395	pCi/g	1.0					
Ruthenium-106	U	-0.0735	+/- 0.176	0.102	0.306	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.207	0.0527	0.206	pCi/g	1.0					
Thorium-232		0.920	+/- 0.121	0.0208	0.0584	pCi/g	1.0					
Thorium-234		1.72	+/- 1.75	0.405	1.91	pCi/g	1.0					
Uranium-235		0.141	+/- 0.121	0.0694	0.222	pCi/g	1.0					
Uranium-238		1.72	+/- 1.75	0.405	1.91	pCi/g	1.0					

9812309-22

GR-116 thru GR-187

Sue Collin per schedule

SF 2001-COC (10-97)

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 1

AR/COC- 601190

Internal Lab Batch No. N/A

SAR/WR No.

Press F1 for instructions for each field.

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland / Lai, Anh
Project Name: Site 228A VCM
Record Center Code: ER/1309/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO USE
Carrier/Waybill No.: 715760
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi / 844-3110
Send Report to SMO: Suzi Jensen

Contract No.: AJ-2480A
Case No.: 7225.2203
SMO Authorization
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample #
043738 - 001	TJAOU-228A-GR-176-S	0	228A	120298 / 0950	S	G	500 ml	4C	G	SA	Gamma Spec, Iso U	
043738 - 002	TJAOU-228A-GR-176-S			120298 / 0950			500 ml				HE, SVOCs	
043738 - 003	TJAOU-228A-GR-176-S			120298 / 0950			4 oz				VOC	
043739 - 001	TJAOU-228A-GR-177-S			120298 / 0955			500 ml				Gamma Spec	
043739 - 002	TJAOU-228A-GR-177-S			120298 / 0955			500 ml				RCRA Metals	
043740 - 001	TJAOU-228A-GR-178-S			120298 / 1000			500 ml				Gamma Spec	
043741 - 001	TJAOU-228A-GR-179-S			120298 / 1003			500 ml				Gamma Spec	
043741 - 002	TJAOU-228A-GR-179-S			120298 / 1003			500 ml				RCRA Metals	
043742 - 001	TJAOU-228A-GR-180-S			120298 / 1005			500 ml				Gamma Spec	
043743 - 001	TJAOU-228A-GR-181-S			120298 / 1010			500 ml				Gamma Spec, Iso U	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/8/98
Entered by: UY

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC 601214 releases this COC

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits. UY

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	Ch. Catechis	CC	MDM/6131/881-3196

Please list as separate report.

1. Relinquished by	Ch. Catechis	Org. 6131	Date 12/04/98	Time 1040	4. Relinquished by	Org.	Date
1. Received by	[illegible]	Org. 7578 (SMO)	Date 12/04/98	Time 1040	4. Received by	Org.	Date
2. Relinquished by	[illegible]	Org. SMO 7577	Date 12/7/98	Time 1200	5. Relinquished by	Org.	Date
2. Received by		Org.	Date	Time	5. Received by	Org.	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org.	Date
3. Received by		Org.	Date	Time	6. Received by	Org.	Date

Original To Accompany Samples, Laboratory Copy (White) — **1st Copy** To Accompany Samples, Return to SMO (Blue) — **2nd Copy** SMO Suspense Copy (Yellow) — **3rd Copy** Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601190

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Samp
043743 – 002	TJAOU-228A-GR-181-S	0	228A	120298/1010	S	G	500 ml	4 C	G	SA	RCRA Metals, HE, SVOCs	
043743 - 003	TJAOU-228A-GR-181-S			120298/1010			40z				VOC	
043744 – 001	TJAOU-228A-GR-181-DU			120298/1010			500 ml				Gamma Spec, Iso U	
043744 – 002	TJAOU-228A-GR-181-DU			120298/1010			500 ml			DU	RCRA Metals, HE, SVOCs	
043744 - 003	TJAOU-228A-GR-181-DU			120298/1010			40z				VOC	
043745 - 001	TJAOU-228A-GR-182-S			120298/1025			500 ml				Gamma Spec	
043746 – 001	TJAOU-228A-GR-183-S			120298/1030							Gamma Spec	
043746 - 002	TJAOU-228A-GR-183-S			120298/1030							RCRA Metals	
043747 - 001	TJAOU-228A-GR-184-S			120298/1033							Gamma Spec	
043748 – 001	TJAOU-228A-GR-185-S			120298/1037							Gamma Spec	
043748 - 002	TJAOU-228A-GR-185-S			120298/1037							RCRA Metals	
043749 – 001	TJAOU-228A-GR-186-S			120298/1045							Gamma Spec, Iso U	
043749 – 002	TJAOU-228A-GR-186-S			120298/1045							HE, SVOCs	
043749 - 003	TJAOU-228A-GR-186-S			120298/1045			40z				VOC	
043750 – 001	TJAOU-228A-GR-187-S			120298/1052			500 ml				Gamma Spec	
043750 - 002	TJAOU-228A-GR-187-S			120298/1052			500 ml				RCRA Metals	
-												
-												
-												
-												
-												
-												
-												
-												
-												

Abnormal Conditions on Receipt **LAB USE**

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) **1st Copy** To Accompany Samples, Return to SMO (Blue) **2nd Copy** SMO Suspense Copy (Yellow) **3rd Copy** Field Copy (Pink)

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

c= SNLS00396 Report Date: January 06, 1999

Sample ID	: 043738-001 TJAOU-228A-GR-176-S
Lab ID	: 9812309-01
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.210				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0430				pCi/g						
Accuracy, Uranium-238		0.231				pCi/g						
Uranium-233/234		0.734	+/- 0.21	0.0328	0.106	pCi/g	1.0					
Uranium-235		0.0371	+/- 0.043	0.00	0.0371	pCi/g	1.0					
Uranium-238		0.888	+/- 0.231	0.00	0.0370	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.925	+/- 0.212	0.0403	0.140	pCi/g	1.0	EJB	12/23/98	0901	137661	2
Americium-241	U	-0.00456	+/- 0.069	0.0257	0.134	pCi/g	1.0					
Cerium-144		0.0555	+/- 0.0989	0.0453	0.187	pCi/g	1.0					
Cesium-134	U	0.00231	+/- 0.018	0.0106	0.0294	pCi/g	1.0					
Cesium-137	U	0.00751	+/- 0.0229	0.00882	0.0374	pCi/g	1.0					
Chromium-51	U	-0.0135	+/- 0.216	0.118	0.381	pCi/g	1.0					
Cobalt-60	U	0.00447	+/- 0.0195	0.0101	0.0370	pCi/g	1.0					
Iron-59	U	-0.0534	+/- 0.0549	0.0248	0.0872	pCi/g	1.0					
Lead-212		1.03	+/- 0.123	0.0175	0.0498	pCi/g	1.0					
Lead-214		0.840	+/- 0.138	0.0201	0.0638	pCi/g	1.0					
Potassium-40		23.7	+/- 2.56	0.140	0.315	pCi/g	1.0					
Radium-226		0.814	+/- 0.13	0.0240	0.0597	pCi/g	1.0					
Radium-228		0.925	+/- 0.212	0.0403	0.140	pCi/g	1.0					
Ruthenium-103	U	0.0113	+/- 0.0208	0.0117	0.0398	pCi/g	1.0					
Ruthenium-106	U	0.0289	+/- 0.154	0.0875	0.285	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.175	0.0434	0.197	pCi/g	1.0					
Thorium-232		1.01	+/- 0.12	0.0171	0.0488	pCi/g	1.0					
Thorium-234		1.00	+/- 1.14	0.260	1.10	pCi/g	1.0					
Uranium-235		0.132	+/- 0.102	0.0562	0.192	pCi/g	1.0					
Uranium-238		1.00	+/- 1.14	0.260	1.10	pCi/g	1.0					

9812309-01

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID : 043738-001 TIAOU-228A-GR-176-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.00480	+/- 0.0178	0.00874	0.0352	pCi/g	1.0					
Zirconium-95	U	0.0167	+/- 0.0421	0.0204	0.0774	pCi/g	1.0	EJB	12/23/98	0901	137661	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812309-01

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043739-001 TJAOU-228A-GR-177-S
Lab ID	: 9812309-04
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.851	+/- 0.196	0.0485	0.135	pCi/g	1.0	EJB	12/20/98	1105	137661	1
Americium-241	U	-0.0265	+/- 0.0873	0.0309	0.145	pCi/g	1.0					
Cerium-144	U	-0.00854	+/- 0.102	0.0542	0.184	pCi/g	1.0					
Cesium-134	U	-0.00708	+/- 0.0211	0.0127	0.0323	pCi/g	1.0					
Cesium-137	U	0.00978	+/- 0.027	0.0122	0.0402	pCi/g	1.0					
Chromium-51	U	-0.109	+/- 0.226	0.132	0.380	pCi/g	1.0					
Cobalt-60	U	-0.00210	+/- 0.0234	0.0122	0.0428	pCi/g	1.0					
Iron-59	U	-0.0306	+/- 0.0587	0.0285	0.0971	pCi/g	1.0					
Lead-212		0.959	+/- 0.118	0.0210	0.0501	pCi/g	1.0					
Lead-214		0.844	+/- 0.137	0.0241	0.0683	pCi/g	1.0					
Potassium-40		19.7	+/- 2.24	0.168	0.359	pCi/g	1.0					
Radium-226		0.743	+/- 0.128	0.0288	0.0674	pCi/g	1.0					
Radium-228		0.851	+/- 0.196	0.0485	0.135	pCi/g	1.0					
Ruthenium-103	U	-0.00827	+/- 0.0222	0.0133	0.0396	pCi/g	1.0					
Ruthenium-106	U	0.0807	+/- 0.172	0.105	0.321	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.216	0.0523	0.197	pCi/g	1.0					
Thorium-232		0.942	+/- 0.116	0.0206	0.0492	pCi/g	1.0					
Thorium-234		1.67	+/- 1.34	0.317	1.20	pCi/g	1.0					
Uranium-235		0.0792	+/- 0.162	0.0631	0.209	pCi/g	1.0					
Uranium-238		1.67	+/- 1.34	0.317	1.20	pCi/g	1.0					
Yttrium-88	U	0.00861	+/- 0.0193	0.0103	0.0396	pCi/g	1.0					
Zirconium-95	U	0.00695	+/- 0.0432	0.0238	0.0778	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812309-04

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043740-001 TJAOU-228A-GR-178-S
Lab ID	: 9812309-06
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.04	+/- 0.246	0.0467	0.142	pCi/g	1.0	EJB	12/16/98	1349	137661	1
Americium-241	U	-0.0298	+/- 0.0869	0.0302	0.161	pCi/g	1.0					
Cerium-144	U	-0.0678	+/- 0.114	0.0527	0.200	pCi/g	1.0					
Cesium-134	U	-0.000385	+/- 0.0217	0.0122	0.0342	pCi/g	1.0					
Cesium-137		0.189	+/- 0.0738	0.0118	0.0367	pCi/g	1.0					
Chromium-51	U	0.0265	+/- 0.224	0.117	0.390	pCi/g	1.0					
Cobalt-60	U	0.00000754	+/- 0.0221	0.0118	0.0409	pCi/g	1.0					
Iron-59		0.0444	+/- 0.0605	0.0260	0.110	pCi/g	1.0					
Lead-212		1.13	+/- 0.142	0.0206	0.0598	pCi/g	1.0					
Lead-214		1.01	+/- 0.164	0.0236	0.0705	pCi/g	1.0					
Potassium-40		24.6	+/- 2.76	0.162	0.383	pCi/g	1.0					
Radium-226		0.916	+/- 0.151	0.0279	0.0654	pCi/g	1.0					
Radium-228		1.04	+/- 0.246	0.0467	0.142	pCi/g	1.0					
Ruthenium-103	U	-0.00411	+/- 0.0218	0.0121	0.0393	pCi/g	1.0					
Ruthenium-106	U	-0.106	+/- 0.206	0.100	0.310	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.196	0.0515	0.228	pCi/g	1.0					
Thorium-232		1.11	+/- 0.14	0.0203	0.0589	pCi/g	1.0					
Thorium-234		2.74	+/- 1.54	0.306	1.30	pCi/g	1.0					
Uranium-235		0.106	+/- 0.154	0.0633	0.207	pCi/g	1.0					
Uranium-238		2.74	+/- 1.54	0.306	1.30	pCi/g	1.0					
Yttrium-88	U	0.000466	+/- 0.0176	0.00963	0.0338	pCi/g	1.0					
Zirconium-95	U	-0.0228	+/- 0.0397	0.0220	0.0675	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812309-06

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043741-001 TJAOU-228A-GR-179-S
Lab ID	: 9812309-07
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.12	+/- 0.243	0.0407	0.123	pCi/g	1.0	EJB	12/20/98	1106	137661	1
Americium-241		0.0576	+/- 0.0733	0.0251	0.133	pCi/g	1.0					
Cerium-144	U	-0.0696	+/- 0.0992	0.0451	0.179	pCi/g	1.0					
Cesium-134	U	0.00164	+/- 0.0187	0.0106	0.0295	pCi/g	1.0					
Cesium-137		0.0691	+/- 0.0341	0.0102	0.0350	pCi/g	1.0					
Chromium-51		0.238	+/- 0.205	0.110	0.376	pCi/g	1.0					
Cobalt-60	U	-0.0147	+/- 0.0249	0.0103	0.0417	pCi/g	1.0					
Iron-59		0.0365	+/- 0.0546	0.0240	0.102	pCi/g	1.0					
Lead-212		1.05	+/- 0.127	0.0175	0.0507	pCi/g	1.0					
Lead-214		0.936	+/- 0.14	0.0201	0.0594	pCi/g	1.0					
Potassium-40		23.2	+/- 2.62	0.142	0.314	pCi/g	1.0					
Radium-226		0.846	+/- 0.148	0.0241	0.0611	pCi/g	1.0					
Radium-228		1.12	+/- 0.243	0.0407	0.123	pCi/g	1.0					
Ruthenium-103	U	0.00836	+/- 0.0227	0.0111	0.0375	pCi/g	1.0					
Ruthenium-106	U	-0.0937	+/- 0.164	0.0874	0.282	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.186	0.0435	0.184	pCi/g	1.0					
Thorium-232		1.03	+/- 0.125	0.0171	0.0498	pCi/g	1.0					
Thorium-234		2.47	+/- 1.37	0.259	1.08	pCi/g	1.0					
Uranium-235		0.102	+/- 0.175	0.0526	0.194	pCi/g	1.0					
Uranium-238		2.47	+/- 1.37	0.259	1.08	pCi/g	1.0					
Yttrium-88		0.0111	+/- 0.0189	0.00868	0.0386	pCi/g	1.0					
Zirconium-95		0.0422	+/- 0.0393	0.0199	0.0750	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812309-07

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043742-001 TJAOU-228A-GR-180-S
Lab ID	: 9812309-09
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.851	+/- 0.232	0.0433	0.118	pCi/g	1.0	EJB	12/21/98	1811	137661	1
Americium-241	U	0.00778	+/- 0.0932	0.0304	0.164	pCi/g	1.0					
Cerium-144	U	-0.0304	+/- 0.0994	0.0495	0.182	pCi/g	1.0					
Cesium-134	U	-0.00779	+/- 0.0199	0.0113	0.0307	pCi/g	1.0					
Cesium-137		0.169	+/- 0.0356	0.0109	0.0329	pCi/g	1.0					
Chromium-51	U	-0.0142	+/- 0.212	0.123	0.372	pCi/g	1.0					
Cobalt-60		0.0136	+/- 0.0216	0.0109	0.0420	pCi/g	1.0					
Iron-59	U	0.00397	+/- 0.0561	0.0260	0.0984	pCi/g	1.0					
Lead-212		0.949	+/- 0.12	0.0190	0.0491	pCi/g	1.0					
Lead-214		0.885	+/- 0.146	0.0217	0.0639	pCi/g	1.0					
Potassium-40		19.8	+/- 2.41	0.151	0.350	pCi/g	1.0					
Radium-226		0.812	+/- 0.134	0.0257	0.0615	pCi/g	1.0					
Radium-228		0.851	+/- 0.232	0.0433	0.118	pCi/g	1.0					
Ruthenium-103	U	0.00415	+/- 0.0204	0.0122	0.0383	pCi/g	1.0					
Ruthenium-106	U	-0.126	+/- 0.169	0.0937	0.289	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.172	0.0472	0.199	pCi/g	1.0					
Thorium-232		0.930	+/- 0.118	0.0186	0.0482	pCi/g	1.0					
Thorium-234		1.33	+/- 1.37	0.308	1.31	pCi/g	1.0					
Uranium-235		0.162	+/- 0.105	0.0616	0.196	pCi/g	1.0					
Uranium-238		1.33	+/- 1.37	0.308	1.31	pCi/g	1.0					
Yttrium-88	U	-0.00701	+/- 0.0209	0.00923	0.0367	pCi/g	1.0					
Zirconium-95		0.0318	+/- 0.0413	0.0215	0.0776	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812309-09

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043743-001 TJAOU-228A-GR-181-S
Lab ID	: 9812309-10
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.257				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0677				pCi/g						
Accuracy, Uranium-238		0.481				pCi/g						
Uranium-233/234		0.976	+/- 0.257	0.0280	0.0849	pCi/g	1.0					
Uranium-235		0.0821	+/- 0.0677	0.00	0.0411	pCi/g	1.0					
Uranium-238		2.62	+/- 0.481	0.0110	0.0720	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		1.02	+/- 0.249	0.0440	0.137	pCi/g	1.0	EJB	12/23/98	0909	137661	2
Americium-241	U	-0.0255	+/- 0.0856	0.0283	0.161	pCi/g	1.0					
Cerium-144	U	-0.00650	+/- 0.113	0.0504	0.206	pCi/g	1.0					
Cesium-134	U	-0.0940	+/- 0.0245	0.0115	0.0312	pCi/g	1.0					
Cesium-137		0.114	+/- 0.0375	0.0111	0.0374	pCi/g	1.0					
Chromium-51	U	-0.0428	+/- 0.252	0.131	0.435	pCi/g	1.0					
Cobalt-60	U	0.00571	+/- 0.0236	0.0111	0.0395	pCi/g	1.0					
Iron-59	U	-0.0173	+/- 0.0682	0.0271	0.115	pCi/g	1.0					
Lead-212		1.26	+/- 0.154	0.0195	0.0546	pCi/g	1.0					
Lead-214		0.906	+/- 0.156	0.0222	0.0737	pCi/g	1.0					
Potassium-40		23.4	+/- 2.61	0.153	0.324	pCi/g	1.0					
Radium-226		0.863	+/- 0.131	0.0262	0.0624	pCi/g	1.0					
Radium-228		1.02	+/- 0.249	0.0440	0.137	pCi/g	1.0					
Ruthenium-103	U	-0.00943	+/- 0.0233	0.0128	0.0417	pCi/g	1.0					
Ruthenium-106	U	-0.0609	+/- 0.174	0.0956	0.307	pCi/g	1.0					
Thorium-231		0.193	+/- 0.194	0.0484	0.212	pCi/g	1.0					
Thorium-232		1.24	+/- 0.151	0.0191	0.0534	pCi/g	1.0					
Thorium-234		2.18	+/- 1.5	0.288	1.31	pCi/g	1.0					
Uranium-235		0.167	+/- 0.225	0.0584	0.220	pCi/g	1.0					
Uranium-238		2.18	+/- 1.5	0.288	1.31	pCi/g	1.0					

9812309-10

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID : 043743-001 TJAOU-228A-GR-181-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	-0.00392	+/- 0.02	0.00945	0.0364	pCi/g	1.0					
Zirconium-95	U	0.00	+/- 0.0658	0.0222	0.0694	pCi/g	1.0	EJB	12/23/98	0909	137661	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812309-10

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043744-001 TJAOU-228A-GR-181-D
Lab ID	: 9812309-13
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.243				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0717				pCi/g						
Accuracy, Uranium-238		0.353				pCi/g						
Uranium-233/234		0.856	+/- 0.243	0.0263	0.0756	pCi/g	1.0					
Uranium-235		0.0793	+/- 0.0717	0.0164	0.0894	pCi/g	1.0					
Uranium-238		1.59	+/- 0.353	0.0115	0.0756	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		1.01	+/- 0.222	0.0409	0.106	pCi/g	1.0	EJB	12/21/98	1814	137661	2
Americium-241	U	0.0115	+/- 0.0262	0.0144	0.0470	pCi/g	1.0					
Cerium-144	U	-0.0467	+/- 0.0839	0.0435	0.153	pCi/g	1.0					
Cesium-134	U	0.00382	+/- 0.0165	0.0107	0.0272	pCi/g	1.0					
Cesium-137		0.0823	+/- 0.0402	0.0103	0.0359	pCi/g	1.0					
Chromium-51	U	-0.00639	+/- 0.191	0.112	0.339	pCi/g	1.0					
Cobalt-60	U	-0.0140	+/- 0.0193	0.0101	0.0329	pCi/g	1.0					
Iron-59	U	-0.0264	+/- 0.0527	0.0244	0.0877	pCi/g	1.0					
Lead-212		1.03	+/- 0.136	0.0172	0.0458	pCi/g	1.0					
Lead-214		1.00	+/- 0.143	0.0199	0.0526	pCi/g	1.0					
Potassium-40		20.8	+/- 2.16	0.140	0.258	pCi/g	1.0					
Radium-226		0.911	+/- 0.154	0.0243	0.0531	pCi/g	1.0					
Radium-228		1.01	+/- 0.222	0.0409	0.106	pCi/g	1.0					
Ruthenium-103	U	0.00422	+/- 0.0193	0.0114	0.0363	pCi/g	1.0					
Ruthenium-106	U	-0.0535	+/- 0.16	0.0884	0.286	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.192	0.0427	0.182	pCi/g	1.0					
Thorium-232		1.01	+/- 0.133	0.0168	0.0449	pCi/g	1.0					
Thorium-234		2.75	+/- 0.762	0.162	0.448	pCi/g	1.0					
Uranium-235		0.150	+/- 0.143	0.0509	0.176	pCi/g	1.0					
Uranium-238		2.75	+/- 0.762	0.162	0.448	pCi/g	1.0					

9812309-13

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID : 043744-001 TJAOU-228A-GR-181-D

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.000605	+/- 0.0179	0.00875	0.0337	pCi/g	1.0					
Zirconium-95	U	-0.00388	+/- 0.0386	0.0204	0.0689	pCi/g	1.0	EJB	12/21/98	1814	137661	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812309-13

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043745-001 TJAOU-228A-GR-182-S
Lab ID	: 9812309-16
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.17	+/- 0.225	0.0392	0.128	pCi/g	1.0	EJB	12/16/98	1915	137661	1
Americium-241		0.0490	+/- 0.0732	0.0250	0.145	pCi/g	1.0					
Cerium-144	U	0.0327	+/- 0.0977	0.0435	0.184	pCi/g	1.0					
Cesium-134		0.0126	+/- 0.0186	0.0102	0.0316	pCi/g	1.0					
Cesium-137		0.105	+/- 0.0327	0.00987	0.0347	pCi/g	1.0					
Chromium-51	U	0.0300	+/- 0.19	0.0974	0.340	pCi/g	1.0					
Cobalt-60	U	-0.0276	+/- 0.0212	0.00985	0.0340	pCi/g	1.0					
Iron-59	U	-0.0207	+/- 0.0487	0.0218	0.0823	pCi/g	1.0					
Lead-212		1.15	+/- 0.135	0.0169	0.0499	pCi/g	1.0					
Lead-214		1.05	+/- 0.152	0.0195	0.0630	pCi/g	1.0					
Potassium-40		21.5	+/- 2.35	0.136	0.299	pCi/g	1.0					
Radium-226		0.904	+/- 0.141	0.0234	0.0559	pCi/g	1.0					
Radium-228		1.17	+/- 0.225	0.0392	0.128	pCi/g	1.0					
Ruthenium-103	U	0.00683	+/- 0.0199	0.0101	0.0376	pCi/g	1.0					
Ruthenium-106		0.219	+/- 0.22	0.0844	0.270	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.173	0.0424	0.197	pCi/g	1.0					
Thorium-232		1.13	+/- 0.133	0.0167	0.0492	pCi/g	1.0					
Thorium-234		1.25	+/- 1.1	0.256	1.14	pCi/g	1.0					
Uranium-235		0.122	+/- 0.105	0.0548	0.197	pCi/g	1.0					
Uranium-238		1.25	+/- 1.1	0.256	1.14	pCi/g	1.0					
Yttrium-88	U	-0.00443	+/- 0.0162	0.00817	0.0293	pCi/g	1.0					
Zirconium-95	U	0.0143	+/- 0.0354	0.0185	0.0657	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812309-16

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043746-001 TJAOU-228A-GR-183-S
Lab ID	: 9812309-17
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.12	+/- 0.247	0.0416	0.131	pCi/g	1.0	EJB	12/16/98	1850	137661	1
Americium-241	U	-0.0540	+/- 0.0795	0.0257	0.125	pCi/g	1.0					
Cerium-144	U	0.0203	+/- 0.0978	0.0458	0.182	pCi/g	1.0					
Cesium-134	U	0.00468	+/- 0.0183	0.0108	0.0294	pCi/g	1.0					
Cesium-137		0.106	+/- 0.0387	0.0104	0.0357	pCi/g	1.0					
Chromium-51	U	-0.137	+/- 0.185	0.102	0.310	pCi/g	1.0					
Cobalt-60	U	-0.00679	+/- 0.0199	0.0105	0.0346	pCi/g	1.0					
Iron-59	U	-0.0335	+/- 0.0533	0.0232	0.0909	pCi/g	1.0					
Lead-212		0.955	+/- 0.117	0.0178	0.0518	pCi/g	1.0					
Lead-214		1.02	+/- 0.158	0.0205	0.0581	pCi/g	1.0					
Potassium-40		20.6	+/- 2.4	0.145	0.371	pCi/g	1.0					
Radium-226		0.850	+/- 0.14	0.0246	0.0621	pCi/g	1.0					
Radium-228		1.12	+/- 0.247	0.0416	0.131	pCi/g	1.0					
Ruthenium-103	U	-0.00882	+/- 0.0203	0.0106	0.0359	pCi/g	1.0					
Ruthenium-106	U	0.00	+/- 0.376	0.0889	0.289	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.207	0.0445	0.196	pCi/g	1.0					
Thorium-232		0.941	+/- 0.115	0.0175	0.0511	pCi/g	1.0					
Thorium-234		1.59	+/- 1.19	0.264	1.08	pCi/g	1.0					
Uranium-235		0.159	+/- 0.173	0.0539	0.195	pCi/g	1.0					
Uranium-238		1.59	+/- 1.19	0.264	1.08	pCi/g	1.0					
Yttrium-88		0.0120	+/- 0.0164	0.00867	0.0350	pCi/g	1.0					
Zirconium-95	U	0.00	+/- 0.0588	0.0196	0.0707	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812309-17

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043747-001 TJAOU-228A-GR-184-S
Lab ID	: 9812309-19
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.999	+/- 0.259	0.0440	0.135	pCi/g	1.0	EJB	12/16/98	1851	137661	1
Americium-241	U	0.0159	+/- 0.0906	0.0278	0.149	pCi/g	1.0					
Cerium-144	U	0.0277	+/- 0.115	0.0500	0.203	pCi/g	1.0					
Cesium-134	U	-0.00192	+/- 0.0299	0.0115	0.0320	pCi/g	1.0					
Cesium-137		0.0889	+/- 0.0392	0.0111	0.0418	pCi/g	1.0					
Chromium-51	U	0.0147	+/- 0.201	0.111	0.363	pCi/g	1.0					
Cobalt-60	U	-0.00335	+/- 0.0222	0.0111	0.0387	pCi/g	1.0					
Iron-59	U	-0.0454	+/- 0.0582	0.0245	0.0958	pCi/g	1.0					
Lead-212		0.786	+/- 0.126	0.0195	0.0829	pCi/g	1.0					
Lead-214		0.792	+/- 0.133	0.0222	0.0698	pCi/g	1.0					
Potassium-40		22.1	+/- 2.69	0.153	0.283	pCi/g	1.0					
Radium-226		0.697	+/- 0.13	0.0262	0.0633	pCi/g	1.0					
Radium-228		0.999	+/- 0.259	0.0440	0.135	pCi/g	1.0					
Ruthenium-103	U	-0.00462	+/- 0.0218	0.0114	0.0378	pCi/g	1.0					
Ruthenium-106	U	-0.0492	+/- 0.181	0.0944	0.307	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.195	0.0484	0.210	pCi/g	1.0					
Thorium-232		0.774	+/- 0.124	0.0191	0.0817	pCi/g	1.0					
Thorium-234		1.53	+/- 1.41	0.284	1.21	pCi/g	1.0					
Uranium-235	U	0.00108	+/- 0.122	0.0631	0.212	pCi/g	1.0					
Uranium-238		1.53	+/- 1.41	0.284	1.21	pCi/g	1.0					
Yttrium-88	U	0.00784	+/- 0.0166	0.00906	0.0340	pCi/g	1.0					
Zirconium-95	U	0.00710	+/- 0.0382	0.0207	0.0701	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812309-19

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043748-001 TJAOU-228A-GR-185-S
Lab ID	: 9812309-20
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.02	+/- 0.216	0.0423	0.115	pCi/g	1.0	EJB	12/16/98	1852	137661	1
Americium-241	U	-0.0381	+/- 0.0815	0.0264	0.138	pCi/g	1.0					
Cerium-144	U	-0.0440	+/- 0.103	0.0476	0.186	pCi/g	1.0					
Cesium-134	U	-0.00410	+/- 0.0194	0.0109	0.0300	pCi/g	1.0					
Cesium-137		0.135	+/- 0.0445	0.0106	0.0309	pCi/g	1.0					
Chromium-51	U	-0.0999	+/- 0.193	0.106	0.326	pCi/g	1.0					
Cobalt-60	U	0.00396	+/- 0.0228	0.0107	0.0419	pCi/g	1.0					
Iron-59		0.0264	+/- 0.054	0.0237	0.101	pCi/g	1.0					
Lead-212		0.954	+/- 0.123	0.0186	0.0498	pCi/g	1.0					
Lead-214		0.764	+/- 0.133	0.0211	0.0641	pCi/g	1.0					
Potassium-40		24.0	+/- 2.93	0.149	0.392	pCi/g	1.0					
Radium-226		0.755	+/- 0.129	0.0250	0.0629	pCi/g	1.0					
Radium-228		1.02	+/- 0.216	0.0423	0.115	pCi/g	1.0					
Ruthenium-103	U	-0.0124	+/- 0.0188	0.0108	0.0328	pCi/g	1.0					
Ruthenium-106	U	0.0659	+/- 0.157	0.0901	0.291	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.196	0.0462	0.201	pCi/g	1.0					
Thorium-232		0.940	+/- 0.121	0.0183	0.0491	pCi/g	1.0					
Thorium-234		3.13	+/- 1.29	0.270	1.17	pCi/g	1.0					
Uranium-235	U	0.0341	+/- 0.172	0.0560	0.210	pCi/g	1.0					
Uranium-238		3.13	+/- 1.29	0.270	1.17	pCi/g	1.0					
Yttrium-88	U	-0.00203	+/- 0.0167	0.00880	0.0305	pCi/g	1.0					
Zirconium-95		0.0260	+/- 0.0772	0.0199	0.0637	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812309-20

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043749-001 TJAOU-228A-GR-186-S
Lab ID	: 9812309-22
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.229				pCi/g		LDM	12/22/98	0759	138241	1
Accuracy, Uranium-235		0.0583				pCi/g						
Accuracy, Uranium-238		0.411				pCi/g						
Uranium-233/234		0.760	+/- 0.229	0.0330	0.108	pCi/g	1.0					
Uranium-235		0.0541	+/- 0.0583	0.0116	0.0759	pCi/g	1.0					
Uranium-238		2.01	+/- 0.411	0.00	0.0430	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.936	+/- 0.233	0.0479	0.120	pCi/g	1.0	EJB	12/16/98	1853	137661	2
Americium-241	U	-0.0770	+/- 0.166	0.0424	0.254	pCi/g	1.0					
Cerium-144	U	-0.0385	+/- 0.109	0.0552	0.195	pCi/g	1.0					
Cesium-134	U	-0.0176	+/- 0.021	0.0124	0.0356	pCi/g	1.0					
Cesium-137		0.141	+/- 0.0369	0.0120	0.0349	pCi/g	1.0					
Chromium-51	U	0.0713	+/- 0.204	0.120	0.360	pCi/g	1.0					
Cobalt-60	U	-0.0232	+/- 0.0298	0.0122	0.0416	pCi/g	1.0					
Iron-59	U	-0.0150	+/- 0.055	0.0268	0.0980	pCi/g	1.0					
Lead-212		0.933	+/- 0.123	0.0212	0.0592	pCi/g	1.0					
Lead-214		0.898	+/- 0.154	0.0241	0.0703	pCi/g	1.0					
Potassium-40		19.0	+/- 2.56	0.168	0.367	pCi/g	1.0					
Radium-226		0.803	+/- 0.131	0.0283	0.0733	pCi/g	1.0					
Radium-228		0.936	+/- 0.233	0.0479	0.120	pCi/g	1.0					
Ruthenium-103	U	0.00560	+/- 0.0214	0.0123	0.0395	pCi/g	1.0					
Ruthenium-106	U	-0.0735	+/- 0.176	0.102	0.306	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.207	0.0527	0.206	pCi/g	1.0					
Thorium-232		0.920	+/- 0.121	0.0208	0.0584	pCi/g	1.0					
Thorium-234		1.72	+/- 1.75	0.405	1.91	pCi/g	1.0					
Uranium-235		0.141	+/- 0.121	0.0694	0.222	pCi/g	1.0					
Uranium-238		1.72	+/- 1.75	0.405	1.91	pCi/g	1.0					

9812309-22

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID : 043749-001 TJAOU-228A-GR-186-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	-0.00539	+/- 0.0218	0.00991	0.0385	pCi/g	1.0					
Zirconium-95	U	0.0219	+/- 0.0399	0.0225	0.0734	pCi/g	1.0	EJB	12/16/98	1853	137661	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812309-22

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: January 06, 1999

Sample ID	: 043750-001 TJAOU-228A-GR-187-S
Lab ID	: 9812309-25
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.881	+/- 0.19	0.0447	0.130	pCi/g	1.0	EJB	12/16/98	1854	137661	1
Americium-241	U	-0.0217	+/- 0.113	0.0289	0.152	pCi/g	1.0					
Cerium-144	U	-0.00103	+/- 0.11	0.0505	0.201	pCi/g	1.0					
Cesium-134	U	0.00646	+/- 0.0186	0.0117	0.0306	pCi/g	1.0					
Cesium-137		0.0620	+/- 0.0317	0.0113	0.0396	pCi/g	1.0					
Chromium-51		0.189	+/- 0.252	0.113	0.349	pCi/g	1.0					
Cobalt-60	U	-0.000758	+/- 0.0225	0.0112	0.0412	pCi/g	1.0					
Iron-59	U	0.00310	+/- 0.0526	0.0249	0.0922	pCi/g	1.0					
Lead-212		0.991	+/- 0.127	0.0197	0.0546	pCi/g	1.0					
Lead-214		0.889	+/- 0.141	0.0226	0.0707	pCi/g	1.0					
Potassium-40		20.3	+/- 2.3	0.155	0.310	pCi/g	1.0					
Radium-226		0.811	+/- 0.129	0.0267	0.0650	pCi/g	1.0					
Radium-228		0.881	+/- 0.19	0.0447	0.130	pCi/g	1.0					
Ruthenium-103	U	0.000987	+/- 0.0205	0.0116	0.0378	pCi/g	1.0					
Ruthenium-106	U	0.0754	+/- 0.164	0.0961	0.307	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.168	0.0492	0.212	pCi/g	1.0					
Thorium-232		0.977	+/- 0.125	0.0194	0.0538	pCi/g	1.0					
Thorium-234		3.46	+/- 1.52	0.295	1.25	pCi/g	1.0					
Uranium-235	U	0.0471	+/- 0.114	0.0638	0.209	pCi/g	1.0					
Uranium-238		3.46	+/- 1.52	0.295	1.25	pCi/g	1.0					
Yttrium-88	U	-0.00675	+/- 0.0183	0.00923	0.0324	pCi/g	1.0					
Zirconium-95		0.0252	+/- 0.0391	0.0211	0.0730	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812309-25

GR-188 thru GR-200

SF 2001-COC (10-97)

Supersedes (5-97) issue

Internal Lab Batch No.

Sue Collins per schedule 11/8/99

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- 601191

Dept. No /Mail Stop: 6133/MS1147
Project/Task Manager: John Copland (Lai, Anh)
Project Name: Site 228A VCM
Record Center Code: EQ/300/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO USE
Carrier/Waybill No.: 75250
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi/843110
Send Report to SMO: Suzi Jensen

Contract No.: AJ-2480A
Case No.: 7225.2205
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample #
043751 - 001	TJAOU-228A-GR-188-S	0	228A	120398/1237	S	AG	500 ml	4 C	G	SA	Gamma Spec	
043752 - 001	TJAOU-228A-GR-189-S			120398/1240							Gamma Spec	
043752 - 002	TJAOU-228A-GR-189-S			120398/1240							RCRA Metals	
043753 - 001	TJAOU-228A-GR-190-S			120398/1245							Gamma Spec	
043754 - 001	TJAOU-228A-GR-191-S			120398/1255							Gamma Spec, Iso U	
043754 - 002	TJAOU-228A-GR-191-S			120398/1255							RCRA Metals, HE, SVOCs	
043754 - 003	TJAOU-228A-GR-191-S			120398/1255			4 oz				VOC	
043755 - 001	TJAOU-228A-GR-191-DU			120398/1255			500 ml			DU	Gamma Spec, Iso U	
043755 - 002	TJAOU-228A-GR-191-DU			120398/1255			500 ml			DU	RCRA Metals, HE, SVOCs	
043755 - 003	TJAOU-228A-GR-191-DU			120398/1255			4 oz			DU	VOC	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/08/98
Entered by: UT

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC 601214 releases this COC

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits. UT

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	C. Catechis	CC	MDM/6131/881-3196

Please list as separate report

	Org	Date	Time		Org	Date
1. Relinquished by C. Catechis	6131	12/04/98	1102	4. Relinquished by		
1. Received by	7578 (SMO)	12/4/98	1102	4. Received by		
2. Relinquished by	SMO 7577	12/7/98	1200	5. Relinquished by		
2. Received by				5. Received by		
3. Relinquished by				6. Relinquished by		
3. Received by				6. Received by		

Original To Accompany Samples, Laboratory Copy (White) — **1st Copy** To Accompany Samples, Return to SMO (Blue) — **2nd Copy** SMO Suspense Copy (Yellow) — **3rd Copy** Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601191

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Samp #
043756 - 001	TJAOU-228A-GR-192-S	0	228A	120298/1305	S	A3	500 ml	4 C	G	SA	Gamma Spec	
043757 – 001	TJAOU-228A-GR-193-S			120298/1310			500 ml				Gamma Spec	
043757 - 002	TJAOU-228A-GR-193-S			120298/1310			500 ml				RCRA Metals	
043758 - 001	TJAOU-228A-GR-194-S			120298/1315							Gamma Spec	
043759 – 001	TJAOU-228A-GR-195-S			120298/1320							Gamma Spec	
043759 - 002	TJAOU-228A-GR-195-S			120298/1320							RCRA Metals	
043760 – 001	TJAOU-228A-GR-196-S			120298/1330							Gamma Spec, Iso U	
043760 – 002	TJAOU-228A-GR-196-S			120298/1330							HE, SVOCs	
043760 - 003	TJAOU-228A-GR-196-S			120298/1330			4 oz				VOC	
043761 – 001	TJAOU-228A-GR-197-S			120298/1340			500 ml				Gamma Spec	
043761 - 002	TJAOU-228A-GR-197-S			120298/1340							RCRA Metals	
043762 - 001	TJAOU-228A-GR-198-S			120298/1350							Gamma Spec	
043763 – 001	TJAOU-228A-GR-199-S			120298/1400							Gamma Spec	
043763 - 002	TJAOU-228A-GR-199-S			120298/1400							RCRA Metals	
043764 - 001	TJAOU-228A-GR-200-S			120298/1403							Gamma Spec	
043764 - 005	TJAOU-228A-TB			120298/1415	DIW	G	3x40 ml	HCL+4C	G	TB	VOC	
043764 - 006	TJAOU-228A-EB			120298/1415		G	3x40 ml	HCL+4C		EB	VOC	
043764 - 007	TJAOU-228A-EB			120298/1415		AG	2x1L	4C		EB	SVOC (8270)	
043764 - 008	TJAOU-228A-EB			120298/1420		AG	4x1L	4C		EB	HE	
043764 - 009	TJAOU-228A-EB			120298/1425		P	500 ml	HNO3+4C		EB	RCRA metals	
043764 - 010	TJAOU-228A-EB			120298/1425		P	1L	HNO3		EB	Gamma Spec	
043764 - 011	TJAOU-228A-EB			120298/1425		P	1L	HNO3		EB	ISO U	

Abnormal Conditions on Receipt **LAB USE**

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) **1st Copy** To Accompany Samples, Return to SMO (Blue) **2nd Copy** SMO Suspense Copy (Yellow) **3rd Copy** Field Copy (Pink)

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043754-001 TJAOU-228A-GR-191-S
Lab ID	: 9812300-05
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.251				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0451				pCi/g						
Accuracy, Uranium-238		0.309				pCi/g						
Uranium-233/234		0.976	+/- 0.251	0.0269	0.0804	pCi/g	1.0					
Uranium-235		0.0389	+/- 0.0451	0.00	0.0389	pCi/g	1.0					
Uranium-238		1.38	+/- 0.309	0.00	0.0388	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.816	+/- 0.178	0.0401	0.101	pCi/g	1.0	EJB	12/18/98	0835	137660	2
Americium-241	U	-0.00618	+/- 0.0915	0.0306	0.163	pCi/g	1.0					
Cerium-144	U	-0.0430	+/- 0.0904	0.0453	0.167	pCi/g	1.0					
Cesium-134	U	-0.0380	+/- 0.0167	0.00968	0.0259	pCi/g	1.0					
Cesium-137		0.114	+/- 0.037	0.00944	0.0312	pCi/g	1.0					
Chromium-51	U	0.00856	+/- 0.169	0.0945	0.301	pCi/g	1.0					
Cobalt-60	U	-0.00580	+/- 0.0189	0.0107	0.0338	pCi/g	1.0					
Iron-59	U	0.00725	+/- 0.0492	0.0206	0.0769	pCi/g	1.0					
Lead-212		0.875	+/- 0.108	0.0153	0.0455	pCi/g	1.0					
Lead-214		0.896	+/- 0.123	0.0179	0.0532	pCi/g	1.0					
Potassium-40		20.6	+/- 2.36	0.0908	0.339	pCi/g	1.0					
Radium-226		0.715	+/- 0.11	0.0206	0.0546	pCi/g	1.0					
Radium-228		0.816	+/- 0.178	0.0401	0.101	pCi/g	1.0					
Ruthenium-103		0.0244	+/- 0.0192	0.00986	0.0352	pCi/g	1.0					
Ruthenium-106	U	-0.00978	+/- 0.143	0.0835	0.261	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.143	0.0445	0.167	pCi/g	1.0					
Thorium-232		0.861	+/- 0.106	0.0150	0.0448	pCi/g	1.0					
Thorium-234		1.41	+/- 1.49	0.356	1.25	pCi/g	1.0					
Uranium-235		0.0494	+/- 0.147	0.0488	0.175	pCi/g	1.0					
Uranium-238		1.41	+/- 1.49	0.356	1.25	pCi/g	1.0					

9812300-05

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AI2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043755-001 TJAOU-228A-GR-191-D
Lab ID	: 9812300-08
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.227				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0503				pCi/g						
Accuracy, Uranium-238		0.349				pCi/g						
Uranium-233/234		0.770	+/- 0.227	0.0341	0.112	pCi/g	1.0					
Uranium-235	U	0.0249	+/- 0.0503	0.0250	0.112	pCi/g	1.0					
Uranium-238		1.60	+/- 0.349	0.00	0.0414	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.802	+/- 0.213	0.0425	0.125	pCi/g	1.0	EJB	12/18/98	0835	137660	2
Americium-241		0.0285	+/- 0.026	0.0147	0.0473	pCi/g	1.0					
Cerium-144	U	-0.0211	+/- 0.0819	0.0440	0.152	pCi/g	1.0					
Cesium-134	U	0.00649	+/- 0.0174	0.0103	0.0289	pCi/g	1.0					
Cesium-137		0.0848	+/- 0.0472	0.0101	0.0327	pCi/g	1.0					
Chromium-51	U	0.0407	+/- 0.174	0.0971	0.313	pCi/g	1.0					
Cobalt-60	U	0.00462	+/- 0.0205	0.0111	0.0383	pCi/g	1.0					
Iron-59	U	-0.00679	+/- 0.0536	0.0215	0.0921	pCi/g	1.0					
Lead-212		0.945	+/- 0.126	0.0154	0.0430	pCi/g	1.0					
Lead-214		0.799	+/- 0.123	0.0185	0.0548	pCi/g	1.0					
Potassium-40		26.2	+/- 2.63	0.0941	0.262	pCi/g	1.0					
Radium-226		0.796	+/- 0.133	0.0220	0.0580	pCi/g	1.0					
Radium-228		0.802	+/- 0.213	0.0425	0.125	pCi/g	1.0					
Ruthenium-103	U	-0.000730	+/- 0.0189	0.0105	0.0349	pCi/g	1.0					
Ruthenium-106	U	-0.0357	+/- 0.154	0.0892	0.276	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.125	0.0452	0.162	pCi/g	1.0					
Thorium-232		0.930	+/- 0.124	0.0152	0.0424	pCi/g	1.0					
Thorium-234		1.43	+/- 0.583	0.194	0.452	pCi/g	1.0					
Uranium-235		0.136	+/- 0.125	0.0478	0.171	pCi/g	1.0					
Uranium-238		1.43	+/- 0.583	0.194	0.452	pCi/g	1.0					

9812300-08

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043760-001 TJAOU-228A-GR-196-S
Lab ID	: 9812300-17
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.333				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0540				pCi/g						
Accuracy, Uranium-238		0.415				pCi/g						
Uranium-233/234		0.884	+/- 0.333	0.0570	0.212	pCi/g	1.0					
Uranium-235	U	0.0199	+/- 0.054	0.0211	0.138	pCi/g	1.0					
Uranium-238		1.33	+/- 0.415	0.00	0.0784	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.977	+/- 0.222	0.0459	0.118	pCi/g	1.0	EJB	12/18/98	1327	137660	2
Americium-241	U	-0.0300	+/- 0.0939	0.0281	0.145	pCi/g	1.0					
Cerium-144		0.0688	+/- 0.108	0.0508	0.199	pCi/g	1.0					
Cesium-134	U	0.00281	+/- 0.018	0.0111	0.0288	pCi/g	1.0					
Cesium-137		0.0982	+/- 0.0358	0.0108	0.0392	pCi/g	1.0					
Chromium-51	U	0.00770	+/- 0.209	0.109	0.363	pCi/g	1.0					
Cobalt-60		0.0161	+/- 0.0312	0.0122	0.0440	pCi/g	1.0					
Iron-59	U	-0.0185	+/- 0.0508	0.0236	0.0897	pCi/g	1.0					
Lead-212		0.971	+/- 0.127	0.0175	0.0551	pCi/g	1.0					
Lead-214		0.850	+/- 0.136	0.0205	0.0661	pCi/g	1.0					
Potassium-40		20.3	+/- 2.51	0.104	0.368	pCi/g	1.0					
Radium-226		0.788	+/- 0.125	0.0237	0.0654	pCi/g	1.0					
Radium-228		0.977	+/- 0.222	0.0459	0.118	pCi/g	1.0					
Ruthenium-103	U	-0.000288	+/- 0.0221	0.0114	0.0400	pCi/g	1.0					
Ruthenium-106	U	0.00474	+/- 0.169	0.0958	0.303	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.192	0.0509	0.207	pCi/g	1.0					
Thorium-232		0.955	+/- 0.125	0.0172	0.0542	pCi/g	1.0					
Thorium-234		2.29	+/- 1.41	0.339	1.19	pCi/g	1.0					
Uranium-235		0.124	+/- 0.169	0.0549	0.213	pCi/g	1.0					
Uranium-238		2.29	+/- 1.41	0.339	1.19	pCi/g	1.0					

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043764-011 TJAOU-228A-EB
Lab ID	: 9812300-32
Matrix	: AQUEOUS
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.0323				pCi/l		NVN	12/24/98	0933	138289	1
Accuracy, Uranium-235		0.0239				pCi/l						
Accuracy, Uranium-238		0.0270				pCi/l						
Uranium-233/234		0.0384	+/- 0.0323	0.0248	0.0464	pCi/l	1.0					
Uranium-235		0.0385	+/- 0.0239	0.0198	0.0243	pCi/l	1.0					
Uranium-238		0.0438	+/- 0.027	0.0192	0.0306	pCi/l	1.0					

M = Method	Method-Description
M 1	EPI A-011

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514

9812300-32

GR-188 thru GR-200

SF 2001-COC (10 97)
Supersedes (5-97) issue

Internal Lab Batch No.

sue Collins per schedule 12/8/98

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- 601191

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland (Lab, Auth)
Project Name: Site 228A VCM
Record Center Code: EQ/300/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO USE
Carrier/Waybill No.: 75750
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi / 844-3110
Send Report to SMO: Suzi Jenson

Contract No.: AJ-2480A
Case No.: 7225,2205
SMO Authorization: Doug Salmi
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample #
043751 - 001	TJAOU-228A-GR-188-S	0	228A	120298/1237	S	AB	500 ml	4 C	G	SA	Gamma Spec	
043752 - 001	TJAOU-228A-GR-189-S			120298/1240							Gamma Spec	
043752 - 002	TJAOU-228A-GR-189-S			120298/1240							RCRA Metals	
043753 - 001	TJAOU-228A-GR-190-S			120298/1245							Gamma Spec	
043754 - 001	TJAOU-228A-GR-191-S			120298/1255							Gamma Spec, Iso U	
043754 - 002	TJAOU-228A-GR-191-S			120298/1255							RCRA Metals, HE, SVOCs	
043754 - 003	TJAOU-228A-GR-191-S			120298/1255			4 oz				VOC	
043755 - 001	TJAOU-228A-GR-191-DU			120298/1255			500 ml			DU	Gamma Spec, Iso U	
043755 - 002	TJAOU-228A-GR-191-DU			120298/1255			500 ml			DU	RCRA Metals, HE, SVOCs	
043755 - 003	TJAOU-228A-GR-191-DU			120298/1255			4 oz			DU	VOC	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/08/98
Entered by: UT

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC 601214 releases this COC

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC inits. UT

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	C. Catechis	CL	MDM/6131/881-3198

Please list as separate report

	Org.	Date	Time
1. Relinquished by C. Catechis	6131	12/04/98	1102
1. Received by	7578 (SMO)	12/4/98	1102
2. Relinquished by	SMO 7577	12/7/98	1200
2. Received by			
3. Relinquished by			
3. Received by			
4. Relinquished by			
4. Received by			
5. Relinquished by			
5. Received by			
6. Relinquished by			
6. Received by			

Original To Accompany Samples, Laboratory Copy (White) — **1st Copy** To Accompany Samples, Return to SMO (Blue) — **2nd Copy** SMO Suspense Copy (Yellow) — **3rd Copy** Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601191

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample #
043756 - 001	TJAOU-228A-GR-192-S	0	228A	120298/1305	S	AG	500 ml	4 C	G	SA	Gamma Spec	
043757 – 001	TJAOU-228A-GR-193-S			120298/1310			500 ml				Gamma Spec	
043757 - 002	TJAOU-228A-GR-193-S			120298/1310			500 ml				RCRA Metals	
043758 - 001	TJAOU-228A-GR-194-S			120298/1315							Gamma Spec	
043759 – 001	TJAOU-228A-GR-195-S			120298/1320							Gamma Spec	
043759 - 002	TJAOU-228A-GR-195-S			120298/1320							RCRA Metals	
043760 – 001	TJAOU-228A-GR-196-S			120298/1330							Gamma Spec, Iso U	
043760 – 002	TJAOU-228A-GR-196-S			120298/1330							HE, SVOCs	
043760 - 003	TJAOU-228A-GR-196-S			120298/1330			4 oz				VOC	
043761 – 001	TJAOU-228A-GR-197-S			120298/1340			500 ml				Gamma Spec	
043761 - 002	TJAOU-228A-GR-197-S			120298/1340							RCRA Metals	
043762 - 001	TJAOU-228A-GR-198-S			120298/1350							Gamma Spec	
043763 – 001	TJAOU-228A-GR-199-S			120298/1400							Gamma Spec	
043763 - 002	TJAOU-228A-GR-199-S			120298/1400							RCRA Metals	
043764 - 001	TJAOU-228A-GR-200-S			120298/1403							Gamma Spec	
043764 - 005	TJAOU-228A-TB			120298/1415	DIW	G	3x40 ml	HCL+4C	G	EB TB	VOC	
043764 - 006	TJAOU-228A-EB			120298/1415		G	3x40 ml	HCL+4C		EB	VOC	
043764 - 007	TJAOU-228A-EB			120298/1415		AG	2x1L	4C		EB	SVOC (8270)	
043764 - 008	TJAOU-228A-EB			120298/1420		AG	4x1L	4C		EB	HE	
043764 - 009	TJAOU-228A-EB			120298/1425		P	500 ml	HNO3+4C		EB	RCRA metals	
043764 - 010	TJAOU-228A-EB			120298/1425		P	1L	HNO3		EB	Gamma Spec	
043764 - 011	TJAOU-228A-EB			120298/1425		P	1L	HNO3		EB	ISO U	
-												
-												
-												

Abnormal Conditions on Receipt

LAB USE

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) **1st Copy** To Accompany Samples, Return to SMO (Blue) **2nd Copy** SMO Suspense Copy (Yellow) **3rd Copy** Field Copy (Pink)

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043751-001 TJAOU-228A-GR-188-S
Lab ID	: 9812300-01
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.770	+/- 0.197	0.0464	0.136	pCi/g	1.0	EJB	12/18/98	0833	137660	1
Americium-241	U	-0.0249	+/- 0.0866	0.0288	0.134	pCi/g	1.0					
Cerium-144	U	0.00890	+/- 0.0994	0.0515	0.181	pCi/g	1.0					
Cesium-134	U	-0.00503	+/- 0.0188	0.0113	0.0287	pCi/g	1.0					
Cesium-137		0.132	+/- 0.0416	0.0110	0.0379	pCi/g	1.0					
Chromium-51	U	-0.0676	+/- 0.2	0.110	0.338	pCi/g	1.0					
Cobalt-60	U	0.00527	+/- 0.0229	0.0122	0.0421	pCi/g	1.0					
Iron-59	U	-0.00189	+/- 0.0495	0.0237	0.0893	pCi/g	1.0					
Lead-212		0.858	+/- 0.108	0.0176	0.0509	pCi/g	1.0					
Lead-214		0.770	+/- 0.12	0.0208	0.0634	pCi/g	1.0					
Potassium-40		20.1	+/- 2.42	0.104	0.327	pCi/g	1.0					
Radium-226		0.614	+/- 0.114	0.0240	0.0607	pCi/g	1.0					
Radium-228		0.770	+/- 0.197	0.0464	0.136	pCi/g	1.0					
Ruthenium-103	U	-0.0000547	+/- 0.0197	0.0115	0.0358	pCi/g	1.0					
Ruthenium-106	U	-0.0227	+/- 0.173	0.0973	0.306	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.243	0.0515	0.200	pCi/g	1.0					
Thorium-232		0.844	+/- 0.107	0.0174	0.0501	pCi/g	1.0					
Thorium-234		1.35	+/- 1.06	0.349	1.08	pCi/g	1.0					
Uranium-235		0.177	+/- 0.178	0.0556	0.184	pCi/g	1.0					
Uranium-238		1.35	+/- 1.06	0.349	1.08	pCi/g	1.0					
Yttrium-88	U	-0.00919	+/- 0.0171	0.0143	0.0301	pCi/g	1.0					
Zirconium-95	U	-0.0151	+/- 0.0387	0.0192	0.0659	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812300-01

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043752-001 TJAOU-228A-GR-189-S
Lab ID	: 9812300-02
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.06	+/- 0.227	0.0490	0.133	pCi/g	1.0	EJB	12/18/98	0833	137660	1
Americium-241	U	-0.0449	+/- 0.111	0.0338	0.171	pCi/g	1.0					
Cerium-144	U	0.0203	+/- 0.107	0.0544	0.195	pCi/g	1.0					
Cesium-134		0.0192	+/- 0.0229	0.0119	0.0308	pCi/g	1.0					
Cesium-137		0.0860	+/- 0.0364	0.0116	0.0363	pCi/g	1.0					
Chromium-51	U	0.0464	+/- 0.206	0.116	0.364	pCi/g	1.0					
Cobalt-60	U	0.00623	+/- 0.0236	0.0129	0.0443	pCi/g	1.0					
Iron-59	U	0.0127	+/- 0.0551	0.0250	0.0979	pCi/g	1.0					
Lead-212		0.849	+/- 0.111	0.0186	0.0518	pCi/g	1.0					
Lead-214		0.887	+/- 0.139	0.0220	0.0655	pCi/g	1.0					
Potassium-40		18.6	+/- 2.28	0.126	0.292	pCi/g	1.0					
Radium-226		0.804	+/- 0.13	0.0254	0.0678	pCi/g	1.0					
Radium-228		1.06	+/- 0.227	0.0490	0.133	pCi/g	1.0					
Ruthenium-103	U	-0.0185	+/- 0.0228	0.0122	0.0393	pCi/g	1.0					
Ruthenium-106	U	-0.0692	+/- 0.189	0.103	0.289	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.228	0.0543	0.169	pCi/g	1.0					
Thorium-232		0.836	+/- 0.109	0.0183	0.0510	pCi/g	1.0					
Thorium-234		2.70	+/- 1.65	0.400	1.36	pCi/g	1.0					
Uranium-235		0.0612	+/- 0.11	0.0587	0.202	pCi/g	1.0					
Uranium-238		2.70	+/- 1.65	0.400	1.36	pCi/g	1.0					
Yttrium-88	U	0.00477	+/- 0.0174	0.0151	0.0350	pCi/g	1.0					
Zirconium-95	U	-0.0126	+/- 0.0444	0.0203	0.0673	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812300-02

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043753-001 TJAOU-228A-GR-190-S
Lab ID	: 9812300-04
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.755	+/- 0.195	0.0567	0.157	pCi/g	1.0	EJB	12/18/98	0834	137660	1
Americium-241		0.0620	+/- 0.0418	0.0194	0.0673	pCi/g	1.0					
Cerium-144	U	-0.129	+/- 0.125	0.0578	0.204	pCi/g	1.0					
Cesium-134	U	-0.000283	+/- 0.0242	0.0138	0.0370	pCi/g	1.0					
Cesium-137		0.218	+/- 0.0746	0.0135	0.0497	pCi/g	1.0					
Chromium-51	U	-0.0475	+/- 0.253	0.129	0.424	pCi/g	1.0					
Cobalt-60	U	-0.00390	+/- 0.027	0.0147	0.0485	pCi/g	1.0					
Iron-59	U	-0.0126	+/- 0.069	0.0287	0.117	pCi/g	1.0					
Lead-212		0.887	+/- 0.159	0.0204	0.0589	pCi/g	1.0					
Lead-214		0.859	+/- 0.173	0.0246	0.0785	pCi/g	1.0					
Potassium-40		19.6	+/- 2.14	0.125	0.355	pCi/g	1.0					
Radium-226		0.907	+/- 0.172	0.0294	0.0788	pCi/g	1.0					
Radium-228		0.755	+/- 0.195	0.0567	0.157	pCi/g	1.0					
Ruthenium-103	U	-0.0182	+/- 0.0286	0.0139	0.0485	pCi/g	1.0					
Ruthenium-106	U	-0.0999	+/- 0.226	0.119	0.386	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.248	0.0597	0.231	pCi/g	1.0					
Thorium-232		0.873	+/- 0.157	0.0201	0.0579	pCi/g	1.0					
Thorium-234		1.26	+/- 0.632	0.255	0.640	pCi/g	1.0					
Uranium-235	U	0.0604	+/- 0.135	0.0629	0.235	pCi/g	1.0					
Uranium-238		1.26	+/- 0.632	0.255	0.640	pCi/g	1.0					
Yttrium-88	U	0.00418	+/- 0.02	0.0174	0.0400	pCi/g	1.0					
Zirconium-95		0.0258	+/- 0.0471	0.0235	0.0863	pCi/g	1.0					

M = Method	Method Description
M 1	HASL 300

9812300-04

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043754-001 TJAOU-228A-GR-191-S
Lab ID	: 9812300-05
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.251				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0451				pCi/g						
Accuracy, Uranium-238		0.309				pCi/g						
Uranium-233/234		0.976	+/- 0.251	0.0269	0.0804	pCi/g	1.0					
Uranium-235		0.0389	+/- 0.0451	0.00	0.0389	pCi/g	1.0					
Uranium-238		1.38	+/- 0.309	0.00	0.0388	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.816	+/- 0.178	0.0401	0.101	pCi/g	1.0	EJB	12/18/98	0835	137660	2
Americium-241	U	-0.00618	+/- 0.0915	0.0306	0.163	pCi/g	1.0					
Cerium-144	U	-0.0430	+/- 0.0904	0.0453	0.167	pCi/g	1.0					
Cesium-134	U	-0.0380	+/- 0.0167	0.00968	0.0259	pCi/g	1.0					
Cesium-137		0.114	+/- 0.037	0.00944	0.0312	pCi/g	1.0					
Chromium-51	U	0.00856	+/- 0.169	0.0945	0.301	pCi/g	1.0					
Cobalt-60	U	-0.00580	+/- 0.0189	0.0107	0.0338	pCi/g	1.0					
Iron-59	U	0.00725	+/- 0.0492	0.0206	0.0769	pCi/g	1.0					
Lead-212		0.875	+/- 0.108	0.0153	0.0455	pCi/g	1.0					
Lead-214		0.896	+/- 0.123	0.0179	0.0532	pCi/g	1.0					
Potassium-40		20.6	+/- 2.36	0.0908	0.339	pCi/g	1.0					
Radium-226		0.715	+/- 0.11	0.0206	0.0546	pCi/g	1.0					
Radium-228		0.816	+/- 0.178	0.0401	0.101	pCi/g	1.0					
Ruthenium-103		0.0244	+/- 0.0192	0.00986	0.0352	pCi/g	1.0					
Ruthenium-106	U	-0.00978	+/- 0.143	0.0835	0.261	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.143	0.0445	0.167	pCi/g	1.0					
Thorium-232		0.861	+/- 0.106	0.0150	0.0448	pCi/g	1.0					
Thorium-234		1.41	+/- 1.49	0.356	1.25	pCi/g	1.0					
Uranium-235		0.0494	+/- 0.147	0.0488	0.175	pCi/g	1.0					
Uranium-238		1.41	+/- 1.49	0.356	1.25	pCi/g	1.0					

9812300-05

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043754-001 TJAOU-228A-GR-191-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	-0.00724	+/- 0.0152	0.0124	0.0264	pCi/g	1.0					
Zirconium-95	U	0.0150	+/- 0.0416	0.0165	0.0610	pCi/g	1.0	EJB	12/18/98	0835	137660	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812300-05

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043755-001 TJAOU-228A-GR-191-D
Lab ID	: 9812300-08
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.227				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0503				pCi/g						
Accuracy, Uranium-238		0.349				pCi/g						
Uranium-233/234		0.770	+/- 0.227	0.0341	0.112	pCi/g	1.0					
Uranium-235	U	0.0249	+/- 0.0503	0.0250	0.112	pCi/g	1.0					
Uranium-238		1.60	+/- 0.349	0.00	0.0414	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.802	+/- 0.213	0.0425	0.125	pCi/g	1.0	EJB	12/18/98	0835	137660	2
Americium-241		0.0285	+/- 0.026	0.0147	0.0473	pCi/g	1.0					
Cerium-144	U	-0.0211	+/- 0.0819	0.0440	0.152	pCi/g	1.0					
Cesium-134	U	0.00649	+/- 0.0174	0.0103	0.0289	pCi/g	1.0					
Cesium-137		0.0848	+/- 0.0472	0.0101	0.0327	pCi/g	1.0					
Chromium-51	U	0.0407	+/- 0.174	0.0971	0.313	pCi/g	1.0					
Cobalt-60	U	0.00462	+/- 0.0205	0.0111	0.0383	pCi/g	1.0					
Iron-59	U	-0.00679	+/- 0.0536	0.0215	0.0921	pCi/g	1.0					
Lead-212		0.945	+/- 0.126	0.0154	0.0430	pCi/g	1.0					
Lead-214		0.799	+/- 0.123	0.0185	0.0548	pCi/g	1.0					
Potassium-40		26.2	+/- 2.63	0.0941	0.262	pCi/g	1.0					
Radium-226		0.796	+/- 0.133	0.0220	0.0580	pCi/g	1.0					
Radium-228		0.802	+/- 0.213	0.0425	0.125	pCi/g	1.0					
Ruthenium-103	U	-0.000730	+/- 0.0189	0.0105	0.0349	pCi/g	1.0					
Ruthenium-106	U	-0.0357	+/- 0.154	0.0892	0.276	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.125	0.0452	0.162	pCi/g	1.0					
Thorium-232		0.930	+/- 0.124	0.0152	0.0424	pCi/g	1.0					
Thorium-234		1.43	+/- 0.583	0.194	0.452	pCi/g	1.0					
Uranium-235		0.136	+/- 0.125	0.0478	0.171	pCi/g	1.0					
Uranium-238		1.43	+/- 0.583	0.194	0.452	pCi/g	1.0					

9812300-08

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043755-001 TJAOU-228A-GR-191-D

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.00577	+/- 0.0169	0.0132	0.0336	pCi/g	1.0					
Zirconium-95		0.0296	+/- 0.0444	0.0176	0.0656	pCi/g	1.0	EJB	12/18/98	0835	137660	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812300-08

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043756-001 TJAOU-228A-GR-192-S
Lab ID	: 9812300-11
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.833	+/- 0.284	0.0598	0.221	pCi/g	1.0	EJB	12/18/98	0836	137660	1
Americium-241		0.115	+/- 0.184	0.0313	0.230	pCi/g	1.0					
Cerium-144	U	-0.104	+/- 0.193	0.0628	0.342	pCi/g	1.0					
Cesium-134	U	0.0122	+/- 0.0365	0.0146	0.0584	pCi/g	1.0					
Cesium-137		0.0445	+/- 0.057	0.0143	0.0639	pCi/g	1.0					
Chromium-51	U	0.0209	+/- 0.359	0.135	0.628	pCi/g	1.0					
Cobalt-60		0.0278	+/- 0.0415	0.0155	0.0794	pCi/g	1.0					
Iron-59	U	-0.0507	+/- 0.0901	0.0302	0.156	pCi/g	1.0					
Lead-212		0.876	+/- 0.138	0.0213	0.0855	pCi/g	1.0					
Lead-214		0.877	+/- 0.168	0.0259	0.120	pCi/g	1.0					
Potassium-40		20.2	+/- 2.41	0.132	0.637	pCi/g	1.0					
Radium-226		0.763	+/- 0.173	0.0312	0.118	pCi/g	1.0					
Radium-228		0.833	+/- 0.284	0.0598	0.221	pCi/g	1.0					
Ruthenium-103	U	-0.0144	+/- 0.0389	0.0147	0.0687	pCi/g	1.0					
Ruthenium-106	U	-0.336	+/- 0.383	0.126	0.537	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.256	0.0626	0.319	pCi/g	1.0					
Thorium-232		0.863	+/- 0.136	0.0210	0.0841	pCi/g	1.0					
Thorium-234		0.830	+/- 2.2	0.388	1.95	pCi/g	1.0					
Uranium-235		0.343	+/- 0.314	0.0676	0.347	pCi/g	1.0					
Uranium-238		0.830	+/- 2.2	0.388	1.95	pCi/g	1.0					
Yttrium-88	U	0.0162	+/- 0.0283	0.0186	0.0600	pCi/g	1.0					
Zirconium-95		0.0373	+/- 0.0711	0.0249	0.131	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client:	Sandia National Laboratories
	1515 Eubank SE
	PO Box 5800
	Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043757-001 TJAOU-228A-GR-193-S
Lab ID	: 9812300-12
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.898	+/- 0.216	0.0459	0.122	pCi/g	1.0	EJB	12/18/98	1325	137660	1
Americium-241	U	-0.0584	+/- 0.0828	0.0287	0.137	pCi/g	1.0					
Cerium-144	U	0.0264	+/- 0.0995	0.0501	0.183	pCi/g	1.0					
Cesium-134		0.0173	+/- 0.0231	0.0112	0.0304	pCi/g	1.0					
Cesium-137		0.104	+/- 0.0494	0.0109	0.0375	pCi/g	1.0					
Chromium-51	U	-0.0552	+/- 0.199	0.108	0.343	pCi/g	1.0					
Cobalt-60	U	-0.00570	+/- 0.0212	0.0121	0.0382	pCi/g	1.0					
Iron-59	U	-0.0543	+/- 0.0534	0.0235	0.0835	pCi/g	1.0					
Lead-212		0.964	+/- 0.118	0.0172	0.0515	pCi/g	1.0					
Lead-214		0.930	+/- 0.143	0.0205	0.0629	pCi/g	1.0					
Potassium-40		17.9	+/- 2.02	0.103	0.407	pCi/g	1.0					
Radium-226		0.741	+/- 0.138	0.0238	0.0613	pCi/g	1.0					
Radium-228		0.898	+/- 0.216	0.0459	0.122	pCi/g	1.0					
Ruthenium-103	U	0.00245	+/- 0.0201	0.0114	0.0373	pCi/g	1.0					
Ruthenium-106	U	-0.00968	+/- 0.16	0.0966	0.290	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.181	0.0503	0.195	pCi/g	1.0					
Thorium-232		0.948	+/- 0.116	0.0169	0.0507	pCi/g	1.0					
Thorium-234		1.89	+/- 1.46	0.345	1.15	pCi/g	1.0					
Uranium-235		0.128	+/- 0.226	0.0541	0.199	pCi/g	1.0					
Uranium-238		1.89	+/- 1.46	0.345	1.15	pCi/g	1.0					
Yttrium-88	U	0.00141	+/- 0.0163	0.0143	0.0320	pCi/g	1.0					
Zirconium-95		0.0278	+/- 0.0384	0.0191	0.0724	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812300.12

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043758-001 TJAOU-228A-GR-194-S
Lab ID	: 9812300-14
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.842	+/- 0.213	0.0519	0.138	pCi/g	1.0	EJB	12/18/98	1326	137660	1
Americium-241	U	0.0135	+/- 0.0836	0.0315	0.132	pCi/g	1.0					
Cerium-144	U	-0.0679	+/- 0.108	0.0563	0.188	pCi/g	1.0					
Cesium-134	U	-0.00456	+/- 0.0327	0.0126	0.0355	pCi/g	1.0					
Cesium-137		0.230	+/- 0.0547	0.0123	0.0425	pCi/g	1.0					
Chromium-51	U	-0.0376	+/- 0.231	0.121	0.389	pCi/g	1.0					
Cobalt-60		0.0264	+/- 0.026	0.0137	0.0504	pCi/g	1.0					
Iron-59	U	0.0104	+/- 0.0574	0.0266	0.104	pCi/g	1.0					
Lead-212		0.930	+/- 0.117	0.0193	0.0552	pCi/g	1.0					
Lead-214		0.873	+/- 0.141	0.0230	0.0659	pCi/g	1.0					
Potassium-40		18.9	+/- 2.26	0.117	0.425	pCi/g	1.0					
Radium-226		0.752	+/- 0.137	0.0268	0.0703	pCi/g	1.0					
Radium-228		0.842	+/- 0.213	0.0519	0.138	pCi/g	1.0					
Ruthenium-103	U	-0.00580	+/- 0.0239	0.0128	0.0419	pCi/g	1.0					
Ruthenium-106	U	-0.153	+/- 0.188	0.109	0.309	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.241	0.0564	0.210	pCi/g	1.0					
Thorium-232		0.915	+/- 0.115	0.0190	0.0543	pCi/g	1.0					
Thorium-234		1.50	+/- 1.36	0.379	1.09	pCi/g	1.0					
Uranium-235		0.207	+/- 0.164	0.0607	0.216	pCi/g	1.0					
Uranium-238		1.50	+/- 1.36	0.379	1.09	pCi/g	1.0					
Yttrium-88	U	0.00933	+/- 0.0238	0.0162	0.0470	pCi/g	1.0					
Zirconium-95	U	0.0177	+/- 0.0421	0.0215	0.0757	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812300-14

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043759-001 TJAOU-228A-GR-195-S
Lab ID	: 9812300-15
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.14	+/- 0.249	0.0539	0.154	pCi/g	1.0	EJB	12/18/98	1327	137660	1
Americium-241		0.0640	+/- 0.121	0.0334	0.157	pCi/g	1.0					
Cerium-144	U	-0.114	+/- 0.137	0.0603	0.223	pCi/g	1.0					
Cesium-134		0.0150	+/- 0.0227	0.0132	0.0361	pCi/g	1.0					
Cesium-137		0.0432	+/- 0.034	0.0128	0.0421	pCi/g	1.0					
Chromium-51	U	-0.144	+/- 0.269	0.129	0.401	pCi/g	1.0					
Cobalt-60	U	0.00539	+/- 0.0252	0.0143	0.0454	pCi/g	1.0					
Iron-59	U	-0.0456	+/- 0.0611	0.0276	0.0999	pCi/g	1.0					
Lead-212		1.11	+/- 0.142	0.0207	0.0631	pCi/g	1.0					
Lead-214		1.01	+/- 0.16	0.0244	0.0773	pCi/g	1.0					
Potassium-40		17.6	+/- 2.26	0.139	0.448	pCi/g	1.0					
Radium-226		0.957	+/- 0.153	0.0280	0.0756	pCi/g	1.0					
Radium-228		1.14	+/- 0.249	0.0539	0.154	pCi/g	1.0					
Ruthenium-103	U	0.00879	+/- 0.0253	0.0135	0.0449	pCi/g	1.0					
Ruthenium-106		0.119	+/- 0.198	0.113	0.353	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.185	0.0603	0.227	pCi/g	1.0					
Thorium-232		1.09	+/- 0.14	0.0204	0.0621	pCi/g	1.0					
Thorium-234		2.28	+/- 1.52	0.401	1.26	pCi/g	1.0					
Uranium-235		0.327	+/- 0.211	0.0651	0.252	pCi/g	1.0					
Uranium-238		2.28	+/- 1.52	0.401	1.26	pCi/g	1.0					
Yttrium-88	U	0.00392	+/- 0.0225	0.0166	0.0432	pCi/g	1.0					
Zirconium-95		0.0342	+/- 0.0505	0.0224	0.0839	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

98122/0L15

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043760-001 TJAOU-228A-GR-196-S
Lab ID : 9812300-17
Matrix : SOIL
Date Collected : 12/02/98
Date Received : 12/08/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.333				pCi/g		LDM	12/22/98	0752	138241	1
Accuracy, Uranium-235		0.0540				pCi/g						
Accuracy, Uranium-238		0.415				pCi/g						
Uranium-233/234		0.884	+/- 0.333	0.0570	0.212	pCi/g	1.0					
Uranium-235	U	0.0199	+/- 0.054	0.0211	0.138	pCi/g	1.0					
Uranium-238		1.33	+/- 0.415	0.00	0.0784	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.977	+/- 0.222	0.0459	0.118	pCi/g	1.0	EJB	12/18/98	1327	137660	2
Americium-241	U	-0.0300	+/- 0.0939	0.0281	0.145	pCi/g	1.0					
Cerium-144		0.0688	+/- 0.108	0.0508	0.199	pCi/g	1.0					
Cesium-134	U	0.00281	+/- 0.018	0.0111	0.0288	pCi/g	1.0					
Cesium-137		0.0982	+/- 0.0358	0.0108	0.0392	pCi/g	1.0					
Chromium-51	U	0.00770	+/- 0.209	0.109	0.363	pCi/g	1.0					
Cobalt-60		0.0161	+/- 0.0312	0.0122	0.0440	pCi/g	1.0					
Iron-59	U	-0.0185	+/- 0.0508	0.0236	0.0897	pCi/g	1.0					
Lead-212		0.971	+/- 0.127	0.0175	0.0551	pCi/g	1.0					
Lead-214		0.850	+/- 0.136	0.0205	0.0661	pCi/g	1.0					
Potassium-40		20.3	+/- 2.51	0.104	0.368	pCi/g	1.0					
Radium-226		0.788	+/- 0.125	0.0237	0.0654	pCi/g	1.0					
Radium-228		0.977	+/- 0.222	0.0459	0.118	pCi/g	1.0					
Ruthenium-103	U	-0.000288	+/- 0.0221	0.0114	0.0400	pCi/g	1.0					
Ruthenium-106	U	0.00474	+/- 0.169	0.0958	0.303	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.192	0.0509	0.207	pCi/g	1.0					
Thorium-232		0.955	+/- 0.125	0.0172	0.0542	pCi/g	1.0					
Thorium-234		2.29	+/- 1.41	0.339	1.19	pCi/g	1.0					
Uranium-235		0.124	+/- 0.169	0.0549	0.213	pCi/g	1.0					
Uranium-238		2.29	+/- 1.41	0.339	1.19	pCi/g	1.0					

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043760-001 TJAOU-228A-GR-196-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.00223	+/- 0.0145	0.0143	0.0289	pCi/g	1.0					
Zirconium-95	U	0.00391	+/- 0.0388	0.0190	0.0692	pCi/g	1.0	EJB	12/18/98	1327	137660	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043761-001 TJAOU-228A-GR-197-S
Lab ID	: 9812300-20
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228	U	0.00	+/- 0.128	0.0456	0.224	pCi/g	1.0	EJB	12/18/98	1328	137660	1
Americium-241	U	0.0125	+/- 0.0323	0.0158	0.0537	pCi/g	1.0					
Cerium-144		0.0818	+/- 0.155	0.0478	0.195	pCi/g	1.0					
Cesium-134		0.0166	+/- 0.0246	0.0111	0.0392	pCi/g	1.0					
Cesium-137		0.0676	+/- 0.0374	0.0109	0.0369	pCi/g	1.0					
Chromium-51	U	0.0116	+/- 0.199	0.106	0.361	pCi/g	1.0					
Cobalt-60		0.0125	+/- 0.0143	0.0119	0.0374	pCi/g	1.0					
Iron-59	U	0.0115	+/- 0.0565	0.0232	0.104	pCi/g	1.0					
Lead-212		0.923	+/- 0.13	0.0167	0.0524	pCi/g	1.0					
Lead-214		0.893	+/- 0.155	0.0200	0.0679	pCi/g	1.0					
Potassium-40	U	0.00	+/- 0.57	0.109	1.06	pCi/g	1.0					
Radium-226		0.702	+/- 0.149	0.0237	0.0718	pCi/g	1.0					
Radium-228	U	0.00	+/- 0.128	0.0456	0.224	pCi/g	1.0					
Ruthenium-103		0.0338	+/- 0.0472	0.0113	0.0388	pCi/g	1.0					
Ruthenium-106	U	0.0356	+/- 0.181	0.0961	0.321	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.256	0.0489	0.201	pCi/g	1.0					
Thorium-232	U	0.00	+/- 0.128	0.0165	0.123	pCi/g	1.0					
Thorium-234		1.87	+/- 0.734	0.208	0.515	pCi/g	1.0					
Uranium-235		0.114	+/- 0.201	0.0519	0.193	pCi/g	1.0					
Uranium-238		1.87	+/- 0.734	0.208	0.515	pCi/g	1.0					
Yttrium-88	U	0.00840	+/- 0.0183	0.0141	0.0358	pCi/g	1.0					
Zirconium-95	U	-0.0141	+/- 0.0513	0.0190	0.0788	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043762-001 TJAOU-228A-GR-198-S
Lab ID	: 9812300-22
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.964	+/- 0.222	0.0429	0.120	pCi/g	1.0	EJB	12/18/98	1329	137660	1
Americium-241	U	0.00554	+/- 0.14	0.0372	0.229	pCi/g	1.0					
Cerium-144	U	0.0322	+/- 0.0992	0.0487	0.186	pCi/g	1.0					
Cesium-134	U	-0.0158	+/- 0.0185	0.0104	0.0271	pCi/g	1.0					
Cesium-137		0.108	+/- 0.0368	0.0101	0.0319	pCi/g	1.0					
Chromium-51	U	-0.0833	+/- 0.202	0.102	0.348	pCi/g	1.0					
Cobalt-60	U	-0.00267	+/- 0.0209	0.0114	0.0379	pCi/g	1.0					
Iron-59	U	-0.0299	+/- 0.0492	0.0221	0.0859	pCi/g	1.0					
Lead-212		0.862	+/- 0.113	0.0164	0.0505	pCi/g	1.0					
Lead-214		0.781	+/- 0.124	0.0193	0.0636	pCi/g	1.0					
Potassium-40		21.0	+/- 2.77	0.0974	0.328	pCi/g	1.0					
Radium-226		0.704	+/- 0.123	0.0221	0.0587	pCi/g	1.0					
Radium-228		0.964	+/- 0.222	0.0429	0.120	pCi/g	1.0					
Ruthenium-103	U	-0.000770	+/- 0.0186	0.0106	0.0344	pCi/g	1.0					
Ruthenium-106		0.136	+/- 0.155	0.0896	0.297	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.198	0.0479	0.196	pCi/g	1.0					
Thorium-232		0.849	+/- 0.111	0.0162	0.0497	pCi/g	1.0					
Thorium-234		1.92	+/- 1.75	0.422	1.64	pCi/g	1.0					
Uranium-235		0.0584	+/- 0.0992	0.0523	0.187	pCi/g	1.0					
Uranium-238		1.92	+/- 1.75	0.422	1.64	pCi/g	1.0					
Yttrium-88	U	-0.00677	+/- 0.0164	0.0133	0.0285	pCi/g	1.0					
Zirconium-95	U	0.00387	+/- 0.0387	0.0177	0.0696	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812300-22

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043763-001 TJAOU-228A-GR-199-S
Lab ID	: 9812300-23
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.846	+/- 0.197	0.0450	0.137	pCi/g	1.0	EJB	12/18/98	1329	137660	1
Americium-241	U	-0.0206	+/- 0.0835	0.0285	0.142	pCi/g	1.0					
Cerium-144	U	-0.00841	+/- 0.102	0.0500	0.187	pCi/g	1.0					
Cesium-134	U	-0.0154	+/- 0.0207	0.0110	0.0306	pCi/g	1.0					
Cesium-137		0.107	+/- 0.0512	0.0107	0.0355	pCi/g	1.0					
Chromium-51	U	-0.0278	+/- 0.208	0.108	0.362	pCi/g	1.0					
Cobalt-60		0.0223	+/- 0.0239	0.0119	0.0471	pCi/g	1.0					
Iron-59	U	-0.0276	+/- 0.0592	0.0230	0.0985	pCi/g	1.0					
Lead-212		0.848	+/- 0.112	0.0172	0.0538	pCi/g	1.0					
Lead-214		0.808	+/- 0.135	0.0203	0.0647	pCi/g	1.0					
Potassium-40		27.3	+/- 3.02	0.116	0.259	pCi/g	1.0					
Radium-226		0.754	+/- 0.13	0.0234	0.0617	pCi/g	1.0					
Radium-228		0.846	+/- 0.197	0.0450	0.137	pCi/g	1.0					
Ruthenium-103	U	0.0106	+/- 0.0209	0.0112	0.0395	pCi/g	1.0					
Ruthenium-106	U	-0.0133	+/- 0.173	0.0947	0.311	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.174	0.0502	0.201	pCi/g	1.0					
Thorium-232		0.835	+/- 0.11	0.0170	0.0530	pCi/g	1.0					
Thorium-234		2.28	+/- 1.34	0.343	1.19	pCi/g	1.0					
Uranium-235	U	-0.0456	+/- 0.106	0.0540	0.190	pCi/g	1.0					
Uranium-238		2.28	+/- 1.34	0.343	1.19	pCi/g	1.0					
Yttrium-88	U	-0.0106	+/- 0.0143	0.0139	0.0231	pCi/g	1.0					
Zirconium-95	U	0.00847	+/- 0.0367	0.0187	0.0673	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812300-23

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043764-001 TJAOU-228A-GR-200-S
Lab ID	: 9812300-25
Matrix	: SOIL
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.814	+/- 0.21	0.0452	0.129	pCi/g	1.0	EJB	12/16/98	1347	137661	1
Americium-241	U	0.00393	+/- 0.085	0.0282	0.146	pCi/g	1.0					
Cerium-144	U	-0.110	+/- 0.105	0.0508	0.181	pCi/g	1.0					
Cesium-134	U	-0.00360	+/- 0.0207	0.0117	0.0320	pCi/g	1.0					
Cesium-137		0.115	+/- 0.0313	0.0113	0.0375	pCi/g	1.0					
Chromium-51	U	-0.118	+/- 0.198	0.112	0.331	pCi/g	1.0					
Cobalt-60	U	0.00296	+/- 0.0234	0.0115	0.0429	pCi/g	1.0					
Iron-59	U	-0.00949	+/- 0.0549	0.0252	0.0979	pCi/g	1.0					
Lead-212		0.951	+/- 0.124	0.0198	0.0519	pCi/g	1.0					
Lead-214		0.852	+/- 0.136	0.0226	0.0618	pCi/g	1.0					
Potassium-40		21.5	+/- 2.67	0.159	0.325	pCi/g	1.0					
Radium-226		0.739	+/- 0.116	0.0267	0.0656	pCi/g	1.0					
Radium-228		0.814	+/- 0.21	0.0452	0.129	pCi/g	1.0					
Ruthenium-103	U	0.0114	+/- 0.0214	0.0115	0.0399	pCi/g	1.0					
Ruthenium-106	U	-0.113	+/- 0.164	0.0963	0.277	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.145	0.0494	0.193	pCi/g	1.0					
Thorium-232		0.938	+/- 0.123	0.0195	0.0512	pCi/g	1.0					
Thorium-234		1.92	+/- 1.37	0.288	1.19	pCi/g	1.0					
Uranium-235		0.0894	+/- 0.126	0.0643	0.208	pCi/g	1.0					
Uranium-238		1.92	+/- 1.37	0.288	1.19	pCi/g	1.0					
Yttrium-88	U	-0.00547	+/- 0.0145	0.00939	0.0256	pCi/g	1.0					
Zirconium-95	U	-0.00139	+/- 0.039	0.0211	0.0686	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812300-25

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043764-010 TJAOU-228A-EB
Lab ID	: 9812300-31
Matrix	: AQUEOUS
Date Collected	: 12/02/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228	U	7.19	+/- 9.88	8.66	16.6	pCi/L	1.0	EJB	12/14/98	2049	137444	1
Americium-241	U	-2.30	+/- 12.2	9.24	20.9	pCi/L	1.0					
Cerium-144	U	-7.62	+/- 16.4	11.3	26.8	pCi/L	1.0					
Cesium-134	U	-1.64	+/- 2.53	1.91	4.10	pCi/L	1.0					
Cesium-137	U	0.548	+/- 2.62	2.10	4.54	pCi/L	1.0					
Chromium-51	U	-1.52	+/- 24.1	18.6	41.9	pCi/L	1.0					
Cobalt-60		3.06	+/- 2.58	1.54	5.20	pCi/L	1.0					
Iron-59	U	0.160	+/- 5.4	4.30	9.66	pCi/L	1.0					
Lead-212		4.72	+/- 7.69	3.69	8.60	pCi/L	1.0					
Lead-214		8.00	+/- 5.15	3.82	9.48	pCi/L	1.0					
Potassium-40	U	25.1	+/- 41.9	31.0	43.2	pCi/L	1.0					
Radium-226		8.39	+/- 5.64	3.81	10.3	pCi/L	1.0					
Radium-228	U	7.19	+/- 9.88	8.66	16.6	pCi/L	1.0					
Ruthenium-103	U	-1.12	+/- 2.69	2.11	4.49	pCi/L	1.0					
Ruthenium-106	U	11.9	+/- 22.9	17.9	40.5	pCi/L	1.0					
Thorium-231	U	-6.28	+/- 13	10.6	22.2	pCi/L	1.0					
Thorium-232		4.67	+/- 7.6	3.65	8.51	pCi/L	1.0					
Thorium-234	U	0.00	+/- 123	72.4	203	pCi/L	1.0					
Uranium-235	U	0.00	+/- 25	10.1	30.3	pCi/L	1.0					
Uranium-238	U	0.00	+/- 123	72.4	203	pCi/L	1.0					
Yttrium-88	U	-1.72	+/- 2.48	1.94	4.14	pCi/L	1.0					
Zirconium-95	U	-0.920	+/- 4.55	3.85	8.05	pCi/L	1.0					

M = Method	Method-Description
M 1	EPI A-013

GR-201 thru GR-211

SF 2001-COC (10-97)

Supersedes (5-97) issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- 601192

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland / Lori Anh
Project Name: Site 228A VCM
Record Center Code: EQ/135V/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12-7-98 SMO USE
Carrier/Waybill No.: 715750
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Saimi / 844-3110
Send Report to SMO: Sue Jenson

Contract No.: AJ-2480A
Case No.: 7225.2203
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area: NA
Building: NA — Room: NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Samp #
043765 - 001	TJAOU-228A-GR-201-S	0	228A	120398/1000	S	AG	500 ml	4 C	G	SA	Gamma Spec, Iso U	
043765 – 002	TJAOU-228A-GR-201-S			120398/1000			500 ml				RCRA Metals, HE, SVOCs	
043765 - 003	TJAOU-228A-GR-201-S			120398/1000			4 oz				VOC	
043766 – 001	TJAOU-228A-GR-201-DU			120398/1000			500 ml				Gamma Spec, Iso U	
043766 – 002	TJAOU-228A-GR-201-DU			120398/1000			500 ml				RCRA Metals, HE, SVOCs	
043766 - 003	TJAOU-228A-GR-201-DU			120398/1000			4 oz				VOC	
043767 - 001	TJAOU-228A-GR-202-S			120398/1010			500 ml				Gamma Spec	
043768 – 001	TJAOU-228A-GR-203-S			120398/1020			500 ml				Gamma Spec	
043768 - 002	TJAOU-228A-GR-203-S			120398/1020			500 ml				RCRA Metals	
043769 - 001	TJAOU-228A-GR-204-S			120398/1025			500 ml				Gamma Spec	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy): 12/08/98
Entered by: LH

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC 601215 releases this COC

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits. LH

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	C. Catechis	CC	MDM/6131/881-3198

Please list as separate report.

1. Relinquished by	C. Catechis	Org. 6131	Date 12/04/98	Time 1500	4. Relinquished by	Org.	Date
1. Received by	[illegible] (SMO)	Org. 7578	Date 12/4/98	Time 1500	4. Received by	Org.	Date
2. Relinquished by	[illegible]	SMO 7577	Date 12/7/98	Time 1200	5. Relinquished by	Org.	Date
2. Received by		Org.	Date	Time	5. Received by	Org.	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org.	Date
3. Received by		Org.	Date	Time	6. Received by	Org.	Date

Original To Accompany Samples, Laboratory Copy (White) — **1st Copy** To Accompany Samples, Return to SMO (Blue) — **2nd Copy** SMO Suspense Copy (Yellow) — **3rd Copy** Field Copy (Pink)

SF 2001-COC (10/97)

Supersedes (5/97) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601192

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA Building NA Room NA

Reference LOV (available at SMO)

Sample No - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample #
043770 - 001	TJAOU-228A-GR-206-S	0	228A	120398/1030	S	AG	500ml	4C	G	SA	Gamma Spec	
043770 - 002	TJAOU-228A-GR-206-S			120398/1030							RCRA Metals	
043944 - 001	TJAOU-228A-GR-208-S			120398/1035							Gamma Spec, Iso U	
043944 - 002	TJAOU-228A-GR-208-S			120398/1035							HE, SVOCs	
043944 - 003	TJAOU-228A-GR-208-S			120398/1035			40z				VOC	
043945 - 001	TJAOU-228A-GR-207-S			120398/1040			500ml				Gamma Spec	
043945 - 002	TJAOU-228A-GR-207-S			120398/1040							RCRA Metals	
043946 - 001	TJAOU-228A-GR-209-S			120398/1045							Gamma Spec	
043947 - 001	TJAOU-228A-GR-209-S			120398/1050							Gamma Spec	
043947 - 002	TJAOU-228A-GR-209-S			120398/1050							RCRA Metals	
043948 - 001	TJAOU-228A-GR-210-S			120398/1055							Gamma Spec	
043949 - 001	TJAOU-228A-GR-211-S			120398/1130							Gamma Spec, Iso U	
043949 - 002	TJAOU-228A-GR-211-S			120398/1130							RCRA Metals, HE, SVOCs	
043949 - 003	TJAOU-228A-GR-211-S			120398/1130			40z				VOC	
043950 - 001	TJAOU-228A-GR-211-DU			120398/1130			500ml				Gamma Spec, Iso U	
043950 - 002	TJAOU-228A-GR-211-DU			120398/1130			500ml				RCRA Metals, HE, SVOCs	
043950 - 003	TJAOU-228A-GR-211-DU			120398/1130			40z				VOC	

Abnormal Conditions on Receipt **LAB USE**

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) **1st Copy** To Accompany Samples, Return to SMO (Blue) **2nd Copy** SMO Suspense Copy (Yellow) **3rd Copy** Field Copy (Pink)

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043765-001 TJAOU-228A-GR-201-S
Lab ID	: 9812310-01
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.168				pCi/g		JEW	12/28/98	1515	138477	1
Accuracy, Uranium-235		0.0361				pCi/g						
Accuracy, Uranium-238		0.226				pCi/g						
Uranium-233/234		0.702	+/- 0.168	0.0308	0.0801	pCi/g	1.0					
Uranium-235		0.0371	+/- 0.0361	0.00755	0.0452	pCi/g	1.0					
Uranium-238		1.16	+/- 0.226	0.0204	0.0238	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.890	+/- 0.216	0.0515	0.135	pCi/g	1.0	EJB	12/16/98	1857	137661	2
Americium-241	U	0.00407	+/- 0.0903	0.0326	0.139	pCi/g	1.0					
Cerium-144	U	-0.00921	+/- 0.109	0.0580	0.192	pCi/g	1.0					
Cesium-134	U	-0.00229	+/- 0.0203	0.0134	0.0312	pCi/g	1.0					
Cesium-137		0.215	+/- 0.0504	0.0129	0.0384	pCi/g	1.0					
Chromium-51		0.135	+/- 0.212	0.126	0.373	pCi/g	1.0					
Cobalt-60	U	-0.000601	+/- 0.0231	0.0129	0.0415	pCi/g	1.0					
Iron-59	U	-0.0575	+/- 0.0543	0.0282	0.0880	pCi/g	1.0					
Lead-212		0.874	+/- 0.112	0.0226	0.0519	pCi/g	1.0					
Lead-214		0.900	+/- 0.146	0.0258	0.0674	pCi/g	1.0					
Potassium-40		19.0	+/- 2.31	0.179	0.371	pCi/g	1.0					
Radium-226		0.803	+/- 0.134	0.0306	0.0622	pCi/g	1.0					
Radium-228		0.890	+/- 0.216	0.0515	0.135	pCi/g	1.0					
Ruthenium-103	U	0.00328	+/- 0.0237	0.0131	0.0379	pCi/g	1.0					
Ruthenium-106	U	-0.0549	+/- 0.178	0.110	0.306	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.187	0.0564	0.212	pCi/g	1.0					
Thorium-232		0.862	+/- 0.111	0.0223	0.0512	pCi/g	1.0					
Thorium-234		1.03	+/- 1.2	0.335	1.17	pCi/g	1.0					
Uranium-235		0.198	+/- 0.123	0.0734	0.220	pCi/g	1.0					
Uranium-238		1.03	+/- 1.2	0.335	1.17	pCi/g	1.0					

9812310-01

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043766-001 TJAOU-228A-GR-201-D
Lab ID	: 9812310-04
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.149				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0441				pCi/g						
Accuracy, Uranium-238		0.215				pCi/g						
Uranium-233/234		0.694	+/- 0.149	0.0320	0.0874	pCi/g	1.0					
Uranium-235		0.0675	+/- 0.0441	0.0119	0.0513	pCi/g	1.0					
Uranium-238		1.28	+/- 0.215	0.0234	0.0609	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.869	+/- 0.201	0.0494	0.134	pCi/g	1.0	EJB	12/16/98	1858	137661	2
Americium-241	U	-0.00405	+/- 0.112	0.0347	0.175	pCi/g	1.0					
Cerium-144	U	0.00349	+/- 0.106	0.0557	0.193	pCi/g	1.0					
Cesium-134	U	0.000695	+/- 0.0197	0.0129	0.0315	pCi/g	1.0					
Cesium-137		0.285	+/- 0.0524	0.0124	0.0381	pCi/g	1.0					
Chromium-51	U	0.0533	+/- 0.2	0.121	0.353	pCi/g	1.0					
Cobalt-60	U	0.00154	+/- 0.0261	0.0124	0.0477	pCi/g	1.0					
Iron-59	U	-0.0235	+/- 0.056	0.0271	0.0932	pCi/g	1.0					
Lead-212		0.928	+/- 0.119	0.0216	0.0523	pCi/g	1.0					
Lead-214		0.826	+/- 0.148	0.0248	0.0685	pCi/g	1.0					
Potassium-40		20.4	+/- 2.49	0.172	0.368	pCi/g	1.0					
Radium-226		0.728	+/- 0.119	0.0294	0.0639	pCi/g	1.0					
Radium-228		0.869	+/- 0.201	0.0494	0.134	pCi/g	1.0					
Ruthenium-103	U	0.00266	+/- 0.0205	0.0125	0.0378	pCi/g	1.0					
Ruthenium-106	U	-0.0532	+/- 0.173	0.106	0.305	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.2	0.0540	0.212	pCi/g	1.0					
Thorium-232		0.916	+/- 0.117	0.0213	0.0516	pCi/g	1.0					
Thorium-234		1.32	+/- 1.38	0.352	1.33	pCi/g	1.0					
Uranium-235		0.0852	+/- 0.172	0.0655	0.184	pCi/g	1.0					
Uranium-238		1.32	+/- 1.38	0.352	1.33	pCi/g	1.0					

9812310-04

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043944-001 TJAOU-228A-GR-206-S
Lab ID	: 9812310-13
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.165				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0324				pCi/g						
Accuracy, Uranium-238		0.165				pCi/g						
Uranium-233/234		0.863	+/- 0.165	0.0213	0.0364	pCi/g	1.0					
Uranium-235		0.0318	+/- 0.0324	0.0117	0.0505	pCi/g	1.0					
Uranium-238		0.869	+/- 0.165	0.0188	0.0364	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		1.03	+/- 0.236	0.0460	0.126	pCi/g	1.0	EJB	12/17/98	0052	137662	2
Americium-241		0.0290	+/- 0.0296	0.0160	0.0489	pCi/g	1.0					
Cerium-144	U	0.0242	+/- 0.0898	0.0526	0.166	pCi/g	1.0					
Cesium-134	U	-0.00172	+/- 0.0189	0.0120	0.0299	pCi/g	1.0					
Cesium-137		0.119	+/- 0.0659	0.0103	0.0383	pCi/g	1.0					
Chromium-51	U	0.0630	+/- 0.185	0.0987	0.329	pCi/g	1.0					
Cobalt-60	U	-0.0108	+/- 0.0217	0.0119	0.0377	pCi/g	1.0					
Iron-59	U	-0.0171	+/- 0.051	0.0259	0.0859	pCi/g	1.0					
Lead-212		1.09	+/- 0.144	0.0201	0.0497	pCi/g	1.0					
Lead-214		0.970	+/- 0.145	0.0244	0.0613	pCi/g	1.0					
Potassium-40		20.1	+/- 2.11	0.139	0.341	pCi/g	1.0					
Radium-226		0.890	+/- 0.157	0.0266	0.0634	pCi/g	1.0					
Radium-228		1.03	+/- 0.236	0.0460	0.126	pCi/g	1.0					
Ruthenium-103	U	-0.00441	+/- 0.0189	0.0124	0.0342	pCi/g	1.0					
Ruthenium-106	U	0.0827	+/- 0.167	0.0930	0.312	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.169	0.0475	0.193	pCi/g	1.0					
Thorium-232		1.08	+/- 0.142	0.0199	0.0490	pCi/g	1.0					
Thorium-234		1.45	+/- 0.658	0.213	0.475	pCi/g	1.0					
Uranium-235		0.147	+/- 0.16	0.0607	0.181	pCi/g	1.0					
Uranium-238		1.45	+/- 0.658	0.213	0.475	pCi/g	1.0					

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043949-001 TJAOU-228A-GR-211-S
Lab ID	: 9812310-22
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.137				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0358				pCi/g						
Accuracy, Uranium-238		0.137				pCi/g						
Uranium-233/234		0.677	+/- 0.137	0.0232	0.0543	pCi/g	1.0					
Uranium-235		0.0366	+/- 0.0358	0.0150	0.0582	pCi/g	1.0					
Uranium-238		0.680	+/- 0.137	0.0184	0.0401	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.871	+/- 0.208	0.0511	0.125	pCi/g	1.0	EJB	12/17/98	0114	137662	2
Americium-241	U	-0.00805	+/- 0.157	0.0446	0.245	pCi/g	1.0					
Cerium-144	U	-0.0134	+/- 0.108	0.0639	0.194	pCi/g	1.0					
Cesium-134		0.0136	+/- 0.0201	0.0132	0.0336	pCi/g	1.0					
Cesium-137		0.0517	+/- 0.0318	0.0114	0.0368	pCi/g	1.0					
Chromium-51	U	-0.127	+/- 0.199	0.114	0.330	pCi/g	1.0					
Cobalt-60	U	-0.00840	+/- 0.0243	0.0135	0.0427	pCi/g	1.0					
Iron-59	U	-0.0400	+/- 0.0532	0.0291	0.0906	pCi/g	1.0					
Lead-212		0.882	+/- 0.119	0.0236	0.0626	pCi/g	1.0					
Lead-214		0.849	+/- 0.136	0.0280	0.0660	pCi/g	1.0					
Potassium-40		19.9	+/- 2.68	0.158	0.427	pCi/g	1.0					
Radium-226		0.752	+/- 0.126	0.0293	0.0636	pCi/g	1.0					
Radium-228		0.871	+/- 0.208	0.0511	0.125	pCi/g	1.0					
Ruthenium-103		0.0170	+/- 0.0215	0.0138	0.0406	pCi/g	1.0					
Ruthenium-106	U	0.0151	+/- 0.182	0.103	0.327	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.169	0.0553	0.204	pCi/g	1.0					
Thorium-232		0.870	+/- 0.117	0.0233	0.0618	pCi/g	1.0					
Thorium-234		0.635	+/- 1.52	0.512	1.88	pCi/g	1.0					
Uranium-235	U	0.0605	+/- 0.113	0.0715	0.207	pCi/g	1.0					
Uranium-238		0.635	+/- 1.52	0.512	1.88	pCi/g	1.0					

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043950-001 TJAOU-228A-GR-211-D
Lab ID	: 9812310-25
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.159				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0309				pCi/g						
Accuracy, Uranium-238		0.148				pCi/g						
Uranium-233/234		0.842	+/- 0.159	0.0232	0.0519	pCi/g	1.0					
Uranium-235		0.0433	+/- 0.0309	0.00	0.0162	pCi/g	1.0					
Uranium-238		0.758	+/- 0.148	0.0180	0.0340	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.873	+/- 0.207	0.0533	0.156	pCi/g	1.0	EJB	12/17/98	0116	137662	2
Americium-241	U	-0.0105	+/- 0.0947	0.0340	0.156	pCi/g	1.0					
Cerium-144		0.138	+/- 0.127	0.0652	0.205	pCi/g	1.0					
Cesium-134	U	0.00573	+/- 0.0225	0.0139	0.0361	pCi/g	1.0					
Cesium-137		0.0819	+/- 0.0489	0.0120	0.0400	pCi/g	1.0					
Chromium-51		0.145	+/- 0.232	0.119	0.410	pCi/g	1.0					
Cobalt-60	U	0.00606	+/- 0.0266	0.0139	0.0496	pCi/g	1.0					
Iron-59	U	-0.00106	+/- 0.0673	0.0302	0.115	pCi/g	1.0					
Lead-212		0.895	+/- 0.12	0.0246	0.0594	pCi/g	1.0					
Lead-214		0.909	+/- 0.15	0.0293	0.0756	pCi/g	1.0					
Potassium-40		29.4	+/- 3.26	0.164	0.429	pCi/g	1.0					
Radium-226		0.690	+/- 0.127	0.0309	0.0799	pCi/g	1.0					
Radium-228		0.873	+/- 0.207	0.0533	0.156	pCi/g	1.0					
Ruthenium-103		0.0192	+/- 0.0231	0.0145	0.0437	pCi/g	1.0					
Ruthenium-106	U	-0.106	+/- 0.191	0.108	0.327	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.227	0.0578	0.227	pCi/g	1.0					
Thorium-232		0.882	+/- 0.119	0.0243	0.0586	pCi/g	1.0					
Thorium-234		1.17	+/- 1.26	0.408	1.31	pCi/g	1.0					
Uranium-235	U	0.0685	+/- 0.121	0.0735	0.218	pCi/g	1.0					
Uranium-238		1.17	+/- 1.26	0.408	1.31	pCi/g	1.0					

9812310-25

GR-201 thru GR-211

SF 2001-COC (10-97)

Supersedes (3-97) issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- 601192

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland / Lori Ank
Project Name: Site 228A VCM
Record Center Code: ER/135/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO890

Date Samples Shipped: 12-7-98 SMO USE
Carrier/Waybill No.: 715750
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi / 844-3110
Send Report to SMO: Suzi Jensen

Contract No.: AD-2480A
Case No.: 7225.2203
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area: NA — Building: NA — Room: NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Samp. #
043765 - 001	TJAOU-228A-GR-201-S	0	228A	120398/1000	S	AG	500 ml	4 C	G	GA	Gamma Spec, Iso U	
043765 – 002	TJAOU-228A-GR-201-S			120398/1000			500 ml				RCRA Metals, HE, SVOCs	
043765 - 003	TJAOU-228A-GR-201-S			120398/1000			4 oz				VOC	
043766 – 001	TJAOU-228A-GR-201-DU			120398/1000			500 ml				Gamma Spec, Iso U	
043766 – 002	TJAOU-228A-GR-201-DU			120398/1000			500 ml				RCRA Metals, HE, SVOCs	
043766 - 003	TJAOU-228A-GR-201-DU			120398/1000			4 oz				VOC	
043767 - 001	TJAOU-228A-GR-202-S			120398/1010			500 ml				Gamma Spec	
043768 – 001	TJAOU-228A-GR-203-S			120398/1020			500 ml				Gamma Spec	
043768 - 002	TJAOU-228A-GR-203-S			120398/1020			500 ml				RCRA Metals	
043769 - 001	TJAOU-228A-GR-204-S			120398/1025			500 ml				Gamma Spec	

LAB USE

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking — SMO USE
Date Entered (mm/dd/yy): 12/08/98
Entered by: [illegible]

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC 601215 releases this COC

Abnormal Conditions on Receipt — LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC inits. [illegible]

	Name	Signature	Init	Company/Organization/Phone
Sample Team Members	Chris Catechis	[signature]	CC	MDM/6131/881-3196

Please list as separate report

1. Relinquished by	[signature]	Org. 6131	Date 12/04/98	Time 1500	4. Relinquished by	Org	Date
1. Received by	[signature] (SMO)	Org. 7578	Date 12/4/98	Time 1500	4. Received by	Org	Date
2. Relinquished by	[signature]	Org. SMO 7577	Date 12/7/98	Time 1200	5. Relinquished by	Org	Date
2. Received by		Org.	Date	Time	5. Received by	Org	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org	Date
3. Received by		Org.	Date	Time	6. Received by	Org	Date

Original — To Accompany Samples, Laboratory Copy (White)
1st Copy — To Accompany Samples, Return to SMO (Blue)
2nd Copy — SMO Suspense Copy (Yellow)
3rd Copy — Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601192

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Sample No - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB U: Lab Samp
043770 - 001	TJAOU-228A-GR-205-S	0	228A	120398/ 1030	S	AG	500ml	4 C	G	SA	Gamma Spec	
043770 - 002	TJAOU-228A-GR-205-S			120398/ 1030							RCRA Metals	
043944 – 001	TJAOU-228A-GR-206-S			120398/ 1035							Gamma Spec, Iso U	
043944 - 002	TJAOU-228A-GR-206-S			120398/ 1035							HE, SVOCs	
043944 - 003	TJAOU-228A-GR-206-S			120398/ 1035			402				VOC	
043945 – 001	TJAOU-228A-GR-207-S			120398/ 1040			500ml				Gamma Spec	
043945 – 002	TJAOU-228A-GR-207-S			120398/ 1040							RCRA Metals	
043946 - 001	TJAOU-228A-GR-208-S			120398/ 1045							Gamma Spec	
043947 – 001	TJAOU-228A-GR-209-S			120398/ 1050							Gamma Spec	
043947 - 002	TJAOU-228A-GR-209-S			120398/ 1050							RCRA Metals	
043948 - 001	TJAOU-228A-GR-210-S			120398/ 1055							Gamma Spec	
043949 – 001	TJAOU-228A-GR-211-S			120398/ 1130							Gamma Spec, Iso U	
043949 – 002	TJAOU-228A-GR-211-S			120398/ 1130							RCRA Metals, HE, SVOCs	
043949 - 003	TJAOU-228A-GR-211-S			120398/ 1130			402				VOC	
043950 – 001	TJAOU-228A-GR-211-DU			120398/ 1130			500ml				Gamma Spec, Iso U	
043950 – 002	TJAOU-228A-GR-211-DU			120398/ 1130			500ml				RCRA Metals, HE, SVOCs	
043950 - 003	TJAOU-228A-GR-211-DU			120398/ 1130			402				VOC	
-												
-												
-												
-												
-												
-												
-												
-												

Abnormal Conditions on Receipt **LAB USE**

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) **1st Copy** To Accompany Samples, Return to SMO (Blue) **2nd Copy** SMO Suspense Copy (Yellow) **3rd Copy** Field Conv (Pink)

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043765-001 TJAOU-228A-GR-201-S
Lab ID	: 9812310-01
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.168				pCi/g		JEW	12/28/98	1515	138477	1
Accuracy, Uranium-235		0.0361				pCi/g						
Accuracy, Uranium-238		0.226				pCi/g						
Uranium-233/234		0.702	+/- 0.168	0.0308	0.0801	pCi/g	1.0					
Uranium-235		0.0371	+/- 0.0361	0.00755	0.0452	pCi/g	1.0					
Uranium-238		1.16	+/- 0.226	0.0204	0.0238	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.890	+/- 0.216	0.0515	0.135	pCi/g	1.0	EJB	12/16/98	1857	137661	2
Americium-241	U	0.00407	+/- 0.0903	0.0326	0.139	pCi/g	1.0					
Cerium-144	U	-0.00921	+/- 0.109	0.0580	0.192	pCi/g	1.0					
Cesium-134	U	-0.00229	+/- 0.0203	0.0134	0.0312	pCi/g	1.0					
Cesium-137		0.215	+/- 0.0504	0.0129	0.0384	pCi/g	1.0					
Chromium-51		0.135	+/- 0.212	0.126	0.373	pCi/g	1.0					
Cobalt-60	U	-0.000601	+/- 0.0231	0.0129	0.0415	pCi/g	1.0					
Iron-59	U	-0.0575	+/- 0.0543	0.0282	0.0880	pCi/g	1.0					
Lead-212		0.874	+/- 0.112	0.0226	0.0519	pCi/g	1.0					
Lead-214		0.900	+/- 0.146	0.0258	0.0674	pCi/g	1.0					
Potassium-40		19.0	+/- 2.31	0.179	0.371	pCi/g	1.0					
Radium-226		0.803	+/- 0.134	0.0306	0.0622	pCi/g	1.0					
Radium-228		0.890	+/- 0.216	0.0515	0.135	pCi/g	1.0					
Ruthenium-103	U	0.00328	+/- 0.0237	0.0131	0.0379	pCi/g	1.0					
Ruthenium-106	U	-0.0549	+/- 0.178	0.110	0.306	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.187	0.0564	0.212	pCi/g	1.0					
Thorium-232		0.862	+/- 0.111	0.0223	0.0512	pCi/g	1.0					
Thorium-234		1.03	+/- 1.2	0.335	1.17	pCi/g	1.0					
Uranium-235		0.198	+/- 0.123	0.0734	0.220	pCi/g	1.0					
Uranium-238		1.03	+/- 1.2	0.335	1.17	pCi/g	1.0					

9812310-01

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043765-001 TJAOU-228A-GR-201-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88		0.0132	+/- 0.0197	0.0106	0.0416	pCi/g	1.0					
Zirconium-95	U	0.0204	+/- 0.0424	0.0240	0.0765	pCi/g	1.0	EJB	12/16/98	1857	137661	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812310-01

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043766-001 TJAOU-228A-GR-201-D
Lab ID	: 9812310-04
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.149				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0441				pCi/g						
Accuracy, Uranium-238		0.215				pCi/g						
Uranium-233/234		0.694	+/- 0.149	0.0320	0.0874	pCi/g	1.0					
Uranium-235		0.0675	+/- 0.0441	0.0119	0.0513	pCi/g	1.0					
Uranium-238		1.28	+/- 0.215	0.0234	0.0609	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.869	+/- 0.201	0.0494	0.134	pCi/g	1.0	EJB	12/16/98	1858	137661	2
Americium-241	U	-0.00405	+/- 0.112	0.0347	0.175	pCi/g	1.0					
Cerium-144	U	0.00349	+/- 0.106	0.0557	0.193	pCi/g	1.0					
Cesium-134	U	0.000695	+/- 0.0197	0.0129	0.0315	pCi/g	1.0					
Cesium-137		0.285	+/- 0.0524	0.0124	0.0381	pCi/g	1.0					
Chromium-51	U	0.0533	+/- 0.2	0.121	0.353	pCi/g	1.0					
Cobalt-60	U	0.00154	+/- 0.0261	0.0124	0.0477	pCi/g	1.0					
Iron-59	U	-0.0235	+/- 0.056	0.0271	0.0932	pCi/g	1.0					
Lead-212		0.928	+/- 0.119	0.0216	0.0523	pCi/g	1.0					
Lead-214		0.826	+/- 0.148	0.0248	0.0685	pCi/g	1.0					
Potassium-40		20.4	+/- 2.49	0.172	0.368	pCi/g	1.0					
Radium-226		0.728	+/- 0.119	0.0294	0.0639	pCi/g	1.0					
Radium-228		0.869	+/- 0.201	0.0494	0.134	pCi/g	1.0					
Ruthenium-103	U	0.00266	+/- 0.0205	0.0125	0.0378	pCi/g	1.0					
Ruthenium-106	U	-0.0532	+/- 0.173	0.106	0.305	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.2	0.0540	0.212	pCi/g	1.0					
Thorium-232		0.916	+/- 0.117	0.0213	0.0516	pCi/g	1.0					
Thorium-234		1.32	+/- 1.38	0.352	1.33	pCi/g	1.0					
Uranium-235		0.0852	+/- 0.172	0.0655	0.184	pCi/g	1.0					
Uranium-238		1.32	+/- 1.38	0.352	1.33	pCi/g	1.0					

9812310-04

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043766-001 TJAOU-228A-GR-201-D

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.00741	+/- 0.0207	0.0101	0.0409	pCi/g	1.0					
Zirconium-95	U	0.0105	+/- 0.0405	0.0230	0.0735	pCi/g	1.0	EJB	12/16/98	1858	137661	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - 1-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812310.04

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043767-001 TJAOU-228A-GR-202-S
Lab ID	: 9812310-07
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.894	+/- 0.222	0.0486	0.119	pCi/g	1.0	EJB	12/16/98	1859	137661	1
Americium-241	U	0.0125	+/- 0.133	0.0378	0.185	pCi/g	1.0					
Cerium-144	U	0.0399	+/- 0.105	0.0558	0.191	pCi/g	1.0					
Cesium-134	U	-0.0286	+/- 0.0186	0.0126	0.0300	pCi/g	1.0					
Cesium-137		0.250	+/- 0.0551	0.0121	0.0341	pCi/g	1.0					
Chromium-51	U	0.106	+/- 0.186	0.119	0.332	pCi/g	1.0					
Cobalt-60	U	0.000126	+/- 0.0251	0.0123	0.0402	pCi/g	1.0					
Iron-59	U	0.00503	+/- 0.0504	0.0268	0.0884	pCi/g	1.0					
Lead-212		1.01	+/- 0.124	0.0214	0.0492	pCi/g	1.0					
Lead-214		0.984	+/- 0.149	0.0243	0.0633	pCi/g	1.0					
Potassium-40		19.3	+/- 2.24	0.171	0.341	pCi/g	1.0					
Radium-226		0.705	+/- 0.123	0.0287	0.0630	pCi/g	1.0					
Radium-228		0.894	+/- 0.222	0.0486	0.119	pCi/g	1.0					
Ruthenium-103	U	0.00651	+/- 0.022	0.0122	0.0379	pCi/g	1.0					
Ruthenium-106	U	-0.0785	+/- 0.166	0.103	0.290	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.147	0.0532	0.166	pCi/g	1.0					
Thorium-232		0.999	+/- 0.122	0.0210	0.0485	pCi/g	1.0					
Thorium-234		2.64	+/- 1.22	0.375	1.38	pCi/g	1.0					
Uranium-235		0.220	+/- 0.214	0.0655	0.186	pCi/g	1.0					
Uranium-238		2.64	+/- 1.22	0.375	1.38	pCi/g	1.0					
Yttrium-88	U	0.000681	+/- 0.0191	0.0100	0.0359	pCi/g	1.0					
Zirconium-95	U	0.0122	+/- 0.037	0.0225	0.0673	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812310-07

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043768-001 TJAOU-228A-GR-203-S
Lab ID	: 9812310-08
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.12	+/- 0.223	0.0429	0.129	pCi/g	1.0	EJB	12/16/98	1859	137661	1
Americium-241		0.0160	+/- 0.0262	0.0151	0.0468	pCi/g	1.0					
Cerium-144		0.101	+/- 0.13	0.0452	0.161	pCi/g	1.0					
Cesium-134	U	0.00713	+/- 0.0185	0.0112	0.0306	pCi/g	1.0					
Cesium-137		0.0919	+/- 0.0407	0.0108	0.0359	pCi/g	1.0					
Chromium-51	U	0.00	+/- 0.364	0.101	0.283	pCi/g	1.0					
Cobalt-60	U	0.000970	+/- 0.0212	0.0106	0.0390	pCi/g	1.0					
Iron-59	U	-0.0474	+/- 0.0516	0.0234	0.0820	pCi/g	1.0					
Lead-212		0.992	+/- 0.132	0.0179	0.0450	pCi/g	1.0					
Lead-214		0.870	+/- 0.136	0.0209	0.0581	pCi/g	1.0					
Potassium-40		22.0	+/- 2.27	0.147	0.332	pCi/g	1.0					
Radium-226		0.847	+/- 0.152	0.0255	0.0615	pCi/g	1.0					
Radium-228		1.12	+/- 0.223	0.0429	0.129	pCi/g	1.0					
Ruthenium-103		0.0200	+/- 0.0188	0.0108	0.0363	pCi/g	1.0					
Ruthenium-106	U	-0.0544	+/- 0.158	0.0918	0.281	pCi/g	1.0					
Thorium-231		0.0792	+/- 0.137	0.0449	0.179	pCi/g	1.0					
Thorium-232		0.979	+/- 0.13	0.0177	0.0444	pCi/g	1.0					
Thorium-234		1.28	+/- 0.584	0.170	0.448	pCi/g	1.0					
Uranium-235	U	0.0248	+/- 0.0899	0.0574	0.167	pCi/g	1.0					
Uranium-238		1.28	+/- 0.584	0.170	0.448	pCi/g	1.0					
Yttrium-88	U	-0.00456	+/- 0.019	0.00884	0.0340	pCi/g	1.0					
Zirconium-95	U	0.00434	+/- 0.0425	0.0200	0.0675	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812310-08

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043769-001 TJAOU-228A-GR-204-S
Lab ID	: 9812310-10
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.673	+/- 0.164	0.0320	0.0942	pCi/g	1.0	EJB	12/16/98	1900	137661	1
Americium-241	U	0.00575	+/- 0.0473	0.0192	0.0800	pCi/g	1.0					
Cerium-144	U	-0.0627	+/- 0.0873	0.0406	0.150	pCi/g	1.0					
Cesium-134	U	0.00677	+/- 0.0147	0.00846	0.0233	pCi/g	1.0					
Cesium-137		0.119	+/- 0.0391	0.00813	0.0266	pCi/g	1.0					
Chromium-51	U	-0.191	+/- 0.141	0.0827	0.233	pCi/g	1.0					
Cobalt-60		0.00925	+/- 0.018	0.00791	0.0321	pCi/g	1.0					
Iron-59	U	-0.0206	+/- 0.04	0.0174	0.0677	pCi/g	1.0					
Lead-212		0.830	+/- 0.1	0.0152	0.0394	pCi/g	1.0					
Lead-214		0.815	+/- 0.118	0.0169	0.0476	pCi/g	1.0					
Potassium-40		25.0	+/- 2.59	0.109	0.232	pCi/g	1.0					
Radium-226		0.669	+/- 0.11	0.0193	0.0483	pCi/g	1.0					
Radium-228		0.673	+/- 0.164	0.0320	0.0942	pCi/g	1.0					
Ruthenium-103		0.0107	+/- 0.0144	0.00832	0.0267	pCi/g	1.0					
Ruthenium-106	U	0.00374	+/- 0.124	0.0695	0.219	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.128	0.0376	0.152	pCi/g	1.0					
Thorium-232		0.819	+/- 0.099	0.0150	0.0389	pCi/g	1.0					
Thorium-234		1.48	+/- 0.945	0.203	0.700	pCi/g	1.0					
Uranium-235		0.0869	+/- 0.151	0.0478	0.163	pCi/g	1.0					
Uranium-238		1.48	+/- 0.945	0.203	0.700	pCi/g	1.0					
Yttrium-88	U	0.00132	+/- 0.015	0.00633	0.0234	pCi/g	1.0					
Zirconium-95		0.0281	+/- 0.0284	0.0150	0.0515	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812310-10

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043770-001 TJAOU-228A-GR-205-S
Lab ID : 9812310-11
Matrix : SOIL
Date Collected : 12/03/98
Date Received : 12/08/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.837	+/- 0.272	0.0598	0.227	pCi/g	1.0	EJB	12/16/98	1901	137661	1
Americium-241		0.123	+/- 0.183	0.0319	0.227	pCi/g	1.0					
Cerium-144		0.107	+/- 0.194	0.0638	0.354	pCi/g	1.0					
Cesium-134	U	-0.00394	+/- 0.0395	0.0156	0.0605	pCi/g	1.0					
Cesium-137		0.139	+/- 0.056	0.0151	0.0671	pCi/g	1.0					
Chromium-51	U	-0.00403	+/- 0.329	0.140	0.573	pCi/g	1.0					
Cobalt-60	U	0.00895	+/- 0.0381	0.0148	0.0710	pCi/g	1.0					
Iron-59	U	-0.0415	+/- 0.0885	0.0325	0.154	pCi/g	1.0					
Lead-212		0.778	+/- 0.128	0.0246	0.0886	pCi/g	1.0					
Lead-214		0.872	+/- 0.178	0.0290	0.120	pCi/g	1.0					
Potassium-40		18.6	+/- 2.33	0.204	0.653	pCi/g	1.0					
Radium-226		0.728	+/- 0.191	0.0358	0.127	pCi/g	1.0					
Radium-228		0.837	+/- 0.272	0.0598	0.227	pCi/g	1.0					
Ruthenium-103	U	0.00376	+/- 0.0404	0.0151	0.0732	pCi/g	1.0					
Ruthenium-106	U	0.0931	+/- 0.307	0.129	0.562	pCi/g	1.0					
Thorium-231		0.236	+/- 0.175	0.0617	0.321	pCi/g	1.0					
Thorium-232		0.768	+/- 0.126	0.0242	0.0874	pCi/g	1.0					
Thorium-234		2.08	+/- 2.04	0.338	1.95	pCi/g	1.0					
Uranium-235	U	0.0644	+/- 0.223	0.0749	0.350	pCi/g	1.0					
Uranium-238		2.08	+/- 2.04	0.338	1.95	pCi/g	1.0					
Yttrium-88		0.0210	+/- 0.0359	0.0124	0.0667	pCi/g	1.0					
Zirconium-95	U	0.0259	+/- 0.076	0.0281	0.137	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812310-11

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043944-001 TJAOU-228A-GR-206-S
Lab ID	: 9812310-13
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.165				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0324				pCi/g						
Accuracy, Uranium-238		0.165				pCi/g						
Uranium-233/234		0.863	+/- 0.165	0.0213	0.0364	pCi/g	1.0					
Uranium-235		0.0318	+/- 0.0324	0.0117	0.0505	pCi/g	1.0					
Uranium-238		0.869	+/- 0.165	0.0188	0.0364	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		1.03	+/- 0.236	0.0460	0.126	pCi/g	1.0	EJB	12/17/98	0052	137662	2
Americium-241		0.0290	+/- 0.0296	0.0160	0.0489	pCi/g	1.0					
Cerium-144	U	0.0242	+/- 0.0898	0.0526	0.166	pCi/g	1.0					
Cesium-134	U	-0.00172	+/- 0.0189	0.0120	0.0299	pCi/g	1.0					
Cesium-137		0.119	+/- 0.0659	0.0103	0.0383	pCi/g	1.0					
Chromium-51	U	0.0630	+/- 0.185	0.0987	0.329	pCi/g	1.0					
Cobalt-60	U	-0.0108	+/- 0.0217	0.0119	0.0377	pCi/g	1.0					
Iron-59	U	-0.0171	+/- 0.051	0.0259	0.0859	pCi/g	1.0					
Lead-212		1.09	+/- 0.144	0.0201	0.0497	pCi/g	1.0					
Lead-214		0.970	+/- 0.145	0.0244	0.0613	pCi/g	1.0					
Potassium-40		20.1	+/- 2.11	0.139	0.341	pCi/g	1.0					
Radium-226		0.890	+/- 0.157	0.0266	0.0634	pCi/g	1.0					
Radium-228		1.03	+/- 0.236	0.0460	0.126	pCi/g	1.0					
Ruthenium-103	U	-0.00441	+/- 0.0189	0.0124	0.0342	pCi/g	1.0					
Ruthenium-106	U	0.0827	+/- 0.167	0.0930	0.312	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.169	0.0475	0.193	pCi/g	1.0					
Thorium-232		1.08	+/- 0.142	0.0199	0.0490	pCi/g	1.0					
Thorium-234		1.45	+/- 0.658	0.213	0.475	pCi/g	1.0					
Uranium-235		0.147	+/- 0.16	0.0607	0.181	pCi/g	1.0					
Uranium-238		1.45	+/- 0.658	0.213	0.475	pCi/g	1.0					

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043944-001 TJAOU-228A-GR-206-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88		0.0152	+/- 0.0166	0.0130	0.0363	pCi/g	1.0					
Zirconium-95	U	-0.0116	+/- 0.0378	0.0204	0.0660	pCi/g	1.0	EJB	12/17/98	0052	137662	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043945-001 TJAOU-228A-GR-207-S
Lab ID	: 9812310-16
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.04	+/- 0.235	0.0477	0.128	pCi/g	1.0	EJB	12/17/98	0111	137662	1
Americium-241	U	-0.00469	+/- 0.0773	0.0300	0.145	pCi/g	1.0					
Cerium-144	U	0.00531	+/- 0.106	0.0573	0.193	pCi/g	1.0					
Cesium-134	U	0.0000237	+/- 0.02	0.0124	0.0318	pCi/g	1.0					
Cesium-137		0.0955	+/- 0.0496	0.0107	0.0363	pCi/g	1.0					
Chromium-51	U	-0.000479	+/- 0.188	0.105	0.327	pCi/g	1.0					
Cobalt-60	U	0.00999	+/- 0.0217	0.0124	0.0419	pCi/g	1.0					
Iron-59		0.0472	+/- 0.0561	0.0270	0.104	pCi/g	1.0					
Lead-212		0.962	+/- 0.12	0.0215	0.0541	pCi/g	1.0					
Lead-214		0.850	+/- 0.135	0.0259	0.0718	pCi/g	1.0					
Potassium-40		19.9	+/- 2.23	0.146	0.331	pCi/g	1.0					
Radium-226		0.888	+/- 0.147	0.0276	0.0587	pCi/g	1.0					
Radium-228		1.04	+/- 0.235	0.0477	0.128	pCi/g	1.0					
Ruthenium-103	U	-0.00875	+/- 0.0204	0.0129	0.0363	pCi/g	1.0					
Ruthenium-106		0.136	+/- 0.163	0.0964	0.312	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.184	0.0506	0.209	pCi/g	1.0					
Thorium-232		0.949	+/- 0.118	0.0212	0.0534	pCi/g	1.0					
Thorium-234		0.866	+/- 1.21	0.368	1.19	pCi/g	1.0					
Uranium-235	U	0.0457	+/- 0.113	0.0644	0.205	pCi/g	1.0					
Uranium-238		0.866	+/- 1.21	0.368	1.19	pCi/g	1.0					
Yttrium-88	U	0.0128	+/- 0.0192	0.0135	0.0401	pCi/g	1.0					
Zirconium-95		0.0571	+/- 0.0667	0.0210	0.0716	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043946-001 TJAOU-228A-GR-208-S
Lab ID	: 9812310-18
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.911	+/- 0.293	0.0700	0.180	pCi/g	1.0	EJB	12/17/98	0124	137662	1
Americium-241	U	-0.0390	+/- 0.132	0.0427	0.168	pCi/g	1.0					
Cerium-144	U	0.0228	+/- 0.135	0.0836	0.233	pCi/g	1.0					
Cesium-134		0.0185	+/- 0.0264	0.0181	0.0428	pCi/g	1.0					
Cesium-137		0.252	+/- 0.0641	0.0156	0.0525	pCi/g	1.0					
Chromium-51	U	0.0300	+/- 0.268	0.153	0.446	pCi/g	1.0					
Cobalt-60	U	-0.00588	+/- 0.0352	0.0183	0.0525	pCi/g	1.0					
Iron-59	U	-0.0342	+/- 0.0808	0.0397	0.117	pCi/g	1.0					
Lead-212		0.999	+/- 0.132	0.0313	0.0647	pCi/g	1.0					
Lead-214		0.975	+/- 0.169	0.0376	0.0802	pCi/g	1.0					
Potassium-40		19.2	+/- 2.37	0.215	0.566	pCi/g	1.0					
Radium-226		0.873	+/- 0.162	0.0403	0.0883	pCi/g	1.0					
Radium-228		0.911	+/- 0.293	0.0700	0.180	pCi/g	1.0					
Ruthenium-103		0.0386	+/- 0.0535	0.0188	0.0484	pCi/g	1.0					
Ruthenium-106	U	-0.0818	+/- 0.24	0.141	0.402	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.209	0.0737	0.266	pCi/g	1.0					
Thorium-232		0.986	+/- 0.131	0.0309	0.0638	pCi/g	1.0					
Thorium-234		3.28	+/- 1.77	0.521	1.36	pCi/g	1.0					
Uranium-235		0.139	+/- 0.215	0.0958	0.260	pCi/g	1.0					
Uranium-238		3.28	+/- 1.77	0.521	1.36	pCi/g	1.0					
Yttrium-88	U	-0.0130	+/- 0.0275	0.0198	0.0480	pCi/g	1.0					
Zirconium-95	U	0.0280	+/- 0.053	0.0308	0.0945	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043947-001 TJAOU-228A-GR-209-S
Lab ID	: 9812310-19
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.22	+/- 0.32	0.0676	0.167	pCi/g	1.0	EJB	12/17/98	0113	137662	1
Americium-241	U	0.0391	+/- 0.157	0.0422	0.191	pCi/g	1.0					
Cerium-144	U	-0.139	+/- 0.174	0.0832	0.242	pCi/g	1.0					
Cesium-134	U	0.00885	+/- 0.0301	0.0176	0.0454	pCi/g	1.0					
Cesium-137		0.286	+/- 0.0583	0.0151	0.0519	pCi/g	1.0					
Chromium-51	U	0.128	+/- 0.278	0.151	0.487	pCi/g	1.0					
Cobalt-60	U	0.000140	+/- 0.0288	0.0176	0.0508	pCi/g	1.0					
Iron-59	U	-0.0292	+/- 0.0823	0.0383	0.118	pCi/g	1.0					
Lead-212		0.986	+/- 0.137	0.0312	0.0700	pCi/g	1.0					
Lead-214		0.861	+/- 0.158	0.0371	0.0900	pCi/g	1.0					
Potassium-40		21.0	+/- 2.71	0.207	0.446	pCi/g	1.0					
Radium-226		0.837	+/- 0.152	0.0391	0.0879	pCi/g	1.0					
Radium-228		1.22	+/- 0.32	0.0676	0.167	pCi/g	1.0					
Ruthenium-103	U	0.0112	+/- 0.0303	0.0183	0.0527	pCi/g	1.0					
Ruthenium-106	U	0.116	+/- 0.245	0.137	0.427	pCi/g	1.0					
Thorium-231		0.249	+/- 0.226	0.0732	0.264	pCi/g	1.0					
Thorium-232		0.973	+/- 0.135	0.0308	0.0690	pCi/g	1.0					
Thorium-234		2.15	+/- 1.87	0.511	1.55	pCi/g	1.0					
Uranium-235		0.234	+/- 0.239	0.0955	0.271	pCi/g	1.0					
Uranium-238		2.15	+/- 1.87	0.511	1.55	pCi/g	1.0					
Yttrium-88	U	-0.00264	+/- 0.024	0.0189	0.0448	pCi/g	1.0					
Zirconium-95	U	-0.00733	+/- 0.0482	0.0298	0.0847	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812310-19

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043948-001 TJAOU-228A-GR-210-S
Lab ID	: 9812310-21
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.662	+/- 0.218	0.0505	0.133	pCi/g	1.0	EJB	12/17/98	0114	137662	1
Americium-241	U	-0.00164	+/- 0.0863	0.0310	0.145	pCi/g	1.0					
Cerium-144	U	0.0227	+/- 0.114	0.0615	0.205	pCi/g	1.0					
Cesium-134	U	-0.00852	+/- 0.0211	0.0130	0.0316	pCi/g	1.0					
Cesium-137		0.341	+/- 0.0599	0.0112	0.0396	pCi/g	1.0					
Chromium-51	U	0.0968	+/- 0.243	0.112	0.380	pCi/g	1.0					
Cobalt-60	U	0.00223	+/- 0.0247	0.0133	0.0451	pCi/g	1.0					
Iron-59	U	-0.0270	+/- 0.0567	0.0287	0.0984	pCi/g	1.0					
Lead-212		0.830	+/- 0.114	0.0231	0.0546	pCi/g	1.0					
Lead-214		0.907	+/- 0.149	0.0274	0.0675	pCi/g	1.0					
Potassium-40		21.1	+/- 2.63	0.156	0.383	pCi/g	1.0					
Radium-226		0.762	+/- 0.125	0.0289	0.0605	pCi/g	1.0					
Radium-228		0.662	+/- 0.218	0.0505	0.133	pCi/g	1.0					
Ruthenium-103	U	0.0000217	+/- 0.0211	0.0136	0.0380	pCi/g	1.0					
Ruthenium-106	U	-0.0160	+/- 0.177	0.101	0.313	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.281	0.0543	0.210	pCi/g	1.0					
Thorium-232		0.819	+/- 0.112	0.0228	0.0539	pCi/g	1.0					
Thorium-234		1.29	+/- 1.25	0.375	1.14	pCi/g	1.0					
Uranium-235		0.169	+/- 0.118	0.0693	0.213	pCi/g	1.0					
Uranium-238		1.29	+/- 1.25	0.375	1.14	pCi/g	1.0					
Yttrium-88	U	-0.0125	+/- 0.0209	0.0143	0.0344	pCi/g	1.0					
Zirconium-95	U	0.00247	+/- 0.0425	0.0222	0.0748	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043949-001 TJAOU-22&A-GR-211-S
Lab ID	: 9812310-22
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.137				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0358				pCi/g						
Accuracy, Uranium-238		0.137				pCi/g						
Uranium-233/234		0.677	+/- 0.137	0.0232	0.0543	pCi/g	1.0					
Uranium-235		0.0366	+/- 0.0358	0.0150	0.0582	pCi/g	1.0					
Uranium-238		0.680	+/- 0.137	0.0184	0.0401	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.871	+/- 0.208	0.0511	0.125	pCi/g	1.0	EJB	12/17/98	0114	137662	2
Americium-241	U	-0.00805	+/- 0.157	0.0446	0.245	pCi/g	1.0					
Cerium-144	U	-0.0134	+/- 0.108	0.0639	0.194	pCi/g	1.0					
Cesium-134		0.0136	+/- 0.0201	0.0132	0.0336	pCi/g	1.0					
Cesium-137		0.0517	+/- 0.0318	0.0114	0.0368	pCi/g	1.0					
Chromium-51	U	-0.127	+/- 0.199	0.114	0.330	pCi/g	1.0					
Cobalt-60	U	-0.00840	+/- 0.0243	0.0135	0.0427	pCi/g	1.0					
Iron-59	U	-0.0400	+/- 0.0532	0.0291	0.0906	pCi/g	1.0					
Lead-212		0.882	+/- 0.119	0.0236	0.0626	pCi/g	1.0					
Lead-214		0.849	+/- 0.136	0.0280	0.0660	pCi/g	1.0					
Potassium-40		19.9	+/- 2.68	0.158	0.427	pCi/g	1.0					
Radium-226		0.752	+/- 0.126	0.0293	0.0636	pCi/g	1.0					
Radium-228		0.871	+/- 0.208	0.0511	0.125	pCi/g	1.0					
Ruthenium-103		0.0170	+/- 0.0215	0.0138	0.0406	pCi/g	1.0					
Ruthenium-106	U	0.0151	+/- 0.182	0.103	0.327	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.169	0.0553	0.204	pCi/g	1.0					
Thorium-232		0.870	+/- 0.117	0.0233	0.0618	pCi/g	1.0					
Thorium-234		0.635	+/- 1.52	0.512	1.88	pCi/g	1.0					
Uranium-235	U	0.0605	+/- 0.113	0.0715	0.207	pCi/g	1.0					
Uranium-238		0.635	+/- 1.52	0.512	1.88	pCi/g	1.0					

9812310-22

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043949-001 TJAOU-228A-GR-211-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.00979	+/- 0.0219	0.0144	0.0433	pCi/g	1.0					
Zirconium-95	U	0.00331	+/- 0.041	0.0224	0.0730	pCi/g	1.0	EJB	12/17/98	0114	137662	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043950-001 T3AOU-228A-GR-211-D
Lab ID	: 9812310-25
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.159				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0309				pCi/g						
Accuracy, Uranium-238		0.148				pCi/g						
Uranium-233/234		0.842	+/- 0.159	0.0232	0.0519	pCi/g	1.0					
Uranium-235		0.0433	+/- 0.0309	0.00	0.0162	pCi/g	1.0					
Uranium-238		0.758	+/- 0.148	0.0180	0.0340	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.873	+/- 0.207	0.0533	0.156	pCi/g	1.0	EJB	12/17/98	0116	137662	2
Americium-241	U	-0.0105	+/- 0.0947	0.0340	0.156	pCi/g	1.0					
Cerium-144		0.138	+/- 0.127	0.0652	0.205	pCi/g	1.0					
Cesium-134	U	0.00573	+/- 0.0225	0.0139	0.0361	pCi/g	1.0					
Cesium-137		0.0819	+/- 0.0489	0.0120	0.0400	pCi/g	1.0					
Chromium-51		0.145	+/- 0.232	0.119	0.410	pCi/g	1.0					
Cobalt-60	U	0.00606	+/- 0.0266	0.0139	0.0496	pCi/g	1.0					
Iron-59	U	-0.00106	+/- 0.0673	0.0302	0.115	pCi/g	1.0					
Lead-212		0.895	+/- 0.12	0.0246	0.0594	pCi/g	1.0					
Lead-214		0.909	+/- 0.15	0.0293	0.0756	pCi/g	1.0					
Potassium-40		29.4	+/- 3.26	0.164	0.429	pCi/g	1.0					
Radium-226		0.690	+/- 0.127	0.0309	0.0799	pCi/g	1.0					
Radium-228		0.873	+/- 0.207	0.0533	0.156	pCi/g	1.0					
Ruthenium-103		0.0192	+/- 0.0231	0.0145	0.0437	pCi/g	1.0					
Ruthenium-106	U	-0.106	+/- 0.191	0.108	0.327	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.227	0.0578	0.227	pCi/g	1.0					
Thorium-232		0.882	+/- 0.119	0.0243	0.0586	pCi/g	1.0					
Thorium-234		1.17	+/- 1.26	0.408	1.31	pCi/g	1.0					
Uranium-235	U	0.0685	+/- 0.121	0.0735	0.218	pCi/g	1.0					
Uranium-238		1.17	+/- 1.26	0.408	1.31	pCi/g	1.0					

9812310-25

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043950-001 TJAOU-228A-GR-211-D

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.0128	+/- 0.0213	0.0150	0.0441	pCi/g	1.0					
Zirconium-95	U	0.00637	+/- 0.0427	0.0235	0.0765	pCi/g	1.0	EJB	12/17/98	0116	137662	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - 1-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812310-25

GR-212 thru GR-228

ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab Batch No

SAR/WR No

Press F1 for instructions for each field

AR/COC- 601212

Mail No/Mail Stop 8133/MS1147
Project/Task Manager: John Copland
Project Name: Site 228A VCM
Cost Center Code: ER/13
Logbook Ref. No.
Service Order No.: CFO890

Date Samples Shipped: 12/7/98 SMO USE
Carrier/Waybill No.: 715750
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi / 844-3110
Send Report to SMO: Suzi Jaeckel

Contract No.: AJ-24EDA
Case No.: 7225.2201
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location: Tech Area NA
Building NA Room NA

228 ok per D.S.

Sample No - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample
043951 - 001	TJAOU-228A-GR-212-S	0	228A	120398/1330	S	AG	500 ml	4 C	G	SA	Gamma Spec	
043952 – 001	TJAOU-228A-GR-213-S	↓	↓	120398/1335	↓	↓	500 ml	↓	↓	↓	Gamma Spec	
043952 - 002	TJAOU-228A-GR-213-S			120398/1335			↓				RCRA Metals	
043953 - 001	TJAOU-228A-GR-214-S	2		120398/1340							Gamma Spec	
043954 – 001	TJAOU-228A-GR-216-S	2		120398/1400							Gamma Spec	
043954 - 002	TJAOU-228A-GR-216-S	2		120398/1400							RCRA Metals	
043955 – 001	TJAOU-228A-GR-216-S	2		120398/1415							Gamma Spec, Iso U	
043955 – 002	TJAOU-228A-GR-216-S	2		120398/1415			↓				HE, SVOCs	
043955 - 003	TJAOU-228A-GR-216-S	2		120398/1415			40z				VOC	
043956 - 001	TJAOU-228A-GR-217-S	0	↓	120398/1430	↓	↓	500 ml	↓	↓	↓	Gamma Spec	

Reference LOV (available at SMO)

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/8/98
Entered by: U

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC GCRIS releases this COC

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits. U

	Name	Signature	Init	Company/Organization/Phone
Sample Team Members	Chris Catechis	C. Catechis	C.L.	MDM/6131/881-3196

Please list as separate report

1. Relinquished by	C. Catechis	Org. 6131	Date 12/4/98	Time 1520	4. Relinquished by	Org	Date
1. Received by	[illegible] (SMO)	Org. 7578	Date 12/4/98	Time 1520	4. Received by	Org	Date
2. Relinquished by	[illegible] (SMO)	Org. 7578	Date 12/7/98	Time 1200	5. Relinquished by	Org	Date
2. Received by		Org	Date	Time	5. Received by	Org	Date
3. Relinquished by		Org	Date	Time	6. Relinquished by	Org	Date
3. Received by		Org	Date	Time	6. Received by	Org	Date

Original: To Accompany Samples, Laboratory Copy (White)
1st Copy: To Accompany Samples, Return to SMO (Blue)
2nd Copy: SMO Suspense Copy (Yellow)
3rd Copy: Field Copy (Pink)

X-200 COC (10-97)

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field

AR/COC- 601212

Project Name: Site 228A VCM | Project/Task Manager: John Copland | Case No.: 7225.2203

Location | Tech Area NA | Building NA | Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Samp #
043956 - 002	TJAOU-228A-GR-217-S	0	228A	120398/1430	S	PB/G	500 ml	4 C	G	SA	RCRA Metals	
043957 - 001	TJAOU-228A-GR-218-S			120398/1440							Gamma Spec	
043958 - 001	TJAOU-228A-GR-219-S			120398/1445							Gamma Spec	
043958 - 002	TJAOU-228A-GR-219-S			120398/1445							RCRA Metals	
043959 - 001	TJAOU-228A-GR-220-S			120398/1447							Gamma Spec	
043960 - 001	TJAOU-228A-GR-221-S			120398/1455							Gamma Spec, Iso U	
043960 - 002	TJAOU-228A-GR-221-S			120398/1455							RCRA Metals, HE, SVOCs	
043960 - 003	TJAOU-228A-GR-221-S			120398/1455			4oz				VOC	
043961 - 001	TJAOU-228A-GR-221-DU			120398/1455			500 ml				Gamma Spec, Iso U	
043961 - 002	TJAOU-228A-GR-221-DU			120398/1455			500 ml				RCRA Metals, HE, SVOCs	
043961 - 003	TJAOU-228A-GR-221-DU			120398/1455			4oz				VOC	
043962 - 001	TJAOU-228A-GR-222-S			120398/1515			500 ml				Gamma Spec	
043963 - 001	TJAOU-228A-GR-223-S			120398/1520							Gamma Spec	
043963 - 002	TJAOU-228A-GR-223-S			120398/1520							RCRA Metals	
043964 - 001	TJAOU-228A-GR-224-S			120398/1530							Gamma Spec	
043965 - 001	TJAOU-228A-GR-225-S			120398/1533							Gamma Spec	
043965 - 002	TJAOU-228A-GR-225-S			120398/1533							RCRA Metals	
043966 - 001	TJAOU-228A-GR-226-S			120398/1540							Gamma Spec, Iso U	
043966 - 002	TJAOU-228A-GR-226-S			120398/1540							HE, SVOCs	
043966 - 003	TJAOU-228A-GR-226-S			120398/1540			4oz				VOC	
043967 - 001	TJAOU-228A-GR-227-S			120398/1550			500 ml				Gamma Spec	
043967 - 002	TJAOU-228A-GR-227-S			120398/1550							RCRA Metals	
043968 - 001	TJAOU-228A-GR-228-S			120398/1605							Gamma Spec	
~~043969 - 001~~	~~TJAOU-228A-GR-229-S~~ E.L.										Gamma Spec	
~~043969 - 002~~	~~TJAOU-228A-GR-229-S~~ E.L.										RCRA Metals	

Abnormal Conditions on Receipt

LAB USE

Recipient Initials _____

Original: To Accompany Samples, Laboratory Copy (White) | 1st Copy: To Accompany Samples, Return to SMO (Blue) | 2nd Copy: SMO Suspense Copy (Yellow) | 3rd Copy: Field Copy (Pink)

01 COC (10-97)

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601212

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Cool at 4°C Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample #
043969-001	TJAOU-228A-GR-230-S	0	228A		S	AG	500 ml	4C	G	SA	Gamma Spec	
043968-005	TJAOU-228A-TB			120398/1615	DW	G	3X 40 ml	HCL		TB	VOC	
043968-006	TJAOU-228A-EB			120398/1615		G	3X 40 ml	HCL		EB	VOC	
043968-007	TJAOU-228A-EB			120398/1620		AG	2X 1 L	4C		EB	SVOC (8270)	
043968-008	TJAOU-228A-EB			120398/1620		AG	4X 1 L	4C		EB	HE	
043968-009	TJAOU-228A-EB			120398/1620		P	500 ml	HNO3		EB	RCRA metals	
043968-010	TJAOU-228A-EB			120398/1620		P	1 L	HNO3		EB	Gamma Spec	
043968-011	TJAOU-228A-EB			120398/1620		P	1 L	HNO3		EB	TSS U	

Abnormal Conditions on Receipt LAB USE

Recipient Initials _____

Original: To Accompany Samples, Laboratory Copy (White) 1st Copy: To Accompany Samples, Return to SMO (Blue) 2nd Copy: SMO Suspense Copy (Yellow) 3rd Copy: Field Copy (Pink)

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Saimi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043955-001 TJAOU-228A-GR-216-S
Lab ID	: 9812316-07
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time		
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.137				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0296				pCi/g						
Accuracy, Uranium-238		0.126				pCi/g						
Uranium-233/234		0.657	+/- 0.137	0.0231	0.0522	pCi/g	1.0					
Uranium-235		0.0354	+/- 0.0296	0.00637	0.0343	pCi/g	1.0					
Uranium-238		0.584	+/- 0.126	0.0179	0.0342	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.165	+/- 0.169	0.0586	0.154	pCi/g	1.0	EJB	12/17/98	0121	137662	2
Americium-241	U	-0.0277	+/- 0.0512	0.0205	0.0607	pCi/g	1.0					
Cerium-144	U	0.0486	+/- 0.13	0.0677	0.222	pCi/g	1.0					
Cesium-134	U	0.00	+/- 0.042	0.0153	0.0695	pCi/g	1.0					
Cesium-137	U	0.00460	+/- 0.0274	0.0132	0.0495	pCi/g	1.0					
Chromium-51		0.239	+/- 0.387	0.126	0.416	pCi/g	1.0					
Cobalt-60	U	0.0136	+/- 0.0435	0.0151	0.0488	pCi/g	1.0					
Iron-59	U	0.0272	+/- 0.0668	0.0329	0.121	pCi/g	1.0					
Lead-212		0.982	+/- 0.148	0.0259	0.0615	pCi/g	1.0					
Lead-214		0.957	+/- 0.163	0.0313	0.0769	pCi/g	1.0					
Potassium-40	U	0.00	+/- 0.59	0.145	1.14	pCi/g	1.0					
Radium-226	U	0.00	+/- 0.0865	0.0340	0.141	pCi/g	1.0					
Radium-228		0.165	+/- 0.169	0.0586	0.154	pCi/g	1.0					
Ruthenium-103	U	0.00102	+/- 0.0277	0.0158	0.0479	pCi/g	1.0					
Ruthenium-106	U	-0.0359	+/- 0.25	0.119	0.368	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.175	0.0610	0.240	pCi/g	1.0					
Thorium-232		0.969	+/- 0.146	0.0256	0.0607	pCi/g	1.0					
Thorium-234		1.13	+/- 0.717	0.272	0.590	pCi/g	1.0					
Uranium-235		0.135	+/- 0.186	0.0781	0.221	pCi/g	1.0					
Uranium-238		1.13	+/- 0.717	0.272	0.590	pCi/g	1.0					

9812316-07

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043960-001 TJAOU-228A-GR-221-S
Lab ID	: 9812316-16
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.209				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0519				pCi/g						
Accuracy, Uranium-238		0.258				pCi/g						
Uranium-233/234		1.23	+/- 0.209	0.0224	0.0453	pCi/g	1.0					
Uranium-235		0.101	+/- 0.0519	0.00978	0.0454	pCi/g	1.0					
Uranium-238		1.68	+/- 0.258	0.0175	0.0177	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.0861	+/- 0.0956	0.0453	0.160	pCi/g	1.0	EJB	12/17/98	0750	137662	2
Americium-241	U	-0.0249	+/- 0.0435	0.0154	0.0548	pCi/g	1.0					
Cerium-144	U	-0.0259	+/- 0.107	0.0509	0.188	pCi/g	1.0					
Cesium-134	U	0.00	+/- 0.0311	0.0115	0.0528	pCi/g	1.0					
Cesium-137		0.0111	+/- 0.02	0.00990	0.0409	pCi/g	1.0					
Chromium-51		0.216	+/- 0.245	0.0955	0.342	pCi/g	1.0					
Cobalt-60		0.0301	+/- 0.0226	0.0113	0.0432	pCi/g	1.0					
Iron-59		0.0391	+/- 0.0794	0.0174	0.0984	pCi/g	1.0					
Lead-212		0.856	+/- 0.135	0.0194	0.0761	pCi/g	1.0					
Lead-214		0.879	+/- 0.152	0.0235	0.0712	pCi/g	1.0					
Potassium-40		0.171	+/- 0.249	0.109	0.432	pCi/g	1.0					
Radium-226	U	0.00	+/- 0.0757	0.0255	0.122	pCi/g	1.0					
Radium-228		0.0861	+/- 0.0956	0.0453	0.160	pCi/g	1.0					
Ruthenium-103	U	-0.0150	+/- 0.0256	0.0119	0.0374	pCi/g	1.0					
Ruthenium-106		0.333	+/- 0.392	0.0892	0.337	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.167	0.0458	0.203	pCi/g	1.0					
Thorium-232	U	0.00	+/- 0.133	0.0192	0.126	pCi/g	1.0					
Thorium-234		1.60	+/- 0.757	0.204	0.532	pCi/g	1.0					
Uranium-235	U	0.0255	+/- 0.157	0.0587	0.204	pCi/g	1.0					
Uranium-238		1.60	+/- 0.757	0.204	0.532	pCi/g	1.0					

bks

1.6
-0.757

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043961-001 TJAOU-228A-GR-221-D
Lab ID	: 9812316-19
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.183				pCi/g		JEW	12/28/98	1536	138477	1
Accuracy, Uranium-235		0.0400				pCi/g						
Accuracy, Uranium-238		0.255				pCi/g						
Uranium-233/234		1.06	+/- 0.183	0.0194	0.0163	pCi/g	1.0					
Uranium-235		0.0711	+/- 0.04	0.00	0.0164	pCi/g	1.0					
Uranium-238		1.71	+/- 0.255	0.0168	0.0163	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.877	+/- 0.213	0.0404	0.113	pCi/g	1.0	EJB	12/20/98	1055	137662	2
Americium-241	U	-0.0256	+/- 0.14	0.0352	0.228	pCi/g	1.0					
Cerium-144	U	0.0470	+/- 0.103	0.0509	0.196	pCi/g	1.0					
Cesium-134	U	-0.00684	+/- 0.0162	0.0105	0.0286	pCi/g	1.0					
Cesium-137		0.0224	+/- 0.0226	0.00898	0.0386	pCi/g	1.0					
Chromium-51	U	-0.0217	+/- 0.197	0.0975	0.348	pCi/g	1.0					
Cobalt-60	U	0.00276	+/- 0.0205	0.0107	0.0381	pCi/g	1.0					
Iron-59	U	-0.0215	+/- 0.0472	0.0242	0.0837	pCi/g	1.0					
Lead-212		0.933	+/- 0.121	0.0187	0.0480	pCi/g	1.0					
Lead-214		0.789	+/- 0.13	0.0221	0.0584	pCi/g	1.0					
Potassium-40		24.0	+/- 3.15	0.125	0.313	pCi/g	1.0					
Radium-226		0.700	+/- 0.112	0.0232	0.0602	pCi/g	1.0					
Radium-228		0.877	+/- 0.213	0.0404	0.113	pCi/g	1.0					
Ruthenium-103	U	-0.00236	+/- 0.0194	0.0115	0.0358	pCi/g	1.0					
Ruthenium-106	U	-0.0515	+/- 0.156	0.0815	0.279	pCi/g	1.0					
Thorium-231		0.165	+/- 0.134	0.0437	0.186	pCi/g	1.0					
Thorium-232		0.918	+/- 0.119	0.0184	0.0472	pCi/g	1.0					
Thorium-234		1.96	+/- 1.85	0.408	1.76	pCi/g	1.0					
Uranium-235		0.0750	+/- 0.159	0.0576	0.192	pCi/g	1.0					
Uranium-238		1.96	+/- 1.85	0.408	1.76	pCi/g	1.0					

bkg

1.96
1.85

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043966-001 TJAOU-228A-GR-226-S
Lab ID	: 9812316-28
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	N
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.160				pCi/g		JEW	12/28/98	1536	138477	
Accuracy, Uranium-235		0.0257				pCi/g						
Accuracy, Uranium-238		0.187				pCi/g						
Uranium-233/234		0.832	+/- 0.16	0.0198	0.0171	pCi/g	1.0					
Uranium-235		0.0286	+/- 0.0257	0.00	0.0171	pCi/g	1.0					
Uranium-238		1.06	+/- 0.187	0.0172	0.0171	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		1.07	+/- 0.21	0.0446	0.141	pCi/g	1.0	EJB	12/16/98	0827	137663	2
Americium-241	U	-0.00239	+/- 0.0302	0.0193	0.0470	pCi/g	1.0					
Cerium-144		0.104	+/- 0.0919	0.0448	0.170	pCi/g	1.0					
Cesium-134	U	-0.00859	+/- 0.0205	0.00961	0.0311	pCi/g	1.0					
Cesium-137		0.162	+/- 0.0495	0.0108	0.0411	pCi/g	1.0					
Chromium-51		0.105	+/- 0.178	0.0866	0.318	pCi/g	1.0					
Cobalt-60	U	0.0109	+/- 0.0197	0.0138	0.0388	pCi/g	1.0					
Iron-59	U	0.0160	+/- 0.0537	0.0249	0.0955	pCi/g	1.0					
Lead-212		0.946	+/- 0.13	0.0139	0.0478	pCi/g	1.0					
Lead-214		0.877	+/- 0.137	0.0218	0.0594	pCi/g	1.0					
Potassium-40		19.0	+/- 2.04	0.149	0.334	pCi/g	1.0					
Radium-226		0.842	+/- 0.153	0.0231	0.0644	pCi/g	1.0					
Radium-228		1.07	+/- 0.21	0.0446	0.141	pCi/g	1.0					
Ruthenium-103	U	-0.00814	+/- 0.0198	0.0123	0.0352	pCi/g	1.0					
Ruthenium-106	U	0.0194	+/- 0.17	0.0931	0.309	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.179	0.0482	0.192	pCi/g	1.0					
Thorium-232		0.934	+/- 0.128	0.0137	0.0472	pCi/g	1.0					
Thorium-234		1.61	+/- 0.775	0.244	0.460	pCi/g	1.0					
Uranium-235		0.217	+/- 0.168	0.0509	0.179	pCi/g	1.0					
Uranium-238		1.61	+/- 0.775	0.244	0.460	pCi/g	1.0					

226 → 228

bkg

9812316-28

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043968-011 TJAOU-228A-TB
Lab ID	: 9812316-40
Matrix	: AQUEOUS
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.0288				pCi/l		NVN	12/24/98	0933	138289	1
Accuracy, Uranium-235		0.0245				pCi/l						
Accuracy, Uranium-238		0.0259				pCi/l						
Uranium-233/234		0.0504	+/- 0.0288	0.0225	0.0310	pCi/l	1.0					
Uranium-235		0.0323	+/- 0.0245	0.0207	0.0311	pCi/l	1.0					
Uranium-238		0.0383	+/- 0.0259	0.0187	0.0310	pCi/l	1.0					

M = Method	Method-Description
M 1	EPI A-011

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514

9812316 40

GR-212 than GR-228

Internal Lab Batch No

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No

Press F1 for instructions for each field

AR/COC- 601212

Mail Stop 8133/MS1147	Date Samples Shipped: 12/7/98 SMO USE	Contract No: AJ-24EDA
Task Manager: John Copland	Carrier/Waybill No.: 715750	Case No.: 7225.2293
Project Name Site 228A VCM	Lab Contact Edie Kent	SMO Authorization
Cost Center Code ER/13A/[illegible]	Lab Destination: GEL	Bill to: Sandia National Laboratories
Logbook Ref. No.	SMO Contact/Phone Doug Salmi /844-3110	Supplier Services, Dept.
Service Order No CFO890	Send Report to SMO Suzi Jessell	P.O. Box 5800 MS 0154

Location Tech Area NA

Building NA Room NA

228 ok per D.S.

Sample No - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample
043951 - 001	TJAOU-228A-GR-212-S	0	228A	120398/1330	S	AG	500 ml	4 C	G	SA	Gamma Spec	
043952 - 001	TJAOU-228A-GR-213-S			120398/1335			500 ml				Gamma Spec	
043952 - 002	TJAOU-228A-GR-213-S			120398/1335							RCRA Metals	
043953 - 001	TJAOU-228A-GR-214-S	2		120398/1340							Gamma Spec	
043954 - 001	TJAOU-228A-GR-216-S	2		120398/1400							Gamma Spec	
043954 - 002	TJAOU-228A-GR-216-S	2		120398/1400							RCRA Metals	
043955 - 001	TJAOU-228A-GR-216-S	2		120398/1415							Gamma Spec, Iso U	
043955 - 002	TJAOU-228A-GR-216-S	2		120398/1415							HE, SVOCs	
043955 - 003	TJAOU-228A-GR-216-S	2		120398/1415			40z				VOC	
043956 - 001	TJAOU-228A-GR-217-S	0		120398/1430			500 ml				Gamma Spec	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/8/98
Entered by: U

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC GCR15 releases this COC

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Initials. UU

	Name	Signature	Init	Company/Organization/Phone
Sample Team Members	Chris Catechis	C. Catechis	C.C.	MDM/6131/881-3196

Please list as separate report

1. Relinquished by	C. Catechis	Org. 6131	Date 12/04/98	Time 1530	4. Relinquished by	Org	Date
2. Received by	[illegible] (SMO)	Org. 7578	Date 12/4/98	Time 1520	4. Received by	Org	Date
3. Relinquished by	[illegible] (SMO)	Org. 7578	Date 12/7/98	Time 1200	5. Relinquished by	Org	Date
3. Received by		Org.	Date	Time	5. Received by	Org	Date
4. Relinquished by		Org	Date	Time	6. Relinquished by	Org	Date
4. Received by		Org	Date	Time	6. Received by	Org	Date

Original To Accompany Samples, Laboratory Copy (White) | 1st Copy To Accompany Samples, Return to SMO (Blue) | 2nd Copy SMO Suspense Copy (Yellow) | 3rd Copy Field Copy (Pink)

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601212

Project Name: Site 228A VCM | Project/Task Manager: John Copland | Case No.: 7225.2203

Location: Tech Area NA | Building NA | Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE
043956 - 002	TJAOU-228A-GR-217-S	0	228A	120398/1430	S	~~G~~ AG	500 ml	4 C	G	SA	RCRA Metals	
043957 - 001	TJAOU-228A-GR-218-S			120398/1440							Gamma Spec	
043958 – 001	TJAOU-228A-GR-219-S			120398/1445							Gamma Spec	
043958 - 002 •	TJAOU-228A-GR-219-S			120398/1445							RCRA Metals	
043959 - 001	TJAOU-228A-GR-220-S			120398/1447							Gamma Spec	
043960 – 001	TJAOU-228A-GR-221-S			120398/1455							Gamma Spec, Iso U	
043960 - 002 •	TJAOU-228A-GR-221-S			120398/1455							RCRA Metals, HE, SVOCs	
043960 - 003 •	TJAOU-228A-GR-221-S			120398/1455			4 oz				VOC	
043961 - 001	TJAOU-228A-GR-221-DU			120398/1455			500 ml				Gamma Spec, Iso U	
043961 - 002 •	TJAOU-228A-GR-221-DU			120398/1455			500 ml				RCRA Metals, HE, SVOCs	
043961 - 003 •	TJAOU-228A-GR-221-DU			120398/1455			4 oz				VOC	
043962 - 001	TJAOU-228A-GR-222-S			120398/1515			500 ml				Gamma Spec	
043963 - 001	TJAOU-228A-GR-223-S			120398/1520							Gamma Spec	
043963 - 002 •	TJAOU-228A-GR-223-S			120398/1520							RCRA Metals	
043964 - 001	TJAOU-228A-GR-224-S			120398/1530							Gamma Spec	
043965 – 001	TJAOU-228A-GR-225-S			120398/1533							Gamma Spec	
043965 - 002 •	TJAOU-228A-GR-225-S			120398/1533							RCRA Metals	
043966 - 001	TJAOU-228A-GR-226-S			120398/1540							Gamma Spec, Iso U	
043966 - 002	TJAOU-228A-GR-226-S			120398/1540							HE, SVOCs	
043966 - 003	TJAOU-228A-GR-226-S			120398/1540			4 oz				VOC	
043967 – 001	TJAOU-228A-GR-227-S			120398/1550			500 ml				Gamma Spec	
043967 - 002	TJAOU-228A-GR-227-S			120398/1550							RCRA Metals	
043968 - 001	TJAOU-228A-GR-228-S			120398/1605							Gamma Spec	
~~043969 – 001~~	~~TJAOU-228A-GR-229-S~~ EL										Gamma Spec	
~~043969 – 002~~	~~TJAOU-228A-GR-229-S~~ EL										RCRA Metals	

Abnormal Conditions on Receipt

LAB USE

Recipient Initials _____

Original: To Accompany Samples, Laboratory Copy (White) | 1st Copy: To Accompany Samples, Return to SMO (Blue) | 2nd Copy: SMO Suspense Copy (Yellow) | 3rd Copy: Field Copy (Pink)

(03) COC (10/97)

Revised (5/97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601212

Project Name: Site 228A VCM | Project/Task Manager: John Copland | Case No.: 7225.2203

Location | Tech Area: NA | Building: NA | Room: NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	All at 4°C Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample #
043060-001	TJAOU-228A-GR-210-S	0	228A		S	AG	500 ml	4C	G	SA	Gamma Spec	
043968-005	TJAOU-228A-TB			120398/1615	DIW	G	3X 40 ml	HCL		TB	VOC	
043968-006	TJAOU-228A-EB			120398/1615		G	3X 40 ml	HCL		EB	VOC	
043968-007	TJAOU-228A-EB			120398/1620		AG	2X 1 L	4C		EB	SVOC (8270)	
043968-008	TJAOU-228A-EB			120398/1620		AG	4X 1 L	4C		EB	HE	
043968-009	TJAOU-228A-EB			120398/1620		P	500 ml	HNO3		EB	RCRA metals	
043968-010	TJAOU-228A-EB			120398/1620		P	1 L	HNO3		EB	Gamma Spec	
043968-011	TJAOU-228A-EB			120398/1620		P	1 L	HNO3		EB	TSS U	

Abnormal Conditions on Receipt

LAB USE

Recipient Initials _____

Original: To Accompany Samples, Laboratory Copy (White) | 1st Copy: To Accompany Samples, Return to SMO (Blue) | 2nd Copy: SMO Suspense Copy (Yellow) | 3rd Copy: Field Copy (Pink)

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043951-001 TJAOU-228A-GR-212-S
Lab ID	: 9812316-01
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.14	+/- 0.252	0.0551	0.136	pCi/g	1.0	EJB	12/17/98	0117	137662	1
Americium-241	U	0.0170	+/- 0.0989	0.0344	0.151	pCi/g	1.0					
Cerium-144	U	-0.00830	+/- 0.115	0.0675	0.202	pCi/g	1.0					
Cesium-134	U	0.0116	+/- 0.0224	0.0143	0.0362	pCi/g	1.0					
Cesium-137		0.121	+/- 0.0384	0.0123	0.0385	pCi/g	1.0					
Chromium-51	U	0.0482	+/- 0.225	0.122	0.384	pCi/g	1.0					
Cobalt-60	U	0.0120	+/- 0.0259	0.0144	0.0485	pCi/g	1.0					
Iron-59	U	-0.0283	+/- 0.0574	0.0312	0.0985	pCi/g	1.0					
Lead-212		1.04	+/- 0.13	0.0253	0.0563	pCi/g	1.0					
Lead-214		1.05	+/- 0.159	0.0301	0.0699	pCi/g	1.0					
Potassium-40		16.9	+/- 2.09	0.169	0.369	pCi/g	1.0					
Radium-226		0.860	+/- 0.142	0.0318	0.0713	pCi/g	1.0					
Radium-228		1.14	+/- 0.252	0.0551	0.136	pCi/g	1.0					
Ruthenium-103	U	0.00181	+/- 0.0219	0.0149	0.0393	pCi/g	1.0					
Ruthenium-106	U	0.0473	+/- 0.201	0.111	0.358	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.164	0.0593	0.213	pCi/g	1.0					
Thorium-232		1.02	+/- 0.128	0.0249	0.0556	pCi/g	1.0					
Thorium-234		0.449	+/- 0.979	0.421	1.24	pCi/g	1.0					
Uranium-235	U	0.0561	+/- 0.122	0.0760	0.217	pCi/g	1.0					
Uranium-238		0.449	+/- 0.979	0.421	1.24	pCi/g	1.0					
Yttrium-88	U	0.00159	+/- 0.0191	0.0154	0.0376	pCi/g	1.0					
Zirconium-95		0.0583	+/- 0.07	0.0243	0.0838	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998 Page

Sample ID	: 043952-001 TJAOU-228A-GR-213-S
Lab ID	: 9812316-02
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.876	+/- 0.223	0.0692	0.160	pCi/g	1.0	EJB	12/17/98	0118	137662	1
Americium-241	U	-0.00296	+/- 0.13	0.0480	0.192	pCi/g	1.0					
Cerium-144	U	0.0163	+/- 0.123	0.0848	0.213	pCi/g	1.0					
Cesium-134	U	-0.0148	+/- 0.0275	0.0180	0.0402	pCi/g	1.0					
Cesium-137		0.0751	+/- 0.034	0.0155	0.0454	pCi/g	1.0					
Chromium-51	U	-0.0837	+/- 0.241	0.153	0.396	pCi/g	1.0					
Cobalt-60	U	-0.00379	+/- 0.0296	0.0181	0.0532	pCi/g	1.0					
Iron-59	U	-0.0726	+/- 0.0703	0.0392	0.106	pCi/g	1.0					
Lead-212		0.796	+/- 0.112	0.0317	0.0607	pCi/g	1.0					
Lead-214		0.798	+/- 0.131	0.0378	0.0768	pCi/g	1.0					
Potassium-40		20.4	+/- 2.59	0.213	0.437	pCi/g	1.0					
Radium-226		0.588	+/- 0.131	0.0400	0.0845	pCi/g	1.0					
Radium-228		0.876	+/- 0.223	0.0692	0.160	pCi/g	1.0					
Ruthenium-103	U	-0.00133	+/- 0.0223	0.0187	0.0400	pCi/g	1.0					
Ruthenium-106	U	-0.145	+/- 0.205	0.140	0.341	pCi/g	1.0					
Thorium-231		0.200	+/- 0.191	0.0744	0.240	pCi/g	1.0					
Thorium-232		0.785	+/- 0.111	0.0313	0.0599	pCi/g	1.0					
Thorium-234	U	0.207	+/- 1.51	0.572	1.58	pCi/g	1.0					
Uranium-235	U	0.000752	+/- 0.129	0.0953	0.222	pCi/g	1.0					
Uranium-238	U	0.207	+/- 1.51	0.572	1.58	pCi/g	1.0					
Yttrium-88	U	0.0124	+/- 0.0207	0.0194	0.0452	pCi/g	1.0					
Zirconium-95		0.0382	+/- 0.0488	0.0305	0.0912	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998 Page

Sample ID	: 043953-001 TJAOU-228A-GR-214-S
Lab ID	: 9812316-04
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.711	+/- 0.191	0.0546	0.135	pCi/g	1.0	EJB	12/17/98	0119	137662	1
Americium-241	U	0.00820	+/- 0.113	0.0420	0.176	pCi/g	1.0					
Cerium-144	U	-0.0459	+/- 0.103	0.0682	0.181	pCi/g	1.0					
Cesium-134	U	-0.0116	+/- 0.0183	0.0141	0.0313	pCi/g	1.0					
Cesium-137	U	0.00	+/- 0.0276	0.0121	0.0538	pCi/g	1.0					
Chromium-51	U	0.0228	+/- 0.187	0.121	0.324	pCi/g	1.0					
Cobalt-60	U	-0.000450	+/- 0.0198	0.0144	0.0367	pCi/g	1.0					
Iron-59	U	-0.0243	+/- 0.0492	0.0310	0.0814	pCi/g	1.0					
Lead-212		0.665	+/- 0.0931	0.0251	0.0544	pCi/g	1.0					
Lead-214		0.759	+/- 0.112	0.0297	0.0641	pCi/g	1.0					
Potassium-40		14.8	+/- 1.83	0.169	0.371	pCi/g	1.0					
Radium-226		0.605	+/- 0.114	0.0313	0.0668	pCi/g	1.0					
Radium-228		0.711	+/- 0.191	0.0546	0.135	pCi/g	1.0					
Ruthenium-103		0.0256	+/- 0.0209	0.0147	0.0380	pCi/g	1.0					
Ruthenium-106	U	-0.100	+/- 0.186	0.110	0.277	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.192	0.0589	0.196	pCi/g	1.0					
Thorium-232		0.656	+/- 0.0919	0.0248	0.0537	pCi/g	1.0					
Thorium-234		1.42	+/- 1.77	0.494	1.40	pCi/g	1.0					
Uranium-235		0.0842	+/- 0.11	0.0764	0.198	pCi/g	1.0					
Uranium-238		1.42	+/- 1.77	0.494	1.40	pCi/g	1.0					
Yttrium-88	U	-0.00220	+/- 0.0186	0.0154	0.0345	pCi/g	1.0					
Zirconium-95	U	-0.0289	+/- 0.0367	0.0239	0.0608	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043954-001 TJAOU-228A-GR-215-S
Lab ID	: 9812316-05
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.06	+/- 0.318	0.0564	0.217	pCi/g	1.0	EJB	12/17/98	0132	137662	1
Americium-241	U	0.0261	+/- 0.191	0.0297	0.233	pCi/g	1.0					
Cerium-144	U	-0.0603	+/- 0.197	0.0654	0.355	pCi/g	1.0					
Cesium-134	U	0.0114	+/- 0.0382	0.0148	0.0607	pCi/g	1.0					
Cesium-137	U	-0.0117	+/- 0.0374	0.0127	0.0655	pCi/g	1.0					
Chromium-51		0.228	+/- 0.408	0.119	0.573	pCi/g	1.0					
Cobalt-60		0.0306	+/- 0.0338	0.0144	0.0674	pCi/g	1.0					
Iron-59	U	-0.00316	+/- 0.0838	0.0316	0.152	pCi/g	1.0					
Lead-212		1.09	+/- 0.161	0.0242	0.0925	pCi/g	1.0					
Lead-214		0.985	+/- 0.178	0.0297	0.116	pCi/g	1.0					
Potassium-40		17.7	+/- 2.13	0.170	0.610	pCi/g	1.0					
Radium-226		0.889	+/- 0.188	0.0328	0.119	pCi/g	1.0					
Radium-228		1.06	+/- 0.318	0.0564	0.217	pCi/g	1.0					
Ruthenium-103	U	0.0130	+/- 0.0369	0.0152	0.0685	pCi/g	1.0					
Ruthenium-106		0.371	+/- 0.428	0.115	0.479	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.241	0.0573	0.324	pCi/g	1.0					
Thorium-232		1.08	+/- 0.159	0.0239	0.0912	pCi/g	1.0					
Thorium-234		0.971	+/- 1.91	0.374	2.02	pCi/g	1.0					
Uranium-235	U	-0.0316	+/- 0.197	0.0732	0.356	pCi/g	1.0					
Uranium-238		0.971	+/- 1.91	0.374	2.02	pCi/g	1.0					
Yttrium-88	U	0.0124	+/- 0.0288	0.0160	0.0588	pCi/g	1.0					
Zirconium-95	U	-0.00298	+/- 0.0712	0.0250	0.126	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043955-001 TJAOU-228A-GR-216-S
Lab ID	: 9812316-07
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time		
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.137				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0296				pCi/g						
Accuracy, Uranium-238		0.126				pCi/g						
Uranium-233/234		0.657	+/- 0.137	0.0231	0.0522	pCi/g	1.0					
Uranium-235		0.0354	+/- 0.0296	0.00637	0.0343	pCi/g	1.0					
Uranium-238		0.584	+/- 0.126	0.0179	0.0342	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.165	+/- 0.169	0.0586	0.154	pCi/g	1.0	EJB	12/17/98	0121	137662	2
Americium-241	U	-0.0277	+/- 0.0512	0.0205	0.0607	pCi/g	1.0					
Cerium-144	U	0.0486	+/- 0.13	0.0677	0.222	pCi/g	1.0					
Cesium-134	U	0.00	+/- 0.042	0.0153	0.0695	pCi/g	1.0					
Cesium-137	U	0.00460	+/- 0.0274	0.0132	0.0495	pCi/g	1.0					
Chromium-51		0.239	+/- 0.387	0.126	0.416	pCi/g	1.0					
Cobalt-60	U	0.0136	+/- 0.0435	0.0151	0.0488	pCi/g	1.0					
Iron-59	U	0.0272	+/- 0.0668	0.0329	0.121	pCi/g	1.0					
Lead-212		0.982	+/- 0.148	0.0259	0.0615	pCi/g	1.0					
Lead-214		0.957	+/- 0.163	0.0313	0.0769	pCi/g	1.0					
Potassium-40	U	0.00	+/- 0.59	0.145	1.14	pCi/g	1.0					
Radium-226	U	0.00	+/- 0.0865	0.0340	0.141	pCi/g	1.0					
Radium-228		0.165	+/- 0.169	0.0586	0.154	pCi/g	1.0					
Ruthenium-103	U	0.00102	+/- 0.0277	0.0158	0.0479	pCi/g	1.0					
Ruthenium-106	U	-0.0359	+/- 0.25	0.119	0.368	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.175	0.0610	0.240	pCi/g	1.0					
Thorium-232		0.969	+/- 0.146	0.0256	0.0607	pCi/g	1.0					
Thorium-234		1.13	+/- 0.717	0.272	0.590	pCi/g	1.0					
Uranium-235		0.135	+/- 0.186	0.0781	0.221	pCi/g	1.0					
Uranium-238		1.13	+/- 0.717	0.272	0.590	pCi/g	1.0					

9812316-07

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043955-001 TJAOU-228A-GR-216-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88		0.0194	+/- 0.0275	0.0165	0.0517	pCi/g	1.0					
Zirconium-95	U	0.00945	+/- 0.0579	0.0259	0.0914	pCi/g	1.0	EJB	12/17/98	0121	137662	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

0812316 07

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043956-001 TJAOU-228A-GR-217-S
Lab ID	: 9812316-10
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.967	+/- 0.227	0.0491	0.137	pCi/g	1.0	EJB	12/17/98	0746	137662	1
Americium-241	U	-0.0142	+/- 0.0871	0.0309	0.146	pCi/g	1.0					
Cerium-144	U	-0.0305	+/- 0.105	0.0590	0.188	pCi/g	1.0					
Cesium-134	U	-0.00724	+/- 0.0205	0.0128	0.0314	pCi/g	1.0					
Cesium-137	U	-0.00230	+/- 0.0205	0.0110	0.0365	pCi/g	1.0					
Chromium-51	U	-0.0420	+/- 0.202	0.108	0.345	pCi/g	1.0					
Cobalt-60	U	0.00550	+/- 0.0232	0.0128	0.0437	pCi/g	1.0					
Iron-59	U	-0.00589	+/- 0.0592	0.0278	0.102	pCi/g	1.0					
Lead-212		1.02	+/- 0.123	0.0222	0.0512	pCi/g	1.0					
Lead-214		0.913	+/- 0.136	0.0266	0.0699	pCi/g	1.0					
Potassium-40		24.4	+/- 2.69	0.151	0.321	pCi/g	1.0					
Radium-226		0.764	+/- 0.131	0.0284	0.0671	pCi/g	1.0					
Radium-228		0.967	+/- 0.227	0.0491	0.137	pCi/g	1.0					
Ruthenium-103	U	0.00108	+/- 0.0205	0.0133	0.0376	pCi/g	1.0					
Ruthenium-106	U	-0.0350	+/- 0.17	0.0993	0.303	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.224	0.0522	0.209	pCi/g	1.0					
Thorium-232		1.00	+/- 0.122	0.0219	0.0505	pCi/g	1.0					
Thorium-234		3.08	+/- 1.6	0.377	1.19	pCi/g	1.0					
Uranium-235		0.113	+/- 0.176	0.0676	0.206	pCi/g	1.0					
Uranium-238		3.08	+/- 1.6	0.377	1.19	pCi/g	1.0					
Yttrium-88	U	0.00708	+/- 0.0185	0.0139	0.0377	pCi/g	1.0					
Zirconium-95	U	0.00480	+/- 0.0403	0.0217	0.0725	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

218

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043957-001 TJAOU-228A-GR-218-S
Lab ID	: 9812316-12
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.02	+/- 0.251	0.0439	0.115	pCi/g	1.0	EJB	12/17/98	0747	137662	1
Americium-241	U	0.0148	+/- 0.0838	0.0267	0.136	pCi/g	1.0					
Cerium-144	U	0.0162	+/- 0.0948	0.0524	0.176	pCi/g	1.0					
Cesium-134	U	-0.00604	+/- 0.0199	0.0114	0.0302	pCi/g	1.0					
Cesium-137		0.0641	+/- 0.0338	0.00978	0.0403	pCi/g	1.0					
Chromium-51	U	-0.0106	+/- 0.19	0.0959	0.328	pCi/g	1.0					
Cobalt-60	U	-0.00431	+/- 0.0224	0.0115	0.0393	pCi/g	1.0					
Iron-59	U	-0.0489	+/- 0.0574	0.0249	0.0957	pCi/g	1.0					
Lead-212		0.905	+/- 0.112	0.0196	0.0485	pCi/g	1.0					
Lead-214		0.842	+/- 0.128	0.0236	0.0673	pCi/g	1.0					
Potassium-40		22.5	+/- 2.55	0.135	0.328	pCi/g	1.0					
Radium-226		0.675	+/- 0.123	0.0252	0.0652	pCi/g	1.0					
Radium-228		1.02	+/- 0.251	0.0439	0.115	pCi/g	1.0					
Ruthenium-103	U	0.000565	+/- 0.0203	0.0118	0.0368	pCi/g	1.0					
Ruthenium-106	U	-0.0365	+/- 0.176	0.0883	0.309	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.17	0.0461	0.191	pCi/g	1.0					
Thorium-232		0.893	+/- 0.11	0.0194	0.0479	pCi/g	1.0					
Thorium-234		2.65	+/- 1.35	0.326	1.04	pCi/g	1.0					
Uranium-235		0.239	+/- 0.19	0.0600	0.201	pCi/g	1.0					
Uranium-238		2.65	+/- 1.35	0.326	1.04	pCi/g	1.0					
Yttrium-88	U	-0.00337	+/- 0.0163	0.0124	0.0304	pCi/g	1.0					
Zirconium-95	U	-0.000483	+/- 0.0445	0.0193	0.0680	pCi/g	1.0					

bkg w/error

M = Method	Method-Description
M 1	HASL 300

2.65
-1.35
1.3 = bkg

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043958-001 TJAOU-228A-GR-219-S
Lab ID	: 9812316-13
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.05	+/- 0.228	0.0400	0.129	pCi/g	1.0	EJB	12/17/98	0748	137662	1
Americium-241	U	-0.0719	+/- 0.108	0.0250	0.136	pCi/g	1.0					
Cerium-144	U	0.00413	+/- 0.109	0.0493	0.195	pCi/g	1.0					
Cesium-134	U	0.00139	+/- 0.0193	0.0104	0.0296	pCi/g	1.0					
Cesium-137		0.0552	+/- 0.0326	0.00896	0.0321	pCi/g	1.0					
Chromium-51		0.0898	+/- 0.181	0.0897	0.337	pCi/g	1.0					
Cobalt-60	U	0.00306	+/- 0.0213	0.0105	0.0382	pCi/g	1.0					
Iron-59	U	0.00687	+/- 0.0497	0.0227	0.0889	pCi/g	1.0					
Lead-212		0.983	+/- 0.129	0.0185	0.0546	pCi/g	1.0					
Lead-214		0.862	+/- 0.139	0.0220	0.0639	pCi/g	1.0					
Potassium-40		22.3	+/- 2.71	0.123	0.337	pCi/g	1.0					
Radium-226		0.825	+/- 0.132	0.0231	0.0591	pCi/g	1.0					
Radium-228		1.05	+/- 0.228	0.0400	0.129	pCi/g	1.0					
Ruthenium-103	U	-0.00766	+/- 0.0207	0.0109	0.0359	pCi/g	1.0					
Ruthenium-106		0.245	+/- 0.234	0.0809	0.288	pCi/g	1.0					
Thorium-231		0.137	+/- 0.1	0.0434	0.190	pCi/g	1.0					
Thorium-232		0.970	+/- 0.127	0.0183	0.0538	pCi/g	1.0					
Thorium-234		2.67	+/- 1.43	0.302	1.13	pCi/g	1.0					
Uranium-235		0.138	+/- 0.118	0.0555	0.212	pCi/g	1.0					
Uranium-238		2.67	+/- 1.43	0.302	1.13	pCi/g	1.0					
Yttrium-88	U	0.00578	+/- 0.0166	0.0112	0.0330	pCi/g	1.0					
Zirconium-95	U	0.00760	+/- 0.0352	0.0177	0.0651	pCi/g	1.0					

bkg

M = Method	Method-Description
M 1	HASL 300

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043959-001 TJAOU-228A-GR-220-S
Lab ID : 9812316-15
Matrix : SOIL
Date Collected : 12/03/98
Date Received : 12/08/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.968	+/- 0.212	0.0401	0.111	pCi/g	1.0	EJB	12/17/98	0749	137662	1
Americium-241	U	-0.0117	+/- 0.077	0.0246	0.135	pCi/g	1.0					
Cerium-144		0.0545	+/- 0.0992	0.0489	0.187	pCi/g	1.0					
Cesium-134	U	-0.0597	+/- 0.0205	0.0104	0.0293	pCi/g	1.0					
Cesium-137		0.0650	+/- 0.0444	0.00892	0.0337	pCi/g	1.0					
Chromium-51	U	-0.106	+/- 0.183	0.0889	0.311	pCi/g	1.0					
Cobalt-60	U	0.00290	+/- 0.0219	0.0106	0.0401	pCi/g	1.0					
Iron-59	U	-0.0104	+/- 0.0457	0.0229	0.0821	pCi/g	1.0					
Lead-212		0.975	+/- 0.125	0.0184	0.0495	pCi/g	1.0					
Lead-214		0.854	+/- 0.131	0.0218	0.0590	pCi/g	1.0					
Potassium-40		21.3	+/- 2.61	0.124	0.302	pCi/g	1.0					
Radium-226		0.796	+/- 0.12	0.0230	0.0597	pCi/g	1.0					
Radium-228		0.968	+/- 0.212	0.0401	0.111	pCi/g	1.0					
Ruthenium-103		0.0146	+/- 0.019	0.0108	0.0363	pCi/g	1.0					
Ruthenium-106		0.0861	+/- 0.173	0.0805	0.300	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.181	0.0430	0.194	pCi/g	1.0					
Thorium-232		0.961	+/- 0.123	0.0181	0.0489	pCi/g	1.0					
Thorium-234		1.42	+/- 0.981	0.299	1.07	pCi/g	1.0					
Uranium-235		0.129	+/- 0.18	0.0561	0.201	pCi/g	1.0					
Uranium-238		1.42	+/- 0.981	0.299	1.07	pCi/g	1.0					
Yttrium-88	U	0.00477	+/- 0.0155	0.0113	0.0306	pCi/g	1.0					
Zirconium-95	U	0.0118	+/- 0.0356	0.0176	0.0649	pCi/g	1.0					

bkg

M = Method	Method-Description
M 1	HASL 300

1.420
-.981
.439

< bkg

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043960-001 TJAOU-228A-GR-221-S
Lab ID	: 9812316-16
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.209				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0519				pCi/g						
Accuracy, Uranium-238		0.258				pCi/g						
Uranium-233/234		1.23	+/- 0.209	0.0224	0.0453	pCi/g	1.0					
Uranium-235		0.101	+/- 0.0519	0.00978	0.0454	pCi/g	1.0					
Uranium-238		1.68	+/- 0.258	0.0175	0.0177	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.0861	+/- 0.0956	0.0453	0.160	pCi/g	1.0	EJB	12/17/98	0750	137662	2
Americium-241	U	-0.0249	+/- 0.0435	0.0154	0.0548	pCi/g	1.0					
Cerium-144	U	-0.0259	+/- 0.107	0.0509	0.188	pCi/g	1.0					
Cesium-134	U	0.00	+/- 0.0311	0.0115	0.0528	pCi/g	1.0					
Cesium-137		0.0111	+/- 0.02	0.00990	0.0409	pCi/g	1.0					
Chromium-51		0.216	+/- 0.245	0.0955	0.342	pCi/g	1.0					
Cobalt-60		0.0301	+/- 0.0226	0.0113	0.0432	pCi/g	1.0					
Iron-59		0.0391	+/- 0.0794	0.0174	0.0984	pCi/g	1.0					
Lead-212		0.856	+/- 0.135	0.0194	0.0761	pCi/g	1.0					
Lead-214		0.879	+/- 0.152	0.0235	0.0712	pCi/g	1.0					
Potassium-40		0.171	+/- 0.249	0.109	0.432	pCi/g	1.0					
Radium-226	U	0.00	+/- 0.0757	0.0255	0.122	pCi/g	1.0					
Radium-228		0.0861	+/- 0.0956	0.0453	0.160	pCi/g	1.0					
Ruthenium-103	U	-0.0150	+/- 0.0256	0.0119	0.0374	pCi/g	1.0					
Ruthenium-106		0.333	+/- 0.392	0.0892	0.337	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.167	0.0458	0.203	pCi/g	1.0					
Thorium-232	U	0.00	+/- 0.133	0.0192	0.126	pCi/g	1.0					
Thorium-234		1.60	+/- 0.757	0.204	0.532	pCi/g	1.0					
Uranium-235	U	0.0255	+/- 0.157	0.0587	0.204	pCi/g	1.0					
Uranium-238		1.60	+/- 0.757	0.204	0.532	pCi/g	1.0					

bks

1.6
-0.757

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043960-001 TJAOU-228A-GR-221-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	-0.00532	+/- 0.0207	0.0124	0.0373	pCi/g	1.0					
Zirconium-95	U	-0.0206	+/- 0.0542	0.0195	0.0823	pCi/g	1.0	EJB	12/17/98	0750	137662	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812316-16

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043961-001 TJAOU-228A-GR-221-D
Lab ID : 9812316-19
Matrix : SOIL
Date Collected : 12/03/98
Date Received : 12/08/98
Priority : Routine
Collector : Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.183				pCi/g		JEW	12/28/98	1536	138477	1
Accuracy, Uranium-235		0.0400				pCi/g						
Accuracy, Uranium-238		0.255				pCi/g						
Uranium-233/234		1.06	+/- 0.183	0.0194	0.0163	pCi/g	1.0					
Uranium-235		0.0711	+/- 0.04	0.00	0.0164	pCi/g	1.0					
Uranium-238		1.71	+/- 0.255	0.0168	0.0163	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.877	+/- 0.213	0.0404	0.113	pCi/g	1.0	EJB	12/20/98	1055	137662	2
Americium-241	U	-0.0256	+/- 0.14	0.0352	0.228	pCi/g	1.0					
Cerium-144	U	0.0470	+/- 0.103	0.0509	0.196	pCi/g	1.0					
Cesium-134	U	-0.00684	+/- 0.0162	0.0105	0.0286	pCi/g	1.0					
Cesium-137		0.0224	+/- 0.0226	0.00898	0.0386	pCi/g	1.0					
Chromium-51	U	-0.0217	+/- 0.197	0.0975	0.348	pCi/g	1.0					
Cobalt-60	U	0.00276	+/- 0.0205	0.0107	0.0381	pCi/g	1.0					
Iron-59	U	-0.0215	+/- 0.0472	0.0242	0.0837	pCi/g	1.0					
Lead-212		0.933	+/- 0.121	0.0187	0.0480	pCi/g	1.0					
Lead-214		0.789	+/- 0.13	0.0221	0.0584	pCi/g	1.0					
Potassium-40		24.0	+/- 3.15	0.125	0.313	pCi/g	1.0					
Radium-226		0.700	+/- 0.112	0.0232	0.0602	pCi/g	1.0					
Radium-228		0.877	+/- 0.213	0.0404	0.113	pCi/g	1.0					
Ruthenium-103	U	-0.00236	+/- 0.0194	0.0115	0.0358	pCi/g	1.0					
Ruthenium-106	U	-0.0515	+/- 0.156	0.0815	0.279	pCi/g	1.0					
Thorium-231		0.165	+/- 0.134	0.0437	0.186	pCi/g	1.0					
Thorium-232		0.918	+/- 0.119	0.0184	0.0472	pCi/g	1.0					
Thorium-234		1.96	+/- 1.85	0.408	1.76	pCi/g	1.0					
Uranium-235		0.0750	+/- 0.159	0.0576	0.192	pCi/g	1.0					
Uranium-238		1.96	+/- 1.85	0.408	1.76	pCi/g	1.0					

bkg

1.96
1.85

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

Sample ID : 043961-001 TJAOU-228A-GR-221-D

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.0102	+/- 0.0276	0.0224	0.0329	pCi/g	1.0					
Zirconium-95		0.0307	+/- 0.0359	0.0184	0.0681	pCi/g	1.0	EJB	12/20/98	1055	137662	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - 1-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812316-19

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043962-001 TJAOU-228A-GR-222-S
Lab ID	: 9812316-22
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.10	+/- 0.239	0.0410	0.133	pCi/g	1.0	EJB	12/17/98	0751	137662	1
Americium-241	U	0.00905	+/- 0.0861	0.0261	0.151	pCi/g	1.0					
Cerium-144	U	0.0304	+/- 0.105	0.0502	0.197	pCi/g	1.0					
Cesium-134	U	0.0103	+/- 0.019	0.0107	0.0319	pCi/g	1.0					
Cesium-137		0.0996	+/- 0.038	0.00918	0.0370	pCi/g	1.0					
Chromium-51	U	-0.0661	+/- 0.189	0.0919	0.328	pCi/g	1.0					
Cobalt-60	U	0.0101	+/- 0.0215	0.0107	0.0413	pCi/g	1.0					
Iron-59	U	0.00491	+/- 0.0498	0.0232	0.0879	pCi/g	1.0					
Lead-212		1.02	+/- 0.128	0.0189	0.0534	pCi/g	1.0					
Lead-214		0.903	+/- 0.146	0.0225	0.0690	pCi/g	1.0					
Potassium-40		23.0	+/- 2.55	0.126	0.300	pCi/g	1.0					
Radium-226		0.825	+/- 0.135	0.0237	0.0622	pCi/g	1.0					
Radium-228		1.10	+/- 0.239	0.0410	0.133	pCi/g	1.0					
Ruthenium-103	U	-0.00711	+/- 0.0246	0.0112	0.0391	pCi/g	1.0					
Ruthenium-106	U	0.0180	+/- 0.162	0.0830	0.298	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.219	0.0444	0.202	pCi/g	1.0					
Thorium-232		1.00	+/- 0.126	0.0187	0.0526	pCi/g	1.0					
Thorium-234		2.05	+/- 1.32	0.316	1.21	pCi/g	1.0					
Uranium-235		0.284	+/- 0.201	0.0576	0.214	pCi/g	1.0					
Uranium-238		2.05	+/- 1.32	0.316	1.21	pCi/g	1.0					
Yttrium-88	U	0.00673	+/- 0.0158	0.0115	0.0323	pCi/g	1.0					
Zirconium-95		0.0357	+/- 0.0615	0.0181	0.0696	pCi/g	1.0					

bks

M = Method	Method-Description
M 1	HASL 300

9812316-22

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043963-001 TJAOU-22&A-GR-223-S
Lab ID	: 9812316-23
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.847	+/- 0.207	0.0395	0.119	pCi/g	1.0	EJB	12/17/98	0751	137662	1
Americium-241		0.0313	+/- 0.0741	0.0247	0.133	pCi/g	1.0					
Cerium-144	U	-0.0524	+/- 0.0959	0.0484	0.175	pCi/g	1.0					
Cesium-134	U	-0.0120	+/- 0.0182	0.0103	0.0270	pCi/g	1.0					
Cesium-137		0.0660	+/- 0.0444	0.00884	0.0313	pCi/g	1.0					
Chromium-51	U	0.0244	+/- 0.185	0.0879	0.327	pCi/g	1.0					
Cobalt-60	U	-0.0120	+/- 0.0252	0.0103	0.0365	pCi/g	1.0					
Iron-59		0.0330	+/- 0.0503	0.0224	0.0945	pCi/g	1.0					
Lead-212		0.894	+/- 0.111	0.0181	0.0489	pCi/g	1.0					
Lead-214		0.847	+/- 0.136	0.0216	0.0573	pCi/g	1.0					
Potassium-40		21.3	+/- 2.52	0.121	0.308	pCi/g	1.0					
Radium-226		0.744	+/- 0.123	0.0228	0.0583	pCi/g	1.0					
Radium-228		0.847	+/- 0.207	0.0395	0.119	pCi/g	1.0					
Ruthenium-103	U	0.00787	+/- 0.018	0.0107	0.0338	pCi/g	1.0					
Ruthenium-106	U	0.0291	+/- 0.149	0.0797	0.272	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.201	0.0425	0.193	pCi/g	1.0					
Thorium-232		0.882	+/- 0.11	0.0179	0.0483	pCi/g	1.0					
Thorium-234		1.98	+/- 1.18	0.301	1.04	pCi/g	1.0					
Uranium-235		0.103	+/- 0.101	0.0544	0.190	pCi/g	1.0					
Uranium-238		1.98	+/- 1.18	0.301	1.04	pCi/g	1.0					
Yttrium-88	U	-0.000668	+/- 0.0175	0.0111	0.0290	pCi/g	1.0					
Zirconium-95	U	0.00797	+/- 0.0368	0.0174	0.0660	pCi/g	1.0					

b&g

M = Method	Method-Description
M 1	HASL 300

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043964-001 TJAOU-228A-GR-224-S
Lab ID	: 9812316-25
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	:.Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.993	+/- 0.239	0.0382	0.133	pCi/g	1.0	EJB	12/16/98	0850	137663	1
Americium-241	U	-0.0205	+/- 0.0817	0.0303	0.155	pCi/g	1.0					
Cerium-144	U	-0.0675	+/- 0.107	0.0412	0.191	pCi/g	1.0					
Cesium-134	U	-0.00399	+/- 0.019	0.00827	0.0298	pCi/g	1.0					
Cesium-137		0.0707	+/- 0.051	0.00922	0.0374	pCi/g	1.0					
Chromium-51	U	-0.0714	+/- 0.192	0.0776	0.330	pCi/g	1.0					
Cobalt-60	U	-0.0119	+/- 0.0229	0.0120	0.0399	pCi/g	1.0					
Iron-59	U	0.0214	+/- 0.0524	0.0216	0.0944	pCi/g	1.0					
Lead-212		1.14	+/- 0.141	0.0126	0.0524	pCi/g	1.0					
Lead-214		0.923	+/- 0.153	0.0194	0.0653	pCi/g	1.0					
Potassium-40		21.7	+/- 2.46	0.129	0.337	pCi/g	1.0					
Radium-226		0.808	+/- 0.131	0.0199	0.0595	pCi/g	1.0					
Radium-228		0.993	+/- 0.239	0.0382	0.133	pCi/g	1.0					
Ruthenium-103	U	0.00433	+/- 0.0194	0.0107	0.0362	pCi/g	1.0					
Ruthenium-106	U	0.0701	+/- 0.16	0.0800	0.300	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.168	0.0434	0.214	pCi/g	1.0					
Thorium-232		1.13	+/- 0.139	0.0124	0.0518	pCi/g	1.0					
Thorium-234		1.83	+/- 1.2	0.347	1.24	pCi/g	1.0					
Uranium-235		0.0553	+/- 0.113	0.0465	0.209	pCi/g	1.0					
Uranium-238		1.83	+/- 1.2	0.347	1.24	pCi/g	1.0					
Yttrium-88	U	0.00766	+/- 0.0188	0.00936	0.0374	pCi/g	1.0					
Zirconium-95	U	-0.0287	+/- 0.039	0.0191	0.0657	pCi/g	1.0					

bkg

M = Method	Method-Description
M 1	HASL 300

9812316-25

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043965-001 TJAOU-228A-GR-225-S
Lab ID	: 9812316-26
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.04	+/- 0.214	0.0357	0.123	pCi/g	1.0	EJB	12/16/98	0826	137663	1
Americium-241	U	-0.00345	+/- 0.0292	0.0155	0.0546	pCi/g	1.0					
Cerium-144		0.0636	+/- 0.152	0.0362	0.180	pCi/g	1.0					
Cesium-134		0.0109	+/- 0.0222	0.00772	0.0353	pCi/g	1.0					
Cesium-137		0.0928	+/- 0.0455	0.00862	0.0342	pCi/g	1.0					
Chromium-51		0.158	+/- 0.221	0.0701	0.322	pCi/g	1.0					
Cobalt-60	U	0.00572	+/- 0.026	0.0111	0.0366	pCi/g	1.0					
Iron-59	U	-0.0190	+/- 0.0525	0.0200	0.0906	pCi/g	1.0					
Lead-212		1.10	+/- 0.153	0.0112	0.0496	pCi/g	1.0					
Lead-214		0.982	+/- 0.15	0.0176	0.0621	pCi/g	1.0					
Potassium-40		21.5	+/- 2.25	0.119	0.328	pCi/g	1.0					
Radium-226		0.784	+/- 0.16	0.0185	0.0695	pCi/g	1.0					
Radium-228		1.04	+/- 0.214	0.0357	0.123	pCi/g	1.0					
Ruthenium-103	U	-0.0105	+/- 0.0211	0.00985	0.0363	pCi/g	1.0					
Ruthenium-106		0.134	+/- 0.182	0.0747	0.332	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.206	0.0390	0.200	pCi/g	1.0					
Thorium-232		1.08	+/- 0.151	0.0111	0.0489	pCi/g	1.0					
Thorium-234		2.64	+/- 0.764	0.196	0.523	pCi/g	1.0					
Uranium-235	U	0.0167	+/- 0.168	0.0412	0.194	pCi/g	1.0					
Uranium-238		2.64	+/- 0.764	0.196	0.523	pCi/g	1.0					
Yttrium-88	U	0.00437	+/- 0.0168	0.00878	0.0334	pCi/g	1.0					
Zirconium-95	U	-0.0145	+/- 0.0354	0.0179	0.0631	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

2.640
-0.764
1.876

Above bkg

9812316-26

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043966-001 TJAOU-228A-GR-226-S
Lab ID	: 9812316-28
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	N
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.160				pCi/g		JEW	12/28/98	1536	138477	
Accuracy, Uranium-235		0.0257				pCi/g						
Accuracy, Uranium-238		0.187				pCi/g						
Uranium-233/234		0.832	+/- 0.16	0.0198	0.0171	pCi/g	1.0					
Uranium-235		0.0286	+/- 0.0257	0.00	0.0171	pCi/g	1.0					
Uranium-238		1.06	+/- 0.187	0.0172	0.0171	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		1.07	+/- 0.21	0.0446	0.141	pCi/g	1.0	EJB	12/16/98	0827	137663	2
Americium-241	U	-0.00239	+/- 0.0302	0.0193	0.0470	pCi/g	1.0					
Cerium-144		0.104	+/- 0.0919	0.0448	0.170	pCi/g	1.0					
Cesium-134	U	-0.00859	+/- 0.0205	0.00961	0.0311	pCi/g	1.0					
Cesium-137		0.162	+/- 0.0495	0.0108	0.0411	pCi/g	1.0					
Chromium-51		0.105	+/- 0.178	0.0866	0.318	pCi/g	1.0					
Cobalt-60	U	0.0109	+/- 0.0197	0.0138	0.0388	pCi/g	1.0					
Iron-59	U	0.0160	+/- 0.0537	0.0249	0.0955	pCi/g	1.0					
Lead-212		0.946	+/- 0.13	0.0139	0.0478	pCi/g	1.0					
Lead-214		0.877	+/- 0.137	0.0218	0.0594	pCi/g	1.0					
Potassium-40		19.0	+/- 2.04	0.149	0.334	pCi/g	1.0					
Radium-226		0.842	+/- 0.153	0.0231	0.0644	pCi/g	1.0					
Radium-228		1.07	+/- 0.21	0.0446	0.141	pCi/g	1.0					
Ruthenium-103	U	-0.00814	+/- 0.0198	0.0123	0.0352	pCi/g	1.0					
Ruthenium-106	U	0.0194	+/- 0.17	0.0931	0.309	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.179	0.0482	0.192	pCi/g	1.0					
Thorium-232		0.934	+/- 0.128	0.0137	0.0472	pCi/g	1.0					
Thorium-234		1.61	+/- 0.775	0.244	0.460	pCi/g	1.0					
Uranium-235		0.217	+/- 0.168	0.0509	0.179	pCi/g	1.0					
Uranium-238		1.61	+/- 0.775	0.244	0.460	pCi/g	1.0					

226 224

bbg

9812316-28

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043966-001 TJAOU-228A-GR-226-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	-0.00900	+/- 0.0201	0.0110	0.0347	pCi/g	1.0					
Zirconium-95	U	0.00154	+/- 0.0383	0.0223	0.0684	pCi/g	1.0	EJB	12/16/98	0827	137663	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043967-001 TJAOU-228A-GR-227-S
Lab ID	: 9812316-31
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.02	+/- 0.214	0.0397	0.127	pCi/g	1.0	EJB	12/16/98	0851	137663	1
Americium-241	U	-0.0187	+/- 0.104	0.0379	0.179	pCi/g	1.0					
Cerium-144	U	-0.0629	+/- 0.101	0.0436	0.180	pCi/g	1.0					
Cesium-134	U	0.00321	+/- 0.0188	0.00849	0.0303	pCi/g	1.0					
Cesium-137		0.184	+/- 0.0487	0.00948	0.0354	pCi/g	1.0					
Chromium-51		0.154	+/- 0.174	0.0797	0.317	pCi/g	1.0					
Cobalt-60	U	0.00286	+/- 0.0195	0.0126	0.0366	pCi/g	1.0					
Iron-59	U	0.0119	+/- 0.0616	0.0225	0.0716	pCi/g	1.0					
Lead-212		0.978	+/- 0.12	0.0130	0.0472	pCi/g	1.0					
Lead-214		0.901	+/- 0.143	0.0199	0.0644	pCi/g	1.0					
Potassium-40		19.4	+/- 2.25	0.135	0.295	pCi/g	1.0					
Radium-226		0.726	+/- 0.118	0.0204	0.0640	pCi/g	1.0					
Radium-228		1.02	+/- 0.214	0.0397	0.127	pCi/g	1.0					
Ruthenium-103	U	-0.000427	+/- 0.0191	0.0109	0.0326	pCi/g	1.0					
Ruthenium-106	U	0.0717	+/- 0.154	0.0822	0.285	pCi/g	1.0					
Thorium-231		0.163	+/- 0.177	0.0448	0.188	pCi/g	1.0					
Thorium-232		0.965	+/- 0.118	0.0128	0.0466	pCi/g	1.0					
Thorium-234		0.994	+/- 1.18	0.427	1.46	pCi/g	1.0					
Uranium-235		0.0747	+/- 0.163	0.0489	0.195	pCi/g	1.0					
Uranium-238		0.994	+/- 1.18	0.427	1.46	pCi/g	1.0					
Yttrium-88		0.0229	+/- 0.0166	0.00974	0.0374	pCi/g	1.0					
Zirconium-95	U	-0.0125	+/- 0.0343	0.0197	0.0597	pCi/g	1.0					

bkg

M = Method	Method-Description
M 1	HASL 300

9812316-31

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043968-001 TJAOU-228A-GR-228-S
Lab ID	: 9812316-33
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.970	+/- 0.214	0.0449	0.126	pCi/g	1.0	EJB	12/16/98	1326	137663	1
Americium-241		0.0513	+/- 0.0827	0.0340	0.143	pCi/g	1.0					
Cerium-144	U	0.0338	+/- 0.105	0.0471	0.191	pCi/g	1.0					
Cesium-134	U	-0.0774	+/- 0.0263	0.00964	0.0359	pCi/g	1.0					
Cesium-137		0.194	+/- 0.0593	0.0108	0.0397	pCi/g	1.0					
Chromium-51		0.120	+/- 0.212	0.0891	0.371	pCi/g	1.0					
Cobalt-60	U	-0.0118	+/- 0.0235	0.0141	0.0395	pCi/g	1.0					
Iron-59	U	-0.0393	+/- 0.0567	0.0254	0.0950	pCi/g	1.0					
Lead-212		0.971	+/- 0.122	0.0143	0.0525	pCi/g	1.0					
Lead-214		0.937	+/- 0.152	0.0223	0.0736	pCi/g	1.0					
Potassium-40		19.0	+/- 2.3	0.152	0.441	pCi/g	1.0					
Radium-226		0.732	+/- 0.122	0.0231	0.0679	pCi/g	1.0					
Radium-228		0.970	+/- 0.214	0.0449	0.126	pCi/g	1.0					
Ruthenium-103		0.0309	+/- 0.0227	0.0124	0.0430	pCi/g	1.0					
Ruthenium-106	U	-0.0669	+/- 0.191	0.0933	0.326	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.177	0.0496	0.198	pCi/g	1.0					
Thorium-232		0.959	+/- 0.121	0.0141	0.0518	pCi/g	1.0					
Thorium-234		0.702	+/- 1.2	0.394	1.14	pCi/g	1.0					
Uranium-235		0.0685	+/- 0.182	0.0531	0.209	pCi/g	1.0					
Uranium-238		0.702	+/- 1.2	0.394	1.14	pCi/g	1.0					
Yttrium-88	U	-0.00364	+/- 0.0197	0.0111	0.0366	pCi/g	1.0					
Zirconium-95	U	0.0176	+/- 0.0444	0.0224	0.0790	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812316-33

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi,MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043968-010 TJAOU-228A-EB
Lab ID	: 9812316-39
Matrix	: AQUEOUS
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228	U	7.49	+/- 19.4	10.6	18.6	pCi/L	1.0	EJB	12/14/98	2051	137444	1
Americium-241	U	0.537	+/- 11.7	9.38	18.9	pCi/L	1.0					
Cerium-144	U	4.94	+/- 15.2	11.6	26.7	pCi/L	1.0					
Cesium-134	U	-1.42	+/- 2.6	2.01	3.79	pCi/L	1.0					
Cesium-137	U	-1.62	+/- 2.88	2.20	4.15	pCi/L	1.0					
Chromium-51	U	17.4	+/- 28.4	18.9	44.2	pCi/L	1.0					
Cobalt-60	U	-1.85	+/- 2.35	1.63	3.88	pCi/L	1.0					
Iron-59	U	0.295	+/- 4.62	4.47	8.66	pCi/L	1.0					
Lead-212	U	0.499	+/- 8.76	3.84	8.30	pCi/L	1.0					
Lead-214		5.59	+/- 6.32	4.00	9.92	pCi/L	1.0					
Potassium-40	U	31.3	+/- 29.2	32.8	58.6	pCi/L	1.0					
Radium-226	U	1.91	+/- 9.94	4.73	9.73	pCi/L	1.0					
Radium-228	U	7.49	+/- 19.4	10.6	18.6	pCi/L	1.0					
Ruthenium-103	U	-0.0313	+/- 2.64	2.17	4.69	pCi/L	1.0					
Ruthenium-106	U	9.78	+/- 21.6	18.7	39.4	pCi/L	1.0					
Thorium-231		14.6	+/- 13.6	11.1	24.0	pCi/L	1.0					
Thorium-232	U	0.494	+/- 8.66	3.80	6.76	pCi/L	1.0					
Thorium-234		143	+/- 98.3	73.5	176	pCi/L	1.0					
Uranium-235		13.2	+/- 28.3	10.4	26.9	pCi/L	1.0					
Uranium-238		143	+/- 98.3	73.5	176	pCi/L	1.0					
Yttrium-88	U	1.74	+/- 3.17	2.04	6.19	pCi/L	1.0					
Zirconium-95	U	1.05	+/- 4.49	4.00	8.07	pCi/L	1.0					

M = Method	Method-Description
M 1	EPI A-013

9812316-39

GR-151-171 (20%)

SF 2001 COC (10 97)

Supersedes (5 97) Issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No

Press F1 for instructions for each field

AR/COC- 601213

COPY

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland
Project Name: Site 228A VCM
Record Center Code: ER/1301/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/3/98 SMO USE
Carrier/Waybill No.: HC
Lab Contact
Lab Destination AMIR
SMO Contact/Phone.
Send Report to SMO:

Contract No.
Case No.: 7225.2203
SMO Authorization
Bill to Sandia National Laboratories
Supplier Services, Dept
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample #
043711 - 004	TJAOU-228A-GR-151-S	0	228	120198/1015	S	M	500 ml	None	G	SA	Gamma Spec, Gross A/B	
043716 - 004	TJAOU-228A-GR-156-S	↓	↓	120198/1045	↓	↓	↓	↓	↓	↓	↓	
043721 - 004	TJAOU-228A-GR-161-S			120198/1115								
043722 - 004	TJAOU-228A-GR-161-DU			120198/1115							DU	
043727 - 004	TJAOU-228A-GR-166-S			1201981312								
043732 - 004	TJAOU-228A-GR-171-S			120198/1340								
043733 - 004	TJAOU-228A-GR-171-DU			120198/1340								
-												
-												
-												

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

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

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
This COC clears 601188

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits.

	Name	Signature	Init	Company/Organization/Phone
Sample Team Members	Chris Catechis	Chris Catechis	CC	MDM/6131/881-3196
	Gill Balzer	GB	GB	Weston/6131/871-2761

Please list as separate report

1. Relinquished by	Chris Catechis	Org. 6131	Date 12/03/98	Time 0855	4. Relinquished by	Org.	Date
1. Received by	[illegible]	Org. 7577	Date 12/3/98	Time 0815	4. Received by	Org.	Date
2. Relinquished by		Org.	Date	Time	5. Relinquished by	Org.	Date
2. Received by		Org.	Date	Time	5. Received by	Org.	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org.	Date
3. Received by		Org.	Date	Time	6. Received by	Org.	Date

Original — To Accompany Samples, Laboratory Copy (White)
1st Copy — To Accompany Samples, Return to SMO (Blue)
2nd Copy — SMO Suspense Copy (Yellow)
3rd Copy — Field Copy (Pink)

Sandia National Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Form
Page 1 of 1

To be completed by Customer — *Shaded areas are for RPSD use only*

Customer: John Copland
Organization: 6133/MS1147
Project Location: Site 228A Vcm
Phone:
Date Results Needed:
Suspect Isotopes:
Other Information:

Hazards/Special Instructions:

Batch Log Number:
Logged By:
LIMS Login
Results Faxed
Sample Disposal

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

Customer Sample ID	Sample Type	Date/Time Collected	Sample Volume	Requested Analysis	RPSD Sample ID	Rad Scan CPM	Sample Weight	Remarks
043711-004	soil	120198/1015	500 ml	Gamma Spec, Gross A/B				
043716-004	↓	120198/1045	↓	↓				
043721-004		120198/1115						
043722-004		120198/1115						
043727-004		120198/1312						
043732-004		120198/1340						
043733-004	↓	120198/1340	↓	↓				

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

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
12/04/98 11:52:33 AM

Analyzed by: 12/7/98 Reviewed by: 12/7/98

Customer : J.COPLAND/D.PERRY (6133/SMO)
Customer Sample ID : 043711-004
Lab Sample ID : 80251601

GR-151

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 653.000 gram
Sample Date/Time : 12/01/98 10:15:00 AM
Acquire Start Date/Time : 12/04/98 10:12:20 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	9.41E-001	5.83E-001	5.38E-001
RA-226	2.42E+000	1.15E+000	6.12E-001
PB-214	8.44E-001	1.14E+000	5.94E-002
BI-214	7.91E-001	1.87E-001	5.54E-002
PB-210	Not Detected	---------	9.14E+000
TH-232	1.03E+000	5.54E-001	1.66E-001
RA-228	8.76E-001	3.49E-001	2.04E-001
AC-228	9.82E-001	2.84E-001	1.09E-001
TH-228	9.24E-001	6.86E-001	5.44E-001
RA-224	1.25E+000	4.72E-001	1.22E-001
PB-212	1.01E+000	1.91E-001	4.45E-002
BI-212	9.91E-001	5.73E-001	3.86E-001
TL-208	7.97E-001	2.16E-001	8.44E-002
U-235	3.23E-001	1.98E-001	2.35E-001
TH-231	Not Detected	---------	8.29E+000
PA-231	Not Detected	---------	1.49E+000
TH-227	Not Detected	---------	3.22E-001
RA-223	Not Detected	---------	1.62E-001
RN-219	Not Detected	---------	4.09E-001
PB-211	Not Detected	---------	9.16E-001
TL-207	Not Detected	---------	1.68E+001
AM-241	Not Detected	---------	2.25E-001
PU-239	Not Detected	---------	3.94E+002
NP-237	Not Detected	---------	2.92E-001
PA-233	Not Detected	---------	6.30E-002
TH-229	Not Detected	---------	1.92E-001

✓ bkg

0.323 ± 0.148
> 0.18.

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80251601

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.39E-002
AG-110m	Not Detected	---------	3.58E-002
BA-133	Not Detected	---------	6.10E-002
BE-7	Not Detected	---------	2.79E-001
CD-109	Not Detected	---------	9.71E-001
CD-115	Not Detected	---------	1.96E-001
CE-139	Not Detected	---------	2.87E-002
CE-141	Not Detected	---------	5.32E-002
CE-144	Not Detected	---------	2.17E-001
CO-56	Not Detected	---------	4.29E-002
CO-57	Not Detected	---------	2.72E-002
CO-58	Not Detected	---------	4.15E-002
CO-60	Not Detected	---------	4.66E-002
CR-51	Not Detected	---------	2.90E-001
CS-134	Not Detected	---------	3.70E-002
CS-137	Not Detected	---------	3.93E-002
EU-152	Not Detected	---------	8.14E-002
EU-154	Not Detected	---------	2.14E-001
EU-155	Not Detected	---------	1.31E-001
FE-59	Not Detected	---------	8.67E-002
GD-153	Not Detected	---------	7.81E-002
HG-203	Not Detected	---------	3.65E-002
I-131	Not Detected	---------	3.72E-002
IR-192	Not Detected	---------	3.29E-002
K-40	1.66E+001	2.70E+000	3.30E-001
MN-52	Not Detected	---------	5.79E-002
MN-54	Not Detected	---------	4.35E-002
MO-99	Not Detected	---------	5.43E-001
NA-22	Not Detected	---------	5.47E-002
NA-24	Not Detected	---------	1.26E+000
NB-95	Not Detected	---------	2.03E-001
ND-147	Not Detected	---------	2.60E-001
NI-57	Not Detected	---------	2.55E-001
RU-103	Not Detected	---------	3.24E-002
RU-106	Not Detected	---------	3.37E-001
SB-122	Not Detected	---------	9.44E-002
SB-124	Not Detected	---------	3.42E-002
SB-125	Not Detected	---------	9.11E-002
SN-113	Not Detected	---------	4.09E-002
SR-85	Not Detected	---------	4.32E-002
TA-182	Not Detected	---------	1.97E-001
TA-183	Not Detected	---------	2.89E-001
TC-99m	Not Detected	---------	1.17E+002
TL-201	Not Detected	---------	2.12E-001
XE-133	Not Detected	---------	2.46E-001
Y-88	Not Detected	---------	3.03E-002
ZN-65	Not Detected	---------	1.28E-001
ZR-95	Not Detected	---------	7.12E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 12/07/98 9:37:42 AM *
****
* *
* Analyzed by: 12/7/98 Reviewed by: 12/7/98 *
****

Customer : J.COPLAND/D.PERRY (6133/SMO)
Customer Sample ID : 043716-004
Lab Sample ID : 80251602

GR-156

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 779.000 gram
Sample Date/Time : 12/01/98 10:45:00 AM
Acquire Start Date/Time : 12/04/98 11:54:19 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	2.26E+000	6.14E-001	5.19E-001
RA-226	2.50E+000	1.03E+000	5.65E-001
PB-214	7.66E-001	1.69E-001	5.31E-002
BI-214	6.83E-001	1.57E-001	4.66E-002
PB-210	Not Detected	---------	8.01E+000
TH-232	8.95E-001	4.69E-001	1.54E-001
RA-228	1.04E+000	3.66E-001	1.77E-001
AC-228	8.86E-001	2.50E-001	9.76E-002
TH-228	8.12E-001	2.67E-001	5.12E-001
RA-224	1.18E+000	4.43E-001	9.57E-002
PB-212	9.12E-001	1.73E-001	4.09E-002
BI-212	9.91E-001	5.40E-001	3.69E-001
TL-208	7.55E-001	1.78E-001	6.72E-002
U-235	1.01E-001	1.79E-001	2.08E-001
TH-231	Not Detected	---------	7.75E+000
PA-231	Not Detected	---------	1.34E+000
TH-227	Not Detected	---------	2.83E-001
RA-223	Not Detected	---------	1.52E-001
RN-219	Not Detected	---------	3.68E-001
PB-211	Not Detected	---------	8.36E-001
TL-207	Not Detected	---------	1.53E+001
AM-241	Not Detected	---------	2.11E-001
PU-239	Not Detected	---------	3.72E+002
NP-237	Not Detected	---------	2.66E-001
PA-233	Not Detected	---------	5.97E-002
TH-229	Not Detected	---------	1.81E-001

U-238
slightly > bkg
2.26 ± 0.614
> 1.3

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80251602

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.83E-002
AG-110m	Not Detected	---------	3.32E-002
BA-133	Not Detected	---------	5.46E-002
BE-7	Not Detected	---------	2.64E-001
CD-109	Not Detected	---------	8.91E-001
CD-115	Not Detected	---------	1.83E-001
CE-139	Not Detected	---------	2.55E-002
CE-141	Not Detected	---------	4.85E-002
CE-144	Not Detected	---------	2.02E-001
CO-56	Not Detected	---------	3.81E-002
CO-57	Not Detected	---------	2.59E-002
CO-58	Not Detected	---------	3.72E-002
CO-60	Not Detected	---------	4.37E-002
CR-51	Not Detected	---------	2.45E-001
CS-134	Not Detected	---------	3.22E-002
CS-137	Not Detected	---------	3.64E-002
EU-152	Not Detected	---------	7.72E-002
EU-154	Not Detected	---------	1.87E-001
EU-155	Not Detected	---------	1.20E-001
FE-59	Not Detected	---------	7.73E-002
GD-153	Not Detected	---------	7.41E-002
HG-203	Not Detected	---------	3.04E-002
I-131	Not Detected	---------	3.48E-002
IR-192	Not Detected	---------	2.84E-002
K-40	1.78E+001	2.74E+000	2.79E-001
MN-52	Not Detected	---------	4.89E-002
MN-54	Not Detected	---------	3.80E-002
MO-99	Not Detected	---------	5.47E-001
NA-22	Not Detected	---------	4.98E-002
NA-24	Not Detected	---------	1.11E+000
NB-95	Not Detected	---------	1.80E-001
ND-147	Not Detected	---------	2.56E-001
NI-57	Not Detected	---------	2.32E-001
RU-103	Not Detected	---------	2.95E-002
RU-106	Not Detected	---------	3.17E-001
SB-122	Not Detected	---------	9.04E-002
SB-124	Not Detected	---------	3.09E-002
SB-125	Not Detected	---------	7.86E-002
SN-113	Not Detected	---------	3.76E-002
SR-85	Not Detected	---------	3.84E-002
TA-182	Not Detected	---------	1.80E-001
TA-183	Not Detected	---------	2.73E-001
TC-99m	Not Detected	---------	1.22E+002
TL-201	Not Detected	---------	1.96E-001
XE-133	Not Detected	---------	2.31E-001
Y-88	Not Detected	---------	3.21E-002
ZN-65	Not Detected	---------	1.17E-001
ZR-95	Not Detected	---------	6.18E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 12/07/98 10:10:19 AM *
****

* Analyzed by: 12/7/98 Reviewed by: 12/7/98 *

Customer : J.COPLAND/D.PERRY (6133/SMO)
Customer Sample ID : 043721-004
Lab Sample ID : 80251603

GR-161

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 778.000 gram
Sample Date/Time : 12/01/98 11:15:00 AM
Acquire Start Date/Time : 12/04/98 1:36:18 PM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

U-238
1.80 ± 1.25
slightly > 1.3 bk

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.80E+000	1.25E+000	5.27E-001
RA-226	2.29E+000	9.65E-001	5.87E-001
PB-214	8.15E-001	1.70E-001	5.39E-002
BI-214	7.46E-001	2.56E-001	4.91E-002
PB-210	Not Detected	---------	8.45E+000
TH-232	9.18E-001	4.63E-001	1.51E-001
RA-228	9.95E-001	3.49E-001	1.68E-001
AC-228	8.19E-001	2.33E-001	9.96E-002
TH-228	8.40E-001	2.78E-001	4.59E-001
RA-224	1.26E+000	4.73E-001	8.85E-002
B-212	9.29E-001	1.69E-001	4.18E-002
BI-212	9.39E-001	5.17E-001	3.61E-001
TL-208	8.55E-001	2.12E-001	7.62E-002
U-235	1.36E-001	1.83E-001	2.13E-001
TH-231	~~2.32E+000~~	~~3.62E+000~~	7.52E+000
PA-231	Not Detected	---------	1.41E+000
TH-227	Not Detected	---------	2.88E-001
RA-223	Not Detected	---------	1.50E-001
RN-219	Not Detected	---------	3.80E-001
PB-211	Not Detected	---------	8.63E-001
TL-207	Not Detected	---------	1.61E+001
AM-241	Not Detected	---------	2.06E-001
PU-239	Not Detected	---------	3.77E+002
NP-237	Not Detected	---------	2.64E-001
PA-233	Not Detected	---------	5.95E-002
TH-229	Not Detected	---------	1.79E-001

Not detected 12/7/98

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80251603

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.00E-002
AG-110m	Not Detected	---------	3.86E-002
BA-133	Not Detected	---------	5.49E-002
BE-7	Not Detected	---------	2.76E-001
CD-109	Not Detected	---------	8.72E-001
CD-115	Not Detected	---------	1.88E-001
CE-139	Not Detected	---------	2.71E-002
CE-141	Not Detected	---------	4.84E-002
CE-144	Not Detected	---------	2.06E-001
CO-56	Not Detected	---------	3.79E-002
CO-57	Not Detected	---------	2.59E-002
CO-58	Not Detected	---------	3.69E-002
CO-60	Not Detected	---------	4.22E-002
CR-51	Not Detected	---------	2.61E-001
CS-134	Not Detected	---------	3.34E-002
CS-137	5.70E-002	3.19E-002	2.33E-002
EU-152	Not Detected	---------	7.74E-002
EU-154	Not Detected	---------	1.94E-001
EU-155	Not Detected	---------	1.19E-001
FE-59	Not Detected	---------	8.80E-002
GD-153	Not Detected	---------	7.05E-002
HG-203	Not Detected	---------	3.17E-002
I-131	Not Detected	---------	3.68E-002
IR-192	Not Detected	---------	2.88E-002
K-40	1.91E+001	2.94E+000	2.77E-001
MN-52	Not Detected	---------	4.85E-002
MN-54	Not Detected	---------	3.96E-002
MO-99	Not Detected	---------	5.78E-001
NA-22	Not Detected	---------	4.83E-002
NA-24	Not Detected	---------	1.25E+000
NB-95	Not Detected	---------	1.88E-001
ND-147	Not Detected	---------	2.62E-001
NI-57	Not Detected	---------	2.19E-001
RU-103	Not Detected	---------	2.90E-002
RU-106	Not Detected	---------	2.93E-001
SB-122	Not Detected	---------	9.53E-002
SB-124	Not Detected	---------	3.17E-002
SB-125	Not Detected	---------	8.47E-002
SN-113	Not Detected	---------	3.84E-002
SR-85	Not Detected	---------	3.89E-002
TA-182	Not Detected	---------	1.80E-001
TA-183	Not Detected	---------	2.68E-001
TC-99m	Not Detected	---------	1.46E+002
TL-201	Not Detected	---------	1.94E-001
XE-133	Not Detected	---------	2.29E-001
Y-88	Not Detected	---------	3.31E-002
ZN-65	Not Detected	---------	1.20E-001
ZR-95	Not Detected	---------	6.30E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 12/07/98 10:26:40 AM *
****

* Analyzed by: 12/7/98 Reviewed by: 12/7/98 *

Customer : J.COPLAND/D.PERRY (6133/SMO)
Customer Sample ID : 043722-004
Lab Sample ID : 80251604

GR-161 dump

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 746.000 gram
Sample Date/Time : 12/01/98 11:15:00 AM
Acquire Start Date/Time : 12/04/98 3:18:20 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	2.08E+000	5.84E-001	5.04E-001
RA-226	2.51E+000 slightly	1.02E+000	6.30E-001
PB-214	7.82E-001	1.69E-001	5.90E-002
BI-214	6.59E-001	4.21E-001	5.31E-002
PB-210	Not Detected	---------	8.60E+000
TH-232	7.94E-001	4.47E-001	1.72E-001
RA-228	8.62E-001	5.78E-001	1.66E-001
AC-228	9.17E-001	2.66E-001	9.55E-002
TH-228	9.41E-001	3.23E-001	5.45E-001
RA-224	1.20E+000	4.54E-001	8.23E-002
PB-212	9.47E-001	1.76E-001	4.20E-002
BI-212	1.11E+000	5.77E-001	3.19E-001
TL-208	8.07E-001	1.98E-001	7.28E-002
U-235	1.17E-001	1.85E-001	2.16E-001
TH-231	Not Detected	---------	7.83E+000
PA-231	Not Detected	---------	1.42E+000
TH-227	Not Detected	---------	3.03E-001
RA-223	Not Detected	---------	1.59E-001
RN-219	Not Detected	---------	3.84E-001
PB-211	Not Detected	---------	8.85E-001
TL-207	Not Detected	---------	1.45E+001
AM-241	Not Detected	---------	2.23E-001
PU-239	Not Detected	---------	3.85E+002
NP-237	Not Detected	---------	2.65E-001
PA-233	Not Detected	---------	5.79E-002
TH-229	Not Detected	---------	1.84E-001

U-238
2.08 ± 0.584
> bkg 1.3

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80251604

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.13E-002
AG-110m	Not Detected	---------	3.87E-002
BA-133	Not Detected	---------	5.65E-002
BE-7	Not Detected	---------	2.51E-001
CD-109	Not Detected	---------	8.87E-001
CD-115	Not Detected	---------	1.97E-001
CE-139	Not Detected	---------	2.65E-002
CE-141	Not Detected	---------	5.06E-002
CE-144	Not Detected	---------	2.08E-001
CO-56	Not Detected	---------	3.80E-002
CO-57	Not Detected	---------	2.63E-002
CO-58	Not Detected	---------	3.81E-002
CO-60	Not Detected	---------	4.05E-002
CR-51	Not Detected	---------	2.58E-001
CS-134	Not Detected	---------	3.44E-002
CS-137	4.21E-002	3.45E-002	2.73E-002
EU-152	Not Detected	---------	7.90E-002
EU-154	Not Detected	---------	2.00E-001
EU-155	Not Detected	---------	1.25E-001
FE-59	Not Detected	---------	8.97E-002
GD-153	Not Detected	---------	7.44E-002
HG-203	Not Detected	---------	3.37E-002
I-131	Not Detected	---------	3.92E-002
IR-192	Not Detected	---------	2.87E-002
K-40	1.83E+001	2.86E+000	3.01E-001
MN-52	Not Detected	---------	5.49E-002
MN-54	Not Detected	---------	3.96E-002
MO-99	Not Detected	---------	5.54E-001
NA-22	Not Detected	---------	4.87E-002
NA-24	Not Detected	---------	1.22E+000
NB-95	Not Detected	---------	1.98E-001
ND-147	Not Detected	---------	2.66E-001
NI-57	Not Detected	---------	2.52E-001
RU-103	Not Detected	---------	3.14E-002
RU-106	Not Detected	---------	3.01E-001
SB-122	Not Detected	---------	9.15E-002
SB-124	Not Detected	---------	3.32E-002
SB-125	Not Detected	---------	8.31E-002
SN-113	Not Detected	---------	3.99E-002
SR-85	Not Detected	---------	3.93E-002
TA-182	Not Detected	---------	1.85E-001
TA-183	Not Detected	---------	2.93E-001
TC-99m	Not Detected	---------	1.77E+002
TL-201	Not Detected	---------	2.06E-001
XE-133	Not Detected	---------	2.40E-001
Y-88	Not Detected	---------	3.36E-002
ZN-65	Not Detected	---------	1.21E-001
ZR-95	Not Detected	---------	6.22E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
12/07/98 11:02:49 AM

Analyzed by: 12/7/98 Reviewed by: 12/7/98

Customer : J.COPLAND/D.PERRY (6133/SMO)
Customer Sample ID : 043727-004
Lab Sample ID : 80251605

GR-166

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 853.000 gram
Sample Date/Time : 12/01/98 1:12:00 PM
Acquire Start Date/Time : 12/04/98 5:00:20 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	5.82E-001	4.63E-001	4.78E-001
RA-226	1.36E+000	7.62E-001	5.96E-001
PB-214	7.61E-001	1.51E-001	4.88E-002
BI-214	6.91E-001	1.48E-001	4.04E-002
PB-210	Not Detected	---------	7.72E+000
TH-232	8.73E-001	4.79E-001	1.46E-001
RA-228	8.14E-001	3.27E-001	1.61E-001
AC-228	7.39E-001	2.32E-001	9.34E-002
TH-228	6.74E-001	2.59E-001	4.70E-001
RA-224	1.08E+000	3.71E-001	8.72E-002
PB-212	8.24E-001	1.59E-001	4.10E-002
BI-212	9.44E-001	5.84E-001	3.25E-001
TL-208	7.19E-001	1.73E-001	7.09E-002
U-235	Not Detected	---------	1.91E-001
TH-231	Not Detected	---------	7.08E+000
PA-231	Not Detected	---------	1.28E+000
TH-227	Not Detected	---------	2.76E-001
RA-223	Not Detected	---------	1.42E-001
RN-219	Not Detected	---------	3.56E-001
PB-211	Not Detected	---------	7.87E-001
TL-207	Not Detected	---------	1.46E+001
AM-241	Not Detected	---------	1.95E-001
PU-239	Not Detected	---------	3.41E+002
NP-237	Not Detected	---------	2.44E-001
PA-233	Not Detected	---------	5.53E-002
TH-229	Not Detected	---------	1.61E-001

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80251605

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.65E-002
AG-110m	Not Detected	---------	3.10E-002
BA-133	Not Detected	---------	5.04E-002
BE-7	Not Detected	---------	2.39E-001
CD-109	Not Detected	---------	8.06E-001
CD-115	Not Detected	---------	1.76E-001
CE-139	Not Detected	---------	2.42E-002
CE-141	Not Detected	---------	4.44E-002
CE-144	Not Detected	---------	1.88E-001
CO-56	Not Detected	---------	3.53E-002
CO-57	Not Detected	---------	2.38E-002
CO-58	Not Detected	---------	3.58E-002
CO-60	Not Detected	---------	3.92E-002
CR-51	Not Detected	---------	2.33E-001
CS-134	Not Detected	---------	3.01E-002
CS-137	Not Detected	---------	3.34E-002
EU-152	Not Detected	---------	7.14E-002
EU-154	Not Detected	---------	1.75E-001
EU-155	Not Detected	---------	1.12E-001
FE-59	Not Detected	---------	7.63E-002
GD-153	Not Detected	---------	6.47E-002
HG-203	Not Detected	---------	2.93E-002
I-131	Not Detected	---------	3.34E-002
IR-192	Not Detected	---------	2.58E-002
K-40	1.95E+001	2.95E+000	2.74E-001
MN-52	Not Detected	---------	4.89E-002
MN-54	Not Detected	---------	3.52E-002
MO-99	Not Detected	---------	5.40E-001
NA-22	Not Detected	---------	4.73E-002
NA-24	Not Detected	---------	1.32E+000
NB-95	Not Detected	---------	1.84E-001
ND-147	Not Detected	---------	2.35E-001
NI-57	Not Detected	---------	2.58E-001
RU-103	Not Detected	---------	2.75E-002
RU-106	Not Detected	---------	2.86E-001
SB-122	Not Detected	---------	8.47E-002
SB-124	Not Detected	---------	2.82E-002
SB-125	Not Detected	---------	7.83E-002
SN-113	Not Detected	---------	3.43E-002
SR-85	Not Detected	---------	3.68E-002
TA-182	Not Detected	---------	1.75E-001
TA-183	Not Detected	---------	2.56E-001
TC-99m	Not Detected	---------	1.56E+002
TL-201	Not Detected	---------	1.88E-001
XE-133	Not Detected	---------	2.20E-001
Y-88	Not Detected	---------	3.06E-002
ZN-65	Not Detected	---------	1.17E-001
ZR-95	Not Detected	---------	6.07E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 12/04/98 8:22:36 PM *
****
*
* Analyzed by: 12/7/98 Reviewed by: 12/7/98 *
****

Customer : J.COPLAND/D.PERRY (6133/SMO)
Customer Sample ID : 043732-004
Lab Sample ID : 80251606

6R-171

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 814.000 gram
Sample Date/Time : 12/01/98 1:40:00 PM
Acquire Start Date/Time : 12/04/98 6:42:22 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	1.72E+000	5.56E-001	4.93E-001
RA-226	1.94E+000	9.44E-001	5.61E-001
PB-214	7.86E-001	1.53E-001	5.08E-002
BI-214	6.88E-001	1.52E-001	4.75E-002
PB-210	Not Detected	---------	8.33E+000
TH-232	8.46E-001	4.76E-001	1.59E-001
RA-228	7.27E-001	3.08E-001	1.66E-001
AC-228	9.63E-001	2.64E-001	9.42E-002
TH-228	7.83E-001	2.93E-001	4.91E-001
RA-224	1.07E+000	6.99E-001	9.77E-002
PB-212	8.97E-001	1.66E-001	3.82E-002
BI-212	9.30E-001	5.35E-001	2.93E-001
TL-208	8.39E-001	4.42E-001	6.94E-002
U-235	Not Detected	---------	2.04E-001
TH-231	Not Detected	---------	7.41E+000
PA-231	Not Detected	---------	1.35E+000
TH-227	Not Detected	---------	2.77E-001
RA-223	Not Detected	---------	1.50E-001
RN-219	Not Detected	---------	3.70E-001
PB-211	Not Detected	---------	8.50E-001
TL-207	Not Detected	---------	1.50E+001
AM-241	Not Detected	---------	2.00E-001
PU-239	Not Detected	---------	3.76E+002
NP-237	Not Detected	---------	2.64E-001
PA-233	Not Detected	---------	5.69E-002
TH-229	Not Detected	---------	1.81E-001

1.72 ± 0.556
> bkg 1.3

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80251606

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.91E-002
AG-110m	Not Detected	---------	3.40E-002
BA-133	Not Detected	---------	5.36E-002
BE-7	Not Detected	---------	2.66E-001
CD-109	Not Detected	---------	8.58E-001
CD-115	Not Detected	---------	1.89E-001
CE-139	Not Detected	---------	2.57E-002
CE-141	Not Detected	---------	4.63E-002
CE-144	Not Detected	---------	1.98E-001
CO-56	Not Detected	---------	3.65E-002
CO-57	Not Detected	---------	2.54E-002
CO-58	Not Detected	---------	3.78E-002
CO-60	Not Detected	---------	3.94E-002
CR-51	Not Detected	---------	2.46E-001
CS-134	Not Detected	---------	3.37E-002
CS-137	2.51E-002	3.29E-002	1.95E-002
EU-152	Not Detected	---------	7.51E-002
EU-154	Not Detected	---------	1.90E-001
EU-155	Not Detected	---------	1.19E-001
FE-59	Not Detected	---------	8.12E-002
GD-153	Not Detected	---------	7.12E-002
HG-203	Not Detected	---------	3.09E-002
I-131	Not Detected	---------	3.68E-002
IR-192	Not Detected	---------	2.66E-002
K-40	1.92E+001	2.91E+000	2.85E-001
MN-52	Not Detected	---------	5.03E-002
MN-54	Not Detected	---------	1.81E-002
MO-99	Not Detected	---------	5.31E-001
NA-22	Not Detected	---------	4.74E-002
NA-24	Not Detected	---------	1.36E+000
NB-95	Not Detected	---------	1.82E-001
ND-147	Not Detected	---------	2.45E-001
NI-57	Not Detected	---------	2.76E-001
RU-103	Not Detected	---------	2.95E-002
RU-106	Not Detected	---------	2.98E-001
SB-122	Not Detected	---------	9.17E-002
SB-124	Not Detected	---------	3.06E-002
SB-125	Not Detected	---------	7.88E-002
SN-113	Not Detected	---------	3.73E-002
SR-85	Not Detected	---------	3.70E-002
TA-182	Not Detected	---------	1.80E-001
TA-183	Not Detected	---------	2.65E-001
TC-99m	Not Detected	---------	1.93E+002
TL-201	Not Detected	---------	2.02E-001
XE-133	Not Detected	---------	2.35E-001
Y-88	Not Detected	---------	2.75E-002
ZN-65	Not Detected	---------	1.17E-001
ZR-95	Not Detected	---------	5.90E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
12/07/98 11:48:21 AM

Analyzed by: 12/7/98 Reviewed by: 12/7/98

Customer : J.COPLAND/D.PERRY (6133/SMO)
Customer Sample ID : 043733-004
Lab Sample ID : 80251607

GR-171 dupe

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 868.000 gram
Sample Date/Time : 12/01/98 1:40:00 PM
Acquire Start Date/Time : 12/04/98 8:24:25 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	1.62E+000	5.28E-001	5.11E-001
RA-226	2.20E+000	9.82E-001	5.37E-001
PB-214	7.79E-001	1.55E-001	4.85E-002
BI-214	7.26E-001	1.57E-001	4.35E-002
PB-210	Not Detected	---------	7.83E+000
TH-232	8.32E-001	4.45E-001	1.55E-001
RA-228	9.56E-001	3.31E-001	1.67E-001
AC-228	8.73E-001	2.51E-001	1.01E-001
TH-228	7.85E-001	2.75E-001	4.47E-001
RA-224	8.97E-001	4.43E-001	7.61E-002
PB-212	9.30E-001	1.70E-001	3.90E-002
BI-212	1.09E+000	6.41E-001	3.52E-001
TL-208	8.14E-001	1.85E-001	6.58E-002
U-235	1.15E-001	1.72E-001	1.99E-001
TH-231	Not Detected	---------	7.54E+000
PA-231	Not Detected	---------	1.26E+000
TH-227	Not Detected	---------	2.75E-001
RA-223	Not Detected	---------	1.51E-001
RN-219	Not Detected	---------	3.46E-001
PB-211	Not Detected	---------	7.91E-001
TL-207	Not Detected	---------	1.39E+001
AM-241	Not Detected	---------	1.92E-001
PU-239	Not Detected	---------	3.60E+002
NP-237	Not Detected	---------	2.54E-001
PA-233	Not Detected	---------	5.72E-002
TH-229	Not Detected	---------	1.73E-001

1.62 ± 0.528
> bks 1.3

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80251607

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.87E-002
AG-110m	Not Detected	---------	3.28E-002
BA-133	Not Detected	---------	5.09E-002
BE-7	Not Detected	---------	2.52E-001
CD-109	Not Detected	---------	8.45E-001
CD-115	Not Detected	---------	1.86E-001
CE-139	Not Detected	---------	2.51E-002
CE-141	Not Detected	---------	4.59E-002
CE-144	Not Detected	---------	1.97E-001
CO-56	Not Detected	---------	3.32E-002
CO-57	Not Detected	---------	2.53E-002
CO-58	Not Detected	---------	3.37E-002
CO-60	Not Detected	---------	3.85E-002
CR-51	Not Detected	---------	2.41E-001
CS-134	Not Detected	---------	3.01E-002
CS-137	2.60E-002	2.51E-002	1.96E-002
EU-152	Not Detected	---------	7.58E-002
EU-154	Not Detected	---------	1.87E-001
EU-155	Not Detected	---------	1.17E-001
FE-59	Not Detected	---------	7.90E-002
GD-153	Not Detected	---------	6.91E-002
HG-203	Not Detected	---------	3.03E-002
I-131	Not Detected	---------	3.62E-002
IR-192	Not Detected	---------	2.71E-002
K-40	1.74E+001	2.69E+000	2.92E-001
MN-52	Not Detected	---------	4.85E-002
MN-54	Not Detected	---------	3.65E-002
MO-99	Not Detected	---------	5.77E-001
NA-22	Not Detected	---------	4.52E-002
NA-24	Not Detected	---------	1.30E+000
NB-95	Not Detected	---------	1.83E-001
ND-147	Not Detected	---------	2.47E-001
NI-57	Not Detected	---------	2.55E-001
RU-103	Not Detected	---------	2.61E-002
RU-106	Not Detected	---------	2.83E-001
SB-122	Not Detected	---------	8.53E-002
SB-124	Not Detected	---------	2.68E-002
SB-125	Not Detected	---------	7.54E-002
SN-113	Not Detected	---------	3.54E-002
SR-85	Not Detected	---------	3.70E-002
TA-182	Not Detected	---------	1.67E-001
TA-183	Not Detected	---------	2.56E-001
TC-99m	Not Detected	---------	2.22E+002
TL-201	Not Detected	---------	2.00E-001
XE-133	Not Detected	---------	2.40E-001
Y-88	Not Detected	---------	2.76E-002
ZN-65	Not Detected	---------	1.10E-001
ZR-95	Not Detected	---------	5.52E-002

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* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 12/05/98 7:41:43 AM *
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*
* Analyzed by: 12/7/98 Reviewed by: 12/7/98 *
****

.stomer : J.COPLAND/D.PERRY (6133/SMO)
Customer Sample ID : LAB CONTROL SAMPLE USING CG134
Lab Sample ID : 80251608

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 : 12/05/98 7:31:29 AM
Detector Name : LAB01
Elapsed Live/Real Time : 600 / 605 seconds

Comments:
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Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	---------	2.75E+003
RA-226	Not Detected	---------	5.49E+003
PB-214	Not Detected	---------	7.09E+002
BI-214	Not Detected	---------	6.55E+002
PB-210	Not Detected	---------	6.88E+004
TH-232	Not Detected	---------	2.23E+003
RA-228	Not Detected	---------	2.95E+003
AC-228	Not Detected	---------	1.82E+003
TH-228	Not Detected	---------	1.25E+005
RA-224	Not Detected	---------	6.20E+003
[illegible]-212	Not Detected	---------	8.57E+003
[illegible]-212	Not Detected	---------	8.85E+004
TL-208	Not Detected	---------	1.82E+004
U-235	Not Detected	---------	1.43E+003
TH-231	Not Detected	---------	4.47E+004
PA-231	Not Detected	---------	1.38E+004
TH-227	Not Detected	---------	2.32E+003
RA-223	Not Detected	---------	1.00E+026
RN-219	Not Detected	---------	6.02E+003
PB-211	Not Detected	---------	1.37E+004
TL-207	Not Detected	---------	2.54E+005
AM-241	8.17E+004	1.41E+004	1.39E+003
PU-239	Not Detected	---------	2.45E+006
NP-237	Not Detected	---------	1.32E+003
PA-233	Not Detected	---------	6.32E+002
TH-229	Not Detected	---------	1.17E+003

[Summary Report] - Sample ID: : 80251608

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	---------	3.67E+002
AG-110m	Not Detected	---------	6.30E+006
BA-133	Not Detected	---------	7.59E+002
BE-7	Not Detected	---------	1.78E+020
CD-109	Not Detected	---------	3.78E+005
CD-115	Not Detected	---------	1.00E+026
CE-139	Not Detected	---------	5.51E+008
CE-141	Not Detected	---------	1.00E+026
CE-144	Not Detected	---------	1.86E+006
CO-56	Not Detected	---------	1.47E+014
CO-57	Not Detected	---------	3.37E+005
CO-58	Not Detected	---------	1.39E+015
CO-60	7.96E+004	1.12E+004	5.23E+002
CR-51	Not Detected	---------	1.00E+026
CS-134	Not Detected	---------	4.68E+003
CS-137	6.86E+004	9.19E+003	3.30E+002
EU-152	Not Detected	---------	8.22E+002
EU-154	Not Detected	---------	3.12E+003
EU-155	Not Detected	---------	2.57E+003
FE-59	Not Detected	---------	1.00E+026
GD-153	Not Detected	---------	2.19E+006
HG-203	Not Detected	---------	3.44E+021
I-131	Not Detected	---------	1.00E+026
IR-192	Not Detected	---------	3.33E+014
K-40	Not Detected	---------	1.79E+003
MN-52	Not Detected	---------	1.00E+026
MN-54	Not Detected	---------	2.87E+005
MO-99	Not Detected	---------	1.00E+026
NA-22	Not Detected	---------	1.88E+003
NA-24	Not Detected	---------	1.00E+026
NB-95	Not Detected	---------	1.00E+026
ND-147	Not Detected	---------	1.00E+026
NI-57	Not Detected	---------	1.00E+026
RU-103	Not Detected	---------	1.00E+026
RU-106	Not Detected	---------	8.43E+005
SB-122	Not Detected	---------	1.00E+026
SB-124	Not Detected	---------	1.85E+017
SB-125	Not Detected	---------	8.86E+003
SN-113	Not Detected	---------	2.41E+010
SR-85	Not Detected	---------	2.09E+016
TA-182	Not Detected	---------	6.98E+010
TA-183	Not Detected	---------	1.00E+026
TC-99m	Not Detected	---------	1.00E+026
TL-201	Not Detected	---------	1.00E+026
XE-133	Not Detected	---------	1.00E+026
Y-88	Not Detected	---------	4.47E+010
ZN-65	Not Detected	---------	4.55E+006
ZR-95	Not Detected	---------	4.72E+016

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*****************************************************************************
*                    Sandia National Laboratories                           *
*              Radiation Protection Sample Diagnostics Program              *
*                      Quality Assurance Report                             *
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.eport Date : 12/05/98 7:41:46 AM
QA File : C:\GENIE2K\CAMFILES\LCS1.QAF
Analyst : FCD
Sample ID : 80251608
Sample Quantity : 1.00 Each
Sample Date : 11/01/90 12:00:00 PM
Measurement Date : 12/05/98 7:31:29 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 605 seconds

Parameter	Mean	1S Error	New Value	< LU	: SD	: UD	: BS >
AM-241 ACTIVITY	8.573E-002	2.402E-003	8.172E-002	<	:	:	: >
CS-137 Activity	6.833E-002	9.978E-004	6.863E-002	<	:	:	: >
CO-60 Activity	7.588E-002	2.706E-003	7.837E-002	<	:	:	: >

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)

.viewed by: 12/7/98

GR-176 → 196

SF 2001-COC (10 97)
Supersedes (5 97) issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No

Press F1 for instructions for each field

AR/COC- 601214

Dept. No /Mail Stop: 8133/MS1147
Project/Task Manager: John Copland / Lai, Anh
Project Name: Site 228A VCM
Record Center Code: ER/300/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: _____ SMO USE
Carrier/Waybill No.: _____
Lab Contact:
Lab Destination: AMIR
SMO Contact/Phone: Doug Salm
Send Report to SMO: Sue, Joseph

Contract No.:
Case No.: 7225.2203
SMO Authorization _____
Bill to Sandia National Laboratories
Supplier Services, Dept _____
P O Box 5800 MS 0154

COPY

Location — Tech Area NA — Building NA — Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Samp #
043738 – 004	TJAOU-228A-GR-176-S	0	228	120298/0950	S	M	500 ml	None	G	SA	Gamma Spec, Gross A/B	
043743 – 004	TJAOU-228A-GR-181-S	↓	↓	120298/1010	↓	↓	↓	↓	↓	↓	↓	
043744 - 004	TJAOU-228A-GR-181-DU			120298/1010								
043749 – 004	TJAOU-228A-GR-186-S			120298/1045								
043754 – 004	TJAOU-228A-GR-191-S			120298/1255								
043755 – 004	TJAOU-228A-GR-191-DU			120298/1255								
043760 - 004	TJAOU-228A-GR-196-S	↓	↓	120298/1330	↓	↓	↓	↓	↓	↓	↓	
-												
-												
-												

RMMA ☒Yes ☐No Ref. No. GR
Sample Disposal ☒Return to Client ☒Disposal by lab

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

Special Instructions/QC Requirements
EDD ☒Yes ☒No
Raw data package ☒Yes ☒No
This COC includes COC 60190 and 60191
Please list as separate report

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date — QC Inits.

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	Ch. Catech.	CC	MDM/6131/881-3196

1. Relinquished by	Ch. Catech	Org 6131	Date 12/09/98	Time 1000	4 Relinquished by	Org	Date
1. Received by	[illegible]	Org 7578 (SMO)	Date 12/9/98	Time 1000	4 Received by	Org	Date
2 Relinquished by		Org	Date	Time	5 Relinquished by	Org	Date
2 Received by		Org	Date	Time	5 Received by	Org	Date
3 Relinquished by		Org	Date	Time	6 Relinquished by	Org	Date
3 Received by		Org	Date	Time	6 Received by	Org	Date

Original — To Accompany Samples, Laboratory Copy (White)
1st Copy — To Accompany Samples, Return to SMO (Blue)
2nd Copy — SMO Suspense Copy (Yellow)
3rd Copy — Field Copy (Pink)

Sandia National Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Form
Page 1 of 1

To be completed by Customer

Shaded areas are for RPSD use only

Customer: John Copland
Organization: 6133/MS1147
Project Location: Site 28A VCM
Phone:
Date Results Needed:
Suspect Isotopes:
Other Information:

Hazards/Special Instructions:

Batch Log Number:
Logged By:
LIMS Login
Results Faxed
Sample Disposal

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

Customer Sample ID	Sample Type	Date/Time Collected	Sample Volume	Requested Analysis	RPSD Sample ID	Rad Scan CPM	Sample Weight	Remarks
043738-004	Soil	120298/0950	500 ml	Gamma Spec, Gross A/B		"		
043743-004	↓	120298/1010	↓	↓				
043744-004		120298/1010						
043749-004		120298/1045						
043754-004		120298/1255						
043755-004		120298/1255						
043760-004	↓	120298/1330	↓	↓				

Relinquished by	[illegible]	Date 12/04/98	Time 1000	Received by	[illegible]	Date 12/4/98	Time 1000
Relinquished by		Date	Time	Received by		Date	Time
Relinquished by		Date	Time	Received by		Date	
Relinquished by		Date	Time	Received by		Date	

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
12/06/98 4:04:17 PM

Analyzed by: 12/6/98 Reviewed by: 12/7/98

Customer : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID : 043738-004
Lab Sample ID : 80253801

GR-176

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 974.000 gram
Sample Date/Time : 12/02/98 9:50:00 AM
Acquire Start Date/Time : 12/05/98 8:21:48 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	8.23E-001	3.50E-001	4.52E-001
RA-226	1.65E+000	8.00E-001	5.03E-001
PB-214	7.49E-001	1.50E-001	4.59E-002
BI-214	6.90E-001	1.54E-001	3.84E-002
PB-210	Not Detected	---------	7.11E+000
TH-232	8.86E-001	4.44E-001	1.22E-001
RA-228	8.51E-001	2.77E-001	1.43E-001
AC-228	7.79E-001	7.07E-001	8.84E-002
TH-228	8.81E-001	6.58E-001	4.01E-001
RA-224	1.01E+000	3.55E-001	7.11E-002
PB-212	8.19E-001	1.54E-001	3.62E-002
BI-212	8.11E-001	5.06E-001	2.74E-001
TL-208	7.06E-001	3.20E-001	6.58E-002
U-235	Not Detected	---------	1.87E-001
TH-231	~~3.61E+000~~	~~3.36E+000~~	6.72E+000
PA-231	Not Detected	---------	1.20E+000
TH-227	Not Detected	---------	2.54E-001
RA-223	Not Detected	---------	1.28E-001
RN-219	Not Detected	---------	3.33E-001
PB-211	Not Detected	---------	7.44E-001
TL-207	Not Detected	---------	1.36E+001
AM-241	Not Detected	---------	1.80E-001
PU-239	Not Detected	---------	3.34E+002
NP-237	Not Detected	---------	2.29E-001
PA-233	Not Detected	---------	5.24E-002
TH-229	Not Detected	---------	1.55E-001

bkg.

Not detected 12/6/98

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253801

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.34E-002
AG-110m	Not Detected	---------	2.94E-002
BA-133	Not Detected	---------	4.66E-002
BE-7	Not Detected	---------	2.18E-001
CD-109	Not Detected	---------	7.77E-001
CD-115	Not Detected	---------	1.49E-001
CE-139	Not Detected	---------	2.33E-002
CE-141	Not Detected	---------	4.29E-002
CE-144	Not Detected	---------	1.80E-001
CO-56	Not Detected	---------	3.09E-002
CO-57	Not Detected	---------	2.35E-002
CO-58	Not Detected	---------	3.16E-002
CO-60	Not Detected	---------	3.56E-002
CR-51	Not Detected	---------	2.17E-001
CS-134	Not Detected	---------	2.88E-002
CS-137	1.65E-002	3.26E-002	2.01E-002
EU-152	Not Detected	---------	7.01E-002
EU-154	Not Detected	---------	1.63E-001
EU-155	Not Detected	---------	1.07E-001
FE-59	Not Detected	---------	7.47E-002
GD-153	Not Detected	---------	6.20E-002
HG-203	Not Detected	---------	2.81E-002
I-131	Not Detected	---------	3.31E-002
IR-192	Not Detected	---------	2.42E-002
K-40	1.80E+001	2.72E+000	2.60E-001
MN-52	Not Detected	---------	4.04E-002
MN-54	Not Detected	---------	3.27E-002
MO-99	Not Detected	---------	4.51E-001
NA-22	Not Detected	---------	4.29E-002
NA-24	Not Detected	---------	8.37E-001
NB-95	Not Detected	---------	1.59E-001
ND-147	Not Detected	---------	2.22E-001
NI-57	Not Detected	---------	1.88E-001
RU-103	Not Detected	---------	2.53E-002
RU-106	Not Detected	---------	2.57E-001
SB-122	Not Detected	---------	7.44E-002
SB-124	Not Detected	---------	2.66E-002
SB-125	Not Detected	---------	7.36E-002
SN-113	Not Detected	---------	3.39E-002
SR-85	Not Detected	---------	3.36E-002
TA-182	Not Detected	---------	1.53E-001
TA-183	Not Detected	---------	2.29E-001
TC-99m	Not Detected	---------	7.99E+001
TL-201	Not Detected	---------	1.63E-001
XE-133	Not Detected	---------	1.92E-001
Y-88	Not Detected	---------	2.53E-002
ZN-65	Not Detected	---------	1.03E-001
ZR-95	Not Detected	---------	5.34E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
12/06/98 4:15:22 PM

Analyzed by: 12/6/98 Reviewed by: 12/7/98

Customer : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID : 043743-004
Lab Sample ID : 80253802

6R-181

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 912.000 gram
Sample Date/Time : 12/02/98 10:10:00 AM
Acquire Start Date/Time : 12/05/98 10:03:52 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	3.40E+000	9.03E-001	5.08E-001
RA-226	2.67E+000	9.46E-001	4.93E-001
PB-214	7.41E-001	1.50E-001	4.83E-002
BI-214	6.63E-001	1.46E-001	4.56E-002
PB-210	Not Detected	---------	7.77E+000
TH-232	7.81E-001	4.13E-001	1.39E-001
RA-228	8.96E-001	1.86E-001	1.66E-001
AC-228	7.82E-001	1.61E-001	9.00E-002
TH-228	7.41E-001	2.84E-001	4.29E-001
RA-224	1.04E+000	3.77E-001	8.68E-002
PB-212	8.23E-001	1.57E-001	3.83E-002
BI-212	8.71E-001	4.73E-001	3.09E-001
TL-208	7.07E-001	1.66E-001	6.16E-002
U-235	1.08E-001	1.69E-001	1.95E-001
TH-231	Not Detected	---------	7.48E+000
PA-231	Not Detected	---------	1.21E+000
TH-227	Not Detected	---------	2.56E-001
RA-223	Not Detected	---------	1.44E-001
RN-219	Not Detected	---------	3.40E-001
PB-211	Not Detected	---------	7.80E-001
TL-207	Not Detected	---------	1.32E+001
AM-241	Not Detected	---------	1.98E-001
PU-239	Not Detected	---------	3.50E+002
NP-237	Not Detected	---------	2.48E-001
PA-233	Not Detected	---------	5.33E-002
TH-229	Not Detected	---------	1.72E-001

{3.40 ± 0.903
>bkg 1.3

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253802

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.61E-002
AG-110m	Not Detected	---------	3.50E-002
BA-133	Not Detected	---------	4.82E-002
BE-7	Not Detected	---------	2.37E-001
CD-109	~~1.96E+000~~	~~5.22E-001~~	7.04E-001 Not detected 12/6/5
CD-115	Not Detected	---------	1.63E-001
CE-139	Not Detected	---------	2.43E-002
CE-141	Not Detected	---------	4.52E-002
CE-144	Not Detected	---------	1.91E-001
CO-56	Not Detected	---------	3.28E-002
CO-57	Not Detected	---------	2.39E-002
CO-58	Not Detected	---------	3.33E-002
CO-60	Not Detected	---------	3.79E-002
CR-51	Not Detected	---------	2.36E-001
CS-134	Not Detected	---------	2.94E-002
CS-137	6.17E-002	3.78E-002	2.16E-002
EU-152	Not Detected	---------	7.20E-002
EU-154	Not Detected	---------	1.75E-001
EU-155	Not Detected	---------	1.13E-001
FE-59	Not Detected	---------	7.47E-002
GD-153	Not Detected	---------	6.98E-002
HG-203	Not Detected	---------	2.87E-002
I-131	Not Detected	---------	3.35E-002
IR-192	Not Detected	---------	2.60E-002
K-40	1.83E+001	2.69E+000	2.44E-001
MN-52	Not Detected	---------	4.34E-002
MN-54	Not Detected	---------	3.53E-002
MO-99	Not Detected	---------	5.08E-001
NA-22	Not Detected	---------	4.30E-002
NA-24	Not Detected	---------	9.44E-001
NB-95	Not Detected	---------	1.64E-001
ND-147	Not Detected	---------	2.26E-001
NI-57	Not Detected	---------	2.08E-001
RU-103	Not Detected	---------	2.65E-002
RU-106	Not Detected	---------	2.65E-001
SB-122	Not Detected	---------	7.97E-002
SB-124	Not Detected	---------	2.67E-002
SB-125	Not Detected	---------	7.46E-002
SN-113	Not Detected	---------	3.34E-002
SR-85	Not Detected	---------	3.40E-002
TA-182	Not Detected	---------	1.61E-001
TA-183	Not Detected	---------	2.54E-001
TC-99m	Not Detected	---------	9.94E+001
TL-201	Not Detected	---------	1.82E-001
XE-133	Not Detected	---------	2.19E-001
Y-88	Not Detected	---------	2.82E-002
ZN-65	Not Detected	---------	1.05E-001
ZR-95	Not Detected	---------	5.57E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
12/06/98 4:28:24 PM

Analyzed by: 12/6/98 Reviewed by: 12/7/98

Customer : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID : 043744-004
Lab Sample ID : 80253803

6R-181 dupe

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 894.000 gram
Sample Date/Time : 12/02/98 10:10:00 AM
Acquire Start Date/Time : 12/05/98 11:45:54 AM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.51E+000	6.18E-001	4.84E-001
RA-226	2.09E+000	9.03E-001	5.18E-001
PB-214	7.51E-001	1.52E-001	4.67E-002
BI-214	6.79E-001	1.40E-001	3.99E-002
PB-210	Not Detected	---------	7.68E+000
TH-232	7.76E-001	4.17E-001	1.37E-001
RA-228	8.64E-001	3.01E-001	1.58E-001
AC-228	7.95E-001	2.62E-001	8.48E-002
TH-228	7.17E-001	3.70E-001	4.36E-001
RA-224	1.01E+000	3.47E-001	8.94E-002
PB-212	7.93E-001	1.51E-001	3.80E-002
BI-212	9.88E-001	6.02E-001	3.03E-001
TL-208	7.89E-001	5.00E-001	6.24E-002
U-235	1.57E-001	1.66E-001	1.93E-001
TH-231	Not Detected	---------	7.08E+000
PA-231	Not Detected	---------	1.25E+000
TH-227	Not Detected	---------	2.56E-001
RA-223	Not Detected	---------	1.40E-001
RN-219	Not Detected	---------	3.52E-001
PB-211	Not Detected	---------	8.01E-001
TL-207	Not Detected	---------	1.41E+001
AM-241	Not Detected	---------	1.92E-001
PU-239	Not Detected	---------	3.50E+002
NP-237	Not Detected	---------	2.41E-001
PA-233	Not Detected	---------	5.49E-002
TH-229	Not Detected	---------	1.66E-001

1.51 ± 0.618 > bkgd.

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253803

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.75E-002
AG-110m	Not Detected	---------	3.83E-002
BA-133	Not Detected	---------	4.88E-002
BE-7	Not Detected	---------	2.34E-001
CD-109	Not Detected	---------	7.98E-001
CD-115	Not Detected	---------	1.65E-001
CE-139	Not Detected	---------	2.41E-002
CE-141	Not Detected	---------	4.41E-002
CE-144	Not Detected	---------	1.91E-001
CO-56	Not Detected	---------	3.10E-002
CO-57	Not Detected	---------	2.37E-002
CO-58	Not Detected	---------	3.31E-002
CO-60	Not Detected	---------	3.96E-002
CR-51	Not Detected	---------	2.34E-001
CS-134	Not Detected	---------	2.86E-002
CS-137	8.11E-002	3.92E-002	2.33E-002
EU-152	Not Detected	---------	7.11E-002
EU-154	Not Detected	---------	1.80E-001
EU-155	Not Detected	---------	1.10E-001
FE-59	Not Detected	---------	7.88E-002
GD-153	Not Detected	---------	6.74E-002
HG-203	Not Detected	---------	3.01E-002
I-131	Not Detected	---------	3.23E-002
IR-192	Not Detected	---------	2.56E-002
K-40	1.85E+001	2.78E+000	2.43E-001
MN-52	Not Detected	---------	4.69E-002
MN-54	Not Detected	---------	3.41E-002
MO-99	Not Detected	---------	5.04E-001
NA-22	Not Detected	---------	4.30E-002
NA-24	Not Detected	---------	1.06E+000
NB-95	Not Detected	---------	1.69E-001
ND-147	Not Detected	---------	2.26E-001
NI-57	Not Detected	---------	2.15E-001
RU-103	Not Detected	---------	2.78E-002
RU-106	Not Detected	---------	2.88E-001
SB-122	Not Detected	---------	8.02E-002
SB-124	Not Detected	---------	2.59E-002
SB-125	Not Detected	---------	7.31E-002
SN-113	Not Detected	---------	3.45E-002
SR-85	Not Detected	---------	3.39E-002
TA-182	Not Detected	---------	1.61E-001
TA-183	Not Detected	---------	2.49E-001
TC-99m	Not Detected	---------	1.17E+002
TL-201	Not Detected	---------	1.79E-001
XE-133	Not Detected	---------	2.15E-001
Y-88	Not Detected	---------	2.80E-002
ZN-65	Not Detected	---------	1.05E-001
ZR-95	Not Detected	---------	5.72E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
12/06/98 4:41:33 PM

Analyzed by: 12/6/98 Reviewed by: 12/7/98

Customer : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID : 043749-004
Lab Sample ID : 80253804

GR-186

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 850.000 gram
Sample Date/Time : 12/02/98 10:45:00 AM
Acquire Start Date/Time : 12/05/98 1:27:55 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	1.88E+000	5.20E-001	4.39E-001
RA-226	2.14E+000	9.41E-001	5.05E-001
PB-214	7.24E-001	1.45E-001	4.67E-002
BI-214	6.05E-001	1.36E-001	4.36E-002
PB-210	Not Detected	---------	7.38E+000
TH-232	7.12E-001	3.37E-001	1.37E-001
RA-228	6.96E-001	2.93E-001	1.58E-001
AC-228	7.16E-001	2.13E-001	9.44E-002
TH-228	5.94E-001	2.06E-001	4.41E-001
RA-224	8.66E-001	3.19E-001	6.48E-002
PB-212	7.09E-001	2.03E-001	3.67E-002
BI-212	8.32E-001	4.32E-001	3.02E-001
TL-208	6.66E-001	1.70E-001	6.70E-002
U-235	1.36E-001	1.67E-001	1.94E-001
TH-231	Not Detected	---------	7.31E+000
PA-231	Not Detected	---------	1.27E+000
TH-227	Not Detected	---------	2.53E-001
RA-223	Not Detected	---------	1.43E-001
RN-219	Not Detected	---------	3.45E-001
PB-211	Not Detected	---------	7.91E-001
TL-207	Not Detected	---------	1.39E+001
AM-241	Not Detected	---------	1.91E-001
PU-239	Not Detected	---------	3.42E+002
NP-237	Not Detected	---------	2.36E-001
PA-233	Not Detected	---------	5.37E-002
TH-229	Not Detected	---------	1.65E-001

1.88 ± 0.52

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253804

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.55E-002
AG-110m	Not Detected	---------	3.99E-002
BA-133	Not Detected	---------	4.95E-002
BE-7	Not Detected	---------	2.39E-001
CD-109	Not Detected	---------	7.86E-001
CD-115	Not Detected	---------	1.65E-001
CE-139	Not Detected	---------	2.34E-002
CE-141	Not Detected	---------	4.54E-002
CE-144	Not Detected	---------	1.86E-001
CO-56	Not Detected	---------	3.22E-002
CO-57	Not Detected	---------	2.40E-002
CO-58	Not Detected	---------	3.34E-002
CO-60	Not Detected	---------	4.08E-002
CR-51	Not Detected	---------	2.35E-001
CS-134	Not Detected	---------	2.91E-002
CS-137	1.08E-001	4.26E-002	2.45E-002
EU-152	Not Detected	---------	7.10E-002
EU-154	Not Detected	---------	1.78E-001
EU-155	Not Detected	---------	1.08E-001
FE-59	Not Detected	---------	7.32E-002
GD-153	Not Detected	---------	6.71E-002
HG-203	Not Detected	---------	2.92E-002
I-131	Not Detected	---------	3.43E-002
IR-192	Not Detected	---------	2.70E-002
K-40	1.74E+001	2.69E+000	2.87E-001
MN-52	Not Detected	---------	4.58E-002
MN-54	Not Detected	---------	3.61E-002
MO-99	Not Detected	---------	4.91E-001
NA-22	Not Detected	---------	4.26E-002
NA-24	Not Detected	---------	1.15E+000
NB-95	Not Detected	---------	1.70E-001
ND-147	Not Detected	---------	2.36E-001
NI-57	Not Detected	---------	2.05E-001
RU-103	Not Detected	---------	2.64E-002
RU-106	Not Detected	---------	2.63E-001
SB-122	Not Detected	---------	8.15E-002
SB-124	Not Detected	---------	2.69E-002
SB-125	Not Detected	---------	7.57E-002
SN-113	Not Detected	---------	3.50E-002
SR-85	Not Detected	---------	3.54E-002
TA-182	Not Detected	---------	1.64E-001
TA-183	Not Detected	---------	2.49E-001
TC-99m	Not Detected	---------	1.31E+002
TL-201	Not Detected	---------	1.81E-001
XE-133	Not Detected	---------	2.18E-001
Y-88	Not Detected	---------	2.59E-002
ZN-65	Not Detected	---------	1.05E-001
ZR-95	Not Detected	---------	5.57E-002

```
*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]        *
*                      12/05/98  4:50:13 PM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:  12/6/98        Reviewed by:  12/7/98                        *
*****************************************************************************
Customer                  : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID        : 043754-004
Lab Sample ID             : 80253805

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   826.000  gram
Sample Date/Time          : 12/02/98  12:55:00 PM
Acquire Start Date/Time   : 12/05/98   3:09:58 PM
Detector Name             : LAB01
Elapsed Live/Real Time    :   6000 /   6003 seconds

Comments:
*****************************************************************************
```

ER-191

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	2.53E+000	8.17E-001	4.97E-001
RA-226	2.28E+000	1.26E+000	5.33E-001
PB-214	6.88E-001	4.60E-001	5.10E-002
BI-214	5.91E-001	8.21E-001	4.90E-002
PB-210	Not Detected	---------	7.72E+000
TH-232	8.15E-001	4.52E-001	1.49E-001
RA-228	8.37E-001	3.63E-001	1.73E-001
AC-228	7.03E-001	2.19E-001	9.74E-002
TH-228	8.61E-001	2.81E-001	4.49E-001
RA-224	9.78E-001	3.94E-001	8.85E-002
PB-212	7.86E-001	2.86E-001	3.85E-002
BI-212	9.59E-001	5.05E-001	3.23E-001
TL-208	7.96E-001	3.38E-001	6.76E-002
U-235	1.02E-001	1.73E-001	2.01E-001
TH-231	Not Detected	---------	7.38E+000
PA-231	Not Detected	---------	1.31E+000
TH-227	Not Detected	---------	2.65E-001
RA-223	Not Detected	---------	1.47E-001
RN-219	Not Detected	---------	3.74E-001
PB-211	Not Detected	---------	8.32E-001
TL-207	Not Detected	---------	1.51E+001
AM-241	Not Detected	---------	2.08E-001
PU-239	Not Detected	---------	3.46E+002
NP-237	Not Detected	---------	2.53E-001
PA-233	Not Detected	---------	5.66E-002
TH-229	Not Detected	---------	1.71E-001

2.53 ± 0.817

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253805

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.67E-002
AG-110m	Not Detected	---------	4.06E-002
BA-133	Not Detected	---------	5.05E-002
BE-7	8.70E-002	9.79E-002	1.55E-001
CD-109	Not Detected	---------	8.48E-001
CD-115	Not Detected	---------	1.75E-001
CE-139	Not Detected	---------	2.49E-002
CE-141	Not Detected	---------	4.72E-002
CE-144	Not Detected	---------	1.94E-001
CO-56	Not Detected	---------	3.60E-002
CO-57	Not Detected	---------	2.51E-002
CO-58	Not Detected	---------	3.38E-002
CO-60	Not Detected	---------	4.38E-002
CR-51	Not Detected	---------	2.28E-001
CS-134	Not Detected	---------	3.05E-002
CS-137	9.83E-002	4.42E-002	2.63E-002
EU-152	Not Detected	---------	7.43E-002
EU-154	Not Detected	---------	1.80E-001
EU-155	Not Detected	---------	1.13E-001
FE-59	Not Detected	---------	7.97E-002
GD-153	Not Detected	---------	7.02E-002
HG-203	Not Detected	---------	3.00E-002
I-131	Not Detected	---------	3.50E-002
IR-192	Not Detected	---------	2.62E-002
K-40	1.80E+001	2.76E+000	2.40E-001
MN-52	Not Detected	---------	4.95E-002
MN-54	Not Detected	---------	3.67E-002
MO-99	Not Detected	---------	5.46E-001
NA-22	Not Detected	---------	4.81E-002
NA-24	Not Detected	---------	1.10E+000
NB-95	Not Detected	---------	1.72E-001
ND-147	Not Detected	---------	2.44E-001
NI-57	Not Detected	---------	2.35E-001
RU-103	Not Detected	---------	2.80E-002
RU-106	Not Detected	---------	2.80E-001
SB-122	Not Detected	---------	8.16E-002
SB-124	Not Detected	---------	2.83E-002
SB-125	Not Detected	---------	7.91E-002
SN-113	Not Detected	---------	3.61E-002
SR-85	Not Detected	---------	3.51E-002
TA-182	Not Detected	---------	1.71E-001
TA-183	Not Detected	---------	2.70E-001
TC-99m	Not Detected	---------	1.30E+002
TL-201	Not Detected	---------	1.91E-001
XE-133	Not Detected	---------	2.22E-001
Y-88	Not Detected	---------	2.94E-002
ZN-65	Not Detected	---------	1.12E-001
ZR-95	Not Detected	---------	5.92E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
12/05/98 6:32:14 PM

Analyzed by: 12/6/98 Reviewed by: 12/7/98

Customer : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID : 043755-004
Lab Sample ID : 80253806

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 825.000 gram
Sample Date/Time : 12/02/98 12:55:00 PM
Acquire Start Date/Time : 12/05/98 4:51:59 PM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6003 seconds

6R-191 dupe

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.65E+000	6.74E-001	4.71E-001
RA-226	1.94E+000	8.06E-001	5.51E-001
PB-214	7.18E-001	1.65E-001	4.93E-002
BI-214	6.33E-001	1.47E-001	4.51E-002
PB-210	Not Detected	---------	7.67E+000
TH-232	8.27E-001	4.55E-001	1.50E-001
RA-228	6.85E-001	2.79E-001	1.55E-001
AC-228	7.37E-001	7.43E-001	1.02E-001
TH-228	8.55E-001	2.94E-001	4.74E-001
RA-224	1.03E+000	3.81E-001	9.07E-002
PB-212	8.07E-001	1.48E-001	3.96E-002
BI-212	7.47E-001	2.57E-001	3.56E-001
TL-208	7.12E-001	1.93E-001	7.09E-002
U-235	1.71E-001	1.66E-001	1.95E-001
TH-231	Not Detected	---------	7.14E+000
PA-231	Not Detected	---------	1.29E+000
TH-227	Not Detected	---------	2.75E-001
RA-223	Not Detected	---------	1.45E-001
RN-219	Not Detected	---------	3.49E-001
PB-211	Not Detected	---------	8.10E-001
TL-207	~~3.30E+000~~	~~3.09E-000~~	5.37E+000 not detected
AM-241	Not Detected	---------	1.90E-001
PU-239	Not Detected	---------	3.49E+002
NP-237	Not Detected	---------	2.45E-001
PA-233	Not Detected	---------	5.60E-002
TH-229	Not Detected	---------	1.72E-001

1.65 ±0.679

12/6/98

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253806

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.79E-002
AG-110m	Not Detected	---------	4.11E-002
BA-133	Not Detected	---------	5.02E-002
BE-7	Not Detected	---------	2.51E-001
CD-109	Not Detected	---------	8.05E-001
CD-115	Not Detected	---------	1.79E-001
CE-139	Not Detected	---------	2.42E-002
CE-141	Not Detected	---------	4.54E-002
CE-144	Not Detected	---------	1.95E-001
CO-56	Not Detected	---------	3.36E-002
CO-57	Not Detected	---------	2.55E-002
CO-58	Not Detected	---------	3.24E-002
CO-60	Not Detected	---------	3.92E-002
CR-51	Not Detected	---------	2.33E-001
CS-134	Not Detected	---------	3.09E-002
CS-137	1.08E-001	6.79E-002	2.23E-002
EU-152	Not Detected	---------	7.62E-002
EU-154	Not Detected	---------	1.79E-001
EU-155	Not Detected	---------	1.13E-001
FE-59	Not Detected	---------	8.47E-002
GD-153	Not Detected	---------	6.84E-002
HG-203	Not Detected	---------	3.05E-002
I-131	Not Detected	---------	3.54E-002
IR-192	Not Detected	---------	2.67E-002
K-40	1.85E+001	2.85E+000	2.73E-001
MN-52	Not Detected	---------	4.75E-002
MN-54	Not Detected	---------	3.67E-002
MO-99	Not Detected	---------	5.14E-001
NA-22	Not Detected	---------	4.62E-002
NA-24	Not Detected	---------	1.38E+000
NB-95	Not Detected	---------	1.85E-001
ND-147	Not Detected	---------	2.41E-001
NI-57	Not Detected	---------	2.43E-001
RU-103	Not Detected	---------	2.84E-002
RU-106	Not Detected	---------	2.79E-001
SB-122	Not Detected	---------	8.83E-002
SB-124	Not Detected	---------	2.75E-002
SB-125	Not Detected	---------	8.01E-002
SN-113	Not Detected	---------	3.65E-002
SR-85	Not Detected	---------	3.74E-002
TA-182	Not Detected	---------	1.71E-001
TA-183	Not Detected	---------	2.49E-001
TC-99m	Not Detected	---------	1.59E+002
TL-201	Not Detected	---------	1.88E-001
XE-133	Not Detected	---------	2.18E-001
Y-88	Not Detected	---------	3.04E-002
ZN-65	Not Detected	---------	1.14E-001
ZR-95	Not Detected	---------	5.91E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
12/05/98 8:14:15 PM

Analyzed by: 12/6/98 Reviewed by: 12/7/98

Customer : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID : 043760-004
Lab Sample ID : 80253807

6R-196

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 838.000 gram
Sample Date/Time : 12/02/98 1:30:00 PM
Acquire Start Date/Time : 12/05/98 6:34:00 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	1.73E+000	5.29E-001	4.75E-001
RA-226	1.65E+000	9.96E-001	5.50E-001
PB-214	6.72E-001	1.40E-001	4.79E-002
BI-214	6.22E-001	1.36E-001	4.38E-002
PB-210	Not Detected	---------	7.66E+000
TH-232	6.67E-001	3.74E-001	1.51E-001
RA-228	7.20E-001	3.23E-001	1.75E-001
AC-228	8.29E-001	1.26E+000	8.92E-002
TH-228	7.02E-001	2.72E-001	4.40E-001
RA-224	9.37E-001	3.72E-001	7.45E-002
PB-212	7.76E-001	5.82E-001	3.71E-002
BI-212	8.18E-001	4.97E-001	3.17E-001
TL-208	6.57E-001	2.89E-001	6.51E-002
U-235	Not Detected	---------	1.92E-001
TH-231	Not Detected	---------	7.25E+000
PA-231	Not Detected	---------	1.30E+000
TH-227	Not Detected	---------	2.63E-001
RA-223	Not Detected	---------	1.41E-001
RN-219	Not Detected	---------	3.66E-001
PB-211	Not Detected	---------	8.06E-001
TL-207	Not Detected	---------	1.43E+001
AM-241	Not Detected	---------	1.97E-001
PU-239	Not Detected	---------	3.53E+002
NP-237	~~5.95E-001~~	~~1.52E-001~~	2.03E-001
PA-233	Not Detected	---------	5.62E-002
TH-229	Not Detected	---------	1.66E-001

1.73 ± 0.529

Not Detected 12/6/98

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253807

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.70E-002
AG-110m	Not Detected	---------	3.75E-002
BA-133	Not Detected	---------	5.02E-002
BE-7	Not Detected	---------	2.43E-001
CD-109	Not Detected	---------	8.23E-001
CD-115	Not Detected	---------	1.73E-001
CE-139	Not Detected	---------	2.46E-002
CE-141	Not Detected	---------	4.48E-002
CE-144	Not Detected	---------	1.88E-001
CO-56	Not Detected	---------	3.56E-002
CO-57	Not Detected	---------	2.41E-002
CO-58	Not Detected	---------	3.43E-002
CO-60	Not Detected	---------	4.09E-002
CR-51	Not Detected	---------	2.46E-001
CS-134	Not Detected	---------	3.04E-002
CS-137	Not Detected	---------	2.31E-002
EU-152	Not Detected	---------	7.07E-002
EU-154	Not Detected	---------	1.78E-001
EU-155	Not Detected	---------	1.15E-001
FE-59	Not Detected	---------	7.89E-002
GD-153	Not Detected	---------	6.79E-002
HG-203	Not Detected	---------	3.02E-002
I-131	Not Detected	---------	3.57E-002
IR-192	Not Detected	---------	2.65E-002
K-40	1.91E+001	2.91E+000	2.63E-001
MN-52	Not Detected	---------	4.92E-002
MN-54	Not Detected	---------	3.56E-002
MO-99	Not Detected	---------	5.50E-001
NA-22	Not Detected	---------	4.61E-002
NA-24	Not Detected	---------	1.35E+000
NB-95	Not Detected	---------	1.76E-001
ND-147	Not Detected	---------	2.29E-001
NI-57	Not Detected	---------	2.39E-001
RU-103	Not Detected	---------	2.93E-002
RU-106	Not Detected	---------	2.80E-001
SB-122	Not Detected	---------	8.43E-002
SB-124	Not Detected	---------	2.86E-002
SB-125	Not Detected	---------	7.60E-002
SN-113	Not Detected	---------	3.71E-002
SR-85	Not Detected	---------	3.58E-002
TA-182	Not Detected	---------	1.65E-001
TA-183	Not Detected	---------	2.61E-001
TC-99m	Not Detected	---------	1.79E+002
TL-201	Not Detected	---------	1.82E-001
XE-133	Not Detected	---------	2.29E-001
Y-88	Not Detected	---------	2.77E-002
ZN-65	Not Detected	---------	1.09E-001
ZR-95	Not Detected	---------	5.92E-002

GR-201 → 226 (20%)

SF 2001-COC (10 97)
Supersedes (5 97) issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field

AR/COC- 601215

COPY

Dept No /Mail Stop 6133/MS1147
Project/Task Manager: John Copland / Lai Ah
Project Name: Site 228A VCM
Record Center Code: CR/1309/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: _____ SMO USE
Carrier/Waybill No.: _____
Lab Contact: RPSD
Lab Destination: AMIR
SMO Contact/Phone: Doug Sims 844-3410
Send Report to SMO: Jansen, Suzi

Contract No.: NA
Case No.: 7225.2203
SMO Authorization: [signature]
Bill to: Sandia National Laboratories, Supplier Services, Dept _____
P O Box 5800 MS 0154

Location Tech Area NA
Building NA Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID (LAB USE)
043765 - 004	TJAOU-228A-GR-201-S	0	228	120398/1000	S	M	500 ml	None	G	SA	Gamma Spec, Gross A/B	
043766 - 004	TJAOU-228A-GR-201-DU			120398/1000								
043944 - 004	TJAOU-228A-GR-206-S			120398/1035								
043949 - 004	TJAOU-228A-GR-211-S			120398/1130								
043950 - 004	TJAOU-228A-GR-211-DU			120398/1130								
043955 - 004	TJAOU-228A-GR-216-S	2		120398/1415								
043960 - 004	TJAOU-228A-GR-221-S	0		120398/1455								
043961 - 004	TJAOU-228A-GR-221-DU	0		120398/1455								
043966 - 004	TJAOU-228A-GR-226-S	0		120398/1540								

RMMA ☒Yes ☐No Ref. No. NA
Sample Disposal ☒Return to Client ☒Disposal by lab

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

Special Instructions/QC Requirements
EDD ☒Yes ☒No
Raw data package ☒Yes ☒No
This COC releases COC 601192 and 601212

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC inits.

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	[signature]	CC	MDM/6131/881-3196

Please list as separate report.

1 Relinquished by	[signature]	Org 6133	Date 12/04/98	Time 1415	4 Relinquished by	Org	Date
1 Received by	[signature]	Org 7578(510)	Date 12/4/98	Time 1415	4 Received by	Org	Date
2 Relinquished by		Org	Date	Time	5 Relinquished by	Org	Date
2 Received by		Org	Date	Time	5 Received by	Org	Date
3 Relinquished by		Org	Date	Time	6 Relinquished by	Org	Date
3 Received by		Org	Date	Time	6 Received by	Org	Date

Original To Accompany Samples, Laboratory Copy (White) | **1st Copy** To Accompany Samples, Return to SMO (Blue) | **2nd Copy** SMO Suspense Copy (Yellow) | **3rd Copy** Field Copy (Pink)

Sandia National Laboratories
Radiation Protection Sample Diagnostics

Sample Analysis Request Form
Page 1 of 1

To be completed by Customer

Shaded areas are for RPSD use only

Customer: John Cochland
Organization: 6133/MS 1147
Project Location: Site 2 and VCM
Phone:
Date Results Needed:
Suspect Isotopes:
Case Number: 7225.2203

Hazards/Special Instructions:

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
043765-004	Soil	120398/1000	500 ml	Gamma Spec, Gross A/B				
043766-004		120398/1000						
043944-004		120398/1035						
043949-004		120398/1130						
043950-004		120398/1130						
043955-004		120398/1415						
043960-004		120398/1455						
043961-004		120398/1455						
043966-004		120398/1540						

Relinquished by [signature] Date 12/04/98 Received by [signature] Date 12/4/98
Relinquished by _____ Date _____ Received by _____ Date _____
Relinquished by _____ Date _____ Received by _____ Date _____
Relinquished by _____ Date _____ Received by _____ Date _____

RPSD 0602-02

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]       *
*                     12-05-98  9:45:42 AM                                  *
*****************************************************************************
*                                                                           *
* Analyzed by:                12/6/98   Reviewed by:          12/7/98       *
*****************************************************************************
Customer                  : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID        : 043765-004
Lab Sample ID             : 80253901

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   677.000  gram
Sample Date/Time          : 12-03-98  10:00:00 AM
Acquire Start Date/Time   : 12-05-98   8:02:53 AM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6002 seconds

Comments:
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GR-201

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	2.84E+00	8.11E-01	6.64E-01
RA-226	Not Detected	---------	5.53E-01
PB-214	7.37E-01	1.38E-01	4.52E-02
BI-214	6.73E-01	1.25E-01	4.22E-02
PB-210	Not Detected	---------	3.55E+01
TH-232	6.89E-01	3.52E-01	1.47E-01
RA-228	9.03E-01	1.78E-01	1.55E-01
AC-228	7.90E-01	2.76E-01	8.39E-02
TH-228	6.25E-01	2.28E-01	4.92E-01
RA-224	7.36E-01	2.65E-01	6.89E-02
PB-212	7.40E-01	5.23E-01	4.36E-02
BI-212	8.80E-01	6.25E-01	3.41E-01
TL-208	6.74E-01	1.42E-01	6.65E-02
U-235	6.38E-02	6.95E-02	1.27E-01
TH-231	Not Detected	---------	2.37E+00
PA-231	Not Detected	---------	4.09E+00
TH-227	Not Detected	---------	3.55E-01
RA-223	Not Detected	---------	2.41E-01
RN-219	Not Detected	---------	3.93E-01
PB-211	Not Detected	---------	8.72E-01
TL-207	Not Detected	---------	1.41E+01
AM-241	Not Detected	---------	5.18E-01
PU-239	Not Detected	---------	4.54E+02
NP-237	Not Detected	---------	4.23E-01
PA-233	Not Detected	---------	6.05E-02
TH-229	Not Detected	---------	2.74E-01

U-238
2.84 ± 0.811
> bks 1.3

[Summary Report] - Sample ID: : 80253901

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.07E-02
AG-110m	Not Detected	---------	4.69E-02
BA-133	Not Detected	---------	7.03E-02
BE-7	Not Detected	---------	2.74E-01
CD-109	Not Detected	---------	1.40E+00
CD-115	Not Detected	---------	1.23E-01
CE-139	Not Detected	---------	3.02E-02
CE-141	Not Detected	---------	5.79E-02
CE-144	Not Detected	---------	2.51E-01
CO-56	Not Detected	---------	3.60E-02
CO-57	Not Detected	---------	3.14E-02
CO-58	Not Detected	---------	3.47E-02
CO-60	Not Detected	---------	3.60E-02
CR-51	Not Detected	---------	2.44E-01
CS-134	Not Detected	---------	4.88E-02
CS-137	1.65E-01	4.14E-02	2.37E-02
EU-152	Not Detected	---------	9.43E-02
EU-154	Not Detected	---------	1.87E-01
EU-155	Not Detected	---------	1.57E-01
FE-59	Not Detected	---------	7.72E-02
GD-153	Not Detected	---------	1.17E-01
HG-203	Not Detected	---------	3.34E-02
I-131	Not Detected	---------	3.60E-02
IR-192	Not Detected	---------	2.81E-02
K-40	1.95E+01	3.79E+00	5.91E-01
KR-85	Not Detected	---------	8.50E+00
MN-52	Not Detected	---------	3.56E-02
MN-54	Not Detected	---------	3.65E-02
MO-99	Not Detected	---------	4.11E-01
NA-22	Not Detected	---------	4.33E-02
NA-24	Not Detected	---------	2.88E-01
NB-95	Not Detected	---------	2.38E-01
ND-147	Not Detected	---------	2.32E-01
NI-57	Not Detected	---------	6.94E-02
NP-239	Not Detected	---------	1.41E-01
RU-103	Not Detected	---------	3.07E-02
RU-106	Not Detected	---------	2.99E-01
SB-122	Not Detected	---------	6.68E-02
SB-124	Not Detected	---------	3.01E-02
SB-125	Not Detected	---------	8.58E-02
SN-113	Not Detected	---------	3.85E-02
TA-182	Not Detected	---------	1.56E-01
TA-183	Not Detected	---------	5.77E-01
TC-99m	Not Detected	---------	6.81E+00
TL-201	Not Detected	---------	2.97E-01
XE-133	Not Detected	---------	2.85E-01
Y-88	Not Detected	---------	2.70E-02
ZN-65	Not Detected	---------	1.08E-01
ZR-95	Not Detected	---------	5.93E-02

```
*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]       *
*                      12-06-98  2:57:01 PM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:  12/6/98          Reviewed by:  12/7/98                      *
*****************************************************************************
Customer                  : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID        : 043766-004
Lab Sample ID             : 80253902

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   742.000  gram
Sample Date/Time          : 12-03-98  10:00:00 AM
Acquire Start Date/Time   : 12-05-98   9:47:57 AM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6003 seconds

Comments:
*****************************************************************************
```

6R-201 dup

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	1.71E+00	5.45E-01	6.15E-01
RA-226	1.65E+00	6.11E-01	5.29E-01
PB-214	6.47E-01	1.28E-01	4.64E-02
BI-214	6.71E-01	2.79E-01	4.41E-02
PB-210	Not Detected	---------	3.45E+01
TH-232	7.47E-01	3.76E-01	1.36E-01
RA-228	7.76E-01	2.59E-01	1.44E-01
AC-228	7.73E-01	1.92E-01	8.56E-02
TH-228	7.79E-01	2.64E-01	4.72E-01
RA-224	6.87E-01	2.48E-01	7.32E-02
PB-212	7.17E-01	1.37E-01	3.82E-02
BI-212	5.03E-01	4.10E-01	2.65E-01
TL-208	6.64E-01	1.33E-01	6.22E-02
U-235	2.30E-01	2.00E-01	2.34E-01
TH-231	Not Detected	---------	2.22E+00
PA-231	Not Detected	---------	3.89E+00
TH-227	Not Detected	---------	3.33E-01
RA-223	Not Detected	---------	2.17E-01
RN-219	Not Detected	---------	3.63E-01
PB-211	Not Detected	---------	8.34E-01
TL-207	Not Detected	---------	1.27E+01
AM-241	Not Detected	---------	4.60E-01
PU-239	Not Detected	---------	4.35E+02
NP-237	Not Detected	---------	3.00E-01
PA-233	Not Detected	---------	5.46E-02
TH-229	Not Detected	---------	2.48E-01

U-238
1.71 ± 0.545
> 1.3 bkg

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253902

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.71E-02
AG-110m	Not Detected	---------	4.55E-02
BA-133	Not Detected	---------	6.44E-02
BE-7	Not Detected	---------	2.55E-01
CD-109	~~1.29E+00~~	~~4.90E-01~~	1.02E+00 Not Detected
CD-115	Not Detected	---------	1.20E-01
CE-139	Not Detected	---------	2.86E-02
CE-141	Not Detected	---------	5.39E-02
CE-144	Not Detected	---------	2.43E-01
CO-56	Not Detected	---------	3.20E-02
CO-57	Not Detected	---------	2.89E-02
CO-58	Not Detected	---------	3.05E-02
CO-60	Not Detected	---------	3.07E-02
CR-51	Not Detected	---------	2.31E-01
CS-134	Not Detected	---------	4.55E-02
CS-137	1.69E-01	4.38E-02	2.23E-02
EU-152	Not Detected	---------	8.68E-02
EU-154	Not Detected	---------	1.70E-01
EU-155	Not Detected	---------	1.47E-01
FE-59	Not Detected	---------	6.88E-02
GD-153	Not Detected	---------	1.05E-01
HG-203	Not Detected	---------	3.15E-02
I-131	Not Detected	---------	3.20E-02
IR-192	Not Detected	---------	2.60E-02
K-40	1.79E+01	2.65E+00	5.35E-01
KR-85	Not Detected	---------	7.66E+00
MN-52	Not Detected	---------	3.75E-02
MN-54	Not Detected	---------	3.35E-02
MO-99	Not Detected	---------	3.81E-01
NA-22	Not Detected	---------	4.10E-02
NA-24	Not Detected	---------	2.88E-01
NB-95	Not Detected	---------	2.26E-01
ND-147	Not Detected	---------	2.15E-01
NI-57	Not Detected	---------	5.08E-02
NP-239	Not Detected	---------	1.32E-01
RU-103	Not Detected	---------	2.97E-02
RU-106	Not Detected	---------	2.68E-01
SB-122	Not Detected	---------	6.06E-02
SB-124	Not Detected	---------	2.79E-02
SB-125	Not Detected	---------	8.16E-02
SN-113	Not Detected	---------	3.64E-02
TA-182	Not Detected	---------	1.45E-01
TA-183	Not Detected	---------	5.17E-01
TC-99m	Not Detected	---------	7.71E+00
TL-201	Not Detected	---------	2.71E-01
XE-133	Not Detected	---------	2.62E-01
Y-88	Not Detected	---------	2.40E-02
ZN-65	Not Detected	---------	9.83E-02
ZR-95	Not Detected	---------	5.48E-02

12/6/98

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]       *
*                      12-05-98  1:15:41 PM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:  12/6/98    Reviewed by:  12/7/98                            *
*****************************************************************************
Customer                  : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID        : 043944-004
Lab Sample ID             : 80253903

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   847.000  gram
Sample Date/Time          : 12-03-98  10:35:00 AM
Acquire Start Date/Time   : 12-05-98  11:32:53 AM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6003 seconds

Comments:
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6R-206

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	9.79E-01	5.04E-01	5.82E-01
RA-226	1.92E+00	1.07E+00	5.43E-01
PB-214	7.60E-01	1.11E+00	4.22E-02
BI-214	6.87E-01	1.34E-01	3.84E-02
PB-210	Not Detected	---------	3.27E+01
TH-232	9.11E-01	5.99E-01	1.37E-01
RA-228	9.32E-01	2.49E-01	1.33E-01
AC-228	6.88E-01	2.01E-01	7.50E-02
TH-228	7.50E-01	2.33E-01	4.48E-01
RA-224	9.23E-01	2.48E-01	5.88E-02
PB-212	9.01E-01	1.37E-01	3.67E-02
BI-212	1.03E+00	3.22E-01	2.55E-01
TL-208	7.85E-01	1.67E-01	6.13E-02
U-235	Not Detected	---------	2.25E-01
TH-231	Not Detected	---------	2.21E+00
PA-231	Not Detected	---------	3.66E+00
TH-227	Not Detected	---------	3.40E-01
RA-223	Not Detected	---------	2.11E-01
RN-219	Not Detected	---------	3.58E-01
PB-211	Not Detected	---------	8.00E-01
TL-207	Not Detected	---------	1.29E+01
AM-241	Not Detected	---------	4.51E-01
PU-239	Not Detected	---------	4.27E+02
NP-237	~~2.87E-01~~	~~1.24E-01~~	2.62E-01
PA-233	Not Detected	---------	5.62E-02
TH-229	Not Detected	---------	2.40E-01

bkg.

not detected 12/6/98

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253903

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.82E-02
AG-110m	Not Detected	---------	4.07E-02
BA-133	Not Detected	---------	6.45E-02
BE-7	Not Detected	---------	2.49E-01
CD-109	Not Detected	---------	8.91E-01
CD-115	Not Detected	---------	1.20E-01
CE-139	Not Detected	---------	2.84E-02
CE-141	Not Detected	---------	5.26E-02
CE-144	Not Detected	---------	2.39E-01
CO-56	Not Detected	---------	3.19E-02
CO-57	Not Detected	---------	2.90E-02
CO-58	Not Detected	---------	2.96E-02
CO-60	Not Detected	---------	3.24E-02
CR-51	Not Detected	---------	2.22E-01
CS-134	Not Detected	---------	4.27E-02
CS-137	1.43E-01 ✓	3.97E-02	2.17E-02
EU-152	Not Detected	---------	8.72E-02
EU-154	Not Detected	---------	1.74E-01
EU-155	Not Detected	---------	1.44E-01
FE-59	Not Detected	---------	6.62E-02
GD-153	Not Detected	---------	1.00E-01
HG-203	Not Detected	---------	3.00E-02
I-131	Not Detected	---------	3.22E-02
IR-192	Not Detected	---------	2.58E-02
K-40	1.75E+01	2.59E+00	4.71E-01
KR-85	Not Detected	---------	7.76E+00
MN-52	Not Detected	---------	3.32E-02
MN-54	Not Detected	---------	3.26E-02
MO-99	Not Detected	---------	3.68E-01
NA-22	Not Detected	---------	3.81E-02
NA-24	Not Detected	---------	2.79E-01
NB-95	Not Detected	---------	2.33E-01
ND-147	Not Detected	---------	2.08E-01
NI-57	Not Detected	---------	6.17E-02
NP-239	Not Detected	---------	1.29E-01
RU-103	Not Detected	---------	2.73E-02
RU-106	Not Detected	---------	2.53E-01
SB-122	Not Detected	---------	5.99E-02
SB-124	Not Detected	---------	2.60E-02
SB-125	Not Detected	---------	7.59E-02
SN-113	Not Detected	---------	3.40E-02
TA-182	Not Detected	---------	1.42E-01
TA-183	Not Detected	---------	5.07E-01
TC-99m	Not Detected	---------	8.73E+00
TL-201	Not Detected	---------	2.75E-01
XE-133	Not Detected	---------	2.57E-01
Y-88	Not Detected	---------	2.40E-02
ZN-65	Not Detected	---------	9.48E-02
ZR-95	Not Detected	---------	5.40E-02

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [836 Laboratory]       *
*                     12-05-98  3:00:43 PM                                  *
*****************************************************************************
*                                                                           *
* Analyzed by:                12/6/98    Reviewed by:                      *
*****************************************************************************
```

Customer : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID : 043949-004
Lab Sample ID : 80253904

GR-211

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 687.000 gram
Sample Date/Time : 12-03-98 11:30:00 AM
Acquire Start Date/Time : 12-05-98 1:17:54 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	5.41E-01	4.95E-01	5.79E-01
RA-226	1.52E+00	4.69E-01	4.45E-01
PB-214	7.22E-01	1.66E-01	4.76E-02
BI-214	6.56E-01	1.32E-01	4.54E-02
PB-210	Not Detected	---------	3.50E+01
TH-232	7.04E-01	3.71E-01	1.54E-01
RA-228	7.27E-01	2.61E-01	1.51E-01
AC-228	7.14E-01	1.69E-01	9.56E-02
TH-228	8.26E-01	2.80E-01	5.00E-01
RA-224	8.43E-01	2.48E-01	6.87E-02
PB-212	7.82E-01	6.10E-01	4.07E-02
BI-212	7.65E-01	3.65E-01	3.17E-01
TL-208	7.01E-01	1.54E-01	6.52E-02
U-235	Not Detected	---------	2.36E-01
TH-231	Not Detected	---------	2.29E+00
PA-231	Not Detected	---------	3.90E+00
TH-227	Not Detected	---------	3.53E-01
RA-223	Not Detected	---------	2.27E-01
RN-219	Not Detected	---------	3.81E-01
PB-211	Not Detected	---------	8.62E-01
TL-207	Not Detected	---------	1.45E+01
AM-241	Not Detected	---------	4.88E-01
PU-239	Not Detected	---------	4.57E+02
NP-237	Not Detected	---------	3.90E-01
PA-233	Not Detected	---------	5.96E-02
TH-229	Not Detected	---------	2.60E-01

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253904

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.10E-02
AG-110m	Not Detected	---------	3.55E-02
BA-133	Not Detected	---------	6.83E-02
BE-7	Not Detected	---------	2.71E-01
CD-109	~~1.41E+00~~	~~6.60E-01~~	9.14E-01 Not detected
CD-115	Not Detected	---------	1.28E-01
CE-139	~~1.30E-02~~	~~1.03E-02~~	1.89E-02 Not detected
CE-141	Not Detected	---------	[illegible]1E-02
CE-144	Not Detected	---------	[illegible]5E-01
CO-56	Not Detected	---------	3.46E-02
CO-57	Not Detected	---------	3.03E-02
CO-58	Not Detected	---------	3.27E-02
CO-60	Not Detected	---------	3.68E-02
CR-51	Not Detected	---------	2.46E-01
CS-134	Not Detected	---------	4.77E-02
CS-137	4.33E-02	1.84E-02	1.94E-02
EU-152	Not Detected	---------	9.09E-02
EU-154	Not Detected	---------	1.90E-01
EU-155	Not Detected	---------	1.53E-01
FE-59	Not Detected	---------	7.60E-02
GD-153	Not Detected	---------	1.10E-01
HG-203	Not Detected	---------	3.35E-02
I-131	Not Detected	---------	3.37E-02
IR-192	Not Detected	---------	2.81E-02
K-40	1.98E+01	3.58E+00	5.77E-01
KR-85	Not Detected	---------	8.44E+00
MN-52	Not Detected	---------	4.01E-02
MN-54	Not Detected	---------	2.00E-02
MO-99	Not Detected	---------	4.03E-01
NA-22	Not Detected	---------	4.42E-02
NA-24	Not Detected	---------	3.26E-01
NB-95	Not Detected	---------	2.43E-01
ND-147	Not Detected	---------	2.28E-01
NI-57	Not Detected	---------	6.10E-02
NP-239	Not Detected	---------	1.39E-01
RU-103	Not Detected	---------	3.03E-02
RU-106	Not Detected	---------	2.92E-01
SB-122	Not Detected	---------	6.95E-02
SB-124	Not Detected	---------	2.90E-02
SB-125	Not Detected	---------	8.20E-02
SN-113	Not Detected	---------	3.77E-02
TA-182	Not Detected	---------	1.62E-01
TA-183	Not Detected	---------	5.53E-01
TC-99m	Not Detected	---------	9.92E+00
TL-201	Not Detected	---------	2.95E-01
XE-133	Not Detected	---------	2.84E-01
Y-88	Not Detected	---------	2.57E-02
ZN-65	Not Detected	---------	1.09E-01
ZR-95	Not Detected	---------	5.86E-02

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]        *
*                      12-06-98  3:14:27 PM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:                12/6/98    Reviewed by:          12-17-98    *
*****************************************************************************
Customer                  : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID        : 043950-004
Lab Sample ID             : 80253905

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   663.000  gram
Sample Date/Time          : 12-03-98  11:30:00 AM
Acquire Start Date/Time   : 12-05-98   3:02:51 PM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6002 seconds

Comments:
*****************************************************************************
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GR-211 dup

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	7.13E-01	4.53E-01	6.22E-01
RA-226	1.54E+00	8.42E-01	5.71E-01
PB-214	7.43E-01	1.42E-01	4.78E-02
BI-214	6.29E-01	1.19E-01	4.47E-02
PB-210	Not Detected	---------	3.58E+01
TH-232	7.15E-01	3.90E-01	1.70E-01
RA-228	7.65E-01	2.30E-01	1.59E-01
AC-228	7.98E-01	2.02E-01	8.78E-02
TH-228	6.94E-01	2.93E-01	5.14E-01
RA-224	8.25E-01	2.66E-01	6.73E-02
PB-212	7.91E-01	2.43E-01	4.31E-02
BI-212	7.78E-01	3.88E-01	2.92E-01
TL-208	7.14E-01	1.54E-01	6.57E-02
U-235	Not Detected	---------	2.48E-01
TH-231	Not Detected	---------	2.40E+00
PA-231	Not Detected	---------	4.00E+00
TH-227	Not Detected	---------	3.64E-01
RA-223	Not Detected	---------	2.33E-01
RN-219	Not Detected	---------	3.86E-01
PB-211	Not Detected	---------	8.65E-01
TL-207	Not Detected	---------	1.37E+01
AM-241	Not Detected	---------	4.99E-01
PU-239	Not Detected	---------	4.68E+02
NP-237	Not Detected	---------	2.80E-01
PA-233	Not Detected	---------	5.94E-02
TH-229	Not Detected	---------	2.65E-01

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253905

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.18E-02
AG-110m	Not Detected	---------	3.80E-02
BA-133	Not Detected	---------	7.07E-02
BE-7	Not Detected	---------	1.53E-01
CD-109	~~1.68E+00~~	~~8.23E-01~~	9.51E-01 Not detected 12/6/98
CD-115	Not Detected	---------	1.33E-01
CE-139	Not Detected	---------	3.09E-02
CE-141	Not Detected	---------	5.79E-02
CE-144	Not Detected	---------	2.61E-01
CO-56	Not Detected	---------	3.60E-02
CO-57	Not Detected	---------	3.18E-02
CO-58	Not Detected	---------	3.43E-02
CO-60	Not Detected	---------	4.05E-02
CR-51	Not Detected	---------	2.49E-01
CS-134	Not Detected	---------	4.80E-02
CS-137	4.49E-02	2.03E-02	2.28E-02
EU-152	Not Detected	---------	9.54E-02
EU-154	Not Detected	---------	1.92E-01
EU-155	Not Detected	---------	1.55E-01
FE-59	Not Detected	---------	7.53E-02
GD-153	Not Detected	---------	1.11E-01
HG-203	Not Detected	---------	3.35E-02
I-131	Not Detected	---------	3.68E-02
IR-192	Not Detected	---------	2.82E-02
K-40	1.99E+01	3.52E+00	5.91E-01
KR-85	Not Detected	---------	8.51E+00
MN-52	Not Detected	---------	3.60E-02
MN-54	Not Detected	---------	3.67E-02
MO-99	Not Detected	---------	4.00E-01
NA-22	Not Detected	---------	4.43E-02
NA-24	Not Detected	---------	3.66E-01
NB-95	Not Detected	---------	2.54E-01
ND-147	Not Detected	---------	2.38E-01
NI-57	Not Detected	---------	7.60E-02
NP-239	Not Detected	---------	1.40E-01
RU-103	Not Detected	---------	3.23E-02
RU-106	Not Detected	---------	3.03E-01
SB-122	Not Detected	---------	7.21E-02
SB-124	Not Detected	---------	2.99E-02
SB-125	Not Detected	---------	8.30E-02
SN-113	Not Detected	---------	3.84E-02
TA-182	Not Detected	---------	1.59E-01
TA-183	Not Detected	---------	5.71E-01
TC-99m	Not Detected	---------	1.26E+01
TL-201	Not Detected	---------	3.05E-01
XE-133	Not Detected	---------	2.97E-01
Y-88	Not Detected	---------	2.55E-02
ZN-65	Not Detected	---------	1.07E-01
ZR-95	Not Detected	---------	6.12E-02

```
*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]       *
*                      12-06-98  3:26:38 PM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:                12/6/98   Reviewed by:          12/7/98       *
*****************************************************************************
Customer                  : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID        : 043955-004
Lab Sample ID             : 80253906

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   535.000  gram
Sample Date/Time          : 12-03-98   2:15:00 PM
Acquire Start Date/Time   : 12-05-98   4:47:59 PM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6002 seconds

Comments:
*****************************************************************************
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BR-216

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)	
U-238	9.23E-01	4.97E-01	7.64E-01	
RA-226	1.92E+00	6.55E-01	5.60E-01	
PB-214	8.98E-01	2.31E-01	5.33E-02	
BI-214	7.99E-01	1.68E-01	5.23E-02	
PB-210	Not Detected	---------	4.12E+01	bkg
TH-232	7.67E-01	3.87E-01	1.71E-01	
RA-228	1.00E+00	3.83E-01	1.84E-01	
AC-228	9.51E-01	5.50E-01	9.20E-02	
TH-228	8.63E-01	3.74E-01	5.68E-01	
RA-224	9.05E-01	3.00E-01	9.73E-02	
PB-212	8.96E-01	1.59E-01	4.59E-02	
BI-212	9.02E-01	7.35E-01	4.23E-01	
TL-208	8.43E-01	2.91E-01	8.23E-02	
U-235	1.57E-01	2.37E-01	2.78E-01	
~~TH-231~~	~~[illegible]~~	~~[illegible]~~	2.80E+00	not detected 12/6/98
PA-231	Not Detected	---------	4.61E+00	
TH-227	Not Detected	---------	4.31E-01	
RA-223	Not Detected	---------	2.64E-01	
RN-219	Not Detected	---------	4.38E-01	
PB-211	Not Detected	---------	1.00E+00	
TL-207	Not Detected	---------	1.58E+01	
AM-241	Not Detected	---------	5.67E-01	
PU-239	Not Detected	---------	5.35E+02	
~~NP-237~~	~~[illegible]~~	~~[illegible]~~	3.80E-01	not detected 12/6/98
PA-233	Not Detected	---------	7.02E-02	
TH-229	Not Detected	---------	3.07E-01	

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253906

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.91E-02
AG-110m	Not Detected	---------	3.54E-02
BA-133	Not Detected	---------	8.52E-02
BE-7	Not Detected	---------	3.04E-01
CD-109	Not Detected	---------	1.29E+00
CD-115	Not Detected	---------	1.49E-01
CE-139	Not Detected	---------	3.46E-02
CE-141	Not Detected	---------	6.46E-02
CE-144	Not Detected	---------	2.89E-01
CO-56	Not Detected	---------	3.94E-02
CO-57	Not Detected	---------	3.62E-02
CO-58	Not Detected	---------	3.88E-02
CO-60	Not Detected	---------	4.10E-02
CR-51	Not Detected	---------	2.88E-01
CS-134	Not Detected	---------	5.88E-02
CS-137	Not Detected	---------	4.01E-02
EU-152	Not Detected	---------	1.09E-01
EU-154	Not Detected	---------	2.26E-01
EU-155	Not Detected	---------	1.82E-01
FE-59	Not Detected	---------	8.77E-02
GD-153	Not Detected	---------	1.26E-01
HG-203	Not Detected	---------	3.85E-02
I-131	Not Detected	---------	4.10E-02
IR-192	Not Detected	---------	3.34E-02
K-40	1.73E+01	2.71E+00	7.34E-01
KR-85	Not Detected	---------	1.03E+01
MN-52	Not Detected	---------	5.15E-02
MN-54	Not Detected	---------	4.05E-02
MO-99	Not Detected	---------	5.00E-01
NA-22	Not Detected	---------	4.95E-02
NA-24	Not Detected	---------	3.81E-01
NB-95	Not Detected	---------	2.99E-01
ND-147	Not Detected	---------	2.88E-01
NI-57	Not Detected	---------	1.61E-01
NP-239	Not Detected	---------	1.63E-01
RU-103	Not Detected	---------	3.65E-02
RU-106	Not Detected	---------	3.40E-01
SB-122	Not Detected	---------	8.16E-02
SB-124	Not Detected	---------	3.59E-02
SB-125	Not Detected	---------	9.63E-02
SN-113	Not Detected	---------	4.25E-02
TA-182	Not Detected	---------	1.83E-01
TA-183	Not Detected	---------	6.53E-01
TC-99m	Not Detected	---------	1.28E+01
TL-201	Not Detected	---------	3.54E-01
XE-133	Not Detected	---------	3.26E-01
Y-88	Not Detected	---------	3.72E-02
ZN-65	Not Detected	---------	1.23E-01
ZR-95	Not Detected	---------	6.80E-02

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]       *
*                      12-05-98  8:16:01 PM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:                12/6/98     Reviewed by:          12/7/98     *
*****************************************************************************
Customer                  : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID        : 043960-004
Lab Sample ID             : 80253907

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   980.000  gram
Sample Date/Time          : 12-03-98   2:55:00 PM
Acquire Start Date/Time   : 12-05-98   6:32:57 PM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6004 seconds

Comments:
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6R-221

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	8.22E+00	1.94E+00	7.05E-01
RA-226	Not Detected	---------	5.20E-01
PB-214	8.01E-01	1.34E-01	4.41E-02
BI-214	7.22E-01	1.24E-01	3.94E-02
PB-210	Not Detected	---------	3.44E+01
TH-232	9.04E-01	1.63E+00	1.29E-01
RA-228	8.68E-01	2.46E-01	1.29E-01
AC-228	9.16E-01	1.82E-01	7.28E-02
TH-228	7.23E-01	2.39E-01	4.58E-01
RA-224	9.33E-01	2.61E-01	5.04E-02
PB-212	9.15E-01	7.20E-01	3.81E-02
BI-212	9.54E-01	7.52E-01	2.66E-01
TL-208	8.68E-01	1.69E-01	5.77E-02
U-235	2.09E-01	3.76E-01	1.65E-01
TH-231	Not Detected	---------	2.35E+00
PA-231	Not Detected	---------	3.86E+00
TH-227	Not Detected	---------	3.29E-01
RA-223	Not Detected	---------	2.57E-01
RN-219	Not Detected	---------	3.46E-01
PB-211	Not Detected	---------	7.99E-01
TL-207	Not Detected	---------	1.19E+01
AM-241	Not Detected	---------	4.84E-01
PU-239	Not Detected	---------	4.67E+02
NP-237	Not Detected	---------	3.44E-01
PA-233	Not Detected	---------	5.35E-02
TH-229	Not Detected	---------	3.06E-01

8.22 ± 1.94
> bkg 1.3

[Summary Report] - Sample ID: : 80253907

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.55E-02
AG-110m	Not Detected	---------	3.23E-02
BA-133	Not Detected	---------	6.30E-02
BE-7	Not Detected	---------	2.31E-01
CD-109	~~2.38E-00~~	~~6.35E-01~~	1.17E+00 Not detected 12/6/98
CD-115	Not Detected	---------	1.19E-01
CE-139	Not Detected	---------	3.12E-02
CE-141	Not Detected	---------	5.80E-02
CE-144	Not Detected	---------	2.57E-01
CO-56	Not Detected	---------	2.90E-02
CO-57	Not Detected	---------	3.25E-02
CO-58	Not Detected	---------	2.85E-02
CO-60	Not Detected	---------	3.04E-02
CR-51	Not Detected	---------	2.30E-01
CS-134	Not Detected	---------	4.16E-02
CS-137	5.18E-02	2.71E-02	1.83E-02
EU-152	Not Detected	---------	9.75E-02
EU-154	Not Detected	---------	1.63E-01
EU-155	Not Detected	---------	1.63E-01
FE-59	Not Detected	---------	6.20E-02
GD-153	Not Detected	---------	1.32E-01
HG-203	Not Detected	---------	3.10E-02
I-131	Not Detected	---------	3.16E-02
IR-192	Not Detected	---------	2.58E-02
K-40	1.80E+01	3.40E+00	4.17E-01
KR-85	Not Detected	---------	7.21E+00
MN-52	Not Detected	---------	3.09E-02
MN-54	Not Detected	---------	3.05E-02
MO-99	Not Detected	---------	3.86E-01
NA-22	Not Detected	---------	3.63E-02
NA-24	Not Detected	---------	3.01E-01
NB-95	Not Detected	---------	2.30E-01
ND-147	Not Detected	---------	2.07E-01
NI-57	Not Detected	---------	6.55E-02
NP-239	Not Detected	---------	1.46E-01
RU-103	Not Detected	---------	2.58E-02
RU-106	Not Detected	---------	2.53E-01
SB-122	Not Detected	---------	6.09E-02
SB-124	Not Detected	---------	2.68E-02
SB-125	Not Detected	---------	7.50E-02
SN-113	Not Detected	---------	3.47E-02
TA-182	Not Detected	---------	1.29E-01
TA-183	Not Detected	---------	5.52E-01
TC-99m	Not Detected	---------	1.29E+01
TL-201	Not Detected	---------	3.19E-01
XE-133	Not Detected	---------	3.22E-01
Y-88	Not Detected	---------	2.03E-02
ZN-65	Not Detected	---------	8.96E-02
ZR-95	Not Detected	---------	5.11E-02

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]       *
*                      12-06-98  3:43:23 PM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:                12/6/98    Reviewed by:          12/7/98     *
*****************************************************************************
```

Customer : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID : 043961-004
Lab Sample ID : 80253908

6R-221 dupe

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 943.000 gram
Sample Date/Time : 12-03-98 2:55:00 PM
Acquire Start Date/Time : 12-05-98 8:18:19 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	1.18E+00	4.98E-01	5.69E-01
RA-226	2.18E+00	7.56E-01	5.29E-01
PB-214	8.13E-01	6.23E-01	4.36E-02
BI-214	7.34E-01	1.28E-01	3.82E-02
PB-210	Not Detected	---------	3.16E+01
TH-232	8.52E-01	3.98E-01	1.28E-01
RA-228	9.91E-01	3.21E-01	1.29E-01
AC-228	1.02E+00	2.57E-01	6.76E-02
TH-228	8.14E-01	2.39E-01	4.18E-01
RA-224	9.71E-01	2.85E-01	5.84E-02
PB-212	8.86E-01	1.41E-01	3.60E-02
BI-212	1.15E+00	4.08E-01	3.07E-01
TL-208	8.24E-01	3.59E-01	6.12E-02
U-235	Not Detected	---------	2.23E-01
TH-231	Not Detected	---------	2.09E+00
PA-231	Not Detected	---------	3.59E+00
TH-227	Not Detected	---------	3.25E-01
RA-223	Not Detected	---------	2.07E-01
RN-219	Not Detected	---------	3.33E-01
PB-211	Not Detected	---------	7.49E-01
TL-207	Not Detected	---------	1.22E+01
AM-241	Not Detected	---------	4.42E-01
PU-239	Not Detected	---------	4.20E+02
NP-237	~~5.84E-01~~	~~1.70E-01~~	2.48E-01
PA-233	Not Detected	---------	5.31E-02
TH-229	Not Detected	---------	2.44E-01

Not detected 12/6/98

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253908

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.83E-02
AG-110m	Not Detected	---------	3.16E-02
BA-133	Not Detected	---------	6.30E-02
BE-7	Not Detected	---------	2.26E-01
CD-109	Not Detected	---------	8.44E-01
CD-115	Not Detected	---------	1.21E-01
CE-139	Not Detected	---------	2.78E-02
CE-141	Not Detected	---------	5.22E-02
CE-144	Not Detected	---------	2.33E-01
CO-56	Not Detected	---------	2.86E-02
CO-57	Not Detected	---------	2.81E-02
CO-58	Not Detected	---------	2.80E-02
CO-60	Not Detected	---------	3.18E-02
CR-51	Not Detected	---------	2.22E-01
CS-134	Not Detected	---------	4.31E-02
CS-137	4.43E-02	2.44E-02	2.01E-02
EU-152	Not Detected	---------	8.44E-02
EU-154	Not Detected	---------	1.78E-01
EU-155	Not Detected	---------	1.41E-01
FE-59	Not Detected	---------	6.68E-02
GD-153	Not Detected	---------	1.02E-01
HG-203	Not Detected	---------	2.89E-02
I-131	Not Detected	---------	2.98E-02
IR-192	Not Detected	---------	2.52E-02
K-40	1.95E+01	2.79E+00	4.25E-01
KR-85	Not Detected	---------	7.28E+00
MN-52	Not Detected	---------	3.17E-02
MN-54	Not Detected	---------	1.75E-02
MO-99	Not Detected	---------	3.75E-01
NA-22	Not Detected	---------	3.65E-02
NA-24	Not Detected	---------	3.50E-01
NB-95	Not Detected	---------	2.31E-01
ND-147	Not Detected	---------	2.09E-01
NI-57	Not Detected	---------	7.82E-02
NP-239	Not Detected	---------	1.27E-01
RU-103	Not Detected	---------	2.61E-02
RU-106	Not Detected	---------	2.56E-01
SB-122	Not Detected	---------	6.00E-02
SB-124	Not Detected	---------	2.64E-02
SB-125	Not Detected	---------	7.24E-02
SN-113	Not Detected	---------	3.42E-02
TA-182	Not Detected	---------	1.30E-01
TA-183	Not Detected	---------	5.16E-01
TC-99m	Not Detected	---------	1.40E+01
TL-201	Not Detected	---------	2.80E-01
XE-133	Not Detected	---------	2.74E-01
Y-88	Not Detected	---------	2.35E-02
ZN-65	Not Detected	---------	9.09E-02
ZR-95	Not Detected	---------	5.12E-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program [806 Laboratory]
12-05-98 11:46:36 PM

Analyzed by: 12/6/98 Reviewed by: 12/7/98

Customer : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID : 043966-004
Lab Sample ID : 80253909

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 691.000 gram
Sample Date/Time : 12-03-98 3:40:00 PM
Acquire Start Date/Time : 12-05-98 10:03:40 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

6R-226

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	9.29E-01	6.05E-01	7.05E-01
RA-226	1.70E+00	1.88E+00	6.05E-01
PB-214	7.37E-01	5.62E-01	4.91E-02
BI-214	6.83E-01	1.31E-01	4.36E-02
PB-210	Not Detected	---------	3.53E+01
TH-232	9.44E-01	7.48E-01	1.56E-01
RA-228	8.30E-01	2.95E-01	1.61E-01
AC-228	8.13E-01	2.06E-01	7.84E-02
TH-228	1.05E+00	3.10E-01	5.07E-01
RA-224	8.55E-01	2.80E-01	6.79E-02
PB-212	8.24E-01	2.61E-01	4.27E-02
BI-212	8.08E-01	4.54E-01	3.37E-01
TL-208	7.45E-01	4.25E-01	6.51E-02
U-235	1.21E-01	2.09E-01	2.44E-01
TH-231	Not Detected	---------	2.46E+00
PA-231	Not Detected	---------	4.08E+00
TH-227	Not Detected	---------	3.65E-01
RA-223	Not Detected	---------	2.36E-01
RN-219	Not Detected	---------	3.81E-01
PB-211	Not Detected	---------	8.76E-01
TL-207	Not Detected	---------	1.41E+01
AM-241	Not Detected	---------	4.93E-01
PU-239	Not Detected	---------	4.67E+02
NP-237	~~6.14E-01~~	~~2.06E-01~~	2.88E-01
PA-233	Not Detected	---------	6.06E-02
TH-229	Not Detected	---------	2.72E-01

bks

Not detected 12/6/98

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80253909

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.25E-02
AG-110m	Not Detected	---------	4.43E-02
BA-133	Not Detected	---------	7.03E-02
BE-7	Not Detected	---------	2.75E-01
CD-109	Not Detected	---------	9.80E-01
CD-115	Not Detected	---------	1.43E-01
CE-139	Not Detected	---------	3.09E-02
CE-141	Not Detected	---------	5.73E-02
CE-144	Not Detected	---------	2.54E-01
CO-56	Not Detected	---------	3.53E-02
CO-57	Not Detected	---------	3.23E-02
CO-58	Not Detected	---------	3.18E-02
CO-60	Not Detected	---------	3.60E-02
CR-51	Not Detected	---------	2.47E-01
CS-134	Not Detected	---------	4.86E-02
CS-137	1.53E-01	3.84E-02	2.20E-02
EU-152	Not Detected	---------	9.69E-02
EU-154	Not Detected	---------	1.97E-01
EU-155	Not Detected	---------	1.55E-01
FE-59	Not Detected	---------	7.64E-02
GD-153	Not Detected	---------	1.12E-01
HG-203	Not Detected	---------	3.31E-02
I-131	Not Detected	---------	3.62E-02
IR-192	Not Detected	---------	2.85E-02
K-40	1.88E+01	2.78E+00	5.79E-01
KR-85	Not Detected	---------	8.37E+00
MN-52	Not Detected	---------	3.77E-02
MN-54	Not Detected	---------	3.43E-02
MO-99	Not Detected	---------	4.52E-01
NA-22	Not Detected	---------	4.36E-02
NA-24	Not Detected	---------	4.32E-01
NB-95	Not Detected	---------	2.61E-01
ND-147	Not Detected	---------	2.37E-01
NI-57	Not Detected	---------	6.88E-02
NP-239	Not Detected	---------	1.39E-01
RU-103	Not Detected	---------	3.11E-02
RU-106	Not Detected	---------	2.96E-01
SB-122	Not Detected	---------	7.04E-02
SB-124	Not Detected	---------	3.13E-02
SB-125	Not Detected	---------	8.38E-02
SN-113	Not Detected	---------	3.89E-02
TA-182	Not Detected	---------	1.68E-01
TA-183	Not Detected	---------	5.76E-01
TC-99m	Not Detected	---------	1.75E+01
TL-201	Not Detected	---------	3.15E-01
XE-133	Not Detected	---------	3.11E-01
Y-88	Not Detected	---------	2.84E-02
ZN-65	Not Detected	---------	1.11E-01
ZR-95	Not Detected	---------	6.07E-02

ER-229 → 238 AMIR

Internal Lab

Batch No. 900333

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

AR/COC 601619

Dept. No /Mail Stop:	6134/1148	[redacted]	Contract No.: NA
Project/Task Manager	Tijeras Arroyo/Collins,Sue	[redacted]	Case No.: 7225.281
Project Name:	Site 228A	Lab Contact: F. Dominguez/844-7683	SMO Authorization:
Record Center Code:	ER/1309/228A/DAT	Lab Destination: RPSD	Bill To: Sandia National Laboratories
Logbook Ref. No.:	ER 050	SMO Contact/Phone: D.Salmi/848-0963	Supplier Services Dept.:
Service Order No.	CF0 690	Send Report to SMO: S. Jenson/848-0963	P.O. Box 5800 MS 0154
Location	Tech Area N/A		
Building N/A	Room N/A		

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Details	Beginning Depth/ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Use Lab Sample ID
044646-001	TJAOU-228A-GR-229-SS	0	228A	2/15/1999 1055	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044647-001	TJAOU-228A-GR-230-SS	0	228A	2/15/1999 1021	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044648-001	TJAOU-228A-GR-231-SS	0	228A	2/15/1999 1101	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044649-001	TJAOU-228A-GR-232-SS	0	228A	2/15/1999 1105	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044650-001	TJAOU-228A-GR-233-SS	0	228A	2/15/1999 1058	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044651-001	TJAOU-228A-GR-234-SS	0	228A	2/15/1999 1057	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044652-001	TJAOU-228A-GR-235-SS	0	228A	2/15/1999 1015	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044653-001	TJAOU-228A-GR-236-SS	0	228A	2/15/1999 1023	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044654-001	TJAOU-228A-GR-237-SS	0	228A	2/15/1999 0950	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044655-001	TJAOU-228A-GR-238-SS	0	228A	2/15/1999 0948	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]

RMMA	☐ Yes ☐ No	Ref. No.	[redacted]
Sample Disposal	☐ Return to Client	☐ Disposal by lab	[redacted]
Turnaround Time	☐ Normal	☐ Rush	[redacted]
		Required Report Date	[redacted]

Special Instructions/QC Requirements
EDD ☐ Yes ☐ No
Raw Data Package ☐ Yes ☐ No
should be N.D. - count to U-238 @ about 1pCi/g

Please list as separate report.

[redacted]

	Name	Signature	Init	Company/Organization/Phone
Sample Team Members	M. Sanchez	M. Sanchez	MA	Weston/6131/239-7637
	G. Baltazar	G. B.	G. B.	Weston/6131/971-2769

1.Relinquished by M. Sanchez	Org. 6131	Date 2-16-99	Time 10:03	4.Relinquished by	Org.	Date	Time
1. Received by	Org. [illegible]	Date 2/16/99	Time 10 03	4. Received by	Org.	Date	Time
2.Relinquished by	Org. 7578	Date 2/22/99	Time 11:45	5.Relinquished by	Org	Date	Time
2. Received by M. Sanchez	Org. 6131	Date 2-22-99	Time 11:45	5. Received by	Org	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org	Date	Time

Sandia National Laboratories
Radiation Protection Sample Diagnostics

601611

Sample Analysis Request Form
Page 2 of 2

To be completed by Customer

Shaded areas are for RPSD use only

Customer: Sue Collins
Organization: 6134
Project Location: 228A
Phone: 284-2548
Date Results Needed: 2-22-99
Suspect Isotopes: Gamma
Case Number: 7225.281

Hazards/Special Instructions:

CoC 601619

Batch Log Number: 900333
Logged By: [illegible]
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
044646-001	Soil	2-10-99/1055	500 mL	Gamma Spec	13	<300	887g	
647		1021			14		853g	
648		1101			15		666g	
649		1100			16		1075g	
650		1058			17		964g	
651		1057			18		934g	
652		1015			19		838g	
653		1023			20		864g	
654		0950			21		854g	
655		0948			22	<300	835g	
LCS	—	INORG	—	γ spec	23	N/A	N/A	

Relinquished by M Sanchez Date 2-16-99 Received by [illegible] Date 2/16/99
Relinquished by [illegible] Date 2/22/99 Received by [illegible] Date
Relinquished by M Sanchez Date 2-22-99 Received by [illegible] Date
Relinquished by Date Received by Date

RPSD-0602-02 3

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]        *
*                        2/17/99  3:49:11 PM                                 *
*****************************************************************************
*                                                                           *
* Analyzed by:  2/17/99          Reviewed by:  2/22/99                      *
*****************************************************************************
Customer                  : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID        : 044646-001
Lab Sample ID             : 90033313

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   887.000  gram
Sample Date/Time          :  2/15/99  10:55:00 AM
Acquire Start Date/Time   :  2/17/99   8:46:13 AM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6004 seconds

Comments:
*****************************************************************************
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6R-229

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	6.95E-001
RA-226	1.53E+000	7.58E-001	4.90E-001
PB-214	8.18E-001	1.45E-001	3.86E-002
BI-214	7.26E-001	1.38E-001	3.69E-002
PB-210	Not Detected	---------	3.14E+001
TH-232	8.82E-001	4.52E-001	1.43E-001
RA-228	8.29E-001	2.80E-001	1.18E-001
AC-228	8.67E-001	2.16E-001	6.66E-002
TH-228	9.92E-001	2.88E-001	4.03E-001
RA-224	9.73E-001	2.31E-001	4.35E-002
PB-212	8.73E-001	2.16E-001	3.43E-002
BI-212	9.15E-001	4.85E-001	2.67E-001
TL-208	7.91E-001	1.86E-001	5.32E-002
U-235	Not Detected	---------	2.00E-001
TH-231	Not Detected	---------	1.33E+000
PA-231	Not Detected	---------	1.17E+000
TH-227	Not Detected	---------	3.30E-001
RA-223	Not Detected	---------	1.90E-001
RN-219	Not Detected	---------	3.15E-001
PB-211	Not Detected	---------	7.25E-001
TL-207	Not Detected	---------	1.10E+001
AM-241	Not Detected	---------	4.35E-001
PU-239	Not Detected	---------	3.81E+002
NP-237	~~6.37E-001~~	~~3.03E-001~~	2.44E-001 Not detected 2/17/99
PA-233	Not Detected	---------	4.84E-002
TH-229	Not Detected	---------	2.32E-001

all bkg

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033313

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.00E-002
AG-110m	Not Detected	---------	2.79E-002
BA-133	Not Detected	---------	5.35E-002
BE-7	Not Detected	---------	2.18E-001
CD-109	Not Detected	---------	8.29E-001
CD-115	Not Detected	---------	1.03E-001
CE-139	Not Detected	---------	2.58E-002
CE-141	Not Detected	---------	4.49E-002
CE-144	Not Detected	---------	2.09E-001
CO-56	Not Detected	---------	2.73E-002
CO-57	Not Detected	---------	2.74E-002
CO-58	Not Detected	---------	2.57E-002
CO-60	Not Detected	---------	2.70E-002
CR-51	Not Detected	---------	1.98E-001
CS-134	Not Detected	---------	3.11E-002
CS-137	5.31E-002	3.07E-002	1.92E-002
EU-152	Not Detected	---------	8.25E-002
EU-154	Not Detected	---------	1.45E-001
EU-155	Not Detected	---------	1.35E-001
FE-59	Not Detected	---------	5.77E-002
GD-153	Not Detected	---------	9.85E-002
HG-203	Not Detected	---------	2.61E-002
I-131	Not Detected	---------	2.83E-002
IR-192	Not Detected	---------	2.29E-002
K-40	1.82E+001	2.61E+000	1.99E-001
MN-52	Not Detected	---------	3.08E-002
MN-54	Not Detected	---------	2.78E-002
MO-99	Not Detected	---------	3.00E-001
NA-22	Not Detected	---------	3.33E-002
NA-24	Not Detected	---------	2.30E-001
NB-95	Not Detected	---------	2.07E-001
ND-147	Not Detected	---------	1.78E-001
NI-57	Not Detected	---------	5.80E-002
RU-103	Not Detected	---------	2.39E-002
RU-106	Not Detected	---------	2.22E-001
SB-122	Not Detected	---------	5.25E-002
SB-124	Not Detected	---------	2.40E-002
SB-125	Not Detected	---------	6.89E-002
SN-113	Not Detected	---------	3.16E-002
SR-85	Not Detected	---------	3.05E-002
TA-182	Not Detected	---------	1.30E-001
TA-183	Not Detected	---------	4.83E-001
TC-99m	Not Detected	---------	5.20E+000
TL-201	Not Detected	---------	2.46E-001
XE-133	Not Detected	---------	2.29E-001
Y-88	Not Detected	---------	1.97E-002
ZN-65	Not Detected	---------	8.45E-002
ZR-95	Not Detected	---------	4.52E-002

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]       *
*                      2/17/99 12:07:13 PM                                  *
*****************************************************************************
*                                                                           *
* Analyzed by:  2/17/99      Reviewed by:  2/22/99                          *
*****************************************************************************
Customer                  : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID        : 044647-001
Lab Sample ID             : 90033314

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   853.000  gram
Sample Date/Time          :  2/15/99  10:21:00 AM
Acquire Start Date/Time   :  2/17/99  10:27:59 AM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6003 seconds

Comments:
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6R-23C

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	5.92E-001	5.34E-001	5.62E-001
RA-226	1.58E+000	7.21E-001	4.74E-001
PB-214	8.08E-001	1.46E-001	4.37E-002
BI-214	7.50E-001	2.48E-001	3.76E-002
PB-210	Not Detected	---------	3.22E+001
TH-232	8.32E-001	4.25E-001	1.46E-001
RA-228	8.77E-001	2.35E-001	1.11E-001
AC-228	8.62E-001	2.03E-001	6.87E-002
TH-228	1.01E+000	6.49E-001	4.08E-001
RA-224	8.58E-001	2.08E-001	4.48E-002
PB-212	8.38E-001	1.66E-001	3.61E-002
BI-212	8.75E-001	4.18E-001	2.59E-001
TL-208	7.32E-001	1.74E-001	5.43E-002
U-235	1.07E-001	1.64E-001	2.07E-001
TH-231	Not Detected	---------	1.33E+000
PA-231	Not Detected	---------	1.16E+000
TH-227	Not Detected	---------	3.32E-001
RA-223	Not Detected	---------	1.94E-001
RN-219	Not Detected	---------	3.12E-001
PB-211	Not Detected	---------	7.10E-001
TL-207	Not Detected	---------	1.08E+001
AM-241	Not Detected	---------	4.57E-001
PU-239	Not Detected	---------	3.71E+002
NP-237	~~5.16E-001~~	~~2.49E-001~~	2.68E-001 Not detected
PA-233	Not Detected	---------	4.89E-002
TH-229	Not Detected	---------	2.36E-001

all

2/17/99

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033314

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.89E-002
AG-110m	Not Detected	---------	2.68E-002
BA-133	Not Detected	---------	5.46E-002
BE-7	Not Detected	---------	2.14E-001
CD-109	Not Detected	---------	9.12E-001
CD-115	Not Detected	---------	1.05E-001
CE-139	Not Detected	---------	2.67E-002
CE-141	Not Detected	---------	4.65E-002
CE-144	Not Detected	---------	2.00E-001
CO-56	Not Detected	---------	2.90E-002
CO-57	Not Detected	---------	2.70E-002
CO-58	Not Detected	---------	2.71E-002
CO-60	Not Detected	---------	2.98E-002
CR-51	Not Detected	---------	2.01E-001
CS-134	Not Detected	---------	3.10E-002
CS-137	4.28E-002	2.63E-002	1.74E-002
EU-152	Not Detected	---------	8.11E-002
EU-154	Not Detected	---------	1.43E-001
EU-155	Not Detected	---------	1.35E-001
FE-59	Not Detected	---------	5.64E-002
GD-153	Not Detected	---------	9.99E-002
HG-203	Not Detected	---------	2.68E-002
I-131	Not Detected	---------	2.79E-002
IR-192	Not Detected	---------	2.36E-002
K-40	1.53E+001	2.25E+000	2.26E-001
MN-52	Not Detected	---------	2.94E-002
MN-54	Not Detected	---------	1.28E-002
MO-99	Not Detected	---------	3.09E-001
NA-22	Not Detected	---------	3.41E-002
NA-24	Not Detected	---------	2.26E-001
NB-95	Not Detected	---------	2.11E-001
ND-147	Not Detected	---------	1.85E-001
NI-57	Not Detected	---------	1.03E-001
RU-103	Not Detected	---------	2.48E-002
RU-106	Not Detected	---------	2.17E-001
SB-122	Not Detected	---------	5.15E-002
SB-124	Not Detected	---------	2.37E-002
SB-125	Not Detected	---------	7.20E-002
SN-113	Not Detected	---------	3.08E-002
SR-85	Not Detected	---------	3.05E-002
TA-182	Not Detected	---------	1.33E-001
TA-183	Not Detected	---------	5.17E-001
TC-99m	Not Detected	---------	6.84E+000
TL-201	Not Detected	---------	2.53E-001
XE-133	Not Detected	---------	2.33E-001
Y-88	Not Detected	---------	2.09E-002
ZN-65	Not Detected	---------	8.62E-002
ZR-95	Not Detected	---------	4.50E-002

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]       *
*                        2/17/99  4:09:58 PM                                *
*****************************************************************************
*                                                                           *
* Analyzed by:  2/17/99        Reviewed by:  2/22/99                        *
*****************************************************************************
Customer                  : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID        : 044648-001
Lab Sample ID             : 90033315

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   666.000  gram
Sample Date/Time          :  2/15/99  11:01:00 AM
Acquire Start Date/Time   :  2/17/99  12:08:45 PM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6003 seconds

Comments:
*****************************************************************************
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GR-231

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	7.96E-001
RA-226	1.58E+000	7.81E-001	5.75E-001
PB-214	8.46E-001	1.58E-001	5.01E-002
BI-214	7.96E-001	2.78E-001	4.91E-002
PB-210	Not Detected	---------	3.85E+001
TH-232	8.35E-001	4.53E-001	1.67E-001
RA-228	9.38E-001	3.96E-001	1.32E-001
AC-228	8.18E-001	2.29E-001	8.37E-002
TH-228	7.90E-001	2.62E-001	4.84E-001
RA-224	8.27E-001	2.08E-001	5.31E-002
PB-212	8.42E-001	4.17E-001	4.28E-002
BI-212	9.93E-001	5.74E-001	2.88E-001
TL-208	7.84E-001	1.97E-001	6.27E-002
U-235	Not Detected	---------	2.40E-001
TH-231	Not Detected	---------	1.49E+000
PA-231	Not Detected	---------	1.43E+000
TH-227	Not Detected	---------	3.78E-001
RA-223	Not Detected	---------	2.22E-001
RN-219	Not Detected	---------	3.88E-001
PB-211	Not Detected	---------	8.63E-001
TL-207	Not Detected	---------	1.23E+001
AM-241	Not Detected	---------	5.26E-001
PU-239	Not Detected	---------	4.28E+002
NP-237	~~4.97E-001~~	~~2.43E-001~~	2.41E-001 Not Detected
PA-233	Not Detected	---------	5.76E-002
TH-229	Not Detected	---------	2.79E-001

all

2/17/99

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033315

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.42E-002
AG-110m	Not Detected	---------	6.48E-002
BA-133	Not Detected	---------	6.37E-002
BE-7	Not Detected	---------	2.82E-001
CD-109	Not Detected	---------	8.18E-001
CD-115	Not Detected	---------	1.26E-001
CE-139	Not Detected	---------	3.05E-002
CE-141	Not Detected	---------	5.45E-002
CE-144	Not Detected	---------	2.34E-001
CO-56	Not Detected	---------	3.23E-002
CO-57	Not Detected	---------	3.13E-002
CO-58	Not Detected	---------	3.18E-002
CO-60	Not Detected	---------	3.48E-002
CR-51	Not Detected	---------	2.37E-001
CS-134	Not Detected	---------	3.75E-002
CS-137	6.21E-001	1.09E-001	2.48E-002
EU-152	Not Detected	---------	9.40E-002
EU-154	Not Detected	---------	1.66E-001
EU-155	Not Detected	---------	1.51E-001
FE-59	Not Detected	---------	7.08E-002
GD-153	Not Detected	---------	1.18E-001
HG-203	Not Detected	---------	3.19E-002
I-131	Not Detected	---------	3.40E-002
IR-192	Not Detected	---------	2.75E-002
K-40	1.64E+001	2.72E+000	2.65E-001
MN-52	Not Detected	---------	3.62E-002
MN-54	Not Detected	---------	3.49E-002
MO-99	Not Detected	---------	3.59E-001
NA-22	Not Detected	---------	3.81E-002
NA-24	Not Detected	---------	3.14E-001
NB-95	Not Detected	---------	2.42E-001
ND-147	Not Detected	---------	2.20E-001
NI-57	Not Detected	---------	7.29E-002
RU-103	Not Detected	---------	2.91E-002
RU-106	Not Detected	---------	2.67E-001
SB-122	Not Detected	---------	6.75E-002
SB-124	Not Detected	---------	2.95E-002
SB-125	Not Detected	---------	9.13E-002
SN-113	Not Detected	---------	3.88E-002
SR-85	Not Detected	---------	3.54E-002
TA-182	Not Detected	---------	1.55E-001
TA-183	Not Detected	---------	6.03E-001
TC-99m	Not Detected	---------	8.80E+000
TL-201	Not Detected	---------	2.90E-001
XE-133	Not Detected	---------	2.80E-001
Y-88	Not Detected	---------	2.37E-002
ZN-65	Not Detected	---------	1.00E-001
ZR-95	Not Detected	---------	5.44E-002

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*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]       *
*                        2/18/99  8:02:32 AM                                *
*****************************************************************************
*                                                                           *
* Analyzed by: 2/18/99          Reviewed by: 2/22/99                        *
*****************************************************************************
```

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044649-001
Lab Sample ID : 90033316

ER-232

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 1075.000 gram
Sample Date/Time : 2/15/99 11:05:00 AM
Acquire Start Date/Time : 2/17/99 4:18:42 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	---------	6.28E-001
RA-226	1.61E+000	1.14E+000	4.82E-001
PB-214	7.70E-001	1.37E-001	3.64E-002
BI-214	6.94E-001	1.29E-001	3.42E-002
PB-210	Not Detected	---------	2.87E+001
TH-232	9.07E-001	4.42E-001	1.14E-001
RA-228	9.27E-001	2.57E-001	1.10E-001
AC-228	8.54E-001	2.07E-001	6.26E-002
TH-228	9.23E-001	2.72E-001	3.58E-001
RA-224	9.59E-001	2.24E-001	3.56E-002
PB-212	8.46E-001	1.55E-001	3.16E-002
BI-212	9.76E-001	4.83E-001	2.34E-001
TL-208	7.60E-001	3.96E-001	4.91E-002
U-235	9.03E-002	1.50E-001	1.90E-001
TH-231	Not Detected	---------	1.22E+000
PA-231	Not Detected	---------	1.08E+000
TH-227	Not Detected	---------	2.93E-001
RA-223	Not Detected	---------	1.80E-001
RN-219	Not Detected	---------	2.78E-001
PB-211	Not Detected	---------	6.44E-001
TL-207	Not Detected	---------	1.01E+001
AM-241	Not Detected	---------	4.17E-001
PU-239	Not Detected	---------	3.50E+002
NP-237	~~6.02E-001~~	~~2.96E-001~~	2.28E-001 Not detected 2/18/99
PA-233	Not Detected	---------	4.50E-002
TH-229	Not Detected	---------	2.23E-001

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033316

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.69E-002
AG-110m	Not Detected	---------	2.86E-002
BA-133	Not Detected	---------	4.78E-002
BE-7	Not Detected	---------	1.91E-001
CD-109	Not Detected	---------	7.75E-001
CD-115	Not Detected	---------	1.02E-001
CE-139	Not Detected	---------	2.46E-002
CE-141	Not Detected	---------	4.28E-002
CE-144	Not Detected	---------	1.93E-001
CO-56	Not Detected	---------	2.44E-002
CO-57	Not Detected	---------	2.49E-002
CO-58	Not Detected	---------	2.52E-002
CO-60	Not Detected	---------	2.76E-002
CR-51	Not Detected	---------	1.82E-001
CS-134	Not Detected	---------	2.77E-002
CS-137	9.59E-002	3.31E-002	1.71E-002
EU-152	Not Detected	---------	7.46E-002
EU-154	Not Detected	---------	1.32E-001
EU-155	Not Detected	---------	1.23E-001
FE-59	Not Detected	---------	5.67E-002
GD-153	Not Detected	---------	9.09E-002
HG-203	Not Detected	---------	2.50E-002
I-131	Not Detected	---------	2.57E-002
IR-192	Not Detected	---------	2.12E-002
K-40	2.11E+001	2.97E+000	1.77E-001
MN-52	Not Detected	---------	3.11E-002
MN-54	Not Detected	---------	2.65E-002
MO-99	Not Detected	---------	2.97E-001
NA-22	Not Detected	---------	3.21E-002
NA-24	Not Detected	---------	2.99E-001
NB-95	Not Detected	---------	1.95E-001
ND-147	Not Detected	---------	1.66E-001
NI-57	Not Detected	---------	6.50E-002
RU-103	Not Detected	---------	2.22E-002
RU-106	Not Detected	---------	2.16E-001
SB-122	Not Detected	---------	5.38E-002
SB-124	Not Detected	---------	2.18E-002
SB-125	Not Detected	---------	6.58E-002
SN-113	Not Detected	---------	2.78E-002
SR-85	Not Detected	---------	2.76E-002
TA-182	Not Detected	---------	1.18E-001
TA-183	Not Detected	---------	4.82E-001
TC-99m	Not Detected	---------	1.13E+001
TL-201	Not Detected	---------	2.44E-001
XE-133	Not Detected	---------	2.31E-001
Y-88	Not Detected	---------	1.70E-002
ZN-65	Not Detected	---------	7.74E-002
ZR-95	Not Detected	---------	4.12E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/17/99 7:41:07 PM *
****

Analyzed by: 2/18/99 Reviewed by: 2/22/99

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044650-001
Lab Sample ID : 90033317

6R-233

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 964.000 gram
Sample Date/Time : 2/15/99 10:58:00 AM
Acquire Start Date/Time : 2/17/99 6:00:51 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	---------	6.51E-001
RA-226	1.64E+000	8.45E-001	4.44E-001
PB-214	7.19E-001	1.29E-001	3.66E-002
BI-214	6.56E-001	1.24E-001	3.60E-002
PB-210	Not Detected	---------	3.06E+001
TH-232	8.28E-001	4.24E-001	1.23E-001
RA-228	7.95E-001	2.50E-001	1.08E-001
AC-228	8.09E-001	1.99E-001	6.31E-002
TH-228	7.60E-001	5.09E-001	3.80E-001
RA-224	8.40E-001	2.01E-001	4.47E-002
PB-212	7.83E-001	2.44E-001	3.41E-002
BI-212	1.03E+000	5.07E-001	2.43E-001
TL-208	7.33E-001	1.55E-001	4.98E-002
U-235	Not Detected	---------	1.89E-001
TH-231	Not Detected	---------	1.23E+000
PA-231	Not Detected	---------	1.12E+000
TH-227	Not Detected	---------	3.01E-001
RA-223	Not Detected	---------	1.86E-001
RN-219	Not Detected	---------	2.92E-001
PB-211	Not Detected	---------	6.60E-001
TL-207	Not Detected	---------	1.08E+001
AM-241	Not Detected	---------	4.11E-001
PU-239	Not Detected	---------	3.55E+002
NP-237	Not Detected	---------	2.82E-001
PA-233	Not Detected	---------	4.57E-002
TH-229	Not Detected	---------	2.31E-001

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033317

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.85E-002
AG-110m	Not Detected	---------	2.98E-002
BA-133	Not Detected	---------	4.93E-002
BE-7	Not Detected	---------	2.03E-001
CD-109	Not Detected	---------	9.57E-001
CD-115	Not Detected	---------	1.09E-001
CE-139	Not Detected	---------	2.49E-002
CE-141	Not Detected	---------	4.28E-002
CE-144	Not Detected	---------	1.96E-001
CO-56	Not Detected	---------	2.47E-002
CO-57	Not Detected	---------	2.54E-002
CO-58	Not Detected	---------	2.36E-002
CO-60	Not Detected	---------	2.86E-002
CR-51	Not Detected	---------	1.87E-001
CS-134	Not Detected	---------	2.83E-002
CS-137	1.04E-001	3.70E-002	1.68E-002
EU-152	Not Detected	---------	7.62E-002
EU-154	Not Detected	---------	1.38E-001
EU-155	Not Detected	---------	1.25E-001
FE-59	Not Detected	---------	5.45E-002
GD-153	Not Detected	---------	9.50E-002
HG-203	Not Detected	---------	2.62E-002
I-131	Not Detected	---------	2.65E-002
IR-192	Not Detected	---------	2.15E-002
K-40	1.77E+001	2.54E+000	2.01E-001
MN-52	Not Detected	---------	3.14E-002
MN-54	Not Detected	---------	2.71E-002
MO-99	Not Detected	---------	3.07E-001
NA-22	Not Detected	---------	3.16E-002
NA-24	Not Detected	---------	3.17E-001
NB-95	Not Detected	---------	2.04E-001
ND-147	Not Detected	---------	1.72E-001
NI-57	Not Detected	---------	5.98E-002
RU-103	Not Detected	---------	2.20E-002
RU-106	Not Detected	---------	2.10E-001
SB-122	Not Detected	---------	5.30E-002
SB-124	Not Detected	---------	2.23E-002
SB-125	Not Detected	---------	6.79E-002
SN-113	Not Detected	---------	3.00E-002
SR-85	Not Detected	---------	2.78E-002
TA-182	Not Detected	---------	1.19E-001
TA-183	Not Detected	---------	4.80E-001
TC-99m	Not Detected	---------	1.44E+001
TL-201	Not Detected	---------	2.48E-001
XE-133	Not Detected	---------	2.40E-001
Y-88	Not Detected	---------	2.08E-002
ZN-65	Not Detected	---------	7.85E-002
ZR-95	Not Detected	---------	4.32E-002

```
*****************************************************************************
*                    Sandia National Laboratories                           *
*    Radiation Protection Sample Diagnostics Program [806 Laboratory]       *
*                        2/17/99  9:22:57 PM                                *
*****************************************************************************
*                                                                           *
* Analyzed by:  2/18/99      Reviewed by:  2/22/99                          *
*****************************************************************************
Customer                  : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID        : 044651-001
Lab Sample ID             : 90033318

Sample Description        : MARINELLI SOLID SAMPLE
Sample Quantity           :   934.000  gram
Sample Date/Time          :  2/15/99  10:57:00 AM
Acquire Start Date/Time   :  2/17/99   7:42:41 PM
Detector Name             : LAB02
Elapsed Live/Real Time    :   6000 /   6004 seconds

Comments:
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ER-234

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	6.68E-001
RA-226	1.77E+000	1.91E+000	4.94E-001
PB-214	8.33E-001	1.42E-001	3.80E-002
BI-214	7.55E-001	2.32E-001	3.62E-002
PB-210	Not Detected	---------	3.04E+001
TH-232	8.53E-001	7.79E-001	1.29E-001
RA-228	9.24E-001	2.56E-001	1.15E-001
AC-228	8.93E-001	1.88E-001	6.34E-002
TH-228	8.88E-001	6.63E-001	4.12E-001
RA-224	9.31E-001	2.22E-001	4.98E-002
PB-212	8.70E-001	1.29E-001	3.15E-002
BI-212	8.61E-001	4.00E-001	2.56E-001
TL-208	7.51E-001	1.59E-001	5.06E-002
U-235	Not Detected	---------	1.99E-001
TH-231	Not Detected	---------	1.26E+000
PA-231	Not Detected	---------	1.15E+000
TH-227	Not Detected	---------	3.19E-001
RA-223	Not Detected	---------	1.94E-001
RN-219	Not Detected	---------	2.95E-001
PB-211	Not Detected	---------	6.68E-001
TL-207	Not Detected	---------	1.07E+001
AM-241	Not Detected	---------	4.17E-001
PU-239	Not Detected	---------	3.66E+002
NP-237	~~6.31E-001~~	~~2.60E-001~~	2.83E-001 Not detected
PA-233	Not Detected	---------	4.64E-002
TH-229	Not Detected	---------	2.24E-001

all bkg

2/18/99

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033318

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.86E-002
AG-110m	Not Detected	---------	2.61E-002
BA-133	Not Detected	---------	5.30E-002
BE-7	Not Detected	---------	2.06E-001
CD-109	Not Detected	---------	9.61E-001
CD-115	Not Detected	---------	1.16E-001
CE-139	Not Detected	---------	2.52E-002
CE-141	Not Detected	---------	4.56E-002
CE-144	Not Detected	---------	1.97E-001
CO-56	Not Detected	---------	2.77E-002
CO-57	Not Detected	---------	2.64E-002
CO-58	Not Detected	---------	2.53E-002
CO-60	Not Detected	---------	2.75E-002
CR-51	Not Detected	---------	1.93E-001
CS-134	Not Detected	---------	2.97E-002
CS-137	2.54E-002	2.38E-002	1.80E-002
EU-152	Not Detected	---------	7.86E-002
EU-154	Not Detected	---------	1.40E-001
EU-155	Not Detected	---------	1.27E-001
FE-59	Not Detected	---------	5.61E-002
GD-153	Not Detected	---------	9.45E-002
HG-203	Not Detected	---------	2.56E-002
I-131	Not Detected	---------	2.73E-002
IR-192	Not Detected	---------	2.25E-002
K-40	1.67E+001	2.39E+000	2.23E-001
MN-52	Not Detected	---------	3.21E-002
MN-54	Not Detected	---------	2.74E-002
MO-99	Not Detected	---------	3.41E-001
NA-22	Not Detected	---------	3.33E-002
NA-24	Not Detected	---------	3.66E-001
NB-95	Not Detected	---------	2.19E-001
ND-147	Not Detected	---------	1.77E-001
NI-57	Not Detected	---------	5.82E-002
RU-103	Not Detected	---------	2.27E-002
RU-106	Not Detected	---------	2.21E-001
SB-122	Not Detected	---------	5.76E-002
SB-124	Not Detected	---------	2.30E-002
SB-125	Not Detected	---------	6.54E-002
SN-113	Not Detected	---------	2.92E-002
SR-85	Not Detected	---------	2.90E-002
TA-182	Not Detected	---------	1.24E-001
TA-183	Not Detected	---------	4.93E-001
TC-99m	Not Detected	---------	1.80E+001
TL-201	Not Detected	---------	2.63E-001
XE-133	Not Detected	---------	2.57E-001
Y-88	Not Detected	---------	2.00E-002
ZN-65	Not Detected	---------	8.11E-002
ZR-95	Not Detected	---------	4.13E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/18/99 8:38:37 AM *
****
* *
* Analyzed by: 2/18/99 Reviewed by: 2/22/99 *
****

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044652-001
Lab Sample ID : 90033319

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 838.000 gram
Sample Date/Time : 2/15/99 10:15:00 AM
Acquire Start Date/Time : 2/17/99 9:24:30 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6004 seconds

GR-235

Comments:
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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	7.36E-001
RA-226	1.63E+000	7.09E-001	5.16E-001
PB-214	8.54E-001	1.47E-001	4.36E-002
BI-214	7.66E-001	1.33E-001	4.12E-002
PB-210	Not Detected	---------	3.49E+001
TH-232	9.61E-001	5.06E-001	1.56E-001
RA-228	9.94E-001	3.01E-001	1.29E-001
AC-228	9.35E-001	2.21E-001	7.36E-002
TH-228	8.52E-001	2.52E-001	4.52E-001
RA-224	9.51E-001	2.28E-001	5.71E-002
PB-212	9.44E-001	2.86E-001	3.73E-002
BI-212	1.04E+000	5.16E-001	3.07E-001
TL-208	8.36E-001	1.74E-001	6.19E-002
U-235	Not Detected	---------	2.21E-001
TH-231	Not Detected	---------	1.36E+000
PA-231	Not Detected	---------	1.28E+000
TH-227	Not Detected	---------	3.56E-001
RA-223	Not Detected	---------	2.09E-001
RN-219	Not Detected	---------	3.54E-001
PB-211	Not Detected	---------	7.97E-001
TL-207	Not Detected	---------	1.16E+001
AM-241	Not Detected	---------	4.64E-001
PU-239	Not Detected	---------	4.10E+002
NP-237	~~6.73E-001~~	~~3.39E-001~~	3.08E-001 Not detected 2/18/99
PA-233	Not Detected	---------	5.31E-002
TH-229	Not Detected	---------	2.58E-001

all bkgo

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033319

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.16E-002
AG-110m	Not Detected	---------	5.09E-002
BA-133	Not Detected	---------	5.70E-002
BE-7	Not Detected	---------	2.31E-001
CD-109	Not Detected	---------	1.05E+000
CD-115	Not Detected	---------	1.37E-001
CE-139	Not Detected	---------	2.80E-002
CE-141	Not Detected	---------	4.95E-002
CE-144	Not Detected	---------	2.18E-001
CO-56	Not Detected	---------	2.91E-002
CO-57	Not Detected	---------	2.89E-002
CO-58	Not Detected	---------	2.78E-002
CO-60	Not Detected	---------	3.29E-002
CR-51	Not Detected	---------	2.19E-001
CS-134	Not Detected	---------	3.24E-002
CS-137	4.56E-001	8.36E-002	2.07E-002
EU-152	Not Detected	---------	8.63E-002
EU-154	Not Detected	---------	1.53E-001
EU-155	Not Detected	---------	1.37E-001
FE-59	Not Detected	---------	6.26E-002
GD-153	Not Detected	---------	1.07E-001
HG-203	Not Detected	---------	3.01E-002
I-131	Not Detected	---------	3.14E-002
IR-192	Not Detected	---------	2.53E-002
K-40	1.99E+001	2.85E+000	2.20E-001
MN-52	Not Detected	---------	3.58E-002
MN-54	Not Detected	---------	3.17E-002
MO-99	Not Detected	---------	3.66E-001
NA-22	Not Detected	---------	3.62E-002
NA-24	Not Detected	---------	4.72E-001
NB-95	Not Detected	---------	2.49E-001
ND-147	Not Detected	---------	2.03E-001
NI-57	Not Detected	---------	7.46E-002
RU-103	Not Detected	---------	2.70E-002
RU-106	Not Detected	---------	2.48E-001
SB-122	Not Detected	---------	6.55E-002
SB-124	Not Detected	---------	2.59E-002
SB-125	Not Detected	---------	7.87E-002
SN-113	Not Detected	---------	3.53E-002
SR-85	Not Detected	---------	3.20E-002
TA-182	Not Detected	---------	1.40E-001
TA-183	Not Detected	---------	5.53E-001
TC-99m	Not Detected	---------	2.62E+001
TL-201	Not Detected	---------	2.95E-001
XE-133	Not Detected	---------	2.92E-001
Y-88	Not Detected	---------	2.11E-002
ZN-65	Not Detected	---------	9.27E-002
ZR-95	Not Detected	---------	4.82E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/18/99 12:46:35 AM *
****

* Analyzed by: 2/18/99 Reviewed by: 2/22/99 *

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044653-001
Lab Sample ID : 90033320

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 864.000 gram
Sample Date/Time : 2/15/99 10:23:00 AM
Acquire Start Date/Time : 2/17/99 11:06:19 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6004 seconds

ER-236

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	7.09E-001
RA-226	1.46E+000	4.02E-001	4.92E-001
PB-214	7.57E-001	3.74E-001	4.22E-002
BI-214	7.09E-001	1.43E-001	3.97E-002
PB-210	Not Detected	---------	3.37E+001
TH-232	7.38E-001	1.44E+000	1.53E-001
RA-228	9.06E-001	2.60E-001	1.26E-001
AC-228	8.48E-001	2.20E-001	7.28E-002
TH-228	8.84E-001	3.45E-001	4.21E-001
RA-224	8.18E-001	1.99E-001	4.71E-002
PB-212	8.71E-001	2.34E-001	3.17E-002
BI-212	1.05E+000	5.53E-001	2.61E-001
TL-208	7.93E-001	3.17E-001	5.70E-002
U-235	1.08E-001	1.64E-001	2.07E-001
TH-231	Not Detected	---------	1.38E+000
PA-231	Not Detected	---------	1.25E+000
TH-227	Not Detected	---------	3.32E-001
RA-223	Not Detected	---------	2.08E-001
RN-219	Not Detected	---------	3.15E-001
PB-211	Not Detected	---------	7.21E-001
TL-207	Not Detected	---------	1.18E+001
AM-241	Not Detected	---------	4.52E-001
PU-239	Not Detected	---------	3.82E+002
NP-237	Not Detected	---------	2.62E-001
PA-233	Not Detected	---------	5.10E-002
TH-229	Not Detected	---------	2.48E-001

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033320

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.12E-002
AG-110m	Not Detected	---------	3.41E-002
BA-133	Not Detected	---------	5.41E-002
BE-7	8.63E-002	1.63E-001	1.32E-001
CD-109	Not Detected	---------	8.91E-001
CD-115	Not Detected	---------	1.26E-001
CE-139	Not Detected	---------	2.70E-002
CE-141	Not Detected	---------	4.67E-002
CE-144	Not Detected	---------	2.09E-001
CO-56	Not Detected	---------	2.94E-002
CO-57	Not Detected	---------	2.83E-002
CO-58	Not Detected	---------	2.80E-002
CO-60	Not Detected	---------	3.19E-002
CR-51	Not Detected	---------	2.19E-001
CS-134	Not Detected	---------	3.13E-002
CS-137	1.19E-001	3.92E-002	1.93E-002
EU-152	Not Detected	---------	8.50E-002
EU-154	Not Detected	---------	1.54E-001
EU-155	Not Detected	---------	1.39E-001
FE-59	Not Detected	---------	6.44E-002
GD-153	Not Detected	---------	1.03E-001
HG-203	Not Detected	---------	2.84E-002
I-131	Not Detected	---------	3.00E-002
IR-192	Not Detected	---------	2.48E-002
K-40	2.28E+001	3.22E+000	2.25E-001
MN-52	Not Detected	---------	3.50E-002
MN-54	Not Detected	---------	1.50E-002
MO-99	Not Detected	---------	3.68E-001
NA-22	Not Detected	---------	3.68E-002
NA-24	Not Detected	---------	4.91E-001
NB-95	Not Detected	---------	2.34E-001
ND-147	Not Detected	---------	1.99E-001
NI-57	Not Detected	---------	1.45E-001
RU-103	Not Detected	---------	2.58E-002
RU-106	Not Detected	---------	2.44E-001
SB-122	Not Detected	---------	3.66E-002
SB-124	Not Detected	---------	2.56E-002
SB-125	Not Detected	---------	7.26E-002
SN-113	Not Detected	---------	3.22E-002
SR-85	Not Detected	---------	3.14E-002
TA-182	Not Detected	---------	1.36E-001
TA-183	Not Detected	---------	5.52E-001
TC-99m	Not Detected	---------	2.98E+001
TL-201	Not Detected	---------	2.92E-001
XE-133	Not Detected	---------	2.88E-001
Y-88	Not Detected	---------	2.20E-002
ZN-65	Not Detected	---------	8.71E-002
ZR-95	Not Detected	---------	4.90E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/18/99 8:53:43 AM *
****

* Analyzed by: 2/18/99 Reviewed by: 2/22/99 *

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044654-001
Lab Sample ID : 90033321

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 854.000 gram
Sample Date/Time : 2/15/99 9:50:00 AM
Acquire Start Date/Time : 2/18/99 12:48:08 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

6R-237

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	6.91E-001
RA-226	1.67E+000	7.57E-001	4.47E-001
PB-214	7.75E-001	3.31E-001	4.05E-002
BI-214	6.56E-001	2.37E-001	3.92E-002
PB-210	Not Detected	---------	3.27E+001
TH-232	7.54E-001	4.04E-001	1.42E-001
RA-228	8.43E-001	2.73E-001	1.18E-001
AC-228	7.52E-001	2.08E-001	7.49E-002
TH-228	8.73E-001	4.75E-001	4.30E-001
RA-224	8.29E-001	2.02E-001	5.27E-002
PB-212	7.63E-001	1.69E-001	3.61E-002
BI-212	9.29E-001	4.68E-001	2.51E-001
TL-208	7.29E-001	1.66E-001	5.43E-002
U-235	Not Detected	---------	2.06E-001
TH-231	Not Detected	---------	1.32E+000
PA-231	Not Detected	---------	1.20E+000
TH-227	Not Detected	---------	3.20E-001
RA-223	Not Detected	---------	2.02E-001
RN-219	Not Detected	---------	3.23E-001
PB-211	Not Detected	---------	7.20E-001
TL-207	Not Detected	---------	1.18E+001
AM-241	Not Detected	---------	4.40E-001
PU-239	Not Detected	---------	3.79E+002
NP-237	~~6.36E-001~~	~~3.47E-001~~	2.90E-001 Not detected
PA-233	Not Detected	---------	4.74E-002
TH-229	Not Detected	---------	2.45E-001

all

2/18/99

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033321

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.03E-002
AG-110m	Not Detected	---------	2.81E-002
BA-133	Not Detected	---------	5.37E-002
BE-7	Not Detected	---------	2.18E-001
CD-109	Not Detected	---------	9.85E-001
CD-115	Not Detected	---------	1.28E-001
CE-139	Not Detected	---------	2.55E-002
CE-141	Not Detected	---------	4.65E-002
CE-144	Not Detected	---------	2.02E-001
CO-56	Not Detected	---------	2.68E-002
CO-57	Not Detected	---------	2.64E-002
CO-58	Not Detected	---------	2.77E-002
CO-60	Not Detected	---------	3.05E-002
CR-51	Not Detected	---------	2.02E-001
CS-134	Not Detected	---------	3.07E-002
CS-137	3.80E-002	2.43E-002	1.92E-002
EU-152	Not Detected	---------	7.93E-002
EU-154	Not Detected	---------	1.48E-001
EU-155	Not Detected	---------	1.34E-001
FE-59	Not Detected	---------	6.66E-002
GD-153	Not Detected	---------	1.01E-001
HG-203	Not Detected	---------	2.71E-002
I-131	Not Detected	---------	3.04E-002
IR-192	Not Detected	---------	2.34E-002
K-40	2.11E+001	3.04E+000	2.18E-001
MN-52	Not Detected	---------	3.37E-002
MN-54	Not Detected	---------	3.02E-002
MO-99	Not Detected	---------	3.74E-001
NA-22	Not Detected	---------	3.50E-002
NA-24	Not Detected	---------	4.91E-001
NB-95	Not Detected	---------	2.31E-001
ND-147	Not Detected	---------	1.94E-001
NI-57	Not Detected	---------	1.38E-001
RU-103	Not Detected	---------	2.46E-002
RU-106	Not Detected	---------	2.34E-001
SB-122	Not Detected	---------	6.59E-002
SB-124	Not Detected	---------	2.50E-002
SB-125	Not Detected	---------	7.06E-002
SN-113	Not Detected	---------	3.17E-002
SR-85	Not Detected	---------	2.98E-002
TA-182	Not Detected	---------	1.35E-001
TA-183	Not Detected	---------	5.37E-001
TC-99m	Not Detected	---------	3.81E+001
TL-201	Not Detected	---------	2.83E-001
XE-133	Not Detected	---------	2.88E-001
Y-88	Not Detected	---------	2.05E-002
ZN-65	Not Detected	---------	8.68E-002
ZR-95	Not Detected	---------	4.64E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/20/99 6:09:04 PM *
****

* Analyzed by: 2/20/99 Reviewed by: 2/22/99 *

****

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044655-001
Lab Sample ID : 90033322

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 835.000 gram
Sample Date/Time : 2/15/99 9:48:00 AM
Acquire Start Date/Time : 2/18/99 2:29:58 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

6R-238

Comments:

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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	7.23E-001
RA-226	1.49E+000	8.80E-001	5.52E-001
PB-214	7.88E-001	1.42E-001	4.39E-002
BI-214	6.90E-001	1.39E-001	3.97E-002
PB-210	Not Detected	---------	3.31E+001
TH-232	8.06E-001	4.26E-001	1.48E-001
RA-228	9.43E-001	2.76E-001	1.19E-001
AC-228	8.86E-001	2.15E-001	7.34E-002
TH-228	8.98E-001	2.72E-001	4.13E-001
RA-224	8.42E-001	2.05E-001	5.63E-002
PB-212	8.45E-001	1.45E-001	3.50E-002
BI-212	9.20E-001	4.89E-001	2.64E-001
TL-208	8.36E-001	1.82E-001	5.87E-002
U-235	Not Detected	---------	2.06E-001
TH-231	Not Detected	---------	1.36E+000
PA-231	Not Detected	---------	1.23E+000
TH-227	Not Detected	---------	3.35E-001
RA-223	Not Detected	---------	2.09E-001
RN-219	Not Detected	---------	3.20E-001
PB-211	Not Detected	---------	7.40E-001
TL-207	Not Detected	---------	1.11E+001
AM-241	Not Detected	---------	4.48E-001
PU-239	Not Detected	---------	3.95E+002
~~NP-237~~	~~5.31E-001~~	~~2.55E-001~~	2.82E-001 Not Detected
PA-233	Not Detected	---------	5.02E-002
TH-229	Not Detected	---------	2.42E-001

all bkg

2/20/99

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033322

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.08E-002
AG-110m	Not Detected	---------	2.60E-002
BA-133	Not Detected	---------	5.52E-002
BE-7	Not Detected	---------	2.23E-001
CD-109	Not Detected	---------	9.58E-001
CD-115	Not Detected	---------	1.35E-001
CE-139	Not Detected	---------	2.72E-002
CE-141	Not Detected	---------	4.76E-002
CE-144	Not Detected	---------	2.07E-001
CO-56	Not Detected	---------	2.85E-002
CO-57	Not Detected	---------	2.76E-002
CO-58	Not Detected	---------	2.80E-002
CO-60	Not Detected	---------	3.20E-002
CR-51	Not Detected	---------	2.06E-001
CS-134	Not Detected	---------	3.13E-002
CS-137	Not Detected	---------	2.80E-002
EU-152	Not Detected	---------	8.31E-002
EU-154	Not Detected	---------	1.49E-001
EU-155	Not Detected	---------	1.38E-001
FE-59	Not Detected	---------	6.45E-002
GD-153	Not Detected	---------	1.01E-001
HG-203	Not Detected	---------	2.78E-002
I-131	Not Detected	---------	3.05E-002
IR-192	Not Detected	---------	2.40E-002
K-40	2.04E+001	2.93E+000	2.20E-001
MN-52	Not Detected	---------	3.73E-002
MN-54	Not Detected	---------	3.05E-002
MO-99	Not Detected	---------	3.76E-001
NA-22	Not Detected	---------	3.49E-002
NA-24	Not Detected	---------	5.62E-001
NB-95	Not Detected	---------	2.45E-001
ND-147	Not Detected	---------	2.01E-001
NI-57	Not Detected	---------	7.82E-002
RU-103	Not Detected	---------	2.39E-002
RU-106	Not Detected	---------	2.36E-001
SB-122	Not Detected	---------	6.49E-002
SB-124	Not Detected	---------	2.56E-002
SB-125	Not Detected	---------	7.49E-002
SN-113	Not Detected	---------	3.20E-002
SR-85	Not Detected	---------	3.22E-002
TA-182	Not Detected	---------	1.39E-001
TA-183	Not Detected	---------	5.53E-001
TC-99m	Not Detected	---------	4.73E+001
TL-201	Not Detected	---------	3.00E-001
XE-133	Not Detected	---------	3.01E-001
Y-88	Not Detected	---------	1.90E-002
ZN-65	Not Detected	---------	8.83E-002
ZR-95	Not Detected	---------	4.70E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/18/99 6:33:40 AM *
****
* *
* Analyzed by: 2/20/99 Reviewed by: 2/22/99 *
****

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : LAB CONTROL SAMPLE USING CG134
Lab Sample ID : ~~90033323~~

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 : 2/18/99 6:23:27 AM
Detector Name : LAB02
Elapsed Live/Real Time : 600 / 606 seconds

Comments:
****

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	---------	4.14E+003
RA-226	Not Detected	---------	5.77E+003
PB-214	Not Detected	---------	6.38E+002
BI-214	Not Detected	---------	5.48E+002
PB-210	Not Detected	---------	2.70E+005
TH-232	Not Detected	---------	1.95E+003
RA-228	Not Detected	---------	2.26E+003
AC-228	Not Detected	---------	1.31E+003
TH-228	Not Detected	---------	1.24E+005
RA-224	Not Detected	---------	2.85E+003
PB-212	Not Detected	---------	9.75E+003
BI-212	Not Detected	---------	7.22E+004
TL-208	Not Detected	---------	1.65E+004
U-235	Not Detected	---------	1.58E+003
TH-231	Not Detected	---------	9.37E+003
PA-231	Not Detected	---------	1.30E+004
TH-227	Not Detected	---------	2.40E+003
RA-223	Not Detected	---------	1.00E+026
RN-219	Not Detected	---------	5.49E+003
PB-211	Not Detected	---------	1.21E+004
TL-207	Not Detected	---------	1.93E+005
AM-241	7.91E+004	1.45E+004	3.00E+003
PU-239	Not Detected	---------	2.80E+006
NP-237	Not Detected	---------	2.15E+003
PA-233	Not Detected	---------	5.63E+002
TH-229	Not Detected	---------	1.75E+003

[Summary Report] - Sample ID: : 90033323

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	---------	2.73E+002
AG-110m	Not Detected	---------	6.66E+006
BA-133	Not Detected	---------	6.83E+002
BE-7	Not Detected	---------	4.05E+020
CD-109	Not Detected	---------	6.48E+005
CD-115	Not Detected	---------	1.00E+026
CE-139	Not Detected	---------	9.20E+008
CE-141	Not Detected	---------	1.00E+026
CE-144	Not Detected	---------	2.49E+006
CO-56	Not Detected	---------	2.18E+014
CO-57	Not Detected	---------	4.75E+005
CO-58	Not Detected	---------	2.17E+015
CO-60	8.09E+004	1.09E+004	4.16E+002
CR-51	Not Detected	---------	1.00E+026
CS-134	Not Detected	---------	4.26E+003
CS-137	7.24E+004	9.62E+003	2.32E+002
EU-152	Not Detected	---------	9.56E+002
EU-154	Not Detected	---------	2.35E+003
EU-155	Not Detected	---------	3.23E+003
FE-59	Not Detected	---------	1.00E+026
GD-153	Not Detected	---------	4.26E+006
HG-203	Not Detected	---------	9.90E+021
I-131	Not Detected	---------	1.00E+026
IR-192	Not Detected	---------	5.95E+014
K-40	Not Detected	---------	1.23E+003
MN-52	Not Detected	---------	1.00E+026
MN-54	Not Detected	---------	2.56E+005
MO-99	Not Detected	---------	1.00E+026
NA-22	Not Detected	---------	1.62E+003
NA-24	Not Detected	---------	1.00E+026
NB-95	Not Detected	---------	1.00E+026
ND-147	Not Detected	---------	1.00E+026
NI-57	Not Detected	---------	1.00E+026
RU-103	Not Detected	---------	1.00E+026
RU-106	Not Detected	---------	8.01E+005
SB-122	Not Detected	---------	1.00E+026
SB-124	Not Detected	---------	3.76E+017
SB-125	Not Detected	---------	8.56E+003
SN-113	Not Detected	---------	3.40E+010
SR-85	Not Detected	---------	3.91E+016
TA-182	Not Detected	---------	8.43E+010
TA-183	Not Detected	---------	1.00E+026
TC-99m	Not Detected	---------	1.00E+026
TL-201	Not Detected	---------	1.00E+026
XE-133	Not Detected	---------	1.00E+026
Y-88	Not Detected	---------	5.66E+010
ZN-65	Not Detected	---------	3.95E+006
ZR-95	Not Detected	---------	8.21E+016

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

Report Date	:	2/18/99 6:33:42 AM
QA File	:	C:\GENIE2K\CAMFILES\LCS2.QAF
Analyst	:	FCD
Sample ID	:	90033323
Sample Quantity	:	1.00 Each
Sample Date	:	11/01/90 12:00:00 PM
Measurement Date	:	2/18/99 6:23:27 AM
Elapsed Live Time	:	600 seconds
Elapsed Real Time	:	606 seconds

Parameter	Mean	1S Error	New Value	< LU	: SD	: UD	: BS >
AM-241 Activity	8.184E-002	4.031E-003	7.912E-002	<	:	:	: >
CS-137 Activity	7.059E-002	1.964E-003	7.242E-002	<	:	:	: >
CO-60 Activity	7.858E-002	2.160E-003	8.058E-002	<	:	:	: >

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: 2/20/99

GR-239 → 249 Amir

Internal Lab Batch No. 900333

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

AR/COC 601620

Dept. No./Mail Stop:	6134/1148	Date Samples Shipped: [redacted]		Contract No.:	NA
Project/Task Manager:	Tijeras Arroyo/Collins,Sue	Carrier/Airbill No.: [redacted]		Case No.:	7225.281
Project Name:	Site 228A	Lab Contact:	F. Dominguez/844-7683	SMO Authorization:	
Record Center Code:	ER/1309/228A/DAT	Lab Destination:	RPSD	Bill To: Sandia National Laboratories	
Logbook Ref. No.:	050	SMO Contact/Phone:	D.Salmi/848-0963	Supplier Services Dept.:	
Service Order No.	CF0 690	Send Report to SMO:	S. Jenson/848-0963	P.O. Box 5800 MS 0154	
Location	Tech Area				
Building	Room				

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Beginning Depth/ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Use: Lab Sample ID
044656-001	TJAOU-228A-GR-239-SS	0	228A	2/15/1999 1002	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044657-001	TJAOU-228A-GR-240-SS	0	228A	2/15/1999 1058	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044658-001	TJAOU-228A-GR-241-SS	0	228A	2/15/1999 0955	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044659-001	TJAOU-228A-GR-242-SS	0	228A	2/15/1999 1004	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044660-001	TJAOU-228A-GR-243-SS	0	228A	2/15/1999 0931	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044661-001	TJAOU-228A-GR-244-SS	0	228A	2/15/1999 0933	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044662-001	TJAOU-228A-GR-245-SS	0	228A	2/15/1999 0940	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044663-001	TJAOU-228A-GR-246-SS	0	228A	2/15/1999 0936	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044664-001	TJAOU-228A-GR-247-SS	0	228A	2/15/1999 1100	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]
044665-001	TJAOU-228A-GR-248-SS	0	228A	2/15/1999 1045	S	M	500ml	none	G	SA	Gamma Spectroscopy (901.1)	[redacted]

RMMA ☐ Yes ☐ No Ref. No.

Sample Disposal ☐ Return to Clien ☐ Disposal by lab

Turnaround Time ☐ Normal ☐ Rush

Required Report Date [redacted]

Special Instructions/QC Requirements

EDD ☐ Yes ☐ No

Raw Data Package ☐ Yes ☐ No

Should be N.D. count to U-238 at about 1p Ci/g

Please list as separate report.

[redacted]

	Name	Signature	Init	Company/Organization/Phone
Sample Team Members	M. Sanchez	M Sanchez	MS	Weston/6131/239-7637
	G. Baltazar	[illegible]	G.B.	Weston/6131/971-2769

1.Relinquished by	M Sanchez	Org 6131	Date 2-16-99	Time 10:03	4.Relinquished by	Org	Date	Time
1. Received by	[illegible]	Org SWDTV	Date 2/16/99	Time 10 03	4. Received by	Org	Date	Time
2.Relinquished by	[illegible]	Org 1578	Date 2/22/99	Time 11:45	5.Relinquished by	Org	Date	Time
2. Received by	M Sanchez	Org 6131	Date 2-22-99	Time 11:45	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

Analysis Request And Chain Of Custody (Continuation)

900333

AR/COC 601620

Project Name: Site 228A Project/Task Manger: Tijerras Arroyo/S. Collins Case No.: 7225.281

Location: Tech Area

Building: Room

Reference LOV (available at SMO)

Sample No-Fraction	ER Sample ID or Sample Location detail	Depth in Ft	ER Site N	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preser-vative	Sample Collection Methods	Sample Type	Parameter & Method Requested	Lab use Lab Sample ID
044666-001	TJAOU-228-GR-249-SS	0	228	2/15/1999 1059	S	M	500ml	none	G	SA	Gamma Spec (901.1)	[redacted]
044667-001	TJAOU-228A- GR- EB2	0	228	2/15/1999 1137	W	M	500ml	4C	G	EB	Gamma Spec (901.1)	[redacted]

Sandia National Laboratories
Radiation Protection Sample Diagnostics

601620

Sample Analysis Request Form
Page 1 of 2

To be completed by Customer

Shaded areas are for RPSD use only

Customer: Sue Collins
Organization: 6134
Project Location: 228A
Phone: 284 2548
Date Results Needed: 2-22-99
Suspect Isotopes: Gamma
Case Number: 7225.281

Hazards/Special Instructions:
Margaret 239-7637-C
845-3267

CoC 601620

Batch Log Number: 900333
Logged By: Jm

Analysis Type:
- [x] 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
044656-001	Soil	2-15-99 1002	500mL	Gamma Spec	01	<300	784g	
657		1058			02		757g	
658		0955			03		627g	
659		1004			04		903g	
660		0931			05		674g	
661		0933			06		798g	
662		0940			07		878g	
663		0836			08		928g	
664		1100			09		939g	
665		1045			10		839g	
666		1058			11		973g	
667	liquid	1177			12	<300	500mL	

Relinquished by M Sanchez	Date 2-16-99	Received by	Date 2/16/99
Relinquished by	Date 2/22/99	Received by	Date
Relinquished by M Sanchez	Date 2-22-99	Received by	Date
Relinquished by	Date	Received by	Date

RPSD 0002-02 1

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/17/99 10:17:22 AM *
****

* Analyzed by: 2/17/99 Reviewed by: 2/22/99 *

****

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044656-001
Lab Sample ID : 90033301

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 784.000 gram
Sample Date/Time : 2/15/99 10:02:00 AM
Acquire Start Date/Time : 2/16/99 1:31:55 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

GR-239

Comments:

****

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	7.32E-001
RA-226	1.48E+000	7.77E-001	5.45E-001
PB-214	7.73E-001	3.96E-001	4.41E-002
BI-214	7.16E-001	2.70E-001	3.78E-002
PB-210	Not Detected	---------	3.27E+001
TH-232	7.99E-001	4.45E-001	1.49E-001
RA-228	8.68E-001	2.62E-001	1.20E-001
AC-228	8.71E-001	2.24E-001	6.49E-002
TH-228	6.47E-001	2.16E-001	4.86E-001
RA-224	8.19E-001	2.01E-001	5.36E-002
PB-212	8.30E-001	1.46E-001	3.45E-002
BI-212	8.08E-001	4.18E-001	2.60E-001
TL-208	6.94E-001	1.61E-001	6.18E-002
U-235	Not Detected	---------	2.18E-001
TH-231	Not Detected	---------	1.39E+000
PA-231	Not Detected	---------	1.28E+000
TH-227	Not Detected	---------	3.43E-001
RA-223	Not Detected	---------	1.98E-001
RN-219	Not Detected	---------	3.34E-001
PB-211	Not Detected	---------	7.49E-001
TL-207	Not Detected	---------	1.17E+001
AM-241	Not Detected	---------	4.66E-001
PU-239	Not Detected	---------	3.90E+002
NP-237	~~4.73E-001~~	~~2.58E-001~~	3.14E-001 Not detected 2/17/99
PA-233	Not Detected	---------	5.27E-002
TH-229	Not Detected	---------	2.48E-001

all bkg

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033301

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.20E-002
AG-110m	Not Detected	---------	4.01E-002
BA-133	Not Detected	---------	5.59E-002
BE-7	Not Detected	---------	2.34E-001
CD-109	Not Detected	---------	1.07E+000
CD-115	Not Detected	---------	8.65E-002
CE-139	Not Detected	---------	2.81E-002
CE-141	Not Detected	---------	4.84E-002
CE-144	Not Detected	---------	2.13E-001
CO-56	Not Detected	---------	2.92E-002
CO-57	Not Detected	---------	2.85E-002
CO-58	Not Detected	---------	2.83E-002
CO-60	Not Detected	---------	3.14E-002
CR-51	Not Detected	---------	2.10E-001
CS-134	Not Detected	---------	3.34E-002
CS-137	1.90E-001	5.00E-002	2.05E-002
EU-152	Not Detected	---------	8.60E-002
EU-154	Not Detected	---------	1.54E-001
EU-155	Not Detected	---------	1.41E-001
FE-59	Not Detected	---------	6.38E-002
GD-153	Not Detected	---------	1.03E-001
HG-203	Not Detected	---------	2.82E-002
I-131	Not Detected	---------	2.91E-002
IR-192	Not Detected	---------	2.47E-002
K-40	1.93E+001	2.75E+000	2.39E-001
MN-52	Not Detected	---------	2.64E-002
MN-54	Not Detected	---------	3.29E-002
MO-99	Not Detected	---------	2.64E-001
NA-22	Not Detected	---------	3.66E-002
NA-24	Not Detected	---------	1.04E-001
NB-95	Not Detected	---------	1.86E-001
ND-147	Not Detected	---------	1.93E-001
NI-57	Not Detected	---------	4.31E-002
RU-103	Not Detected	---------	2.55E-002
RU-106	Not Detected	---------	2.54E-001
SB-122	Not Detected	---------	4.71E-002
SB-124	Not Detected	---------	2.50E-002
SB-125	Not Detected	---------	7.57E-002
SN-113	Not Detected	---------	3.37E-002
SR-85	Not Detected	---------	3.23E-002
TA-182	Not Detected	---------	1.34E-001
TA-183	Not Detected	---------	4.64E-001
TC-99m	Not Detected	---------	6.62E-001
TL-201	Not Detected	---------	2.16E-001
XE-133	Not Detected	---------	1.89E-001
Y-88	Not Detected	---------	1.98E-002
ZN-65	Not Detected	---------	8.78E-002
ZR-95	Not Detected	---------	4.46E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/17/99 10:33:45 AM *
****

* Analyzed by: 2/17/99 Reviewed by: 2/22/99 *

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044657-001
Lab Sample ID : 90033302

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 757.000 gram
Sample Date/Time : 2/15/99 10:58:00 AM
Acquire Start Date/Time : 2/16/99 3:13:43 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

GR -24C

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	7.36E-001
RA-226	1.76E+000	7.81E-001	4.70E-001
PB-214	7.86E-001	2.45E-001	4.41E-002
BI-214	7.49E-001	3.99E-001	3.89E-002
PB-210	Not Detected	---------	3.41E+001
TH-232	7.87E-001	4.29E-001	1.49E-001
RA-228	9.38E-001	2.92E-001	1.32E-001
AC-228	8.72E-001	2.08E-001	7.05E-002
TH-228	9.02E-001	2.68E-001	4.28E-001
RA-224	8.74E-001	2.14E-001	5.01E-002
PB-212	8.60E-001	3.24E-001	3.72E-002
BI-212	1.04E+000	4.69E-001	2.59E-001
TL-208	7.61E-001	1.67E-001	6.28E-002
U-235	Not Detected	---------	2.07E-001
TH-231	Not Detected	---------	1.39E+000
PA-231	Not Detected	---------	1.24E+000
TH-227	Not Detected	---------	3.54E-001
RA-223	Not Detected	---------	1.94E-001
RN-219	Not Detected	---------	3.50E-001
PB-211	Not Detected	---------	7.49E-001
TL-207	Not Detected	---------	1.20E+001
AM-241	Not Detected	---------	4.69E-001
PU-239	Not Detected	---------	3.96E+002
NP-237	~~4.69E-001~~	~~2.41E-001~~	2.79E-001 Not detected
PA-233	Not Detected	---------	5.12E-002
TH-229	Not Detected	---------	2.43E-001

all bkg

2/17/99

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033302

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.25E-002
AG-110m	Not Detected	---------	2.80E-002
BA-133	Not Detected	---------	5.67E-002
BE-7	Not Detected	---------	2.16E-001
CD-109	Not Detected	---------	9.46E-001
CD-115	Not Detected	---------	8.83E-002
CE-139	Not Detected	---------	2.76E-002
CE-141	Not Detected	---------	4.68E-002
CE-144	Not Detected	---------	2.15E-001
CO-56	Not Detected	---------	2.85E-002
CO-57	Not Detected	---------	2.85E-002
CO-58	Not Detected	---------	2.80E-002
CO-60	Not Detected	---------	3.37E-002
CR-51	Not Detected	---------	2.05E-001
CS-134	Not Detected	---------	3.36E-002
CS-137	2.10E-002	2.72E-002	1.99E-002
EU-152	Not Detected	---------	8.59E-002
EU-154	Not Detected	---------	1.60E-001
EU-155	Not Detected	---------	1.41E-001
FE-59	Not Detected	---------	5.93E-002
GD-153	Not Detected	---------	1.02E-001
HG-203	Not Detected	---------	2.88E-002
I-131	Not Detected	---------	2.75E-002
IR-192	Not Detected	---------	2.49E-002
K-40	1.79E+001	2.59E+000	2.50E-001
MN-52	Not Detected	---------	3.14E-002
MN-54	Not Detected	---------	1.51E-002
MO-99	Not Detected	---------	2.64E-001
NA-22	Not Detected	---------	3.75E-002
NA-24	Not Detected	---------	1.05E-001
NB-95	Not Detected	---------	1.92E-001
ND-147	Not Detected	---------	1.83E-001
NI-57	Not Detected	---------	7.25E-002
RU-103	Not Detected	---------	2.46E-002
RU-106	Not Detected	---------	2.50E-001
SB-122	Not Detected	---------	4.46E-002
SB-124	Not Detected	---------	2.58E-002
SB-125	Not Detected	---------	7.52E-002
SN-113	Not Detected	---------	3.24E-002
SR-85	Not Detected	---------	3.35E-002
TA-182	Not Detected	---------	1.40E-001
TA-183	Not Detected	---------	4.71E-001
TC-99m	Not Detected	---------	7.16E-001
TL-201	Not Detected	---------	2.28E-001
XE-133	Not Detected	---------	1.88E-001
Y-88	Not Detected	---------	2.34E-002
ZN-65	Not Detected	---------	9.04E-002
ZR-95	Not Detected	---------	4.77E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/17/99 10:48:14 AM *
****

* Analyzed by: 2/17/99 Reviewed by: 2/22/99 *

****

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044658-001
Lab Sample ID : 90033303

GR-241

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 627.000 gram
Sample Date/Time : 2/15/99 9:55:00 AM
Acquire Start Date/Time : 2/16/99 5:10:47 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	7.96E-001
RA-226	1.57E+000	7.69E-001	5.98E-001
PB-214	7.13E-001	3.74E-001	4.92E-002
BI-214	6.84E-001	1.31E-001	4.67E-002
PB-210	Not Detected	---------	3.56E+001
TH-232	7.60E-001	4.30E-001	1.64E-001
RA-228	7.79E-001	2.51E-001	1.32E-001
AC-228	7.30E-001	3.33E-001	8.24E-002
TH-228	6.51E-001	2.62E-001	4.87E-001
RA-224	8.05E-001	2.06E-001	7.10E-002
PB-212	7.20E-001	3.14E-001	3.79E-002
BI-212	9.15E-001	5.61E-001	3.27E-001
TL-208	7.09E-001	1.80E-001	6.70E-002
U-235	Not Detected	---------	2.25E-001
TH-231	Not Detected	---------	1.43E+000
PA-231	Not Detected	---------	1.39E+000
TH-227	Not Detected	---------	3.65E-001
RA-223	Not Detected	---------	2.04E-001
RN-219	Not Detected	---------	3.50E-001
PB-211	Not Detected	---------	8.11E-001
TL-207	Not Detected	---------	1.30E+001
AM-241	Not Detected	---------	4.92E-001
PU-239	Not Detected	---------	4.13E+002
NP-237	~~6.01E-001~~	~~3.52E-001~~	2.86E-001 Not Detected 2/17/99
PA-233	Not Detected	---------	5.73E-002
TH-229	Not Detected	---------	2.59E-001

all bkg

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033303

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.52E-002
AG-110m	Not Detected	---------	2.78E-002
BA-133	Not Detected	---------	6.02E-002
BE-7	Not Detected	---------	2.43E-001
CD-109	Not Detected	---------	9.72E-001
CD-115	Not Detected	---------	9.78E-002
CE-139	Not Detected	---------	2.96E-002
CE-141	Not Detected	---------	4.95E-002
CE-144	Not Detected	---------	2.24E-001
CO-56	Not Detected	---------	3.29E-002
CO-57	Not Detected	---------	2.93E-002
CO-58	Not Detected	---------	3.04E-002
CO-60	Not Detected	---------	3.45E-002
CR-51	Not Detected	---------	2.15E-001
CS-134	Not Detected	---------	3.67E-002
CS-137	Not Detected	---------	3.11E-002
EU-152	Not Detected	---------	8.81E-002
EU-154	Not Detected	---------	1.71E-001
EU-155	Not Detected	---------	1.45E-001
FE-59	Not Detected	---------	6.43E-002
GD-153	Not Detected	---------	1.11E-001
HG-203	Not Detected	---------	3.12E-002
I-131	Not Detected	---------	3.07E-002
IR-192	Not Detected	---------	2.67E-002
K-40	1.64E+001	2.42E+000	2.65E-001
MN-52	Not Detected	---------	3.47E-002
MN-54	Not Detected	---------	2.05E-002
MO-99	Not Detected	---------	3.05E-001
NA-22	Not Detected	---------	3.64E-002
NA-24	Not Detected	---------	1.37E-001
NB-95	Not Detected	---------	2.04E-001
ND-147	Not Detected	---------	2.01E-001
NI-57	Not Detected	---------	9.41E-002
RU-103	Not Detected	---------	2.66E-002
RU-106	Not Detected	---------	2.59E-001
SB-122	Not Detected	---------	4.92E-002
SB-124	Not Detected	---------	2.79E-002
SB-125	Not Detected	---------	7.95E-002
SN-113	Not Detected	---------	3.53E-002
SR-85	Not Detected	---------	3.56E-002
TA-182	Not Detected	---------	1.46E-001
TA-183	Not Detected	---------	5.04E-001
TC-99m	Not Detected	---------	1.07E+000
TL-201	Not Detected	---------	2.29E-001
XE-133	Not Detected	---------	2.11E-001
Y-88	Not Detected	---------	2.47E-002
ZN-65	Not Detected	---------	9.48E-002
ZR-95	Not Detected	---------	5.26E-002

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* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/17/99 11:16:19 AM *
****

* Analyzed by: 2/17/99 Reviewed by: 2/22/99 *

****

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044659-001
Lab Sample ID : 90033304

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 903.000 gram
Sample Date/Time : 2/15/99 10:04:00 AM
Acquire Start Date/Time : 2/16/99 6:52:33 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

EM-242

Comments:

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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	6.59E-001
RA-226	1.72E+000	7.45E-001	4.85E-001
PB-214	6.55E-001	1.27E-001	4.01E-002
BI-214	6.66E-001	1.27E-001	3.84E-002
PB-210	Not Detected	---------	3.07E+001
TH-232	7.46E-001	3.98E-001	1.33E-001
RA-228	8.19E-001	2.39E-001	1.15E-001
AC-228	7.70E-001	1.71E-001	6.30E-002
TH-228	8.97E-001	2.67E-001	3.67E-001
RA-224	8.47E-001	2.04E-001	4.43E-002
PB-212	7.76E-001	3.93E-001	3.24E-002
BI-212	8.59E-001	4.77E-001	2.45E-001
TL-208	7.00E-001	1.56E-001	5.35E-002
U-235	Not Detected	---------	1.99E-001
TH-231	Not Detected	---------	1.25E+000
PA-231	Not Detected	---------	1.18E+000
TH-227	Not Detected	---------	3.09E-001
RA-223	Not Detected	---------	1.82E-001
RN-219	Not Detected	---------	3.05E-001
PB-211	Not Detected	---------	6.89E-001
TL-207	Not Detected	---------	1.14E+001
AM-241	Not Detected	---------	4.31E-001
PU-239	Not Detected	---------	3.60E+002
NP-237	Not Detected	---------	2.58E-001
PA-233	Not Detected	---------	4.73E-002
TH-229	Not Detected	---------	2.29E-001

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033304

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.85E-002
AG-110m	Not Detected	---------	2.79E-002
BA-133	Not Detected	---------	5.04E-002
BE-7	Not Detected	---------	1.97E-001
CD-109	Not Detected	---------	8.76E-001
CD-115	Not Detected	---------	8.13E-002
CE-139	Not Detected	---------	2.53E-002
CE-141	Not Detected	---------	4.41E-002
CE-144	Not Detected	---------	1.98E-001
CO-56	Not Detected	---------	2.65E-002
CO-57	Not Detected	---------	2.56E-002
CO-58	Not Detected	---------	2.70E-002
CO-60	Not Detected	---------	2.75E-002
CR-51	Not Detected	---------	1.82E-001
CS-134	Not Detected	---------	2.89E-002
CS-137	4.20E-002	3.22E-002	1.80E-002
EU-152	Not Detected	---------	7.66E-002
EU-154	Not Detected	---------	1.39E-001
EU-155	Not Detected	---------	1.27E-001
FE-59	Not Detected	---------	5.75E-002
GD-153	Not Detected	---------	9.34E-002
HG-203	Not Detected	---------	2.60E-002
I-131	Not Detected	---------	2.49E-002
IR-192	Not Detected	---------	2.11E-002
K-40	1.89E+001	2.71E+000	2.11E-001
MN-52	Not Detected	---------	2.75E-002
MN-54	Not Detected	---------	2.76E-002
MO-99	Not Detected	---------	2.56E-001
NA-22	Not Detected	---------	3.45E-002
NA-24	Not Detected	---------	1.20E-001
NB-95	Not Detected	---------	1.75E-001
ND-147	Not Detected	---------	1.72E-001
NI-57	Not Detected	---------	4.00E-002
RU-103	Not Detected	---------	2.30E-002
RU-106	Not Detected	---------	2.23E-001
SB-122	Not Detected	---------	4.67E-002
SB-124	Not Detected	---------	2.23E-002
SB-125	Not Detected	---------	6.68E-002
SN-113	Not Detected	---------	3.01E-002
SR-85	Not Detected	---------	2.85E-002
TA-182	Not Detected	---------	1.23E-001
TA-183	Not Detected	---------	4.44E-001
TC-99m	Not Detected	---------	1.14E+000
TL-201	Not Detected	---------	2.08E-001
XE-133	Not Detected	---------	1.82E-001
Y-88	Not Detected	---------	1.90E-002
ZN-65	Not Detected	---------	8.05E-002
ZR-95	Not Detected	---------	4.33E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/17/99 11:41:50 AM *
****

* Analyzed by: 2/17/99 Reviewed by: 2/22/99 *

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044660-001
Lab Sample ID : 90033305

ER-243

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 674.000 gram
Sample Date/Time : 2/15/99 9:31:00 AM
Acquire Start Date/Time : 2/16/99 8:34:21 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	---------	7.81E-001
RA-226	1.77E+000	8.16E-001	5.43E-001
PB-214	7.56E-001	1.37E-001	4.98E-002
BI-214	7.11E-001	1.48E-001	4.58E-002
PB-210	Not Detected	---------	3.70E+001
TH-232	7.33E-001	4.23E-001	1.62E-001
RA-228	9.33E-001	3.12E-001	1.42E-001
AC-228	8.47E-001	2.38E-001	7.52E-002
TH-228	7.89E-001	2.66E-001	4.74E-001
RA-224	9.21E-001	2.28E-001	5.65E-002
PB-212	7.97E-001	3.62E-001	4.28E-002
BI-212	1.02E+000	5.17E-001	2.85E-001
TL-208	7.10E-001	2.42E-001	7.07E-002
U-235	Not Detected	---------	2.23E-001
TH-231	Not Detected	---------	1.51E+000
PA-231	Not Detected	---------	1.40E+000
TH-227	Not Detected	---------	3.72E-001
RA-223	Not Detected	---------	2.16E-001
RN-219	Not Detected	---------	3.62E-001
PB-211	Not Detected	---------	8.25E-001
TL-207	Not Detected	---------	1.27E+001
AM-241	Not Detected	---------	5.11E-001
PU-239	Not Detected	---------	4.16E+002
NP-237	~~4.87E-001~~	~~2.60E-001~~	2.86E-001 Not detected 2/17/99
PA-233	Not Detected	---------	5.63E-002
TH-229	Not Detected	---------	2.62E-001

all

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033305

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.47E-002
AG-110m	Not Detected	---------	4.74E-002
BA-133	Not Detected	---------	6.05E-002
BE-7	2.76E-001	2.36E-001	1.68E-001
CD-109	Not Detected	---------	9.70E-001
CD-115	Not Detected	---------	1.00E-001
CE-139	Not Detected	---------	2.94E-002
CE-141	Not Detected	---------	5.02E-002
CE-144	Not Detected	---------	2.27E-001
CO-56	Not Detected	---------	3.23E-002
CO-57	Not Detected	---------	3.05E-002
CO-58	Not Detected	---------	3.03E-002
CO-60	Not Detected	---------	3.63E-002
CR-51	Not Detected	---------	2.29E-001
CS-134	Not Detected	---------	3.50E-002
CS-137	2.77E-001	6.38E-002	2.23E-002
EU-152	Not Detected	---------	9.06E-002
EU-154	Not Detected	---------	1.69E-001
EU-155	Not Detected	---------	1.52E-001
FE-59	Not Detected	---------	6.97E-002
GD-153	Not Detected	---------	1.11E-001
HG-203	Not Detected	---------	3.05E-002
I-131	Not Detected	---------	3.18E-002
IR-192	Not Detected	---------	2.63E-002
K-40	1.99E+001	2.90E+000	2.39E-001
MN-52	Not Detected	---------	3.41E-002
MN-54	Not Detected	---------	3.16E-002
MO-99	Not Detected	---------	3.12E-001
NA-22	Not Detected	---------	4.15E-002
NA-24	Not Detected	---------	1.69E-001
NB-95	Not Detected	---------	2.14E-001
ND-147	Not Detected	---------	2.01E-001
NI-57	Not Detected	---------	5.74E-002
RU-103	Not Detected	---------	2.85E-002
RU-106	Not Detected	---------	2.66E-001
SB-122	Not Detected	---------	5.47E-002
SB-124	Not Detected	---------	2.69E-002
SB-125	Not Detected	---------	8.18E-002
SN-113	Not Detected	---------	3.57E-002
SR-85	Not Detected	---------	3.57E-002
TA-182	Not Detected	---------	1.48E-001
TA-183	Not Detected	---------	5.38E-001
TC-99m	Not Detected	---------	1.68E+000
TL-201	Not Detected	---------	2.42E-001
XE-133	Not Detected	---------	2.22E-001
Y-88	Not Detected	---------	2.25E-002
ZN-65	Not Detected	---------	9.60E-002
ZR-95	Not Detected	---------	5.33E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/22/99 8:44:14 AM *
****

* Analyzed by: 2/22/99 Reviewed by: 2/22/99 *

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044661-001
Lab Sample ID : 90033306

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 798.000 gram
Sample Date/Time : 2/15/99 9:33:00 AM
Acquire Start Date/Time : 2/16/99 10:16:08 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

CR-244

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	7.51E-001
RA-226	2.09E+000	7.84E-001	5.51E-001
PB-214	8.01E-001	1.50E-001	4.32E-002
BI-214	6.75E-001	3.73E-001	3.92E-002
PB-210	Not Detected	---------	3.50E+001
TH-232	8.20E-001	4.16E-001	1.45E-001
RA-228	8.49E-001	2.55E-001	1.34E-001
AC-228	8.69E-001	2.25E-001	7.56E-002
TH-228	3.80E-001	3.31E-001	3.80E-001
RA-224	8.61E-001	2.10E-001	5.99E-002
PB-212	8.44E-001	2.95E-001	3.93E-002
BI-212	9.12E-001	5.16E-001	2.81E-001
TL-208	8.25E-001	1.80E-001	6.00E-002
U-235	1.05E-001	1.74E-001	2.20E-001
TH-231	Not Detected	---------	1.39E+000
PA-231	Not Detected	---------	1.30E+000
TH-227	Not Detected	---------	3.48E-001
RA-223	Not Detected	---------	2.01E-001
RN-219	Not Detected	---------	3.30E-001
PB-211	Not Detected	---------	7.58E-001
TL-207	Not Detected	---------	1.25E+001
AM-241	Not Detected	---------	4.60E-001
PU-239	Not Detected	---------	4.04E+002
NP-237	~~4.73E-001~~	~~2.30E-001~~	~~2.74E-001~~ not detected 2/22/99
PA-233	Not Detected	---------	5.09E-002
TH-229	Not Detected	---------	2.50E-001

all

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033306

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.27E-002
AG-110m	Not Detected	---------	3.23E-002
BA-133	Not Detected	---------	5.72E-002
BE-7	Not Detected	---------	2.35E-001
CD-109	Not Detected	---------	9.31E-001
CD-115	Not Detected	---------	9.53E-002
CE-139	Not Detected	---------	2.79E-002
CE-141	Not Detected	---------	4.87E-002
CE-144	Not Detected	---------	2.18E-001
CO-56	Not Detected	---------	3.01E-002
CO-57	Not Detected	---------	2.79E-002
CO-58	Not Detected	---------	2.83E-002
CO-60	Not Detected	---------	3.36E-002
CR-51	Not Detected	---------	2.07E-001
CS-134	Not Detected	---------	3.23E-002
CS-137	7.66E-002	3.73E-002	1.81E-002
EU-152	Not Detected	---------	8.33E-002
EU-154	Not Detected	---------	1.59E-001
EU-155	Not Detected	---------	1.41E-001
FE-59	Not Detected	---------	6.43E-002
GD-153	Not Detected	---------	1.08E-001
HG-203	Not Detected	---------	2.79E-002
I-131	Not Detected	---------	2.81E-002
IR-192	Not Detected	---------	2.40E-002
K-40	2.10E+001	3.00E+000	2.29E-001
MN-52	Not Detected	---------	3.31E-002
MN-54	Not Detected	---------	1.49E-002
MO-99	Not Detected	---------	2.92E-001
NA-22	Not Detected	---------	3.85E-002
NA-24	Not Detected	---------	1.53E-001
NB-95	Not Detected	---------	2.03E-001
ND-147	Not Detected	---------	1.88E-001
NI-57	Not Detected	---------	5.19E-002
RU-103	Not Detected	---------	2.44E-002
RU-106	Not Detected	---------	2.45E-001
SB-122	Not Detected	---------	5.32E-002
SB-124	Not Detected	---------	2.55E-002
SB-125	Not Detected	---------	7.65E-002
SN-113	Not Detected	---------	3.43E-002
SR-85	Not Detected	---------	3.26E-002
TA-182	Not Detected	---------	1.41E-001
TA-183	Not Detected	---------	4.85E-001
TC-99m	Not Detected	---------	1.94E+000
TL-201	Not Detected	---------	2.40E-001
XE-133	Not Detected	---------	2.12E-001
Y-88	Not Detected	---------	2.26E-002
ZN-65	Not Detected	---------	9.25E-002
ZR-95	Not Detected	---------	4.96E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/17/99 1:38:10 AM *
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* Analyzed by: 2/17/99 Reviewed by: 2/22/99 *

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Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044662-001
Lab Sample ID : 90033307

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 878.000 gram
Sample Date/Time : 2/15/99 9:40:00 AM
Acquire Start Date/Time : 2/16/99 11:57:56 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6004 seconds

ER-245

Comments:

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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	6.87E-001
RA-226	1.73E+000	2.15E+000	4.93E-001
PB-214	7.55E-001	8.16E-001	4.09E-002
BI-214	7.11E-001	2.17E-001	3.81E-002
PB-210	Not Detected	---------	3.30E+001
TH-232	8.41E-001	4.36E-001	1.48E-001
RA-228	9.59E-001	2.88E-001	1.19E-001
AC-228	8.38E-001	5.95E-001	6.89E-002
TH-228	7.97E-001	6.18E-001	4.25E-001
RA-224	8.37E-001	2.03E-001	5.02E-002
PB-212	8.73E-001	1.47E-001	3.57E-002
BI-212	9.25E-001	2.84E-001	2.31E-001
TL-208	7.79E-001	1.41E+000	5.34E-002
U-235	Not Detected	---------	2.00E-001
TH-231	Not Detected	---------	1.33E+000
PA-231	Not Detected	---------	1.20E+000
TH-227	Not Detected	---------	3.30E-001
RA-223	Not Detected	---------	1.88E-001
RN-219	Not Detected	---------	3.13E-001
PB-211	Not Detected	---------	7.15E-001
TL-207	Not Detected	---------	1.07E+001
AM-241	Not Detected	---------	4.40E-001
PU-239	Not Detected	---------	3.70E+002
NP-237	Not Detected	---------	2.49E-001
PA-233	Not Detected	---------	4.81E-002
TH-229	Not Detected	---------	2.37E-001

all bkg

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033307

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.99E-002
AG-110m	Not Detected	---------	2.64E-002
BA-133	Not Detected	---------	5.29E-002
BE-7	Not Detected	---------	2.18E-001
CD-109	Not Detected	---------	8.44E-001
CD-115	Not Detected	---------	9.27E-002
CE-139	Not Detected	---------	2.67E-002
CE-141	Not Detected	---------	4.55E-002
CE-144	Not Detected	---------	2.01E-001
CO-56	Not Detected	---------	2.75E-002
CO-57	Not Detected	---------	2.65E-002
CO-58	Not Detected	---------	2.58E-002
CO-60	Not Detected	---------	2.93E-002
CR-51	Not Detected	---------	2.00E-001
CS-134	Not Detected	---------	3.08E-002
CS-137	3.68E-002	1.82E-002	1.74E-002
EU-152	Not Detected	---------	7.98E-002
EU-154	Not Detected	---------	1.46E-001
EU-155	Not Detected	---------	1.34E-001
FE-59	Not Detected	---------	5.75E-002
GD-153	Not Detected	---------	9.99E-002
HG-203	Not Detected	---------	2.63E-002
I-131	Not Detected	---------	2.76E-002
IR-192	Not Detected	---------	2.32E-002
K-40	1.83E+001	2.60E+000	2.27E-001
MN-52	Not Detected	---------	3.28E-002
MN-54	Not Detected	---------	2.95E-002
MO-99	Not Detected	---------	2.75E-001
NA-22	Not Detected	---------	3.46E-002
NA-24	Not Detected	---------	1.62E-001
NB-95	Not Detected	---------	1.95E-001
ND-147	Not Detected	---------	1.65E-001
NI-57	Not Detected	---------	9.03E-002
RU-103	Not Detected	---------	2.32E-002
RU-106	Not Detected	---------	2.20E-001
SB-122	Not Detected	---------	4.96E-002
SB-124	Not Detected	---------	2.37E-002
SB-125	Not Detected	---------	7.12E-002
SN-113	Not Detected	---------	3.10E-002
SR-85	Not Detected	---------	3.04E-002
TA-182	Not Detected	---------	1.31E-001
TA-183	Not Detected	---------	4.68E-001
TC-99m	Not Detected	---------	2.15E+000
TL-201	Not Detected	---------	2.22E-001
XE-133	Not Detected	---------	2.03E-001
Y-88	Not Detected	---------	2.10E-002
ZN-65	Not Detected	---------	8.67E-002
ZR-95	Not Detected	---------	4.44E-002

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* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/17/99 1:02:26 PM *
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* Analyzed by: 2/17/99 Reviewed by: 2/22/99 *

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Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044663-001
Lab Sample ID : 90033308

ER-246

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 928.000 gram
Sample Date/Time : 2/15/99 9:36:00 AM
Acquire Start Date/Time : 2/17/99 1:39:44 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:

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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	6.87E-001
RA-226	1.84E+000	6.63E-001	5.66E-001
PB-214	7.26E-001	3.97E-001	4.03E-002
BI-214	7.13E-001	1.46E-001	3.83E-002
PB-210	Not Detected	---------	3.11E+001
TH-232	8.25E-001	4.40E-001	1.37E-001
RA-228	9.25E-001	2.63E-001	1.20E-001
AC-228	8.52E-001	2.08E-001	7.14E-002
TH-228	9.07E-001	2.61E-001	3.88E-001
RA-224	9.58E-001	2.27E-001	4.63E-002
PB-212	8.34E-001	1.49E-001	3.41E-002
BI-212	9.83E-001	4.07E-001	2.60E-001
TL-208	8.13E-001	3.31E-001	5.52E-002
U-235	Not Detected	---------	2.00E-001
TH-231	Not Detected	---------	1.27E+000
PA-231	Not Detected	---------	1.17E+000
TH-227	Not Detected	---------	3.17E-001
RA-223	Not Detected	---------	1.88E-001
RN-219	Not Detected	---------	2.98E-001
PB-211	Not Detected	---------	6.78E-001
TL-207	Not Detected	---------	1.07E+001
AM-241	Not Detected	---------	4.45E-001
PU-239	Not Detected	---------	3.59E+002
NP-237	~~5.39E-001~~	~~2.52E-001~~	2.40E-001 Not detected 2/17/99
PA-233	Not Detected	---------	4.70E-002
TH-229	Not Detected	---------	2.35E-001

all bkg

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033308

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.89E-002
AG-110m	Not Detected	---------	2.63E-002
BA-133	Not Detected	---------	5.13E-002
BE-7	Not Detected	---------	2.11E-001
CD-109	Not Detected	---------	8.14E-001
CD-115	Not Detected	---------	9.23E-002
CE-139	Not Detected	---------	2.55E-002
CE-141	Not Detected	---------	4.49E-002
CE-144	Not Detected	---------	2.00E-001
CO-56	Not Detected	---------	2.66E-002
CO-57	Not Detected	---------	2.63E-002
CO-58	Not Detected	---------	2.59E-002
CO-60	Not Detected	---------	2.86E-002
CR-51	Not Detected	---------	1.85E-001
CS-134	Not Detected	---------	2.99E-002
CS-137	3.66E-002	2.44E-002	1.90E-002
EU-152	Not Detected	---------	7.88E-002
EU-154	Not Detected	---------	1.40E-001
EU-155	Not Detected	---------	1.29E-001
FE-59	Not Detected	---------	6.15E-002
GD-153	Not Detected	---------	9.63E-002
HG-203	Not Detected	---------	2.62E-002
I-131	Not Detected	---------	2.59E-002
IR-192	Not Detected	---------	2.20E-002
K-40	2.06E+001	2.90E+000	2.13E-001
MN-52	Not Detected	---------	2.69E-002
MN-54	Not Detected	---------	2.95E-002
MO-99	Not Detected	---------	2.75E-001
NA-22	Not Detected	---------	3.33E-002
NA-24	Not Detected	---------	1.70E-001
NB-95	Not Detected	---------	1.90E-001
ND-147	Not Detected	---------	1.71E-001
NI-57	Not Detected	---------	5.08E-002
RU-103	Not Detected	---------	2.28E-002
RU-106	Not Detected	---------	2.36E-001
SB-122	Not Detected	---------	4.77E-002
SB-124	Not Detected	---------	2.28E-002
SB-125	Not Detected	---------	6.72E-002
SN-113	Not Detected	---------	2.99E-002
SR-85	Not Detected	---------	2.94E-002
TA-182	Not Detected	---------	1.28E-001
TA-183	Not Detected	---------	4.80E-001
TC-99m	Not Detected	---------	2.64E+000
TL-201	Not Detected	---------	2.23E-001
XE-133	Not Detected	---------	2.05E-001
Y-88	Not Detected	---------	1.88E-002
ZN-65	Not Detected	---------	8.34E-002
ZR-95	Not Detected	---------	4.64E-002

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* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/17/99 1:28:36 PM *
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* Analyzed by: 2/17/99 Reviewed by: 2/22/99 *

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Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044664-001
Lab Sample ID : 90033309

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 939.000 gram
Sample Date/Time : 2/15/99 11:00:00 AM
Acquire Start Date/Time : 2/17/99 3:21:32 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6004 seconds

GR-247

Comments:

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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	6.82E-001
RA-226	1.80E+000	7.36E-001	5.12E-001
PB-214	8.33E-001	1.48E-001	4.09E-002
BI-214	7.81E-001	1.38E-001	3.50E-002
PB-210	Not Detected	---------	3.21E+001
TH-232	8.65E-001	4.33E-001	1.32E-001
RA-228	8.31E-001	2.45E-001	1.10E-001
AC-228	8.88E-001	1.98E-001	6.45E-002
TH-228	1.13E+000	2.96E-001	3.90E-001
RA-224	1.04E+000	2.44E-001	4.89E-002
PB-212	9.31E-001	1.58E-001	3.45E-002
BI-212	9.29E-001	4.50E-001	2.74E-001
TL-208	8.42E-001	1.53E-001	5.72E-002
U-235	Not Detected	---------	2.04E-001
TH-231	Not Detected	---------	1.31E+000
PA-231	Not Detected	---------	1.18E+000
TH-227	Not Detected	---------	3.29E-001
RA-223	Not Detected	---------	1.89E-001
RN-219	Not Detected	---------	3.14E-001
PB-211	Not Detected	---------	6.99E-001
TL-207	Not Detected	---------	1.04E+001
AM-241	Not Detected	---------	4.33E-001
PU-239	Not Detected	---------	3.73E+002
NP-237	~~7.09E-001~~	~~4.37E-001~~	2.83E-001 Not detected
PA-233	Not Detected	---------	4.86E-002
TH-229	Not Detected	---------	2.40E-001

all bkg

2/17/99

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033309

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.00E-002
AG-110m	Not Detected	---------	2.55E-002
BA-133	Not Detected	---------	5.32E-002
BE-7	Not Detected	---------	2.07E-001
CD-109	Not Detected	---------	9.63E-001
CD-115	Not Detected	---------	9.31E-002
CE-139	Not Detected	---------	2.65E-002
CE-141	Not Detected	---------	4.57E-002
CE-144	Not Detected	---------	2.02E-001
CO-56	Not Detected	---------	2.56E-002
CO-57	Not Detected	---------	2.62E-002
CO-58	Not Detected	---------	2.59E-002
CO-60	Not Detected	---------	2.84E-002
CR-51	Not Detected	---------	1.95E-001
CS-134	Not Detected	---------	3.02E-002
CS-137	Not Detected	---------	2.81E-002
EU-152	Not Detected	---------	7.88E-002
EU-154	Not Detected	---------	1.43E-001
EU-155	Not Detected	---------	1.32E-001
FE-59	Not Detected	---------	5.27E-002
GD-153	Not Detected	---------	9.96E-002
HG-203	Not Detected	---------	2.70E-002
I-131	Not Detected	---------	2.67E-002
IR-192	Not Detected	---------	2.30E-002
K-40	1.69E+001	2.43E+000	1.98E-001
MN-52	Not Detected	---------	3.00E-002
MN-54	Not Detected	---------	2.87E-002
MO-99	Not Detected	---------	2.85E-001
NA-22	Not Detected	---------	3.42E-002
NA-24	Not Detected	---------	1.71E-001
NB-95	Not Detected	---------	1.96E-001
ND-147	Not Detected	---------	1.76E-001
NI-57	~~1.34E-001~~	~~4.50E-002~~	5.26E-002 Not detected 2/17/99
RU-103	Not Detected	---------	2.33E-002
RU-106	Not Detected	---------	2.27E-001
SB-122	Not Detected	---------	4.87E-002
SB-124	Not Detected	---------	2.30E-002
SB-125	Not Detected	---------	6.90E-002
SN-113	Not Detected	---------	3.02E-002
SR-85	Not Detected	---------	2.90E-002
TA-182	Not Detected	---------	1.29E-001
TA-183	Not Detected	---------	4.68E-001
TC-99m	Not Detected	---------	2.75E+000
TL-201	Not Detected	---------	2.38E-001
XE-133	Not Detected	---------	2.06E-001
Y-88	Not Detected	---------	2.06E-002
ZN-65	Not Detected	---------	8.67E-002
ZR-95	Not Detected	---------	4.40E-002

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* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/17/99 6:43:34 AM *
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* Analyzed by: 2/17/99 Reviewed by: 2/22/99 *

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Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044665-001
Lab Sample ID : 90033310

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 839.000 gram
Sample Date/Time : 2/15/99 10:45:00 AM
Acquire Start Date/Time : 2/17/99 5:03:20 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6004 seconds

6R-248

Comments:

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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	7.85E-001
RA-226	2.09E+000	6.93E-001	5.62E-001
PB-214	1.02E+000	3.00E-001	4.59E-002
BI-214	9.21E-001	1.69E-001	4.01E-002
PB-210	Not Detected	---------	3.61E+001
TH-232	1.21E+000	6.16E-001	1.53E-001
RA-228	1.12E+000	3.23E-001	1.22E-001
AC-228	1.10E+000	2.55E-001	7.46E-002
TH-228	1.17E+000	6.57E-001	4.36E-001
RA-224	1.19E+000	2.79E-001	5.75E-002
PB-212	1.15E+000	1.80E-001	3.66E-002
BI-212	1.25E+000	5.50E-001	2.92E-001
TL-208	1.08E+000	1.94E-001	5.68E-002
U-235	Not Detected	---------	2.26E-001
TH-231	Not Detected	---------	1.45E+000
PA-231	Not Detected	---------	1.34E+000
TH-227	Not Detected	---------	3.83E-001
RA-223	Not Detected	---------	2.18E-001
RN-219	Not Detected	---------	3.48E-001
PB-211	Not Detected	---------	7.87E-001
TL-207	Not Detected	---------	1.22E+001
AM-241	Not Detected	---------	5.00E-001
PU-239	Not Detected	---------	4.19E+002
NP-237	~~7.27E-001~~	~~3.16E-001~~	2.79E-001 Not detected 2/17/99
PA-233	Not Detected	---------	5.47E-002
TH-229	Not Detected	---------	2.69E-001

all bkg

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033310

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.40E-002
AG-110m	Not Detected	---------	2.97E-002
BA-133	Not Detected	---------	6.13E-002
BE-7	Not Detected	---------	2.32E-001
CD-109	Not Detected	---------	9.49E-001
CD-115	Not Detected	---------	1.15E-001
CE-139	Not Detected	---------	2.94E-002
CE-141	Not Detected	---------	5.04E-002
CE-144	Not Detected	---------	2.23E-001
CO-56	Not Detected	---------	2.92E-002
CO-57	Not Detected	---------	2.98E-002
CO-58	Not Detected	---------	2.85E-002
CO-60	Not Detected	---------	3.09E-002
CR-51	Not Detected	---------	2.15E-001
CS-134	Not Detected	---------	3.43E-002
CS-137	2.47E-002	2.15E-002	2.07E-002
EU-152	Not Detected	---------	9.03E-002
EU-154	Not Detected	---------	1.66E-001
EU-155	Not Detected	---------	1.47E-001
FE-59	Not Detected	---------	6.14E-002
GD-153	Not Detected	---------	1.12E-001
HG-203	Not Detected	---------	3.00E-002
I-131	Not Detected	---------	3.02E-002
IR-192	Not Detected	---------	2.55E-002
K-40	1.75E+001	2.49E+000	2.25E-001
MN-52	Not Detected	---------	3.29E-002
MN-54	Not Detected	---------	3.05E-002
MO-99	Not Detected	---------	3.24E-001
NA-22	Not Detected	---------	3.58E-002
NA-24	Not Detected	---------	2.00E-001
NB-95	Not Detected	---------	2.33E-001
ND-147	Not Detected	---------	1.94E-001
NI-57	Not Detected	---------	5.12E-002
RU-103	Not Detected	---------	2.59E-002
RU-106	Not Detected	---------	2.64E-001
SB-122	Not Detected	---------	5.74E-002
SB-124	Not Detected	---------	2.63E-002
SB-125	Not Detected	---------	7.61E-002
SN-113	Not Detected	---------	3.50E-002
SR-85	Not Detected	---------	3.37E-002
TA-182	Not Detected	---------	1.44E-001
TA-183	Not Detected	---------	5.40E-001
TC-99m	Not Detected	---------	3.87E+000
TL-201	Not Detected	---------	2.65E-001
XE-133	Not Detected	---------	2.42E-001
Y-88	Not Detected	---------	2.42E-002
ZN-65	Not Detected	---------	9.47E-002
ZR-95	Not Detected	---------	4.97E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/17/99 8:25:22 AM *
****

* Analyzed by: 2/17/99 Reviewed by: 2/22/99 *

****

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044666-001
Lab Sample ID : 90033311

5R-249

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 973.000 gram
Sample Date/Time : 2/15/99 10:59:00 AM
Acquire Start Date/Time : 2/17/99 6:45:08 AM
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	---------	6.47E-001
RA-226	1.90E+000	7.50E-001	4.71E-001
PB-214	7.21E-001	1.23E-001	3.70E-002
BI-214	6.87E-001	2.47E-001	3.71E-002
PB-210	Not Detected	---------	2.97E+001
TH-232	8.39E-001	4.24E-001	1.35E-001
RA-228	7.59E-001	1.74E-001	1.09E-001
AC-228	8.34E-001	1.96E-001	6.36E-002
TH-228	7.74E-001	6.05E-001	4.25E-001
RA-224	8.70E-001	2.07E-001	4.72E-002
PB-212	8.27E-001	3.88E-001	3.17E-002
BI-212	7.76E-001	5.02E-001	2.50E-001
TL-208	7.43E-001	1.60E-001	5.13E-002
U-235	9.12E-002	1.53E-001	1.94E-001
TH-231	Not Detected	---------	1.25E+000
PA-231	Not Detected	---------	1.14E+000
TH-227	Not Detected	---------	3.07E-001
RA-223	Not Detected	---------	1.81E-001
RN-219	Not Detected	---------	2.88E-001
PB-211	Not Detected	---------	6.51E-001
TL-207	Not Detected	---------	1.06E+001
AM-241	Not Detected	---------	4.25E-001
PU-239	Not Detected	---------	3.59E+002
NP-237	Not Detected	---------	2.43E-001
PA-233	Not Detected	---------	4.40E-002
TH-229	Not Detected	---------	2.26E-001

all bkg

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 90033311

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.91E-002
AG-110m	Not Detected	---------	2.39E-002
BA-133	Not Detected	---------	4.83E-002
BE-7	Not Detected	---------	2.06E-001
CD-109	Not Detected	---------	8.26E-001
CD-115	Not Detected	---------	9.45E-002
CE-139	Not Detected	---------	2.51E-002
CE-141	Not Detected	---------	4.34E-002
CE-144	Not Detected	---------	1.95E-001
CO-56	Not Detected	---------	2.53E-002
CO-57	Not Detected	---------	2.54E-002
CO-58	Not Detected	---------	2.63E-002
CO-60	Not Detected	---------	2.87E-002
CR-51	Not Detected	---------	1.86E-001
CS-134	Not Detected	---------	2.80E-002
CS-137	1.50E-002	2.73E-002	1.62E-002
EU-152	Not Detected	---------	7.64E-002
EU-154	Not Detected	---------	1.42E-001
EU-155	Not Detected	---------	1.25E-001
FE-59	Not Detected	---------	5.78E-002
GD-153	Not Detected	---------	9.34E-002
HG-203	Not Detected	---------	2.53E-002
I-131	Not Detected	---------	2.64E-002
IR-192	Not Detected	---------	2.08E-002
K-40	2.10E+001	2.94E+000	1.85E-001
MN-52	Not Detected	---------	2.61E-002
MN-54	Not Detected	---------	2.66E-002
MO-99	Not Detected	---------	2.87E-001
NA-22	Not Detected	---------	3.22E-002
NA-24	Not Detected	---------	1.95E-001
NB-95	Not Detected	---------	1.89E-001
ND-147	Not Detected	---------	1.67E-001
NI-57	Not Detected	---------	9.41E-002
RU-103	Not Detected	---------	2.17E-002
RU-106	Not Detected	---------	2.19E-001
SB-122	Not Detected	---------	4.95E-002
SB-124	Not Detected	---------	2.24E-002
SB-125	Not Detected	---------	6.37E-002
SN-113	Not Detected	---------	2.95E-002
SR-85	Not Detected	---------	2.72E-002
TA-182	Not Detected	---------	1.23E-001
TA-183	Not Detected	---------	4.66E-001
TC-99m	Not Detected	---------	3.92E+000
TL-201	Not Detected	---------	2.22E-001
XE-133	Not Detected	---------	2.06E-001
Y-88	Not Detected	---------	1.81E-002
ZN-65	Not Detected	---------	8.15E-002
ZR-95	Not Detected	---------	4.47E-002

****
* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [806 Laboratory] *
* 2/16/99 12:21:34 PM *
****

* Analyzed by: 2/17/99 Reviewed by: 2/22/99 *

Customer : S.COLLINS/M.SANCHEZ (6134)
Customer Sample ID : 044667-001
Lab Sample ID : 90033312

Sample Description : MARINELLI WATER SAMPLE
Sample Quantity : 500.000 mL
Sample Date/Time : 2/15/99 11:37:00 AM
Acquire Start Date/Time : 2/16/99 10:41:25 AM
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	---------	3.32E-001
RA-226	Not Detected	---------	3.78E-001
PB-214	Not Detected	---------	4.05E-002
BI-214	Not Detected	---------	4.46E-002
PB-210	Not Detected	---------	1.16E+001
TH-232	Not Detected	---------	1.13E-001
RA-228	Not Detected	---------	1.10E-001
AC-228	Not Detected	---------	5.95E-002
TH-228	Not Detected	---------	3.92E-001
RA-224	Not Detected	---------	9.60E-002
PB-212	Not Detected	---------	3.08E-002
BI-212	Not Detected	---------	2.37E-001
TL-208	Not Detected	---------	5.56E-002
U-235	Not Detected	---------	1.13E-001
TH-231	Not Detected	---------	7.38E-001
PA-231	Not Detected	---------	7.89E-001
TH-227	Not Detected	---------	1.15E-001
RA-223	Not Detected	---------	9.30E-002
RN-219	Not Detected	---------	2.02E-001
PB-211	Not Detected	---------	4.52E-001
TL-207	Not Detected	---------	6.62E+000
AM-241	Not Detected	---------	2.18E-001
PU-239	Not Detected	---------	2.09E+002
NP-237	Not Detected	---------	1.64E-001
PA-233	Not Detected	---------	3.15E-002
TH-229	Not Detected	---------	1.37E-001

all bkg

[Summary Report] - Sample ID: : 90033312

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
AG-108m	Not Detected	---------	1.62E-002
AG-110m	Not Detected	---------	1.72E-002
BA-133	Not Detected	---------	2.40E-002
BE-7	Not Detected	---------	1.39E-001
CD-109	Not Detected	---------	5.30E-001
CD-115	Not Detected	---------	3.78E-002
CE-139	Not Detected	---------	1.59E-002
CE-141	Not Detected	---------	2.58E-002
CE-144	Not Detected	---------	1.23E-001
CO-56	Not Detected	---------	2.14E-002
CO-57	Not Detected	---------	1.52E-002
CO-58	Not Detected	---------	1.62E-002
CO-60	Not Detected	---------	2.19E-002
CR-51	Not Detected	---------	1.34E-001
CS-134	Not Detected	---------	1.89E-002
CS-137	Not Detected	---------	1.80E-002
EU-152	Not Detected	---------	4.63E-002
EU-154	Not Detected	---------	7.58E-002
EU-155	Not Detected	---------	7.26E-002
FE-59	Not Detected	---------	3.30E-002
GD-153	Not Detected	---------	5.16E-002
HG-203	Not Detected	---------	1.68E-002
I-131	Not Detected	---------	1.84E-002
IR-192	Not Detected	---------	1.58E-002
K-40	Not Detected	---------	2.79E-001
MN-52	Not Detected	---------	2.00E-002
MN-54	Not Detected	---------	1.78E-002
MO-99	Not Detected	---------	1.36E-001
NA-22	Not Detected	---------	1.71E-002
NA-24	Not Detected	---------	5.45E-002
NB-95	Not Detected	---------	6.36E-002
ND-147	Not Detected	---------	1.17E-001
NI-57	Not Detected	---------	3.79E-002
RU-103	Not Detected	---------	1.78E-002
RU-106	Not Detected	---------	1.58E-001
SB-122	Not Detected	---------	2.77E-002
SB-124	Not Detected	---------	1.72E-002
SB-125	Not Detected	---------	4.88E-002
SN-113	Not Detected	---------	1.98E-002
SR-85	Not Detected	---------	2.28E-002
TA-182	Not Detected	---------	5.69E-002
TA-183	Not Detected	---------	2.11E-001
TC-99m	Not Detected	---------	2.23E-001
TL-201	Not Detected	---------	8.69E-002
XE-133	Not Detected	---------	8.57E-002
Y-88	Not Detected	---------	1.50E-002
ZN-65	Not Detected	---------	3.85E-002
ZR-95	Not Detected	---------	2.80E-002

Survey Number: 816671

RADIOLOGICAL SURVEY FORM

Location: 228 B	Requestor/Org: John Copland/6133	Date: 02/15/99	Time: 1400	Duration: 1.0
Purpose: Release of samples		Request #: N/A	RWP #: 0319	RHR # #: N/A

Instrument and Probe Type and Serial Number		Surveyor(s) Printed Name	Surveyor(s) Signature
ASP 1 \ HP 260 \ 2885	N/A	Arthur Tucker	
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

#	Item Description/Location	BETA-GAMMA ACTIVITY Counting Data Attached [X] Yes [ ] No; % Eff. 0.2 /Radionuclide N/A				ALPHA ACTIVITY Counting Data Attached [X] Yes [ ] No; % Eff. N/A /Radionuclide N/A				RADIATION SURVEY Bkg. N/A	
		cpm	Bkg. cpm	dpm/100 cm² [1]	T/R/F [2]	cpm	Bkg cpm	dpm/100 cm² [1]	T/R/F [2]	mrem/hr [3]	Distance
1	Sample # 044667-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
2	Sample # 044649-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
3	Sample # 044650-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
4	Sample # 044666-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
5	Sample # 044648-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
6	Sample # 044647-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
7	Sample # 044658-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
8	Sample # 044646-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
9	Sample # 044665-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
10	Sample # 044662-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
11	Sample # 044657-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A

[1] If area other than 100 cm², record as dpm/probe, or dpm/LAW. [2] Total/Removable/Fixed. [3] Indicate type, if other than gamma (i.e., n, α, or β).

Remarks:

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	Reviewed by:	Date:

Survey Number: S16671

RADIOLOGICAL SURVEY FORM CONTINUATION

#	Item Description/Location	BETA-GAMMA ACTIVITY cpm	Bkg. cpm	dpm/100 cm² [1]	TRT [2]	ALPHA ACTIVITY cpm	Bkg. cpm	dpm/100 cm² [1]	T.R.F. [2]	RADIATION SURVEY mrem/hr [3]	Distance
12	Sample # 044653-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
13	Sample # 044661-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
14	Sample # 044659-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
15	Sample # 044660-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
16	Sample # 044653-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
17	Sample # 044656-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
18	Sample # 044654-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
19	Sample # 044663-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
20	Sample # 044651-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
21	Sample # 044652-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
22	Sample # 044664-001	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
23	Sample spade	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
24	Sample spade	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
25	Sample space	100	100	ND	T	N/A	N/A	N/A	R	N/A	N/A
					N/A						

[1] If area other than 100 cm², record as dpm/probe, or dpm/N/A. [2] Total/Removable/Fixed. [3] Indicate type, if all or than gamma (i.e., n, α, or β).

Survey #16611

****
* Sandia Radioactive Sample Diagnostics Program 2-15-1999 *
****

LSC Analysis Program - version 5.3

Batch Number : 93014701
Count Protocol : 1
Client : 2265 2/15/99 1400 A. TUCKER 7523 93014701
Laboratory ID : 6921-2 S/N 405921
Count Date : 15-Feb-99
Protocol Name : H3A2 -- SWIPE
Region of Interest : 0-12
Count Time : 5.0 minutes
Background cpm : 23.00 +- 4.36
Background tSIE : 463.5
Background Eff : 0.415
Systematic Error : 12.90%
Sample Aliquot : 1.000 f

H-3 MDA = 2.54E+01 dpm/f
H-3 CL = 1.21E+01 dpm/f

H-3 Efficiency = 0.9740 - exp(-0.00047*tSIE^1.1600)

Flag Description:

>CL : Result > 2-sigma Error and Result > Critical Level.
<CL : Result < 2-sigma Error and Result < Critical Level.
@CL : Result < 2-sigma Error and Result > Critical Level.
@CL : Result > 2-sigma Error and Result < Critical Level.

Analyzed by: RT Preston 2/16/99 Reviewed by: RT Preston 2/16/99

S#	RPED ID	Client ID	cpm	Error	tSIE	Eff	H-3 Activity dpm/f	Error	Flag
2	001	001	2.12E-01	4.49E+00	459	0.411	-4.38E+00	2.21E+01	<CL
3	002	002	2.10E-01	4.44E+00	439	0.394	-5.07E+00	2.30E+01	<CL
4	003	003	2.34E+01	4.61E+00	450	0.404	9.91E-01	2.24E+01	<CL
5	004	004	2.30E+01	4.58E+00	444	0.398	0.00E+00	2.25E+01	<CL
6	005	005	2.14E+01	4.44E+00	447	0.401	-3.99E+00	2.25E+01	<CL
7	006	006	2.50E+01	4.68E+00	440	0.396	5.06E+00	2.35E+01	<CL
8	007	007	2.24E+01	4.45E+00	453	0.406	-1.48E+00	2.19E+01	<CL
9	008	008	2.26E+01	4.54E+00	439	0.394	-1.01E+00	2.27E+01	<CL
10	009	009	2.18E+01	4.40E+00	453	0.406	-2.96E+00	2.20E+01	<CL
11	010	010	1.96E-01	4.19E+00	451	0.404	-8.41E+00	2.23E+01	<CL
12	011	011	1.82E-01	3.98E+00	452	0.405	-1.18E+01	2.21E+01	<CL
13	012	012	1.98E+01	4.14E+00	442	0.397	-8.07E+00	2.25E+01	<CL
14	013	013	2.10E+01	4.21E+00	456	0.408	-4.90E+00	2.16E+01	<CL
15	014	014	2.00E+01	4.23E+00	450	0.404	-7.43E+00	2.22E+01	<CL

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Sheet 4 of 8

****
* Sandia Radioactive Sample Diagnostics Program 2-16-1999 *
****

Batch Number: 93014701

S#	RPSD ID	Client ID	cpm	Error	tSIE	Eff	H-3 Activity dpm/f	Error	Flag
16	015	015	2.16E+01	4.38E+00	445	0.399	-3.51E+00	2.24E+01	<CL
17	016	016	1.98E+01	4.14E+00	455	0.408	-7.85E+00	2.19E+01	<CL
18	017	017	2.10E+01	4.21E+00	453	0.406	-4.92E+00	2.17E+01	<CL
19	018	018	2.34E+01	4.44E+00	458	0.410	9.75E-01	2.16E+01	<CL
20	019	019	1.78E+01	3.94E+00	446	0.400	-1.30E+01	2.24E+01	<CL
21	020	020	2.00E+01	4.08E+00	435	0.391	-7.66E+00	2.26E+01	<CL
22	021	021	1.98E+01	4.10E+00	456	0.408	-7.84E+00	2.17E+01	<CL
23	022	022	2.18E+01	4.33E+00	451	0.405	-2.96E+00	2.19E+01	<CL
24	023	023	1.86E+01	3.98E+00	447	0.401	-1.10E+01	2.22E+01	<CL
25	024	024	1.90E+01	3.98E+00	441	0.396	-1.01E+01	2.24E+01	<CL
26	025	025	1.98E+01	4.10E+00	408	0.368	-8.69E+00	2.41E+01	<CL

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Page 5 of 8

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*****************************************************************************
* Sandia Radioactive Sample Diagnostics Program                   2-16-1999 *
*****************************************************************************
LSC Analysis Program - version 5.3

Batch Number        : 93014701
Count Protocol      : 1
Client              : 228B 2/15/99 1400 A. TUCKER 7523          93014701
Laboratory ID       : 6921-2  S/N 605921
Count Date          : 15-Feb-99
Protocol Name       : H3AB -- SWIPE
Region of Interest  : 20-600
Count Time          : 5.0 minutes
Background cpm      : 5.80 +- 2.15
Background LSIE     : 463.5
Background Eff      : 1.039
Systematic Error    :  8.90%
Sample Aliquot      : 1.000 f

Alpha MDA =  5.35E+00 dpm/f
Alpha CL  =  2.42E+00 dpm/f

Alpha Efficiency = 1.0390 - exp(-0.00990*tSIE^1.1780)

Flag Description:

>CL : Result > 2 sigma Error  and  Result > Critical Level.
<CL : Result < 2-sigma Error  and  Result < Critical Level.
@CL : Result < 2-sigma Error  and  Result > Critical Level.
@CL : Result > 2-sigma Error  and  Result < Critical Level.
```

S#	RPSD ID	Client ID	cpm	Error	tSIE	Eff	Alpha Activity dpm/f	Error	Flag
2	001	001	3.20E+00	1.60E-00	459	1.039	-2.50E+00	3.84E+00	<CL
3	002	002	5.40E+00	2.08E+00	439	1.039	-3.85E-01	4.11E+00	<CL
4	003	003	4.20E+00	1.83E+00	450	1.039	-1.54E+00	3.97E+00	<CL
5	004	004	5.60E+00	2.12E+00	444	1.039	-1.92E-01	4.13E+00	<CL
6	005	005	4.00E+00	1.79E+00	447	1.039	-1.73E+00	3.95E+00	<CL
7	006	006	3.60E+00	1.70E+00	440	1.039	-2.12E+00	3.90E+00	<CL
8	007	007	4.80E+00	1.96E+00	453	1.039	-9.62E-01	4.04E+00	<CL
9	008	008	3.20E+00	1.60E+00	439	1.039	2.50E+00	3.84E+00	<CL
10	009	009	5.20E+00	2.04E+00	453	1.039	-5.77E-01	4.09E+00	<CL
11	010	010	5.00E+00	2.00E+00	451	1.039	-7.70E-01	4.07E+00	<CL
12	011	011	5.00E-00	2.00E+00	452	1.039	-7.70E-01	4.07E+00	<CL
13	012	012	3.20E+00	1.60E+00	442	1.039	-2.50E+00	3.84E+00	<CL
14	013	013	4.20E+00	1.83E+00	456	1.039	-1.54E+00	3.57E+00	<CL
15	014	014	4.20E+00	1.83E+00	450	1.039	-1.54E+00	3.57E+00	<CL

Survey #16671

page 6 of 8

****
* Sandia Radioactive Sample Diagnostics Program 2-16-1993 *
****

Batch Number: 93014701

S#	RPSD ID	Client ID	cpm	Error	tSIE	Eff	Alpha Activity dpm/f	Error	Flag
16	015	015	5.00E+00	2.00E+00	445	1.039	-7.70E-01	4.07E-00	<CL
17	016	016	5.00E+00	2.00E+00	455	1.039	-7.70E-01	4.07E-00	<CL
18	017	017	5.20E+00	2.04E+00	453	1.039	-5.77E-01	4.09E+00	<CL
19	018	018	5.80E+00	2.15E+00	458	1.039	0.00E+00	4.15E+00	<CL
20	019	019	3.60E+00	1.70E+00	446	1.039	-2.12E+00	3.90E+00	<CL
21	020	020	3.00E+00	1.74E+00	435	1.039	-1.92E+00	3.92E+00	<CL
22	021	021	4.40E+00	1.88E+00	456	1.039	-1.35E+00	4.00E+00	<CL
23	022	022	5.60E+00	2.12E+00	451	1.039	-1.92E-01	4.13E+00	<CL
24	023	023	3.20E+00	1.60E+00	447	1.039	-2.50E+00	3.64E+00	<CL
25	024	024	3.40E+00	1.65E+00	441	1.039	-2.31E+00	3.87E-00	<CL
26	025	025	5.00E+00	2.00E+00	408	1.039	-7.70E-01	4.07E-00	<CL

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Survey #516671

of Case 7 of 8

```
*****************************************************************
* Sandia Radioactive Sample Diagnostics Program          2-15-1999 *
*****************************************************************
LSC Analysis Program - version 3.3

Batch Number          : 93014701
Count Protocol        : 1
Client                : 228B 2/15/99 1400 A. TUCKER 7523          93014701
Laboratory ID         : 6921-2  S/N 405931
Count Date            : 15-Feb-99
Protocol Name         : H3AB -- SWIPE
Region of Interest    : 12-2000
Count Time            : 5.0 minutes
Background cpm        : 37.20 +- 5.45
Background tSIE       : 463.5
Background Eff        : 0.841
Systematic Error      :  6.30%
Sample Aliquot        : 1.000 f

Beta MDA =  1.58E+01 dpm/f
Beta CL  =  7.56E+00 dpm/f

Beta Efficiency = 0.8410 - exp(-0.01319*tSIE^1.1040)

Flag Description:

>CL : Result > 2-sigma Error  and  Result > Critical Level.
<CL : Result < 2-sigma Error  and  Result < Critical Level.
@CL : Result < 2-sigma Error  and  Result > Critical Level.
@CL : Result > 2-sigma Error  and  Result < Critical Level.
```

S#	RFSD ID	Client ID	cpm	Error	tSIE	Eff	Beta Activity dpm/f	Error	Flag
2	001	001	4.18E+01	5.78E+00	459	0.841	5.47E+00	1.37E+01	<CL
3	002	002	3.90E+01	5.58E+00	439	0.841	2.14E+00	1.33E+01	<CL
4	003	003	4.04E+01	5.68E+00	450	0.841	3.81E+00	1.35E+01	<CL
5	004	004	3.78E+01	5.50E+00	444	0.841	7.13E-01	1.31E+01	<CL
6	005	005	4.02E+01	5.67E+00	447	0.841	3.57E+00	1.35E+01	<CL
7	006	006	4.22E+01	5.81E+00	440	0.841	5.95E+00	1.38E+01	<CL
8	007	007	3.84E+01	5.54E+00	453	0.841	1.43E+00	1.32E+01	<CL
9	008	008	4.06E+01	5.70E+00	439	0.841	4.04E+00	1.35E+01	<CL
10	009	009	3.86E+01	5.56E+00	453	0.841	1.66E+00	1.32E+01	<CL
11	010	010	3.78E+01	5.50E+00	451	0.841	7.13E-01	1.31E+01	<CL
12	011	011	3.70E+01	5.44E+00	452	0.841	-2.38E-01	1.30E+01	<CL
13	012	012	3.60E+01	5.37E+00	443	0.841	-1.43E+00	1.30E+01	<CL
14	013	013	3.20E+01	5.14E+00	456	0.841	-4.99E+00	1.29E+01	<CL
15	014	014	4.16E+01	5.77E+00	450	0.841	5.23E+00	1.37E+01	<CL

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Sing 2.

page 87.

```
*************************************************************************
* Sandia Radioactive Sample Diagnostics Program                2-16-1999 *
*************************************************************************
Batch Number: 93014701


     RPSD  Client                                              Beta Activity
S#   ID    ID            cpm        Error     tSIE  Eff     dpm/f      Error      Flag
---  ---   --------  ---------  ---------  -   -  -----  ---------  --------    ----
 16  015        015  3.58E+01   5.35E+00   445  0.841  -1.66E+00   1.30E-01    <CL
 17  015        016  3.96E+01   5.63E+00   455  0.841   2.85E+00   1.34E-01    <CL
 18  017        017  4.22E+01   5.81E+00   453  0.841   5.95E+00   1.38E+01    <CL
 19  018        018  3.78E+01   5.50E+00   458  0.841   7.13E-01   1.31E+01    <CL
 20  019        019  3.74E+01   5.47E+00   446  0.841   2.38E-01   1.30E+01    <CL
 21  020        020  4.20E+01   5.80E+00   435  0.841   5.71E+00   1.37E+01    <CL
 22  021        021  3.68E+01   5.42E+00   456  0.841  -4.76E-01   1.30E+01    <CL
 23  022        022  3.32E+01   5.15E+00   451  0.841  -4.76E+00   1.29E+01    <CL
 24  023        023  4.32E+01   5.88E+00   447  0.841   7.13E+00   1.35E+01    <CL
 25  024        024  3.72E+01   5.45E+00   441  0.841   0.00E+00   1.30E+01    <CL
 26  025        025  4.56E+01   6.04E+00   408  0.841   9.99E+00   1.43E-01    @CL
```

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Annex 3-F

ANNEX 3-F
Data Validation Reports

Site: 22 A

AR/COC: 601212 Data Classification: organics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
No	DATA	WERE	QUALIFIED
	DATA	IS	ACCEPTABLE
	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: E. Todd Monk Date: 3-5-99

Site: 228A

AR/COC: 601212 Data Classification: Inorganics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
	NO DATA	WERE	QUALIFIED
	DATA	IS	ACCEPTABLE
	QC	MEASURES	APPEAR
	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-MS, EPA8270, HACH_ALK, HACH_NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: E Tolmachs Date: 3-5-99

Site: 226A

AR/COC: 601212 Data Classification: Radiometrics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
	NO DATA	WERE	QUALIFIED
	DATA	IS	ACCEPTABLE
	QC MEASURES		APPEAR 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: ETJ Mark Date: 3-5-99

MEMORANDUM

DATE: March 5, 1999

TO: File

FROM: Tod Monks TM

SUBJECT: Organic Data Review and Validation
228 A, ARCOC No. 601212, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods (HE - EPA8330, EPA8260A, and EPA8270). All compounds were successfully analyzed. No problems were identified with the organics methods listed above that resulted in the qualification of data.

The following sections discuss the data review and validation.

Holding Times

The samples were extracted and analyzed within the prescribed holding times.

Calibration

Initial and continuing calibration met acceptance criteria. However, the RSD was between 20 and 40 percent for 2,4-dinitrophenol, 4-nitrophenol, 4-nitroaniline, and 4,6-dinitro-2methylphenol. No data were qualified.

Blanks

No target analytes were detected above the reporting limit in the method blanks.

Surrogates

The surrogate data met acceptance limits for site samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

The MS/MSD met acceptance criteria except for 4-nitrophenol which failed the MS recovery low (less than 10%). The MSD passed. No data were qualified.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses

The LCS/LCSDs for the site samples met acceptance criteria.

Other QC

No other specific issues were identified which affect data quality.

No data were qualified. Data is acceptable. QC measures appear to be adequate.

Please contact me if you have any questions or comments regarding the review of this package.

MEMORANDUM

DATE: March 5, 1999

TO: File

FROM: Tod Monks

SUBJECT: Inorganic Data Review and Validation
228A, ARCOC No. 601212, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

The samples were prepared and analyzed with accepted procedures and specified methods (Metals – EPA6010B and EPA7471). All compounds were successfully analyzed. There are no problems which were identified within the data package that result in the qualification of data.

The following sections further discuss the data review and validation.

Holding Times

The sample was analyzed within the prescribed holding times.

Calibration

Initial and continuing calibration met acceptance criteria for all methods.

Blanks

Chromium and mercury were present in method blanks. The concentration of mercury was between the IDL and the RL. Mercury was not detected in field samples. No action was taken. Field sample results showed chromium concentration in field samples at concentrations > 10 X the blank concentration. No data were qualified.

Trace concentrations of barium, chromium, and lead were detected in the equipment blank. No data were qualified because concentrations in field samples are > 5X the blank concentrations.

ICP Interference Check Sample (ICS) Analysis

The ICS met QC acceptance limits.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses

The LCS/LCSD met acceptance criteria for all analytes except mercury. Mercury failed the LCS high. No data were qualified.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

The MS/MSD met acceptance criteria for all samples.

Other QC

No other specific issues were identified which affect data quality.

Data is acceptable. QC measures appear to be adequate.

Please contact me if you have any questions or comments regarding the review of this package.

MEMORANDUM

DATE: March 5, 1999

TO: File

FROM: Tod Monks TM

SUBJECT: Radiometric Data Review and Validation
228A, ARCOC No. 601212, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

<u>Summary</u>

All samples were prepared and analyzed with accepted procedures and specified methods (gross alpha/beta – EPA900.0 and EPI-A-01IB). All compounds were successfully analyzed. No problems were identified with the data package that result in the qualification of data. Data is acceptable and QC measures appear to be adequate.

The following sections discuss the data review and validation.

<u>Holding Times</u>

The samples were analyzed within the prescribed holding times.

<u>Calibration</u>

Calibration met acceptance criteria for the methods.

<u>Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses</u>

The LCS/LCSD met acceptance criteria for the methods.

<u>Blanks</u>

No target analytes were detected above the reporting limits in the method blank.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses</u>

The MS/MSD met acceptance criteria for the methods.

Duplicate

The duplicate error ratio (DER) met acceptance criteria (< 1.0).

Other QC

No data were qualified. Data is acceptable. QC measures appear to be acceptable.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

DATA VALIDATION SUMMARY:

SITE/PROJECT: 228A CASE #: 7225.2203
ARCOC #: 60/2/2
LABORATORY: GEL
LABORATORY REPORT #: 98/2316

OF SAMPLES: 7 (33) MATRIX: Aqueous (Soil)
LAB SAMPLE IDs: See ARCOC for ID's

ANALYSIS/ QC ELEMENT	VOC	SVOC	PEST/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	✓	NA	✓	✓	NA	✓	NA	✓	NA
2. CALIBRATIONS	✓	✓		✓	✓		✓		✓	
3. METHOD BLANKS	✓	✓		✓	✓		✓		✓	
4. MS/MSD	✓	✓		✓	✓		✓		✓	
5. LABORATORY CONTROL SAMPLES	✓	✓		✓	✓		✓		✓	
6. REPLICATES					✓		✓		✓	
7. SURROGATES	✓	✓		✓						
8. INTERNAL STDS	✓	✓								
9. TCL COMPOUND IDENTIFICATION	✓	✓								
10. ICP INTERFERENCE CHECK SAMPLE					✓					
11. ICP SERIAL DILUTION					✓					
12. CARRIER/CHEM TRACER RECOVERIES	✓	✓		✓	✓		✓		✓	
13. OTHER QC										

CHECK MARK (√) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED

SHADED CELLS – NOT APPLICABLE
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

REVIEWED BY: E Todd Monkus DATE: 3-5-99

VOLATILE ORGANICS:
SW-846 - Method 8260

SITE/PROJECT: 22 B A ARCOC #: 601212
LABORATORY: GEL LABORATORY REPORT #: 9812316

IS	GC/MS Name	CAS #	Min RF	Intercept	Calib RF >.05	Calib RSD / R^2 <20% / 0.99	CCV RPD <20%	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Trip Blks			
1	Chloromethane	74-87-3	0.10																	
1	Bromomethane	74-83-9	0.10																	
1	vinyl chloride	75-01-4	0.10																	
1	Chloroethane	75-00-3	0.01																	
1	methylene chloride (10xblk)	75-09-2	0.01																	
1	acetone(10xblk)	67-64-1	0.01																	
1	carbon disulfide	75-15-0	0.10																	
1	1,1-dichloroethene	75-35-4	0.20																	
1	1,1-dichloroethane	75-34-3	0.10																	
1	Chloroform	67-66-3	0.20																	
1	1,2-dichloroethane	107-06-2	0.10																	
1	2-butanone(10xblk)	78-93-3	0.01																	
2	1,1,1-trichloroethane	71-55-6	0.10																	
2	carbon tetrachloride	56-23-5	0.10																	
2	Bromodichloromethane	75-27-4	0.20																	
2	1,2-dichloropropane	78-87-5	0.01																	
2	cis-1,3-dichloropropene	10061-01-5	0.20																	
2	Trichloroethene	79-01-6	0.30																	
2	Dibromochloromethane	124-48-1	0.10																	
2	1,1,2-trichloroethane	79-00-5	0.10																	
2	Benzene	71-43-2	0.50						✓	✓	✓	✓	✓	✓						
2	trans-1,3-dichloropropene	10061-02-6	0.10																	
2	Bromoform	75-25-2	0.10																	
3	4-methyl-2-pentanone	108-10-1	0.10																	
3	2-hexanone	591-78-6	0.01																	
3	Tetrachloroethene	127-18-4	0.20																	
3	1,1,2,2-tetrachloroethane	79-34-5	0.30																	
3	toluene(10xblk)	108-88-3	0.40																	
3	Chlorobenzene	108-90-7	0.50																	
3	Ethylbenzene	100-41-4	0.10																	
3	Styrene	100-42-5	0.30																	
3	xylenes(total)	1330-20-7	0.30																	
	1,2-dichloroethylene(total)	540-59-0	0.01																	
	2-chloroethyl vinyl ether	110-75-8																		

Comments:

REVIEWED BY: E Todd Monk DATE: 3-5-99

VOLATILE ORGANICS: page 2
SW-846 - Method 8260

SITE/PROJECT: 226 A ARCOC #: 601212
LABORATORY: GEL LABORATORY REPORT #: 981236

Surrogate Recovery and Internal Standard Outliers

Sample	SMC 1	SMC 2	SMC 3	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3- area	IS 3- RT			
						Met						
						Criteria						

SMC 1: 4-Bromofluorobenzene
SMC 2: 1,2-Dichloroethane-d4
SMC 3: Toluene-d8

IS 1: Bromochloromethane
IS 2: 1,4-Difluorobenzene
IS 3: Chlorobenzene-d5

Comments:

RE 'D BY: E Todd Monroe DATE 3-5-99

SEMI-VOLATILE ORGANICS:
SW-846 - Method 8270

SITE/PROJECT: 228 A ARCOC #: 60/212
LABORATORY: GEL LABORATORY REPORT #: 98/2316

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
1	A	108-95-2	Phenol	0.80																	
1	BN	111-44-4	bis(2-Chloroethyl)ether	0.70																	
1	A	95-57-8	2-Chlorophenol	0.80																	
1	BN	541-73-1	1,3-Dichlorobenzene	0.60																	
1	BN	106-46-7	1,4-Dichlorobenzene	0.50																	
1	BN	95-50-1	1,2-Dichlorobenzene	0.40																	
1	A	95-48-7	2-Methylphenol	0.70																	
1	BN	108-60-1	bis(2-chloroisopropyl)ether	0.01																	
1	A	106-44-5	4-Methylphenol	0.60																	
1	BN	621-64-7	N-Nitroso-di-n-propylamine	0.50																	
1	BN	67-72-1	Hexachloroethane	0.30																	
2	BN	98-95-3	Nitrobenzene	0.20																	
2	BN	78-59-1	Isophorone	0.40																	
2	A	88-75-5	2-Nitrophenol	0.10																	
2	A	105-67-9	2,4-Dimethylphenol	0.20																	
2	BN	111-91-1	bis(2-Chloroethoxy)methane	0.30																	
2	A	120-83-2	2,4-Dichlorophenol	0.20																	
2	BN	120-82-1	1,2,4-Trichlorobenzene	0.20																	
2	BN	91-20-3	Naphthalene	0.70																	
2	BN	106-47-8	4-Chloroaniline	0.01																	
2	BN	87-68-3	Hexachlorobutadiene	0.01																	
2	A	59-50-7	4-Chloro-3-methylphenol	0.20																	
2	BN	91-57-6	2-Methylnaphthalene	0.40																	
3	BN	77-47-4	Hexachlorocyclopentadiene	0.01																	
3	A	88-06-2	2,4,6-Trichlorophenol	0.20																	
3	A	95-95-4	2,4,5-Trichlorophenol	0.20																	

Comments:

REVIEWED BY: E Todd Monkus DATE: 3-5-99

SEMI-VOLATILE ORGANICS: page 2
SW 846 - Method 8270

SITE/PROJECT: 228 A ARCOC #: 601212
LABORATORY: GEL LABORATORY REPORT #: 9812316

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	(2) Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq Blks	Field Blks			
					✓	>.05	<20% / 0.99	<20%													
3	BN	91-58-7	2-Chloronaphthalene	0.80			✓														
3	BN	88-74-4	2-Nitroaniline	0.01			✓														
3	BN	131-11-3	Dimethylphthalate	0.01			✓														
3	BN	208-96-8	Acenaphthylene	0.90			✓														
3	BN	606-20-2	2,6-Dinitrotoluene	0.20			✓														
3	BN	99-09-2	3-Nitroaniline	0.01			✓			✓	✓	✓	✓	✓	✓						
3	BN	83-32-9	Acenaphthene	0.90			✓														
3	A	51-28-5	2,4-Dinitrophenol	0.01			34.37						(1)								
3	A	100-02-7	4-Nitrophenol	0.01			21.28			✓	✓	✓	2.010	✓	✓						
3	BN	132-64-9	Dibenzofuran	0.80			✓														
3	BN	121-14-2	2,4-Dinitrotoluene	0.20						✓	✓	✓	✓	✓	✓						
3	BN	84-66-2	Diethylphthalate	0.01			✓														
3	BN	7005-72-3	4-Chlorophenyl-phenylether	0.40			✓														
3	BN	86-73-7	Fluorene	0.90			✓														
3	BN	100-01-6	4-Nitroaniline	0.01			21.85														
4	A	534-52-1	4,6-Dinitro-2-methylphenol	0.01			23.90														
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	0.01			✓														
4	BN	101-55-3	4-Bromophenyl-phenylether	0.10			✓														
4	BN	118-74-1	Hexachlorobenzene	0.10			✓														
4	A	87-86-5	Pentachlorophenol	0.05			✓			✓	✓	✓	✓	✓	✓						
4	BN	85-01-8	Phenanthrene	0.70			✓														
4	BN	120-12-7	Anthracene	0.70			✓														
4	BN	86-74-8	Carbazole	0.01			✓														
4	BN	84-74-2	Di-n-butylphthalate	0.01			✓														
4	BN	206-44-0	Fluoranthene	0.60			✓														
5	BN	129-00-0	Pyrene	0.60			✓			✓	✓	✓	✓	✓	✓						
5	BN	85-68-7	Butylbenzylphthalate	0.01			✓														
5	BN	91-94-1	3,3'-Dichlorobenzidine	0.01			✓														
5	BN	56-55-3	Benzo(a)anthracene	0.80			✓														

Comments: (1) MS Failed acceptance criteria for 4-Nitrophenol. MSD Passed. MS recovery < 10%. Field samples ND. 1 Qualification of data. NO
(2) % RSD > 20% but less than 40% for several analytes. No Data Qualified

REVIEWED BY: E Joel Monke DATE 3-5-99

3-5-99

SEMI-VOLATILE ORGANICS: page 3
SW 846 - Method 8270

SITE/PROJECT: 228A ARCOC #: 601212
LABORATORY: GEL LABORATORY REPORT #: 98/2316

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
					✓	>.05	<20% / 0.99	<20%													
5	BN	218-01-9	Chrysene	0.70																	
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	0.01																	
6	BN	117-84-0	Di-n-octylphthalate	0.01																	
6	BN	205-99-2	Benzo(b)fluoranthene	0.70																	
6	BN	207-08-9	Benzo(k)fluoranthene	0.70																	
6	BN	50-32-8	Benzo(a)pyrene	0.70																	
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	0.50																	
6	BN	53-70-3	Dibenz(a,h)anthracene	0.40																	
6	BN	191-24-2	Benzo(g,h,i)perylene	0.50	⊥	⊥	⊥	⊥	⊥							⊥	⊥				

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
			met					
			criteria					

Comments:

SMC 1: Nitrobenzene-d5 (BN) SMC 2: 2-Fluorobiphenyl (BN) SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d5 (A) SMC 5: 2-Fluorophenol (A) SMC 6: 2,4,6-Tribromophenol (A)
SMC 7: 2-2-Chlorophenol-d4 (A) SMC 8: 1,2-Dichlorobenzene-d4 (BN)

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT
				met								
				criteria								

IS 1: 1,4-Dichlorobenzene-d4 (BN) IS 2: Naphthalene-d8 (BN) IS 3: Acenaphthene-d10 (BN)
IS 4: Phenanthrene-d10 (BN) IS 5: Chrysene-d12 (BN) IS 6: Perylene-d12 (BN)

REVIEWED BY: E Trol Monk DATE: 3-5-99

HIGH EXPLOSIVES:
SW846 Method 8330

SITE/PROJECT: 228A ARCOC #: 60/12/2
LABORATORY: GEL LABORATORY REPORT #: 9812316

NAME	CAS #	Intercept	Curve R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks		
		/	.99	20%	U			20%			20%		U	U		
HMX	2691-41-0															
RDX	121-82-4															
1,3,5-Trinitrobenzene	99-35-4															
1,3-dinitrobenzene	99-64-0															
Nitrobenzene	98-95-3															
Tetryl	479-45-8															
2,4,6-trinitrotoluene	118-96-7															
2-amino-4,6-dinitrotoluene	35572-78-2															
4-amino-2,6-dinitrotoluene	1946-51-0															
2,4-dinitrotoluene	121-14-2															
2,6-dinitrotoluene	606-20-2															
2-nitrotoluene	88-72-2															
4-nitrotoluene	99-99-0															
3-nitrotoluene	99-08-1															
PETN	78-11-5															

Sample	SMC %REC	SMC RT		Sample	SMC %REC	SMC RT
		met				
		criteria				

~~Comments:~~

Confirmation

Sample	CAS #	RPD > 25%		Sample	CAS #	~~RPD > 25%~~
		met				
		criteria				

REVIEWED BY: E Todd Monkou DATE: 3-5-99

INORGANIC METALS:

SITE/PROJECT: 220 A ARCOC #: 601212
LABORATORY: GEL LABORATORY REPORT #: 981 2316
METHODS: EPA 6010 A EPA 7471

QC Element/ Analyte	ICV	CCV	ICB	CCB	Method Blks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	REP RPD	ICS AB	Serial Dilution	Field Dup RPD	Eq. Blks	Field Blks			
7429-90-5 Al	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		(4)				
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		.002 mg/l				
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓				
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	(3) .103 mg/l	✓	✓	✓	✓	✓	✓	✓	✓	✓		.0014 mg/l				
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K																				
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓				
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		.00427 mg/l				
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓				
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓				
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	(1) .000258 mg/l		(2) 126	✓	✓	✓	✓	✓	✓	✓	✓		✓ .000058 mg/l				
Cyanide CN																				

mg/kg = ug/g : [(ug/g) x (sample mass (g) / sample vol. (ml)) x (1000ml / liter)] / Dilution Factor = ug / l

Comments:

(1) Absolute value of blank between IDL & RL. No action taken. Sample is ND, not qualified.
(2) Sample results less than detection. LCS % R greater than 120 %. No action taken
(3) Sample results >10 x blank concentration. No data qualified
(4) Sample conc are greater than 5 x blank value. No data qualified.

REVIEWED BY: E Tod Morken DATE: 3-5-99

RADIOCHEMISTRY:

SITE/PROJECT: 228 A ARCOC #: 60/212
LABORATORY: GEL LABORATORY REPORT #: 9812316
METHODS: EPI A-011B EPI A 013

QC Element/ Analyte	Method Blks	LCS	MS	Rep RER	Eq. Blks	Field Dup RER	Field Blks	-	Sample ID	Isotope	IS/Trace	Sample ID	Isotope	IS/Trace
CRITERIA	U	20%	25%	<1.0	U	<1.0	U	-			50-105			50-105
H3		/				/		-		U 232	✓			
U-238		/				/								
U-234		/				/								
U-235/236		/				/		-						
Th-232														
Th-228														
Th-230								-						
Pu-239/240														
Gross Alpha								-						
Nonvolatile Beta														
Ra226								-						
Ra228								-						
Ni-63								-						
Gamma Spec– Am241		/						-						
Gamma Spec– Cs137		/												
Gamma Spec– Co60		/												
								-						
								-						

Parameter	Method	Typical Tracer	Typical Carrier
Iso-U	Alpha spec	U-232	NA
Iso-Pu	Alpha spec	Pu-242	NA
Iso-Th	Alpha spec	Th-229	NA
Am-241	Alpha spec	Am-242	NA
Sr-90	Beta	Y ingrowth	NA
Ni-63	Beta	NA	Ni by ICP
Ra-226	Deamination	NA	NA
Ra-226	Alpha spec	Ba-133 or Ra-225	NA
Ra-228	Gamma spec	Ba-133	NA

Comments:

Gamma spec LCS contains: Am-241, Cs-137, and Co-60

REV D BY: E Trol Monk DATE: 5-5-99

Contract Verification Review (CVR)

Project Leader COLLINS | Project Name SITE 228A VCM | Case No. 7225.2203

AR/COC No. 60112 | Analytical Lab GEL | SDG No. 9812316

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 and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, LCD)	X				
2.4	Matrix spike/matrix spike duplicate data provided(if requested)	X				
2.5	Detection Limits provided; PQL and MDL(or IDL)	X				
2.6	QC batch numbers provided	X				
2.7	Dilution Factors provided	X				
2.8	Data reported using correct sig. fig. (2 for org.; 3 for inorg.)	X				
2.9	Rad analysis uncertainty provided (2 sigma error)	X				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Were contractual qualifiers provided	X				
2.14	All requested result data provided	X				

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1)Reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg). Units consistent between QC samples and sample data.	X		
3.2)Quantitation limit met for all samples?		X	thorium-231 not quantified due to low abundance
3.3)Accuracy a) Laboratory control sample accuracy reported and met for all samples?		X	mercury REC% high for aqueous sample
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?	X		
c) If requested, matrix spike recovery data reported and met .		X	4-nitrophenol out of acceptance limits
3.4)Precision a) Laboratory control sample precision reported and met for all samples? For rad analysis, sample duplicate precision reported and met.	X		
b) If requested, matrix spike duplicate RPD data reported and met.	X		
3.5)Blank data a) Method or reagent blank data reported and met for all samples?		X	several radiological analytes detected in method blank mercury detected between DL and RL in method blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?		X	several radiological analytes detected in equipment blank barium, chromium, and lead detected between DL and RL in equipment blank
3.6)Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank; "U"- analyte undetected (results are below the MDL or L_C (rad)); "H"-analysis done beyond the holding time.	X		
3.7)Narrative included, correct, and complete?	X		

4.0 Data Quality Evaluation Continuation

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/ Fraction No.	Analysis	Qualifiers	Comments

Were deficiencies noted. ☹ Yes ☺ No

Based on the review, this data package is complete. ☺ Yes ☹ No

If no, provide : nonconformance report or correction request number _____ and date correction request was submitted _____

Reviewed by: _____ Date: 01/26/99 Closed by: _____ Date: _____

SF 2001-COC (10-97)

Supersedes (5-97) issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

9812316

AR/COC- 601212

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland / Lai, Anh
Project Name: Site 228A VCM
Record Center Code: ER/13-A-08/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO USE
Carrier/Waybill No.: 715750
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Saimi / 844-3110
Send Report to SMO: Suzi Jarsch

Contract No.: AJ-2480A
Case No.: 7225,2283
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services, Dept/
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

9812316

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Samp #
043951 - 001	TJAOU-228A-GR-212-S	0	228A	120398/1330	S	AG	500 ml	4 C	G	SA	Gamma Spec	1 .1
043952 - 001	TJAOU-228A-GR-213-S	↓	↓	120398/1335	↓	↓	500ml	↓	↓	↓	Gamma Spec	2 .1
043952 - 002	TJAOU-228A-GR-213-S	↓	↓	120398/1335	↓	↓	↓	↓	↓	↓	RCRA Metals	3 .2
043953 - 001	TJAOU-228A-GR-214-S	2	↓	120398/1340	↓	↓	↓	↓	↓	↓	Gamma Spec	4 .1
043954 - 001	TJAOU-228A-GR-215-S	2	↓	120398/1400	↓	↓	↓	↓	↓	↓	Gamma Spec	5 .1
043954 - 002	TJAOU-228A-GR-215-S	2	↓	120398/1400	↓	↓	↓	↓	↓	↓	RCRA Metals	6 .2
043955 - 001	TJAOU-228A-GR-216-S	2	↓	120398/1415	↓	↓	↓	↓	↓	↓	Gamma Spec, Iso U	7 .3
043955 - 002	TJAOU-228A-GR-216-S	2	↓	120398/1415	↓	↓	↓	↓	↓	↓	HEs&VOCs	8 .4
043956 - 003	TJAOU-228A-GR-216-S	2	↓	120398/1415	↓	↓	40z	↓	↓	↓	VOC	9 .5
043956 - 001	TJAOU-228A-GR-217-S	0	↓	120398/1430	↓	↓	500ml	↓	↓	↓	Gamma Spec	10 .1

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy)
Entered by

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC GOALS releases this COC

Abnormal Conditions on Receipt Lab use
HOC

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Initials

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	C. Catechis	C.C.	MDM/6131/881-3198

Please list as separate report.

1. Relinquished by	C. Catechis	Org. 6131	Date 12/04/98	Time 1580	4. Relinquished by	Org.	Date
1. Received by	(210)	Org. 7578	Date 12/4/98	Time 1520	4. Received by	Org.	Date
2. Relinquished by	(210)	Org. 7578	Date 12/7/98	Time 1200	5. Relinquished by	Org.	Date
2. Received by		Org.	Date 12-8-98	Time 0900	5. Received by	Org.	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org.	Date
3. Received by		Org.	Date	Time	6. Received by	Org.	Date

Original — To Accompany Samples, Laboratory Copy (White)

1st Copy — To Accompany Samples, Return to SMO (Blue)

2nd Copy — SMO Suspense Copy (Yellow)

3rd Copy — Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601212

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Samp
043956 - 002	TJAOU-228A-GR-217-S	0	228A	120398/1430	S	~~Bk~~ Jar	500 ml	4 C	G	SA	RCRA Metals	11 .2
043957 - 001	TJAOU-228A-GR-218-S			120398/1440							Gamma Spec	12 .1
043958 – 001	TJAOU-228A-GR-219-S			120398/1445							Gamma Spec	13 .1
043958 - 002	TJAOU-228A-GR-219-S			120398/1445							RCRA Metals	14 .2
043959 - 001	TJAOU-228A-GR-220-S			120398/1447							Gamma Spec	15 .1
043960 – 001	TJAOU-228A-GR-221-S			120398/1455							Gamma Spec, Iso U	16 .3
043960 - 002	TJAOU-228A-GR-221-S			120398/1455							RCRA Metals, HE, SVOCs	17 .4
043960 - 003	TJAOU-228A-GR-221-S			120398/1455			4oz				VOC	18 .5
043961 - 001	TJAOU-228A-GR-221-DU			120398/1455			500 ml				Gamma Spec, Iso U	19 .3
043961 - 002	TJAOU-228A-GR-221-DU			120398/1455			500 ml				RCRA Metals, HE, SVOCs	20 .4
043961 - 003	TJAOU-228A-GR-221-DU			120398/1455			4oz				VOC	21 .5
043962 - 001	TJAOU-228A-GR-222-S			120398/1515			500 ml				Gamma Spec	22 .1
043963 - 001	TJAOU-228A-GR-223-S			120398/1520							Gamma Spec	23 .1
043963 - 002	TJAOU-228A-GR-223-S			120398/1520							RCRA Metals	24 .2
043964 - 001	TJAOU-228A-GR-224-S			120398/1530							Gamma Spec	25 .1
043965 – 001	TJAOU-228A-GR-225-S			120398/1533							Gamma Spec	26 .1
043965 - 002	TJAOU-228A-GR-225-S			120398/1533							RCRA Metals	27 .2
043966 - 001	TJAOU-228A-GR-226-S			120398/1540							Gamma Spec, Iso U	28 .3
043966 - 002	TJAOU-228A-GR-226-S			120398/1540							HE, SVOCs	29 .4
043966 - 003	TJAOU-228A-GR-226-S			120398/1540			4oz				VOC	30 .5
043967 – 001	TJAOU-228A-GR-227-S			120398/1550			500 ml				Gamma Spec	31 .1
043967 - 002	TJAOU-228A-GR-227-S			120398/1550							RCRA Metals	32 .2
043968 - 001	TJAOU-228A-GR-228-S			120398/1605							Gamma Spec	33 .1
~~043969 - 001~~	~~TJAOU-228A-GR-229-S~~ EE										Gamma Spec	
~~043969 - 002~~	~~TJAOU-228A-GR-229-S~~ EE										RCRA Metals	

Abnormal Conditions on Receipt:

LAB USE

Recipient Initials

Original To Accompany Samples, Laboratory Copy (White) 1st Copy To Accompany Samples, Return to SMO (Blue) 2nd Copy SMO Suspense Copy (Yellow) 3rd Copy Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601212

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative (all at 4°C)	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Samp
~~043969-001~~	~~TJAOU-228A-GR-230-S~~	0	228A		S	AG	500 ml	4C	G	SA	Gamma Spec	
043968-005	TJAOU-228A - TB			120318/1615	DIW	G	3X 40 ml	HCL		TB	VOC	14
043968-006	TJAOU-228A-EB			120318/1615		G	3X 40 ml	HCL		EB	VOC	15
043968-007	TJAOU-228A-EB			120318/1620		AG	2X 1 L	4C		EB	SVOC (8270)	16
043968-008	TJAOU-228A-EB			120318/1620		AG	4X 1 L	4C		EB	HE	17
043968-009	TJAOU-228A-EB			120318/1620		P	500 ml	HNO3		EB	RCRA metals	18
043968-010	TJAOU-228A-EB			120318/1620		P	1 L	HNO3		EB	Gamma Spec	19
043968-011	TJAOU-228A-EB			120318/1620		P	1 L	HNO3		EB	ISO U	20

Abnormal Conditions on Receipt

Recipient Initials

LAB USE

Original To Accompany Samples, Laboratory Copy (White) 1st Copy To Accompany Samples, Return to SMO (Blue) 2nd Copy SMO Suspense Copy (Yellow) 3rd Copy Field Copy (Pink)

SEMI-VOLATILE ORGANICS: page 3
SW 846 - Method 8270

SITE/PROJECT: 228A ARCOC #: 600799
LABORATORY: CORE LABORATORY REPORT #: 982439

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						> 05	<20% / 0.99	<20%													
5	BN	218-01-9	Chrysene	0.70		✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	✓ ~~[illegible]~~	NA	NA			
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	0.01		✓	✓	✓	↓	↓	↓	↓	↓	↓	↓	✓ ~~54~~	↓	↓			
6	BN	117-84-0	Di-n-octylphthalate	0.01		✓	✓	✓								✓					
6	BN	205-99-2	Benzo(b)fluoranthene	0.70		✓	✓	✓								✓					
6	BN	207-08-9	Benzo(k)fluoranthene	0.70		✓	✓	✓								✓					
6	BN	50-32-8	Benzo(a)pyrene	0.70		✓	✓	✓								~~NA~~ ✓					
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	0.50		✓	✓	23.2								✓					
6	BN	53-70-3	Dibenz(a,h)anthracene	0.40		✓	✓	✓								✓					
6	BN	191-24-2	Benzo(g,h,i)perylene	0.50		✓	✓	✓	↓	↓	↓	↓	↓	↓	↓	✓	↓	↓			

NA - Not Applicable

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
~~Terphenyl~~			141.5					

Comments:

SMC 1: Nitrobenzene-d5 (BN) SMC 2: 2-Fluorobiphenyl (BN) SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d5 (A) SMC 5: 2-Fluorophenol (A) SMC 6: 2,4,6-Tribromophenol (A)
SMC 7: 2-2-Chlorophenol-d4 (A) SMC 8: 1,2-Dichlorobenzene-d4 (BN)

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT
			Met QC	Criteria								

IS 1: 1,4-Dichlorobenzene-d4 (BN) IS 2: Naphthalene-d8 (BN) IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN) IS 5: Chrysene-d12 (BN) IS 6: Perylene-d12 (BN)

REVIEWED BY [signature] DATE: 3-11-99

HIGH EXPLOSIVES:
SW846 Method 8330

SITE/PROJECT: 2081 ARCOC #: 600799
LABORATORY: CORF LABORATORY REPORT #: 982439

NAME	CAS #	Intercept	Curve R^2	CCV RPD	Method Blks	LCS ③	LCSD	LCS RPD	MS ①	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks		
			.99	20%	U			20%			20%		U	U		
HMX	2691-41-0	NA	✓	✓	✓	145.9	145.1	7.9	NA	NA	NA	✓	NA	NA		
RDX	121-82-4		✓	✓		157	134.3	8.3								
1,3,5-Trinitrobenzene	99-35-4		✓	✓		✓	✓	✓								
1,3-dinitrobenzene	99-64-0		✓	✓		142.4	133.4	✓								
Nitrobenzene	98-95-3		✓	✓		239.7	58.1	121.9								
Tetryl	479-45-8		✓	✓		379.8	✓	237.6								
2,4,6-trinitrotoluene	118-96-7															
2-amino-4,6-dinitrotoluene	35572-78-2		✓	✓		255.6	✓	101.1								
4-amino-2,6-dinitrotoluene	1946-51-0		✓	✓		257.4	237.6	✓								
2,4-dinitrotoluene	121-14-2		✓	✓		212.1	139.6	41.2								
2,6-dinitrotoluene	606-20-2		✓	✓		479.8	316.8	40.9								
2-nitrotoluene	88-72-2		✓	✓		167.2	159.6	8								
4-nitrotoluene	99-99-0		✓	✓		174.4	163.5	8								
3-nitrotoluene	99-08-1		✓	✓		178.8	161.5	✓								
PETN	78-11-5															

1,2 Dinitrobenzene 3,4 Dinitrotoluene (70-130)

②

Sample	SMC %REC	SMC RT		Sample	SMC %REC	SMC RT
All samples	ND			MB	15	
and QC				LCS, LCD	63, 59	
				982439-2	13	

Comments:

	% Rec
982439-8	13
982439-11	12
982439-21	13

Confirmation

Sample	CAS #	RPD > 25%		Sample	CAS #	RPD > 25%

All samples ND

① No MS/MSD reported.

② Surrogate % REC of 1,2 Dinitrobenzene is ND. Sample results qualified "R" unusable.

③ % REC and LCS/LCSD % REC greater than QC limit. No qualification

RF WED BY: [signature] DATE: 3-11-99

INORGANIC METALS:

SITE/PROJECT: 228 A ARCOC #: ~~6008~~ mk 600799
LABORATORY: CORE LABORATORY REPORT #: 982439
METHODS:

QC Element/ Analyte	ICV	CCV	ICB	CCB	Method Blks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	REP RPD	ICS AB	Serial Dilution	Field Dup RPD	Eq. Blks	Field Blks			
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	✓	NA	→	→	NA	✓	NA	✓	NA	NA			
7440-41-7 Be	NA	→	→	→	→	→	→	→	→	→	→	→	NA	↓	NA	↓	↓			
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	✓	NA	→	→	NA	✓	NA	↓	↓	↓			
7440-70-2 Ca													NA	↓	↓	↓	↓			
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	✓	NA	→	→	NA	✓	NA	✓	↓	↓			
7440-48-4 Co	NA	→	→	→	→	→	→	→	→	→	→	→	NA	↓	NA	↓	↓			
7440-50-8 Cu	↓	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓			
7439-89-6 Fe	↓	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓			
7439-95-4 Mg	↓	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓			
7439-96-5 Mn	↓	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓			
7440-02-0 Ni	↓	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓			
7440-09-7 K	↓	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓			
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓	✓	NA	→	→	NA	✓	NA	✓	↓	↓			
7440-23-5 Na	NA	→	→	→	→	→	→	→	→	→	→	→	NA	↓	NA	↓	↓			
7440-62-2 V	NA	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓			
7440-66-6 Zn	NA	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓			
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	NA	✓	↓	↓			
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	↓	✓	↓	↓			
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	↓	✓	↓	↓			
7440-36-0 Sb	NA	→	→	→	→	→	→	→	→	→	→	→	NA	↓	NA	↓	↓			
7440-28-0 Tl	NA	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓			
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	✓	↓	↓			
Cyanide CN																				

Comments: NA - Not Applicable NA

REVIEWED BY: [signature] DATE: 3-11-99

RADIOCHEMISTRY:

SITE/PROJECT: 228A ARCOC #: 600799
LABORATORY: CORE LABORATORY REPORT #: ~~600799~~ 982439
METHODS:

QC Element/ Analyte	Method Blks	LCS	MS	Rep RER	Eq. Blks	Field Dup RER	Field Blks	-	Sample ID	Isotope	IS/Trace	Sample	Isotope	IS/Trace			
CRITERIA	U	20%	25%	<1.0	U	<1.0	U	-			50-105			50-105			
H3								-	All samples	U232	✓						
U-238	✓	✓	✓	✓		✓											
U-234	✓	✓	✓	✓		✓											
U-235/236	✓					✓		-									
Th-232																	
Th-228																	
Th-230								-									
Pu-239/240																	
Gross Alpha								-									
Nonvolatile Beta																	
Ra226								-									
Ra228								-									
Gamma Spec	✓	✓		✓		(1)		-									
Ni-63								-									
								-									
								-									

Parameter	Method	Typical Tracer	Typical Carrier
Iso-U	Alpha spec	U-232	NA
Iso-Pu	Alpha spec	Pu-242	NA
Iso-Th	Alpha spec	Th-229	NA
Am-241	Alpha spec	Am-242	NA
Sr-90	Beta	Y ingrowth	NA
Ni-63	Beta	NA	Ni by ICP
Ra-226	Deamination	NA	NA
Ra-226	Alpha spec	Ba-133 or Ra-225	NA
Ra-228	Gamma spec	Ba-133	NA

Comments: (1) - RER > 1 for K^{40} (1.42) + Ru^{103} (2)

Gamma spec LCS contains: Am-241, Cs-137, and Co-60

RE[illegible]ED BY [signature] DATE: 3-11-99

Records Center Code: ER / 1309 / 228A / DAT

SMO ANALYTICAL DATA ROUTING FORM

Project Name: 228A Sampling

Case No./Service Order: 7225.2203 / CF0596

SNL Task Leader: COPLAND

Org/Mail Stop: 6133 / 1147

SMO Project Coordinator: SALMI

Sample Ship Date: 9/11/98

ARCOC	Lab	Lab ID	Preliminary Received	Final Received	EDD Req'd YES	EDD Req'd NO	EDD Rec'd YES	EDD Rec'd NO
600799	CORE	982439		10/30/98	X			x
600800	RPSD	801881						

	Date		
Correction Requested from Lab:	12-7-98 10/30/98	Correction Request #:	#1555 WP #1366 No EDD
Corrections Received:	2-18-99	Requester:	JENSEN / Palencia
Review Complete:	12-7-98	Signature:	W. Palencia
Priority Data Faxed:		Faxed To:	
Preliminary Notification:		Person Notified:	
Final Transmittal:	12-7-98	Transmitted To:	Copland
		Transmitted By:	Palencia
Filed in ~~Records Center~~/ER:	2-19-99	Filed By:	A. Jensen

Comments:

Received (Records Center) By:

SF 2001-COC (10-97)

Supersedes (5-97) Issue

Internal Lab Batch No. _____

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No. _____

AR/COC- 600799

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: 228A/John Copland
Project Name: 228A
Record Center Code: 1309/228A/DAT
Logbook Ref. No.: ER-014
Service Order No.: CFO596

Date Samples Shipped: 9/11/98 (SMO Use)
Carrier/Waybill No.: 709130
Lab Contact: Tim Kellogg
Lab Destination: Core/Denver/Casper
SMO Contact/Phone: Doug Salmi
Send Report to SMO: Suzi Montano

Contract No.: AJ-2480C
Case No.: 7225.2203
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services, Dept. _____
P.O. Box 5800 MS 0154

Location Tech Area NA
Building NA Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID (LAB USE)
042495-001	TJAOU-228A-GR-120-S	0	228A	9/8/98 1030	soil	G	16oz	none	G	SA	gamma spec; Iso U	1
042495-002	TJAOU-228A-GR-120-S	0	228A	9/8/98 1030	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	2
042495-003	TJAOU-228A-GR-120-S	0	228A	9/8/98 1030	soil	G	16oz	4 C	G	SA	VOC'S	3
042496-001	TJAOU-228A-GR-121-S	0	228A	9/8/98 1035	soil	G	16oz	none	G	SA	gamma spec; Iso U	4
042497-001	TJAOU-228A-GR-122-S	0	228A	9/8/98 1040	soil	G	16oz	none	G	SA	gamma spec; Iso U	5
042497-005	TJAOU-228A-GR-122-S	0	228A	9/8/98 1040	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	6
042498-001	TJAOU-228A-GR-123-S	0	228A	9/8/98 1045	soil	G	16oz	none	G	SA	gamma spec; Iso U	7
042498-002	TJAOU-228A-GR-123-S	0	228A	9/8/98 1045	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	8
042498-003	TJAOU-228A-GR-123-S	0	228A	9/8/98 1045	soil	G	4oz	4 C	G	SA	VOC'S	9
042527-001	TJAOU-228A-GR-123-DU	0	228A	9/8/98 1046	Sol	G	16oz	None	G	DU	Gamma spec; Iso U	10

RMMA ☒Yes ☐No Ref. No. _____

Sample Disposal ☐Return to Client ☒Disposal by lab

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

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
*Send as separate report
* Please note hold times in VOC samples
* COC # 600570 relates; COC # 600799

Abnormal Conditions on Receipt (LAB USE)

Turnaround Time ☒Normal ☐Rush Required Report Date _____

QC Initials

Sample Team Members	Name	Signature	Init	Company/Organization/Phon
	Nelson Capitan	[signature]	NC	IT/6131 284-3317

1. Relinquished by	[signature]	Org. IT/6131	Date 9-10-98	Time 1500	4. Relinquished by	Org.	Date
1. Received by	[signature]	Org. 7578	Date 9-10-98	Time 1500	4. Received by	Org.	Date
2. Relinquished by	[signature]	Org. 7577	Date 9/11/98	Time 1300	5. Relinquished by	Org.	Date
2. Received by	[signature]	Org. COR	Date 09-12-98	Time 1100	5. Received by	Org.	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org.	Date
3. Received by		Org.	Date	Time	6. Received by	Org.	Date

Original To Accompany Samples, Laboratory Copy (White) **1st Copy** To Accompany Samples, Return to SMO (Blue) **2nd Copy** SMO Suspense Copy (Yellow) **3rd Copy** Field Copy (Pink)

01-COC (10-97)

Supersedes (5-87) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600799

Project Name: 228A | Project/Task Manager: 228A/John Copland | Case No.: 7225.2203

Location: Tech Area NA; Building NA; Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE: Lab Sample ID
042527-002	TJAOU-228A-GR-123-DU	0	228A	9/8/98 1046	soil	G	16oz	4 C	G	DU	RCRA Metals/Total U; HE; SVOC	111
042527-003	TJAOU-228A-GR-123-DU	0	228A	9/8/98 1046	soil	G	4oz	4 C	G	DU	VOC'S	112
042499-001	TJAOU-228A-GR-124-S	0	228A	9/8/98 1050	soil	G	16oz	none	G	SA	gamma spec; Iso U	113
042500-001	TJAOU-228A-GR-125-S	0	228A	9/8/98 1055	soil	G	16oz	none	G	SA	gamma spec; Iso U	114
042500-005	TJAOU-228A-GR-125-S	0	228A	9/8/98 1055	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	115
042501-001	TJAOU-228A-GR-126-S	0	228A	9/8/98 1100	soil	G	16oz	none	G	SA	gamma spec; Iso U	116
042502-001	TJAOU-228A-GR-127-S	0	228A	9/8/98 1105	soil	G	16oz	none	G	SA	gamma spec; Iso U	117
042502-005	TJAOU-228A-GR-127-S	0	228A	9/8/98 1105	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	118
042503-001	TJAOU-228A-GR-128-S	0	228A	9/8/98 1110	soil	G	16oz	none	G	SA	gamma spec; Iso U	119
042504-001	TJAOU-228A-GR-129-S	0	228A	9/8/98 1115	soil	G	16oz	none	G	SA	gamma spec; Iso U	120
042504-002	TJAOU-228A-GR-129-S	0	228A	9/8/98 1115	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	121
042504-003	TJAOU-228A-GR-129-S	0	228A	9/8/98 1115	soil	G	4oz	4 C	G	SA	VOC'S	122
042505-001	TJAOU-228A-GR-130-S	0	228A	9/8/98 1120	soil	G	16oz	none	G	SA	gamma spec; Iso U	123
042506-001	TJAOU-228A-GR-131-S	0	228A	9/8/98 1125	soil	G	16oz	none	G	SA	gamma spec; Iso U	124
042506-005	TJAOU-228A-GR-131-S	0	228A	9/8/98 1125	soil	G	16oz	4 C	G	SA	RCRA Metals; Total U	125
042507-001	TJAOU-228A-GR-132-S	0	228A	9/8/98 1130	soil	G	16oz	none	G	SA	gamma spec; Iso U	126

Abnormal Conditions on Receipt: LAB USE

Recipient Initials _____

Original: To Accompany Samples, Laboratory Copy (White) | 1st Copy: To Accompany Samples, Return to SMO (Blue) | 2nd Copy: SMO Suspense Copy (Yellow) | 3rd Copy: Field Copy (Pink)

Contract Verification Review (CVR)

Project Leader COPLAND | Project Name 228A SAMPLING | Case No. 7225.2203

AR/COC No. 600799 | Analytical Lab CORE | SDG No. 982439

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 and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, LCD)		X	LCD NOT REPORTED FOR SVOCs		X
2.4	Matrix spike/matrix spike duplicate data provided(if requested)	X				
2.5	Detection Limits provided; PQL and MDL(or IDL)	X				
2.6	QC batch numbers provided	X				
2.7	Dilution Factors provided	X				
2.8	Data reported using correct sig. fig. (2 for org.; 3 for inorg.)	X				
2.9	Rad analysis uncertainty provided (2 sigma error)	X				
2.10	Narrative provided	X				
2.11	TAT met		X	30 DAY TAT EXCEEDED		X
2.12	Hold times met	X				
2.13	Were contractual qualifiers provided	X		CHROMIUM RESULT FOR SAMPLE #982439-002 MISSING "J" QUALIFIER		
2.14	All requested result data provided	X				

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1)Reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg). Units consistent between QC samples and sample data.		X	ISO-URANIUM REPORTED IN pCi/L TOTAL URANIUM REPORTED IN pCi/g INSTEAD OF mg/Kg
3.2)Quantitation limit met for all samples?	X		
3.3)Accuracy a) Laboratory control sample accuracy reported and met for all samples?		X	MANY EXPLOSIVE LCS/LCD ANALYTES OUTSIDE RECOVERY LIMITS n-NITROSODI-n-PROPYLAMINE ABOVE RECOVERY LIMITS FOR SVOC LCS
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?		X	TERPHENYL-d14 RECOVERY HIGH IN SAMPLE #982439-008(042498-002) SURROGATE FOR ALL EXPLOSIVES SAMPLES ABOVE RECOVERY LIMITS
c) If requested, matrix spike recovery data reported and met .	X		
3.4)Precision a) Laboratory control sample precision reported and met for all samples? For rad analysis, sample duplicate precision reported and met.		X	SEVERAL RPDs FOR EXPLOSIVES LCS/LCD OUTSIDE QC ACCEPTANCE LIMITS NO RPDs REPORTED FOR TOTAL URANIUM OR ISO-U
b) If requested, matrix spike duplicate RPD data reported and met.	X		
3.5)Blank data a) Method or reagent blank data reported and met for all samples?	X		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?	NA		
3.6)Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank; "U"- analyte undetected (results are below the MDL or L_c (rad)); "H"-analysis done beyond the holding time.		X	"J" QUALIFIER NOT REPORTED FOR CHROMIUM RESULT ON SAMPLE #982439-002
3.7)Narrative included, correct, and complete?	X		

4.0 Data Quality Evaluation Continuation

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/ Fraction No.	Analysis	Qualifiers	Comments
ALL	TOTAL-U		RESULTS REPORTED IN INCORRECT UNITS
ALL	ISO-U		RESULTS REPORTED IN INCORRECT UNITS FOR MATRIX
982439-002	6010	J	QUALIFIER MISSING
BLANK	908.1	ND	REPORTED AS "LESS THAN" INSTEAD OF ND
MS/MSD	TOTAL-U		RPD NOT REPORTED
MS/MSD	ISO-U		RPD NOT REPORTED

Were deficiencies noted. ☹ Yes ☺ No

Based on the review, this data package is complete. ☺ Yes ☹ No

If no, provide : nonconformance report or correction request number 1555 and date correction request was submitted 12-7-98

Reviewed by: W. Palencia Date: 12-7-98 Closed by: W. Palencia Date: 2-19-99

Site: 228A

AR/COC: 600835 Data Classification: Organics

	Sample Fraction No.	Analysis	DV Qualifiers	Comments
VOC	TSAOU-228A-GR - 1335 1330U 1375	51-28-5 (2,4 Dinitrophenol)	UJ	
	1405 1435 1455			
	1475 1495			
		Data is acceptable QC measures appear	adequate	
VOC		Data is acceptable		
		QC measures appear adequate		
HE	TSAOU-228A-GR - 1335 1330U 1375	EPA - 8330 High Explosives	UJ, A1	
	1405 1435 1455 1475			
	1495	Data is acceptable QC measures appear	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: [signature] Date: 2-25-99

MEMORANDUM

DATE: February 25, 1999

TO: File

FROM: Matthew Kase

SUBJECT: Organics Data Review and Validation
Site 228A, ARCOC No. 600835, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

<u>Summary</u>

The samples were prepared and analyzed with accepted procedures and specified method (VOC – EPA8260, SVOC – EPA8270, and HE – EPA8330). All compounds were successfully analyzed. Problems were identified with the data package that result in the qualification of data.

1. SVOC analysis: ICV relative standard deviation (RSD) and CCV relative percent difference (RPD) did not meet QC acceptance criteria for 2,4-dinitrophenol. Sample results are non-detect and data will be qualified "UJ."

2. HE analysis: Surrogate 3,4-dinitrotoluene percent recovery (%REC) for all samples was below the QC acceptance criteria. Samples are non-detect and data will be qualified "UJ."

Data is acceptable and QC measures appear to be adequate. The following sections discuss the data review and validation.

<u>Holding Times</u>

The samples were extracted and analyzed within the prescribed holding times for all methods.

<u>Calibration</u>

SVOC analysis: Initial calibration met QC criteria except as noted above. The initial calibration RSD for Benzo(k)fluoranthene (24.2%) was slightly above the QC limit (20%). Sample results are non-detect; no data was qualified. Continuing calibration

met QC criteria except as noted above. The continuing calibration RPD for pentachlorophenol (29.5), bis(2-chloroisopropyl)ether (38.2), and hexachlorocyclopentadiene (23.1) were above the QC acceptance criteria (20%) but less than 40%. Sample results are non-detect; no data was qualified.

VOC analysis: Initial calibration met QC acceptance criteria except the RSD for Bromomethane (29.5%) was slightly above the QC criteria (20%). Sample results are non-detect; no data was qualified. No continuing calibration data was reported.

HE analysis: Initial calibration and continuing calibration met acceptance criteria.

Blanks

SVOC, VOC & HE: No target analytes were detected in the method blanks.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

No MS/MSD was run on the ARCOC group for any method. The MS/MSD acceptability was reported from another ARCOC group in the batch and met QC criteria for each method.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses

SVOC and VOC analysis: LCS/LCSD met QC acceptance criteria.

HE analysis: LCS/LCSD %REC for all compounds were above the QC acceptance criteria. Sample results are non-detect and have already been qualified "UJ" due to poor surrogate recovery; no further qualification was necessary.

Surrogates

SVOC analysis: Surrogate recoveries met QC acceptance criteria except for 2,4,6-tribromophenol and p-terphenyl-d14. The %REC for 2,4,6-tribromophenol in three samples (139%, 145%, 140%) and the LCS/LCSD (133%, 145%) was slightly above the QC acceptance criteria (19-122%). The %REC for p-terphenyl-d14 (144%) for one sample was slightly above the QC acceptance criteria (18-137%). Sample results are non-detect and no data was qualified.

VOC analysis: The surrogate recovery met QC acceptance criteria.

HE analysis: The surrogate recovery was below the QC acceptance criteria and data was qualified as noted above.

Internal Standards

SVOC & VOC analysis: Internal standards met QC acceptance criteria.

Field Duplicate Analyses

SVOC, VOC & HE analysis: Field duplicate met QC acceptance criteria.

Other QC

No trip blank (TB), field blank (FB) or equipment blank (EB) was submitted on ARCOC.

No other specific problems were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

Site: 228A

AR/COC: Data Classification: Metals ~~RAD~~ mch

Sample Fraction No.	Analysis	DV Qualifiers	Comments
Metals TJA0U-228A-GR 1335 133DU 1355	7439-92-1 (Lead)	J, P1	
1375 1395 1405			
1435 1445 1455			
1465 ~~1465~~ 1475 ~~1505~~ 1485			
TJA0U-228A-GR 1355 1375 1395	7782-49-2 (Selenium)	J, P1	
1405 1435			
1445 1455 1465			
1485 1335		UJ, P1	
133DU 1475 1495			
1505			
	Data is acceptable QC measures appear 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: [signature] Date: 2-25-99

MEMORANDUM

DATE: February 25, 1999

TO: File

FROM: Matthew Kase

SUBJECT: Inorganic Metals Data Review and Validation
Site 228A, ARCOC No. 600835, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

<u>Summary</u>

The samples were prepared and analyzed with accepted procedures and specified methods (Metals – EPA6010/7470/7060). All compounds were successfully analyzed. A problem was identified with the data package that result in the qualification of data.

1. MS/MSD % recoveries for lead and selenium were below QC acceptance criteria. The lead %REC was below 30%. Lead was detected in all samples and results will be qualified "J." The selenium %REC falls within the range of 30-74%. Positive selenium sample results will be qualified "J" and non-detects will be qualified "UJ."

Data is acceptable and QC measures appear to be adequate. The following sections discuss the data review and validation.

<u>Holding Times</u>

The samples were analyzed within the prescribed holding times for all methods.

<u>Calibration</u>

Initial and continuing calibration met QC acceptance criteria.

<u>Blanks</u>

No target analytes were observed in the method blank.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses</u>

MS/MSD met QC acceptance criteria except as noted above.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)Analyses

LCS/LCSD met QC acceptance criteria.

ICP Interference Check Sample (ICS) Analysis

Interference check sample met QC acceptance criteria.

Field duplicate Analyses

The field duplicate pair met QC acceptance criteria except for lead. The difference between the original lead result and the duplicate lead result was greater than the PQL. All sample results have already been qualified as noted above, no further qualification was necessary.

Other QC

No trip blank (TB), field blank (FB) or equipment blank (EB) was submitted on ARCOC.

No other specific problems were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

Site: 228A

AR/COC: 600835 Data Classification: RAD

Gamma Spec
TSAOU-228A-GR

Sample Fraction No.	Analysis	DV Qualifiers	Comments
1335 1330u 1345	13967-48-1 (Ruthenium-106)	J	
1355 1365 1375			
1385 1395 1405			
1415 1425 1435			
1445 1455 1465			
1475 1485 1495			
1505			
	Data is acceptable		
	QC measures	appear	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: [signature] Date: 2-25-99

MEMORANDUM

DATE: February 25, 1999

TO: File

FROM: Matthew Kase

SUBJECT: Radiometric Data Review and Validation
Site 228A, ARCOC No. 600835, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

<u>Summary</u>

All samples were prepared and analyzed with accepted procedures and specified methods (gamma spec – EPA901.1 and isotopic uranium - CA-GLR-R405). All compounds were successfully analyzed. A problem was identified with the data package that resulted in the qualification of data.

1. The field duplicate pair met QC criteria, except for Ruthenium-106. The replicate error ratio (RER) for Ru^{106} was 1.61 and sample result will be qualified "J."

Data is acceptable and QC measures appear to be adequate. The following sections discuss the data review and validation.

<u>Holding Times</u>

The samples were analyzed within the prescribed holding times.

<u>Blanks</u>

No target analytes were detected in the method blanks.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses</u>

MS/MSD met QC acceptance criteria.

<u>Tracer Compound</u>

Isotopic Uranium: Tracer recovery met QC acceptance criteria.

Field Duplicate Analyses

Field duplicates met QC acceptance criteria, except as noted above.

Other QC

No trip blank (TB), field blank (FB) or equipment blank (EB) was submitted on ARCOC.

No other specific problems were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

DATA VALIDATION SUMMARY:

SITE/PROJECT: 220A CASE #: _____
ARCOC #: 9 600835
LABORATORY: _____
LABORATORY REPORT #: 982440

OF SAMPLES: _____ MATRIX: Soil
LAB SAMPLE IDs: _____

ANALYSIS/ QC ELEMENT	VOC	SVOC	PEST/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	✓		✓	✓		✓		✓	
2. CALIBRATIONS	✓	UJ		✓	✓		✓		✓	
3. METHOD BLANKS	✓	✓		✓	✓		✓		✓	
4. MS/MSD	✓	✓		✓	J, UJ		✓		✓	
5. LABORATORY CONTROL SAMPLES	✓	✓		✓	✓		✓		✓	
6. REPLICATES					✓		✓		✓	
7. SURROGATES	✓	✓		UJ						
8. INTERNAL STDS	✓	✓		NA	NA		NA		NA	
9. TCL COMPOUND IDENTIFICATION	✓	✓								
10. ICP INTERFERENCE CHECK SAMPLE					✓					
11. ICP SERIAL DILUTION					NA					
12. CARRIER/CHEM TRACER RECOVERIES									✓	
13. OTHER QC Field Duplicates	✓	✓		✓	J		✓		J ✓ mod	

CHECK MARK (✓) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED

SHADED CELLS – NOT APPLICABLE
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

NA - Not Applicable

REVIEWED BY: [signature] DATE: 2-25-99

VOLATILE ORGANICS:
SW-846 - Method 8260

SITE/PROJECT: 228A ARCOC #: 600835
LABORATORY: CORE LABORATORY REPORT #: 782440

IS	GC/MS Name	CAS #	Min RF	Intercept	Calib RF	Calib RSD / R²	CCV RPD (2)	Method Blks	LCS	LCSD	LCS RPD	MS (1)	MSD	MS RPD	Field Dup RPD	Eq. Blks	Trip Blks			
					>.05	<20% / 0.99	<20%													
1	Chloromethane	74-87-3	0.10	NA	✓	✓	NA	✓	NA	NA	NA	NA	NA	NA	✓	NA	NA			
1	Bromomethane	74-83-9	0.10		✓	29.5		✓												
1	vinyl chloride	75-01-4	0.10		✓	~~29.6~~ ✓		✓												
1	Chloroethane	75-00-3	0.01		✓	✓		✓												
1	methylene chloride (10xblk)	75-09-2	0.01		✓	✓		✓	✓	✓	✓									
1	acetone(10xblk)	67-64-1	0.01		✓	✓		NA	NA	NA	NA									
1	carbon disulfide	75-15-0	0.10		✓	✓		NA												
1	1,1-dichloroethene	75-35-4	0.20		✓	✓		✓	✓	✓	✓									
1	1,1-dichloroethane	75-34-3	0.10		✓	✓		✓	✓	✓	✓									
1	Chloroform	67-66-3	0.20		✓	✓		✓	✓	✓	✓									
1	1,2-dichloroethane	107-06-2	0.10		✓	✓		✓	✓	✓	✓									
1	2-butanone(10xblk)	78-93-3	0.01		✓	✓		NA	NA	NA	NA									
2	1,1,1-trichloroethane	71-55-6	0.10		✓	✓		NA	✓	✓	✓									
2	carbon tetrachloride	56-23-5	0.10		✓	✓		✓	✓	✓	✓									
2	Bromodichloromethane	75-27-4	0.20		✓	✓		✓	✓	✓	✓									
2	1,2-dichloropropane	78-87-5	0.01		✓	✓		✓	✓	✓	✓									
2	cis-1,3-dichloropropene	10061-01-5	0.20		✓	✓		✓	NA	NA	NA									
2	Trichloroethene	79-01-6	0.30		✓	✓		✓	✓	✓	✓									
2	Dibromochloromethane	124-48-1	0.10		✓	✓		✓	✓	✓	✓									
2	1,1,2-trichloroethane	79-00-5	0.10		✓	✓			✓	✓	✓									
2	Benzene	71-43-2	0.50		✓	✓		✓	✓	✓	✓				✓					
2	trans-1,3-dichloropropene	10061-02-6	0.10		✓	✓		✓	NA	NA	NA									
2	Bromoform	75-25-2	0.10		✓	✓		✓	✓	✓	✓				✓					
3	4-methyl-2-pentanone	108-10-1	0.10		✓	✓		NA	NA	NA	NA									
3	2-hexanone	591-78-6	0.01		✓	✓		NA	✓	✓	✓									
3	Tetrachloroethene	127-18-4	0.20		✓	✓		✓	✓	✓	✓									
3	1,1,2,2-tetrachloroethane	79-34-5	0.30		✓	✓		✓	✓	✓	✓									
3	toluene(10xblk)	108-88-3	0.40		✓	✓		✓	✓	✓	✓									
3	Chlorobenzene	108-90-7	0.50		✓	✓		✓	✓	✓	✓									
3	Ethylbenzene	100-41-4	0.10		✓	✓		✓	✓	✓	✓									
3	Styrene	100-42-5	0.30		✓	✓		✓	NA	NA	NA									
3	xylenes(total)	1330-20-7	0.30		✓	✓		✓	✓	✓	✓									
	1,2-dichloroethylene(total)	540-59-0	0.01		✓	✓		✓	✓	✓	✓									
	2-chloroethyl vinyl ether	110-75-8			✓	✓		NA	NA	NA	NA									
	1,2 Dichlorobenzene							✓	✓	✓	✓									
	1,3 Dichlorobenzene			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	1,4 Dichlorobenzene							✓	✓	✓	✓									

Comments: (1) - Matrix Spike run but not reported. (2) Results ND for all compounds. NA - Not Applicable
(2) - No CCV sample result reported.

R' WED BY: [signature] DATE: 2-25-99

VOLATILE ORGANICS: page 2
SW-846 - Method 8260

SITE/PROJECT: 228A ARCOC #: 600835
LABORATORY: CORE LABORATORY REPORT #: 982440

Surrogate Recovery and Internal Standard Outliers

Sample	SMC 1	SMC 2	SMC 3	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3- area	IS 3- RT			
	All samples met QC criteria			All samples met QC criteria								

SMC 1: 4-Bromofluorobenzene
SMC 2: 1,2-Dichloroethane-d4
SMC 3: Toluene-d8

IS 1: Bromochloromethane
IS 2: 1,4-Difluorobenzene
IS 3: Chlorobenzene-d5

Comments:

REVIEWED BY [signature] DATE: 2-25-99

SEMI-VOLATILE ORGANICS:
SW-846 - Method 8270

SITE/PROJECT: i-28A ARCOC #: 600835
LABORATORY: CORE LABORATORY REPORT #: 982440

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS (1)	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
1	A	108-95-2	Phenol	0.80	NA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA			
1	BN	111-44-4	bis(2-Chloroethyl)ether	0.70		✓	✓	✓	✓	NA	NA	NA									
1	A	95-57-8	2-Chlorophenol	0.80		✓	✓	✓	✓	✓	✓	✓									
1	BN	541-73-1	1,3-Dichlorobenzene	0.60		✓	✓	✓	✓	✓	✓	✓									
1	BN	106-46-7	1,4-Dichlorobenzene	0.50		✓	✓	✓	✓	NA	NA	NA									
1	BN	95-50-1	1,2-Dichlorobenzene	0.40		✓	✓	✓	✓												
1	A	95-48-7	2-Methylphenol	0.70		✓	✓	✓	✓												
1	BN	108-60-1	bis(2-chloroisopropyl)ether	0.01		✓	✓	(2) 38.2	✓												
1	A	106-44-5	4-Methylphenol	0.60		✓	✓	✓	✓												
1	BN	621-64-7	N-Nitroso-di-n-propylamine	0.50		✓	✓	✓	✓												
1	BN	67-72-1	Hexachloroethane	0.30		✓	✓	✓	✓												
2	BN	98-95-3	Nitrobenzene	0.20		✓	✓	✓	✓												
2	BN	78-59-1	Isophorone	0.40		✓	✓	✓	✓												
2	A	88-75-5	2-Nitrophenol	0.10		✓	✓	✓													
2	A	105-67-9	2,4-Dimethylphenol	0.20		✓	✓	✓	✓												
2	BN	111-91-1	bis(2-Chloroethoxy)methane	0.30		✓	✓	✓	✓												
2	A	120-83-2	2,4-Dichlorophenol	0.20		✓	✓	✓	✓												
2	BN	120-82-1	1,2,4-Trichlorobenzene	0.20		✓	✓	✓	✓	✓	✓	✓									
2	BN	91-20-3	Naphthalene	0.70		✓	✓	✓	✓	NA	NA	NA									
2	BN	106-47-8	4-Chloroaniline	0.01		✓	✓	✓													
2	BN	87-68-3	Hexachlorobutadiene	0.01		✓	✓	✓	✓												
2	A	59-50-7	4-Chloro-3-methylphenol	0.20		✓	✓	✓	✓	✓	✓	✓									
2	BN	91-57-6	2-Methylnaphthalene	0.40		✓	✓	✓	✓	NA	NA	NA									
3	BN	77-47-4	Hexachlorocyclopentadiene	0.01		✓	✓	23.1	✓												
3	A	88-06-2	2,4,6-Trichlorophenol	0.20		✓	✓	✓	✓												
3	A	95-95-4	2,4,5-Trichlorophenol	0.20		✓	✓	✓	✓												

Comments: (1). MS/MSD run but no supporting documentation found. Completed on another ARCOC. NA - Not Applicable

(2). RCV for bis(2-chloroisopropyl)ether (38.2) is above the QC limit, samples are ND, qualify "UJ."

REVIEWED BY: [signature] DATE: 2-25-99

SEMI-VOLATILE ORGANICS: page 2
SW 846 - Method 8270

SITE/PROJECT: 228A ARCOC #: 600835
LABORATORY: CORE LABORATORY REPORT #: 982440

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
3	BN	91-58-7	2-Chloronaphthalene	0.80	NA	✓	✓	✓	✓	NA	NA	NA	✓	✓	✓	✓	NA	NA			
3	BN	88-74-4	2-Nitroaniline	0.01																	
3	BN	131-11-3	Dimethylphthalate	0.01																	
3	BN	208-96-8	Acenaphthylene	0.90																	
3	BN	606-20-2	2,6-Dinitrotoluene	0.20																	
3	BN	99-09-2	3-Nitroaniline	0.01																	
3	BN	83-32-9	Acenaphthene	0.90			(3)			✓	✓	✓									
3	A	51-28-5	2,4-Dinitrophenol	0.01			40.7	26.8		NA	NA	NA									
3	A	100-02-7	4-Nitrophenol	0.01			✓	✓		✓	✓	✓									
3	BN	132-64-9	Dibenzofuran	0.80						NA	NA	NA									
3	BN	121-14-2	2,4-Dinitrotoluene	0.20						✓	✓	✓									
3	BN	84-66-2	Diethylphthalate	0.01						NA	NA	NA									
3	BN	7005-72-3	4-Chlorophenyl-phenylether	0.40																	
3	BN	86-73-7	Fluorene	0.90																	
3	BN	100-01-6	4-Nitroaniline	0.01																	
4	A	534-52-1	4,6-Dinitro-2-methylphenol	0.01																	
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	0.01						✓	✓	✓									
4	BN	101-55-3	4-Bromophenyl-phenylether	0.10						NA	NA	NA									
4	BN	118-74-1	Hexachlorobenzene	0.10																	
4	A	87-86-5	Pentachlorophenol	0.05				29.5		✓	✓	✓									
4	BN	85-01-8	Phenanthrene	0.70						NA	NA	NA									
4	BN	120-12-7	Anthracene	0.70																	
4	BN	86-74-8	Carbazole	0.01																	
4	BN	84-74-2	Di-n-butylphthalate	0.01																	
4	BN	206-44-0	Fluoranthene	0.60																	
5	BN	129-00-0	Pyrene	0.60						✓	✓	✓									
5	BN	85-68-7	Butylbenzylphthalate	0.01						NA	NA	NA									
5	BN	91-94-1	3,3'-Dichlorobenzidine	0.01																	
5	BN	56-55-3	Benzo(a)anthracene	0.80																	

Comments: (3) - ICV & CCV for 2,4 Dinitrophenol above QC limit. Qualify positives "J" ND "UJ" NA - Not Applicable

REVIEWED BY: [signature] DATE: 2-25-99

SEMI-VOLATILE ORGANICS: page 3
SW 846 - Method 8270

SITE/PROJECT: 228 A ARCOC #: 600835
LABORATORY: CORE LABORATORY REPORT #: 982440

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%					✓	✓	✓	✓					
5	BN	218-01-9	Chrysene	0.70	NA	✓	✓	✓	✓	NA	NA	NA				~~✓~~ NA	NA	NA			
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	0.01		✓	✓	✓	✓												
6	BN	117-84-0	Di-n-octylphthalate	0.01		✓	✓	✓	✓												
6	BN	205-99-2	Benzo(b)fluoranthene	0.70		✓	✓	✓	✓												
6	BN	207-08-9	Benzo(k)fluoranthene	0.70		✓	24.2	✓	✓												
6	BN	50-32-8	Benzo(a)pyrene	0.70		✓	✓	✓	✓												
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	0.50		✓	✓	✓	✓												
6	BN	53-70-3	Dibenz(a,h)anthracene	0.40		✓	✓	✓	✓												
6	BN	191-24-2	Benzo(g,h,i)perylene	0.50		✓	✓	✓	✓												

NA - Not Applicable

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
LCS/LCSD						133 / 185		
982440-18						139		
982440-2			144			145		
982440-38						140		

Comments: ② No data qualified, ~~due to~~ sample results are ND.

SMC 1: Nitrobenzene-d5 (BN) SMC 2: 2-Fluorobiphenyl (BN) SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d5 (A) SMC 5: 2-Fluorophenol (A) SMC 6: 2,4,6-Tribromophenol (A)
SMC 7: 2-2-Chlorophenol-d4 (A) SMC 8: 1,2-Dichlorobenzene-d4 (BN)

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT

Met QC Criteria

IS 1: 1,4-Dichlorobenzene-d4 (BN) IS 2: Naphthalene-d8 (BN) IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN) IS 5: Chrysene-d12 (BN) IS 6: Perylene-d12 (BN)

REVIEWED BY [signature] DATE: 2-25-99

HIGH EXPLOSIVES:
SW846 Method 8330

SITE/PROJECT: 228 A ARCOC #: 600835
LABORATORY: CORE LABORATORY REPORT #: 982440

NAME	CAS #	Intercept	Curve R^2	CCV RPD	Method Blks	① LCS 70-130	LCSD	LCS RPD	② MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks		
			.99	20%	U			20%	✓	✓	20%		U	U		
HMX	2691-41-0	NA	✓	✓	✓	138.2	144.6	✓			✓	✓	NA	NA		
RDX	121-82-4					✓	✓	✓								
1,3,5-Trinitrobenzene	99-35-4					✓	✓	✓								
1,3-dinitrobenzene	99-64-0					✓	✓	✓								
Nitrobenzene	98-95-3					138.8	145	✓								
Tetryl	479-45-8					✓	✓	✓								
2,4,6-trinitrotoluene	118-96-7															
2-amino-4,6-dinitrotoluene	35572-78-2					237.5	✓	74								
4-amino-2,6-dinitrotoluene	1946-51-0					237.2	254.5	✓								
2,4-dinitrotoluene	121-14-2					189.8	198	✓								
2,6-dinitrotoluene	606-20-2					430	449	✓								
2-nitrotoluene	88-72-2					148.2	153.9	✓								
4-nitrotoluene	99-99-0					149.6	152.7	✓								
3-nitrotoluene	99-08-1					149	157	✓								
PETN	78-11-5															

3,4 Dinitrotoluene

Sample	SMC %REC	SMC RT		Sample	SMC %REC	SMC RT
Low Surrogate Recovery for all samples and QC sample >109%						

Confirmation

Sample	CAS #	RPD > 25%		Sample	CAS #	RPD > 25%

NA - Not Applicable.

Comments: ① LCS/LCSD % recovery above QC limit. All sample results are ND. No Data Qualified.

② MS/MSD performed ~~on~~ not performed on sample submitted on ARCOC 600835. MS/MSD was performed on another sample + met QC criteria.

③ Surrogate % recovery was below QC limit for all samples. All results are ND. Qualify data "UJ"

REVIEWED BY: [signature] DATE: 2-25-99

INORGANIC METALS:

SITE/PROJECT: 228A ARCOC #: 600835
LABORATORY: CORE LABORATORY REPORT #: 982440
METHODS: 7060, 6010B

QC Element/ Analyte	ICV	CCV	ICB	CCB	Method Blks	LCS	LCSD	LCSD RPD	MS (1)	MSD	MSD RPD	REP RPD	ICS AB	Serial Dilution	Field Dup RPD (2)	Eq. Blks	Field Blks			
7429-90-5 Al	NA																			
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	NA	NA			
7440-41-7 Be	NA															NA	NA			
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	NA	✓	NA	NA			
7440-70-2 Ca	NA																			
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓					
7440-48-4 Co	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA					
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K																				
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓		✓		✓					
7440-23-5 Na	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA		NA		NA					
7440-62-2 V																				
7440-66-6 Zn																				
															(3)					
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	✓	27.5	19.4	✓		✓		~~146~~		✓			
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	35.9	33.3	✓		✓		✓					
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓					
7440-36-0 Sb	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA					
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓					
Cyanide CN																				

NA - Not Applicable

Comments: (1) - MS/MSD % rec. <30% for Pb. Qualify all samples "J."
% rec >30% for Se: 982440-9, -12, -16, -18, -23, -26, -28, -31, -36 } J code
982440-2, -5, -33, -38, -41 } UJ code

(2) ~~Field Duplicate RPD >35% for Pb & Hg~~
Field Duplicate results for Pb show original result > 5x PQL + replicate < 5x PQL. The difference > PQL. Qualify pos. "J"
Qualify ND "UJ"

REVIEWED BY: _____ DATE: 3-25-99

RADIOCHEMISTRY:

SITE/PROJECT: 228A ARCOC #: 600835
LABORATORY: CORE LABORATORY REPORT #: 982440
METHODS: Gamma Spec. 901.1, Isotopic Uranium CA-GLR-R405

QC Element/ Analyte	Method Blks	LCS	MS	Rep RER	Eq. Blks	Field Dup RER (1)	Field Blks	-	Sample ID	Isotope	IS/Trace	Sample	Isotope	IS/Trace			
CRITERIA	U	20%	25%	<1.0	U	<1.0	U	-			50-105			50-105			
H3	NA							-									
U-238	✓	✓	✓	✓	NA	✓	NA		~~U-233~~	U232	✓						
U-234	✓	✓	✓	✓		✓				U232	✓						
U-235/236	✓			✓		✓		-		U232	✓						
Th-232	NA																
Th-228	NA																
Th-230	NA							-									
Pu-239/240	NA																
Gross Alpha	NA							-									
Nonvolatile Beta	NA																
Ra226	NA							-									
Ra228	NA							-									
Gamma Spec	✓	✓	✓	NA	NA	✓	NA	-									
Ni-63	NA							-									
								-									
								-									

Parameter	Method	Typical Tracer	Typical Carrier
Iso-U	Alpha spec	U-232	NA
Iso-Pu	Alpha spec	Pu-242	NA
Iso-Th	Alpha spec	Th-229	NA
Am-241	Alpha spec	Am-242	NA
Sr-90	Beta	Y ingrowth	NA
Ni-63	Beta	NA	Ni by ICP
Ra-226	Deamination	NA	NA
Ra-226	Alpha spec	Ba-133 or Ra-225	NA
Ra-228	Gamma spec	Ba-133	NA

Comments: NA - Not applicable

(1) - RER for Ru^{106} in Gamma spec actually 1.61. ~~No data qualified.~~ Data Qualified "J" for Ruthenium.

Gamma spec LCS contains: Am-241, Cs-137, and Co-60

REVIEWED BY: [signature] DATE: 2-5-99

SF 2001-COC (10-97)
Supersedes (5-97) issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

AR/COC- 600835

Dept. No./Mail Stop: 6133/MS 1147
Project/Task Manager: 228A/John Copland
Project Name: 228A
Record Center Code: 1309/228A/DAT
Logbook Ref. No.: ER-014
Service Order No.: CFO596

Date Samples Shipped: 9/11/98 SMO USE
Carrier/Waybill No.: 709136
Lab Contact: Tim Kellogg
Lab Destination: Core/Denver/Casper
SMO Contact/Phone: Doug Salmi
Send Report to SMO: Suzi Montano

Contract No.: AJ-2480C
Case No.: 7225.2203
SMO Authorization
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location: Tech Area NA; Building NA; Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Sample ID
042508-001	TJAOU-228A-GR-133-S	0	228A	9/8/98 1400	soil	G	16oz	none	G	SA	gamma spec; Iso U	1
042508-002	TJAOU-228A-GR-133-S	0	228A	9/8/98 1400	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	2
042508-003	TJAOU-228A-GR-133-S	0	228A	9/8/98 1400	soil	G	4oz	4 C	G	SA	VOC'S	3
042526-001	TJAOU-228A-GR-133-DU	0	228A	9/8/98 1400	soil	G	16oz	none	G	DU	gamma spec; Iso U	4
042526-002	TJAOU-228A-GR-133-DU	0	228A	9/8/98 1400	soil	G	16oz	4 C	G	DU	RCRA Metals/Total U; HE; SVOC	5
042526-003	TJAOU-228A-GR-133-DU	0	228A	9/8/98 1400	soil	G	4oz	4 C	G	DU	VOC'S	6
042509-001	TJAOU-228A-GR-134-S	0	228A	9/8/98 1410	soil	G	16oz	none	G	SA	gamma spec; Iso U	7
042510-001	TJAOU-228A-GR-135-S	0	228A	9/8/98 1405	soil	G	16oz	none	G	SA	gamma spec; Iso U	8
042510-005	TJAOU-228A-GR-135-S	0	228A	9/8/98 1405	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	9
042511-001	TJAOU-228A-GR-136-S	0	228A	9/8/98 1415	soil	G	16oz	none	G	SA	gamma spec; Iso U	10

RMMA ☒Yes ☐No Ref. No. _____

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy)
Entered by

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
* Send a separate report
* Please note hold times on VOC samples
* COC #600800 releases #600835

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date _____

QC Initials

Sample Team Members	Name	Signature	Init	Company/Organization/Phon
	Nelson Capitan			IT/6131 284-3507

1. Relinquished by		Org. IT/6131	Date 9-10-98	Time 1500	4. Relinquished by		Org.	Date
1. Received by		Org. 7578	Date 9-10-98	Time 1500	4. Received by		Org.	Date
2. Relinquished by		Org. 7577	Date 9/11/98	Time 1300	5. Relinquished by		Org.	Date
2. Received by		Org. CORE	Date 09-12-98	Time 1100	5. Received by		Org.	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by		Org.	Date
3. Received by		Org.	Date	Time	6. Received by		Org.	Date

Original To Accompany Samples, Laboratory Copy (White) **1st Copy** To Accompany Samples, Return to SMO (Blue) **2nd Copy** SMO Suspense Copy (Yellow) **3rd Copy** Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600835

Project Name: 228A | Project/Task Manager: 228A/John Copland | Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE: Lab Sample ID
042512-001	TJAOU-228A-GR-137-S	0	228A	9/8/98 1420	soil	G	16oz	none	G	SA	gamma spec; Iso U	11
042512-002	TJAOU-228A-GR-137-S	0	228A	9/8/98 1420	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	12
042512-003	TJAOU-228A-GR-137-S	0	228A	9/8/98 1420	soil	G	4oz	4 C	G	SA	VOC'S	13
042513-001	TJAOU-228A-GR-138-S	0	228A	9/8/98 1430	soil	G	16oz	none	G	SA	gamma spec; Iso U	14
042514-001	TJAOU-228A-GR-139-S	0	228A	9/8/98 1433	soil	G	16oz	none	G	SA	gamma spec; Iso U	15
042514-005	TJAOU-228A-GR-139-S	0	228A	9/8/98 1433	soil	G	16oz	4 C	G	SA	RCRA Metal; Total U	16
042515-001	TJAOU-228A-GR-140-S	0	228A	9/8/98 1435	soil	G	16oz	none	G	SA	gamma spec; Iso U	17
042515-002	TJAOU-228A-GR-140-S	0	228A	9/8/98 1435	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	18
042515-003	TJAOU-228A-GR-140-S	0	228A	9/8/98 1435	soil	G	4oz	4 C	G	SA	VOC'S	19
042516-001	TJAOU-228A-GR-141-S	0	228A	9/8/98 1445	soil	G	16oz	none	G	SA	gamma spec; Iso U	20
042517-001	TJAOU-228A-GR-142-S	0	228A	9/8/98 1450	soil	G	16oz	none	G	SA	gamma spec; Iso U	21
042518-001	TJAOU-228A-GR-143-S	0	228A	9/9/98 1000	soil	G	16oz	none	G	SA	gamma spec; Iso U	22
042518-002	TJAOU-228A-GR-143-S	0	228A	9/9/98 1000	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	23
042518-003	TJAOU-228A-GR-143-S	0	228A	9/9/98 1000	soil	G	4oz	4 C	G	SA	VOC'S	24
042519-001	TJAOU-228A-GR-144-S	0	228A	9/9/98 1015	soil	G	16oz	none	G	SA	gamma spec; Iso U	25
042519-005	TJAOU-228A-GR-144-S	0	228A	9/9/98 1015	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	26
042520-001	TJAOU-228A-GR-145-S	0	228A	9/9/98 1020	soil	G	16oz	none	G	SA	gamma spec; Iso U	27
042520-002	TJAOU-228A-GR-145-S	0	228A	9/9/98 1020	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	28
042520-003	TJAOU-228A-GR-145-S	0	228A	9/9/98 1020	soil	G	4oz	4 C	G	SA	VOC'S	29
042521-001	TJAOU-228A-GR-146-S	0	228A	9/9/98 1022	soil	G	16oz	none	G	SA	gamma spec; Iso U	30
042521-005	TJAOU-228A-GR-146-S	0	228A	9/9/98 1022	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	31
042522-001	TJAOU-228A-GR-147-S	0	228A	9/9/98 1100	soil	G	16oz	none	G	SA	gamma spec; Iso U	32
042522-002	TJAOU-228A-GR-147-S	0	228A	9/9/98 1100	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	33
042522-003	TJAOU-228A-GR-147-S	0	228A	9/9/98 1100	soil	G	4oz	4 C	G	SA	VOC'S	34
042523-001	TJAOU-228A-GR-148-S	0	228A	9/9/98 1105	soil	G	16oz	none	G	SA	gamma spec; Iso U	35

Abnormal Conditions on Receipt LAB USE

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) | 1st Copy To Accompany Samples, Return to SMO (Blue) | 2nd Copy SMO Suspense Copy (Yellow) | 3rd Copy Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600835

Project Name: 228A | Project/Task Manager: 228A/John Copland | Case No.: 7225.2203

Location | Tech Area NA | Building NA | Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO): Sample Matrix	Container: Type	Container: Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE: Lab Sample ID
042523-005	TJAOU-228A-GR-148-S	0	228A	9/9/98 1105	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	36
042524-001	TJAOU-228A-GR-149-S	0	228A	9/9/98 1115	soil	G	16oz	none	G	SA	gamma spec; Iso U	37
042524-002	TJAOU-228A-GR-149-S	0	228A	9/9/98 1115	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U; HE; SVOC	38
042524-003	TJAOU-228A-GR-149-S	0	228A	9/9/98 1115	soil	G	4oz	4 C	G	SA	VOC'S	39
042525-001	TJAOU-228A-GR-150-S	0	228A	9/9/98 1120	soil	G	16oz	none	G	SA	gamma spec; Iso U	40
042525-005	TJAOU-228A-GR-150-S	0	228A	9/9/98 1120	soil	G	16oz	4 C	G	SA	RCRA Metals/Total U	41

Abnormal Conditions on Receipt

LAB USE

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) | 1st Copy To Accompany Samples, Return to SMO (Blue) | 2nd Copy SMO Suspense Copy (Yellow) | 3rd Copy Field Copy (Pink)

Contract Verification Review (CVR)

Project Leader COLLINS | Project Name SITE 228A | Case No. 7225.2203

AR/COC No. 600835 | Analytical Lab CORE | SDG No. 982440

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 and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, LCD)		X	MS NOT REPORTED FOR BARIUM (PG.123)		
2.4	Matrix spike/matrix spike duplicate data provided(if requested)	X				
2.5	Detection Limits provided; PQL and MDL(or IDL)	X		MANY GAMMA SPEC CRITICAL LEVELS GREATER THAN MDAs		
2.6	QC batch numbers provided	X				
2.7	Dilution Factors provided	X				
2.8	Data reported using correct sig. fig. (2 for org.; 3 for inorg.)	X				
2.9	Rad analysis uncertainty provided (2 sigma error)	X				
2.10	Narrative provided	X				
2.11	TAT met		X	30 DAY TAT EXCEEDED		X
2.12	Hold times met	X				
2.13	Were contractual qualifiers provided	X				
2.14	All requested result data provided	X				

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1)Reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg). Units consistent between QC samples and sample data.		X	ISOTOPIC URANIUM REPORTED IN pCi/L TOTAL URANIUM REPORTED IN pCi/g
3.2)Quantitation limit met for all samples?	X		
3.3)Accuracy a) Laboratory control sample accuracy reported and met for all samples?		X	MANY EXPLOSIVE LCS/LCD ANALYTES OUTSIDE RECOVERY LIMITS
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?		X	2,4,6-TRIBROMOPHENOL OUTSIDE RECOVERY LIMITS FOR SVOC SAMPLES #982440-2, -5, -18 & SVOC LCS/LCD TERPHENYL-d14 OUTSIDE RECOVERY LIMITS FOR SVOC SAMPLE #982440-2, 3,4-DINITROTOLUENE OUTSIDE RECOVERY LIMITS FOR ALL EXPLOSIVE SAMPLES
c) If requested, matrix spike recovery data reported and met .	X		MS/MSD RECOVERIES OUTSIDE ACCEPTANCE LIMITS FOR Se, As, Ba & Cd
3.4)Precision a) Laboratory control sample precision reported and met for all samples? For rad analysis, sample duplicate precision reported and met.	X		RPD FOR 2-AMINO-4, 6-DINITROTOLUENE ABOVE QC LIMITS
b) If requested, matrix spike duplicate RPD data reported and met.	X		
3.5)Blank data a) Method or reagent blank data reported and met for all samples?	X		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?	NA		
3.6)Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank; "U"- analyte undetected (results are below the MDL or L_c (rad)); "H"-analysis done beyond the holding time.	X		
7 arrative included, correct, and complete?	X		

4.0 Data Quality Evaluation Continuation

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/ Fraction No.	Analysis	Qualifiers	Comments
ALL	TOTAL URANIUM		INCORRECTLY REPORTED IN pCi/g
ALL	ISOTOPIC URANIUM		INCORRECTLY REPORTED IN pCi/L
ALL	6010A		MS FOR BARIUM NOT REPORTED

Were deficiencies noted. ☹ Yes ☺ No

Based on the review, this data package is complete. ☺ Yes ☹ No

If no, provide : nonconformance report or correction request number 1470 and date correction request was submitted 11-13-98

Reviewed by: W. Palencia Date: 11-13-98 Closed by: W. Palencia Date: 1-22-99

Site: 228 A

AR/COC: 600836 Data Classification: Organics (SVOC + VOC)

Sample Fraction No.	Analysis	DV Qualifiers	Comments
SVOC ...U-228A-GR-EB- 042530-006 042536-006	(4-Nitroaniline) 100-01-6	UJ	
	~~(Carbazole) 86-74-8~~	~~UJ~~	4-6-99 KM NOT ON TCL FOR CCRE
	(Phenol) 108-95-2	UJ	
	(4-Nitrophenol) 100-02-7	UJ	
	Data was acceptable		
	QC appear to meet criteria.		
VOC	No data qualified		
	Data was acceptable		
	QC measures appear 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-M5. EPA8270. HACH_ALK. HACH_ NO2. HACH_NO3. MEKC_HE. PCBRISC

Reviewed by: [signature] Date: 2-25-99

MEMORANDUM

DATE: February 25, 1999

TO: File

FROM: Matthew Kase

SUBJECT: Organics Data Review and Validation
Site 228A, ARCOC No. 600836, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation. All samples were analyzed using VOC EPA-8260, SVOC EPA-8270 and HE EPA-8330 methods.

Summary

ARCOC 600836 consists of only a trip blank and equipment blank samples. Problems were identified with the data package that require data validation. Data is acceptable and QC measures appear to be adequate, except for HE analysis. HE analysis showed poor recovery or LCS/LCSD and surrogate compounds.

1. SVOC Analysis: CCV RPD is above the QC limit for 4-Nitroaniline(60.8%) and Carbazole(43.3%). Sample results are non-detect. The CCV RPD for 4-Nitroaniline is slightly >60%, all other QC met acceptance criteria. Sample results for 4-Nitroaniline will be qualified "UJ." The RPD for Carbazole is >40%, sample results are non-detect. Sample results for Carbazole will be qualified "UJ."

2. SVOC Analysis: LCS/LCSD %REC for phenol was below the QC acceptance criteria. Sample results are non-detect, and data will be qualified "UJ." The LCS/LCSD %REC and RPD for 4-Nitrophenol were below QC limits. Sample results are non-detect, data will be qualified "UJ."

3. HE Analysis: LCS/LCSD %REC for all compounds was below the QC limit. All sample results are non-detect, data will be qualified "R." Surrogate %REC for 1,2 Dinitrobezene is zero. All sample results are non-detect, data will be qualified "R."

Holding Times

All samples were extracted and analyzed within the prescribed holding times for all methods.

Calibration

VOC Analysis: Initial calibration met acceptance criteria. Continuing calibration met acceptance criteria except 1,2 Dichloroethane RPD was above accepted criteria(31.9%). Sample results are non-detect, no data was qualified.

SVOC Analysis: Initial calibration met acceptance criteria. Continuing calibration met acceptance criteria except for the RPD of the compounds noted above.

HE Analysis: No initial calibration information reported. Continuing calibration met QC criteria.

Blanks

VOC Analysis: No target analytes were detected in the method blank.

SVOC Analysis: No target analytes were detected in the method blank.

HE Analysis: No target analytes were detected in the method blank.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

No MS/MSD was reported on the ARCOC group for all methods.

Laboratory Control Sample/Laboratory Control Sample Duplicate(LCS/LCSD) Analyses

VOC Analysis: The LCSD percent recovery for 1,1 Dichloroethane and 1,2 Dichloroethane was above the QC limit. Sample results non-detect, no data qualified.

SVOC Analysis: LCS/LCSD %REC and RPD did not meet the QC criteria for the compounds noted above and was qualified as noted above. The LCSD for 2,4 Dinitrotoluene(60.9) was slightly below the QC range (63-119%). Sample results were non-detect, no data qualified.

HE Analysis: LCS/LCSD %REC and RPD were below QC criteria and data was qualified as noted above.

Surrogates

VOC Analysis: The surrogate % recovery for Dibromofluoromethane in both samples(119% and 120.7%) and the MB(119.6%) was slightly the range of 85-118%. Sample results are non-detect, no data qualified.

SVOC Analysis: The surrogate % rec met QC criteria.

HE Analysis: The surrogate % rec did not meet QC criteria and was qualified as noted above.

Internal Standards

VOC Analysis: All internal standards met QC criteria.

SVOC Analysis: All internal standards met QC criteria.

Other QC

VOC Analysis: No field blank (FB) or field duplicate pair was submitted on ARCOC.

SVOC Analysis: No trip blank (TB), field blank (FB) or field duplicate pair was submitted on ARCOC.

HE Analysis: No trip blank (TB), field blank (FB) or field duplicate pair was submitted on ARCOC.

No other specific problems were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

MEMORANDUM

DATE: February 25, 1999

TO: File

FROM: Matthew Kase

SUBJECT: Inorganic Metals Data Review and Validation
Site 228A, ARCOC No. 600836, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation. All samples were analyzed using methods EPA 6010/7470.

<u>Summary</u>

ARCOC 600836 consists of only equipment blank samples. No problems were identified with the data package that required data validation. Data is acceptable and QC measures appear to be adequate.

<u>Holding Times</u>

All samples were analyzed within the prescribed holding times.

<u>Calibration</u>

Calibration data met QC criteria.

<u>Blanks</u>

No target analytes were detected in the method blanks.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses</u>

MS/MSD met QC criteria.

<u>Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)</u>

LCS/LCSD results met QC criteria.

ICP Serial Dilution

ICP serial dilution met QC criteria.

ICP Interference Check Sample

Interference check sample met QC criteria.

Other QC

No trip blank (TB), field blank (FB) or field duplicate pair were submitted on ARCOC.

No other specific problems were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

MEMORANDUM

DATE: February 25, 1999

TO: File

FROM: Matthew Kase

SUBJECT: Radiological Data Review and Validation
Site 228A, ARCOC No. 600836, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation. All samples were analyzed using methods EPA 901.1 (Gamma Spec.) and CA GLR R405 (Iso Uranium).

Summary

ARCOC 600836 consists of only equipment blank samples. No problems were identified with the data package that required data validation. Data is acceptable and QC measures appear to be adequate.

Holding Times

All samples were analyzed within the prescribed holding times.

Calibration

Calibration data met QC criteria.

Blanks

No target analytes were detected in the method blanks.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

No MS/MSD was run on the ARCOC group.

Tracer Compound

Tracer for Iso Uranium met QC criteria.

Other QC

No trip blank (TB), field blank (FB) or field duplicate pair were submitted on ARCOC.

No other specific problems were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

DATA VALIDATION SUMMARY:

SITE/PROJECT: 228A CASE #: 7225.2203
ARCOC #: 600836
LABORATORY: CORE
LABORATORY REPORT #: 982441

OF SAMPLES: 12 MATRIX: Water
LAB SAMPLE IDs: See Method Checklists for sample numbers.

ANALYSIS/ QC ELEMENT	VOC	SVOC	PEST/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	✓		✓	✓		✓		✓	
2. CALIBRATIONS	✓	UJ		② ✓ ~~UJ~~	✓		✓		✓	
3. METHOD BLANKS	✓	✓		✓	✓		✓		✓	
4. MS/MSD ①	NA	NA		NA	✓		✓		✓	
5. LABORATORY CONTROL SAMPLES	✓	UJ		R	✓		✓		✓	
6. REPLICATES					✓		✓		✓	
7. SURROGATES	✓	✓		R						
8. INTERNAL STDS	✓	✓								
9. TCL COMPOUND IDENTIFICATION	✓	✓								
10. ICP INTERFERENCE CHECK SAMPLE					✓					
11. ICP SERIAL DILUTION					✓					
12. CARRIER/CHEM TRACER RECOVERIES									✓	
13. OTHER QC										

CHECK MARK (√) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED
SHADED CELLS – NOT APPLICABLE
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

Comments:
1. No MS/MSD reported for VOC, SVOC + HE
2. No initial ~~or continuing~~ cal calibration data reported.

REVIEWED BY: [signature] DATE: 2-25-99

2 Aqueous Samples:
042528-003 TJA01-228A-GR-TB
042529-003 TJA01-228A-GR-EB

VOLATILE ORGANICS:
SW-846 - Method 8260

SITE/PROJECT: 228A Sampling ARCOC #: 500836
LABORATORY: CORE LABORATORY REPORT #: 982441

IS	GC/MS		Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Trip Blks		
	Name	CAS #		NA	>.05	<20% / 0.99	<20%					NA	NA	NA	NA				
1	Chloromethane	74-87-3	0.10			✓	✓	✓	NA	NA	NA					✓	✓		
1	Bromomethane	74-83-9	0.10					✓	↓	↓	↓					NA	NA		
1	vinyl chloride	75-01-4	0.10					✓								✓	✓		
1	Chloroethane	75-00-3	0.01					✓								✓	✓		
1	methylene chloride (10xblk)	75-09-2	0.01					✓	✓	✓	✓					✓	✓		
1	acetone(10xblk)	67-64-1	0.01				26.3	NA	NA	NA	NA					NA	NA		
1	carbon disulfide	75-15-0	0.10					NA	↓	(2) ↓	↓					↓	↓		
1	1,1-dichloroethene	75-35-4	0.20					✓	✓	162	✓					✓	✓		
1	1,1-dichloroethane	75-34-3	0.10					✓	✓	✓	✓					✓	✓		
1	Chloroform	67-66-3	0.20					✓	✓	✓	✓					✓	✓		
1	1,2-dichloroethane	107-06-2	0.10				(1) 31.9	✓	✓	136.0	✓					✓	✓		
1	2-butanone(10xblk)	78-93-3	0.01					NA	✓	→	→					NA	→		
2	1,1,1-trichloroethane	71-55-6	0.10					✓	✓	✓	✓					✓	✓		
2	carbon tetrachloride	56-23-5	0.10					✓	✓	✓	✓					✓	✓		
2	Bromodichloromethane	75-27-4	0.20					✓	✓	✓	✓					✓	✓		
2	1,2-dichloropropane	78-87-5	0.01					✓	✓	✓	✓					✓	✓		
2	cis-1,3-dichloropropene	10061-01-5	0.20					NA	→	→	→					NA	→		
2	Trichloroethene	79-01-6	0.30					✓	✓	✓	✓					✓	✓		
2	Dibromochloromethane	124-48-1	0.10					✓	✓	✓	✓					✓	✓		
2	1,1,2-trichloroethane	79-00-5	0.10					✓	✓	✓	✓					✓	✓		
✓ 2	Benzene	71-43-2	0.50					✓	✓	✓	✓					✓	✓		
2	trans-1,3-dichloropropene	10061-02-6	0.10					NA	→	→	→					✓			
2	Bromoform	75-25-2	0.10					✓	✓	✓	✓					✓	✓		
3	4-methyl-2-pentanone	108-10-1	0.10					NA	→	→	→					NA	→		
3	2-hexanone	591-78-6	0.01					NA	→	→	→					NA	→		
3	Tetrachloroethene	127-18-4	0.20					✓	✓	✓	✓					✓	✓		
3	1,1,2,2-tetrachloroethane	79-34-5	0.30					✓	✓	✓	✓					✓	✓		
3	toluene(10xblk)	108-88-3	0.40					✓	✓	✓	✓					✓	✓		
3	Chlorobenzene	108-90-7	0.50					✓	✓	✓	✓					✓	✓		
3	Ethylbenzene	100-41-4	0.10					✓	✓	✓	✓					✓	✓		
3	Styrene	100-42-5	0.30					✓	NA	NA	NA					✓	✓		
3	xylenes(total)	1330-20-7	0.30					✓								✓	✓		
	1,2-dichloroethylene(total)	540-59-0	0.01	↓	↓	↓	↓	✓	↓	↓	↓	↓	↓	↓	↓	NA	NA		
	2-chloroethyl vinyl ether	110-75-8						NA											

(1) No data qualified for the compound 1,2 dichloroethane ~~due to~~ not samples are all ND.

(2) LCSD values for 1,1 dichloroethane and 1,2 dichloroethane are above upper limit. No data qualified, ~~due to~~ not samples ND.

(3) Surrogate recovery is high for all samples, however no data qualified, ~~because~~ not samples all ND.

REVIEWED BY: [signature] DATE: 2-25-99

* Not Applicable

VOLATILE ORGANICS: page 2
SW-846 - Method 8260

SITE/PROJECT: 228A ARCOC #: 600836
LABORATORY: CORE LABORATORY REPORT #: 982441

3

Surrogate Recovery and Internal Standard Outliers

Sample	SMC 1	SMC 2	SMC 3	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3- area	IS 3- RT			
~~042528-01 T8A04-228A~~	✓	119	✓			QC criteria						
042529 ~~003 T3A04-228A-GRAB~~	✓	120.7	✓		MEX							
MB	✓	119.6	✓									

SMC 1: 4-Bromofluorobenzene
SMC 2: ~~1,2-Dichloroethane-d4~~
SMC 3: Toluene-d8
SMC 2: Dibromo fluoromethane

~~IS 1: Bromochloromethane~~
IS 2: 1,4-Difluorobenzene
IS 3: Chlorobenzene-d5
Pentafluorobenzene
1,4 Dichlorobenzene

REVIEWED BY: [signature] DATE: 2-25-99

2 Aqueous Samples
042530 - 016 TJA01-228A-GR-EB
042536 - 006 TJA01-228A-GR-EB

SEMI-VOLATILE ORGANICS:
SW-846 - Method 8270
TJA01- 228A

SITE/PROJECT: GR-TB ARCOC #: 600836
LABORATORY: CORE LABORATORY REPORT #: 982441

IS	CAS#	Name	Min RF	Intercept	Calib RSD	Calib RF	CCV RPD	Method Blks	Field Blks	Field Dup	MS	MSD	MSD RPD	① LCS	② LCSD	EB			LCS RPD
1	108-95-2	Phenol	0.80	NA	✓	✓	✓	✓	NA	NA	NA	NA	NA	33.5	51.6	✓			✓
1	111-44-4	bis(2-Chloroethyl)ether	0.70		✓	✓	✓							NA	NA				NA
1	95-57-8	2-Chlorophenol	0.80		✓	✓	✓							✓	✓				✓
1	541-73-1	1,3-Dichlorobenzene	0.60		✓	✓	✓							NA	NA				NA
1	106-46-7	1,4-Dichlorobenzene	0.50		✓	✓	✓							✓	✓				✓
1	95-50-1	1,2-Dichlorobenzene	0.40		✓	✓	✓							NA	NA				NA
1	95-48-7	2-Methylphenol	0.70		✓	✓	✓												
1	108-60-1	2,2'-oxybis(1-Chloropropane)	0.01		✓	~~NA~~	NA												
1	106-44-5	4-Methylphenol	0.60		✓	~~NA~~	NA												
1	621-64-7	N-Nitroso-di-n-propylamine	0.50		✓	✓	✓							✓	✓				✓
1	67-72-1	Hexachloroethane	0.30		✓	✓	✓							NA	NA				NA
2	98-95-3	Nitrobenzene	0.20		✓	✓	✓												
2	78-59-1	Isophorone	0.40		✓	✓	✓												
2	88-75-5	2-Nitrophenol	0.10		✓	✓	✓												
2	105-67-9	2,4-Dimethylphenol	0.20		✓	✓	✓												
2	111-91-1	bis(2-Chloroethoxy)methane	0.30		✓	✓	✓												
2	120-83-2	2,4-Dichlorophenol	0.20		✓	✓	✓												
2	120-82-1	1,2,4-Trichlorobenzene	0.20		✓	✓	✓							✓	✓				✓
2	91-20-3	Naphthalene	0.70		✓	✓	✓							NA	NA				NA
2	106-47-8	4-Chloroaniline	0.01		✓	✓	✓												
2	87-68-3	Hexachlorobutadiene	0.01		✓	✓	✓												
2	59-50-7	4-Chloro-3-methylphenol	0.20		✓	✓	✓							✓	✓				✓
2	91-57-6	2-Methylnaphthalene	0.40		✓	✓	✓							NA	NA				NA
3	77-47-4	Hexachlorocyclopentadiene	0.01		✓	✓	✓												
3	88-06-2	2,4,6-Trichlorophenol	0.20		✓	✓	✓												
3	95-95-4	2,4,5-Trichlorophenol	0.20		✓	✓	✓												

① LCS recovery below QC range for Phenol and 4-Nitrophenol.
② LCSD recovery below QC range for Phenol, 4-Nitrophenol. 2,4 Dinitrotoluene recovery was slightly below the QC limit. Do not qualify 2,4 DN
③ CCV for ~~3-Nitroaniline~~*, 4-Nitroaniline + Carbazole did not meet QC criteria. Qualify "aj"

* NA - Not Applicable

REVIEWED BY: [signature] DATE: 2-25-99

SEMI-VOLATILE ORGANICS: page 2
SW 846 - Method 8270

SITE/PROJECT: TJAou-228A-G2-7B ARCOC #: 600836
LABORATORY: CORE LABORATORY REPORT #: 982441

IS	CAS #	NAME	Min RF	Int	Calib RSD	Calib RF	CCV RPD (3)	CCV RF	CCB	~~Field~~ method blank	Field Dup	MS	MSD	MSD RPD	LCS	LCSD	LCS RPD
3	91-58-7	2-Chloronaphthalene	0.80	NA	✓	✓	✓	✓	NA	✓	NA	NA	NA	NA	NA	NA	NA
3	88-74-4	2-Nitroaniline	0.01		✓		✓										
3	131-11-3	Dimethylphthalate	0.01		✓	✓	✓										
3	208-96-8	Acenaphthylene	0.90		✓	✓	✓										
3	606-20-2	2,6-Dinitrotoluene	0.20		✓	✓	✓										
3	99-09-2	3-Nitroaniline	0.01		✓	✓	23.0										
3	83-32-9	Acenaphthene	0.90		✓	✓	✓								✓	✓	✓
3	51-28-5	2,4-Dinitrophenol	0.01		✓	✓	✓								NA	NA	NA
3	100-02-7	4-Nitrophenol	0.01		✓	✓	✓								37.4	1.1	188.4
3	132-64-9	Dibenzofuran	0.80		✓	✓	✓								NA	NA	NA
3	121-14-2	2,4-Dinitrotoluene	0.20		✓	✓	✓								✓	60.9	✓
3	84-66-2	Diethylphthalate	0.01		✓	✓	✓								NA	NA	NA
3	7005-72-3	4-Chlorophenyl-phenylether	0.40		✓	✓	✓										
3	86-73-7	Fluorene	0.90		✓		✓										
3	100-01-6	4-Nitroaniline	0.01		✓	✓	60.8										
4	534-52-1	4,6-Dinitro-2-methylphenol	0.01		✓	✓	✓										
4	86-30-6	N-Nitrosodiphenylamine (1)	0.01		✓	✓	✓										
4	101-55-3	4-Bromophenyl-phenylether	0.10		✓	✓	✓										
4	118-74-1	Hexachlorobenzene	0.10		✓	✓	✓										
4	87-86-5	Pentachlorophenol	0.05		✓	✓	✓								✓		
4	85-01-8	Phenanthrene	0.70		✓	✓	✓								NA		
4	120-12-7	Anthracene	0.70		✓	✓	✓										
4	86-74-8	Carbazole	0.01		✓	✓	43.3										
4	84-74-2	Di-n-butylphthalate	0.01		✓	✓	✓										
4	206-44-0	Fluoranthene	0.60		✓	✓	✓										
5	129-00-0	Pyrene	0.60		✓	✓	✓								✓	✓	✓
5	85-68-7	Butylbenzylphthalate	0.01		✓	✓	✓								NA	NA	NA
5	91-94-1	3,3'-Dichlorobenzidine	0.01		✓	✓	✓										
5	56-55-3	Benzo(a)anthracene	0.80		✓	✓	✓										

EB

C3-119 Limit for LCS

REVIEWED BY: [illegible] DATE: 2-25-99

* NA - Not Applicable

SEMI-VOLATILE ORGANICS: page 3
SW 846 - Method 8270

SITE/PROJECT: UAOU-228A-GR-TB ARCOC #: 600836
LABORATORY: CORE LABORATORY REPORT #: 982441

IS	CAS #	NAME	Min RF	Int	Calib RSD	Calib RF	CCV RPD	CCV RF	CCB	~~Field~~ method blank	Field Dup	MS	MSD	MSD RPD	LCS	LCSD	LCS RPD
5	218-01-9	Chrysene	0.70	NA	✓	✓	✓	✓	NA		NA	NA	NA	NA			
5	117-81-7	bis(2-Ethylhexyl)phthalate	0.01		✓	✓	✓										
6	117-84-0	Di-n-octylphthalate	0.01		✓	✓	✓										
6	205-99-2	Benzo(b)fluoranthene	0.70		✓	✓	✓										
6	207-08-9	Benzo(k)fluoranthene	0.70		✓	✓	✓										
6	50-32-8	Benzo(a)pyrene	0.70		✓	✓	✓										
6	193-39-5	Indeno(1,2,3-cd)pyrene	0.50		✓	✓	✓										
6	53-70-3	Dibenz(a,h)anthracene	0.40		✓	✓	✓	✓									
6	191-24-2	Benzo(g,h,i)perylene	0.50		✓	✓	✓										

EB

* NA - Not Applicable

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8

Met QC Criteria

SMC 1: Nitrobenzene-d5 SMC 2: 2-Fluorobiphenyl SMC 3: p-Terphenyl-d14
SMC 4: Phenol-d5 SMC 5: 2-Fluorophenol SMC 6: 2,4,6-Tribromophenol
SMC 7: 2-2-Chlorophenol-d4 SMC 8: 1,2-Dichlorobenzene-d4

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT

Met QC Criteria

IS 1: 1,4-Dichlorobenzene-d4 IS 2: Naphthalene-d8 IS 3: Acenaphthene-d10
IS 4: Phenathrene-d10 IS 5: Chrysene-d12 IS 6: Perylene-d12

REVIEWED BY: [signature] DATE: 2-25-99

Aqueous samples
042531-001 - TIA01-228A-GR-EB
042535-001 - TIA01-228A-GR-EB

HIGH EXPLOSIVES:
SW846 Method 8330

SITE/PROJECT: 228A ARCOC #: 600836
LABORATORY: CORE LABORATORY REPORT #: 982441

NAME	CAS #	Intercept	Curve R^2	CCV RPD (1)	Method Blks	LCS %R (2)	LCSD %R	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks		
			.99	20%	U	70-130	70-130	20%			20%	NA	U	U		
HMX	2691-41-0	NA	NA	↓	✓	4.4	6.4	36.5	NA	NA	NA	↓	✓	NA		
RDX	121-82-4	↓	↓	↓	↓	4.9	6.5	27.7	↓	↓	↓	↓	✓	↓		
1,3,5-Trinitrobenzene	99-35-4	↓	↓	↓	↓	6.9	6.5	✓	↓	↓	↓	↓	✓	↓		
1,3-dinitrobenzene	99-64-0	↓	↓	↓	↓	7.8	7.0	✓	↓	↓	↓	↓	✓	↓		
Nitrobenzene	98-95-3	↓	↓	↓	↓	9.6	8.8	✓	↓	↓	↓	↓	✓	↓		
Tetryl	479-45-8	↓	↓	↓	↓	2.7	16.0	141	↓	↓	↓	↓	✓	↓		
2,4,6-trinitrotoluene	118-96-7	↓	↓	↓	↓	NA	NA	NA	↓	↓	↓	↓	✓	↓		
2-amino-4,6-dinitrotoluene	35572-78-2	↓	↓	↓	↓	23.4	21.8	✓	↓	↓	↓	↓	✓	↓		
4-amino-2,6-dinitrotoluene	1946-51-0	↓	↓	↓	↓	16.2	14.4	✓	↓	↓	↓	↓	✓	↓		
2,4-dinitrotoluene	121-14-2	↓	↓	↓	↓	15.4	14.4	✓	↓	↓	↓	↓	✓	↓		
2,6-dinitrotoluene	606-20-2	↓	↓	↓	↓	23.4	21.9	✓	↓	↓	↓	↓	✓	↓		
2-nitrotoluene	88-72-2	↓	↓	↓	↓	9.4	7.8	✓	↓	↓	↓	↓	✓	↓		
4-nitrotoluene	99-99-0	↓	↓	↓	↓	9.8	8.0	21.2	↓	↓	↓	↓	✓	↓		
3-nitrotoluene	99-08-1	↓	↓	↓	↓	9.7	8.3	✓	↓	↓	↓	↓	✓	↓		
PETN	78-11-5	↓	↓	↓	↓											

(3)

Sample	SMC %REC (#1)	SMC RT		Sample	SMC %REC (#2) (4)	SMC RT
All Samples	ND			982441-4	67	✓

Confirmation

Sample	CAS #	RPD > 25%		Sample	CAS #	RPD > 25%

(1). No initial or continuing calibration data submitted.

* NA - Not Applicable

Comments:

(2) - Recovery for all LCS compounds below QC limit. All samples are ND and more than half of the LCS compounds are below QC Limit, therefore data should be "R" coded.

(3) Recovery for surrogate #1 was below 10% for each sample. Data should be qualified "R"

(4) Surrogate recovery for 3,4 Dinitrotoluene was slightly below QC limit. No data qualified.

REVIEWED BY: [signature] DATE: 2-25-99

2 Aqueous Samples:
0-12532-005 TJAOU - 228A - GR - EB
0-13068-001 TJAOU - 228A - GR - EB

INORGANIC METALS:

SITE/PROJECT: 228A ARCOC #: ~~80-mh~~ 600936
LABORATORY: CORE LABORATORY REPORT #: 982441
METHODS: EPA - 6010, 7421, 7470, 7740

QC Element/ Analyte	ICV	CCV	ICB	CCB	Method Blks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	REP RPD	ICS AB	Serial Dilution	Field Dup RPD	Eq. Blks	Field Blks			
7429-90-5 Al														NA	NA		NA			
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	✓ mal		✓				
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓		✓	✓ mal		✓				
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓		✓	✓ mal		✓				
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K																				
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓		✓	✓ mal		✓				
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓ mal		✓				
7782-49-2 Se	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓		✓	✓ mal		✓				
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓ mal		✓				
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		NA			✓				
Cyanide CN																				

Comments: * NA - Not Applicable

RE[illegible]D BY: [illegible] DATE 2-25-99

4 Aqueous Samples:
Gamma Spec: 042533-001-TJAOU-228A-GR-EB
043069-001-TJAOU-228A-GR-EB
Iso U: 042534-010-TJAOU-228A-GR-EB
043070-001-TJAOU-228A-GR-EB

RADIOCHEMISTRY:

SITE/PROJECT: 228A ARCOC #: 600836
LABORATORY: CORE LABORATORY REPORT #: 982441
METHODS: Gamma Spec. EPA 901.1, Iso U CA-GLR-R405

QC Element/ Analyte	Method Blks	LCS	① MS	Rep RER	Eq. Blks	Field Dup RER	Field Blks	-	Sample ID	Isotope	IS/Trace	Sample	Isotope	IS/Trace			
CRITERIA	U	20%	25%	<1.0	U	<1.0	U	-			50-105			50-105			
H3								-									
U-238	✓	✓	✓	✓	✓	NA	NA			U-232	✓						
U-234	✓	✓	✓	✓	✓	↓	↓			↓	✓						
U-235/236	✓	✓	✓	✓	✓	↓	↓	-		↓	✓						
Th-232																	
Th-228																	
Th-230								-									
Pu-239/240																	
Gross Alpha								-									
Nonvolatile Beta																	
Ra226								-									
Ra228								-									
Gamma Spec	✓	✓	NA	NA	✓	NA	NA	-									
Ni-63								-									
								-									
								-									

* - NA - Not Applicable

Parameter	Method	Typical Tracer	Typical Carrier
Iso-U	Alpha spec	U-232	NA
Iso-Pu	Alpha spec	Pu-242	NA
Iso-Th	Alpha spec	Th-229	NA
Am-241	Alpha spec	Am-242	NA
Sr-90	Beta	Y ingrowth	NA
Ni-63	Beta	NA	Ni by ICP
Ra-226	Deamination	NA	NA
Ra-226	Alpha spec	Ba-133 or Ra-225	NA
Ra-228	Gamma spec	Ba-133	NA

Comments:

① - MS

Gamma spec LCS contains: Am-241, Cs-137, and Co-60

REVIEWED BY: [signature] DATE 2-25-99

Contract Verification Review (CVR)

Project Leader COPLAND | Project Name 228A SAMPLING | Case No. 7225.2203

AR/COC No. 600836 | Analytical Lab CORE | SDG No. 982441

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 and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, LCD)		X	NO LCS/LCD REPORTED FOR ISOTOPIC URANIUM NO LCD REPORTED FOR METALS		X
2.4	Matrix spike/matrix spike duplicate data provided(if requested)	NA				
2.5	Detection Limits provided; PQL and MDL(or IDL)	X				
2.6	QC batch numbers provided	X				
2.7	Dilution Factors provided	X				
2.8	Data reported using correct sig. fig. (2 for org.; 3 for inorg.)	X				
2.9	Rad analysis uncertainty provided (2 sigma error)	X				
2.10	Narrative provided	X				
2.11	TAT met		X	30 DAY TAT MISSED		X
2.12	Hold times met	X				
2.13	Were contractual qualifiers provided	X				
2.14	All requested result data provided	X				

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1)Reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg). Units consistent between QC samples and sample data.		X	GAMMA SPEC RESULTS REPORTED IN pCI/g MERCURY QC REPORTED IN pCI/L
3.2)Quantitation limit met for all samples?	X		
3.3)Accuracy a) Laboratory control sample accuracy reported and met for all samples?		X	1,1-DICHLOROETHENE, TRANS-1,2-DICHLOROETHENE ABOVE RECOVERY LIMITS FOR VOC LCS 1,1-DICHLOROETHENE, TRANS-1,2-DICHLOROETHENE & 1,2 – DICHLOROETHANE ABOVE RECOVERY LIMITS FOR VOC LCD 4-NITROPHENOL & PHENOL BELOW RECOVERY LIMITS FOR SVOC LCS 2,4-DINITROPHENOL, 4-NITROPHENOL & PHENOL BELOW RECOVERY LIMITS FOR SVOC LCD ALL LCS/LCD ANALYTES BELOW QC RECOVERY LIMITS FOR EXPLOSIVES LCS/LCD
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?		X	DIBROMOFLUOROMETHANE OUTSIDE RECOVERY LIMITS FOR VOC SAMPLES #042528-003 & 042529-003 & ASSOCIATED METHOD BLANK 3,4-DINITROTOLUENE OUTSIDE QC RECOVERY LIMITS FOR HE SAMPLE #042531-007
c) If requested, matrix spike recovery data reported and met .	NA		
3.4)Precision a) Laboratory control sample precision reported and met for all samples? For rad analysis, sample duplicate precision reported and met.		X	RPD FOR 4-NITROPHENOL ABOVE QC ACCEPTANCE LIMITS FOR SVOC LCS/LCD SEVERAL RPDS ABOVE QC ACCEPTANCE LIMITS FOR EXPLOSIVES LCS/LCD
b) If requested, matrix spike duplicate RPD data reported and met.	NA		
3.5)Blank data a) Method or reagent blank data reported and met for all samples?	X		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?	X		
3.6)Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found	X		

in method blank; "U"- analyte undetected (results are below the MDL or L_c (rad)); "H"-analysis done beyond the holding time.			
3.7)Narrative included, correct, and complete?	X		

4.0 Data Quality Evaluation Continuation

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/ Fraction No.	Analysis	Qualifiers	Comments
ALL	GAMMA SPEC		RESULTS REPORTED IN pCi/g
QC	7174		REPORTED IN pCi/L (PAGE 26)

Were deficiencies noted. ☹ Yes ☺ No

Based on the review, this data package is complete. ☺ Yes ☹ No

If no, provide : nonconformance report or correction request number 1633 and date correction request was submitted 12-22-98

Reviewed by: W. Palencia Date: 12-22-98 Closed by: W. Palencia Date: 1-21-99

SJ 2501-COC (11-97)
Supersedes (9-97) form

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

AR/COC- 600836

Dept. No./Mail Stop: 6133/MS 1147
Project/Task Manager: 228A/John Copland
Project Name: 228A
Record Center Code: 1309/228A/DAT
Logbook Ref. No.: ER-014
Service Order No.: CFO596

Lab Contact: Tim Kellogg
Lab Destination: Core/Denver/Cassper
SMO Contact/Phone: Doug Salmi
Send Report to SMO: Suzi Montano

Contract No.: AJ-3490C
Case No.: 7228.2200
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area: NA; Building: NA; Room: NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
642528-003	TJAOU-228A-GR-TB	0	228A	9/9/98 1510	DIW	G	3 x 40ml	HCl; 4	G	TB	VOC's	
642518-003	TJAOU-228A-GR-TB	0	228A	9/9/98 1510	DIW	G	40ml	HCl; 4	G	TB	VOC's	
642528-003	TJAOU-228A-GR-TB	0	228A	9/9/98 1510	DIW	G	40ml	HCl; 4	G	TB	VOC's	
642528-003	TJAOU-228A-GR-EB	0	228A	9/9/98 1500	DIW	G	3 x 40ml	HCl; 4	G	EB	VOC's	
642518-003	TJAOU-228A-GR-EB	0	228A	9/9/98 1500	DIW	G	40ml	HCl; 4	G	EB	VOC's	
642529-004	TJAOU-228A-GR-EB	0	228A	9/9/98 1500	DIW	G	40ml	HCl; 4	G	EB	VOC's	
642530-004	TJAOU-228A-GR-EB	0	228A	9/9/98 1500	DIW	AG	2 x 1L	4 C	G	EB	SVOC (8270)	
642530-004	TJAOU-228A-GR-EB	0	228A	9/9/98 1500	DIW	AG	1L	4 C	G	EB	SVOC (8270)	
642531-007	TJAOU-228A-GR-EB	0	228A	9/9/98 1500	DIW	AG	4 x 1L	4 C	G	EB	HE	
642531-007	TJAOU-228A-GR-EB	0	228A	9/9/98 1500	DIW	AG	1L	4 C	G	EB	HE	

RNMA ☒Yes ☐No Ref. No. .....
Sample Disposal ☐Return to Client ☒Disposal by lab
Turnaround Time ☒Normal ☐Rush Required Report Date .....

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
* Send a separate report
* Please note hold times on VOC samples
* COC #600800 relinquishes #600836

Sample Team Members	Name	Signature	Initials	Company/Organization/Phone
	Nolan Clayton			ET/LIN 588-3927

	Org.	Date	Time		Org.	Date
1. Relinquished by	ET/LIN	9-10-98	1500	4. Relinquished by		
1. Received by	7578	9/10/98	1500	4. Received by		
2. Relinquished by	7572	9/11/98	1300	5. Relinquished by		
2. Received by	CORE	09-12-98	1100	5. Received by		
3. Relinquished by				6. Relinquished by		
3. Received by				6. Received by		

Original: To Accompany Samples, Laboratory Copy (White) — 1st Copy: To Accompany Samples, Return to SMO (Blue) — 2nd Copy: SMO Suspense Copy (Yellow) — 3rd Copy: Field Copy (Pink)

SF 2001-COC (10/97)

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

AR/COC- 600836

Project Name 228A | Project/Task Manager: 228A/John Copland | Case No.: 7225.2203

Location | Tech Area NA | Building NA | Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
~~042531-007~~	~~TJAOU-228A-GR-EB~~	~~0~~	~~228A~~	~~9/8/98 1505~~	~~DIW~~	~~AG~~	~~1L~~	~~4 C~~	~~G~~	~~EB~~	~~HE~~	
042531-007	TJAOU-228A-GR-EB	0	228A	9/8/98 1505	DIW	AG	1L	4 C	G	EB	HE	
042532-008	TJAOU-228A-GR-EB	0	228A	9/8/98 1507	DIW	P	500ml	HNO3; 4 C	G	EB	RCRA METALS	
~~042533-009~~ 043068-001	TJAOU-228A-GR-EB	0	228A	9/9/98 1310	DIW	P	500ml	HNO3; 4 C	G	EB	RCRA METALS	
042533-009	TJAOU-228A-GR-EB	0	228A	9/9/98 1509	DIW	P	1L	HNO3; 4 C	G	EB	GAMMA SPEC	
~~042533-009~~ 043069-001	TJAOU-228A-GR-EB	0	228A	9/9/98 1305	DIW	P	1L	HNO3; 4 C	G	EB	GAMMA SPEC	
042534-010	TJAOU-228A-GR-EB	0	228A	9/9/98 1600	DIW	P	1L	HNO3; 4 C	G	EB	ISO U	
~~042534-010~~ 043070-001	TJAOU-228A-GR-EB	0	228A	9/9/98 1300	DIW	P	1L	HNO3; 4 C	G	EB	ISO U	
042536-007	TJAOU-228A-GR-EB	0	228A	9/9/98 1315	DIW	AG	4x1L	4 C	G	EB	HE	
042536-008	TJAOU-228A-GR-EB	0	228A	9/9/98 1320	DIW	AG	2x1L	4 C	G	EB	SVOC	

Per Salmi

Abnormal Conditions on Receipt: LAB USE

Recipient Initials

Original To Accompany Samples. Laboratory Copy (White) | 1st Copy To Accompany Samples, Return to SMO (Blue) | 2nd Copy SMO Suspense Copy (Yellow) | 3rd Copy Field Copy (Pink)

SAMPLE FINDINGS SUMMARY

Site: Site 228A VCM

AR/COC: 601188 Data Classification: Organics (EPA 8260A ↓ 8270B 8330)

	Sample Fraction No.	Analysis	DV Qualifiers	Comments
043711-003 043716-003 043721-003 043722-003	TJAOU-228A-GR-151-S -156-S -161-S -161-DU	67-64-1 (Acetone)	R	
		75-15-0 (Carbon Disulfide)	R	Applies to same 4 samples as above.
		78-93-3 (2-butanone)	UJ	" "
043721-003	TJAOU-228A-GR-161-S	75-09-2 (Methylene Chloride)	J	
043711-002 043716-002 043721-002 043722-002	TJAOU-228A-GR-151-S -156-S -161-S -161-DU	100-02-7 (4-Nitrophenol)	R	
		108-60-1 [bis(2-chloro-isopropyl) ether]	UJ	Applies to same 4 samples as above.
		51-28-5 (2,4-dinitrophenol)	UJ	" "
		91-94-1 (3,3'-dichlorobenzidine)	UJ	" "
	Data is acceptable (except as noted above)			
	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: [signature] Date: 3/12/99

MEMORANDUM

DATE: March 12, 1999

TO: File

FROM: Kenneth Salaz KAS

SUBJECT: Organic Data Review and Validation
Site 228A VCM, ARCOC No. 601188, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods (EPA8260A, EPA8270B, EPA8330). Problems were identified with the data package that result in the qualification of data.

1. VOC Analysis: The relative percent differences (RPD) of the continuing calibrations (CCV) for acetone and carbon disulfide were >60%. All sample results were non-detect (ND) and will be qualified "R" (unusable). The CCV RPD for 2-butanone was >40%. All sample results were ND and will be qualified "UJ." The CCV RPD for methylene chloride was >20%. Results for sample 9812298-21 were positive and will be qualified "J."

   SVOC Analysis: The CCV RPD for 4-nitrophenol was >60%. All sample results were ND and will be qualified "R." The CCV RPDs for bis(2-chloroisopropyl)ether, 2,4-dinitrophenol, and 3,3'-dichlorobenzidine were >40%. All sample results were ND and will be qualified "UJ."

No high explosives (HE) data required qualification. Data is acceptable, except for: the acetone and carbon disulfide results of samples 9812298-03, -12, -21, and -24; as well as the 4-nitrophenol results of samples -02, -11, -20, and -23. QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

VOC/ SVOC/HE Analyses: All samples were extracted and analyzed within the prescribed holding times.

Calibration

VOC Analysis: The initial and continuing calibrations met QC acceptance criteria except for acetone, bromomethane, carbon disulfide, methylene chloride, 1,1-dichloroethene, 2-butanone, 2-chloroethyl vinyl ether, and 2-hexanone. Acetone, carbon disulfide, methylene chloride, and 2-butanone sample results were qualified as noted above in the summary section. Sample results for all other compounds were ND; no data were qualified.

SVOC Analysis: The initial and continuing calibrations met QC acceptance criteria except for benzoic acid, bis(2-chloroisopropyl)ether, pentachlorophenol, 4-nitrophenol, 2,4-dinitrophenol, 4-nitroaniline, 4,6-dinitro-2-methylphenol, and 3,3'-dichlorobenzidine. Sample results for bis(2-chloroisopropyl)ether, 2,4-dinitrophenol, 4-nitrophenol, and 3,3'-dichlorobenzidine were qualified as noted above in the summary section. Results for all other compounds were ND; no data were qualified.

HE Analysis: The initial and continuing calibrations met all QC acceptance criteria.

Blanks

VOC Analysis: No target analytes were detected in the method blanks except for ethylbenzene and xylenes. All sample results for these compounds were ND; no data were qualified.

SVOC/HE Analyses: No target analytes were detected in the method blanks.

Surrogates

VOC/SVOC/HE Analyses: The surrogate recoveries met QC acceptance criteria.

Internal Standards

VOC/SVOC Analyses: The areas and retention times for the internal standards met QC acceptance criteria.

HE Analysis: No internal standards were required for this method.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

SVOC Analysis: The MS/MSD met QC acceptance criteria except for 4-nitrophenol, which exceeded the percent recovery (%REC) limit. Sample results were ND; no data were qualified.

VOC/HE Analyses: The MS/MSD met QC acceptance criteria.

Laboratory Control Samples

SVOC Analysis: The LCS/LCSD met QC acceptance criteria except for 4-nitrophenol, which exceeded the %REC limit. Sample results were ND; no data were qualified.

VOC/HE Analyses: The LCS/LCSD met QC acceptance criteria.

Other QC

VOC/SVOC/HE Analyses: The field duplicate pair met QC acceptance criteria for all target compounds. No field blank (FB) or equipment blank (EB) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

SAMPLE FINDINGS SUMMARY

Site: Site 228A VCM

AR/COC: 601188 Data Classification: Inorganics (EPA 6010B ↓ 7471)

	Sample Fraction No.	Analysis	DV Qualifiers	Comments
043711-002	TJA04-228A-GR-151-S	7439-97-6 (Mercury)	J, B	
043713-002	-153-S			
043715-002	-155-S			
043717-002	-157-S			
043719-002	-159-S			
043721-002	-161-S			
043722-002	-161-DU			
043711-002	TJA04-228A-GR-151-S	7440-39-3 (Barium)	J, A2, P1	
043713-002	-153-S			
043715-002	-155-S			
043717-002	-157-S			
043719-002	-159-S			
043721-002	-161-S			
043722-002	-161-DU			
043711-002	TJA04-228A-GR-151-S	7440-43-9 (Cadmium)	UJ, P1	
043713-002	-153-S		J, P1	
043715-002	-155-S		UJ, P1	
043717-002	-157-S			
043719-002	-159-S			
043721-002	-161-S			
043722-002	-161-DU			
		Data is acceptable.		
		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: [signature] Date: 3/12/99

MEMORANDUM

DATE: March 12, 1999

TO: File

FROM: Kenneth Salaz KAS

SUBJECT: Inorganic Data Review and Validation
Site 228A VCM, ARCOC No. 601188, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

<u>Summary</u>

All samples were prepared and analyzed with accepted procedures and specified methods (EPA6010B, EPA7471). Problems were identified with the data package that result in the qualification of data.

1. In the method blank, mercury (Hg) was detected. All samples had positive results less than five times the blank concentration and will be qualified "J,B."

2. The MSD percent recovery and the MS/MSD relative percent difference (RPD) for barium (Ba) exceeded the QC limits. All sample results were positive and will be qualified "J,A2,P1." The RPD for cadmium (Cd) also exceeded the QC limit. Results for sample 9812298-06 were positive and will be qualified "J,P1." All other sample results for Cd were ND and will be qualified "UJ,P1."

Data is acceptable. QC measures appear to be adequate. The following sections discuss the data review and validation.

<u>Holding Times</u>

All samples were extracted and analyzed within the prescribed holding times.

<u>Calibration</u>

The initial and continuing calibrations met QC acceptance criteria.

Blanks

In the method blank barium (Ba) and Hg were observed. Sample results for Hg were qualified as noted above in the summary section. Sample results Ba were all greater than five times the blank concentration. Thus, no data were qualified.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

The MS/MSD met QC acceptance criteria except for Ba and Cd. Sample results for these elements were qualified as noted above in the summary section.

Laboratory Control Samples

The LCS/LCSD met QC acceptance criteria.

Replicates

The replicate samples met QC acceptance criteria.

ICP Interference Check Sample (ICS)

The ICP ICS met QC acceptance criteria.

ICP Serial Dilution

The ICP serial dilution met QC acceptance criteria.

Other QC

The field duplicate pair met QC acceptance criteria for all target compounds. No field blank (FB) or equipment blank (EB) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

SAMPLE FINDINGS SUMMARY

Site: Site 228A VCM

AR/COC: 601188 Data Classification: Radiological (EPI A-011B HASL 300)

	Sample Fraction No.	Analysis	DV Qualifiers	Comments
3716-001 TJA0U-	228A-GR-156-S	NS632 (U-233/234)	J	Alpha Spec (Iso-U)
3722-001	-161-DU	↓	↓	↓
3716-001	-156-S	7440-61-1 (U-238)	↓	↓
3722-001	-161-DU	↓	↓	↓
3711-001	-151-S	15117-96-1 (U-235)	↓	↓
3716-001	-156-S	↓	↓	↓
3721-001	-161-S	↓	↓	↓
3722-001	-161-DU	↓	↓	↓
⇒	Note: Gamma Spec summary on attached spreadsheet.			
		Data is Acceptable.		
	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: [signature] Date: 3/12/99

Sample Number	14331-83-0 (Ac-228)	86954-36-1 (Am-241)	14762-78-8 (Ce-144)	13967-70-9 (Cs-134)	10045-97-3 (Cs-137)	14392-02-0 (Cr-51)	10198-40-0 (Co-60)	14596-12-4 (Fe-59)	13982-63-3 (RA-226)	15262-20-1 (Ra-228)	13968-53-1 (Ru-103)	13967-48-1 (Ru-106)	14932-40-2 (Th-231)	7440-29-1 (Th-232)	15065-10-8 (Th-234)	15117-96-1 (U-235)	7440-61-1 (U-238)	Y-88 (Yttrium-88)	13967-71-0 (Zr-95)
TJAOU-228A-GR-151-S		J	J	J	J	J	J	J			J	J	J		J	J	J	J	J
TJAOU-228A-GR-152-S		J	J	J	J	J	J	J			J	J	J		J	J	J	J	J
TJAOU-228A-GR-153-S		J	J	J	J	J	J	J			J	J	J			J		J	J
TJAOU-228A-GR-154-S		J	J	J	J	J	J	J			J	J	J		J	J	J	J	J
TJAOU-228A-GR-155-S		J	J	J	J	J	J	J			J	J	J		J	J	J	J	J
TJAOU-228A-GR-156-S		J	J	J	J	J	J	J			J	J	J		J	J	J	J	J
TJAOU-228A-GR-157-S		J	J	J	J	J	J	J			J	J	J		J	J	J	J	J
TJAOU-228A-GR-158-S	J	J	J	J	J	J	J	J	J	J	J	J	J	J		J		J	J
TJAOU-228A-GR-159-S		J	J	J	J	J	J	J			J	J	J		J	J	J	J	J
TJAOU-228A-GR-160-S		J	J	J		J	J	J			J	J	J		J	J	J	J	J
TJAOU-228A-GR-161-S		J	J	J	J	J	J	J			J	J	J		J	J	J	J	J
TJAOU-228A-GR-161-DU		J	J	J		J	J	J			J	J	J		J	J	J	J	J

ARCOC #601188
Radiological Analysis
(Gamma Spec)

3/12/99

MEMORANDUM

DATE: March 12, 1999

TO: File

FROM: Kenneth Salaz KS

SUBJECT: Radiological Data Review and Validation
Site 228A VCM, ARCOC No. 601188, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

<u>Summary</u>

All samples were prepared and analyzed with accepted procedures and specified methods (EPI A-011B, HASL 300). Problems were identified with the data package that result in the qualification of data.

1. Gamma Spec Analysis: The replicate error ratio (RER) of the field duplicate pair for K-40 was >3. All sample results for this analyte will be qualified "R."

2. Alpha Spec Analysis: The tracer percent recoveries for samples 9812298-10 and -22 were >105%. Thus, results for all uranium isotopes (U-233/234, U-235, and U-238) will be qualified "J."

3. Alpha Spec (Iso-U) Analysis: The 2-sigma uncertainties of U-235 for samples 9812298-01 and -19 were greater than 50% of the sample results. Thus, these results will be qualified "J."

   Gamma Spec Analysis: The 2-sigma uncertainties of Am-241, Ce-144, Cs-134, Cr-51, Co-60, Fe-59, Ru-103, Ru-106, Th-231, U-235, Y-88, and Zr-95 for all samples were greater than 50% of the respective sample results. This was also true of Th-234 and U-238 for samples 9812298-01, -04, -07, -08, -10, -13, -16, -18, -19, and -22; Cs-137 for samples -01, -04, -05, -07, -08, -10, -13, -15, -16, and -19; and Ac-228, Ra-226, Ra-228, and Th-232 for sample -15. These results will be qualified "J."

Data is acceptable. QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

Alpha Spec (Iso-U)/Gamma Spec: All samples were extracted and analyzed within the prescribed holding times.

Calibration

Alpha Spec (Iso-U)/Gamma Spec: The instrument calibrations met QC acceptance criteria.

Blanks

Alpha Spec (Iso-U)/Gamma Spec: No target analytes were detected in the method blank above the required acceptance limit.

Matrix Spike (MS) Analysis

Alpha Spec (Iso-U)/Gamma Spec: The MS met QC acceptance criteria.

Laboratory Control Samples

Alpha Spec (Iso-U)/Gamma Spec: The LCS met QC acceptance criteria.

Replicates

Alpha Spec (Iso-U)/Gamma Spec: The replicate pair met QC acceptance criteria.

Tracer Recoveries

Alpha Spec (Iso-U): Tracer recoveries met QC acceptance criteria for all samples except 9812298-10 and -22. Sample results were qualified as noted above in the summary section.

Other QC

Alpha Spec (Iso-U)/Gamma Spec: No field blank (FB) or equipment blank (EB) were submitted on the ARCOC. The field duplicate pair met QC acceptance criteria except as noted above in the summary section.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

DATA VALIDATION SUMMARY:

SITE/PROJECT: Site 228A VCM CASE #: 7225.2203
ARCOC #: 601188
LABORATORY: GEL
LABORATORY REPORT #: 9812298

OF SAMPLES: 24 MATRIX: Soil
LAB SAMPLE IDs: 9812298-01 thru -24

ANALYSIS/ QC ELEMENT	VOC	SVOC	PEST/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	✓	NA	✓	✓	NA	✓	NA	✓	NA
2. CALIBRATIONS	R; J; UJ	R; UJ		✓	✓		✓		✓	
3. METHOD BLANKS	✓	✓		✓	J, B				✓	
4. MS/MSD	✓	✓		✓	J, A2, P1 J, P1; UJP1		✓		✓	
5. LABORATORY CONTROL SAMPLES	✓	✓		✓	✓		✓		✓	
6. REPLICATES					✓		✓		✓	
7. SURROGATES	✓	✓		✓						
8. INTERNAL STDS	✓	✓								
9. TCL COMPOUND IDENTIFICATION	✓	✓								
10. ICP INTERFERENCE CHECK SAMPLE					✓					
11. ICP SERIAL DILUTION					✓					
12. CARRIER/CHEM TRACER RECOVERIES									J	
13. OTHER QC	~~N/A~~ ✓	✓		✓	✓		✓		R; J	

CHECK MARK (√) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED

SHADED CELLS – NOT APPLICABLE
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

NA = Not Applicable

REVIEWED BY: [signature] 3/12/99

VOLATILE ORGANICS:
SW-846 - Method 8260

# of samples: 1
Matrix: soil
Batch #: 137578

Sample ID's: 9812298-03
-12
-21
-24

SITE/PROJECT: Site 228A VCM ARCOC #: 601188
LABORATORY: GEL LABORATORY REPORT #: 9812298

IS	GC/MS Name	CAS #	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks ①	Trip Blks ①			
					>.05	<20% / 0.99	<20%													
1	Chloromethane	74-87-3	0.10	NA	✓	✓	✓	✓							✓	NA	NA			
1	Bromomethane	74-83-9	0.10	✓	✓	✓	21.2													
1	vinyl chloride	75-01-4	0.10	NA	✓	✓	✓													
1	Chloroethane	75-00-3	0.01		✓	✓	✓													
1	methylene chloride (10xblk)	75-09-2	0.01		✓	✓	34.2													
1	acetone(10xblk)	67-64-1	0.01	✓	✓	✓	153.6													
1	carbon disulfide	75-15-0	0.10	✓	✓	✓	62.4													
1	1,1-dichloroethene	75-35-4	0.20	NA	0.17	✓	✓		✓	✓	✓	✓	✓	✓						
1	1,1-dichloroethane	75-34-3	0.10		✓	✓	✓													
1	Chloroform	67-66-3	0.20		✓	✓	✓													
1	1,2-dichloroethane	107-06-2	0.10		✓	✓	✓													
1	2-butanone(10xblk)	78-93-3	0.01		✓	✓	51.3													
2	1,1,1-trichloroethane	71-55-6	0.10		✓	✓	✓													
2	carbon tetrachloride	56-23-5	0.10		✓	✓	✓													
2	Bromodichloromethane	75-27-4	0.20		✓	✓	✓													
2	1,2-dichloropropane	78-87-5	0.01		✓	✓	✓													
2	cis-1,3-dichloropropene	10061-01-5	0.20		✓	✓	✓													
2	Trichloroethene	79-01-6	0.30		✓	✓	✓		✓	✓	✓	✓	✓	✓						
2	Dibromochloromethane	124-48-1	0.10		✓	✓	✓													
2	1,1,2-trichloroethane	79-00-5	0.10		✓	✓	✓													
2	Benzene	71-43-2	0.50		✓	✓	✓		✓	✓	✓	✓	✓	✓						
2	trans-1,3-dichloropropene	10061-02-6	0.10	✓	✓	✓	✓													
2	Bromoform	75-25-2	0.10	NA	✓	✓	✓													
3	4-methyl-2-pentanone	108-10-1	0.10		✓	✓	✓													
3	2-hexanone	591-78-6	0.01		✓	✓	37.0													
3	Tetrachloroethene	127-18-4	0.20		✓	✓	✓													
3	1,1,2,2-tetrachloroethane	79-34-5	0.30		✓	✓	✓													
3	toluene(10xblk)	108-88-3	0.40		✓	✓	✓		✓	✓	✓	✓	✓	✓						
3	Chlorobenzene	108-90-7	0.50		✓	✓	✓		✓	✓	✓	✓	✓	✓						
3	Ethylbenzene	100-41-4	0.10		✓	✓	✓	1.0												
3	Styrene	100-42-5	0.30		✓	✓	✓	✓												
3	xylenes(total)	1330-20-7	0.30		✓	✓	✓	0.85												
②	1,2-dichloroethylene(total)	540-59-0	0.01		✓	✓	✓	✓												
	2-chloroethyl vinyl ether	110-75-8			✓	✓	30.7	✓												
	Vinyl Acetate	108-05-4			✓	✓	✓	✓												

NA = Not Applicable

Comments:
① No Eq. blank or trip blank submitted on the COC.
② QC criteria evaluated for cis- and trans-1,2-dichloroethylene separately.

REVIEWED BY: [signature] DATE: 3/12/99

VOLATILE ORGANICS: page 2
SW-846 - Method 8260

SITE/PROJECT: Site 228A VCM ARCOC #: 601188
LABORATORY: GEL LABORATORY REPORT #: 9812298

Surrogate Recovery and Internal Standard Outliers

	Sample	SMC 1	SMC 2	SMC 3	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3- area	IS 3- RT			
①													

All Passed

SMC 1: 4-Bromofluorobenzene
SMC 2: ~~1,2-Dichloroethane-d4~~
SMC 3: Toluene-d8 → Dibromofluoromethane

KM 3/9/99
IS 1: ~~Bromochloromethane~~ Fluorobenzene
IS 2: 1,4-Difluorobenzene -d4
IS 3: Chlorobenzene-d5

Comments:
① All samples met QC acceptance criteria for surrogate recoveries, internal standard areas, and retention times.

* Summary → See back of this page.

RE 'ED BY: Kenneth Foley DATE: 3/12/99

SEMI-VOLATILE ORGANICS:
SW-846 - Method 8270

SITE/PROJECT: 228A ARCOC #: 600799
LABORATORY: CORE LABORATORY REPORT #: R2439

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS (2)	LCSD (1)	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
1	A	108-95-2	Phenol	0.80	NA	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	✓	NA	NA			
1	BN	111-44-4	bis(2-Chloroethyl)ether	0.70		✓	✓	✓		NA											
1	A	95-57-8	2-Chlorophenol	0.80		✓	✓	✓		✓											
1	BN	541-73-1	1,3-Dichlorobenzene	0.60		✓	✓	✓		NA											
1	BN	106-46-7	1,4-Dichlorobenzene	0.50		✓	✓	✓		✓											
1	BN	95-50-1	1,2-Dichlorobenzene	0.40		✓	✓	✓		NA											
1	A	95-48-7	2-Methylphenol	0.70		✓	✓	✓													
1	BN	108-60-1	bis(2-chloroisopropyl)ether	0.01		✓	✓	21.8													
1	A	106-44-5	4-Methylphenol	0.60		✓	✓	✓													
1	BN	621-64-7	N-Nitroso-di-n-propylamine	0.50		✓	✓	✓		121.1											
1	BN	67-72-1	Hexachloroethane	0.30		✓	✓	✓		NA											
2	BN	98-95-3	Nitrobenzene	0.20		✓	✓	✓													
2	BN	78-59-1	Isophorone	0.40		✓	✓	✓													
2	A	88-75-5	2-Nitrophenol	0.10		✓	✓	✓													
2	A	105-67-9	2,4-Dimethylphenol	0.20		✓	✓	✓													
2	BN	111-91-1	bis(2-Chloroethoxy)methane	0.30		✓	✓	✓													
2	A	120-83-2	2,4-Dichlorophenol	0.20		✓	✓	✓													
2	BN	120-82-1	1,2,4-Trichlorobenzene	0.20		✓	✓	✓		✓											
2	BN	91-20-3	Naphthalene	0.70		✓	✓	✓		NA											
2	BN	106-47-8	4-Chloroaniline	0.01		✓	✓	✓													
2	BN	87-68-3	Hexachlorobutadiene	0.01		✓	✓	✓													
2	A	59-50-7	4-Chloro-3-methylphenol	0.20		✓	✓	✓		✓											
2	BN	91-57-6	2-Methylnaphthalene	0.40		✓	✓	✓		NA											
3	BN	77-47-4	Hexachlorocyclopentadiene	0.01		✓	20.4	✓													
3	A	88-06-2	2,4,6-Trichlorophenol	0.20		✓	✓	✓													
3	A	95-95-4	2,4,5-Trichlorophenol	0.20		✓	✓	✓													

Comments: (1) - No LCSD analyzed. NA - Not Applicable
(2) LCS for N-Nitroso-di-n-propylamine (121.1) % REC above range (41-107%). Samples ND, qualify "UJ"

REVIEWED BY [signature] DATE: 3-11-99

SEMI-VOLATILE ORGANICS: page 2
SW 846 - Method 8270

SITE/PROJECT: 228A ARCOC #: 600799
LABORATORY: CORE LABORATORY REPORT #: 982439

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
3	BN	91-58-7	2-Chloronaphthalene	0.80		✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	✓	NA	NA			
3	BN	88-74-4	2-Nitroaniline	0.01		✓	✓	✓													
3	BN	131-11-3	Dimethylphthalate	0.01		✓	✓	✓													
3	BN	208-96-8	Acenaphthylene	0.90		✓	✓	✓													
3	BN	606-20-2	2,6-Dinitrotoluene	0.20		✓	✓	✓													
3	BN	99-09-2	3-Nitroaniline	0.01		✓	✓	✓													
3	BN	83-32-9	Acenaphthene	0.90		✓	✓	✓		✓											
3	A	51-28-5	2,4-Dinitrophenol	0.01		✓	24.6	✓		NA											
3	A	100-02-7	4-Nitrophenol	0.01		✓	✓	29.5		✓											
3	BN	132-64-9	Dibenzofuran	0.80		✓	✓	✓		NA											
3	BN	121-14-2	2,4-Dinitrotoluene	0.20		✓	✓	30.9		✓											
3	BN	84-66-2	Diethylphthalate	0.01		✓	✓	✓		NA											
3	BN	7005-72-3	4-Chlorophenyl-phenylether	0.40		✓	✓	✓													
3	BN	86-73-7	Fluorene	0.90		✓	✓	✓													
3	BN	100-01-6	4-Nitroaniline	0.01		✓	30.3	31.6													
4	A	534-52-1	4,6-Dinitro-2-methylphenol	0.01		✓	22.2	✓													
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	0.01		✓	✓	✓													
4	BN	101-55-3	4-Bromophenyl-phenylether	0.10		✓	✓	✓													
4	BN	118-74-1	Hexachlorobenzene	0.10		✓	✓	✓		✓											
4	A	87-86-5	Pentachlorophenol	0.05		✓	✓	✓		✓											
4	BN	85-01-8	Phenanthrene	0.70		✓	✓	✓		NA						~~43~~					
4	BN	120-12-7	Anthracene	0.70		✓	✓	✓								✓					
4	BN	86-74-8	Carbazole	0.01		✓	✓	✓													
4	BN	84-74-2	Di-n-butylphthalate	0.01		✓	✓	✓													
4	BN	206-44-0	Fluoranthene	0.60		✓	✓	✓		✓						120mk					
5	BN	129-00-0	Pyrene	0.60		✓	✓	✓		✓						120mk					
5	BN	85-68-7	Butylbenzylphthalate	0.01		✓	✓	✓		NA						✓					
5	BN	91-94-1	3,3'-Dichlorobenzidine	0.01		✓	✓	36.8													
5	BN	56-55-3	Benzo(a)anthracene	0.80		✓	✓	✓								Hmk					

Comments:

NA - Not Applicable

RE VED BY: [signature] DATE: 3-11-99

VOLATILE ORGANICS:
SW-846 - Method 8260

SITE/PROJECT: 278A ARCOC #: 600799
LABORATORY: CORE LABORATORY REPORT #: 982439

IS	GC/MS Name	CAS #	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Trip Blks			
					> .05	<20% / 0.99	<20%													
1	Chloromethane	74-87-3	0.10	NA	✓	✓	NA	✓	NA	NA	NA	NA	NA	NA	✓	NA	NA			
1	Bromomethane	74-83-9	0.10		✓	29.3														
1	vinyl chloride	75-01-4	0.10		✓	✓														
1	Chloroethane	75-00-3	0.01		✓	✓			✓	✓	✓									
1	methylene chloride (10xblk)	75-09-2	0.01		✓	✓			✓	✓	✓									
1	acetone(10xblk)	67-64-1	0.01		✓	✓			NA	NA	NA									
1	carbon disulfide	75-15-0	0.10		✓	✓			✓	✓	✓									
1	1,1-dichloroethene	75-35-4	0.20		✓	✓			✓	✓	✓									
1	1,1-dichloroethane	75-34-3	0.10		✓	✓			✓	✓	✓									
1	Chloroform	67-66-3	0.20		✓	✓			✓	✓	✓									
1	1,2-dichloroethane	107-06-2	0.10		✓	✓			✓	✓	✓									
1	2-butanone(10xblk)	78-93-3	0.01		✓	✓			✓	✓	✓									
2	1,1,1-trichloroethane	71-55-6	0.10		✓	✓			✓	✓	✓									
2	carbon tetrachloride	56-23-5	0.10		✓	✓			✓	✓	✓									
2	Bromodichloromethane	75-27-4	0.20		✓	✓			✓	✓	✓									
2	1,2-dichloropropane	78-87-5	0.01		✓	✓			✓	✓	✓									
2	cis-1,3-dichloropropene	10061-01-5	0.20		✓	✓			NA	NA	NA									
2	Trichloroethene	79-01-6	0.30		✓	✓			✓	✓	✓									
2	Dibromochloromethane	124-48-1	0.10		✓	✓			✓	✓	✓									
2	1,1,2-trichloroethane	79-00-5	0.10		✓	✓			✓	✓	✓									
2	Benzene	71-43-2	0.50		✓	✓			✓	✓	✓									
2	trans-1,3-dichloropropene	10061-02-6	0.10		✓	✓			NA	NA	NA									
2	Bromoform	75-25-2	0.10		✓	✓			✓	✓	✓									
3	4-methyl-2-pentanone	108-10-1	0.10		✓	✓			NA	NA	NA									
3	2-hexanone	591-78-6	0.01		✓	✓			✓	✓	✓									
3	Tetrachloroethene	127-18-4	0.20		✓	✓			✓	✓	✓									
3	1,1,2,2-tetrachloroethane	79-34-5	0.30		✓	✓			✓	✓	✓									
3	toluene(10xblk)	108-88-3	0.40		✓	✓			✓	✓	✓									
3	Chlorobenzene	108-90-7	0.50		✓	✓			✓	✓	✓									
3	Ethylbenzene	100-41-4	0.10		✓	✓			✓	✓	✓									
3	Styrene	100-42-5	0.30		✓	✓			NA	NA	NA									
3	xylenes(total)	1330-20-7	0.30		✓	✓														
	1,2-dichloroethylene(total)	540-59-0	0.01						✓	✓	✓									
	2-chloroethyl vinyl ether	110-75-8			✓	✓			NA	NA	NA									
	1,2 Dichlorobenzene				✓	✓			✓	✓	✓									
	1,3 Dichlorobenzene				✓	✓			✓	✓	✓									
	1,4 Dichlorobenzene				✓	✓			✓	✓	✓									

Comments:

NA - Not Applicable

REVIEWED BY: [signature] DATE: 3-11-99

VOLATILE ORGANICS: page 2
SW-846 - Method 8260

SITE/PROJECT: 228A ARCOC #: 100799
LABORATORY: CORE LABORATORY REPORT #: 982439

Surrogate Recovery and Internal Standard Outliers

Sample	SMC 1	SMC 2	SMC 3	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3- area	IS 3- RT			
	Met QC criteria in all samples				Met QC criteria in all samples							

SMC 1: 4-Bromofluorobenzene
SMC 2: 1,2-Dichloroethane-d4
SMC 3: Toluene-d8

IS 1: Bromochloromethane
IS 2: 1,4-Difluorobenzene
IS 3: Chlorobenzene-d5

Comments:

REVIEWED BY [signature] DATE: 3-11-99

Field Duplicate Analyses

Field duplicate data met QC criteria, except as noted above.

Other QC

No trip blank (TB), field blank (FB) or equipment blank (EB) was submitted on ARCOC.

No other specific problems were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

DATA VALIDATION SUMMARY:

SITE/PROJECT: 228A CASE #: 7225.2203
ARCOC #: 600799
LABORATORY: CORE
LABORATORY REPORT #: 982439

OF SAMPLES: 26 MATRIX: Soil
LAB SAMPLE IDs: 982439-1 - 26

ANALYSIS/ QC ELEMENT	VOC	SVOC	PEST/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	✓		✓	✓		✓		✓	
2. CALIBRATIONS	✓			✓	✓		✓		✓	
3. METHOD BLANKS	✓	✓		✓	✓		✓		✓	
4. MS/MSD	✓	✓		✓	✓		✓		✓	
5. LABORATORY CONTROL SAMPLES	✓	✓		✓	✓		✓		✓	
6. REPLICATES					✓		✓		✓	
7. SURROGATES	✓	✓		R						
8. INTERNAL STDS	✓	✓								
9. TCL COMPOUND IDENTIFICATION	✓	✓								
10. ICP INTERFERENCE CHECK SAMPLE					✓					
11. ICP SERIAL DILUTION					NA					
12. CARRIER/CHEM TRACER RECOVERIES									✓	
13. OTHER QC Field Duplicate	NA	NA		✓	✓		✓		J	

CHECK MARK (✓) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED

SHADED CELLS – NOT APPLICABLE
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

NA - Not Applicable

REVIEWED BY: [signature] DATE: 5-11-99

Interference check sample met QC acceptance criteria.

Field duplicate Analyses

The field duplicate pair met QC acceptance criteria.

Other QC

No trip blank (TB), field blank (FB) or equipment blank (EB) was submitted on ARCOC.

No other specific problems were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

MEMORANDUM

DATE: March 11, 1999

TO: File

FROM: Matthew Kase

SUBJECT: Radiochemistry Data Review and Validation
Site 228A, ARCOC No. 600799, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed using accepted procedures and specified methods (Gamma Spec - EPA 901.1 and Isotopic Uranium CA-GLR-R405). All compounds were successfully analyzed. A problem was identified with the data package that required data validation.

1. Field duplicate pair data met QC acceptance criteria, except for potassium 40 and ruthenium 103. The replicate error ratio (RER) for K^{40} and Ru^{103} was above the QC acceptance criteria. Sample results will be qualified "J."

Data is acceptable and QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding times.

Blanks

No target analytes were detected in the method blanks.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

MS/MSD met QC acceptance criteria.

Tracer Compound

Isotopic Uranium: Tracer recovery met QC acceptance criteria.

Site: 228A

AR COC: 600799 Data Classification: Inorganic / Radiometric

Sample Fraction No.	Analysis	DV Qualifiers	Comments
Inorganic	Data is acceptable		
	QC measures appear adequate		
Radiometric TJA0U-228A-GR 1205. 1215 1225	13966-00-2 (Potassium 40)	J	Both elements flag "J" coded for all samples listed.
1235 1230U 1245	13968-53-1 (Ruthenium-103)		
1255 1265 1275			
1285 1295 1305			
1315 1325			
	Data is acceptable		
	QC measures appear 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: [signature] Date: 3-11-99

MEMORANDUM

DATE: March 11, 1999

TO: File

FROM: Matthew Kase

SUBJECT: Inorganic Metals Data Review and Validation
Site 228A, ARCOC No. 600799, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

The samples were prepared and analyzed with accepted procedures and specified methods (Metals – EPA 6010/7470/7060). All compounds were successfully analyzed. No problems were identified with the data package that required data validation.

Data is acceptable and QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding times for all methods.

Calibration

Initial and continuing calibration met QC acceptance criteria.

Blanks

No target analytes were detected in the method blanks.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

MS/MSD met QC acceptance criteria.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)Analyses

LCS/LCSD results met QC acceptance criteria.

ICP Interference Check Sample

(21.8%) and 3,3' dichlorobenzene (36.8%) which were greater than the QC acceptance limit(20%). The RPDs are less than 40%. Sample results are non-detect and no data was qualified.

VOC analysis: Initial calibration met acceptance criteria except the RSD of Bromomethane(29.5%) which was slightly above the QC acceptance criteria(20%). Sample results are non-detect and no data was qualified. No continuing calibration data was reported.

HE analysis: Initial calibration and continuing calibration met acceptance criteria.

Blanks

SVOC, VOC & HE: No target analytes were detected in the method blanks.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

No MS/MSD was run on the ARCOC group for any method. The MS/MSD acceptability was reported from another ARCOC group in the batch and met QC criteria for each method.

Laboratory Control Samples(LCS/LCSD) Analysis

SVOC analysis: LCS/LCSD met QC acceptance criteria except as noted above.

VOC analysis: LCS/LCSD percent recoveries met QC criteria.

HE analysis: LCS/LCSD %REC was above the QC acceptance criteria for twelve compounds. Sample results non-detect and have already been qualified "R" due to poor surrogate recovery and no further qualification was necessary.

Surrogates

SVOC analysis: The surrogate recoveries met QC acceptance criteria except for p-terphenyl-d14. The %REC (141.5%) was slightly greater than the 18-137% QC acceptance criteria. Sample results are non-detect and no data was qualified.

VOC analysis: The surrogate recovery met QC criteria.

HE analysis: The surrogate %REC for 3,4 dinitrotoluene did not meet the QC acceptance criteria. Due to poor surrogate %REC for 1,2 dinitrobenzene the data has already been qualified unusable ("R" coded); no further qualification was necessary.

Internal Standards

SVOC & VOC analysis: The internal standards met QC acceptance criteria.

HE analysis: Not applicable

Field Duplicate Analyses

SVOC, VOC & HE analysis: Field duplicate pairs met QC acceptance criteria.

Other QC

No trip blank (TB), field blank (FB) or equipment blank (EB) was submitted on ARCOC.

No other specific problems were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

Site: 228A

AR COC: 600799 Data Classification: SVOC/VOC/HE

	Sample Fraction No.	Analysis	DV Qualifiers	Comments
SVOC JA0U-228A-GR	120-S 123-S 123-DU	(N-Nitro-di-n-propylamine) 621-64-7	UJ, A	
	129-S			
		Data is acceptable		
		QC measures appear to be adequate		
VOC				
	Data	is acceptable,	No Data Qualified	
	QC	measures appear to be adequate.		
HE JA0U-228A+GR	120S 123S 123DU	EPA-8330 High Explosives	R, A1	
	129S			
	Data	is 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: [signature] Date: 3-11-99

MEMORANDUM

DATE: March 11, 1999

TO: File

FROM: Matthew Kase

SUBJECT: Organics Data Review and Validation
Site 228A, ARCOC No. 600799, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary
All samples were prepared and analyzed using accepted procedures and specified methods (EPA 8260-VOC, EPA 8270-SVOC and EPA 8330-HE). All compounds were successfully analyzed. Problems were identified with the data package that required data validation.

1. SVOC analysis: The LCS percent recovery (%REC) for N-nitroso-di-n-propylamine was above the QC acceptance criteria. Samples results are non-detect and will be qualified "UJ."

2. HE analysis: The surrogate 1,2 Dinitrobenzene %REC was zero for all samples. Samples are non-detect and data will be qualified "R" unusable.

Data is acceptable and QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were extracted and analyzed within the prescribed holding times for all methods.

Calibration

SVOC analysis: Initial calibration met QC acceptance criteria except the relative standard deviation (RSD) for hexachloropentadiene(20.4%), 2,4 dinitrophenol(24.6%), 4-nitroaniline(20.2%) and 4,6 dinitro 2-methylphenol(22.2%). The RSD for these compounds is slightly greater than the QC acceptance limit(20%). No data was qualified. Continuing calibration met QC acceptance criteria except the relative percent difference (RPD) for 4-nitrophenol(29.5%), 2,4 dinitrotoluene(20.9%), 4-nitroaniline(31.6%), indeno(1,2,3-cd)pyrene(23.2%), bis(2-chloroisopropyl)ether

.0 Data Quality Evaluation Continuation

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/ Fraction No.	Analysis	Qualifiers	Comments

Were deficiencies noted. ☹ Yes ☺ No

Based on the review, this data package is complete. ☺ Yes ☹ No

If no, provide : nonconformance report or correction request number _____ and date correction request was submitted _____

Reviewed by: _____ Date: 01/26/99 Closed by: _____ Date: _____

Contract Verification Review (CVR)

Project Leader COLLINS | Project Name SITE 228A VCM | Case No. 7225.2203

AR/COC No. 601192 | Analytical Lab GEL | SDG No. 9812310

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 and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, LCD)	X				
2.4	Matrix spike/matrix spike duplicate data provided(if requested)	X				
2.5	Detection Limits provided; PQL and MDL(or IDL)	X				
2.6	QC batch numbers provided	X				
2.7	Dilution Factors provided	X				
2.8	Data reported using correct sig. fig. (2 for org.; 3 for inorg.)	X				
2.9	Rad analysis uncertainty provided (2 sigma error)	X				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Were contractual qualifiers provided	X				
2.14	All requested result data provided	X				

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1)Reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg). Units consistent between QC samples and sample data.	X		
3.2)Quantitation limit met for all samples?		X	thorium-231, lead-212, thorium-232 not quantified due to low abundance
3.3)Accuracy a) Laboratory control sample accuracy reported and met for all samples?	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?	X		
c) If requested, matrix spike recovery data reported and met.		X	4-nitrophenol MS out of acceptance limits
3.4)Precision a) Laboratory control sample precision reported and met for all samples? For rad analysis, sample duplicate precision reported and met.	X		
b) If requested, matrix spike duplicate RPD data reported and met.	X		4-nitrophenol out of acceptance limits
3.5)Blank data a) Method or reagent blank data reported and met for all samples?			several radiological analytes out of acceptance limits chromiun detected between DL and RL in method blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?	NA		
3.6)Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank; "U"- analyte undetected (results are below the MDL or L_C (rad)); "H"-analysis done beyond the holding time.	X		
3.7)Narrative included, correct, and complete?	X		

2001-COC (10-97)

Internal Lab Batch No

Sue Collins per schedule

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- 601192

Dept No./Mail Stop 6133/MS1147
Project/Task Manager: John Copland / Lori Ash
Project Name: Site 228A VCM
Record Center Code EQ/130/228A/DAT
Logbook Ref. No.
Service Order No.: CFO690

Date Samples Shipped: 12-7-98 SMO USE
Carrier/Waybill No.: 715750
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Selmi / 844-3110
Send Report to SMO: Sue Jensen

Contract No.: AJ-2180A
Case No.: 7225,2203
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services, Dept
P.O. Box 5800 MS 0154

Location — Tech Area: NA — Building: NA — Room: NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample #
043765 - 001	TJAOU-228A-GR-201-S	0	228A	120398/1000	S	AG	500 ml	4 C	G	SA	Gamma Spec, Iso U	
043765 – 002	TJAOU-228A-GR-201-S			120398/1000			500 ml				RCRA Metals, HE, SVOCs	
043765 - 003	TJAOU-228A-GR-201-S			120398/1000			4 oz				VOC	
043766 – 001	TJAOU-228A-GR-201-DU			120398/1000			500 ml				Gamma Spec, Iso U	
043766 – 002	TJAOU-228A-GR-201-DU			120398/1000			500 ml				RCRA Metals, HE, SVOCs	
043766 - 003	TJAOU-228A-GR-201-DU			120398/1000			4 oz				VOC	
043767 - 001	TJAOU-228A-GR-202-S			120398/1010			500 ml				Gamma Spec	
043768 – 001	TJAOU-228A-GR-203-S			120398/1020			500 ml				Gamma Spec	
043768 - 002	TJAOU-228A-GR-203-S			120398/1020			500 ml				RCRA Metals	
043769 - 001	TJAOU-228A-GR-204-S			120398/1025			500 ml				Gamma Spec	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/08/98
Entered by: LH

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC 601215 releases this COC

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits. LH

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	[signature]	CC	MDM/6131/881-3198

Please list as seperate report.

1 Relinquished by	[signature]	Org 6131	Date 12/04/98	Time 1500	4. Relinquished by		Org	Date
1 Received by	[signature] (SMO)	Org 7573	Date 12/4/98	Time 1500	4. Received by		Org	Date
2 Relinquished by	[signature]	Org SMO 7573	Date 12/7/98	Time 1200	5. Relinquished by		Org	Date
2 Received by		Org.	Date	Time	5. Received by		Org	Date
3 Relinquished by		Org.	Date	Time	6. Relinquished by		Org.	Date
3 Received by		Org.	Date	Time	6. Received by		Org.	Date

Original — To Accompany Samples, Laboratory Copy (White)

1st Copy — To Accompany Samples, Return to SMO (Blue)

2nd Copy — SMO Suspense Copy (Yellow)

3rd Copy — Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (1-97) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field

AR/COC- 601192

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: T228.2203

Location Tech Area NA

Building NA Room NA

Sample No - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Sample #
043770 - 001	TJAOU-228A-GR-205-S	0	228A	120398 / 1030	S	#9	500ml	4C	G	GA	Gamma Spec	
043770 - 002	TJAOU-228A-GR-205-S			120398 / 1030							RCRA Metals	
043944 - 001	TJAOU-228A-GR-206-S			120398 / 1035							Gamma Spec, Iso U	
043944 - 002	TJAOU-228A-GR-206-S			120398 / 1035							HE, SVOCs	
043944 - 003	TJAOU-228A-GR-206-S			120398 / 1035			402				VOC	
043945 - 001	TJAOU-228A-GR-207-S			120398 / 1040			500ml				Gamma Spec	
043945 - 002	TJAOU-228A-GR-207-S			120398 / 1040							RCRA Metals	
043946 - 001	TJAOU-228A-GR-208-S			120398 / 1045							Gamma Spec	
043947 - 001	TJAOU-228A-GR-209-S			120398 / 1050							Gamma Spec	
043947 - 002	TJAOU-228A-GR-209-S			120398 / 1050							RCRA Metals	
043948 - 001	TJAOU-228A-GR-210-S			120398 / 1055							Gamma Spec	
043949 - 001	TJAOU-228A-GR-211-S			120398 / 1130							Gamma Spec, Iso U	
043949 - 002	TJAOU-228A-GR-211-S			120398 / 1130							RCRA Metals, HE, SVOCs	
043949 - 003	TJAOU-228A-GR-211-S			120398 / 1130			402				VOC	
043950 - 001	TJAOU-228A-GR-211-DU			120398 / 1130			500ml				Gamma Spec, Iso U	
043950 - 002	TJAOU-228A-GR-211-DU			120398 / 1130			500ml				RCRA Metals, HE, SVOCs	
043950 - 003	TJAOU-228A-GR-211-DU			120398 / 1130			402				VOC	
-												
-												
-												
-												
-												
-												
-												
-												

Abnormal Conditions on Receipt LAB USE

Recipient Initials _____

Original: To Accompany Samples, Laboratory Copy (White) 1st Copy: To Accompany Samples, Return to SMO (Blue) 2nd Copy: SMO Suspense Copy (Yellow) 3rd Copy: Field Copy (Pink)

VOLATILE ORGANICS:
SW-846 - Method 8260

SITE/PROJECT: 228A VCM ARCOC #: 601192
LABORATORY: GEL LABORATORY REPORT #: 9812310

IS	GC/MS Name	CAS #	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Trip Blks			
								2/9								n/a	n/a			
					>.05	<20% / 0.99	<20%													
1	Chloromethane	74-87-3	0.10		✓	✓		✓	✓	✓		✓	✓	✓	✓					
1	Bromomethane	74-83-9	0.10	✓		✓			✓											
1	**vinyl chloride**	75-01-4	0.10		✓	✓			✓											
1	Chloroethane	75-00-3	0.01		✓	✓			✓											
1	methylene chloride (10xblk)	75-09-2	0.01	✓		✓	34.2		✓											
1	**acetone(10xblk)**	67-64-1	0.01	✓		✓	98.4		✓											
1	carbon disulfide	75-15-0	0.10		✓	✓	67.2		✓											
1	**1,1-dichloroethene**	75-35-4	0.20		.17	✓			✓											
1	**1,1-dichloroethane**	75-34-3	0.10		✓	✓			✓											
1	**Chloroform**	67-66-3	0.20		✓	✓			✓											
1	**1,2-dichlbroethane**	107-06-2	0.10		✓	✓			✓											
1	**2-butanone(10xblk)**	78-93-3	0.01		✓	✓	233		✓											
2	1,1,1-trichloroethane	71-55-6	0.10		✓	✓			✓											
2	**carbon tetrachloride**	56-23-5	0.10		✓	✓			✓											
2	Bromodichloromethane	75-27-4	0.20		✓	✓			✓											
2	**1,2-dichloropropane**	78-87-5	0.01		✓	✓			✓											
2	cis-1,3-dichloropropene	10061-01-5	0.20		✓	✓			✓											
2	**Trichloroethene**	79-01-6	0.30		✓	✓			✓											
2	Dibromochloromethane	124-48-1	0.10		✓	✓			✓											
2	1,1,2-trichloroethane	79-00-5	0.10		✓	✓			✓											
2	**Benzene**	71-43-2	0.50		✓	✓			✓											
2	trans-1,3-dichloropropene	10061-02-6	0.10		✓	✓			✓											
2	Bromoform	75-25-2	0.10		✓	✓			✓											
3	4-methyl-2-pentanone	108-10-1	0.10		✓	✓			✓											
3	2-hexanone	591-78-6	0.01		✓	✓	26.1	4.2	✓											
3	**Tetrachloroethene**	127-18-4	0.20		✓	✓		✓	✓											
3	1,1,2,2-tetrachloroethane	79-34-5	0.30		✓	✓		✓	✓											
3	toluene(10xblk)	108-88-3	0.40		✓	✓		✓	✓											
3	**Chlorobenzene**	108-90-7	0.50		✓	✓		✓	✓											
3	Ethylbenzene	100-41-4	0.10		✓	✓		1.0	✓											
3	Styrene	100-42-5	0.30		✓	✓		✓	✓											
3	xylenes(total)	1330-20-7	0.30		✓	✓		0.8	✓											
	1,2-dichloroethylene(total)	540-59-0	0.01		✓	✓		✓	✓											
	2-chloroethyl vinyl ether	110-75-8																		
	vinyl acetate				✓	✓		✓	✓		✓	✓	✓	✓	✓					

Comments:

REVIEWED BY: _____ DATE: 3/2/99

RADIOCHEMISTRY:

SITE/PROJECT: 228A VCM ARCOC #: 601192
LABORATORY: GEL LABORATORY REPORT #: 9812310
METHODS: HASL 300 & spec, iso Th U

QC Element/ Analyte	Method Blks	LCS	MS	Rep RER RPD	Eq. Blks n/a	Field Dup RER	Field Blks n/a	-	Sample ID	Isotope	IS/Trace	Sample	Isotope	IS/Trace			
CRITERIA	U	20%	25%	<1.0	U	<1.0	U	-			50-105			50-105			
I13								-									
U-238	.00492	✓	✓	✓		✓				U232	✓						
U-234	.00573			✓		✓											
U-235/236	U			✓		✓		-									
Th-232																	
Th-228																	
Th-230								-									
Pu-239/240																	
Gross Alpha								-									
Nonvolatile Beta																	
Ra226								-									
Ra228								-									
Gamma Spec	✓	✓	—	✓		✓		-		U232	✓						
Ni-63								-									
								-									
								-									

Parameter	Method	Typical Tracer	Typical Carrier
Iso-U	Alpha spec	U-232	NA
Iso-Pu	Alpha spec	Pu-242	NA
Iso-Th	Alpha spec	Th-229	NA
Am-241	Alpha spec	Am-242	NA
Sr-90	Beta	Y ingrowth	NA
Ni-63	Beta	NA	Ni by ICP
Ra-226	Deamination	NA	NA
Ra-226	Alpha spec	Ba-133 or Ra-225	NA
Ra-228	Gamma spec	Ba-133	NA

Comments:

Gamma spec LCS contains: Am-241, Cs-137, and Co-60

REVIEWED BY: [signature] DATE: 3/2/99

S VOLATILE ORGANICS: page 2
SW 846 - Method 8270

SITE/PROJECT: 228A VCM ARCOC #: 601192
LABORATORY: GEC LABORATORY REPORT #: 9812510

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq Blks (n/a)	Field Blks (n/a)	CCV RPD (14/8)		
						> 05	<20% / 0.99	<20%													
3	BN	91-58-7	2-Chloronaphthalene	0.80		✓	✓	✓	✓				✓	✓	✓	✓			✓		
3	BN	88-74-4	2-Nitroaniline	0.01																	
3	BN	131-11-3	Dimethylphthalate	0.01																	
3	BN	208-96-8	Acenaphthylene	0.90																	
3	BN	606-20-2	2,6-Dinitrotoluene	0.20																	
3	BN	99-09-2	3-Nitroaniline	0.01																	
3	BN	83-32-9	Acenaphthene	0.90						✓	✓	✓									
3	A	51-28-5	2,4-Dinitrophenol	0.01			34.4	27.4											27.2		
3	A	100-02-7	4-Nitrophenol	0.01			21.3	53.3		✓	✓	✓	F						79.3		
3	BN	132-64-9	Dibenzofuran	0.80			✓	✓					✓						✓		
3	BN	121-14-2	2,4-Dinitrotoluene	0.20						✓	✓	✓									
3	BN	84-66-2	Diethylphthalate	0.01																	
3	BN	7005-72-3	4-Chlorophenyl-phenylether	0.40																	
3	BN	86-73-7	Fluorene	0.90																	
3	BN	100-01-6	4-Nitroaniline	0.01																	
4	A	534-52-1	4,6-Dinitro-2-methylphenol	0.01			23.9														
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	0.01			✓														
4	BN	101-55-3	4-Bromophenyl-phenylether	0.10				24.6											28.3		
4	BN	118-74-1	Hexachlorobenzene	0.10				✓											✓		
4	A	87-86-5	Pentachlorophenol	0.05						✓	✓	✓									
4	BN	85-01-8	Phenanthrene	0.70																	
4	BN	120-12-7	Anthracene	0.70																	
4	BN	86-74-8	Carbazole	0.01																	
4	BN	84-74-2	Di-n-butylphthalate	0.01																	
4	BN	206-44-0	Fluoranthene	0.60																	
5	BN	129-00-0	Pyrene	0.60						✓	✓	✓									
5	BN	85-68-7	Butylbenzylphthalate	0.01																	
5	BN	91-94-1	3,3'-Dichlorobenzidine	0.01																	
5	BN	56-55-3	Benzo(a)anthracene	0.80		✓	✓	✓	✓				✓	✓	✓	✓			✓		

Comments:

REVIEWED BY: [signature] DATE: 3/2/99

SEMI-VOLATILE ORGANICS: page 3
SW 846 - Method 8270

SITE/PROJECT: 228A NCM ARCOC #: 601192
LABORATORY: CEL LABORATORY REPORT #: 9812310

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks (n/a)	Field Blks (n/a)	CCV RPD (12/18)		
						>.05	<20% / 0.99	<20%													
5	BN	218-01-9	Chrysene	0.70		✓	✓	✓	✓				✓	✓	✓	✓			✓		
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	0.01				29.1											22.1		
6	BN	117-84-0	Di-n-octylphthalate	0.01				✓											✓		
6	BN	205-99-2	Benzo(b)fluoranthene	0.70																	
6	BN	207-08-9	Benzo(k)fluoranthene	0.70																	
6	BN	50-32-8	Benzo(a)pyrene	0.70																	
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	0.50																	
6	BN	53-70-3	Dibenz(a,h)anthracene	0.40																	
6	BN	191-24-2	Benzo(g,h,i)perylene	0.50																	

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
			n/a					

Comments:

SMC 1: Nitrobenzene-d5 (BN)
SMC 2: 2-Fluorobiphenyl (BN)
SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d5 (A)
SMC 5: 2-Fluorophenol (A)
SMC 6: 2,4,6-Tribromophenol (A)
SMC 7: 2-2-Chlorophenol-d4 (A)
SMC 8: 1,2-Dichlorobenzene-d4 (BN)

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT
					n/a							

IS 1: 1,4-Dichlorobenzene-d4 (BN)
IS 2: Naphthalene-d8 (BN)
IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN)
IS 5: Chrysene-d12 (BN)
IS 6: Perylene-d12 (BN)

REVIEWED BY: [signature] DATE: 3/2/99

HI[illegible] EXPLOSIVES:
SW846 Method 8330

SITE/PROJECT: 228A VCM ARCOC #: 601192
LABORATORY: GEL LABORATORY REPORT #: 9812310

NAME	CAS #	Intercept	Curve R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks		
													n/a	n/a		
			.99	20%	U			20%			20%		U	U		
HMX	2691-41-0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
RDX	121-82-4															
1,3,5-Trinitrobenzene	99-35-4															
1,3-dinitrobenzene	99-64-0															
Nitrobenzene	98-95-3															
Tetryl	479-45-8															
2,4,6-trinitrotoluene	118-96-7															
2-amino-4,6-dinitrotoluene	35572-78-2															
4-amino-2,6-dinitrotoluene	1946-51-0															
2,4-dinitrotoluene	121-14-2															
2,6-dinitrotoluene	606-20-2															
2-nitrotoluene	88-72-2															
4-nitrotoluene	99-99-0															
3-nitrotoluene	99-08-1															
PETN	78-11-5															

Sample	SMC %REC	SMC RT		Sample	SMC %REC	SMC RT
		OK				

Comments:

Confirmation

Sample	CAS #	RPD > 25%		Sample	CAS #	RPD > 25%
		n/a				

REVIEWED BY [signature] DATE: 3/2/99

SEMI-VOLATILE ORGANICS:
SW-846 - Method 8270

SITE/PROJECT: 228A VCM ARCOC #: 601192
LABORATORY: GEL LABORATORY REPORT #: 9812310

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R²	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks	CCV RPD		
					n/a			12/11									n/a	n/a	12/12		
						>.05	<20% / 0.99	<20%													
1	A	108-95-2	Phenol	0.80		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		
1	BN	111-44-4	bis(2-Chloroethyl)ether	0.70		✓															
1	A	95-57-8	2-Chlorophenol	0.80		✓				✓	✓	✓									
1	BN	541-73-1	1,3-Dichlorobenzene	0.60		✓															
1	BN	106-46-7	1,4-Dichlorobenzene	0.50		✓				✓	✓	✓									
1	BN	95-50-1	1,2-Dichlorobenzene	0.40																	
1	A	95-48-7	2-Methylphenol	0.70																	
1	BN	108-60-1	bis(2-chloroisopropyl)ether	0.01				86.9											78.1		
1	A	106-44-5	4-Methylphenol	0.60				✓											✓		
1	BN	621-64-7	N-Nitroso-di-n-propylamine	0.50						✓	✓	✓									
1	BN	67-72-1	Hexachloroethane	0.30																	
2	BN	98-95-3	Nitrobenzene	0.20																	
2	BN	78-59-1	Isophorone	0.40																	
2	A	88-75-5	2-Nitrophenol	0.10																	
2	A	105-67-9	2,4-Dimethylphenol	0.20																	
2	BN	111-91-1	bis(2-Chloroethoxy)methane	0.30																	
2	A	120-83-2	2,4-Dichlorophenol	0.20																	
2	BN	120-82-1	1,2,4-Trichlorobenzene	0.20						✓	✓	✓									
2	BN	91-20-3	Naphthalene	0.70																	
2	BN	106-47-8	4-Chloroaniline	0.01																	
2	BN	87-68-3	Hexachlorobutadiene	0.01																	
2	A	59-50-7	4-Chloro-3-methylphenol	0.20						✓	✓	✓									
2	BN	91-57-6	2-Methylnaphthalene	0.40																	
3	BN	77-47-4	Hexachlorocyclopentadiene	0.01				21.3											23.3		
3	A	88-06-2	2,4,6-Trichlorophenol	0.20				✓											✓		
3	A	95-95-4	2,4,5-Trichlorophenol	0.20		✓	✓	✓	✓				✓	✓	✓	✓			✓		

Comments:

RI VFD BY: [signature] DATE: 3/2/99

DATA VALIDATION SUMMARY:

SITE/PROJECT: 228A CASE #: 2225.2203
ARCOC #: 601192
LABORATORY: GEL
LABORATORY REPORT #: 9812310

OF SAMPLES: 13 MATRIX: Soil
LAB SAMPLE IDs: TJA01-228A-GR-201S through TJA01-22AEGR-211DU

ANALYSIS/ QC ELEMENT	VOC	SVOC	PEST/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	✓		✓	✓	✓	✓		✓	
2. CALIBRATIONS	R,UJ	R,UJ		✓	✓		✓		✓	
3. METHOD BLANKS	✓	✓		✓	✓		✓		✓	
4. MS/MSD	✓	✓		✓	✓		✓		✓	
5. LABORATORY CONTROL SAMPLES	✓	✓		✓	✓		✓		✓	
6. REPLICATES					✓		✓		✓	
7. SURROGATES	✓	✓		✓						
8. INTERNAL STDS	✓	✓								
9. TCL COMPOUND IDENTIFICATION	✓	✓								
10. ICP INTERFERENCE CHECK SAMPLE										
11. ICP SERIAL DILUTION										
12. CARRIER/CHEM TRACER RECOVERIES									✓	
13. OTHER QC										

CHECK MARK (✓) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED

SHADED CELLS – NOT APPLICABLE
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

REVIEWED BY: [signature] DATE: 3/2/99

INORGANIC METALS:

SITE/PROJECT: 228A VCM ARCOC #: 601192
LABORATORY: GEL LABORATORY REPORT #: 9812310
METHODS: ICP, CVAA

QC Element/ Analyte	ICV	CCV	ICB	CCB	Method Blks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	REP RPD	ICS AB	Serial Dilution	Field Dup RPD	Eq Blks	Field Blks			
																n/a	n/a			
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓					
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓					
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	103	✓	✓	✓	✓	✓	✓		✓	✓	✓					
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K																				
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓					
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓					
7782-49-2 Se	✓	✓	✓	-2.6	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓					
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓					
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓					
Cyanide CN																				

Comments:

REVIEWED BY: [signature] DATE: 3/2/99

MEMORANDUM

Date: 03/02/99

To: File

From: Marcia Hilchey

Subject: Radiometric Data Review and Validation
Site: 228A
AR/COC: 601192
Case: 7225.2203
Laboratory: GEL
SDG: 9812310

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods (gamma spec. HASL 300, isotopic uranium EPI-011B). All components were successfully analyzed.

No problems were identified with the data package that result in the qualification of data.

Holding Times

The samples were analyzed within the prescribed holding times.

Calibration

Calibration met acceptance criteria for both methods.

Tracer Recovery

Chemical tracer recovery met acceptance criteria for isotopic uranium analyses.

Laboratory Control Sample Analyses

The LCS met acceptance criteria for both methods

Blanks

No target analytes were detected above the reporting limits in the method blank in either method.

Matrix Spike Analysis

The matrix spike sample met acceptance criteria for both methods.

Replicate

The laboratory duplicate met the RPD QC acceptance criteria for both methods. RERs were not calculated due to lack of error information in the QC summary.

Other QC

Field duplicate RERs met acceptance criteria for isotopic uranium analyses. Field duplicate RERs were calculated for only Am-241, Cs-137, and Co-60 in the gamma spec. analysis. These RERs met acceptance criteria.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this data package.

Memorandum

Date: 03/02/99

To: File

From: Marcia Hilchey

Subject: Organic Data Review and Validation
Site: 228A
AR/COC: 601192
Case: 7225-2203
Laboratory: GEL
SDG: 9812310

See attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and with specified methods (VOC EPA 8260, SVOC EPA 8270, HE EPA 8330). All compounds were successfully analyzed.

Qualifications were applied to VOC sample data due to high CCV RPD.

Qualifications were applied to SVOC sample data due to high CCV RPD and high ICV RSD.

No qualifications were applied to HE sample data.

Note: pages 1203 and 1204 were missing from the sample data section. These pages contained HE sample results, including surrogate information. According to the raw data, all sample results were ND.

Holding Times

The samples were analyzed within the prescribed holding times.

Calibration

Initial and continuing calibration met acceptance criteria for HE analyses.

VOC: Sample results for acetone and carbon disulfide were qualified due to high RPD (98.4 and 67.2, respectively) for CCV analysis.

SVOC: Sample results for bis(2-chloroisopropyl)ether and 4-nitrophenol were qualified due to high (86.9, 78.1; and 53.3, 79.3, respectively) RPD for CCV analyses.

Sample results for 2,4-dinitrophenol were qualified for high ICV (34.4) RSD and high CCV (27.4, 22.2) RPD.

Blanks

No sample data were qualified due to blank contamination for any organic method.

The method blank for VOC run on 2/9/99 contained 2-hexanone, ethylbenzene, and total xylenes at low levels, but as all sample results were ND, no data were qualified.

Surrogates

All surrogate recoveries met acceptance criteria for all organic methods.

Matrix Spike/Matrix Spike Duplicates (MS/MSD)

According to the case narratives, MS/MSD sample analysis for VOC and HE met acceptance criteria. The MS/MSD samples were from another SDG in both cases.

In the SVOC analysis, the case narrative indicated that 4-nitrophenol failed acceptance criteria for the MS sample from another SDG. No data are qualified since the MS sample was from another SDG.

Internal Standards

Internal standard acceptance criteria were met for SVOC and VOC analyses.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)

LCS/LCSD samples met acceptance criteria for all organic methods.

Other QC

Field duplicate RPDs met acceptance criteria for all organic methods.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

Memorandum

Date: 03-02-99

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation
Site: 228A
AR/COC: 601192
Case: 7225.2203
Laboratory: GEL
SDG: 9812310

See attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and with specified methods(ICP EPA6010, CVAA EPA 7470). All components were successfully analyzed.

Note: pages 1203 and 1204 were missing from the sample data section of the data package. These pages contained metals results for sample TJAO-228A-GR-211-S. This data has been requested from the laboratory. Changes in this assessment may be warranted upon receipt and review of the missing information.

No inorganic sample results were qualified.

Holding Times

The samples were analyzed within the prescribed holding times.

Calibration

Initial and continuing calibration met QC acceptance criteria for both the ICP and CVAA methods.

Blanks

Chromium and selenium were detected at low levels in blanks. No data were qualified as a result.

The method blank run for the mercury analysis (CVAA) detected no mercury above reporting limits.

Matrix Spike Analysis

The MS/MSD analyses were from another SDG for both metals methods. The narratives stated that all acceptance criteria were met.

Laboratory Control/Laboratory Control Duplicate Samples

The LCS/LCSD samples met QC acceptance criteria for both methods.

ICP Interference check sample (ICS) Analysis

The ICS met all QC acceptance criteria.

Laboratory Replicate Analysis

No sample results were identified as replicates. No data were qualified as a result.

Other QC

Field duplicate RPDs met acceptance criteria.

No other field QC samples were submitted with this data package.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this data package.

SAMPLE FINDINGS SUMMARY

Site: 228A

AR/COC: 601192 Data Classification: Organics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
SEE ATTACHED			
TABLE			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470'1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: Kevin A Lambert Date: 3-4-99

ORGANICS

SAMPLE FINDINGS SUMMARY

COC: 601192

Sample Number	VOC	acetone (67-64-1)	carbon disulfide (75-15-0)	SVOC	bis(2-chloroisopropyl)ether (106-60-	4-nitrophenol (100-02-7)
TJAOU-228A-GR-201-S		R	UJ		R	UJ
TJAOU-228A-GR-201-DU		R	UJ		R	UJ
TJAOU-228A-GR-206-S		R	UJ		R	UJ
TJAOU-228A-GR-211-S		R	UJ		R	UJ
TJAOU-228A-GR-211-DU		R	UJ		R	UJ

SF 2001-COC (10-97)

Supersedes (5-97) issue

Internal Lab Batch No.

Sue Collins pcl schedule 12/8/98

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- 601191

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland (Lai, Anh)
Project Name: Site 228A VCM
Record Center Code EQ/1309/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO USE
Carrier/Waybill No.: 75750
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi/844-3110
Send Report to SMO: Suzi Jensen

Contract No.: AJ-2480A
Case No.: 7225.2205
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Samp #
043751 - 001	TJAOU-228A-GR-188-S	0	228A	120398/1237	S	A3	500 ml	4 C	G	SA	Gamma Spec	
043752 - 001	TJAOU-228A-GR-189-S			120398/1240							Gamma Spec	
043752 - 002	TJAOU-228A-GR-189-S			120398/1240							RCRA Metals	
043753 - 001	TJAOU-228A-GR-190-S			120398/1245							Gamma Spec	
043754 - 001	TJAOU-228A-GR-191-S			120398/1255							Gamma Spec, Iso U	
043754 - 002	TJAOU-228A-GR-191-S			120398/1255							RCRA Metals, HE, SVOCs	
043754 - 003	TJAOU-228A-GR-191-S			120398/1255			4 oz				VOC	
043755 - 001	TJAOU-228A-GR-191-DU			120398/1255			500 ml			DU	Gamma Spec, Iso U	
043755 - 002	TJAOU-228A-GR-191-DU			120398/1255			500 ml			DU	RCRA Metals, HE, SVOCs	
043755 - 003	TJAOU-228A-GR-191-DU			120398/1255			4 oz			DU	VOC	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO USE
Date Entered (mm/dd/yy) 12/08/98
Entered by: UH

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC 601214 releases this COC

Abnormal Conditions on Receipt LAB USE

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits. UH

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	[signature]	CC	MDM/6131/881-3196

Please list as separate report.

	Org.	Date	Time		Org.	Date
1. Relinquished by [signature]	6131	12/04/98	1102	4. Relinquished by		
1. Received by [signature]	7578 (SMO)	12/4/98	1102	4. Received by		
2. Relinquished by [signature]	SMO 7577	12/7/98	1200	5. Relinquished by		
2. Received by				5. Received by		
3. Relinquished by				6. Relinquished by		
3. Received by				6. Received by		

Original To Accompany Samples, Laboratory Copy (White) — **1st Copy** To Accompany Samples, Return to SMO (Blue) — **2nd Copy** SMO Suspense Copy (Yellow) — **3rd Copy** Field Copy (Pink)

SF 2001-COC (10-97)

Supersedes (5-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601191

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Samp
043756 - 001	TJAOU-228A-GR-192-S	0	228A	120298/1305	S	A3	500 ml	4 C	G	SA	Gamma Spec	
043757 – 001	TJAOU-228A-GR-193-S			120298/1310			500 ml				Gamma Spec	
043757 - 002	TJAOU-228A-GR-193-S			120298/1310			500 ml				RCRA Metals	
043758 - 001	TJAOU-228A-GR-194-S			120298/1315							Gamma Spec	
043759 – 001	TJAOU-228A-GR-195-S			120298/1320							Gamma Spec	
043759 - 002	TJAOU-228A-GR-195-S			120298/1320							RCRA Metals	
043760 – 001	TJAOU-228A-GR-196-S			120298/1330							Gamma Spec, Iso U	
043760 – 002	TJAOU-228A-GR-196-S			120298/1330							HE, SVOCs	
043760 - 003	TJAOU-228A-GR-196-S			120298/1330			4 oz				VOC	
043761 – 001	TJAOU-228A-GR-197-S			120298/1340			500 ml				Gamma Spec	
043761 - 002	TJAOU-228A-GR-197-S			120298/1340							RCRA Metals	
043762 - 001	TJAOU-228A-GR-198-S			120298/1350							Gamma Spec	
043763 – 001	TJAOU-228A-GR-199-S			120298/1400							Gamma Spec	
043763 - 002	TJAOU-228A-GR-199-S			120298/1400							RCRA Metals	
043764 - 001	TJAOU-228A-GR-200-S			120298/1403							Gamma Spec	
043764 - 005	TJAOU-228A-TB			120298/1415	DIW	G	3x40 ml	HCL+4C	G	TB	VOC	
043764 - 006	TJAOU-228A-EB			120298/1415		G	3x40 ml	HCL+4C		EB	VOC	
043764 - 007	TJAOU-228A-EB			120298/1415		AG	2x1L	4C		EB	SVOC (8270)	
043764 - 008	TJAOU-228A-EB			120298/1420		AG	4x1L	4C		EB	HE	
043764 - 009	TJAOU-228A-EB			120298/1425		P	500 ml	HNO3+4		EB	RCRA Metals	
043764 - 010	TJAOU-228A-EB			120298/1425		P	1L	HNO3		EB	Gamma Spec	
043764 - 011	TJAOU-228A-EB			120298/1425		P	1L	HNO3		EB	ISO U	

Abnormal Conditions on Receipt LAB USE

Recipient Initials _____

Original To Accompany Samples, Laboratory Copy (White) 1st Copy To Accompany Samples, Return to SMO (Blue) 2nd Copy SMO Suspense Copy (Yellow) 3rd Copy Field Copy (Pink)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1)Reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg). Units consistent between QC samples and sample data.	X		
3.2)Quantitation limit met for all samples?	X		
3.3)Accuracy a) Laboratory control sample accuracy reported and met for all samples?		X	4-NITROPHENOL OUTSIDE RECOVERY LIMITS FOR SVOC LCS/LCD MERCURY RECOVERY ABOVE QC LIMITS FOR METALS LCS/LCD
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?	X		
c) If requested, matrix spike recovery data reported and met .		X	4-NITROPHENOL OUTSIDE RECOVERY LIMITS FOR SVOC MS/MSD BARIUM BELOW RECOVERY LIMITS FOR MSD
3.4)Precision a) Laboratory control sample precision reported and met for all samples? For rad analysis, sample duplicate precision reported and met.	X		
b) If requested, matrix spike duplicate RPD data reported and met.		X	RPD FOR 4-NITROPHENOL OUTSIDE QC ACCEPTANCE LIMITS RPD FOR BARIUM OUTSIDE QC ACCEPTANCE LIMITS
3.5)Blank data a) Method or reagent blank data reported and met for all samples?		X	Cr, Pb, Ag & Hg DETECTED IN METALS PREP BLANK
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?		X	METHYLENE CHLORIDE DETECTED IN VOA TRIP BLANK
3.6)Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank; "U"- analyte undetected (results are below the MDL or L_c (rad)); "H"-analysis done beyond the holding time.	X		
3.7)Narrative included, correct, and complete?	X		

4.0 Data Quality Evaluation Continuation

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/ Fraction No.	Analysis	Qualifiers	Comments

Were deficiencies noted. ☹ Yes ☺ No

Based on the review, this data package is complete. ☺ Yes ☹ No

If no, provide : nonconformance report or correction request number _____ and date correction request was submitted _____

Reviewed by: W. Palenosia Date: 1-26-99 Closed by: _____ Date: _____

RADIOCHEMISTRY:

SITE/PROJECT: 228A ARCOC #: 601191
LABORATORY: GEL LABORATORY REPORT #: 981230C
METHODS:

QC Element/ Analyte	Method Blks	LCS	MS	Rep RER	Eq. Blks	Field Dup RER	Field Blks	-	Sample ID	Isotope	IS/Trace	Sample ID	Isotope	IS/Trace
CRITERIA	U	20%	25%	<1.0	U	<1.0	U	-			50-105			50-105
H3								-						
U-238														
U-234														
U-235/236								-						
Th-232														
Th-228														
Th-230								-						
Pu-239/240														
Gross Alpha								-						
Nonvolatile Beta														
Ra226								-						
Ra228								-						
Ni-63								-						
Gamma Spec- Am241								-						
Gamma Spec- Cs137														
Gamma Spec- Co60														
								-						
								-						

Parameter	Method	Typical Tracer	Typical Carrier
Iso-U	Alpha spec	U-232	NA
Iso-Pu	Alpha spec	Pu-242	NA
Iso-Th	Alpha spec	Th-229	NA
Am-241	Alpha spec	Am-242	NA
Sr-90	Beta	Y ingrowth	NA
Ni-63	Beta	NA	Ni by ICP
Ra-226	Deamination	NA	NA
Ra-226	Alpha spec	Ba-133 or Ra-225	NA
Ra-228	Gamma spec	Ba-133	NA

Comments:

Gamma spec LCS contains: Am-241, Cs-137, and Co-60

REVIEWED BY: E Todd Monk DATE: 3-8-99

Contract Verification Review (CVR)

Project Leader COLLINS | Project Name SITE 228A VCM | Case No. 7225.2203

AR/COC No. 601191 | Analytical Lab GEL | SDG No. 9812300

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 and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, LCD)	X				
2.4	Matrix spike/matrix spike duplicate data provided(if requested)	X				
2.5	Detection Limits provided; PQL and MDL(or IDL)	X				
2.6	QC batch numbers provided	X				
2.7	Dilution Factors provided	X				
2.8	Data reported using correct sig. fig. (2 for org.; 3 for inorg.)	X				
2.9	Rad analysis uncertainty provided (2 sigma error)	X				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Were contractual qualifiers provided	X				
2.14	All requested result data provided	X				

INORGANIC METALS:

SITE/PROJECT: 228 A ARCOC #: 601191
LABORATORY: GEL LABORATORY REPORT #: 9012300
METHODS: EPA 6010 A EPA 7471

QC Element/ Analyte	ICV	CCV	ICB	CCB	Method Blks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	REP RPD	ICS AB	Serial Dilution	Field Dup RPD	Eq. Blks (mg/l)	Field Blks			
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	✓	✓	54.6	✓	✓	✓	✓		.001265				
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓				
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	.105 J mg/kg	✓	✓	✓	✓	✓	✓	✓	✓	✓		.00207	J			
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K																				
7440-22-4 Ag	✓	✓	✓	✓	.108 J mg/kg	✓	✓	✓	✓	✓	✓	✓	✓	.415 J mg/kg		.00164	J			
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	.1865 mg/kg	✓	✓	✓	✓	✓	✓	✓	✓	✓		.00161	J			
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓				
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓				
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	.0204 mg/kg	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓				
Cyanide CN																				

mg/kg = ug/g : [(ug/g) x (sample mass (g) / sample vol. (ml)) x (1000ml / liter)] / Dilution Factor = ug / l

Comments:

* MSD RPD for barium was outside acceptance criteria range RPD 54.6 range (0-23.2). All associated positive sample results will be qualified J. Nondetects will be qualified UJ.
* Hg in method blank at concentrations between DL and RL. Concentrations in all samples < 5 times blank concentration. Detected concentrations qualified J.
* Cr and Pb present in method blank between DL and RL. Concentrations in field samples > 5 x blank conc. No data qualified
* Ba, Cr and Pb present in equipment blank at concentrations between DL and RL. Concentrations in field samples > 5x blank concentration. No data qualified.
* Silver in method blank at concentrations between DL and RL. Sample concentration < 5 x blank concentration. Field sample results qualified J.

REVIEWED BY: E. Todd Morrison DATE: 3-8-99

RADIOCHEMISTRY:

SITE/PROJECT: L2E A ARCOC #: 601191
LABORATORY: GEL LABORATORY REPORT #: 7812300
METHODS: EPA 6010 A EPA 7471

QC Element/ Analyte	Method Blks	LCS	MS	Rep RER	Eq. Blks	Field Dup RER	Field Blks	-	Sample ID	Isotope	IS/Trace	Sample ID	Isotope	IS/Trace
CRITERIA	U	20%	25%	<1.0	U	<1.0	U	-			50-105			50-105
H3		/						-		U232	✓			
U-238		/				/								
U-234		/				/								
U-235/236		/				/		-						
Th-232														
Th-228														
Th-230								-						
Pu-239/240														
Gross Alpha								-						
Nonvolatile Beta														
Ra226								-						
Ra228								-						
Ni-63		/						-						
Gamma Spec- Am241		/						-						
Gamma Spec- Cs137		/												
Gamma Spec- Co60		/												
								-						
								-						

Parameter	Method	Typical Tracer	Typical Carrier
Iso-U	Alpha spec	U-232	NA
Iso-Pu	Alpha spec	Pu-242	NA
Iso-Th	Alpha spec	Th-229	NA
Am-241	Alpha spec	Am-242	NA
Sr-90	Beta	Y ingrowth	NA
Ni-63	Beta	NA	Ni by ICP
Ra-226	Deamination	NA	NA
Ra-226	Alpha spec	Ba-133 or Ra-225	NA
Ra-228	Gamma spec	Ba-133	NA

Comments:

Gamma spec LCS contains: Am-241, Cs-137, and Co-60

REVI. BY: E Todd Monk DATE: 3-8-17

SEMI-VOLATILE ORGANICS: page 3
SW 846 - Method 8270

SITE/PROJECT: 226A ARCOC #: 601191
LABORATORY: GEL LABORATORY REPORT #: 981270

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
5	BN	218-01-9	Chrysene	0.70																	
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	0.01																	
6	BN	117-84-0	Di-n-octylphthalate	0.01																	
6	BN	205-99-2	Benzo(b)fluoranthene	0.70																	
6	BN	207-08-9	Benzo(k)fluoranthene	0.70																	
6	BN	50-32-8	Benzo(a)pyrene	0.70																	
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	0.50																	
6	BN	53-70-3	Dibenz(a,h)anthracene	0.40																	
6	BN	191-24-2	Benzo(g,h,i)perylene	0.50																	

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
			not					
			criteria					

Comments:

SMC 1: Nitrobenzene-d5 (BN) SMC 2: 2-Fluorobiphenyl (BN) SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d5 (A) SMC 5: 2-Fluorophenol (A) SMC 6: 2,4,6-Tribromophenol (A)
SMC 7: 2-2-Chlorophenol-d4 (A) SMC 8: 1,2-Dichlorobenzene-d4 (BN)

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT
					not							
					criteria							

IS 1: 1,4-Dichlorobenzene-d4 (BN) IS 2: Naphthalene-d8 (BN) IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN) IS 5: Chrysene-d12 (BN) IS 6: Perylene-d12 (BN)

REVIEWED BY: Ed Monk DATE: 3-8-99

HIGH EXPLOSIVES:
SW846 Method 8330

SITE/PROJECT: 228 A ARCOC #: 60191
LABORATORY: GEL LABORATORY REPORT #: 981230c

NAME	CAS #	Intercept	Curve R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks		
		✓	.99	20%	U			20%	✓		20%		U	U		
HMX	2691-41-0	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
RDX	121-82-4	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
1,3,5-Trinitrobenzene	99-35-4	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
1,3-dinitrobenzene	99-64-0	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
Nitrobenzene	98-95-3	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
Tetryl	479-45-8	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
2,4,6-trinitrotoluene	118-96-7	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
2-amino-4,6-dinitrotoluene	35572-78-2	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
4-amino-2,6-dinitrotoluene	1946-51-0	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
2,4-dinitrotoluene	121-14-2	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
2,6-dinitrotoluene	606-20-2	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
2-nitrotoluene	88-72-2	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
4-nitrotoluene	99-99-0	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
3-nitrotoluene	99-08-1	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			
PETN	78-11-5	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			

Sample	SMC %REC	SMC RT		Sample	SMC %REC	SMC RT
		met				
		criteria				

Comments:

Confirmation

Sample	CAS #	RPD > 25%		Sample	CAS #	RPD > 25%
		met				
		criteria				

mg/kg = ug/g : [(ug/g) x (sample mass (g) / sample vol. (ml)) x (1000ml / 1liter)] / Dilution Factor = ug / l

REVIEWED BY: E Todd Monk DATE: 3-8-99

SEMI-VOLATILE ORGANICS:
SW-846 - Method 8270

SITE/PROJECT: 228 A ARCOC #: 601191
LABORATORY: GEL LABORATORY REPORT #: 981230

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
1	A	108-95-2	Phenol	0.80																	
1	BN	111-44-4	bis(2-Chloroethyl)ether	0.70																	
1	A	95-57-8	2-Chlorophenol	0.80																	
1	BN	541-73-1	1,3-Dichlorobenzene	0.60																	
1	BN	106-46-7	1,4-Dichlorobenzene	0.50																	
1	BN	95-50-1	1,2-Dichlorobenzene	0.40																	
1	A	95-48-7	2-Methylphenol	0.70																	
1	BN	108-60-1	bis(2-chloroisopropyl)ether	0.01																	
1	A	106-44-5	4-Methylphenol	0.60																	
1	BN	621-64-7	N-Nitroso-di-n-propylamine	0.50																	
1	BN	67-72-1	Hexachloroethane	0.30																	
2	BN	98-95-3	Nitrobenzene	0.20																	
2	BN	78-59-1	Isophorone	0.40																	
2	A	88-75-5	2-Nitrophenol	0.10																	
2	A	105-67-9	2,4-Dimethylphenol	0.20																	
2	BN	111-91-1	bis(2-Chloroethoxy)methane	0.30																	
2	A	120-83-2	2,4-Dichlorophenol	0.20																	
2	BN	120-82-1	1,2,4-Trichlorobenzene	0.20																	
2	BN	91-20-3	Naphthalene	0.70																	
2	BN	106-47-8	4-Chloroaniline	0.01																	
2	BN	87-68-3	Hexachlorobutadiene	0.01																	
2	A	59-50-7	4-Chloro-3-methylphenol	0.20																	
2	BN	91-57-6	2-Methylnaphthalene	0.40																	
3	BN	77-47-4	Hexachlorocyclopentadiene	0.01																	
3	A	88-06-2	2,4,6-Trichlorophenol	0.20																	
3	A	95-95-4	2,4,5-Trichlorophenol	0.20																	

Comments:

REVIEWED BY: E Todd Monk DATE: 3-8-99

SEMI-VOLATILE ORGANICS: page 2
SW 846 - Method 8270

SITE/PROJECT: 228A ARCOC #: 60191
LABORATORY: GEL LABORATORY REPORT #: 98/2300

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
					/	>.05 /	<20% / 0.99	<20% /	/								/				
3	BN	91-58-7	2-Chloronaphthalene	0.80																	
3	BN	88-74-4	2-Nitroaniline	0.01																	
3	BN	131-11-3	Dimethylphthalate	0.01																	
3	BN	208-96-8	Acenaphthylene	0.90																	
3	BN	606-20-2	2,6-Dinitrotoluene	0.20																	
3	BN	99-09-2	3-Nitroaniline	0.01																	
3	BN	83-32-9	Acenaphthene	0.90						/	/	/	/	/	/						
3	A	51-28-5	2,4-Dinitrophenol	0.01			40.445														
3	A	100-02-7	4-Nitrophenol	0.01			22.84			186	/	/	/	/	/						
3	BN	132-64-9	Dibenzofuran	0.80																	
3	BN	121-14-2	2,4-Dinitrotoluene	0.20						/	/	/	/	/	/						
3	BN	84-66-2	Diethylphthalate	0.01																	
3	BN	7005-72-3	4-Chlorophenyl-phenylether	0.40						/	/	/	/	/	/						
3	BN	86-73-7	Fluorene	0.90																	
3	BN	100-01-6	4-Nitroaniline	0.01																	
4	A	534-52-1	4,6-Dinitro-2-methylphenol	0.01																	
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	0.01																	
4	BN	101-55-3	4-Bromophenyl-phenylether	0.10																	
4	BN	118-74-1	Hexachlorobenzene	0.10						/	/	/	/	/	/						
4	A	87-86-5	Pentachlorophenol	0.05						/	/	/	/	/	/						
4	BN	85-01-8	Phenanthrene	0.70			22.490														
4	BN	120-12-7	Anthracene	0.70			20.36														
4	BN	86-74-8	Carbazole	0.01			26.38														
4	BN	84-74-2	Di-n-butylphthalate	0.01			27.40														
4	BN	206-44-0	Fluoranthene	0.60																	
5	BN	129-00-0	Pyrene	0.60						/	/	/	/	/	/						
5	BN	85-68-7	Butylbenzylphthalate	0.01																	
5	BN	91-94-1	3,3'-Dichlorobenzidine	0.01																	
5	BN	56-55-3	Benzo(a)anthracene	0.80																	

Comments:

REVIEWED BY: E Todd Monk DATE: 3-8-99

VOLATILE ORGANICS:
SW-846 - Method 8260

SITE/PROJECT: 228 A ARCOC #: 601191
LABORATORY: GEL LABORATORY REPORT #: 9612300

IS	GC/MS Name	CAS #	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Trip Blks			
					>.05	<20% / 0.99	<20%													
1	Chloromethane	74-87-3	0.10																	
1	Bromomethane	74-83-9	0.10																	
1	vinyl chloride	75-01-4	0.10																	
1	Chloroethane	75-00-3	0.01																	
1	methylene chloride (10xblk)	75-09-2	0.01														1.6			
1	acetone(10xblk)	67-64-1	0.01																	
1	carbon disulfide	75-15-0	0.10																	
1	1,1-dichloroethene	75-35-4	0.20																	
1	1,1-dichloroethane	75-34-3	0.10																	
1	Chloroform	67-66-3	0.20																	
1	1,2-dichloroethane	107-06-2	0.10																	
1	2-butanone(10xblk)	78-93-3	0.01																	
2	1,1,1-trichloroethane	71-55-6	0.10																	
2	carbon tetrachloride	56-23-5	0.10																	
2	Bromodichloromethane	75-27-4	0.20																	
2	1,2-dichloropropane	78-87-5	0.01																	
2	cis-1,3-dichloropropene	10061-01-5	0.20																	
2	Trichloroethene	79-01-6	0.30																	
2	Dibromochloromethane	124-48-1	0.10																	
2	1,1,2-trichloroethane	79-00-5	0.10																	
2	Benzene	71-43-2	0.50																	
2	trans-1,3-dichloropropene	10061-02-6	0.10																	
2	Bromoform	75-25-2	0.10																	
3	4-methyl-2-pentanone	108-10-1	0.10																	
3	2-hexanone	591-78-6	0.01					4.2												
3	Tetrachloroethene	127-18-4	0.20																	
3	1,1,2,2-tetrachloroethane	79-34-5	0.30																	
3	toluene(10xblk)	108-88-3	0.40																	
3	Chlorobenzene	108-90-7	0.50																	
3	Ethylbenzene	100-41-4	0.10					1.0												
3	Styrene	100-42-5	0.30																	
3	xylenes(total)	1330-20-7	0.30					.80												
	1,2-dichloroethylene(total)	540-59-0	0.01																	
	2-chloroethyl vinyl ether	110-75-8																		

Comments: * methylene chloride detected in trip blank at concentrations between DL and RL. Compound not found in any field samples. No data qualified.
+ concentrations of 2-Hexanone, ethylbenzene and total xylenes detected in method blank. Compounds not detected in any samples. No data qualified

REVIEWED BY: E Ted Morris DATE: 3-8-99

VOLATILE ORGANICS: page 2
SW-846 - Method 8260

SITE/PROJECT: 226A ARCOC #: 601191
LABORATORY: GEL LABORATORY REPORT #: 98/2300

Surrogate Recovery and Internal Standard Outliers

Sample	SMC 1	SMC 2	SMC 3	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3- area	IS 3- RT			

met criteria

SMC 1: 4-Bromofluorobenzene
SMC 2: 1,2-Dichloroethane-d4
SMC 3: Toluene-d8

IS 1: Bromochloromethane
IS 2: 1,4-Difluorobenzene
IS 3: Chlorobenzene-d5

Comments:

REVI. BY: E Todd Monk DATE: 3-8-99

Duplicate

The duplicate error ratio (DER) met acceptance criteria (< 1.0).

Other QC

No data were qualified. Data is acceptable. QC measures appear to be acceptable.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

DATA VALIDATION SUMMARY:

SITE/PROJECT: 22 & A CASE #7725.2203
ARCOC #: GEL 601191
LABORATORY: GEL
LABORATORY REPORT #:

OF SAMPLES: 25 7 MATRIX: soil water
LAB SAMPLE IDs: See ARCOC

ANALYSIS/ QC ELEMENT	VOC	SVOC	PEST/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	✓	NA	✓	✓	NA	✓	NA	✓	NA
2. CALIBRATIONS	✓	UJ		✓	✓		✓		✓	
3. METHOD BLANKS	✓	✓		✓	J		J		✓	
4. MS/MSD	✓	✓		✓	J,		✓		✓	
5. LABORATORY CONTROL SAMPLES	✓	✓		✓	✓		✓		✓	
6. REPLICATES					✓		✓		✓	
7. SURROGATES	✓	✓		✓						
8. INTERNAL STDS	✓	✓								
9. TCL COMPOUND IDENTIFICATION	✓	✓								
10. ICP INTERFERENCE CHECK SAMPLE					✓					
11. ICP SERIAL DILUTION					✓					
12. CARRIER/CHEM TRACER RECOVERIES									✓	
13. OTHER QC	✓	✓	↓	✓	✓	↓	✓	↓	✓	↓

CHECK MARK (√) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED

SHADED CELLS – NOT APPLICABLE
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

REVIEWER: E Todd Monroe DATE: 3-8-99

Trace concentrations of barium, chromium and lead were detected in the equipment blank. No data were qualified because concentrations in field samples are > 5X the blank concentrations.

ICP Interference Check Sample (ICS) Analysis

The ICS met QC acceptance limits.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses

The LCS/LCSD met acceptance criteria for all analytes except mercury. Mercury failed the LCS high. No data were qualified.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

The MS/MSD met acceptance criteria for all analytes except for those mentioned above.

Other QC

No other specific issues were identified which affect data quality.

Data is acceptable. QC measures appear to be adequate.

Please contact me if you have any questions or comments regarding the review of this package.

MEMORANDUM

DATE: March 8, 1999

TO: File

FROM: Tod Monks TM

SUBJECT: Radiometric Data Review and Validation
228A, ARCOC No. 601191, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods (gross alpha/beta – EPA900.0 and EPI-A-01IB). All compounds were successfully analyzed. No problems were identified with the data package that result in the qualification of data. Data is acceptable and QC measures appear to be adequate.

The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding times.

Calibration

Calibration met acceptance criteria for the methods.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses

The LCS/LCSD met acceptance criteria for the methods.

Blanks

No target analytes were detected above the reporting limits in the method blank.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

The MS/MSD met acceptance criteria for the methods.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

The MS/MSD met acceptance criteria.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses

The LCS/LCSDs for the site samples met acceptance criteria except for 4-nitrophenol which failed the LCS high. No data were qualified.

Other QC

No other specific issues were identified which affect data quality.

Data is acceptable. QC measures appear to be adequate.

Please contact me if you have any questions or comments regarding the review of this package.

MEMORANDUM

DATE: March 8, 1999

TO: File

FROM: Tod Monks

SUBJECT: Inorganic Data Review and Validation
228A, ARCOC No. 601191, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

The samples were prepared and analyzed with accepted procedures and specified methods (Metals – EPA6010B and EPA7471). All compounds were successfully analyzed. There are no problems which were identified within the data package that result in the qualification of data.

1. Silver and mercury were detected in QC blanks. The sample concentrations were less than 5 X the blank concentration. Results were qualified "J" for the affected samples.

2. All data met acceptance criteria for relative percent difference except for barium which failed the MSD high. All associated positive sample results are qualified J.

No other data were qualified. Data is acceptable. QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The sample was analyzed within the prescribed holding times.

Calibration

Initial and continuing calibration met acceptance criteria for all methods.

Blanks

Chromium and lead were present in the method blank. No data were qualified as the concentrations in field samples were > 5X the blank concentration.

Site: 228A

AR/COC: 601191 Data Classification: Radiochemistry

Sample Fraction No.	Analysis	DV Qualifiers	Comments
	No	DATA	Qualified
	Data	Is	Acceptable
	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: E Trol Monk Date: 3-8-99

MEMORANDUM

DATE: March 8, 1999

TO: File

FROM: Tod Monks TM

SUBJECT: Organic Data Review and Validation
228 A, ARCOC No. 601191, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods (HE – EPA8330, EPA8260A, and EPA8270). All compounds were successfully analyzed. No problems were identified with the organics methods listed above that resulted in the qualification of data.

SVOCs - EPA8270

1. Initial and continuing calibration met acceptance criteria except for 2,4 dinitrophenol for which the RSD was 40.44. The analyte was not dectected in any samples. Sample results were qualified "UJ".

No other data were qualified in this package.

The following sections discuss the data review and validation.

Holding Times

The samples were extracted and analyzed within the prescribed holding times.

Calibration

Initial and continuing calibration met acceptance criteria except where noted above.

Blanks

No target analytes were detected above the reporting limit in the method blanks.

Surrogates

The surrogate data met acceptance limits for site samples.

Site: 228A

AR/COC: 601191 Data Classification: Organics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
TJA04-228A-GR-1915	2,4 Dinitrophenol (51-28-5)	UJ	RSD > 40% - No 2,4 dinitrophenol detected in field samples
TJA04-228A-GR-1914			
TJA04-228A-GR-1965			
TJA04-228A-EB			
	Data	Is	Acceptable
	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: E Todd Monkos Date: 3-8-99

Site: 228 A

AR/COC: 601191 Data Classification: Inorganics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
TJA6U-228A-GR-189S	Ba (7440-39-3)	J	MSD RPD for barium was outside acceptance criteria range. Positive results are qualified J.
TJA6U-228A-GR-191S TJA6U-228A-GR-191DU			
-GR-193-S GR-195-S GR-197-S			
GR-199-S TJA6U-228A-EB			
TJA64-228-GR-189S	Hg (7439-97-6)	J	Hg detected in method blank. Concentrations in samples < 5x blank conc. Data qualified J
TJA6U-228A-GR-191S TJA6U-228A-GR-191DU -GR-193S			
GR-195-S GR-197-S GR-199-S			
TJA6U-228A-GR-189S TJA6U-228A-GR-191-S	Ag (7440-22-4)	J	Silver detected in method blank. Sample concentrations < 5x blank conc. Field sample results qualified J.
TJA6U-228A-GR-191-DU - -193-S - 195-S			
- 197-S - 199-S			
	Data is QC measures	Acceptable	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: E Tolmonko Date: 3-8-99

# of samples: 7
Matrix: soil

Sample IDs: 9812 -05, -08, -11, -14, -18, -21, -26

INORGANIC METALS:

SITE/PROJECT: 228A VCM ARCOC #: 601190
LABORATORY: GEL LABORATORY REPORT #: 9812309
METHODS: EPA 6010B, EPA 7471 (RCRA metals + Hg)

KM 2/22/99

QC Element/ Analyte	ICV	CCV	ICB	CCB	Method Blks	LCS	LCSD	LCSD RPD	MS (1)	MSD	MSD RPD	REP RPD (2)	ICS AB	Serial (3) Dilution	Field Dup (4) RPD/D.I.	Eq. Blks	Field Blks			
7429-90-5 Al									NA	NA	NA	NA		NA		NA	NA			
7440-39-3 Ba	✓	✓	0.3	0.4	✓	✓	✓	✓					✓		✓					
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	✓					✓		✓					
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	0.7	1.5	0.105	✓	✓	✓					✓		✓					
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K																				
7440-22-4 Ag	✓	✓	0.9	2.1	0.108	✓	✓	✓					✓		✓					
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	1.5	1.7	0.186	✓	✓	✓					✓		✓					
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓					✓		✓					
7440-38-2 As	✓	✓	4.0	4.0	✓	✓	✓	✓					✓		0.55					
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	0.1	0.1	0.00183	✓	✓	✓					NA		✓					
Cyanide CN																				

NA = Not Applicable

Comments: (1) MS/MSD were performed on a sample from a different SDG, All QC criteria were met.
(2) No replicate sample analysis submitted; MS/MSD used.
(3) Sample designated for Serial Dilution was from a different SDG; All QC criteria were met.
(4) Difference used instead of RPD when sample results are < 5X PQL.

* Summary → See back of this page.

REVIEWED BY: [signature] DATE: 2/22/99

Matrix: Soil

Sample IDs: -04, -06, -07, -09, -10, -13, -16, -17, -19, -20, -22, -23

RADIOCHEMISTRY:

SITE/PROJECT: 228A VCM ARCOC #: 601190
LABORATORY: GEL LABORATORY REPORT #: 9812309
METHODS: Alpha Spec (Iso-U), Gamma Spec

QC Element/ Analyte	Method Blks	LCS	MS (1)	Rep RER (2)	Eq. Blks	Field Dup RER	Field Blks	-	Sample ID	Isotope	IS/Trace	Sample	Isotope	IS/Trace			
CRITERIA	U	20%	25%	<1.0	U	<1.0	U	-			50-105			50-105			
113			NA	NA	NA		NA	-	9812309-01	U-232	✓						
U-238	✓	✓				1.24			-10		✓						
KAS 2/19/99 U-234/233	✓					✓			-13		✓						
U-235/~~236~~	✓					✓		-	-22		✓						
Th-232									QC569606		✓						
Th-228									QC569607		✓						
Th-230								-	QC569608		✓						
Pu-239/240									QC569609		✓						
Gross Alpha								-	QC569610		✓						
Nonvolatile Beta									QC569651		✓						
Ra226								-	9812298-01		✓						
Ra228								-									
Gamma Spec (3)	NA	✓				2.39		-									
Ni-63								-									
9/99 Am-241	NA	✓				✓											
Cs-137		✓				✓											
Co-160		✓				✓		-									
								-									

NA = Not Applicable

Parameter	Method	Typical Tracer	Typical Carrier
Iso-U(234,235,238)	Alpha spec	U-232	NA
Iso-Pu	Alpha spec	Pu-242	NA
Iso-Th	Alpha spec	Th-229	NA
Am-241	Alpha spec	Am-242	NA
Sr-90	Beta	Y ingrowth	NA
Ni-63	Beta	NA	Ni by ICP
Ra-226	Deamination	NA	NA
Ra-226	Alpha spec	Ba-133 or Ra-225	NA
Ra-228	Gamma spec	Ba-133	NA

Comments:

(1) MS was performed on a sample from a different SDG. All QC criteria were met.

(2) Replicate analysis was performed on a sample from a different SDG. All results were within QC limits.

(3) RER failed for Cesium-134. (Gamma Spec)

* Summary → See back of this page

Gamma spec LCS contains: Am-241, Cs-137, and Co-60

REVIEWED BY: [signature] DATE: 2/23/99

* Summary → See! d ...

SEMI-VOLATILE ORGANICS: page 3
SW 846 - Method 8270

SITE/PROJECT: 228A VCM ARCOC #: 601190
LABORATORY: GEL LABORATORY REPORT #: 9812309

IS	CAS #	NAME	Min RF	Int	Calib RSD	Calib RF	CCV RPD	CCV RF	CCB	~~Field~~ Method blank	Field Dup (KM 2/16/99)	MS	MSD	MSD RPD	LCS	LCSD	LCS RPD
5	218-01-9	Chrysene	0.70	NA	✓	✓	✓	NA	NA	✓	✓						
5	117-81-7	bis(2-Ethylhexyl)phthalate	0.01		✓	✓	-29.2										
6	117-84-0	Di-n-octylphthalate	0.01		✓	✓	✓										
6	205-99-2	Benzo(b)fluoranthene	0.70		✓	✓	✓										
6	207-08-9	Benzo(k)fluoranthene	0.70		✓	✓	✓										
6	50-32-8	Benzo(a)pyrene	0.70		✓	✓	✓										
6	193-39-5	Indeno(1,2,3-cd)pyrene	0.50		✓	✓	✓										
6	53-70-3	Dibenz(a,h)anthracene	0.40		✓	✓	✓										
6	191-24-2	Benzo(g,h,i)perylene	0.50		✓	✓	✓										
	122-66-7	1,2-Diphenylhydrazine			✓	✓	✓										

NA = Not Applicable

Surrogate Recovery Outliers

	Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
(0)	None								

(0) No outliers; all QC acceptance criteria for Surrogates and Int. Std.

SMC 1: Nitrobenzene-d5 SMC 2: 2-Fluorobiphenyl SMC 3: p-Terphenyl-d14
SMC 4: Phenol-d5 SMC 5: 2-Fluorophenol SMC 6: 2,4,6-Tribromophenol
~~SMC 7: 2-2-Chlorophenol-d4~~ ~~SMC 8: 1,2-Dichlorobenzene-d4~~
KAS 2/16/99

Internal Standard Outliers

	Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT
(0)	None												

IS 1: 1,4-Dichlorobenzene-d4 IS 2: Naphthalene-d8 IS 3: Acenaphthene-d10
IS 4: Phenathrene-d10 IS 5: Chrysene-d12 IS 6: Perylene-d12

REVIEWED BY: [signature] DATE: 2/22/99

# of Samples: 7

Matrix: Soil

Sample IDs: 9812309-02
-11
-14
-23

HIGH EXPLOSIVES:
SW846 Method 8330

SITE/PROJECT: 228A VCM ARCOC #: 601190
LABORATORY: GEL LABORATORY REPORT #: 9812309

Name	CAS #	Curve R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS (1)	MSD	MS RPD	Field Dup RPD	Eq. Blks (2)	Field Blks	Int		
	FAS 2/18/99	.99	15% 15	U			20%	25% 30	25% 30	20%		U	U	~~U~~		
HMX	2691-41-0	✓	✓	✓	✓	✓	✓	NA	NA	NA	✓	NA	NA	✓		
RDX	121-82-4	✓	✓	✓	✓	✓	✓							✓		
FAS 2/18/99 1,3,5- ~~1,2,3-~~ Trinitrobenzene (sym-)	99-35-4	✓	✓	✓	✓	✓	✓							✓		
1,3-dinitrobenzene (m-)	99-64-0	✓	✓	✓	✓	✓	✓							✓		
Nitrobenzene	98-95-3	✓	✓	✓	✓	✓	✓							✓		
Tetryl	479-45-8	✓	✓	✓	✓	✓	✓							✓		
2,4,6-trinitrotoluene	118-96-7	✓	✓	✓	✓	✓	✓							✓		
2-amino-4,6-dinitrotoluene	35572-78-2	✓	✓	✓	✓	✓	✓							✓		
4-amino-2,6-dinitrotoluene	1946-51-0	✓	✓	✓	✓	✓	✓							✓		
2,4-dinitrotoluene	121-14-2	✓	✓	✓	✓	✓	✓							✓		
2,6-dinitrotoluene	606-20-2	✓	✓	✓	✓	✓	✓							✓		
2-nitrotoluene (o-)	88-72-2	✓	✓	✓	✓	✓	✓							✓		
4-nitrotoluene (p-)	99-99-0	✓	✓	✓	✓	✓	✓							✓		
3-nitrotoluene (m-)	99-08-1	✓	✓	✓	✓	✓	✓							✓		
PETN	78-11-5	✓	NA	NA	NA	NA	NA				NA			✓		

NA = Not Applicable

Sample	SMC %REC	SMC RT		Sample	SMC %REC	SMC RT
9812309-02	✓	✓		9812309-23	✓	✓
-11	✓	✓		QC567048	✓	✓
-14	✓	✓		QC567049	✓	✓
				QC567050	✓	✓

Confirmation

Sample	CAS #	% diff > 25%	Sample	CAS #	% diff >25%
(3) NA					

Summary

=> All samples ND. All QC criteria were met. No data qualified.

(1) MS/MSD were run on samples from a different SDG; All QC acceptance criteria met.
(2) No Field or Equipment blanks were submitted.
(3) All sample results were ND; No confirmation necessary.

REVIEWED BY: [signature] DATE: 2/22/99

of samples: 1 —
Matrix: Soil

Sample IDs: 9812309-02
-11
-14
-23

SEMI-VOLATILE ORGANICS:
SW-846 - Method 8270

SITE/PROJECT: 228A VCM ARCOC #: 601190
LABORATORY: GEL LABORATORY REPORT #: 9812309

IS	CAS#	Name	Min RF	Intercept	Calib RSD	Calib RF	CCV RPD	Method Blks	Field Blks	Field Dup	MS	MSD	MSD RPD	LCS	LCSD				LCS RPD
1	108-95-2	Phenol	0.80	NA	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓				✓
1	111-44-4	bis(2-Chloroethyl)ether	0.70		✓	✓	✓												
1	95-57-8	2-Chlorophenol	0.80		✓	✓	✓				✓	✓	✓	✓	✓				✓
1	541-73-1	1,3-Dichlorobenzene	0.60		✓	✓	✓												
1	106-46-7	1,4-Dichlorobenzene	0.50		✓	✓	✓				✓	✓	✓	✓	✓				✓
1	95-50-1	1,2-Dichlorobenzene	0.40		✓	✓	✓												
1	95-48-7	2-Methylphenol	0.70		✓	✓	✓												
1	108-60-1	2,2'-oxybis(1-Chloropropane)	0.01		✓	✓	-86.9												
1	106-44-5	4-Methylphenol	0.60		NA	NA	NA	NA		NA									
1	621-64-7	N-Nitroso-di-n-propylamine	0.50		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓				✓
1	67-72-1	Hexachloroethane	0.30		✓	✓	✓												
2	98-95-3	Nitrobenzene	0.20		✓	✓	✓												
2	78-59-1	Isophorone	0.40		✓	✓	✓												
2	88-75-5	2-Nitrophenol	0.10		✓	✓	✓												
2	105-67-9	2,4-Dimethylphenol	0.20		✓	✓	✓												
2	111-91-1	bis(2-Chloroethoxy)methane	0.30		✓	✓	✓												
2	120-83-2	2,4-Dichlorophenol	0.20		✓	✓	✓												
2	120-82-1	1,2,4-Trichlorobenzene	0.20		✓	✓	✓				✓	✓	✓	✓	✓				✓
2	91-20-3	Naphthalene	0.70		✓	✓	✓												
2	106-47-8	4-Chloroaniline	0.01		✓	✓	✓												
2	87-68-3	Hexachlorobutadiene	0.01		✓	✓	✓												
2	59-50-7	4-Chloro-3-methylphenol	0.20		✓	✓	✓				✓	✓	✓	✓	✓				✓
2	91-57-6	2-Methylnaphthalene	0.40		✓	✓	✓												
3	77-47-4	Hexachlorocyclopentadiene	0.01		✓	✓	27.3												
3	88-06-2	2,4,6-Trichlorophenol	0.20		✓	✓	✓												
3	95-95-4	2,4,5-Trichlorophenol	0.20		✓	✓	✓												
	65-85-0	Benzoic Acid			✓	✓	31.0												
	100-51-6	Benzyl Alcohol			✓	✓	✓												
	N22	m,p-Cresol			✓	✓	✓												

o-cresol
()-chloroisopropyl ether

NA = Not Applicable

REVIEWED BY: [signature] DATE: 2/22/98

SEMI-VOLATILE ORGANICS: page 2
SW 846 - Method 8270

SITE/PROJECT: 228A VCM ARCOC #: 601190
LABORATORY: GEL LABORATORY REPORT #: 9812309

IS	CAS #	NAME	Min RF	Int	Calib RSD	Calib RF	CCV RPD	CCV RF	CCB	~~Field~~ Method blank	Field Dup	MS	MSD	MSD RPD	LCS	LCSD	LCS RPD
3	91-58-7	2-Chloronaphthalene	0.80	NA	✓	✓	✓	NA	NA	✓	✓						
3	88-74-4	2-Nitroaniline (o-)	0.01		✓	✓	✓										
3	131-11-3	Dimethylphthalate	0.01		✓	✓	✓										
3	208-96-8	Acenaphthylene	0.90		✓	✓	✓										
3	606-20-2	2,6-Dinitrotoluene	0.20		✓	✓	✓										
3	99-09-2	3-Nitroaniline (m-)	0.01		✓	✓	✓										
3	83-32-9	Acenaphthene	0.90		✓	✓	✓					✓	✓	✓	✓	✓	✓
3	51-28-5	2,4-Dinitrophenol	0.01		34.37	✓	27.4										
3	100-02-7	4-Nitrophenol	0.01		21.28	✓	53.3					~~0.0~~ KAS 2/16/99	~~0.0~~	✓	✓	✓	✓
3	132-64-9	Dibenzofuran	0.80		✓	✓	✓										
3	121-14-2	2,4-Dinitrotoluene	0.20		✓	✓	✓					✓	✓	✓	✓	✓	✓
3	84-66-2	Diethylphthalate	0.01		✓	✓	✓										
3	7005-72-3	4-Chlorophenyl-phenylether	0.40		✓	✓	✓										
3	86-73-7	Fluorene	0.90		✓	✓	✓										
3	100-01-6	4-Nitroaniline (p-)	0.01		21.85	✓	✓										
4	534-52-1	4,6-Dinitro-2-methylphenol	0.01		23.90	✓	✓										
4	86-30-6	N-Nitrosodiphenylamine (1)	0.01		✓	✓	✓										
4	101-55-3	4-Bromophenyl-phenylether	0.10		✓	✓	24.6										
4	118-74-1	Hexachlorobenzene	0.10		✓	✓	✓										
4	87-86-5	Pentachlorophenol	0.05		✓	✓	✓					✓	✓	✓	✓	✓	✓
4	85-01-8	Phenanthrene	0.70		✓	✓	✓										
4	120-12-7	Anthracene	0.70		✓	✓	✓										
4	86-74-8	Carbazole	0.01		✓	✓	✓			NA	NA						
4	84-74-2	Di-n-butylphthalate	0.01		✓	✓	✓			✓	✓						
4	206-44-0	Fluoranthene	0.60		✓	✓	✓				~~200~~ KAS 2/16/99						
5	129-00-0	Pyrene	0.60		✓	✓	✓				✓	✓	✓	✓	✓	✓	✓
5	85-68-7	Butylbenzylphthalate	0.01		✓	✓	✓										
5	91-94-1	3,3'-Dichlorobenzidine	0.01		✓	✓	220										
5	56-55-3	Benzo(a)anthracene	0.80		✓	✓	✓										

NA = Not Applicable

REVIEWED BY: [signature] DATE: 2/22/99

- Samples: _
Matrix: SO

Sample ID: 9812309 13
- 12
- 15
- 24

VOLATILE ORGANICS:
SW-846 - Method 8260

SITE/PROJECT: 228A VCM ARCOC #: 601190
LABORATORY: GEL LABORATORY REPORT #: 9812309

IS	GC/MS Name	CAS #	Min RF	Intercept	Calib RF	Calib RSD / R²	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS ①	MSD	MS RPD	Field Dup RPD	Eq. Blks	Trip Blks	② CCV RPD	Method Blank	LCS
					>.05	<20% / 0.99	<20%													
1	Chloromethane	74-87-3	0.10	NA	✓	✓	✓	✓				NA	NA	NA	✓	NA	NA	✓	✓	
1	Bromomethane	74-83-9	0.10	✓	✓	✓	21.2	✓										✓		
1	vinyl chloride	75-01-4	0.10	NA	✓	✓	✓	✓										✓		
1	Chloroethane	75-00-3	0.01	NA	✓	✓	✓	✓										✓		
1	methylene chloride (10xblk)	75-09-2	0.01	✓	✓	✓	-34.2	✓										-34.2		
1	acetone(10xblk)	67-64-1	0.01	✓	✓	✓	-153.6	✓										-98.4		
1	carbon disulfide	75-15-0	0.10	✓	✓	✓	-62.4	✓										-67.2		
1	1,1-dichloroethene	75-35-4	0.20	NA	0.1739	✓	✓	✓	✓	✓	✓							✓		✓
1	1,1-dichloroethane	75-34-3	0.10		✓	✓	✓	✓										✓		
1	Chloroform	67-66-3	0.20		✓	✓	✓	✓										✓		
1	1,2-dichloroethane	107-06-2	0.10		✓	✓	✓	✓										✓		
1	2-butanone(10xblk)	78-93-3	0.01		✓	✓	-51.3	✓										-23.3		
2	1,1,1-trichloroethane	71-55-6	0.10		✓	✓	✓	✓										✓		
2	carbon tetrachloride	56-23-5	0.10		✓	✓	✓	✓										✓		
2	Bromodichloromethane	75-27-4	0.20		✓	✓	✓	✓										✓		
2	1,2-dichloropropane	78-87-5	0.01		✓	✓	✓	✓										✓		
2	cis-1,3-dichloropropene	10061-01-5	0.20		✓	✓	✓	✓										✓		
2	Trichloroethene	79-01-6	0.30		✓	✓	✓	✓	✓	✓	✓							✓		✓
2	Dibromochloromethane	124-48-1	0.10		✓	✓	✓	✓										✓		
2	1,1,2-trichloroethane	79-00-5	0.10		✓	✓	✓	✓										✓		
2	Benzene	71-43-2	0.50		✓	✓	✓	✓	✓	✓	✓							✓		✓
2	trans-1,3-dichloropropene	10061-02-6	0.10	✓	✓	✓	✓	✓										✓		
2	Bromoform	75-25-2	0.10	NA	✓	✓	✓	✓										✓		
3	4-methyl-2-pentanone	108-10-1	0.10		✓	✓	✓	✓										✓		
3	2-hexanone	591-78-6	0.01		✓	✓	-39.0	4.2 J										-26.1		
3	Tetrachloroethene	127-18-4	0.20		✓	✓	✓	✓										✓		
3	1,1,2,2-tetrachloroethane	79-34-5	0.30		✓	✓	✓	✓										✓		
3	toluene(10xblk)	108-88-3	0.40		✓	✓	✓	✓	✓	✓	✓							✓		✓
3	Chlorobenzene	108-90-7	0.50		✓	✓	✓	✓	✓	✓	✓							✓		✓
3	Ethylbenzene	100-41-4	0.10		✓	✓	✓	1.0 J										✓		
3	Styrene	100-42-5	0.30		✓	✓	✓	✓										✓		
3	xylenes(total)	1330-20-7	0.30		✓	✓	✓	0.8 J										✓		
③	1,2-dichloroethylene(total)	540-59-0	0.01		✓	✓	✓	✓							↓			✓	✓	
	2-chloroethyl vinyl ether	110-75-8			✓	✓	30.7	NA							NA			✓	NA	
	Vinyl Acetate	108-05-4		↓	✓	✓	✓	✓				↓	↓	↓	✓	↓	↓	✓	✓	

① MS/MSD were analyzed on samples from a different SDG; results within QC acceptance criteria. NA = Not Applicable
② CCV RPD, blank, and LCS apply to sample # 9812309-24 only; No LCSD submitted (different analytical batch)
③ CCV and blank evaluated for cis- and trans-1,2-dichloroethylene separately.

REVIEWED BY: Kenneth Roy DATE: 2/22/99

VOLATILE ORGANICS: page 2
SW-846 - Method 8260

* Summary → See back page

SITE/PROJECT: 228A VCM ARCOC #: 601190
LABORATORY: GEL LABORATORY REPORT #: 9812309

Surrogate Recovery and Internal Standard Outliers

Sample	SMC 1	SMC 2	SMC 3	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3- area	IS 3- RT			
9812309-03	✓	✓	✓	✓	✓	✓	✓	✓	✓			
-12	✓	✓	✓									
-15	✓	✓	✓									
-24	✓	✓	✓									
QC567266 (blank)	✓	✓	✓									
QC567267 (LCS)	✓	✓	✓									
QC567494 (LCSD)	✓	✓	✓									
QC567492 (blank)	✓	✓	✓									
QC567493 (LCS)	✓	✓	✓									

SMC 1: 4-Bromofluorobenzene
SMC 2: ~~1,2-Dichloroethane-d4~~
SMC 3: Toluene-d8
KAS 3/15/99 Dibromofluoromethane

IS 1: ~~Bromochloromethane~~ Fluorobenzene
IS 2: ~~1,4-Difluorobenzene~~ 1,4-Dichlorobenzene-d4 KAS 3/15/99
IS 3: Chlorobenzene-d5

R WED BY: [signature] DATE: 2/22/99

Holding Times

Alpha Spec (Iso-U)/Gamma Spec: All samples were extracted and analyzed within the prescribed holding times.

Calibration

Alpha Spec (Iso-U)/Gamma Spec: The instrument calibrations met QC acceptance criteria.

Blanks

Alpha Spec (Iso-U)/Gamma Spec: No target analytes were detected in the method blank above the required acceptance limit.

Matrix Spike (MS) Analysis

Alpha Spec (Iso-U)/Gamma Spec: The MS met QC acceptance criteria.

Laboratory Control Samples

Alpha Spec (Iso-U)/Gamma Spec: The LCS met QC acceptance criteria.

Replicates

Alpha Spec (Iso-U)/Gamma Spec: The replicate samples met QC acceptance criteria.

Tracer Recoveries

Alpha Spec (Iso-U): Tracer recoveries in all samples met QC acceptance limits.

Other QC

Alpha Spec (Iso-U)/Gamma Spec: No field blank (FB) or equipment blank (EB) were submitted on the ARCOC. The field duplicate pair met QC acceptance criteria except as noted above in the summary section.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

DATA VALIDATION SUMMARY:

SITE/PROJECT: 228A VCM CASE #: 7225, 7203
ARCOC #: 601190
LABORATORY: GEL
LABORATORY REPORT #: 9812309

OF SAMPLES: 26 MATRIX: Soil
LAB SAMPLE IDs: 951309-01 thru -26

ANALYSIS/ QC ELEMENT	VOC	SVOC	PEST/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	✓	NA	✓	✓	NA	✓	NA	✓	NA
2. CALIBRATIONS	R;UJ	R;UJ	↓	✓	✓	↓	✓	↓	✓	↓
3. METHOD BLANKS	✓	✓	↓	✓	J,U1	↓	J,U1	↓	✓	↓
4. MS/MSD	✓	R,A2	↓	✓	✓	↓	✓	↓	✓	↓
5. LABORATORY CONTROL SAMPLES	✓	✓	↓	✓	✓	↓	✓	↓	✓	↓
6. REPLICATES			↓		NA	↓	NA	↓	✓	↓
7. SURROGATES	✓	✓	↓	✓		↓		↓		↓
8. INTERNAL STDS	✓	✓	↓	NA		↓		↓		↓
9. TCL COMPOUND IDENTIFICATION	✓	✓	↓			↓		↓		↓
10. ICP INTERFERENCE CHECK SAMPLE			↓		✓	↓		↓		↓
11. ICP SERIAL DILUTION			↓		✓	↓		↓		↓
12. CARRIER/CHEM TRACER RECOVERIES			↓			↓		↓	✓	↓
13. OTHER QC	✓	✓	↓	✓	✓	↓	✓	↓	J;~~UJ~~	↓

CHECK MARK (✓) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED

SHADED CELLS – NOT APPLICABLE
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

RAS 2/22/99

REVIEWED BY: [signature] 2/22/99

Site: 228A VCM Sample Find Summary

Sample Number	86954-36-1 (Am-241)	14762-78-8 (Ce-144)	13967-70-9 (Cs-134)	10045-97-3 (Cs-137)	14392-02-0 (Cr-51)	10198-40-0 (Co-60)	14596-12-4 (Fe-59)	13968-53-1 (Ru-103)	13967-48-1 (Ru-106)	14932-40-2 (Th-231)	15065-10-8 (Th-234)	15117-96-1 (U-235)	7440-61-1 (U-238)	Y-88 (Yttrium-88)	13967-71-0 (Zr-95)
TJAOU-228A-GR-176-S	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J
TJAOU-228A-GR-177-S	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J
TJAOU-228A-GR-178-S	J	J	J		J	J	J	J	J	J	J	J	J	J	J
TJAOU-228A-GR-179-S	J	J	J		J	J	J	J	J	J	J	J	J	J	J
TJAOU-228A-GR-180-S	J	J	J		J	J	J	J	J	J	J	J	J	J	J
TJAOU-228A-GR-181-S	J	J	J		J	J	J	J	J	J	J	J	J	J	J
TJAOU-228A-GR-181-DU	J	J	J		J	J	J	J	J	J		J		J	J
TJAOU-228A-GR-182-S	J	J	J		J	J	J	J	J	J	J	J	J	J	J
TJAOU-228A-GR-183-S	J	J	J		J	J	J	J	J	J	J	J	J	J	J
TJAOU-228A-GR-184-S	J	J	J		J	J	J	J	J	J	J	J	J	J	J
TJAOU-228A-GR-185-S	J	J	J		J	J	J	J	J	J		J		J	J
TJAOU-228A-GR-186-S	J	J	J		J	J	J	J	J	J	J	J	J	J	J
TJAOU-228A-GR-187-S	J	J	J		J	J	J	J	J	J		J		J	J
ARCOC #601190															
Radiological Analysis															
(Gamma Spec)															

MEMORANDUM

DATE: February 23, 1999

TO: File

FROM: Kenneth Salaz KNS

SUBJECT: Radiological Data Review and Validation
Site 228A VCM, ARCOC No. 601190, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

<u>Summary</u>

All samples were prepared and analyzed with accepted procedures and specified methods (EPI A-011B, HASL 300). Problems were identified with the data package that result in the qualification of data.

1. Alpha Spec (Iso-U) Analysis: The replicate error ratio (RER) of the field duplicate samples for U-238 was >1. The results of samples 9812309-01, -10, -13, and -22 will be qualified "J."

   Gamma Spec Analysis: The RER for Cs-134 was >1. The results of all samples will be qualified "J."

2. Alpha Spec (Iso-U) Analysis: The 2-sigma uncertainties of U-235 for samples 9812309-01, -10, -13, and -22 were greater than 50% of the sample results. Thus, these results will be qualified "J."

   Gamma Spec Analysis: The 2-sigma uncertainties of Am-241, Ce-144, Cr-51, Co-60, Fe-59, Ru-103, Ru-106, Th-231, U-235, Y-88, and Zr-95 for all samples were greater than 50% of the respective sample results. This was also true of Th-234 and U-238 for samples 9812309-01, -04, -06, -07, -09, -10, -16, -17, -19, and -22; as well as Cs-137 for samples -01 and -04. These results will be qualified "J."

Data is acceptable. QC measures appear to be adequate. The following sections discuss the data review and validation.

results for As, Ba, Cr, and Pb were all greater than five times the respective blank concentrations. Thus, no data were qualified.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

The MS/MSD met QC acceptance criteria.

Laboratory Control Samples

The LCS/LCSD met QC acceptance criteria.

Replicates

The replicate samples met QC acceptance criteria.

ICP Interference Check Sample (ICS)

The ICP ICS met QC acceptance criteria.

ICP Serial Dilution

The ICP serial dilution met QC acceptance criteria.

Other QC

The field duplicate pair met QC acceptance criteria for all target compounds except As. The difference between results was used as the qualification criterion since one of the values was less than five times the PQL. The difference slightly exceeded the PQL (0.55>0.48). All other QC criteria were met. Thus, no data were qualified. No field blank (FB) or equipment blank (EB) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

Site: 228A VCM

AR/COC: 601190 Data Classification: Radiological (Alpha spec, Iso-U / Gamma spec)

	Sample Fraction No.	Analysis	DV Qualifiers	Comments
TJAOU	228A-GR-176-S	15117-96-1	J	Alpha Spec (Iso-U)
	-181-S	(U-235)		
	-181-DU			
	-186-S			
TJAOU	228A-GR-176-S	7440-61-1	J	
	-181-S	(U-238)		
	-181-DU			
	-186-S			
⇒	Note: Gamma Spec summary on attached spreadsheet.			
		Data is Acceptable.		
	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: [signature] Date: 2/23/99

SAMPLE FINDINGS SUMMARY

Site: 228A VCM

AR/COC: 601190 Data Classification: Inorganics (EPA 6010B, EPA 7471)

	Sample Fraction No.	Analysis	DV Qualifiers	Comments
TJAOU	228A-GR-177-S -179-S -181-S	7439-97-6 (Mercury)	J, U1	
	-181-DU -183-S -185-S			
	-187-S			
TJAOU	228A-GR-177-S -179-S -181-S	7440-22-4 (Silver)	J, U1	
	-181-DU -183-S -185-S			
		Data is acceptable.		
		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: [signature] Date: 2/22/99

MEMORANDUM

DATE: February 23, 1999

TO: File

FROM: Kenneth Salaz KAS

SUBJECT: Inorganic Data Review and Validation
Site 228A VCM, ARCOC No. 601190, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods (EPA6010B, EPA7471). Problems were identified with the data package that result in the qualification of data.

1. In the initial calibration blank (ICB), continuing calibration blank (CCB), and method blank, silver (Ag) and mercury (Hg) were observed. For Hg, all samples had positive results less than five times the blank concentrations. Thus, these results will be qualified "J,U1." For Ag, samples 9812309-05, -08, -11, -14, -18, and -21 had positive results less than five times the blank concentrations, which will also be qualified "J,U1."

Data is acceptable. QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

All samples were extracted and analyzed within the prescribed holding times.

Calibration

The initial and continuing calibrations met QC acceptance criteria.

Blanks

In the ICB and CCB, barium (Ba), chromium (Cr), Ag, lead (Pb), arsenic (As), and Hg were observed. In the method blank, Cr, Ag, Pb, and Hg were observed. Sample results for Ag and Hg were qualified as noted above in the summary section. Sample

Calibration

VOC Analysis: The initial and continuing calibrations met QC acceptance criteria except for acetone, bromomethane, carbon disulfide, methylene chloride, 1,1-dichloroethene, 2-butanone, 2-chloroethyl vinyl ether, and 2-hexanone. Acetone, carbon disulfide, and 2-butanone sample results were qualified as noted above in the summary section. Sample results for the other compounds were ND; no data were qualified.

SVOC Analysis: The initial and continuing calibrations met QC acceptance criteria except for benzoic acid, bis(2-ethylhexyl)phthalate, hexachlorocyclopentadiene, 2,2'-oxybis(1-chloropropane), 4-nitrophenol, 2,4-dinitrophenol, 4-nitroaniline, 4,6-dinitro-2-methylphenol, 4-bromophenyl-phenylether, and 3-3'-dichlorobenzidine. Sample results for 2,2'-oxybis(1-chloropropane) were qualified as noted above in the summary section. 4-nitrophenol had a CCV RPD outside the QC limits. However, the data were qualified "R,A2" due to MS/MSD failure; no further qualification was necessary. Results for the other compounds were ND; no data were qualified.

HE Analysis: The initial and continuing calibrations met all QC acceptance criteria.

Blanks

VOC Analysis: No target analytes were detected in the method blanks except for ethylbenzene, xylenes, and 2-hexanone. All sample results for these compounds were ND; no data were qualified.

SVOC/HE Analyses: No target analytes were detected in the method blanks.

Surrogates

VOC/SVOC/HE Analyses: The surrogate recoveries met QC acceptance criteria.

Internal Standards

VOC/SVOC Analyses: The areas and retention times for the internal standards met QC acceptance criteria.

HE Analysis: No internal standards were required for this method.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

SVOC Analysis: The MS/MSD met QC acceptance criteria except for 4-nitrophenol. Sample results were qualified as noted above in the summary section.

VOC/HE Analyses: The MS/MSD met QC acceptance criteria.

Laboratory Control Samples

VOC/SVOC/HE Analyses: The LCS/LCSD met QC acceptance criteria.

Other QC

VOC/SVOC/HE Analyses: The field duplicate pair met QC acceptance criteria for all target compounds. No field blank (FB) or equipment blank (EB) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

SAMPLE FINDINGS SUMMARY No CVR or Chain attached

Site: 228A VCM

AR/COC: 601190

Data Classification: ~~Volatile~~ Organics (EPA 8260A, EPA 8270B, EPA 8330)

	Sample Fraction No.	Analysis	DV Qualifiers	Comments
TJAOU	228A-GR-176-S	67-64-1	R	
	-181-S	(Acetone)		
	-181-DU			
	-186-S			
TJAOU	228A-GR-176-S	75-15-0	R	
	-181-S	(Carbon disulfide)		
	-181-DU			
	-186-S			
TJAOU	228A-GR-176-S	78-93-3	UJ	
	-181-S			
	-181-DU	(2-butanone)		
TJAOU	228A-GR-176-S	108-60-1	R	
	-181-S	(2,2'-oxybis (1-chloropropane))		
	-181-DU			
	-186-S			
TJAOU	228A-GR-176-S	100-02-7	R,A2	
	-181-S	(4-Nitrophenol)		
	-181-DU			
	-186-S			

Data is acceptable (except as noted above).

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: [signature] Date: 2/22/99

MEMORANDUM

DATE: February 23, 1999

TO: File

FROM: Kenneth Salaz KAS

SUBJECT: Organic Data Review and Validation
Site 228A VCM, ARCOC No. 601190, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

<u>Summary</u>

All samples were prepared and analyzed with accepted procedures and specified methods (EPA8260A, EPA8270B, EPA8330). Problems were identified with the data package that result in the qualification of data.

1. VOC Analysis: The relative percent differences (RPD) of the continuing calibrations (CCV) for acetone and carbon disulfide, in both analytical batches, were >60%. All sample results were non-detect (ND) and will be qualified "R" (unusable). The CCV RPD for 2-butanone was 51% in the first analytical batch. Results for samples 9812309-03, -12, and -15 were ND and will be qualified "UJ."

   SVOC Analysis: The CCV RPD for 2-2'-oxybis(1-chloropropane) was 87%. All sample results were ND and will be qualified "R."

2. SVOC Analysis: The percent recoveries of the Matrix Spike (MS) and Matrix Spike Duplicate (MSD) for 4-nitrophenol were <10%. All sample results were ND and will be qualified "R,A2."

No high explosives (HE) data required qualification. Data is acceptable, except for: the acetone and carbon disulfide results of samples 9812309-03, -12, -15, and -24; as well as the 2,2'-oxybis(1-chloropropane) and 4-nitrophenol results of samples -02, -11, -14, and -23. QC measures appear to be adequate. The following sections discuss the data review and validation.

<u>Holding Times</u>

VOC/ SVOC/HE Analyses: All samples were extracted and analyzed within the prescribed holding times.

SF 2001-COC (10-97)

Supersedes (5-97) issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601189

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative (all GA 4°C)	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Samp #
043728 - 002	TJAOU-228A-GR-167-S	0	228A	120198/1320	S	AG	500 ml	4 C	G	SA	RCRA Metals	.2
043729 - 001	TJAOU-228A-GR-168-S			120198/1325							Gamma Spec	.1
043730 – 001	TJAOU-228A-GR-169-S			120198/1327							Gamma Spec	.1
043730 - 002	TJAOU-228A-GR-169-S			120198/1327							RCRA Metals	.2
043731 - 001	TJAOU-228A-GR-170-S			120198/1330							Gamma Spec	.1
043732 – 001	TJAOU-228A-GR-171-S			120198/1340							Gamma Spec/Iso U	.3
043732 - 002	TJAOU-228A-GR-171-S			120198/1340							RCRA Metals, HE, SVOCs	.6
043732 - 003	TJAOU-228A-GR-171-S			120198/1340			40 ml				VOC	.5
043733 – 001	TJAOU-228A-GR-171-DU			120198/1340			500 ml			DU	Gamma Spec/Iso U	.3
043733 – 002	TJAOU-228A-GR-171-DU			120198/1340			500 ml			DU	RCRA Metals, HE, SVOCs	.6
043733 - 003	TJAOU-228A-GR-171-DU			120198/1340			40 ml			DU	VOC	.5
043734 - 001	TJAOU-228A-GR-172-S			120198/1400			500 ml			SA	Gamma Spec	.1
043735 – 001	TJAOU-228A-GR-173-S			120198/1440							Gamma Spec	.1
043735 - 002	TJAOU-228A-GR-173-S			120198/1440							RCRA Metals	.2
043736 - 001	TJAOU-228A-GR-174-S			120198/1445							Gamma Spec	.1
043737 – 001	TJAOU-228A-GR-175-S			120198/1450							Gamma Spec	.1
043737 - 002	TJAOU-228A-GR-175-S			120198/1450							RCRA Metals	.2
~~043737-003~~ 043737-003	TJAOU-228A-TB			120198/1520	DW	G	3X 40ml	HCl	G	TB	VOC	.5, 7
043737 - 006	TJAOU-228A-EB			120198/1520	DW	G	3X 40ml	HCl	G	EB	VOC	.5, 7
043737 - 007	TJAOU-228A-EB			120198/1520	DW	AG	8X1L	4C	G	W	SVOC (8270)	.8
043737 - 008	TJAOU-228A-EB			120198/1520	DW	AG	4X1L	4C	G	W	HE	.9
043737 - 009	TJAOU-228A-EB			120198/1520	DW	P	500 ml	HNO3	G	W	RCRA Metals	.10
043737 - 010	TJAOU-228A-EB			120198/1520	DW	P	1L	HNO3	G	W	Gamma Spec	.11
043737 011	TJAOU-228A-EB			120198/1520	DW	P	1L	HNO3	G	W	ISO U	.12
										C.C.		

Abnormal Conditions on Receipt:

Recipient Initials MC

Original To Accompany Samples, Laboratory Copy (White) 1st Copy To Accompany Samples, Return to SMO (Blue) 2nd Copy SMO Suspense Copy (Yellow) 3rd Copy Field Copy (Pink)

4.0 Data Quality Evaluation Continuation

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/ Fraction No.	Analysis	Qualifiers	Comments

Were deficiencies noted. ☹ **Yes** ☺ No

Based on the review, this data package is complete. ☺ **Yes** ☹ No

If no, provide : nonconformance report or correction request number _____ and date correction request was submitted _____

Reviewed by: CRKw Date: 01/22/99 Closed by: _____ Date: _____

9812299

SF 2001-COC (10-97)

Supersedes (5-97) Issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

AR/COC- 601189

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland / Lai, Anh
Project Name: Site 228 VCM
Record Center Code: ER/1309/228A/DAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO Use
Carrier/Waybill No.: 715751
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi
Send Report to SMO: 5021 Jensen

Contract No.: AJ-2480A
Case No.: 7225,2205
SMO Authorization
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location — Tech Area NA — Building NA — Room NA

Reference LOV (available at SMO)

9812299

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	Lab Samp
043723 - 001	TJAOU-228A-GR-162-S	0	228A	120198/1255	S	G	500ml	4 C	G	SA	Gamma Spec	
043724 - 001	TJAOU-228A-GR-163-S			120198/1300							Gamma Spec	
043724 - 002	TJAOU-228A-GR-163-S			120198/1300							RCRA Metals	
043725 - 001	TJAOU-228A-GR-164-S			120198/1303							Gamma Spec	
043726 - 001	TJAOU-228A-GR-165-S			120198/1307							Gamma Spec	
043726 - 002	TJAOU-228A-GR-165-S			120198/1307							RCRA Metals	
043727 - 001	TJAOU-228A-GR-166-S			120198/1312							Gamma Spec/Iso U	
043727 - 002	TJAOU-228A-GR-166-S			120198/1312							HE, SVOCs	
043727 - 003	TJAOU-228A-GR-166-S			120198/1312			4 oz				VOC	
043728 - 001	TJAOU-228A-GR-167-S			120198/1320			500ml				Gamma Spec	

RMMA ☒Yes ☐No Ref. No.

Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking — SMO Use — Date Entered (mm/dd/yy) — Entered by

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
COC 601213 ~~and~~ releases this COC

Abnormal Conditions on Receipt (Yes/No)

Turnaround Time ☒Normal ☐Rush Required Report Date

QC Inits

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Chris Catechis	Ch. Catech.	CC	MDM/6131/881-3198

Please list as separate report.

1. Relinquished by	Ch. Catech.	Org. 6131	Date 12/4/98	Time 1025	4. Relinquished by	Org.	Date
1. Received by		Org. 7578 (SMO)	Date 12/4/98	Time 1025	4. Received by	Org.	Date
2. Relinquished by	(SMO)	Org. 7578	Date 12/7/98	Time 1300	5. Relinquished by	Org.	Date
2. Received by		Org.	Date 12/8/98	Time 0900	5. Received by	Org.	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org.	Date
3. Received by		Org.	Date	Time	6. Received by	Org.	Date

Original — To Accompany Samples, Laboratory Copy (White)

1st Copy — To Accompany Samples, Return to SMO (Blue)

2nd Copy — SMO Suspense Copy (Yellow)

3rd Copy — Field Copy (Pink)

Contract Verification Review (CVR)

Project Leader COLLINS | Project Name SITE 228A VCM | Case No. 7225.2203

AR/COC No. 601189 | Analytical Lab GEL | SDG No. 9812299

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 and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, LCD)	X		some LCDs run on a different SDG		
2.4	Matrix spike/matrix spike duplicate data provided(if requested)	X		Some MS/MSDs run on a different SDG		
2.5	Detection Limits provided; PQL and MDL(or IDL)	X				
2.6	QC batch numbers provided	X				
2.7	Dilution Factors provided	X				
2.8	Data reported using correct sig. fig. (2 for org.; 3 for inorg.)	X				
2.9	Rad analysis uncertainty provided (2 sigma error)	X				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Were contractual qualifiers provided	X				
2.14	All requested result data provided	X				

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1)Reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg). Units consistent between QC samples and sample data.	X		
3.2)Quantitation limit met for all samples?	X		
3.3)Accuracy a) Laboratory control sample accuracy reported and met for all samples?		X	LCS high for 4-nitrophenol and mercury
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?	X		
c) If requested, matrix spike recovery data reported and met .		X	4-nitrophenol MS high (run on a different SDG)
3.4)Precision a) Laboratory control sample precision reported and met for all samples? For rad analysis, sample duplicate precision reported and met.	X		
b) If requested, matrix spike duplicate RPD data reported and met.		X	RPD% for barium and cadmium not within acceptance limits (run on a different SDG)
3.5)Blank data a) Method or reagent blank data reported and met for all samples?		X	Several radiological analytes detected in method blank. 2-hexanone, ethylbenzene, xylenes(total) detected in method blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?		X	Methylene chloride detected in equipment blank (between DL and RL) Several metal and radiological analytes detected in equipment blanks
3.6)Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank; "U"- analyte undetected (results are below the MDL or L_C (rad)); "H"-analysis done beyond the holding time.	X		
3.7)Narrative included, correct, and complete?	X		

INORGANIC METALS:

SITE/PROJECT: 22E A VCM ARCOC #: 601189
LABORATORY: GEL LABORATORY REPORT #: 9812299
METHODS: RCRA metals

QC Element/ Analyte	ICV	CCV	ICB	CCB	Method Blks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	REP RPD	ICS AB	Serial Dilution	Field Dup RPD	Eq. Blks	Field Blks			
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	✓	✓	.139	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	.00189	✓			
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K																	EPW			
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	.00105	J			
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	* J		126	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Cyanide CN	✓ EPW	✓ EPW	✓ EPW																	

Comments:

* J code Batch 137494 for Hg
Barium MB - Sample results > 5x blank conc. No data qualified.
EB - Sample results > 5x blank conc. No data qualified.
Ag EB - Silver is ND in all samples. No data qualified.

REVIEWED BY: E Todd Montoya DATE: 2-18-99

RADIOCHEMISTRY:

SITE/PROJECT: 228 A VCM ARCOC #: 601189
LABORATORY: GEL LABORATORY REPORT #: 981 2299
METHODS: gamma Spec I-Su-4

QC Element/ Analyte	Method Blks	LCS	MS	Rep RER	Eq. Blks	Field Dup RER	Field Blks	-	Sample ID	Isotope	IS/Trace	Sample	Isotope	IS/Trace			
CRITERIA	U	20%	25%	<1.0	U	<1.0	U	-			50-105			50-105			
113								-		U232	✓						
U-238		✓				✓											
U-234		✓				✓											
U-235/236		✓				✓		-									
Th-232																	
Th-228																	
Th-230								-									
Pu-239/240																	
Gross Alpha								-									
Nonvolatile Beta																	
Ra226								-									
Ra228								-									
Gamma Spec								-									
Ni-63								-									
								-									
								-									

Parameter	Method	Typical Tracer	Typical Carrier
Iso-U	Alpha spec	U-232	NA
Iso-Pu	Alpha spec	Pu-242	NA
Iso-Th	Alpha spec	Th-229	NA
Am-241	Alpha spec	Am-242	NA
Sr-90	Beta	Y ingrowth	NA
Ni-63	Beta	NA	Ni by ICP
Ra-226	Deamination	NA	NA
Ra-226	Alpha spec	Ba-133 or Ra-225	NA
Ra-228	Gamma spec	Ba-133	NA

Comments:

Gamma spec LCS contains: Am-241, Cs-137, and Co-60 — LCS met criteria for each of those for gamma Spec

REVIEWED BY: E Todd Monk DATE: 2-18-99

VOLATILE ORGANICS: page 2
SW-846 - Method 8260

SITE/PROJECT: 228 A VCM ARCOC #: 601187
LABORATORY: GEL LABORATORY REPORT #: 98/2298

Surrogate Recovery and Internal Standard Outliers

Sample	SMC 1	SMC 2	SMC 3	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3- area	IS 3- RT			

met criteria

SMC 1: 4-Bromofluorobenzene
SMC 2: 1,2-Dichloroethane-d4
SMC 3: Toluene-d8

IS 1: Bromochloromethane
IS 2: 1,4-Difluorobenzene
IS 3: Chlorobenzene-d5

Comments:

REVIEWED BY: E Todd Monday DATE: 2-18-99

HIGH EXPLOSIVES:
SW846 Method 8330

SITE/PROJECT: 228 A VCM ARCOC #: 60 11 89
LABORATORY: GEL LABORATORY REPORT #: 981 2299

NAME	CAS #	Intercept	Curve R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks		
			.99	20%	U			20%			20%		U	U		
HMX	2691-41-0	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
RDX	121-82-4															
1,3,5-Trinitrobenzene	99-35-4															
1,3-dinitrobenzene	99-64-0															
Nitrobenzene	98-95-3															
Tetryl	479-45-8															
2,4,6-trinitrotoluene	118-96-7															
2-amino-4,6-dinitrotoluene	35572-78-2															
4-amino-2,6-dinitrotoluene	1946-51-0															
2,4-dinitrotoluene	121-14-2															
2,6-dinitrotoluene	606-20-2															
2-nitrotoluene	88-72-2															
4-nitrotoluene	99-99-0															
3-nitrotoluene	99-08-1	⊥	⊥		⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥		
PETN	78-11-5															

Sample	SMC %REC	SMC RT		Sample	SMC %REC	SMC RT
		met				
		criteria				

Comments:

Confirmation

Sample	CAS #	RPD > 25%		Sample	CAS #	RPD > 25%
		met				
		criteria				

REVIEWED BY: E. Todd Monroe DATE: 2-18-99

SEMI-VOLATILE ORGANICS: page 3
SW 846 - Method 8270

SITE/PROJECT: 228 AVCM ARCOC #: 601189
LABORATORY: GEL LABORATORY REPORT #: 9812249

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
5	BN	218-01-9	Chrysene	0.70																	
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	0.01																	
6	BN	117-84-0	Di-n-octylphthalate	0.01																	
6	BN	205-99-2	Benzo(b)fluoranthene	0.70																	
6	BN	207-08-9	Benzo(k)fluoranthene	0.70																	
6	BN	50-32-8	Benzo(a)pyrene	0.70																	
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	0.50																	
6	BN	53-70-3	Dibenz(a,h)anthracene	0.40																	
6	BN	191-24-2	Benzo(g,h,i)perylene	0.50																	

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8

not criteria

Comments:

SMC 1: Nitrobenzene-d5 (BN) SMC 2: 2-Fluorobiphenyl (BN) SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d5 (A) SMC 5: 2-Fluorophenol (A) SMC 6: 2,4,6-Tribromophenol (A)
SMC 7: 2-2-Chlorophenol-d4 (A) SMC 8: 1,2-Dichlorobenzene-d4 (BN)

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT

not criteria

IS 1: 1,4-Dichlorobenzene-d4 (BN) IS 2: Naphthalene-d8 (BN) IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN) IS 5: Chrysene-d12 (BN) IS 6: Perylene-d12 (BN)

REVIEWED BY: E Todd Monk DATE: 2-18-99

VOLATILE ORGANICS:
SW-846 - Method 8260

SITE/PROJECT: 228 A VCM ARCOC #: 60/189
LABORATORY: GEL LABORATORY REPORT #: 9812295

IS	GC/MS		Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Trip Blks			
	Name	CAS #			>.05	<20% / 0.99	<20%													
1	Chloromethane	74-87-3	0.10	✓	✓	✓		✓												
1	Bromomethane	74-83-9	0.10																	
1	vinyl chloride	75-01-4	0.10																	
1	Chloroethane	75-00-3	0.01																	
1	methylene chloride (10xblk)	75-09-2	0.01																	
1	acetone(10xblk)	67-64-1	0.01						✓	✓	✓	✓	✓	✓						
1	carbon disulfide	75-15-0	0.10																	
1	1,1-dichloroethene	75-35-4	0.20																	
1	1,1-dichloroethane	75-34-3	0.10																	
1	Chloroform	67-66-3	0.20																	
1	1,2-dichloroethane	107-06-2	0.10																	
1	2-butanone(10xblk)	78-93-3	0.01																	
2	1,1,1-trichloroethane	71-55-6	0.10																	
2	carbon tetrachloride	56-23-5	0.10																	
2	Bromodichloromethane	75-27-4	0.20																	
2	1,2-dichloropropane	78-87-5	0.01																	
2	cis-1,3-dichloropropene	10061-01-5	0.20						✓	✓	✓	✓	✓	✓						
2	Trichloroethene	79-01-6	0.30																	
2	Dibromochloromethane	124-48-1	0.10																	
2	1,1,2-trichloroethane	79-00-5	0.10						✓	✓	✓	✓	✓	✓						
2	Benzene	71-43-2	0.50																	
2	trans-1,3-dichloropropene	10061-02-6	0.10																	
2	Bromoform	75-25-2	0.10																	
3	4-methyl-2-pentanone	108-10-1	0.10																	
3	2-hexanone	591-78-6	0.01					4.2												
3	Tetrachloroethene	127-18-4	0.20					✓												
3	1,1,2,2-tetrachloroethane	79-34-5	0.30					✓												
3	toluene(10xblk)	108-88-3	0.40					✓	✓	✓	✓	✓	✓	✓						
3	Chlorobenzene	108-90-7	0.50					✓	✓	✓	✓	✓	✓	✓						
3	Ethylbenzene	100-41-4	0.10					1.0												
3	Styrene	100-42-5	0.30					✓												
3	xylenes(total)	1330-20-7	0.30					.80												
	1,2-dichloroethylene(total)	540-59-0	0.01					✓												
	2-chloroethyl vinyl ether	110-75-8						✓												

Comments: 2-Hexanone, Ethylbenzene, and xylenes are ND in all samples. No Data qualified.

REVIEWED BY: E Ted Mouton DATE: 2-18-99

SEMI-VOLATILE ORGANICS:
SW-846 - Method 8270

SITE/PROJECT: 328 A VCM ARCOC #: 601189
LABORATORY: GEL LABORATORY REPORT #: 9812299

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						> 05	<20% / 0.99	<20%	✓												
1	A	108-95-2	Phenol	0.80						✓	✓	✓	✓	✓	✓	✓	✓	✓			
1	BN	111-44-4	bis(2-Chloroethyl)ether	0.70																	
1	A	95-57-8	2-Chlorophenol	0.80						✓	✓	✓	✓	✓	✓						
1	BN	541-73-1	1,3-Dichlorobenzene	0.60																	
1	BN	106-46-7	1,4-Dichlorobenzene	0.50						✓	✓	✓	✓	✓	✓						
1	BN	95-50-1	1,2-Dichlorobenzene	0.40																	
1	A	95-48-7	2-Methylphenol	0.70																	
1	BN	108-60-1	bis(2-chloroisopropyl)ether	0.01																	
1	A	106-44-5	4-Methylphenol	0.60						✓	✓	✓	✓	✓	✓						
1	BN	621-64-7	N-Nitroso-di-n-propylamine	0.50																	
1	BN	67-72-1	Hexachloroethane	0.30																	
2	BN	98-95-3	Nitrobenzene	0.20																	
2	BN	78-59-1	Isophorone	0.40																	
2	A	88-75-5	2-Nitrophenol	0.10																	
2	A	105-67-9	2,4-Dimethylphenol	0.20																	
2	BN	111-91-1	bis(2-Chloroethoxy)methane	0.30																	
2	A	120-83-2	2,4-Dichlorophenol	0.20																	
2	BN	120-82-1	1,2,4-Trichlorobenzene	0.20						✓	✓	✓	✓	✓	✓						
2	BN	91-20-3	Naphthalene	0.70																	
2	BN	106-47-8	4-Chloroaniline	0.01																	
2	BN	87-68-3	Hexachlorobutadiene	0.01						✓	✓	✓	✓	✓	✓						
2	A	59-50-7	4-Chloro-3-methylphenol	0.20																	
2	BN	91-57-6	2-Methylnaphthalene	0.40																	
3	BN	77-47-4	Hexachlorocyclopentadiene	0.01																	
3	A	88-06-2	2,4,6-Trichlorophenol	0.20																	
3	A	95-95-4	2,4,5-Trichlorophenol	0.20																	

Comments:

REVIEWED BY: E Todd Monk DATE: 2-18-99

SEMI-VOLATILE ORGANICS: page 2
SW 846 - Method 8270

SITE/PROJECT: 228 A VCM ARCOC #: 6 011 89
LABORATORY: GEL LABORATORY REPORT #: 9812299

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
3	BN	91-58-7	2-Chloronaphthalene	0.80																	
3	BN	88-74-4	2-Nitroaniline	0.01																	
3	BN	131-11-3	Dimethylphthalate	0.01																	
3	BN	208-96-8	Acenaphthylene	0.90																	
3	BN	606-20-2	2.6-Dinitrotoluene	0.20																	
3	BN	99-09-2	3-Nitroaniline	0.01																	
3	BN	83-32-9	Acenaphthene	0.90																	
3	A	51-28-5	2.4-Dinitrophenol	0.01			40.44														
3	A	100-02-7	4-Nitrophenol	0.01			22.84			186											
3	BN	132-64-9	Dibenzofuran	0.80																	
3	BN	121-14-2	2,4-Dinitrotoluene	0.20																	
3	BN	84-66-2	Diethylphthalate	0.01																	
3	BN	7005-72-3	4-Chlorophenyl-phenylether	0.40																	
3	BN	86-73-7	Fluorene	0.90																	
3	BN	100-01-6	4-Nitroaniline	0.01																	
4	A	534-52-1	4.6-Dinitro-2-methylphenol	0.01																	
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	0.01																	
4	BN	101-55-3	4-Bromophenyl-phenylether	0.10																	
4	BN	118-74-1	Hexachlorobenzene	0.10																	
4	A	87-86-5	Pentachlorophenol	0.05																	
4	BN	85-01-8	Phenanthrene	0.70			22.49														
4	BN	120-12-7	Anthracene	0.70			20.36														
4	BN	86-74-8	Carbazole	0.01			26.83														
4	BN	84-74-2	Di-n-butylphthalate	0.01			27.90														
4	BN	206-44-0	Fluoranthene	0.60																	
5	BN	129-00-0	Pyrene	0.60																	
5	BN	85-68-7	Butylbenzylphthalate	0.01																	
5	BN	91-94-1	3.3'-Dichlorobenzidine	0.01																	
5	BN	56-55-3	Benzo(a)anthracene	0.80																	

Comments:

REVIEWED BY: ETD Montr DATE: 2-18-99

Duplicate

The duplicate error ratio (DER) met acceptance criteria.

Other QC

No data were qualified. Data is acceptable. QC measures appear to be acceptable.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

DATA VALIDATION SUMMARY:

21-soil
7-gw

SITE/PROJECT: 228 A UCM CASE #: 7225/2203
ARCOC #: 60/189
LABORATORY: GEL
LABORATORY REPORT #: 981 2299

OF SAMPLES: 34 MATRIX:
LAB SAMPLE IDs: See ARCOC

ANALYSIS/ QC ELEMENT	VOC	SVOC	PEST/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	✓	NA	✓	✓	NA	✓	NA	✓	NA
2. CALIBRATIONS	✓	UJ	↓	✓	✓	↓	✓	↓	✓	↓
3. METHOD BLANKS	✓	✓	↓	✓	✓	↓	J	↓	✓	↓
4. MS/MSD	✓	✓	↓	✓	✓	↓	✓	↓	✓	↓
5. LABORATORY CONTROL SAMPLES	✓	UJ	↓	✓	✓	↓	J	↓	✓	↓
6. REPLICATES			↓		✓	↓	✓	↓	✓	↓
7. SURROGATES	✓	✓	↓	✓		↓		↓		↓
8. INTERNAL STDS	✓	✓	↓			↓		↓		↓
9. TCL COMPOUND IDENTIFICATION	✓	✓	↓			↓		↓		↓
10. ICP INTERFERENCE CHECK SAMPLE			↓		✓	↓		↓		↓
11. ICP SERIAL DILUTION			↓		✓	↓		↓		↓
12. CARRIER/CHEM TRACER RECOVERIES			↓			↓		↓	✓	↓
13. OTHER QC	✓	✓	↓	✓	✓	↓		↓	✓	↓

CHECK MARK (√) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED

SHADED CELLS – NOT APPLICABLE
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

REVIEWED BY: E Trol Monks 2-18-99

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses

The LCS/LCSD met acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

The MS/MSD met acceptance criteria.

Other QC

Data is acceptable. QC measures appear to be adequate.
No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

MEMORANDUM

DATE: February 19, 1999

TO: File

FROM: Tod Monks TM

SUBJECT: Radiometric Data Review and Validation
Site 228-A, ARCOC No. 601189, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods (gamma spec- HASL 300 and alpha spec/uranium-EPA-A011B). All compounds were successfully analyzed. No problems were identified with the data package that result in the qualification of data. Data is acceptable and QC measures appear to be adequate.

The following sections discuss the data review and validation.

Holding Times

The samples were analyzed within the prescribed holding times.

Calibration

Calibration met acceptance criteria for the method.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses

The LCS/LCSD met acceptance criteria for the method.

Blanks

No target analytes were detected above the required acceptance limit in the method blank.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

The MS/MSD met acceptance criteria for the method.

Blanks

No target analytes were detected above the reporting limit in the method blanks.

Surrogates

The surrogate data met acceptance limits for site samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

The MS/MSD met acceptance criteria.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses

The LCS/LCSDs for the site samples met acceptance criteria except where noted above.

Other QC

Data is acceptable. QC measures appear to be adequate.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

MEMORANDUM

DATE: February 19, 1999

TO: File

FROM: Tod Monks TM

SUBJECT: Inorganic Data Review and Validation
Site 228-A, ARCOC No. 601189, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

<u>Summary</u>

The samples were prepared and analyzed with accepted procedures and specified methods (Metals – EPA6010B and EPA7471-mercury). All compounds were successfully analyzed. Problems which were identified within the data package that result in the qualification of data are listed below.

1. Silver, barium and mercury were detected in QC blanks. The detection of silver and barium did not result in the qualification of data as the sample results for barium were greater than 5X the blank value and silver was not detected in any of the field samples. In the case of mercury, the sample concentration was less than 5 X the blank concentration. Results were qualified "J" for the affected batch (137494).

QC measures appear to be adequate. The following sections discuss the data review and validation.

<u>Holding Times</u>

The sample was analyzed within the prescribed holding times.

<u>Calibration</u>

Initial and continuing calibration met acceptance criteria for all methods.

<u>Blanks</u>

No target analytes were detected above reporting limits in the method blanks except those mentioned above.

<u>ICP Interference Check Sample (ICS) Analysis</u>

The ICS met QC acceptance limits.

Site: 228A VCM

AR/COC: 601189 Data Classification: Radiometrics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
	NO DATA QUALIFIED		
	DATA IS ACCEPTABLE		
	QC MEASURES APPEAR		
	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: E Ted Monroe Date: 2-18-99

MEMORANDUM

DATE: February 19, 1999

TO: File

FROM: Tod Monks TM

SUBJECT: Organic Data Review and Validation
Site 228-A, ARCOC No. 601189, Case No. 7225.2203

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods (HE – EPA8330, EPA8260A, and EPA8270). All compounds were successfully analyzed. Problems identified with the organics methods listed above that resulted in the qualification of data are presented below.

HE - EPA8330 and VOCs - EPA8260A

No data were qualified. Data is acceptable. QC measures appear to be adequate.

SVOCs - EPA8270

1. Initial and continuing calibration met acceptance criteria except for 2,4 dinitrophenol for which the RSD was 40.44. The analyte was not dectected in all samples. Sample results were qualified "UJ".

2. LCS acceptance criteria was met accept for 4-nitophenol for which the percent recovery was high 86. The analyte was non-detect in all samples. ~~Sample results were qualified "UJ".~~ no data qualified. 3.2.99 KH

Data is acceptable. QC measures appear to be adequate.

The following sections discuss the data review and validation.

Holding Times

The samples were extracted and analyzed within the prescribed holding times.

Calibration

Initial and continuing calibration met acceptance criteria except as noted above.

Site: 228 A VCM

AR/COC: 601189 Data Classification: organics

3-4-99 KM

Sample Fraction No.	Analysis	DV Qualifiers	Comments
ER - TJA04-228A-GR-166-S ER - TJA04-228A-GR-171-S ER - TJA04-228A-GR-171-DU	2,4 Dinitrophenol (51-28-5)	UJ	RSD = 40.44%
	Data	is	Acceptable
	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: E Ted Monkes Date: 2-18-99

Site: 22 8 4 VCM

AR/COC: 601189 Data Classification: Inorganics

3-4-99 KM

Sample Fraction No.	Analysis	DV Qualifiers	Comments
CR-TJA04-2284-GR-163-S -165-S -167-S	Hg-Mercury (7439-97-6)	J	Sample results < 5 x blank concentration. Mercury data
169-S 171-S 173-S			from affected aerial are qualified "J".
175-S			
	Data	are	Acceptable
	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: E Tod Monk Date: 2-18-99

SF 2001-COC (10-97)

Supersedes (6-97) Issue

ANALYSIS REQUEST AND CHAIN OF CUSTODY (Continuation)

Press F1 for instructions for each field.

AR/COC- 601188

Project Name: Site 228A VCM Project/Task Manager: John Copland Case No.: 7225.2203

Location Tech Area NA

Building NA Room NA

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB U Lab Samp
043716 – 002	TJAOU-228A-GR-156-S	0	228A	120198/1045	S	G	500 ml	4 C	G	SA	~~RCRA metals~~,HE,SVOCs Cl-	11 .6
043716 - 003	TJAOU-228A-GR-156-S	0	228A	120198/1045	S	G	4 oz	4 C	G	SA	VOCs	12 .3
043717 – 001	TJAOU-228A-GR-157-S	0	228A	120198/1050	S	G	500 ml	4 C	G	SA	Gamma Spec	13 .4
043717 - 002	TJAOU-228A-GR-157-S	0	228A	120198/1050	S	G		4 C	G	SA	RCRA metals	14 .5
043718 - 001	TJAOU-228A-GR-158-S	0	228A	120198/1053	S	G		4 C	G	SA	Gamma Spec	15 .4
043719 – 001	TJAOU-228A-GR-159-S	0	228A	120198/1100	S	G		4 C	G	SA	Gamma Spec	16 .4
043719 - 002	TJAOU-228A-GR-159-S	0	228A	120198/1100	S	G		4 C	G	SA	RCRA metals	17 .5
043720 - 001	TJAOU-228A-GR-160-S	0	228A	120198/1203	S	G		4 C	G	SA	Gamma Spec	18 .4
043721 - 001	TJAOU-228A-GR-161-S	0	228A	120198/1115	S	G		4 C	G	SA	Gamma Spec/Iso U	19 .1
043721 - 002	TJAOU-228A-GR-161-S	0	228A	120198/1115	S	G		4 C	G	SA	RCRA metals,HE,SVOCs	20 .2
043721 - 003	TJAOU-228A-GR-161-S	0	228A	120198/1115	S	G	4 oz	4 C	G	SA	VOCs	21 .3
043722 - 001	TJAOU-228A-GR-161-DU	0	228A	120198/1115	S	G	500 ml	4 C	G	SA	Gamma Spec/Iso U	22 .1
043722 - 002	TJAOU-228A-GR-161-DU	0	228A	120198/1115	S	G	500 ml	4 C	G	SA	RCRA metals,HE,SVOCs	23 .2
043722 - 003	TJAOU-228A-GR-161-DU	0	228A	120198/1115	S	G	4 oz	4 C	G	SA	VOCs	24 .3
-												
-												
-												
-												
-												
-												
-												
-												
-												
-												
-												

Abnormal Conditions on Receipt LAB USE

Recipient Initials Jmk

Original To Accompany Samples, Laboratory Copy (White) 1st Copy To Accompany Samples, Return to SMO (Blue) 2nd Copy SMO Suspense Copy (Yellow) 3rd Copy Field Copy (Pink)

4.0 Data Quality Evaluation Continuation

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/ Fraction No.	Analysis	Qualifiers	Comments
ALL	8260	B	QUALIFIER NOT REPORTED

Were deficiencies noted. ☹ Yes ☺ No

Based on the review, this data package is complete. ☺ Yes ☹ No

If no, provide : nonconformance report or correction request number 1875 and date correction request was submitted 1-25-99

Reviewed by: W. Palencia Date: 1-25-99 Closed by: _____ Date: _____

SF 2001-COC (10-97)
Supersedes (5-97) Issue

Internal Lab Batch No.

ANALYSIS REQUEST AND CHAIN OF CUSTODY

SAR/WR No.

Press F1 for instructions for each field.

9812298

AR/COC- **601188**

Dept. No./Mail Stop: 6133/MS1147
Project/Task Manager: John Copland
Project Name: Site 228A VCM
Record Center Code: ER/1309/228A/OAT
Logbook Ref. No.:
Service Order No.: CFO690

Date Samples Shipped: 12/7/98 SMO use
Carrier/Waybill No.: 71575
Lab Contact: Edie Kent
Lab Destination: GEL
SMO Contact/Phone: Doug Salmi/ 844-3110
Send Report to SMO: Suzi Jaramillo

Contract No.: AJ-2480A
Case No.: 7225.2203
SMO Authorization: Doug Salmi
Bill to: Sandia National Laboratories
Supplier Services, Dept.
P.O. Box 5800 MS 0154

Location Tech Area NA
Building NA Room NA

Reference LOV (available at SMO)

9812298

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Parameter & Method Requested	LAB USE Lab Samp #
043711 – 001	TJAOU-228A-GR-151-S	0	228A	120198/1015	S	G	500 ml	4 C	G	SA	Gamma Spec/Iso U	1
043711 - 002	TJAOU-228A-GR-151-S	0	228A	120198/1015	S	G	500 ml	4 C	G	SA	RCRA metals,HE,SVOCs	2
043711 - 003	TJAOU-228A-GR-151-S	0	228A	120198/1015	S	G	4 oz	4 C	G	SA	VOCs	3
043712 - 001	TJAOU-228A-GR-152-S	0	228A	120198/1020	S	G	500 ml	4 C	G	SA	Gamma Spec	4
043713 – 001	TJAOU-228A-GR-153-S	0	228A	120198/1025	S	G	↓	4 C	G	SA	Gamma Spec	5
043713 - 002	TJAOU-228A-GR-153-S	0	228A	120198/1025	S	G		4 C	G	SA	RCRA metals	6
043714 - 001	TJAOU-228A-GR-154-S	0	228A	120198/1030	S	G		4 C	G	SA	Gamma Spec	7
043715 – 001	TJAOU-228A-GR-155-S	0	228A	120198/1035	S	G		4 C	G	SA	Gamma Spec	8
043715 - 002	TJAOU-228A-GR-155-S	0	228A	120198/1035	S	G		4 C	G	SA	RCRA metals	9
043716 - 001	TJAOU-228A-GR-156-S	0	228A	120198/1045	S	G	↓	4 C	G	SA	Gamma Spec/Iso U	10

RMMA ☒Yes ☐No Ref. No.
Sample Disposal ☐Return to Client ☒Disposal by lab

Sample Tracking SMO use
Date Entered (mm/dd/yy)
Entered by

Special Instructions/QC Requirements
EDD ☒Yes ☐No
Raw data package ☒Yes ☐No
Released by COC 601213
Please list as separate report.

Abnormal Conditions on Receipt Lab use

Turnaround Time ☒Normal ☐Rush Required Report Date
QC Inits.

	Name	Signature	Init	Company/Organization/Phone
Sample Team Members	Chris Catechis	Ch. Catechis	CC	MDM/6131/881-3196
	Gill Baltazar	GB	GB	Weston/6131/971-27

1. Relinquished by	Ch. Catechis	Org. 6131	Date 12/03/98	Time 0920	4. Relinquished by	Org.	Date
1. Received by	[illegible]	Org. 7577	Date 12/3/98	Time 0920	4. Received by	Org.	Date
2. Relinquished by	[illegible] (SMO)	Org. 7578	Date 12/7/98	Time 1255	5. Relinquished by	Org.	Date
2. Received by	[illegible]	Org. GEL	Date 12-7-98	Time 0900	5. Received by	Org.	Date
3. Relinquished by		Org.	Date	Time	6. Relinquished by	Org.	Date
3. Received by		Org.	Date	Time	6. Received by	Org.	Date

Original To Accompany Samples, Laboratory Copy (White) | 1st Copy To Accompany Samples, Return to SMO (Blue) | 2nd Copy SMO Suspense Copy (Yellow) | 3rd Copy Field Copy (Pink)

Contract Verification Review (CVR)

Project Leader COLLINS | Project Name SITE 228A VCM | Case No. 7225.2203

AR/COC No. 601188 | Analytical Lab GEL | SDG No. 9812298

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 and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, LCD)	X				
2.4	Matrix spike/matrix spike duplicate data provided(if requested)	X				
2.5	Detection Limits provided; PQL and MDL(or IDL)	X				
2.6	QC batch numbers provided	X				
2.7	Dilution Factors provided	X				
2.8	Data reported using correct sig. fig. (2 for org.; 3 for inorg.)	X				
2.9	Rad analysis uncertainty provided (2 sigma error)	X				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Were contractual qualifiers provided		X	"B" QUALIFIERS MISSING FOR VOC SAMPLES		
2.14	All requested result data provided	X				

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1)Reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg). Units consistent between QC samples and sample data.	X		
3.2)Quantitation limit met for all samples?	X		
3.3)Accuracy a) Laboratory control sample accuracy reported and met for all samples?		X	4-NITROPHENOL RECOVERY ABOVE QC ACCEPTANCE LIMITS FOR LCS/LCD
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?	X		
c) If requested, matrix spike recovery data reported and met .		X	4-NITROPHENOL ABOVE QC RECOVERY LIMITS FOR SVOC MS/MSD BARIUM ABOVE QC RECOVERY LIMITS FOR MS/MSD
3.4)Precision a) Laboratory control sample precision reported and met for all samples? For rad analysis, sample duplicate precision reported and met.	X		
b) If requested, matrix spike duplicate RPD data reported and met.		X	BARIUM & CADMIUM RPD OUTSIDE QC ACCEPTANCE LIMITS
3.5)Blank data a) Method or reagent blank data reported and met for all samples?		X	2-HEXANONE, ETHYLBENZENE & XYLENES DETECTED IN VOA METHOD BLANK
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?	NA		
3.6)Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank; "U"- analyte undetected (results are below the MDL or L_c (rad)); "H"-analysis done beyond the holding time.	X		
3.7)Narrative included, correct, and complete?	X		

Sample: 1

Matrix: soil

Type Test: ~~[illegible]~~ - 03
9812298 - 06
- 09
- 14
- 17
- 20
- 23

INORGANIC METALS:

SITE/PROJECT: Site 228A VCM ARCOC #: 601188
LABORATORY: GGL LABORATORY REPORT #: 9812298
METHODS: EPA 6010B, EPA 7471

QC Element/ Analyte	ICV	CCV	ICB	CCB	Method Blks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	(1) REP RPD	ICS AB	(2) Serial Dilution	Field Dup RPD	Eq. Blks	Field Blks			
7429-90-5 Al																NA	NA			
7440-39-3 Ba	✓	✓	✓	✓	0.139J	✓	✓	✓	✓	177	33	NA	✓	✓	✓					
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10.7		✓	NA	✓					
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	NA	✓					
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K																				
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	NA	✓					
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	NA	✓					
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	NA	~~57.9~~ ✓					
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	NA	✓					
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	0.0203J	✓	✓	✓	✓	✓	✓		NA	NA	✓					
Cyanide CN																				

mg/kg = ug/g : [(ug/g) x (sample mass (g) / sample vol. (ml)) x (1000ml / liter)] / Dilution Factor = ug/l

NA = Not Applicable

Comments:

(1) No replicate analysis was performed. MS/MSD used.

(2) Serial dilution criteria only apply to sample results ≥ 50X the PQL.

* Summary → See back of this page

REVIEWED BY: [signature] DATE: 3/12/99

# of samples: 12

Matrix: soil

Sample IDs: 9812298 -01, -04, -05, -07, -08, -10, -13, -15, -16, -18, -19, -22

RADIOCHEMISTRY:

SITE/PROJECT: Site 228A VCM ARCOC #: 601188
LABORATORY: GEL LABORATORY REPORT #: 9812298
METHODS: Alpha Spec (Iso-U), Gamma Spec

QC Element/ Analyte	Method Blks	LCS	MS	Rep RER	Eq. Blks (1)	Field Dup RER	Field Blks	-	Sample ID	Isotope	IS/Trace	Sample ID	Isotope	IS/Trace
CRITERIA	U	20%	25%	<1.0	U	<1.0	U	-			50-105			50-105
H3								-	9812298 -01	U-232	✓			
U-238	✓	✓	✓	✓	NA	✓	NA							
U-234/233	✓			✓		✓			-10		112			
U-235/~~236~~ EAS 3/11/99	✓			✓		✓		-	-19		✓			
Th-232									-22		107			
Th-228									QC569606		✓			
Th-230								-	QC569607		✓			
Pu-239/240									QC569608		✓			
Gross Alpha								-	QC569607		✓			
Nonvolatile Beta									QC569610		✓			
Ra226								-	QC569651		✓			
Ra228								-						
Ni-63								-						
Gamma Spec– Am241	✓	✓	NA	✓		✓		-						
Gamma Spec– Cs137	✓	✓		✓		✓								
Gamma Spec– Co60	✓	✓		✓		✓								
" – K40	✓	✓		✓		4.6		-						
								-						

NA = Not Applicable

Parameter	Method	Typical Tracer	Typical Carrier
Iso-U(234,235,238)	Alpha spec	U-232	NA
Iso-Pu	Alpha spec	Pu-242	NA
Iso-Th	Alpha spec	Th-229	NA
Am-241	Alpha spec	Am-242	NA
Sr-90	Beta	Y ingrowth	NA
Ni-63	Beta	NA	Ni by ICP
Ra-226	Deamination	NA	NA
Ra-226	Alpha spec	Ba-133 or Ra-225	NA
Ra-228	Gamma spec	Ba-133	NA

Comments:
(1) No Eq. blanks or Field blanks submitted on the COC.

Gamma spec LCS contains: Am-241, Cs-137, and Co-60

* Summary → See back of this page.

REV. D BY: Kenneth Bailey DATE: 3/12/99

SEMI-VOLATILE ORGANICS: page 3
SW 846 - Method 8270

SITE/PROJECT: Site 228A VCM ARCOC #: 601188
LABORATORY: GEL LABORATORY REPORT #: 9812298

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
5	BN	218-01-9	Chrysene	0.70	NA	✓	✓	✓	✓							✓	NA	NA			
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	0.01		✓	✓	✓													
6	BN	117-84-0	Di-n-octylphthalate	0.01		✓	✓	✓													
6	BN	205-99-2	Benzo(b)fluoranthene	0.70		✓	✓	✓													
6	BN	207-08-9	Benzo(k)fluoranthene	0.70		✓	✓	✓													
6	BN	50-32-8	Benzo(a)pyrene	0.70		✓	✓	✓													
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	0.50		✓	✓	✓													
6	BN	53-70-3	Dibenz(a,h)anthracene	0.40		✓	✓	✓													
6	BN	191-24-2	Benzo(g,h,i)perylene	0.50		✓	✓	✓													
		65-85-0	Benzoic Acid			✓	36, 117	✓													
		100-51-6	Benzyl Alcohol			✓	✓	✓													
		N22	m,p-Cresol			✓	✓	✓													
		122-66-7	1,2-Diphenylhydrazine			✓	✓	✓													

✓ NA = Not Applicable

Surrogate Recovery Outliers

	Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
①	NA								

Comments:
① All Samples met QC criteria for surrogate recoveries.
② All Samples met QC criteria for internal standard areas and retention time

SMC 1: Nitrobenzene-d5 (BN) SMC 2: 2-Fluorobiphenyl (BN) SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d5 (A) SMC 5: 2-Fluorophenol (A) SMC 6: 2,4,6-Tribromophenol (A)
MS 1/99 ~~SMC 7: 2-2-Chlorophenol-d4 (A)~~ ~~SMC 8: 1,2-Dichlorobenzene-d4 (BN)~~

Internal Standard Outliers

	Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT
②	NA												

IS 1: 1,4-Dichlorobenzene-d4 (BN) IS 2: Naphthalene-d8 (BN) IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN) IS 5: Chrysene-d12 (BN) IS 6: Perylene-d12 (BN)

* Summary → See back of this page.

REVIEWED BY: Kenneth Kelly DATE: 3/12/99

ct Samples: 4
Matrix: Soil
Batch #: 137509

Sample IDs: 9812298-02
-11
-20
-23

HIGH EXPLOSIVES:
SW846 Method 8330

SITE/PROJECT: Site 228A VCM ARCOC #: 601188
LABORATORY: GEL LABORATORY REPORT #: 9812298

NAME	CAS #	Intercept	Curve R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks (1)	Field Blks (1)		
			.99	20%	U			20%			20%		U	U		
HMX	2691-41-0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA		
RDX	121-82-4	✓	✓			✓	✓	✓	✓	✓	✓					
1,3,5-Trinitrobenzene	99-35-4	✓	✓			✓	✓	✓	✓	✓	✓					
1,3-dinitrobenzene	99-~~64-0~~65-0	✓	✓			✓	✓	✓	✓	✓	✓					
Nitrobenzene	98-95-3	✓	✓													
Tetryl	479-45-8	✓	✓			✓	✓	✓	✓	✓	✓					
2,4,6-trinitrotoluene	118-96-7	✓	✓			✓	✓	✓	✓	✓	✓					
2-amino-4,6-dinitrotoluene	35572-78-2	✓	✓			✓	✓	✓	✓	✓	✓					
4-amino-2,6-dinitrotoluene	1946-51-0	✓	✓			✓	✓	✓	✓	✓	✓					
2,4-dinitrotoluene	121-14-2	✓	✓			✓	✓	✓	✓	✓	✓					
2,6-dinitrotoluene	606-20-2	✓	✓			✓	✓	✓	✓	✓	✓					
2-nitrotoluene	88-72-2	✓	✓			✓	✓	✓	✓	✓	✓					
4-nitrotoluene	99-99-0	✓	✓			✓	✓	✓	✓	✓	✓					
3-nitrotoluene	99-08-1	✓	✓			✓	✓	✓	✓	✓	✓					
(2) PETN	78-11-5	✓	✓	NA	NA	NA	NA	NA	NA	NA	NA	NA				

NA = Not Applicable

(3)

Sample	SMC %REC	SMC RT		Sample	SMC %REC	SMC RT
NA						

Confirmation

(4)

Sample	CAS #	RPD > 25%		Sample	CAS #	RPD > 25%
NA						

mg/kg = ug/g : [(ug/g) x (sample mass (g) / sample vol. (ml)) x (1000ml / liter)] / Dilution Factor = ug/l

Comments:
(1) No Eq. blank or Field blank were submitted on the COC.
(2) Samples were not analyzed for PETN
(3) All samples met Surrogate %REC and R.T. criteria.
(4) All sample results were ND; No confirmation required.

* Summary

⇒ All sample results ND. All QC criteria met. No data qualified.

RE ED BY: Kenneth Eaby DATE: 3/12/99

SEMI-VOLATILE ORGANICS:
SW-846 - Method 8270

# of samp: 7
Matrix: soil
Batch #: 137412

Sample IDs: 9812298-02
-11
-20
-23

SITE/PROJECT: Site 228A VCM ARCOC #: 601188
LABORATORY: GEL LABORATORY REPORT #: 9812298

	IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks ②	Field Blks ②			
							>.05	<20% / 0.99	<20%									NA	NA			
	1	A	108-95-2	Phenol	0.80	NA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	1	BN	111-44-4	bis(2-Chloroethyl)ether	0.70		✓	✓	✓													
	1	A	95-57-8	2-Chlorophenol	0.80		✓	✓	✓		✓	✓	✓	✓	✓	✓						
	1	BN	541-73-1	1,3-Dichlorobenzene	0.60		✓	✓	✓													
	1	BN	106-46-7	1,4-Dichlorobenzene	0.50		✓	✓	✓		✓	✓	✓	✓	✓	✓						
	1	BN	95-50-1	1,2-Dichlorobenzene	0.40		✓	✓	✓													
	1	A	95-48-7	2-Methylphenol (o-cresol)	0.70		✓	✓	✓													
	1	BN	108-60-1	bis(2-chloroisopropyl)ether	0.01		✓	23.613	49.8	~~NA~~ ✓	KM 3/9/99											
①	1	A	106-44-5	4-Methylphenol	0.60		NA	NA	NA	NA							NA					
	1	BN	621-64-7	N-Nitroso-di-n-propylamine	0.50		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	1	BN	67-72-1	Hexachloroethane	0.30		✓	✓	✓													
	2	BN	98-95-3	Nitrobenzene	0.20		✓	✓	✓													
	2	BN	78-59-1	Isophorone	0.40		✓	✓	✓													
	2	A	88-75-5	2-Nitrophenol	0.10		✓	✓	✓													
	2	A	105-67-9	2,4-Dimethylphenol	0.20		✓	✓	✓													
	2	BN	111-91-1	bis(2-Chloroethoxy)methane	0.30		✓	✓	✓													
	2	A	120-83-2	2,4-Dichlorophenol	0.20		✓	✓	✓													
	2	BN	120-82-1	1,2,4-Trichlorobenzene	0.20		✓	✓	✓		✓	✓	✓	✓	✓	✓						
	2	BN	91-20-3	Naphthalene	0.70		✓	✓	✓													
	2	BN	106-47-8	4-Chloroaniline	0.01		✓	✓	✓													
	2	BN	87-68-3	Hexachlorobutadiene	0.01		✓	✓	✓													
	2	A	59-50-7	4-Chloro-3-methylphenol	0.20		✓	✓	✓		✓	✓	✓	✓	✓	✓						
	2	BN	91-57-6	2-Methylnaphthalene	0.40		✓	✓	✓													
	3	BN	77-47-4	Hexachlorocyclopentadiene	0.01		✓	✓	✓													
	3	A	88-06-2	2,4,6-Trichlorophenol	0.20		✓	✓	✓													
	3	A	95-95-4	2,4,5-Trichlorophenol	0.20		✓	✓	✓													

Comments:
① Samples not analyzed for 4-methylphenol.
② No Eq. blank or Field blank submitted on the COC.

NA = Not Applicable

REVIEWED BY: Kenneth Foley DATE: 3/12/99

SEMI-VOLATILE ORGANICS: page 2
SW 846 - Method 8270

SITE/PROJECT: Site 228A VCM ARCOC #: 601188
LABORATORY: GEL LABORATORY REPORT #: 98122998

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks (2)	Field Blks (2)			
						>.05	<20% / 0.99	<20%													
3	BN	91-58-7	2-Chloronaphthalene	0.80	NA	✓	✓	✓	✓							✓	NA	NA			
3	BN	88-74-4	2-Nitroaniline (o-)	0.01		✓	✓	✓													
3	BN	131-11-3	Dimethylphthalate	0.01		✓	✓	✓													
3	BN	208-96-8	Acenaphthylene	0.90		✓	✓	✓													
3	BN	606-20-2	2,6-Dinitrotoluene	0.20		✓	✓	✓													
3	BN	99-09-2	3-Nitroaniline (m-)	0.01		✓	✓	✓													
3	BN	83-32-9	Acenaphthene	0.90		✓	✓	✓		✓	✓	✓	✓	✓	✓						
3	A	51-28-5	2,4-Dinitrophenol	0.01		✓	21.817	47.7													
3	A	100-02-7	4-Nitrophenol	0.01		✓	✓	80.2		186	185	✓	139	156	✓						
3	BN	132-64-9	Dibenzofuran	0.80		✓	✓	✓													
3	BN	121-14-2	2,4-Dinitrotoluene	0.20		✓	✓	✓		✓	✓	✓	✓	✓	✓						
3	BN	84-66-2	Diethylphthalate	0.01		✓	✓	✓													
3	BN	7005-72-3	4-Chlorophenyl-phenylether	0.40		✓	✓	✓													
3	BN	86-73-7	Fluorene	0.90		✓	✓	✓													
3	BN	100-01-6	4-Nitroaniline (p-)	0.01		✓	29.454	✓													
4	A	534-52-1	4,6-Dinitro-2-methylphenol	0.01		✓	22.948	~~✓~~ 21.24 7/1/99													
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	0.01		✓	✓	✓													
4	BN	101-55-3	4-Bromophenyl-phenylether	0.10		✓	✓	✓													
4	BN	118-74-1	Hexachlorobenzene	0.10		✓	✓	✓													
4	A	87-86-5	Pentachlorophenol	0.05		✓	26.385	✓		✓	✓	✓	✓	✓	✓						
4	BN	85-01-8	Phenanthrene	0.70		✓	✓	✓													
4	BN	120-12-7	Anthracene	0.70		✓	✓	✓	✓							✓					
(1) 4	BN	86-74-8	Carbazole	0.01		✓	✓	24.5	NA							NA					
4	BN	84-74-2	Di-n-butylphthalate	0.01		✓	✓	✓	✓							✓					
4	BN	206-44-0	Fluoranthene	0.60		✓	✓	✓													
5	BN	129-00-0	Pyrene	0.60		✓	✓	✓		✓	✓	✓	✓	✓	✓						
5	BN	85-68-7	Butylbenzylphthalate	0.01		✓	✓	✓													
5	BN	91-94-1	3,3'-Dichlorobenzidine	0.01		✓	✓	44.7													
5	BN	56-55-3	Benzo(a)anthracene	0.80		✓	✓	✓	✓							✓	✓	✓			

Comments:
(1) Samples not analyzed for Carbazole.
(2) No blank or field blanks were submitted on the COC.

NA = Not Applicable

REVIEWED BY: [signature] DATE: 3/12/99

Annex 3-G

ANNEX 3-G
Justification for Removal of Radiological Restrictions at SNL ER Site 228A
M. Miller (May 1999)

JUSTIFICATION FOR REMOVAL OF RADIOLOGICAL RESTRICTIONS AT SNL ER SITE 228A

Prepared by
Mark L. Miller, CHP
Roy F. Weston, Inc.
Albuquerque, NM
May 7, 1999

JUSTIFICATION FOR REMOVAL OF RADIOLOGICAL RESTRICTIONS AT SNL ER SITE 228A

Introduction

ER Site 228A, the Centrifuge Dump Site, is managed by the Sandia National Laboratories/New Mexico Environmental Restoration Project. Environmental concern at Site 228A was primarily based on the presence of depleted uranium (DU) fragments that have weathered into schoepite. Site 228A is also designated as a Radioactive Materials Management Area (RMMA) by Sandia National Laboratories.

The following narrative is to provide the necessary information to the Department of Energy to obtain their concurrence that the site is suitable for unrestricted radiological release of SNL ER Site 228A under guidance found in DOE Order 5400.5 and related interpretive correspondence.

Site Description and History

Site 228A is located on the northern rim of Tijeras Arroyo, about 500 feet east of SNL/NM Technical Area II. The site is approximately 1.6 acres in size. In the mid-1950s, DU fragments were dumped along the arroyo rim along with other test debris from the nearby rocket-powered centrifuge, which was used for testing the reliability of nuclear weapon components.

Under the direction of the ER Project, Rust Geotech, Inc. identified two radioactive anomalies at Site 228A in September 1994. The anomalies were identified as 228E1 and 228E2. Unfortunately, these anomalies were partially covered by 1-foot-thick concrete slabs on a steep slope, which limited the Rust Geotech, Inc. effort to remove contaminated materials. Still, some of the soil beneath the slabs was excavated and 12 drums of DU fragments and DU-contaminated soil were generated and disposed of. The largest DU fragment encountered weighed about 40 pounds. Another drum of radioactive metallic test debris was generated. However, the majority of the test debris and DU remained covered by soil and concrete slabs until heavy rainfall in July 1997 caused significant erosion in the gully. As a result of the rainfall, DU fragments and test debris were washed down the gully and onto a small alluvial fan on the edge of the arroyo.

After visible pieces of DU were picked up by hand in August 1997, geophysical and radiological surveys were conducted. The surveys revealed that DU fragments and test debris were buried over an approximate 0.5 acre area consisting of the gully and adjoining alluvial fan (SNL/NM, 1998). During July through November 1998, the ER Project conducted a voluntary corrective measure (VCM) at Site 228A. Loaders were used to excavate soil, test debris, and DU fragments. After being sorted through a field grizzly (a mechanical sieve), soil from the excavation work was processed with the Thermo NUtech Inc. Segmented Gate System (SGS). Soil containing DU that exceeded

criteria of 27 pCi/g of DU was containerized (see Attachment 1). Soil that was below the cleanup criteria was diverted to a "cold pile", which has a volume of 1,380 cubic yards. Test debris was containerized separately. The "cold pile" remains onsite and is formally identified as pile #5.

A total of about 1,380 cubic yards of soil was processed through the SGS. Soil was sorted through the SGS based on a 27 pCi/g screening threshold, which was 10% of the U-238 Preliminary Remediation Goal (PRG) of 271 pCi/g. An additional 130 cubic yards of oversize material that was sorted out by the SGS grizzly was not processed.

A total volume reduction of contaminated material is excess of 99 percent was realized after the soil was processed through the SGS. A total of approximately 5 cubic yards was sorted by the SGS to a "hot pile" that represented soils above the SGS-criterion of 27 pCi/g for U-238. These soils were placed in twenty-one 55-gallon drums for disposal as radioactive waste. The remaining soil that was below the 27 pCi/g PRG was sorted to a separate "cold pile". This pile, approximately 1,380 cubic yards, remains onsite.

Final Radiological Condition of Site

During the VCM activity, virtually all DU was removed from the site. A small residual amount of DU remains in a "cold" soil pile that was produced by the operation of the SGS process. Nine composite soil samples and two duplicates were collected from the "cold pile". The samples were sent to onsite and offsite laboratories for radiochemical and chemical analyses. The radioactive soil concentration results of these analyses are presented in Attachment 2. Radionuclides were detected in activities only slightly exceeding background and well below a PRG of 271 pCi/g for unrestricted release. Laboratory analyses of the composite soil samples showed a maximum of 8.2 pCi/g for the "cold pile". This highest net value (8.2 pCi/g - 1.3 pCi/g = 6.9 pCi/g) will be used in RESRAD to conservatively calculate potential human exposure for future use scenarios at the site.

Maximum Residual Radionuclide Levels in ER Site 228A Soils

Radionuclide	Maximum Activity (pCi/g)	Background Activity (pCi/g)*
U-238	8.2	1.3
U-235	0.28	0.18
U-234**	1.02	1.6

*(Dinwiddie, 1997)

** U-234 values were calculated using the U-238 concentration and assuming that the U-238 to U-234 ratio was equal to that detected during waste characterization of depleted uranium-contaminated soils generated during the radiological voluntary corrective measures project, where U-234=U-238/8 (Brown January 1998).

A final walkover radiation survey was conducted by SNL RCTs in the gully and alluvial fan from where the soils had been excavated. No radioactivity readings 1.3 times above background were noted during the survey. All oversize material that was sorted by the SGS grizzly was swiped and surveyed for release; items that were 1.3 times greater than background were containerized for off-site disposal.

Dose Assessments for Site

A dose assessment, using the DOE RESRAD computer code, was performed for ER Site 228A assuming both industrial and residential (loss of active control measures) land-use scenarios. It assumes that the only contamination will come from the 1,380 yd^3 of "cold" soil produced by the SGS sorting operation. The highest lab result from the composite sampling activity is taken to represent the average concentration of the entire pile. It is proposed that this be pile be spread evenly over about 0.8 acre of the existing site, resulting in a layer about 1.2 feet thick. This "slightly contaminated" layer is used as the basis of the RESRAD analysis, since no other contamination remains at the site. Site-specific RESRAD input parameters were developed based on information provided by the Task Leader responsible for the site and were as follows:

- Area of Contaminated Zone: 3238 m^2
- Thickness of contaminated zone: 0.37 m
- Length Parallel to Aquifer Flow: 49 m
- Density of Contaminated Zone: 1.27 g/cm^3
- Contaminated Zone Total Porosity: 0.5
- Contaminated Zone Effective Porosity: 0.3
- Contaminated Zone Hydraulic Conductivity: 890 m/year
- Contaminated Zone b Parameter: 4.9 (Sandy Loam)
- Runoff Coefficient: 0.4

The RESRAD dose assessment resulted in the following maximum Total Effective Dose Equivalents (TEDE) to the Reasonably Maximally Exposed (RME) individual (Miller, 1998b)

- Industrial Land-Use: 0.20 mrem/year (the "most likely" future use of the site)
- Residential Land-Use: 1.1 mrem/year (scenario remotely possible with loss of institutional control)

ER Site 228A, with the SGS-sorted "cold" soil pile spread over about 0.8 acre on the site, is recommended for unrestricted radiological release since both the industrial (most likely) and the residential (remotely possible) scenario resulted in an incremental TEDE to the on-site receptor of less than 25 mrem/year per DOE Order 5400.5, Chapter IV. The calculated TEDE for both scenarios are also well below proposed EPA guidance of 15 mrem/year (OSWER 9200.4-18). The average radiation exposure due to natural

human health due to exposure to radionuclides at the site are well within proposed standards when considering both a industrial land-use scenario and a residential land-use scenario.

The data used for these RESRAD runs came from the laboratory analyses of the soil piles. Similar data was obtained live-time during the operation of the SGS. The maximum "clean pile" daily average from this analysis was 24.4 pCi/g. If this U-238 value was used instead of the analytical-laboratory value, the resultant projected doses would only be approximately 3 times the TEDE values listed above and still well below the criterion for unrestricted radiological release for either exposure scenario.

ALARA Analysis for Site

Since no contamination other than that found in the "cold" soil pile remains on the site, the ALARA cost analysis will address only the expense of treating the 1,380 yd^3 soil pile as radioactive waste compared to spreading it out on the site and leaving it. If it were necessary to handle the 1,380 yd^3 pile as radioactive waste and ship it to a disposal facility to eliminate the 1.1 mrem/year dose projected for residential land use, it would cost about $786,000, which includes radioactive waste disposal cost of $550/$yd^3$ and costs for mobilization, demobilization, waste management and verification sampling of $27,000. Assuming residential land use, where 1.1 mrem/year is avoided by each of the projected 6 site residents (8 residents/acre X 0.8 acre) for each of the next 50 years, the projected cost per person-rem avoided would be $2.9 million. By comparison, the heavy-equipment cost to simply spread the soil pile on site is estimated to be about $1000.

Further remedial actions or radioactive waste disposal expense to reduce the already minimal radiation doses on ER Site 228A are not reasonably justified. The site, with "cold" soil pile spread over about 0.8 acres on site, should be released for unrestricted use.

Conclusion and Recommendation

Based on the information provided above, ER Site 228A with the SGS-sorted "cold" soil pile spread over about 0.8 acres on site, can be released for unrestricted use with respect to radiological contaminants under the guidelines provided in DOE Order 5400.5. In the spirit of ALARA, care will be taken to spread the soil outside the 100-year flood plain of Tijeras Arroyo. Sandia National Laboratories requests that the Department of Energy provide a memorandum of concurrence with this recommendation so that this action can be properly documented and access restrictions to the site can be removed.

References

(SNL/NM, 1998) Sandia National Laboratories/New Mexico Environmental Restoration (1998), *Voluntary Corrective Measures Plan - Environmental Restoration Project - Site 228A - Centrifuge Dump Site*, SNL/NM Environmental Project

(NCRP, 1987) 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.

(SAND97-2320/1) *Final Report, Survey and Removal of Radioactive Surface Contamination at Environmental Restoration Sites Sandia National Laboratories/New Mexico Volume 1*, Sandia National Laboratories, September 1997.

(Dinwiddie, 1997) *Request for Supplemental Information: Background Concentrations Report, SNL/KAFB*, Letter from S. Dinwiddie, State of New Mexico Environment Department, Hazardous & Radioactive Materials Bureau, September 24, 1997, to Michael J. Zamorski, U.S. Department of Energy, Kirtland Area Office

(OSWER No. 9200.4-1) *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination*, United States Environmental Protection Agency, August 1997.

Attachment 1

Segmented Gate System ER Site 228A Remediation Project
Thermo NUtech Final Report, December 15, 1998

Attachment 1 is already presented in Annex 3-C

Attachment 2

Site 228A Laboratory Sample Analyses Reports

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program (806 Laboratory)
12-05-98 8:16:01 PM

Analyzed by: 12/6/98 Reviewed by: 12/7/98

Customer : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID : 043960-004
Lab Sample ID : 80253907

ER-221

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 980.000 gram
Sample Date/Time : 12-03-98 2:55:00 PM
Acquire Start Date/Time : 12-05-98 6:32:57 PM
Detector Name : LA302
Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	8.22E-00	1.94E-00	7.05E-01
RA-226	Not Detected	---------	5.20E-01
PB-214	8.01E-01	1.34E-01	4.41E-02
BI-214	7.22E-01	1.24E-01	3.94E-02
PB-210	Not Detected	---------	3.44E+01
TH-232	9.04E-01	1.63E-00	1.29E-01
RA-228	8.68E-01	2.46E-01	1.29E-01
AC-228	9.16E-01	1.82E-01	7.28E-02
TH-228	7.23E-01	2.39E-01	4.58E-01
RA-224	9.33E-01	2.61E-01	5.04E-02
PB-212	9.15E-01	7.20E-01	3.81E-02
BI-212	9.54E-01	7.52E-01	2.66E-01
TL-208	8.68E-01	1.69E-01	5.77E-02
U-235	2.09E-01	3.76E-01	1.65E-01
TH-231	Not Detected	---------	2.35E-00
PA-231	Not Detected	---------	3.86E-00
TH-227	Not Detected	---------	3.29E-01
RA-223	Not Detected	---------	2.57E-01
RN-219	Not Detected	---------	3.46E-01
PB-211	Not Detected	---------	7.99E-01
TL-207	Not Detected	---------	1.19E+01
AM-241	Not Detected	---------	4.84E-01
PU-239	Not Detected	---------	4.67E-02
NP-237	Not Detected	---------	3.44E-01
PA-233	Not Detected	---------	5.35E-02
TH-229	Not Detected	---------	3.06E-01

8.22 ± 1.94
> bkg 1.3

U-235
net = 6.92 pCi/g

U-235 net
.209 − 0.15 = .03 pCi/g
MDA U-235 net
is 0.10 pCi/g

calculated U-234 is
8.22/8 − 1.6 =
(1.03) − 1.6 = −0.57
< bkgd

[Summary Report] - Sample ID: : 80253907

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.55E-02
AG-110m	Not Detected	---------	3.23E-02
BA-133	Not Detected	---------	6.30E-02
BE-7	Not Detected	---------	2.31E-01
CD-109	[illegible]	[illegible]	1.17E+00
CD-115	Not Detected	---------	1.19E-01
CE-139	Not Detected	---------	3.12E-02
CE-141	Not Detected	---------	5.80E-02
CE-144	Not Detected	---------	2.57E-01
CO-56	Not Detected	---------	2.90E-02
CO-57	Not Detected	---------	3.25E-02
CO-58	Not Detected	---------	2.85E-02
CO-60	Not Detected	---------	3.04E-02
CR-51	Not Detected	---------	2.30E-01
CS-134	Not Detected	---------	4.16E-02
CS-137	5.18E-02	2.71E-02	1.83E-02
EU-152	Not Detected	---------	9.75E-02
EU-154	Not Detected	---------	1.63E-01
EU-155	Not Detected	---------	1.63E-01
FE-59	Not Detected	---------	6.20E-02
GD-153	Not Detected	---------	1.32E-01
HG-203	Not Detected	---------	3.10E-02
I-131	Not Detected	---------	3.16E-02
IR-192	Not Detected	---------	2.58E-02
K-40	1.80E+01	3.40E+00	4.17E-01
KR-85	Not Detected	---------	7.21E+00
MN-52	Not Detected	---------	3.09E-02
MN-54	Not Detected	---------	3.05E-02
MO-99	Not Detected	---------	3.86E-01
NA-22	Not Detected	---------	3.63E-02
NA-24	Not Detected	---------	3.01E-01
NB-95	Not Detected	---------	2.30E-01
ND-147	Not Detected	---------	2.07E-01
NI-57	Not Detected	---------	6.55E-02
NP-239	Not Detected	---------	1.46E-01
RU-103	Not Detected	---------	2.58E-02
RU-106	Not Detected	---------	2.53E-01
SB-122	Not Detected	---------	6.09E-02
SB-124	Not Detected	---------	2.68E-02
SB-125	Not Detected	---------	7.50E-02
SN-113	Not Detected	---------	3.47E-02
TA-182	Not Detected	---------	1.29E-01
TA-183	Not Detected	---------	5.52E-01
TC-99m	Not Detected	---------	1.29E-01
TL-201	Not Detected	---------	3.19E-01
XE-133	Not Detected	---------	3.22E-01
Y-88	Not Detected	---------	2.03E-02
ZN-65	Not Detected	---------	8.96E-02
ZR-95	Not Detected	---------	5.11E-02

Not detected
12/6/94

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program (806 Laboratory)
12-06-98 3:43:23 PM

Analyzed by: 12/6/98 Reviewed by: 12/7/98

Customer : J.COPLAND/R.RIVERA (6133/SMO)
Customer Sample ID : 043961-004
Lab Sample ID : 80253908

SR-221 dupe

Sample Description : MARINELLI SOLID SAMPLE
Sample Quantity : 943.000 gram
Sample Date/Time : 12-03-98 2:55:00 PM
Acquire Start Date/Time : 12-05-98 8:18:19 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	1.18E+00	4.98E-01	5.69E-01
RA-226	2.18E+00	7.56E-01	5.29E-01
PB-214	8.13E-01	6.23E-01	4.36E-02
BI-214	7.34E-01	1.28E-01	3.82E-02
PB-210	Not Detected	---------	3.16E+01
TH-232	8.52E-01	3.98E-01	1.28E-01
RA-228	9.91E-01	3.21E-01	1.29E-01
AC-228	1.02E+00	2.57E-01	6.76E-02
TH-228	8.14E-01	2.39E-01	4.18E-01
RA-224	9.71E-01	2.85E-01	5.84E-02
PB-212	8.86E-01	1.41E-01	3.60E-02
BI-212	1.15E+00	4.08E-01	3.07E-01
TL-208	8.24E-01	3.59E-01	6.12E-02
U-235	Not Detected	---------	2.23E-01
TH-231	Not Detected	---------	2.09E+00
PA-231	Not Detected	---------	3.59E+00
TH-227	Not Detected	---------	3.25E-01
RA-223	Not Detected	---------	2.07E-01
RN-219	Not Detected	---------	3.33E-01
PB-211	Not Detected	---------	7.49E-01
TL-207	Not Detected	---------	1.22E+01
AM-241	Not Detected	---------	4.42E-01
PU-239	Not Detected	---------	4.20E+02
NP-237	[illegible]	[illegible]	2.48E-01
PA-233	Not Detected	---------	5.31E-02
TH-229	Not Detected	---------	2.44E-01

not detected 12/6/98

Note: Ra-226 and U-235 gamma peaks interfere. Either isotope may be over-estimated.

[Summary Report] - Sample ID: : 80283908

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.83E-02
AG-110m	Not Detected	---------	3.16E-02
BA-133	Not Detected	---------	6.30E-02
BE-7	Not Detected	---------	2.26E-01
CD-109	Not Detected	---------	8.44E-01
CD-115	Not Detected	---------	1.21E-01
CE-139	Not Detected	---------	2.78E-02
CE-141	Not Detected	---------	5.22E-02
CE-144	Not Detected	---------	2.33E-01
CO-56	Not Detected	---------	2.86E-02
CO-57	Not Detected	---------	2.81E-02
CO-58	Not Detected	---------	2.80E-02
CO-60	Not Detected	---------	3.18E-02
CR-51	Not Detected	---------	2.22E-01
CS-134	Not Detected	---------	4.31E-02
CS-137	4.43E-02	2.44E-02	2.01E-02
EU-152	Not Detected	---------	8.44E-02
EU-154	Not Detected	---------	1.78E-01
EU-155	Not Detected	---------	1.41E-01
FE-59	Not Detected	---------	6.68E-02
GD-153	Not Detected	---------	1.02E-01
HG-203	Not Detected	---------	2.69E-02
I-131	Not Detected	---------	2.98E-02
IR-192	Not Detected	---------	2.52E-02
K-40	1.95E-01	2.79E-00	4.25E-01
KR-85	Not Detected	---------	7.28E-00
MN-52	Not Detected	---------	3.17E-02
MN-54	Not Detected	---------	1.75E-02
MO-99	Not Detected	---------	3.75E-01
NA-22	Not Detected	---------	3.65E-02
NA-24	Not Detected	---------	3.50E-01
NB-95	Not Detected	---------	2.31E-01
ND-147	Not Detected	---------	2.09E-01
NI-57	Not Detected	---------	7.62E-02
NP-239	Not Detected	---------	1.27E-01
RU-103	Not Detected	---------	2.61E-02
RU-106	Not Detected	---------	2.56E-01
SB-122	Not Detected	---------	6.00E-02
SB-124	Not Detected	---------	2.64E-02
SB-125	Not Detected	---------	7.24E-02
SN-113	Not Detected	---------	3.42E-02
TA-182	Not Detected	---------	1.30E-01
TA-183	Not Detected	---------	5.15E-01
TC-99m	Not Detected	---------	1.40E-01
TL-201	Not Detected	---------	2.80E-01
XE-133	Not Detected	---------	2.74E-01
Y-88	Not Detected	---------	2.35E-02
ZN-65	Not Detected	---------	9.09E-02
ZR-95	Not Detected	---------	5.12E-02

218

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043957-001 TJAOU-228A-GR-218-S
Lab ID	: 9812316-12
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.02	+/- 0.251	0.0439	0.115	pCi/g	1.0	EJB	12/17/98	0747	137662	1
Americium-241	U	0.0148	+/- 0.0838	0.0267	0.136	pCi/g	1.0					
Cerium-144	U	0.0162	+/- 0.0948	0.0524	0.176	pCi/g	1.0					
Cesium-134	U	-0.00604	+/- 0.0199	0.0114	0.0302	pCi/g	1.0					
Cesium-137		0.0641	+/- 0.0338	0.00978	0.0403	pCi/g	1.0					
Chromium-51	U	-0.0106	+/- 0.19	0.0959	0.328	pCi/g	1.0					
Cobalt-60	U	-0.00431	+/- 0.0224	0.0115	0.0393	pCi/g	1.0					
Iron-59	U	-0.0459	+/- 0.0574	0.0249	0.0957	pCi/g	1.0					
Lead-212		0.905	+/- 0.112	0.0196	0.0485	pCi/g	1.0					
Lead-214		0.842	+/- 0.128	0.0236	0.0673	pCi/g	1.0					
Potassium-40		22.5	+/- 2.55	0.135	0.328	pCi/g	1.0					
Radium-226		0.675	+/- 0.123	0.0252	0.0652	pCi/g	1.0					
Radium-228		1.02	+/- 0.251	0.0439	0.115	pCi/g	1.0					
Ruthenium-103	U	0.000565	+/- 0.0203	0.0118	0.0368	pCi/g	1.0					
Ruthenium-106	U	-0.0365	+/- 0.176	0.0883	0.309	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.17	0.0461	0.191	pCi/g	1.0					
Thorium-232		0.893	+/- 0.11	0.0194	0.0479	pCi/g	1.0					
Thorium-234		2.65	+/- 1.35	0.326	1.04	pCi/g	1.0					
Uranium-235		0.239	+/- 0.19	0.0600	0.201	pCi/g	1.0					
Uranium-238		2.65	+/- 1.35	0.326	1.04	pCi/g	1.0					
Yttrium-88	U	-0.00337	+/- 0.0163	0.0124	0.0304	pCi/g	1.0					
Zirconium-95	U	-0.000483	+/- 0.0445	0.0193	0.0680	pCi/g	1.0					

U-235 net
.239 - .18 = 0.06 pCi/g

bkg error

M = Method	Method Description
M 1	HASL 300

2.65 - 1.35 / 1.3 = bkg

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi, MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043958-001 TJAOU-228A-GR-219-S
Lab ID	: 9812316-13
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.05	+/- 0.228	0.0400	0.129	pCi/g	1.0	EJB	12/17/98	0748	137662	1
Americium-241	U	-0.0719	+/- 0.108	0.0250	0.136	pCi/g	1.0					
Cerium-144	U	0.00413	+/- 0.109	0.0493	0.195	pCi/g	1.0					
Cesium-134	U	0.00139	+/- 0.0193	0.0104	0.0296	pCi/g	1.0					
Cesium-137		0.0552	+/- 0.0326	0.00896	0.0321	pCi/g	1.0					
Chromium-51		0.0893	+/- 0.181	0.0597	0.357	pCi/g	1.0					
Cobalt-60	U	0.00206	+/- 0.0213	0.0105	0.0382	pCi/g	1.0					
Iron-59	U	0.00687	+/- 0.0497	0.0227	0.0889	pCi/g	1.0					
Lead-212		0.983	+/- 0.129	0.0185	0.0546	pCi/g	1.0					
Lead-214		0.862	+/- 0.139	0.0220	0.0639	pCi/g	1.0					
Potassium-40		22.3	+/- 2.71	0.123	0.337	pCi/g	1.0					
Radium-226		0.825	+/- 0.132	0.0231	0.0591	pCi/g	1.0					
Radium-228		1.05	+/- 0.228	0.0400	0.129	pCi/g	1.0					
Ruthenium-103	U	-0.00766	+/- 0.0207	0.0109	0.0359	pCi/g	1.0					
Ruthenium-106		0.245	+/- 0.234	0.0809	0.288	pCi/g	1.0					
Thorium-231		0.137	+/- 0.1	0.0434	0.190	pCi/g	1.0					
Thorium-232		0.970	+/- 0.127	0.0183	0.0558	pCi/g	1.0					
Thorium-234		2.67	+/- 1.43	0.302	1.13	pCi/g	1.0					
Uranium-235		0.138	+/- 0.118	0.0555	0.212	pCi/g	1.0					
Uranium-238		2.67	+/- 1.43	0.302	1.13	pCi/g	1.0					
Yttrium-88	U	0.00578	+/- 0.0166	0.0112	0.0330	pCi/g	1.0					
Zirconium-95	U	0.00760	+/- 0.0352	0.0177	0.0651	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043959-001 TJAOU-228A-GR-220-S
Lab ID	: 9812316-15
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		0.968	+/- 0.212	0.0401	0.111	pCi/g	1.0	EJB	12/17/98	0749	137662	1
Americium-241	U	-0.0117	+/- 0.077	0.0246	0.135	pCi/g	1.0					
Cerium-144		0.0545	+/- 0.0992	0.0489	0.187	pCi/g	1.0					
Cesium-134	U	-0.0597	+/- 0.0205	0.0104	0.0293	pCi/g	1.0					
Cesium-137		0.0650	+/- 0.0444	0.00892	0.0337	pCi/g	1.0					
Chromium-51	U	-0.106	+/- 0.183	0.0889	0.311	pCi/g	1.0					
Cobalt-60	U	0.00290	+/- 0.0219	0.0106	0.0401	pCi/g	1.0					
Iron-59	U	-0.0104	+/- 0.0457	0.0229	0.0821	pCi/g	1.0					
Lead-212		0.975	+/- 0.125	0.0184	0.0495	pCi/g	1.0					
Lead-214		0.354	+/- 0.131	0.0218	0.0590	pCi/g	1.0					
Potassium-40		21.3	+/- 2.61	0.124	0.302	pCi/g	1.0					
Radium-226		0.796	+/- 0.12	0.0230	0.0597	pCi/g	1.0					
Radium-228		0.968	+/- 0.212	0.0401	0.111	pCi/g	1.0					
Ruthenium-103		0.0146	+/- 0.019	0.0108	0.0362	pCi/g	1.0					
Ruthenium-106		0.0861	+/- 0.173	0.0805	0.300	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.181	0.0430	0.194	pCi/g	1.0					
Thorium-232		0.961	+/- 0.123	0.0151	0.0489	pCi/g	1.0					
Thorium-234		1.42	+/- 0.981	0.299	1.07	pCi/g	1.0					
Uranium-235		0.129	+/- 0.18	0.0561	0.201	pCi/g	1.0					
Uranium-238		1.42	+/- 0.981	0.299	1.07	pCi/g	1.0					
Yttrium-88	U	0.00477	+/- 0.0155	0.0113	0.0306	pCi/g	1.0					
Zirconium-95	U	0.0118	+/- 0.0356	0.0176	0.0649	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

1.420
.439
.439

1238

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043960-001 TJAOU-228A-GR-221-S
Lab ID	: 9812316-16
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.209				pCi/g		JEW	12/28/98	1521	138477	1
Accuracy, Uranium-235		0.0519				pCi/g						
Accuracy, Uranium-238		0.258				pCi/g						
Uranium-233/234		1.23	+/- 0.209	0.0224	0.0455	pCi/g	1.0					
Uranium-235		0.101	+/- 0.0519	0.00978	0.0454	pCi/g	1.0					
Uranium-238		1.68	+/- 0.258	0.0175	0.0177	pCi/g	1.0					
Gamma PHA - 22 items												
Actinium-228		0.0861	+/- 0.0956	0.0453	0.160	pCi/g	1.0	EJB	12/17/98	0750	137662	2
Americium-241	U	-0.0249	+/- 0.0435	0.0154	0.0548	pCi/g	1.0					
Cerium-144	U	-0.0259	+/- 0.107	0.0509	0.188	pCi/g	1.0					
Cesium-134	U	0.00	+/- 0.0311	0.0115	0.0528	pCi/g	1.0					
Cesium-137		0.0111	+/- 0.02	0.00990	0.0409	pCi/g	1.0					
Chromium-51		0.216	+/- 0.245	0.0955	0.342	pCi/g	1.0					
Cobalt-60		0.0301	+/- 0.0226	0.0113	0.0432	pCi/g	1.0					
Iron-59		0.0391	+/- 0.0794	0.0174	0.0984	pCi/g	1.0					
Lead-212		0.856	+/- 0.135	0.0194	0.0761	pCi/g	1.0					
Lead-214		0.879	+/- 0.152	0.0235	0.0712	pCi/g	1.0					
Potassium-40		0.171	+/- 0.249	0.109	0.432	pCi/g	1.0					
Radium-226	U	0.00	+/- 0.0757	0.0255	0.122	pCi/g	1.0					
Radium-228		0.0861	+/- 0.0956	0.0453	0.160	pCi/g	1.0					
Ruthenium-103	U	-0.0150	+/- 0.0256	0.0119	0.0374	pCi/g	1.0					
Ruthenium-106		0.233	+/- 0.392	0.0892	0.337	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.167	0.0458	0.203	pCi/g	1.0					
Thorium-232	U	0.00	+/- 0.133	0.0192	0.126	pCi/g	1.0					
Thorium-234		1.60	+/- 0.757	0.204	0.532	pCi/g	1.0					
Uranium-235	U	0.0255	+/- 0.157	0.0587	0.204	pCi/g	1.0					
Uranium-238		1.60	+/- 0.757	0.204	0.532	pCi/g	1.0					

bks

1.6 757

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Saimi MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043960-001 TJAOU-228A-GR-221-S

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	-0.00532	+/- 0.0207	0.0124	0.0373	pCi/g	1.0					
Zirconium-95	U	-0.0206	+/- 0.0542	0.0195	0.0823	pCi/g	1.0	EJB	12/17/98	0750	137662	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812316-16

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043961-001 TJAOU-228A-GR-221-D
Lab ID	: 9812316-19
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Alpha Spectroscopy Uranium - 6 items												
Accuracy, Uranium-233/234		0.183				pCi/g		JEW	12/28/98	1536	138477	1
Accuracy, Uranium-235		0.0400				pCi/g						
Accuracy, Uranium-238		0.255				pCi/g						
Uranium-233/234		1.06	+/- 0.183	0.0194	0.0163	pCi/g	1.0					
Uranium-235		0.0711	+/- 0.04	0.00	0.0164	pCi/g	1.0					
Uranium-238		1.71	+/- 0.255	0.0163	0.0163	pCi/g	1.0					
Gamma PH1 - 22 items												
Actinium-228		0.877	+/- 0.213	0.0404	0.113	pCi/g	1.0	EJB	12/20/98	1055	137662	2
Americium-241	U	-0.0256	+/- 0.14	0.0352	0.228	pCi/g	1.0					
Cerium-144	U	0.0470	+/- 0.103	0.0509	0.196	pCi/g	1.0					
Cesium-134	U	-0.00684	+/- 0.0162	0.0105	0.0286	pCi/g	1.0					
Cesium-137		0.0224	+/- 0.0226	0.00598	0.0386	pCi/g	1.0					
Chromium-51	U	-0.0217	+/- 0.197	0.0975	0.348	pCi/g	1.0					
Cobalt-60	U	0.00276	+/- 0.0205	0.0107	0.0381	pCi/g	1.0					
Iron-59	U	-0.0215	+/- 0.0472	0.0242	0.0837	pCi/g	1.0					
Lead-212		0.933	+/- 0.121	0.0187	0.0480	pCi/g	1.0					
Lead-214		0.789	+/- 0.13	0.0221	0.0584	pCi/g	1.0					
Potassium-40		24.0	+/- 3.15	0.125	0.313	pCi/g	1.0					
Radium-226		0.700	+/- 0.112	0.0232	0.0602	pCi/g	1.0					
Radium-228		0.877	+/- 0.213	0.0404	0.113	pCi/g	1.0					
Ruthenium-103	U	-0.00236	+/- 0.0194	0.0115	0.0358	pCi/g	1.0					
Ruthenium-106	U	-0.0515	+/- 0.156	0.0815	0.279	pCi/g	1.0					
Thorium-231		0.165	+/- 0.134	0.0437	0.186	pCi/g	1.0					
Thorium-232		0.918	+/- 0.119	0.0184	0.0472	pCi/g	1.0					
Thorium-234		1.96	+/- 1.85	0.408	1.76	pCi/g	1.0					
Uranium-235		0.0750	+/- 0.159	0.0576	0.192	pCi/g	1.0					
Uranium-238		1.96	+/- 1.85	0.408	1.76	pCi/g	1.0					

bkg

1.96
1.55

Client:	Sandia National Laboratories 1515 Eubank SE PO Box 5800 Albuquerque, New Mexico 87123
Contact:	Mr. Doug Salmi MS-1042
Project Description:	RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID : 043961-001 TJAOU-228A-GR-221-D

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Yttrium-88	U	0.0102	+/- 0.0276	0.0224	0.0329	pCi/g	1.0					
Zirconium-95		0.0307	+/- 0.0359	0.0184	0.0681	pCi/g	1.0	EJB	12/20/98	1055	137662	2

M = Method	Method-Description
M 1	EPI A-011B
M 2	HASL 300

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - 1-1023/2056	CT - PH-0175
DE - SC012	FL - E87156/87294	FL - E87472/87458	MS - 29417
ME - SC012	MS - 10120	NY - 11502	RI - 138
NC - 233	NY - 11501	SC - 10582	TN - 02934
RI - 135	SC - 10120	UT - E-227	VA - 00111

9812316-19

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi MS-1042
Project Description: RFP #AJ2480A

Sample ID : 043962-001 TJAOU-228A-GR-222-S
Lab ID : 9812316-22
Matrix : SOIL
Date Collected : 12/03/98
Date Received : 12/08/98
Priority : Routine
Collector : Client

rameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
iological												
ome PHA - 22 items												
nium-228		1.10	+/- 0.239	0.0410	0.133	pCi/g	1.0	EJB	12/17/98	0751	137662	1
ericium-241	U	0.00905	+/- 0.0361	0.0261	0.151	pCi/g	1.0					
ium-144	U	0.0304	+/- 0.165	0.0502	0.197	pCi/g	1.0					
ium-134	U	0.0103	+/- 0.019	0.0107	0.0319	pCi/g	1.0					
ium-137		0.0996	+/- 0.038	0.00918	0.0370	pCi/g	1.0					
romium-51	U	-0.0661	+/- 0.189	0.0919	0.328	pCi/g	1.0					
alt-60	U	0.0101	+/- 0.0215	0.0107	0.0413	pCi/g	1.0					
-59	U	0.00491	+/- 0.0498	0.0232	0.0879	pCi/g	1.0					
d-212		1.02	+/- 0.128	0.0189	0.0534	pCi/g	1.0					
d-214		0.903	+/- 0.146	0.0225	0.0690	pCi/g	1.0					
assium-40		23.0	+/- 2.55	0.126	0.300	pCi/g	1.0					
ium-226		0.825	+/- 0.135	0.0237	0.0622	pCi/g	1.0					
ium-228		1.10	+/- 0.239	0.0410	0.133	pCi/g	1.0					
obalt-103	U	-0.00711	+/- 0.0246	0.0112	0.0391	pCi/g	1.0					
obalt-106	U	0.0180	+/- 0.162	0.0850	0.298	pCi/g	1.0					
ium-231	U	0.00	+/- 0.219	0.0444	0.202	pCi/g	1.0					
ium-232		1.00	+/- 0.126	0.0187	0.0526	pCi/g	1.0					
ium-234		2.05	+/- 1.32	0.316	1.21	pCi/g	1.0					
ium-235		0.284	+/- 0.201	0.0576	0.214	pCi/g	1.0					
ium-238		2.05	+/- 1.32	0.316	1.21	pCi/g	1.0					
m-88	U	0.00673	+/- 0.0158	0.0115	0.0323	pCi/g	1.0					
ium-95		0.0357	+/- 0.0615	0.0181	0.0696	pCi/g	1.0					

Net U-235 = .284 - .18 = 0.10 222 γ

kg

Method	Method-Description
	HASL 300

9812316-22

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043963-001 TJAOU-228A-GR-223-S
Lab ID	: 9812216-23
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
*Radiological												
*Gamma PHA - 22 items												
Actinium-228		0.847	+/- 0.207	0.0395	0.119	pCi/g	1.0	EJB	12/17/98	0751	137662	1
Americium-241		0.0313	+/- 0.0741	0.0247	0.133	pCi/g	1.0					
Cerium-144	U	-0.0524	+/- 0.0959	0.0484	0.175	pCi/g	1.0					
Cesium-134	U	-0.0120	+/- 0.0132	0.0103	0.0270	pCi/g	1.0					
Cesium-137		0.0660	+/- 0.0444	0.00584	0.0313	pCi/g	1.0					
Chromium-51	U	0.0244	+/- 0.135	0.0879	0.327	pCi/g	1.0					
Cobalt-60	U	-0.0120	+/- 0.0252	0.0103	0.0365	pCi/g	1.0					
Iron-59		0.0330	+/- 0.0503	0.0224	0.0945	pCi/g	1.0					
Lead-212		0.894	+/- 0.111	0.0181	0.0489	pCi/g	1.0					
Lead-214		0.847	+/- 0.136	0.0216	0.0573	pCi/g	1.0					
Potassium-40		21.3	+/- 2.52	0.121	0.308	pCi/g	1.0					
Radium-226		0.744	+/- 0.122	0.0228	0.0583	pCi/g	1.0					
Radium-228		0.847	+/- 0.207	0.0395	0.119	pCi/g	1.0					
Ruthenium-103	U	0.00787	+/- 0.018	0.0107	0.0338	pCi/g	1.0					
Ruthenium-106	U	0.0291	+/- 0.149	0.0797	0.272	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.201	0.0425	0.193	pCi/g	1.0					
Thorium-232		0.882	+/- 0.11	0.0179	0.0483	pCi/g	1.0					
Thorium-234		1.98	+/- 1.18	0.301	1.04	pCi/g	1.0					
Uranium-235		0.103	+/- 0.101	0.0544	0.190	pCi/g	1.0					
Uranium-238		1.98	+/- 1.18	0.301	1.04	pCi/g	1.0					
Yttrium-88	U	-0.000668	+/- 0.0175	0.0111	0.0290	pCi/g	1.0					
Zirconium-95	U	0.00797	+/- 0.0368	0.0174	0.0660	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNL500396 Report Date: December 31, 1998

Sample ID	: 043964-001 TJAOU-228A-GR-224-S
Lab ID	: 9812316-25
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 Items												
Actinium-228		0.993	+/- 0.239	0.0382	0.133	pCi/g	1.0	EJB	12/16/98	0550	137563	1
Americium-241	U	-0.0205	+/- 0.0817	0.0303	0.155	pCi/g	1.0					
Cerium-144	U	-0.0675	+/- 0.107	0.0412	0.191	pCi/g	1.0					
Cesium-134	U	-0.00399	+/- 0.019	0.00827	0.0298	pCi/g	1.0					
Cesium-137		0.0707	+/- 0.051	0.00922	0.0374	pCi/g	1.0					
Chromium-51	U	-0.0714	+/- 0.192	0.0776	0.330	pCi/g	1.0					
Cobalt-60	U	-0.0119	+/- 0.0229	0.0120	0.0399	pCi/g	1.0					
Iron-59	U	0.0214	+/- 0.0524	0.0216	0.0944	pCi/g	1.0					
Lead-212		1.14	+/- 0.141	0.0125	0.0524	pCi/g	1.0					
Lead-214		0.923	+/- 0.153	0.0194	0.0653	pCi/g	1.0					
Potassium-40		21.7	+/- 2.46	0.129	0.537	pCi/g	1.0					
Radium-226		0.308	+/- 0.131	0.0199	0.0595	pCi/g	1.0					
Radium-228		0.993	+/- 0.239	0.0382	0.133	pCi/g	1.0					
Ruthenium-103	U	0.00433	+/- 0.0194	0.0107	0.0362	pCi/g	1.0					
Ruthenium-106	U	0.0701	+/- 0.16	0.0800	0.300	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.168	0.0434	0.214	pCi/g	1.0					
Thorium-232		1.13	+/- 0.139	0.0124	0.0515	pCi/g	1.0					
Thorium-234		1.83	+/- 1.2	0.347	1.24	pCi/g	1.0					
Uranium-235		0.0553	+/- 0.113	0.0465	0.209	pCi/g	1.0					
Uranium-238		1.83	+/- 1.2	0.347	1.24	pCi/g	1.0					
Yttrium-88	U	0.00766	+/- 0.0158	0.00936	0.0374	pCi/g	1.0					
Zirconium-95	U	-0.0287	+/- 0.029	0.0191	0.0657	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

9812316-25

Client: Sandia National Laboratories
1515 Eubank SE
PO Box 5800
Albuquerque, New Mexico 87123
Contact: Mr. Doug Salmi,MS-1042
Project Description: RFP #AJ2480A

cc: SNLS00396 Report Date: December 31, 1998

Sample ID	: 043965-001 TJAOU-228A-GR-225-S
Lab ID	: 9812316-26
Matrix	: SOIL
Date Collected	: 12/03/98
Date Received	: 12/08/98
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Radiological												
Gamma PHA - 22 items												
Actinium-228		1.04	+/- 0.214	0.0357	0.123	pCi/g	1.0	EJB	12/16/98	0826	137663	1
Americium-241	U	-0.00345	+/- 0.0292	0.0155	0.0546	pCi/g	1.0					
Cerium-144		0.0636	+/- 0.152	0.0362	0.180	pCi/g	1.0					
Cesium-134		0.0109	+/- 0.0222	0.00772	0.0353	pCi/g	1.0					
Cesium-137		0.0928	+/- 0.0455	0.00862	0.0342	pCi/g	1.0					
Chromium-51		0.158	+/- 0.221	0.0701	0.322	pCi/g	1.0					
Cobalt-60	U	0.00572	+/- 0.026	0.0111	0.0366	pCi/g	1.0					
Iron-59	U	-0.0190	+/- 0.0525	0.0200	0.0906	pCi/g	1.0					
Lead-212		1.10	+/- 0.153	0.0112	0.0496	pCi/g	1.0					
Lead-214		0.982	+/- 0.15	0.0176	0.0621	pCi/g	1.0					
Potassium-40		21.5	+/- 2.25	0.119	0.325	pCi/g	1.0					
Radium-226		0.784	+/- 0.16	0.0185	0.0695	pCi/g	1.0					
Radium-228		1.04	+/- 0.214	0.0357	0.123	pCi/g	1.0					
Ruthenium-103	U	-0.0105	+/- 0.0211	0.00985	0.0363	pCi/g	1.0					
Ruthenium-106		0.134	+/- 0.182	0.0747	0.332	pCi/g	1.0					
Thorium-231	U	0.00	+/- 0.206	0.0390	0.200	pCi/g	1.0					
Thorium-232		1.08	+/- 0.151	0.0111	0.0489	pCi/g	1.0					
Thorium-234		2.64	+/- 0.764	0.196	0.523	pCi/g	1.0					
Uranium-235	U	0.0167	+/- 0.163	0.0412	0.194	pCi/g	1.0					
Uranium-238		2.64	+/- 0.764	0.196	0.523	pCi/g	1.0					
Yttrium-88	U	0.00437	+/- 0.0168	0.00878	0.0334	pCi/g	1.0					
Zirconium-95	U	-0.0145	+/- 0.0354	0.0179	0.0631	pCi/g	1.0					

M = Method	Method-Description
M 1	HASL 300

2.640
-0.764
1.875

Above bkg

9812316-26

Attachment 3

Site 228A RESRAD Outputs:

Industrial Scenario
&
Residential Scenario

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Dose Conversion Factor (and Related) Parameter Summary
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(2)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(3)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(5)
B-1	U-234	1.320E-01	1.320E-01	DCF2(6)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(7)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(8)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(2)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(3)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(5)
D-1	U-234	2.830E-04	2.830E-04	DCF3(6)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(7)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(8)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(8,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(6,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input	Parameter Name
R011	Area of contaminated zone (m**2)	3.238E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.700E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	not used	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	1.000E+03	3.000E+00	---	T(3)
R011	Times for calculations (yr)	not used	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E-02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-235	6.200E-01	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	1.010E+01	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.850E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	0.000E+00	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	3.500E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	3.650E+03	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.900E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	3.630E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	2.670E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	not used	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	not used	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.850E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.500E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	3.650E+03	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.900E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	not used	1	---	NS
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	4.000E+05	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.801E-10	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	4.000E+05	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.801E-10	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.900E+03	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	not used	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	not used	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.076E-07	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	1.300E+03	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.400E-07	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	5.900E+04	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	not used	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	not used	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.289E-09	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	5.300E+05	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	not used	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	not used	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	5.888E-10	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	1.300E+07	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	not used	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	not used	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.400E-11	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter U-234				
R016	Contaminated zone (cm**3/g)	4.000E+05	5.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	not used	5.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	not used	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	7.801E-10	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R017	Inhalation rate (m**3/yr)	7.300E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	7.600E-07	1.000E-04	---	MLINH
R017	Exposure duration	2.500E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	1.150E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.150E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	not used	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	not used	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	not used	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	not used	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	not used	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	not used	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	not used	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	not used	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	not used	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	not used	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	not used	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	-1.000E+00	3.000E-07	6.666E-09	DIFFL
R021	in contaminated zone soil	-1.000E+00	2.000E-06	2.280E-06	DIFCZ
R021	Radon vertical dimension of mixing (m)	not used	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	---	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	not used	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	suppressed
Find peak pathway doses	suppressed

Summary : Site 228A Office Worker Scenario 50/50 in/out, conservative

File : 228AINDH.RAD

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3238.00 square meters	U-235	6.200E-01
Thickness:	0.37 meters	U-238	1.010E+01
Cover Depth:	0.00 meters		

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 15 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	1.000E+03
TDOSE(t):	3.629E-01	3.629E-01	3.709E-01
M(t):	2.420E-02	2.420E-02	2.472E-02

Maximum TDOSE(t): 3.709E-01 mrem/yr at t = 1.000E+03 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	8.649E-02	0.2383	6.779E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.390E-03	0.0038
U-238	2.521E-01	0.6947	1.059E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.281E-02	[illegible]
Total	3.386E-01	0.9330	1.127E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.420E-02	[illegible]

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.788E-02	0.2421
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.751E-01	0.7579
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.629E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	8.649E-02	0.2383	6.791E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.391E-03	0.0038
U-238	2.521E-01	0.6947	1.059E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.281E-02	0.0628
Total	3.386E-01	0.9330	1.127E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.420E-02	0.0667

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.789E-02	0.2421
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.751E-01	0.7579
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.629E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	9.157E-02	0.2469	1.577E-05	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.107E-03	0.0111
U-238	2.522E-01	0.6800	1.363E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.288E-02	0.0617
Total	3.438E-01	0.9269	1.221E-04	0.0003	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.699E-02	0.0728

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.570E-02	0.2580
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.752E-01	0.7420
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.709E-01	1.0000

*Sum of all water independent and dependent pathways.

Summary : Site 228A Office Worker Scenario 50/50 in/out, conservative

File : 228AINDH.RAD

Dose/Source Ratios Summed Over All Pathways

Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) t= 0.000E+00	(mrem/yr)/(pCi/g) 1.000E+00	1.000E+03
U-235	U-235	1.000E+00	1.417E-01	1.417E-01	1.417E-01
U-235	Pa-231	1.000E+00	0.000E+00	2.629E-06	2.601E-03
U-235	Ac-227	1.000E+00	0.000E+00	1.643E-07	1.000E-02
U-235	∑DSR(j)		1.417E-01	1.418E-01	1.543E-01
U-238	U-238	1.000E+00	2.723E-02	2.723E-02	2.723E-02
U-238	U-234	1.000E+00	0.000E+00	6.980E-09	6.970E-06
U-238	Th-230	1.000E+00	0.000E+00	6.193E-14	6.168E-08
U-238	Ra-226	1.000E+00	0.000E+00	4.007E-15	3.386E-06
U-238	Pb-210	1.000E+00	0.000E+00	3.157E-18	9.382E-08
U-238	∑DSR(j)		2.723E-02	2.723E-02	2.724E-02

*Branch Fraction is the cumulative factor for the j'th principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 15 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	1.000E+03
U-235	1.058E+02	1.058E+02	9.718E+01
U-238	5.508E+02	5.508E+02	5.506E+02

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.000E+03 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
U-235	6.200E-01	1.000E+03	1.543E-01	9.718E+01	1.543E-01	9.718E+01
U-238	1.010E+01	1.000E+03	2.724E-02	5.506E+02	2.724E-02	5.506E+02

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	1.000E+03
U-235	U-235	1.000E+00	8.788E-02	8.788E-02	8.788E-02
Pa-231	U-235	1.000E+00	0.000E+00	1.630E-06	1.612E-03
Ac-227	U-235	1.000E+00	0.000E+00	1.019E-07	6.200E-03
U-238	U-238	1.000E+00	2.751E-01	2.751E-01	2.751E-01
U-234	U-238	1.000E+00	0.000E+00	7.049E-08	7.039E-05
Th-230	U-238	1.000E-00	0.000E+00	6.254E-13	6.230E-07
Ra-226	U-238	1.000E+00	0.000E+00	4.047E-14	3.420E-05
Pb-210	U-238	1.000E+00	0.000E+00	3.189E-17	9.476E-07

BRF(i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	1.000E+03
U-235	U-235	1.000E+00	6.200E-01	6.200E-01	6.200E-01
Pa-231	U-235	1.000E+00	0.000E+00	1.312E-05	1.298E-02
Ac-227	U-235	1.000E+00	0.000E+00	2.066E-07	1.258E-02
U-238	U-238	1.000E+00	1.010E+01	1.010E+01	1.010E+01
U-234	U-238	1.000E+00	0.000E+00	2.863E-05	2.859E-02
Th-230	U-238	1.000E+00	0.000E+00	1.289E-10	1.284E-04
Ra-226	U-238	1.000E+00	0.000E+00	1.977E-14	1.671E-05
Pb-210	U-238	1.000E+00	0.000E+00	5.129E-16	1.524E-05

BRF(i) is the branch fraction of the parent nuclide.

Table of Contents

Part I: Mixture Sums and Single Radionuclide Guidelines

Dose Conversion Factor (and Related) Parameter Summary
File: BAES.BIN

Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(2)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(3)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(5)
B-1	U-234	1.320E-01	1.320E-01	DCF2(6)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(7)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(8)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(2)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(3)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(5)
D-1	U-234	2.830E-04	2.830E-04	DCF3(6)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(7)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(8)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	3.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	2.500E-03	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	4.500E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	1.500E-02	4.000E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	8.500E-04	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	8.500E-03	2.500E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	8.500E-03	2.500E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: BAES.BIN

Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-238+D , plant/soil concentration ratio, dimensionless	8.500E-03	2.500E-03	RTF(8,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(6,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	3.238E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.700E-01	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	7.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	1.000E-03	3.000E+00	---	T(3)
R011	Times for calculations (yr)	not used	1.000E+01	---	T(4)
R011	Times for calculations (yr)	not used	3.000E+01	---	T(5)
R011	Times for calculations (yr)	not used	1.000E+02	---	T(6)
R011	Times for calculations (yr)	not used	3.000E+02	---	T(7)
R011	Times for calculations (yr)	not used	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-235	6.200E-01	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	1.010E+01	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	5.000E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.000E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	2.000E-01	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	2.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	1.000E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	1.000E-03	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+02	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSU2(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPU2(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPU2(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BU2(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E-01	---	HCU2(1)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.794E-02	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.794E-02	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.457E-02	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.794E-02	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.990E-03	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.283E-02	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.501E-05	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R016	Distribution coefficients for daughter U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.794E-02	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	1.000E-04	---	MLINH
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	6.200E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	4.000E-02	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	>0 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
R19B	Wet weight crop yield for Non-Leafy (kg/m**2)	7.000E-01	7.000E-01	---	YV(1)
R19B	Wet weight crop yield for Leafy (kg/m**2)	1.500E+00	1.500E+00	---	YV(2)
R19B	Wet weight crop yield for Fodder (kg/m**2)	not used	1.100E+00	---	YV(3)
R19B	Growing Season for Non-Leafy (years)	1.700E-01	1.700E-01	---	TE(1)
R19B	Growing Season for Leafy (years)	2.500E-01	2.500E-01	---	TE(2)
R19B	Growing Season for Fodder (years)	not used	8.000E-02	---	TE(3)
R19B	Translocation Factor for Non-Leafy	1.000E-01	1.000E-01	---	TIV(1)
R19B	Translocation Factor for Leafy	1.000E+00	1.000E+00	---	TIV(2)
R19B	Translocation Factor for Fodder	not used	1.000E+00	---	TIV(3)
R19B	Dry Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RDRY(1)
R19B	Dry Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RDRY(2)
R19B	Dry Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RDRY(3)
R19B	Wet Foliar Interception Fraction for Non-Leafy	2.500E-01	2.500E-01	---	RWET(1)
R19B	Wet Foliar Interception Fraction for Leafy	2.500E-01	2.500E-01	---	RWET(2)
R19B	Wet Foliar Interception Fraction for Fodder	not used	2.500E-01	---	RWET(3)
R19B	Weathering Removal Constant for Vegetation	2.000E+01	2.000E+01	---	WLAM
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	1.400E+01	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	1.000E+00	1.000E+00	---	STOR_T(2)
STOR	Milk	1.000E+00	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	2.000E+01	2.000E+01	---	STOR_T(4)
STOR	Fish	7.000E+00	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	7.000E+00	7.000E+00	---	STOR_T(6)
STOR	Well water	1.000E+00	1.000E+00	---	STOR_T(7)
STOR	Surface water	1.000E+00	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	4.500E+01	4.500E+01	---	STOR_T(9)
R021	Thickness of building foundation (m)	1.500E-01	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	3.000E-02	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	3.000E-07	3.000E-07	---	DIFFL
R021	in contaminated zone soil	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average building air exchange rate (1/hr)	5.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	0.000E+00	0.000E+00	code computed (time dependent)	FAI
R021	Building depth below ground surface (m)	-1.000E+00	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	active
Find peak pathway doses	suppressed

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	3238.00 square meters	U-235	6.200E-01
Thickness:	0.37 meters	U-238	1.010E+01
Cover Deptn:	0.00 meters		

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 75 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	1.000E+03
TDOSE(t):	1.857E+00	1.823E+00	1.716E-02
M(t):	2.476E-02	2.430E-02	2.289E-04

Maximum TDOSE(t): 1.857E+00 mrem/yr at t = 0.000E+00 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	2.096E-01	0.1129	5.561E-03	0.0030	0.000E+00	0.0000	5.034E-02	0.0271	0.000E+00	0.0000	0.000E+00	0.0000	3.988E-03	0.0021
U-238	6.091E-01	0.3280	8.691E-02	0.0468	0.000E+00	0.0000	8.262E-01	0.4449	0.000E+00	0.0000	0.000E+00	0.0000	6.545E-02	0.0352
Total	8.187E-01	0.4408	9.247E-02	0.0498	0.000E+00	0.0000	8.766E-01	0.4720	0.000E+00	0.0000	0.000E+00	0.0000	6.944E-02	0.0374

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.695E-01	0.1451
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.588E+00	0.8549
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.857E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	2.059E-01	0.1130	5.464E-03	0.0030	0.000E+00	0.0000	4.936E-02	0.0271	0.000E+00	0.0000	0.000E+00	0.0000	3.920E-03	0.0021
U-238	5.983E-01	0.3283	8.537E-02	0.0468	9.253E-13	0.0000	8.099E-01	0.4444	0.000E+00	0.0000	0.000E+00	0.0000	6.429E-02	0.0351
Total	8.042E-01	0.4413	9.083E-02	0.0498	9.253E-13	0.0000	8.593E-01	0.4715	0.000E+00	0.0000	0.000E+00	0.0000	6.821E-02	0.0374

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.647E-01	0.1452
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.558E+00	0.8548
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.823E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.772E-03	0.2198	0.000E+00	0.0000	0.000E+00	0.0000	3.772E-03	0.2198
U-238	0.000E+00	0.0000	0.000E+00	0.0000	5.062E-07	0.0000	1.339E-02	0.7802	0.000E+00	0.0000	0.000E+00	0.0000	1.339E-02	0.7802
Total	0.000E+00	0.0000	0.000E+00	0.0000	5.062E-07	0.0000	1.716E-02	1.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.716E-02	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction*	DSR(j,t) t= 0.000E+00	(mrem/yr)/(pCi/g) 1.000E-00	1.000E+03
U-235	U-235	1.000E+00	4.347E-01	4.268E-01	1.312E-03
U-235	Pa-231	1.000E+00	0.000E+00	3.037E-05	1.089E-03
U-235	Ac-227	1.000E+00	0.000E+00	1.154E-06	3.684E-03
U-235	∑DSR(j)		4.347E-01	4.269E-01	6.085E-03
U-238	U-238	1.000E+00	1.572E-01	1.542E-01	1.322E-03
U-238	U-234	1.000E-00	0.000E+00	2.855E-07	3.937E-06
U-238	Th-230	1.000E-00	0.000E+00	8.137E-13	2.557E-11
U-238	Ra-226	1.000E+00	0.000E+00	1.018E-13	6.601E-08
U-238	Pb-210	1.000E+00	0.000E+00	1.518E-16	6.019E-08
U-238	∑DSR(j)		1.572E-01	1.542E-01	1.326E-03

*Branch Fraction is the cumulative factor for the j't principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life ≤ 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 75 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	1.000E+03
U-235	1.725E+02	1.757E+02	1.233E+04
U-238	4.771E+02	4.862E+02	5.656E+04

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
U-235	6.200E-01	0.000E+00	4.347E-01	1.725E+02	4.347E-01	1.725E+02
U-238	1.010E+01	0.000E+00	1.572E-01	4.771E+02	1.572E-01	4.771E+02

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	1.000E+03
U-235	U-235	1.000E+00	2.695E-01	2.646E-01	8.135E-04
Pa-231	U-235	1.000E+00	0.000E+00	1.883E-05	6.751E-04
Ac-227	U-235	1.000E+00	0.000E+00	7.157E-07	2.284E-03
U-238	U-238	1.000E+00	1.588E+00	1.558E+00	1.335E-02
U-234	U-238	1.000E+00	0.000E+00	2.883E-06	3.977E-05
Th-230	U-238	1.000E+00	0.000E+00	8.219E-12	2.583E-10
Ra-226	U-238	1.000E+00	0.000E+00	1.028E-12	6.667E-07
Pb-210	U-238	1.000E+00	0.000E+00	1.533E-15	6.079E-07

BRF(i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	1.000E+03
U-235	U-235	1.000E+00	6.200E-01	6.090E-01	1.001E-08
Pa-231	U-235	1.000E+00	0.000E+00	1.288E-05	2.097E-10
Ac-227	U-235	1.000E+00	0.000E+00	2.012E-07	1.122E-10
U-238	U-238	1.000E+00	1.010E+01	9.920E+00	1.631E-07
U-234	U-238	1.000E+00	0.000E+00	2.812E-05	4.618E-10
Th-230	U-238	1.000E+00	0.000E+00	1.273E-10	7.837E-07
Ra-226	U-238	1.000E+00	0.000E+00	1.838E-14	2.564E-08
Pb-210	U-238	1.000E+00	0.000E+00	1.421E-16	1.990E-08

BRF(i) is the branch fraction of the parent nuclide.

Annex 3-H

ANNEX 3-H
Removal of Radiological Restrictions from SNL/NM ER Site 228
Soden and Rael (July 1999)

United States Government | Department of Energy

Memorandum

Albuquerque Operations Office

DATE: JUL 0 6 1999

REPLY TO: ESHD:RJB

SUBJECT: Removal of Radiological Restrictions from SNL ER Site 228

TO: M. Zamorski, Area Manager, Kirtland Area Office

On June 2, 1999 you forwarded for review a document prepared by the staff from Sandia National Laboratories/New Mexico (SNL/NM) entitled "*Justification for Removal of Radiological Restrictions at SNL ER Site 228*". Following subsequent reviews and clarification of issues, it was determined that the document adequately presents the final radiological characteristics of the site. Furthermore, the projected dose analysis of the site meets the Authorized Release Limits of DOE Order 5400.5, *Radiological Protection of the Public and Environment*.

Based on this analysis and the data presented within, the request is approved and the radiological cleanup of SNL/NM ER Site ~~55~~ 228 is satisfactorily completed. Consequently, the site should be released from any further radiological controls. All radiological postings can be removed and unrestricted access to the site may be restored. In addition, the site no longer needs to be considered a Radiological Material Management Area (RMMA).

Please forward this decision to Dick Fate, Manager SNL ER Project Closure Department. Remind him that SNL/NM must maintain the records associated with this release indefinitely, including all survey data, soil sampling and computer modeling analysis. A copy of this letter with attachment is being forwarded to DOE/HQ EH-412 for recording purposes. If you have any questions regarding this topic please call either Mr. Rex Borders in ESHD at 845-5076 or Mr. Dave Bourne in ERD at 845-4032.

6-29-99
C.L. Soden — Date
Director,
Environment Safety and Health Division

7/6/99
G. Rael — Date
Director,
Environmental Restoration Division

cc:
A. Wallo III, DOE/HQ/EH-412 (2 copies with attachments)
J. Cormier, AL/KAO

TOTAL P.01

Annex 3-I

ANNEX 3-I
Risk Screening Assessment

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SWMU 228A: RISK SCREENING ASSESSMENT

I. Site Description and History

Solid Waste Management Unit (SWMU) 228A, the Centrifuge Dump Site at Sandia National Laboratories/New Mexico (SNL/NM), covers 1.6 acres and is located about 500 feet east of Technical Area (TA)-II on land that is owned by Kirtland Air Force Base (KAFB) and leased to the U.S. Department of Energy. The site is situated on the steeply sloping northern rim of Tijeras Arroyo and the nearly flat floodplain below. Ground elevations at SWMU 228A range from 5,405 feet at the northern site boundary to about 5,360 feet at the southern site boundary on the Tijeras Arroyo floodplain.

Environmental concern about SWMU 228A was caused by weapons debris and construction debris that had been dumped at the site in the 1950s. The weapons debris, including depleted uranium (DU) fragments, came from the adjacent SWMU 50 centrifuge. Following centrifuge tests in the mid-1950s, weapons debris was dumped in a gully located about 80 feet east of the centrifuge. This gully eventually became part of SWMU 228A. The weapons debris was dumped next to construction debris that had previously been dumped in the early 1950s. The construction debris had been generated by the demolition of KAFB barracks. Except for a limited amount of cleanup in 1994, the weapons and construction debris remained near the upper end of the gully until the summer of 1997. Unfortunately, heavy rainfall on July 28,1997, washed some of the weapons and construction debris approximately 250 feet farther down the gully and onto the Tijeras Arroyo floodplain. Starting in the summer of 1998, a voluntary corrective measure (VCM) was conducted at SWMU 228A at the four remediation areas: the construction debris area, the buried test debris area, the Scrappy-DU gully, and the Scooby-DU alluvial fan deposit. As a result of the VCM activities, all construction and weapons debris was excavated and removed.

Historical records and technical memoranda have provided a significant level of process knowledge for the centrifuge testing activities. Weapons operations at the centrifuge are well documented in a series of classified memoranda written by SNL/NM engineers and scientists. The centrifuge was constructed in 1952 within an abandoned meander-loop above the Tijeras Arroyo floodplain. The centrifuge was rocket-driven and was not covered by a building or other structure. The centrifuge was used from 1952 through 1956 to test arming, fuzing, and firing components at high rates of centrifugal acceleration. For test containment purposes, native soil was used to construct a 7-foot-high berm around the 80-foot-diameter concrete slab and to build up a nearby section of the arroyo rim. The centrifuge boom was 50 feet in length and held an experimental apparatus test jig on one end and rocket motors on the other end to provide rapid acceleration. During some tests, the test jigs contained DU and high explosive (HE) components. The most commonly used HE was 1,3,5-trinitrobenzene, also known as Cyclonite. However, none of the HE spheres or detonators were fired (expended) during the tests. DU was the only radioactive material used at the site; no other radionuclides such as tritum or plutonim were used in the centrifuge tests.

The debris at SWMU 228A consisted of weapons debris from the SWMU 50 centrifuge and construction debris from the demolition of the KAFB barracks. The weapons debris consisted mostly of DU fragments, rubber pads, aluminum pieces, concrete spheres, and small electrical components. Because SWMU 228A received weapons debris from centrifuge operations, the

potential existed for unexploded ordnance (UXO)/HE material such as rocket motors or explosives charges also to be buried in or near the Scrappy-DU gully. However, no explosive materials were found during the VCM remediation. The construction debris consisted mostly of scrap metal, lumber, bricks, and concrete rubble.

The annual precipitation for the area, as measured at the Albuquerque International Sunport, is 8.1 inches. No springs or perennial surface-water bodies are located within two miles of the site. During most rainfall events, rainfall quickly infiltrates the soil at SWMU 228A. However, virtually all of the moisture subsequently undergoes evapotranspiration. The estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall.

The vicinity of SWMU 228A is unpaved and no stormwater channels are used to direct surface water. The extreme southern end of SWMU 228A is located within the 100-year Tijeras Arroyo floodplain. However, the site is located approximately 800 feet from the active channel, which only flows several times each year at Powerline Road. Tijeras Arroyo is the most significant surface-water drainage feature on KAFB. The arroyo originates in Tijeras Canyon, which is bounded by the Sandia Mountains to the north and the Manzano Mountains to the south. The arroyo trends southwest along the southern edge of the site and eventually drains into the Rio Grande, approximately nine miles west of SWMU 228A.

Groundwater monitoring for the area surrounding SWMU 228A is conducted as part of the Sandia North Groundwater Investigation. Four monitoring wells (TA2-W-24, TA2-W-25, TA2-W-26, and TA2-W-27) are located within 400 feet of SWMU 228A. Two water-bearing zones, the shallow groundwater system and the regional aquifer, underlie SWMU 228A. The shallow groundwater system is not used for water supply. The depth to the shallow groundwater system is approximately 280 feet below ground surface (bgs) near the southern end of SWMU 228A. The depth to the regional aquifer is approximately 450 feet bgs. Both the City of Albuquerque and KAFB use the regional aquifer for water supply. The nearest water supply well (KAFB-11) is located approximately 0.7 mile east of SWMU 228A. The nearest downgradient water supply well is KAFB-1, which is located approximately 1.4 miles northwest of the site.

Grasslands, which include species such as blue/black grama and western wheatgrass, are the dominant plant communities surrounding SWMU 228A . The site is principally vegetated by ruderal species such as Russian thistle (tumbleweed). Soil at the site has been identified as the Bluepoint-Kokan Association. For purposes of defining the background levels of metals and radionuclides in soil, this soil has been included as part of the Sandia North Supergroup. The Bluepoint-Kokan Association consists of the Bluepoint loamy fine sand, which is developed on slopes of 5 to 15 percent, and the Kokan gravelly sand on slopes of 15 to 40 percent. These slightly calcareous soils are mildly to moderately alkaline. The runoff potential ranges from slow to very rapid, and the hazard of water erosion is slight to severe. Water permeability is moderate to very rapid. The surficial deposits are underlain by the upper unit of the Santa Fe Group, which consists of coarse- to fine-grained fluvial deposits from the ancestral Rio Grande. The Santa Fe Group intertongues with the coarse-grained alluvial fan/piedmont veneer facies that extend westward from the Sandia and Manzanita Mountains. The upper Santa Fe unit is approximately 1,200 feet thick in the vicinity of the site.

II. Data Quality Objectives

The data quality objectives (DQO) presented in the SWMU 228A VCM Plan (SNL/NM May 1998) and its accompanying SWMU 228A Field Implementation Plan (FIP) (SNL/NM July 1998) identified the site-specific confirmatory sampling locations, sample depths, sampling procedures, and analytical requirements. The DQOs outlined the quality assurance (QA)/quality control (QC) requirements necessary for producing analytical data suitable for risk-assessment purposes. The confirmatory sampling conducted at SWMU 228A was designed to:

- Confirm that a thorough remediation had been conducted during the VCM,
- Characterize the nature and extent of any residual contaminants of concern (COC),
- Demonstrate that the VCM proposed cleanup values were achieved, and
- Provide analytical data of sufficient quality to support risk screening assessments.

Table 1 summarizes the rationale for designing the sampling pattern. The source of potential COCs at SWMU 228A was the weapons debris and construction debris that had been dumped at the site in the 1950s. The VCM activities removed about 605 pounds of DU fragments along with several hundred cubic yards of weapons and construction debris.

Following the conclusion of the VCM remediation activities (excavation, debris removal, and radiological/metal detector surveying) at a particular area, a series of confirmatory soil samples was collected. The confirmatory soil samples (identified as TJAOU-228A-GR-120-S through TJAOU-228A-GR-249-S) were collected at 130 locations across SWMU 228A. All except three of the samples were surface soil samples that were collected using a hand trowel from a depth of 0 to 0.5 foot bgs. Three samples (TJAOU-228A-GR-214-S through TJAOU-228A-GR-216-S) were collected using a hand auger from a depth of 2 to 3 feet bgs. The soil samples were collected using the sampling procedures detailed in the SWMU 228A FIP (SNL/NM July 1998).

The SWMU 228A confirmatory soil samples were analyzed for all COCs: DU-related radionuclides (uranium-233/234, uranium-235, uranium-238), Resource Conservation and Recovery Act (RCRA) metals, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and HE compounds. Three analytical laboratories (Core Laboratories Inc., General Engineering Laboratories Inc. [GEL]), and the on-site SNL/NM Radiation Protection Sample Diagnostic [RPSD] Laboratory analyzed the samples. Isotopic uranium and gamma spectroscopy analyses were performed at the two off-site analytical laboratories for all 130 sample locations. Samples from approximately 50 percent of the locations also were analyzed for RCRA metals. Samples from about 20 percent of the locations were analyzed for VOCs, SVOCs, and HE compounds. Samples from approximately 35 percent of the locations were analyzed by the RPSD Laboratory for gamma emitting radionuclides. Table 2 summarizes the sampling performed to meet the data quality requirements from the SWMU 228A FIP (SNL/NM July 1998).

Nineteen QA/QC samples (nine duplicates, six trip blanks, and six equipment blanks) were collected during the confirmatory sampling effort according to the Environmental Restoration Project QA Project Plan (QAPjP). For sampling in the debris areas, duplicate soil samples were collected at 10 percent of the sampling locations. Equipment-wash (aqueous rinsate) blanks was prepared at the end of each sampling day. Trip blanks accompanied the soil samples that were sent for VOC analyses. No significant QA/QC problems were identified in the QA/QC samples.

Table 1
Summary of Sampling Performed to Meet Data Quality Objectives

SWMU 228A Sampling Areas	Potential COC Source	Number of Sampling Locations	Sample Density	Sampling Location Rationale
Construction debris area	Construction debris, including scrap metal, lumber, bricks, and concrete	10	1 per 190 ft^2; 20-foot grid spacing and random	Confirm that no significant levels of COCs remain where construction debris was removed
Buried test debris area	Construction debris, including communication wire, scrap metal, lumber, bricks, and concrete	13	1 per 450 ft^2; 20-foot grid spacing and random	Confirm that no significant levels of COCs remain where construction debris was removed
Scrappy-DU gully	DU fragments; weapons debris, including aluminum plates, steel brackets, nylon webbing, microelectronics, batteries; construction debris, including scrap metal, lumber, bricks, and concrete	15	1 per 80 ft^2; 10-foot grid spacing and random	Confirm that no significant levels of COCs remain where DU fragments, construction debris, and weapons debris were removed
Scooby-DU and remainder of alluvial fan deposit	DU fragments; weapons debris, including aluminum plates, steel brackets, nylon webbing, microelectronics, batteries; construction debris, including scrap metal, lumber, bricks, and concrete	52	1 per 340 ft^2; 25-foot grid spacing and random	Confirm that no significant levels of COCs remain where DU fragments, construction debris, and weapons debris were removed
Soil Piles #1, #2, #3	Construction debris area/ buried test debris area	8	1 per 220 ft^2; 3-foot intervals along perimeter of piles (aliquots used to make composite samples)	Confirm that no significant levels of COCs remain in soil removed from construction debris area and buried test debris area
Soil Piles #5 and #6	DU fragments	11	1 per 410 ft^2; 10-foot intervals across Soil Pile #5 and 3-foot intervals across Soil Pile #6 (aliquots used to make composite samples)	Confirm that no significant levels of COCs remain in soil processed by the SGS or in the soil previously used as a loader (heavy equipment) ramp
Perimeter of SWMU 228A and across at SWMU 50	None suspected	21	Judgmental and random; sample density not applicable.	Confirm that no significant levels of COCs are present along perimeter of SWMU 228A and SWMU 50

COC = Contaminant of concern.
DU = Depleted uranium.
ft = Foot (feet).
SGS = Segmented Gate System.
SWMU = Solid Waste Management Unit.

Table 2
Summary of Data Quality Requirements

Analytical Requirement	Core Laboratories, Inc. and GEL	RPSD Laboratory
Gamma Spectroscopy EPA Method 901.1[a]	130 samples	47 samples
Isotopic Uranium Laboratory Method CA-GLR-R405	130 samples	Not analyzed
RCRA metals EPA Method 6010/7000[a]	57 samples	Not analyzed
VOCs EPA Method 8260A[a]	26 samples	Not analyzed
SVOCs EPA Method 8270[a]	26 samples	Not analyzed
HE compounds EPA Method 8330[a]	26 samples	Not analyzed

Note: The number of samples does not include QA/QC samples such as duplicates, trip blanks, and equipment blanks.
[a]EPA November 1986.
EPA = U.S. Environmental Protection Agency.
GEL = General Engineering Laboratories, Inc.
HE = High explosive.
QA = Quality assurance.
QC = Quality control.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostic Laboratory.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

SNL/NM verified/validated all of the confirmatory soil sample results. The off-site laboratory results from Core Laboratories Inc. and GEL were reviewed according to "Data Verification/Validation Level 3—DV-3" in the Technical Operating Procedure 94-03, Rev. 0. The DV3 reports are presented in the associated SWMU 228A no-further-action (NFA) proposal. The gamma spectroscopy data from the RPSD Laboratory were reviewed according to "Laboratory Data Review Guidelines," Procedure No. RPSD-02-11, Issue No. 02. The RPSD verification/validation reports are presented with the gamma spectroscopy results in the NFA proposal. The reviews confirmed that the analytical data from the three analytical laboratories were acceptable for use in the NFA proposal.

III. Determination of Nature, Rate, and Extent of Contamination

III.1 Introduction

The determination of the nature, migration rate, and extent of contamination at SWMU 228A was based upon an initial conceptual model validated with confirmatory sampling at the site.

The initial conceptual model was developed from archival research, soil sampling, soil-vapor sampling, aerial photographs, geophysical surveys, and radiological surveys. The DQOs contained in the SWMU 228A VCM Plan and its FIP identified the sample locations, sample density, sample depth, and analytical requirements. The sample data were subsequently used to develop the final conceptual model for SWMU 228A, which is presented in Section 3.5 of the associated NFA proposal. The nature, migration rate, and extent of contamination is described below.

III.2 Nature of Contamination

Both the nature of contamination and the potential for the degradation of COCs at SWMU 228A was evaluated using laboratory analyses of the soil samples (Section V). The analytical requirements included gamma spectroscopy and specific analyses for DU-related radionuclides, RCRA metals, VOCs, SVOCs, and HE. The analyses characterized any potential contaminants remaining after the debris removal operation. The analytes and methods listed in Table 2 were appropriate to characterize the COCs and degradation products at SWMU 228A.

III.3 Rate of Contaminant Migration

SWMU 228A is an inactive site that has been recently remediated, and therefore, all primary sources of COCs have been eliminated. As a result, only secondary sources of COCs potentially remain in soil in the form of adsorbed COCs (DU, RCRA metals, VOCs, SVOCs, and HE). The rate of COC migration from surficial soil is dependent predominantly upon precipitation and occasional surface-water flow, as described in Section V. Data available from the Sandia North Groundwater Investigation; numerous SNL/NM monitoring programs for air, water, and radionuclides; various biological surveys; and meteorological monitoring are adequate to evaluate the rate of COC migration at SWMU 228A.

III.4 Extent of Contamination

Surface and subsurface confirmatory soil samples were collected from all four of the remediated areas and the vicinity of SWMU 228A to assess the effectiveness of the VCM remediation. The confirmatory soil samples were collected using the sampling density in Table 1 after the following five VCM excavation targets were satisfied:

1. No visible DU fragments, construction debris, or weapons debris remained.

2. Verification radiological surveys with field instruments indicated that no DU fragments or DU-contaminated soil with radioactivity in excess of 1.3 times background were present.

3. Verification geophysical surveys indicated that no debris remained buried.

4. No VOCs or SVOCs were detected with the photoionization detector.

5. Geologic evidence was found that distinguished fill material from native soil.

Confirmatory soil samples were collected from the ground surface to a maximum depth of 3 feet. Sampling at a more extensive variety of depths was not a significant concern at SWMU 228A because the five VCM excavation targets were satisfied. Furthermore, the vertical rate of contamination migration was expected to be extremely low for SWMU 228A because of the low precipitation, high evapotranspiration, impermeable vadose zone soils, and the relatively low solubility of metals and DU. Therefore, the confirmatory soil samples are considered to be both representative of the soil potentially contaminated with the COCs and sufficient to determine the vertical extent, if any, of COCs.

In summary, the design of the confirmatory sampling was appropriate and adequate to determine the nature, migration rate, and extent of residual COCs in surface and subsurface soils at SWMU 228A.

IV. Comparison of COCs to Background Screening Levels

Site history and characterization activities were used to identify potential COCs. The identification of COCs and the sampling to determine the residual concentration levels of those COCs across the site are described in the SWMU 228A NFA proposal. Generally, COCs evaluated in this risk assessment include all detected radiological COCs and organics and all inorganic COCs for which samples were analyzed. 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 SNL/NM maximum background concentration (Dinwiddie September 1997) was selected to provide the background screening results shown in Tables 3 and 4. If applicable, human health nonradiological COCs were also compared to SNL/NM-proposed Subpart S action levels (Table 3) (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).

Table 3 lists nonradiological COCs for the human health and ecological risk assessment at SWMU 228A; Table 4 lists radiological COCs. Both tables show the associated SNL/NM maximum background concentration values (Dinwiddie September 1997). Sections VI.4, VII.2 and VII.3 discuss the content of Tables 3 and 4.

V. Fate and Transport

The primary releases of COCs at SWMU 228A were to the ground surface in association with the surface disposal of waste material along a gully near the old centrifuge site (SWMU 50), approximately 500 feet east of the historic boundary for TA-II along the northern rim of the Tijeras Arroyo. Subsequent erosion by surface-water runoff exposed some of the debris and carried COCs southward toward the main channel of the Tijeras Arroyo with the transported soil. Residual COCs in the exposed soil may be transported by certain winds, although the site is somewhat protected by topography and reseeded native grasses.

The average annual precipitation received at this site is about 8 inches (NOAA 1990). Most of the water received at the site will infiltrate into the soil and will then be lost to evapotranspiration. Water that infiltrates into the soil may carry COCs desorbed from the soil particles. The COCs at this site generally do not have a high potential for leaching in soil.

Table 3
Nonradiological COCs for Human Health and Ecological Risk Assessment at SWMU 228A 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	3.32	4.4	Yes	44[c]	NA	Yes
Barium	216	200	No	170[d]	NA	Yes
Cadmium	1.77	<1	No	64[c]	NA	Yes
Chromium, total	12.0	12.8	Yes	16[c]	NA	No
Lead	40.5	11.2	No	49[c]	NA	Yes
Mercury	0.063 J	<0.1	Unknown	5500[c]	NA	Yes
Selenium	0.918	<1	Unknown	800[e]	NA	Yes
Silver	0.436 J	<1	Unknown	0.5[c]	NA	No
Uranium	83.9	2.3	No	20[d]	NA	No
Benzene	0.0012	NA	NA	5.2[c]	2.13[c]	No
Methylene chloride	0.0072	NA	NA	5[f]	1.25[f]	No
Acenapthene	0.070 J	NA	NA	389[g]	3.92[g]	Yes
Anthracene	0.110 J	NA	NA	917[c]	4.45[c]	Yes
Benzo(a)anthracene	0.32 J	NA	NA	10,000[g]	5.61[g]	Yes
Benzo(a)pyrene	0.26 J	NA	NA	3,000[c]	6.04[c]	Yes
Benzo(b)fluoranthene	0.37	NA	NA	--	6.124[g]	Yes
Benzo(g,h,i)perylene	0.25 J	NA	NA	58,884[g]	6.58[g]	Yes
Benzo(k)fluoranthene	0.28 J	NA	NA	93,325[g]	6.84[g]	Yes
Chrysene	0.37	NA	NA	18,000[g]	5.91[g]	Yes
Di-n-butyl phthalate	0.06 J	NA	NA	6,761[h]	4.61[g]	Yes
bis(2-ethylhexyl) phthalate	0.11 J	NA	NA	851[h]	7.6[g]	Yes

Refer to footnotes at end of table.

Table 3 (Concluded)
Nonradiological COCs for Human Health and Ecological Risk Assessment at SWMU 228A 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)
Fluoranthene	0.63	NA	NA	12,302[g]	4.90[g]	**Yes**
Fluorene	0.050 J	NA	NA	2,239[g]	4.18[g]	**Yes**
Indeno(1,2,3-c,d) pyrene	0.099 J	NA	NA	59,407[g]	6.58[g]	**Yes**
Phenanthrene	0.42	NA	NA	23,800[c]	4.63[c]	**Yes**
Pyrene	0.6	NA	NA	36,300[c]	5.32[g]	**Yes**

Note: **Bold** indicates the COCs that failed the background screening procedure and/or are bioaccumulators.
[a]From Dinwiddie (September 1997) North Supergroup.
[b]NMED (March 1998).
[c]BCF and/or Log K_{ow} from Yanicak (March 1997).
[d]BCF from Neumann (1976).
[e]BCF from Callahan et al. (1979).
[f]BCF and/or Log K_{ow} from Howard (1990)
[g]BCF and/or Log K_{ow} from Micromedex (1998)
[h]BCF from Howard (1989).
BCF = Bioconcentration factor.
COC = Constituent of concern.
J = Estimated concentration.
K_{ow} = Octanol-water partition coefficient.
Log = Logarithm (base 10).
mg/kg = Milligram(s) per kilogram.
NA = Not applicable.
NMED = New Mexico Environment Department.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.
-- = Information not available.

Table 4
Radiological COCs for Human Health and Ecological Risk Assessment at SWMU 228A with Comparison to the Associated SNL/NM Background Screening Value and BCF

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)	Bioaccumulator?[b] (BCF>40)
Cs-137	0.621	0.836	Yes	3000[c]	**Yes**
Th-232	1.24	1.54	Yes	3000[d]	No[e]
U-233/234	1.64	1.6	**No**	900[d]	**Yes**
U-235	0.8	0.18	**No**	900[d]	**Yes**
U-238	11.4	1.3	**No**	900[d]	**Yes**

Note: **Bold** indicates the COCs that failed the background screening procedure and/or are bioaccumulators.
[a]From Dinwiddie (September 1997), North Supergroup.
[b]NMED (March 1998).
[c]From Whicker and Schultz (1982).
[d]From Baker and Soldat (1992).
[e]From Yanicak (March 1997).
BCF = Bioconcentration factor.
COC = Constituent of concern.
NMED = New Mexico Environment Department.
pCi/g = Picocurie(s) per gram.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

Because groundwater at SWMU 228A is approximately 280 feet bgs, it is unlikely that the infiltration and percolation at the site will be sufficient to reach groundwater. The potential for future surface-water runoff and run on has been extensively mitigated. Final grading at the northern part of SWMU 228A and around the SWMU 50 centrifuge has eliminated the catch basin that created the July 1997 erosion and washout of debris. Surface-water controls (a diversion ditch, revegetation, and erosion-control mats) have greatly reduced the effects of surface water. Numerous site inspections during the unusually wet August 1999, monsoon season confirm that no off-site surface water runoff or run on occurs at SWMU 228A; the rainfall infiltrated the soil well before off-site runoff or run on could occur. Transported soils have not left the site or reached the active channel of the Tijeras Arroyo, which is located about 800 feet south of the site across the flat floodplain.

The site contains natural vegetation and is open for use by wildlife. Therefore, uptake of COCs into the food chain is possible. Plant roots can take up constituents of potential ecological concern (COPEC) from the soil, and these can be either transferred to herbivores that consume the plant tissues or returned to the soil as litter. Above-ground litter could be transported by wind and surface water until consumed by decomposer organisms. Animals could also consume COCs through direct ingestion of soil particles. COCs that are consumed by animals could pass through the gut and be returned to the soil in feces (either at the site or distant from the site as the animal moves), or they could be absorbed into tissues and held. The animal could be eaten by a carnivore or scavenger, and the constituents still held in the consumed tissues would repeat the process of excretion or consumption by higher predators, scavengers, and decomposers.

The residual COCs at SWMU 228A include both inorganic and organic constituents. The inorganic COCs (including radionuclides) are elemental in form, and therefore, they are not considered to be degradable. 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). This is often the result of biotransformation (i.e., transformation caused by plants, animals, and microorganisms); however, because of the aridity of the environment, such processes are not expected to be significant at this site. Because of their long half-lives, loss of radionuclides by radioactive decay is also considered to be insignificant at this site. Transformation of organic compounds through photolysis, hydrolysis, and biodegradation may occur but it is expected that the aridity of the environment would slow the process. Loss by volatilization may occur for those organics near the soil surface, especially for benzene and methylene chloride.

Table 5 summarizes the fate and transport processes that may occur at SWMU 228A. Because of the topography and vegetative cover at this site, the potential for transport by wind is low. The potential for transport by surface water is low and is not expected to result in significant off-site effects. The existence of natural vegetative cover and habitat for wildlife at this site results in a potential for food chain uptake; however, because of the site's small size and arid conditions, this is not expected to be a significant fate and transport mechanism for COCs. COCs are not expected to leach significantly into the soil and are, therefore, not expected to reach groundwater. Degradation or transformation of the inorganic COCs at this site is expected to be negligible but may affect some of the organic COCs present at the site.

Table 5
Summary of Fate and Transport at SWMU 228A

Transport and Fate Mechanism	Existence at Site	Significance
Wind	Yes	Low
Surface runoff	Yes	Low
Migration to groundwater	No	None
Food chain uptake	Yes	Low
Transformation/degradation	Yes	Low

SWMU = Solid Waste Management Unit.

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 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 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 regarding the contents of the previous steps are addressed.

VI.2 Step 1. Site Data

Section I provides the description and history for SWMU 228A. Section II presents the argument that DQOs were satisfied. Section III describes the determination of the nature, rate, and extent of contamination.

VI.3 Step 2. Pathway Identification

SWMU 228A has been designated with a future land-use scenario of industrial (DOE et al. September 1995) (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 is limited to nonradiological COCs). Soil ingestion is included for the radiological COCs as well. No water pathways to the groundwater are considered, because depth to groundwater at SWMU 228A is approximately 280 feet bgs. Because of the lack of surface water or other significant mechanisms for dermal contact, the dermal exposure pathway is considered to be insignificant. 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, which includes the two screening procedures. The first screening procedure compared the maximum COC concentration to the background screening level. The second screening procedure compared maximum COC concentrations to SNL/NM proposed Subpart S action levels. This second procedure was applied only to COCs that were not eliminated during the first screening procedure.

VI.4.1 Background Screening Procedure

VI.4.1.1 Methodology

Maximum concentrations of nonradiological COCs were compared to the approved SNL/NM maximum screening level for this area. The SNL/NM maximum background concentration was selected to provide the background screen in Table 3 and was used to calculate risk attributable to background in Table 9. Only the COCs that were above their respective SNL/NM maximum background screening levels or did not have a quantifiable background screening level were considered in further risk assessment analyses.

For radiological COCs that exceeded the SNL/NM background screening levels, background values were subtracted from the individual maximum radionuclide concentrations. Those that

did not exceed these background levels were not carried any further in the risk assessment. This approach is consistent with DOE (1993). Radiological COCs that did not have a background value and were detected above the analytical minimum detectable activity were carried through the risk assessment at their maximum levels. The resultant radiological COCs remaining after this step are referred to as background-adjusted radiological COCs.

VI.4.1.2 Background Screening Procedure Results

A comparison of SWMU 228A maximum COC concentrations to the SNL/NM maximum background values (Dinwiddie September 1997) for the human health risk assessment is presented in Tables 3 and 4. For the nonradiological COCs, four constituents exceeded the background screening value. Three COCs had no quantified background screening levels; thus, it is unknown whether these COCs exceeded background. Finally, seventeen COCs were organic and had no background screening values.

The maximum concentration value for lead is 40.5 milligrams (mg)/kilogram (kg). The EPA intentionally does not provide any human health toxicological data on lead; therefore, no risk parameter values could be calculated. However, EPA Region 6 guidance for the screening value for lead for the industrial land-use scenario is 2,000 mg/kg (EPA 1996a); for the residential land-use scenario, the EPA screening guidance value is 400 mg/kg (EPA July 1994). The maximum concentration value for lead at this site is less than both screening values; therefore, lead is eliminated from further consideration in the human health risk assessment.

For the radiological COCs, three constituents had maximum activity concentrations greater than their respective background (uranium-233/234, uranium-235, and uranium-238).

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 (IT July 1994) that were calculated using methods and equations promulgated in the proposed RCRA Subpart S (EPA 1990) and Risk Assessment Guidance for Superfund (RAGS) (EPA 1989) documentation. Accordingly, all calculations were based upon the assumption that receptor doses from both toxic and potentially carcinogenic compounds result most significantly from ingestion of contaminated soil. Because the samples were all taken from the surface, this assumption is considered valid. If there were ten or fewer COCs and each had a maximum concentration less than one-tenth the action level, then the site was judged to pose no significant health hazard to humans. If there were more than ten COCs, the Subpart S screening procedure was not performed.

VI.4.2.2 Results

Because the SWMU 228A sample set had more than ten COCs that continued beyond the first screening level (including COCs that did not have background screening values), the proposed

Subpart S screening process was not performed. All nonradiological COCs that were not eliminated during the background screening process for SWMU 228A had 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 were taken from the Integrated Risk Information System (IRIS) (EPA 1998a), the Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), and the Region 9 (EPA 1996b) electronic database. 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 were 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" (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 the industrial and residential land-use scenarios. The equations for nonradiological COCs are based upon the RAGS (EPA 1989). Parameters are

Table 6
Toxicological Parameter Values for SWMU 228A Nonradiological COCs

COC Name	RfD_o (mg/kg-day)	Confidence[a]	RfD_{inh} (mg/kg-day)	Confidence[a]	SF_o $(mg/kg\text{-}day)^{-1}$	SF_{inh} $(mg/kg\text{-}day)^{-1}$	Cancer Class[b]
Barium	7E-2[c]	M	1.4E-4[d]	--	--	--	--
Cadmium	5E-4[c]	H	5.7E-5[d]	--	--	6.3E+0[c]	B1
Mercury	3E-4[e]	--	8.6E-5[c]	M	--	--	D
Selenium	5E-3[c]	H	--	--	--	--	D
Silver	5E-3[c]	L	--	--	--	--	D
Uranium	3E-3[c]	M	--	--	--	--	--
Benzene	1.7E-3[d]	--	1.7E-3[d]	--	2.9E-2[c]	2.9E-2[c]	A
Methylene chloride	6E-2[c]	M	8.6E-1[e]	--	7.5E-3[c]	1.7E-3[c]	B2
Acenapthene	6E-2[c]	L	6E-2[d]	--	--	--	--
Anthracene	3E-1[c]	L	3E-1[d]	--	--	--	D
Benzo(a) anthracene	--	--	--	--	7.3E-1[d]	7.3E-1[d]	--
Benzo(a) pyrene	--	--	--	--	7.3E+0[c]	7.3E+0[c]	B2
Benzo(b) fluoranthene	--	--	--	--	7.3E-1[d]	7.3E-1[d]	B2
Benzo(g,h,i) perylene[f]	--	--	--	--	7.3E+0[d]	7.3E+0[d]	B2
Benzo(k) fluoranthene	--	--	--	--	7.3E-2[d]	7.3E-2[d]	B2
Chrysene	--	--	--	--	7.3E-3[d]	7.3E-3[d]	B2
Di-n-butyl phthalate	1E-1[c]	L	1E-1[d]	--	--	--	D
bis(2-ethylhexyl) phthalate	2E-2[d]	--	2.2E-2[d]	--	1.4E-2[d]	1.4E-2[d]	--
Fluoranthene	4E-2[c]	L	4E-2[d]	--	--	--	D
Fluorene	4E-2[c]	L	4E-2[d]	--	--	--	D
Indeno(1,2,3-c,d) pyrene	--	--	--	--	7.3E-1[d]	7.3E-1[d]	B2
Phenanthrene[g]	3E-1[c]	L	3E-1[d]	--	--	--	D
Pyrene	3E-2[c]	L	3E-2[d]	--	--	--	D

[a]Confidence associated with IRIS (EPA 1998a) database values. Confidence - L = low, M = medium, H = high.
[b]EPA weight-of-evidence classification system for carcinogenicity (EPA 1989) taken from IRIS (EPA 1998a):

A = Human carcinogen.
B1 = Probable human carcinogen. Limited human data are available.
B2 = Probable human carcinogen. Indicates sufficient evidence in animals and inadequate or no evidence in humans.
D = Not classifiable as to human carcinogenicity.

[c]Toxicological parameter values from IRIS electronic database (EPA 1998a).
[d]Toxicological parameter values from EPA Region 9 electronic database (EPA 1996b)
[e]Toxicological parameter values from HEAST database (EPA 1997a)
[f]Toxicological parameter values for benzo(g,h,i)perylene were not found in toxicological databases; Dibenz(a,h)anthracene was selected as surrogate compound.
[g]Toxicological parameter values for phenanthrene were not found in toxicological databases. Anthracene was selected as surrogate compound.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
HEAST = Health Effects Assessment Summary Tables.

Table 6 (Concluded)
Toxicological Parameter Values for SWMU 228A Nonradiological COCs

IRIS = Integrated Risk Information System.
mg/kg-day = Milligram(s) per kilogram day.
$(mg/kg\text{-}day)^{-1}$ = Per milligram per kilogram day.
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 228A COCs Obtained from RESRAD Risk Coefficients[a]

COC Name	SF_o (1/pCi)	SF_{inh} (1/pCi)	SF_{ev} (g/pCi-yr)	Cancer Class[b]
U-233/234	4.40E-11	1.40E-08	2.10E-11	A
U-235	4.70E-11	1.30E-08	2.70E-07	A
U-238	6.20E-11	1.20E-08	6.60E-08	A

[a]From Yu et al. (1993a).
[b]EPA weight-of-evidence classification system for carcinogenicity (EPA 1989): A = Human carcinogen.
1/pCi = One per picocurie.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
g/pCi-yr = Gram(s) per picocurie-year.
SF_{ev} = External volume exposure slope factor.
SF_{inh} = Inhalation slope factor.
SF_o = Oral (ingestion) slope factor.
SWMU = Solid Waste Management Unit.

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 were 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* (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 on potential risk to human health under the more restrictive land-use scenario.

VI.6.2 Risk Characterization

Table 8 shows an HI of 0.03 for the SWMU 228A nonradiological COCs and an excess cancer risk of 2E-6 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 that the associated background constituents had an HI of 0.00 and no measurable excess cancer risk.

For the radiological COCs, contribution from the direct gamma exposure pathway is included. For the industrial land-use scenario, a TEDE was calculated for an individual who spends 4 hours/week on the site. This resulted in an incremental TEDE of 7.0E-1 millirem (mrem) per year (/yr). In accordance with EPA guidance found in Office of Solid Waste and Emergency Response Directive No. 9200.4-18 (EPA 1997b), an incremental TEDE of 15 mrem/yr was used for the probable land-use scenario (industrial in this case); the calculated dose value for SWMU 228A for the industrial land use was well below this guideline. The estimated excess cancer risk was 7.8E-6.

For the residential land-use scenario nonradioactive COCs, the HI was 2 and the excess cancer risk was 2E-5 (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 was 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 were not considered (see Appendix 1). Table 9 shows that the associated background constituents had a HI of 0.04 and no measurable excess cancer risk.

For the radiological COCs, the incremental TEDE for the residential land-use scenario was 2.7E+0 mrem/yr. The guideline being used was 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 228A for the residential land-use scenario was well below this guideline. Consequently, SWMU 228A is eligible for unrestricted radiological release because 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 was 2.5E-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 was 0.03 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). Excess cancer risk was estimated at 2E-6. 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 1E-5 for Class C carcinogens (NMED March 1998). For this

Table 8
Risk Assessment Values for SWMU 228A Nonradiological COCs

COC Name	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Barium	216	0.00	--	0.03	--
Cadmium	1.77	0.00	6E-10	1.45	1E-9
Mercury	0.063 J	0.00	--	0.11	--
Selenium	0.918	0.00	--	0.32	--
Silver	0.436 J	0.00	--	0.02	--
Uranium	83.9	0.03	--	0.20	--
Benzene	0.0012	0.00	9E-10	0.00	1E-8
Methylene chloride	0.0072	0.00	5E-10	0.00	5E-8
Acenapthene	0.070 J	0.00	--	0.00	--
Anthracene	0.110 J	0.00	--	0.00	--
Benzo(a) anthracene	0.32 J	0.00	8E-8	0.00	1E-6
Benzo(a) pyrene	0.26 J	0.00	7E-7	0.00	6E-6
Benzo(b) fluoranthene	0.37	0.00	1E-7	0.00	9E-7
Benzo(g,h,i) perylene[b]	0.25 J	0.00	6E-7	0.00	9E-6
Benzo(k) fluoranthene	0.28 J	0.00	7E-9	0.00	7E-8
Chrysene	0.37	0.00	1E-9	0.00	1E-8
Di-n-butyl phthalate	0.06 J	0.00	--	0.00	--
bis (2-ethylhexyl) phthalate	0.11 J	0.00	5E-10	0.00	4E-9
Fluoranthene	0.63	0.00	--	0.00	--
Fluorene	0.050 J	0.00	--	0.00	--
Indeno(1,2,3-c,d) pyrene	0.099 J	0.00	3E-8	0.00	2E-7
Phenanthrene[c]	0.42	0.00	--	0.00	--
Pyrene	0.6	0.00	--	0.00	--
Total		**0.03**	**2E-6**	**2**	**2E-5**

[a]From EPA (1989).
[b]Toxicological parameter values for benzo(g,h,i) perylene were not found in toxicological databases. Dibenz(a,h) anthracene was selected as surrogate compound.
[c]Toxicological parameter values for phenanthrene were not found in toxicological databases. Anthracene was selected as surrogate compound.
EPA = U.S. Environmental Protection Agency.
COC = Constituent of concern.
J = Concentration is estimated.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
-- = Information not available.

Table 9
Risk Assessment Values for SWMU 228A Nonradiological Background Constituents

COC Name	Background Concentration[a] (mg/kg)	Industrial Land-Use Scenario[b]		Residential Land-Use Scenario[b]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Barium	200	0.00	--	0.03	--
Cadmium	<1	--	--	--	--
Mercury	<0.1	--	--	--	--
Selenium	<1	--	--	--	--
Silver	<1	--	--	--	--
Uranium	2.3	0.00	--	0.01	--
Total		**0.00**	**--**	**0.04**	**--**

[a]From Dinwiddie (September 1997), North Supergroup.
[b]From EPA (1989).
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
-- = Information not available.

assessment, the excess cancer risk was driven by benzo(a)pyrene, benzo(b) fluoranthene, and benzo(g,h,i) perylene. All three of these organics are Class B2 carcinogens. Thus, the excess cancer risk for this site was above the suggested acceptable risk value (1E-6).

This assessment also determined risks considering background concentrations of the potential nonradiological COCs for both the industrial and residential land-use scenarios. Table 9 shows that the associated background constituents had an HI of 0.00 and no measurable excess cancer risk. Incremental risk was determined by subtracting risk associated with background from potential COC risk. These numbers were not rounded before the difference was determined and, therefore, may appear to be inconsistent with numbers presented in tables and within the text. For conservatism, the background constituents that do not have quantified background concentrations are assumed to have an HQ and excess cancer risk of 0.00. Incremental HI was 0.03. Incremental cancer risk was 1.52E-6 for the industrial land-use scenario. These incremental risk calculations indicated incremental excess cancer risk above the proposed guidelines, considering a industrial land-use scenario.

For radiological COCs and the industrial land-use scenario, incremental TEDE was 7.0E-1 mrem/yr, which is significantly less than EPA's numerical guideline of 15 mrem/yr. Incremental estimated excess cancer risk was 7.8E-6.

The calculated HI for the residential land-use scenario nonradiological COCs was 2, which is above the numerical guidance. Excess cancer risk was estimated at 2E-5. Excess cancer risk was driven by benzo(a) pyrene, benzo(b) fluoranthene, and benzo(g,h,i) perylene. All three organics are Class B2 carcinogens. Therefore, the excess cancer risk for this site would be above the suggested acceptable risk value (1E-6). Table 9 shows that the associated background constituents had an HI of 0.04 and no measurable excess cancer risk. The

incremental HI was 2.09, and the incremental cancer risk was 1.72E-5 for the residential land-use scenario. Both the incremental HI and excess cancer risk were above proposed guidelines considering the residential land-use scenario.

The incremental TEDE for a residential land-use scenario from the radiological components was 2.7E+0 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 was 2.5E-5.

VI.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at SWMU 228A was based upon an initial conceptual model that was validated with confirmatory sampling conducted across the site. The confirmatory sampling was implemented in accordance with the SWMU 228A VCM Plan (SNL/NM May 1998) and the SWMU 228A FIP (SNL/NM July 1998). The DQOs contained in the VCM Plan and the FIP were appropriate for use in risk-screening assessments. The data collected, based upon sample location, density, and depth, were representative of the site. The analytical requirements and results satisfied the DQOs. Data quality was verified/validated in accordance with SNL/NM procedures (SNL/NM July 1994, SNL/NM July 1996). Therefore, there is no uncertainty associated with the data quality used to perform the risk screening assessment at SWMU 228A.

Because of the location, history of the site, and future land use (DOE et al. September 1995), 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 were found in 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 were conservative and that calculated intakes were probably overestimates. Maximum measured values of COC concentrations were used to provide conservative results.

Table 6 shows the uncertainties (confidence) in nonradiological toxicological parameter values. There is a mixture of estimated values and values from the IRIS (EPA 1998a), the HEAST (EPA 1997a), and EPA Region 9 (EPA 1996b) electronic databases. Where values were not provided, information was not available from the HEAST (EPA 1997a), the IRIS (EPA 1998a), or the EPA regions (EPA 1996, 1997c). Because of the conservative nature of the RME approach, uncertainties in toxicological values were not expected to change the conclusion from the risk assessment analysis.

The calculated HI for the nonradiological COCs was within the human health acceptable range for the industrial land-use scenario compared to established numerical guidance. Although the excess cancer risk was above proposed guidelines, the excess cancer risk was conservatively estimated by using maximum concentrations of the detected COCs. Because the site was adequately characterized, average concentrations would be more representative of actual site conditions. If the 95th upper confidence limits of the means for benzo(a) pyrene (0.13 mg/kg), benzo(b) fluoranthene (0.18 mg/kg), and benzo(g,h,I) perylene (0.11 mg/kg) are used in place

of maximum concentrations, the excess cancer risk is calculated to be 8E-7, which is within proposed guidelines considering an industrial land-use scenario.

For radiological COCs, the conclusion of the risk assessment was that potential effects on human health for both industrial and residential land-use scenarios were within guidelines and were 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

This risk assessment identified COCs consisting of some organic, inorganic and radiological compounds at SWMU 228A. 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 (0.03) was significantly less than the accepted numerical guidance from the EPA. Excess cancer risk (2E-6) was above the acceptable risk value provided by the NMED for an industrial land use scenario (NMED March 1998). The incremental HI was 0.03, and the incremental cancer risk was 1.52E-6 for the industrial land-use scenario. Total and incremental HI risk calculations indicated insignificant risk to human health for an industrial land-use scenario.

Although the excess cancer risk was above proposed guidelines, the excess cancer risk was conservatively estimated by using maximum concentrations of the detected COCs. Because the site was adequately characterized, average concentrations are considered to be more representative of actual site conditions. If the 95th upper confidence limits of the means for benzo(a) pyrene (0.13 mg/kg), benzo(b) fluoranthene (0.18 mg/kg), and benzo(g,h,i) perylene (0.11 mg/kg) are used in place of maximum concentrations, the excess cancer risk is calculated to be 8E-7, which is within proposed guidelines considering an industrial land-use scenario.

Incremental TEDE and corresponding estimated cancer risk from radiological COCs were much less than EPA guidance values. The estimated TEDE was 7.0E-1 mrem/yr for the industrial land-use scenario, relative to 15 mrem/yr in EPA guidance (EPA 1997b). The corresponding incremental estimated cancer risk value was 7.8E-6 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 was only 2.7E+0 mrem/yr with an associated risk of 2.5E-5. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, SWMU 228A is eligible for unrestricted radiological release.

Uncertainties associated with the calculations are considered to be small relative to the conservatism 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 COPECs in soils at SWMU 228A. 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) (NMED March 1998) are addressed in Sections II through V. 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 conservatisms in the estimation of ecological risks, ecological relevance and professional judgment are also used as recommended by the EPA (1998b) 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 that biota at/or adjacent to the site will 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 the 0- to 5-foot depth interval that exceeded background concentrations were:

- Barium
- Cadmium
- Lead
- U-233/234
- U-235
- U-238.

Mercury, selenium, and silver do not have quantified background screening levels, thus it was unknown if these COCs exceeded background. Therefore, these COCs were carried forward in the risk assessment process.

Several organic analytes were detected in soil which included:

- Benzene
- Methylene chloride
- Acenaphthene
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Chrysene
- Di-n-butyl phthalate
- Bis(2-ethylhexyl)phthalate
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Phenanthrene
- Pyrene.

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):

- Barium
- Cadmium
- Lead
- Mercury
- Selenium
- Cs-137
- U-233/234
- U-235
- U-238
- Acenaphthene
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Chrysene
- Di-n-butyl phthalate
- Bis(2-ethylhexyl)phthalate
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene

- Phenanthrene
- Pyrene.

It should be noted, however, that as directed by the NMED (NMED March 1998), bioaccumulation for inorganics was assessed exclusively based upon maximum reported bioconcentration factors (BCF) for aquatic species. Because only aquatic BCFs are used to evaluate the bioaccumulation potential for metals, bioaccumulation in terrestrial species is likely to be overpredicted.

VII.2.3 Fate and Transport Potential

The potential for the 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), surface-water runoff is expected to be low as transport mechanisms for COPECs at this site. Migration to groundwater is not anticipated. Both food chain uptake and degradation/transformation are of low significance.

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 involved 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 was conservative to ensure that ecological risks were not underpredicted.

Components within the screening assessment included:

- 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, Environmental Restoration Program, Sandia National Laboratories/New Mexico" (IT July 1998) and are not duplicated here.

VII.3.1.1 Ecological Pathways and Setting

SWMU 228A is approximately 1.6 acres in size. The site is located in grassland habitat; however, much of the habitat at this site was disturbed during 1950s test operations and 1998 to 1999 VCM activities. Natural vegetation, including grasses, forbs, and shrubs, is partially restored through natural succession and revegetation work. The aridity of the site is exacerbated by its southern exposure. The site is open to use by wildlife, but the disturbed habitat conditions and lack of water at the site limit the quality of the habitat conditions for wildlife. Biological and sensitive species surveys were conducted in 1994 at both the centrifuge site (SWMU 50) and SWMU 228 (IT February 1995) with no sensitive species being found. No sensitive species are expected to occur at this site because of the habitat disturbance.

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 and exposure to external radiation. Because of the lack of surface water at this site, exposure to COPECs through the ingestion of surface water was considered insignificant. Inhalation and dermal contact were also considered insignificant pathways with respect to ingestion (Sample and Suter 1994). Groundwater is not expected to be affected by COPECs at this site.

VII.3.1.2 COPECs

The analytical results from soil samples collected at SWMU 228A are summarized in Tables 3 and 4 (Section IV). All soil samples were within the potential range of contact with ecological receptors (0 to 5 feet bgs), and therefore, all samples were used in the evaluation of COPECs. Both radiological and nonradiological analytes were evaluated as COPECs. The nonradiological COPECs included both inorganic and organic analytes. 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 and those for which a definitive screening level had not been determined were considered to be COPECs. All organic analytes detected were considered to be COPECs. Nonradiological inorganics that are essential nutrients such as iron, magnesium, calcium, potassium, and sodium were not included in this risk assessment per the EPA (1989). In order to provide conservatism in this ecological risk assessment, the assessment was based upon the maximum soil concentrations of the COPECs measured at this site.

VII.3.1.3 Ecological Receptors

As described in detail in 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 associated with the site. The deer mouse (*Peromyscus maniculatus*) and the 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

For nonradiological COPECs, direct uptake 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 surface water at this site. The deer mouse was modeled under three dietary regimes: as an herbivore (100 percent of its diet as plant material), as an omnivore (50 percent of its diet as plants and 50 percent as soil invertebrates), and an insectivore (100 percent of its diet as soil invertebrates). The burrowing owl was modeled as a strict predator on small mammals (100 percent of its diet as deer mice). Because the exposure in the burrowing owl from a diet consisting of equal parts of herbivorous, omnivorous, and insectivorous mice is equal to the exposure from a diet 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 one, 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 provide a conservative estimate of potential exposures and risks to plants and wildlife at this site.

For 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

Table 10
Exposure Factors for Ecological Receptors at SWMU 228A

Receptor Species	Class/Order	Trophic Level	Body Weight (kg)[a]	Food Intake Rate (kg/day)[b]	Dietary Composition[c]	Home Range (acres)
Deer mouse (*Peromyscus maniculatus*)	Mammalia/ Rodentia	Herbivore	2.39E-2[d]	3.72E-3	Plants: 100% (+ soil at 2% of intake)	2.7E-1[e]
Deer mouse (*Peromyscus maniculatus*)	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 (*Peromyscus maniculatus*)	Mammalia/ Rodentia	Insectivore	2.39E-2[d]	3.72E-3	Invertebrates: 100% (+ soil at 2% of intake)	2.7E-1[e]
Burrowing owl (*Speotyto cunicularia*)	Aves/ Strigiformes	Carnivore	1.55E-1[f]	1.73E-2	Rodents: 100% (+ soil at 2% of intake)	3.5E+1[g]

[a]Body weights are in kilograms wet weight.
[b]Food intake rates are estimated from the allometric equations presented in Nagy (1987). Units are kilograms dry weight per day.
[c]Dietary compositions are generalized for modeling purposes. Default soil intake value of 2% of food intake.
[d]From Silva and Downing (1995).
[e]EPA (1993), based upon the average home range measured in semiarid shrubland in Idaho.
[f]From Dunning (1993).
[g]From Haug et al. (1993).
EPA = U.S. Environmental Protection Agency.
kg = Kilogram(s).
kg/day = Kilogram(s) per day.
SWMU = Solid Waste Management Unit.

comprising 2 percent of the total dietary intake. Receptors are exposed to radiation both internally and externally from uranium-233/234, uranium-235, and uranium-238. Internal and external dose rates to the deer mouse and the 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 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 from 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. 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 228A.

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.

Table 11
Transfer Factors Used in Exposure Models for Constituents of Potential Ecological Concern at SWMU 228A

Constituent of Potential Ecological Concern	Soil-to-Plant Transfer Factor	Soil-to-Invertebrate Transfer Factor	Food-to-Muscle Transfer Factor
Inorganic			
Barium	1.5E-1[a]	1.0E+0[b]	2.0E-4[c]
Cadmium	5.5E-1[a]	6.0E-1[d]	5.5E-4[a]
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]
Uranium	1.0E-2[c]	1.0E+0[b]	1.0E-2[a]
Organic[e]			
Benzene	2.3E+0	1.7E+1	2.9E-6
Methylene chloride	7.3E+0	1.5E+1	3.6E-7
Acenaphthene	2.1E-1	2.1E+1	2.1E-4
Anthracene	1.0E-1	2.2E+1	7.3E-4
Benzo(a)anthracene	2.2E-2	2.5E+1	1.2E-2
Benzo(a)pyrene	1.1E-2	2.7E+1	3.8E-2
Benzo(b)fluoranthene	6.2E-3	2.8E+1	1.1E-1
Benzo(g,h,i)perylene	2.6E-3	3.0E+1	5.4E-1
Benzo(k)fluoranthene	4.3E-3	2.9E+1	2.1E-1
Chrysene	1.5E-2	2.6E+1	2.3E-2
Di-n-butyl phthalate	8.4E-2	2.2E+1	1.1E-3
Bis(2-ethylhexyl)phthalate	2.3E-3	3.1E+1	6.4E-1
Fluoranthene	3.2E-2	2.4E+1	5.9E-3
Fluorene	1.5E-1	2.1E+1	3.8E-4
Indeno(1,2,3-cd)pyrene	1.5E-3	3.2E+1	1.5E+0
Phenanthrene	8.9E-2	2.2E+1	9.6E-4
Pyrene	3.3E-2	2.4E+1	5.8E-3

[a]From Baes et al. (1984).
[b]Default value.
[c]From NCRP (January 1989).
[d]From Stafford et al. (1991).
[e]Soil-to-plant and food-to-muscle transfer factors from equations developed in Travis and Arms (1988). Soil-to-invertebrate transfer factors from equations developed in Connell and Markwell (1990). All three equations based upon relationship of the transfer factor to the log K_{ow} value of compound.

K_{ow} = Octanol/water partition coefficient.
NCRP = National Council for Radiation Protection and Measurements.
SWMU = Solid Waste Management Unit.

Table 12
Media Concentrations[a] for Constituents of Potential Ecological Concern at SWMU 228A

Constituent of Potential Ecological Concern	Soil (maximum)[a]	Plant Foliage[b]	Soil Invertebrate[b]	Deer Mouse Tissues[c]
Inorganic				
Barium	2.2E+2	3.2E+1	2.2E+2	8.0E-2
Cadmium	1.8E+0	9.7E-1	1.1E+0	1.8E-3
Lead	4.1E+1	3.7E+0	1.6E+0	8.6E-3
Mercury	6.3E-2	6.3E-2	6.3E-2	5.0E-2
Selenium	9.2E-1	4.6E-1	9.2E-1	2.2E-1
Silver	4.4E-1	4.4E-1	1.1E-1	4.4E-3
Uranium	8.4E+1	8.4E-1	8.4E+1	1.4E+0
Organic				
Benzene	1.2E-3	2.7E-3	2.0E-2	1.1E-7
Methylene chloride	7.2E-3	5.3E-2	1.1E-1	9.1E-8
Acenaphthene	7.0E-2	1.5E-2	1.5E+0	4.7E-4
Anthracene	1.1E-1	1.1E-2	2.4E+0	2.8E-3
Benzo(a)anthracene	3.2E-1	7.1E-3	8.0E+0	1.4E-1
Benzo(a)pyrene	2.6E-1	3.0E-3	6.9E+0	4.1E-1
Benzo(b)fluoranthene	3.7E-1	2.3E-3	1.0E+1	1.8E+0
Benzo(g,h,i)perylene	2.5E-1	1.5E-3	7.0E+0	1.3E+0
Benzo(k)fluoranthene	2.8E-1	1.2E-3	8.1E+0	2.7E+0
Chrysene	3.7E-1	5.5E-3	9.6E+0	3.5E-1
Di-n-butyl phthalate	6.0E-2	5.0E-3	1.3E+0	2.2E-3
Bis(2-ethylhexyl)phthalate	1.1E-1	1.7E-4	3.5E+0	7.1E+0
Fluoranthene	6.3E-1	3.6E-2	1.5E+1	4.9E-2
Fluorene	5.0E-2	7.4E-3	1.1E+0	6.4E-4
Indeno(1,2,3-cd)pyrene	9.9E-2	6.0E-4	2.8E+0	5.0E-1
Phenanthrene	4.2E-1	3.7E-2	9.4E+0	1.4E-2
Pyrene	6.0E-1	2.0E-2	1.5E+1	1.3E-1

[a]In milligram(s) per kilogram. All are based upon dry weight of the media.
[b]Product of the soil concentration and the corresponding transfer factor.
[c]Based 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).
SWMU = Solid Waste Management Unit.

Table 13
Toxicity Benchmarks for Ecological Receptors at SWMU 228A

Constituent of Potential Ecological Concern	Plant Benchmark[a,b]	Mammalian NOAELs			Avian NOAELs		
		Mammalian Test Species[c,d]	Test Species NOAEL[d,e]	Deer Mouse NOAEL[e,f]	Avian Test Species[d]	Test Species NOAEL[d,e]	Burrowing Owl NOAEL[e,g]
Inorganic							
Barium	500	Rat[h]	10.5	5.1	Chicks	20.8	20.8
Cadmium	3	Rat[i]	1.0	1.9	Mallard	1.45	1.45
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
Silver	2	Rat	17.8[j]	34.8	---	---	---
Uranium	5	Mouse[k]	3.07	3.19	Black duck	16.0	16.0
Organic							
Benzene	---	Mouse	26.4	27.9	---	---	---
Methylene chloride	---	Rat	5.85	11.4	---	---	---
Acenaphthene	18[l]	Mouse[m]	17.5[m]	18.5	---	---	---
Anthracene	18[l]	Mouse[m]	100[m]	106	---	---	---
Benzo(a)anthracene	18[l]	Mouse[n]	1.0[n]	1.06	---	---	---
Benzo(a)pyrene	18[l]	Mouse	1.0	1.06	---	---	---
Benzo(b)fluoranthene	18[l]	Mouse[n]	1.0[n]	1.06	---	---	---
Benzo(g,h,i)perylene	18[l]	Mouse[n]	1.0[n]	1.06	---	---	---
Benzo(k)fluoranthene	18[l]	Mouse[n]	1.0[n]	1.06	---	---	---
Chrysene	18[l]	Mouse[n]	1.0[n]	1.06	---	---	---
Di-n-butyl phthalate	200	Mouse	550	582	Ringed dove	0.11	0.11
Bis(2-ethylhexyl)phthalate	---	Mouse	18.3	19.4	Ringed dove	1.1	1.1
Fluoranthene	18[l]	Mouse[m]	12.5[m]	13.2	---	---	---
Fluorene	18[l]	Mouse[m]	12.5[m]	13.2	---	---	---
Indeno(1,2,3-cd)pyrene	18[l]	Mouse[n]	1.0[n]	1.06	---	---	---
Phenanthrene	18[l]	Mouse[n]	1.0[n]	1.06	---	---	---
Pyrene	18[l]	Mouse[m]	7.5[m]	7.94	---	---	---

Refer to footnotes at end of table.

Table 13 (Concluded)
Toxicity Benchmarks for Ecological Receptors at SWMU 228A

[a]In milligram(s) per kilogram soil.
[b]From Efroymson et al. (1997).
[c]Body weights (in kilogram[s]) for the NOAEL conversion are as follows: lab mouse, 0.030; lab rat, 0.350 (except where noted).
[d]From Sample et al. (1996), except where noted.
[e]In milligram(s) per kilogram body weight per day.
[f]Based 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.
[g]Based 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.
[h]Body weight: 0.435 kilogram.
[i]Body weight: 0.303 kilogram.
[j]Based upon a rat LOAEL of 89 mg/kg/d (EPA 1998a) and an uncertainty factor of 0.2.
[k]Body weight: 0.028 kilogram.
[l]Based upon toxicity information from Sims and Overcash (1983).
[m]Based upon a toxicity information from EPA (1998a).
[n]Insufficient toxicity data available for this compound. The NOAEL for benzo(a)pyrene is used as a default.

EPA = U.S. Environmental Protection Agency.
LOAEL = Lowest-observed-adverse-effect level.
mg/kg/d = Milligram(s) per kilogram per day
NOAEL = No-observed-adverse-effect level
SWMU =Solid Waste Management Unit.
--- = Insufficient toxicity data.

Table 14
HQs for Ecological Receptors at SWMU 228A

Constituent of Potential Ecological Concern	Plant HQ	Deer Mouse HQ (Herbivorous)	Deer Mouse HQ (Omnivorous)	Deer Mouse HQ (Insectivorous)	Burrowing Owl HQ
Inorganics					
Barium	4.3E-1	5.4E-1	**1.9E+0**	**3.3E+0**	2.4E-2
Cadmium	5.9E-1	8.3E-2	8.7E-2	9.1E-2	2.9E-3
Lead	8.1E-1	4.4E-2	3.4E-2	2.4E-2	2.4E-2
Mercury (inorganic)	2.1E-1	7.2E-4	7.2E-4	7.2E-4	1.3E-2
Mercury (organic)	2.1E-1	1.6E-1	1.6E-1	1.6E-1	9.0E-1
Selenium	9.2E-1	1.9E-1	2.8E-1	3.7E-1	6.1E-2
Silver	2.2E-1	2.0E-3	1.3E-3	5.3E-4	---
Uranium	**1.7E+1**	1.2E-1	**2.2E+0**	**4.2E+0**	2.1E-2
Organics					
Benzene	---	1.5E-5	6.4E-5	1.1E-4	---
Methylene chloride	---	7.2E-4	1.1E-3	1.5E-3	---
Acenaphthene	3.9E-3	1.4E-4	6.2E-3	1.2E-2	---
Anthracene	6.1E-3	2.0E-5	1.8E-3	3.6E-3	---
Benzo(a)anthracene	1.8E-2	2.0E-3	5.9E-1	**1.2E+0**	---
Benzo(a)pyrene	1.4E-2	1.2E-3	5.1E-1	1.0E+0	---
Benzo(b)fluoranthene	2.1E-2	1.4E-3	7.6E-1	**1.5E+0**	---
Benzo(g,h,i)perylene	1.4E-2	9.6E-4	5.2E-1	1.0E+0	---
Benzo(k)fluoranthene	1.6E-2	1.0E-3	6.0E-1	**1.2E+0**	---
Chrysene	2.1E-2	1.9E-3	7.1E-1	**1.4E+0**	---
Di-n-butyl phthalate	3.0E-4	1.7E-6	1.8E-4	3.6E-4	3.5E-3
Bis(2-ethylhexyl)phthalate	---	1.9E-5	1.4E-2	2.8E-2	7.2E-1
Fluoranthene	3.5E-2	5.7E-4	8.6E-2	1.7E-1	---
Fluorene	2.8E-3	9.9E-5	6.3E-3	1.3E-2	---
Indeno(1,2,3-cd)pyrene	5.5E-3	3.8E-4	2.1E-1	4.1E-1	---
Phenanthrene	2.3E-2	6.7E-3	6.9E-1	**1.4E+0**	---
Pyrene	3.3E-2	6.2E-4	1.4E-1	2.9E-1	---
HI[a]	**2.0E+1**	**1.2E+0**	**9.5E+0**	**1.8E+1**	**1.8E+0**

Refer to footnotes at end of table.

Table 14 (Concluded)
HQs for Ecological Receptors at SWMU 228A

Note: **Bold** text indicates HQ or HI exceeds unity.
[a]The 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 quotient.
SWMU = Solid Waste Management Unit.
--- = Insufficient toxicity data available for risk estimation purposes.

Uranium was the only COPEC that showed an HQ exceeding unity for plants. Both uranium and barium resulted in HQs greater than unity for the omnivorous and insectivorous deer mouse. Five of the polycyclic aromatic hydrocarbons (PAH) (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and phenanthrene), yielded HQs greater than 1.0 for the insectivorous diet of the deer mouse but not for either of the other two dietary regimes. No HQs were greater than 1.0 for either the herbivorous mouse or the burrowing owl. 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 total HIs greater than unity, with a maximum HI of 20 for plants. The HI for PAHs also exceeded unity for the omnivorous and insectivorous deer mice.

Tables 15 and 16 summarize the internal and external dose-rate model results for U-235 and U-238. The total radiation dose rate to the deer mouse was predicted to be 2.1E-4 rad/day. Total dose rate to the burrowing owl was predicted to be 1.1E-4 rad/day. The internal dose rate from exposure to these radionuclides for both receptors is 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 228A. 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 provide more protection to the ecological resources potentially affected by the site. Conservatisms 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).

Uncertainties associated with the estimation of risk to ecological receptors following exposure to uranium-233/234, uranium-235, and uranium-238 are primarily related to those inherent in the radionuclide-specific data. Radionuclide-dependent data are measured values that have their associated errors, which are typically negligible. The dose-rate models used for these calculations are based upon conservative estimates on receptor shape, radiation absorption by body tissues, and intake parameters. The goal is to provide a realistic but conservative estimate of a receptor's exposure to radionuclides in soil, both internally and externally.

In estimating ecological risk, background concentrations are included as a component of maximum on-site concentrations. As shown in Table 17, conservatisms in the modeling of exposure and risk for barium resulted in the prediction of risk to ecological receptors when exposed at the background concentration of 200 mg/kg. Background accounts for 93 percent

Table 15
Internal and External Dose Rates for
Deer Mice Exposed to Radionuclides at SWMU 228A

Radionuclide	Maximum Concentration (pCi/g)	Internal Dose (rad/day)	External Dose (rad/day)	Total Dose (rad/day)
U-233/234	1.64E+0	1.9E-5	1.9E-7	1.9E-7
U-235	8.0E-1	8.7E-6	1.3E-5	2.2E-5
U-238	1.1E+1	1.2E-4	2.3E-5	1.4E-4
Total		1.5E-4	3.6E-5	1.6E-4

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 228A

Radionuclide	Maximum Concentration (pCi/g)	Internal Dose (rad/day)	External Dose (rad/day)	Total Dose (rad/day)
U-233/234	1.64E+0	7.7E-6	1.9E-7	7.8E-6
U-235	8.0E-1	3.5E-6	1.3E-5	1.7E-5
U-238	1.1E+1	4.7E-5	2.3E-5	7.0E-5
Total		5.8E-5	3.6E-5	9.5E-5

pCi/g = Picocurie(s) per gram.
SWMU = Solid Waste Management Unit.

Table 17
HQs for Ecological Receptors Exposed to Background Concentrations for SWMU 228A

Constituent of Potential Ecological Concern	Plant HQ	Deer Mouse HQ (Herbivorous)	Deer Mouse HQ (Omnivorous)	Deer Mouse HQ (Insectivorous)	Burrowing Owl HQ
Inorganic					
Barium	4.0E-1	5.0E-1	**1.8E+0**	**3.0E+0**	2.2E-2
Cadmium	1.7E-1	2.4E-2	2.5E-2	2.6E-2	8.1E-4
Lead	2.2E-1	1.2E-2	9.5E-3	6.7E-3	6.6E-3
Mercury (inorganic)	1.7E-1	5.7E-4	5.7E-4	5.7E-4	1.0E-2
Mercury (organic)	1.7E-1	1.3E-1	1.3E-1	1.3E-1	7.1E-1
Selenium	5.0E-1	1.0E-1	1.5E-1	2.0E-1	3.3E-2
Silver	2.5E-1	2.3E-3	1.4E-3	6.0E-4	---
Uranium	5.5E-1	3.4E-3	5.9E-2	1.1E-1	5.8E-4
HI[a]	**2.3E+0**	7.7E-1	**2.1E+0**	**3.5E+0**	7.8E-1

Note: **Bold** text indicates HQ or HI exceeds unity.

[a]The 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.
--- = Insufficient toxicity data available for risk estimation purposes.

of the maximum measured barium concentrations at SWMU 228A, and only three of the 68 soil samples analyzed for inorganics showed barium concentrations exceeding the background screening value. Therefore, because of the uncertainties associated with exposure and toxicity, it is unlikely that barium (with exposure concentrations largely attributable to background) presents significant ecological risk at this site.

The assumption of an area use factor of 1.0 is a source of uncertainty for the burrowing owl. Because SWMU 228A is approximately 1.6 acres in size, an area use factor of approximately 0.046 would be justified for this receptor. Therefore, although no COPECs produced HQs greater than unity for this species, the assumption of an area use factor of 1.0 has resulted in the overestimation of the HQs by a factor of about 20, indicating that these HQs are highly conservative.

A significant source of uncertainty associated with the prediction of ecological risks at this site is the use of the maximum measured concentrations to evaluate risk. This results in a conservative exposure scenario that does not necessarily reflect actual site conditions. To assess the potential degree of overestimation caused by using the maximum measured soil concentrations in the exposure assessment, average soil concentrations (using the method detection limits for nondetects) were calculated for each COPEC that exhibited one or more HQ(s) greater than unity to determine whether the exceedence can be accounted for by the magnitude of the extreme measurement.

The average concentration of barium (at 125 mg/kg) was well below the background screening value (200 mg/kg). The average concentration of uranium (at 28.5 mg/kg) was 34 percent of the maximum value, which is sufficient to reduce the HQ for the omnivorous deer mouse to less than unity and HQs for plants and the insectivorous deer mouse to 5.8 and 1.4, respectively. It should be noted that this HQ for plants is based on a LOAEL from a toxicity study that used uranyl nitrate as a soil amendment (Efroymson et al. 1997), whereas the measured uranium concentrations in the soil samples from SWMU 228A are of total uranium and probably include a high proportion that is in a form much less available for plant uptake than that of the toxicity study. It should also be noted that the exposures to uranium for the omnivorous and insectivorous deer mice are based on the default soil-to-invertebrate transfer factor of 1.0. That the actual uptake of uranium by invertebrates is probably much less results in further reductions of the HQs for these receptors. For these reasons, the risks to plants and wildlife from exposures to uranium at this site are expected to be low.

The average concentrations for the five PAHs that showed HQs greater than 1.0 were 0.058 mg/kg for benzo(a)anthracene, 0.065 mg/kg for benzo(b)fluoranthene, 0.033 mg/kg for benzo(k)fluoranthene, 0.066 mg/kg for chrysene, and 0.051 mg/kg for phenanthrene. All of these average concentrations are sufficiently below the maximum concentrations to reduce the HQs to values less than 1.0. It should be noted that for all of these PAHs, compound-specific toxicity information could not be found, and therefore, the NOAELs were conservatively based upon the NOAEL for benzo(a)pyrene. It is likely that the toxicities of these compounds are actually less than that of benzo(a)pyrene.

Based upon this uncertainty analysis, ecological risks at SWMU 228A are expected to be low. HQs greater than unity are predicted; however, closer examination of the exposure assumptions reveals an overestimation of risk primarily attributed to treatment of exposure

concentration, conservative exposure modeling assumptions, and conservative toxicity benchmark values.

VII.3.6 Risk Interpretation

Ecological risks associated with SWMU 228A were estimated through a screening assessment that incorporated site-specific information when available. Overall, risks to ecological receptors are expected to be low because predicted risks associated with exposure to COPECs are based upon calculations using maximum detected values. The average barium concentration at the site was within the range of background concentrations. Predicted risks from exposure to uranium and to five PAHs were attributed to the use of maximum detected values. Additionally, conservative assumptions of the availability and uptake of uranium by plants and invertebrates probably resulted in estimated exposures that do not reflect actual site conditions. No COPECs were predicted to be hazardous to the burrowing owl or the herbivorous deer mouse. Based upon this final analysis, ecological risks associated with SWMU 228A 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 to whether the site should be recommended for NFA or whether 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.

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APPENDIX 1
EXPOSURE PATHWAY DISCUSSION FOR CHEMICAL AND RADIONUCLIDE CONTAMINATION

Introduction

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), excess cancer 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:

Risk (or Dose) = Intake x 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 1E-6 for Class A and B carcinogens and 1E-5 for Class C carcinogens. 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 used 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.

Table 2
Default Parameter Values for Various Land-Use Scenarios

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure frequency (day/yr)	***	***	***
Exposure duration (yr)	25[a,b]	30[a,b]	30[a,b]
Body weight (kg)	70[a,b]	70 adult[a,b] 15 child	70 adult[a,b] 15 child
Averaging Time (days) for carcinogenic compounds (= 70 y x 365 day/yr) for noncarcinogenic compounds (= ED x 365 day/yr)	25550[a] 9125	25550[a] 10950	25550[a] 10950
Soil Ingestion Pathway			
Ingestion rate	100 mg/day[c]	200 mg/day child 100 mg/day adult	200 mg/day child 100 mg/day adult
Inhalation Pathway			
Inhalation rate (m^3/yr)	5000[a,b]	260[d]	7000[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.

[a]RAGS, Vol 1, Part B (EPA 1991).

[b]Exposure Factors Handbook (EPA 1989b)

[c]EPA Region VI guidance.

[d]For radionuclides, RESRAD (ANL 1993) is used for human health risk calculations; default parameters are consistent with RESRAD guidance.

[e]Dermal Exposure Assessment (EPA 1992).

References

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