

4-1-2000

# Justification for Class III Permit Modification April 2000, ER Site 57A, Workman Site: Firing Site, Operable Unit 1334

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**Sandia National Laboratories**

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**Justification for Class III Permit Modification**

**April 2000**

**ER Site 57A  
Workman Site: Firing Site  
Operable Unit 1334**

NFA Originally Submitted September 15, 1998  
RSI Originally Submitted September 1999

**Environmental  
Restoration  
Project**



United States Department of Energy  
Albuquerque Operations Office

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**Justification for  
Class III Permit Modification**

**April 2000**

**Solid Waste Management Unit 57A  
Operable Unit 1334  
Round 11**

(RCRA Permit No. NM5890110518)

NFA Originally Submitted September 15, 1998

RSI Originally Submitted September 1999

(Main Chapter and Annex 7-C Resubmitted  
September 1999)

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**Justification for  
Class III Permit Modification**

**April 2000**

**Solid Waste Management Unit 57A  
Operable Unit 1334  
Round 11**

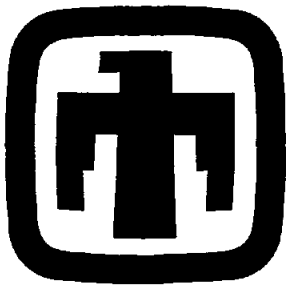
NFA Originally Submitted September 15, 1998

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Sandia National Laboratories/New Mexico

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**PROPOSAL FOR NO FURTHER ACTION  
SWMU 57A, WORKMAN SITE: FIRING SITE,  
OU 1334, ENVIRONMENTAL RESTORATION  
PROJECT**

January 2000

Environmental  
Restoration  
Project



United States Department of Energy  
Albuquerque Operations Office

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### Annex

- 7-A            Gamma Spectroscopy Results
- 7-B            Data Validation Results
- 7-C            Risk Screening Assessment

## ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
AR/COC	analysis request/chain-of-custody
bgs	below ground surface
CEARP	Comprehensive Environmental Assessment and Response Program
COC	constituent of concern
cps	count(s) per second
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
ERCL	Environmental Restoration Chemistry Laboratory
FOP	field operating procedure
g	gram(s)
HE	high explosive(s)
HI	hazard index
HMX	1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane
HRMB	Hazardous and Radioactive Materials Bureau
KAFB	Kirtland Air Force Base
kg	kilogram(s)
L	liter(s)
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
mg	milligram(s)
mrem	millirem(s)
MS	mass spectrometry; matrix spike
MSD	matrix spike duplicate
µg	microgram(s)
NFA	no further action
NMED	New Mexico Environment Department
OU	operable unit
PCB	polychlorinated biphenyl
pCi	picocurie(s)
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RDX	1,3,5-trinitro-1,3,5-triazacyclohexane
RFA	RCRA facility assessment
RFI	RCRA facility investigation
RPD	relative percent difference
RSI	Request for Supplemental Information
SNL/NM	Sandia National Laboratories/New Mexico
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TAL	target analyte list
TCLP	toxicity characteristic leaching procedure
UXO	unexploded ordnance
VCM	voluntary corrective measure
VOC	volatile organic compound
yr	year



## 7.0 SOLID WASTE MANAGEMENT UNIT 57A

### 7.1 Summary

The original NFA document contained a provision that contamination associated with the underground bunker floor drain sediments would be further characterized and submitted later with any applicable risk assessment. However, in an October 23, 1998 meeting with Mr. William P. Moats and other NMED-HRMB personnel, it was decided that additional characterization would not be necessary. A laboratory reporting error in units and MDLs for the PCB analyses in Table 4.4.4-17 was also identified at that time. This NFA and risk assessment resubmission has incorporated these corrections. The justification for a proposal of NFA remains unchanged.

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a risk-based no further action (NFA) decision for Solid Waste Management Unit (SWMU) 57A, Workman Site: Firing Site, Operable Unit (OU) 1334. SWMU 57A is a former artillery firing area that was used during World War II to develop the proximity fuze—a radar-activated, variable-timed bomb fuze used in anti-aircraft defense munitions. A variety of artillery pieces were used to fire test shells at targets suspended between the two former towers at SWMU 57B, Workman Site: Target Area, located approximately 2 miles to the east. Potential constituents of concern (COC) are radionuclides, residual high explosives (HE), semivolatile organic compounds (SVOC), volatile organic compounds (VOC), Resource Conservation and Recovery Act (RCRA) metals, and polychlorinated biphenyls (PCB). Review and analysis of all relevant data for SWMU 57A indicate that concentrations of COCs at this SWMU are less than (1) SNL/NM or other applicable background limits or (2) proposed subpart S or other action levels or (3) applicable risk assessment action levels. Thus, SWMU 57A is being proposed for an NFA decision based upon confirmatory sampling data demonstrating that COCs that may have been released from this SWMU into the environment pose an acceptable level of risk under current and projected future land 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 indicate that contaminants pose an acceptable level of risk under current and projected future land use" (NMED March 1998).

### 7.2 Description and Operational History

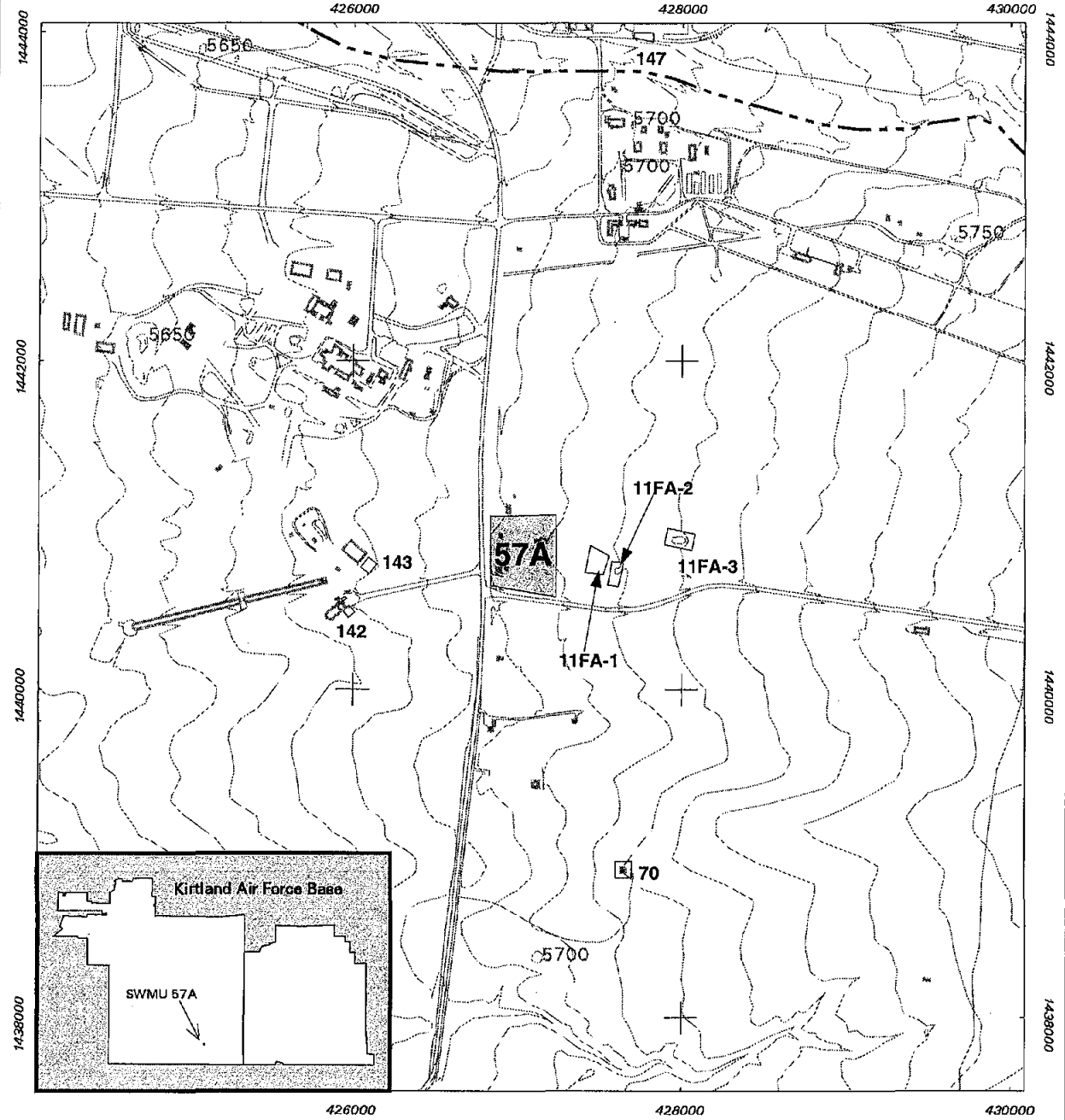
#### 7.2.1 Site Description

SWMU 57A is situated in OU 1334, which is also known as the Central Coyote Test Area. SWMU 57A (Figure 7.2.1-1) is located on the northeastern corner of the intersection of Lovelace Road and Isleta Road in the south-central portion of Kirtland Air Force Base (KAFB). The SWMU is on land owned by the U.S. Air Force that is permitted to the U.S. Department of Energy (DOE) and SNL/NM. The SWMU occupies approximately 4.22 acres, but the study area includes features just north of the actual site boundary.

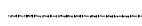



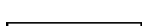

The site (Figure 7.2.1-2) includes two small buildings, five concrete slabs, two concrete gun mount positions, a set of three utility poles set around a fixed metal plate, and an underground bunker. Three debris mounds containing burned trash were sampled and removed as a voluntary corrective measure (VCM) in January 1997. This section groups these features in logical associations in order to facilitate their descriptions.

Beginning with the largest site feature and proceeding clockwise, Pad 1 (Figure 7.2.1-2) is approximately 45 by 260 feet and is aligned roughly north-south in front of four known gun mount positions. The pad was apparently placed to aid in gun maintenance and gun removal and placement and to suppress airborne dust and dirt entrained in the muzzle blast when the guns were fired. Five stained areas on the slab are visible in an early site aerial photograph.

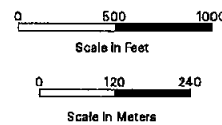
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**Legend**

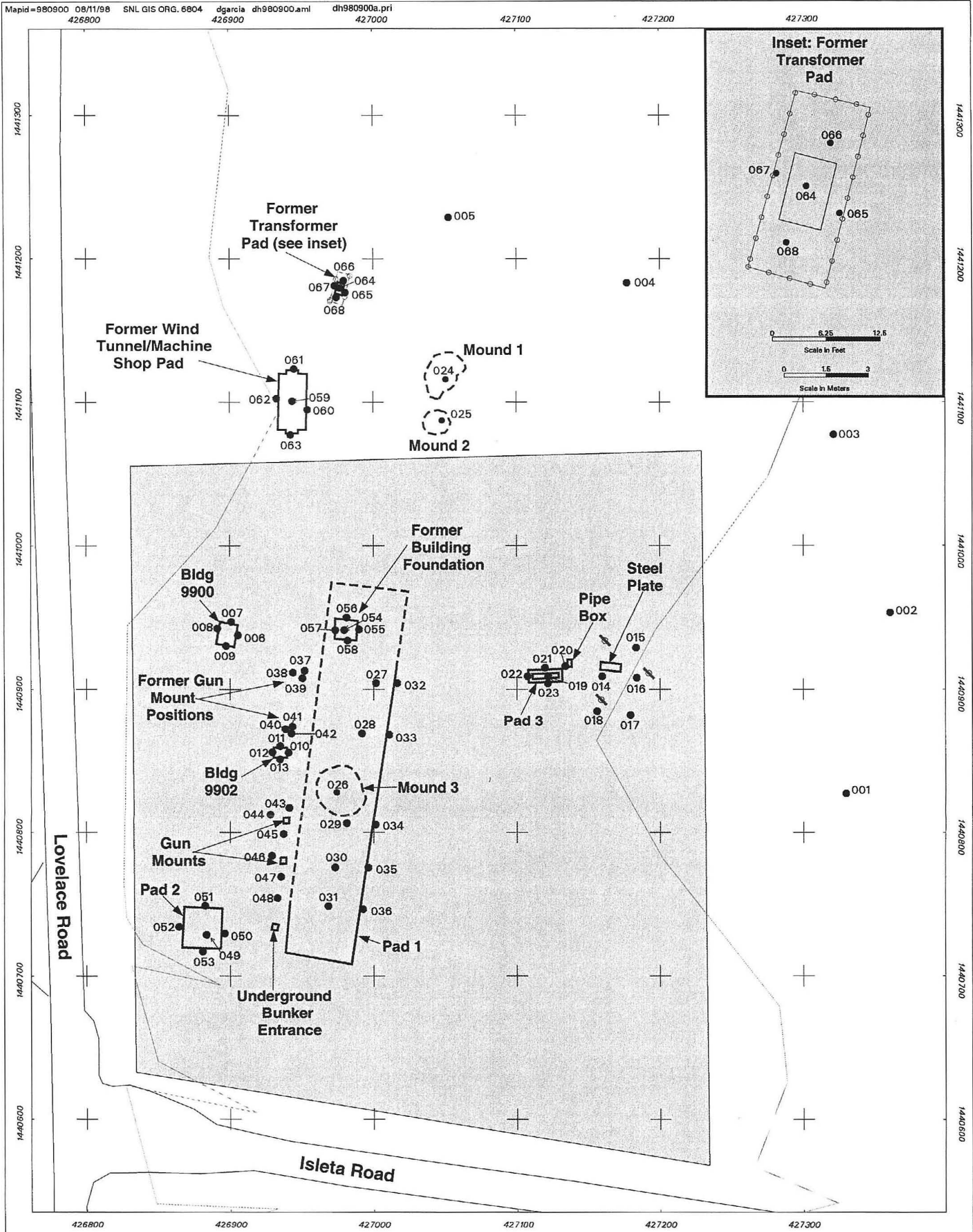
-  Road
-  10 Foot Contour
-  Drainage
-  SWMU 57A
-  Other SWMU Site
-  Building

**Figure 7.2.1-1  
Location of SWMU 57A  
Workman Site: Firing Site**



Sandia National Laboratories, New Mexico  
Environmental Geographic Information System

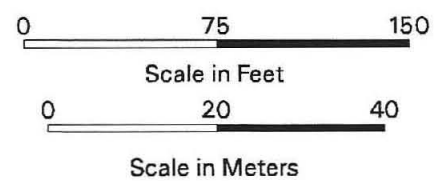




### Legend

- 001 Soil Sampling Location and Identification
- ⚡ Utility Pole
- ⋯ 10 Ft Contour
- Road
- ⋯ Fence
- - - Debris Mound Outline
- ▭ Concrete Slab (dashed where projected)
- ▨ SWMU 57A

Figure 7.2.1-2  
 SWMU 57A,  
 Soil Sampling Locations at  
 Workman Site: Firing Site





Four of the stained areas correspond to the known gun mount positions. At some time following activities at this site, Pad 1 was almost entirely covered with 2 to 3 feet of soil. Only the southernmost corners were left exposed. When the slab surface was partially excavated prior to sampling, several locations with circular fractures were noticed. Three circular fracture areas were excavated and were found to be depressions in the concrete slab. The smallest bowl-shaped depression was 2 to 3 feet in diameter and 8 to 10 inches deep, while the largest funnel-shaped depression was 3 to 5 feet in diameter and 3 feet deep. The deformations at the bottom of the depressions ranged from a simple crack in the smallest depression to an irregular hole about 1 foot in diameter in the bottom of the largest depression. There were no impact scars, marks, or staining on any of the depression sides. SNL/NM explosives experts concluded that these depressions were probably produced by detonating explosives on top of "spreader plates" during blast effects testing. The spreader plates would have rested atop the soil covering the slab and "spread" the downward force into a hemispherical wave front and caused the underlying concrete to deform into bowl shapes. Larger charges would form larger "bowls" and the deformation at the bottom of the bowl would increase until a concrete rupture would occur. Two concrete gun mounts are still visible south of Building 9902. The former building foundation at the north end of the slab is actually a few rows of concrete blocks that rise above the soil covering the slab. The floor of this former building is actually the surface of Pad 1.

Due west of Pad 1 are buildings 9902 and 9900. Building 9902 is a 7- by 10-foot concrete building topped with a bilevel observation platform. Building 9900 is a 13- by 14-foot cinder block structure that bears signs indicating that it was once used for flammable liquid (gasoline) storage. There are no drains or sumps inside Building 9900. There were no visible stains on the floor or in the vicinity to indicate a gasoline spill. There are no drains or sumps inside Building 9900. There were no visible stains on the floor or in the vicinity to indicate a gasoline spill.

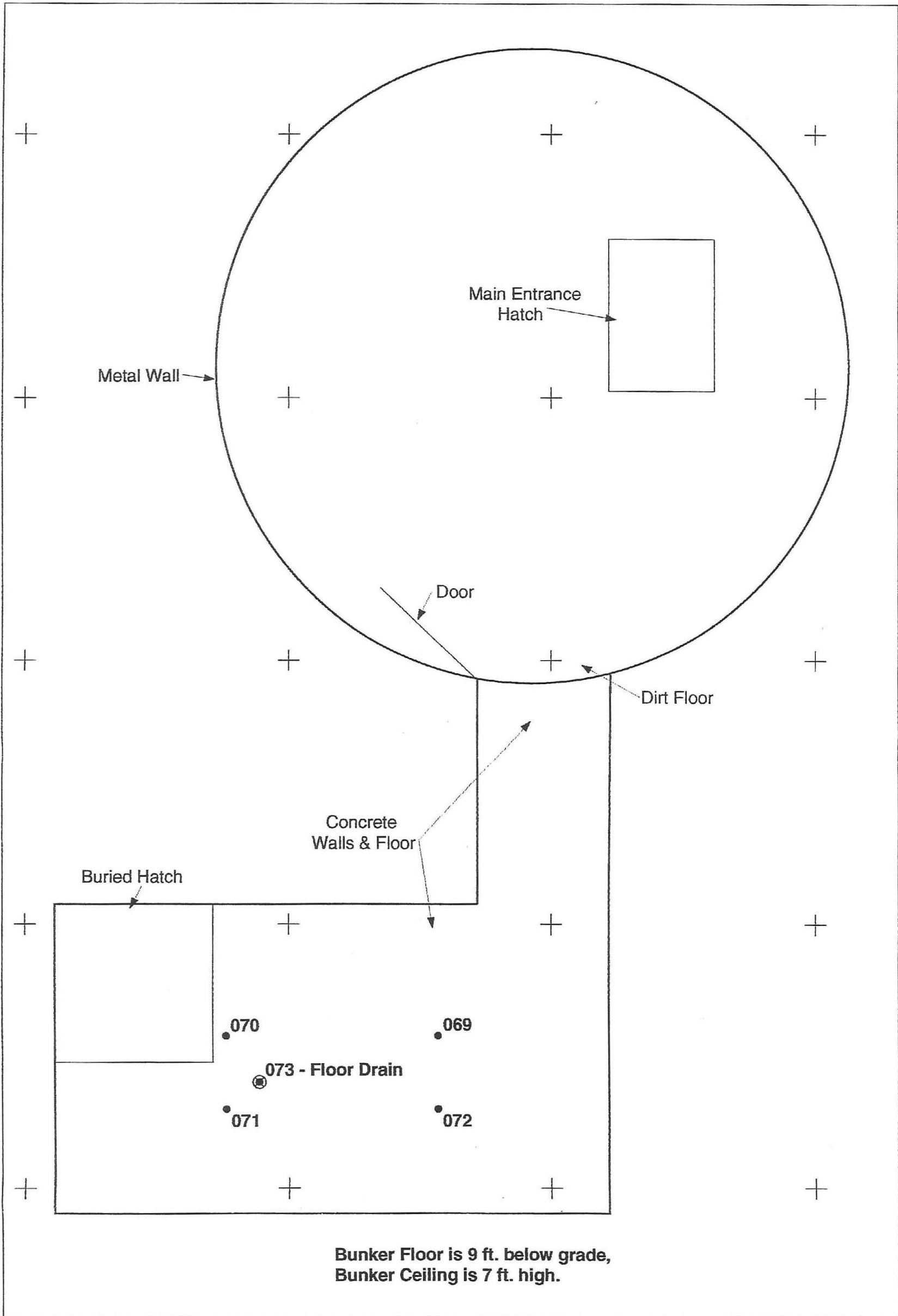
The 22- by 40-foot concrete slab north of Building 9900 is the foundation for a former building that reportedly was used at various times as a wind tunnel and machine shop. An empty electrical conduit present on the west side of the slab was removed during the VCM to remove the debris mounds. The 10- by 20-foot fenced area at the north end of the site encloses a 6- by 10-foot slab that marks the location of a power transformer.

East of Pad 1 is a test structure with an unknown purpose and history. It consists of three wood utility poles arranged around a 6- by 14-foot steel plate that is anchored to an underlying solid concrete slab. A cable system strung between the poles was apparently used to suspend objects over the plate. The steel plate has several impact "dimples" and is bolted around its perimeter to the underlying slab. The steel plate has two 2.5-inch-wide openings that connect to a set of dual pipes originating in a wooden box about 20 feet to the west (Figure 7.2.1-2). Adjacent to the pipe box is a 9.5- by 24.5-foot concrete slab that has a 3.5- by 19-foot open center.

At the south end of Pad 1 is the entrance to an underground bunker. This structure consists of two rooms connected by a short passageway (Figure 7.2.1-3). The main entrance hatch leads down via a crumbling wooden ladder into a 12-foot-diameter circular metal-walled room with a dirt floor. A heavy metal door separates this room from the passageway that leads to a 6.5-foot-wide by 10-foot-long concrete-walled and floored room. This room has a floor drain and another hatchway. This hatchway is secured closed and covered with soil and rubble on the ground surface. A series of deenergized electrical outlets and light fixtures are mounted on the south wall of this room. The bunker floor is 9 feet below ground surface (bgs) and the rooms are 7 feet high.

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6-7

### Legend

- ⊗ Floor Drain
- Sample Location
- Underground Bunker Structure

**Figure 7.2.1-3**  
**Sampling Locations and Diagram of SWMU 57A;**  
**Workman Site: Firing Site, Underground Bunker**

0 2 4  
 Scale in Feet





Pad 2 is a 28-foot-square concrete slab just west of the underground bunker. This slab has lightweight strap anchoring bolts and a thin metal plate surrounded by a metal edging set into the center of the surface.

Three debris mounds containing burned wood, metal cans, wire, and concrete pieces were present at this site. Mound 3 was created after Pad 1 was covered over because it rested atop the soil covering Pad 1. The debris mounds and other scrap materials scattered across the site were removed during the VCM in January 1997.

SWMU 57A is on alluvial fan deposits of the Mount Washington watershed that extend west from the Manzanita Mountains (IT May 1994). The SWMU topography is flat with a gentle slope to the west-northwest, and it has an average elevation of 5,706 feet above mean sea level (amsl) (SNL/NM April 1994). The SWMU geology consists of alluvial deposits overlying bedrock. The alluvial deposits belong to the Tijeras gravelly fine sandy loam soil group (IT May 1994). Monitoring Well TRN-1, drilled to a depth of about 515 feet, about 800 feet to the northeast, penetrated about 160 feet of silts, gravels, and sands before entering a sequence of claystones, siltstones, and sandstones. Water was encountered at a depth of about 82 feet bgs. The static water level is about 88 feet bgs (5,642 feet amsl). For a detailed discussion regarding the local setting at SWMU 57A, refer to the "RCRA Facility Investigation (RFI) Work Plan for Operable Unit 1334, Central Coyote Test Area" (SNL/NM October 1994).

### 7.2.2 Operational History

The SWMU was constructed around 1942 to develop the "proximity fuze," a radar-activated, variable-timed, bomb fuze used in anti-aircraft defense munitions. The proximity fuze would detonate an artillery shell near an intended target without having actually to hit it. The fuze was developed for the U.S. Navy during World War II as a method of destroying Japanese kamikaze planes and for anti-aircraft defense during the Battle of Britain. Fuze development activities took place from 1942 to 1948. Shells were fired from a variety of naval and field artillery pieces toward targets (old airplane fuselages, old cars, or chicken wire frames) suspended between two towers at SWMU 57B 2 miles to the east. Observation shelters used during these tests are located in the range between the firing area (SWMU 57A) and the target site (SWMU 57B). Pad 1, Buildings 9900 and 9902, the wind tunnel/machine shop, the transformer pad, and the former building near the north end of Pad 1 were constructed to support these test activities.

Later testing activities of an unknown nature are responsible for the construction of utility poles and a metal plate, Pads 2 and 3, the underground bunker, and the three debris mounds. Pads 2 and 3 are visible and Pad 1 had been covered over in a 1967 aerial photo (USGS 1967). In a 1975 aerial photo (USGS 1975), the site appears to be the same as it is today.

Between 1975 and 1985, unspecified equipment from blast overpressure testing at the Nevada Test Site by the military was reportedly brought back by SNL/NM and stored at this site. Proximity fuze testing debris and this equipment were removed by SNL/NM and the military prior to 1985.

## **7.3 Land Use**

### **7.3.1 Current**

SWMU 57A is currently an inactive site located on land owned by the U.S. Air Force and permitted to the DOE and SNL/NM. The current land use is industrial.

### **7.3.2 Future/Proposed**

For future use planning, SWMU 57A has been recommended for industrial land use purposes (DOE et al. October 1995).

## **7.4 Investigatory Activities**

SWMU 57A has been characterized and/or remediated in a series of four investigations. Section 7.4 discusses the SWMU 57A investigatory activities.

### **7.4.1 Summary**

SWMU 57A was initially investigated under the Comprehensive Environmental Assessment and Response Program (CEARP) (DOE September 1987) and the RCRA Facility Assessment (RFA) (EPA April 1987) in the 1980s. The investigation included nonsampling data collection (initial interviews, records search, and literature survey, etc.) (Investigation #1). The CEARP investigation reported that SNL/NM and the military conducted a cleanup of the site in the early 1980s, but no records have been located to document the cleanup. The RFA determined that the Workman Site did not meet the regulatory definition of a SWMU; nevertheless, a hazardous source may be present at the site (DOE September 1987, EPA April 1987). Beginning in 1993, preliminary investigations were conducted that included an unexploded ordnance (UXO)/HE survey (Investigation #2) a surface radiological survey (Investigation #3), and RFI sampling that included scoping sampling and the removal of the three debris mounds (Investigation #4).

No live UXO/HE or significant UXO/HE debris was found during the December 1993 surface visual UXO/HE survey of SWMU 57A. The March 1994 surface radiological survey identified one point source and two area sources. The point source had characteristics consistent with a buried radioactive fragment. One area source was associated with granitic base rock underlying the metal entrance ramp to Building 9900. The second area source was associated with two cylindrical, cinder block posts with flat metal bases. In order to obtain preliminary analytical data, RFI sampling in June 1995 included scoping surface soil sampling. The RFI sampling included the debris mounds and subsequent removal of the mounds in January 1997. The remainder of the site was sampled in December 1997, and the underground bunker was sampled in February 1998.

## 7.4.2 Investigation #1—Comprehensive Environmental Assessment and Response Program

### 7.4.2.1 *CEARP Nonsampling Data Collection*

The DOE CEARP Phase I and the RFA documents (DOE September 1987, EPA April 1987) reported that the site did not meet the definition of a SWMU; nevertheless, it posed a threat of environmental contamination.

### 7.4.2.2 *CEARP Sampling Data Collection*

No samples were collected at SWMU 57A during the CEARP.

### 7.4.2.3 *CEARP Data Gaps*

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

### 7.4.2.4 *Results and Conclusions*

The CEARP found that a remedial action was completed (the debris pick-up and equipment removal took place around 1985); therefore, Federal Facility Site Discovery and Identification Findings, a preliminary assessment, a preliminary site inspection, and Hazard Ranking System migration mode scoring were not appropriate. The RFA identified this site as an area of concern that did not “meet the definition of a SWMU but, nevertheless, posed a threat of environmental contamination. Releases of hazardous constituents from these areas have either been previously documented or are considered highly likely considering the nature of activities in the area” (EPA April 1987).

## 7.4.3 Investigation #2—SNL/NM ER Preliminary Investigations

### 7.4.3.1 *Nonsampling Data Collection*

This section describes the nonsampling investigation data collected at SWMU 57A.

#### 7.4.3.1.1 *Background Review*

A background review was conducted in order to collect available and relevant information regarding SWMU 57A. Background information sources included interviews with SNL/NM staff and contractors familiar with site operational history and existing historical site records and reports. The study was completely documented and has provided traceable references that sustain the integrity of the NFA proposal. The following lists the information sources that were used to assist in the evaluation of SWMU 57A:

- Photographs and field notes from site inspections conducted at the site by SNL/NM Environmental Restoration (ER) staff (SNL/NM July 1996, July 1998)
- Aerial photo interpretation and analysis (IT April 1994)
- Six interviews with six facility personnel (current and retired) (Caregeorges January 1994; Cooper December 1993; Copland September 1993; Sandhaus January 1993a, January 1993b, September 1993c, October 1993d)
- Miscellaneous information sources including SNL/NM personnel correspondence (memoranda, articles, and notes regarding SWMU 57A activities or proximity fuze development work) (Pavletich September 1998).

#### *7.4.3.1.2 UXO/HE Survey*

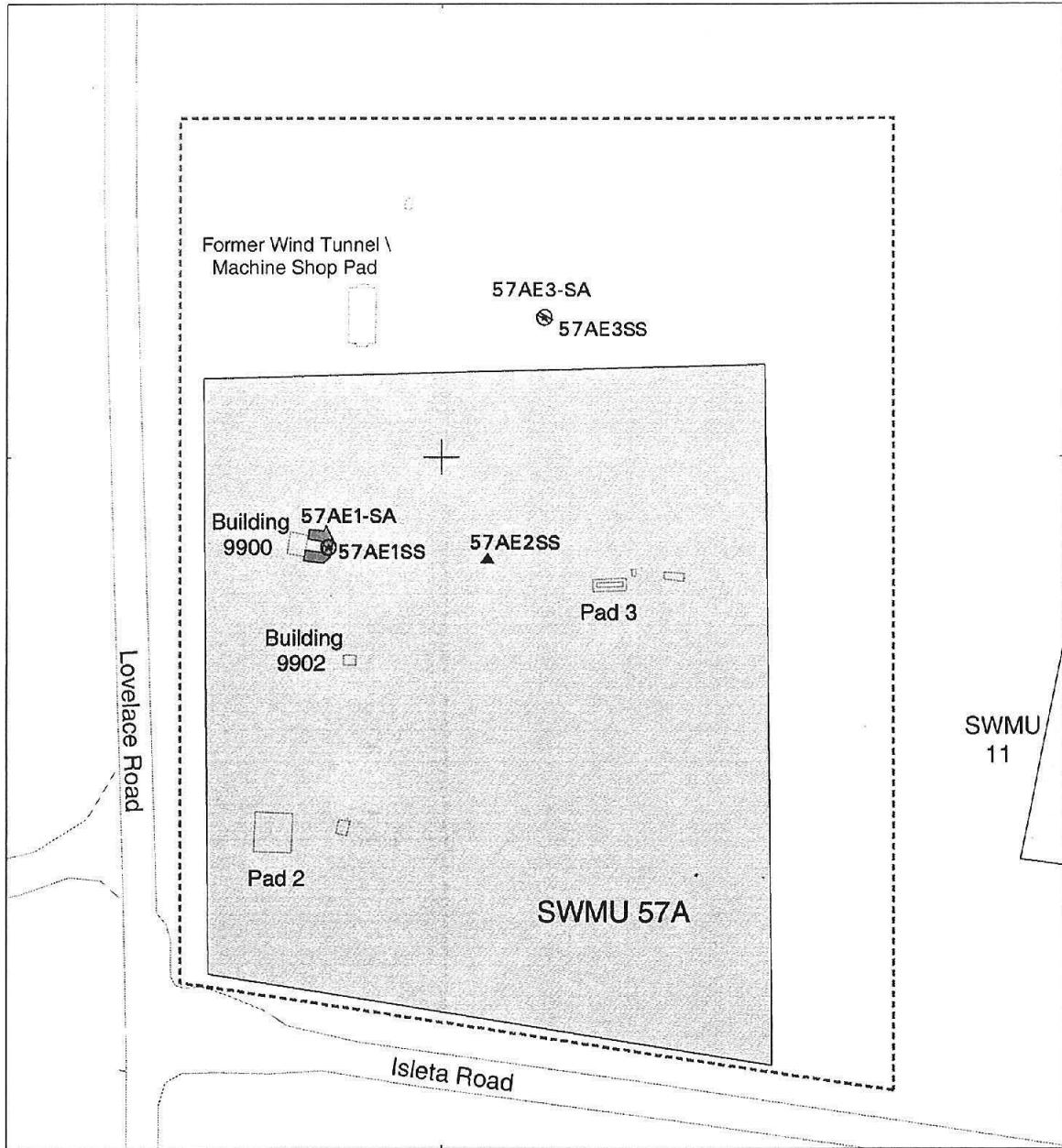
In December 1993, KAFB Explosive Ordnance Disposal personnel conducted a visual surface survey for UXO/HE at SWMU 57A and did not discover any live UXO/HE or significant UXO/HE debris.

#### *7.4.3.1.3 Radiological Survey(s)*

In March 1994 RUST Geotech Inc. completed a detailed surface gamma radiological survey at 10-foot centers (70-percent coverage) of SWMU 57A. One point source with up to 1,400 counts per second (cps) and two area source anomalies were identified (Figure 7.4.3-1). The first area source anomaly was measured on the gravel base-rock around the entrance to Building 9900. The second area source anomaly was associated with two cylindrical cinder-block posts with flat metal bases located in the northeastern part of the site. Both area source anomalies had readings varying from 110 to 160 cps, compared to a background activity of 90 cps. The metallic point source had characteristics consistent with a buried radioactive fragment of depleted uranium. The slightly elevated readings at the two area sources are probably related to the granitic composition of the base rock and aggregate in the cinder block. RUST Geotech removed the point source and SNL/NM removed the two cinder-block posts during the January 1997 VCM to remove the three debris mounds.

#### *7.4.3.1.4 Cultural-Resources Survey*

A cultural-resources survey of SWMU 57A was conducted in 1994 in support of the environmental assessment of the ER Project. The site was identified as having the potential to be eligible for the National Register of Historic Places under criteria (a) "association with an event that has made a significant contribution to the broad patterns of our history" and/or (c) "distinctive characteristics of type periods and methods of constructions" (Hoagland and Dello-Russo February 1995). In consultation with the New Mexico State Historic Preservation Office, the DOE/Kirtland Area Office indicated that there would be no adverse effects on the potentially eligible cultural resources as a result of sampling and debris mound removal activities at SWMU 57A (Lacy December 1996)



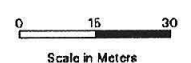
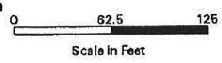
427000

**Legend**

- ⊛ Pre-cleanup Soil Sample Location (Final determination, no cleanup required SS = Soil Sample)
- ▲ Post-cleanup (Verification) Soil Sample Location (SS = Soil Sample)
- Road
- - - Rad Survey Boundary
- Building

- ▨ SWMU 57A Boundary
- Area Source Gamma Radiation Anomaly (Elevated relative to site specific background SA = Soil Area)
- Other SWMUs

**Figure 7.4.3-1**  
Phase I Survey Radiation Anomalies and VCM Surface Soil Sampling Locations at SWMU 57A



Sandia National Laboratories, New Mexico  
Environmental Geographic Information System





#### 7.4.3.1.5 *Sensitive-Species Survey*

A sensitive-species survey performed at SWMU 57A in 1994 indicated that no sensitive species were present on the site (IT February 1995).

#### 7.4.3.1.6 *Geophysical Survey(s)*

No geophysical surveys have been performed at SWMU 57A.

#### 7.4.3.2 *Sampling Data Collection*

Scoping sampling was conducted in June 1995. Soil samples were collected from the 0- to 6-inch depth interval at nine locations across the site. All samples were analyzed at the SNL/NM Environmental Restoration Chemistry Laboratory (ERCL) for RCRA metals plus beryllium, gamma spectrum, HE and total petroleum hydrocarbons (by immunoassay). Six of these samples were analyzed at the ERCL for VOCs. The purpose of this scoping sampling effort was to obtain preliminary analytical data to support the ER Project site ranking and prioritization. No quality assurance (QA)/quality control (QC) samples were collected.

#### 7.4.3.3 *Data Gaps*

Because the analytical data obtained from scoping sampling only generally determined whether contamination was present, additional sampling was required to characterize the site adequately.

#### 7.4.3.4 *Results and Conclusions*

The scoping sampling indicated no radiological or organic contamination was present at the SWMU. However, the detection limits (practical quantitation limits) in the metals analyses results were too high to permit reliable decision making regarding the presence or absence of contamination. In addition, the limited number of samples and lack of QA/QC samples did not support a rigorous data interpretation or site evaluation. The scoping data were not used in decision making and to avoid confusion are not presented in this document.

#### 7.4.4 *Investigation #3—SWMU 57A RFI Sampling*

The SNL/NM ER Project conducted RFI sampling in January 1997 for the debris mounds and from December 1997 through February 1998 for the remaining features and areas. The purpose of the RFI sampling activities were as follows:

- To collect site-specific background samples
- To determine the presence or absence of hazardous constituents in site soils and concrete.

The RFI activities included surface soil sampling, concrete slab sampling, underground bunker concrete and soil sampling, and debris mound soil sampling and removal.

The site-specific background soil samples were collected outside the north and east boundaries of the site (locations 001 through 005, Figure 7.2.1-2) in undisturbed areas assumed to be unaffected by previous site activities. The remaining RFI samples were collected around site features and in areas where potential releases could have occurred:

- The Pad 1, Gun Mount Positions, and Former Building Foundation
- Buildings 9900 and 9902
- The Former Wind Tunnel/Machine Shop Pad
- The Former Transformer Pad
- The Pad 3, Steel Plate and Utility Pole Area
- Pad 2
- The underground bunker
- The three debris mounds.

Figure 7.2.1-2 shows these features.

In January 1997, samples were collected of the debris mound soils and from a depth of 0 to 6 inches below each mound's contact with underlying "native" soil. Except for the underground bunker, samples were collected from all the areas and features as detailed in the RFI work plan for OU 1334 Central Coyote Test Area (SNL/NM October 1994). Changes in the sampling depth (0- to 6-inches and 6- to 12-inches) were made to incorporate draft EPA comments on the work plan (EPA November 1995). Analytical suites were modified to incorporate changes specified in the New Mexico Environment Department's (NMED) Hazardous and Radioactive Materials Bureau (HRMB) request for supplemental information (RSI) on the OU 1334 work plan (SNL/NM November 1997) and based upon discussions in the field with Mr. William P. Moats of the NMED's HRMB. The underground bunker was sampled in February 1998.

SNL/NM analysis request/chain-of-custody (AR/COC) and sample documentation procedures were followed for all samples collected. The SNL/NM ERCL analyzed the debris mound and underlying soil samples on site. Splits were sent off site to General Engineering Laboratory in Charleston, South Carolina. All the later samples were sent for analysis to Core Laboratories in either Denver, Colorado, or Casper, Wyoming. Some samples were sent to the SNL/NM Department 7713 Radiation Protection Sample Diagnostics Laboratory for radionuclide analysis using gamma spectroscopy (U.S. Environmental Protection Agency [EPA] Method 901.1) (EPA November 1986).

Only surface samples were collected because the nature of the known operations (i.e., firing artillery at low angles and working on concrete pads) would have resulted in any surviving materials being aurally deposited in the upper few inches of surface soil or concrete.

Soil sampling was performed using a scoop sampler in accordance with ER Field Operating Procedure (FOP) 94-52 (SNL/NM December 1994) with standard equipment such as a stainless steel bowl, a trowel, etc. and in accordance with the standard decontamination procedures of ER FOP 94-57 (SNL/NM May 1994). A hammer drill was used to chip the slab surface directly down range of the gun positions in order to collect concrete samples from the center of the slab or where staining was observed. All samples were field-screened for radioactivity using a beta-gamma (pancake) probe. QA/QC samples included duplicates, matrix spike (MS)/matrix spike

duplicates (MSD), equipment rinsate blanks, and trip blanks. All samples were managed in accordance with ER FOP 94-34 (SNL/NM May 1995). Section 7.4.4.4 presents sample results, and Annex A presents analytical results for on-site gamma spectrum laboratory analyses.

#### *7.4.4.1 Nonsampling Data Collection*

Nonsampling investigation data were collected as discussed in Section 7.4.3.1.

#### *7.4.4.2 Sampling Data Collection*

##### *7.4.4.2.1 RFI Site-Specific Background Soil Sampling*

Ten site-specific background soil samples and one duplicate were collected from five locations at SWMU 57A (locations 001 through 005 on Figure 7.2.1-2). The samples were collected from the 0- to 6- and 6- to 12-inch depth intervals, in accordance with the SNL/NM procedures described in Section 7.4.4. The samples were analyzed for RCRA metals plus beryllium and radionuclides (gamma spectrum, gross alpha/gross beta, and isotopic uranium and thorium) in order to determine the background metal concentrations and radiation levels for soils in the vicinity of SWMU 57A.

##### *7.4.4.2.2 RFI Sampling at Pad 1, Gun Mount Positions, and the Former Building Foundation*

Five concrete samples and one duplicate were collected from the surface of Pad 1 at locations in front of the gun mount positions or where stains were observed on an early aerial photograph of the site (locations 027 through 031 [Figure 7.2.1-2]). The excavated circular depression was field-screened for radiation and organic vapor monitoring instruments. No indications of contamination were observed. No samples were collected. There was some faint staining on the pad surface at location 031 when the slab was excavated. An electric hammer drill was used to chisel the concrete pad surface in order to obtain concrete chip samples, which were then analyzed for Toxicity Leaching Characteristic Procedure (TCLP) metals plus mercury, RCRA metals plus beryllium, target analyte list metals (TAL), TCLP SVOCs, SVOCs, and HE, gamma spectrum, and gross alpha/gross beta. The analytical suites were specified in the OU 1334 work plan and later modified by NMED HRMB RSI comments and discussions with NMED HRMB personnel as described in Section 7.4.4.

Ten soil samples and one duplicate were collected from just off the edge of the concrete pad in line with the gun mount positions and stain marks (locations 032 through 036 on Figure 7.2.1-2). The samples were collected from the 0- to 6- and 6- to 12-inch depth intervals, in accordance with the SNL/NM procedures described in Section 7.4.4. The samples were analyzed for RCRA metals plus beryllium, SVOCs, and HE. The analytical suites were specified in the OU 1334 work plan and later modified by NMED HRMB RSI comments and discussions with NMED HRMB personnel as described in Section 7.4.4.

Twenty-four soil samples and two duplicates were collected from around the gun mount positions (locations 037 through 048 [Figure 7.2.1-2]) on the west side of Pad 1. The samples

were collected from the 0- to 6- and 6- to 12-inch depth intervals, in accordance with the SNL/NM procedures described in Section 7.4.4. The samples were analyzed for RCRA metals plus beryllium, SVOCs, and HE.

One concrete sample and four soil samples were collected from the former building foundation near the north end of Pad 1 (locations 054 through 058 [Figure 7.2.1-2]). An electric hammer drill was used to chisel the center of the pad surface in order to obtain concrete chip samples, which were then analyzed for TCLP metals plus mercury, TCLP SVOCs, SVOCs, HE, gamma spectrum, and gross alpha/gross beta. The soil samples were collected from the 0- to 6-inch depth interval in accordance with the SNL/NM procedures described in Section 7.4.4. These samples were analyzed for RCRA metals plus beryllium, SVOCs, and HE. The analytical suites were specified in the OU 1334 work plan and later modified by NMED HRMB RSI comments and discussions with NMED HRMB personnel as described in Section 7.4.4.

#### *7.4.4.2.3 RFI Sampling at Buildings 9900 and 9902*

Eight soil samples and one duplicate were collected from four locations around the perimeter of Building 9900 (locations 006 through 009 [Figure 7.2.1-2]), and eight soil samples and one duplicate were collected from four locations around the perimeter of Building 9902 (locations 010 through 013 on Figure 7.2.1-2). These samples were collected from the 0- to 6- and 6- to 12-inch depth intervals, in accordance with the SNL/NM procedures described in Section 7.4.4. The samples were analyzed for RCRA metals plus beryllium, SVOCs, and HE.

#### *7.4.4.2.4 RFI Sampling at the Former Wind Tunnel/Machine Shop Pad*

One concrete sample and four soil samples plus one duplicate were collected from the former wind tunnel/machine shop north of Pad 1 (locations 059 through 063 [Figure 7.2.1-2]). An electric hammer drill was used to chisel the center of the concrete pad surface in order to obtain concrete chip samples, which were then analyzed for TCLP metals plus mercury, TCLP SVOCs, SVOCs, VOCs, HE, gamma spectrum, and gross alpha/gross beta. The soil samples were collected from the 0- to 6-inch depth interval in accordance with the SNL/NM procedures described in Section 7.4.4. These samples were analyzed for RCRA metals plus beryllium, SVOCs, VOCs, and HE. The analytical suites were specified in the OU 1334 work plan and later modified by NMED HRMB RSI comments and discussions with NMED HRMB personnel as described in Section 7.4.4.

#### *7.4.4.2.5 RFI Sampling at the Former Transformer Pad*

One concrete sample and four soil samples were collected from the former transformer pad north of Pad 1 (locations 064 through 068 [Figure 7.2.1-2]). An electric hammer drill was used to chisel the center of the concrete pad surface in order to obtain concrete chip samples, which were then analyzed for TCLP metals plus mercury, TCLP SVOCs, SVOCs, PCBs, HE, gamma spectrum, and gross alpha/gross beta. The soil samples were collected from the 0- to 6-inch depth interval in accordance with the SNL/NM procedures described in Section 7.4.4. These samples were analyzed for RCRA metals plus beryllium, SVOCs, PCBs, and HE. The analytical suites were specified in the OU 1334 work plan and later modified by NMED HRMB RSI comments and discussions with NMED HRMB personnel as described in Section 7.4.4.

#### *7.4.4.2.6 RFI Sampling at Pad 3, Steel Plate and Utility Pole Area*

Twenty soil samples, and three duplicates, were collected at Pad 3, steel plate and utility pole area, east of Pad 1 (locations 014 through 023 [Figure 7.2.1-2]). These samples were collected from the 0- to 6- and 6- to 12-inch depth intervals, in accordance with the SNL/NM procedures described in Section 7.4.4. The samples were analyzed for RCRA metals plus beryllium, SVOCs, HE, gamma spectrum, and gross alpha/gross beta. The analytical suites were specified in the OU 1334 work plan and later modified by NMED HRMB RSI comments and discussions with NMED HRMB personnel as described in Section 7.4.4.

#### *7.4.4.2.7 RFI Sampling at Pad 2*

One concrete sample and four soil samples were collected from Pad 2, which is near the southwestern corner of Pad 1 (locations 049 through 053 [Figure 7.2.1-2]). An electric hammer drill was used to chisel the concrete pad surface just southeast of the metal hardware mounted in the center of the pad in order to obtain concrete chip samples, which were then analyzed for TCLP metals plus mercury, TCLP SVOCs, HE, gamma spectrum, and gross alpha/gross beta. The soil samples were collected from the 0- to 6-inch depth interval in accordance with the SNL/NM procedures described in Section 7.4.4. These samples were analyzed for RCRA metals plus beryllium, SVOCs, and HE. The analytical suites were specified in the OU 1334 work plan and later modified by NMED HRMB RSI comments and discussions with NMED HRMB personnel as described in Section 7.4.4.

#### *7.4.4.2.8 RFI Sampling at the Underground Bunker*

At four locations inside the rectangular room of the underground bunker, the concrete floor and underlying soil were sampled (locations 069 through 072 [Figure 7.2.1-3]). Soil from beneath the floor drain was also sampled (location 073 [Figure 7.2.1-3]). An electric hammer drill was used to chip the concrete floor and the chips were collected for analysis. Then the floor was pierced and the soil directly beneath the floor was sampled. The four concrete samples were analyzed for TAL metals, TCLP metals plus mercury, RCRA metals plus beryllium, TCLP SVOCs, SVOCs, HE, gamma spectrum, and gross alpha/gross beta. Duplicate samples for TCLP metals plus mercury and TCLP SVOCs analyses were also collected from location 069. The four soil samples were analyzed for RCRA metals plus beryllium, SVOCs, HE, gamma spectrum, and gross alpha/gross beta. These samples were collected in accordance with the SNL/NM procedures described in Section 7.4.4. A duplicate soil sample for RCRA metals plus beryllium and SVOCs analysis was collected from location 069. The analytical suites were specified in the OU 1334 work plan and later modified by NMED-HRMB RSI comments and discussions with NMED-HRMB personnel as described in Section 7.4.4.

The floor drain (a French drain) emptied directly into a pocket of sand and gravel. There was no discharge line leading away from the drain. A sample of the French drain material and a duplicate was obtained and analyzed for TAL metals, RCRA metals plus beryllium, SVOCs, HE, gamma spectrum, and gross alpha/gross beta. The analytical suites were specified in the OU 1334 work plan and later modified by NMED HRMB RSI comments and discussions with NMED HRMB personnel as described in Section 7.4.4.

#### 7.4.4.2.9 *RFI Sampling at the Debris Mounds*

At each of the three debris mounds (locations 024 through 026 [Figure 7.2.1-2]), a sample was collected from the approximate center of each mound and from just below the mound's contact with underlying native material. All samples were collected in accordance with the SNL/NM procedures described in Section 7.4.4. The mound samples were considered "debris" samples although they were actually soil. Three debris samples and one duplicate were collected and analyzed for TAL metals, TCLP metals plus mercury, RCRA metals plus beryllium, TCLP SVOCs, SVOCs, VOCs, HE, and gamma spectrum. The samples beneath the mound were collected in the 0- to 6-inch depth interval below the presumed mound contact with native material. Three samples, including one duplicate and one off-site split, were collected and analyzed for TAL metals, RCRA metals plus beryllium, SVOCs, VOCs, and HE. Only the soil sample from location 024 was analyzed for gamma spectrum.

#### 7.4.4.3 *Voluntary Corrective Measure (VCM) Activities*

##### 7.4.4.3.1 *Underground Bunker VCM*

On June 30, 1994, KAFB subcontracted a visual inspection, a radiation screening, and limited debris sampling and removal from the underground bunker. The circular room contained a deteriorated wood stair-ladder system, old electrical debris, rubble, small animal carcasses, two dry cell battery packs, a 20-gallon closed-top steel drum, and four 5-gallon open-top containers (buckets). Two of the 5-gallon containers were empty and were disposed of as trash. No elevated radiation readings were observed.

The 20-gallon drum contained an estimated 1 to 2 gallons of a dark purple liquid. The two 5-gallon buckets contained a black pasty solid. Samples were collected from each container and from three areas of the bunker floor. One of the floor/soil samples was taken from where the 20-gallon drum had apparently leaked and stained the soil. Another sample was collected from near the floor drain in the rectangular room. These floor samples were archived and not analyzed.

The drum and bucket samples were subjected to field hazard characterization analysis; no hazardous characteristics other than combustibility in the black pasty materials were observed (IT August 1994). The three waste containers and battery packs were repacked into appropriate containers, labeled as investigation-derived waste, and turned over to KAFB hazardous waste management personnel.

##### 7.4.4.3.2 *Debris Mound Removal*

In January 1997, the three debris mounds at SWMU 57A were sampled and removed. A soil/debris sample was collected from the approximate middle of each mound and from the soil directly beneath the mound/native material contact. The mounds were then dismantled and the materials contained in drums for proper disposal. Ten drums of material were generated and nine were disposed of as nonregulated waste. The tenth drum was disposed of as regulated waste based upon the detection of 5.6 milligrams (mg)/kilogram (kg) of 2,4-dinitrotoluene in the

debris sample from Mound 3 (location 026 [Figure 7.2.1-2]). Additional debris (scrap wood, scrap metal pieces and debris, wire cable) scattered across the site were also removed and disposed of as nonregulated waste.

#### 7.4.4.4 *Data Gaps*

Information gathered through process knowledge, personnel interviews, site files, and scoping/RFI sampling methods aided in selecting the most probable COCs, the most probable distribution of contaminants, and the analytical suites to be performed on samples. Definitive data did not previously exist that would meet existing data quality objectives such as a quantitative and definitive determination of whether HE, RCRA metals, SVOCs, PCBs, VOCs, and radionuclides were present at the site in sufficient concentrations to pose a risk to human health and the environment.

#### 7.4.4.5 *Results and Conclusions*

This section discusses the summary results and conclusions for the soil and concrete samples that were analyzed for radionuclides, RCRA metals, HE, SVOCs, VOCs, and PCBs, as well as their comparison to site-specific background data and HRMB background values. The data are presented in tabular form and are discussed in the same order in which they are presented in the RFI sampling section:

- The site-specific background locations
- Pad 1, Gun Mount Positions, and Former Building Foundation
- Buildings 9900 and 9902
- The Former Wind Tunnel/Machine Shop Pad
- The Former Transformer Pad
- The Pad 3, Steel Plate and Utility Pole Area
- Pad 2
- The underground bunker
- The three debris mounds.

This section also illustrates how the nature and extent of contamination were defined.

Silver, cadmium, selenium, and mercury do not have quantified background concentration values, and <1 mg/kg is listed as the HRMB-approved background value. This circumstance arises because the laboratory reporting limits are usually at or less than 1 mg/kg for these metals in soil. Therefore, an absolute concentration less than the reporting limit cannot be established and used for maximum background concentrations. This issue is handled two different ways in this NFA proposal. For site characterization purposes, the <1 mg/kg value is used as a cut-off concentration for possible metal contamination discussion. However, for the risk screening purposes, the conservative approach is taken and the maximum concentration for each of these four metals is carried through the risk assessment, even if that maximum is below the <1 mg/kg nonquantified background value.

Table 7.4.4-1  
Summary of SWMU 57A Gamma Spectroscopy Analysis, December 1997–February 1998

Sample Attributes			Activity (pCi/g) <sup>a</sup>							
Record Number	ER Sample ID <sup>c</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Uranium-238		Thorium-232		Uranium-235		Cesium-137	
			Result	Error <sup>d</sup>	Result	Error <sup>d</sup>	Result	Error <sup>d</sup>	Result	Error <sup>d</sup>
Steel Plate										
510203	CCTA-57A-GR-014-0-0.5-S	0-0.5	ND (1.54E+00)	--	6.63E-01	3.31E-01	ND (2.14E-01)	--	9.35E-02	3.48E-02
510203	CCTA-57A-GR-014-0.5-1.0-S	0.5-1.0	ND (1.47E+00)	--	6.15E-01	3.10E-01	9.67E-02	8.15E-02	2.45E-02	4.47E-03
510203	CCTA-57A-GR-015-0-0.5-S	0-0.5	1.06E+00	1.24E+00	8.32E-01	9.33E-01	ND (1.92E-01)	--	9.32E-02	2.68E-02
510203	CCTA-57A-GR-015-0.5-1.0-S	0.5-1.0	ND (1.33E+00)	--	7.02E-01	3.43E-01	ND (1.81E-01)	--	ND (3.33E-02)	--
510206	CCTA-57A-GR-016-0-0.5-S	0-0.5	ND (3.42E+00)	--	5.86E-01	7.15E-01	ND (2.49E-01)	--	2.49E-01	4.94E-02
510206	CCTA-57A-GR-016-0-0.5-DU	0-0.5	ND (3.45E+00)	--	6.98E-01	3.73E-01	ND (2.52E-01)	--	2.86E-01	8.63E-02
510206	CCTA-57A-GR-016-0.5-1.0-S	0.5-1.0	ND (3.64E+00)	--	7.48E-01	3.84E-01	ND (2.77E-01)	--	1.64E-01	1.16E-01
510206	CCTA-57A-GR-017-0-0.5-S	0-0.5	ND (3.47E+00)	--	6.06E-01	3.06E-01	ND (2.48E-01)	--	7.04E-02	3.38E-02
510206	CCTA-57A-GR-017-0.5-1.0-S	0.5-1.0	ND (3.42E+00)	--	5.83E-01	3.05E-01	ND (2.55E-01)	--	ND (3.39E-02)	--
510206	CCTA-57A-GR-018-0-0.5-S	0-0.5	ND (3.44E+00)	--	5.39E-01	2.97E-01	ND (2.49E-01)	--	ND (3.72E-02)	--
510206	CCTA-57A-GR-018-0.5-1.0-S	0.5-1.0	ND (3.44E+00)	--	5.90E-01	3.36E-01	ND (2.51E-01)	--	ND (3.53E-02)	--
Pad 3										
510206	CCTA-57A-GR-019-0-0.5-S	0-0.5	ND (2.06E+00)	--	5.63E-01	3.49E-01	ND (2.44E-01)	--	1.05E-01	4.66E-02
510206	CCTA-57A-GR-019-0-0.5-DU	0-0.5	ND (3.48E+00)	--	7.58E-01	3.81E-01	ND (2.44E-01)	--	ND (2.52E-02)	--
510206	CCTA-57A-GR-019-0.5-1.0-S	0.5-1.0	ND (3.24E+00)	--	5.46E-01	3.40E-01	ND (2.41E-01)	--	8.95E-02	4.20E-02
510206	CCTA-57A-GR-020-0-0.5-S	0-0.5	ND (3.32E+00)	--	6.99E-01	3.52E-01	ND (2.47E-01)	--	1.56E-01	3.75E-02
510206	CCTA-57A-GR-020-0.5-1.0-S	0.5-1.0	ND (3.30E+00)	--	5.11E-01	2.60E-01	ND (2.42E-01)	--	1.05E-01	5.98E-02
510206	CCTA-57A-GR-021-0-0.5-S	0-0.5	ND (3.28E+00)	--	7.65E-01	3.94E-01	ND (2.48E-01)	--	1.78E-01	4.44E-02
510206	CCTA-57A-GR-021-0.5-1.0-S	0.5-1.0	ND (3.68E+00)	--	8.76E-01	4.66E-01	ND (2.68E-01)	--	8.89E-02	3.91E-02
510206	CCTA-57A-GR-022-0-0.5-S	0-0.5	ND (3.35E+00)	--	7.06E-01	3.42E-01	ND (2.38E-01)	--	8.01E-02	3.25E-02
510206	CCTA-57A-GR-022-0.5-1.0-S	0.5-1.0	1.51E+00	1.53+00	6.33E-01	3.10E-01	ND (2.33E-01)	--	5.87E-02	2.45E-02
510206	CCTA-57A-GR-023-0-0.5-S	0-0.5	ND (3.71E+00)	--	7.79E-01	4.14E-01	ND (2.80E-01)	--	2.11E-01	6.02E-02
510206	CCTA-57A-GR-023-0.5-1.0-S	0-0.5	ND (3.59E+00)	--	8.17E-01	4.40E-01	ND (2.65E-01)	--	3.87E-02	2.71E-02
510206	CCTA-57A-GR-023-0.5-1.0-DU	0.5-1.0	ND (4.08E+00)	--	8.54E-01	1.52E+00	ND (2.93E-01)	--	ND (4.58E-02)	--
Debris Mounds										
06046	CCTA-57A-GR-024-D	NA	ND (1.25E+00)	--	6.35E-01	3.36E-01	ND (1.76E-01)	--	2.51E-01	5.63E-02
06046	CCTA-57A-GR-024-0.5-S	0-0.5	ND (1.18E+00)	--	5.67E-01	6.31E-01	ND (1.59E-01)	--	7.83E-02	4.14E-02
06046	CCTA-57A-GR-025-D	NA	ND (1.29E+00)	--	6.23E-01	3.53E-01	ND (1.80E-01)	--	3.11E-01	7.71E-02
06046	CCTA-57A-GR-026-D	NA	ND (1.02E+00)	--	6.21E-01	3.87E-01	ND (1.73E-01)	--	3.37E-02	1.81E-02

Refer to footnotes at end of table.



Table 7.4.4-1 (Continued)  
 Summary of SWMU 57A Gamma Spectroscopy Analysis, December 1997–February 1998

Sample Attributes			Activity (pCi/g) <sup>a</sup>							
Record Number	ER Sample ID <sup>c</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Uranium-238		Thorium-232		Uranium-235		Cesium-137	
			Result	Error <sup>d</sup>	Result	Error <sup>d</sup>	Result	Error <sup>d</sup>	Result	Error <sup>d</sup>
Pad 1										
510217	CCTA-57A-GR-027-C	NA	ND (2.87E+00)	--	5.94E-01	3.24E-01	ND (2.13E-01)	--	2.33E-01	1.43E-02
510217	CCTA-57A-GR-028-C	NA	ND (3.10E+00)	--	6.34E-01	3.36E-01	ND (2.40E-01)	--	1.77E-02	1.37E-02
510217	CCTA-57A-GR-028-C-DU	NA	ND (2.96E+00)	--	6.20E-01	3.10E-01	ND (2.19E-01)	--	2.06E-01	1.65E-02
510217	CCTA-57A-GR-029-C	NA	ND (2.75E+00)	--	5.40E-01	2.65E-01	ND (2.09E-01)	--	ND (2.95E-02)	--
510217	CCTA-57A-GR-030-C	NA	ND (2.81E+00)	--	6.22E-01	2.87E-01	ND (2.06E-01)	--	2.19E-02	1.32E-02
510217	CCTA-57A-GR-031-C	NA	ND (2.64E+00)	--	5.06E-01	2.79E-01	ND (1.96E-01)	--	3.47E-02	2.55E-02
Pad 2										
510217	CCTA-57A-GR-049-C	NA	ND (2.84E+00)	--	5.11E-01	2.66E-01	ND (2.14E-01)	--	ND (2.74E-02)	--
Former Building Foundation										
510217	CCTA-57A-GR-054-C	NA	ND (3.17E+00)	--	6.95E-01	3.82E-01	ND (2.46E-01)	--	ND (3.45E-02)	--
Former Wind Tunnel/Machine Shop Pad										
510217	CCTA-57A-GR-059-C	NA	ND (3.09E+00)	--	5.75E-01	2.93E-01	ND (2.30E-01)	--	ND (3.13E-02)	--
Former Transformer Pad										
510217	CCTA-57A-GR-064-C	NA	ND (3.24E+00)	--	5.17E-01	2.64E-01	ND (2.40E-01)	--	ND (3.42E-02)	--
Underground Bunker										
510220	CCTA-57A-GR-069-C	NA	ND (3.21E+00)	--	6.24E-01	3.33E-01	ND (2.37E-01)	--	ND (3.04E-02)	--
510220	CCTA-57A-GR-069-0-0.5-S	0-0.5	ND (3.47E+00)	--	7.75E-01	7.45E-01	ND (2.63E-01)	--	ND (3.49E-02)	--
510220	CCTA-57A-GR-070-C	NA	ND (3.10E+00)	--	5.68E-01	3.02E-01	ND (2.29E-01)	--	ND (3.11E-02)	--
510220	CCTA-57A-GR-070-0-0.5-S	0-0.5	ND (3.29E+00)	--	6.97E-01	3.80E-01	ND (2.53E-01)	--	ND (3.35E-02)	--
510220	CCTA-57A-GR-071-C	NA	ND (3.14E+00)	--	6.70E-01	3.06E-01	ND (2.31E-01)	--	ND (3.20E-02)	--
510220	CCTA-57A-GR-071-0-0.5-S	0-0.5	ND (3.28E+00)	--	6.80E-01	3.43E-01	ND (2.36E-01)	--	ND (3.24E-02)	--
510220	CCTA-57A-GR-072-C	NA	ND (3.22E+00)	--	6.63E-01	3.25E-01	ND (2.36E-01)	--	ND (3.18E-02)	--
510220	CCTA-57A-GR-072-0-0.5-S	0-0.5	ND (3.39E+00)	--	5.68E-01	2.85E-01	ND (2.49E-01)	--	2.44E-02	3.45E-03
510222	CCTA-57A-GR-073-0-0.5-S	0-0.5	ND (3.27E+00)	--	6.25E-01	2.92E-01	ND (2.42E-01)	--	1.91E-01	5.06E-02
510222	CCTA-57A-GR-073-0-0.5-DU	0-0.5	ND (3.55E+00)	--	6.51E-01	3.35E-01	ND (2.51E-01)	--	1.61E-01	3.94E-02
Quality Assurance/Quality Control Samples (all in pCi/mL)										
510203	CCTA-57A-GR-000-EB	NA	ND (8.46E-01)	--	ND (1.62E-01)	--	ND (1.36E-01)	--	ND (2.73E-02)	--
510206	CCTA-57A-GR-000-EB	NA	ND (1.67E+00)	--	ND (1.57E-01)	--	ND (1.60E-01)	--	ND (2.33E-02)	--
06046	CCTA-57A-GR-000-EB	NA	ND (7.64E-01)	--	ND (1.49E-01)	--	ND (1.21E-01)	--	ND (2.61E-02)	--

Refer to footnotes at end of table.

Table 7.4.4-1 (Concluded)  
 Summary of SWMU 57A Gamma Spectroscopy Analysis, December 1997–February 1998

Sample Attributes			Activity (pCi/g) <sup>a</sup>							
Record Number	ER Sample ID <sup>c</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Uranium-238		Thorium-232		Uranium-235		Cesium-137	
			Result	Error <sup>d</sup>	Result	Error <sup>d</sup>	Result	Error <sup>d</sup>	Result	Error <sup>d</sup>
510217	CCTA-57A-GR-000-EB	NA	ND (1.61E+00)	--	ND (1.53E-01)	--	ND (1.57E-01)	--	ND (2.23E-02)	--
510220	CCTA-57A-GR-000-EB	NA	ND (1.81E+00)	--	ND (1.55E-01)	--	ND (1.62E-01)	--	ND (2.43E-02)	--
Site-Specific Background Samples (pCi/g)										
510203	<b>CCTA-57A-GR-001-0-0.5-S</b>	0-0.5	ND (1.70E+00)	--	6.86E-01	8.48E-01	ND (2.35E-01)	--	2.65E-01	7.49E-02
510203	<b>CCTA-57A-GR-001-0.5-1.0-S</b>	0.5-1.0	1.72E+00	1.05E+00	6.91E-01	3.49E-01	ND (2.09E-01)	--	ND (3.84E-02)	--
510203	<b>CCTA-57A-GR-002-0-0.5-S</b>	0-0.5	ND (1.84E+00)	--	8.31E-01	5.14E-01	ND (2.61E-01)	--	3.91E-01	9.02E-02
510203	<b>CCTA-57A-GR-002-0.5-1.0-S</b>	0.5-1.0	ND (1.58E+00)	--	7.12E-01	4.38E-01	ND (2.38E-01)	--	ND (4.60E-02)	--
510203	<b>CCTA-57A-GR-003-0-0.5-S</b>	0-0.5	ND (1.60E+00)	--	8.16E-01	4.06E-01	ND (2.10E-01)	--	5.50E-01	9.29E-02
510203	<b>CCTA-57A-GR-003-0.5-1.0-S</b>	0.5-1.0	8.03E-01	7.37E-01	7.34E-01	3.60E-01	ND (1.99E-01)	--	ND (3.95E-02)	--
510203	<b>CCTA-57A-GR-004-0-0.5-S</b>	0-0.5	ND (1.81E+00)	--	6.84E-01	4.14E-01	ND (2.46E-01)	--	1.63E-01	8.38E-02
510203	<b>CCTA-57A-GR-004-0.5-1.0-S</b>	0.5-1.0	9.78E-01	4.47E-01	5.99E-01	3.11E-01	ND (2.35E-01)	--	ND (4.29E-02)	--
510203	<b>CCTA-57A-GR-005-0-0.5-S</b>	0-0.5	ND (1.65E+00)	--	8.60E-01	4.36E-01	ND (2.21E-01)	--	1.25E-01	3.66E-02
510203	<b>CCTA-57A-GR-005-0.5-1.0-S</b>	0.5-1.0	ND (1.60E+00)	--	7.59E-01	3.78E-01	ND (2.19E-01)	--	1.86E-02	2.56E-02
510203	<b>CCTA-57A-GR-005-0.5-1.0-DU</b>	0.5-1.0	ND (2.01E+00)	--	7.75E-01	4.03E-01	ND (2.64E-01)	--	1.74E-02	1.87E-02
Background Soil Concentrations, Coyote Test Field <sup>e</sup>			1.4	NA	1.01	NA	0.18	NA	0.079	NA

<sup>a</sup> Soil samples in bold exceed background.

<sup>b</sup> Analysis request/chain-of-custody record.

<sup>c</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figures 7.2.1-2 and 7.2.1-3.

<sup>d</sup> Two standard deviations about the mean detected activity.

<sup>e</sup> From Dinwiddle September 1997. The minimum background activity between surface (0 to 0.5 feet) and subsurface (>0.5 feet) soils is listed as the background value.

- C = Concrete sample.
- CCTA = Central Coyote Test Area.
- D = Debris sample.
- EB = Equipment blank.
- ER = Environmental Restoration.
- DU = Duplicate sample.
- ft = Foot (feet).
- GR = Grab sample.
- ID = Identification.
- NA = Not applicable.
- ND ( ) = Not detected at or above the minimum detectable activity, shown in parenthesis.
- pCi/g = Picocurie(s) per gram.
- pCi/mL = Picocurie(s) per milliliter.
- S = Soil sample.
- SWMU = Solid waste management unit.
- = Error not calculated.

Table 7.4.4-2  
Summary of SWMU 57A Thorium and Uranium Isotopic Analysis, December 1997

Sample Attributes			Activity (pCi/g)											
Record Number <sup>a</sup>	ER Sample ID <sup>b</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Thorium-228		Thorium-230		Thorium-232		Uranium-233/234		Uranium-235		Uranium-238	
			Result	Error <sup>c</sup>	Result	Error <sup>c</sup>	Result	Error <sup>c</sup>	Result	Error <sup>c</sup>	Result	Error <sup>c</sup>	Result	Error <sup>c</sup>
<b>Site-Specific Background Soil Samples</b>														
510202	<b>CCTA-57A-GR-001-0-0.5-S</b>	0-0.5	0.725	0.313	0.806	0.281	0.683	0.257	0.434	0.0865	0.0269	0.021	0.499	0.0943
510202	<b>CCTA-57A-GR-001-0.5-1.0-S</b>	0.5-1.0	1.05	0.541	2.60	0.832	0.748	0.38	0.433	0.0919	0.0326	0.022	0.555	0.107
510202	<b>CCTA-57A-GR-002-0-0.5-S</b>	0-0.5	0.949	0.382	1.16	0.402	0.832	0.321	0.532	0.107	0.0386	0.0247	0.496	0.102
510202	<b>CCTA-57A-GR-002-0.5-1.0-S</b>	0.5-1.0	1.05	0.61	2.43	0.888	1.19	0.554	0.404	0.0842	0.0392	0.0244	0.461	0.0908
510202	<b>CCTA-57A-GR-003-0-0.5-S</b>	0-0.5	0.963	0.352	1.69	0.442	0.791	0.277	0.415	0.0846	0.0508	0.0282	0.461	0.0901
510202	<b>CCTA-57A-GR-003-0.5-1.0-S</b>	0.5-1.0	1.57	0.326	1.14	0.252	1.93	0.364	0.423	0.0783	0.0320	0.0189	0.479	0.0848
510202	<b>CCTA-57A-GR-004-0-0.5-S</b>	0-0.5	0.539	0.252	0.888	0.258	0.459	0.176	0.433	0.0807	0.0201	0.0155	0.421	0.0794
510202	<b>CCTA-57A-GR-004-0.5-1.0-S</b>	0.5-1.0	0.986	0.319	1.03	0.284	0.605	0.204	0.475	0.0853	0.0302	0.0198	0.484	0.0862
510202	<b>CCTA-57A-GR-005-0-0.5-S</b>	0-0.5	0.908	0.348	1.26	0.347	0.706	0.243	0.368	0.0748	0.0344	0.0225	0.316	0.0686
510202	<b>CCTA-57A-GR-005-0.5-1.0-S</b>	0.5-1.0	0.803	0.285	1.08	0.304	0.711	0.235	0.456	0.0865	0.0348	0.0204	0.458	0.0862
510202	<b>CCTA-57A-GR-005-0.5-1.0-DU</b>	0.5-1.0	1.22	0.466	1.41	0.431	0.880	0.315	0.576	0.105	0.0561	0.0291	0.480	0.0926
Background Soil Activities, Coyote Test Field <sup>d</sup>			Not available	NA	Not available	NA	1.01	NA	1.6	NA	0.18	NA	1.4	NA
Quality Assurance/Quality Control Sample (pCi/L)														
510202	<b>CCTA-57A-GR-000-EB</b>	NA	ND (0.357)	--	0.155	0.137	0.0773	0.0943	0.214	0.121	ND (0.126)	--	0.158	0.0981

<sup>a</sup> Analysis request/chain-of-custody record.

<sup>b</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

<sup>c</sup> Two standard deviations about the mean detected activity.

<sup>d</sup> From Dinwiddie September 1997.

CCTA = Central Coyote Test Area.

EB = Equipment blank.

ER = Environmental Restoration.

DU = Duplicate sample

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

NA = Not applicable.

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

pCi/g = Picocurie(s) per gram.

pCi/L = Picocurie(s) per liter.

S = Soil sample.

SWMU = Solid waste management unit.

- = Error not calculated.

Table 7.4.4-3  
Summary of SWMU 57A Gross Alpha and Beta Analysis  
February—April 1998

Sample Attributes			Activity (pCi/g)			
Record Number <sup>a</sup>	ER Sample ID <sup>b</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	Gross Alpha		Gross Beta	
			Result	Error <sup>c</sup>	Result	Error <sup>c</sup>
<b>Steel Plate</b>						
510202	CCTA-57A-GR-014-0-0.5-S	0-0.5	12.0	3.24	27.8	3.45
510202	CCTA-57A-GR-014-0.5-1.0-S	0.5-1.0	9.73	2.97	25.0	3.27
510202	CCTA-57A-GR-015-0-0.5-S	0-0.5	19.1	3.78	25.2	3.3
510202	CCTA-57A-GR-015-0.5-1.0-S	0.5-1.0	18.2	4.02	24.0	3.6
510208	CCTA-57A-GR-016-0-0.5-S	0-0.5	5.99	2.97	23.6	3.73
510208	CCTA-57A-GR-016-0-0.5-DU	0-0.5	9.71	3.24	22.1	3.63
510208	CCTA-57A-GR-016-0.5-1.0-S	0.5-1.0	13.7	3.68	19.4	3.38
510208	CCTA-57A-GR-017-0-0.5-S	0-0.5	8.82	3.05	22.1	3.76
510208	CCTA-57A-GR-017-0.5-1.0-S	0.5-1.0	15.1	3.67	18.2	3.2
510208	CCTA-57A-GR-018-0-0.5-S	0-0.5	16.5	4.1	21.7	3.48
510208	CCTA-57A-GR-018-0.5-1.0-S	0.5-1.0	11.2	3.59	18.4	3.47
<b>Pad 3</b>						
510208	CCTA-57A-GR-019-0-0.5-S	0-0.5	13.2	3.71	17.7	3.55
510208	CCTA-57A-GR-019-0-0.5-DU	0-0.5	9.22	3.38	24.4	3.86
510208	CCTA-57A-GR-019-0.5-1.0-S	0.5-1.0	18.9	4.4	24.5	3.95
510208	CCTA-57A-GR-020-0-0.5-S	0-0.5	13.0	2.63	22.1	2.67
510208	CCTA-57A-GR-020-0.5-1.0-S	0.5-1.0	12.0	2.61	24.2	2.82
510208	CCTA-57A-GR-021-0-0.5-S	0-0.5	11.9	2.77	25.2	2.84
510208	CCTA-57A-GR-021-0.5-1.0-S	0.5-1.0	13.7	2.53	22.3	2.39
510208	CCTA-57A-GR-022-0-0.5-S	0-0.5	8.70	2.25	22.4	2.5
510208	CCTA-57A-GR-022-0.5-1.0-S	0.5-1.0	11.7	2.64	22.3	2.63
510208	CCTA-57A-GR-023-0-0.5-S	0-0.5	7.86	2.05	20.1	2.39
510208	CCTA-57A-GR-023-0-0.5-DU	0-0.5	8.31	2.32	23.7	2.94
510208	CCTA-57A-GR-023-0.5-1.0-S	0.5-1.0	14.2	2.81	23.7	2.9
<b>Pad 1</b>						
510212	CCTA-57A-GR-027-C	NA	15.4	3.95	21.5	3.63
510212	CCTA-57A-GR-028-C	NA	12.2	3.64	18.7	3.52
510212	CCTA-57A-GR-028-C-DU	NA	6.03	2.48	15.0	2.98
510212	CCTA-57A-GR-029-C	NA	16.9	4.35	32.9	4.35
510212	CCTA-57A-GR-030-C	NA	9.54	2.94	18.9	2.69
510212	CCTA-57A-GR-031-C	NA	5.31	2.89	17.1	3.31
<b>Pad 2</b>						
510212	CCTA-57A-GR-049-C	NA	11.4	3.59	11.2	3.32
<b>Former Building Foundation</b>						
510212	CCTA-57A-GR-054-C	NA	10.4	3.15	16.1	3.16
<b>Former Wind Tunnel/Machine Shop Pad</b>						
510212	CCTA-57A-GR-059-C	NA	6.82	2.77	19.1	3.3
<b>Former Transformer Pad</b>						
510212	CCTA-57A-GR-064-C	NA	7.56	3.01	15.8	3.23
<b>Underground Bunker</b>						
510219	CCTA-57A-GR-069-C	NA	7.10	2.47	21.4	1.92
510219	CCTA-57A-GR-069-0-0.5-S	0-0.5	11.6	2.72	32.7	2.11
510219	CCTA-57A-GR-070-C	NA	4.15	2.30	12.0	1.75
510219	CCTA-57A-GR-070-0-0.5-S	0-0.5	5.60	2.39	27.6	2.03
510219	CCTA-57A-GR-071-C	NA	5.96	2.41	18.4	1.87
510219	CCTA-57A-GR-071-0-0.5-S	0-0.5	13.0	2.79	21.6	1.93
510219	CCTA-57A-GR-072-C	NA	5.44	2.38	15.0	1.81
510219	CCTA-57A-GR-072-0-0.5-S	0-0.5	9.54	2.61	21.6	1.93
510221	CCTA-57A-GR-073-0-0.5-S	0-0.5	8.74	2.86	30.4	2.29

Refer to footnotes at end of table.

Table 7.4.4-3 (Concluded)  
Summary of SWMU 57A Gross Alpha and Beta Analysis  
February—April 1998

Sample Attributes			Activity (pCi/g)			
Record Number <sup>a</sup>	ER Sample ID (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	Gross Alpha		Gross Beta	
			Result	Error <sup>c</sup>	Result	Error <sup>c</sup>
510221	CCTA-57A-GR-073-0-0.5-DU	0-0.5	10.6	3.08	43.3	2.94
Quality Assurance/Quality Control Samples (all in pCi/L)						
510202	CCTA-57A-GR-000-EB	NA	ND (0.142)	--	ND (0.379)	--
510208	CCTA-57A-GR-000-EB	NA	0.217	0.256	0.466	0.405
510212	CCTA-57A-GR-000-EB	NA	ND (0.108)	--	0.433	0.339
510219	CCTA-57A-GR-000-EB	NA	ND (0.500)	--	1.56	0.590
Site Specific Background Samples (pCi/g)						
510202	CCTA-57A-GR-001-0-0.5-S	0-0.5	14.4	2.86	26.6	3.13
510202	CCTA-57A-GR-001-0.5-1.0-S	0.5-1.0	9.43	2.47	18.0	2.89
510202	CCTA-57A-GR-002-0-0.5-S	0-0.5	12.7	2.56	22.9	2.96
510202	CCTA-57A-GR-002-0.5-1.0-S	0.5-1.0	9.41	2.42	23.3	2.94
510202	CCTA-57A-GR-003-0-0.5-S	0-0.5	9.97	2.36	26.2	3.05
510202	CCTA-57A-GR-003-0.5-1.0-S	0.5-1.0	14.5	2.79	24.9	2.91
510202	CCTA-57A-GR-004-0-0.5-S	0-0.5	10.9	2.35	25.3	2.87
510202	CCTA-57A-GR-004-0.5-1.0-S	0.5-1.0	13.0	2.72	22.3	2.74
510202	CCTA-57A-GR-005-0-0.5-S	0-0.5	11.0	2.37	25.5	3.09
510202	CCTA-57A-GR-005-0.5-1.0-S	0.5-1.0	8.76	2.2	22.7	2.77
510202	CCTA-57A-GR-005-0.5-1.0-DU	0.5-1.0	11.0	2.49	20.7	2.72
Background Soil Concentrations <sup>d</sup>			18.3	--	52.7	--

<sup>a</sup> Analysis request/chain-of-custody record.

<sup>b</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figures 7.2.1-2 and 7.2.1-3.

<sup>c</sup> Two standard deviations about the mean detected activity.

<sup>d</sup> From Tharp July 1998.

- C = Concrete sample.
- CCTA = Central Coyote Test Area.
- EB = Equipment blank.
- ER = Environmental Restoration.
- DU = Duplicate sample
- ft = Foot (feet).
- GR = Grab sample.
- ID = Identification.
- NA = Not applicable.
- ND ( ) = Not detected at or above the minimum detectable activity, shown in parenthesis.
- pCi/g = Picocurie(s) per gram.
- pCi/L = Picocurie(s) per liter.
- S = Soil sample.
- SWMU = Solid waste management unit.
- = Error not calculated.

Table 7.4.4-4  
Summary of SWMU 57A RCRA Metals Analytical Results, December 1997–February 1998

Sample Attributes			Metals (EPA 6010/7000) <sup>a</sup> (mg/kg) <sup>b</sup>								
Record Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Building 9900											
510201	CCTA-57A-GR-006-0-0.5-S	0-0.5	3.94	128	0.611	ND (0.4)	10.9 J	18.2	0.0151 J (0.11)	ND (0.2)	0.263 J (1)
510201	CCTA-57A-GR-006-0-0.5-DU	0-0.5	3.50	118	0.391 J (0.6)	ND (0.4)	6.85 J	16.2	0.0193 J (0.12)	ND (0.2)	2.85
510201	CCTA-57A-GR-006-0.5-1.0-S	0.5-1.0	3.67	158	0.542 J (0.6)	ND (0.4)	7.84 J	13.8	0.0184 J (0.11)	ND (0.2)	2.64
510201	CCTA-57A-GR-007-0-0.5-S	0-0.5	3.35	164	0.382 J (0.6)	ND (0.4)	5.31 J	13.8	0.0217 J (0.11)	ND (0.2)	1.66
510201	CCTA-57A-GR-007-0.5-1.0-S	0.5-1.0	3.86	194	0.398 J (0.6)	ND (0.4)	7.14 J	35.2	0.0344 J (0.11)	ND (0.2)	2.33
510201	CCTA-57A-GR-008-0-0.5-S	0-0.5	3.91	170	0.713	ND (0.4)	11.0 J	14.8	0.0226 J (0.12)	ND (0.2)	3.80
510201	CCTA-57A-GR-008-0.5-1.0-S	0.5-1.0	4.30	143	0.572 J (0.6)	ND (0.4)	9.48 J	13.1	0.0150 J (0.12)	ND (0.2)	3.38
510201	CCTA-57A-GR-009-0-0.5-S	0-0.5	3.90	141	0.590	ND (0.4)	10.3 J	13.6	0.0313 J (0.11)	ND (0.2)	3.54
510201	CCTA-57A-GR-009-0.5-1.0-S	0.5-1.0	4.51	187	0.736	ND (0.4)	12.2 J	19.5	0.0167 J (0.11)	ND (0.2)	4.07
Building 9902											
510201	CCTA-57A-GR-010-0-0.5-S	0-0.5	3.36	161	0.716	ND (0.4)	11.9	19.2	0.0170 J (0.11)	ND (0.2)	4.03
510201	CCTA-57A-GR-010-0-0.5-DU	0-0.5	3.55	150	0.618	ND (0.4)	8.57	13.5	0.0302 J (0.12)	ND (0.2)	3.61
510201	CCTA-57A-GR-010-0.5-1.0-S	0.5-1.0	3.49	139	0.559 J (0.6)	ND (0.4)	7.86	9.35	0.0148 J (0.11)	ND (0.2)	2.73
510201	CCTA-57A-GR-011-0-0.5-S	0-0.5	2.90	279	0.295 J (0.5)	1.01	7.15	133	0.0100 J (0.11)	ND (0.2)	2.52
510201	CCTA-57A-GR-011-0.5-1.0-S	0.5-1.0	3.59	154	0.392 J (0.5)	ND (0.4)	7.62	29.7	0.0179 J (0.11)	ND (0.2)	2.62
510201	CCTA-57A-GR-012-0-0.5-S	0-0.5	ND (0.06)	177	0.475 J (0.6)	1.06	7.84	29.9	0.0413 J (0.11)	ND (0.2)	2.83
510201	CCTA-57A-GR-012-0.5-1.0-S	0.5-1.0	4.97	142	0.377 J (0.6)	ND (0.4)	6.54	12.8	0.0313 J (0.11)	ND (0.2)	2.32
510201	CCTA-57A-GR-013-0-0.5-S	0-0.5	3.41	198	0.529 J (0.6)	1.23	8.88	72.0	0.0303 J (0.12)	ND (0.2)	2.67
510201	CCTA-57A-GR-013-0.5-1.0-S	0.5-1.0	4.12	131	0.583	0.481 J (0.6)	8.64	25.6	0.0196 J (0.11)	ND (0.2)	2.30
Steel Plate											
510201	CCTA-57A-GR-014-0-0.5-S	0-0.5	3.35	113	0.297 J (0.5)	ND (0.4)	4.45	15.1	0.0146 J (0.11)	ND (0.2)	1.73
510201	CCTA-57A-GR-014-0.5-1.0-S	0.5-1.0	3.51	116	0.269	ND (0.4)	4.12	5.43	0.0148 J (0.11)	ND (0.2)	1.53
510201	CCTA-57A-GR-015-0-0.5-S	0-0.5	3.38	120	0.559 J (0.6)	ND (0.4)	9.64	11.3	0.0222 J (0.11)	ND (0.2)	3.59
510201	CCTA-57A-GR-015-0.5-1.0-S	0.5-1.0	4.47	128	0.564	ND (0.4)	7.35	9.00	0.0189 J (0.12)	ND (0.2)	2.18
510207	CCTA-57A-GR-016-0-0.5-S	0-0.5	3.04	105	0.362 J (0.5)	ND (0.4)	4.88 J	10.1 J	0.0120 J (0.11)	ND (0.2)	1.81 J
510207	CCTA-57A-GR-016-0-0.5-DU	0-0.5	2.51	2.19 J	0.309 J (0.5)	ND (0.4)	4.69 J	13.2 J	0.0120 J (0.11)	ND (0.2)	1.80 J
510207	CCTA-57A-GR-016-0.5-1.0-S	0.5-1.0	2.78	110 J	0.293 J (0.5)	ND (0.4)	4.85	8.52 J	0.0124 J (0.10)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-017-0-0.5-S	0-0.5	2.01	105 J	0.377 J (0.5)	ND (0.4)	6.71	5.92 J	0.0154 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-017-0.5-1.0-S	0.5-1.0	2.60	103 J	0.283 J (0.5)	ND (0.4)	4.55	4.81 J	0.0174 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-018-0-0.5-S	0-0.5	5.48	111 J	0.455 J (0.6)	ND (0.4)	6.60	0.940 J (1.2)	0.0263 J (0.12)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-018-0.5-1.0-S	0.5-1.0	4.74	128 J	0.337 J (0.6)	ND (0.4)	5.62	10.7 J	0.0163 J (0.12)	ND (0.2)	ND (0.2)

Refer to footnotes at end of table.

Table 7.4.4-4 (Continued)  
 Summary of SWMU 57A RCRA Metals Analytical Results, December 1997–February 1998

Sample Attributes			Metals (EPA 6010/7000) <sup>a</sup> (mg/kg) <sup>b</sup>								
Record Number <sup>c</sup>	ER Sample ID <sup>d</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Pad 3											
510207	CCTA-57A-GR-019-0-0.5-S	0–0.5	2.54	88.7	0.312 J (0.6)	ND (0.4)	4.89	21.2	0.0141 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-019-0-0.5-DU	0–0.5	2.15	117	0.342 J (0.6)	ND (0.4)	5.60	17.5	0.0172 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-019-0.5-1.0-S	0.5–1.0	3.34	98.4	0.317 J (0.6)	ND (0.4)	5.36	13.7 J	0.0165 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-020-0-0.5-S	0–0.5	2.70	167	0.411 J (0.6)	ND (0.4)	6.57	35.9	0.0136 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-020-0.5-1.0-S	0.5–1.0	3.42	173	0.384 J (0.6)	ND (0.4)	6.86	28.7	0.0227 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-021-0-0.5-S	0–0.5	3.30	88.3	0.353 J (0.6)	ND (0.4)	6.51	23.1	0.0194 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-021-0.5-1.0-S	0.5–1.0	2.84	102	0.487 J (0.6)	ND (0.4)	6.81	55.7	0.0203 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-022-0-0.5-S	0–0.5	3.13	102	0.425 J (0.5)	ND (0.4)	6.78	20.8	0.0103 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-022-0.5-1.0-S	0.5–1.0	3.48	119	0.373 J (0.6)	ND (0.4)	6.31	19.5	0.0143 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-023-0-0.5-S	0–0.5	3.07	96.7	0.329 J (0.6)	ND (0.4)	5.57	14.3	0.0146 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-023-0.5-1.0-S	0.5–1.0	3.24	105	0.362 J (0.6)	ND (0.4)	6.82	11.8 J	0.0388 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-023-0.5-1.0-DU	0.5–1.0	2.92	97.3	0.354 J (0.6)	ND (0.4)	6.55	17.1 J	0.0106 J (0.11)	ND (0.2)	ND (0.2)
Pad 1											
510216	CCTA-57A-GR-027-C	NA	5.45	91.8	0.153 J (0.5)	ND (0.4)	10.3	57.2	ND (0.0078)	ND (0.2)	1.70
510216	CCTA-57A-GR-028-C	NA	3.59	111	0.217	ND (0.4)	6.82	27.4	ND (0.0078)	ND (0.2)	2.32
510216	CCTA-57A-GR-028-C-DU	NA	4.65	78.3	0.196 J (0.5)	ND (0.4)	5.03	21.9	ND (0.0078)	ND (0.2)	1.89
510216	CCTA-57A-GR-029-C	NA	5.66	78.7	0.187 J (0.5)	ND (0.4)	5.59	12.8	ND (0.0078)	ND (0.2)	1.96
510216	CCTA-57A-GR-030-C	NA	5.29	110	0.195 J (0.5)	ND (0.4)	7.11	10.1	ND (0.0078)	ND (0.2)	2.35
510216	CCTA-57A-GR-031-C	NA	5.95	148	0.181 J (0.5)	ND (0.4)	5.55	13.7	ND (0.0078)	ND (0.2)	1.98
510207	CCTA-57A-GR-032-0-0.5-S	0–0.5	3.95	146	0.694	ND (0.4)	11.3	25.0 J	0.0124 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-032-0.5-1.0-S	0.5–1.0	3.45	140	0.653	ND (0.4)	11.0	32.1 J	0.0230 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-033-0-0.5-S	0–0.5	3.58	118	0.604	ND (0.4)	10.7	12.2 J	0.0126 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-033-0-0.5-DU	0–0.5	3.25	120	0.567	ND (0.4)	10.1	13.1 J	0.0137 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-033-0.5-1.0-S	0.5–1.0	3.32	139	0.701	ND (0.4)	10.4	20.5	0.0215 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-034-0-0.5-S	0–0.5	3.67	126	0.567	ND (0.4)	10.1	64.9	0.0120 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-034-0.5-1.0-S	0.5–1.0	3.63	123	0.493 J (0.5)	ND (0.4)	7.91	131	ND (0.0078)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-035-0-0.5-S	0–0.5	3.15	180	0.686	ND (0.4)	11.9	14.3	ND (0.0078)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-035-0.5-1.0-S	0.5–1.0	3.32	140	0.597 J (0.6)	ND (0.4)	9.95	23.0	0.00946 J (0.11)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-036-0-0.5-S	0–0.5	3.22	134	0.586 J (0.6)	ND (0.4)	9.93	14.3	ND (0.0078)	ND (0.2)	ND (0.2)
510207	CCTA-57A-GR-036-0.5-1.0-S	0.5–1.0	3.73	140	0.684	ND (0.4)	11.2	13.7	0.0157 J (0.11)	ND (0.2)	ND (0.2)

Refer to footnotes at end of table.

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Table 7.4.4-4 (Continued)  
 Summary of SWMU 57A RCRA Metals Analytical Results, December 1997–February 1998

Sample Attributes			Metals (EPA 6010/7000) <sup>a</sup> (mg/kg) <sup>b</sup>								
Record Number <sup>c</sup>	ER Sample ID <sup>d</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
<b>Debris Mounds</b>											
06122	CCTA-57A-GR-024-D (on-site laboratory)	NA	3.2	100	0.49	0.44	9.6	17	ND (0.035)	0.74 J (0.96)	0.071
06122	CCTA-57A-GR-024-D-DU (on-site laboratory)	NA	3	90	0.46	0.33	9.8	15	ND (0.035)	0.24 J (0.96)	0.1
06122	CCTA-57A-GR-024-0.5-S (on-site laboratory)	0–0.5	2.3	65	0.21	0.12 J (0.19)	3.9	5.2	ND (0.035)	0.65 J (0.96)	ND (0.014)
06122	CCTA-57A-GR-024-0.5-S-DU (on-site laboratory)	0–0.5	2.1	43	0.32	0.14 J (0.19)	6.8	5.7	ND (0.035)	0.5 J (0.96)	0.062
06122	CCTA-57A-GR-025-D (on-site laboratory)	NA	3	100	0.43	1.1	9.4	28	ND (0.035)	0.59 J (0.96)	0.063
06122	CCTA-57A-GR-025-0.5-S (on-site laboratory)	0–0.5	3.8	94	0.48	0.21	7.6	10	ND (0.035)	0.59 J (0.96)	0.037 J (0.056)
06122	CCTA-57A-GR-026-D (on-site laboratory)	NA	3.1	93	0.41	0.79	7.8	11	ND (0.035)	0.64 J (0.96)	0.066
06122	CCTA-57A-GR-026-0.5-S (on-site laboratory)	0–0.5	3.6	110	0.47	0.41	6.9	14	ND (0.035)	0.72 J (0.96)	0.063
06126	CCTA-57A-GR-026-0.5-S	0–0.5	4.04	144	0.632	0.307 J (0.490)	11.2	15.7	0.0226 J (0.0329)	ND (0.144)	0.0848 J (0.980)
<b>Former Gun Mounts / Gun Mounts</b>											
510218	CCTA-57A-GR-037-0-0.5-S	0–0.5	4.09	125	0.525	ND (0.4)	10.8	12.6	0.0104 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-037-0.5-1.0-S	0.5–1.0	3.71	142	0.541	ND (0.4)	8.17	13.3	0.0121 J (0.10)	ND (0.2)	0.391 J (1)
510218	CCTA-57A-GR-038-0-0.5-S	0–0.5	4.01	108	0.386 J (0.5)	ND (0.4)	6.97	11.8	0.0196 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-038-0.5-1.0-S	0.5–1.0	4.26	190	0.283 J (0.5)	0.789	4.84	42.2	0.0168 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-039-0-0.5-S	0–0.5	3.81	135	0.601	ND (0.4)	9.47	12.2	0.0137 J (0.10)	ND (0.2)	0.257 J (1)
510218	CCTA-57A-GR-039-0.5-1.0-S	0.5–1.0	4.17	142	0.525	ND (0.4)	8.44	11.0	0.0145 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-039-0.5-1.0-DU	0.5–1.0	4.57	131	0.572	ND (0.4)	9.80	9.60	0.0180 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-040-0-0.5-S	0–0.5	3.45	123	0.466 J (0.5)	ND (0.4)	8.75	10.5	ND (0.0078)	ND (0.2)	0.313 J (1)
510218	CCTA-57A-GR-040-0.5-1.0-S	0.5–1.0	4.63	139	0.552	ND (0.4)	9.00	10.5	0.00796 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-041-0-0.5-S	0–0.5	4.22	119	0.450	ND (0.4)	7.20	12.5	0.0129 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-041-0.5-1.0-S	0.5–1.0	4.08	121	0.515	ND (0.4)	8.29	11.8	0.0156 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-042-0-0.5-S	0–0.5	4.36	146	0.633	0.570	10.7	13.4	0.00901 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-042-0.5-1.0-S	0.5–1.0	4.21	128	0.545	ND (0.4)	7.65	12.4	0.0129 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-043-0-0.5-S	0–0.5	2.79	97.3	0.472 J (0.5)	0.576	6.98	16.8	0.0110 J (0.10)	ND (0.2)	0.649 J (1)
510218	CCTA-57A-GR-043-0.5-1.0-S	0.5–1.0	2.81	108	0.544	ND (0.4)	9.76	11.8	0.0127 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-044-0-0.5-S	0–0.5	2.85	112	0.413 J (0.5)	0.572	7.61	64.4	0.0141 J (0.10)	ND (0.2)	1.22
510218	CCTA-57A-GR-044-0.5-1.0-S	0.5–1.0	2.91	97.3	0.420 J (0.5)	ND (0.4)	8.62	11.5	0.0108 J (0.10)	ND (0.2)	0.316 J (1)
510218	CCTA-57A-GR-045-0-0.5-S	0–0.5	3.27	95.0	0.420 J (0.5)	0.610	7.77	13.1	0.0131 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-045-0.5-1.0-S	0.5–1.0	3.52	107	0.526	ND (0.4)	8.81	13.3	0.00945 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-045-0.5-1.0-DU	0.5–1.0	2.11	112	0.565	ND (0.4)	8.52	13.6	ND (0.0078)	ND (0.2)	ND (0.2)

Refer to footnotes at end of table.



Table 7.4.4-4 (Continued)  
 Summary of SWMU 57A RCRA Metals Analytical Results, December 1997–February 1998

Sample Attributes			Metals (EPA 6010/7000) <sup>a</sup> <sub>b</sub> (mg/kg)								
Record Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
510218	CCTA-57A-GR-046-0-0.5-S	0-0.5	2.71	59.4	0.183 J (0.5)	ND (0.4)	4.25	18.7	0.0163 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-046-0.5-1.0-S	0.5-1.0	3.03	91.5	0.393 J (0.5)	ND (0.4)	6.76	17.1	0.0155 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-047-0-0.5-S	0-0.5	2.97	85.7	0.487 J (0.5)	0.420 J (0.5)	8.35	11.2	0.0170 J (0.10)	ND (0.2)	ND (0.2)
510218	CCTA-57A-GR-047-0.5-1.0-S	0.5-1.0	3.32	140	0.578	ND (0.4)	11.1	13.8	0.0098 J (0.10)	ND (0.2)	4.63
510218	CCTA-57A-GR-048-0-0.5-S	0-0.5	6.06	136	0.488 J (0.5)	ND (0.4)	8.34	11.1	0.0112 J (0.10)	ND (0.2)	3.26
510218	CCTA-57A-GR-048-0.5-1.0-S	0.5-1.0	4.37	172	0.470 J (0.5)	ND (0.4)	6.70	11.1	0.00934 J (0.10)	ND (0.2)	2.75
Pad 2											
510218	CCTA-57A-GR-050-0-0.5-S	0-0.5	3.40	115	0.281 J (0.5)	ND (0.4)	4.90	11.4	0.0140 J (0.10)	ND (0.2)	1.86
510218	CCTA-57A-GR-051-0-0.5-S	0-0.5	3.08	189	0.388 J (0.5)	ND (0.4)	6.59	15.0	0.0128 J (0.10)	ND (0.2)	2.61
510218	CCTA-57A-GR-052-0-0.5-S	0-0.5	3.50	195	0.320 J (0.5)	ND (0.4)	5.58	11.9	0.0104 J (0.10)	ND (0.2)	2.12
510218	CCTA-57A-GR-053-0-0.5-S	0-0.5	4.31	110	0.355 J (0.5)	ND (0.4)	6.53	20.8	0.0112 J (0.10)	ND (0.2)	2.43
Former Building Foundation											
510218	CCTA-57A-GR-055-0-0.5-S	0-0.5	4.46	146	0.504	ND (0.4)	8.25	23.0	0.0197 J (0.10)	ND (0.2)	3.71
510218	CCTA-57A-GR-056-0-0.5-S	0-0.5	3.56	103	0.593	ND (0.4)	9.48	13.7	0.0111 J (0.10)	ND (0.2)	3.71
510218	CCTA-57A-GR-057-0-0.5-S	0-0.5	3.28	114	0.447 J (0.5)	ND (0.4)	7.27	17.0	0.0126 J (0.10)	ND (0.2)	3.06
510218	CCTA-57A-GR-058-0-0.5-S	0-0.5	4.09	112	0.509	ND (0.4)	8.56	19.1	0.00987 J (0.10)	ND (0.2)	3.30
Former Wind Tunnel/Machine Shop Pad											
510216	CCTA-57A-GR-060-0-0.5-S	0-0.5	1.99	98.2	0.399 J (0.6)	1.13	6.91	95.5	0.0633	ND (0.2)	2.27
510216	CCTA-57A-GR-061-0-0.5-S	0-0.5	2.04	81.5	0.426 J (0.6)	ND (0.4)	7.49	9.18	0.0256 J (0.11)	ND (0.2)	ND (0.2)
510216	CCTA-57A-GR-062-0-0.5-S	0-0.5	1.56	84.0	0.317 J (0.5)	0.598	5.57	35.9	0.0394	ND (0.2)	1.76
510216	CCTA-57A-GR-062-0-0.5-DU	0-0.5	2.01	97.3	0.360 J (0.6)	0.639	6.87	56.1	0.0428	ND (0.2)	2.81
510216	CCTA-57A-GR-063-0-0.5-S	0-0.5	3.39	146	0.548 J (0.6)	1.27	14.1	74.4	0.182	ND (0.2)	3.09
Former Transformer Pad											
510216	CCTA-57A-GR-065-0-0.5-S	0-0.5	1.69	80.0	0.328 J (0.6)	0.674	4.38	18.9	0.0121 J (0.11)	ND (0.2)	1.66
510216	CCTA-57A-GR-066-0-0.5-S	0-0.5	1.54	69.5	0.340 J (0.6)	0.481 J (0.6)	6.28	21.8	0.00947 J (0.11)	ND (0.2)	2.21
510216	CCTA-57A-GR-067-0-0.5-S	0-0.5	2.09	68.1	0.318 J (0.6)	1.19	6.16	30.0	0.0107 J (0.12)	ND (0.2)	2.25
510216	CCTA-57A-GR-068-0-0.5-S	0-0.5	2.40	75.3	0.235 J (0.5)	ND (0.4)	4.75	19.0	0.0124 J (0.11)	ND (0.2)	1.57
Underground Bunker											
510219	CCTA-57A-GR-069-C	NA	2.70	98.5	0.255 J (0.5)	ND (0.245)	6.28	7.81	0.348	ND (0.0891)	ND (0.291)
510219	CCTA-57A-GR-069-0-0.5-S	0-0.5	4.01	73.7	0.270 J (0.5)	0.263 J (0.5)	3.61	11.3	0.178	ND (0.0891)	ND (0.291)
510219	CCTA-57A-GR-070-C	NA	2.77	132	0.236 J (0.5)	0.335 J (0.5)	6.40	5.21	0.0238 J (0.10)	ND (0.0891)	ND (0.291)

Refer to footnotes at end of table.

Table 7.4.4-4 (Continued)  
Summary of SWMU 57A RCRA Metals Analytical Results, December 1997–February 1998

Sample Attributes			Metals (EPA 6010/7000) <sup>a</sup> (mg/kg) <sup>b</sup>								
Record Number <sup>c</sup>	ER Sample ID <sup>d</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
510219	CCTA-57A-GR-070-0-0.5-S	0-0.5	3.02	90.1	0.270 J (0.5)	ND (0.245)	5.42	9.37	0.0134 J (0.11)	ND (0.0891)	ND (0.291)
510219	CCTA-57A-GR-071-C	NA	2.35	153	0.296 J (0.5)	0.306 J (0.5)	6.72	5.90	0.316	ND (0.0891)	ND (0.291)
510219	CCTA-57A-GR-071-0-0.5-S	0-0.5	4.13	91.0	0.310 J (0.5)	0.385 J (0.5)	6.66	8.11	0.0735 J (0.11)	ND (0.0891)	ND (0.291)
510219	CCTA-57A-GR-072-C	NA	2.75	154	0.242 J (0.5)	ND (0.245)	7.40	4.69	0.153	ND (0.0891)	ND (0.291)
510219	CCTA-57A-GR-072-0-0.5-S	0-0.5	3.34	109	0.278 J (0.5)	ND (0.245)	5.84	8.40	0.250	ND (0.0891)	ND (0.291)
510221	CCTA-57A-GR-073-0-0.5-S	0-0.5	6.42	200	0.263 J (0.6)	2.79	12.1	48.7	2.55	ND (0.0891)	ND (0.291)
510221	CCTA-57A-GR-073-0-0.5-DU	0-0.5	6.25	321	0.423 J (0.6)	3.84	9.52	54.6	2.09	0.161 J (1.2)	ND (0.291)
Background Soil Concentrations—Covote Test Field <sup>e</sup>			5.6	130	0.65	<1	12.8	11.8	<0.1	<1	<1
Site Specific Background Samples											
510201	CCTA-57A-GR-001-0-0.5-S	0-0.5	2.10	95.7	0.365 J (0.5)	ND (0.4)	7.33	18.0	0.0132 J (0.11)	ND (0.002)	3.57
510201	CCTA-57A-GR-001-0.5-1.0-S	0.5-1.0	2.33	96.8	0.352 J (0.6)	ND (0.4)	5.93	5.75	0.0110 J (0.11)	ND (0.002)	2.23
510201	CCTA-57A-GR-002-0-0.5-S	0-0.5	2.05	109	0.352 J (0.6)	ND (0.4)	6.19	13.8	0.0120 J (0.11)	ND (0.002)	2.27
510201	CCTA-57A-GR-002-0.5-1.0-S	0.5-1.0	2.85	119	0.333 J (0.6)	ND (0.4)	5.80	6.06	ND (0.0078)	ND (0.002)	2.06
510201	CCTA-57A-GR-003-0-0.5-S	0-0.5	1.72	99.2	0.408 J (0.6)	ND (0.4)	8.16	18.1	0.0242 J (0.11)	ND (0.002)	2.59
510201	CCTA-57A-GR-003-0.5-1.0-S	0.5-1.0	2.13	107	0.441 J (0.6)	ND (0.4)	6.79	12.5	0.0153 J (0.11)	ND (0.002)	2.32
510201	CCTA-57A-GR-004-0-0.5-S	0-0.5	1.65	82.5	0.347 J (0.5)	ND (0.4)	6.77	17.2	ND (0.0078)	ND (0.002)	2.42
510201	CCTA-57A-GR-004-0.5-1.0-S	0.5-1.0	2.15	91.4	0.415 J (0.6)	ND (0.4)	7.77	1.37	0.0152 J (0.11)	ND (0.002)	2.70
510201	CCTA-57A-GR-005-0-0.5-S	0-0.5	1.88	99.9	0.447 J (0.5)	ND (0.4)	9.31	15.9	0.0157 J (0.11)	ND (0.002)	3.04
510201	CCTA-57A-GR-005-0.5-1.0-S	0.5-1.0	3.34	84.9	0.443 J (0.5)	ND (0.4)	6.60	9.77	0.0161 J (0.11)	ND (0.002)	ND (0.2)
510201	CCTA-57A-GR-005-0.5-1.0-DU	0.5-1.0	3.24	111	0.510 J (0.6)	ND (0.4)	9.71	13.1	0.0211 J (0.11)	ND (0.002)	2.71
Quality Assurance/Quality Control Sample (mg/L)											
510201	CCTA-57A-GR-000-EB	NA	ND (0.0006)	ND (0.0004)	ND (0.0003)	ND (0.004)	ND (0.003)	ND (0.001)	ND (0.000047)	ND (0.002)	ND (0.002)
510207	CCTA-57A-GR-000-EB	NA	ND (0.0006)	0.00012 J (0.01)	ND (0.0003)	ND (0.004)	ND (0.003)	0.002	ND (0.000047)	ND (0.002)	ND (0.002)
06122	CCTA-57A-GR-000-EB (on-site laboratory)	NA	ND (0.0025)	ND (0.005)	0.00048	ND (0.004)	ND (0.009)	ND (0.00055)	0.00012 J (0.0032)	ND (0.0025)	0.0003 J (0.00012)
06126	CCTA-57A-GR-000-EB	NA	ND (0.00276)	0.00121 J (0.0100)	ND (0.000135)	ND (0.000209)	0.00116 J (0.0100)	ND (0.00136)	ND (0.0001)	ND (0.00228)	0.00128 J (0.0100)
510216	CCTA-57A-GR-000-EB	NA	ND (0.0006)	0.0008 J (0.01)	ND (0.0003)	ND (0.004)	ND (0.003)	ND (0.001)	ND (0.000047)	ND (0.002)	ND (0.002)
510218	CCTA-57A-GR-000-EB	NA	ND (0.0006)	ND (0.0004)	ND (0.0003)	ND (0.004)	ND (0.003)	ND (0.001)	ND (0.000047)	ND (0.002)	ND (0.002)

Refer to footnotes at end of table.

Table 7.4.4-4 (Concluded)  
Summary of SWMU 57A RCRA Metals Analytical Results, December 1997–February 1998

<sup>a</sup> EPA November 1986.

<sup>b</sup> Soil sample results in bold exceed background.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figures 7.2.1-2 and 7.2.1-3.

<sup>e</sup> From Dinwiddie September 1997. The minimum background concentrations between surface and subsurface soils are reported.

C = Concrete sample.

CCTA = Central Coyote Test Area.

D = Debris sample.

DU = Duplicate sample.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

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

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

mg/kg = Milligram(s) per kilogram.

mg/L = Milligram(s) per liter.

NA = Not applicable.

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

RCRA = Resource Conservation Recovery Act.

S = Soil sample.

SWMU = Solid waste management unit.

#### 7.4.4.5.1 *Site-specific Background Samples*

Tables 7.4.4-1 through 7.4.4-4 present analytical results from the ten site-specific background samples and the one duplicate. These sample locations are shown and identified only by the location portion of their full ER sample identification code on Figure 7.2.1-2. These results are discussed below.

##### Radionuclides

None of the background samples that were analyzed using gamma spectroscopy contained uranium-238, uranium-235, thorium-232, or cesium-137 above their respective HRMB maximum background concentrations (Table 7.4.4-1). Similarly, analysis for isotopic uranium and thorium also did not show uranium-238, uranium-235, uranium-233/234, or thorium-232 above their respective HRMB maximum background concentrations (Table 7.4.4-2) (Dinwiddie September 1997). Thorium-230 and thorium-228 were detected through isotopic analysis, but there are no HRMB background values established for these isotopes. Gross alpha/gross beta analysis (Table 7.4.4-3) gives a site-specific background range of 8.76 to 14.5 picocuries (pCi)/gram (g) for gross alpha and 18.0 to 26.6 pCi/g for gross beta. These gross alpha/gross beta values are also less than the background values presented in Tharp (July 1998).

##### RCRA Metals Plus Beryllium

Except for lead and silver, all RCRA metals and beryllium concentrations in the site-specific background samples were below the HRMB background values (Table 7.4.4-4) (Dinwiddie September 1997). Seven of the eleven samples that were analyzed had lead concentrations (from 1.37 to 18.1 mg/kg) exceeding the 11.8 mg/kg background value. Ten samples had silver concentrations (from <0.2 to 3.57 mg/kg, which exceeded the <1 mg/kg background value). Because these samples were collected in areas that show no evidence of activity or disturbance, it may indicate that elevated lead and silver concentrations are naturally occurring at this SWMU.

#### 7.4.4.5.2 *Pad 1, Gun Mount Positions and Former Building Foundation*

Tables 7.4.4-1 through 7.4.4-11 present the analytical results for the soil and concrete sampling at the gun mount positions and former building foundation. These sample locations are shown and identified only by the location portion of their full ER sample identification code on Figure 7.2.1-2. Samples 027 through 031 and 054 are concrete samples; the rest are soil samples. This section discusses the results.

##### Radionuclides

No uranium-235 or uranium-238 were detected in any of the concrete samples or duplicate from Pad 1 or the former building foundation from the gamma spectroscopy analysis. Concentrations of thorium-232 (from 5.06E-01 to 6.95E-01 pCi/g) and cesium-137 (from ND [2.10E-02] to 2.33E-01 pCi/g) did not exceed the HRMB background values (Table 7.4.4-1) (Dinwiddie September 1997).

Table 7.4.4-5  
Summary of SWMU 57A TAL Metals Analytical Results, December 1997–February 1998

Sample Attributes			Metals (EPA 6010/7000) <sup>a</sup> (mg/kg) <sup>b</sup>										
Record Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron
<b>Debris Mounds</b>													
06122	CCTA-57A-GR-024-D (on-site laboratory)	NA	8100	2.3	2.2 J (2.4)	80	0.4 B	0.27	13000	8.3	3.1	12	9800
06122	CCTA-57A-GR-024-0.5-S (on-site laboratory)	0–0.5	3600	ND (0.3)	1.9 J (2.4)	68	0.23 B	0.13 J (0.16)	40000	4.2	2	4.5	5400
06122	CCTA-57A-GR-024-0.5-S-DU (on-site laboratory)	0–0.5	5800	ND (0.3)	2 J (2.4)	45	0.35 B	0.14 J (0.16)	10000	7	2	7.1	7400
06122	CCTA-57A-GR-025-D (on-site laboratory)	NA	7900	0.32 J (1.1)	2.3	95	0.42 B	1	12000	8.2	3.1	37	10000
06122	CCTA-57A-GR-025-0.5-S (on-site laboratory)	0–0.5	7300	ND (0.3)	3.5	95	0.54 B	0.26 B	15000 B	7.9	3.7 B	12 B	9400 B
06122	CCTA-57A-GR-026-D (on-site laboratory)	NA	6400	ND (0.29)	2.8	91	0.44 B	0.82 B	16000	7.1	3.3 B	13 B	9100 B
06122	CCTA-57A-GR-026-0.5-S (on-site laboratory)	0–0.5	6300	ND (0.3)	3.2	110	0.49	0.43	24000	7.3	3.9	23	9200
<b>Pad 1</b>													
510216	CCTA-57A-GR-027-C	NA	4780	1.19	5.45	91.8	0.153 J (0.5)	ND (0.4)	54900	10.3	2.80 J (3)	105	6760
510216	CCTA-57A-GR-028-C	NA	4320	0.893	3.59	111	0.217 J (0.5)	ND (0.4)	45900	6.82	3.15	52.3	5530
510216	CCTA-57A-GR-028-C-DU	NA	3850	0.675	4.65	78.3	0.196 J (0.5)	ND (0.4)	30000	5.03	2.74 J (3)	43.1	4830
510216	CCTA-57A-GR-029-C	NA	4870	1.52	5.66	78.7	0.187 J (0.5)	ND (0.4)	56500	5.59	2.85 J (3)	20.5	5960
510216	CCTA-57A-GR-030-C	NA	5180	1.15	5.29	110	0.195 J (0.5)	ND (0.4)	54200	7.11	3.40	18.5	7590
510216	CCTA-57A-GR-031-C	NA	5130	1.17	5.95	148	0.181 J (0.5)	ND (0.4)	59200	5.55	3.02 J (3)	18.8	6770
<b>Underground Bunker</b>													
510219	CCTA-57A-GR-069-C	NA	7560	ND (0.002298)	2.70	98.5	0.255 J (0.5)	ND (0.245)	78300	6.28	3.15	7.31	6000
510219	CCTA-57A-GR-070-C	NA	18.2	ND (0.002298)	2.77	132	0.236 J (0.5)	0.335 J (0.5)	87500	6.40	3.24	9.06	5830
510219	CCTA-57A-GR-071-C	NA	9250	ND (0.002298)	2.35	153	0.296 J (0.5)	0.306 J (0.5)	92800	6.72	3.42	8.44	6910
510219	CCTA-57A-GR-072-C	NA	9250	ND (0.002298)	2.75	154	0.242 J (0.5)	ND (0.245)	99900	7.40	3.34	8.97	6590
510221	CCTA-57A-GR-073-0-0.5-S	0–0.5	13800	0.799	6.42	200	0.263 J (0.6)	2.79	50200	12.1	7.66	51.1	26400
510221	CCTA-57A-GR-073-0-0.5-DU	0–0.5	12500	0.588	6.25	321	0.423	3.84	54500	9.52	6.60	52.0	17000
<b>Background Soil Concentrations—Coyote Test Field <sup>e</sup></b>			NA	3.9	5.6	130	0.65	<1	NA	12.8	5.2	15.4	NA
<b>Quality Assurance/Quality Control Sample (mg/L)</b>													
06122	CCTA-57A-GR-000-EB (on-site laboratory)	NA	NA	NA	ND (0.0025)	ND (0.005)	0.48	ND (0.004)	NA	ND (0.009)	NA	NA	NA
510216	CCTA-57A-GR-000-EB	NA	0.19	ND (0.002)	ND (0.0006)	0.0008 J (0.01)	ND (0.0003)	ND (0.004)	0.05 J (0.1)	ND (0.003)	ND (0.003)	ND (0.004)	0.104
510219	CCTA-57A-GR-000-EB	NA	0.0995	ND (0.002298)	ND (0.000827)	ND (0.001709)	ND (0.001811)	ND (0.002453)	0.367	ND (0.003826)	ND (0.003725)	ND (0.002113)	0.0494

Refer to footnotes at end of table.

Table 7.4.4-5 (Continued)  
Summary of SWMU 57A TAL Metals Analytical Results, December 1997–February 1998

Sample Attributes			Metals (EPA 6010/7000) <sup>a</sup> (mg/kg) <sup>b</sup>											
Record Number <sup>c</sup>	ER Sample ID <sup>d</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
<b>Debris Mounds</b>														
06122	CCTA-57A-GR-024-D (on-site laboratory)	NA	14 B	2800	160	ND (0.039)	6.3	1800	0.49 J (1.2)	0.064	81 J (110)	ND (0.29)	18	53
06122	CCTA-57A-GR-024-0.5-S (on-site laboratory)	0–0.5	6.2 B	1500	110	ND (0.04)	4.1	880	0.71 J (1.2)	ND (0.04)	39 J (110)	ND (0.3)	9.3	16
06122	CCTA-57A-GR-024-0.5-S-DU (on-site laboratory)	0–0.5	6.2 B	1900	110	ND (0.04)	5.5	1200	0.39 J (1.2)	0.072 J (0.16)	51 J (110)	ND (0.3)	15	21
06122	CCTA-57A-GR-025-D (on-site laboratory)	NA	26 B	2700	160	ND (0.036)	6.7	2400	0.44 J (1.1)	0.064 J (0.14)	85 J (98)	ND (0.27)	14	220
06122	CCTA-57A-GR-025-0.5-S (on-site laboratory)	0–0.5	12	3100	170	ND (0.04)	8	1700	0.57 J (1.2)	0.074 JB (0.16)	100 J (110)	ND (0.3)	15	27
06122	CCTA-57A-GR-026-D (on-site laboratory)	NA	12 B	2800	150	ND (0.039)	8.2	1300	0.62 J (1.2)	0.078 JB (0.16)	150	ND (0.29)	16	24
06122	CCTA-57A-GR-026-0.5-S (on-site laboratory)	0–0.5	16	3100	170	ND (0.04)	8.4	1300	0.68 J (1.2)	0.085 J (0.16)	190	ND (0.3)	16	25
<b>Pad 1</b>														
510216	CCTA-57A-GR-027-C	NA	57.2	1980	121	0.00134 J (0.02)	3.54 J (4)	ND (1)	ND (0.04)	1.70	495	ND (0.1)	12.5	58.1
510216	CCTA-57A-GR-028-C	NA	27.4	2330	121	ND (0.0078)	4.15	ND (1)	ND (0.04)	2.32	556	ND (0.1)	12.4	58.7
510216	CCTA-57A-GR-028-C-DU	NA	21.9	2050	95.4	ND (0.0078)	3.65 J (4)	ND (1)	ND (0.04)	1.89	509	ND (0.1)	10.2	53.9
510216	CCTA-57A-GR-029-C	NA	12.8	2470	120	ND (0.0078)	2.68 J (4)	ND (1)	ND (0.04)	1.96	626	ND (0.1)	12.5	94.2
510216	CCTA-57A-GR-030-C	NA	10.1	2440	130	ND (0.0078)	5.11	ND (1)	ND (0.04)	2.35	569	ND (0.1)	13.6	82.8
510216	CCTA-57A-GR-031-C	NA	13.7	2340	133	ND (0.0078)	3.89 J (4)	ND (1)	ND (0.04)	1.98	498	ND (0.1)	12.4	91.1
<b>Underground Bunker</b>														
510219	CCTA-57A-GR-069-C	NA	7.81	2270	270	0.348	8.43	267	ND (0.089)	ND (0.291)	543	ND (0.116)	25.5	123
510219	CCTA-57A-GR-070-C	NA	5.21	2110	273	0.0238 J (0.10)	9.10	747	ND (0.089)	ND (0.291)	611	ND (0.116)	31.6	45.8
510219	CCTA-57A-GR-071-C	NA	5.90	2730	287	0.316	9.51	797	ND (0.089)	ND (0.291)	480	ND (0.116)	32.2	33.6
510219	CCTA-57A-GR-072-C	NA	4.69	2170	325	0.153	10.1	537	ND (0.089)	ND (0.291)	653	ND (0.116)	35.2	40.2
510221	CCTA-57A-GR-073-0-0.5-S	0–0.5	48.7	5220	296	2.55	14.7	3890	ND (0.089)	ND (0.291)	341	ND (0.116)	26.7	204
510221	CCTA-57A-GR-073-0-0.5-DU	0–0.5	54.6	5250	253	2.09	10.8	3610	0.161 J (1.2)	ND (0.291)	306	0.155 J (0.6)	24.1	214
<b>Background Soil Concentrations—Coyote Test Field</b>			11.8	NA	NA	<0.1	11.5	NA	<1	<1	NA	<1.1	20.4	62
<b>Quality Assurance/Quality Control Sample (mg/L)</b>														
06122	CCTA-57A-GR-000-EB (on-site laboratory)	NA	ND (0.00055)	NA	NA	ND (0.08)	NA	NA	ND (0.0025)	0.3 J (0.12)	NA	NA	NA	NA
510216	CCTA-57A-GR-000-EB	NA	ND (0.001)	0.279	0.0010 J (0.01)	ND (0.000047)	ND (0.02)	ND (1)	ND (0.002)	ND (0.002)	ND (0.03)	ND (0.001)	ND (0.002)	0.01
510219	CCTA-57A-GR-000-EB	NA	ND (0.000929)	ND (0.067902)	ND (0.002014)	0.000097 J (0.0004)	ND (0.012834)	1.08 J (5)	ND (0.002)	0.00331 J (0.01)	0.781 J (1)	ND (0.001164)	ND (0.006021)	0.0355

Refer to footnotes at end of table.

Table 7.4.4-5 (Concluded)  
Summary of SWMU 57A TAL Metals Analytical Results, December 1997–February 1998

<sup>a</sup> EPA November 1986.

<sup>b</sup> Soil values in bold exceed background.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figures 7.2.1-2 and 7.2.1-3.

<sup>e</sup> From Dinwiddie September 1997.

B = Analyte detected in associated blank.

C = Concrete sample.

CCTA = Central Coyote Test Area.

D = Debris sample.

DU = Duplicate sample.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

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

mg/kg = Milligram(s) per kilogram.

mg/L = Milligram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SWMU = Solid waste management unit.

TAL = Target analyte list.

Table 7.4.4-6  
 Summary of SWMU 57A TCLP Metals Analytical Results, January 1997, December 1997, February 1998

Sample Attributes			Metals (EPA 6010/7000) <sup>a</sup> (mg/L)							
Record Number	ER Sample ID <sup>c</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Debris Mounds										
06122	CCTA-57A-GR-024-D (on-site laboratory)	NA	0.013	1.500	0.0045	0.020 J (0.036)	0.120	0.0008	0.0099 J (0.010)	0.00025 J (0.00048)
06122	CCTA-57A-GR-024-D-DU (on-site laboratory)	NA	ND (0.0025)	1.700	0.0046	0.023 J (0.036)	0.010	0.00097	0.011	0.00035 JB(0.00048)
06122	CCTA-57A-GR-025-D (on-site laboratory)	NA	ND (0.0025)	1.600	0.010	0.026 J (0.036)	0.0065	0.0009	0.0072 J (0.010)	0.00035 J (0.00048)
06122	CCTA-57A-GR-026-D (on-site laboratory)	NA	ND (0.0025)	2.200	0.012	0.014 J (0.036)	0.013	0.00083	0.011	0.00031 J (0.00048)
Pad 1										
510216	CCTA-57A-GR-027-C	NA	0.05 J (0.05)	0.517	ND (0.004)	ND (0.003)	ND (0.03)	0.00134 J (0.02)	ND (0.04)	0.008 J (0.01)
510216	CCTA-57A-GR-028-C	NA	0.05 J (0.05)	0.418	ND (0.004)	0.009 J (0.01)	ND (0.03)	ND (0.000047)	ND (0.002)	2.32
510216	CCTA-57A-GR-028-C-DU	NA	0.04 J (0.05)	0.396 J (0.5)	ND (0.004)	ND (0.003)	ND (0.03)	ND (0.000047)	0.06 J (0.1)	0.006 J (0.01)
510216	CCTA-57A-GR-029-C	NA	ND (0.04)	0.464 J (0.5)	ND (0.004)	0.007 J (0.01)	ND (0.03)	0.00055 J (0.02)	ND (0.04)	0.005 J (0.01)
510216	CCTA-57A-GR-030-C	NA	0.05	0.791	ND (0.003)	ND (0.005)	ND (0.03)	0.00121 J (0.02)	ND (0.09)	ND (0.002)
510216	CCTA-57A-GR-031-C	NA	0.05 J (0.05)	0.6511	ND (0.004)	ND (0.003)	ND (0.03)	ND (0.000047)	ND (0.04)	0.005 J (0.01)
Pad 2										
510216	CCTA-57A-GR-049-C	NA	ND (0.04)	0.306 J (0.5)	ND (0.004)	ND (0.003)	ND (0.03)	ND (0.000047)	ND (0.04)	0.004 J (0.01)
Former Building Foundation										
510216	CCTA-57A-GR-054-C	NA	0.04 J (0.05)	0.622	ND (0.004)	ND (0.003)	ND (0.03)	ND (0.000047)	ND (0.04)	0.002 J (0.01)
Former Wind Tunnel/Machine Shop Pad										
510216	CCTA-57A-GR-059-C	NA	ND (0.04)	0.695 J (2)	ND (0.004)	ND (0.003)	ND (0.03)	ND (0.000047)	ND (0.04)	ND (0.002)
Former Transformer Pad										
510216	CCTA-57A-GR-064-C	NA	ND (0.04)	0.446 J (2)	ND (0.004)	ND (0.003)	ND (0.03)	0.00130 J (0.02)	ND (0.04)	ND (0.002)

Refer to footnotes at end of table.



Table 7.4.4-6 (Concluded)  
Summary of SWMU 57A TCLP Metals Analytical Results, January 1997, December 1997, February 1998

Sample Attributes			Metals (EPA 6010/7000) <sup>a</sup> (mg/L)							
Record <sup>b</sup> Number	ER Sample ID <sup>c</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Underground Bunker										
510219	<b>CCTA-57A-GR-069-C</b>	NA	0.0689	0.411 J (0.5)	ND (0.00245)	ND (0.00383)	ND (0.0248)	ND (0.000047)	ND (0.0549)	0.00738 J (0.01)
510219	<b>CCTA-57A-GR-070-C</b>	NA	0.0614	0.337 J (0.5)	ND (0.00245)	ND (0.00383)	ND (0.0248)	ND (0.000047)	ND (0.0549)	0.00669 J (0.01)
510219	<b>CCTA-57A-GR-071-C</b>	NA	0.0689	0.530	ND (0.00245)	ND (0.00383)	ND (0.0248)	ND (0.000047)	ND (0.0549)	0.00731 J (0.01)
510219	<b>CCTA-57A-GR-072-C</b>	NA	0.0541	0.347 J (0.5)	ND (0.00245)	ND (0.00383)	ND (0.0248)	ND (0.000047)	ND (0.0549)	0.00446 J (0.01)
Maximum concentration of the contaminants for the toxicity characteristic (mg/L)			5.0	100.0	1.0	5.0	5.0	0.2	1.0	5.0

<sup>a</sup> EPA November 1986.

<sup>b</sup> Analysis request/chain-of-custody record.

<sup>c</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figures 7.2.1-2 and 7.2.1-3.

<sup>d</sup> 40 CFR Part 261.24.

C = Concrete sample.

CCTA = Central Coyote Test Area.

CFR = Code of Federal Regulations.

D = Debris sample.

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 (MDL) but is less than the practical quantitation limit for on-site laboratory analyses or the contract required detection limit for off-site laboratory analyses, shown in parenthesis.

mg/L = Milligram(s) per liter.

NA = Not applicable.

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

SWMU = Solid waste management unit.

TCLP = Toxicity characteristic leaching procedure.

Table 7.4.4-7  
Summary of SWMU 57A HE Analytical Results, January and December 1997, February 1998

Sample Attributes			Explosives, Methods (EPA 8330) <sup>a</sup> (µg/kg) <sup>b</sup>						
Record Number	ER Sample ID (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	2,4,6-Trinitrotoluene	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2 amino 4,6-dinitrotoluene	4 amino 2,6-dinitrotoluene	o-Nitrotoluene	m-Nitrotoluene
<b>Building 9900</b>									
510201	CCTA-57A-GR-006-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-006-0-0.5-DU	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-006-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-007-0-0.5-S	0-0.5	ND (19)	180 J (280)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-007-0.5-1.0-S	0.5-1.0	ND (19)	96 J (280)	ND (17)	ND (17)	ND (79)	ND (41)	160 J (280)
510201	CCTA-57A-GR-008-0-0.5-S	0-0.5	ND (19)	980	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-008-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-009-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-009-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
<b>Building 9902</b>									
510201	CCTA-57A-GR-010-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-010-0-0.5-DU	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-010-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-011-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-011-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-012-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-012-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-013-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-013-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
<b>Steel Plate</b>									
510201	CCTA-57A-GR-014-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-014-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-015-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510201	CCTA-57A-GR-015-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-016-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-016-0-0.5-DU	0-0.5	ND (19)	3200	130 J (270)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-016-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-017-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-017-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-018-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-018-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
<b>Pad 3</b>									
510207	CCTA-57A-GR-019-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-019-0-0.5-DU	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-019-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-020-0-0.5-S	0-0.5	ND (19)	580	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)

Refer to footnotes at end of table.

Table 7.4.4-7 (Continued)  
 Summary of SWMU 57A HE Analytical Results, January and December 1997, February 1998

Sample Attributes			Explosives, Methods (EPA 8330) <sup>a</sup> (µg/kg) <sup>b</sup>						
Record Number <sup>c</sup>	ER Sample ID <sup>d</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	p-Nitrotoluene	Nitrobenzene	1,3-Dinitrobenzene	1,3,5-Trinitrobenzene	RDX	Tetryl	HMX
<b>Building 9900</b>									
510201	CCTA-57A-GR-006-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510201	CCTA-57A-GR-006-0-0.5-DU	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510201	CCTA-57A-GR-006-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510201	CCTA-57A-GR-007-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510201	CCTA-57A-GR-007-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510201	CCTA-57A-GR-008-0-0.5-S	0-0.5	380	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510201	CCTA-57A-GR-008-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510201	CCTA-57A-GR-009-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510201	CCTA-57A-GR-009-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	120 J (280)
<b>Building 9902</b>									
510201	CCTA-57A-GR-010-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	180 J (280)	ND (94)	ND (24)
510201	CCTA-57A-GR-010-0-0.5-DU	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	100 J (290)
510201	CCTA-57A-GR-010-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	110 J (280)
510201	CCTA-57A-GR-011-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	1200
510201	CCTA-57A-GR-011-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	240 J (270)	ND (94)	ND (24)
510201	CCTA-57A-GR-012-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	120 J (280)
510201	CCTA-57A-GR-012-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	210 J (280)	ND (94)	ND (24)
510201	CCTA-57A-GR-013-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	230 J (280)	ND (94)	ND (24)
510201	CCTA-57A-GR-013-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	230 J (280)	ND (94)	ND (24)
<b>Steel Plate</b>									
510201	CCTA-57A-GR-014-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	140 J (260)
510201	CCTA-57A-GR-014-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	160 J (280)
510201	CCTA-57A-GR-015-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	100 J (280)
510201	CCTA-57A-GR-015-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	200 J (290)
510207	CCTA-57A-GR-016-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-016-0-0.5-DU	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-016-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-017-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-017-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-018-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	200 J (290)	ND (94) R	ND (24)
510207	CCTA-57A-GR-018-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
<b>Pad 3</b>									
510207	CCTA-57A-GR-019-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-019-0-0.5-DU	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	120 J (280)
510207	CCTA-57A-GR-019-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-020-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)

Refer to footnotes at end of table.

Table 7.4.4-7 (Continued)  
Summary of SWMU 57A HE Analytical Results, January and December 1997, February 1998

Sample Attributes			Explosives, Methods (EPA 8330) <sup>a</sup> (µg/kg) <sup>b</sup>						
Record Number	ER Sample ID (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	2,4,6-Trinitrotoluene	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2 amino 4,6-dinitrotoluene	4 amino 2,6-dinitrotoluene	o-Nitrotoluene	m-Nitrotoluene
510207	CCTA-57A-GR-020-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-021-0-0.5-S	0-0.5	ND (19)	300	ND (17)	ND (17)	ND (79)	ND (41)	160 J (280)
510207	CCTA-57A-GR-021-0.5-1.0-S	0.5-1.0	ND (19)	2100	110 J (280)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-022-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-022-0.5-1.0-S	0.5-1.0	ND (19)	250 J (280)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-023-0-0.5-S	0-0.5	ND (19)	7600	320	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-023-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-023-0.5-1.0-DU	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
Pad 1									
510216	CCTA-57A-GR-027-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-028-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-028-C-DU	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-029-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-030-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-031-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-032-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-032-0.5-1.0-S	0.5-1.0	ND (19)	340	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-033-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-033-0-0.5-DU	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-033-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-034-0-0.5-S	0-0.5	ND (19)	ND (17)	140 J (270)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-034-0.5-1.0-S	0.5-1.0	ND (19)	2300	130 J (270)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-035-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-035-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-036-0-0.5-S	0-0.5	ND (19)	490	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510207	CCTA-57A-GR-036-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
Debris Mounds									
06122	CCTA-57A-GR-024-D (on-site laboratory)	NA	ND (120)	ND (120)	ND (120)	NA	NA	ND (90)	ND (100)
06122	CCTA-57A-GR-024-0.5-S (on-site laboratory)	0-0.5	ND (120)	ND (120)	ND (120)	NA	NA	ND (90)	ND (100)
06122	CCTA-57A-GR-025-D (on-site laboratory)	NA	ND (120)	500 J (640)	ND (120)	NA	NA	ND (90)	ND (100)
06122	CCTA-57A-GR-025-0.5-S (on-site laboratory)	0-0.5	ND (120)	ND (120)	ND (120)	NA	NA	ND (90)	ND (100)
06122	CCTA-57A-GR-026-D (on-site laboratory)	NA	ND (120)	5600	ND (120)	NA	NA	ND (90)	ND (100)
06122	CCTA-57A-GR-026-0.5-S (on-site laboratory)	0-0.5	ND (120)	ND (120)	160 J (640)	NA	NA	ND (90)	ND (100)
06126	CCTA-57A-GR-026-0.5-S	0-0.5	ND (5.67)	ND (6.18)	ND (6.48)	ND (6.6)	ND (5.45)	ND (7.83)	ND (11.1)

Refer to footnotes at end of table.

Table 7.4.4-7 (Continued)  
Summary of SWMU 57A HE Analytical Results, January and December 1997, February 1998

Sample Attributes			Explosives, Methods (EPA 8330) <sup>a</sup> (µg/kg) <sup>b</sup>						
Record Number	ER Sample ID (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	p-Nitrotoluene	Nitrobenzene	1,3-Dinitrobenzene	1,3,5-Trinitrobenzene	RDX	Tetryl	HMX
510207	CCTA-57A-GR-020-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-021-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-021-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-022-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-022-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-023-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-023-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-023-0.5-1.0-DU	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	210 J (280)	ND (94) R	ND (24)
Pad 1									
510216	CCTA-57A-GR-027-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	220 J (260)	ND (94) R	130 J (260)
510216	CCTA-57A-GR-028-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	130 J (260)
510216	CCTA-57A-GR-028-C-DU	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	120 J (260)
510216	CCTA-57A-GR-029-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	130 J (260)
510216	CCTA-57A-GR-030-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	110 J (260)
510216	CCTA-57A-GR-031-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	130 J (260)
510207	CCTA-57A-GR-032-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-032-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-033-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-033-0-0.5-DU	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-033-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-034-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	170 J (270)	ND (94) R	ND (24)
510207	CCTA-57A-GR-034-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	200 J (270)	ND (94) R	110 J (270)
510207	CCTA-57A-GR-035-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-035-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-036-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510207	CCTA-57A-GR-036-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
Debris Mounds									
06122	CCTA-57A-GR-024-D (on-site laboratory)	NA	ND (100)	NA	NA	NA	ND (110)	ND (70)	ND (150)
06122	CCTA-57A-GR-024-0.5-S (on-site laboratory)	0-0.5	ND (100)	NA	NA	NA	ND (110)	ND (70)	ND (150)
06122	CCTA-57A-GR-025-D (on-site laboratory)	NA	ND (100)	NA	NA	NA	ND (110)	ND (70)	ND (150)
06122	CCTA-57A-GR-025-0.5-S (on-site laboratory)	0-0.5	ND (100)	NA	NA	NA	ND (110)	ND (70)	ND (150)
06122	CCTA-57A-GR-026-D (on-site laboratory)	NA	ND (100)	NA	NA	NA	ND (110)	ND (70)	ND (150)
06122	CCTA-57A-GR-026-0.5-S (on-site laboratory)	0-0.5	ND (100)	NA	NA	NA	ND (110)	ND (70)	ND (150)
06126	CCTA-57A-GR-026-0.5-S	0-0.5	ND (10.6)	ND (5.21)	ND (4.05)	ND (6.62)	ND (9.71)	ND (7.55) UJ	ND (5.27)

Refer to footnotes at end of table.

Table 7.4.4-7 (Continued)  
 Summary of SWMU 57A HE Analytical Results, January and December 1997, February 1998

Sample Attributes			Explosives, Methods (EPA 8330) <sup>a</sup> <sup>b</sup> (µg/kg)						
Record Number	ER Sample ID (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	2,4,6-Trinitrotoluene	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2 amino 4,6-dinitrotoluene	4 amino 2,6-dinitrotoluene	o-Nitrotoluene	m-Nitrotoluene
Former Gun Mounts / Gun Mounts									
510218	CCTA-57A-GR-037-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-037-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-038-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-038-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-039-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-039-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-039-0.5-1.0-DU	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-040-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-040-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-041-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-041-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	220 J (300)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-042-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-042-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-043-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-043-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-044-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-044-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-045-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-045-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-045-0.5-1.0-DU	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-046-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-046-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-047-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-047-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-048-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-048-0.5-1.0-S	0.5-1.0	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
Pad 2									
510218	CCTA-57A-GR-049-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-050-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-051-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-052-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-053-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)

Refer to footnotes at end of table.

Table 7.4.4-7 (Continued)  
 Summary of SWMU 57A HE Analytical Results, January and December 1997, February 1998

Sample Attributes			Explosives, Methods (EPA 8330) <sup>a</sup> (µg/kg) <sup>b</sup>						
Record <sub>c</sub> Number	ER Sample ID (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	p-Nitrotoluene	Nitrobenzene	1,3-Dinitrobenzene	1,3,5- Trinitrobenzene	RDX	Tetryl	HMX
Former Gun Mounts / Gun Mounts									
510218	CCTA-57A-GR-037-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-037-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-038-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-038-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-039-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	220 J (290)	ND (94) R	ND (24)
510218	CCTA-57A-GR-039-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	150 J (290)	ND (94) R	ND (24)
510218	CCTA-57A-GR-039-0.5-1.0-DU	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	230 J (290)	ND (94) R	ND (24)
510218	CCTA-57A-GR-040-0-0.5-S	0-0.5	ND (31)	99 J (290)	ND (16)	ND (32) R	190 J (290)	ND (94) R	ND (24)
510218	CCTA-57A-GR-040-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	210 J (290)	ND (94) R	130 J (290)
510218	CCTA-57A-GR-041-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	230 J (290)	ND (94) R	ND (24)
510218	CCTA-57A-GR-041-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	210 J (300)	ND (94) R	ND (24)
510218	CCTA-57A-GR-042-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-042-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-043-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-043-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-044-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-044-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-045-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	140 J (290)
510218	CCTA-57A-GR-045-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	220 J (280)	ND (94) R	ND (24)
510218	CCTA-57A-GR-045-0.5-1.0-DU	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-046-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	190 J (300)	ND (94) R	ND (24)
510218	CCTA-57A-GR-046-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-047-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-047-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-048-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-048-0.5-1.0-S	0.5-1.0	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
Pad 2									
510216	CCTA-57A-GR-049-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	140 J (290)
510218	CCTA-57A-GR-050-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-051-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-052-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-053-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)

Refer to footnotes at end of table.

Table 7.4.4-7 (Continued)  
Summary of SWMU 57A HE Analytical Results, January and December 1997, February 1998

Sample Attributes			Explosives, Methods (EPA 8330) <sup>a</sup> (µg/kg) <sup>b</sup>						
Record Number <sup>c</sup>	ER Sample ID (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	2,4,6-Trinitrotoluene	2,4-Dinitrotoluene	2,6-Dinitrotoluene	2 amino 4,6-dinitrotoluene	4 amino 2,6-dinitrotoluene	o-Nitrotoluene	m-Nitrotoluene
<b>Former Building Foundation</b>									
510216	CCTA-57A-GR-054-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-055-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-056-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-057-0-0.5-S	0-0.5	ND (19)	1100	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510218	CCTA-57A-GR-058-0-0.5-S	0-0.5	ND (19)	570	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
<b>Former Wind Tunnel/Machine Shop Pad</b>									
510216	CCTA-57A-GR-059-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-060-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-061-0-0.5-S	0-0.5	ND (19)	180 J (280)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-062-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-062-0-0.5-DU	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-063-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
<b>Former Transformer Pad</b>									
510216	CCTA-57A-GR-064-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-066-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-066-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-067-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510216	CCTA-57A-GR-068-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
<b>Underground Bunker</b>									
510219	CCTA-57A-GR-069-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510219	CCTA-57A-GR-069-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510219	CCTA-57A-GR-070-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510219	CCTA-57A-GR-070-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510219	CCTA-57A-GR-071-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510219	CCTA-57A-GR-071-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510219	CCTA-57A-GR-072-C	NA	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510219	CCTA-57A-GR-072-0-0.5-S	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510221	CCTA-57A-GR-073-0-0.5-S	0-0.5	ND (19)	540	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
510221	CCTA-57A-GR-073-0-0.5-DU	0-0.5	ND (19)	ND (17)	ND (17)	ND (17)	ND (79)	ND (41)	ND (30)
<b>Quality Assurance/Quality Control Sample (µg/L)</b>									
510201	CCTA-57A-GR-000-EB	NA	ND (0.11)	ND (0.10)	ND (0.13)	ND (0.14)	ND (0.16)	ND (0.16)	ND (0.39)
510207	CCTA-57A-GR-000-EB	NA	ND (0.11)	ND (0.10)	ND (0.13)	ND (0.14)	ND (0.16)	ND (0.16)	ND (0.39)
06122	CCTA-57A-GR-000-EB	NA	ND (14)	ND (14)	ND (14)	NA	NA	ND (11)	ND (12)
06126	CCTA-57A-GR-000-EB (on-site laboratory)	NA	ND (0.0293)	ND (0.0137)	ND (0.0425)	ND (0.0186)	ND (0.0195)	ND (0.0238)	ND (0.0312)
510216	CCTA-57A-GR-000-EB	NA	ND (0.11)	ND (0.10)	ND (0.13)	ND (0.14)	ND (0.16)	ND (0.16)	ND (0.39)
510218	CCTA-57A-GR-000-EB	NA	ND (0.11)	ND (0.10)	ND (0.13)	ND (0.14)	ND (0.16)	ND (0.16)	ND (0.39)
510219	CCTA-57A-GR-000-EB	NA	ND (0.11)	ND (0.10)	ND (0.13)	ND (0.14)	ND (0.16)	ND (0.16)	ND (0.39)
510221	CCTA-57A-GR-000-EB	NA	ND (0.11)	ND (0.10)	ND (0.13)	ND (0.14)	ND (0.16)	ND (0.16)	ND (0.39)

Refer to footnotes at end of table.



Table 7.4.4-7 (Continued)  
Summary of SWMU 57A HE Analytical Results, January and December 1997, February 1998

Sample Attributes			Explosives, Methods (EPA 8330) <sup>a</sup> (µg/kg) <sup>b</sup>						
Record <sup>c</sup> Number	ER Sample ID (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	p-Nitrotoluene	Nitrobenzene	1,3-Dinitrobenzene	1,3,5- Trinitrobenzene	RDX	Tetryl	HMX
<b>Former Building Foundation</b>									
510216	CCTA-57A-GR-054-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	150 J (260)
510218	CCTA-57A-GR-055-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-056-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
510218	CCTA-57A-GR-057-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	130 J (300)
510218	CCTA-57A-GR-058-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32) R	ND (31)	ND (94) R	ND (24)
<b>Former Wind Tunnel/Machine Shop Pad</b>									
510216	CCTA-57A-GR-059-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	120 J (260)
510216	CCTA-57A-GR-060-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	160 J (280)
510216	CCTA-57A-GR-061-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	98 J (280)
510216	CCTA-57A-GR-062-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510216	CCTA-57A-GR-062-0-0.5-DU	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	100 J (280)
510216	CCTA-57A-GR-063-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
<b>Former Transformer Pad</b>									
510216	CCTA-57A-GR-064-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510216	CCTA-57A-GR-066-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510216	CCTA-57A-GR-066-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510216	CCTA-57A-GR-067-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
510216	CCTA-57A-GR-068-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94) R	ND (24)
<b>Underground Bunker</b>									
510219	CCTA-57A-GR-069-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510219	CCTA-57A-GR-069-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510219	CCTA-57A-GR-070-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510219	CCTA-57A-GR-070-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	110 J (260)
510219	CCTA-57A-GR-071-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510219	CCTA-57A-GR-071-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510219	CCTA-57A-GR-072-C	NA	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510219	CCTA-57A-GR-072-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510221	CCTA-57A-GR-073-0-0.5-S	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
510221	CCTA-57A-GR-073-0-0.5-DU	0-0.5	ND (31)	ND (9)	ND (16)	ND (32)	ND (31)	ND (94)	ND (24)
<b>Quality Assurance/Quality Control Sample (µg/L)</b>									
510201	CCTA-57A-GR-000-EB	NA	ND (0.19)	ND (0.12)	ND (0.11)	ND (0.32)	0.19	ND (0.18) R	0.20
510207	CCTA-57A-GR-000-EB	NA	ND (0.19)	ND (0.12)	ND (0.11)	ND (0.32)	ND (0.12)	ND (0.18) R	ND (0.095)
06122	CCTA-57A-GR-000-EB	NA	ND (12)	NA	NA	NA	ND (13)	ND (8.4)	ND (18)
06126	CCTA-57A-GR-000-EB (on-site laboratory)	NA	ND (0.0335)	ND (0.0161)	ND (0.0202)	ND (0.0206)	ND (0.0185)	ND (0.0215) UJ	ND (0.0459)
510216	CCTA-57A-GR-000-EB	NA	ND (0.19)	ND (0.12)	ND (0.11)	ND (0.32)	ND (0.12)	ND (0.18)	0.12 J (0.5)
510218	CCTA-57A-GR-000-EB	NA	ND (0.19)	ND (0.12)	ND (0.11)	ND (0.32)	ND (0.12)	ND (0.18) R	0.31 J (0.5)
510219	CCTA-57A-GR-000-EB	NA	ND (0.19)	ND (0.12)	ND (0.11)	ND (0.32)	ND (0.12) R	ND (0.18)	ND (0.095) R
510221	CCTA-57A-GR-000-EB	NA	ND (0.19)	ND (0.12)	ND (0.11)	ND (0.32)	ND (0.12)	ND (0.18)	ND (0.095)

Refer to footnotes at end of table.

Table 7.4.4-7 (Concluded)  
Summary of SWMU 57A HE Analytical Results, January and December 1997, February 1998

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected HE compounds.

<sup>c</sup> Analysis request/chain-of-custody.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figures 7.2.1-2 and 7.2.1-3.

C = Concrete sample.  
CCTA = Central Coyote Test Area.  
D = Debris sample.  
DU = Duplicate sample.  
EB = Equipment blank.  
ER = Environmental Restoration.  
ft = Foot (feet).  
GR = Grab sample.  
HE = High explosives.  
HMX = 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane.  
ID = Identification.  
J = Analytical result was qualified as an estimation during data validation.  
J ( ) = The reported value is greater than or equal to the method detection limit (MDL) but is less than the practical quantitation limit, shown in parenthesis.  
µg/kg = Microgram(s) per kilogram.  
µg/L = Microgram(s) per liter.  
NA = Not applicable.  
ND ( ) = Not detected above the MDL, shown in parenthesis.  
R = Value rejected during data validation.  
RDX = 1,3,5-trinitro-1,3,5-triazacyclohexane.  
S = Soil sample.  
SWMU = Solid waste management unit.  
Tetryl = 2,4,6-trinitrophenylmethyl nitramine.  
U = Analytical result was qualified as a nondetect during data validation.

Table 7.4.4-8  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Pad 1)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>				
Record Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Bis(2-ethylhexyl)phthalate	Di-n-butyl phthalate	2,4-Dinitrotoluene	2,6-Dinitrotoluene	n-Nitrosodiphenylamine
Pad 1							
510223	CCTA-57A-GR-027-C	NA	ND (0.6)	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)
510223	CCTA-57A-GR-028-C	NA	ND (0.6)	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)
510223	CCTA-57A-GR-029-C	NA	ND (0.6)	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)
510223	CCTA-57A-GR-030-C	NA	ND (0.6)	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)
510223	CCTA-57A-GR-031-C	NA	ND (0.6)	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)
510207	CCTA-57A-GR-032-0-0.5-S	0-0.5	ND (0.6)	190 J (350)	170 J (350)	ND (0.6)	ND (0.6)
510207	CCTA-57A-GR-032-0.5-1.0-S	0.5-1.0	53 J (350)	ND (0.3)	ND (0.5)	ND (0.4)	ND (0.7)
510207	CCTA-57A-GR-033-0-0.5-S	0-0.5	46 J (350)	37 J (350)	ND (0.5)	ND (0.4)	ND (0.7)
510207	CCTA-57A-GR-033-0-0.5-DU	0-0.5	38 J (350)	ND (0.3)	ND (0.5)	ND (0.4)	ND (0.7)
510207	CCTA-57A-GR-033-0.5-1.0-S	0.5-1.0	44 J (350)	180 J (350)	190 J (350)	ND (0.4)	ND (0.7)
510207	CCTA-57A-GR-034-0-0.5-S	0-0.5	46 J (350)	1900 J	3300	180 J (350)	330 J (350)
510207	CCTA-57A-GR-034-0.5-1.0-S	0.5-1.0	52 J (350)	2000 J	2500	130 J (350)	280 J (350)
510207	CCTA-57A-GR-035-0-0.5-S	0-0.5	ND (1.0)	ND (0.3)	ND (0.5)	ND (0.4)	ND (0.7)
510207	CCTA-57A-GR-035-0.5-1.0-S	0.5-1.0	ND (1.0)	39 J (370)	ND (0.5)	ND (0.4)	ND (0.7)
510207	CCTA-57A-GR-036-0-0.5-S	0-0.5	55 J (370)	310 J (370)	240 J (370)	ND (0.4)	ND (0.7)
510207	CCTA-57A-GR-036-0.5-1.0-S	0.5-1.0	140 J (370)	ND (0.3)	ND (0.5)	ND (0.4)	ND (0.7)
Quality Assurance/Quality Control Samples (all in µg/L)							
510223	CCTA-57A-GR-000-EB	NA	2.0 J (10)	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)
510207	CCTA-57A-GR-000-EB	NA	3.2 J (10)	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)

Refer to footnotes at end of table.

Table 7.4.4-8 (Concluded)  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Pad 1)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

C = Concrete sample.

CCTA = Central Coyote Test Area.

DU = Duplicate sample.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

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

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

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compounds.

SWMU = Solid waste management unit.

Table 7.4.4-9  
 Summary of SWMU 57A SVOC Analytical Results, December 1997  
 (Gun Mount Positions)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>					
Record Number <sup>c</sup>	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Benzo(a) anthracene	Benzo(k) fluoranthene	Bis(2-ethylhexyl) phthalate	Chrysene	Dibenzofuran	Di-n-butyl phthalate
<b>Former Gun Mounts / Gun Mounts</b>								
510218	CCTA-57A-GR-037-0-0.5-S	0-0.5	ND (0.4)	ND (0.9)	57 J (390)	ND (0.3)	ND (0.2)	ND (0.3)
510218	CCTA-57A-GR-037-0.5-1.0-S	0.5-1.0	ND (0.4)	ND (0.9)	120 J (380)	ND (0.3)	ND (0.2)	ND (0.3)
510218	CCTA-57A-GR-038-0-0.5-S	0-0.5	ND (0.4)	ND (0.9)	78 J (380)	ND (0.3)	ND (0.2)	ND (0.3)
510218	CCTA-57A-GR-038-0.5-1.0-S	0.5-1.0	ND (0.4)	ND (0.9)	89 J (370)	ND (0.3)	ND (0.2)	1900
510218	CCTA-57A-GR-039-0-0.5-S	0-0.5	ND (0.4)	ND (0.9)	160 J (390)	ND (0.3)	ND (0.2)	ND (0.3)
510218	CCTA-57A-GR-039-0.5-1.0-S	0.5-1.0	ND (0.5)	ND (0.8)	59 J (390)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-039-0.5-1.0-DU	0.5-1.0	ND (0.5)	ND (0.8)	43 J (390)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-040-0-0.5-S	0-0.5	ND (0.5)	ND (0.8)	ND (0.6)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-040-0.5-1.0-S	0.5-1.0	ND (0.5)	ND (0.8)	92 J (380)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-041-0-0.5-S	0-0.5	ND (0.5)	ND (0.8)	ND (0.6)	ND (0.5)	ND (0.5)	64 J (380)
510218	CCTA-57A-GR-041-0.5-1.0-S	0.5-1.0	ND (0.5)	ND (0.8)	360 J (400)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-042-0-0.5-S	0-0.5	ND (0.5)	ND (0.8)	69 J (390)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-042-0.5-1.0-S	0.5-1.0	ND (0.5)	ND (0.8)	140 J (400)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-043-0-0.5-S	0-0.5	ND (0.5)	ND (0.8)	ND (0.6)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-043-0.5-1.0-S	0.5-1.0	ND (0.5)	ND (0.8)	83 J (370)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-044-0-0.5-S	0-0.5	130 J (370)	46 J (370)	ND (0.6)	150 J (370)	51 J (370)	530
510218	CCTA-57A-GR-044-0.5-1.0-S	0.5-1.0	ND (0.5)	ND (0.8)	ND (0.6)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-045-0-0.5-S	0-0.5	ND (0.5)	ND (0.8)	50 J (370)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-045-0.5-1.0-S	0.5-1.0	ND (0.5)	ND (0.8)	190 J (380)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-045-0.5-1.0-DU	0.5-1.0	ND (0.5)	ND (0.8)	220 J (370)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-046-0-0.5-S	0-0.5	ND (0.5)	ND (0.8)	78 J (390)	ND (0.5)	ND (0.5)	1500
510218	CCTA-57A-GR-046-0.5-1.0-S	0.5-1.0	ND (0.5)	ND (0.8)	66 J (380)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-047-0-0.5-S	0-0.5	ND (0.5)	ND (0.8)	ND (0.6)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-047-0.5-1.0-S	0.5-1.0	ND (0.5)	ND (0.8)	ND (0.6)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-048-0-0.5-S	0-0.5	ND (0.5)	ND (0.8)	ND (0.6)	ND (0.5)	ND (0.5)	ND (0.5)
510218	CCTA-57A-GR-048-0.5-1.0-S	0.5-1.0	ND (0.5)	ND (0.8)	79 J (370)	ND (0.5)	ND (0.5)	ND (0.5)
<b>Quality Assurance/Quality Control Samples (all in µg/L)</b>								
510218	CCTA-57A-GR-000-EB	NA	ND (0.5)	ND (0.8)	2.3 J (10)	ND (0.5)	ND (0.5)	ND (0.5)

Refer to footnotes at end of table.

Table 7.4.4-9 (Continued)  
 Summary of SWMU 57A SVOC Analytical Results, December 1997  
 (Gun Mount Positions)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>						
Record Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Fluoranthene	Naphthalene	n-Nitrosodiphenylamine	Phenanthrene	Pyrene
Former Gun Mounts / Gun Mounts									
510218	CCTA-57A-GR-037-0-0.5-S	0-0.5	ND (0.5)	ND (0.4)	ND (0.3)	ND (0.4)	ND (0.7)	ND (0.6)	ND (1.0)
510218	CCTA-57A-GR-037-0.5-1.0-S	0.5-1.0	ND (0.5)	ND (0.4)	ND (0.3)	ND (0.4)	ND (0.7)	ND (0.6)	ND (1.0)
510218	CCTA-57A-GR-038-0-0.5-S	0-0.5	ND (0.5)	ND (0.4)	ND (0.3)	ND (0.4)	ND (0.7)	ND (0.6)	ND (1.0)
510218	CCTA-57A-GR-038-0.5-1.0-S	0.5-1.0	2800	160 J (370)	ND (0.3)	ND (0.4)	240 J (370)	ND (0.6)	ND (1.0)
510218	CCTA-57A-GR-039-0-0.5-S	0-0.5	ND (0.5)	ND (0.4)	ND (0.3)	ND (0.4)	ND (0.7)	ND (0.6)	ND (1.0)
510218	CCTA-57A-GR-039-0.5-1.0-S	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-039-0.5-1.0-DU	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-040-0-0.5-S	0-0.5	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-040-0.5-1.0-S	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-041-0-0.5-S	0-0.5	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-041-0.5-1.0-S	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-042-0-0.5-S	0-0.5	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-042-0.5-1.0-S	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-043-0-0.5-S	0-0.5	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-043-0.5-1.0-S	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-044-0-0.5-S	0-0.5	630	ND (0.6)	420	100 J (370)	ND (0.6)	570	320 J (370)
510218	CCTA-57A-GR-044-0.5-1.0-S	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-045-0-0.5-S	0-0.5	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-045-0.5-1.0-S	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-045-0.5-1.0-DU	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-046-0-0.5-S	0-0.5	2000	110 J (390)	ND (0.6)	ND (0.5)	85 J (390)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-046-0.5-1.0-S	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-047-0-0.5-S	0-0.5	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-047-0.5-1.0-S	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-048-0-0.5-S	0-0.5	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-048-0.5-1.0-S	0.5-1.0	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)
Quality Assurance/Quality Control Samples (all in µg/L)									
510218	CCTA-57A-GR-000-EB	NA	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.5)	ND (0.6)	ND (0.6)	ND (0.6)

Refer to footnotes at end of table.

Table 7.4.4-9 (Concluded)  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Gun Mount Positions)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

CCTA = Central Coyote Test Area.

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 (MDL) but is less than the practical quantitation limit for on-site laboratory analyses or the contract required detection limit for off-site laboratory analyses, shown in parenthesis.

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

Table 7.4.4-10  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Former Building Foundation)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>		
Record <sup>c</sup> Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Bis(2-ethylhexyl)phthalate	Di-n-butyl phthalate	2,4-Dinitrotoluene
Former Building Foundation					
510218	CCTA-57A-GR-055-0-0.5-S	0-0.5	<b>43 J (380)</b>	ND (0.5)	ND (0.7)
510218	CCTA-57A-GR-056-0-0.5-S	0-0.5	ND (0.6)	ND (0.5)	ND (0.7)
510218	CCTA-57A-GR-057-0-0.5-S	0-0.5	<b>42 J (400)</b>	ND (0.5)	ND (0.7)
510218	CCTA-57A-GR-058-0-0.5-S	0-0.5	<b>54 J (380)</b>	<b>88 J (380)</b>	<b>68 J (380)</b>
Quality Assurance/Quality Control Samples (all in µg/L)					
510218	CCTA-57A-GR-000-EB	NA	<b>2.3 J (10)</b>	ND (0.5)	ND (0.7)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

CCTA = Central Coyote Test Area.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

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

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.



Table 7.4.4-11  
Summary of SWMU 57A TCLP SVOC Analytical Results,  
January 1997, December 1997, February 1998

Sample Attributes			TCLP SVOCs (EPA Method 8270) <sup>a</sup> (µg/L)
Record Number <sup>b</sup>	ER Sample ID <sup>c</sup> (Figure 7.2.1-2 and 7.2.1-3)	Sample Depth (ft)	2,4-Dinitrotoluene
<b>Debris Mounds</b>			
06122	CCTA-57A-GR-024-D (on-site laboratory)	NA	15
06122	CCTA-57A-GR-024-D-DU (on-site laboratory)	NA	ND (0.5)
06122	CCTA-57A-GR-025-D (on-site laboratory)	NA	ND (0.5)
06122	CCTA-57A-GR-026-D (on-site laboratory)	NA	ND (0.5)
<b>Pad 1</b>			
510216	CCTA-57A-GR-027-C	NA	ND (0.5)
510216	CCTA-57A-GR-028-C	NA	ND (0.5)
510216	CCTA-57A-GR-028-C-DU	NA	ND (0.5)
510216	CCTA-57A-GR-029-C	NA	ND (0.5)
510216	CCTA-57A-GR-030-C	NA	ND (0.5)
510216	CCTA-57A-GR-031-C	NA	ND (0.5)
<b>Pad 2</b>			
510216	CCTA-57A-GR-049-C	NA	ND (0.5)
<b>Former Building Foundation</b>			
510216	CCTA-57A-GR-054-C	NA	ND (0.5)
<b>Former Wind Tunnel/Machine Shop Pad</b>			
510216	CCTA-57A-GR-059-C	NA	ND (0.5)
<b>Former Transformer Pad</b>			
510216	CCTA-57A-GR-064-C	NA	ND (0.5)
<b>Underground Bunker</b>			
510219	CCTA-57A-GR-069-C	NA	ND (0.5)
510219	CCTA-57A-GR-070-C	NA	ND (0.5)
510219	CCTA-57A-GR-071-C	NA	ND (0.5)
510219	CCTA-57A-GR-072-C	NA	ND (0.5)
Maximum concentration of contaminants for the Toxicity Characteristic (mg/L)			0.13

<sup>a</sup> EPA November 1986.

<sup>b</sup> Analysis request/chain-of-custody record.

<sup>c</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figures 7.2.1-2 and 7.2.1-3.

<sup>d</sup> 40 CFR Part 261.24.

C = Concrete sample.

CCTA = Central Coyote Test Area.

CFR = Code of Federal Regulations.

D = Debris sample.

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 (MDL) but is less than the practical quantitation limit for on-site laboratory analyses or the contract required detection limit for off-site laboratory analyses, shown in parenthesis.

mg/L = Milligram(s) per liter.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

TCLP = Toxicity characteristic leaching procedure.

Levels of gross alpha (from 6.03 to 16.9 pCi/g) and gross beta (from 15.0 to 32.9 pCi/g) were all within the same order-of-magnitude range as the site-specific background values of from 8.76 to 14.5 pCi/g for gross alpha and from 18.0 to 26.6 pCi/g for gross beta (Table 7.4.4-3). These are also less than the background values given by Tharp (July 1998).

Soil samples from the edge of the concrete pad, the gun mount positions, and the former building foundation area were not analyzed for radionuclides.

### RCRA Metals Plus Beryllium

All RCRA metal and beryllium concentrations detected in the Pad 1 concrete samples (from locations 027 to 031) were below the HRMB maximum background concentration values (Table 7.4.4-4) (Dinwiddie September 1997). The concrete sample from the former building foundation was not analyzed for RCRA metals. Arsenic, barium, beryllium, lead, and silver were detected in soil samples collected at Pad 1, Gun Mount Positions and Former Building Foundation Areas, at concentrations exceeding the HRMB maximum background concentrations (Table 7.4.4-4) (Dinwiddie September 1997).

Concentrations of arsenic (from 2.11 to 6.06 mg/kg) only exceeded the HRMB background value of 5.6 mg/kg in the 0- to 0.5-foot depth sample from location 048 near the south end of Pad 1. Barium concentrations (from 59.4 to 190 mg/kg) exceeded the HRMB maximum background concentration of 130 mg/kg in 18 of the 41 soil samples and duplicates from this area. Beryllium concentrations (from 0.153J to 0.701 mg/kg) exceeded the HRMB maximum background concentration of 0.65 mg/kg in 5 of the 11 samples and one duplicate from locations along the eastern side of Pad 1. Concentrations of lead (from 10.5 to 131 mg/kg) exceeded the HRMB maximum background concentration of 11.8 mg/kg in 29 of the 41 samples and duplicates from this area. Silver (from <0.2 to 4.63 mg/kg) was detected in 8 of the 41 samples and duplicates at concentrations exceeding the HRMB maximum background concentration of <1 mg/kg. These lead concentrations were in samples from around the southern gun mount positions and in samples from around the former building foundation.

### TAL and TCLP Metals

The five concrete samples and one duplicate from Pad 1 were analyzed for the 23 TAL metals (Table 7.4.4-5). These samples and the one concrete sample from the former building foundation were also analyzed for TCLP metals plus mercury (Table 7.4.4-6). Arsenic, copper, lead, silver, and zinc were detected above their HRMB maximum background concentration values in samples from several of the locations. However, a comparison of these concentrations to background values has limited value because these are concrete samples and the constituents would be far less mobile than if they had been in soil. This assumption is supported by the results of the TCLP metals plus mercury analyses. All TCLP metal concentrations were below the maximum contaminant concentrations for the toxicity characteristic analysis.

### High Explosives

Table 7.4.4-7 shows analytical results for HE in soil and concrete samples. 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane (HMX) (from 110 J to 130 J micrograms [ $\mu\text{g}$ ]/kg) was detected in all

of the five concrete samples and one duplicate collected at Pad 1. 1,3,5-trinitro-1,3,5-triazacyclohexane (RDX) (at 220 J  $\mu\text{g}/\text{kg}$ ) was also detected in the Pad 1 concrete sample from location 027. HMX (at 150 J  $\mu\text{g}/\text{kg}$ ) was detected at the former building foundation (location 054 [Figure 7.2.1-2]).

In addition to HMX and RDX, three other HE compounds were detected in soil samples from this area. 2,4-dinitrotoluene (from 340 to 1100  $\mu\text{g}/\text{kg}$ ) was detected in 5 of the 41 soil samples and duplicates. 2,6-dinitrotoluene (from 130 to 220  $\mu\text{g}/\text{kg}$ ) was detected in 3 of the 41 soil samples. Nitrobenzene (at 99 J  $\mu\text{g}/\text{kg}$ ) was detected in only one soil sample. RDX (from 150 J to 230 J  $\mu\text{g}/\text{kg}$ ) was detected in 14 of the 41 soil samples, while HMX (from 110 J to 140 J  $\mu\text{g}/\text{kg}$ ) was detected in 4 of the 41 samples.

These HE compounds were detected in areas closely associated with the artillery firing activities. The HE compounds that were detected in the concrete samples would most likely have been deposited from the muzzle blasts during gun firing. This would also account for the HE detections in the soil samples just off the eastern edge of the concrete pad (locations 032 through 036 [Figure 7.2.1-2]). Similarly, HE compounds would also be expected near the gun mount positions (locations 037 through 048 [Figure 7.2.1-2]), where firing residue particulates would have settled and expended shell casings would have been tossed onto the surface following firing. HMX in samples taken from the former building foundation could also be related to shell storage activities or firing activities at that location.

#### SVOCs and TCLP SVOCs

Table 7.4.4-8 presents SVOC analytical results for Pad 1 concrete and soil samples taken from locations 027 to 036 (Figure 7.2.1-2). Table 7.4.4-9 presents SVOC analytical results of samples from the gun mount positions (locations 037 to 048 [Figure 7.2-2]). Table 7.4.4-10 presents SVOC analytical results of samples from the former building foundation (locations 055 to 058 [Figure 7.2-2]). Table 7.4.4-11 presents TCLP SVOC analytical results of samples from the Pad 1 concrete.

No SVOCs were detected in the five concrete samples and one duplicate from Pad 1 (Table 7.4.4-8). Five SVOCs were detected in the soil samples from along the eastern edge of Pad 1 (locations 032 to 036 [Figure 7.2.1-2]): bis(2-ethylhexyl)phthalate (from <1.0 to 140 J  $\mu\text{g}/\text{kg}$ ); di-n-butyl phthalate (from <0.3 to 2000 J  $\mu\text{g}/\text{kg}$ ); 2,4-dinitrotoluene (from <0.5 to 3300  $\mu\text{g}/\text{kg}$ ); 2,6-dinitrotoluene (from <0.4 to 180 J  $\mu\text{g}/\text{kg}$ ); and n-nitrosodiphenylamine (from <0.7 to 330 J  $\mu\text{g}/\text{kg}$ ). The highest SVOC concentrations were detected in samples from location 034, which were comparable to detections of 2,4-dinitrotoluene and 2,6-dinitrotoluene in the HE analyses (Table 7.4.4-7). Samples from location 034 were the only ones that also had detections of n-nitrosodiphenylamine. Bis(2-ethylhexyl)phthalate and di-n-butyl phthalate are common in plastics and, at these low concentrations, may not be conclusive evidence of contamination, especially because bis(2-ethylhexyl)phthalate was also detected in the associated equipment blank for these soil samples.

Thirteen different SVOCs were detected in samples from the gun mount positions (Table 7.4.4-9). Most SVOC detections were in samples from locations 038 (taken from the 0.5- to 1.0-foot depth), 044 (taken from the 0- to 0.5-foot depth), and 046 (taken from the 0- to 0.5-foot depth). Ten different SVOCs were detected in the sample from location 044, and five different SVOCs were detected in the samples from locations 038 and 046. As samples from

Pad 1, the most commonly detected SVOC was bis(2-ethylhexyl)phthalate, which was detected in 18 of the 26 soil samples at concentrations from <0.6 to 220 J  $\mu\text{g}/\text{kg}$ . Di-n-butyl phthalate was detected in 4 of 26 soil samples at concentrations from <0.5 to 1900  $\mu\text{g}/\text{kg}$ . The remaining 11 SVOCs that were detected were found in three or fewer soil samples—some were only detected in one soil sample (Table 7.4.4-9). Bis(2-ethylhexyl)phthalate was also detected in the associated equipment blank for these soil samples.

Three SVOCs were detected in the soil samples from the former building foundation (Table 7.4.4-10). Bis(2-ethylhexyl)phthalate (from <0.6 to 54  $\mu\text{g}/\text{kg}$ ) was detected in three of the four soil samples and in the associated equipment blank. Di-n-butyl phthalate and 2,4-dinitrotoluene (from <0.5 to 88 J  $\mu\text{g}/\text{kg}$  and <0.7 to 68 J  $\mu\text{g}/\text{kg}$ , respectively) were only detected in the sample from location 058.

TCLP analysis of concrete samples from Pad 1 and the former building foundation did not detect any SVOCs (Table 7.4.4-11).

#### *7.4.4.5.3 Buildings 9900 and 9902*

Tables 7.4.4-4, 7.4.4-7, 7.4.4-12, and 7.4.4-13 present the analytical results for the RCRA metals, HE, and SVOC soil sampling around the perimeters of these two buildings. These sample locations are shown and identified only by the location portion of their full ER sample identification code on Figure 7.2.1-2. Samples 006 through 009 were collected from around Building 9900, and samples 011 through 013 were collected from around Building 9902.

These samples were not analyzed for radionuclides.

#### RCRA Metals Plus Beryllium

At Building 9900, barium, beryllium, lead, and silver exceeded the HRMB maximum background concentrations (Table 7.4.4-4) (Dinwiddie September 1997). Barium (from 118 to 194  $\text{mg}/\text{kg}$ ) was detected in seven of the eight samples and one duplicate sample at concentrations exceeding the HRMB maximum background concentration of 130  $\text{mg}/\text{kg}$ . Beryllium concentrations (from 0.382 to 0.736  $\text{mg}/\text{kg}$ ) in two samples exceeded the HRMB maximum background concentration of 0.65  $\text{mg}/\text{kg}$ . Lead concentrations (from 13.1 to 35.2  $\text{mg}/\text{kg}$ ) exceeded the HRMB maximum background concentration of 11.8  $\text{mg}/\text{kg}$  in every soil sample. Silver concentrations (from 0.263 J to 4.07  $\text{mg}/\text{kg}$ ) exceeded the HRMB maximum background concentration in all but one of the soil samples.

At Building 9902, barium, beryllium, cadmium, lead, and silver exceeded their respective HRMB maximum background concentrations (Table 7.4.4-4) (Dinwiddie September 1997). Barium (from 131 to 279  $\text{mg}/\text{kg}$ ) exceeded the HRMB maximum background concentration of 130  $\text{mg}/\text{kg}$  in every sample collected. Beryllium (from 0.295 J to 0.716  $\text{mg}/\text{kg}$ ) exceeded the HRMB maximum background concentration in only the 0- to 0.5-foot sample at location 010. Cadmium (from <0.04 to 1.23  $\text{mg}/\text{kg}$ ) exceeded the HRMB maximum background concentration in three of the eight samples and one duplicate. Lead (from 9.35 to 133  $\text{mg}/\text{kg}$ ) exceeded the HRMB maximum background concentration in all but one sample. Silver (from 2.30 to 4.03  $\text{mg}/\text{kg}$ ) exceeded the HRMB maximum background concentration in every sample.

Table 7.4.4-12  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Building 9900)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>					
Record <sup>c</sup> Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Bis(2-ethylhexyl) phthalate	Di-n-butyl phthalate	2,4-Dinitrotoluene	2-Methylnaphthalene	Naphthalene	Phenanthrene
Building 9900								
510201	CCTA-57A-GR-006-0-0.5-S	0-0.5	ND (1.0)	ND (0.3)	ND (0.5)	ND (1.0)	ND (0.4)	ND (0.6)
510201	CCTA-57A-GR-006-0-0.5-DU	0-0.5	<b>43 J (380)</b>	<b>140 J (380)</b>	<b>79 J (380)</b>	ND (1.0)	ND (0.4)	ND (0.6)
510201	CCTA-57A-GR-006-0.5-1.0-S	0.5-1.0	<b>50 J (380)</b>	ND (0.3)	ND (0.5)	ND (1.0)	ND (0.4)	ND (0.6)
510201	CCTA-57A-GR-007-0-0.5-S	0-0.5	<b>390</b>	<b>150 J (370)</b>	<b>66 J (370)</b>	ND (1.0)	ND (0.4)	ND (0.6)
510201	CCTA-57A-GR-007-0.5-1.0-S	0.5-1.0	<b>160 J (370)</b>	<b>59 J (370)</b>	ND (0.5)	<b>240 J (370)</b>	<b>56 J (370)</b>	<b>55 J (370)</b>
510201	CCTA-57A-GR-008-0-0.5-S	0-0.5	<b>50 J (390)</b>	<b>45 J (390)</b>	ND (0.5)	ND (1.0)	ND (0.4)	ND (0.6)
510201	CCTA-57A-GR-008-0.5-1.0-S	0.5-1.0	<b>55 J (380)</b>	ND (0.3)	ND (0.5)	ND (1.0)	ND (0.4)	ND (0.6)
510201	CCTA-57A-GR-009-0-0.5-S	0-0.5	<b>59 J (370)</b>	ND (0.3)	ND (0.5)	ND (1.0)	ND (0.4)	ND (0.6)
510201	CCTA-57A-GR-009-0.5-1.0-S	0.5-1.0	<b>71 J (380)</b>	ND (0.3)	ND (0.5)	ND (1.0)	ND (0.4)	ND (0.6)
Quality Assurance/Quality Control Samples (all in µg/L)								
510201	CCTA-57A-GR-000-EB	NA	<b>1.2 J (10)</b>	ND (0.5)	ND (0.7)	ND (0.5)	ND (0.5)	ND (0.6)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

CCTA = Central Coyote Test Area.

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 (MDL) but is less than the practical quantitation limit for on-site laboratory analyses or the contract required detection limit for off-site laboratory analyses, shown in parenthesis.

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

Table 7.4.4-13  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Building 9902)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>								
Record Number <sup>c</sup>	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Anthracene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Benzo(a)pyrene	Bis(2-ethylhexyl)phthalate	Chrysene	Diethyl phthalate
Building 9902											
510201	CCTA-57A-GR-010-0-0.5-S	0-0.5	ND (0.6)	ND (0.4)	ND (0.5)	ND (0.9)	ND (1.5)	ND (0.4)	110 J (380)	ND (0.3)	ND (0.6)
510201	CCTA-57A-GR-010-0-0.5-DU	0-0.5	ND (0.6)	ND (0.4)	ND (0.5)	ND (0.9)	ND (1.5)	ND (0.4)	290 J (380)	ND (0.3)	ND (0.6)
510201	CCTA-57A-GR-010-0.5-1.0-S	0.5-1.0	ND (0.6)	ND (0.4)	ND (0.5)	ND (0.9)	ND (1.5)	ND (0.4)	110 J (370)	ND (0.3)	ND (0.6)
510201	CCTA-57A-GR-011-0-0.5-S	0-0.5	ND (0.6)	ND (0.4)	ND (0.5)	ND (0.9)	ND (1.5)	ND (0.4)	54 J (350)	ND (0.3)	47 J (350)
510201	CCTA-57A-GR-011-0.5-1.0-S	0.5-1.0	ND (0.6)	ND (0.4)	ND (0.5)	ND (0.9)	ND (1.5)	ND (0.4)	180 J (360)	ND (0.3)	ND (0.6)
510201	CCTA-57A-GR-012-0-0.5-S	0-0.5	ND (0.6)	ND (0.4)	ND (0.5)	ND (0.9)	ND (1.5)	ND (0.4)	36 J (370)	ND (0.3)	ND (0.6)
510201	CCTA-57A-GR-012-0.5-1.0-S	0.5-1.0	ND (0.6)	ND (0.4)	ND (0.5)	ND (0.9)	ND (1.5)	ND (0.4)	130 J (370)	ND (0.3)	ND (0.6)
510201	CCTA-57A-GR-013-0-0.5-S	0-0.5	ND (0.6)	ND (0.4)	75 J (380)	ND (0.9)	ND (1.5)	57 J (380)	160 J (380)	56 J (380)	ND (0.6)
510201	CCTA-57A-GR-013-0.5-1.0-S	0.5-1.0	110 J (380)	120 J (380)	370 J (380)	200 J (380)	250 J (380)	160 J (380)	140 J (380)	260 J (380)	ND (0.6)
Quality Assurance/Quality Control Samples (all in µg/L)											
510201	CCTA-57A-GR-000-EB	NA	ND (0.6)	ND (0.5)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	1.2 J (10)	ND (0.5)	ND (0.7)

Refer to footnotes at end of table.

Table 7.4.4-13 (Concluded)  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Building 9902)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>							
Record <sup>c</sup> Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Di-n-butyl phthalate	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Fluoranthene	Indeno(1,2,3-cd) pyrene	n-Nitrosodiphenylamine	Phenanthrene	Pyrene
Building 9902										
510201	CCTA-57A-GR-010-0-0.5-S	0-0.5	ND (0.3)	ND (0.5)	ND (0.4)	ND (0.3)	ND (0.4)	ND (0.7)	ND (0.6)	ND (1.0)
510201	CCTA-57A-GR-010-0-0.5-DU	0-0.5	ND (0.3)	ND (0.5)	ND (0.4)	ND (0.3)	ND (0.4)	ND (0.7)	ND (0.6)	ND (1.0)
510201	CCTA-57A-GR-010-0.5-1.0-S	0.5-1.0	ND (0.3)	ND (0.5)	ND (0.4)	ND (0.3)	ND (0.4)	ND (0.7)	ND (0.6)	ND (1.0)
510201	CCTA-57A-GR-011-0-0.5-S	0-0.5	<b>1000</b>	<b>1700</b>	<b>79 J (350)</b>	ND (0.3)	ND (0.4)	<b>170 J (350)</b>	ND (0.6)	ND (1.0)
510201	CCTA-57A-GR-011-0.5-1.0-S	0.5-1.0	<b>460</b>	<b>600</b>	ND (0.4)	ND (0.3)	ND (0.4)	<b>71 J (360)</b>	ND (0.6)	ND (1.0)
510201	CCTA-57A-GR-012-0-0.5-S	0-0.5	<b>73 J (370)</b>	ND (0.5)	ND (0.4)	ND (0.3)	ND (0.4)	ND (0.7)	ND (0.6)	ND (1.0)
510201	CCTA-57A-GR-012-0.5-1.0-S	0.5-1.0	ND (0.3)	ND (0.5)	ND (0.4)	ND (0.3)	ND (0.4)	ND (0.7)	ND (0.6)	ND (1.0)
510201	CCTA-57A-GR-013-0-0.5-S	0-0.5	ND (0.3)	ND (0.5)	ND (0.4)	<b>50 J (380)</b>	ND (0.4)	ND (0.7)	ND (0.6)	<b>38 J (380)</b>
510201	CCTA-57A-GR-013-0.5-1.0-S	0.5-1.0	ND (0.3)	ND (0.5)	ND (0.4)	<b>210 J (380)</b>	<b>180 J (380)</b>	ND (0.7)	<b>48 J (380)</b>	<b>210 J (380)</b>
Quality Assurance/Quality Control Samples (all in µg/L)										
510201	CCTA-57A-GR-000-EB	NA	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)	ND (0.6)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

CCTA = Central Coyote Test Area.

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 (MDL) but is less than the practical quantitation limit for on-site laboratory analyses or the contract required detection limit for off-site laboratory analyses, shown in parenthesis.

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

## High Explosives

At Building 9900, four HE compounds were detected in the soil samples (Table 7.4.4-7): 2,4-dinitrotoluene was at levels from <17 to 980 µg/kg in three samples; m-nitrotoluene (160 J µg/kg), p-nitrotoluene (at 380 µg/kg), and HMX (at 120 J µg/kg) were detected once and in different from the above-mentioned three samples.

RDX (from <31 to 240 J µg/kg) was detected in five of the eight soil samples and one duplicate from Building 9902. HMX (from <24 to 1200 µg/kg) was detected in four of the eight soil samples and one duplicate. Oddly enough, these samples contained either only RDX or only HMX rather than both (Table 7.4.4-7).

## Semivolatile Organic Compounds

Six SVOC compounds were detected in the eight soil samples and one duplicate from Building 9900 (Table 7.4.4-12). Bis(2-ethylhexyl)phthalate (<1.0 to 390 µg/kg) was detected in all but the 0- to 0.5-foot depth sample from location 006. Di-n-butyl phthalate (from <0.3 to 150 J µg/kg) was detected in four samples while 2,4-dinitrotoluene (from <0.5 to 79 J µg/kg) was detected in three samples. 2-methylnaphthalene (from <1.0 to 240 J µg/kg), naphthalene (from <0.4 to 56 J µg/kg), and phenanthrene (from <0.6 to 55 J µg/kg) were only detected in the 0.5- to 1.0-foot depth sample from location 007. Bis(2-ethylhexyl)phthalate (at 1.2 J µg/liter [L]) was also detected in the equipment blank associated with these samples.

Seventeen SVOC compounds were detected in soils samples from Building 9902 (Table 7.4.4-13). Bis(2-ethylhexyl)phthalate (from 54 J to 290 J µg/kg) was detected in every sample. The remaining 12 SVOCs were detected in one or two samples. The greatest number of detections was in the 0.5- to 1.0-foot depth sample from location 013. Twelve SVOC compounds were detected in this sample. Bis(2-ethylhexyl)phthalate (at 1.2 J µg/L) was also detected in the equipment blank associated with these samples.

### *7.4.4.5.4 The Former Wind Tunnel/Machine Shop Pad*

Tables 7.4.4-1, 7.4.4-3, 7.4.4-4, 7.4.4-6, 7.4.4-7, 7.4.4-11, 7.4.4-14, and 7.4.4-15 present the analytical results for the soil and concrete sampling at the Former Wind Tunnel/Machine Shop Pad. These sample locations are shown and identified only by the location portion of their full ER sample identification code on Figure 7.2.1-2. The sample from location 059 is a concrete sample; the samples from locations 060 through 063 are soil samples. This section discusses the analytical results of these samples.

## Radionuclides

Table 7.4.4-1 presents gamma spectroscopy results for the one concrete sample analyzed from the pad. No uranium-238 or uranium-235 were detected. Concentrations of thorium-232 (at 5.75E-01 pCi/g) and cesium-137 (at ND [3.13E-02 pCi/g]) did not exceed the HRMB maximum background values (Dinwiddie September 1997).



Table 7.4.4-14  
 Summary of SWMU 57A SVOC Analytical Results, December 1997  
 (Former Wind Tunnel/Machine Shop Pad)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>							
Record Number <sup>c</sup>	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Acenaphthylene	Anthracene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Benzo(g,h,i) perylene	Benzo(a) pyrene	Bis(2-ethylhexyl) phthalate	Butyl benzyl phthalate
Former Wind Tunnel/Machine Shop Pad										
510216	CCTA-57A-GR-060-0-0.5-S	0-0.5	250 J (370)	256 J (370)	420	290 J (370)	130 J (370)	300 J (370)	ND (0.6)	ND (0.5)
510216	CCTA-57A-GR-061-0-0.5-S	0-0.5	ND (0.5)	ND (0.6)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	ND (0.6)	ND (0.5)
510216	CCTA-57A-GR-062-0-0.5-S	0-0.5	ND (0.5)	ND (0.6)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	4000	83 J (360)
510216	CCTA-57A-GR-062-0-0.5-DU	0-0.5	ND (0.5)	ND (0.6)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	4700	53 J (360)
510216	CCTA-57A-GR-063-0-0.5-S	0-0.5	ND (0.5)	ND (0.6)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	87 J (380)	ND (0.5)
Quality Assurance/Quality Control Samples (all in µg/L)										
510216	CCTA-57A-GR-000-EB	NA	ND (0.5)	ND (0.6)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	2.6 J (10)	ND (0.5)

Refer to footnotes at end of table.

Table 7.4.4-14 (Concluded)  
 Summary of SWMU 57A SVOC Analytical Results, December 1997  
 (Former Wind Tunnel/Machine Shop Pad)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> ( $\mu\text{g}/\text{kg}$ ) <sup>b</sup>							
Record <sup>c</sup> Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Chrysene	Di-n-butyl phthalate	Di-n-octyl phthalate	2,4-Dinitrotoluene	Fluoranthene	Indeno(1,2,3-cd) pyrene	Phenanthrene	Pyrene
Former Wind Tunnel/Machine Shop Pad										
510216	<b>CCTA-57A-GR-060-0-0.5-S</b>	0-0.5	<b>290 J (370)</b>	<b>110 J (370)</b>	ND (0.6)	<b>83 J (370)</b>	<b>280 J (370)</b>	<b>110 J (370)</b>	<b>52 J (370)</b>	<b>610</b>
510216	<b>CCTA-57A-GR-061-0-0.5-S</b>	0-0.5	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.7)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
510216	<b>CCTA-57A-GR-062-0-0.5-S</b>	0-0.5	ND (0.5)	<b>37 J (360)</b>	<b>55 J (360)</b>	ND (0.7)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
510216	<b>CCTA-57A-GR-062-0-0.5-DU</b>	0-0.5	ND (0.5)	ND (0.5)	<b>55 J (360)</b>	ND (0.7)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
510216	<b>CCTA-57A-GR-063-0-0.5-S</b>	0-0.5	ND (0.5)	<b>52 J (380)</b>	ND (0.6)	ND (0.7)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
Quality Assurance/Quality Control Samples (all in $\mu\text{g}/\text{L}$ )										
510216	<b>CCTA-57A-GR-000-EB</b>	NA	ND (0.5)	<b>1.7 J (10)</b>	ND (0.6)	ND (0.7)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

CCTA = Central Coyote Test Area.

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 (MDL) but is less than the practical quantitation limit for on-site laboratory analyses or the contract required detection limit for off-site laboratory analyses, shown in parenthesis.

$\mu\text{g}/\text{kg}$  = Microgram(s) per kilogram.

$\mu\text{g}/\text{L}$  = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

Table 7.4.4-15  
Summary of SWMU 57A VOC Analytical Results,  
January and December 1997

Sample Attributes			VOCs (EPA Method 8260A) <sup>a</sup> (µg/kg) <sup>b</sup>	
Record <sup>c</sup> Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Isopropylbenzene	Methylene Chloride
<b>Debris Mounds</b>				
06122	CCTA-57A-GR-024-D (on-site laboratory)	NA	Not analyzed	ND (0.5)
06122	CCTA-57A-GR-024-D-DU (on-site laboratory)	NA	Not analyzed	ND (5)
06122	CCTA-57A-GR-024-0-0.5-S (on-site laboratory)	0-0.5	Not analyzed	ND (0.5)
06122	CCTA-57A-GR-024-0-0.5-S-DU (on-site laboratory)	0-0.5	Not analyzed	ND (0.5)
06122	CCTA-57A-GR-025-D (on-site laboratory)	NA	Not analyzed	ND (2.5)
06122	CCTA-57A-GR-025-0-0.5-S (on-site laboratory)	0-0.5	Not analyzed	ND (2.5)
06122	CCTA-57A-GR-026-D (on-site laboratory)	NA	Not analyzed	ND (5)
06122	CCTA-57A-GR-026-0-0.5-S (on-site laboratory)	0-0.5	Not analyzed	ND (0.5)
06126	CCTA-57A-GR-026-0-0.5-S	0-0.5	Not analyzed	2.80 U B (5.0)
<b>Former Wind Tunnel/Machine Shop Pad</b>				
510216	CCTA-57A-GR-059-C	NA	ND (0.68)	<b>1.6 J (5)</b>
510216	CCTA-57A-GR-060-0-0.5-S	0-0.5	ND (0.68)	<b>1.8 J (6)</b>
510216	CCTA-57A-GR-061-0-0.5-S	0-0.5	ND (0.68)	<b>1.4 J (6)</b>
510216	CCTA-57A-GR-062-0-0.5-S	0-0.5	<b>1.2 J (5)</b>	ND (0.48)
510216	CCTA-57A-GR-062-0-0.5-DU	0-0.5	ND (0.68)	ND (0.48)
510216	CCTA-57A-GR-063-0-0.5-S	0-0.5	ND (0.68)	ND (0.48)
<b>Quality Assurance/Quality Control Samples (all in µg/L)</b>				
06122	CCTA-57A-GR-000-EB (on-site laboratory)	NA	Not analyzed	ND (5)
06122	CCTA-57A-GR-000-TB (on-site laboratory)	NA	Not analyzed	ND (5)
06126	CCTA-57A-GR-000-EB	NA	Not analyzed	ND (10)
06126	CCTA-57A-GR-000-TB	NA	Not analyzed	<b>2880</b>
510216	CCTA-57A-GR-000-EB	NA	ND (1.4)	ND (1.2)
510216	CCTA-57A-GR-000-TB	NA	ND (1.4)	ND (2.0)

<sup>a</sup>EPA November 1986.

<sup>b</sup>Values in bold represent detected VOC compounds.

<sup>c</sup>Analysis request/chain-of-custody record.

<sup>d</sup>Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

B = Analyte detected in associated blank.

C = Concrete sample.

CCTA = Central Coyote Test Area.

D = Debris sample.

DU = Duplicate sample.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

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

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SWMU = Solid waste management unit.

TB = Trip blank.

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

VOC = Volatile organic compound.

Analytical results of gross alpha and gross beta (at 6.82 pCi/g and 19.1 pCi/g, respectively) were within the same order-of-magnitude range as the site-specific background values from 8.76 to 14.5 pCi/g for gross alpha and from 18.0 to 26.6 pCi/g for gross beta (Table 7.4.4-3). These gross alpha and gross beta values are also less than the background discussed by Tharp (July 1998).

Soil samples from the edge of the concrete pad were not analyzed for radionuclides.

#### RCRA Metals Plus Beryllium and TCLP Metals Plus Mercury

In the four soil samples and one duplicate taken from the Former Wind Tunnel/Machine Shop Pad, barium, cadmium, chromium, lead, mercury, and silver were detected at concentrations exceeding the HRMB maximum background concentrations (Table 7.4.4-4) (Dinwiddie September 1997). Only in the sample from location 063 did barium (from 81.5 to 146 mg/kg), chromium (from 5.57 to 14.1 mg/kg), and mercury (from 0.0256 J to 0.182 mg/kg) exceed their respective HRMB maximum background concentrations of 130 mg/kg, 12.8 mg/kg, and <0.01 mg/kg. In two samples cadmium (from <0.04 to 1.27 mg/kg) exceeded the HRMB maximum background concentration of <1 mg/kg. Lead concentrations (from 9.18 to 95.5 mg/kg) exceeded the HRMB maximum background concentration of 11.8 mg/kg in all but one soil sample. Silver concentrations (from <0.2 to 3.09 mg/kg) exceeded the HRMB maximum background concentration in all but one of the soil samples.

The concrete sample TCLP analysis revealed that all metals were below the maximum contaminant concentrations for the toxicity characteristic analysis (Table 7.4.4-6).

#### High Explosives

Only two HE compounds were detected in the one concrete and four soil samples and one duplicate from this feature (Table 7.4.4-7). A concentration of 2,4-dinitrotoluene (at 180 J  $\mu\text{g}/\text{kg}$ ) was only detected in the 0- to 0.5-foot depth sample from location 061. Concentrations of HMX (from 98 J to 120 J  $\mu\text{g}/\text{kg}$ ) were detected in the one concrete and three soil samples.

#### SVOCs and TCLP SVOCs

Table 7.4.4-14 presents SVOC analytical results for the soil samples from around the perimeter of the Former Wind Tunnel/Machine Shop Pad. The concrete pad was analyzed for TCLP SVOCs and these analytical results are presented in Table 7.4.4-11.

Sixteen SVOC compounds were detected in the shallow soil samples from this feature. Twelve of these compounds were only detected in the 0- to 0.5-foot depth sample from location 060. The remaining four SVOCs—bis(2-ethylhexyl)phthalate (from <0.6 to 4700  $\mu\text{g}/\text{kg}$ ), butyl benzyl phthalate (from <0.5 to 83 J  $\mu\text{g}/\text{kg}$ ), di-n-butyl phthalate (from <0.5 to 110 J  $\mu\text{g}/\text{kg}$ ), and di-n-octyl phthalate (from <0.6 to 55 J  $\mu\text{g}/\text{kg}$ )—were detected in two or more samples. Concentrations of bis(2-ethylhexyl)phthalate (at 2.6 J  $\mu\text{g}/\text{L}$ ) and di-n-butyl phthalate (at 1.7 J  $\mu\text{g}/\text{L}$ ) were also detected in the equipment blank associated with these samples.

TCLP analysis of the concrete sample from the pad did not detect any SVOC compounds (Table 7.4.4-11).

#### Volatile Organic Compounds

Table 7.4.4-15 presents VOC analytical results for the one concrete and four soil samples and one duplicate taken from around the perimeter of this feature. Concentrations of isopropylbenzene (from <0.68 to 1.2  $\mu\text{g}/\text{kg}$ ) were only detected in the 0- to 0.5-foot depth sample at location 062. Methylene chloride (from <0.48 to 1.8  $\mu\text{g}/\text{kg}$ ) was detected in three samples.

#### *7.4.4.5.5 The Former Transformer Pad*

Tables 7.4.4-1, 7.4.4-3, 7.4.4-4, 7.4.4-6, 7.4.4-7, 7.4.4-11, 7.4.4-16, and 7.4.4-17 present the analytical results for the soil and concrete sampling at the Former Wind Tunnel/Machine Shop Pad. These sample locations are shown and identified only by the location portion of their full ER sample identification code on Figure 7.2.1-2. The sample from location 064 is a concrete sample; the samples from locations 065 through 068 are soil samples. This section discusses the analytical results of these samples.

#### Radionuclides

Table 7.4.4-1 presents gamma spectroscopy analysis results for the one concrete sample from the pad. No uranium-238, uranium-235, or cesium-137 were detected. Thorium-232 (at  $5.17\text{E-}01$  pCi/g) did not exceed the HRMB maximum background concentration (Dinwiddie September 1997).

The analytical results for gross alpha (at 7.56 pCi/g) and gross beta (at 15.8 pCi/g) were within the same order-of-magnitude range as the site-specific background values of from 8.76 to 14.5 pCi/g for gross alpha and from 18.0 to 26.6 pCi/g for gross beta (Table 7.4.4-3), and were less than those discussed by Tharp (July 1998).

Soil samples from the edge of the concrete pad were not analyzed for radionuclides.

#### RCRA Metals Plus Beryllium and TCLP Metals Plus Mercury

In the four shallow soil samples from this feature, cadmium, lead, and silver exceeded the HRMB maximum background concentrations (Table 7.4.4-4) (Dinwiddie September 1997). Cadmium (from <0.04 to 1.19 mg/kg) only exceeded the HRMB maximum background concentration of <1 mg/kg in the sample from location 067. Lead (from 18.9 to 30.0 mg/kg) and silver (from 1.57 to 2.25 mg/kg) exceeded their respective HRMB maximum background concentrations of 11.8 mg/kg and <1 mg/kg, in all soil samples.

The concrete sample TCLP analysis revealed that all metals were below the maximum contaminant concentrations for the toxicity characteristic analysis (Table 7.4.4-6).

Table 7.4.4-16  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Former Transformer Pad)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> ( $\mu\text{g}/\text{kg}$ ) <sup>b</sup>				
Record <sup>c</sup> Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Bis(2-ethylhexyl)phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	2,4-Dinitrotoluene	Pentachlorophenol
Former Transformer Pad							
510216	CCTA-57A-GR-065-0-0.5-S	0-0.5	<b>54 J (350)</b>	ND (0.5)	ND (0.6)	ND (0.7)	ND (2.3)
510216	CCTA-57A-GR-066-0-0.5-S	0-0.5	<b>87 J (380)</b>	<b>120 J (380)</b>	<b>53 J (380)</b>	<b>83 J (380)</b>	<b>100 J (1900)</b>
510216	CCTA-57A-GR-067-0-0.5-S	0-0.5	<b>620</b>	ND (0.5)	ND (0.6)	ND (0.7)	ND (2.3)
510216	CCTA-57A-GR-068-0-0.5-S	0-0.5	<b>55 J (350)</b>	ND (0.5)	ND (0.6)	ND (0.7)	ND (2.3)
Quality Assurance/Quality Control Samples (all in $\mu\text{g}/\text{L}$ )							
510216	CCTA-57A-GR-000-EB	NA	<b>2.6 J (10)</b>	<b>1.7 J (10)</b>	ND (0.6)	ND (0.7)	ND (2.3)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

CCTA = Central Coyote Test Area.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

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

$\mu\text{g}/\text{kg}$  = Microgram(s) per kilogram.

$\mu\text{g}/\text{L}$  = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

Table 7.4.4-17  
Summary of SWMU 57A PCB Analytical Results, December 1997  
(Former Transformer Pad)

Sample Attributes			PCBs (EPA Method 8080) <sup>a</sup> ( $\mu\text{g}/\text{kg}$ ) <sup>d</sup>									
Record <sup>c</sup> Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCB
Former Transformer Pad												
510216	<b>CCTA-57A-GR-064-C</b>	NA	ND (2.5)	ND (2.6)	ND (1.6)	ND (2.1)	ND (2.4)	ND (1.9)	<b>5.7 J (18)</b>	ND (1.2)	ND (1.6)	<b>5.7 J (18)</b>
510216	CCTA-57A-GR-065-0-0.5-S	0-0.5	ND (2.5)	ND (2.6)	ND (1.6)	ND (2.1)	ND (2.4)	ND (1.9)	ND (1.6)	ND (1.2)	ND (1.6)	NA
510216	CCTA-57A-GR-066-0-0.5-S	0-0.5	ND (2.5)	ND (2.6)	ND (1.6)	ND (2.1)	ND (2.4)	ND (1.9)	ND (1.6)	ND (1.2)	ND (1.6)	NA
510216	CCTA-57A-GR-067-0-0.5-S	0-0.5	ND (2.5)	ND (2.6)	ND (1.6)	ND (2.1)	ND (2.4)	<b>13 J (20)</b>	ND (1.6)	ND (1.2)	ND (1.6)	<b>13 J (20)</b>
510216	CCTA-57A-GR-068-0-0.5-S	0-0.5	ND (2.5)	ND (2.6)	ND (1.6)	ND (2.1)	ND (2.4)	ND (1.9)	<b>6.8 J (18)</b>	ND (1.2)	ND (1.6)	<b>6.8 J (18)</b>
Quality Assurance/Quality Control Sample ( $\mu\text{g}/\text{L}$ )												
510216	CCTA-57A-GR-000-EB	0-0.5	ND (0.0076)	ND (0.0079)	ND (0.0047)	ND (0.0062)	ND (0.0071)	ND (0.0057)	ND (0.0048)	ND (0.0037)	ND (0.0047)	NA

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected PCB compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

C = Concrete sample.

CCTA = Central Coyote Test Area.

EB = Equipment blank.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification

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

NA = Not applicable.

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

$\mu\text{g}/\text{kg}$  = Microgram(s) per kilogram.

$\mu\text{g}/\text{L}$  = Microgram(s) per liter.

PCB = Polychlorinated biphenyl.

S = Soil sample.

SWMU = Solid waste management unit

## High Explosives

No HE compounds were detected in either the concrete sample or the soil samples from the former transformer pad (Table 7.4.4-7).

## SVOCs and TCLP SVOCs

Table 7.4.4-16 presents SVOC analytical results for the soil samples from around the perimeter of the former transformer pad. The concrete pad was analyzed for TCLP SVOCs; Table 7.4.4-11 presents these results.

Five SVOC compounds were detected in the shallow soil samples from the former transformer pad: Bis(2-ethylhexyl)phthalate (from 54 J to 620  $\mu\text{g}/\text{kg}$ ) was detected in every soil sample; di-n-butyl phthalate (at 120 J  $\mu\text{g}/\text{kg}$ ); di-n-octyl phthalate (at 53 J  $\mu\text{g}/\text{kg}$ ); 2,4-dinitrotoluene (at 83 J  $\mu\text{g}/\text{kg}$ ); and pentachlorophenol (at 100 J  $\mu\text{g}/\text{kg}$ ) were only detected in the 0- to 0.5-foot depth sample from location 066. Bis(2-ethylhexyl)phthalate (at 2.6 J  $\mu\text{g}/\text{L}$ ) and di-n-butyl phthalate (at 1.7 J  $\mu\text{g}/\text{L}$ ) were also detected in the equipment blank associated with these samples.

TCLP analysis of the concrete sample did not detect any SVOC compounds (Table 7.4.4-11).

## Polychlorinated Biphenyls

Table 7.4.4-17 presents analytical results for PCBs in the one concrete and four soil samples from around the perimeter of the former transformer pad. Aroclor 1260 was detected in the concrete sample (at 5.7 J  $\mu\text{g}/\text{kg}$ ) and in the 0- to 0.5-foot depth sample from location 068 (at 6.8 J  $\mu\text{g}/\text{kg}$ ). Aroclor 1254 (at 13 J  $\mu\text{g}/\text{kg}$ ) was detected in the 0- to 0.5-foot depth sample from location 067. No other PCBs were detected in these samples.

### *7.4.4.5.6 The Pad 3, Steel Plate and Utility Pole Area*

Tables 7.4.4-1, 7.4.4-3, 7.4.4-4, 7.4.4-7, 7.4.4-18, and 7.4.4-19 present the analytical results for the soil sampling at Pad 3, Steel Plate and Utility Pole Area. These sample locations are shown and identified only by the location portion of their full ER sample identification code on Figure 7.2.1-2. The samples from locations 014 through 018 were collected from around the utility pole area; the samples from locations 019 through 023 were collected from around the concrete Pad 3. This section discusses the analytical results of these samples.

## Radionuclides

Table 7.4.4-1 presents gamma spectroscopy results for the 20 soil samples and three duplicates. Uranium-238 (at 1.06E+00 pCi/g) was detected in the 0- to 0.5-foot depth sample from location 015 and in the 0.5- to 1.0-foot depth sample from location 022 (at 1.53E+00 pCi/g). Uranium-235 (at 9.67E-02 pCi/g) was only detected in the 0.5- to 1.0-foot depth sample from location 014. Thorium-232 (from 5.11E-01 to 8.76E-01 pCi/g) was detected in all samples. These concentrations are below HRMB maximum background concentrations (Dinwiddie September 1997). Cesium-137 (from the ND [2.52E-02] level to 2.86E-01 pCi/g)



Table 7.4.4-18  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Steel Plate and Utility Pole Area)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>		
Record Number <sup>c</sup>	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Bis(2-ethylhexyl)phthalate	Di-n-butyl phthalate	2,4-Dinitrotoluene
<b>Steel Plate</b>					
510201	CCTA-57A-GR-014-0-0.5-S	0-0.5	ND (1.0)	<b>66 J (350)</b>	ND (0.5)
510201	CCTA-57A-GR-014-0.5-1.0-S	0.5-1.0	<b>48 J (370)</b>	ND (0.3)	ND (0.5)
510201	CCTA-57A-GR-015-0-0.5-S	0-0.5	<b>57 J (370)</b>	ND (0.3)	ND (0.5)
510201	CCTA-57A-GR-015-0.5-1.0-S	0.5-1.0	<b>150 J (380)</b>	ND (0.3)	ND (0.5)
510207	CCTA-57A-GR-016-0-0.5-S	0-0.5	ND (0.6)	ND (0.5)	ND (0.7)
510207	CCTA-57A-GR-016-0-0.5-DU	0-0.5	ND (0.6)	<b>420</b>	<b>810</b>
510207	CCTA-57A-GR-016-0.5-1.0-S	0.5-1.0	ND (0.6)	<b>91 J (340)</b>	<b>80 J (340)</b>
510207	CCTA-57A-GR-017-0-0.5-S	0-0.5	<b>66 J (360)</b>	ND (0.5)	ND (0.7)
510207	CCTA-57A-GR-017-0.5-1.0-S	0.5-1.0	<b>100 J (370)</b>	ND (0.5)	ND (0.7)
510207	CCTA-57A-GR-018-0-0.5-S	0-0.5	ND (0.6)	ND (0.5)	ND (0.7)
510207	CCTA-57A-GR-018-0.5-1.0-S	0.5-1.0	ND (0.6)	ND (0.5)	ND (0.7)
<b>Quality Assurance/Quality Control Samples (all in µg/L)</b>					
510201	CCTA-57A-GR-000-EB	NA	<b>1.2 J (10)</b>	ND (0.5)	ND (0.7)
510207	CCTA-57A-GR-000-EB	NA	<b>3.2 J (10)</b>	ND (0.5)	ND (0.7)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

CCTA = Central Coyote Test Area.

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 (MDL) but is less than the practical quantitation limit for on-site laboratory analyses or the contract required detection limit for off-site laboratory analyses, shown in parenthesis.

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

Table 7.4.4-19  
 Summary of SWMU 57A SVOC Analytical Results, December 1997  
 (Pad 3)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>				
Record <sup>c</sup> Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Bis(2-ethylhexyl)phthalate	Di-n-butyl phthalate	2,4-Dinitrotoluene	2,6-Dinitrotoluene	n-Nitrosodiphenylamine
Pad 3							
510207	CCTA-57A-GR-019-0-0.5-S	0-0.5	<b>53 J (360)</b>	ND (0.5)	37000 UJ	<b>2900</b>	<b>100 J (360)</b>
510207	CCTA-57A-GR-019-0-0.5-DU	0-0.5	<b>52 J (370)</b>	1400	1200 UJ	<b>62 J (370)</b>	<b>55 J (370)</b>
510207	CCTA-57A-GR-019-0.5-1.0-S	0.5-1.0	ND (0.6)	<b>100 J (370)</b>	ND (0.7) UJ	ND (0.6) UJ	ND (0.6) UJ
510207	CCTA-57A-GR-020-0-0.5-S	0-0.5	<b>45 J (360)</b>	<b>4100</b>	<b>42 J (360) J</b>	ND (0.6) UJ	ND (0.6) UJ
510207	CCTA-57A-GR-020-0.5-1.0-S	0.5-1.0	<b>53 J (370)</b>	<b>4100</b>	<b>89 J (370) J</b>	ND (0.6) UJ	ND (0.6) UJ
510207	CCTA-57A-GR-021-0-0.5-S	0-0.5	<b>44 J (370)</b>	<b>550</b>	<b>480 J</b>	ND (0.6) UJ	ND (0.6) UJ
510207	CCTA-57A-GR-021-0.5-1.0-S	0.5-1.0	<b>100 J (360)</b>	<b>4700</b>	<b>6500 J</b>	<b>380 J</b>	<b>55 J (360) J</b>
510207	CCTA-57A-GR-022-0-0.5-S	0-0.5	ND (0.6)	<b>130 J (360)</b>	<b>48 J (360) J</b>	ND (0.6) UJ	ND (0.6) UJ
510207	CCTA-57A-GR-022-0.5-1.0-S	0.5-1.0	<b>42 J (370)</b>	<b>1100</b>	<b>1700 J</b>	<b>83 J (370) UJ</b>	<b>57 J (370) J</b>
510207	CCTA-57A-GR-023-0-0.5-S	0-0.5	ND (0.6)	<b>320 J (370)</b>	<b>290 J (370) J</b>	ND (0.6) UJ	ND (0.6) UJ
510207	CCTA-57A-GR-023-0.5-1.0-S	0.5-1.0	ND (0.6)	ND (0.5)	ND (0.7) UJ	ND (0.6) UJ	ND (0.6) UJ
510207	CCTA-57A-GR-023-0.5-1.0-DU	0.5-1.0	<b>39 J (370)</b>	<b>610</b>	<b>760 J</b>	<b>41 J (370) J</b>	<b>39 J (370) J</b>
Quality Assurance/Quality Control Samples (all in µg/L)							
510207	CCTA-57A-GR-000-EB	NA	<b>3.2 J (10)</b>	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

CCTA = Central Coyote Test Area.

DU = Duplicate sample.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

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

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

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

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

exceeded the HRMB maximum background concentration of 0.664 pCi/g in 13 of the 20 soil samples and three duplicates.

Analytical results for gross alpha (from 5.99 to 18.9 pCi/g) and gross beta (from 17.7 to 27.8 pCi/g) were within the same order-of-magnitude range as the site-specific background values of 8.76 to 14.5 pCi/g for gross alpha and from 18.0 to 26.6 pCi/g for gross beta (Table 7.4.4-3) and less than the values discussed by Tharp (July 1998).

### RCRA Metals Plus Beryllium

In the 20 soil samples and 3 duplicates collected, only lead and silver exceeded the HRMB maximum background concentrations (Table 7.4.4-4) (Dinwiddie September 1997). Lead (from 9.940 J to 13.2 mg/kg) exceeded the HRMB maximum background concentration in the 0- to 0.5-foot depth sample at location 014 and in the duplicate 0- to 0.5-foot depth sample from location 016 at the Steel Plate/Utility Pole Area. All the samples from around Pad 3 (from 11.8 J to 55.7 mg/kg) equaled or exceeded the HRMB maximum background concentration of 11.8 mg/kg. Silver (from the ND level [ $<0.2$ ] to 3.59 mg/kg) only exceeded the HRMB maximum background in samples from locations 014 and 015 and in the 0- to 0.5-foot sample and duplicate from location 016.

### High Explosives

At the Steel Plate/Utility Pole Area, four HE compounds were detected in the 10 soil samples and 1 duplicate (Table 7.4.4-7). 2,4-dinitrotoluene (3,200  $\mu\text{g}/\text{kg}$ ) and 2,6-dinitrotoluene (at 130 J  $\mu\text{g}/\text{kg}$ ) were only detected in the 0- to 0.5-foot depth duplicate sample at location 016. RDX (at 200 J  $\mu\text{g}/\text{kg}$ ) was only detected in the sample from location 018. HMX (from 100 J to 200 J  $\mu\text{g}/\text{kg}$ ) was detected in the 0- to 0.5- and 0.5- to 1.0-foot depth samples from locations 014 and 015.

Five HE compounds were detected in 10 soil samples and two duplicates from around Pad 3 (Table 7.4.4-7). 2,4-dinitrotoluene (from the ND [17] to 7,600  $\mu\text{g}/\text{kg}$ ) and 2,6-dinitrotoluene (from the ND [17] to 320  $\mu\text{g}/\text{kg}$ ) were detected in samples from locations 020, 021, 022, and 023. m-Nitrotoluene (160 J  $\mu\text{g}/\text{kg}$ ) was only detected in the 0- to 0.5-foot depth sample from location 021. RDX (210 J  $\mu\text{g}/\text{kg}$ ) was only detected in the 0.5- to 1.0-foot depth duplicate sample from location 023. HMX (120 J  $\mu\text{g}/\text{kg}$ ) was only detected in the 0- to 0.5-foot depth duplicate sample from location 019.

### Semivolatile Organic Compounds

Tables 7.4.4-18 and 7.4.4-19 present SVOC analytical results for the soil samples from around Pad 3, Steel Plate and Utility Pole Area.

Three SVOC compounds were identified in the ten soil samples and the one duplicate from around the steel plate and utility poles (Table 7.4.4-18). Bis(2-ethylhexyl)phthalate (from the ND [1.0] level to 150 J  $\mu\text{g}/\text{kg}$ ) was detected in five of the samples and in the associated equipment blank (from 1.2 J and 3.2 J  $\mu\text{g}/\text{L}$ ). Di-n-butyl phthalate (from the ND [0.3] level to 420 J  $\mu\text{g}/\text{kg}$ ) was detected in three soil samples; 2,4-dinitrotoluene was detected only in two soil samples.

Five SVOCs were identified in the ten soil samples and the two duplicates from around Pad 3 (Table 7.4.4-19). Bis(2-ethylhexyl)phthalate (from the ND [0.6] level to 100 J  $\mu\text{g}/\text{kg}$ ) was detected in eight soil samples and in the associated equipment blank (at 3.2  $\mu\text{g}/\text{L}$ ). Di-n-butyl phthalate (from the ND [0.5] level to 4,700  $\mu\text{g}/\text{kg}$ ) was detected in 10 soil samples. 2,4-dinitrotoluene (from the ND [0.7] level to 6,500 J  $\mu\text{g}/\text{kg}$ ) was detected in eight soil samples. 2,6-dinitrotoluene (from 41 J to 2,900  $\mu\text{g}/\text{kg}$ ) was detected in four soil samples. n-Nitrosodiphenylamine (from 39 J to 100 J  $\mu\text{g}/\text{kg}$ ) was detected in five soil samples.

#### 7.4.4.5.7 Pad 2

Tables 7.4.4-1, 7.4.4-3, 7.4.4-4, 7.4.4-6, 7.4.4-7, 7.4.4-11, and 7.4.4-20 present the analytical results for the soil and concrete sampling at Pad 2. These sample locations are shown and identified only by the location portion of their full ER sample identification code on Figure 7.2.1-2. The sample from location 049 is a concrete sample, the samples from locations 050 through 053 are soil samples. This section discusses the analytical results of these samples.

#### Radionuclides

Table 7.4.4-1 presents gamma spectroscopy analysis results for the one concrete sample taken from the pad. No uranium-238, uranium-235, or cesium-137 were detected. Thorium-232 (at 5.11E-01 pCi/g) did not exceed the HRMB maximum background value (Dinwiddie September 1997).

Analytical results for gross alpha (at 11.4 pCi/g) and gross beta (at 11.2 pCi/g) were within the same order-of-magnitude range as the site-specific background values of 8.76 to 14.5 pCi/g for gross alpha and from 18.0 to 26.6 pCi/g for gross beta (Table 7.4.4-3) and less than those discussed by Tharp (July 1998).

Soil samples from the edge of the concrete pad were not analyzed for radionuclides.

#### RCRA Metals Plus Beryllium and TCLP Metals Plus Mercury

In the four shallow soil samples from around the Pad 2 perimeter, barium, lead, and silver concentrations exceeded the HRMB maximum background concentrations (Table 7.4.4-4) (Dinwiddie September 1997). Barium (from 110 to 195 mg/kg) exceeded the HRMB maximum background concentration in the samples from locations 051 and 052. Lead (from 11.4 to 20.8 mg/kg) exceeded the 11.8 mg/kg HRMB maximum concentration in the samples from locations 051 through 053. Concentrations of silver (from 1.86 to 2.61 mg/kg) exceeded the HRMB maximum background concentration in all four soil samples.

The concrete sample TCLP analysis revealed that all metals were below the maximum contaminant concentrations for the toxicity characteristic (Table 7.4.4-6).

#### High Explosives

Only one HE compound was detected in one sample from this location. HMX (at 140 J  $\mu\text{g}/\text{kg}$ ) was detected in the concrete sample from Pad 2 (Table 7.4.4-7).

Table 7.4.4-20  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Pad 2)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>d</sup>									
Record Number <sup>c</sup>	ER Sample ID (Figure 7.2.1-2) <sup>d</sup>	Sample Depth (ft)	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Bis(2- ethylhexyl) phthalate	Chrysene	Di-n-butyl phthalate	2,4- Dinitrotoluene	2,6- Dinitrotoluene	Fluoranthene	Phenanthrene	Pyrene
Pad 2												
510218	CCTA-57A-GR-050-0-0.5-S	0-0.5	<b>64 J (380)</b>	<b>67 J (380)</b>	ND (0.6)	<b>99 J (380)</b>	<b>56 J (380)</b>	ND (0.7)	ND (0.6)	<b>85 J (380)</b>	ND (0.6)	<b>89 J (380)</b>
510218	CCTA-57A-GR-051-0-0.5-S	0-0.5	ND (0.9)	ND (0.8)	<b>130 J (380)</b>	<b>52 J (380)</b>	ND (0.5)	ND (0.7)	ND (0.6)	<b>110 J (380)</b>	<b>120 J (380)</b>	<b>98 J (380)</b>
510218	CCTA-57A-GR-052-0-0.5-S	0-0.5	ND (0.9)	ND (0.8)	ND (0.6)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.6)
510218	CCTA-57A-GR-053-0-0.5-S	0-0.5	ND (0.9)	ND (0.8)	<b>79 J (370)</b>	ND (0.5)	<b>770</b>	<b>1300</b>	<b>59 J (370)</b>	ND (0.6)	ND (0.6)	ND (0.6)
Quality Assurance/Quality Control Samples (all in µg/L)												
510218	CCTA-57A-GR-000-EB	NA	ND (0.9)	ND (0.8)	<b>2.3 J (10)</b>	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.6)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

CCTA = Central Coyote Test Area.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

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

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

## SVOCs and TCLP SVOCs

Table 7.4.4-20 presents SVOC analytical results for the soil samples from around Pad 2. Ten SVOC compounds were detected in the shallow soil samples taken from around the perimeter of the pad. Benzo(b)fluoranthene (at 64 J  $\mu\text{g}/\text{kg}$ ); benzo(k)fluoranthene (at 67 J  $\mu\text{g}/\text{kg}$ ); 2,4-dinitrotoluene (at 1,300  $\mu\text{g}/\text{kg}$ ); 2,6-dinitrotoluene (59 J  $\mu\text{g}/\text{kg}$ ); and phenanthrene (at 120 J  $\mu\text{g}/\text{kg}$ ) were only detected once. Bis(2-ethylhexyl)phthalate (from the ND [0.6] level to 130 J  $\mu\text{g}/\text{kg}$ ), chrysene (from the ND [0.5] level to 99 J  $\mu\text{g}/\text{kg}$ ), di-n-butyl phthalate (from the ND [0.5] level to 770  $\mu\text{g}/\text{kg}$ ), fluoranthene (from the ND [0.6] level to 110 J  $\mu\text{g}/\text{kg}$ ), and pyrene (from the ND [0.6] level to 98 J  $\mu\text{g}/\text{kg}$ ) were detected twice. Bis(2-ethylhexyl)phthalate (at 2.3 J  $\mu\text{g}/\text{L}$ ) was also detected in the equipment blank associated with these samples.

The TCLP analysis of the concrete sample from the pad did not detect any SVOC compounds (Table 7.4.4-11).

### *7.4.4.5.8 The Underground Bunker*

Tables 7.4.4-1, 7.4.4-3, 7.4.4-4, 7.4.4-5, 7.4.4-6, 7.4.4-7, 7.4.4-11, and 7.4.4-21 present the analytical results for the soil and concrete samples from the underground bunker. These sample locations are shown and identified only by the location portion of their full ER sample identification code on Figure 7.2.1-3. The samples from locations 069 through 072 are for the concrete floor and the underlying soil. Location 073 is the floor drain. This section discusses the analytical results of these samples.

## Radionuclides

Table 7.4.4-1 presents gamma spectroscopy analysis results for the four concrete, five soil, and one soil duplicate samples from the bunker. No uranium-238 or uranium-235 were detected. Thorium-232 (from 5.68E-01 to 7.75 pCi/g) was below the HRMB maximum background concentration of 1.01 pCi/g (Dinwiddie September 1997). Cesium-137 (from the ND [3.11E-02] level to 1.91E-01 pCi/g) exceeded the HRMB maximum background concentration value of 0.664 pCi/g in both the soil sample and duplicate from the floor drain (location 073 [Figure 7.2.1-3]).

Analytical results for gross alpha (from 4.15 to 13.0 pCi/g) and gross beta (from 12.0 to 43.3 pCi/g) were within the same order-of-magnitude range as the site-specific background values of 8.76 to 14.5 pCi/g for gross alpha and from 18.0 to 26.6 pCi/g for gross beta (Table 7.4.4-3) and less than those discussed by Tharp (July 1998).

## RCRA Metals Plus Beryllium

All RCRA metal and beryllium concentrations in the underground bunker concrete samples were below the HRMB maximum background concentration values (Table 7.4.4-4) (Dinwiddie September 1997). In the soil underlying the bunker floor and in soil beneath the floor drain, arsenic, barium, cadmium, lead, and mercury exceeded the HRMB maximum background concentrations. In the soil samples from locations 069 and 072, mercury was detected at 0.178

Table 7.4.4-21  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Underground Bunker)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>						
Record Number <sup>c</sup>	ER Sample ID <sup>d</sup> (Figure 7.2.1-3)	Sample Depth (ft)	Benzo (a) anthracene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Benzo(g,h,i) perylene	Benzo(a) pyrene	Bis(2-ethylhexyl) phthalate	Chrysene
Underground Bunker									
510219	CCTA-57A-GR-069-C	NA	ND (0.5)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	ND (0.6)	ND (0.5)
510219	CCTA-57A-GR-069-0-0.5-S	0-0.5	ND (0.5)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	ND (0.6)	ND (0.5)
510219	CCTA-57A-GR-070-C	NA	ND (0.5)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	ND (0.6)	ND (0.5)
510219	CCTA-57A-GR-070-0-0.5-S	0-0.5	ND (0.5)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	ND (0.6)	ND (0.5)
510219	CCTA-57A-GR-071-C	NA	ND (0.5)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	ND (0.6)	ND (0.5)
510219	CCTA-57A-GR-071-0-0.5-S	0-0.5	ND (0.5)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	ND (0.6)	ND (0.5)
510219	CCTA-57A-GR-072-C	NA	ND (0.5)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	ND (0.6)	ND (0.5)
510219	CCTA-57A-GR-072-0-0.5-S	0-0.5	ND (0.5)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	37 J (350)	ND (0.5)
510221	CCTA-57A-GR-073-0-0.5-S	0-0.5	200 J (380)	270 J (380)	170 J (380)	140 J (380)	210 J (380)	130 J (380)	250 J (380)
510221	CCTA-57A-GR-073-0-0.5-DU	0-0.5	110 J (380)	190 J (380)	96 J (380)	75 J (380)	130 J (380)	230 J (380)	150 J (380)
Quality Assurance/Quality Control Samples (all in µg/L)									
510219	CCTA-57A-GR-000-EB	NA	ND (0.5)	ND (0.9)	ND (0.8)	ND (1.6)	ND (0.7)	2.3 J (10)	ND (0.5)

Refer to footnotes at end of table.

Table 7.4.4-21 (Concluded)  
Summary of SWMU 57A SVOC Analytical Results, December 1997  
(Underground Bunker)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>						
Record <sup>c</sup> Number	ER Sample ID <sup>d</sup> (Figure 7.2.1-3)	Sample Depth (ft)	Di-n-butyl phthalate	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Fluoranthene	Indeno(1,2,3-cd) pyrene	Phenanthrene	Pyrene
Underground Bunker									
510219	CCTA-57A-GR-069-C	NA	<b>62 J (340)</b>	ND (0.7)	ND (0.6)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
510219	CCTA-57A-GR-069-0-0.5-S	0-0.5	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
510219	CCTA-57A-GR-070-C	NA	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
510219	CCTA-57A-GR-070-0-0.5-S	0-0.5	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
510219	CCTA-57A-GR-071-C	NA	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
510219	CCTA-57A-GR-071-0-0.5-S	0-0.5	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
510219	CCTA-57A-GR-072-C	NA	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
510219	CCTA-57A-GR-072-0-0.5-S	0-0.5	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)
510221	CCTA-57A-GR-073-0-0.5-S	0-0.5	<b>690</b>	<b>55 J (380)</b>	ND (0.6)	<b>340 J (380)</b>	<b>110 J (380)</b>	<b>97 J (380)</b>	<b>320 J (380)</b>
510221	CCTA-57A-GR-073-0-0.5-DU	0-0.5	<b>1100</b>	<b>450</b>	<b>41 J (380)</b>	<b>180 J (380)</b>	<b>67 J (380)</b>	<b>56 J (380)</b>	<b>180 J (380)</b>
Quality Assurance/Quality Control Samples (all in µg/L)									
510219	CCTA-57A-GR-000-EB	NA	ND (0.5)	ND (0.7)	ND (0.6)	ND (0.6)	ND (1.7)	ND (0.6)	ND (0.6)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-3.

C = Concrete sample.

CCTA = Central Coyote Test Area.

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 (MDL) but is less than the practical quantitation limit for on-site laboratory analyses or the contract required detection limit for off-site laboratory analyses, shown in parenthesis.

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.



and 0.250 mg/kg, respectively. In the floor drain soil sample and duplicate, mercury was detected at 2.55 and 2.09 mg/kg, respectively. These concentrations exceeded the HRMB maximum background concentration of <0.1 mg/kg. Also in the floor drain soil sample and duplicate, arsenic (at 6.42 mg/kg), barium (at 200 and 321 mg/kg), cadmium (at 2.79 and 3.84 mg/kg) and lead (at 48.7 and 54.6 mg/kg) were detected above their respective HRMB maximum background concentrations (Table 7.4.4-4) (Dinwiddie September 1997).

#### TAL and TCLP Metals Plus Mercury

The four concrete samples and the soil sample and duplicate from the floor drain were analyzed for the 23 TAL metals (Table 7.4.4-5). The four concrete samples were also analyzed for TCLP metals plus mercury (Table 7.4.4-6).

Only the soil sample and the duplicate from the floor drain contained TAL metals at concentrations exceeding the HRMB maximum background concentration: arsenic (at 6.42 and 6.25 mg/kg), barium (at 200 and 321 mg/kg), cadmium (at 2.79 and 3.84 mg/kg), cobalt (at 7.66 and 6.60 mg/kg), copper (at 51.1 and 52.0 mg/kg), lead (at 48.7 and 54.6 mg/kg), mercury (at 2.55 and 2.09 mg/kg), vanadium (at 26.7 and 24.1 mg/kg), and zinc (at 204 and 214 mg/kg). Nickel (at 14.7 mg/kg) only exceeded the HRMB maximum background in the "normal" rather than in the duplicate sample from the soil beneath the floor drain.

The TCLP analysis of the four concrete samples revealed that all metals were below the maximum contaminant concentrations for the toxicity characteristic analysis.

#### High Explosives

HE compounds were detected in only two of the concrete or soil samples (Table 7.4.4-7). HMX (at 110 J µg/kg) was only detected in the soil sample from location 070. 2,4-Dinitrotoluene (at 540 µg/kg) was only detected in the "normal" soil sample from the floor drain; no HE compounds were detected in the duplicate.

#### SVOCs and TCLP SVOCs

Fourteen SVOCs were detected in the soil and concrete samples from the underground bunker. With the exceptions of one detection of di-n-butyl phthalate (at 62 J µg/kg) in the concrete sample from location 069 and one detection of bis(2-ethylhexyl)phthalate in the soil sample from location 072, all the other SVOC detections were in the soil sample and duplicate from the floor drain (location 073) (Table 7.4.4-21). 2,6-dinitrotoluene was not detected in the "normal" soil sample from the floor drain but was detected in the duplicate.

The TCLP analysis of the four concrete samples from the underground bunker floor did not detect any SVOC compounds (Table 7.4.4-11).

#### 7.4.4.5.9 *The Three Debris Mounds*

Tables 7.4.4-1, 7.4.4-4, 7.4.4-5, 7.4.4-6, 7.4.4-7, 7.4.4-11, 7.4.4-15, and 7.4.4-22 present the analytical results for the samples from the three debris mounds and from the soil directly beneath the mounds. Sample locations 024 through 026 and former mound outlines are shown and identified only by the location portion of their full ER sample identification code on Figure 7.2.1-2. This section discusses the analytical results of these samples.

#### Radionuclides

Table 7.4.4-1 present gamma spectroscopy results for the three debris and one soil samples. No uranium-238 or uranium-235 was detected in any of these samples. Thorium-232 (from 5.67E-01 to 6.35E-01 pCi/g) and cesium-137 (from 7.83E-02 to 3.11E-01 pCi/g) was detected in all samples. These concentrations are below their respective HRMB maximum background concentrations (Dinwiddie September 1997). These samples were not analyzed for gross alpha/gross beta.

#### RCRA Metals Plus Beryllium

Of the three debris samples and one duplicate and the three soil samples and one duplicate, only barium and lead exceeded the HRMB maximum background concentration (Table 7.4.4-4) (Dinwiddie September 1997). Barium (from 43 to 144 mg/kg) exceeded the HRMB background concentration of 130 mg/kg only in the 0- to 0.5-foot depth sample from location 026 under Mound 3, which was sent off site for analysis. Lead (from 5.2 to 15.7 mg/kg) exceeded the HRMB maximum background concentration in the same 0- to 0.5-foot depth sample under Mound 3 in both the on- and off-site samples.

#### TAL and TCLP Metals Plus Mercury

Three debris mound samples and three soil samples and one duplicate were also analyzed for the 23 TAL metals (Table 7.4.4-5). A concentration of copper (at 23 mg/kg) in the 0- to 0.5-foot depth sample from location 026 under Mound 3 exceeded the HRMB maximum background concentration of 15.4 mg/kg. Lead (at 12 and 16 mg/kg) exceeded the HRMB maximum background concentration of 11.8 mg/kg in the 0- to 0.5-foot depth samples at locations 025 (under Mound 2) and 026 (under Mound 3). The debris samples from location 025 (Mound 2) exceeded the background concentrations for cadmium, copper, lead, and zinc, but the mound was removed as part of a VCM (refer to Section 7.4.4.2.2).

The three debris mound samples and one duplicate were also analyzed for TCLP metals plus mercury (Table 7.4.4-6). All TCLP metal concentrations were below the maximum contaminant concentrations for the toxicity characteristic analysis.

#### High Explosives

Only two HE compounds were detected in the analyses of the three debris mound and four soil samples (Table 7.4.4-7). 2,4-Dinitrotoluene (from the ND [120] level to 5,600 µg/kg) was detected in the debris samples from locations 025 (Mound 2) and 026 (Mound 3).

Table 7.4.4-22  
Summary of SWMU 57A SVOC Analytical Results, January 1997  
(Debris Mounds)

Sample Attributes			SVOCs (EPA Method 8270) <sup>a</sup> (µg/kg) <sup>b</sup>								
Record Number <sup>c</sup>	ER Sample ID <sup>d</sup> (Figure 7.2.1-2)	Sample Depth (ft)	Anthracene	Bis(2-ethylhexyl) phthalate	Di-n-butyl phthalate	2,4-Dinitrotoluene	2,6-Dinitrotoluene	Naphthalene	Pentachlorophenol	Pyrene	1,2,4-Trichlorobenzene
Debris Mounds											
06122	CCTA-57A-GR-024-D (on-site laboratory)	NA	ND (30)	<b>380 J (1000)</b>	<b>900 J (1000)</b>	<b>2000</b>	<b>120 J (240)</b>	ND (30)	ND (30)	ND (30)	ND (30)
06122	CCTA-57A-GR-024-DU (on-site laboratory)	NA	ND (30)	<b>600 J (1000)</b>	ND (250)	ND (30)	ND (60)	ND (30)	ND (30)	ND (30)	ND (30)
06122	CCTA-57A-GR-024-0.5-S (on-site laboratory)	0-0.5	ND (30)	ND (250)	ND (250)	ND (30)	ND (60)	ND (30)	ND (30)	ND (30)	ND (30)
06122	CCTA-57A-GR-024-0.5-S-DU (on-site laboratory)	0-0.5	ND (30)	ND (250)	ND (250)	ND (30)	ND (60)	ND (30)	ND (30)	ND (30)	ND (30)
06122	CCTA-57A-GR-025-D (on-site laboratory)	NA	ND (30)	ND (250)	ND (250)	<b>58 J (120)</b>	ND (60)	<b>43 J (120)</b>	<b>63 J (120)</b>	<b>54 J (120)</b>	ND (30)
06122	CCTA-57A-GR-025-0.5-S (on-site laboratory)	0-0.5	ND (30)	ND (250)	ND (250)	ND (30)	ND (60)	ND (30)	ND (30)	ND (30)	ND (30)
06122	CCTA-57A-GR-026-D (on-site laboratory)	NA	<b>52 J (120)</b>	ND (250)	<b>890 J (1000)</b>	<b>2200</b>	<b>110 J (240)</b>	<b>50 J (120)</b>	<b>75 J (120)</b>	<b>54 J (120)</b>	<b>49 J (120)</b>
06122	CCTA-57A-GR-026-0.5-S (on-site laboratory)	0-0.5	ND (30)	<b>490 J (1000)</b>	<b>420 J (1000)</b>	<b>620</b>	ND (60)	ND (30)	ND (30)	ND (30)	ND (30)
06126	CCTA-57A-GR-026-0.5-S	0-0.5	ND (167)	ND (167)	<b>377</b>	<b>249 J (328)</b>	ND (167)	ND (167)	ND (167)	ND (167)	ND (167)
Quality Assurance/Quality Control Samples (all in µg/L)											
06122	CCTA-57A-GR-000-EB (on-site laboratory)	NA	ND (0.5)	ND (5)	ND (5)	ND (0.5)	ND (1)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
06126	CCTA-57A-GR-000-EB	NA	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)

<sup>a</sup> EPA November 1986.

<sup>b</sup> Values in bold represent detected SVOC compounds.

<sup>c</sup> Analysis request/chain-of-custody record.

<sup>d</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figure 7.2.1-2.

CCTA = Central Coyote Test Area.

D = Debris sample.

DU = Duplicate sample.

EB = Equipment blank.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

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

µg/kg = Microgram(s) per kilogram.

µg/L = Microgram(s) per liter.

NA = Not applicable.

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

S = Soil sample.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

2,6-Dinitrotoluene (at 160 J  $\mu\text{g}/\text{kg}$ ) was found only in the 0- to 0.5-foot depth sample from location 026 under Mound 3.

### SVOCs and TCLP SVOCs

Nine SVOC compounds were detected in the three debris mound samples and one duplicate and in the three soil samples and one duplicate (Table 7.4.4-22). The majority of the detections were in the debris samples, and eight of the nine SVOCs were detected in the location 026 (Mound 3) debris sample. Three SVOCs were detected in the 0- to 0.5-foot depth sample from location 026 (Mound 3). Bis(2-ethylhexyl)phthalate (at 490 J  $\mu\text{g}/\text{kg}$ ), di-n-butyl phthalate (at 420 J  $\mu\text{g}/\text{kg}$ ); and 2,4-dinitrotoluene (at 620 J  $\mu\text{g}/\text{kg}$ ) were detected by the SNL/NM on-site laboratory. Only di-n-butyl phthalate (at 377  $\mu\text{g}/\text{kg}$ ) and 2,4-dinitrotoluene (at 249 J  $\mu\text{g}/\text{kg}$ ) were detected in the off-site laboratory analysis.

The TCLP analysis of the three debris mound samples and one duplicate detected only one SVOC compound (Table 7.4.4-11). The sample from location 024 (Mound 1) contained 15  $\mu\text{g}/\text{kg}$  of 2,4-dinitrotoluene. This concentration was below the maximum contaminant concentration of 15 mg/L for the toxicity characteristic analysis.

### Volatile Organic Compounds

No VOCs were detected in any of the debris mound or soil samples (Table 7.4.4-15).

#### *7.4.4.6 Quality Assurance/Quality Control Results*

All off-site samples were analyzed by state-certified laboratories using accepted contract laboratory program protocols and EPA methods for Level III data generation. On-site SNL/NM laboratories used accepted EPA methods and sufficient QA/QC procedures to produce acceptable data for site characterization.

### Radionuclides

Tables 7.4.4-1, 7.4.4-2 and 7.4.4-3 present radionuclide analytical results for QA/QC samples that were collected during RFI sampling and VCM activities at SWMU 57A. Table 7.4.4-1 presents gamma spectroscopy results, and Table 7.4.4-2 presents isotopic uranium and thorium results. Table 7.4.4-3 presents gross alpha/gross beta QA/QC analytical results.

All gamma spectroscopy QA/QC analyses were performed on site at SNL/NM.

QA/QC samples included five equipment rinsate blanks: one per day when sampling for radionuclides. No radionuclides were detected in any of the rinsate blanks.

Five duplicate soil samples (locations 005 at the 0.5- to 1.0-foot depth, 016 at the 0- to 0.5-foot depth, 019 at the 0- to 0.5-foot depth, 023 at the 0.5- to 1.0-foot depth, 073 at the 0- to 0.5-foot depth) and one duplicate concrete sample (028-C) were analyzed using gamma spectroscopy. No uranium-238 or uranium-235 was detected in any of the duplicates or "regular" samples.

Activities for thorium-232 were comparable in all samples. Cesium-137 activities were comparable except in samples from location 019 at the 0- to 0.5-foot depth (at the ND [2.52E-02] level versus 1.05E-01 pCi/g) and from location 023 at the 0.5- to 1.0-foot depth (at the ND [4.58E-02] level versus 3.87E-02) and in the concrete sample 028-C (at 1.77E-02 versus 2.06E-01 pCi/g) (Table 7.4.4-1).

The duplicate sample for isotopic uranium and thorium analysis (from location 005 at the 0.5- to 1.0-foot depth) was also within comparable limits for thorium-228, thorium-230, thorium-232, uranium-233/234, uranium-235, and uranium-238 (Table 7.4.4-2).

Five duplicate soil samples (from locations 005 at the 0.5- to 1.0-foot depth, 016 at the 0- to 0.5-foot depth, 019 at the 0- to 0.5-foot depth, 023 at the 0.5- to 1.0-foot depth, and 073 at the 0- to 0.5-foot depth) and one duplicate concrete sample (028-C) were analyzed for gross alpha/gross beta. Except for the gross beta analysis result for the sample from location 073 at the 0- to 0.5-foot depth (at  $30.4 \pm 2.29$  versus  $43.3 \pm 2.94$  pCi/g), all results were comparable within the error of the analysis (Table 7.4.4-3).

### Metals

Tables 7.4.4-4, 7.4.4-5, and 7.4.4-6 present the analytical results for metals QA/QC samples that were collected during the RFI sampling at SWMU 57A. The analytical results in these tables include background, RFI, debris mound characterization, and equipment rinsate blank samples. Thirteen soil samples and one concrete duplicate were analyzed for RCRA metals plus beryllium. Six equipment blanks were collected: one per each day of sampling. The equipment blanks yielded three detections of barium, two detections of silver, and one each of beryllium, chromium, lead, and mercury. The concentrations were just above their respective detection limits and were not high enough to invalidate or qualify the soil or concrete data. Table 7.4.4-23 presents the relative percent difference (RPD) results for the RCRA metals analyses. RPDs ranged from 2.7 to 50.1 for off-site laboratory analyses and from 2.1 to 54.2 for on-site laboratory analyses.

RPDs were not calculated for the TAL or TCLP metals analyses because of the number of nondetections and estimated values in the duplicate pairs.

### High Explosives

Table 7.4.4-7 presents the analytical results for HE in QA/QC samples that were collected during the RFI sampling at SWMU 57A. QA/QC samples consisted of 10 soil duplicates, 1 concrete sample duplicate, and 8 equipment rinsate blanks. There was very little correlation between detections in the "normal" and duplicate samples, because of sample inhomogeneity. RPDs were not correlated because of the obvious lack of correlation. The equipment blanks yielded one detection of RDX and three detections of HMX. Except for the one equipment blank that yielded both RDX and HMX detections, the concentrations were below the practical quantitation level for the method. All detected HE concentrations were not high enough to invalidate or qualify the soil data. Laboratory analytical problems with insufficient spike recoveries were sufficient to reject numerous tetra analyses. The rejected results would all be biased toward low recovery so that the samples that yielded no detections should actually be higher.

Table 7.4.4-23  
Summary of SWMU 57A RCRA Metals Relative Percent Difference Results, December 1997–February 1998

Sample Attributes			Relative Percent Difference								
Record Number <sup>a</sup>	ER Sample ID (Figure 7.2.1-2 and 7.2.1-3) <sup>b</sup>	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
510201	CCTA-57A-GR-005-0.5-1.0-S CCTA-57A-GR-005-0.5-1.0-DU (off-site laboratory)	0.5–1.0	3.0	26.6	NC	NC	38.1	29.1	NC	NC	NC
510201	CCTA-57A-GR-006-0-0.5-S CCTA-57A-GR-006-0-0.5-DU (off-site laboratory)	0–0.5	11.8	8.1	NC	NC	NC	11.6	NC	NC	NC
510201	CCTA-57A-GR-010-0-0.5-S CCTA-57A-GR-010-0-0.5-DU (off-site laboratory)	0–0.5	5.5	7.1	14.7	NC	32.5	34.9	NC	NC	11.0
510207	CCTA-57A-GR-016-0-0.5-S CCTA-57A-GR-016-0-0.5-DU (off-site laboratory)	0–0.5	19.1	NC	NC	NC	NC	NC	NC	NC	NC
510207	CCTA-57A-GR-019-0-0.5-S CCTA-57A-GR-019-0-0.5-DU (off-site laboratory)	0–0.5	16.6	27.5	NC	NC	13.5	19.1	NC	NC	NC
510207	CCTA-57A-GR-023-0.5-1.0-S CCTA-57A-GR-023-0.5-1.0-DU (off-site laboratory)	0.5–1.0	10.4	7.6	NC	NC	4.0	NC	NC	NC	NC
510216	CCTA-57A-GR-028-C CCTA-57A-GR-028-C-DU (off-site laboratory)	NA	25.7	34.5	NC	NC	30.2	22.3	NC	NC	20.4
510207	CCTA-57A-GR-033-0-0.5-S CCTA-57A-GR-033-0-0.5-DU (off-site laboratory)	0–0.5	9.7	1.7	6.3	NC	5.8	NC	NC	NC	NC
6122	CCTA-57A-GR-024-D CCTA-57A-GR-024-D-DU (on-site laboratory)	NA	6.5	10.5	6.3	28.6	2.1	12.5	NC	NC	33.9
6122	CCTA-57A-GR-024-0.5-S CCTA-57A-GR-024-0.5-S-DU (on-site laboratory)	0–0.5	9.1	40.7	41.5	NC	54.2	9.2	NC	NC	NC
510218	CCTA-57A-GR-039-0.5-1.0-S CCTA-57A-GR-039-0.5-1.0-DU (off-site laboratory)	0.5–1.0	9.2	8.1	8.6	NC	14.9	13.6	NC	NC	NC

Refer to footnotes at end of table.

Table 7.4.4-23 (Concluded)  
Summary of SWMU 57A RCRA Metals Relative Percent Difference Results, December 1997–February 1998

Sample Attributes			Relative Percent Difference								
Record Number <sup>a</sup>	ER Sample ID (Figure 7.2.1-2 and 7.2.1-3) <sup>b</sup>	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
510218	<b>CCTA-57A-GR-045-0.5-1.0-S</b> CCTA-57A-GR-045-0.5-1.0-DU (off-site laboratory)	0.5–1.0	50.1	4.6	7.1	NC	3.3	2.2	NC	NC	NC
510216	<b>CCTA-57A-GR-062-0-0.5-S</b> CCTA-57A-GR-062-0-0.5-DU (off-site laboratory)	0–0.5	25.2	14.7	NC	6.6	20.9	43.9	8.3	NC	46.0
510221	<b>CCTA-57A-GR-073-0-0.5-S</b> CCTA-57A-GR-073-0-0.5-DU (off-site laboratory)	0-0.5	2.7	46.4	NC	31.7	23.9	11.4	19.8	NC	NC

<sup>a</sup> Analysis request/chain-of-custody.

<sup>b</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figures 7.2.1-2 and 7.2.1-3.

C = Concrete sample.

CCTA = Central Coyote Test Area.

D = Debris sample.

DU = Duplicate sample.

ER = Environmental Restoration.

ft = Foot (feet).

GR = Grab sample.

ID = Identification.

NC = Not calculated for estimated values or nondetected results.

RCRA = Resource Conservation Recovery Act.

S = Soil sample.

SWMU = Solid waste management unit.

### Semivolatile Organic Compounds

Tables 7.4.4-8 through 7.4.4-10; 7.4.4-12 through 7.4.4-14; and 7.4.4-16 through 7.4.4-22 present the analytical results for SVOCs in QA/QC samples that were collected during the RFI sampling at SWMU 57A. Table 7.4.4-25 presents analytical detection limits for SVOC analyses. QA/QC samples consisted of 12 soil duplicates and 8 equipment rinsate blanks. Because of the number of samples that yielded nondetections and because of the estimated concentrations in the duplicate sample pairs, RPDs could only be calculated for bis(2-ethylhexyl)phthalate in the sample from location 062 at the 0- to 0.5-foot depth (16.1 percent); for 2,4-dinitrotoluene in the sample from location 019 at the 0- to 0.5-foot depth (102 percent); and for di-n-butyl phthalate in the sample from location 073 at the 0- to 0.5-foot depth (45.81 percent) (Table 7.4.4-24). Six equipment rinsate blanks yielded bis(2-ethylhexyl)phthalate. One of these six also yielded di-n-butyl phthalate. However, these concentrations were not sufficient to invalidate or qualify any soil data.

RPDs could not be calculated for the TCLP SVOC analyses because the duplicate sample pairs yielded no detections. Table 7.4.4-26 presents analytical detection limits for the TCLP SVOC analyses.

### Volatile Organic Compounds

Table 7.4.4-15 presents the analytical results for VOCs in QA/QC samples that were collected during the RFI sampling at SWMU 57A. Table 7.4.4-27 presents analytical detection limits for VOC analyses. QA/QC samples consisted of one debris duplicate, two soil duplicates, three equipment rinsate blanks, and three trip blanks.

No RPDs could be calculated because of the number of nondetections in the duplicate pairs. One trip blank yielded one detection of methylene chloride. This resulted in a nondetection qualification in one soil sample (from location 026 at the 0- to 0.5-foot depth).

### Polychlorinated Biphenyls

Table 7.4.4-17 presents the results for PCBs in QA/QC samples that were collected during the RFI sampling at SWMU 57A. No duplicate soil or concrete samples were collected. An equipment rinsate blank analysis did not have any detectable PCBs.

#### *7.4.4.7 Data Validation*

The SNL/NM ER Project Office conducted Data Validation I and Data Validation II reviews of the off-site data in accordance with Technical Operating Procedure 94-03, Rev. 0 (SNL/NM July 1994).

Off-site analysis data were validated for radionuclides (isotopic uranium, isotopic thorium, and gross alpha/gross beta), organics (SVOCs, TCLP SVOCs, HE, VOCs, and PCBs), and inorganics (RCRA metals plus beryllium, TCLP metals plus mercury, and TAL metals). The review included the assessment of holding times, method blanks, MS/MSD, laboratory control sample/laboratory control sample duplicates (LCS/LCSD), the surrogate date, and equipment



Table 7.4.4-24  
Summary of SWMU 57A SVOC Relative Percent Difference Results,  
December 1997–February 1998

Sample Attributes			Relative Percent Difference		
Record Number <sup>a</sup>	ER Sample ID (Figure 7.2.1-2 and 7.2.1-3) <sup>b</sup>	Sample Depth (ft)	Bis(2-ethylhexyl) phthalate	2,4-Dinitrotoluene	Di-n-butyl phthalate
510207	CCTA-57A-GR-019-0-0.5-S CCTA-57A-GR-019-0-0.5-DU (off-site laboratory)	0–0.5	NC	102.0	NC
510216	CCTA-57A-GR-062-0-0.5-S CCTA-57A-GR-062-0-0.5-DU (off-site laboratory)	0–0.5	16.1	NC	NC
510221	CCTA-57A-GR-073-0-0.5-S CCTA-57A-GR-073-0-0.5-DU (off-site laboratory)	0–0.5	NC	NC	NC

<sup>a</sup> Analysis request/chain-of-custody.

<sup>b</sup> Bold portion of the ER Sample ID corresponds to the sample location specified in Figures 7.2.1-2 and 7.2.1-3.

CCTA = Central Coyote Test Area.

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.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

Table 7.4.4-25  
Summary of SVOC Analytical Detection Limits  
for SWMU 57A Soil Sampling; January 1997, December 1997, February 1998

Analyte	MDL ( $\mu\text{g}/\text{kg}$ )
1,2,4-Trichlorobenzene	0.4-167
1,2-Dichlorobenzene	0.5-167
1,3-Dichlorobenzene	0.3-167
1,4-Dichlorobenzene	0.6-167
2,4,5-Trichlorophenol	0.8-167
2,4,6-Trichlorophenol	0.6-167
2,4-Dichlorophenol	0.3-167
2,4-Dimethylphenol	0.5-167
2,4-Dinitrophenol	1.1-333
2,4-Dinitrotoluene	0.5-167
2,6-Dinitrotoluene	0.4-167
2-Chloronaphthalene	0.3-167
2-Chlorophenol	0.4-167
2-Methyl-4,6-dinitrophenol	0.7-167
2-Methylnaphthalene	0.5-167
2-Methylphenol	0.5-167
2-Nitroaniline	0.6-167
2-Nitrophenol	0.5-167
3,3-Dichlorobenzidine	0.7-333
3-Nitroaniline	0.6-167
4-Bromophenyl phenyl ether	0.5-167
4-Chloro-3-methylphenol	0.5-167
4-Chloroaniline	0.5-200
4-Chlorophenyl phenyl ether	0.5-167
4-Methylphenol	0.6-333
4-Nitroaniline	0.6-200
4-Nitrophenol	0.6-167
Acenaphthene	0.5-167
Acenaphthylene	0.4-167
Anthracene	0.6-167
Benzidine	0.4-167
Benzo(a)anthracene	0.4-167
Benzo(a)pyrene	0.4-167
Benzo(b)fluoranthene	0.5-167
Benzo(g,h,i)perylene	1.5-167
Benzo(k)fluoranthene	0.8-167
Benzoic Acid	0.5-333
Benzyl Alcohol	0.6-167
Bis(2-chloroethoxy) methane	0.3-167
Bis(2-chloroethyl) ether	0.6-167
Bis(2-chloroisopropyl) ether	0.6-167

Refer to footnotes at end of table.

Table 7.4.4-25 (Concluded)  
Summary of SVOC Analytical Detection Limits  
for SWMU 57A Soil Sampling; January 1997, December 1997, February 1998

Analyte	MDL ( $\mu\text{g}/\text{kg}$ )
Bis(2-ethylhexyl)phthalate	0.6-167
Butylbenzylphthalate	0.5-167
Chrysene	0.3-167
Dibenzo(a,h)anthracene	1.8-167
Dibenzofuran	0.2-167
Diethylphthalate	0.7-167
Dimethylphthalate	0.3-167
Di-n-butylphthalate	0.5-167
Di-n-octylphthalate	0.3-167
Fluoranthene	0.3-167
Fluorene	0.4-167
Hexachlorobenzene	0.5-167
Hexachlorobutadiene	0.5-167
Hexachlorocyclopentadiene	2.0-167
Hexachloroethane	0.8-167
Indeno(1,2,3-cd)pyrene	0.4-167
Isophorone	0.5-167
Naphthalene	0.4-167
Nitrobenzene	0.5-167
N-Nitroso-di-n-propylamine	0.7-167
N-Nitrosodiphenylamine	0.6-167
Pentachlorophenol	2.3-167
Phenanthrene	0.6-167
Phenol	0.5-167
Pyrene	0.6-167

$\mu\text{g}/\text{kg}$  = Microgram(s) per kilogram.

MDL = Method detection limit.

SVOC = Semivolatile organic compound.

SWMU = Solid waste management unit.

Table 7.4.4-26  
Summary of TCLP SVOC Analytical Detection Limits  
for SWMU 57A Sampling; January 1997, December 1997, February 1998

Analyte	MDL ( $\mu\text{g/L}$ )
1,4-Dichlorobenzene	0.5-1.3
2,4,5-Trichlorophenol	0.5-0.9
2,4,6-Trichlorophenol	0.5-2.3
2,4-Dinitrotoluene	0.5
2-Methylphenol	0.5-1.0
3-Methylphenol	0.5-3.0
4-Methylphenol	0.5-3.0
Hexachlorobenzene	0.5-0.9
Hexachlorobutadiene	0.5-0.9
Hexachloroethane	0.5-1.1
Nitrobenzene	0.5-1.0
Pentachlorophenol	0.5-3.7
Pyridine	0.5-1.4

$\mu\text{g/L}$  = Microgram(s) per liter.  
MDL = Method detection limit.  
SVOC = Semivolatile organic compound.  
SWMU = Solid waste management unit.  
TCLP = Toxicity characteristic leaching procedure.

Table 7.4.4-27  
Summary of VOC Analytical Detection Limits  
for SWMU 57A Soil Sampling, January and December 1997

Analyte	MDL (µg/kg)
Acetone	0.5-25
Benzene	0.96-5
Bromobenzene	0.83
Bromochloromethane	0.80
Bromodichloromethane	0.64-5
Bromoform	0.5-25
Bromomethane	1-2.1
2-Butanone	0.5-25
n-Butylbenzene	0.67
sec-Butylbenzene	0.62
tert-Butylbenzene	0.52
Carbon Disulfide	1-25
Carbon Tetrachloride	0.69-1
Chlorobenzene	0.5-5
Chlorodibromomethane	1-5
Chloroethane	0.86-1
Chloroform	0.72-5
Chloromethane	1.2
2-Chlorotoluene	0.58
4-Chlorotoluene	0.73
Dibromochloromethane	0.55
1,2-Dibromo-3-chloropropane	0.84
1,2-Dibromoethane	0.5
Dibromomethane	0.52
Dichlorobromomethane	1
1,2 -Dichlorobenzene	0.63
1,3 -Dichlorobenzene	0.71
1,4 -Dichlorobenzene	0.64
Dichlorodifluoromethane	1.2
1,1 -Dichloroethane	0.5-5
1,2 -Dichloroethane	0.64-5
1,1 -Dichloroethene	0.77-25
1,2 -Dichloroethene	0.5-5
cis-1,2-Dichloroethene	0.5-5
trans-1,2-Dichloroethene	0.73-1
1,1-Dichloropropane	0.81
1,2-Dichloropropane	0.5-5
1,3-Dichloropropane	0.79
cis-1,3-Dichloropropene	0.5-5
trans-1,3-Dichloropropene	0.5-5
2,2-Dichloropropane	0.61
Ethylbenzene	0.5-5
Hexachlorobutadiene	0.84
2-Hexanone	1-25
Isopropylbenzene	0.68
p-Isopropyltoluene	0.57

Refer to footnotes at end of table.

Table 7.4.4-27 (Concluded)  
Summary of VOC Analytical Detection Limits  
for SWMU 57A Grid Soil Sampling, January and December 1997

Analyte	MDL ( $\mu\text{g}/\text{kg}$ )
4-Methyl-2-pentanone	0.5-25
Methylene Chloride	0.48-5
Naphthalene	0.43
n-Propylbenzene	0.56
Styrene	0.47-5
1,1,1,2-Tetrachloroethane	0.55
1,1,2,2-Tetrachloroethane	0.38-5
Tetrachloroethene	0.5-5
Toluene	0.5-5
1,2,3-Trichlorobenzene	0.42
1,2,3-Trichlorobenzene	1.2
1,1,1-Trichloroethane	0.5-5
1,1,2-Trichloroethane	0.39-5
Trichloroethene	0.5-5
Trichlorofluoromethane	5.0
1,2,3-Trichloropropane	0.96
1,2,4-Trimethylbenzene	0.64
1,3,5-Trimethylbenzene	0.59
Vinyl Acetate	2
Vinyl Chloride	1-25
o-Xylene	0.5-5
p/m-Xylene	1-5
Xylenes (total)	3 - 3.1

$\mu\text{g}/\text{kg}$  = Microgram(s) per kilogram.  
MDL = Method detection limit.  
SWMU = Solid waste management unit.  
VOC = Volatile organic compound.

rinsate blank data. All of the solid and liquid samples were prepared and analyzed in accordance with specified EPA methods and accepted procedures. All compounds were successfully analyzed.

No significant problems were noted during the review of the data packages. A few problems that were identified are summarized in this section. Annex B presents copies of the data validation summary sheets. The most common problem was with the analysis of the HE compound tetryl. Poor recoveries required that nondetections in numerous soil samples be rejected. The poor recoveries are thought to be the result of matrix interference, and even though the results are rejected, it is believed that the compound is not present in those samples.

### Radionuclides

No data were qualified. The QC measures were adequate and all data were acceptable.

### Organics

This section discusses problems with SVOC and HE analyses that caused some data to be qualified or rejected. Otherwise QC measures were adequate and the data were acceptable.

For AR/COC 510201. A low percent recovery in the LCS/LCSD resulted in the rejection of the HE compound tetryl.

For AR/COC 510207 samples, benzidine and tetryl were both rejected in the equipment blank, and the tetryl nondetections were rejected in the soil samples (from locations 016 through 036) because the RPD exceeded the acceptance criteria and the LCS/LCSD were below the acceptance criteria for percent recovered. The SVOCs 2,4-dinitrotoluene; 2,6-dinitrotoluene; and n-nitrosodiphenylamine were qualified J or UJ for soil samples (from locations 019 through 023, 016 or 034) because the field precision measurements for the field duplicate pair did not meet acceptance criteria for RPD or because the LCS/LCSD percent recovery exceeded the upper control limit.

For AR/COC 510216, the tetryl nondetections were rejected for concrete samples (from locations 027-C through 031-C, 049-C, 054-C, 064-C) and for soil samples (from locations 061 through 068) because the RPD exceeded the acceptance criteria and because the LCS/LCSD were below the acceptance criteria for percent recovered.

For AR/COC 510218, 1,3,5-trinitrobenzene and tetryl nondetections in the equipment blank and tetryl in soil samples (from locations 037 through 058) were rejected because the RPD exceeded the acceptance criteria and the LCS/LCSD were below the acceptance criteria for percent recovered.

For the AR/COC 510219 equipment blank sample, HMX and RDX nondetections were rejected.

For AR/COC 510221, di-n-butyl phthalate was qualified for the soil sample and duplicate from location 073 because field precision measurements for the field duplicate pair did not meet acceptance criteria. In addition, poor recovery probably caused by matrix interference resulted in the qualification for 2,4-dinitrotoluene in the normal soil sample from location 073.

For AR/COC 510223, poor surrogate recovery probably caused by matrix interference resulted in the qualification of concrete samples 027-C, 028-C, and 029-C.

For AR/COC 06126, methylene chloride in the soil sample from beneath debris Mound 3 (at location 026) was qualified as a nondetection under provisions of the blank rule because the detected concentration was less than 10 times the concentration in the associated trip blank (SNL/NM July 1994).

### Inorganics

This section discusses problems with metals analyses that caused some data to be qualified or rejected. Otherwise QC measures were adequate and the data were acceptable.

For AR/COC 510201, chromium was qualified for samples from locations 006 through 009 because field precision measurements for the field duplicate pair did not meet acceptance criteria.

For AR/COC 510207, lead, beryllium, cadmium, silver, barium, and mercury were qualified for numerous samples either because field precision measurements for the field duplicate pair did not meet acceptance criteria or because the lab precision measurements for LCS/LCSD did not meet acceptance criteria. Arsenic and selenium were qualified for numerous samples because the accuracy measurements for MS/MSD did not meet acceptance criteria.

For AR/COC 510216, calcium was qualified for the concrete samples from locations 027-C through 030-C. Lead and silver were qualified for the soil samples from locations 060 through 068.

For AR/COC 510219, matrix interference probably caused the variability observed in the data.

## **7.5 Site Conceptual Model**

### **7.5.1 Nature and Extent of Contamination in Soil**

The RFI sampling at SWMU 57A (excluding concrete samples) yielded the following COCs: metals, HE, SVOCs, PCBs, and radionuclides. Most organic compound detections (HE, SVOCs, VOCs) and PCBs were equal to or slightly above the background levels of detection. Most metal detections were equal to or slightly above the HRMB maximum approved background concentrations, (IT March 1996; Dinwiddie September 1997; SNL/NM December 1997), although some samples did contain elevated metal concentrations indicative of a release. Table 7.5.1-1 summarizes the COCs and their distribution around the features at SWMU 57A and briefly discusses these results. Table 7.5.1-2 lists the COCs that were detected in the concrete samples and Section 7.5.2 discusses these results.

The majority of metal detections that exceeded the HRMB maximum approved background concentrations included silver, lead, and barium. Since elevated silver and lead concentrations



Table 7.5.1-1  
Summary of COCs in Soil Samples

Area	COC concentrations greater than NMED background or detection limit	Analytical Table	Extent of Contamination (For locations referenced see Figure 7.2.1-2)
Site-specific background locations	Radionuclides	7.4.4-1	No elevated radionuclide concentrations were detected in soil samples.
	RCRA metals plus beryllium	7.4.4-4	Elevated lead and silver concentrations in the majority of background samples (locations 001-005). These concentrations may be naturally occurring at this site.
Pad 1, Gun Mount Positions and Former Building Foundation	RCRA metals plus beryllium	7.4.4-4	Elevated barium, beryllium, and lead concentrations in samples collected along east edge of Pad 1 (locations 032-036). Elevated barium and lead concentrations irregularly distributed around gun mount positions (locations 037-048). Elevated silver concentrations at the southern gun mount positions (locations 043, 047, 048). Elevated lead and arsenic concentrations at the former building foundation (locations 055-058).
	HE	7.4.4-7	HE compounds detected in samples collected along the east edge of Pad 1 (locations 032, 034, 036). Mainly RDX detected at northern gun mount positions (locations 039-041). HE detections at locations 045 and 046 and at the former building foundation locations.
	SVOCs	7.4.4-8 7.4.4-9 7.4.4-10	Detections in samples along the east side edge of Pad 1 (locations 032-036). Most SVOCs detected in samples near the southern gun mount positions (locations 044-046) and some at the former building foundation (locations 055-058).
Buildings 9900 and 9902	RCRA metals plus beryllium	7.4.4-4	Elevated barium, lead, and silver concentrations in almost every sample. Elevated beryllium in only three samples. Elevated cadmium only in the 0- to 0.5-foot depth samples from locations 011, 012, and 013 at Building 9902.
	HE	7.4.4-7	A few detections in Building 9900 samples. Either RDX or HMX detected in every Building 9902 sample.
	SVOCs	7.4.4-12	Several SVOCs detected in Building 9900 samples.
7.4.4-13		Several SVOCs detected in Building 9902 samples; the greatest variety of SVOCs in samples from locations 011 and 013	

Refer to footnotes at end of table.

Table 7.5.1-1 (Continued)  
Summary of COCs in Soil Samples

Area	COC concentrations greater than NMED background or detection limit	Analytical Table	Extent of Contamination (Locations referenced see Figure 7.2.1-2)
Former Wind Tunnel/Machine Shop Pad	RCRA metals plus beryllium	7.4.4-4	Elevated silver and lead concentrations in all but the sample from location 061. Elevated barium, chromium, and mercury in the sample from location 063. Elevated cadmium also in the sample from location 060.
	HE	7.4.4-7	HMX detected in samples from locations 060, 061 and the 062 duplicate. 2,4-dinitrotoluene also detected in the sample from location 061.
	SVOCs	7.4.4-14	SVOCs detected in four of the five samples. Greatest variety in the sample from location 060.
	VOCs	7.4.4-15	Methylene chloride (1.4 J to 1.8 J $\mu$ /kg) detected in three of the five soil samples. Isopropylbenzene (1.2 J $\mu$ g/kg) detected in the soil sample from location 062.
Former Transformer Pad	RCRA metals plus beryllium	7.4.4-4	Elevated silver and lead concentrations in all samples. Elevated cadmium also detected in the sample from location 067.
	HE	7.4.4-7	No HE compounds were detected in any soil sample.
	SVOCs	7.4.4-16	Bis(2-ethylhexyl)phthalate detected in all four samples. Four other SVOCs also detected in the sample from location 066.
	PCBs	7.4.4-17	Aroclor 1254 detected in the sample from location 067. Aroclor 1260 detected in sample from location 068.
Pad 3, Steel Plate and Utility Pole Area	Radionuclides	7.4.4-1 7.4.4-3	Elevated cesium-137 detected in surface samples from locations 014 and 015 and in both samples and duplicate from location 016. No elevated gross alpha/gross beta detections.
	RCRA metals plus beryllium	7.4.4-4	Two elevated lead (locations 014 and 016) and five elevated silver (locations 014-016) concentrations detected in samples from the Steel Plate/Utility Pole Area. Elevated lead concentrations detected in every sample from the Pad 3 area (locations 019-023).
	HE	7.4.4-7	HE compounds detected in 13 of 23 soil samples from these areas.
	SVOCs	7.4.4-18 7.4.4-19	SVOCs detected in 8 of 11 soil samples from the Steel Plate/Utility Pole Area. SVOCs detected in 8 of 12 soil samples from the Pad 3 area.

Refer to footnotes at end of table.

Table 7.5.1-1 (Continued)  
Summary of COCs in Soil Samples

Area	COC concentrations greater than NMED background or detection limit	Analytical Table	Extent of Contamination (Locations referenced see Figures 7.2.1-2 and 7.2.1-3)
Pad 2	RCRA metals plus beryllium	7.4.4-4	Elevated silver concentrations in all samples. Elevated lead concentrations in three of four samples and elevated barium concentrations in two of four samples.
	HE	7.4.4-7	No HE compounds were detected in any soil samples.
	SVOCs	7.4.4-20	A total of ten SVOCs detected. No SVOCs were detected in the sample from location 052.
Underground bunker	Radionuclides	7.4.4-1	Elevated cesium-137 was detected in the sample and duplicate from the bunker floor drain (location 073, Figure 7.2.1-3).
	RCRA metals plus beryllium	7.4.4-4	Elevated mercury concentrations detected in the soil samples underlying the concrete floor from locations 069 and 072 (Figure 7.2.1-3). Elevated arsenic, barium, cadmium, lead, and mercury concentrations in the soil sample and duplicate from the floor drain.
	TAL metals	7.4.4-5	TAL Metals analysis of the soil sample and duplicate from the floor drain (location 073) detected elevated concentrations of arsenic, barium, cadmium, cobalt, copper, lead, mercury, vanadium, and zinc. An elevated nickel concentration was only measured in the sample and not in the duplicate from location 073.
	HE	7.4.4-7	HMX was detected in the soil sample from location 070 (Figure 7.2.1-3). 2,4-dinitrotoluene was detected in the soil sample but not in the duplicate from the floor drain (location 073).
	SVOCs	7.4.4-21	Fourteen SVOCs detected. Except for one SVOC detection in the sample from location 072, SVOCs were only detected in the sample and in the duplicate from the floor drain (location 073).

Refer to footnotes at end of table.

Table 7.5.1-1 (Concluded)  
Summary of COCs in Soil Samples

Area	COC concentrations greater than NMED background or detection limit	Analytical Table	Extent of Contamination (Locations referenced see Figure 7.2.1-2)
Debris mounds	Radionuclides	7.4.4-1	No elevated radionuclides were detected in the three debris mound samples or in the soil sample from beneath Mound 1.
	RCRA metals plus beryllium	7.4.4-4	Elevated barium was detected in the split sample from beneath Mound 3 (location 026) that was analyzed off-site. Elevated lead concentrations were detected in both the on-site and the off-site split soil samples from beneath Mound 3 (location 026).
	TAL metals	7.4.4-5	TAL Metals analysis yielded elevated concentrations of cadmium, copper, lead, and zinc in the Mound 2 debris sample. An elevated copper concentration was also detected in the soil sample from beneath Mound 3 (location 026).
	TCLP metals plus mercury	7.4.4-6	No debris mound samples exceeded the toxicity characteristic concentrations for metals.
	HE	7.4.4-7	2,4-dinitrotoluene was detected in the debris samples from Mounds 2 and 3. 2,6-dinitrotoluene was detected in the soil sample from beneath Mound 3 (location 026).
	SVOCs	7.4.4-22	Nine SVOCs were detected, mainly in the debris mound samples. Three SVOCs (on-site laboratory analysis) and 2 SVOCs (off-site split sample) were detected in the soil sample from beneath Mound 3 (location 026).
	TCLP SVOCs	7.4.4-11	2,4-dinitrotoluene was detected at a concentration above the toxicity characteristic in the TCLP SVOC analysis of the debris sample from Mound 1.
	VOCs	7.4.4-15	No VOCs were detected in the debris samples or in soil samples from beneath the mounds.

- COC = Constituent of concern.
- HE = High explosive(s).
- HMX = 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane.
- NMED = New Mexico Environment Department.
- PCBs = Polychlorinated biphenyls.
- RCRA = Resource Conservation and Recovery Act.
- RDX = 1,3,5-trinitro-1,3,5-triazacyclohexane.
- SVOC = Semivolatile organic compound.
- TAL = Target analyte list.
- TCLP = Toxicity characteristic leaching procedure.
- VOC = Volatile organic compound.

Table 7.5.1-2  
Summary of COCs in Concrete Samples

Area	COC concentrations greater than NMED background or detection limit	Analytical Table	Extent of Contamination (Locations referenced see Figure 7.2.1-2)
Pad 1	Radionuclides	7.4.4-1	Elevated cesium-137 concentrations in the sample from location 027 and in the duplicate concrete sample from location 028 were detected.
	RCRA metals plus beryllium	7.4.4-7	No elevated metal concentrations were detected.
	TAL metals	7.4.4-5	Elevated concentrations of arsenic, barium, copper, lead, silver, and zinc were detected in the TAL analyses. Elevated copper and silver concentrations were detected in every Pad 1 concrete sample.
	TCLP metals plus mercury	7.4.4-6	No metal concentrations exceed the toxicity characteristic values.
	HE	7.4.4-7	HMX was detected in every concrete sample. RDX was only detected in the sample from location 027.
	SVOCs	7.4.4-8	No SVOCs were detected in any concrete sample.
	TCLP SVOCs	7.4.4-11	TCLP analysis yielded no SVOCs.
Former Wind Tunnel/Machine Shop Pad	Radionuclides	7.4.4-1	No elevated radionuclides were detected in the concrete sample.
	TCLP metals plus mercury	7.4.4-6	No metal concentrations exceeded the toxicity characteristic values for the TCLP analysis.
	HE	7.4.4-7	HMX (120 J µg/kg) was detected in the concrete sample.
	TCLP SVOCs	7.4.4-11	TCLP analysis yielded no SVOCs.
	VOCs	7.4.4-15	Methylene chloride (1.6 J µg/kg) was detected in the concrete sample.
Former Transformer Pad	Radionuclides	7.4.4-1	No elevated radionuclides were detected in the concrete sample.
	TCLP metals plus mercury	7.4.4-6	No metal concentrations exceeded the toxicity characteristic values for the TCLP analysis.
	HE	7.4.4-7	No HE compounds were detected in the concrete sample.
	TCLP SVOCs	7.4.4-11	TCLP analysis yielded no SVOCs.
	PCBs	7.4.4-17	Aroclor 1260 (5.7 J µg/kg) was detected in the concrete sample.
Pad 2	Radionuclides	7.4.4-1	No elevated radionuclides were detected in the concrete sample.
	TCLP metals plus mercury	7.4.4-6	TCLP analysis yielded no metal concentrations exceeding the toxicity characteristic values.
	HE	7.4.4-7	HMX (140 J µg/kg) was detected in the concrete sample.
	TCLP SVOCs	7.4.4-11	TCLP analysis yielded no SVOCs.

Refer to footnotes at end of table.

Table 7.5.1-2 (Concluded)  
Summary of COCs in Concrete Samples

Area	COC concentrations greater than NMED background or detection limit	Analytical Table	Extent of Contamination (Locations referenced see Figure 7.2.1-3)
Underground Bunker	Radionuclides	7.4.4-1	No elevated radionuclides were detected in the concrete samples from the bunker floor.
	RCRA Metals plus beryllium	7.4.4-7	Elevated barium concentrations were detected in concrete samples from locations 070, 071, and 072 (Figure 7.2.1-3). Elevated mercury concentrations were detected in samples from locations 069, 071, and 072.
	TAL metals	7.4.4-5	TAL metals analysis yielded elevated barium in samples from locations 070, 071, and 072. Elevated mercury was detected in samples from locations 069 and 071. Elevated zinc was detected in the sample from location 069. Elevated vanadium was detected in every concrete sample.
	TCLP metals plus mercury	7.4.4-6	TCLP analysis yielded no metal concentrations exceeding the toxicity characteristic values.
	HE	7.4.4-7	No HE compounds were detected in the concrete samples from the bunker floor.
	SVOCs	7.4.4-21	Di-n-butyl phthalate (62 J µg/kg) was detected in the concrete sample from location 069.
	TCLP SVOCs	7.4.4-11	TCLP analysis yielded no SVOCs.

- COC = Constituent of concern.
- HE = High explosive(s).
- HMX = 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane.
- NMED = New Mexico Environment Department.
- PCBs = Polychlorinated biphenyls.
- RCRA = Resource Conservation and Recovery Act.
- RDX = 1,3,5-trinitro-1,3,5-triazacyclohexane.
- SVOC = Semivolatile organic compound.
- TAL = Target analyte list.
- TCLP = Toxicity characteristic leaching procedure.
- VOC = Volatile organic compound.

were also detected in the site-specific background soil sampling locations, similar silver and lead concentrations by themselves may not be indicative of a release.

#### Pad 1, Gun Mount Positions and Former Building Foundation

As expected, elevated metal, HE, and SVOC concentrations were detected along the eastern edge of Pad 1, around the gun mounts, and around the former building foundation. COCs along the pad edge and around the gun mount positions are likely a direct result of artillery firing activities. The gun muzzle blasts would have deposited residues down range in the area of the pad edge. Residues from gun breach operations and expended shell ejection onto the surrounding surface would probably account for COCs around the mount positions. Grading activities would have repositioned soils containing COCs (probably from down range) on top of the slab and around the former building foundation.

#### Buildings 9900 and 9902

Detections of metals, HE, and SVOCs indicated that most of the contamination was present around Building 9902, although there were sporadic detections around Building 9900. COCs in the soil around Building 9902 probably resulted from the proximity of the building to gun firing activities. The distance of Building 9900 from gun firing activities may also explain the fewer detections and lower COC concentrations detected in these soil samples.

#### Former Wind Tunnel/Machine Shop Pad

Detections of metals, SVOCs, and VOCs indicated low-level contamination around the pad. Detections of HE could possibly have resulted from airborne deposition from the nearby firing activities because their concentrations were similar to those found in areas of probable airborne deposition (i.e., the eastern edge of Pad 1 soil samples).

#### Former Transformer Pad

Detections of metals, SVOCs, and PCBs indicated low-level COC concentrations in soil on the west and north sides of the pad. The absence of HE detections may indicate that this area was far enough away to preclude airborne residues from firing activities.

#### Pad 3, Steel Plate and Utility Pole Area

HE and SVOCs are the most ubiquitous COC detections from Pad 3, Steel Plate and Utility Pole Area. Cesium-137 was also detected in a few samples at elevated concentrations. Elevated lead and silver concentrations were detected, but as mentioned above, high concentrations may be naturally occurring at this SWMU.

## Pad 2

Low concentrations of SVOCs were detected at three locations around the slab. Barium levels were elevated in samples from two locations around the slab. Lead and silver concentrations were elevated, but as mentioned above, high concentrations may be naturally occurring at this SWMU.

## Debris Mounds

Metals (lead and barium) and two SVOCs were detected at low concentrations in the soil sample from under Mound 3 following the mound's removal.

## Underground Bunker

Most of the COCs detected were in the soil sample and duplicate from the floor drain. These included cesium-137, metals, SVOCs, and HE. All potential COCs detected in the soil samples were retained in the conceptual model and evaluated in the human health and ecological risk assessments. COCs detected in concrete samples are discussed below in Section 7.5.2. Because of the matrix (concrete), any COCs detected in these samples were not evaluated in the risk assessments.

## 7.5.2 Nature and Extent of Contamination in Concrete

Table 7.5.1-2 lists the COCs that were detected in concrete samples. In general, elevated metals concentrations in concrete may not be indicative of a release, because they could have been introduced or biased because of the aggregate materials, the concrete composition, or the water used for hydration.

## Pad 1

Elevated cesium-137 detections were measured at two locations. HE was detected in every sample, undoubtedly deposited from gun muzzle blasts. The normal or TCLP analyses yielded no SVOC detections. TAL metal analyses yielded several elevated metal concentrations, but these may be artificially biased as discussed above. No elevated RCRA metal concentrations were measured.

## Former Wind Tunnel/Machine Shop Pad

HMX and methylene chloride were detected in the concrete sample. The sample passed the TCLP analyses for metals and SVOCs.



### Former Transformer Pad

Only a low-level detection of aroclor was measured in the concrete sample. The sample passed the TCLP analyses for metals and SVOCs.

### Pad 2

Only a low-level detection of HMX was measured in the concrete sample. The sample passed the TCLP analyses for metals and SVOCs.

### Underground Bunker

The RCRA and TAL metal analyses yielded several elevated metal concentrations, but these may be artificially biased as discussed above. The samples passed the TCLP analysis for metals. One SVOC was detected in one sample. No SVOCs were detected in the TCLP analysis, nor were HE compounds or radionuclides detected.

## 7.5.3 Environmental Fate

The primary releases of COCs at SWMU 57A were to the surface soil; however a release appears to be related to the underground bunker floor drain. Wind, water, and biota are natural mechanisms of COC transport from the primary release points. Excavation and removal of soil are potential human-caused mechanisms of transport. Winds can be strong in the open grassland environment at SWMU 57A. Moderate winds can transport soil particles with adsorbed COCs (or COCs in particulate form) as suspended dust, capable of dry or wet deposition away from the site. Strong winds may move larger (sand-sized) particles by saltation. Vegetation and physical structures provide wind breaks, thereby limiting the potential for significant wind erosion at the site. The Site Conceptual Model Diagram summarizes these possible exposure pathways (Figure 7.5.3-1). Because the analytical detection limit for uranium-235 and uranium-238 was above the HRMB background concentration values, these radioisotopes are carried through the risk assessment as potential COCs. In order to take a more conservative approach, for cesium-137 the HRMB subsurface background concentration of 0.079 pCi/g is used for risk assessment.

Water at SWMU 57A occurs through precipitation (rain or occasionally snow). The average annual precipitation in this area is about 8 inches (NOAA 1990) and the evapotranspiration value is 95 percent of the total rainfall (Thomson and Smith 1985). Precipitation will either infiltrate or form runoff. Infiltration at the site is enhanced by the nearly flat relief and the sandy nature of the soil (primarily Tijeras gravelly fine sandy loam [USDA 1977]). The vegetative cover will also slow runoff, increasing infiltration and loss by evapotranspiration. Runoff from the site is probably only significant during intense rainfall events and during extended rainfall periods when soils are near saturation from previous rainfall. Surface runoff in the area of SWMU 57A is to the west; however, the western side of the site is bounded by Lovelace Road. Therefore, surface runoff from the site will be carried by the bar ditch along this road toward an internal drainage basin on the west side of KAFB. Runoff may carry soil particles with adsorbed

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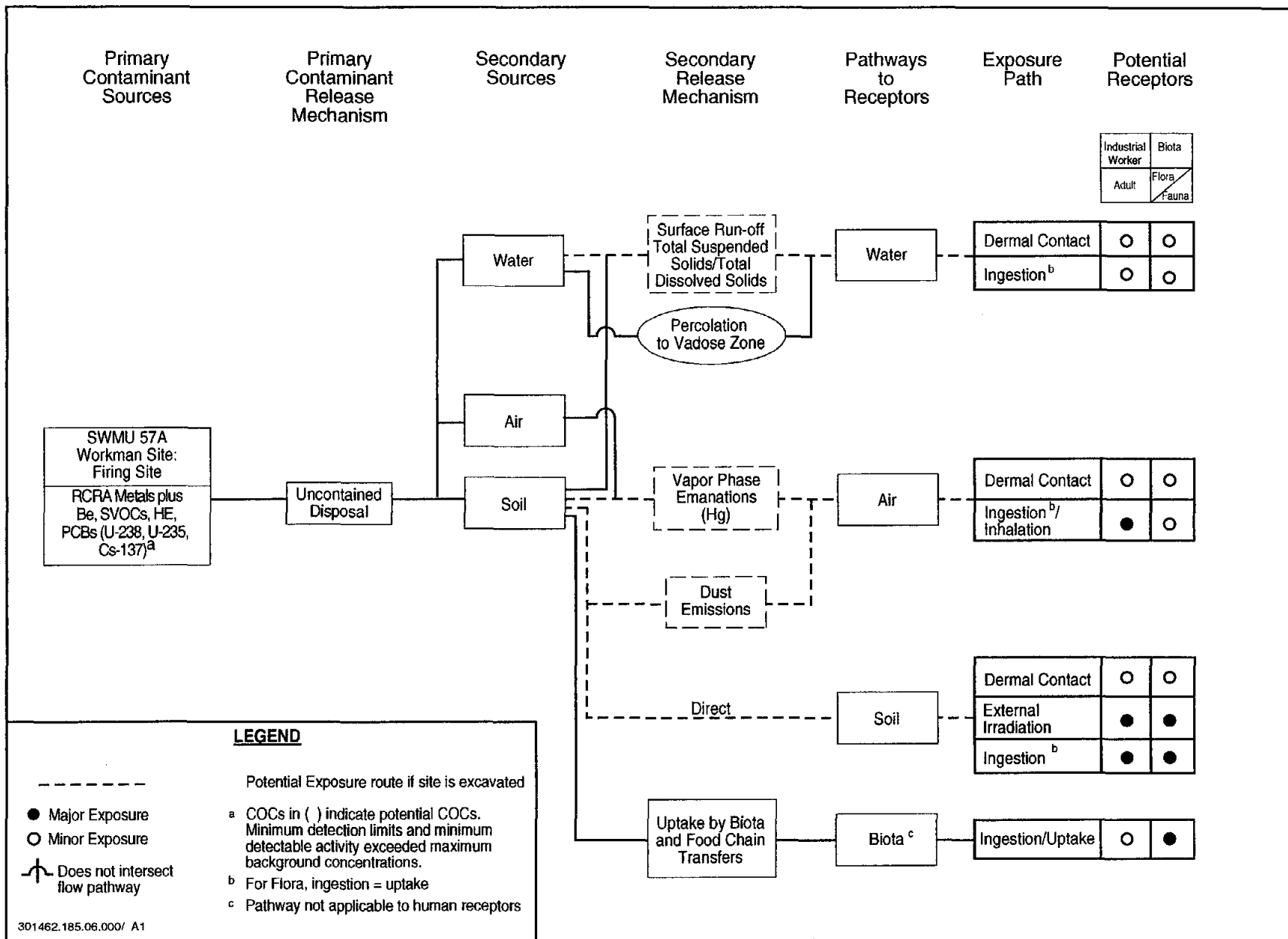


Figure 7.5.3-1  
 Conceptual Model Flow Diagram for SWMU 57A Workman Site: Firing Site

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COCs. The distance of transport will depend upon the size of the particle and the velocity of the water (expected to be low because of the flat terrain).

Water that infiltrates into the soil will continue to percolate through the soil until field capacity is reached. COCs desorbed from the soil particles into the soil solution may be leached into the subsurface soil with this percolation. The effective rooting depths of the soil at SWMU 57A is about 60 inches (USDA 1977), indicating the depth of the system's transient water cycling zone (the dynamic balance between percolation/infiltration and evapotranspiration). Because groundwater at this site is approximately 82 feet bgs, the potential for COCs to reach groundwater through the unsaturated zone above the water table is very small. As water from the surface evaporates, the direction of COC movement may be reversed with capillary rise of the soil water. Vegetation increases the rate of water loss from the subsurface soil through transpiration.

Plant roots can take up COCs that are in the soil solution. Aboveground tissues can take up adsorbed constituents directly from the air or by contact with dust particles. Organic constituents in plant tissues may be metabolized or released through volatilization. COCs that remain in the tissue may be consumed by herbivores or eventually returned to the soil as litter. Aboveground litter is capable of transport by wind until consumed by decomposer organisms in the soil. Constituents in plant tissues that are consumed by herbivores may pass through the gut and be returned to the soil in feces (either at the site or transported from the site by the herbivore) or may be absorbed into tissues, held, metabolized, or later excreted. The herbivore may be eaten by a primary carnivore or scavenger, and the constituents may still be held in the consumed tissues until the sequence of absorption, metabolism, excretion, and consumption by higher predators, scavengers, and decomposers is repeated. The potential for transport of the constituents within the food chain is dependent upon the mobility of the species that comprise the food chain and the potential for the constituent to be transferred across the links in the food chain.

Degradation of COCs at SWMU 57A may result from biotic or abiotic processes. Inorganic COCs at SWMU 57A are elemental in form and are, therefore, not considered degradable. Radiological COCs, however, undergo decay to stable isotopes or radioactive daughter elements. Other transformations of inorganics may include changes in valence (oxidation/reduction reactions) or incorporation into organic forms (e.g., the conversion of selenite or selenate from soil to seleno-amino acids in plants). Degradation processes for organic COCs may include photolysis, hydrolysis, and biotransformation. Photolysis requires light and, therefore, takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water and may occur in the soil solution. Biotransformation (i.e., transformation caused by plants, animals, and microorganisms) may occur; however, biological activity may be limited by the aridity of the environment at this site.

Table 7.5.3-1 summarizes the fate and transport processes that may occur at SWMU 57A. COCs at this site include a variety of inorganics (metals, radionuclides, and others) and organics (HE, PCBs, and others) in surface soil. Because the topography of the site is flat and the site is moderately vegetated, the potential for transport of COCs by wind or surface-water runoff is moderate to low. Significant leaching into the subsoil is unlikely for most COCs and leaching to the groundwater at this site is highly unlikely. Because of the diversity of COCs at this site, the potential for uptake into the food chain is highly variable, depending upon the specific COC in question. The potential for food chain uptake for most metals and radionuclides is expected to be low; however, that for PCBs may be high because of their highly lipophilic

nature (as measured by the octanol/water partition coefficient,  $K_{ow}$ ) and their resistance to biotransformation and degradation. For other organics, the potential for food chain uptake will generally be moderate to low caused by either lower lipophilicity or higher potential for biotransformation. Degradation of the inorganic COCs is insignificant and the decay of radiological COCs is also insignificant because of their long half lives.

Table 7.5.3-1  
Summary of Fate and Transport at SWMU 57A

Transport and Fate Mechanism	Existence at Site	Significance
Wind	Yes	Moderate to low
Surface runoff	Yes	Moderate to low
Migration to groundwater	No	None
Food chain uptake	Yes	Variable
Transformation/degradation	Yes	Variable

SWMU = Solid waste management unit.

## 7.6 Site Assessments

### 7.6.1 Summary

The site assessment concludes that SWMU 57A does not have significant potential to affect human health under an industrial land-use scenario. After consideration of the uncertainties associated with the available data and modeling assumptions, ecological risks associated with SWMU 57A were found to be low. This section briefly describes and Annex 7-C provides details of the site assessments.

### 7.6.2 Screening Assessments

#### 7.6.2.1 Human Health

SWMU 57A has been recommended for an industrial land use (DOE and USAF March 1996). Annex 2-A 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. Besides COC metals, any VOCs or SVOCs detected above their reporting limits and any radionuclide compounds detected either above background levels and/or MDAs were included in this assessment. The risk assessment process provides a quantitative evaluation of the potential adverse human health effects caused by constituents in the SWMU's soil. The risk assessment report calculated the hazard index (HI) and excess cancer risk for both an industrial land-use and a residential land-use setting. The excess cancer risk from nonradiological COCs and the radiological COCs is not additive (EPA 1989).

In summary, the HI calculated for SWMU 57A nonradiological COCs is 0.04 for an industrial land-use setting, which is less than the numerical standard of 1.0 suggested by risk assessment

guidance (EPA 1989). Incremental risk is determined by subtracting risk associated with background from potential nonradiological COC risk. The incremental HI is 0.02. The total excess cancer risk for SWMU 57A nonradiological COCs is  $8E-6$  for an industrial land use setting, which is above the acceptable risk value provided by the NMED for Class A and B carcinogens. The incremental cancer risk for SWMU 57A is  $5E-6$ . Although the incremental excess cancer risk is above the proposed numerical standard, maximum concentrations were used in the calculations. Because the site has been adequately characterized, it is more realistic to use average concentrations in the risk calculation. Average concentrations for arsenic (3.37 mg/kg); for 2,4-dinitrotoluene (0.2702 mg/kg); and for 2,6-dinitrotoluene (0.03817 mg/kg) produce an incremental excess cancer risk of  $3E-7$  (well below the proposed guideline of  $1E-6$ ). Incremental risk calculations using the more realistic average concentrations indicate acceptable risk to human health for an industrial land-use scenario.

The incremental total effective dose equivalent for radionuclides for an industrial land-use setting for SWMU 57A is 0.21 millirem (mrem)/year (yr), which is well below the numerical guidance of 15 mrem/yr found in EPA's OSWER Directive No. 9200.4-18 and reflected in a document entitled "Sandia National Laboratories/New Mexico Environmental Restoration Project—RESRAD Input Parameter Assumptions and Justification" (SNL/NM February 1998). The incremental excess cancer risk for radionuclides is  $2.5E-6$  for industrial land-use scenario, which is much less than risk values calculated from naturally occurring radiation and from intakes considered background concentration values.

The residential land-use scenarios for this site are provided only for comparison in the risk assessment report (Annex 8-A). The report concludes that SWMU 57A does not have significant potential to affect human health under an industrial land-use scenario.

#### 7.6.2.2 *Ecological*

As set forth by the NMED Risk-Based Decision Tree, an ecological screening assessment that corresponds with the screening procedures in the EPA's Ecological Risk Assessment Guidance for Superfund (EPA 1997) was performed. An early step in the evaluation is comparison of COC concentrations and identification of potentially bioaccumulative constituents. This is presented in Annex 8-A. This methodology also requires the development of a site conceptual model and food web model as well as selection of ecological receptors. Each of these items is presented in the "Predictive Ecological Risk Assessment Methodology for SNL/NM ER Program, Sandia National Laboratories/New Mexico" (IT May 1998) and will not be duplicated here. The screening also includes the estimation of exposure and ecological risk.

Tables 14, 15, 16, and 17 of Annex 8-A present the results of the ecological risk assessment screen. Site-specific information was incorporated into the screening assessment when such data were available. Hazard quotients greater than unity were originally predicted; however, closer examination of the exposure assumptions revealed an overestimation of risk primarily attributed to exposure concentration (maximum COC concentration was used in the estimation of risk), exposure setting (area use factors of one were assumed), background risk, quality of analytical data, and the use of detection limits as exposure concentrations. Based upon an evaluation of these uncertainties, ecological risks associated with this site are expected to be low.

### 7.6.3 Baseline Risk Assessments

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

#### 7.6.3.1 *Human Health Baseline Risk Assessment*

Based upon the screening assessment information summarized in Section 7.6.2.1, a baseline human health risk assessment is not required for SWMU 57A.

#### 7.6.3.2 *Ecological Baseline Risk Assessment*

Based upon the screening assessment information summarized in Section 7.6.2.2, a baseline ecological risk assessment is not required for SWMU 57A.

### 7.7 No Further Action Proposal

#### 7.7.1 Rationale

Based upon field investigation data and the human health risk assessment analysis, an NFA is proposed for SWMU 57A for the following reasons:

- No VOCs and radionuclides were detected during the field-screening program.
- Gross alpha/gross beta results were within background levels.
- No COCs (in particular VOCs, SVOCs, HE compounds, TAL or RCRA metals plus beryllium, PCBs, and radionuclides) were present at concentration levels considered hazardous to human health for an industrial land-use scenario.

#### 7.7.2 Criterion

Based upon the evidence provided above, SWMU 57A is proposed for an NFA decision in conformance with Criterion 5 (NMED March 1998), which states that "the SWMU has been fully characterized and remediated in accordance with current and applicable state or federal regulations and that available data indicate that contaminants pose an acceptable level of risk under current and projected future land use."

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**ANNEX 7-A**  
**Gamma Spectroscopy Results**











To be completed by Customer

Shaded areas are for RPSD use only

Customer: AMS / PAVLETICH

Hazards/Special Instructions:

Batch Log Number: 702116

Organization: 6134

Logged By: Jro

Project Location: LCFA - Site 57A

Phone: 264-2479

Analysis Type:  Gamma Spec

Date Results Needed: 30 days

Suspect Isotopes: DU, Th

Case Number: 715.220300

COC 510203

- 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
036725-003	SOIL	11/14/97 1010	500ml	GAMMA SPEC	01	<300	615g	
036726-003		1015			02		686g	
036727-003		1020			03		558g	
036728-003		1025			04		581g	
036729-003		1035			05		770g	
036730-003		1090			06		799g	
036731-003		1045 <sup>8</sup> 1040 <sup>8</sup> 1/19/98			07		615g	
036732-003		1050 <sup>8</sup> 1045 <sup>8</sup> 1/19/98			08		600g	
036733-003		1105			09		690g	
036734-003		1110			10		636g	
036735-003		1110			11		478g	
036736-003		1315			12		702g	
036737-003		1320			13		723g	

Relinquished by [Signature]  
Relinquished by [Signature]  
Relinquished by [Signature]  
Relinquished by [Signature]

Date 12/18/97  
Date 12/24/97  
Date \_\_\_\_\_  
Date \_\_\_\_\_

Received by [Signature]  
Received by [Signature]  
Received by \_\_\_\_\_  
Received by \_\_\_\_\_

Date 12/18/97  
Date 12/24/97  
Date \_\_\_\_\_  
Date \_\_\_\_\_



To be completed by Customer

Shaded areas are for RPSD use only

Customer: <u>As / Paviment</u>	Hazards/Special Instructions:	Batch Log Number: <u>702116</u>
Organization: <u>6134</u>		Logged By: <u>JM</u>
Project Location: <u>CCTA - Site 57A</u>		Analysis Type: <input checked="" type="checkbox"/> Gamma Spec <input type="checkbox"/> H-3 <input type="checkbox"/> Alpha/Beta <input type="checkbox"/> Alpha Spec <input type="checkbox"/> Total U <input type="checkbox"/> Other
Phone: <u>284-2479</u>		
Date Results Needed: <u>30 days</u>		
Suspect Isotopes: <u>Pu, Th</u>		
Case Number: <u>7215.220300</u>		

Customer Sample ID	Sample Type	Date/Time Collected	Sample Quantity	Requested Analysis	RPSD Sample ID	Screen cpm	Sample Mass	Remarks / Aliquot Amount
036738-003	SOIL	11/14/98 1325	500ml	Gamma Spec	14	< 300	891g	
036739-003	↓	↓ 1320	↓	↓	15	< 300	854g	
036740-006	WATER	↓ 0940	↓	↓	16	< 300	500ml	
LCS	—	1/15/99	—	γ spec	17	N/A	N/A	

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

Records Center Code: ER/1334/57A/DAT

## SMO ROUTING FORM - RESULTS FROM RPSD LAB

Project Name: Central Coyote Test Area,  
Site 57A

Case No./Service Order: 7215.220300/  
CF0515

SNL Task Leader: AAS

Org/Mail Stop: 6134/1148

Final Transmittal To: AAS

Date Transmitted: 01/13/98

SMO Project Coordinator: SALMI

Sample Ship Date: 12/18/97

ARCOC	Lab	Lab ID
<u>510203</u>	<u>RPSD</u>	<u>702116</u>
<u>          </u>	<u>          </u>	<u>          </u>
<u>          </u>	<u>          </u>	<u>          </u>

*-D01 → -D05,  
-D14 → -D15*

Date

Filed in Records Center: \_\_\_\_\_ Transmitted By: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Received (Records Center) By: \_\_\_\_\_



Sandia National Laboratories  
 Radiation Protection Sample Diagnostics Program [881 Laboratory]  
 12-18-97 5:58:21 PM

Analyzed by: *J* 12/22/97 Reviewed by: *W* 12/23/97

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036725-003  
 Lab Sample ID : 70211601

GR-001-0-0.5-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 615.000 gram  
 Sample Date/Time : 12-17-97 10:10:00 AM  
 Acquire Start Date/Time : 12-18-97 4:14:03 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	-----	1.70E+00
TH-234	9.70E-01	3.75E-01	4.95E-01
RA-226	1.91E+00	1.30E+00	7.02E-01
PB-214	7.14E-01	1.43E-01	6.14E-02
BI-214	6.15E-01	1.40E-01	6.18E-02
PB-210	Not Detected	-----	9.24E+00
TH-232	6.86E-01	8.48E-01	1.67E-01
RA-228	7.92E-01	4.68E-01	2.17E-01
AC-228	7.17E-01	2.38E-01	1.08E-01
TH-228	6.04E-01	4.11E-01	5.84E-01
RA-224	6.28E-01	3.17E-01	1.16E-01
PB-212	7.23E-01	1.30E-01	4.60E-02
BI-212	7.81E-01	7.30E-01	4.32E-01
TL-208	6.81E-01	1.75E-01	8.36E-02
<del>U-235</del>	<del>1.75E-01</del>	<del>2.11E-01</del>	<del>2.35E-01</del>
TH-231	Not Detected	-----	2.55E+00
PA-231	Not Detected	-----	4.02E+00
TH-227	Not Detected	-----	4.13E-01
RA-223	Not Detected	-----	1.65E-01
RN-219	Not Detected	-----	4.67E-01
PB-211	Not Detected	-----	1.09E+00
TL-207	Not Detected	-----	1.82E+01
AM-241	Not Detected	-----	2.13E-01
PU-239	Not Detected	-----	3.91E+02
<del>NP-237</del>	<del>1.39E-01</del>	<del>1.65E-01</del>	<del>2.34E-01</del>
PA-233	Not Detected	-----	6.56E-02
TH-229	Not Detected	-----	2.26E-01

*not detected*  
*J* 12/22/97

*not detected*  
*J* 12/22/97

[Summary Report] - Sample ID: : 70211601

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected		5.18E-02
AG-110m	Not Detected		6.53E-02
AM-243	Not Detected		6.32E-02
BA-133	Not Detected		5.79E-02
BE-7	2.96E-01	2.44E-01	1.91E-01
CD-109	Not Detected		1.07E+00
CD-115	Not Detected		1.12E-01
CE-139	Not Detected		2.91E-02
CE-141	Not Detected		5.08E-02
CE-144	Not Detected		2.22E-01
CO-56	Not Detected		4.56E-02
CO-57	Not Detected		2.71E-02
CO-58	Not Detected		4.15E-02
CO-60	Not Detected		4.88E-02
CR-51	Not Detected		2.75E-01
CS-134	Not Detected		5.78E-02
CS-137	2.65E-01	7.49E-02	2.90E-02
EU-152	Not Detected		8.07E-02
EU-154	Not Detected		2.38E-01
EU-155	Not Detected		1.26E-01
FE-59	Not Detected		9.76E-02
GD-153	Not Detected		9.14E-02
HG-203	Not Detected		3.62E-02
I-131	Not Detected		3.82E-02
IR-192	Not Detected		3.09E-02
K-40	1.71E+01	2.69E+00	3.62E-01
KR-85	Not Detected		1.04E+01
MN-52	Not Detected		4.70E-02
MN-54	Not Detected		4.69E-02
MO-99	Not Detected		4.00E-01
NA-22	Not Detected		5.58E-02
NA-24	Not Detected		1.88E-01
NB-95	Not Detected		2.31E-01
ND-147	Not Detected		2.89E-01
NI-57	Not Detected		1.02E-01
NP-239	Not Detected		1.14E-01
RU-103	Not Detected		3.57E-02
RU-106	Not Detected		3.44E-01
SB-122	Not Detected		6.79E-02
SB-124	Not Detected		3.76E-02
SB-125	Not Detected		1.05E-01
SN-113	Not Detected		4.62E-02
TA-182	Not Detected		1.91E-01
TA-183	Not Detected		2.16E-01
TC-99m	Not Detected		9.72E-01
TL-201	Not Detected		1.54E-01
XE-133	Not Detected		1.59E-01
Y-88	Not Detected		4.31E-02
ZN-65	Not Detected		1.31E-01
ZR-95	Not Detected		7.08E-02

\* Analyzed by: *J* 12/22/97 Reviewed by: *W* 12/23/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036726-003  
 Lab Sample ID : 70211602

001-05-1-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 686.000 gram  
 Sample Date/Time : 12-17-97 10:15:00 AM  
 Acquire Start Date/Time : 12-19-97 8:05:26 AM  
 Detector Name : LAB01  
 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	1.72E+00	1.05E+00	1.64E+00
TH-234	9.20E-01	3.86E-01	4.55E-01
RA-226	1.25E+00	5.78E-01	5.74E-01
PB-214	6.64E-01	1.21E-01	5.25E-02
BI-214	5.85E-01	1.32E-01	5.33E-02
PB-210	Not Detected	-----	7.43E+00
TH-232	6.91E-01	3.49E-01	1.53E-01
RA-228	5.14E-01	2.19E-01	1.76E-01
AC-228	5.71E-01	2.89E-01	1.06E-01
TH-228	5.42E-01	2.31E-01	5.27E-01
RA-224	6.37E-01	2.49E-01	1.06E-01
PB-212	6.35E-01	1.10E-01	3.59E-02
BI-212	6.45E-01	3.57E-01	3.44E-01
TL-208	5.25E-01	1.26E-01	7.19E-02
<del>U-235</del>	<del>1.17E-01</del>	<del>1.03E-01</del>	<del>2.09E-01</del>
TH-231	Not Detected	-----	2.30E+00
PA-231	Not Detected	-----	3.61E+00
TH-227	Not Detected	-----	3.62E-01
RA-223	Not Detected	-----	1.52E-01
RN-219	Not Detected	-----	4.11E-01
PB-211	Not Detected	-----	9.58E-01
TL-207	Not Detected	-----	1.57E+01
AM-241	Not Detected	-----	1.86E-01
PU-239	Not Detected	-----	3.56E+02
<del>NP-237</del>	<del>1.50E-01</del>	<del>1.13E-01</del>	<del>2.02E-01</del>
PA-233	Not Detected	-----	5.88E-02
TH-229	Not Detected	-----	1.98E-01

*not detected*  
*J* 12/22/97

*not detected*  
*J* 12/22/97



Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.69E-02
AG-110m	Not Detected	-----	3.34E-02
AM-243	<del>2.33E-01</del>	<del>7.29E-02</del>	5.54E-02
BA-133	Not Detected	-----	4.99E-02
BE-7	Not Detected	-----	2.67E-01
CD-109	Not Detected	-----	9.76E-01
CD-115	Not Detected	-----	1.23E-01
CE-139	Not Detected	-----	2.65E-02
CE-141	Not Detected	-----	4.68E-02
CE-144	Not Detected	-----	1.96E-01
CO-56	Not Detected	-----	4.15E-02
CO-57	Not Detected	-----	2.48E-02
CO-58	Not Detected	-----	3.61E-02
CO-60	Not Detected	-----	4.16E-02
CR-51	Not Detected	-----	2.57E-01
CS-134	Not Detected	-----	5.31E-02
CS-137	Not Detected	-----	3.84E-02
EU-152	Not Detected	-----	7.43E-02
EU-154	Not Detected	-----	2.15E-01
EU-155	Not Detected	-----	1.11E-01
FE-59	Not Detected	-----	8.65E-02
GD-153	Not Detected	-----	7.96E-02
HG-203	Not Detected	-----	3.20E-02
I-131	Not Detected	-----	3.51E-02
IR-192	Not Detected	-----	2.79E-02
K-40	1.55E+01	2.53E+00	2.71E-01
KR-85	Not Detected	-----	9.20E+00
MN-52	Not Detected	-----	4.57E-02
MN-54	Not Detected	-----	3.91E-02
MO-99	Not Detected	-----	4.28E-01
NA-22	Not Detected	-----	4.99E-02
NA-24	Not Detected	-----	3.09E-01
NB-95	Not Detected	-----	2.32E-01
ND-147	Not Detected	-----	2.41E-01
NI-57	Not Detected	-----	1.46E-01
NP-239	Not Detected	-----	1.01E-01
RU-103	Not Detected	-----	3.14E-02
RU-106	Not Detected	-----	3.25E-01
SB-122	Not Detected	-----	7.19E-02
SB-124	Not Detected	-----	3.52E-02
SB-125	Not Detected	-----	9.21E-02
SN-113	Not Detected	-----	4.07E-02
TA-182	Not Detected	-----	1.79E-01
TA-183	Not Detected	-----	2.06E-01
TC-99m	Not Detected	-----	5.32E+00
TL-201	Not Detected	-----	1.66E-01
XE-133	Not Detected	-----	1.77E-01
Y-88	Not Detected	-----	3.64E-02
ZN-65	Not Detected	-----	1.22E-01
ZR-95	Not Detected	-----	6.76E-02

*not detected* *12/23/97*

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-19-97 11:34:46 AM \*  
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\* Analyzed by: *J* 12/22/97 Reviewed by: *W* 12/23/97 \*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036727-003  
 Lab Sample ID : 70211603

002-0-0.5-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 558.000 gram  
 Sample Date/Time : 12-17-97 10:20:00 AM  
 Acquire Start Date/Time : 12-19-97 9:50:29 AM  
 Detector Name : LAB01  
 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	-----	1.84E+00
TH-234	Not Detected	-----	5.50E-01
RA-226	1.43E+00	5.58E-01	5.79E-01
PB-214	7.23E-01	1.66E-01	6.22E-02
BI-214	7.07E-01	2.35E-01	6.64E-02
PB-210	Not Detected	-----	9.57E+00
TH-232	8.31E-01	5.14E-01	2.11E-01
RA-228	6.26E-01	2.29E-01	2.01E-01
AC-228	7.27E-01	2.08E-01	1.37E-01
TH-228	7.50E-01	5.14E-01	6.30E-01
RA-224	7.39E-01	3.52E-01	1.08E-01
PB-212	7.89E-01	1.60E-01	5.02E-02
BI-212	6.98E-01	4.16E-01	4.29E-01
TL-208	7.02E-01	2.23E-01	1.02E-01
U-235	<del>1.39E-01</del>	<del>2.35E-01</del>	2.61E-01
TH-231	Not Detected	-----	2.77E+00
PA-231	Not Detected	-----	4.39E+00
TH-227	Not Detected	-----	4.48E-01
RA-223	Not Detected	-----	1.86E-01
RN-219	Not Detected	-----	5.27E-01
PB-211	Not Detected	-----	1.24E+00
TL-207	Not Detected	-----	1.83E+01
AM-241	Not Detected	-----	2.24E-01
PU-239	Not Detected	-----	4.31E+02
NP-237	<del>4.25E-01</del>	<del>1.62E-01</del>	2.51E-01
PA-233	Not Detected	-----	7.42E-02
TH-229	Not Detected	-----	2.45E-01

*Not detected*  
*J* 12/22/97

*Not detected*  
*J* 12/22/97

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	5.60E-02
AG-110m	Not Detected	-----	7.85E-02
AM-243	Not Detected	-----	7.35E-02
BA-133	Not Detected	-----	6.16E-02
BE-7	Not Detected	-----	3.55E-01
CD-109	Not Detected	-----	1.18E+00
CD-115	Not Detected	-----	1.62E-01
CE-139	Not Detected	-----	3.11E-02
CE-141	Not Detected	-----	5.90E-02
CE-144	Not Detected	-----	2.37E-01
CO-56	Not Detected	-----	5.28E-02
CO-57	Not Detected	-----	2.86E-02
CO-58	Not Detected	-----	4.34E-02
CO-60	Not Detected	-----	5.14E-02
CR-51	Not Detected	-----	2.96E-01
CS-134	Not Detected	-----	6.52E-02
CS-137	3.91E-01	9.02E-02	3.18E-02
EU-152	Not Detected	-----	8.54E-02
EU-154	Not Detected	-----	2.58E-01
EU-155	Not Detected	-----	1.38E-01
FE-59	Not Detected	-----	1.11E-01
GD-153	Not Detected	-----	9.95E-02
HG-203	Not Detected	-----	3.84E-02
I-131	Not Detected	-----	4.45E-02
IR-192	Not Detected	-----	3.43E-02
K-40	1.81E+01	2.90E+00	3.25E-01
KR-85	Not Detected	-----	1.12E+01
MN-52	Not Detected	-----	6.34E-02
MN-54	Not Detected	-----	4.90E-02
MO-99	Not Detected	-----	5.72E-01
NA-22	Not Detected	-----	6.07E-02
NA-24	Not Detected	-----	4.31E-01
NB-95	Not Detected	-----	2.90E-01
ND-147	Not Detected	-----	3.02E-01
NI-57	Not Detected	-----	1.77E-01
NP-239	Not Detected	-----	1.24E-01
RU-103	Not Detected	-----	4.00E-02
RU-106	Not Detected	-----	3.82E-01
SB-122	Not Detected	-----	8.81E-02
SB-124	Not Detected	-----	4.07E-02
SB-125	Not Detected	-----	1.16E-01
SN-113	Not Detected	-----	4.84E-02
TA-182	Not Detected	-----	2.29E-01
TA-183	Not Detected	-----	2.50E-01
TC-99m	Not Detected	-----	7.84E+00
TL-201	Not Detected	-----	2.09E-01
XE-133	Not Detected	-----	2.17E-01
Y-88	Not Detected	-----	4.05E-02
ZN-65	Not Detected	-----	1.57E-01
ZR-95	Not Detected	-----	8.07E-02

\* Analyzed by: *J* 12/22/97 Reviewed by: *WY* 12/23/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036728-003  
 Lab Sample ID : 70211604

002-0.5-1-S

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 581.000 gram  
 Sample Date/Time : 12-17-97 10:25:00 AM  
 Acquire Start Date/Time : 12-19-97 11:59:12 AM  
 Detector Name : LAB01  
 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	-----	1.58E+00
TH-234	Not Detected	-----	5.05E-01
RA-226	1.48E+00	9.09E-01	6.43E-01
PB-214	6.24E-01	1.43E-01	5.98E-02
BI-214	5.74E-01	9.66E-02	6.38E-02
PB-210	3.59E+00	3.54E+00	6.96E+00
TH-232	7.12E-01	4.38E-01	1.92E-01
RA-228	5.02E-01	4.55E-01	2.17E-01
AC-228	6.28E-01	2.48E-01	1.20E-01
TH-228	4.94E-01	2.45E-01	5.43E-01
RA-224	5.61E-01	2.71E-01	1.27E-01
PB-212	6.49E-01	1.32E-01	4.61E-02
BI-212	6.73E-01	3.90E-01	4.09E-01
TL-208	5.31E-01	1.60E-01	8.74E-02
U-235	<del>1.27E-01</del>	<del>2.15E-01</del>	2.38E-01
TH-231	Not Detected	-----	2.48E+00
PA-231	Not Detected	-----	4.05E+00
TH-227	Not Detected	-----	4.02E-01
RA-223	Not Detected	-----	1.65E-01
RN-219	Not Detected	-----	4.56E-01
PB-211	Not Detected	-----	1.02E+00
TL-207	Not Detected	-----	1.94E+01
AM-241	Not Detected	-----	2.07E-01
PU-239	Not Detected	-----	3.77E+02
NP-237	<del>1.37E-01</del>	<del>1.59E-01</del>	2.12E-01
PA-233	Not Detected	-----	6.52E-02
TH-229	Not Detected	-----	2.16E-01

*not detected*  
*J* 12/22/97

*not detected*  
*J* 12/22/97

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	5.33E-02
AG-110m	Not Detected	-----	3.89E-02
AM-243	Not Detected	-----	6.19E-02
BA-133	Not Detected	-----	5.66E-02
BE-7	Not Detected	-----	3.09E-01
CD-109	Not Detected	-----	1.03E+00
CD-115	Not Detected	-----	1.49E-01
CE-139	Not Detected	-----	2.81E-02
CE-141	Not Detected	-----	5.42E-02
CE-144	Not Detected	-----	2.14E-01
CO-56	Not Detected	-----	4.84E-02
CO-57	Not Detected	-----	2.73E-02
CO-58	Not Detected	-----	4.15E-02
CO-60	Not Detected	-----	4.98E-02
CR-51	Not Detected	-----	2.56E-01
CS-134	Not Detected	-----	5.83E-02
CS-137	Not Detected	-----	4.60E-02
EU-152	Not Detected	-----	8.13E-02
EU-154	Not Detected	-----	2.45E-01
EU-155	Not Detected	-----	1.25E-01
FE-59	Not Detected	-----	1.04E-01
GD-153	Not Detected	-----	9.08E-02
HG-203	Not Detected	-----	3.57E-02
I-131	Not Detected	-----	4.20E-02
IR-192	Not Detected	-----	3.13E-02
K-40	1.80E+01	3.00E+00	3.47E-01
KR-85	Not Detected	-----	1.03E+01
MN-52	Not Detected	-----	4.80E-02
MN-54	Not Detected	-----	4.35E-02
MO-99	Not Detected	-----	5.17E-01
NA-22	Not Detected	-----	5.42E-02
NA-24	Not Detected	-----	4.58E-01
NB-95	Not Detected	-----	2.62E-01
ND-147	Not Detected	-----	2.79E-01
NI-57	Not Detected	-----	1.73E-01
NP-239	Not Detected	-----	1.12E-01
RU-103	Not Detected	-----	3.54E-02
RU-106	Not Detected	-----	3.50E-01
SB-122	Not Detected	-----	8.98E-02
SB-124	Not Detected	-----	3.88E-02
SB-125	Not Detected	-----	1.07E-01
SN-113	Not Detected	-----	4.39E-02
TA-182	Not Detected	-----	2.01E-01
TA-183	Not Detected	-----	2.34E-01
TC-99m	Not Detected	-----	9.20E+00
TL-201	Not Detected	-----	1.94E-01
XE-133	Not Detected	-----	2.05E-01
Y-88	Not Detected	-----	4.26E-02
ZN-65	Not Detected	-----	1.38E-01
ZR-95	Not Detected	-----	7.63E-02

\* Analyzed by: *J* 12/22/97 Reviewed by: *WY* 12/23/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO) 003-0-0.5-S  
 Customer Sample ID : 036729-003  
 Lab Sample ID : 70211605

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 770.000 gram  
 Sample Date/Time : 12-17-97 10:35:00 AM  
 Acquire Start Date/Time : 12-19-97 1:44:13 PM  
 Detector Name : LAB01  
 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	-----	1.60E+00
TH-234	9.04E-01	3.36E-01	4.81E-01
RA-226	1.77E+00	6.23E-01	6.13E-01
PB-214	6.83E-01	1.30E-01	5.26E-02
BI-214	6.18E-01	1.34E-01	4.95E-02
PB-210	Not Detected	-----	8.24E+00
TH-232	8.16E-01	4.06E-01	1.51E-01
RA-228	7.31E-01	2.48E-01	1.81E-01
AC-228	7.55E-01	2.30E-01	8.80E-02
TH-228	9.58E-01	4.87E-01	5.24E-01
RA-224	8.00E-01	2.98E-01	8.46E-02
PB-212	7.61E-01	1.32E-01	4.07E-02
BI-212	7.45E-01	7.89E-01	3.98E-01
TL-208	6.56E-01	5.23E-01	7.81E-02
<del>U-235</del>	<del>2.80E-02</del>	<del>1.91E-01</del>	<del>2.10E-01</del>
TH-231	Not Detected	-----	2.35E+00
PA-231	Not Detected	-----	3.56E+00
TH-227	Not Detected	-----	3.68E-01
RA-223	Not Detected	-----	1.08E-01
RN-219	Not Detected	-----	4.24E-01
PB-211	Not Detected	-----	9.66E-01
TL-207	Not Detected	-----	1.55E+01
AM-241	Not Detected	-----	1.89E-01
PU-239	Not Detected	-----	3.54E+02
<del>NP-237</del>	<del>1.66E-01</del>	<del>1.40E-01</del>	<del>2.21E-01</del>
PA-233	Not Detected	-----	6.01E-02
TH-229	Not Detected	-----	1.97E-01

*not detected*  
*J* 12/22/97

*not detected*  
*J* 12/22/97

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.50E-02
AG-110m	Not Detected	-----	7.68E-02
AM-243	Not Detected	-----	6.01E-02
BA-133	Not Detected	-----	5.16E-02
BE-7	Not Detected	-----	3.05E-01
CD-109	Not Detected	-----	9.73E-01
CD-115	Not Detected	-----	1.33E-01
CE-139	Not Detected	-----	2.67E-02
CE-141	Not Detected	-----	4.82E-02
CE-144	<del>5.81E-01</del>	<del>8.24E-00</del>	9.61E-02
CO-56	Not Detected	-----	3.89E-02
CO-57	Not Detected	-----	2.51E-02
CO-58	Not Detected	-----	3.61E-02
CO-60	Not Detected	-----	4.47E-02
CR-51	Not Detected	-----	2.62E-01
CS-134	Not Detected	-----	5.10E-02
CS-137	5.50E-01	9.29E-02	2.46E-02
EU-152	Not Detected	-----	7.56E-02
EU-154	Not Detected	-----	2.06E-01
EU-155	Not Detected	-----	1.16E-01
FE-59	Not Detected	-----	8.40E-02
GD-153	Not Detected	-----	8.03E-02
HG-203	Not Detected	-----	3.38E-02
I-131	Not Detected	-----	3.66E-02
IR-192	Not Detected	-----	2.87E-02
K-40	1.67E+01	2.67E+00	2.96E-01
KR-85	Not Detected	-----	9.22E+00
MN-52	Not Detected	-----	4.07E-02
MN-54	Not Detected	-----	1.93E-02
MO-99	Not Detected	-----	4.46E-01
NA-22	Not Detected	-----	5.01E-02
NA-24	Not Detected	-----	4.08E-01
NB-95	Not Detected	-----	2.44E-01
ND-147	Not Detected	-----	2.52E-01
NI-57	Not Detected	-----	1.49E-01
NP-239	Not Detected	-----	1.06E-01
RJ-103	Not Detected	-----	3.46E-02
RU-106	Not Detected	-----	3.07E-01
SB-122	Not Detected	-----	7.82E-02
SB-124	Not Detected	-----	3.28E-02
SB-125	Not Detected	-----	9.74E-02
SN-113	Not Detected	-----	4.08E-02
TA-182	Not Detected	-----	1.77E-01
TA-183	Not Detected	-----	2.16E-01
TC-99m	Not Detected	-----	9.87E+00
TL-201	Not Detected	-----	1.80E-01
XE-133	Not Detected	-----	9.41E-02
Y-88	Not Detected	-----	3.21E-02
ZN-65	Not Detected	-----	1.22E-01
ZR-95	Not Detected	-----	6.32E-02

*not detected*  
*J 12/22/57*

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-19-97 5:57:41 PM \*  
 \*\*\*\*\*  
 \* Analyzed by: *J* 12/22/97 Reviewed by: *W* 12/23/97 \*  
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003-6.5-1-5

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036730-003  
 Lab Sample ID : 70211606

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 799.000 gram  
 Sample Date/Time : 12-17-97 10:40:00 AM  
 Acquire Start Date/Time : 12-19-97 4:14:55 PM  
 Detector Name : LAB01  
 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	8.30E-01	7.37E-01	1.15E+00
TH-234	9.76E-01	4.80E-01	4.75E-01
RA-226	1.65E+00	7.00E-01	5.42E-01
PB-214	5.38E-01	1.01E-01	5.06E-02
BI-214	5.43E-01	2.23E-01	5.15E-02
PB-210	Not Detected	-----	7.23E+00
TH-232	7.34E-01	3.60E-01	1.55E-01
RA-228	7.84E-01	9.50E-01	1.73E-01
AC-228	7.78E-01	3.61E-01	1.08E-01
TH-228	7.04E-01	3.81E-01	4.27E-01
RA-224	8.09E-01	3.24E-01	7.91E-02
PB-212	7.70E-01	1.28E-01	4.03E-02
BI-212	9.07E-01	5.03E-01	3.28E-01
TL-208	8.22E-01	1.83E-01	7.51E-02
U-235	<del>9.63E-02</del>	<del>1.81E-01</del>	1.99E-01
TH-231	<del>1.59E-00</del>	<del>1.76E-00</del>	2.16E+00
PA-231	Not Detected	-----	3.38E+00
TH-227	Not Detected	-----	3.72E-01
RA-223	Not Detected	-----	1.51E-01
RN-219	Not Detected	-----	3.84E-01
PB-211	Not Detected	-----	8.59E-01
TL-207	Not Detected	-----	1.53E+01
AM-241	Not Detected	-----	1.87E-01
PU-239	Not Detected	-----	3.43E+02
NP-237	<del>4.45E-01</del>	<del>1.60E-01</del>	2.04E-01
PA-233	Not Detected	-----	5.57E-02
TH-229	Not Detected	-----	1.92E-01

*Not detected J 12/22/97*

*Not detected J 12/22/97*



[Summary Report] - Sample ID: : 70211606

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.42E-02
AG-110m	Not Detected	-----	3.53E-02
AM-243	Not Detected	-----	5.57E-02
BA-133	Not Detected	-----	4.51E-02
BE-7	Not Detected	-----	2.54E-01
CD-109	Not Detected	-----	9.51E-01
CD-115	Not Detected	-----	1.32E-01
CE-139	Not Detected	-----	2.54E-02
CE-141	Not Detected	-----	4.55E-02
CE-144	Not Detected	-----	1.85E-01
CO-56	Not Detected	-----	3.90E-02
CO-57	Not Detected	-----	2.36E-02
CO-58	Not Detected	-----	3.39E-02
CO-60	Not Detected	-----	4.08E-02
CR-51	Not Detected	-----	2.33E-01
CS-134	Not Detected	-----	4.93E-02
CS-137	Not Detected	-----	3.95E-02
EU-152	Not Detected	-----	7.09E-02
EU-154	Not Detected	-----	2.04E-01
EU-155	Not Detected	-----	1.14E-01
FE-59	Not Detected	-----	8.58E-02
GD-153	Not Detected	-----	7.68E-02
HG-203	Not Detected	-----	3.12E-02
I-131	Not Detected	-----	3.38E-02
IR-192	Not Detected	-----	2.69E-02
K-40	1.47E+01	2.39E+00	3.03E-01
KR-85	Not Detected	-----	8.76E+00
MN-52	Not Detected	-----	4.03E-02
MN-54	Not Detected	-----	1.91E-02
MO-99	Not Detected	-----	4.40E-01
NA-22	Not Detected	-----	4.63E-02
NA-24	Not Detected	-----	4.00E-01
NB-95	Not Detected	-----	2.53E-01
ND-147	Not Detected	-----	2.31E-01
NI-57	Not Detected	-----	1.33E-01
NP-239	Not Detected	-----	1.02E-01
RU-103	Not Detected	-----	3.04E-02
RU-106	Not Detected	-----	2.97E-01
SB-122	Not Detected	-----	7.29E-02
SB-124	Not Detected	-----	3.22E-02
SB-125	Not Detected	-----	8.60E-02
SN-113	Not Detected	-----	3.60E-02
TA-182	Not Detected	-----	1.68E-01
TA-183	Not Detected	-----	2.16E-01
TC-99m	Not Detected	-----	1.23E+01
TL-201	Not Detected	-----	1.72E-01
XE-133	Not Detected	-----	1.85E-01
Y-88	Not Detected	-----	2.83E-02
ZN-65	Not Detected	-----	1.13E-01
ZR-95	Not Detected	-----	6.02E-02

\* Analyzed by: *J* 12/22/97 Reviewed by: *W* 12/23/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036731-003  
 Lab Sample ID : 70211607 004-0-0.5-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 615.000 gram  
 Sample Date/Time : 12-17-97 10:45:00 AM  
 Acquire Start Date/Time : 12-20-97 11:59:46 AM  
 Detector Name : LAB01  
 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	-----	1.81E+00
TH-234	1.01E+00	5.19E-01	5.25E-01
RA-226	1.44E+00	6.09E-01	6.67E-01
PB-214	8.74E-01	1.70E-01	6.21E-02
BI-214	7.90E-01	1.64E-01	6.09E-02
PB-210	Not Detected	-----	9.43E+00
TH-232	6.84E-01	4.14E-01	1.85E-01
RA-228	6.35E-01	3.18E-01	2.31E-01
AC-228	6.61E-01	2.43E-01	1.20E-01
TH-228	5.08E-01	3.21E-01	4.92E-01
RA-224	6.92E-01	3.74E-01	1.16E-01
PB-212	7.77E-01	1.36E-01	4.64E-02
BI-212	7.80E-01	7.42E-01	4.11E-01
TL-208	6.58E-01	1.59E-01	9.22E-02
U-235	Not Detected	-----	2.46E-01
TH-231	Not Detected	-----	2.59E+00
PA-231	Not Detected	-----	4.10E+00
TH-227	Not Detected	-----	4.27E-01
RA-223	Not Detected	-----	1.86E-01
RN-219	Not Detected	-----	4.73E-01
PB-211	Not Detected	-----	1.10E+00
TL-207	Not Detected	-----	1.81E+01
AM-241	Not Detected	-----	2.22E-01
PU-239	Not Detected	-----	4.04E+02
NP-237	<del>5.37E-01</del>	<del>1.85E-01</del>	2.50E-01
PA-233	Not Detected	-----	7.10E-02
TH-229	Not Detected	-----	2.32E-01

*not detected*  
*J* 12/22/97

[Summary Report] - Sample ID: : 70211607

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected		5.13E-02
AG-110m	Not Detected		5.95E-02
AM-243	Not Detected		6.81E-02
BA-133	Not Detected		5.97E-02
BE-7	Not Detected		3.31E-01
CD-109	Not Detected		1.11E+00
CD-115	Not Detected		2.03E-01
CE-139	Not Detected		3.03E-02
CE-141	Not Detected		5.63E-02
CE-144	Not Detected		2.19E-01
CO-56	Not Detected		4.81E-02
CO-57	Not Detected		2.78E-02
CO-58	Not Detected		4.33E-02
CO-60	Not Detected		4.74E-02
CR-51	Not Detected		3.00E-01
CS-134	Not Detected		6.42E-02
CS-137	1.63E-01	8.38E-02	3.18E-02
EU-152	Not Detected		8.30E-02
EU-154	Not Detected		2.37E-01
EU-155	Not Detected		1.28E-01
FE-59	Not Detected		1.01E-01
GD-153	Not Detected		9.33E-02
HG-203	Not Detected		3.84E-02
I-131	Not Detected		4.64E-02
IR-192	Not Detected		3.39E-02
K-40	1.84E+01	2.94E+00	3.76E-01
KR-85	Not Detected		1.08E+01
MN-52	Not Detected		5.67E-02
MN-54	Not Detected		4.66E-02
MO-99	Not Detected		6.71E-01
NA-22	Not Detected		5.58E-02
NA-24	Not Detected		1.45E+00
NB-95	Not Detected		3.40E-01
ND-147	Not Detected		3.14E-01
NI-57	Not Detected		2.85E-01
NP-239	Not Detected		1.16E-01
RU-103	Not Detected		4.04E-02
RU-106	Not Detected		3.63E-01
SB-122	Not Detected		1.11E-01
SB-124	Not Detected		4.04E-02
SB-125	Not Detected		1.09E-01
SN-113	Not Detected		4.91E-02
TA-182	Not Detected		2.36E-01
TA-183	Not Detected		2.88E-01
TC-99m	Not Detected		1.49E+02
TL-201	Not Detected		2.48E-01
XE-133	Not Detected		2.91E-01
Y-88	Not Detected		3.95E-02
ZN-65	Not Detected		1.59E-01
ZR-95	Not Detected		8.20E-02

\* Analyzed by: *J* 12/22/97 Reviewed by: *WY* 12/23/97 \*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036732-003  
 Lab Sample ID : 70211608

004-0.5-1-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 600.000 gram  
 Sample Date/Time : 12-17-97 10:50:00 AM  
 Acquire Start Date/Time : 12-20-97 1:43:34 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	9.78E-01	4.47E-01	1.41E+00
TH-234	9.09E-01	3.52E-01	5.05E-01
RA-226	1.41E+00	6.06E-01	6.03E-01
PB-214	6.16E-01	1.22E-01	5.71E-02
BI-214	5.86E-01	6.67E-01	6.20E-02
PB-210	Not Detected	-----	8.28E+00
TH-232	5.99E-01	3.11E-01	1.63E-01
RA-228	8.04E-01	2.44E-01	1.95E-01
AC-228	7.19E-01	2.51E-01	1.20E-01
TH-228	2.22E-01	6.62E-02	3.99E-01
RA-224	7.01E-01	3.38E-01	1.25E-01
PE-212	7.22E-01	1.37E-01	4.61E-02
BI-212	9.69E-01	5.40E-01	4.24E-01
TL-208	6.82E-01	1.61E-01	9.11E-02
<del>U-235</del>	<del>2.53E-01</del>	<del>2.96E-01</del>	2.35E-01
TH-231	Not Detected	-----	2.55E+00
PA-231	Not Detected	-----	3.97E+00
TH-227	Not Detected	-----	4.13E-01
RA-223	Not Detected	-----	1.85E-01
RN-219	Not Detected	-----	4.69E-01
PB-211	Not Detected	-----	1.08E+00
TL-207	Not Detected	-----	1.86E+01
AM-241	Not Detected	-----	2.10E-01
PU-239	Not Detected	-----	3.84E+02
<del>NP-237</del>	<del>5.29E-01</del>	<del>1.73E-01</del>	2.23E-01
PA-233	Not Detected	-----	6.75E-02
TH-229	Not Detected	-----	2.17E-01

*not detected J 12/22/97*

*not detected J 12/22/97*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	5.18E-02
AG-110m	Not Detected	-----	3.58E-02
AM-243	Not Detected	-----	6.39E-02
BA-133	Not Detected	-----	5.45E-02
BE-7	Not Detected	-----	3.03E-01
CD-109	Not Detected	-----	1.07E+00
CD-115	Not Detected	-----	1.88E-01
CE-139	Not Detected	-----	2.91E-02
CE-141	Not Detected	-----	5.33E-02
CE-144	Not Detected	-----	2.11E-01
CO-56	Not Detected	-----	4.62E-02
CO-57	Not Detected	-----	2.66E-02
CO-58	Not Detected	-----	4.27E-02
CO-60	Not Detected	-----	4.76E-02
CR-51	Not Detected	-----	2.87E-01
CS-134	Not Detected	-----	5.74E-02
CS-137	Not Detected	-----	4.29E-02
EU-152	Not Detected	-----	7.96E-02
EU-154	Not Detected	-----	2.40E-01
EU-155	Not Detected	-----	1.26E-01
FE-59	Not Detected	-----	1.02E-01
GD-153	Not Detected	-----	9.05E-02
HG-203	Not Detected	-----	3.68E-02
I-131	Not Detected	-----	4.28E-02
IR-192	Not Detected	-----	3.30E-02
K-40	1.66E+01	2.68E+00	3.85E-01
KR-85	Not Detected	-----	1.01E+01
MN-52	Not Detected	-----	5.86E-02
MN-54	Not Detected	-----	4.42E-02
MO-99	Not Detected	-----	6.43E-01
NA-22	Not Detected	-----	5.34E-02
NA-24	Not Detected	-----	1.36E+00
NB-95	Not Detected	-----	3.34E-01
ND-147	Not Detected	-----	2.97E-01
NI-57	Not Detected	-----	2.63E-01
NP-239	Not Detected	-----	1.14E-01
RU-103	Not Detected	-----	3.70E-02
RU-106	Not Detected	-----	3.36E-01
SB-122	Not Detected	-----	1.06E-01
SB-124	Not Detected	-----	3.67E-02
SB-125	Not Detected	-----	1.04E-01
SN-113	Not Detected	-----	4.45E-02
TA-182	Not Detected	-----	2.06E-01
TA-183	Not Detected	-----	2.75E-01
TC-99m	Not Detected	-----	1.66E+02
TL-201	Not Detected	-----	2.43E-01
XE-133	Not Detected	-----	2.77E-01
Y-88	Not Detected	-----	3.00E-02
ZN-65	Not Detected	-----	1.38E-01
ZR-95	Not Detected	-----	7.60E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-22-97 8:34:31 AM \*  
 \*\*\*\*\*  
 \* Analyzed by: *J 12/23/97* Reviewed by: *W 12/23/97* \*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036733-003  
 Lab Sample ID : 70211609

005-0-0.5-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 690.000 gram  
 Sample Date/Time : 12-17-97 11:05:00 AM  
 Acquire Start Date/Time : 12-22-97 6:51:54 AM  
 Detector Name : LAB01  
 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	-----	1.65E+00
TH-234	1.39E+00	4.69E-01	5.11E-01
RA-226	1.77E+00	1.19E+00	6.75E-01
PB-214	7.59E-01	1.50E-01	5.67E-02
BI-214	6.79E-01	1.33E-01	5.41E-02
PB-210	Not Detected	-----	8.46E+00
TH-232	8.60E-01	4.36E-01	1.69E-01
RA-228	9.17E-01	3.56E-01	1.82E-01
AC-228	8.16E-01	1.05E+00	1.11E-01
TH-228	5.49E-01	3.15E-01	4.24E-01
RA-224	7.71E-01	2.55E-01	9.51E-02
PB-212	7.97E-01	1.47E-01	4.35E-02
BI-212	7.29E-01	3.87E-01	3.53E-01
TL-208	7.88E-01	1.72E-01	8.15E-02
U-235	Not Detected	-----	2.21E-01
TH-231	Not Detected	-----	2.41E+00
PA-231	Not Detected	-----	3.84E+00
TH-227	Not Detected	-----	3.98E-01
RA-223	Not Detected	-----	1.97E-01
RN-219	Not Detected	-----	4.64E-01
PB-211	Not Detected	-----	1.05E+00
TL-207	Not Detected	-----	1.53E+01
AM-241	Not Detected	-----	2.02E-01
PU-239	Not Detected	-----	3.77E+02
NP-237	<del>6.21E-01</del>	<del>1.71E-01</del>	2.12E-01
PA-233	Not Detected	-----	6.30E-02
TH-229	Not Detected	-----	2.05E-01

*not detected*  
*J 12/23/97*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected		4.88E-02
AG-110m	Not Detected		5.06E-02
AM-243	Not Detected		6.17E-02
BA-133	Not Detected		5.25E-02
BE-7	Not Detected		2.99E-01
CD-109	Not Detected		1.05E+00
CD-115	Not Detected		3.25E-01
CE-139	Not Detected		2.80E-02
CE-141	Not Detected		5.40E-02
CE-144	Not Detected		2.02E-01
CO-56	Not Detected		4.28E-02
CO-57	Not Detected		2.53E-02
CO-58	Not Detected		4.00E-02
CO-60	Not Detected		4.75E-02
CR-51	Not Detected		2.89E-01
CS-134	Not Detected		5.60E-02
CS-137	1.25E-01	3.66E-02	2.66E-02
EU-152	Not Detected		7.56E-02
EU-154	Not Detected		2.24E-01
EU-155	Not Detected		1.20E-01
FE-59	Not Detected		9.76E-02
GD-153	Not Detected		8.64E-02
HG-203	Not Detected		3.54E-02
I-131	Not Detected		5.00E-02
IR-192	Not Detected		3.15E-02
K-40	1.63E+01	2.59E+00	2.91E-01
KR-85	Not Detected		9.85E+00
MN-52	Not Detected		6.75E-02
MN-54	Not Detected		4.45E-02
MO-99	Not Detected		9.52E-01
NA-22	Not Detected		4.90E-02
NA-24	Not Detected		8.98E+00
NB-95	Not Detected		4.45E-01
ND-147	Not Detected		3.17E-01
NI-57	Not Detected		6.42E-01
NP-239	Not Detected		1.08E-01
RU-103	Not Detected		3.77E-02
RU-106	Not Detected		3.31E-01
SB-122	Not Detected		1.65E-01
SB-124	Not Detected		3.62E-02
SB-125	Not Detected		9.92E-02
SN-113	Not Detected		4.25E-02
TA-182	Not Detected		1.92E-01
TA-183	Not Detected		3.32E-01
TC-99m	Not Detected		1.79E+04
TL-201	Not Detected		3.55E-01
XE-133	Not Detected		4.62E-01
Y-88	Not Detected		3.61E-02
ZN-65	Not Detected		1.28E-01
ZR-95	Not Detected		7.26E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-22-97 10:43:46 AM \*  
 \*\*\*\*\*  
 \* Analyzed by: *J* 12/23/97 Reviewed by: *J* 12/23/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036734-003  
 Lab Sample ID : 70211610

005-0.5-1-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 636.000 gram  
 Sample Date/Time : 12-17-97 11:10:00 AM  
 Acquire Start Date/Time : 12-22-97 9:01:09 AM  
 Detector Name : LAB01  
 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	-----	1.60E+00
TH-234	Not Detected	-----	4.72E-01
RA-226	1.03E+00	6.99E-01	5.25E-01
PB-214	5.88E-01	1.48E-01	5.58E-02
BI-214	4.91E-01	1.28E-01	6.04E-02
PB-210	Not Detected	-----	7.96E+00
TH-232	7.59E-01	3.78E-01	1.47E-01
RA-228	7.70E-01	2.26E-01	1.80E-01
AC-228	6.47E-01	2.07E-01	9.79E-02
TH-228	6.39E-01	4.13E-01	5.57E-01
RA-224	6.44E-01	2.95E-01	1.21E-01
PB-212	6.88E-01	1.20E-01	4.45E-02
BI-212	6.27E-01	4.30E-01	3.91E-01
TL-208	5.95E-01	1.42E-01	8.79E-02
U-235	<del>2.56E-01</del>	<del>1.56E-01</del>	2.19E-01
TH-231	Not Detected	-----	2.46E+00
PA-231	Not Detected	-----	3.75E+00
TH-227	Not Detected	-----	3.92E-01
RA-223	Not Detected	-----	1.93E-01
RN-219	Not Detected	-----	4.36E-01
PB-211	Not Detected	-----	9.41E-01
TL-207	Not Detected	-----	1.70E+01
AM-241	Not Detected	-----	1.98E-01
PU-239	Not Detected	-----	3.69E+02
NP-237	<del>4.57E-01</del>	<del>1.56E-01</del>	2.19E-01
PA-233	Not Detected	-----	6.32E-02
TH-229	Not Detected	-----	2.05E-01

*not detected J 12/23/97*

*not detected J 12/23/97*



[Summary Report] - Sample ID: : 70211610

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.92E-02
AG-110m	Not Detected	-----	3.88E-02
AM-243	Not Detected	-----	6.01E-02
BA-133	Not Detected	-----	5.08E-02
BE-7	Not Detected	-----	2.80E-01
CD-109	Not Detected	-----	1.05E+00
CD-115	Not Detected	-----	3.33E-01
CE-139	Not Detected	-----	2.84E-02
CE-141	Not Detected	-----	5.29E-02
CE-144	Not Detected	-----	2.03E-01
CO-56	Not Detected	-----	4.66E-02
CO-57	Not Detected	-----	2.60E-02
CO-58	Not Detected	-----	3.86E-02
CO-60	Not Detected	-----	4.57E-02
CR-51	Not Detected	-----	2.89E-01
CS-134	Not Detected	-----	5.45E-02
CS-137	1.86E-02	2.56E-02	2.38E-02
EU-152	Not Detected	-----	7.79E-02
EU-154	Not Detected	-----	2.25E-01
EU-155	Not Detected	-----	1.18E-01
FE-59	Not Detected	-----	9.16E-02
GD-153	Not Detected	-----	8.65E-02
HG-203	Not Detected	-----	3.64E-02
I-131	Not Detected	-----	4.90E-02
IR-192	Not Detected	-----	3.01E-02
K-40	1.56E+01	2.62E+00	3.38E-01
KR-85	Not Detected	-----	9.87E+00
MN-52	Not Detected	-----	6.90E-02
MN-54	Not Detected	-----	4.10E-02
MO-99	Not Detected	-----	1.04E+00
NA-22	Not Detected	-----	5.10E-02
NA-24	Not Detected	-----	9.88E-00
NB-95	Not Detected	-----	4.47E-01
ND-147	Not Detected	-----	3.27E-01
NI-57	Not Detected	-----	6.01E-01
NP-239	Not Detected	-----	1.05E-01
RU-103	Not Detected	-----	3.76E-02
RU-106	Not Detected	-----	3.38E-01
SB-122	Not Detected	-----	1.68E-01
SB-124	Not Detected	-----	4.00E-02
SB-125	Not Detected	-----	9.64E-02
SN-113	Not Detected	-----	4.34E-02
TA-182	Not Detected	-----	1.93E-01
TA-183	Not Detected	-----	3.30E-01
TC-99m	Not Detected	-----	2.22E+04
TL-201	Not Detected	-----	3.53E-01
XE-133	Not Detected	-----	4.78E-01
Y-88	Not Detected	-----	3.67E-02
ZN-65	Not Detected	-----	1.27E-01
ZR-95	Not Detected	-----	6.89E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-23-97 7:14:12 AM \*  
 \*\*\*\*\*  
 \* Analyzed by: *J* 12/23/97 Reviewed by: *W* 12/23/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036735-003  
 Lab Sample ID : 70211611

005-0.5-1-*DU*

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 478.000 gram  
 Sample Date/Time : 12-17-97 11:10:00 AM  
 Acquire Start Date/Time : 12-22-97 10:54:55 AM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

\*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	2.01E+00
TH-234	Not Detected	-----	6.23E-01
RA-226	1.63E+00	7.55E-01	7.74E-01
PB-214	6.03E-01	1.27E-01	6.69E-02
BI-214	5.75E-01	1.34E-01	7.13E-02
PB-210	Not Detected	-----	9.90E+00
TH-232	7.75E-01	4.03E-01	1.88E-01
RA-228	8.50E-01	5.14E-01	2.51E-01
AC-228	8.09E-01	2.41E-01	1.25E-01
TH-228	8.97E-01	3.26E-01	5.93E-01
RA-224	7.10E-01	4.48E-01	1.45E-01
PB-212	7.84E-01	1.40E-01	5.19E-02
BI-212	1.13E+00	5.21E-01	5.20E-01
TL-208	6.26E-01	1.78E-01	1.06E-01
<del>U-235</del>	<del>2.28E-01</del>	<del>2.26E-01</del>	<del>2.64E-01</del>
TH-231	Not Detected	-----	2.84E+00
PA-231	Not Detected	-----	4.37E+00
TH-227	Not Detected	-----	4.83E-01
RA-223	Not Detected	-----	2.34E-01
RN-219	Not Detected	-----	5.19E-01
PB-211	Not Detected	-----	1.21E+00
TL-207	Not Detected	-----	2.06E+01
AM-241	Not Detected	-----	2.42E-01
PU-239	Not Detected	-----	4.61E+02
<del>NP-237</del>	<del>5.63E-01</del>	<del>2.88E-01</del>	<del>2.39E-01</del>
PA-233	Not Detected	-----	7.58E-02
TH-229	Not Detected	-----	2.48E-01

*not detected*  
*J* 12/23/97

*not detected*  
*J* 12/23/97

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	6.39E-02
AG-110m	Not Detected	-----	4.75E-02
AM-243	Not Detected	-----	7.16E-02
BA-133	Not Detected	-----	6.28E-02
BE-7	Not Detected	-----	3.79E-01
CD-109	Not Detected	-----	1.22E+00
CD-115	Not Detected	-----	4.17E-01
CE-139	Not Detected	-----	3.29E-02
CE-141	Not Detected	-----	6.31E-02
CE-144	Not Detected	-----	2.44E-01
CO-56	Not Detected	-----	5.75E-02
CO-57	Not Detected	-----	3.11E-02
CO-58	Not Detected	-----	4.92E-02
CO-60	Not Detected	-----	5.32E-02
CR-51	Not Detected	-----	3.61E-01
CS-134	Not Detected	-----	6.71E-02
CS-137	1.74E-02	1.87E-02	2.89E-02
EU-152	Not Detected	-----	9.24E-02
EU-154	Not Detected	-----	2.95E-01
EU-155	Not Detected	-----	1.42E-01
FE-59	Not Detected	-----	1.17E-01
GD-153	Not Detected	-----	1.04E-01
HG-203	Not Detected	-----	4.30E-02
I-131	Not Detected	-----	5.76E-02
IR-192	Not Detected	-----	3.77E-02
K-40	1.71E+01	2.99E+00	4.31E-01
KR-85	Not Detected	-----	1.23E+01
MN-52	Not Detected	-----	9.06E-02
MN-54	Not Detected	-----	5.18E-02
MO-99	Not Detected	-----	1.23E+00
NA-22	Not Detected	-----	6.95E-02
NA-24	Not Detected	-----	1.27E+01
NB-95	Not Detected	-----	5.59E-01
ND-147	Not Detected	-----	3.78E-01
NI-57	Not Detected	-----	7.76E-01
NP-239	Not Detected	-----	1.27E-01
RU-103	Not Detected	-----	4.53E-02
RU-106	Not Detected	-----	4.37E-01
SB-122	Not Detected	-----	1.91E-01
SB-124	Not Detected	-----	4.61E-02
SB-125	Not Detected	-----	1.19E-01
SN-113	Not Detected	-----	5.31E-02
TA-182	Not Detected	-----	2.30E-01
TA-183	Not Detected	-----	4.08E-01
TC-99m	Not Detected	-----	3.48E+04
TL-201	Not Detected	-----	4.36E-01
XE-133	Not Detected	-----	5.88E-01
Y-88	Not Detected	-----	4.31E-02
ZN-65	Not Detected	-----	1.51E-01
ZR-95	Not Detected	-----	9.08E-02

\* Analyzed by: *J 12/23/97* Reviewed by: *YH 12/23/97* \*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036736-003  
 Lab Sample ID : 70211612

*014-0-0.5-5*

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 702.000 gram  
 Sample Date/Time : 12-17-97 1:15:00 PM  
 Acquire Start Date/Time : 12-22-97 12:59:43 PM  
 Detector Name : LAB01  
 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	-----	1.54E+00
TH-234	Not Detected	-----	4.56E-01
RA-226	1.28E+00	5.31E-01	5.25E-01
PB-214	6.02E-01	2.07E-01	5.33E-02
BI-214	5.34E-01	1.18E-01	5.41E-02
PB-210	Not Detected	-----	8.07E+00
TH-232	6.63E-01	3.31E-01	1.43E-01
RA-228	5.07E-01	1.88E-01	1.69E-01
AC-228	6.46E-01	1.78E-01	9.78E-02
TH-228	5.79E-01	3.38E-01	4.81E-01
RA-224	7.04E-01	2.71E-01	1.22E-01
PB-212	6.50E-01	1.21E-01	4.06E-02
BI-212	7.27E-01	5.95E-01	3.94E-01
TL-208	5.80E-01	1.37E-01	7.68E-02
U-235	Not Detected	-----	2.14E-01
TH-231	Not Detected	-----	2.22E+00
PA-231	Not Detected	-----	3.50E+00
TH-227	Not Detected	-----	3.62E-01
RA-223	Not Detected	-----	1.89E-01
RN-219	Not Detected	-----	4.23E-01
PB-211	Not Detected	-----	9.63E-01
TL-207	Not Detected	-----	1.60E+01
AM-241	Not Detected	-----	1.88E-01
PU-239	Not Detected	-----	3.53E+02
NP-237	<del>1.74E-01</del>	<del>1.54E-01</del>	2.05E-01
PA-233	Not Detected	-----	5.88E-02
TH-229	Not Detected	-----	1.99E-01

*not detected*  
*J 12/23/97*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.83E-02
AG-110m	Not Detected	-----	4.49E-02
AM-243	Not Detected	-----	5.55E-02
BA-133	Not Detected	-----	4.94E-02
BE-7	Not Detected	-----	3.05E-01
CD-109	Not Detected	-----	9.64E-01
CD-115	Not Detected	-----	3.17E-01
CE-139	Not Detected	-----	2.73E-02
CE-141	Not Detected	-----	5.16E-02
CE-144	Not Detected	-----	1.93E-01
CO-56	Not Detected	-----	4.12E-02
CO-57	Not Detected	-----	2.42E-02
CO-58	Not Detected	-----	3.74E-02
CO-60	Not Detected	-----	4.21E-02
CR-51	Not Detected	-----	2.67E-01
CS-134	Not Detected	-----	5.15E-02
CS-137	9.35E-02	3.48E-02	2.79E-02
EU-152	Not Detected	-----	7.15E-02
EU-154	Not Detected	-----	2.22E-01
EU-155	Not Detected	-----	1.14E-01
FE-59	Not Detected	-----	9.00E-02
GD-153	Not Detected	-----	8.21E-02
HG-203	Not Detected	-----	3.42E-02
I-131	Not Detected	-----	4.70E-02
IR-192	Not Detected	-----	2.93E-02
K-40	1.51E+01	2.49E+00	3.46E-01
KR-85	Not Detected	-----	9.13E+00
MN-52	Not Detected	-----	6.12E-02
MN-54	Not Detected	-----	4.04E-02
MO-99	Not Detected	-----	9.71E-01
NA-22	Not Detected	-----	5.10E-02
NA-24	Not Detected	-----	1.02E+01
NB-95	Not Detected	-----	4.18E-01
ND-147	Not Detected	-----	3.16E-01
NI-57	Not Detected	-----	5.92E-01
NP-239	Not Detected	-----	1.01E-01
RU-103	Not Detected	-----	3.70E-02
RU-106	Not Detected	-----	3.25E-01
SB-122	Not Detected	-----	1.56E-01
SB-124	Not Detected	-----	3.54E-02
SB-125	Not Detected	-----	9.46E-02
SN-113	Not Detected	-----	4.05E-02
TA-182	Not Detected	-----	1.81E-01
TA-183	Not Detected	-----	3.17E-01
TC-99m	Not Detected	-----	2.73E+04
TL-201	Not Detected	-----	3.31E-01
XE-133	Not Detected	-----	4.88E-01
Y-88	Not Detected	-----	3.19E-02
ZN-65	Not Detected	-----	1.24E-01
ZR-95	Not Detected	-----	7.08E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-23-97 7:54:26 AM \*  
 \*\*\*\*\*

\* Analyzed by: *J* 12/23/97 Reviewed by: *W* 12/23/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO) *014-0.5-1-5*  
 Customer Sample ID : 036737-003  
 Lab Sample ID : 70211613

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 723.000 gram  
 Sample Date/Time : 12-17-97 1:20:00 PM  
 Acquire Start Date/Time : 12-22-97 2:50:56 PM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.47E+00
TH-234	1.04E+00	4.45E-01	4.54E-01
RA-226	Not Detected	-----	5.03E-01
PB-214	5.76E-01	1.09E-01	4.74E-02
BI-214	5.08E-01	1.25E-01	5.29E-02
PE-210	Not Detected	-----	7.45E+00
TH-232	6.15E-01	3.10E-01	1.39E-01
RA-228	6.22E-01	2.31E-01	1.89E-01
AC-228	6.55E-01	2.14E-01	9.65E-02
TH-228	6.00E-01	2.39E-01	4.93E-01
RA-224	5.10E-01	2.95E-01	1.02E-01
PB-212	6.18E-01	1.12E-01	4.03E-02
BI-212	6.45E-01	3.46E-01	3.47E-01
TL-208	5.63E-01	1.66E-01	6.99E-02
U-235	9.67E-02	8.15E-02	1.20E-01
TH-231	Not Detected	-----	2.17E+00
PA-231	Not Detected	-----	3.29E+00
TH-227	Not Detected	-----	3.57E-01
RA-223	Not Detected	-----	1.78E-01
RN-219	Not Detected	-----	4.04E-01
PB-211	Not Detected	-----	9.30E-01
TL-207	Not Detected	-----	1.48E+01
AM-241	Not Detected	-----	1.74E-01
PU-239	Not Detected	-----	3.44E+02
NP-237	<del>1.85E-01</del>	<del>1.58E-01</del>	2.04E-01
PA-233	Not Detected	-----	5.56E-02
TH-229	Not Detected	-----	1.82E-01

*Not detected*  
*J* 12/23/97

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.32E-02
AG-110m	Not Detected	-----	3.64E-02
AM-243	Not Detected	-----	5.59E-02
BA-133	Not Detected	-----	4.68E-02
BE-7	Not Detected	-----	2.72E-01
CD-109	Not Detected	-----	9.32E-01
CD-115	Not Detected	-----	3.16E-01
CE-139	Not Detected	-----	2.52E-02
CE-141	Not Detected	-----	4.93E-02
CE-144	Not Detected	-----	1.88E-01
CO-56	Not Detected	-----	3.89E-02
CO-57	Not Detected	-----	2.38E-02
CO-58	Not Detected	-----	3.46E-02
CO-60	Not Detected	-----	4.07E-02
CR-51	Not Detected	-----	2.59E-01
CS-134	Not Detected	-----	5.09E-02
CS-137	2.54E-02	4.47E-03	2.05E-02
EU-152	Not Detected	-----	7.13E-02
EU-154	Not Detected	-----	1.99E-01
EU-155	Not Detected	-----	1.09E-01
FE-59	Not Detected	-----	8.30E-02
GD-153	Not Detected	-----	7.60E-02
HG-203	Not Detected	-----	3.26E-02
I-131	Not Detected	-----	4.39E-02
IR-192	Not Detected	-----	2.87E-02
K-40	1.56E+01	2.41E+00	2.34E-01
KR-85	Not Detected	-----	8.71E+00
MN-52	Not Detected	-----	6.19E-02
MN-54	Not Detected	-----	3.88E-02
MO-99	Not Detected	-----	9.88E-01
NA-22	Not Detected	-----	4.86E-02
NA-24	Not Detected	-----	1.04E+01
NB-95	Not Detected	-----	4.21E-01
ND-147	Not Detected	-----	2.79E-01
NI-57	Not Detected	-----	5.55E-01
NP-239	Not Detected	-----	9.74E-02
RU-103	Not Detected	-----	3.27E-02
RU-106	Not Detected	-----	2.77E-01
SB-122	Not Detected	-----	1.52E-01
SB-124	Not Detected	-----	3.51E-02
SB-125	Not Detected	-----	8.91E-02
SN-113	Not Detected	-----	3.97E-02
TA-182	Not Detected	-----	1.80E-01
TA-183	Not Detected	-----	2.97E-01
TC-99m	Not Detected	-----	3.13E+04
TL-201	Not Detected	-----	3.23E-01
XE-133	Not Detected	-----	4.50E-01
Y-88	Not Detected	-----	3.45E-02
ZN-65	Not Detected	-----	1.20E-01
ZR-95	Not Detected	-----	6.58E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-22-97 6:35:43 PM \*  
 \*\*\*\*\*

\* Analyzed by: *J* 12/23/97 Reviewed by: *W* 12/23/97  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO) *015-Q-0.5-S*  
 Customer Sample ID : 036738-003  
 Lab Sample ID : 70211614

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 891.000 gram  
 Sample Date/Time : 12-17-97 1:25:00 PM  
 Acquire Start Date/Time : 12-22-97 4:52:56 PM  
 Detector Name : LAB01  
 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	1.06E+00	1.24E+00	1.22E+00
TH-234	9.11E-01	3.19E-01	4.39E-01
RA-226	1.33E+00	5.13E-01	4.62E-01
PB-214	6.01E-01	1.17E-01	4.73E-02
BI-214	5.52E-01	1.30E-01	4.67E-02
PB-210	Not Detected	-----	7.15E+00
TH-232	8.32E-01	9.33E-01	1.36E-01
RA-228	8.17E-01	2.74E-01	1.55E-01
AC-228	8.87E-01	2.61E-01	8.35E-02
TH-228	7.09E-01	3.65E-01	4.07E-01
RA-224	7.78E-01	2.63E-01	8.41E-02
PB-212	7.92E-01	1.29E-01	3.72E-02
BI-212	9.28E-01	5.58E-01	3.03E-01
TL-208	7.58E-01	1.74E-01	6.42E-02
U-235	<del>1.83E-01</del>	<del>1.74E-01</del>	1.92E-01
TH-231	Not Detected	-----	2.03E+00
PA-231	Not Detected	-----	3.30E+00
TH-227	Not Detected	-----	3.50E-01
RA-223	Not Detected	-----	1.77E-01
RN-219	Not Detected	-----	3.67E-01
PB-211	Not Detected	-----	8.47E-01
TL-207	Not Detected	-----	1.40E+01
AM-241	Not Detected	-----	1.74E-01
PU-239	Not Detected	-----	3.21E+02
NP-237	<del>1.45E-01</del>	<del>1.43E-01</del>	2.11E-01
PA-233	Not Detected	-----	5.44E-02
TH-229	Not Detected	-----	1.84E-01

*not detected*  
*J 12/23/97*

*not detected*  
*J 12/23/97*



Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.17E-02
AG-110m	Not Detected	-----	3.96E-02
AM-243	Not Detected	-----	5.02E-02
BA-133	Not Detected	-----	4.42E-02
BE-7	Not Detected	-----	2.69E-01
CD-109	Not Detected	-----	9.18E-01
CD-115	Not Detected	-----	3.12E-01
CE-139	Not Detected	-----	2.45E-02
CE-141	Not Detected	-----	4.61E-02
CE-144	Not Detected	-----	1.78E-01
CO-56	Not Detected	-----	3.79E-02
CO-57	Not Detected	-----	2.25E-02
CO-58	Not Detected	-----	3.39E-02
CO-60	Not Detected	-----	3.80E-02
CR-51	Not Detected	-----	2.43E-01
CS-134	Not Detected	-----	4.50E-02
CS-137	9.32E-02	2.86E-02	2.32E-02
EU-152	Not Detected	-----	6.69E-02
EU-154	Not Detected	-----	1.93E-01
EU-155	Not Detected	-----	1.06E-01
FE-59	Not Detected	-----	7.90E-02
GD-153	Not Detected	-----	7.61E-02
HG-203	Not Detected	-----	3.14E-02
I-131	Not Detected	-----	4.13E-02
IR-192	Not Detected	-----	2.70E-02
K-40	1.61E+01	2.49E+00	2.70E-01
KR-85	Not Detected	-----	8.45E+00
MN-52	Not Detected	-----	6.31E-02
MN-54	Not Detected	-----	3.39E-02
MO-99	Not Detected	-----	9.04E-01
NA-22	Not Detected	-----	4.51E-02
NA-24	Not Detected	-----	1.10E+01
NB-95	Not Detected	-----	4.17E-01
ND-147	Not Detected	-----	2.69E-01
NI-57	Not Detected	-----	5.90E-01
NP-239	Not Detected	-----	9.58E-02
RU-103	Not Detected	-----	3.20E-02
RU-106	Not Detected	-----	2.84E-01
SB-122	Not Detected	-----	1.54E-01
SB-124	Not Detected	-----	3.09E-02
SB-125	Not Detected	-----	8.37E-02
SN-113	Not Detected	-----	3.66E-02
TA-182	Not Detected	-----	1.59E-01
TA-183	Not Detected	-----	2.99E-01
TC-99m	Not Detected	-----	3.74E+04
TL-201	Not Detected	-----	3.33E-01
XE-133	Not Detected	-----	4.60E-01
Y-88	Not Detected	-----	3.45E-02
ZN-65	Not Detected	-----	1.08E-01
ZR-95	Not Detected	-----	5.97E-02

\* Analyzed by: *J* 12/23/97 Reviewed by: *WJ* 12/23/97  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO) 015-0.5-1-5  
 Customer Sample ID : 036739-003  
 Lab Sample ID : 70211615

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 854.000 gram  
 Sample Date/Time : 12-17-97 1:30:00 PM  
 Acquire Start Date/Time : 12-23-97 6:24:25 AM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.33E+00
TH-234	9.90E-01	4.03E-01	4.43E-01
RA-226	1.24E+00	5.18E-01	4.47E-01
PB-214	5.41E-01	1.05E-01	4.73E-02
BI-214	4.88E-01	1.16E-01	4.44E-02
PB-210	Not Detected	-----	6.90E+00
TH-232	7.02E-01	3.43E-01	1.39E-01
RA-228	7.40E-01	2.08E-01	1.50E-01
AC-228	7.06E-01	1.75E-01	8.74E-02
TH-228	4.59E-01	2.21E-01	3.24E-01
RA-224	6.98E-01	3.41E-01	1.00E-01
PB-212	7.00E-01	1.17E-01	3.55E-02
BI-212	8.66E-01	3.83E-01	3.02E-01
TL-208	6.44E-01	1.38E-01	7.07E-02
<del>U-235</del>	<del>2.13E-01</del>	<del>2.62E-01</del>	<del>1.81E-01</del>
TH-231	Not Detected	-----	2.03E+00
PA-231	Not Detected	-----	3.10E+00
TH-227	Not Detected	-----	3.37E-01
RA-223	Not Detected	-----	1.74E-01
RN-219	Not Detected	-----	3.67E-01
PB-211	Not Detected	-----	8.49E-01
TL-207	Not Detected	-----	1.37E+01
AM-241	Not Detected	-----	1.66E-01
PU-239	Not Detected	-----	3.17E+02
<del>NP-237</del>	<del>5.17E-01</del>	<del>1.54E-01</del>	<del>1.96E-01</del>
PA-233	Not Detected	-----	5.30E-02
TH-229	Not Detected	-----	1.74E-01

*Not detected*  
*J* 12/23/97

*Not detected*  
*J* 12/23/97

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.35E-02
AG-110m	Not Detected	-----	2.92E-02
AM-243	Not Detected	-----	5.64E-02
BA-133	Not Detected	-----	4.34E-02
BE-7	Not Detected	-----	2.42E-01
CD-109	Not Detected	-----	8.85E-01
CD-115	Not Detected	-----	3.66E-01
CE-139	Not Detected	-----	2.36E-02
CE-141	Not Detected	-----	4.44E-02
CE-144	Not Detected	-----	1.71E-01
CO-56	Not Detected	-----	3.68E-02
CO-57	Not Detected	-----	2.21E-02
CO-58	Not Detected	-----	3.12E-02
CO-60	Not Detected	-----	3.66E-02
CR-51	Not Detected	-----	2.37E-01
CS-134	Not Detected	-----	4.42E-02
CS-137	Not Detected	-----	3.33E-02
EU-152	Not Detected	-----	6.51E-02
EU-154	Not Detected	-----	2.00E-01
EU-155	Not Detected	-----	1.01E-01
FE-59	Not Detected	-----	7.55E-02
GD-153	Not Detected	-----	7.24E-02
HG-203	Not Detected	-----	2.96E-02
I-131	Not Detected	-----	4.18E-02
IR-192	Not Detected	-----	2.56E-02
K-40	1.42E+01	2.24E+00	2.36E-01
KR-85	Not Detected	-----	8.23E+00
MN-52	Not Detected	-----	6.00E-02
MN-54	Not Detected	-----	3.47E-02
MO-99	Not Detected	-----	1.04E+00
NA-22	Not Detected	-----	4.46E-02
NA-24	Not Detected	-----	1.92E+01
NB-95	Not Detected	-----	4.48E-01
ND-147	Not Detected	-----	2.65E-01
NI-57	Not Detected	-----	6.87E-01
NP-239	Not Detected	-----	9.23E-02
RU-103	Not Detected	-----	3.04E-02
RU-106	Not Detected	-----	2.77E-01
SB-122	Not Detected	-----	1.74E-01
SB-124	Not Detected	-----	3.09E-02
SB-125	Not Detected	-----	8.19E-02
SN-113	Not Detected	-----	3.55E-02
TA-182	Not Detected	-----	1.60E-01
TA-183	Not Detected	-----	3.08E-01
TC-99m	Not Detected	-----	1.69E+05
TL-201	Not Detected	-----	3.51E-01
XE-133	Not Detected	-----	5.02E-01
Y-88	Not Detected	-----	2.59E-02
ZN-65	Not Detected	-----	1.08E-01
ZR-95	Not Detected	-----	6.35E-02

\* Analyzed by: *[Signature]* 12/23/97 Reviewed by: *[Signature]* 12/23/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO) 000-EB  
 Customer Sample ID : 036740-006  
 Lab Sample ID : 70211616

Sample Description : MARINELLI LIQUID SAMPLE  
 Sample Quantity : 500.000 mL  
 Sample Date/Time : 12-17-97 9:40:00 AM  
 Acquire Start Date/Time : 12-23-97 8:19:01 AM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6001 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/mL )	2-sigma Error	MDA (pCi/mL )
U-238	Not Detected	-----	8.46E-01
TH-234	Not Detected	-----	3.25E-01
RA-226	Not Detected	-----	4.83E-01
PB-214	Not Detected	-----	5.48E-02
BI-214	Not Detected	-----	6.49E-02
PB-210	Not Detected	-----	3.76E+00
TH-232	Not Detected	-----	1.62E-01
RA-228	Not Detected	-----	1.52E-01
AC-228	Not Detected	-----	9.53E-02
TH-228	Not Detected	-----	5.32E-01
RA-224	Not Detected	-----	1.57E-01
PB-212	Not Detected	-----	4.16E-02
BI-212	Not Detected	-----	3.84E-01
TL-208	Not Detected	-----	8.10E-02
U-235	Not Detected	-----	1.36E-01
TH-231	Not Detected	-----	1.67E+00
PA-231	Not Detected	-----	2.68E+00
TH-227	Not Detected	-----	1.60E-01
RA-223	Not Detected	-----	1.04E-01
RN-219	Not Detected	-----	3.08E-01
PB-211	Not Detected	-----	6.50E-01
TL-207	Not Detected	-----	1.09E+01
AM-241	Not Detected	-----	1.02E-01
PU-239	Not Detected	-----	2.19E+02
NP-237	Not Detected	-----	1.36E-01
PA-233	Not Detected	-----	4.46E-02
TH-229	Not Detected	-----	1.22E-01

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
AG-108m	Not Detected	-----	2.68E-02
AG-110m	Not Detected	-----	2.59E-02
AM-243	Not Detected	-----	3.99E-02
BA-133	Not Detected	-----	3.28E-02
BE-7	Not Detected	-----	2.07E-01
CD-109	Not Detected	-----	4.51E-01
CD-115	Not Detected	-----	2.44E-01
CE-139	Not Detected	-----	1.86E-02
CE-141	Not Detected	-----	3.43E-02
CE-144	Not Detected	-----	1.26E-01
CO-56	Not Detected	-----	3.88E-02
CO-57	Not Detected	-----	1.61E-02
CO-58	Not Detected	-----	2.57E-02
CO-60	Not Detected	-----	2.58E-02
CR-51	Not Detected	-----	2.01E-01
CS-134	Not Detected	-----	2.97E-02
CS-137	Not Detected	-----	2.73E-02
EU-152	Not Detected	-----	4.94E-02
EU-154	Not Detected	-----	1.25E-01
EU-155	Not Detected	-----	7.04E-02
FE-59	Not Detected	-----	5.38E-02
GD-153	Not Detected	-----	4.92E-02
HG-203	Not Detected	-----	2.47E-02
I-131	Not Detected	-----	4.23E-02
IR-192	Not Detected	-----	2.21E-02
K-40	Not Detected	-----	3.47E-01
KR-85	Not Detected	-----	7.15E+00
MN-52	Not Detected	-----	6.02E-02
MN-54	Not Detected	-----	2.48E-02
MO-99	Not Detected	-----	8.82E-01
NA-22	Not Detected	-----	2.69E-02
NA-24	Not Detected	-----	2.18E+01
NB-95	Not Detected	-----	2.29E-01
ND-147	Not Detected	-----	2.21E-01
NI-57	Not Detected	-----	5.89E-01
NP-239	Not Detected	-----	6.35E-02
RU-103	Not Detected	-----	2.79E-02
RU-106	Not Detected	-----	2.65E-01
SB-122	Not Detected	-----	1.44E-01
SB-124	Not Detected	-----	2.68E-02
SB-125	Not Detected	-----	6.53E-02
SN-113	Not Detected	-----	3.05E-02
TA-182	Not Detected	-----	9.16E-02
TA-183	Not Detected	-----	1.95E-01
TC-99m	Not Detected	-----	2.70E+05
TL-201	Not Detected	-----	2.21E-01
XE-133	Not Detected	-----	3.43E-01
Y-88	Not Detected	-----	4.15E-02
ZN-65	Not Detected	-----	6.17E-02
ZR-95	Not Detected	-----	4.26E-02

\* Analyzed by: *J* 12/23/97 Reviewed by: *WJ* 12/23/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134  
 Lab Sample ID : 70211617

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 : 12-23-97 10:01:42 AM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 600 / 604 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	8.95E+03
TH-234	Not Detected	-----	3.40E+03
RA-226	Not Detected	-----	5.89E+03
PB-214	Not Detected	-----	7.72E+02
BI-214	Not Detected	-----	7.22E+02
PB-210	Not Detected	-----	6.91E+04
TH-232	Not Detected	-----	2.31E+03
RA-228	Not Detected	-----	3.17E+03
AC-228	Not Detected	-----	1.99E+03
TH-228	Not Detected	-----	9.35E+04
RA-224	Not Detected	-----	1.11E+03
PB-212	Not Detected	-----	7.14E+03
BI-212	Not Detected	-----	7.35E+04
TL-208	Not Detected	-----	1.44E+04
U-235	Not Detected	-----	1.55E+03
TH-231	Not Detected	-----	2.12E+04
PA-231	Not Detected	-----	3.41E+04
TH-227	Not Detected	-----	2.60E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	6.76E+03
PB-211	Not Detected	-----	1.49E+04
TL-207	Not Detected	-----	2.78E+05
AM-241	8.44E+04	1.42E+04	1.49E+03
PU-239	Not Detected	-----	2.45E+06
NP-237	Not Detected	-----	1.76E+03
PA-233	Not Detected	-----	6.56E+02
TH-229	Not Detected	-----	1.37E+03

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected		4.28E+02
AG-110m	Not Detected		2.70E+06
AM-243	Not Detected		4.46E+02
BA-133	Not Detected		7.65E+02
BE-7	Not Detected		2.08E+18
CD-109	3.04E+05	1.49E+05	2.10E+05
CD-115	Not Detected		1.00E+26
CE-139	Not Detected		1.06E+08
CE-141	Not Detected		1.00E+26
CE-144	Not Detected		8.09E+05
CO-56	Not Detected		6.75E+12
CO-57	Not Detected		1.47E+05
CO-58	Not Detected		4.75E+13
CO-60	7.81E+04	1.09E+04	5.26E+02
CR-51	Not Detected		1.00E+26
CS-134	Not Detected		3.81E+03
CS-137	6.94E+04	9.31E+03	3.32E+02
EU-152	Not Detected		8.19E+02
EU-154	Not Detected		3.35E+03
EU-155	Not Detected		2.25E+03
FE-59	Not Detected		4.64E+20
GD-153	Not Detected		9.84E+05
HG-203	Not Detected		2.19E+19
I-131	Not Detected		1.00E+26
IR-192	Not Detected		1.32E+13
K-40	Not Detected		1.94E+03
KR-85	Not Detected		1.28E+05
MN-52	Not Detected		1.00E+26
MN-54	Not Detected		1.39E+05
MO-99	Not Detected		1.00E+26
NA-22	Not Detected		1.75E+03
NA-24	Not Detected		1.00E+26
NB-95	Not Detected		1.00E+26
ND-147	Not Detected		1.00E+26
NI-57	Not Detected		1.00E+26
NP-239	Not Detected		6.98E+02
RU-103	Not Detected		1.00E+26
RU-106	Not Detected		4.57E+05
SB-122	Not Detected		1.00E+26
SB-124	Not Detected		3.81E+15
SB-125	Not Detected		7.76E+03
SN-113	Not Detected		3.31E+09
TA-182	Not Detected		9.92E+09
TA-183	Not Detected		1.00E+26
TC-99m	Not Detected		1.00E+26
TL-201	Not Detected		1.00E+26
XE-133	Not Detected		1.00E+26
Y-88	Not Detected		4.91E+09
ZN-65	Not Detected		1.84E+06
ZR-95	Not Detected		1.25E+15

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

Report Date : 12-23-97 10:14:15 AM  
 QA File : C:\GENIEPC\CAMFILES\LCS1.QAF  
 Analyst : FCD  
 Sample ID : 70211617  
 Sample Quantity : 1.00 Each  
 Sample Date : 11-01-90 12:00:00 PM  
 Measurement Date : 12-23-97 10:01:42 AM  
 Elapsed Live Time : 600 seconds  
 Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.721E-02	2.723E-03	8.445E-02	< :In: : >
CS-137 Activity	6.888E-02	1.596E-03	6.944E-02	< : OK 12/23/97 : >
CO-60 Activity	7.608E-02	2.929E-03	7.775E-02	< : : : >

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

Reviewed by: *J* 12/23/97







# ANALYSIS REQUEST AND CHAIN OF CUSTODY CONTINUATION FORM

SP 2001 (10) (12 96)  
Supersedes (10) (9) (1996)

AR/COC- 510214

SANDIA BATCH # 702105

Project Name: <u>CETA-57A</u>		Project/Task Manager: <u>AAC / PAVIETICH</u>		Case No.: <u>7215.220300</u>								
Location		Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO)					Sample Type	Lab Sample ID	
Building	Room				Sample Matrix	Type	Volume	Preservative	Sample Collection Method			Sample Type
Tech Area: <u>M/A</u>												
<u>0150779-003</u>		<u>020-0.0.5.5</u>	<u>57A</u>	<u>7/14/93 1245</u>	<u>S</u>	<u>S</u>	<u>500ml</u>	<u>112</u>	<u>7</u>	<u>SA</u>	<u>X</u>	LAB USE
<u>0150779-003</u>		<u>070-0.5.10.5</u>		<u>1745</u>							<u>X</u>	
<u>0150771-003</u>		<u>121-0.0.5.5</u>		<u>1750</u>							<u>X</u>	
<u>0150772-003</u>		<u>071-0.5.10.5</u>		<u>1755</u>							<u>X</u>	
<u>0150773-003</u>		<u>122-0.0.5.5</u>		<u>1757</u>							<u>X</u>	
<u>0150771-003</u>		<u>072-0.5.10.5</u>		<u>1800</u>							<u>X</u>	
<u>0150773-003</u>		<u>075-0.5.10.5</u>		<u>1805</u>							<u>X</u>	
<u>0150774-003</u>		<u>075-0.5.10.5</u>		<u>1807</u>							<u>X</u>	
<u>0150777-003</u>		<u>077-0.5.10.5-DU</u>		<u>1807</u>						<u>DU</u>	<u>X</u>	
<u>0150772-003</u>		<u>001-EB</u>	<u>N/A</u>	<u>1830</u>	<u>DIW</u>	<u>P</u>				<u>EB</u>	<u>X</u>	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px;">Abnormal Conditions on Receipt</div> <div style="border: 1px solid black; padding: 5px;">LAB USE</div> </div>												



To be completed by Customer

Shaded areas are for RPSD use only

Customer: AAZ / PAVLETIKH  
 Organization: 6134  
 Project Location: LECTA - SZA  
 Phone: 284-2479  
 Date Results Needed: 30 Dec 97  
 Suspect Isotopes: Pu, Th  
 Case Number: RUS. 220300

Hazards/Special Instructions:  
  
COC 570206

Batch Log Number: 702105  
 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
36759-003	So.1	12/14/97 1045	500ml	GAMMA SPEC	01	2300	670g	
36760-003		1045			02		651g	
36761-003		1055			03		589g	
36762-003		1105			04		651g	
36763-003		1110			05		619g	
36764-003		1120			06		621g	
36765-003		1125			07		612g	
36766-003		1230			08		669g	
36767-003		1230			09		652g	
36768-003		1235			10		675g	
36769-003		1240			11		636g	
36770-003		1245			12		679g	
36771-003		1250			13		658g	2300

elinquished by [Signature]  
 elinquished by [Signature]  
 elinquished by \_\_\_\_\_  
 elinquished by \_\_\_\_\_

Date 12/11/97  
 Date 12/19/97  
 Date \_\_\_\_\_  
 Date \_\_\_\_\_

Received by [Signature]  
 Received by [Signature]  
 Received by \_\_\_\_\_  
 Received by \_\_\_\_\_

Date 12/17/97  
 Date 12/19/97  
 Date \_\_\_\_\_  
 Date \_\_\_\_\_



to be completed by Customer

Shaded areas are for RPSD use only

Customer: AGS / PAVERICH  
 Organization: 634  
 Project Location: CCTA-57A  
 Phone: 284-2479  
 Date Results Needed: 30 days  
 Suspect Isotopes: DU, Pu  
 Case Number: 725.220300

Hazards/Special Instructions:

COC 570206

Batch Log Number:

702105

Logged By:

FM

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
36772-003	SOIL	12/16/92 1253	500ml	GAMMA SPEC.	14	2300	658g	
36773-003	}	1257	}		15	}	705g	
36774-003		1300			16		768g	
36775-003		1305			17		560g	
36776-003		1307			18		604g	
36777-003		1307			19		528g	
36802-006	Water	1030			20	2300	500ml	
LCS	—	1/15/90	—	Y spec	21	N/A	N/A	

Relinquished by \_\_\_\_\_ Date \_\_\_\_\_ Received by \_\_\_\_\_ Date \_\_\_\_\_  
 Relinquished by \_\_\_\_\_ Date \_\_\_\_\_ Received by \_\_\_\_\_ Date \_\_\_\_\_  
 Relinquished by \_\_\_\_\_ Date \_\_\_\_\_ Received by \_\_\_\_\_ Date \_\_\_\_\_  
 Relinquished by \_\_\_\_\_ Date \_\_\_\_\_ Received by \_\_\_\_\_ Date \_\_\_\_\_

Records Center Code: ER/1334/57A/DAT

## SMO ROUTING FORM - RESULTS FROM RPSD LAB

Project Name: Central Coyote Test Area - Site 57A

Case No./Service Order: 7215.220300/CF0515

SNL Task Leader: AAS

Org/Mail Stop: 6134/1148

Final Transmittal To: AAS

Date Transmitted: 01/22/98

SMO Project Coordinator: SALMI

Sample Ship Date: 12/17/97

ARCOC	Lab	Lab ID
<u>510206</u>	<u>RPSD</u>	<u>702105</u>
<u>          </u>	<u>          </u>	<u>          </u>
<u>          </u>	<u>          </u>	<u>          </u>

-016, → -023

Date

Filed in Records Center: \_\_\_\_\_ Transmitted By: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Received (Records Center) By: \_\_\_\_\_



Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

12-17-97 1:04:18 PM

Analyzed by: *[Signature]*

12/18/97

Reviewed by: *[Signature]*

12/19/97

Customer : AAS/MAC (6134/SMO)  
 Customer Sample ID : 036759-003  
 Lab Sample ID : 70210501

016-0-0.5-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 670.000 gram  
 Sample Date/Time : 12-16-97 10:45:00 AM  
 Acquire Start Date/Time : 12-17-97 11:21:34 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	-----	3.42E+00
TH-234	Not Detected	-----	6.60E-01
RA-226	1.54E+00	5.28E-01	6.02E-01
PB-214	6.35E-01	1.32E-01	4.73E-02
BI-214	5.82E-01	1.21E-01	5.47E-02
PB-210	Not Detected	-----	3.53E+01
TH-232	5.86E-01	7.15E-01	1.42E-01
PA-228	4.79E-01	2.12E-01	1.74E-01
C-228	6.67E-01	1.61E-01	8.28E-02
TH-228	6.24E-01	2.25E-01	4.82E-01
RA-224	5.68E-01	2.49E-01	9.01E-02
PB-212	6.10E-01	1.04E-01	3.90E-02
BI-212	8.84E-01	4.07E-01	3.29E-01
TL-208	5.89E-01	1.43E-01	6.92E-02
U-235	Not Detected	-----	2.49E-01
TH-231	Not Detected	-----	1.28E+01
PA-231	Not Detected	-----	1.49E+00
TH-227	Not Detected	-----	3.41E-01
RA-223	Not Detected	-----	2.15E-01
RN-219	Not Detected	-----	4.05E-01
PB-211	Not Detected	-----	9.06E-01
TL-207	Not Detected	-----	1.46E+01
AM-241	Not Detected	-----	4.98E-01
PU-239	Not Detected	-----	4.58E+02
NP-237	Not Detected	-----	2.76E-01
PA-233	Not Detected	-----	6.17E-02
TH-229	Not Detected	-----	2.66E-01



Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.24E-02
AG-110m	Not Detected	-----	5.38E-02
BA-133	Not Detected	-----	6.85E-02
BE-7	1.22E-01	2.38E-01	1.86E-01
CD-109	Not Detected	-----	9.38E-01
CD-115	Not Detected	-----	9.38E-02
CE-139	Not Detected	-----	3.07E-02
CE-141	Not Detected	-----	5.52E-02
CE-144	Not Detected	-----	2.56E-01
CO-56	Not Detected	-----	3.87E-02
CO-57	Not Detected	-----	3.19E-02
CO-58	Not Detected	-----	3.30E-02
CO-60	Not Detected	-----	3.74E-02
CR-51	Not Detected	-----	2.43E-01
CS-134	Not Detected	-----	4.88E-02
CS-137	2.49E-01	4.94E-02	2.55E-02
EU-152	Not Detected	-----	9.61E-02
EU-154	Not Detected	-----	1.94E-01
EU-155	Not Detected	-----	1.55E-01
FE-59	Not Detected	-----	8.10E-02
GD-153	Not Detected	-----	1.11E-01
HG-203	Not Detected	-----	3.27E-02
I-131	Not Detected	-----	3.33E-02
IR-192	Not Detected	-----	2.85E-02
K-40	1.96E+01	3.17E+00	3.05E-01
MN-52	Not Detected	-----	3.57E-02
MN-54	Not Detected	-----	3.63E-02
MO-99	Not Detected	-----	3.13E-01
NA-22	Not Detected	-----	4.59E-02
NA-24	Not Detected	-----	1.13E-01
NB-95	Not Detected	-----	1.92E-01
ND-147	Not Detected	-----	2.22E-01
NI-57	Not Detected	-----	7.95E-02
RU-103	Not Detected	-----	3.18E-02
RU-106	Not Detected	-----	3.08E-01
SB-122	Not Detected	-----	5.21E-02
SB-124	Not Detected	-----	3.17E-02
SB-125	Not Detected	-----	8.63E-02
SN-113	Not Detected	-----	3.88E-02
SR-85	Not Detected	-----	3.73E-02
TA-182	Not Detected	-----	1.61E-01
TA-183	Not Detected	-----	4.93E-01
TC-99m	Not Detected	-----	5.66E-01
TL-201	Not Detected	-----	2.33E-01
XE-133	Not Detected	-----	2.00E-01
Y-88	Not Detected	-----	2.66E-02
ZN-65	Not Detected	-----	1.08E-01
ZR-95	Not Detected	-----	5.86E-02

Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

12-18-97 2:05:47 PM

Analyzed by: *J* 12/18/97

Reviewed by: *MS* 12/19/97

016-0-0.5-D4

Customer : AAS/MAC (6134/SMO)  
 Customer Sample ID : 036760-003  
 Lab Sample ID : 70210502

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 651.000 gram  
 Sample Date/Time : 12-16-97 10:45:00 AM  
 Acquire Start Date/Time : 12-17-97 1:17:31 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.45E+00
TH-234	Not Detected	-----	6.97E-01
RA-226	1.52E+00	6.34E-01	5.28E-01
PB-214	6.59E-01	1.61E-01	5.33E-02
BI-214	5.48E-01	1.19E-01	5.39E-02
PB-210	Not Detected	-----	3.74E+01
TH-232	6.98E-01	3.73E-01	1.49E-01
RA-228	6.81E-01	2.51E-01	1.56E-01
C-228	7.31E-01	1.87E-01	8.61E-02
TH-228	7.06E-01	2.36E-01	5.35E-01
RA-224	6.97E-01	2.36E-01	7.68E-02
PB-212	6.83E-01	1.30E-01	4.20E-02
BI-212	7.95E-01	3.25E-01	3.17E-01
TL-208	5.92E-01	1.59E-01	7.23E-02
U-235	Not Detected	-----	2.52E-01
TH-231	Not Detected	-----	1.30E+01
PA-231	Not Detected	-----	1.53E+00
TH-227	Not Detected	-----	3.53E-01
RA-223	Not Detected	-----	2.18E-01
RN-219	Not Detected	-----	4.07E-01
PB-211	Not Detected	-----	9.35E-01
TL-207	Not Detected	-----	1.43E+01
AM-241	Not Detected	-----	5.05E-01
PU-239	Not Detected	-----	4.67E+02
NP-237	Not Detected	-----	2.75E-01
PA-233	Not Detected	-----	6.31E-02
TH-229	Not Detected	-----	2.69E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.35E-02
AG-110m	Not Detected	-----	5.69E-02
BA-133	Not Detected	-----	7.06E-02
BE-7	2.87E-01	2.61E-01	2.14E-01
CD-109	Not Detected	-----	9.33E-01
CD-115	Not Detected	-----	9.79E-02
CE-139	Not Detected	-----	3.14E-02
CE-141	Not Detected	-----	5.56E-02
CE-144	Not Detected	-----	2.58E-01
CO-56	Not Detected	-----	3.86E-02
CO-57	Not Detected	-----	3.23E-02
CO-58	Not Detected	-----	3.48E-02
CO-60	Not Detected	-----	3.91E-02
CR-51	Not Detected	-----	2.53E-01
CS-134	Not Detected	-----	5.01E-02
CS-137	2.86E-01	8.63E-02	2.59E-02
EU-152	Not Detected	-----	9.71E-02
EU-154	Not Detected	-----	1.98E-01
EU-155	Not Detected	-----	1.56E-01
FE-59	Not Detected	-----	7.36E-02
GD-153	Not Detected	-----	1.09E-01
HG-203	Not Detected	-----	3.46E-02
I-131	Not Detected	-----	3.31E-02
IR-192	Not Detected	-----	2.92E-02
K-40	1.79E+01	2.95E+00	2.67E-01
MN-52	Not Detected	-----	3.38E-02
MN-54	Not Detected	-----	3.68E-02
MO-99	Not Detected	-----	3.33E-01
NA-22	Not Detected	-----	4.42E-02
NA-24	Not Detected	-----	1.17E-01
NB-95	Not Detected	-----	2.02E-01
ND-147	Not Detected	-----	2.19E-01
NI-57	Not Detected	-----	4.14E-02
RU-103	Not Detected	-----	3.14E-02
RU-106	Not Detected	-----	3.18E-01
SB-122	Not Detected	-----	5.52E-02
SB-124	Not Detected	-----	3.38E-02
SB-125	Not Detected	-----	8.98E-02
SN-113	Not Detected	-----	4.09E-02
SR-85	Not Detected	-----	4.03E-02
TA-182	Not Detected	-----	1.61E-01
TA-183	Not Detected	-----	5.01E-01
TC-99m	Not Detected	-----	7.11E-01
TL-201	Not Detected	-----	2.43E-01
XE-133	Not Detected	-----	2.12E-01
Y-88	Not Detected	-----	2.77E-02
ZN-65	Not Detected	-----	1.08E-01
ZR-95	Not Detected	-----	5.83E-02

Analyzed by: *J* 12/18/97 Reviewed by: *[Signature]* 12/19/97

Customer : AAS/MAC (6134/SMO)  
 Customer Sample ID : 036761-003  
 Lab Sample ID : 70210503

016-05-1-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 589.000 gram  
 Sample Date/Time : 12-16-97 10:55:00 AM  
 Acquire Start Date/Time : 12-17-97 3:02:15 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.64E+00
TH-234	9.99E-01	6.26E-01	6.31E-01
RA-226	1.43E+00	5.93E-01	5.82E-01
PE-214	6.40E-01	1.34E-01	5.39E-02
BI-214	6.30E-01	1.35E-01	6.12E-02
PB-210	Not Detected	-----	4.03E+01
TH-232	7.48E-01	3.84E-01	1.49E-01
RA-228	6.88E-01	3.34E-01	1.82E-01
C-228	6.26E-01	1.87E-01	9.81E-02
TH-228	4.89E-01	2.32E-01	5.50E-01
RA-224	6.46E-01	2.12E-01	9.11E-02
PB-212	7.45E-01	1.29E-01	4.45E-02
BI-212	8.71E-01	4.03E-01	3.68E-01
TL-208	6.06E-01	1.48E-01	7.59E-02
U-235	<del>1.39E-01</del>	<del>2.77E-01</del>	2.77E-01
TH-231	Not Detected	-----	1.39E+01
PA-231	Not Detected	-----	1.62E+00
TH-227	Not Detected	-----	3.83E-01
RA-223	Not Detected	-----	2.31E-01
RN-219	Not Detected	-----	4.40E-01
PB-211	Not Detected	-----	9.81E-01
TL-207	Not Detected	-----	1.50E+01
AM-241	Not Detected	-----	5.17E-01
PU-239	Not Detected	-----	4.84E+02
NP-237	Not Detected	-----	3.11E-01
PA-233	Not Detected	-----	6.64E-02
TH-229	Not Detected	-----	2.77E-01

*Not detected J 12/18/97*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.57E-02
AG-110m	Not Detected	-----	5.24E-02
BA-133	Not Detected	-----	7.27E-02
BE-7	Not Detected	-----	3.04E-01
CD-109	Not Detected	-----	1.05E+00
CD-115	Not Detected	-----	1.06E-01
CE-139	Not Detected	-----	3.31E-02
CE-141	Not Detected	-----	6.08E-02
CE-144	Not Detected	-----	2.71E-01
CO-56	Not Detected	-----	4.14E-02
CO-57	Not Detected	-----	3.28E-02
CO-58	Not Detected	-----	3.70E-02
CO-60	Not Detected	-----	4.01E-02
CR-51	Not Detected	-----	2.77E-01
CS-134	Not Detected	-----	5.32E-02
CS-137	1.64E-01	1.16E-01	2.71E-02
EU-152	Not Detected	-----	9.87E-02
EU-154	Not Detected	-----	2.11E-01
EU-155	Not Detected	-----	1.62E-01
FE-59	Not Detected	-----	8.59E-02
GD-153	Not Detected	-----	1.17E-01
HG-203	Not Detected	-----	3.62E-02
I-131	Not Detected	-----	3.64E-02
IR-192	Not Detected	-----	3.16E-02
K-40	2.01E+01	3.00E+00	3.00E-01
MN-52	Not Detected	-----	4.17E-02
MN-54	Not Detected	-----	3.82E-02
MO-99	Not Detected	-----	3.54E-01
NA-22	Not Detected	-----	4.57E-02
NA-24	Not Detected	-----	1.50E-01
NB-95	Not Detected	-----	2.22E-01
ND-147	Not Detected	-----	2.48E-01
NI-57	Not Detected	-----	9.82E-02
RU-103	Not Detected	-----	3.39E-02
RU-106	Not Detected	-----	3.41E-01
SB-122	Not Detected	-----	6.23E-02
SB-124	Not Detected	-----	3.44E-02
SB-125	Not Detected	-----	8.94E-02
SN-113	Not Detected	-----	4.31E-02
SR-85	Not Detected	-----	4.25E-02
TA-182	Not Detected	-----	1.70E-01
TA-183	Not Detected	-----	5.18E-01
TC-99m	Not Detected	-----	9.31E-01
TL-201	Not Detected	-----	2.58E-01
XE-133	Not Detected	-----	2.19E-01
Y-88	Not Detected	-----	2.56E-02
ZN-65	Not Detected	-----	1.19E-01
ZR-95	Not Detected	-----	6.22E-02

Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

12-17-97 6:29:50 PM

analyzed by: *J* 12/18/97

Reviewed by: *JS* 12/19/97

Customer : AAS/MAC (6134/SMO)  
 Customer Sample ID : 036762-003  
 Lab Sample ID : 70210504

07-0-0.5-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 651.000 gram  
 Sample Date/Time : 12-16-97 11:05:00 AM  
 Acquire Start Date/Time : 12-17-97 4:47:03 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	-----	3.47E+00
TH-234	8.46E-01	4.67E-01	6.26E-01
RA-226	1.50E+00	5.87E-01	5.35E-01
PB-214	6.23E-01	6.05E-01	4.93E-02
BI-214	5.56E-01	5.54E-01	5.71E-02
PB-210	Not Detected	-----	3.58E+01
TH-232	6.06E-01	3.06E-01	1.53E-01
PA-228	6.86E-01	2.27E-01	1.58E-01
TH-228	6.62E-01	8.19E-01	8.19E-02
TH-228	6.97E-01	2.51E-01	5.22E-01
RA-224	6.59E-01	2.17E-01	8.46E-02
PB-212	6.71E-01	1.16E-01	4.10E-02
BI-212	7.21E-01	4.13E-01	2.94E-01
TL-208	6.10E-01	1.15E-01	7.11E-02
U-235	Not Detected	-----	2.48E-01
TH-231	Not Detected	-----	1.28E+01
PA-231	Not Detected	-----	1.46E+00
TH-227	Not Detected	-----	3.51E-01
RA-223	Not Detected	-----	2.15E-01
RN-219	Not Detected	-----	4.00E-01
PB-211	Not Detected	-----	8.91E-01
TL-207	Not Detected	-----	1.47E+01
AM-241	Not Detected	-----	4.90E-01
PU-239	Not Detected	-----	4.63E+02
NP-237	Not Detected	-----	2.76E-01
PA-233	Not Detected	-----	6.21E-02
TH-229	Not Detected	-----	2.50E-01

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.22E-02
AG-110m	Not Detected	-----	3.95E-02
BA-133	Not Detected	-----	6.78E-02
BE-7	Not Detected	-----	2.89E-01
CD-109	Not Detected	-----	9.37E-01
CD-115	Not Detected	-----	9.90E-02
CE-139	Not Detected	-----	3.03E-02
CE-141	Not Detected	-----	5.46E-02
CE-144	Not Detected	-----	2.55E-01
CO-56	Not Detected	-----	3.90E-02
CO-57	Not Detected	-----	3.13E-02
CO-58	Not Detected	-----	3.38E-02
CO-60	Not Detected	-----	3.75E-02
CR-51	Not Detected	-----	2.48E-01
CS-134	Not Detected	-----	4.93E-02
CS-137	7.04E-02	3.38E-02	2.22E-02
EU-152	Not Detected	-----	9.40E-02
EU-154	Not Detected	-----	1.95E-01
EU-155	Not Detected	-----	1.54E-01
FE-59	Not Detected	-----	7.35E-02
GD-153	Not Detected	-----	1.07E-01
HG-203	Not Detected	-----	3.28E-02
I-131	Not Detected	-----	3.40E-02
IR-192	Not Detected	-----	2.95E-02
K-40	1.87E+01	2.80E+00	2.81E-01
MN-52	Not Detected	-----	3.62E-02
MN-54	Not Detected	-----	3.57E-02
MO-99	Not Detected	-----	3.56E-01
NA-22	Not Detected	-----	4.57E-02
NA-24	Not Detected	-----	1.37E-01
NB-95	Not Detected	-----	2.06E-01
ND-147	Not Detected	-----	2.30E-01
NI-57	Not Detected	-----	4.71E-02
RU-103	Not Detected	-----	2.91E-02
RU-106	Not Detected	-----	2.84E-01
SB-122	Not Detected	-----	5.74E-02
SB-124	Not Detected	-----	3.35E-02
SB-125	Not Detected	-----	8.72E-02
SN-113	Not Detected	-----	3.78E-02
SR-85	Not Detected	-----	4.00E-02
TA-182	Not Detected	-----	1.59E-01
TA-183	Not Detected	-----	4.95E-01
TC-99m	Not Detected	-----	9.99E-01
TL-201	Not Detected	-----	2.57E-01
XE-133	Not Detected	-----	2.17E-01
Y-88	Not Detected	-----	2.72E-02
ZN-65	Not Detected	-----	1.10E-01
ZR-95	Not Detected	-----	6.31E-02

Sandia National Laboratories

Radiation Protection Sample Diagnostics Program [881 Laboratory]

12-18-97 4:36:07 PM

Analyzed by: *J*

*12/18/97*

Reviewed by: *J*

*12/19/97*

Customer : AAS/MAC (6134/SMO)  
 Customer Sample ID : 036763-003  
 Lab Sample ID : 70210505

*017-0.5-1-5*

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 619.000 gram  
 Sample Date/Time : 12-16-97 11:10:00 AM  
 Acquire Start Date/Time : 12-17-97 6:31:59 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	-----	3.42E+00
TH-234	9.08E-01	4.03E-01	5.87E-01
RA-226	1.32E+00	6.62E-01	5.88E-01
PB-214	5.50E-01	1.06E-01	4.68E-02
BI-214	5.89E-01	1.34E-01	5.65E-02
PB-210	Not Detected	-----	3.69E+01
TH-232	5.83E-01	3.05E-01	1.32E-01
U-228	5.84E-01	2.01E-01	1.46E-01
AC-228	5.88E-01	2.58E-01	8.32E-02
TH-228	7.97E-01	2.54E-01	4.53E-01
RA-224	5.46E-01	1.92E-01	7.62E-02
PB-212	6.49E-01	1.23E-01	3.88E-02
BI-212	8.85E-01	5.32E-01	3.54E-01
TL-208	5.67E-01	1.06E-01	6.61E-02
U-235	Not Detected	-----	2.55E-01
TH-231	Not Detected	-----	1.26E+01
PA-231	Not Detected	-----	1.44E+00
TH-227	Not Detected	-----	3.48E-01
RA-223	Not Detected	-----	2.13E-01
RN-219	Not Detected	-----	3.89E-01
PB-211	Not Detected	-----	8.73E-01
TL-207	Not Detected	-----	1.42E+01
AM-241	Not Detected	-----	5.00E-01
PU-239	Not Detected	-----	4.58E+02
NP-237	<del>4.22E-01</del>	<del>2.78E-01</del>	<del>2.84E-01</del>
PA-233	Not Detected	-----	6.10E-02
TH-229	Not Detected	-----	2.51E-01

*not detected J 12/18/97*



Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.30E-02
AG-110m	Not Detected	-----	3.21E-02
BA-133	Not Detected	-----	6.73E-02
BE-7	Not Detected	-----	2.71E-01
CD-109	Not Detected	-----	9.63E-01
CD-115	Not Detected	-----	1.02E-01
CE-139	Not Detected	-----	3.03E-02
CE-141	Not Detected	-----	5.61E-02
CE-144	Not Detected	-----	2.49E-01
CO-56	Not Detected	-----	4.01E-02
CO-57	Not Detected	-----	3.15E-02
CO-58	Not Detected	-----	3.37E-02
CO-60	Not Detected	-----	3.99E-02
CR-51	Not Detected	-----	2.47E-01
CS-134	Not Detected	-----	5.00E-02
CS-137	Not Detected	-----	3.39E-02
EU-152	Not Detected	-----	9.47E-02
EU-154	Not Detected	-----	2.00E-01
EU-155	Not Detected	-----	1.51E-01
FE-59	Not Detected	-----	7.74E-02
GD-153	Not Detected	-----	1.05E-01
HG-203	Not Detected	-----	3.22E-02
I-131	Not Detected	-----	3.33E-02
IR-192	Not Detected	-----	2.94E-02
K-40	1.62E+01	2.46E+00	2.85E-01
MN-52	Not Detected	-----	3.63E-02
MN-54	Not Detected	-----	3.58E-02
MO-99	Not Detected	-----	3.34E-01
NA-22	Not Detected	-----	4.62E-02
NA-24	Not Detected	-----	1.43E-01
NB-95	Not Detected	-----	2.07E-01
ND-147	Not Detected	-----	2.22E-01
NI-57	Not Detected	-----	9.05E-02
RU-103	Not Detected	-----	2.95E-02
RU-106	Not Detected	-----	3.12E-01
SB-122	Not Detected	-----	5.79E-02
SB-124	Not Detected	-----	3.20E-02
SB-125	Not Detected	-----	8.82E-02
SN-113	Not Detected	-----	3.88E-02
SR-85	Not Detected	-----	3.97E-02
TA-182	Not Detected	-----	1.59E-01
TA-183	Not Detected	-----	5.11E-01
TC-99m	Not Detected	-----	1.24E+00
TL-201	Not Detected	-----	2.48E-01
XE-133	Not Detected	-----	2.18E-01
Y-88	Not Detected	-----	2.63E-02
ZN-65	Not Detected	-----	1.07E-01
ZR-95	Not Detected	-----	5.85E-02

analyzed by: *J* 12/18/97 Reviewed by: *W* 12/19/97  
 \*\*\*\*\*

Customer : AAS/MAC (6134/SMO) 018-0-0.5-5  
 Customer Sample ID : 036764-003  
 Lab Sample ID : 70210506

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 621.000 gram  
 Sample Date/Time : 12-16-97 11:20:00 AM  
 Acquire Start Date/Time : 12-17-97 8:16:49 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.44E+00
TH-234	9.66E-01	4.20E-01	6.88E-01
RA-226	1.79E+00	9.27E-01	6.83E-01
PB-214	5.78E-01	1.34E-01	5.15E-02
BI-214	6.01E-01	1.33E-01	5.57E-02
PB-210	Not Detected	-----	3.71E+01
TH-232	5.39E-01	2.97E-01	1.52E-01
-228	6.86E-01	8.09E-01	1.42E-01
-228	6.39E-01	1.87E-01	8.43E-02
TH-228	5.97E-01	2.29E-01	5.00E-01
RA-224	6.66E-01	2.37E-01	9.09E-02
PB-212	6.29E-01	1.17E-01	3.97E-02
BI-212	5.92E-01	3.05E-01	3.25E-01
TL-208	5.68E-01	1.31E-01	6.72E-02
U-235	Not Detected	-----	2.49E-01
TH-231	<del>5.10E+00</del>	<del>6.22E+00</del>	1.32E+01
PA-231	Not Detected	-----	1.48E+00
TH-227	Not Detected	-----	3.43E-01
RA-223	Not Detected	-----	2.18E-01
RN-219	Not Detected	-----	3.89E-01
PB-211	Not Detected	-----	8.76E-01
TL-207	Not Detected	-----	1.47E+01
AM-241	Not Detected	-----	4.89E-01
PU-239	Not Detected	-----	4.48E+02
NP-237	<del>1.57E-01</del>	<del>1.77E-01</del>	3.32E-01
PA-233	Not Detected	-----	5.93E-02
TH-229	Not Detected	-----	2.57E-01

*Not detected J 12/18/97*

*Not detected J 12/18/97*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.04E-02
AG-110m	Not Detected	-----	3.50E-02
BA-133	Not Detected	-----	6.72E-02
BE-7	Not Detected	-----	2.77E-01
CD-109	Not Detected	-----	1.13E+00
CD-115	Not Detected	-----	9.97E-02
CE-139	Not Detected	-----	2.98E-02
CE-141	Not Detected	-----	5.44E-02
CE-144	Not Detected	-----	2.47E-01
CO-56	Not Detected	-----	4.04E-02
CO-57	Not Detected	-----	3.14E-02
CO-58	Not Detected	-----	3.25E-02
CO-60	Not Detected	-----	3.72E-02
CR-51	Not Detected	-----	2.51E-01
CS-134	Not Detected	-----	4.97E-02
CS-137	Not Detected	-----	3.72E-02
EU-152	Not Detected	-----	9.43E-02
EU-154	Not Detected	-----	1.86E-01
EU-155	Not Detected	-----	1.53E-01
FE-59	Not Detected	-----	7.25E-02
GD-153	Not Detected	-----	1.07E-01
HG-203	Not Detected	-----	3.26E-02
I-131	Not Detected	-----	3.34E-02
IR-192	Not Detected	-----	2.81E-02
K-40	1.54E+01	2.38E+00	2.94E-01
MN-52	Not Detected	-----	3.76E-02
MN-54	Not Detected	-----	3.57E-02
MO-99	Not Detected	-----	3.44E-01
NA-22	Not Detected	-----	4.25E-02
NA-24	Not Detected	-----	1.47E-01
NB-95	Not Detected	-----	2.06E-01
ND-147	Not Detected	-----	2.26E-01
NI-57	Not Detected	-----	4.63E-02
RU-103	Not Detected	-----	3.11E-02
RU-106	Not Detected	-----	3.15E-01
SB-122	Not Detected	-----	5.73E-02
SB-124	Not Detected	-----	3.14E-02
SB-125	Not Detected	-----	8.08E-02
SN-113	Not Detected	-----	4.01E-02
SR-85	Not Detected	-----	3.98E-02
TA-182	Not Detected	-----	1.55E-01
TA-183	Not Detected	-----	5.03E-01
TC-99m	Not Detected	-----	1.47E+00
TL-201	Not Detected	-----	2.56E-01
XE-133	Not Detected	-----	2.27E-01
Y-88	Not Detected	-----	2.80E-02
ZN-65	Not Detected	-----	1.08E-01
ZR-95	Not Detected	-----	6.09E-02

Analyzed by: *J* 12/18/97 Reviewed by: *WJ* 12/19/97

Customer : AAS/MAC (6134/SMO)  
 Customer Sample ID : 036765-003  
 Lab Sample ID : 70210507

018-0.5-1.0-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 612.000 gram  
 Sample Date/Time : 12-16-97 11:25:00 AM  
 Acquire Start Date/Time : 12-17-97 10:01:28 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	-----	3.44E+00
TH-234	1.17E+00	5.88E-01	5.74E-01
RA-226	1.50E+00	1.05E+00	5.84E-01
PB-214	6.89E-01	2.23E-01	5.21E-02
BI-214	6.06E-01	9.57E-01	5.83E-02
PB-210	Not Detected	-----	3.66E+01
TH-232	5.90E-01	3.36E-01	1.63E-01
-228	5.82E-01	2.97E-01	1.60E-01
-228	5.89E-01	1.53E-01	9.47E-02
TH-228	4.96E-01	3.15E-01	5.11E-01
RA-224	6.96E-01	2.63E-01	8.78E-02
PB-212	6.69E-01	1.14E-01	4.14E-02
BI-212	7.40E-01	3.04E-01	2.95E-01
TL-208	5.58E-01	1.21E-01	6.48E-02
U-235	Not Detected	-----	2.51E-01
TH-231	Not Detected	-----	1.35E+01
PA-231	Not Detected	-----	1.55E+00
TH-227	Not Detected	-----	3.57E-01
RA-223	Not Detected	-----	2.21E-01
RN-219	Not Detected	-----	3.91E-01
PB-211	Not Detected	-----	8.83E-01
TL-207	Not Detected	-----	1.38E+01
AM-241	Not Detected	-----	5.09E-01
PU-239	Not Detected	-----	4.64E+02
NP-237	Not Detected	-----	2.77E-01
PA-233	Not Detected	-----	5.96E-02
TH-229	Not Detected	-----	2.51E-01

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.33E-02
AG-110m	Not Detected	-----	3.18E-02
BA-133	Not Detected	-----	7.16E-02
BE-7	Not Detected	-----	2.63E-01
CD-109	Not Detected	-----	9.40E-01
CD-115	Not Detected	-----	1.08E-01
CE-139	Not Detected	-----	2.97E-02
CE-141	Not Detected	-----	5.50E-02
CE-144	Not Detected	-----	2.57E-01
CO-56	Not Detected	-----	3.86E-02
CO-57	Not Detected	-----	3.07E-02
CO-58	Not Detected	-----	3.35E-02
CO-60	Not Detected	-----	3.90E-02
CR-51	Not Detected	-----	2.47E-01
CS-134	Not Detected	-----	5.29E-02
CS-137	Not Detected	-----	3.53E-02
EU-152	Not Detected	-----	9.24E-02
EU-154	Not Detected	-----	1.98E-01
EU-155	Not Detected	-----	1.54E-01
FE-59	Not Detected	-----	7.79E-02
GD-153	Not Detected	-----	1.08E-01
HG-203	Not Detected	-----	3.44E-02
I-131	Not Detected	-----	3.54E-02
IR-192	Not Detected	-----	2.82E-02
K-40	1.53E+01	2.35E+00	2.76E-01
MN-52	Not Detected	-----	3.81E-02
MN-54	Not Detected	-----	3.72E-02
MO-99	Not Detected	-----	3.64E-01
NA-22	Not Detected	-----	4.40E-02
NA-24	Not Detected	-----	1.76E-01
NB-95	Not Detected	-----	2.18E-01
ND-147	Not Detected	-----	2.33E-01
NI-57	Not Detected	-----	1.00E-01
RU-103	Not Detected	-----	3.10E-02
RU-106	Not Detected	-----	3.22E-01
SB-122	Not Detected	-----	5.80E-02
SB-124	Not Detected	-----	3.46E-02
SB-125	Not Detected	-----	8.79E-02
SN-113	Not Detected	-----	3.94E-02
SR-85	Not Detected	-----	4.06E-02
TA-182	Not Detected	-----	1.63E-01
TA-183	Not Detected	-----	5.35E-01
TC-99m	Not Detected	-----	1.77E+00
TL-201	Not Detected	-----	2.65E-01
XE-133	Not Detected	-----	2.40E-01
Y-88	Not Detected	-----	2.87E-02
ZN-65	Not Detected	-----	1.11E-01
ZR-95	Not Detected	-----	5.88E-02

Analyzed by: *J* 12/18/97 Reviewed by: *A* 12/19/97

Customer : AAS/MAC (6134/SMO)  
 Customer Sample ID : 036766-003  
 Lab Sample ID : 70210508

019-0-0.5-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 669.000 gram  
 Sample Date/Time : 12-16-97 12:30:00 PM  
 Acquire Start Date/Time : 12-17-97 11:46:16 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	-----	2.06E+00
TH-234	Not Detected	-----	7.88E-01
RA-226	1.22E+00	2.22E+00	5.50E-01
PB-214	6.14E-01	9.71E-02	4.76E-02
BI-214	5.16E-01	1.26E-01	5.49E-02
PB-210	Not Detected	-----	3.47E+01
TH-232	5.63E-01	3.49E-01	1.48E-01
U-228	6.76E-01	2.41E-01	1.41E-01
Th-228	6.31E-01	1.54E-01	9.10E-02
TH-228	8.02E-01	2.72E-01	5.18E-01
RA-224	6.72E-01	2.78E-01	6.79E-02
PB-212	6.70E-01	1.22E-01	4.05E-02
BI-212	7.69E-01	2.74E-01	2.45E-01
TL-208	6.43E-01	1.50E-01	6.57E-02
U-235	Not Detected	-----	2.40E-01
TH-231	Not Detected	-----	1.30E+01
PA-231	Not Detected	-----	1.48E+00
TH-227	Not Detected	-----	3.43E-01
RA-223	Not Detected	-----	2.17E-01
RN-219	Not Detected	-----	3.80E-01
PB-211	Not Detected	-----	8.55E-01
TL-207	Not Detected	-----	1.39E+01
AM-241	Not Detected	-----	4.80E-01
FU-239	Not Detected	-----	4.52E+02
NP-237	Not Detected	-----	3.78E-01
PA-233	Not Detected	-----	5.98E-02
TH-229	Not Detected	-----	2.58E-01

[Summary Report] - Sample ID: : 70210508

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.82E-02
AG-110m	Not Detected	-----	4.29E-02
BA-133	Not Detected	-----	6.63E-02
BE-7	Not Detected	-----	2.64E-01
CD-109	Not Detected	-----	8.49E-01
CD-115	Not Detected	-----	1.02E-01
CE-139	Not Detected	-----	2.96E-02
CE-141	Not Detected	-----	5.31E-02
CE-144	Not Detected	-----	2.47E-01
CO-56	Not Detected	-----	3.58E-02
CO-57	Not Detected	-----	3.09E-02
CO-58	Not Detected	-----	3.34E-02
CO-60	Not Detected	-----	3.64E-02
CR-51	Not Detected	-----	2.42E-01
CS-134	Not Detected	-----	4.65E-02
CS-137	1.05E-01	4.66E-02	2.67E-02
EU-152	Not Detected	-----	9.29E-02
EU-154	Not Detected	-----	1.76E-01
EU-155	Not Detected	-----	1.50E-01
FE-59	Not Detected	-----	7.59E-02
GD-153	Not Detected	-----	1.07E-01
HG-203	Not Detected	-----	3.23E-02
I-131	Not Detected	-----	3.32E-02
IR-192	Not Detected	-----	2.84E-02
K-40	1.71E+01	2.53E+00	2.74E-01
MN-52	Not Detected	-----	3.44E-02
MN-54	Not Detected	-----	3.28E-02
MO-99	Not Detected	-----	3.44E-01
NA-22	Not Detected	-----	4.24E-02
NA-24	Not Detected	-----	1.73E-01
NB-95	Not Detected	-----	2.10E-01
ND-147	Not Detected	-----	2.20E-01
NI-57	Not Detected	-----	9.34E-02
RU-103	Not Detected	-----	3.01E-02
RU-106	Not Detected	-----	3.02E-01
SB-122	Not Detected	-----	5.81E-02
SB-124	Not Detected	-----	3.12E-02
SB-125	Not Detected	-----	8.46E-02
SN-113	Not Detected	-----	3.66E-02
SR-85	Not Detected	-----	3.75E-02
TA-182	Not Detected	-----	1.49E-01
TA-183	Not Detected	-----	4.97E-01
TC-99m	Not Detected	-----	1.86E+00
TL-201	Not Detected	-----	2.49E-01
XE-133	Not Detected	-----	2.36E-01
Y-88	Not Detected	-----	2.94E-02
ZN-65	Not Detected	-----	1.04E-01
ZR-95	Not Detected	-----	5.84E-02

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 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-18-97 3:13:55 AM \*  
 \*\*\*\*\*

\* Analyzed by: *J 12/18/97* Reviewed by: *M 12/19/97* \*  
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Customer : AAS/MAC (6134/SMO) *019-0-0.5-04*  
 Customer Sample ID : 036767-003  
 Lab Sample ID : 70210509

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 652.000 gram  
 Sample Date/Time : 12-16-97 12:30:00 PM  
 Acquire Start Date/Time : 12-18-97 1:31:08 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	-----	3.48E+00
TH-234	Not Detected	-----	6.12E-01
RA-226	1.51E+00	8.05E-01	5.46E-01
PB-214	6.82E-01	1.35E-01	4.88E-02
BI-214	5.93E-01	1.18E-01	5.53E-02
PB-210	Not Detected	-----	3.78E+01
TH-232	7.58E-01	3.81E-01	1.46E-01
RA-228	6.52E-01	1.96E-01	1.58E-01
AC-228	6.34E-01	3.88E-01	9.01E-02
TH-228	7.49E-01	3.27E-01	5.28E-01
RA-224	7.08E-01	2.72E-01	8.77E-02
PB-212	6.94E-01	1.29E-01	4.17E-02
BI-212	7.83E-01	5.31E-01	3.66E-01
TL-208	5.78E-01	1.57E-01	6.55E-02
U-235	Not Detected	-----	2.44E-01
TH-231	Not Detected	-----	1.31E+01
PA-231	Not Detected	-----	1.50E+00
TH-227	Not Detected	-----	3.54E-01
RA-223	Not Detected	-----	2.20E-01
RN-219	Not Detected	-----	4.05E-01
PB-211	Not Detected	-----	8.80E-01
TL-207	Not Detected	-----	1.45E+01
AM-241	Not Detected	-----	5.08E-01
PU-239	Not Detected	-----	4.53E+02
NP-237	Not Detected	-----	2.69E-01
PA-233	Not Detected	-----	6.08E-02
TH-229	Not Detected	-----	2.55E-01



[Summary Report] - Sample ID: : 70210509

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.14E-02
AG-110m	Not Detected	-----	4.36E-02
BA-133	Not Detected	-----	7.07E-02
BE-7	Not Detected	-----	2.80E-01
CD-109	Not Detected	-----	9.13E-01
CD-115	Not Detected	-----	1.13E-01
CE-139	Not Detected	-----	2.97E-02
CE-141	Not Detected	-----	5.46E-02
CE-144	Not Detected	-----	2.48E-01
CO-56	Not Detected	-----	3.99E-02
CO-57	Not Detected	-----	3.19E-02
CO-58	Not Detected	-----	3.41E-02
CO-60	Not Detected	-----	3.85E-02
CR-51	Not Detected	-----	2.59E-01
CS-134	Not Detected	-----	4.99E-02
CS-137	Not Detected	-----	2.52E-02
EU-152	Not Detected	-----	9.60E-02
EU-154	Not Detected	-----	1.90E-01
EU-155	Not Detected	-----	1.51E-01
FE-59	Not Detected	-----	7.39E-02
GD-153	Not Detected	-----	1.07E-01
HG-203	Not Detected	-----	3.32E-02
I-131	Not Detected	-----	3.43E-02
IR-192	Not Detected	-----	2.88E-02
K-40	1.78E+01	2.68E+00	2.76E-01
MN-52	Not Detected	-----	3.88E-02
MN-54	Not Detected	-----	3.44E-02
MO-99	Not Detected	-----	3.57E-01
NA-22	Not Detected	-----	4.71E-02
NA-24	Not Detected	-----	1.86E-01
NB-95	Not Detected	-----	2.20E-01
ND-147	Not Detected	-----	2.29E-01
NI-57	Not Detected	-----	5.53E-02
RU-103	Not Detected	-----	3.04E-02
RU-106	Not Detected	-----	3.09E-01
SB-122	Not Detected	-----	6.13E-02
SB-124	Not Detected	-----	3.35E-02
SB-125	Not Detected	-----	8.43E-02
SN-113	Not Detected	-----	3.94E-02
SR-85	Not Detected	-----	4.01E-02
TA-182	Not Detected	-----	1.53E-01
TA-183	Not Detected	-----	5.34E-01
TC-99m	Not Detected	-----	2.32E+00
TL-201	Not Detected	-----	2.69E-01
XE-133	Not Detected	-----	2.40E-01
Y-88	Not Detected	-----	2.90E-02
ZN-65	Not Detected	-----	1.07E-01
ZR-95	Not Detected	-----	6.14E-02

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 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-18-97 4:58:50 AM \*  
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\* Analyzed by: *J* 12/18/97 Reviewed by: *AS* 12/19/97  
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Customer : AAS/MAC (6134/SMO) *019-0.5-1.0-5*  
 Customer Sample ID : 036768-003  
 Lab Sample ID : 70210510

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 675.000 gram  
 Sample Date/Time : 12-16-97 12:35:00 PM  
 Acquire Start Date/Time : 12-18-97 3:16:07 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	Not Detected	-----	7.64E-01
RA-226	1.53E+00	9.05E-01	5.41E-01
PB-214	6.17E-01	3.69E-01	5.01E-02
EI-214	6.24E-01	3.39E-01	5.48E-02
PB-210	Not Detected	-----	3.56E+01
TH-232	5.46E-01	3.40E-01	1.48E-01
RA-228	5.68E-01	6.43E-01	1.43E-01
AC-228	6.05E-01	6.00E-01	8.96E-02
TH-228	5.03E-01	2.16E-01	5.29E-01
RA-224	6.38E-01	2.23E-01	8.18E-02
PB-212	6.07E-01	1.07E-01	3.80E-02
EI-212	6.12E-01	3.19E-01	3.13E-01
TL-208	5.53E-01	1.51E-01	6.54E-02
U-235	Not Detected	-----	2.41E-01
TH-231	Not Detected	-----	1.29E+01
PA-231	Not Detected	-----	1.42E+00
TH-227	Not Detected	-----	3.33E-01
RA-223	Not Detected	-----	2.20E-01
RN-219	Not Detected	-----	3.72E-01
PB-211	Not Detected	-----	8.49E-01
TL-207	Not Detected	-----	1.31E+01
AM-241	Not Detected	-----	4.72E-01
PU-239	Not Detected	-----	4.42E+02
NP-237	Not Detected	-----	2.53E-01
FA-233	Not Detected	-----	5.83E-02
TH-229	Not Detected	-----	2.58E-01

[Summary Report] - Sample ID: : 70210510

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.99E-02
AG-110m	Not Detected	-----	4.03E-02
BA-133	Not Detected	-----	6.59E-02
BE-7	Not Detected	-----	2.67E-01
CD-109	Not Detected	-----	8.57E-01
CD-115	Not Detected	-----	1.06E-01
CE-139	Not Detected	-----	2.91E-02
CE-141	Not Detected	-----	5.42E-02
CE-144	Not Detected	-----	2.46E-01
CO-56	Not Detected	-----	3.87E-02
CO-57	Not Detected	-----	2.99E-02
CO-58	Not Detected	-----	3.32E-02
CO-60	Not Detected	-----	3.95E-02
CR-51	Not Detected	-----	2.50E-01
CS-134	Not Detected	-----	4.83E-02
CS-137	8.95E-02	4.20E-02	2.35E-02
EU-152	Not Detected	-----	8.99E-02
EU-154	Not Detected	-----	1.82E-01
EU-155	Not Detected	-----	1.45E-01
FE-59	Not Detected	-----	7.31E-02
GD-153	Not Detected	-----	1.07E-01
HG-203	Not Detected	-----	3.15E-02
I-131	Not Detected	-----	3.31E-02
IR-192	Not Detected	-----	2.81E-02
K-40	1.65E+01	2.50E+00	2.79E-01
MN-52	Not Detected	-----	3.42E-02
MN-54	Not Detected	-----	3.58E-02
MO-99	Not Detected	-----	3.64E-01
NA-22	Not Detected	-----	4.22E-02
NA-24	Not Detected	-----	1.83E-01
NB-95	Not Detected	-----	2.10E-01
ND-147	Not Detected	-----	2.22E-01
NI-57	Not Detected	-----	5.48E-02
RU-103	Not Detected	-----	3.05E-02
RU-106	Not Detected	-----	2.98E-01
SB-122	Not Detected	-----	6.24E-02
SB-124	Not Detected	-----	3.09E-02
SB-125	Not Detected	-----	8.10E-02
SN-113	Not Detected	-----	3.89E-02
SR-85	Not Detected	-----	3.84E-02
TA-182	Not Detected	-----	1.48E-01
TA-183	Not Detected	-----	5.07E-01
TC-99m	Not Detected	-----	2.69E+00
TL-201	Not Detected	-----	2.68E-01
XE-133	Not Detected	-----	2.44E-01
Y-88	Not Detected	-----	2.70E-02
ZN-65	Not Detected	-----	1.02E-01
ZR-95	Not Detected	-----	5.64E-02

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 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-18-97 5:29:02 PM \*  
 \*\*\*\*\*

\* Analyzed by: *J* 12/18/97 Reviewed by: *W* 12/19/97 \*  
 \*\*\*\*\*

Customer : AAS/MAC (6134/SMO)  
 Customer Sample ID : 036769-003  
 Lab Sample ID : 70210511 020-0.0-0.5=5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 636.000 gram  
 Sample Date/Time : 12-16-97 12:40:00 PM  
 Acquire Start Date/Time : 12-18-97 5:00:59 AM  
 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	-----	3.32E+00
TH-234	9.45E-01	5.11E-01	6.52E-01
RA-226	1.37E+00	8.81E-01	5.80E-01
PB-214	5.63E-01	1.09E-01	5.15E-02
BI-214	5.53E-01	1.13E-01	5.45E-02
PB-210	Not Detected	-----	3.65E+01
TH-232	6.99E-01	3.52E-01	1.39E-01
RA-228	6.16E-01	3.27E-01	1.59E-01
AC-228	6.49E-01	1.78E-01	8.80E-02
TH-228	6.68E-01	3.88E-01	4.99E-01
RA-224	5.99E-01	2.82E-01	7.77E-02
PB-212	6.37E-01	1.39E-01	4.02E-02
BI-212	6.61E-01	4.02E-01	3.19E-01
TL-208	5.47E-01	1.43E-01	6.26E-02
U-235	Not Detected	-----	2.47E-01
TH-231	Not Detected	-----	1.27E+01
PA-231	Not Detected	-----	1.49E+00
TH-227	Not Detected	-----	3.43E-01
RA-223	Not Detected	-----	2.18E-01
RN-219	Not Detected	-----	3.90E-01
PB-211	Not Detected	-----	8.71E-01
TL-207	Not Detected	-----	1.47E+01
AM-241	Not Detected	-----	4.83E-01
PU-239	Not Detected	-----	4.49E+02
NP-237	Not Detected	-----	3.01E-01
PA-233	Not Detected	-----	5.99E-02
TH-229	Not Detected	-----	2.64E-01

[Summary Report] - Sample ID: : 70210511

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.08E-02
AG-110m	Not Detected	-----	4.77E-02
BA-133	Not Detected	-----	6.67E-02
BE-7	Not Detected	-----	2.76E-01
CD-109	<del>1.54E+00</del>	<del>7.23E-01</del>	<del>1.02E+00</del>
CD-115	Not Detected	-----	1.14E-01
CE-139	Not Detected	-----	3.04E-02
CE-141	Not Detected	-----	5.42E-02
CE-144	Not Detected	-----	2.53E-01
CO-56	Not Detected	-----	3.86E-02
GO-57	Not Detected	-----	3.14E-02
CO-58	Not Detected	-----	3.54E-02
CO-60	Not Detected	-----	3.89E-02
CR-51	Not Detected	-----	2.56E-01
CS-134	Not Detected	-----	5.01E-02
CS-137	1.56E-01	3.75E-02	2.34E-02
EU-152	Not Detected	-----	9.43E-02
EU-154	Not Detected	-----	1.88E-01
EU-155	Not Detected	-----	1.57E-01
FE-59	Not Detected	-----	8.03E-02
GD-153	Not Detected	-----	1.10E-01
HG-203	Not Detected	-----	3.40E-02
I-131	Not Detected	-----	3.45E-02
IR-192	Not Detected	-----	2.88E-02
K-40	1.78E+01	2.69E+00	3.02E-01
MN-52	Not Detected	-----	3.75E-02
MN-54	Not Detected	-----	3.57E-02
MO-99	Not Detected	-----	3.86E-01
NA-22	Not Detected	-----	4.64E-02
NA-24	Not Detected	-----	2.35E-01
NB-95	Not Detected	-----	2.19E-01
ND-147	Not Detected	-----	2.37E-01
NI-57	Not Detected	-----	5.76E-02
RU-103	Not Detected	-----	3.14E-02
RU-106	Not Detected	-----	3.18E-01
SB-122	Not Detected	-----	6.18E-02
SB-124	Not Detected	-----	3.32E-02
SB-125	Not Detected	-----	8.44E-02
SN-113	Not Detected	-----	3.95E-02
SR-85	Not Detected	-----	3.91E-02
TA-182	Not Detected	-----	1.53E-01
TA-183	Not Detected	-----	5.21E-01
TC-99m	Not Detected	-----	3.43E+00
TL-201	Not Detected	-----	2.74E-01
XE-133	Not Detected	-----	2.47E-01
Y-88	Not Detected	-----	2.62E-02
ZN-65	Not Detected	-----	1.04E-01
ZR-95	Not Detected	-----	5.91E-02

*not detected 7/12/18/97*

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 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-18-97 8:28:23 AM \*  
 \*\*\*\*\*

\* Analyzed by: *J 12/18/97* Reviewed by: *[Signature] 12/19/97* \*

Customer : AAS/MAC (6134/SMO)  
 Customer Sample ID : 036770-003  
 Lab Sample ID : 70210512

*020-0.5-1.0-5*

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 679.000 gram  
 Sample Date/Time : 12-16-97 12:45:00 PM  
 Acquire Start Date/Time : 12-18-97 6:45:40 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	-----	3.30E+00
TH-234	1.10E+00	5.57E-01	5.86E-01
RA-226	1.20E+00	4.86E-01	5.39E-01
PB-214	5.64E-01	1.24E-01	5.14E-02
BI-214	5.94E-01	3.47E-01	5.25E-02
PB-210	Not Detected	-----	3.53E+01
TH-232	5.11E-01	2.60E-01	1.39E-01
RA-228	6.54E-01	2.11E-01	1.47E-01
AC-228	5.84E-01	1.44E-01	7.89E-02
TH-228	3.78E-01	3.65E-01	4.65E-01
RA-224	6.61E-01	2.21E-01	7.49E-02
PB-212	6.57E-01	1.19E-01	3.75E-02
EI-212	5.53E-01	3.99E-01	3.34E-01
TL-208	5.46E-01	1.25E-01	6.08E-02
U-235	Not Detected	-----	2.42E-01
TH-231	Not Detected	-----	1.24E+01
PA-231	Not Detected	-----	1.45E+00
TH-227	Not Detected	-----	3.34E-01
RA-223	Not Detected	-----	2.15E-01
RN-219	Not Detected	-----	3.66E-01
PB-211	Not Detected	-----	8.29E-01
TL-207	Not Detected	-----	1.34E+01
AM-241	Not Detected	-----	4.73E-01
PU-239	Not Detected	-----	4.38E+02
NP-237	Not Detected	-----	2.59E-01
PA-233	Not Detected	-----	5.64E-02
TH-229	Not Detected	-----	2.51E-01

[Summary Report] - Sample ID: : 70210511

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.08E-02
AG-110m	Not Detected	-----	4.77E-02
BA-133	Not Detected	-----	6.67E-02
BE-7	Not Detected	-----	2.76E-01
CD-109	<del>1.54E+00</del>	<del>7.23E-01</del>	1.02E+00
CD-115	Not Detected	-----	1.14E-01
CE-139	Not Detected	-----	3.04E-02
CE-141	Not Detected	-----	5.42E-02
CE-144	Not Detected	-----	2.53E-01
CO-56	Not Detected	-----	3.86E-02
CO-57	Not Detected	-----	3.14E-02
CO-58	Not Detected	-----	3.54E-02
CO-60	Not Detected	-----	3.89E-02
CR-51	Not Detected	-----	2.56E-01
CS-134	Not Detected	-----	5.01E-02
CS-137	1.56E-01	3.75E-02	2.34E-02
EU-152	Not Detected	-----	9.43E-02
EU-154	Not Detected	-----	1.88E-01
EU-155	Not Detected	-----	1.57E-01
FE-59	Not Detected	-----	8.03E-02
GD-153	Not Detected	-----	1.10E-01
HG-203	Not Detected	-----	3.40E-02
I-131	Not Detected	-----	3.45E-02
IR-192	Not Detected	-----	2.88E-02
K-40	1.78E+01	2.69E+00	3.02E-01
MN-52	Not Detected	-----	3.75E-02
MN-54	Not Detected	-----	3.57E-02
MO-99	Not Detected	-----	3.86E-01
NA-22	Not Detected	-----	4.64E-02
NA-24	Not Detected	-----	2.35E-01
NB-95	Not Detected	-----	2.19E-01
ND-147	Not Detected	-----	2.37E-01
NI-57	Not Detected	-----	5.76E-02
RU-103	Not Detected	-----	3.14E-02
RU-106	Not Detected	-----	3.18E-01
SB-122	Not Detected	-----	6.18E-02
SB-124	Not Detected	-----	3.32E-02
SB-125	Not Detected	-----	8.44E-02
SN-113	Not Detected	-----	3.95E-02
SR-85	Not Detected	-----	3.91E-02
TA-182	Not Detected	-----	1.53E-01
TA-183	Not Detected	-----	5.21E-01
TC-99m	Not Detected	-----	3.43E+00
TL-201	Not Detected	-----	2.74E-01
XE-133	Not Detected	-----	2.47E-01
Y-88	Not Detected	-----	2.62E-02
ZN-65	Not Detected	-----	1.04E-01
ZR-95	Not Detected	-----	5.91E-02

*not detected 7/12/18/57*

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 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-19-97 8:27:23 AM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 12/19/97 Reviewed by: *[Signature]* 12/19/97 \*  
 \*\*\*\*\*

Customer : AAS/MAC (6134/SMO) *021-0.0-1.0-5*  
 Customer Sample ID : 036771-003 *0.0*  
 Lab Sample ID : 70210513

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 658.000 gram  
 Sample Date/Time : 12-16-97 12:50:00 PM  
 Acquire Start Date/Time : 12-18-97 8:30:31 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.28E+00
TH-234	1.19E+00	4.24E-01	6.44E-01
RA-226	1.26E+00	5.89E-01	5.67E-01
PB-214	6.24E-01	1.11E-01	4.86E-02
BI-214	5.83E-01	1.30E-01	5.53E-02
PB-210	Not Detected	-----	3.76E+01
TH-232	7.65E-01	3.94E-01	1.48E-01
RA-228	5.88E-01	2.23E-01	1.53E-01
AC-228	6.73E-01	2.11E-01	9.18E-02
TH-228	8.31E-01	2.64E-01	5.08E-01
RA-224	6.57E-01	3.00E-01	7.91E-02
PB-212	7.33E-01	2.06E-01	4.21E-02
BI-212	6.15E-01	2.90E-01	3.20E-01
TL-208	6.96E-01	1.37E-01	6.21E-02
U-235	Not Detected	-----	2.48E-01
TH-231	Not Detected	-----	1.32E+01
PA-231	Not Detected	-----	1.47E+00
TH-227	Not Detected	-----	3.56E-01
RA-223	Not Detected	-----	2.31E-01
RN-219	Not Detected	-----	3.92E-01
PB-211	Not Detected	-----	9.10E-01
TL-207	Not Detected	-----	1.40E+01
AM-241	Not Detected	-----	4.96E-01
PU-239	Not Detected	-----	4.63E+02
NP-237	Not Detected	-----	3.28E-01
PA-233	Not Detected	-----	6.02E-02
TH-229	Not Detected	-----	2.61E-01



[Summary Report] - Sample ID: : 70210513

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.13E-02
AG-110m	Not Detected	-----	4.85E-02
BA-133	Not Detected	-----	6.82E-02
BE-7	Not Detected	-----	2.77E-01
CD-109	<del>2.63E+00</del>	<del>5.84E-02</del>	1.11E+00
CD-115	Not Detected	-----	1.19E-01
CE-139	Not Detected	-----	3.02E-02
CE-141	Not Detected	-----	5.55E-02
CE-144	Not Detected	-----	2.56E-01
CO-56	Not Detected	-----	3.84E-02
CO-57	Not Detected	-----	3.07E-02
CO-58	Not Detected	-----	3.28E-02
CO-60	Not Detected	-----	3.65E-02
CR-51	Not Detected	-----	2.47E-01
CS-134	Not Detected	-----	4.91E-02
CS-137	1.78E-01	4.44E-02	2.41E-02
EU-152	Not Detected	-----	9.23E-02
EU-154	Not Detected	-----	1.89E-01
EU-155	Not Detected	-----	1.53E-01
FE-59	Not Detected	-----	7.78E-02
GD-153	Not Detected	-----	1.09E-01
HG-203	Not Detected	-----	3.22E-02
I-131	Not Detected	-----	3.53E-02
IR-192	Not Detected	-----	2.79E-02
K-40	1.57E+01	3.01E+00	2.86E-01
MN-52	Not Detected	-----	3.92E-02
MN-54	Not Detected	-----	3.61E-02
MO-99	Not Detected	-----	3.91E-01
NA-22	Not Detected	-----	4.16E-02
NA-24	Not Detected	-----	2.70E-01
NB-95	Not Detected	-----	2.34E-01
ND-147	Not Detected	-----	2.29E-01
NI-57	Not Detected	-----	1.19E-01
RU-103	Not Detected	-----	3.06E-02
RU-106	Not Detected	-----	3.04E-01
SB-122	Not Detected	-----	6.60E-02
SB-124	Not Detected	-----	3.16E-02
SB-125	Not Detected	-----	8.47E-02
SN-113	Not Detected	-----	3.95E-02
SR-85	Not Detected	-----	3.98E-02
TA-182	Not Detected	-----	1.57E-01
TA-183	Not Detected	-----	5.41E-01
TC-99m	Not Detected	-----	5.01E+00
TL-201	Not Detected	-----	2.83E-01
XE-133	Not Detected	-----	2.70E-01
Y-88	Not Detected	-----	2.78E-02
ZN-65	Not Detected	-----	1.07E-01
ZR-95	Not Detected	-----	5.76E-02

*Not detected*  
*J 12/19/97*

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-18-97 12:35:23 PM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 12/19/97 Reviewed by: *[Signature]* 12/19/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO) *022-00-05-5*  
 Customer Sample ID : 036772-003 *021-05-00-5*  
 Lab Sample ID : 70210514

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 658.000 gram  
 Sample Date/Time : 12-16-97 12:55:00 PM  
 Acquire Start Date/Time : 12-18-97 10:52:32 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	-----	3.68E+00
TH-234	Not Detected	-----	6.98E-01
RA-226	1.68E+00	7.11E-01	6.18E-01
PB-214	7.78E-01	5.70E-01	5.43E-02
BI-214	7.44E-01	1.24E-01	5.77E-02
PB-210	Not Detected	-----	3.87E+01
TH-232	8.76E-01	4.66E-01	1.74E-01
RA-228	9.36E-01	3.20E-01	1.80E-01
AC-228	9.27E-01	4.67E-01	9.62E-02
TH-228	1.15E+00	3.23E-01	5.51E-01
RA-224	9.18E-01	3.48E-01	8.57E-02
PB-212	9.20E-01	2.08E-01	4.62E-02
EI-212	1.19E+00	2.01E+00	3.31E-01
TL-208	8.63E-01	9.78E-01	7.58E-02
U-235	Not Detected	-----	2.68E-01
TH-231	Not Detected	-----	1.44E+01
PA-231	Not Detected	-----	1.60E+00
TH-227	Not Detected	-----	3.97E-01
RA-223	Not Detected	-----	2.50E-01
RN-219	Not Detected	-----	4.31E-01
PB-211	Not Detected	-----	9.63E-01
TL-207	Not Detected	-----	1.57E+01
AM-241	Not Detected	-----	5.35E-01
PU-239	Not Detected	-----	4.93E+02
NP-237	Not Detected	-----	3.60E-01
PA-233	Not Detected	-----	6.71E-02
TH-229	Not Detected	-----	2.81E-01

[Summary Report] - Sample ID: : 70210514

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	4.64E-02
AG-110m	Not Detected	-----	4.39E-02
BA-133	Not Detected	-----	7.46E-02
BE-7	Not Detected	-----	2.90E-01
CD-109	Not Detected	-----	1.22E+00
CD-115	Not Detected	-----	1.36E-01
CE-139	Not Detected	-----	3.32E-02
CE-141	Not Detected	-----	6.06E-02
CE-144	Not Detected	-----	2.70E-01
CO-56	Not Detected	-----	4.18E-02
CO-57	Not Detected	-----	3.43E-02
CO-58	Not Detected	-----	3.70E-02
CO-60	Not Detected	-----	4.36E-02
CR-51	Not Detected	-----	2.70E-01
CS-134	Not Detected	-----	5.45E-02
CS-137	8.89E-02	3.91E-02	2.78E-02
EU-152	Not Detected	-----	1.03E-01
EU-154	Not Detected	-----	2.15E-01
EU-155	Not Detected	-----	1.66E-01
FE-59	Not Detected	-----	8.88E-02
GD-153	Not Detected	-----	1.20E-01
HG-203	Not Detected	-----	3.64E-02
I-131	Not Detected	-----	3.77E-02
IR-192	Not Detected	-----	3.09E-02
K-40	2.21E+01	3.99E+00	3.07E-01
MN-52	Not Detected	-----	4.24E-02
MN-54	Not Detected	-----	4.13E-02
MO-99	Not Detected	-----	4.29E-01
NA-22	Not Detected	-----	4.78E-02
NA-24	Not Detected	-----	3.15E-01
NB-95	Not Detected	-----	2.66E-01
ND-147	Not Detected	-----	2.59E-01
NI-57	Not Detected	-----	7.05E-02
RU-103	Not Detected	-----	3.35E-02
RU-106	Not Detected	-----	3.28E-01
SB-122	Not Detected	-----	7.28E-02
SB-124	Not Detected	-----	3.57E-02
SB-125	Not Detected	-----	9.15E-02
SN-113	Not Detected	-----	4.15E-02
SR-85	Not Detected	-----	4.26E-02
TA-182	Not Detected	-----	1.71E-01
TA-183	Not Detected	-----	5.93E-01
TC-99m	Not Detected	-----	7.16E+00
TL-201	Not Detected	-----	3.20E-01
XE-133	Not Detected	-----	2.97E-01
Y-88	Not Detected	-----	2.85E-02
ZN-65	Not Detected	-----	1.16E-01
ZR-95	Not Detected	-----	6.30E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-18-97 2:20:24 PM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 12/19/97 Reviewed by: *[Signature]* 12/19/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO) *022-0-0.5-5*  
 Customer Sample ID : 036773-003  
 Lab Sample ID : 70210515

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 705.000 gram  
 Sample Date/Time : 12-16-97 12:57:00 PM  
 Acquire Start Date/Time : 12-18-97 12:37:38 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	-----	3.35E+00
TH-234	Not Detected	-----	5.82E-01
RA-226	1.37E+00	1.68E+00	6.61E-01
PB-214	5.67E-01	1.22E-01	4.73E-02
BI-214	5.32E-01	1.11E-01	4.97E-02
B-210	Not Detected	-----	3.50E+01
TH-232	7.06E-01	3.42E-01	1.41E-01
RA-228	7.79E-01	2.56E-01	1.42E-01
AC-228	6.99E-01	4.99E-01	8.09E-02
TH-228	6.14E-01	2.33E-01	4.68E-01
RA-224	6.36E-01	2.42E-01	8.09E-02
PB-212	7.51E-01	1.24E-01	3.76E-02
BI-212	7.95E-01	4.61E-01	3.46E-01
TL-208	7.06E-01	2.01E-01	5.89E-02
U-235	Not Detected	-----	2.38E-01
TH-231	Not Detected	-----	1.23E+01
PA-231	Not Detected	-----	1.43E+00
TH-227	Not Detected	-----	3.47E-01
RA-223	Not Detected	-----	2.16E-01
RN-219	Not Detected	-----	3.72E-01
PB-211	Not Detected	-----	8.44E-01
TL-207	Not Detected	-----	1.31E+01
AM-241	Not Detected	-----	4.70E-01
PU-239	Not Detected	-----	4.45E+02
NP-237	Not Detected	-----	2.84E-01
PA-233	Not Detected	-----	5.78E-02
TH-229	Not Detected	-----	2.52E-01

[Summary Report] - Sample ID: : 70210515

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.11E-02
AG-110m	Not Detected	-----	3.90E-02
BA-133	Not Detected	-----	6.24E-02
BE-7	Not Detected	-----	2.59E-01
CD-109	Not Detected	-----	9.66E-01
CD-115	Not Detected	-----	1.22E-01
CE-139	Not Detected	-----	2.95E-02
CE-141	Not Detected	-----	5.41E-02
CE-144	Not Detected	-----	2.42E-01
CO-56	Not Detected	-----	3.68E-02
CO-57	Not Detected	-----	2.95E-02
CO-58	Not Detected	-----	3.24E-02
CO-60	Not Detected	-----	3.56E-02
CR-51	Not Detected	-----	2.44E-01
CS-134	Not Detected	-----	4.53E-02
CS-137	8.01E-02	3.25E-02	1.93E-02
EU-152	Not Detected	-----	8.85E-02
EU-154	Not Detected	-----	1.90E-01
EU-155	Not Detected	-----	1.50E-01
FE-59	Not Detected	-----	6.89E-02
GD-153	Not Detected	-----	1.06E-01
HG-203	Not Detected	-----	3.21E-02
I-131	Not Detected	-----	3.35E-02
IR-192	Not Detected	-----	2.75E-02
K-40	1.76E+01	2.62E+00	2.61E-01
MN-52	Not Detected	-----	3.92E-02
MN-54	Not Detected	-----	3.38E-02
MO-99	Not Detected	-----	3.77E-01
NA-22	Not Detected	-----	4.16E-02
NA-24	Not Detected	-----	3.19E-01
NB-95	Not Detected	-----	2.35E-01
ND-147	Not Detected	-----	2.28E-01
NI-57	Not Detected	-----	7.27E-02
RU-103	Not Detected	-----	3.01E-02
RU-106	Not Detected	-----	2.85E-01
SB-122	Not Detected	-----	6.49E-02
SB-124	Not Detected	-----	2.94E-02
SB-125	Not Detected	-----	7.98E-02
SN-113	Not Detected	-----	3.76E-02
SR-85	Not Detected	-----	3.75E-02
TA-182	Not Detected	-----	1.41E-01
TA-183	Not Detected	-----	5.27E-01
TC-99m	Not Detected	-----	7.63E+00
TL-201	Not Detected	-----	2.91E-01
XE-133	Not Detected	-----	2.59E-01
Y-88	Not Detected	-----	2.66E-02
ZN-65	Not Detected	-----	9.86E-02
ZR-95	Not Detected	-----	5.72E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-19-97 8:54:00 AM \*  
 \*\*\*\*\*

\* Analyzed by: *J* 12/19/97 Reviewed by: *AG* 12/19/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO) *022-0.5-1.0-5*  
 Customer Sample ID : 036774-003  
 Lab Sample ID : 70210516

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 768.000 gram  
 Sample Date/Time : 12-16-97 1:00:00 PM  
 Acquire Start Date/Time : 12-18-97 2:22:38 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	1.51E+00	1.53E+00	2.17E+00
TH-234	8.34E-01	3.76E-01	5.48E-01
RA-226	1.03E+00	4.83E-01	4.98E-01
PB-214	6.37E-01	1.16E-01	4.80E-02
BI-214	6.48E-01	1.24E-01	4.65E-02
PB-210	Not Detected	-----	3.27E+01
TH-232	6.33E-01	3.10E-01	1.48E-01
RA-228	6.86E-01	2.17E-01	1.43E-01
AC-228	6.67E-01	1.76E-01	7.82E-02
TH-228	7.34E-01	2.45E-01	4.36E-01
RA-224	8.45E-01	2.75E-01	6.48E-02
PB-212	7.33E-01	1.24E-01	3.74E-02
BI-212	9.43E-01	4.10E-01	2.79E-01
TL-208	7.00E-01	1.34E-01	5.71E-02
U-235	Not Detected	-----	2.33E-01
TH-231	Not Detected	-----	1.18E+01
PA-231	Not Detected	-----	1.39E+00
TH-227	Not Detected	-----	3.26E-01
RA-223	Not Detected	-----	2.08E-01
RN-219	Not Detected	-----	3.54E-01
PB-211	Not Detected	-----	7.92E-01
TL-207	Not Detected	-----	1.29E+01
AM-241	Not Detected	-----	4.54E-01
PU-239	Not Detected	-----	4.18E+02
NP-237	<del>3.62E-01</del>	<del>1.52E-01</del>	2.52E-01
PA-233	Not Detected	-----	5.32E-02
TH-229	Not Detected	-----	2.40E-01

*Not detected*  
*J* 12/19/97

[Summary Report] - Sample ID: : 70210516

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.76E-02
AG-110m	Not Detected	-----	3.65E-02
BA-133	Not Detected	-----	6.27E-02
BE-7	Not Detected	-----	2.37E-01
CD-109	Not Detected	-----	8.56E-01
CD-115	Not Detected	-----	1.17E-01
CE-139	Not Detected	-----	2.78E-02
CE-141	Not Detected	-----	5.14E-02
CE-144	Not Detected	-----	2.33E-01
CO-56	Not Detected	-----	3.37E-02
GO-57	Not Detected	-----	2.86E-02
CO-58	Not Detected	-----	2.98E-02
CO-60	Not Detected	-----	3.31E-02
CR-51	Not Detected	-----	2.30E-01
CS-134	Not Detected	-----	4.62E-02
CS-137	5.87E-02	2.45E-02	2.08E-02
EU-152	Not Detected	-----	8.57E-02
EU-154	Not Detected	-----	1.74E-01
EU-155	Not Detected	-----	1.42E-01
FE-59	Not Detected	-----	6.95E-02
GD-153	Not Detected	-----	9.88E-02
HG-203	Not Detected	-----	3.12E-02
I-131	Not Detected	-----	3.21E-02
IR-192	Not Detected	-----	2.56E-02
K-40	1.60E+01	2.36E+00	2.35E-01
MN-52	Not Detected	-----	3.77E-02
MN-54	Not Detected	-----	3.02E-02
MO-99	Not Detected	-----	3.67E-01
NA-22	Not Detected	-----	4.09E-02
NA-24	Not Detected	-----	3.24E-01
NB-95	Not Detected	-----	2.24E-01
ND-147	Not Detected	-----	2.09E-01
NI-57	Not Detected	-----	6.92E-02
RU-103	Not Detected	-----	2.88E-02
RU-106	Not Detected	-----	2.73E-01
SB-122	Not Detected	-----	6.26E-02
SB-124	Not Detected	-----	2.94E-02
SB-125	Not Detected	-----	8.04E-02
SN-113	Not Detected	-----	3.55E-02
SR-85	Not Detected	-----	3.57E-02
TA-182	Not Detected	-----	1.43E-01
TA-183	Not Detected	-----	5.22E-01
TC-99m	Not Detected	-----	9.27E+00
TL-201	Not Detected	-----	2.71E-01
XE-133	Not Detected	-----	2.60E-01
Y-88	Not Detected	-----	2.90E-02
ZN-65	Not Detected	-----	9.79E-02
ZR-95	Not Detected	-----	5.21E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-19-97 9:21:10 AM \*  
 \*\*\*\*\*

\* Analyzed by: *J 12/19/97* Reviewed by: *SM, 12/19/97*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO) *023-0-05-5*  
 Customer Sample ID : 036775-003  
 Lab Sample ID : 70210517

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 560.000 gram  
 Sample Date/Time : 12-16-97 1:05:00 PM  
 Acquire Start Date/Time : 12-18-97 4:07:28 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	-----	3.71E+00
TH-234	1.06E+00	4.55E-01	7.15E-01
RA-226	1.57E+00	7.04E-01	6.38E-01
PB-214	6.56E-01	1.31E-01	5.38E-02
BI-214	7.13E-01	2.14E-01	6.06E-02
PB-210	Not Detected	-----	4.02E+01
TH-232	7.79E-01	4.14E-01	1.58E-01
RA-228	7.64E-01	3.40E-01	1.72E-01
AC-228	7.09E-01	2.07E-01	9.86E-02
TH-228	9.37E-01	2.99E-01	5.50E-01
RA-224	6.56E-01	2.57E-01	8.95E-02
PB-212	7.29E-01	1.44E-01	4.56E-02
BI-212	6.03E-01	4.57E-01	3.38E-01
TL-208	6.91E-01	1.64E-01	8.25E-02
U-235	Not Detected	-----	2.80E-01
TH-231	Not Detected	-----	1.40E+01
PA-231	Not Detected	-----	1.64E+00
TH-227	Not Detected	-----	3.91E-01
RA-223	Not Detected	-----	2.42E-01
RN-219	Not Detected	-----	4.55E-01
PB-211	Not Detected	-----	9.99E-01
TL-207	Not Detected	-----	1.57E+01
AM-241	Not Detected	-----	5.63E-01
PU-239	Not Detected	-----	5.18E+02
NP-237	Not Detected	-----	3.51E-01
PA-233	Not Detected	-----	6.79E-02
TH-229	Not Detected	-----	2.87E-01



[Summary Report] - Sample ID: : 70210517

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.21E-02
AG-110m	Not Detected	-----	5.69E-02
BA-133	Not Detected	-----	7.59E-02
BE-7	Not Detected	-----	3.09E-01
CD-109	<del>2.15E+00</del>	<del>8.52E-01</del>	<del>1.19E+00</del>
CD-115	Not Detected	-----	1.47E-01
CE-139	Not Detected	-----	3.35E-02
CE-141	Not Detected	-----	6.27E-02
CE-144	Not Detected	-----	2.75E-01
CO-56	Not Detected	-----	4.53E-02
CO-57	Not Detected	-----	3.49E-02
CO-58	Not Detected	-----	3.84E-02
CO-60	Not Detected	-----	4.38E-02
CR-51	Not Detected	-----	2.88E-01
CS-134	Not Detected	-----	5.72E-02
CS-137	2.11E-01	6.02E-02	2.97E-02
EU-152	Not Detected	-----	1.05E-01
EU-154	Not Detected	-----	1.94E-01
EU-155	Not Detected	-----	1.71E-01
FE-59	Not Detected	-----	8.12E-02
GD-153	Not Detected	-----	1.22E-01
HG-203	Not Detected	-----	3.68E-02
I-131	Not Detected	-----	4.27E-02
IR-192	Not Detected	-----	3.31E-02
K-40	1.55E+01	2.69E+00	3.21E-01
MN-52	Not Detected	-----	4.81E-02
MN-54	Not Detected	-----	3.99E-02
MO-99	Not Detected	-----	4.66E-01
NA-22	Not Detected	-----	4.65E-02
NA-24	Not Detected	-----	4.06E-01
NB-95	Not Detected	-----	2.72E-01
ND-147	Not Detected	-----	2.58E-01
NI-57	Not Detected	-----	7.70E-02
RU-103	Not Detected	-----	3.54E-02
RU-106	Not Detected	-----	3.48E-01
SB-122	Not Detected	-----	8.25E-02
SB-124	Not Detected	-----	3.65E-02
SB-125	Not Detected	-----	9.79E-02
SN-113	Not Detected	-----	4.33E-02
SR-85	Not Detected	-----	4.42E-02
TA-182	Not Detected	-----	1.67E-01
TA-183	Not Detected	-----	6.35E-01
TC-99m	Not Detected	-----	1.31E+01
TL-201	Not Detected	-----	3.30E-01
XE-133	Not Detected	-----	3.14E-01
Y-88	Not Detected	-----	3.39E-02
ZN-65	Not Detected	-----	1.17E-01
ZR-95	Not Detected	-----	6.64E-02

*not detected*  
*J 12/19/97*

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-19-97 9:43:46 AM \*  
 \*\*\*\*\*  
 \* Analyzed-by: *[Signature]* 12/19/97 Reviewed by: *[Signature]* 12/19/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036776-003  
 Lab Sample ID : 70210518 023-05-10-3

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 604.000 gram  
 Sample Date/Time : 12-16-97 1:07:00 PM  
 Acquire Start Date/Time : 12-18-97 5:52:22 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.59E+00
TH-234	8.73E-01	5.73E-01	6.94E-01
RA-226	1.45E+00	6.07E-01	5.77E-01
PB-214	7.55E-01	1.83E-01	5.35E-02
BI-214	7.15E-01	1.51E-01	5.76E-02
PB-210	Not Detected	-----	3.84E+01
TH-232	8.17E-01	4.40E-01	1.72E-01
RA-228	7.93E-01	4.38E-01	2.05E-01
AC-228	7.10E-01	1.68E-01	8.61E-02
TH-228	6.52E-01	2.70E-01	5.55E-01
RA-224	6.71E-01	2.61E-01	8.02E-02
PB-212	7.43E-01	1.29E-01	4.17E-02
EI-212	7.66E-01	5.51E-01	3.63E-01
TL-208	6.43E-01	1.59E-01	6.98E-02
U-235	Not Detected	-----	2.65E-01
TH-231	Not Detected	-----	1.37E+01
PA-231	Not Detected	-----	1.62E+00
TH-227	Not Detected	-----	3.75E-01
RA-223	Not Detected	-----	2.43E-01
RN-219	Not Detected	-----	4.15E-01
PB-211	Not Detected	-----	9.58E-01
TL-207	Not Detected	-----	1.53E+01
AM-241	Not Detected	-----	5.22E-01
PU-239	Not Detected	-----	4.85E+02
NP-237	Not Detected	-----	2.90E-01
PA-233	Not Detected	-----	6.35E-02
TH-229	Not Detected	-----	2.72E-01

[Summary Report] - Sample ID: : 70210518

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.32E-02
AG-110m	Not Detected	-----	3.78E-02
BA-133	Not Detected	-----	7.58E-02
BE-7	Not Detected	-----	2.83E-01
CD-109	Not Detected	-----	9.85E-01
CD-115	Not Detected	-----	1.45E-01
CE-139	Not Detected	-----	3.25E-02
CE-141	Not Detected	-----	5.92E-02
CE-144	Not Detected	-----	2.67E-01
CO-56	Not Detected	-----	4.24E-02
GO-57	Not Detected	-----	3.33E-02
CO-58	Not Detected	-----	3.74E-02
CO-60	Not Detected	-----	3.90E-02
CR-51	Not Detected	-----	2.74E-01
CS-134	Not Detected	-----	5.44E-02
CS-137	3.87E-02	2.71E-02	2.41E-02
EU-152	Not Detected	-----	9.99E-02
EU-154	Not Detected	-----	1.99E-01
EU-155	Not Detected	-----	1.65E-01
FE-59	Not Detected	-----	8.29E-02
GD-153	Not Detected	-----	1.14E-01
HG-203	Not Detected	-----	3.57E-02
I-131	Not Detected	-----	3.76E-02
IR-192	Not Detected	-----	3.10E-02
K-40	1.79E+01	2.71E+00	2.83E-01
MN-52	Not Detected	-----	4.09E-02
MN-54	Not Detected	-----	3.94E-02
MO-99	Not Detected	-----	4.65E-01
NA-22	Not Detected	-----	4.91E-02
NA-24	Not Detected	-----	4.05E-01
NB-95	Not Detected	-----	2.65E-01
ND-147	Not Detected	-----	2.51E-01
NI-57	Not Detected	-----	8.68E-02
RU-103	Not Detected	-----	3.34E-02
RU-106	Not Detected	-----	3.27E-01
SB-122	Not Detected	-----	8.10E-02
SB-124	Not Detected	-----	3.41E-02
SB-125	Not Detected	-----	8.72E-02
SN-113	Not Detected	-----	4.10E-02
SR-85	Not Detected	-----	4.30E-02
TA-182	Not Detected	-----	1.69E-01
TA-183	Not Detected	-----	6.09E-01
TC-99m	Not Detected	-----	1.54E+01
TL-201	Not Detected	-----	3.27E-01
XE-133	Not Detected	-----	3.16E-01
Y-88	Not Detected	-----	3.03E-02
ZN-65	Not Detected	-----	1.19E-01
ZR-95	Not Detected	-----	6.18E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-18-97 9:19:54 PM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 12/19/97 Reviewed by: *[Signature]* 12/19/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO) *023-05-1.0-D4*  
 Customer Sample ID : 036777-003  
 Lab Sample ID : 70210519

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 528.000 gram  
 Sample Date/Time : 12-16-97 1:07:00 PM  
 Acquire Start Date/Time : 12-18-97 7:37:15 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	-----	4.08E+00
TH-234	1.08E+00	5.58E-01	6.91E-01
RA-226	1.62E+00	7.84E-01	6.80E-01
PB-214	7.24E-01	1.45E-01	5.59E-02
BI-214	6.71E-01	1.42E-01	6.98E-02
PB-210	Not Detected	-----	4.50E+01
U-232	8.54E-01	1.52E+00	1.76E-01
RA-228	8.32E-01	2.61E-01	1.65E-01
AC-228	7.49E-01	1.98E-01	1.01E-01
TH-228	6.93E-01	2.62E-01	5.59E-01
RA-224	7.53E-01	2.92E-01	9.82E-02
PB-212	7.73E-01	1.33E-01	4.61E-02
EI-212	8.08E-01	3.69E-01	3.82E-01
TL-208	7.23E-01	1.69E-01	7.15E-02
U-235	Not Detected	-----	2.93E-01
TH-231	Not Detected	-----	1.51E+01
PA-231	Not Detected	-----	1.74E+00
TH-227	Not Detected	-----	4.12E-01
RA-223	Not Detected	-----	2.68E-01
RN-219	Not Detected	-----	4.90E-01
PB-211	Not Detected	-----	1.13E+00
TL-207	Not Detected	-----	1.79E+01
AM-241	Not Detected	-----	5.81E-01
FU-239	Not Detected	-----	5.32E+02
NP-237	Not Detected	-----	4.54E-01
PA-233	Not Detected	-----	7.09E-02
TH-229	Not Detected	-----	2.91E-01

[Summary Report] - Sample ID: : 70210519

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	5.13E-02
AG-110m	Not Detected	-----	4.20E-02
BA-133	Not Detected	-----	8.13E-02
BE-7	Not Detected	-----	3.15E-01
CD-109	Not Detected	-----	1.52E+00
CD-115	Not Detected	-----	1.65E-01
CE-139	Not Detected	-----	3.53E-02
CE-141	Not Detected	-----	6.60E-02
CE-144	Not Detected	-----	2.89E-01
CO-56	Not Detected	-----	4.87E-02
CO-57	Not Detected	-----	3.69E-02
CO-58	Not Detected	-----	4.20E-02
CO-60	Not Detected	-----	4.45E-02
CR-51	Not Detected	-----	2.93E-01
CS-134	Not Detected	-----	5.83E-02
CS-137	Not Detected	-----	4.58E-02
EU-152	Not Detected	-----	1.11E-01
EU-154	Not Detected	-----	2.36E-01
EU-155	Not Detected	-----	1.76E-01
FE-59	Not Detected	-----	9.26E-02
GD-153	Not Detected	-----	1.20E-01
HG-203	Not Detected	-----	3.97E-02
I-131	Not Detected	-----	4.23E-02
IR-192	Not Detected	-----	3.30E-02
K-40	1.95E+01	2.94E+00	3.29E-01
MN-52	Not Detected	-----	5.10E-02
MN-54	Not Detected	-----	4.28E-02
MO-99	Not Detected	-----	5.11E-01
NA-22	Not Detected	-----	5.11E-02
NA-24	Not Detected	-----	5.33E-01
NB-95	Not Detected	-----	2.95E-01
ND-147	Not Detected	-----	2.81E-01
NI-57	Not Detected	-----	1.70E-01
RU-103	Not Detected	-----	3.66E-02
RU-106	Not Detected	-----	3.66E-01
SB-122	Not Detected	-----	8.74E-02
SB-124	Not Detected	-----	3.74E-02
SB-125	Not Detected	-----	1.02E-01
SN-113	Not Detected	-----	4.69E-02
SR-85	Not Detected	-----	4.73E-02
TA-182	Not Detected	-----	1.93E-01
TA-183	Not Detected	-----	6.73E-01
TC-99m	Not Detected	-----	2.03E+01
TL-201	Not Detected	-----	3.74E-01
XE-133	Not Detected	-----	3.51E-01
Y-88	Not Detected	-----	3.59E-02
ZN-65	Not Detected	-----	1.29E-01
ZR-95	Not Detected	-----	7.20E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-18-97 11:03:55 PM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 12/19/97 Reviewed by: *[Signature]* 12/19/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO) *000-EC*  
 Customer Sample ID : 036802-006  
 Lab Sample ID : 70210520

Sample Description : MARINELLI LIQUID SAMPLE  
 Sample Quantity : 500.000 mL  
 Sample Date/Time : 12-16-97 10:30:00 AM  
 Acquire Start Date/Time : 12-18-97 9:22:03 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6001 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/mL)	2-sigma Error	MDA (pCi/mL)
U-238	Not Detected	-----	1.67E+00
TH-234	Not Detected	-----	3.95E-01
RA-226	Not Detected	-----	4.82E-01
PB-214	Not Detected	-----	5.56E-02
BI-214	Not Detected	-----	6.38E-02
PB-210	Not Detected	-----	1.51E+01
H-232	Not Detected	-----	1.57E-01
RA-228	Not Detected	-----	1.34E-01
AC-228	Not Detected	-----	8.35E-02
TH-228	Not Detected	-----	5.18E-01
RA-224	Not Detected	-----	1.26E-01
PB-212	Not Detected	-----	3.80E-02
BI-212	Not Detected	-----	3.09E-01
TL-208	Not Detected	-----	7.18E-02
U-235	Not Detected	-----	1.60E-01
TH-231	Not Detected	-----	6.72E+00
PA-231	Not Detected	-----	1.04E+00
TH-227	Not Detected	-----	1.45E-01
RA-223	Not Detected	-----	1.23E-01
RN-219	Not Detected	-----	2.62E-01
PB-211	Not Detected	-----	6.16E-01
TL-207	Not Detected	-----	9.97E+00
AM-241	Not Detected	-----	2.36E-01
PU-239	Not Detected	-----	2.81E+02
NP-237	Not Detected	-----	2.00E-01
PA-233	Not Detected	-----	4.57E-02
TH-229	Not Detected	-----	1.57E-01

[Summary Report] - Sample ID: : 70210520

Nuclide Name	Activity (pCi/mL )	2-sigma Error	MDA (pCi/mL )
AG-108m	Not Detected	-----	2.37E-02
AG-110m	Not Detected	-----	2.22E-02
BA-133	Not Detected	-----	3.44E-02
BE-7	Not Detected	-----	1.95E-01
CD-109	Not Detected	-----	6.67E-01
CD-115	Not Detected	-----	8.35E-02
CE-139	Not Detected	-----	2.00E-02
CE-141	Not Detected	-----	3.56E-02
CE-144	Not Detected	-----	1.55E-01
CO-56	Not Detected	-----	3.15E-02
CO-57	Not Detected	-----	2.01E-02
CO-58	Not Detected	-----	2.29E-02
CO-60	Not Detected	-----	2.59E-02
CR-51	Not Detected	-----	1.86E-01
CS-134	Not Detected	-----	2.88E-02
CS-137	Not Detected	-----	2.33E-02
EU-152	Not Detected	-----	6.03E-02
EU-154	Not Detected	-----	1.07E-01
EU-155	Not Detected	-----	8.92E-02
FE-59	Not Detected	-----	4.95E-02
GD-153	Not Detected	-----	6.42E-02
HG-203	Not Detected	-----	2.35E-02
I-131	Not Detected	-----	2.78E-02
IR-192	Not Detected	-----	2.12E-02
K-40	Not Detected	-----	3.13E-01
MN-52	Not Detected	-----	3.40E-02
MN-54	Not Detected	-----	2.55E-02
MO-99	Not Detected	-----	2.85E-01
NA-22	Not Detected	-----	2.77E-02
NA-24	Not Detected	-----	4.27E-01
NE-95	Not Detected	-----	1.07E-01
ND-147	Not Detected	-----	1.77E-01
NI-57	Not Detected	-----	1.17E-01
RU-103	Not Detected	-----	2.31E-02
RU-106	Not Detected	-----	2.29E-01
SB-122	Not Detected	-----	6.02E-02
SB-124	Not Detected	-----	2.46E-02
SB-125	Not Detected	-----	5.81E-02
SN-113	Not Detected	-----	2.80E-02
SR-85	Not Detected	-----	3.26E-02
TA-182	Not Detected	-----	8.59E-02
TA-183	Not Detected	-----	2.98E-01
TC-99m	Not Detected	-----	1.98E+01
TL-201	Not Detected	-----	1.84E-01
XE-133	Not Detected	-----	1.63E-01
Y-88	Not Detected	-----	2.61E-02
ZN-65	Not Detected	-----	5.68E-02
ZR-95	Not Detected	-----	4.30E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-19-97 7:42:31 AM \*  
 \*\*\*\*\*

\* Analyzed by: *J* 12/19/97 Reviewed by: *WJ* 12/19/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134  
 Lab Sample ID : 70210521

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 : 12-19-97 7:30:34 AM  
 Detector Name : LAB02  
 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	-----	2.09E+04
TH-234	Not Detected	-----	4.75E+03
RA-226	Not Detected	-----	6.32E+03
PB-214	Not Detected	-----	7.23E+02
BI-214	Not Detected	-----	6.35E+02
PB-210	Not Detected	-----	2.66E+05
TH-232	Not Detected	-----	2.29E+03
RA-228	Not Detected	-----	2.74E+03
AC-228	Not Detected	-----	1.59E+03
TH-228	Not Detected	-----	9.28E+04
RA-224	Not Detected	-----	2.36E+03
FE-212	Not Detected	-----	6.80E+03
EI-212	Not Detected	-----	6.02E+04
TL-208	Not Detected	-----	1.27E+04
U-235	Not Detected	-----	1.83E+03
TH-231	Not Detected	-----	8.42E+04
PA-231	Not Detected	-----	1.50E+04
TH-227	Not Detected	-----	2.53E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	5.74E+03
PB-211	Not Detected	-----	1.29E+04
TL-207	Not Detected	-----	2.23E+05
AM-241	7.95E+04	1.44E+04	3.28E+03
EU-239	Not Detected	-----	3.23E+06
NP-237	Not Detected	-----	2.48E+03
FA-233	Not Detected	-----	6.37E+02
TH-229	Not Detected	-----	1.82E+03



[Summary Report] - Sample ID: : 70210521

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected		3.46E+02
AG-110m	Not Detected		2.32E+06
BA-133	Not Detected		7.12E+02
BE-7	Not Detected		1.84E+18
CD-109	4.67E+05	4.35E+05	3.31E+05
CD-115	Not Detected		1.00E+26
CE-139	Not Detected		1.16E+08
CE-141	Not Detected		1.00E+26
CE-144	Not Detected		1.01E+06
CO-56	Not Detected		5.51E+12
CO-57	Not Detected		1.78E+05
CO-58	Not Detected		4.08E+13
CO-60	7.99E+04	1.24E+04	4.09E+02
CR-51	Not Detected		1.00E+26
CS-134	Not Detected		3.21E+03
CS-137	7.20E+04	1.03E+04	2.86E+02
EU-152	Not Detected		1.01E+03
EU-154	Not Detected		2.70E+03
EU-155	Not Detected		3.10E+03
FE-59	Not Detected		3.47E+20
GD-153	Not Detected		1.31E+06
HG-203	Not Detected		2.04E+19
I-131	Not Detected		1.00E+26
IR-192	Not Detected		1.23E+13
K-40	Not Detected		1.67E+03
MN-52	Not Detected		1.00E+26
MN-54	Not Detected		1.21E+05
MO-99	Not Detected		1.00E+26
NA-22	Not Detected		1.42E+03
NA-24	Not Detected		1.00E+26
NE-95	Not Detected		1.00E+26
ND-147	Not Detected		1.00E+26
NI-57	Not Detected		1.00E+26
RU-103	Not Detected		1.00E+26
RU-106	Not Detected		4.16E+05
SB-122	Not Detected		1.00E+26
SB-124	Not Detected		3.07E+15
SB-125	Not Detected		6.64E+03
SN-113	Not Detected		2.91E+09
SR-85	Not Detected		4.62E+14
TA-182	Not Detected		8.01E+09
TA-183	Not Detected		1.00E+26
TC-99m	Not Detected		1.00E+26
TL-201	Not Detected		1.00E+26
XE-133	Not Detected		1.00E+26
Y-88	Not Detected		4.10E+09
ZN-65	Not Detected		1.46E+06
ZR-95	Not Detected		1.02E+15

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

Report Date : 12-19-97 7:43:10 AM  
 QA File : C:\GENIEPC\CAMFILES\LCS2.QAF  
 Analyst : GLS  
 Sample ID : 70210521  
 Sample Quantity : 1.00 Each  
 Sample Date : 11-01-90 12:00:00 PM  
 Measurement Date : 12-19-97 7:30:34 AM  
 Elapsed Live Time : 600 seconds  
 Elapsed Real Time : 605 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.410E-02	4.275E-03	7.951E-02	< :In : : >
CS-137 Activity	6.995E-02	1.926E-03	7.200E-02	< :In : : >
CO-60 Activity	7.770E-02	2.121E-03	8.006E-02	< :In : : >

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

Reviewed by: \_\_\_\_\_

*[Signature]* 12/19/97

*[Handwritten notes: OK, 12/19/97]*



# ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab  
Batch No. 700093

AR/COC- 06046

SE 2001 COC 0.55

Dept. No./Mail Stop: <u>1465/1110</u>	Date Samples Shipped: <u>1/22/97</u>
Project/Task Manager: <u>AA-1 SAVLETT II</u>	Carrier/Waybill No.: <u>NC</u>
Project Name: <u>Final Report for ARA 57A</u>	Lab Contact: <u>FERNANDO DOMINGUEZ</u>
Record Center Code: <u>ER/1531 57A/TAT</u>	Lab Destination: <u>7715</u>
Logbook Ref No: <u>015 2F0375</u>	SMO Contact/Phone: <u>7266 SAIMI 811-3110</u>
Service Order No.: <u>2474 2052AD</u>	Send Report to SMO: <u>KATHY BECKER</u>

Contract No.: N/A  
 Case No.: 2839 Z 57A  
 SMO Authorization: DM Gayle  
 Bill to: Sandia National Laboratories  
 Supplier Services Department  
 P.O. Box 5800 MS 0154  
 Albuquerque, NM 87185-0154

Parameter & Method Requested									

Location		Tech Area		Reference LOV (available at SMO)		Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container		Preservative	Sample Collection Method	Sample Type	Lab Sample ID
Building <u>N/A</u> Room <u>N/A</u>		ER Sample ID or Sample Location Detail	Type	Volume											
Sample No. - Fraction															
✓	032515-005	CCTA-57A-GR-D14-D	N/A	57A	1-21-92 12:11	S	P	500ml	None	G	SA	X			
✓	032515-003	CCTA-57A-GR-D14-D-D.5-S	0-0.5		1-21-92 15:10										
✓	032517-005	CCTA-57A-GR-D175-D	N/A		1-21-92 10:25										
✓	032519-005	CCTA-57A-GR-D126-D	N/A		1-21-92 13:01										
✓	032521-005	CCTA-57A-GR-D14-D-EB	N/A		1-21-92 09:55	D14					EB	X			

RMMA <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Ref. No. _____	Sample Tracking <u>1/22/97</u>	Special Instructions/QC Requirements	Abnormal Conditions on Receipt
Sample Disposal <input type="checkbox"/> Return to Client <input type="checkbox"/> Disposal by lab	Date Entered (mm/dd/yy) <u>1/22/97</u>		
Turnaround Time <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Rush Required Report Date _____	Entered by: <u>DM Gayle</u>		

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	<u>F. Franchina</u>	<u>[Signature]</u>	<u>FF</u>	<u>LANL/6165/254-2999</u>

1. Relinquished by <u>[Signature]</u> Org. <u>LANL</u> Date <u>1-22-97</u> Time <u>1703</u>	4. Relinquished by _____ Org. _____ Date _____ Time _____
1. Received by <u>[Signature]</u> Org. <u>SMU7578</u> Date <u>1/22/97</u> Time <u>0903</u>	4. Received by _____ Org. _____ Date _____ Time _____
2. Relinquished by <u>[Signature]</u> Org. <u>SMU7578</u> Date <u>1/22/97</u> Time <u>1305</u>	5. Relinquished by _____ Org. _____ Date _____ Time _____
2. Received by <u>[Signature]</u> Org. <u>SMU7578</u> Date <u>1/22/97</u> Time <u>1305</u>	5. Received by _____ Org. _____ Date _____ Time _____
3. Relinquished by <u>[Signature]</u> Org. <u>SMU7578</u> Date <u>1/30/97</u> Time <u>0935</u>	6. Relinquished by _____ Org. _____ Date _____ Time _____
3. Received by <u>[Signature]</u> Org. <u>SMU7578</u> Date <u>1/30/97</u> Time <u>0935</u>	6. Received by _____ Org. _____ Date _____ Time _____



To be completed by Customer

Shaded areas are for RPSD use only

Customer: <u>AAS / PAVLETCH</u>	Hazards/Special Instructions:  <u>CASC # 8834.205710</u> <u>CUC-06046</u>	Batch Log Number <u>790077</u>
Organization: <u>WBP5</u>		Logged By <u>[Signature]</u>
Project Location: <u>CCTA Site 57A</u>		Analysis Type <input checked="" type="checkbox"/> Gamma Spec <input type="checkbox"/> H-3 <input type="checkbox"/> Alpha Beta <input type="checkbox"/> Alpha Spec <input type="checkbox"/> Total U <input type="checkbox"/> Other
Phone: <u>284-2479</u>		UIMS Login
Date Results Needed: <u>2-3-97</u>		Results Filter
Suspect Isotopes: <u>V238, Th</u>		Sample disposal
Other Information: <u>N/A</u>		

Customer Sample ID	Sample Type	Date/Time Collected	Sample Volume	Requested Analysis	RPSD Sample ID	Rad Count GPM	Sample Weight	Remarks
<u>032513-005</u>	<u>SOIL</u>	<u>1-24-97 1240</u>	<u>500ml</u>	<u>GAMMA SPEC</u>	<u>01</u>	<u>2300</u>	<u>785</u>	
<u>032515-003</u>		<u>1-24-97 1310</u>			<u>02</u>		<u>858</u>	
<u>032517-005</u>		<u>1-24-97 1055</u>			<u>03</u>		<u>649</u>	
<u>032519-005</u>		<u>1-24-97 1350</u>			<u>04</u>		<u>764</u>	
<u>032521-005</u>	<u>DIW</u>	<u>1-24-97 0955</u>			<u>05</u>	<u>5300</u>	<u>577</u>	
<u>LCS</u>	<u>—</u>	<u>1/10/97</u>	<u>—</u>	<u>8 spec</u>	<u>06</u>	<u>N/A</u>	<u>N/A</u>	

Relinquished by <u>[Signature]</u>	Date <u>1-22-97</u>	Time <u>0903</u>	Received by <u>[Signature]</u>	Date <u>1/22/97</u>	Time <u>903 AM</u>
Relinquished by <u>[Signature]</u>	Date <u>1/22/97</u>	Time <u>1305</u>	Received by <u>[Signature]</u>	Date <u>1/22/97</u>	Time <u>1305</u>
Relinquished by <u>[Signature]</u>	Date <u>1/30/97</u>	Time <u>0935</u>	Received by <u>[Signature]</u>	Date <u>1/30/97</u>	Time <u>0935</u>
Relinquished by <u>[Signature]</u>	Date _____	Time _____	Received by _____	Date _____	Time _____

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 1-22-97 3:22:54 PM \*  
 \*\*\*\*\*

\* Analyzed by: *Sju 1/23/97* Reviewed by: *[Signature] 1/23/97* \*

Customer : PAVLETICH/McLAUGHLIN (6685/SMO)  
 Customer Sample ID : 032513-005  
 Lab Sample ID : 70009301

Sample Description : MARINELLI SOLID SAMPLE *CCTA - 574 - 6R - 024 - D*  
 Sample Quantity : 783.000 gram  
 Sample Date/Time : 1-21-97 12:40:00 PM  
 Acquire Start Date/Time : 1-22-97 1:37:07 PM  
 Detector Name : LAB01  
 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	-----	1.25E+00
TH-234	5.36E-01	3.01E-01	4.09E-01
RA-226	1.06E+00	5.26E-01	4.59E-01
PB-214	4.78E-01	1.13E-01	4.92E-02
BI-214	4.27E-01	9.79E-02	5.17E-02
TH-232	6.35E-01	3.36E-01	1.56E-01
RA-228	6.41E-01	3.33E-01	1.66E-01
AC-228	6.54E-01	1.94E-01	9.60E-02
TH-228	5.53E-01	3.25E-01	3.70E-01
RA-224	6.44E-01	2.76E-01	8.76E-02
PB-212	6.42E-01	1.24E-01	3.84E-02
BI-212	7.90E-01	4.87E-01	3.01E-01
TL-208	5.09E-01	1.54E-01	7.00E-02
U-235	Not Detected	-----	1.76E-01
TH-231	Not Detected	-----	1.64E+00
PA-231	Not Detected	-----	1.28E+00
TH-227	Not Detected	-----	2.93E-01
RA-223	Not Detected	-----	1.21E-01
RN-219	Not Detected	-----	3.55E-01
PB-211	Not Detected	-----	7.87E-01
TL-207	Not Detected	-----	1.39E+01
AM-241	Not Detected	-----	1.61E-01
PU-239	Not Detected	-----	3.17E+02
NP-237	Not Detected	-----	2.44E-01
PA-233	Not Detected	-----	5.33E-02
TH-229	Not Detected	-----	1.94E-01

[Summary Report] - Sample ID: : 70009301

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-110m	Not Detected	-----	4.93E-02
BA-133	Not Detected	-----	3.82E-02
BE-7	Not Detected	-----	2.38E-01
CD-109	Not Detected	-----	6.15E-01
CD-115	Not Detected	-----	8.47E-02
CE-139	Not Detected	-----	2.41E-02
CE-141	Not Detected	-----	4.01E-02
CE-144	Not Detected	-----	1.73E-01
CO-56	Not Detected	-----	3.97E-02
CO-57	Not Detected	-----	2.17E-02
CO-58	Not Detected	-----	3.26E-02
CO-60	Not Detected	-----	3.83E-02
CR-51	Not Detected	-----	2.17E-01
CS-134	Not Detected	-----	3.66E-02
CS-137	2.51E-01	5.63E-02	2.35E-02
EU-152	Not Detected	-----	2.55E-01
EU-154	Not Detected	-----	1.79E-01
EU-155	Not Detected	-----	9.78E-02
FE-59	Not Detected	-----	8.02E-02
GD-153	Not Detected	-----	7.41E-02
HG-203	Not Detected	-----	2.69E-02
I-131	Not Detected	-----	2.89E-02
IR-192	Not Detected	-----	2.52E-02
K-40	1.73E+01	2.69E+00	2.87E-01
MN-54	Not Detected	-----	3.50E-02
MO-99	Not Detected	-----	3.26E-01
NA-22	Not Detected	-----	4.62E-02
NA-24	Not Detected	-----	1.05E-01
NB-95	Not Detected	-----	1.37E-01
ND-147	Not Detected	-----	2.06E-01
NI-57	Not Detected	-----	7.22E-02
RU-103	Not Detected	-----	2.73E-02
RU-106	Not Detected	-----	2.93E-01
SB-122	Not Detected	-----	5.14E-02
SB-124	Not Detected	-----	2.93E-02
SB-125	Not Detected	-----	7.99E-02
SR-85	Not Detected	-----	3.66E-02
TA-182	Not Detected	-----	1.57E-01
TA-183	Not Detected	-----	1.58E-01
TC-99m	Not Detected	-----	3.73E-01
TL-201	Not Detected	-----	8.70E-02
XE-133	Not Detected	-----	1.02E-01
Y-88	Not Detected	-----	2.65E-02
ZN-65	Not Detected	-----	1.08E-01
ZR-95	Not Detected	-----	6.28E-02

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 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 1-22-97 5:13:05 PM \*  
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\* Analyzed by: *S. J. / 1/23/97* Reviewed by: *[Signature] / 1/23/97*  
 \*\*\*\*\*

Customer : PAVLETICH/McLAUGHLIN (6685/SMO)  
 Customer Sample ID : 032515-003  
 Lab Sample ID : 70009302

Sample Description : MARINELLI SOLID SAMPLE CCTA-57A-GR-024-D-0.5-S  
 Sample Quantity : 858.000 gram  
 Sample Date/Time : 1-21-97 1:10:00 PM  
 Acquire Start Date/Time : 1-22-97 3:25:30 PM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.18E+00
TH-234	Not Detected	-----	4.79E-01
RA-226	1.00E+00	4.20E-01	4.24E-01
PB-214	4.20E-01	9.45E-02	4.31E-02
BI-214	4.03E-01	9.78E-02	4.65E-02
TH-232	5.67E-01	6.31E-01	1.29E-01
RA-228	5.78E-01	1.80E-01	1.51E-01
AC-228	5.29E-01	3.44E-01	8.19E-02
TH-228	4.28E-01	2.44E-01	3.21E-01
RA-224	5.70E-01	2.91E-01	7.61E-02
PB-212	5.32E-01	1.15E-01	3.60E-02
BI-212	4.92E-01	3.25E-01	3.01E-01
TL-208	4.71E-01	2.85E-01	6.33E-02
U-235	Not Detected	-----	1.59E-01
TH-231	Not Detected	-----	1.59E+00
PA-231	Not Detected	-----	1.19E+00
TH-227	Not Detected	-----	2.64E-01
RA-223	Not Detected	-----	1.13E-01
RN-219	Not Detected	-----	3.26E-01
PB-211	Not Detected	-----	7.22E-01
TL-207	Not Detected	-----	1.29E+01
AM-241	Not Detected	-----	1.51E-01
PU-239	Not Detected	-----	2.98E+02
NP-237	Not Detected	-----	2.22E-01
PA-233	Not Detected	-----	4.92E-02
TH-229	Not Detected	-----	1.83E-01



[Summary Report] - Sample ID: : 70009302

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-110m	Not Detected	-----	3.56E-02
BA-133	Not Detected	-----	3.72E-02
BE-7	Not Detected	-----	2.18E-01
CD-109	Not Detected	-----	5.35E-01
CD-115	Not Detected	-----	7.93E-02
CE-139	Not Detected	-----	2.19E-02
CE-141	Not Detected	-----	3.71E-02
CE-144	Not Detected	-----	1.61E-01
CO-56	Not Detected	-----	3.51E-02
CO-57	Not Detected	-----	2.10E-02
CO-58	Not Detected	-----	3.22E-02
CO-60	Not Detected	-----	3.62E-02
CR-51	Not Detected	-----	1.97E-01
CS-134	Not Detected	-----	3.54E-02
CS-137	7.83E-02	4.14E-02	2.26E-02
EU-152	Not Detected	-----	2.27E-01
EU-154	Not Detected	-----	1.64E-01
EU-155	Not Detected	-----	9.03E-02
FE-59	Not Detected	-----	7.24E-02
GD-153	Not Detected	-----	6.95E-02
HG-203	Not Detected	-----	2.43E-02
I-131	Not Detected	-----	2.44E-02
IR-192	Not Detected	-----	2.35E-02
K-40	1.89E+01	2.85E+00	2.52E-01
MN-54	Not Detected	-----	3.44E-02
MO-99	Not Detected	-----	3.15E-01
NA-22	Not Detected	-----	4.30E-02
NA-24	Not Detected	-----	1.01E-01
NB-95	Not Detected	-----	1.24E-01
ND-147	Not Detected	-----	1.93E-01
NI-57	Not Detected	-----	6.82E-02
RU-103	Not Detected	-----	2.54E-02
RU-106	Not Detected	-----	2.68E-01
SB-122	Not Detected	-----	4.98E-02
SB-124	Not Detected	-----	2.81E-02
SB-125	Not Detected	-----	7.23E-02
SR-85	Not Detected	-----	3.30E-02
TA-182	Not Detected	-----	1.55E-01
TA-183	Not Detected	-----	1.49E-01
TC-99m	Not Detected	-----	3.99E-01
TL-201	Not Detected	-----	8.33E-02
XE-133	Not Detected	-----	1.00E-01
Y-88	Not Detected	-----	2.71E-02
ZN-65	Not Detected	-----	1.00E-01
ZR-95	Not Detected	-----	5.52E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 1-22-97 7:03:29 PM \*  
 \*\*\*\*\*

Analyzed by: *[Signature]* 1/23/97 Reviewed by: *[Signature]* 1/23/97  
 \*\*\*\*\*

Customer : PAVLETICH/McLAUGHLIN (6685/SMO)  
 Customer Sample ID : 032517-005  
 Lab Sample ID : 70009303

Sample Description : MARINELLI SOLID SAMPLE CCA-57A-GR-025-D  
 Sample Quantity : 644.000 gram  
 Sample Date/Time : 1-21-97 10:55:00 AM  
 Acquire Start Date/Time : 1-22-97 5:15:52 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	-----	1.29E+00
TH-234	Not Detected	-----	5.82E-01
RA-226	1.11E+00	5.51E-01	5.35E-01
PB-214	4.57E-01	9.57E-02	5.03E-02
BI-214	4.52E-01	2.09E-01	5.29E-02
TH-232	6.23E-01	3.53E-01	1.66E-01
RA-228	5.69E-01	2.29E-01	1.71E-01
AC-228	5.21E-01	1.95E-01	9.15E-02
PH-228	2.73E-01	3.21E-01	5.22E-01
RA-224	6.45E-01	2.45E-01	1.06E-01
PB-212	5.99E-01	1.14E-01	4.13E-02
BI-212	6.36E-01	6.06E-01	3.62E-01
TL-208	4.74E-01	1.38E-01	6.87E-02
U-235	Not Detected	-----	1.80E-01
TH-231	Not Detected	-----	1.85E+00
PA-231	Not Detected	-----	1.42E+00
TH-227	Not Detected	-----	3.12E-01
RA-223	Not Detected	-----	1.33E-01
RN-219	Not Detected	-----	3.99E-01
PB-211	Not Detected	-----	8.83E-01
TL-207	Not Detected	-----	1.50E+01
AM-241	Not Detected	-----	1.64E-01
PU-239	Not Detected	-----	3.48E+02
NP-237	Not Detected	-----	2.57E-01
PA-233	Not Detected	-----	5.61E-02
TH-229	Not Detected	-----	2.01E-01

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-110m	Not Detected	-----	5.96E-02
BA-133	Not Detected	-----	4.29E-02
BE-7	Not Detected	-----	2.79E-01
CD-109	Not Detected	-----	8.71E-01
CD-115	Not Detected	-----	9.88E-02
CE-139	Not Detected	-----	2.55E-02
CE-141	Not Detected	-----	4.22E-02
CE-144	Not Detected	-----	1.79E-01
CO-56	Not Detected	-----	3.86E-02
CO-57	Not Detected	-----	2.37E-02
CO-58	Not Detected	-----	3.57E-02
CO-60	Not Detected	-----	4.11E-02
CR-51	Not Detected	-----	2.28E-01
CS-134	Not Detected	-----	4.13E-02
CS-137	3.11E-01	7.71E-02	2.84E-02
EU-152	Not Detected	-----	2.48E-01
EU-154	Not Detected	-----	1.89E-01
EU-155	Not Detected	-----	1.00E-01
FE-59	Not Detected	-----	7.66E-02
GD-153	Not Detected	-----	7.95E-02
HG-203	Not Detected	-----	2.95E-02
I-131	Not Detected	-----	3.32E-02
IR-192	Not Detected	-----	2.74E-02
K-40	1.30E+01	2.17E+00	3.04E-01
MN-54	Not Detected	-----	3.53E-02
MO-99	Not Detected	-----	3.78E-01
NA-22	Not Detected	-----	4.55E-02
NA-24	Not Detected	-----	1.36E-01
NB-95	Not Detected	-----	1.50E-01
ND-147	Not Detected	-----	2.28E-01
NI-57	Not Detected	-----	9.07E-02
RU-103	Not Detected	-----	3.14E-02
RU-106	Not Detected	-----	3.13E-01
SB-122	Not Detected	-----	5.56E-02
SB-124	Not Detected	-----	3.22E-02
SB-125	Not Detected	-----	8.23E-02
SR-85	Not Detected	-----	4.06E-02
TA-182	Not Detected	-----	1.71E-01
TA-183	Not Detected	-----	1.67E-01
TC-99m	Not Detected	-----	7.38E-01
TL-201	Not Detected	-----	9.98E-02
XE-133	Not Detected	-----	1.25E-01
Y-88	Not Detected	-----	2.98E-02
ZN-65	Not Detected	-----	1.11E-01
ZR-95	Not Detected	-----	6.19E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 1-23-97 8:42:33 AM \*  
 \*\*\*\*\*

\* Analyzed by: *S. J. [Signature]* 1/23/97 Reviewed by: *[Signature]* 1/23/97 \*  
 \*\*\*\*\*

Customer : PAVLETICH/McLAUGHLIN (6685/SMO)  
 Customer Sample ID : 032519-005  
 Lab Sample ID : 70009304

Sample Description : MARINELLI SOLID SAMPLE CCTA-57A-GR-026 ->  
 Sample Quantity : 764.000 gram  
 Sample Date/Time : 1-21-97 1:50:00 PM  
 Acquire Start Date/Time : 1-23-97 6:58:12 AM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	1.02E+00
TH-234	5.68E-01	2.96E-01	4.55E-01
RA-226	1.33E+00	6.41E-01	5.26E-01
PB-214	5.52E-01	1.08E-01	4.65E-02
BI-214	5.51E-01	1.13E-01	4.95E-02
TH-232	6.21E-01	3.87E-01	1.50E-01
RA-228	7.04E-01	2.48E-01	1.56E-01
AC-228	6.65E-01	2.21E-01	9.84E-02
TH-228	4.64E-01	3.45E-01	3.96E-01
RA-224	7.73E-01	2.92E-01	7.69E-02
PB-212	6.63E-01	1.36E-01	3.98E-02
BI-212	7.34E-01	4.42E-01	3.13E-01
TL-208	6.14E-01	1.65E-01	6.57E-02
U-235	Not Detected	-----	1.73E-01
TH-231	Not Detected	-----	1.75E+00
PA-231	Not Detected	-----	1.31E+00
TH-227	Not Detected	-----	3.02E-01
RA-223	Not Detected	-----	1.30E-01
RN-219	Not Detected	-----	3.53E-01
PB-211	Not Detected	-----	7.94E-01
TL-207	Not Detected	-----	1.35E+01
AM-241	Not Detected	-----	1.60E-01
PU-239	Not Detected	-----	3.26E+02
NP-237	Not Detected	-----	2.52E-01
PA-233	Not Detected	-----	5.60E-02
TH-229	Not Detected	-----	1.92E-01

[Summary Report] - Sample ID: : 70009304

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-110m	Not Detected	-----	3.40E-02
BA-133	Not Detected	-----	4.00E-02
BE-7	Not Detected	-----	2.34E-01
CD-109	Not Detected	-----	5.85E-01
CD-115	Not Detected	-----	1.05E-01
CE-139	Not Detected	-----	2.46E-02
CE-141	Not Detected	-----	4.16E-02
CE-144	Not Detected	-----	1.76E-01
CO-56	Not Detected	-----	2.34E-02
CO-57	Not Detected	-----	2.23E-02
CO-58	<del>7.32E-03</del>	<del>2.52E-03</del>	1.43E-02
CO-60	Not Detected	-----	3.74E-02
CR-51	Not Detected	-----	2.08E-01
CS-134	Not Detected	-----	3.98E-02
CS-137	3.37E-02	1.81E-02	2.22E-02
EU-152	Not Detected	-----	2.43E-01
EU-154	Not Detected	-----	1.83E-01
EU-155	Not Detected	-----	9.93E-02
FE-59	Not Detected	-----	7.31E-02
GD-153	Not Detected	-----	7.42E-02
HG-203	Not Detected	-----	2.87E-02
I-131	Not Detected	-----	3.04E-02
IR-192	Not Detected	-----	2.58E-02
K-40	1.50E+01	2.34E+00	2.47E-01
MN-54	Not Detected	-----	3.42E-02
MO-99	Not Detected	-----	4.02E-01
NA-22	Not Detected	-----	4.46E-02
NA-24	Not Detected	-----	2.34E-01
NB-95	Not Detected	-----	1.60E-01
ND-147	Not Detected	-----	2.09E-01
NI-57	Not Detected	-----	1.03E-01
RU-103	Not Detected	-----	2.77E-02
RU-106	Not Detected	-----	2.96E-01
SB-122	Not Detected	-----	6.10E-02
SB-124	Not Detected	-----	2.94E-02
SB-125	Not Detected	-----	7.88E-02
SR-85	Not Detected	-----	3.75E-02
TA-182	Not Detected	-----	1.65E-01
TA-183	Not Detected	-----	1.72E-01
TC-99m	Not Detected	-----	2.46E+00
TL-201	Not Detected	-----	1.07E-01
XE-133	Not Detected	-----	1.33E-01
Y-88	Not Detected	-----	2.56E-02
ZN-65	Not Detected	-----	1.09E-01
ZR-95	Not Detected	-----	5.78E-02

*not detected* *J* *1/23/57*

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 1-23-97 10:28:45 AM \*  
 \*\*\*\*\*  
 \* Analyzed by: *S/pe 1/23/97* Reviewed by: *[Signature] 1/23/97* \*

Customer : PAVLETICH/McLAUGHLIN (6685/SMO)  
 Customer Sample ID : 032521-005  
 Lab Sample ID : 70009305  
 Sample Description : MARINELLI LIQUID SAMPLE CCTA - 57A - GR - 000 - EB  
 Sample Quantity : 500.000 mL  
 Sample Date/Time : 1-21-97 9:55:00 AM  
 Acquire Start Date/Time : 1-23-97 8:45:33 AM  
 Detector Name : LAB01  
 Elapsed Live/Real Time : 6000 / 6001 seconds

Comments:  
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Nuclide Name	Activity (pCi/mL )	2-sigma Error	MDA (pCi/mL )
U-238	Not Detected	-----	7.64E-01
TH-234	Not Detected	-----	2.22E-01
RA-226	Not Detected	-----	4.84E-01
PB-214	Not Detected	-----	5.64E-02
BI-214	Not Detected	-----	7.01E-02
TH-232	Not Detected	-----	1.49E-01
RA-228	Not Detected	-----	1.54E-01
AC-228	Not Detected	-----	1.02E-01
TH-228	Not Detected	-----	5.23E-01
RA-224	Not Detected	-----	1.43E-01
PB-212	Not Detected	-----	3.78E-02
BI-212	Not Detected	-----	3.26E-01
TL-208	Not Detected	-----	7.60E-02
U-235	Not Detected	-----	1.21E-01
TH-231	Not Detected	-----	1.00E+00
PA-231	Not Detected	-----	1.02E+00
TH-227	Not Detected	-----	1.53E-01
RA-223	Not Detected	-----	7.29E-02
RN-219	Not Detected	-----	2.71E-01
PB-211	Not Detected	-----	6.29E-01
TL-207	Not Detected	-----	9.22E+00
AM-241	Not Detected	-----	1.02E-01
PU-239	Not Detected	-----	2.27E+02
NP-237	Not Detected	-----	1.33E-01
PA-233	Not Detected	-----	4.25E-02
TH-229	Not Detected	-----	1.26E-01

[Summary Report] - Sample ID: : 70009305

Nuclide Name	Activity (pCi/mL )	2-sigma Error	MDA (pCi/mL )
AG-110m	Not Detected	-----	2.33E-02
BA-133	Not Detected	-----	2.88E-02
BE-7	Not Detected	-----	2.00E-01
CD-109	Not Detected	-----	4.61E-01
CD-115	Not Detected	-----	7.08E-02
CE-139	Not Detected	-----	1.83E-02
CE-141	Not Detected	-----	2.83E-02
CE-144	Not Detected	-----	1.25E-01
CO-56	Not Detected	-----	3.25E-02
CO-57	Not Detected	-----	1.55E-02
CO-58	Not Detected	-----	2.58E-02
CO-60	Not Detected	-----	2.59E-02
CR-51	Not Detected	-----	1.67E-01
CS-134	Not Detected	-----	2.76E-02
CS-137	Not Detected	-----	2.61E-02
EU-152	Not Detected	-----	1.90E-01
EU-154	Not Detected	-----	1.14E-01
EU-155	Not Detected	-----	6.38E-02
FE-59	Not Detected	-----	4.51E-02
GD-153	Not Detected	-----	4.93E-02
HG-203	Not Detected	-----	2.12E-02
I-131	Not Detected	-----	2.24E-02
IR-192	Not Detected	-----	2.09E-02
K-40	Not Detected	-----	2.83E-01
MN-54	Not Detected	-----	2.43E-02
MO-99	Not Detected	-----	2.95E-01
NA-22	Not Detected	-----	2.78E-02
NA-24	Not Detected	-----	1.94E-01
NB-95	Not Detected	-----	9.94E-02
ND-147	Not Detected	-----	1.80E-01
NI-57	Not Detected	-----	8.42E-02
RU-103	Not Detected	-----	2.29E-02
RU-106	Not Detected	-----	2.07E-01
SB-122	Not Detected	-----	4.77E-02
SB-124	Not Detected	-----	2.46E-02
SB-125	Not Detected	-----	6.08E-02
SR-85	Not Detected	-----	3.26E-02
TA-182	Not Detected	-----	8.89E-02
TA-183	Not Detected	-----	1.14E-01
TC-99m	Not Detected	-----	3.72E+00
TL-201	Not Detected	-----	6.09E-02
XE-133	Not Detected	-----	8.52E-02
Y-88	Not Detected	-----	3.80E-02
ZN-65	Not Detected	-----	5.55E-02
ZR-95	Not Detected	-----	4.61E-02

Survey #: \_\_\_\_\_

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 1-23-97 10:46:37 AM \*  
 \*\*\*\*\*

\* Analyzed by: *Jpc 1/23/97* Reviewed by: *[Signature] 1/23/97* \*

Customer : PAVLETICH/McLAUGHLIN (6685/SMO)  
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134  
 Lab Sample ID : 70009306

Sample Description : MIXED GAMMA STANDARD CG134  
 Sample Quantity : 1.000 Each  
 Sample Date/Time : 11-01-90 12:00:00 PM  
 Acquire Start Date/Time : 1-23-97 10:33:32 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	-----	8.33E+03
TH-234	Not Detected	-----	3.18E+03
RA-226	Not Detected	-----	5.82E+03
PB-214	Not Detected	-----	7.14E+02
BI-214	Not Detected	-----	6.79E+02
TH-232	Not Detected	-----	2.15E+03
RA-228	Not Detected	-----	3.33E+03
AC-228	Not Detected	-----	1.82E+03
TH-228	Not Detected	-----	6.58E+04
RA-224	Not Detected	-----	3.20E+03
PB-212	Not Detected	-----	4.79E+03
BI-212	Not Detected	-----	5.05E+04
TL-208	Not Detected	-----	1.01E+04
U-235	Not Detected	-----	1.44E+03
TH-231	Not Detected	-----	1.15E+04
PA-231	Not Detected	-----	1.46E+04
TH-227	Not Detected	-----	2.42E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	5.98E+03
PB-211	Not Detected	-----	1.34E+04
TL-207	Not Detected	-----	2.52E+05
AM-241	8.71E+04	1.42E+04	1.55E+03
PU-239	Not Detected	-----	2.58E+06
NP-237	Not Detected	-----	1.71E+03
PA-233	Not Detected	-----	6.24E+02
TH-229	Not Detected	-----	1.48E+03



[Summary Report] - Sample ID: : 70009306

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-110m	Not Detected	-----	9.30E+05
BA-133	Not Detected	-----	6.53E+02
BE-7	Not Detected	-----	2.61E+16
CD-109	3.44E+05	1.11E+05	1.21E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	2.03E+07
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	3.52E+05
CO-56	Not Detected	-----	3.36E+11
CO-57	Not Detected	-----	4.23E+04
CO-58	Not Detected	-----	1.91E+12
CO-60	7.33E+04	1.00E+04	4.46E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	2.61E+03
CS-137	6.71E+04	8.97E+03	3.33E+02
EU-152	Not Detected	-----	4.15E+03
EU-154	Not Detected	-----	2.94E+03
EU-155	Not Detected	-----	1.84E+03
FE-59	Not Detected	-----	2.47E+18
GD-153	Not Detected	-----	3.79E+05
HG-203	Not Detected	-----	1.39E+17
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	5.60E+11
K-40	Not Detected	-----	1.57E+03
MN-54	Not Detected	-----	6.60E+04
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.34E+03
NA-24	Not Detected	-----	1.00E+26
NB-95	Not Detected	-----	1.00E+26
ND-147	Not Detected	-----	1.00E+26
NI-57	Not Detected	-----	1.00E+26
RU-103	Not Detected	-----	1.02E+20
RU-106	Not Detected	-----	2.33E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	7.56E+13
SB-125	Not Detected	-----	5.47E+03
SR-85	Not Detected	-----	1.42E+13
TA-182	Not Detected	-----	1.28E+09
TA-183	Not Detected	-----	1.00E+26
TC-99m	Not Detected	-----	1.00E+26
TL-201	Not Detected	-----	1.00E+26
XE-133	Not Detected	-----	1.00E+26
Y-88	Not Detected	-----	5.18E+08
ZN-65	Not Detected	-----	6.74E+05
ZR-95	Not Detected	-----	3.45E+13

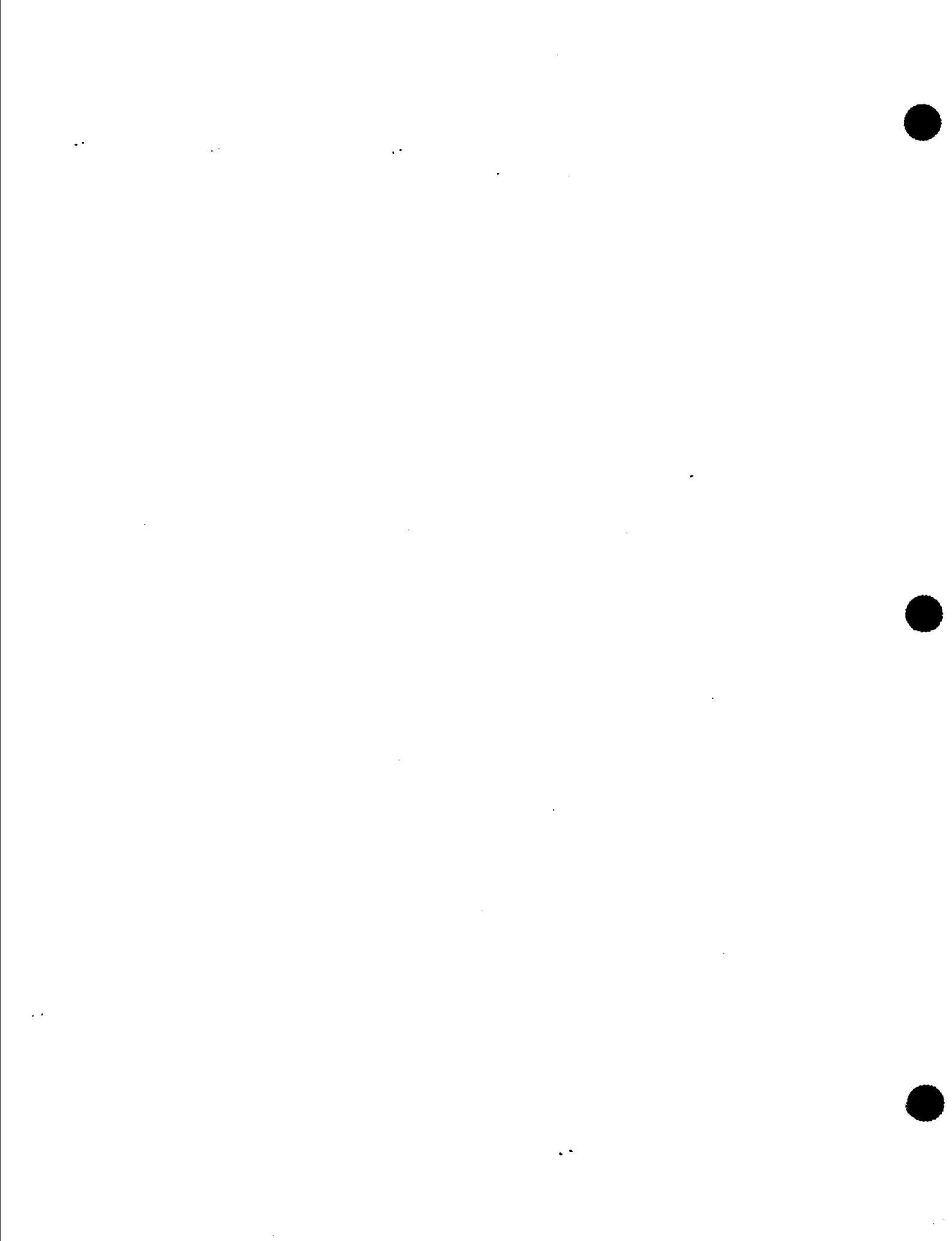
\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program \*  
 \* Quality Assurance Report \*  
 \*\*\*\*\*

Report Date : 1-23-97 10:47:20 AM  
 QA File : C:\GENIEPC\CAMFILES\LCS1.QAF  
 Analyst : FCD  
 Sample ID : 70009306  
 Sample Quantity : 1.00 Each  
 Sample Date : 11-01-90 12:00:00 PM  
 Measurement Date : 1-23-97 10:33:32 AM  
 Elapsed Live Time : 600 seconds  
 Elapsed Real Time : 605 seconds

Parameter	Mean	1S Error	New Value	<	LU	:	SD	:	UD	:	BS	>
AM-241 Activity	8.781E-02	2.719E-03	8.709E-02	<	:	:	:	:	:	:	:	>
CS-137 Activity	6.889E-02	1.668E-03	6.713E-02	<	:In	:	<sup>o.k.</sup> 1/23/97	:	:	:	:	>
CO-60 Activity	7.564E-02	3.096E-03	7.321E-02	<	:	:	:	:	:	:	:	>

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

Reviewed by: Shee 1/23/97





# ANALYSIS REQUEST AND CHAIN OF CUSTODY CONTINUATION FORM

AR/COC- 510217

SP 2001-COD (12-99)  
Superseded (10-99) Issues

*SNL BATCH # 702100*

Project Name: CCTA-SPA      Project/Task Manager: AAC/TAVITICH      Case No.: 7215.220300

Location		Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Reference LOV (available at SMO)		Preservative	Sample Collection Method	Sample Type	LAB USE
Building	Room					Type	Volume				
Tech Area MYA											LAB USE
Sample No. - Fraction	ER Sample ID or Sample Location Detail										
030315-003	CCTA-SPA-AR DUW-EB	MYA	7A	12/19/99 1000	DIW	T	500ml	11%	AR	EB	

GAMMA STEL



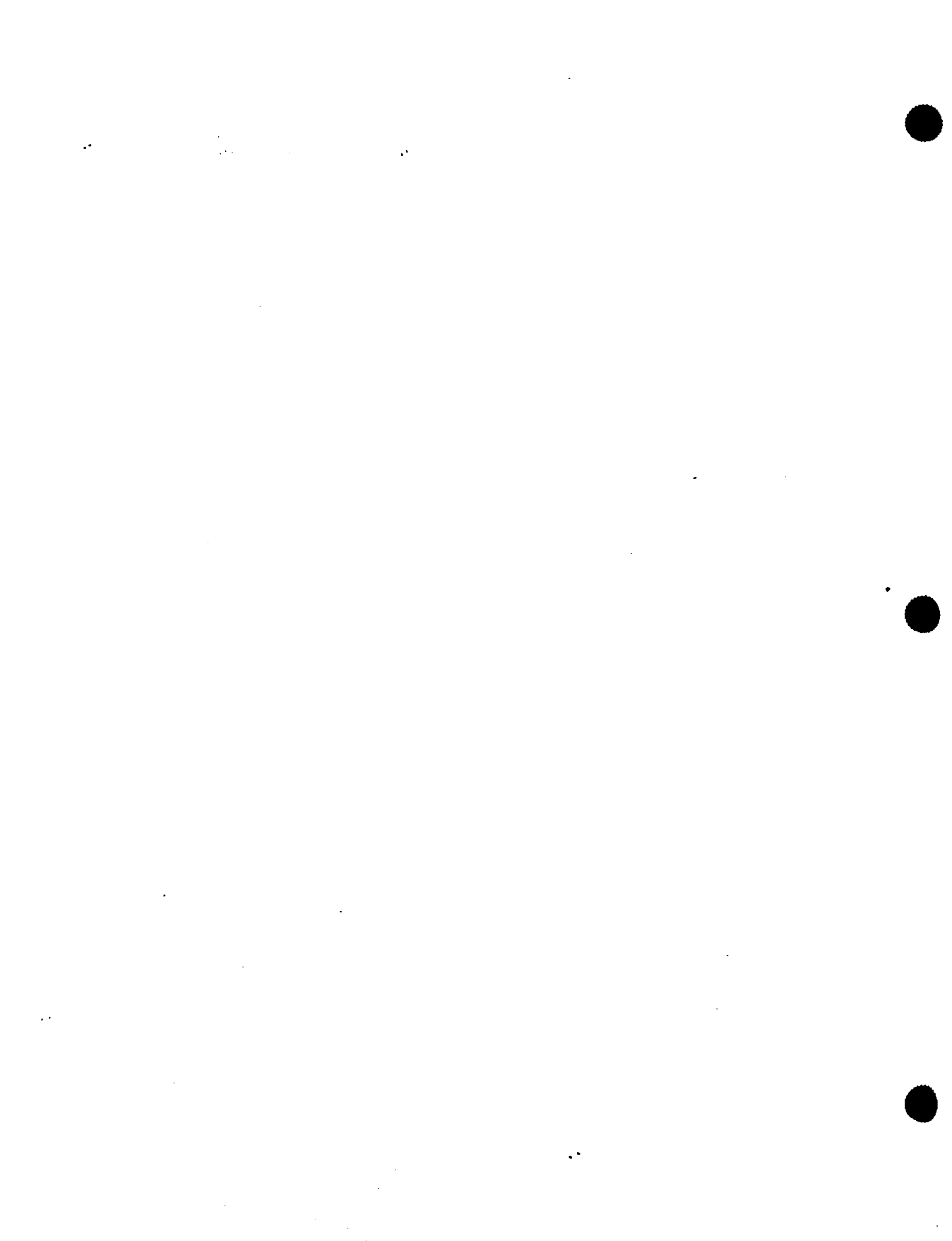
To be completed by Customer

Shaded areas are for RPSD use only

Customer: <u>Adz/PALMERICH</u>	Hazards/Special Instructions:  <u>C.O.C 510217</u>	Batch Log Number: <u>702100</u>
Organization: <u>6134</u>		Logged By: <u>JM</u>
Project Location: <u>CCRA-57A</u>		Analysis Type: <input checked="" type="checkbox"/> Gamma Spec <input type="checkbox"/> H-3 <input type="checkbox"/> Alpha/Beta <input type="checkbox"/> Alpha Spec <input type="checkbox"/> Total U <input type="checkbox"/> Other
Phone: <u>204-2479</u>		
Date Results Needed: <u>today</u>		
Suspect Isotopes: <u>Pu, Cm</u>		
Case Number: <u>725.220300</u>		

Customer Sample ID	Sample Type	Date/Time Collected	Sample Quantity	Requested Analysis	RPSD Sample ID	Screen cpm	Sample Mass	Remarks / Aliquot Amount
056015-003	Concrete	12/16/97 1400	500ml	Gamma Spec	01	2300	845g	
056016-003		1430			02		766g	
056017-003		1430			03		706.826g	
056018-003		1450			04		892g	
056019-003		1530			05		924g	
056020-003		1550			06		947g	
056021-003		1605			07		924g	
056022-003		1330			08		672g	
056023-003		110			09		748g	
056024-003		1315			10		710g	
056045-003		Water			1010			11
PLCS	—	12/19/97	—	γ spec	12	N/A	N/A	

Relinquished by <u>[Signature]</u>	Date <u>12/16/97</u>	Received by <u>[Signature]</u>	Date <u>12/16/97</u>
Relinquished by <u>[Signature]</u>	Date <u>12/18/97</u>	Received by <u>[Signature]</u>	Date <u>12/19/97</u>
Relinquished by _____	Date _____	Received by _____	Date _____
Relinquished by _____	Date _____	Received by _____	Date _____



Records Center Code: ER/1334/57A/DAT

# SMO ROUTING FORM - RESULTS FROM RPSD LAB

Project Name: Central Coyote Test Area,  
Site 57A

Case No./Service Order: 7215.220300/  
CF0515

SNL Task Leader: AAS

Org/Mail Stop: 6134/1148

Final Transmittal To: AAS

Date Transmitted: 01/08/98

SMO Project Coordinator: SALMI

Sample Ship Date: 12/16/97

ARCOC	Lab	Lab ID
<u>510217</u>	<u>RPSD</u>	<u>702100</u>
<u>          </u>	<u>          </u>	<u>          </u>
<u>          </u>	<u>          </u>	<u>          </u>

*concrete slab  
3.5 spec sample results.  
-027 -> -031  
-049, -054, -057, -064*

Date

Filed in Records Center: \_\_\_\_\_ Transmitted By: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Received (Records Center) By: \_\_\_\_\_





\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-16-97 12:39:29 PM \*  
 \*\*\*\*\*

Analyzed by: *J* 12/17/97 Reviewed by: *X* 12/18/97

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036825-003  
 Lab Sample ID : 70210001

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 845.000 gram  
 Sample Date/Time : 12-15-97 2:00:00 PM  
 Acquire Start Date/Time : 12-16-97 10:56:39 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:

\*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	2.87E+00
TH-234	Not Detected	-----	5.29E-01
RA-226	1.40E+00	5.34E-01	4.17E-01
PB-214	6.60E-01	1.14E-01	4.00E-02
BI-214	5.71E-01	2.19E-01	4.59E-02
PB-210	Not Detected	-----	3.15E+01
TH-232	5.94E-01	3.24E-01	1.23E-01
PA-228	5.93E-01	2.41E-01	1.53E-01
AC-228	6.11E-01	1.71E-01	7.23E-02
TH-228	5.43E-01	2.84E-01	4.47E-01
RA-224	6.92E-01	2.68E-01	6.09E-02
PB-212	6.16E-01	1.12E-01	3.50E-02
BI-212	6.03E-01	3.49E-01	2.59E-01
TL-208	5.74E-01	1.31E-01	5.90E-02
U-235	Not Detected	-----	2.13E-01
TH-231	Not Detected	-----	1.13E+01
PA-231	Not Detected	-----	1.28E+00
TH-227	Not Detected	-----	2.94E-01
RA-223	Not Detected	-----	1.85E-01
RN-219	Not Detected	-----	3.31E-01
PB-211	Not Detected	-----	7.56E-01
TL-207	Not Detected	-----	1.18E+01
AM-241	Not Detected	-----	4.16E-01
PU-239	Not Detected	-----	3.92E+02
NP-237	Not Detected	-----	2.68E-01
PA-233	Not Detected	-----	5.08E-02
TH-229	Not Detected	-----	2.21E-01

[Summary Report] - Sample ID: : 70210001

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected		3.36E-02
AG-110m	Not Detected		2.95E-02
BA-133	Not Detected		5.94E-02
BE-7	Not Detected		2.14E-01
CD-109	Not Detected		9.09E-01
CD-115	Not Detected		7.34E-02
CE-139	Not Detected		2.60E-02
CE-141	Not Detected		4.67E-02
CE-144	Not Detected		2.14E-01
CO-56	Not Detected		3.06E-02
CO-57	Not Detected		2.67E-02
CO-58	Not Detected		2.77E-02
CO-60	Not Detected		3.29E-02
CR-51	Not Detected		2.01E-01
CS-134	Not Detected		4.04E-02
CS-137	2.33E-02	1.43E-02	1.74E-02
EU-152	Not Detected		8.03E-02
EU-154	Not Detected		1.55E-01
EU-155	Not Detected		1.31E-01
FE-59	Not Detected		6.24E-02
GD-153	Not Detected		9.27E-02
HG-203	Not Detected		1.48E-02
I-131	Not Detected		2.70E-02
IR-192	Not Detected		2.35E-02
K-40	1.58E+01	2.67E+00	2.48E-01
MN-52	Not Detected		2.88E-02
MN-54	Not Detected		3.01E-02
MO-99	Not Detected		2.63E-01
NA-22	Not Detected		3.69E-02
NA-24	Not Detected		7.40E-02
NB-95	Not Detected		1.61E-01
ND-147	Not Detected		1.80E-01
NI-57	Not Detected		3.36E-02
RU-103	Not Detected		2.59E-02
RU-106	Not Detected		2.59E-01
SB-122	Not Detected		4.41E-02
SB-124	Not Detected		2.55E-02
SB-125	Not Detected		7.18E-02
SN-113	Not Detected		3.27E-02
SR-85	Not Detected		3.19E-02
TA-182	Not Detected		1.29E-01
TA-183	Not Detected		4.02E-01
TC-99m	Not Detected		3.11E-01
TL-201	Not Detected		2.00E-01
XE-133	Not Detected		1.69E-01
Y-88	Not Detected		2.24E-02
ZN-65	Not Detected		8.70E-02
ZR-95	Not Detected		4.82E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-16-97 2:24:27 PM \*  
 \*\*\*\*\*

\* Analyzed by: *J* 12/17/97 Reviewed by: *J* 12/18/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036826-003  
 Lab Sample ID : 70210002

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 766.000 gram  
 Sample Date/Time : 12-15-97 2:30:00 PM  
 Acquire Start Date/Time : 12-16-97 12:41:45 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	-----	3.10E+00
TH-234	Not Detected	-----	7.37E-01
RA-226	1.70E+00	6.03E-01	4.95E-01
PB-214	6.78E-01	1.16E-01	4.53E-02
BI-214	6.42E-01	1.20E-01	4.75E-02
PB-210	Not Detected	-----	3.31E+01
TH-232	6.34E-01	3.36E-01	1.28E-01
RA-228	6.80E-01	2.35E-01	1.36E-01
AC-228	6.87E-01	1.84E-01	7.58E-02
TH-228	6.19E-01	3.02E-01	4.43E-01
RA-224	5.17E-01	1.71E-01	7.83E-02
PB-212	6.11E-01	1.02E-01	3.63E-02
BI-212	8.08E-01	3.59E-01	2.82E-01
TL-208	5.82E-01	1.77E-01	6.06E-02
U-235	<del>1.64E-01</del>	<del>2.86E-01</del>	2.40E-01
TH-231	Not Detected	-----	1.21E+01
PA-231	Not Detected	-----	1.37E+00
TH-227	Not Detected	-----	3.17E-01
RA-223	Not Detected	-----	1.97E-01
RN-219	Not Detected	-----	3.63E-01
PB-211	Not Detected	-----	8.18E-01
TL-207	Not Detected	-----	1.28E+01
AM-241	Not Detected	-----	4.53E-01
PU-239	Not Detected	-----	4.20E+02
NP-237	Not Detected	-----	2.48E-01
PA-233	Not Detected	-----	5.58E-02
TH-229	Not Detected	-----	2.34E-01

*not detected J 12/17/97*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.89E-02
AG-110m	Not Detected	-----	3.08E-02
BA-133	Not Detected	-----	6.42E-02
BE-7	Not Detected	-----	2.36E-01
CD-109	Not Detected	-----	8.42E-01
CD-115	Not Detected	-----	8.04E-02
CE-139	Not Detected	-----	2.84E-02
CE-141	Not Detected	-----	5.25E-02
CE-144	Not Detected	-----	2.34E-01
CO-56	Not Detected	-----	3.44E-02
CO-57	Not Detected	-----	2.87E-02
CO-58	Not Detected	-----	3.03E-02
CO-60	Not Detected	-----	3.47E-02
CR-51	Not Detected	-----	2.19E-01
CS-134	Not Detected	-----	4.65E-02
CS-137	1.77E-02	1.37E-02	1.78E-02
EU-152	Not Detected	-----	8.64E-02
EU-154	Not Detected	-----	1.79E-01
EU-155	Not Detected	-----	1.42E-01
FE-59	Not Detected	-----	6.98E-02
GD-153	Not Detected	-----	9.77E-02
HG-203	Not Detected	-----	3.09E-02
I-131	Not Detected	-----	2.89E-02
IR-192	Not Detected	-----	2.55E-02
K-40	1.70E+01	2.55E+00	2.43E-01
MN-52	Not Detected	-----	3.11E-02
MN-54	Not Detected	-----	3.25E-02
MO-99	Not Detected	-----	2.85E-01
NA-22	Not Detected	-----	4.02E-02
NA-24	Not Detected	-----	8.76E-02
NB-95	Not Detected	-----	1.75E-01
ND-147	Not Detected	-----	1.91E-01
NI-57	Not Detected	-----	6.90E-02
RU-103	Not Detected	-----	2.78E-02
RU-106	Not Detected	-----	2.71E-01
SB-122	Not Detected	-----	4.80E-02
SB-124	Not Detected	-----	2.95E-02
SB-125	Not Detected	-----	7.72E-02
SN-113	Not Detected	-----	3.46E-02
SR-85	Not Detected	-----	3.50E-02
TA-182	Not Detected	-----	1.44E-01
TA-183	Not Detected	-----	4.37E-01
TC-99m	Not Detected	-----	4.05E-01
TL-201	Not Detected	-----	2.08E-01
XE-133	Not Detected	-----	1.86E-01
Y-88	Not Detected	-----	2.41E-02
ZN-65	Not Detected	-----	9.87E-02
ZR-95	Not Detected	-----	5.38E-02

Analyzed by: *J* 12/17/97 Reviewed by: *J* 12/18/97

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036827-003  
 Lab Sample ID : 70210003

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 826.000 gram  
 Sample Date/Time : 12-15-97 2:30:00 PM  
 Acquire Start Date/Time : 12-16-97 2:26:36 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	-----	2.96E+00
TH-234	6.97E-01	2.95E-01	4.60E-01
RA-226	1.63E+00	5.59E-01	5.36E-01
PB-214	6.14E-01	2.02E-01	4.21E-02
BI-214	5.83E-01	1.16E-01	4.27E-02
PB-210	Not Detected	-----	3.02E+01
TH-232	6.20E-01	3.10E-01	1.25E-01
LA-228	5.23E-01	2.92E-01	1.50E-01
AC-228	5.82E-01	1.40E-01	7.29E-02
TH-228	7.72E-01	1.91E-01	4.54E-01
RA-224	5.94E-01	3.20E-01	7.45E-02
PB-212	6.39E-01	1.11E-01	3.71E-02
BI-212	6.83E-01	3.25E-01	2.69E-01
TL-208	5.59E-01	1.41E-01	5.80E-02
U-235	Not Detected	-----	2.19E-01
TH-231	Not Detected	-----	1.15E+01
PA-231	Not Detected	-----	1.29E+00
TH-227	Not Detected	-----	3.06E-01
RA-223	Not Detected	-----	1.88E-01
RN-219	Not Detected	-----	3.31E-01
PB-211	Not Detected	-----	7.32E-01
TL-207	Not Detected	-----	1.19E+01
AM-241	Not Detected	-----	4.27E-01
PU-239	Not Detected	-----	3.99E+02
NP-237	<del>3.59E-01</del>	<del>1.51E-01</del>	2.46E-01
PA-233	Not Detected	-----	4.94E-02
TH-229	Not Detected	-----	2.28E-01

*not detected*  
*J* 12/17/97

[Summary Report] - Sample ID: : 70210003

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.61E-02
AG-110m	Not Detected	-----	2.82E-02
BA-133	Not Detected	-----	5.93E-02
BE-7	Not Detected	-----	2.18E-01
CD-109	Not Detected	-----	8.36E-01
CD-115	Not Detected	-----	8.02E-02
CE-139	Not Detected	-----	2.68E-02
CE-141	Not Detected	-----	4.77E-02
CE-144	Not Detected	-----	2.23E-01
CO-56	Not Detected	-----	3.16E-02
CO-57	Not Detected	-----	2.76E-02
CO-58	Not Detected	-----	2.93E-02
CO-60	Not Detected	-----	2.96E-02
CR-51	Not Detected	-----	2.07E-01
CS-134	Not Detected	-----	4.14E-02
CS-137	2.06E-02	1.65E-02	1.96E-02
EU-152	Not Detected	-----	8.31E-02
EU-154	Not Detected	-----	1.68E-01
EU-155	Not Detected	-----	1.34E-01
FE-59	Not Detected	-----	6.44E-02
GD-153	Not Detected	-----	9.65E-02
HG-203	Not Detected	-----	2.84E-02
I-131	Not Detected	-----	2.85E-02
IR-192	Not Detected	-----	2.37E-02
K-40	1.68E+01	2.50E+00	2.38E-01
MN-52	Not Detected	-----	2.98E-02
MN-54	Not Detected	-----	3.00E-02
MO-99	Not Detected	-----	2.80E-01
NA-22	Not Detected	-----	3.75E-02
NA-24	Not Detected	-----	8.47E-02
NB-95	Not Detected	-----	1.71E-01
ND-147	Not Detected	-----	1.90E-01
NI-57	Not Detected	-----	7.02E-02
RU-103	Not Detected	-----	2.56E-02
RU-106	Not Detected	-----	2.58E-01
SB-122	Not Detected	-----	4.62E-02
SB-124	Not Detected	-----	2.62E-02
SB-125	Not Detected	-----	6.99E-02
SN-113	Not Detected	-----	3.26E-02
SR-85	Not Detected	-----	3.30E-02
TA-182	Not Detected	-----	1.34E-01
TA-183	Not Detected	-----	4.17E-01
TC-99m	Not Detected	-----	4.62E-01
TL-201	Not Detected	-----	1.98E-01
XE-133	Not Detected	-----	1.77E-01
Y-88	Not Detected	-----	2.32E-02
ZN-65	Not Detected	-----	9.21E-02
ZR-95	Not Detected	-----	5.06E-02

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 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-17-97 9:35:19 AM \*  
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\* Analyzed by: *J* 12/17/97 Reviewed by: *M* 12/18/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036828-003  
 Lab Sample ID : 70210004

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 892.000 gram  
 Sample Date/Time : 12-15-97 2:50:00 PM  
 Acquire Start Date/Time : 12-16-97 4:11:35 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	-----	2.75E+00
TH-234	8.57E-01	3.93E-01	4.69E-01
RA-226	1.60E+00	1.01E+00	4.94E-01
PB-214	5.53E-01	9.90E-02	3.81E-02
BI-214	5.58E-01	1.44E-01	4.31E-02
PB-210	Not Detected	-----	2.85E+01
TH-232	5.40E-01	2.65E-01	1.15E-01
RA-228	5.51E-01	1.63E-01	1.26E-01
AC-228	5.16E-01	1.27E-01	7.29E-02
TH-228	6.96E-01	2.06E-01	3.95E-01
RA-224	4.82E-01	1.78E-01	7.27E-02
PB-212	5.65E-01	1.28E-01	3.19E-02
BI-212	5.98E-01	3.16E-01	2.66E-01
TL-208	5.27E-01	1.12E-01	5.23E-02
U-235	Not Detected	-----	2.09E-01
TH-231	Not Detected	-----	1.09E+01
PA-231	Not Detected	-----	1.17E+00
TH-227	Not Detected	-----	2.79E-01
RA-223	Not Detected	-----	1.80E-01
RN-219	Not Detected	-----	3.24E-01
PB-211	Not Detected	-----	7.34E-01
TL-207	Not Detected	-----	1.11E+01
AM-241	Not Detected	-----	4.08E-01
PU-239	Not Detected	-----	3.76E+02
NP-237	Not Detected	-----	2.45E-01
PA-233	Not Detected	-----	4.78E-02
TH-229	Not Detected	-----	2.16E-01



[Summary Report] - Sample ID: : 70210004

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.32E-02
AG-110m	Not Detected	-----	2.79E-02
BA-133	Not Detected	-----	5.46E-02
BE-7	Not Detected	-----	2.05E-01
CD-109	<del>1.33E+00</del>	<del>5.12E-01</del>	8.33E-01
CD-115	Not Detected	-----	7.60E-02
CE-139	Not Detected	-----	2.45E-02
CE-141	Not Detected	-----	4.61E-02
CE-144	Not Detected	-----	2.01E-01
CO-56	Not Detected	-----	3.01E-02
CO-57	Not Detected	-----	2.57E-02
CO-58	Not Detected	-----	2.71E-02
CO-60	Not Detected	-----	2.94E-02
CR-51	Not Detected	-----	2.00E-01
CS-134	Not Detected	-----	3.97E-02
CS-137	Not Detected	-----	2.95E-02
EU-152	Not Detected	-----	7.73E-02
EU-154	Not Detected	-----	1.52E-01
EU-155	Not Detected	-----	1.26E-01
FE-59	Not Detected	-----	6.13E-02
GD-153	Not Detected	-----	8.99E-02
HG-203	Not Detected	-----	2.62E-02
I-131	Not Detected	-----	2.55E-02
IR-192	Not Detected	-----	2.26E-02
K-40	1.61E+01	2.37E+00	2.15E-01
MN-52	Not Detected	-----	3.02E-02
MN-54	Not Detected	-----	2.74E-02
MO-99	Not Detected	-----	2.51E-01
NA-22	Not Detected	-----	3.32E-02
NA-24	Not Detected	-----	9.25E-02
NB-95	Not Detected	-----	1.58E-01
ND-147	Not Detected	-----	1.71E-01
NI-57	Not Detected	-----	6.84E-02
RU-103	Not Detected	-----	2.40E-02
RU-106	Not Detected	-----	2.43E-01
SB-122	Not Detected	-----	4.28E-02
SB-124	Not Detected	-----	2.43E-02
SB-125	Not Detected	-----	6.70E-02
SN-113	Not Detected	-----	3.16E-02
SR-85	Not Detected	-----	2.99E-02
TA-182	Not Detected	-----	1.25E-01
TA-183	Not Detected	-----	4.07E-01
TC-99m	Not Detected	-----	5.09E-01
TL-201	Not Detected	-----	1.94E-01
XE-133	Not Detected	-----	1.73E-01
Y-88	Not Detected	-----	2.07E-02
ZN-65	Not Detected	-----	8.50E-02
ZR-95	Not Detected	-----	4.59E-02

*Not detected 7/2/17/57*

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-16-97 7:39:31 PM \*  
 \*\*\*\*\*

Analyzed by: *J* 12/17/97 Reviewed by: *JY* 12/18/97  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036829-003  
 Lab Sample ID : 70210005

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 924.000 gram  
 Sample Date/Time : 12-15-97 3:30:00 PM  
 Acquire Start Date/Time : 12-16-97 5:56:46 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	-----	2.81E+00
TH-234	8.36E-01	3.44E-01	5.18E-01
RA-226	1.50E+00	6.81E-01	4.68E-01
PB-214	6.57E-01	1.09E-01	3.94E-02
BI-214	6.18E-01	1.13E-01	4.23E-02
PB-210	Not Detected	-----	2.98E+01
TH-232	6.22E-01	2.87E-01	1.19E-01
LA-228	6.24E-01	9.70E-02	1.30E-01
AC-228	5.71E-01	1.60E-01	7.27E-02
TH-228	5.44E-01	3.60E-01	4.24E-01
RA-224	5.90E-01	1.82E-01	5.23E-02
PB-212	5.88E-01	1.07E-01	3.27E-02
BI-212	6.28E-01	2.71E-01	2.46E-01
TL-208	5.27E-01	4.27E-01	5.92E-02
U-235	Not Detected	-----	2.06E-01
TH-231	Not Detected	-----	1.07E+01
PA-231	Not Detected	-----	1.22E+00
TH-227	Not Detected	-----	2.85E-01
RA-223	Not Detected	-----	1.78E-01
RN-219	Not Detected	-----	3.11E-01
PB-211	Not Detected	-----	7.09E-01
TL-207	Not Detected	-----	1.08E+01
AM-241	Not Detected	-----	4.11E-01
PU-239	Not Detected	-----	3.86E+02
NP-237	Not Detected	-----	2.51E-01
PA-233	Not Detected	-----	4.87E-02
TH-229	Not Detected	-----	2.18E-01

[Summary Report] - Sample ID: : 70210005

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.28E-02
AG-110m	Not Detected	-----	2.68E-02
BA-133	Not Detected	-----	5.73E-02
BE-7	Not Detected	-----	2.12E-01
CD-109	Not Detected	-----	8.51E-01
CD-115	Not Detected	-----	7.63E-02
CE-139	Not Detected	-----	2.54E-02
CE-141	Not Detected	-----	4.55E-02
CE-144	Not Detected	-----	2.13E-01
CO-56	Not Detected	-----	2.95E-02
CO-57	Not Detected	-----	2.62E-02
CO-58	Not Detected	-----	2.59E-02
CO-60	Not Detected	-----	2.96E-02
CR-51	Not Detected	-----	2.02E-01
CS-134	Not Detected	-----	4.06E-02
CS-137	2.19E-02	1.32E-02	1.69E-02
EU-152	Not Detected	-----	7.87E-02
EU-154	Not Detected	-----	1.50E-01
EU-155	Not Detected	-----	1.27E-01
FE-59	Not Detected	-----	5.97E-02
GD-153	Not Detected	-----	9.25E-02
HG-203	Not Detected	-----	2.74E-02
I-131	Not Detected	-----	2.65E-02
IR-192	Not Detected	-----	2.30E-02
K-40	1.55E+01	2.25E+00	2.36E-01
MN-52	Not Detected	-----	2.61E-02
MN-54	Not Detected	-----	2.92E-02
MO-99	Not Detected	-----	2.60E-01
NA-22	Not Detected	-----	3.27E-02
NA-24	Not Detected	-----	9.22E-02
NB-95	Not Detected	-----	1.63E-01
ND-147	Not Detected	-----	1.71E-01
NI-57	Not Detected	-----	3.69E-02
RU-103	Not Detected	-----	2.42E-02
RU-106	Not Detected	-----	2.37E-01
SB-122	Not Detected	-----	4.26E-02
SB-124	Not Detected	-----	2.54E-02
SB-125	Not Detected	-----	6.97E-02
SN-113	Not Detected	-----	3.10E-02
SR-85	Not Detected	-----	2.96E-02
TA-182	Not Detected	-----	1.26E-01
TA-183	Not Detected	-----	4.09E-01
TC-99m	Not Detected	-----	5.77E-01
TL-201	Not Detected	-----	2.04E-01
XE-133	Not Detected	-----	1.72E-01
Y-88	Not Detected	-----	2.19E-02
ZN-65	Not Detected	-----	8.57E-02
ZR-95	Not Detected	-----	4.53E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-17-97 1:55:13 PM \*  
 \*\*\*\*\*

\* Analyzed by: *J* 12/17/97 Reviewed by: *W* 12/18/97  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036830-003  
 Lab Sample ID : 70210006

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 947.000 gram  
 Sample Date/Time : 12-15-97 3:50:00 PM  
 Acquire Start Date/Time : 12-16-97 7:41:39 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	2.64E+00
TH-234	8.72E-01	4.38E-01	5.06E-01
RA-226	1.28E+00	4.22E-01	4.04E-01
PB-214	6.51E-01	1.09E-01	3.65E-02
BI-214	5.63E-01	1.39E-01	3.93E-02
PB-210	Not Detected	-----	2.80E+01
TH-232	5.06E-01	2.79E-01	1.22E-01
RA-228	5.11E-01	1.48E-01	1.19E-01
AC-228	5.92E-01	1.37E-01	6.17E-02
TH-228	5.56E-01	1.55E-01	3.74E-01
RA-224	6.36E-01	2.01E-01	6.30E-02
PB-212	5.46E-01	9.53E-02	3.27E-02
BI-212	5.07E-01	2.31E-01	2.48E-01
TL-208	4.74E-01	1.31E-01	5.21E-02
U-235	Not Detected	-----	1.96E-01
TH-231	<del>2.43E-00</del>	<del>4.74E-00</del>	1.02E+01
PA-231	Not Detected	-----	1.12E+00
TH-227	Not Detected	-----	2.67E-01
RA-223	Not Detected	-----	1.73E-01
RN-219	<del>2.74E-01</del>	<del>2.50E-01</del>	3.02E-01
PB-211	Not Detected	-----	6.70E-01
TL-207	Not Detected	-----	1.09E+01
AM-241	Not Detected	-----	3.87E-01
PU-239	Not Detected	-----	3.57E+02
NP-237	Not Detected	-----	2.43E-01
PA-233	Not Detected	-----	4.65E-02
TH-229	Not Detected	-----	2.06E-01

*not detected J 12/17/97*  
*not detected J 12/17/97*

[Summary Report] - Sample ID: : 70210006

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.26E-02
AG-110m	Not Detected	-----	2.68E-02
BA-133	Not Detected	-----	5.57E-02
BE-7	Not Detected	-----	2.00E-01
CD-109	<del>1.24E-00</del>	<del>5.52E-02</del>	<del>8.25E-01</del>
CD-115	Not Detected	-----	7.31E-02
CE-139	Not Detected	-----	2.44E-02
CE-141	Not Detected	-----	4.36E-02
CE-144	Not Detected	-----	1.99E-01
CO-56	Not Detected	-----	2.81E-02
CO-57	Not Detected	-----	2.46E-02
CO-58	Not Detected	-----	2.56E-02
CO-60	Not Detected	-----	2.98E-02
CR-51	Not Detected	-----	1.93E-01
CS-134	Not Detected	-----	3.86E-02
CS-137	3.47E-02	2.55E-02	1.82E-02
EU-152	Not Detected	-----	7.40E-02
EU-154	Not Detected	-----	1.51E-01
EU-155	Not Detected	-----	1.24E-01
FE-59	Not Detected	-----	5.76E-02
GD-153	Not Detected	-----	8.58E-02
HG-203	Not Detected	-----	2.51E-02
I-131	Not Detected	-----	2.54E-02
IR-192	Not Detected	-----	2.25E-02
K-40	1.42E+01	2.07E+00	2.15E-01
MN-52	Not Detected	-----	2.56E-02
MN-54	Not Detected	-----	2.76E-02
MO-99	Not Detected	-----	2.52E-01
NA-22	Not Detected	-----	3.35E-02
NA-24	Not Detected	-----	9.18E-02
NB-95	Not Detected	-----	1.55E-01
ND-147	Not Detected	-----	1.69E-01
NI-57	Not Detected	-----	6.47E-02
RU-103	Not Detected	-----	2.33E-02
RU-106	Not Detected	-----	2.38E-01
SB-122	Not Detected	-----	4.20E-02
SB-124	Not Detected	-----	2.49E-02
SB-125	Not Detected	-----	6.57E-02
SN-113	Not Detected	-----	2.91E-02
SR-85	Not Detected	-----	2.93E-02
TA-182	Not Detected	-----	1.25E-01
TA-183	Not Detected	-----	3.91E-01
TC-99m	Not Detected	-----	6.47E-01
TL-201	Not Detected	-----	1.89E-01
XE-133	Not Detected	-----	1.65E-01
Y-88	Not Detected	-----	2.10E-02
ZN-65	Not Detected	-----	8.60E-02
ZR-95	Not Detected	-----	4.51E-02

*not detected 12/17/57*

\* Analyzed by: *J 12/17/97* Reviewed by: *SP 12/18/97*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036831-003  
 Lab Sample ID : 70210007

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 924.000 gram  
 Sample Date/Time : 12-15-97 4:05:00 PM  
 Acquire Start Date/Time : 12-16-97 9:26:37 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	2.84E+00
TH-234	1.39E+00	5.02E-01	5.34E-01
RA-226	2.19E+00	7.53E-01	5.02E-01
PB-214	7.96E-01	1.37E-01	3.67E-02
BI-214	7.30E-01	3.61E-01	4.16E-02
PB-210	1.21E+01	1.23E+01	1.87E+01
TH-232	5.11E-01	2.66E-01	1.12E-01
RA-228	4.57E-01	1.48E-01	1.10E-01
AC-228	5.40E-01	1.57E-01	7.33E-02
TH-228	4.96E-01	1.85E-01	3.99E-01
RA-224	5.42E-01	1.70E-01	6.39E-02
PB-212	5.32E-01	9.07E-02	3.26E-02
BI-212	5.58E-01	3.10E-01	2.41E-01
TL-208	4.44E-01	5.74E-01	5.00E-02
U-235	<del>2.44E-01</del>	<del>1.94E-01</del>	2.14E-01
TH-231	Not Detected	-----	1.09E+01
PA-231	Not Detected	-----	1.20E+00
TH-227	Not Detected	-----	2.64E-01
RA-223	Not Detected	-----	1.82E-01
RN-219	Not Detected	-----	3.04E-01
PB-211	Not Detected	-----	6.94E-01
TL-207	Not Detected	-----	1.12E+01
AM-241	Not Detected	-----	3.96E-01
FU-239	Not Detected	-----	3.71E+02
NP-237	Not Detected	-----	2.50E-01
PA-233	Not Detected	-----	4.85E-02
TH-229	Not Detected	-----	2.14E-01

*not detected*  
*J 12/17/97*

[Summary Report] - Sample ID: : 70210007

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.03E-02
AG-110m	Not Detected	-----	2.53E-02
BA-133	Not Detected	-----	6.03E-02
BE-7	Not Detected	-----	2.10E-01
CD-109	Not Detected	-----	8.48E-01
CD-115	Not Detected	-----	7.69E-02
CE-139	Not Detected	-----	2.50E-02
CE-141	Not Detected	-----	4.71E-02
CE-144	Not Detected	-----	2.08E-01
CO-56	Not Detected	-----	2.89E-02
CO-57	Not Detected	-----	2.61E-02
CO-58	Not Detected	-----	2.54E-02
CO-60	Not Detected	-----	2.89E-02
CR-51	Not Detected	-----	1.95E-01
CS-134	Not Detected	-----	4.18E-02
CS-137	Not Detected	-----	2.74E-02
EU-152	Not Detected	-----	7.87E-02
EU-154	Not Detected	-----	1.40E-01
EU-155	Not Detected	-----	1.29E-01
FE-59	Not Detected	-----	5.88E-02
GD-153	Not Detected	-----	8.87E-02
HG-203	Not Detected	-----	2.59E-02
I-131	Not Detected	-----	2.55E-02
IR-192	Not Detected	-----	2.25E-02
K-40	1.21E+01	1.85E+00	2.03E-01
MN-52	Not Detected	-----	2.87E-02
MN-54	Not Detected	-----	2.74E-02
MO-99	Not Detected	-----	2.66E-01
NA-22	Not Detected	-----	3.39E-02
NA-24	Not Detected	-----	1.08E-01
NB-95	Not Detected	-----	1.55E-01
ND-147	Not Detected	-----	1.73E-01
NI-57	Not Detected	-----	3.73E-02
RU-103	Not Detected	-----	2.29E-02
RU-106	Not Detected	-----	2.30E-01
SB-122	Not Detected	-----	4.56E-02
SB-124	Not Detected	-----	2.45E-02
SB-125	Not Detected	-----	6.67E-02
SN-113	Not Detected	-----	3.12E-02
SR-85	Not Detected	-----	2.83E-02
TA-182	Not Detected	-----	1.30E-01
TA-183	Not Detected	-----	4.06E-01
TC-99m	Not Detected	-----	8.13E-01
TL-201	Not Detected	-----	2.02E-01
XE-133	Not Detected	-----	1.81E-01
Y-88	Not Detected	-----	2.40E-02
ZN-65	Not Detected	-----	8.95E-02
ZR-95	Not Detected	-----	4.59E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-17-97 2:56:26 PM \*  
 \*\*\*\*\*

Analyzed by: *J* 12/17/97 Reviewed by: *A* 12/18/97  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036832-003  
 Lab Sample ID : 70210008

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 672.000 gram  
 Sample Date/Time : 12-15-97 1:30:00 PM  
 Acquire Start Date/Time : 12-16-97 11:11:42 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	-----	3.17E+00
TH-234	1.03E+00	5.74E-01	6.15E-01
RA-226	1.35E+00	9.01E-01	6.08E-01
PB-214	6.62E-01	1.18E-01	4.53E-02
BI-214	6.38E-01	1.30E-01	5.11E-02
PB-210	Not Detected	-----	3.52E+01
TH-232	6.95E-01	3.82E-01	1.36E-01
UA-228	6.96E-01	2.05E-01	1.39E-01
AC-228	6.56E-01	1.77E-01	7.86E-02
TH-228	7.28E-01	2.44E-01	4.62E-01
RA-224	7.57E-01	4.24E-01	7.39E-02
PB-212	6.87E-01	1.44E-01	3.97E-02
BI-212	6.71E-01	3.87E-01	3.14E-01
TL-208	5.76E-01	1.31E-01	7.06E-02
U-235	Not Detected	-----	2.46E-01
TH-231	Not Detected	-----	1.29E+01
PA-231	Not Detected	-----	1.44E+00
TH-227	Not Detected	-----	3.44E-01
RA-223	Not Detected	-----	2.15E-01
RN-219	Not Detected	-----	3.76E-01
PB-211	Not Detected	-----	8.33E-01
TL-207	Not Detected	-----	1.40E+01
AM-241	Not Detected	-----	4.74E-01
PU-239	Not Detected	-----	4.35E+02
NP-237	Not Detected	-----	3.19E-01
PA-233	Not Detected	-----	5.78E-02
TH-229	Not Detected	-----	2.46E-01



[Summary Report] - Sample ID: : 70210008

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.97E-02
AG-110m	Not Detected	-----	3.17E-02
EA-133	Not Detected	-----	6.79E-02
EE-7	Not Detected	-----	2.50E-01
CD-109	<del>1.58E+00</del>	<del>7.76E-02</del>	<del>1.08E+00</del>
CD-115	Not Detected	-----	1.02E-01
CE-139	Not Detected	-----	2.97E-02
CE-141	Not Detected	-----	5.51E-02
CE-144	Not Detected	-----	2.41E-01
CO-56	Not Detected	-----	3.78E-02
CO-57	Not Detected	-----	3.08E-02
CO-58	Not Detected	-----	3.27E-02
CO-60	Not Detected	-----	3.46E-02
CR-51	Not Detected	-----	2.36E-01
CS-134	Not Detected	-----	4.73E-02
CS-137	Not Detected	-----	3.45E-02
EU-152	Not Detected	-----	9.25E-02
EU-154	Not Detected	-----	1.83E-01
EU-155	Not Detected	-----	1.50E-01
FE-59	Not Detected	-----	6.93E-02
GD-153	Not Detected	-----	1.02E-01
HG-203	Not Detected	-----	3.18E-02
I-131	Not Detected	-----	3.21E-02
IR-192	Not Detected	-----	2.71E-02
K-40	1.47E+01	2.80E+00	2.77E-01
MN-52	Not Detected	-----	3.22E-02
MN-54	Not Detected	-----	3.30E-02
MO-99	Not Detected	-----	3.20E-01
NA-22	Not Detected	-----	4.39E-02
NA-24	Not Detected	-----	1.67E-01
NB-95	Not Detected	-----	2.08E-01
ND-147	Not Detected	-----	2.13E-01
NI-57	Not Detected	-----	5.68E-02
RU-103	Not Detected	-----	2.98E-02
RU-106	Not Detected	-----	2.98E-01
SB-122	Not Detected	-----	5.65E-02
SB-124	Not Detected	-----	3.07E-02
SB-125	Not Detected	-----	8.43E-02
SN-113	Not Detected	-----	3.69E-02
SR-85	Not Detected	-----	3.84E-02
TA-182	Not Detected	-----	1.42E-01
TA-183	Not Detected	-----	4.93E-01
TC-99m	Not Detected	-----	1.59E+00
TL-201	Not Detected	-----	2.54E-01
XE-133	Not Detected	-----	2.27E-01
Y-88	Not Detected	-----	2.71E-02
ZN-65	Not Detected	-----	9.89E-02
ZR-95	Not Detected	-----	5.93E-02

*not detected*  
*J 12/17/97*

Analyzed by: *J* 12/17/97 Reviewed by: *W* 12/18/97

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036833-003  
 Lab Sample ID : 70210009  
 Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 748.000 gram  
 Sample Date/Time : 12-15-97 11:20:00 AM  
 Acquire Start Date/Time : 12-17-97 12:56:36 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	-----	3.09E+00
TH-234	9.97E-01	5.93E-01	5.28E-01
RA-226	1.54E+00	6.37E-01	5.06E-01
PB-214	6.65E-01	1.25E-01	4.68E-02
BI-214	6.03E-01	1.54E-01	4.98E-02
PB-210	Not Detected	-----	3.31E+01
TH-232	5.75E-01	2.93E-01	1.45E-01
A-228	7.14E-01	2.10E-01	1.45E-01
AC-228	7.22E-01	1.70E-01	7.50E-02
TH-228	4.99E-01	1.99E-01	4.72E-01
RA-224	5.95E-01	2.53E-01	8.55E-02
PB-212	6.51E-01	1.11E-01	3.40E-02
BI-212	6.42E-01	3.99E-01	2.88E-01
TL-208	6.30E-01	2.56E-01	5.99E-02
U-235	<del>2.13E-01</del>	<del>1.97E-01</del>	2.30E-01
TH-231	Not Detected	-----	1.19E+01
PA-231	Not Detected	-----	1.39E+00
TH-227	Not Detected	-----	3.20E-01
RA-223	Not Detected	-----	2.04E-01
RN-219	Not Detected	-----	3.52E-01
PB-211	Not Detected	-----	8.13E-01
TL-207	Not Detected	-----	1.34E+01
AM-241	Not Detected	-----	4.46E-01
PU-239	Not Detected	-----	4.26E+02
NP-237	Not Detected	-----	2.76E-01
PA-233	Not Detected	-----	5.53E-02
TH-229	Not Detected	-----	2.36E-01

*not detected*  
*J* 12/17/97

[Summary Report] - Sample ID: : 70210009

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.77E-02
AG-110m	Not Detected	-----	2.86E-02
BA-133	Not Detected	-----	6.40E-02
BE-7	3.31E-01	1.50E-01	1.49E-01
CD-109	Not Detected	-----	9.37E-01
CD-115	Not Detected	-----	9.90E-02
CE-139	Not Detected	-----	2.83E-02
CE-141	Not Detected	-----	5.05E-02
CE-144	Not Detected	-----	2.26E-01
CO-56	Not Detected	-----	3.33E-02
CO-57	Not Detected	-----	2.92E-02
CO-58	Not Detected	-----	3.02E-02
CO-60	Not Detected	-----	3.49E-02
CR-51	Not Detected	-----	2.32E-01
CS-134	Not Detected	-----	4.40E-02
CS-137	Not Detected	-----	3.13E-02
EU-152	Not Detected	-----	8.77E-02
EU-154	Not Detected	-----	1.74E-01
EU-155	Not Detected	-----	1.40E-01
FE-59	Not Detected	-----	6.91E-02
GD-153	Not Detected	-----	9.64E-02
HG-203	Not Detected	-----	3.03E-02
I-131	Not Detected	-----	3.03E-02
IR-192	Not Detected	-----	2.61E-02
K-40	1.72E+01	2.52E+00	2.40E-01
MN-52	Not Detected	-----	3.53E-02
MN-54	Not Detected	-----	3.36E-02
MO-99	Not Detected	-----	3.36E-01
NA-22	Not Detected	-----	3.79E-02
NA-24	Not Detected	-----	1.86E-01
NB-95	Not Detected	-----	2.00E-01
ND-147	Not Detected	-----	1.99E-01
NI-57	Not Detected	-----	4.98E-02
RU-103	Not Detected	-----	2.81E-02
RU-106	Not Detected	-----	2.87E-01
SB-122	Not Detected	-----	5.70E-02
SB-124	Not Detected	-----	2.85E-02
SB-125	Not Detected	-----	7.52E-02
SN-113	Not Detected	-----	3.62E-02
SR-85	Not Detected	-----	3.48E-02
TA-182	Not Detected	-----	1.39E-01
TA-183	Not Detected	-----	4.72E-01
TC-99m	Not Detected	-----	2.31E+00
TL-201	Not Detected	-----	2.38E-01
XE-133	Not Detected	-----	2.22E-01
Y-88	Not Detected	-----	2.18E-02
ZN-65	Not Detected	-----	9.52E-02
ZR-95	Not Detected	-----	5.24E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-17-97 4:24:12 AM \*  
 \*\*\*\*\*

Analyzed by: *J* 12/17/97 Reviewed by: *H* 12/18/97  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036834-003  
 Lab Sample ID : 70210010

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 710.000 gram  
 Sample Date/Time : 12-15-97 1:15:00 PM  
 Acquire Start Date/Time : 12-17-97 2:41:26 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	-----	3.24E+00
TH-234	Not Detected	-----	7.61E-01
RA-226	1.38E+00	5.99E-01	4.72E-01
PB-214	6.91E-01	1.22E-01	4.30E-02
BI-214	6.47E-01	1.41E-01	5.29E-02
PB-210	Not Detected	-----	3.48E+01
TH-232	5.17E-01	2.64E-01	1.36E-01
RA-228	6.31E-01	2.47E-01	1.62E-01
AC-228	6.22E-01	1.76E-01	8.18E-02
TH-228	5.45E-01	2.09E-01	4.70E-01
RA-224	6.38E-01	2.03E-01	7.88E-02
PB-212	5.92E-01	9.79E-02	3.82E-02
BI-212	5.17E-01	4.12E-01	2.59E-01
TL-208	5.23E-01	5.41E-01	6.17E-02
U-235	Not Detected	-----	2.40E-01
TH-231	Not Detected	-----	1.24E+01
PA-231	Not Detected	-----	1.43E+00
TH-227	Not Detected	-----	3.21E-01
RA-223	Not Detected	-----	2.14E-01
RN-219	Not Detected	-----	3.71E-01
PB-211	Not Detected	-----	8.41E-01
TL-207	Not Detected	-----	1.30E+01
AM-241	Not Detected	-----	4.66E-01
PU-239	Not Detected	-----	4.31E+02
NP-237	Not Detected	-----	2.60E-01
PA-233	Not Detected	-----	5.76E-02
TH-229	Not Detected	-----	2.48E-01

[Summary Report] - Sample ID: : 70210010

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.76E-02
AG-110m	Not Detected	-----	3.18E-02
BA-133	Not Detected	-----	6.70E-02
BE-7	1.65E-01	1.52E-01	1.58E-01
CD-109	Not Detected	-----	8.82E-01
CD-115	Not Detected	-----	1.02E-01
CE-139	Not Detected	-----	2.86E-02
CE-141	Not Detected	-----	5.32E-02
CE-144	Not Detected	-----	2.37E-01
CO-56	Not Detected	-----	3.37E-02
CO-57	Not Detected	-----	2.96E-02
CO-58	Not Detected	-----	3.04E-02
CO-60	Not Detected	-----	3.35E-02
CR-51	Not Detected	-----	2.33E-01
CS-134	Not Detected	-----	4.74E-02
CS-137	Not Detected	-----	3.42E-02
EU-152	Not Detected	-----	8.90E-02
EU-154	Not Detected	-----	1.75E-01
EU-155	Not Detected	-----	1.47E-01
FE-59	Not Detected	-----	7.47E-02
GD-153	Not Detected	-----	1.04E-01
HG-203	Not Detected	-----	3.10E-02
I-131	Not Detected	-----	3.11E-02
IR-192	Not Detected	-----	2.72E-02
K-40	1.64E+01	2.41E+00	2.68E-01
MN-52	Not Detected	-----	3.63E-02
MN-54	Not Detected	-----	3.44E-02
MO-99	Not Detected	-----	3.30E-01
NA-22	Not Detected	-----	4.25E-02
NA-24	Not Detected	-----	1.92E-01
NB-95	Not Detected	-----	2.00E-01
ND-147	Not Detected	-----	2.12E-01
NI-57	Not Detected	-----	5.67E-02
RU-103	Not Detected	-----	2.84E-02
RU-106	Not Detected	-----	2.87E-01
SB-122	Not Detected	-----	5.66E-02
SB-124	Not Detected	-----	3.05E-02
SB-125	Not Detected	-----	8.00E-02
SN-113	Not Detected	-----	3.60E-02
SR-85	Not Detected	-----	3.67E-02
TA-182	Not Detected	-----	1.49E-01
TA-183	Not Detected	-----	4.93E-01
TC-99m	Not Detected	-----	2.31E+00
TL-201	Not Detected	-----	2.56E-01
XE-133	Not Detected	-----	2.32E-01
Y-88	Not Detected	-----	2.70E-02
ZN-65	Not Detected	-----	1.01E-01
ZR-95	Not Detected	-----	5.62E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 12-17-97 6:08:16 AM \*  
 \*\*\*\*\*

Analyzed by: *J* 12/17/97 Reviewed by: *W* 12/18/97  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036845-003  
 Lab Sample ID : 70210011

Sample Description : MARINELLI LIQUID SAMPLE  
 Sample Quantity : 500.000 mL  
 Sample Date/Time : 12-15-97 10:10:00 AM  
 Acquire Start Date/Time : 12-17-97 4:26:24 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	-----	1.61E+00
TH-234	Not Detected	-----	3.82E-01
RA-226	Not Detected	-----	4.95E-01
PB-214	Not Detected	-----	5.29E-02
BI-214	Not Detected	-----	6.07E-02
PB-210	Not Detected	-----	1.43E+01
TH-232	Not Detected	-----	1.53E-01
RA-228	Not Detected	-----	1.47E-01
AC-228	Not Detected	-----	7.84E-02
TH-228	Not Detected	-----	5.14E-01
RA-224	Not Detected	-----	1.21E-01
PB-212	Not Detected	-----	3.56E-02
BI-212	Not Detected	-----	3.23E-01
TL-208	Not Detected	-----	7.20E-02
U-235	Not Detected	-----	1.57E-01
TH-231	Not Detected	-----	6.85E+00
PA-231	Not Detected	-----	1.06E+00
TH-227	Not Detected	-----	1.37E-01
RA-223	Not Detected	-----	1.14E-01
RN-219	Not Detected	-----	2.83E-01
PB-211	Not Detected	-----	6.35E-01
TL-207	Not Detected	-----	9.53E+00
AM-241	Not Detected	-----	2.27E-01
PU-239	Not Detected	-----	2.74E+02
NP-237	Not Detected	-----	1.84E-01
PA-233	Not Detected	-----	4.24E-02
TH-229	Not Detected	-----	1.50E-01

[Summary Report] - Sample ID: : 70210011

Nuclide Name	Activity (pCi/mL )	2-sigma Error	MDA (pCi/mL )
AG-108m	Not Detected	-----	2.44E-02
AG-110m	Not Detected	-----	2.15E-02
BA-133	Not Detected	-----	3.30E-02
BE-7	Not Detected	-----	1.87E-01
CD-109	Not Detected	-----	6.22E-01
CD-115	Not Detected	-----	6.49E-02
CE-139	Not Detected	-----	1.92E-02
CE-141	Not Detected	-----	3.43E-02
CE-144	Not Detected	-----	1.50E-01
CO-56	Not Detected	-----	3.18E-02
CO-57	Not Detected	-----	1.89E-02
CO-58	Not Detected	-----	2.40E-02
CO-60	Not Detected	-----	2.57E-02
CR-51	Not Detected	-----	1.81E-01
CS-134	Not Detected	-----	2.72E-02
CS-137	Not Detected	-----	2.23E-02
EU-152	Not Detected	-----	5.69E-02
EU-154	Not Detected	-----	1.13E-01
EU-155	Not Detected	-----	9.02E-02
FE-59	Not Detected	-----	4.72E-02
GD-153	Not Detected	-----	5.90E-02
HG-203	Not Detected	-----	2.25E-02
I-131	Not Detected	-----	2.35E-02
IR-192	Not Detected	-----	2.04E-02
K-40	Not Detected	-----	3.35E-01
MN-52	Not Detected	-----	2.98E-02
MN-54	Not Detected	-----	2.41E-02
MO-99	Not Detected	-----	2.29E-01
NA-22	Not Detected	-----	2.46E-02
NA-24	Not Detected	-----	1.64E-01
NB-95	Not Detected	-----	8.91E-02
ND-147	Not Detected	-----	1.51E-01
NI-57	Not Detected	-----	7.89E-02
RU-103	Not Detected	-----	2.38E-02
RU-106	Not Detected	-----	2.22E-01
SB-122	Not Detected	-----	4.54E-02
SB-124	Not Detected	-----	2.57E-02
SB-125	Not Detected	-----	5.92E-02
SN-113	Not Detected	-----	2.71E-02
SR-85	Not Detected	-----	3.10E-02
TA-182	Not Detected	-----	8.34E-02
TA-183	Not Detected	-----	2.46E-01
TC-99m	Not Detected	-----	2.83E+00
TL-201	Not Detected	-----	1.37E-01
XE-133	Not Detected	-----	1.37E-01
Y-88	Not Detected	-----	2.43E-02
ZN-65	Not Detected	-----	5.61E-02
ZR-95	Not Detected	-----	3.70E-02

\* Analyzed by: *J* 12/17/97. Reviewed by: *Y* 12/18/97 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : LAB CONTROL SAMPLE USING CG134  
 Lab Sample ID : 70210012

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 : 12-17-97 7:35:57 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 600 / 605 seconds

Comments:  
 \*\*\*\*\*

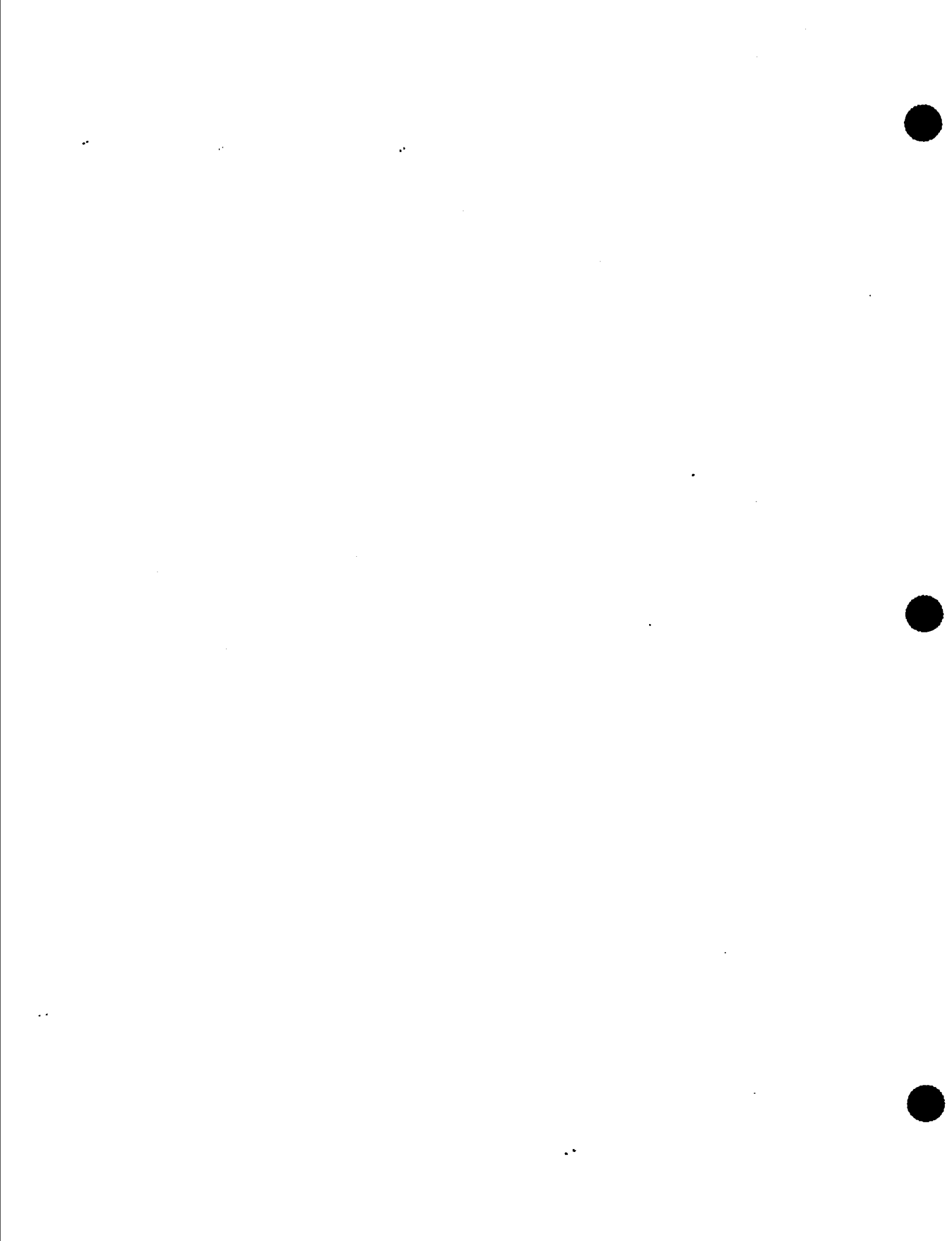
Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	-----	2.15E+04
TH-234	Not Detected	-----	4.68E+03
RA-226	Not Detected	-----	6.42E+03
PB-214	Not Detected	-----	7.25E+02
BI-214	Not Detected	-----	6.40E+02
PB-210	Not Detected	-----	2.71E+05
TH-232	Not Detected	-----	2.30E+03
RA-228	Not Detected	-----	2.68E+03
AC-228	Not Detected	-----	1.61E+03
TH-228	Not Detected	-----	9.06E+04
RA-224	Not Detected	-----	3.05E+03
PB-212	Not Detected	-----	6.83E+03
BI-212	Not Detected	-----	5.92E+04
TL-208	Not Detected	-----	1.22E+04
U-235	Not Detected	-----	1.83E+03
TH-231	Not Detected	-----	8.10E+04
PA-231	Not Detected	-----	1.49E+04
TH-227	Not Detected	-----	2.51E+03
RA-223	Not Detected	-----	1.00E+26
RN-219	Not Detected	-----	5.89E+03
PB-211	Not Detected	-----	1.33E+04
TL-207	Not Detected	-----	2.23E+05
AM-241	7.97E+04	1.40E+04	3.13E+03
PU-239	Not Detected	-----	3.26E+06
NP-237	Not Detected	-----	2.49E+03
PA-233	Not Detected	-----	6.43E+02
TH-229	Not Detected	-----	1.82E+03



[Summary Report] - Sample ID: : 70210012

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	3.41E+02
AG-110m	Not Detected	-----	2.29E+06
BA-133	Not Detected	-----	7.16E+02
BE-7	Not Detected	-----	1.81E+18
CD-109	5.80E+05	9.85E+05	3.63E+05
CD-115	Not Detected	-----	1.00E+26
CE-139	Not Detected	-----	1.14E+08
CE-141	Not Detected	-----	1.00E+26
CE-144	Not Detected	-----	1.05E+06
CO-56	Not Detected	-----	5.48E+12
CO-57	Not Detected	-----	1.75E+05
CO-58	Not Detected	-----	3.85E+13
CO-60	7.93E+04	1.07E+04	4.25E+02
CR-51	Not Detected	-----	1.00E+26
CS-134	Not Detected	-----	3.21E+03
CS-137	7.13E+04	9.47E+03	2.80E+02
EU-152	Not Detected	-----	9.94E+02
EU-154	Not Detected	-----	2.69E+03
EU-155	Not Detected	-----	3.03E+03
FE-59	Not Detected	-----	3.39E+20
GD-153	Not Detected	-----	1.33E+06
HG-203	Not Detected	-----	1.97E+19
I-131	Not Detected	-----	1.00E+26
IR-192	Not Detected	-----	1.22E+13
K-40	Not Detected	-----	1.58E+03
MN-52	Not Detected	-----	1.00E+26
MN-54	Not Detected	-----	1.19E+05
MO-99	Not Detected	-----	1.00E+26
NA-22	Not Detected	-----	1.52E+03
NA-24	Not Detected	-----	1.00E+26
NB-95	Not Detected	-----	1.00E+26
ND-147	Not Detected	-----	1.00E+26
NI-57	Not Detected	-----	1.00E+26
RU-103	Not Detected	-----	1.00E+26
RU-106	Not Detected	-----	4.17E+05
SB-122	Not Detected	-----	1.00E+26
SB-124	Not Detected	-----	3.03E+15
SB-125	Not Detected	-----	6.83E+03
SN-113	Not Detected	-----	2.89E+09
SR-85	Not Detected	-----	4.44E+14
TA-182	Not Detected	-----	7.54E+09
TA-183	Not Detected	-----	1.00E+26
TC-99m	Not Detected	-----	1.00E+26
TL-201	Not Detected	-----	1.00E+26
XE-133	Not Detected	-----	1.00E+26
Y-88	Not Detected	-----	3.89E+09
ZN-65	Not Detected	-----	1.39E+06
ZR-95	Not Detected	-----	9.58E+14





# ANALYSIS REQUEST AND CHAIN OF CUSTODY

980371

PAGE 1 OF 2

Internal Lab  
Batch No. \_\_\_\_\_

Dept. No./Mail Stop: 6134 / 1148

Project/Task Manager: AASJ TAVLETICH

Project Name: CRITICAL CORNER TEST AREA

Record Center Code: ER/1334 / STA / DAT

Linkhook Ref No: 0151

Service Order No.: CF0515

SAR/WR No. \_\_\_\_\_

Contract No: AJ2480C

Case No: 7215, 7230D

SMO Authorization: DW/LL

Bill to: Sandia National Laboratories

Supplier Services Department  
P.O. Box 5800 MS 0154

Lab Contact: TIM KELLOGG

Lab Destination: CODE CENTER

SMO Contact/Phone: SALMI / 505-844-3110

Send Report to SMO: ANGELA MUFF

AR/COC- 510219

Location		Tech Area	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Reference LOV (available at SMO)			Parameter & Method Requested							Lab Sample ID		
Building	Room	N/A					Container Type	Volume	Preservative	Sample Collection Method	Sample Type	COARSE ALPHA	COARSE BETA	REDA METALS + BA	TAL METALS	SUDES		TCLP SUDES	HIGH EXPLOSIVES
B 55	- 001		N/A	STA	2-N-90 11:57	CONCRETE	G	40Z	4°C	G	SA	X	X						
B 55	- 002							160Z						X	X	X	X	X	X
B 56	- 001		0-0.5		1070	SOIL		90Z				X	X						
B 56	- 002							160Z						X	X				
B 57	- 001		N/A		1759	CONCRETE		90Z				X	X						
B 57	- 002							160Z						X	X	X	X	X	X
B 58	- 001		0-0.5		1300	SOIL		40Z				X	X						
B 58	- 002							160Z						X	X				
B 59	- 001		N/A		1110	CONCRETE		90Z				X	X						
B 59	- 002							160Z						X	X	X	X	X	X

RMMA  Yes  No Ref. No. \_\_\_\_\_

Sample Disposal  Return to Client  Disposal by lab

Turnaround Time  Normal  Rush Required Report Date \_\_\_\_\_

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	JOE TAVLETICH	<i>[Signature]</i>	JT	ARMY / 6134 / 284-2479

Special Instructions/QC Requirements:

SEND RAW DATA PACKAGE AS SEPARATE REPORT

LIST LAB #s

1. Relinquished by <i>[Signature]</i> Org. <u>6134</u> Date <u>2-11-98</u> Time <u>1415</u>	4. Relinquished by _____ Org. _____ Date _____ Time _____
1. Received by <i>[Signature]</i> Org. <u>6407578</u> Date <u>2/11/98</u> Time <u>1458</u>	4. Received by _____ Org. _____ Date _____ Time _____
2. Relinquished by <i>[Signature]</i> Org. <u>ARMY 7578</u> Date <u>2/12/98</u> Time <u>1300</u>	5. Relinquished by _____ Org. _____ Date _____ Time _____
2. Received by <i>[Signature]</i> Org. <u>Code</u> Date <u>021308</u> Time <u>1015</u>	5. Received by _____ Org. _____ Date _____ Time _____
3. Relinquished by _____ Org. _____ Date _____ Time _____	6. Relinquished by _____ Org. _____ Date _____ Time _____
3. Received by _____ Org. _____ Date _____ Time _____	6. Received by _____ Org. _____ Date _____ Time _____

WHITE: To Accompany Samples; BLUE: To Accompany Samples; YELLOW: SMO Suspense Copy; PINK: Field Copy

# ANALYSIS REQUEST A JD CHAIN OF CUSTODY

## CONTINUATION FORM

AR/COC- 510219

SF 2001-COD (12-98)  
Superseded (10-90) Issue

Project Name: CEMEX Copoly Test Area Project/Task Manager: AAS / PAULETICH Case No.: 7215.220300

Location		Tech Area	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO)					Parameter & Method Requested								Lab Sample ID
						Building	Room	Sample Matrix	Container	Volume	Preservative	Sample Collection Method	Sample Type	GROSS ALPHA	GROSS BETA	REEM METALS + SE	TAL METALS	SVOCs	
Sample No. - Fraction		ER Sample ID or Sample Location Detail					Type												
056	B60-DD1	CEMEX-STA-AR-D71-0-0.5-S	0-0.5	57A	1-11-98 11:20	Soil	G	10g	4°C	G	SA	X	X						
	B60-DD2	↓	↓		↓	↓		160g						X	X				
	B61-DD1	CEMEX-STA-AR-D72-C	N/A		10:55	Concrete		40g				X	X						
	B61-DD2	↓	↓		↓	↓		160g						X	X	X	X	X	
	B62-DD1	CEMEX-STA-AR-D72-0-0.5-S	0-0.5		11:00 #1055	Soil		40g				X	X						
	B62-DD2	↓	↓		11:00	↓		160g						X	X	X			
	B63-DD4	CEMEX-STA-AR-U00-ES	N/A		2/11/98 10:00	DIW	P	2L	HNO <sub>3</sub>		EB	X	X						
	B63-DD5	↓	↓		↓	↓	P	500ml	↓					X	X				
	B63-DD7	↓	↓		↓	↓	AG	251L	4°C					X					
	B63-DD8	↓	↓		↓	↓	AG	251L	↓							X			

**Abnormal Conditions on Receipt:** [Handwritten notes and signatures]

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 2-13-98 9:41:46 AM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 2/13/98 Reviewed by: *[Signature]* 2/16/98  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036855-003  
 Lab Sample ID : 80020501

069-C

RECEIVE  
 JUN 30 1998  
 RECEIVED

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 690.000 gram  
 Sample Date/Time : 2-11-98 10:35:00 AM  
 Acquire Start Date/Time : 2-12-98 8:58:48 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:

\*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.21E+00
TH-234	7.24E-01	3.93E-01	6.50E-01
RA-226	1.31E+00	6.90E-01	4.82E-01
PB-214	5.97E-01	1.17E-01	4.35E-02
BI-214	5.64E-01	1.16E-01	4.76E-02
PB-210	Not Detected	-----	3.38E+01
TH-232	6.24E-01	3.33E-01	1.36E-01
RA-228	5.58E-01	2.27E-01	1.49E-01
AC-228	5.09E-01	1.52E-01	9.06E-02
TH-228	4.22E-01	1.97E-01	4.75E-01
RA-224	5.84E-01	1.95E-01	7.15E-02
PB-212	5.64E-01	1.07E-01	3.88E-02
BI-212	7.39E-01	3.85E-01	2.62E-01
TL-208	5.25E-01	1.44E-01	6.22E-02
U-235	Not Detected	-----	2.37E-01
TH-231	Not Detected	-----	2.27E+00
PA-231	Not Detected	-----	3.68E+00
TH-227	Not Detected	-----	3.19E-01
RA-223	Not Detected	-----	2.00E-01
RN-219	Not Detected	-----	3.60E-01
PB-211	Not Detected	-----	8.01E-01
TL-207	Not Detected	-----	1.33E+01
AM-241	Not Detected	-----	4.53E-01
PU-239	Not Detected	-----	4.22E+02
NP-237	Not Detected	-----	2.56E-01
PA-233	Not Detected	-----	5.60E-02
TH-229	Not Detected	-----	2.38E-01

Post-It™ brand fax transmittal memo 7671 # of pages 25

To DOUG VEDER	From RPSA
Ca. JT	Ca. SNL
Dept.	Phone # 844-4069
Fax # 262-8855	Fax # 844-5977

[Summary Report] - Sample ID: : 80020501

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.80E-02
AG-110m	Not Detected	-----	2.81E-02
AM-243	Not Detected	-----	8.29E-02
BA-133	Not Detected	-----	6.35E-02
BE-7	Not Detected	-----	2.39E-01
CD-109	<del>1.27E+00</del>	<del>5.05E-01</del>	8.68E-01
CD-115	Not Detected	-----	8.55E-02
CE-139	Not Detected	-----	2.88E-02
CE-141	Not Detected	-----	5.17E-02
CE-144	Not Detected	-----	2.31E-01
CO-56	Not Detected	-----	3.51E-02
CO-57	Not Detected	-----	2.92E-02
CO-58	Not Detected	-----	3.16E-02
CO-60	Not Detected	-----	3.78E-02
CR-51	Not Detected	-----	2.22E-01
CS-134	Not Detected	-----	4.78E-02
CS-137	Not Detected	-----	3.04E-02
EU-152	Not Detected	-----	8.78E-02
EU-154	Not Detected	-----	1.75E-01
EU-155	Not Detected	-----	1.40E-01
FE-59	Not Detected	-----	7.20E-02
GD-153	Not Detected	-----	1.02E-01
HG-203	Not Detected	-----	3.08E-02
I-131	Not Detected	-----	3.03E-02
IR-192	Not Detected	-----	2.57E-02
K-40	1.50E+01	2.26E+00	2.62E-01
KR-85	Not Detected	-----	7.94E+00
MN-52	Not Detected	-----	3.20E-02
MN-54	Not Detected	-----	3.41E-02
MO-99	Not Detected	-----	2.92E-01
NA-22	Not Detected	-----	4.15E-02
NA-24	Not Detected	-----	9.34E-02
NB-95	Not Detected	-----	1.77E-01
ND-147	Not Detected	-----	1.92E-01
NI-57	Not Detected	-----	3.83E-02
NP-239	Not Detected	-----	1.24E-01
RU-103	Not Detected	-----	2.71E-02
RU-106	Not Detected	-----	2.78E-01
SB-122	Not Detected	-----	4.78E-02
SB-124	Not Detected	-----	3.06E-02
SB-125	Not Detected	-----	7.84E-02
SN-113	Not Detected	-----	3.68E-02
TA-182	Not Detected	-----	1.48E-01
TA-183	Not Detected	-----	4.47E-01
TC-99m	Not Detected	-----	4.18E-01
TL-201	Not Detected	-----	2.18E-01
XE-133	Not Detected	-----	1.87E-01
Y-88	Not Detected	-----	2.63E-02
ZN-65	Not Detected	-----	1.01E-01
ZR-95	Not Detected	-----	5.28E-02

*Not detected*  
*J 2/15/98*

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 2-12-98 12:26:24 PM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 2/13/98 Reviewed by: *[Signature]* 2/16/98 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036856-003  
 Lab Sample ID : 80020502

*069-0-0.5-5*

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 691.000 gram  
 Sample Date/Time : 2-11-98 10:40:00 AM  
 Acquire Start Date/Time : 2-12-98 10:43:41 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	-----	3.47E+00
TH-234	Not Detected	-----	7.71E-01
RA-226	2.08E+00	7.07E-01	5.57E-01
PB-214	8.28E-01	1.62E-01	5.31E-02
BI-214	7.34E-01	1.38E-01	4.78E-02
PB-210	Not Detected	-----	3.70E+01
TH-232	7.75E-01	7.45E-01	1.71E-01
RA-228	7.73E-01	3.12E-01	1.72E-01
AC-228	8.01E-01	1.91E-01	8.90E-02
TH-228	7.57E-01	2.07E-01	4.98E-01
RA-224	7.74E-01	2.87E-01	7.69E-02
PB-212	7.53E-01	1.38E-01	4.53E-02
BI-212	6.47E-01	2.80E-01	2.81E-01
TL-208	6.78E-01	1.06E+00	6.55E-02
U-235	<del>1.22E-01</del>	<del>2.26E-01</del>	2.63E-01
TH-231	Not Detected	-----	2.36E+00
PA-231	Not Detected	-----	4.26E+00
TH-227	Not Detected	-----	3.60E-01
RA-223	Not Detected	-----	2.26E-01
RN-219	Not Detected	-----	3.89E-01
PB-211	Not Detected	-----	8.71E-01
TL-207	Not Detected	-----	1.44E+01
AM-241	Not Detected	-----	5.13E-01
PU-239	Not Detected	-----	4.73E+02
NP-237	Not Detected	-----	3.06E-01
PA-233	Not Detected	-----	6.09E-02
TH-229	Not Detected	-----	2.62E-01

*Not detected*  
*[Signature]* 2/13/98



			TD
AG-108m	Not Detected	-----	4.19E-02
AG-110m	Not Detected	-----	3.20E-02
AM-243	Not Detected	-----	1.03E-01
BA-133	Not Detected	-----	7.31E-02
BE-7	Not Detected	-----	2.64E-01
CD-109	Not Detected	-----	1.04E+00
CD-115	Not Detected	-----	9.34E-02
CE-139	Not Detected	-----	3.09E-02
CE-141	Not Detected	-----	5.73E-02
CE-144	Not Detected	-----	2.57E-01
CO-56	Not Detected	-----	3.80E-02
CO-57	Not Detected	-----	3.22E-02
CO-58	Not Detected	-----	3.55E-02
CO-60	Not Detected	-----	3.77E-02
CR-51	Not Detected	-----	2.48E-01
CS-134	Not Detected	-----	5.11E-02
CS-137	Not Detected	-----	3.49E-02
EU-152	Not Detected	-----	9.69E-02
EU-154	Not Detected	-----	1.93E-01
EU-155	Not Detected	-----	1.56E-01
FE-59	Not Detected	-----	7.84E-02
GD-153	Not Detected	-----	1.11E-01
HG-203	Not Detected	-----	3.24E-02
I-131	Not Detected	-----	3.31E-02
IR-192	Not Detected	-----	2.86E-02
K-40	1.98E+01	2.90E+00	2.78E-01
KR-85	Not Detected	-----	8.98E+00
MN-52	Not Detected	-----	3.57E-02
MN-54	Not Detected	-----	3.63E-02
MO-99	Not Detected	-----	3.22E-01
NA-22	Not Detected	-----	4.62E-02
NA-24	Not Detected	-----	1.08E-01
NB-95	Not Detected	-----	2.02E-01
ND-147	Not Detected	-----	2.18E-01
NI-57	Not Detected	-----	8.41E-02
NP-239	Not Detected	-----	1.41E-01
RU-103	Not Detected	-----	3.06E-02
RU-106	Not Detected	-----	3.12E-01
SB-122	Not Detected	-----	5.35E-02
SB-124	Not Detected	-----	3.11E-02
SB-125	Not Detected	-----	8.61E-02
SN-113	Not Detected	-----	3.95E-02
TA-182	Not Detected	-----	1.61E-01
TA-183	Not Detected	-----	5.01E-01
TC-99m	Not Detected	-----	5.43E-01
TL-201	Not Detected	-----	2.44E-01
XE-133	Not Detected	-----	2.11E-01
Y-88	Not Detected	-----	2.48E-02
ZN-65	Not Detected	-----	1.11E-01
ZR-95	Not Detected	-----	5.89E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 2-12-98 2:11:22 PM \*  
 \*\*\*\*\*  
 \* Analyzed by: *J* 2/13/98 Reviewed by: *W* 2/16/98 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036857-003  
 Lab Sample ID : 80020503

070-C

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 732.000 gram  
 Sample Date/Time : 2-11-98 12:55:00 PM  
 Acquire Start Date/Time : 2-12-98 12:28:33 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

## Comments:

\*\*\*\*\*

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
U-238	Not Detected	-----	3.10E+00
TH-234	1.01E+00	6.35E-01	6.59E-01
RA-226	1.51E+00	6.03E-01	5.12E-01
PB-214	6.18E-01	1.25E-01	4.31E-02
BI-214	6.13E-01	9.04E-01	4.23E-02
PB-210	Not Detected	-----	3.35E+01
TH-232	5.68E-01	3.02E-01	1.35E-01
RA-226	5.95E-01	3.10E-01	1.33E-01
AC-228	5.76E-01	2.38E-01	8.02E-02
TH-228	3.48E-01	1.89E-01	4.97E-01
RA-224	5.45E-01	3.18E-01	8.66E-02
PB-212	5.65E-01	1.13E-01	3.85E-02
BI-212	5.55E-01	3.77E-01	2.74E-01
TL-208	5.02E-01	9.58E-01	6.42E-02
U-235	Not Detected	-----	2.29E-01
TH-231	Not Detected	-----	2.15E+00
PA-231	Not Detected	-----	3.64E+00
TH-227	Not Detected	-----	3.12E-01
RA-223	Not Detected	-----	1.97E-01
RN-219	Not Detected	-----	3.33E-01
PB-211	Not Detected	-----	7.46E-01
TL-207	Not Detected	-----	1.31E+01
AM-241	Not Detected	-----	4.41E-01
PU-239	Not Detected	-----	4.29E+02
NP-237	Not Detected	-----	2.56E-01
PA-233	Not Detected	-----	5.50E-02
TH-229	Not Detected	-----	2.35E-01

[Summary Report] - Sample ID: : 80020503

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.62E-02
AG-110m	Not Detected	-----	2.85E-02
AM-243	Not Detected	-----	9.65E-02
BA-133	Not Detected	-----	6.29E-02
BE-7	Not Detected	-----	2.33E-01
CD-109	Not Detected	-----	8.68E-01
CD-115	Not Detected	-----	8.34E-02
CE-139	Not Detected	-----	2.85E-02
CE-141	Not Detected	-----	5.04E-02
CE-144	Not Detected	-----	2.32E-01
CO-56	Not Detected	-----	3.31E-02
CO-57	Not Detected	-----	2.88E-02
CO-58	Not Detected	-----	2.99E-02
CO-60	Not Detected	-----	3.47E-02
CR-51	Not Detected	-----	2.22E-01
CS-134	Not Detected	-----	4.59E-02
CS-137	Not Detected	-----	3.11E-02
EU-152	Not Detected	-----	8.66E-02
EU-154	Not Detected	-----	1.68E-01
EU-155	Not Detected	-----	1.41E-01
FE-59	Not Detected	-----	6.29E-02
GD-153	Not Detected	-----	9.73E-02
HG-203	Not Detected	-----	3.09E-02
I-131	Not Detected	-----	2.99E-02
IR-192	Not Detected	-----	2.57E-02
K-40	1.30E+01	1.99E+00	2.48E-01
KR-85	Not Detected	-----	7.91E+00
MN-52	Not Detected	-----	3.22E-02
MN-54	Not Detected	-----	3.20E-02
MO-99	Not Detected	-----	2.84E-01
NA-22	Not Detected	-----	3.67E-02
NA-24	Not Detected	-----	8.61E-02
NB-95	Not Detected	-----	1.74E-01
ND-147	Not Detected	-----	1.85E-01
NI-57	Not Detected	-----	4.00E-02
NP-239	Not Detected	-----	1.26E-01
RU-103	Not Detected	-----	2.61E-02
RU-106	Not Detected	-----	2.60E-01
SB-122	Not Detected	-----	4.62E-02
SB-124	Not Detected	-----	2.81E-02
SB-125	Not Detected	-----	7.89E-02
SN-113	Not Detected	-----	3.57E-02
TA-182	Not Detected	-----	1.38E-01
TA-183	Not Detected	-----	4.33E-01
TC-99m	Not Detected	-----	4.59E-01
TL-201	Not Detected	-----	2.14E-01
XE-133	Not Detected	-----	1.83E-01
Y-88	Not Detected	-----	2.46E-02
ZN-65	Not Detected	-----	9.26E-02
ZR-95	Not Detected	-----	5.34E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 2-12-98 3:56:18 PM \*  
 \*\*\*\*\*

\* Analyzed by: *J* 2/13/98 Reviewed by: *WJ* 2/16/98 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036858-003  
 Lab Sample ID : 80020504

070-0-0.5-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 705.000 gram  
 Sample Date/Time : 2-11-98 1:00:00 PM  
 Acquire Start Date/Time : 2-12-98 2:13:30 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	-----	3.29E+00
TH-234	1.23E+00	5.07E-01	7.44E-01
RA-226	1.73E+00	6.34E-01	5.88E-01
PB-214	7.05E-01	1.25E-01	4.90E-02
BI-214	7.37E-01	2.35E-01	4.35E-02
PB-210	Not Detected	-----	3.53E+01
TH-232	6.97E-01	3.80E-01	1.44E-01
RA-228	6.74E-01	3.04E-01	1.58E-01
AC-228	6.80E-01	1.80E-01	8.39E-02
TH-228	7.97E-01	2.65E-01	4.93E-01
RA-224	7.97E-01	2.63E-01	8.16E-02
PB-212	7.12E-01	1.23E-01	4.20E-02
BI-212	9.33E-01	5.22E-01	3.11E-01
TL-208	5.86E-01	1.24E-01	6.59E-02
U-235	Not Detected	-----	2.53E-01
TH-231	Not Detected	-----	2.32E+00
PA-231	Not Detected	-----	4.03E+00
TH-227	Not Detected	-----	3.45E-01
RA-223	Not Detected	-----	2.12E-01
RN-219	Not Detected	-----	3.86E-01
PB-211	Not Detected	-----	8.79E-01
TL-207	Not Detected	-----	1.47E+01
AM-241	Not Detected	-----	4.80E-01
PU-239	Not Detected	-----	4.64E+02
NP-237	<del>1.68E-01</del>	<del>1.69E-01</del>	2.71E-01
PA-233	Not Detected	-----	5.83E-02
TH-229	Not Detected	-----	2.56E-01

not detected  
*J* 2/13/98

[Summary Report] - Sample ID: : 80020504

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.09E-02
AG-110m	Not Detected	-----	3.04E-02
AM-243	Not Detected	-----	9.37E-02
BA-133	Not Detected	-----	6.90E-02
BE-7	Not Detected	-----	2.52E-01
CD-109	Not Detected	-----	9.19E-01
CD-115	Not Detected	-----	8.97E-02
CE-139	Not Detected	-----	2.92E-02
CE-141	Not Detected	-----	5.61E-02
CE-144	Not Detected	-----	2.48E-01
CO-56	Not Detected	-----	3.67E-02
CO-57	Not Detected	-----	3.12E-02
CO-58	Not Detected	-----	3.37E-02
CO-60	Not Detected	-----	3.68E-02
CR-51	Not Detected	-----	2.40E-01
CS-134	Not Detected	-----	5.17E-02
CS-137	Not Detected	-----	3.35E-02
EU-152	Not Detected	-----	9.38E-02
EU-154	Not Detected	-----	1.87E-01
EU-155	Not Detected	-----	1.54E-01
FE-59	Not Detected	-----	7.45E-02
GD-153	Not Detected	-----	1.09E-01
HG-203	Not Detected	-----	3.34E-02
I-131	Not Detected	-----	3.13E-02
IR-192	Not Detected	-----	2.78E-02
K-40	1.84E+01	2.71E+00	2.69E-01
KR-85	Not Detected	-----	8.50E+00
MN-52	Not Detected	-----	3.63E-02
MN-54	Not Detected	-----	3.70E-02
MO-99	Not Detected	-----	3.20E-01
NA-22	Not Detected	-----	4.48E-02
NA-24	Not Detected	-----	1.05E-01
NB-95	Not Detected	-----	1.95E-01
ND-147	Not Detected	-----	2.17E-01
NI-57	Not Detected	-----	4.33E-02
NP-239	Not Detected	-----	1.39E-01
RU-103	Not Detected	-----	3.00E-02
RU-106	Not Detected	-----	2.90E-01
SB-122	Not Detected	-----	5.30E-02
SB-124	Not Detected	-----	3.23E-02
SB-125	Not Detected	-----	8.49E-02
SN-113	Not Detected	-----	3.80E-02
TA-182	Not Detected	-----	1.50E-01
TA-183	Not Detected	-----	4.76E-01
TC-99m	Not Detected	-----	6.06E-01
TL-201	Not Detected	-----	2.36E-01
XE-133	Not Detected	-----	2.07E-01
Y-88	Not Detected	-----	2.74E-02
ZN-65	Not Detected	-----	1.03E-01
ZR-95	Not Detected	-----	5.74E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 2-13-98 11:11:31 AM \*  
 \*\*\*\*\*

\* Analyzed by: *J* 2/13/98 Reviewed by: *J* 2/16/98 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036859-003  
 Lab Sample ID : 80020505 071-C

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 712.000 gram  
 Sample Date/Time : 2-11-98 11:10:00 AM  
 Acquire Start Date/Time : 2-12-98 3:58:27 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:  
 \*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.14E+00
TH-234	8.79E-01	4.98E-01	7.26E-01
RA-226	1.49E+00	5.77E-01	5.43E-01
PB-214	6.81E-01	1.22E-01	4.28E-02
BI-214	5.74E-01	1.21E-01	4.45E-02
PB-210	Not Detected	-----	3.34E+01
TH-232	6.70E-01	3.06E-01	1.38E-01
RA-228	7.15E-01	1.99E-01	1.26E-01
AC-228	6.31E-01	1.53E-01	7.89E-02
TH-228	7.69E-01	2.60E-01	5.00E-01
RA-224	6.35E-01	2.03E-01	8.04E-02
PB-212	6.25E-01	1.13E-01	4.07E-02
BI-212	6.61E-01	4.13E-01	2.83E-01
TL-208	5.45E-01	2.46E-01	6.32E-02
U-235	Not Detected	-----	2.31E-01
TH-231	Not Detected	-----	2.22E+00
PA-231	Not Detected	-----	3.70E+00
TH-227	Not Detected	-----	3.24E-01
RA-223	Not Detected	-----	2.04E-01
RN-219	Not Detected	-----	3.43E-01
PB-211	Not Detected	-----	7.79E-01
TL-207	Not Detected	-----	1.24E+01
AM-241	Not Detected	-----	4.48E-01
PU-239	Not Detected	-----	4.26E+02
NP-237	<del>4.79E-01</del>	<del>1.83E-01</del>	3.01E-01
PA-233	Not Detected	-----	5.68E-02
TH-229	Not Detected	-----	2.44E-01

*Not Detected*  
*J* 2/13/98

[Summary Report] - Sample ID: : 80020505

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.82E-02
AG-110m	Not Detected	-----	2.99E-02
AM-243	Not Detected	-----	8.70E-02
BA-133	Not Detected	-----	6.53E-02
BE-7	Not Detected	-----	2.29E-01
CD-109	Not Detected	-----	1.02E+00
CD-115	Not Detected	-----	9.14E-02
CE-139	Not Detected	-----	2.84E-02
CE-141	Not Detected	-----	5.04E-02
CE-144	Not Detected	-----	2.38E-01
CO-56	Not Detected	-----	3.31E-02
CO-57	Not Detected	-----	2.97E-02
CO-58	Not Detected	-----	3.02E-02
CO-60	Not Detected	-----	3.45E-02
CR-51	Not Detected	-----	2.27E-01
CS-134	Not Detected	-----	4.63E-02
CS-137	Not Detected	-----	3.20E-02
EU-152	Not Detected	-----	8.94E-02
EU-154	Not Detected	-----	1.76E-01
EU-155	Not Detected	-----	1.45E-01
FE-59	Not Detected	-----	6.71E-02
GD-153	Not Detected	-----	1.01E-01
HG-203	Not Detected	-----	3.04E-02
I-131	Not Detected	-----	3.04E-02
IR-192	Not Detected	-----	2.63E-02
K-40	1.32E+01	2.31E+00	2.51E-01
KR-85	Not Detected	-----	7.90E+00
MN-52	Not Detected	-----	3.36E-02
MN-54	Not Detected	-----	3.23E-02
MO-99	Not Detected	-----	3.05E-01
NA-22	Not Detected	-----	4.15E-02
NA-24	Not Detected	-----	1.17E-01
NB-95	Not Detected	-----	1.89E-01
ND-147	Not Detected	-----	2.13E-01
NI-57	Not Detected	-----	5.19E-02
NP-239	Not Detected	-----	1.29E-01
RU-103	Not Detected	-----	2.90E-02
RU-106	Not Detected	-----	2.72E-01
SB-122	Not Detected	-----	5.18E-02
SB-124	Not Detected	-----	3.03E-02
SB-125	Not Detected	-----	7.69E-02
SN-113	Not Detected	-----	3.55E-02
TA-182	Not Detected	-----	1.46E-01
TA-183	Not Detected	-----	4.50E-01
TC-99m	Not Detected	-----	8.54E-01
TL-201	Not Detected	-----	2.33E-01
XE-133	Not Detected	-----	2.08E-01
Y-88	Not Detected	-----	2.26E-02
ZN-65	Not Detected	-----	1.02E-01
ZR-95	Not Detected	-----	5.43E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program (881 Laboratory) \*  
 \* 2-12-98 7:38:57 PM \*  
 \*\*\*\*\*  
 \* Analyzed by: *[Signature]* 2/13/98 Reviewed by: *[Signature]* 2/16/98 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036860-003  
 Lab Sample ID : 80020506

071-0-0.5-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 765.000 gram  
 Sample Date/Time : 2-11-98 11:20:00 AM  
 Acquire Start Date/Time : 2-12-98 5:49:53 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	-----	3.28E+00
TH-234	Not Detected	-----	6.85E-01
RA-226	2.17E+00	8.08E-01	5.33E-01
PB-214	7.41E-01	1.29E-01	4.62E-02
BI-214	6.87E-01	1.30E-01	4.42E-02
PB-210	Not Detected	-----	1.92E+01
TH-232	6.80E-01	3.43E-01	1.44E-01
RA-228	5.05E-01	1.85E-01	1.51E-01
AC-228	6.34E-01	8.94E-01	7.97E-02
TH-228	6.22E-01	2.17E-01	4.61E-01
RA-224	6.32E-01	2.34E-01	7.63E-02
PB-212	6.39E-01	1.13E-01	4.12E-02
BI-212	5.88E-01	3.77E-01	3.08E-01
TL-208	6.08E-01	1.45E-01	5.87E-02
U-235	Not Detected	-----	2.36E-01
TH-231	Not Detected	-----	2.23E+00
PA-231	Not Detected	-----	3.74E+00
TH-227	Not Detected	-----	3.22E-01
RA-223	Not Detected	-----	2.07E-01
RN-219	Not Detected	-----	1.93E-01
PB-211	Not Detected	-----	8.06E-01
TL-207	Not Detected	-----	1.21E+01
AM-241	Not Detected	-----	4.55E-01
PU-239	Not Detected	-----	4.21E+02
NP-237	Not Detected	-----	2.32E-01
PA-233	Not Detected	-----	5.62E-02
TH-229	Not Detected	-----	2.43E-01



[Summary Report] - Sample ID: : 80020506

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.78E-02
AG-110m	Not Detected	-----	2.95E-02
AM-243	Not Detected	-----	8.97E-02
BA-133	Not Detected	-----	6.55E-02
BE-7	Not Detected	-----	2.38E-01
CD-109	Not Detected	-----	7.86E-01
CD-115	Not Detected	-----	9.11E-02
CE-139	Not Detected	-----	2.82E-02
CE-141	Not Detected	-----	5.21E-02
CE-144	Not Detected	-----	2.29E-01
CO-56	Not Detected	-----	3.36E-02
CO-57	Not Detected	-----	2.93E-02
CO-58	Not Detected	-----	2.89E-02
CO-60	Not Detected	-----	3.44E-02
CR-51	Not Detected	-----	2.25E-01
CS-134	Not Detected	-----	4.67E-02
CS-137	Not Detected	-----	3.24E-02
EU-152	Not Detected	-----	8.81E-02
EU-154	Not Detected	-----	1.76E-01
EU-155	Not Detected	-----	1.41E-01
FE-59	Not Detected	-----	6.72E-02
GD-153	Not Detected	-----	1.00E-01
HG-203	Not Detected	-----	3.00E-02
I-131	Not Detected	-----	2.99E-02
IR-192	Not Detected	-----	2.61E-02
K-40	1.56E+01	2.30E+00	2.66E-01
KR-85	Not Detected	-----	7.60E+00
MN-52	Not Detected	-----	3.48E-02
MN-54	Not Detected	-----	3.23E-02
MO-99	Not Detected	-----	3.06E-01
NA-22	Not Detected	-----	3.85E-02
NA-24	Not Detected	-----	1.37E-01
NB-95	Not Detected	-----	1.90E-01
ND-147	Not Detected	-----	2.09E-01
NI-57	Not Detected	-----	5.19E-02
NP-239	Not Detected	-----	1.27E-01
RU-103	Not Detected	-----	2.65E-02
RU-106	Not Detected	-----	2.70E-01
SB-122	Not Detected	-----	5.22E-02
SB-124	Not Detected	-----	2.92E-02
SB-125	Not Detected	-----	7.54E-02
SN-113	Not Detected	-----	3.54E-02
TA-182	Not Detected	-----	1.48E-01
TA-183	Not Detected	-----	4.60E-01
TC-99m	Not Detected	-----	1.05E+00
TL-201	Not Detected	-----	2.34E-01
XE-133	Not Detected	-----	2.07E-01
Y-88	Not Detected	-----	2.68E-02
ZN-65	Not Detected	-----	9.97E-02
ZR-95	Not Detected	-----	5.24E-02

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 2-13-98 12:03:01 PM \*  
 \*\*\*\*\*

\* Analyzed by: *[Signature]* 2/13/98 Reviewed by: *[Signature]* 2/16/98 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036861-003  
 Lab Sample ID : 80020507

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 669.000 gram  
 Sample Date/Time : 2-11-98 10:55:00 AM  
 Acquire Start Date/Time : 2-12-98 7:41:33 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6002 seconds

072-C

Comments:

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Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.22E+00
TH-234	1.30E+00	1.02E+00	8.69E-01
RA-226	1.23E+00	5.06E-01	4.95E-01
PB-214	5.71E-01	1.04E-01	4.56E-02
BI-214	5.86E-01	1.58E-01	4.13E-02
PB-210	Not Detected	-----	3.40E+01
PH-232	6.63E-01	3.25E-01	1.26E-01
RA-228	5.92E-01	1.76E-01	1.41E-01
AC-228	5.72E-01	1.76E-01	8.13E-02
TH-228	5.13E-01	2.08E-01	4.72E-01
RA-224	6.59E-01	2.26E-01	8.16E-02
PB-212	5.79E-01	1.23E-01	3.98E-02
BI-212	6.83E-01	4.93E-01	3.06E-01
TL-208	5.36E-01	1.21E-01	5.95E-02
U-235	Not Detected	-----	2.36E-01
TH-231	Not Detected	-----	2.29E+00
PA-231	Not Detected	-----	3.82E+00
TH-227	Not Detected	-----	3.29E-01
RA-223	Not Detected	-----	2.14E-01
RN-219	Not Detected	-----	3.72E-01
PB-211	Not Detected	-----	8.33E-01
TL-207	Not Detected	-----	1.39E+01
AM-241	Not Detected	-----	4.71E-01
PU-239	Not Detected	-----	4.31E+02
NP-237	Not Detected	-----	3.54E-01
PA-233	Not Detected	-----	5.70E-02
TH-229	Not Detected	-----	2.43E-01

[Summary Report] - Sample ID: : 80020507

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.96E-02
AG-110m	Not Detected	-----	2.90E-02
AM-243	Not Detected	-----	1.07E-01
BA-133	Not Detected	-----	6.47E-02
BE-7	Not Detected	-----	2.47E-01
CD-109	<del>2.13E+00</del>	<del>1.71E+00</del>	1.20E+00
CD-115	Not Detected	-----	9.74E-02
CE-139	Not Detected	-----	2.87E-02
CE-141	Not Detected	-----	5.23E-02
CE-144	Not Detected	-----	2.39E-01
CO-56	Not Detected	-----	3.69E-02
CO-57	Not Detected	-----	3.02E-02
CO-58	Not Detected	-----	3.18E-02
CO-60	Not Detected	-----	3.47E-02
CR-51	Not Detected	-----	2.35E-01
CS-134	Not Detected	-----	4.71E-02
CS-137	Not Detected	-----	3.18E-02
EU-152	Not Detected	-----	9.07E-02
EU-154	Not Detected	-----	1.82E-01
EU-155	Not Detected	-----	1.48E-01
FE-59	Not Detected	-----	6.96E-02
GD-153	Not Detected	-----	1.02E-01
HG-203	Not Detected	-----	3.17E-02
I-131	Not Detected	-----	3.18E-02
IR-192	Not Detected	-----	2.69E-02
K-40	1.35E+01	2.06E+00	2.74E-01
KR-85	Not Detected	-----	8.34E+00
MN-52	Not Detected	-----	3.22E-02
MN-54	Not Detected	-----	2.30E-02
MO-99	Not Detected	-----	3.43E-01
NA-22	Not Detected	-----	4.11E-02
NA-24	Not Detected	-----	1.48E-01
NB-95	Not Detected	-----	1.98E-01
ND-147	Not Detected	-----	2.16E-01
NI-57	Not Detected	-----	9.21E-02
NP-239	Not Detected	-----	1.35E-01
RU-103	Not Detected	-----	2.89E-02
RU-106	Not Detected	-----	2.79E-01
SB-122	Not Detected	-----	5.85E-02
SB-124	Not Detected	-----	3.03E-02
SB-125	Not Detected	-----	8.23E-02
SN-113	Not Detected	-----	3.64E-02
TA-182	Not Detected	-----	1.45E-01
TA-183	Not Detected	-----	4.88E-01
TC-99m	Not Detected	-----	1.37E+00
TL-201	Not Detected	-----	2.48E-01
XE-133	Not Detected	-----	2.18E-01
Y-88	Not Detected	-----	2.65E-02
ZN-65	Not Detected	-----	9.66E-02
ZR-95	Not Detected	-----	5.67E-02

*Not detected*  
*2/13/98*

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 2-13-98 12:31:27 PM \*  
 \*\*\*\*\*

\* Analyzed by: *J* 2/13/98 Reviewed by: *WJ* 2/16/98 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036862-003  
 Lab Sample ID : 80020508

072-0-0.5-5

Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 704.000 gram  
 Sample Date/Time : 2-11-98 11:00:00 AM  
 Acquire Start Date/Time : 2-12-98 9:32:55 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	-----	3.39E+00
TH-234	9.33E-01	4.67E-01	6.85E-01
RA-226	1.57E+00	5.72E-01	5.22E-01
PB-214	7.20E-01	1.38E-01	4.60E-02
BI-214	6.54E-01	1.42E-01	4.74E-02
PB-210	Not Detected	-----	3.57E+01
TH-232	5.68E-01	2.85E-01	1.46E-01
RA-228	6.98E-01	2.29E-01	1.58E-01
AC-228	6.54E-01	1.77E-01	7.73E-02
TH-228	5.83E-01	2.32E-01	5.00E-01
RA-224	6.55E-01	2.25E-01	7.46E-02
PB-212	6.59E-01	1.21E-01	4.21E-02
BI-212	7.93E-01	4.36E-01	3.38E-01
TL-208	5.19E-01	1.26E-01	6.29E-02
U-235	Not Detected	-----	2.49E-01
TH-231	Not Detected	-----	2.27E+00
PA-231	Not Detected	-----	3.91E+00
TH-227	Not Detected	-----	3.38E-01
RA-223	Not Detected	-----	2.15E-01
RN-219	Not Detected	-----	3.69E-01
PB-211	Not Detected	-----	8.42E-01
TL-207	Not Detected	-----	1.41E+01
AM-241	Not Detected	-----	4.78E-01
PU-239	Not Detected	-----	4.56E+02
NP-237	Not Detected	-----	2.68E-01
PA-233	Not Detected	-----	6.01E-02
TH-229	Not Detected	-----	2.57E-01

[Summary Report] - Sample ID: : 80020508

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.08E-02
AG-110m	Not Detected	-----	3.22E-02
AM-243	Not Detected	-----	8.59E-02
BA-133	Not Detected	-----	6.82E-02
BE-7	Not Detected	-----	2.64E-01
CD-109	<del>1.52E+00</del>	<del>6.12E-01</del>	9.11E-01
CD-115	Not Detected	-----	1.00E-01
CE-139	Not Detected	-----	3.01E-02
CE-141	Not Detected	-----	5.50E-02
CE-144	Not Detected	-----	2.42E-01
CO-56	Not Detected	-----	3.77E-02
CO-57	Not Detected	-----	2.99E-02
CO-58	Not Detected	-----	3.27E-02
CO-60	Not Detected	-----	3.65E-02
CR-51	Not Detected	-----	2.41E-01
CS-134	Not Detected	-----	4.78E-02
CS-137	2.44E-02	3.45E-03	1.88E-02
EU-152	Not Detected	-----	9.00E-02
EU-154	Not Detected	-----	1.87E-01
EU-155	Not Detected	-----	1.50E-01
FE-59	Not Detected	-----	7.58E-02
GD-153	Not Detected	-----	1.08E-01
HG-203	Not Detected	-----	3.12E-02
I-131	Not Detected	-----	3.29E-02
IR-192	Not Detected	-----	2.76E-02
K-40	1.81E+01	2.64E+00	2.52E-01
KR-85	Not Detected	-----	8.42E+00
MN-52	Not Detected	-----	3.59E-02
MN-54	Not Detected	-----	3.55E-02
MO-99	Not Detected	-----	3.57E-01
NA-22	Not Detected	-----	4.31E-02
NA-24	Not Detected	-----	1.68E-01
NB-95	Not Detected	-----	2.06E-01
ND-147	Not Detected	-----	2.14E-01
NI-57	Not Detected	-----	4.36E-02
NP-239	Not Detected	-----	1.33E-01
RU-103	Not Detected	-----	3.01E-02
RU-106	Not Detected	-----	2.88E-01
SB-122	Not Detected	-----	5.70E-02
SB-124	Not Detected	-----	3.12E-02
SB-125	Not Detected	-----	7.97E-02
SN-113	Not Detected	-----	3.61E-02
TA-182	Not Detected	-----	1.57E-01
TA-183	Not Detected	-----	4.98E-01
TC-99m	Not Detected	-----	1.76E+00
TL-201	Not Detected	-----	2.51E-01
XE-133	Not Detected	-----	2.26E-01
Y-88	Not Detected	-----	2.83E-02
ZN-65	Not Detected	-----	1.06E-01
ZR-95	Not Detected	-----	5.75E-02

*not detected*  
*J 2/13/98*

\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 2-13-98 1:10:32 AM \*  
 \*\*\*\*\*  
 \* Analyzed by: *[Signature]* 2/13/98 Reviewed by: *[Signature]* 2/16/98 \*  
 \*\*\*\*\*  
 Customer : C.AAS/MAC (6134/SMD)  
 Customer Sample ID : 036863-006  
 Lab Sample ID : 80020509

000-EB

Sample Description : MARINELLI LIQUID SAMPLE  
 Sample Quantity : 500.000 mL  
 Sample Date/Time : 2-11-98 10:00:00 AM  
 Acquire Start Date/Time : 2-12-98 11:24:51 PM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6001 seconds

## Comments:

\*\*\*\*\*

Nuclide Name	Activity (pCi/mL )	2-sigma Error	MDA (pCi/mL )
U-238	Not Detected	-----	1.81E+00
TH-234	Not Detected	-----	4.05E-01
RA-226	Not Detected	-----	5.00E-01
PB-214	Not Detected	-----	4.98E-02
BI-214	Not Detected	-----	6.26E-02
PB-210	Not Detected	-----	1.52E+01
TH-232	Not Detected	-----	1.55E-01
RA-228	Not Detected	-----	1.48E-01
AC-228	Not Detected	-----	8.59E-02
TH-228	Not Detected	-----	4.84E-01
RA-224	Not Detected	-----	1.18E-01
PB-212	Not Detected	-----	3.65E-02
BI-212	Not Detected	-----	3.10E-01
TL-208	Not Detected	-----	6.72E-02
U-235	Not Detected	-----	1.62E-01
TH-231	Not Detected	-----	1.70E+00
PA-231	Not Detected	-----	2.70E+00
TH-227	Not Detected	-----	1.43E-01
RA-223	Not Detected	-----	1.12E-01
RN-219	Not Detected	-----	2.83E-01
PB-211	Not Detected	-----	6.25E-01
TL-207	Not Detected	-----	1.03E+01
AM-241	Not Detected	-----	2.42E-01
PU-239	Not Detected	-----	2.79E+02
NP-237	Not Detected	-----	1.89E-01
PA-233	Not Detected	-----	4.15E-02
TH-229	Not Detected	-----	1.53E-01

[Summary Report] - Sample ID: : 80020509

Nuclide Name	Activity (pCi/mL )	2-sigma Error	MDA (pCi/mL )
AG-108m	Not Detected	-----	2.29E-02
AG-110m	Not Detected	-----	2.29E-02
AM-243	Not Detected	-----	6.22E-02
BA-133	Not Detected	-----	2.95E-02
BE-7	Not Detected	-----	1.85E-01
CD-109	Not Detected	-----	6.08E-01
CD-115	Not Detected	-----	6.36E-02
CE-139	Not Detected	-----	1.94E-02
CE-141	Not Detected	-----	3.47E-02
CE-144	Not Detected	-----	1.55E-01
CO-56	Not Detected	-----	3.22E-02
CO-57	Not Detected	-----	1.95E-02
CO-58	Not Detected	-----	2.25E-02
CO-60	Not Detected	-----	2.61E-02
CR-51	Not Detected	-----	1.76E-01
CS-134	Not Detected	-----	2.86E-02
CS-137	Not Detected	-----	2.43E-02
EU-152	Not Detected	-----	5.86E-02
EU-154	Not Detected	-----	1.05E-01
EU-155	Not Detected	-----	9.08E-02
FE-59	Not Detected	-----	4.94E-02
GD-153	Not Detected	-----	6.15E-02
HG-203	Not Detected	-----	2.31E-02
I-131	Not Detected	-----	2.27E-02
IR-192	Not Detected	-----	2.00E-02
K-40	Not Detected	-----	3.00E-01
KR-85	Not Detected	-----	7.13E+00
MN-52	Not Detected	-----	2.81E-02
MN-54	Not Detected	-----	2.26E-02
MO-99	Not Detected	-----	2.29E-01
NA-22	Not Detected	-----	2.57E-02
NA-24	Not Detected	-----	1.62E-01
NB-95	Not Detected	-----	8.93E-02
ND-147	Not Detected	-----	1.46E-01
NI-57	Not Detected	-----	7.61E-02
NP-239	Not Detected	-----	8.34E-02
RU-103	Not Detected	-----	2.42E-02
RU-106	Not Detected	-----	2.01E-01
SB-122	Not Detected	-----	4.18E-02
SB-124	Not Detected	-----	2.77E-02
SB-125	Not Detected	-----	6.26E-02
SN-113	Not Detected	-----	2.67E-02
TA-182	Not Detected	-----	7.40E-02
TA-183	Not Detected	-----	2.51E-01
TC-99m	Not Detected	-----	1.63E+00
TL-201	Not Detected	-----	1.40E-01
XE-133	Not Detected	-----	1.16E-01
Y-88	Not Detected	-----	2.42E-02
ZN-65	Not Detected	-----	5.13E-02
ZR-95	Not Detected	-----	3.30E-02

# ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab  
 Batch No. 6134 / 114B  
 Dept. No./Mail Stop: 6134 / 114B  
 Project/Task Manager: AAL / TAVLETICH  
 Project Name: CENTRAL CORTEX TEST AREA  
 Record Center Code: EU/1334 / 57A / MAT  
 Logbook Ref No: 0151  
 Service Order No.: CF0515

SAR/WR No. \_\_\_\_\_  
 Samples Shipped: 2/11/98 SMO USE  
 Waybill No.: 702932711  
 Lab Contact: Tina Kellie  
 Lab Destination: ORE DENVER  
 SMO Contact/Phone: SAR / 505-811-3110  
 Send Report to SMO: ANGELA ALVES

Control No.: AJ248DC  
 Case No.: 7115.22030  
 SMO Authorization: MP  
 OIL to: Sandia National Laboratories  
 Supplier Services  
 Department  
 P.O. Box 5800 MS 0154

AR/COC- 51022122

Location		Tech Area	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Reference LOV (available at SMO)					Parameter & Method Requested							Lab Sample ID			
						Sample Matrix	Container		Preservative	Sample Collection Method	Sample Type	GROSS ALPHA	GROSS BETA	RCR METALS + BE	TAL METALS	SVOC	HIGH EXPLOSIVES		MST/MSD		
Building	Room	ER Sample ID or Sample Location Detail	Sample No. - Fraction	Type	Volume	Volume	Volume	Volume										Volume		Volume	Volume
		N/A	0-0.5	57A	2-11-98 12:25	Soil	G	413	4°C	G	SA	X	X								
			↓		↓	↓	↓	16oz			MS/MS			X	X	X	X	X			
			0-0.5		↓	↓	↓	413			DU	X	X								
			↓		↓	↓	↓	16oz	↓		↓			X	X	X	X				
			N/A			DIW	P	12	H <sub>2</sub> O <sub>2</sub>		ES	X	X								
							P	50ml	↓					X	X						
							AG	2512	4°C							X					
							↓	↓	↓								X				

RMMA  Yes  No Ref. No. \_\_\_\_\_

Sample Disposal  Return to Client  Disposal by lab

Turnaround Time  Normal  Rush Required Report Date \_\_\_\_\_

Sample Team Members	Name	Signature	Init	Company/Organization/Phone
	Joe Tavletich	<i>Joe Tavletich</i>	JT	GMAM / 6134 / 284-2179

Special Instructions/QC Requirements  
 SEND RAW DATA PACKAGE AS SEPARATE REPORT  
 List as separate report

Relinquished by <u>Joe Tavletich</u>	Org. <u>6134</u>	Date <u>2-11-98</u>	Time <u>12:45</u>	4. Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org. <u>SMO 7578</u>	Date <u>2/11/98</u>	Time <u>14:50</u>	4. Received by	Org.	Date	Time
Relinquished by <u>[Signature]</u>	Org. <u>SMO 7578</u>	Date <u>2/12/98</u>	Time <u>1300</u>	5. Relinquished by	Org.	Date	Time
Received by <u>[Signature]</u>	Org. <u>CMC</u>	Date <u>02/19/98</u>	Time <u>10:15</u>	5. Received by	Org.	Date	Time
Relinquished by	Org.	Date	Time	6. Relinquished by	Org.	Date	Time
Received by	Org.	Date	Time	6. Received by	Org.	Date	Time





\*\*\*\*\*  
 \* Sandia National Laboratories \*  
 \* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
 \* 2-13-98 1:20:43 PM \*  
 \*\*\*\*\*  
 \* Analyzed by: *J* 2/13/98 Reviewed by: *J* 2/16/98 \*  
 \*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
 Customer Sample ID : 036864-003  
 Lab Sample ID : 80020510  
 Sample Description : MARINELLI SOLID SAMPLE  
 Sample Quantity : 686.000 gram  
 Sample Date/Time : 2-11-98 1:25:00 PM  
 Acquire Start Date/Time : 2-13-98 1:13:02 AM  
 Detector Name : LAB02  
 Elapsed Live/Real Time : 6000 / 6003 seconds

*073-0-0.5-5*

Comments:

\*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.27E+00
TH-234	1.10E+00	5.05E-01	7.41E-01
RA-226	1.50E+00	8.09E-01	5.66E-01
PB-214	6.63E-01	2.29E-01	4.65E-02
BI-214	6.49E-01	1.82E-01	4.41E-02
PB-210	Not Detected	-----	3.49E+01
TH-232	6.25E-01	2.92E-01	1.35E-01
RA-228	6.74E-01	3.26E-01	1.68E-01
AC-228	5.62E-01	1.71E-01	8.62E-02
TH-228	7.83E-01	2.45E-01	4.69E-01
RA-224	6.58E-01	2.12E-01	8.91E-02
PB-212	6.42E-01	1.22E-01	4.11E-02
BI-212	4.83E-01	2.84E-01	2.91E-01
TL-208	6.26E-01	1.66E-01	6.29E-02
U-235	Not Detected	-----	2.42E-01
TH-231	Not Detected	-----	2.24E+00
PA-231	Not Detected	-----	3.92E+00
TH-227	Not Detected	-----	3.37E-01
RA-223	Not Detected	-----	2.09E-01
RN-219	Not Detected	-----	3.64E-01
PB-211	Not Detected	-----	8.41E-01
TL-207	Not Detected	-----	1.30E+01
AM-241	Not Detected	-----	4.78E-01
PU-239	Not Detected	-----	4.49E+02
NP-237	<del>1.43E-01</del>	<del>1.64E-01</del>	3.08E-01
PA-233	Not Detected	-----	5.85E-02
TH-229	Not Detected	-----	2.46E-01

*Not detected*  
*J* 2/13/98

[Summary Report] - Sample ID: : 80020510

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.78E-02
AG-110m	Not Detected	-----	4.63E-02
AM-243	Not Detected	-----	9.56E-02
BA-133	Not Detected	-----	6.73E-02
BE-7	Not Detected	-----	2.55E-01
CD-109	Not Detected	-----	1.05E+00
CD-115	Not Detected	-----	1.04E-01
CE-139	Not Detected	-----	2.88E-02
CE-141	Not Detected	-----	5.31E-02
CE-144	Not Detected	-----	2.44E-01
CO-56	Not Detected	-----	3.51E-02
CO-57	Not Detected	-----	3.00E-02
CO-58	Not Detected	-----	3.20E-02
CO-60	Not Detected	-----	3.52E-02
CR-51	Not Detected	-----	2.38E-01
CS-134	Not Detected	-----	4.72E-02
CS-137	1.91E-01	5.06E-02	2.02E-02
EU-152	Not Detected	-----	9.01E-02
EU-154	Not Detected	-----	1.73E-01
EU-155	Not Detected	-----	1.48E-01
FE-59	Not Detected	-----	6.57E-02
GD-153	Not Detected	-----	1.03E-01
HG-203	Not Detected	-----	3.23E-02
I-131	Not Detected	-----	3.21E-02
IR-192	Not Detected	-----	2.73E-02
K-40	1.31E+01	2.21E+00	2.81E-01
KR-85	Not Detected	-----	8.45E+00
MN-52	Not Detected	-----	3.86E-02
MN-54	Not Detected	-----	3.56E-02
MO-99	Not Detected	-----	3.52E-01
NA-22	Not Detected	-----	4.24E-02
NA-24	Not Detected	-----	1.73E-01
NE-95	Not Detected	-----	2.08E-01
ND-147	Not Detected	-----	2.16E-01
NI-57	Not Detected	-----	5.53E-02
NP-239	Not Detected	-----	1.31E-01
RU-103	Not Detected	-----	3.01E-02
RU-106	Not Detected	-----	2.84E-01
SB-122	Not Detected	-----	5.70E-02
SB-124	Not Detected	-----	2.96E-02
SB-125	Not Detected	-----	8.01E-02
SN-113	Not Detected	-----	3.80E-02
TA-182	Not Detected	-----	1.53E-01
TA-183	Not Detected	-----	5.04E-01
TC-99m	Not Detected	-----	1.98E+00
TL-201	Not Detected	-----	2.46E-01
XE-133	Not Detected	-----	2.24E-01
Y-88	Not Detected	-----	2.58E-02
ZN-65	Not Detected	-----	1.05E-01
ZR-95	Not Detected	-----	5.51E-02

\*\*\*\*\*  
\* Sandia National Laboratories \*  
\* Radiation Protection Sample Diagnostics Program [881 Laboratory] \*  
\* 2-13-98 4:53:18 AM \*  
\*\*\*\*\*

\* Analyzed by: *J* 2/13/98 Reviewed by: *WJ* 2/16/98 \*  
\*\*\*\*\*

Customer : C.AAS/MAC (6134/SMO)  
Customer Sample ID : 036865-003  
Lab Sample ID : 80020511

*073-0-0.5-04*

Sample Description : MARINELLI SOLID SAMPLE  
Sample Quantity : 654.000 gram  
Sample Date/Time : 2-11-98 1:25:00 PM  
Acquire Start Date/Time : 2-13-98 3:04:37 AM  
Detector Name : LAB02  
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:  
\*\*\*\*\*

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	3.55E+00
TH-234	Not Detected	-----	8.11E-01
RA-226	1.47E+00	8.72E-01	6.93E-01
PB-214	6.73E-01	3.55E-01	4.58E-02
BI-214	5.84E-01	1.24E-01	4.43E-02
PB-210	Not Detected	-----	3.65E+01
TH-232	6.51E-01	3.35E-01	1.48E-01
RA-228	7.38E-01	2.26E-01	1.58E-01
AC-228	6.36E-01	1.80E-01	9.49E-02
TH-228	5.52E-01	4.19E-01	5.18E-01
RA-224	7.60E-01	2.78E-01	8.16E-02
PB-212	6.35E-01	1.16E-01	4.22E-02
BI-212	7.07E-01	3.33E-01	3.08E-01
TL-208	5.99E-01	7.07E-01	5.98E-02
U-235	Not Detected	-----	2.51E-01
TH-231	Not Detected	-----	2.38E+00
PA-231	Not Detected	-----	3.94E+00
TH-227	Not Detected	-----	3.41E-01
RA-223	Not Detected	-----	2.24E-01
RN-219	Not Detected	-----	3.89E-01
PB-211	Not Detected	-----	8.65E-01
TL-207	Not Detected	-----	1.39E+01
AM-241	Not Detected	-----	4.89E-01
PU-239	Not Detected	-----	4.64E+02
NP-237	<del>3.55E-01</del>	<del>1.46E-01</del>	2.53E-01
PA-233	Not Detected	-----	6.12E-02
TH-229	Not Detected	-----	2.49E-01

*not detected*  
*J* 2/13/98

[Summary Report] - Sample ID: : 80020511

Nuclide Name	Activity (pCi/gram )	2-sigma Error	MDA (pCi/gram )
AG-108m	Not Detected	-----	3.90E-02
AG-110m	Not Detected	-----	4.73E-02
AM-243	Not Detected	-----	9.96E-02
BA-133	Not Detected	-----	6.96E-02
BE-7	Not Detected	-----	2.65E-01
CD-109	Not Detected	-----	8.60E-01
CD-115	Not Detected	-----	1.08E-01
CE-139	Not Detected	-----	3.03E-02
CE-141	Not Detected	-----	5.55E-02
CE-144	Not Detected	-----	2.51E-01
CO-56	Not Detected	-----	3.78E-02
CO-57	Not Detected	-----	3.09E-02
CO-58	Not Detected	-----	3.28E-02
CO-60	Not Detected	-----	3.50E-02
CR-51	Not Detected	-----	2.48E-01
CS-134	Not Detected	-----	4.85E-02
CS-137	1.61E-01	3.94E-02	2.63E-02
EU-152	Not Detected	-----	9.29E-02
EU-154	Not Detected	-----	1.79E-01
EU-155	Not Detected	-----	1.54E-01
FE-59	Not Detected	-----	7.49E-02
GD-153	Not Detected	-----	1.05E-01
HG-203	Not Detected	-----	3.32E-02
I-131	Not Detected	-----	3.37E-02
IR-192	Not Detected	-----	2.88E-02
K-40	1.48E+01	2.27E+00	2.60E-01
KR-85	Not Detected	-----	8.41E+00
MN-52	Not Detected	-----	3.83E-02
MN-54	Not Detected	-----	3.49E-02
MO-99	Not Detected	-----	3.65E-01
NA-22	Not Detected	-----	4.25E-02
NA-24	Not Detected	-----	2.03E-01
NB-95	Not Detected	-----	2.13E-01
ND-147	Not Detected	-----	2.26E-01
NI-57	Not Detected	-----	1.01E-01
NP-239	Not Detected	-----	1.36E-01
RU-103	Not Detected	-----	3.03E-02
RU-106	Not Detected	-----	2.98E-01
SB-122	Not Detected	-----	6.15E-02
SB-124	Not Detected	-----	3.14E-02
SB-125	Not Detected	-----	8.50E-02
SN-113	Not Detected	-----	3.93E-02
TA-182	Not Detected	-----	1.52E-01
TA-183	Not Detected	-----	5.21E-01
TC-99m	Not Detected	-----	2.49E+00
TL-201	Not Detected	-----	2.71E-01
XE-133	Not Detected	-----	2.41E-01
Y-88	Not Detected	-----	2.84E-02
ZN-65	Not Detected	-----	1.03E-01
ZR-95	Not Detected	-----	5.55E-02



**ANNEX 7-B**  
**Data Validation Results**







October 14, 1997

Project No. 301462.170.02.000

Sandia National Laboratories  
Attn: Ms. Tina Sanchez  
Department 6682  
P.O. Box 5800, M/S 1147  
Albuquerque, NM 87185-1147

Resolution to Data Verification/Validation Level 1 Incomplete Notations

Dear Ms. Sanchez:

Documented reviews of analytical data reports generated by the Sandia National Laboratories/New Mexico (SNL/NM) Environmental Restoration Chemistry Lab (ERCL) for samples recorded on the above referenced Analysis Request and Chain of Custody forms (ARCOC) were recently completed by IT Corporation. Following submittal of the review forms, Fran Nimick, SNL 6682, requested IT resolve certain items on the Data Verification/Validation Level 1 forms checked as "incomplete." This letter documents resolution of the subject incomplete items for the samples recorded on the above ARCOCs which were submitted to the laboratory under the direction of Paula Slavin, SNL 6682.

Be advised that the "Documentation Completion Checklist, Data Verification/Validation Level 1-DV1" form is a modification to the SNL/NM Technical Operation Procedure, "Verification and Validation of Chemical and Radiochemical Data, TOP 94-03." The SNL/NM Sample Management Office (SMO) is the owner of the procedure, and as such, many of the items reviewed are specific to SMO practices, procedures, and responsibilities. Samples collected by SNL/NM Environmental Restoration (ER) Departments and analyzed at the ERCL that are never subject to SMO processing may not be subject to all of the procedures of the SMO and therefore certain review items may appear incomplete. The terms and relationships between the ER Departments and the ERCL may not be the same as those between the SMO and their laboratory contractors. Consequently, some review items may not be applicable to ER operations.

- Line No. 1.1: "All items on COC complete - data entry clerk initialed and dated"

This item was checked as incomplete because the box where the SMO data entry clerk would initial and date indicating the sample information entry into the SMO Sample Tracking Database was not checked. If ARCOCs are not being provided to SMO for ER sampling tasks then the data cannot be entered into the SMO data base. The line item is not applicable in this case and will be checked on the DV1 form as "resolved."

- Line No. 1.8: "Tritium Screen data provided (Rad labs)"

This item was originally intended to document that the SMO contractor laboratories had completed sample screening for tritium and forwarded those results back to the SMO. That requirement has since been dropped and the item as originally intended is no longer applicable. However, the item was checked as incomplete by the reviewer because the samples originated from a Radiological Materials Management Area (RMMA) but radioactivity screening results (necessary for transportation of the samples from the site of collection to the laboratory) did not accompany the analytical data package provided for review. Today, August 21, 1997, I telephoned Warren Strong, SNL 6684, manager of the ERCL and left him a voice mail message requesting that when samples arrive at the laboratory with radioactivity screening data that a copy of those screening data be included in the analytical data reports. The review item will be checked as resolved on the DV1 form.

- Line No. 2.4: "Quality control data provided (MB, LCS, LCD, Detection Limit)"

The reviewer determined that a Laboratory Control Sample (LCS) and a Laboratory Control Sample Duplicate (LCS D) were not analyzed for quality control indicators of accuracy and precision in association with soil samples analyzed for explosives residues. Analysis of the LCS and LCS D in conjunction with each batch of samples is a contractual requirement between the SMO and their contractor laboratories. In the absence of such an agreement between ER and the ERCL the review item may not be appropriate. As documented in the ERCL report case narrative, the method used for explosives analysis at ERCL is a laboratory developed performance based method.

Documentation for the method requirements are not complete and quality control limits for method specific quality control measures have not been established. Also documented in the case narrative is an agreement between the ERCL and the Paula Slavin to use the method with knowledge of the limitations. The review item will be checked as resolved on the DV1 form.

- Line No. 2.5: "Matrix spike/matrix spike duplicate data provided (if requested)"

MS/MSD analysis on the sample numbered 034318-001 for explosives residue analysis were requested on the ARCOG but not performed by the laboratory. The laboratory report case narrative documents discussions between the laboratory and Paula Slavin concerning the analytical method and an agreement that MS/MSD would not be analyzed. The review item will be checked as resolved on the DV1 form.

- Line No. 2.7: "TAT met"

Turnaround times (TAT), or the elapsed time between submitting samples to a laboratory and the receipt of the laboratory data report, are specified in the contracts administered by the SMO between SNL/NM and their contractor analytical laboratories. The reviewer assumed that the 30-day turnaround time for routine analytical service agreed to between the SMO and their contractor laboratories was also applicable between the ER Departments and the ERCL. Because the analytical data reports from ERCL were not received with 30 days of sample submittal the item was checked as incomplete. However, IT is not aware of any enforceable TAT agreement between the

ER Departments and the ERCL and so it seems the item is not applicable. The item will be checked as resolved on the DV1 form.

- Line No. 2.8: "Hold times met"

The reviewer determined that the subject soil samples had been analyzed for mercury after 28 days had elapsed. Twenty-eight days is the recommended holding time for mercury in soil samples published in Table 3-1 of the EPA's guidance document, "Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846)." The analytical method reportedly used for metals analyses on the summary results data pages provided by ERCL is EPA Method 6020 referenced to SW-846. The ERCL Data Report Summaries are internally inconsistent in that the case narratives report using EPA Method 200.8 (a method in the EPA drinking water program) for metals in soil with a 6-month holding time for mercury while the data sheets report using SW-846 methods. Without specific guidance from the ER Departments as to what analysis holding times ER desires to enforce, our position is that no error was made in noting that the recommended 28-day holding time had elapsed prior to analysis. The item will be checked as resolved on the DV1 form.

If you have any questions or require additional information then please call me at 262-8920.

Respectfully submitted,

IT CORPORATION

Mark Lyon  
Project Chemist

ML:sh  
Enclosures

cc. F. Nimick, SNL 6682





List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., AJ))
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a method or reagent blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

4200

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

SITE OR PROJECT Site 57A  
 ANALYTICAL LABORATORY CORE  
 LABORATORY REPORT # 973570  
 CASE NO. 7215.220300  
 ARCO # 510201

SAMPLE IDS 24 samples  
 NO. OF SAMPLES 036741-002 to 036758-002,  
036736-002 to 036739-002,  
036740-007, -008

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	HE OTHER
1. HOLDING TIMES/PRESERVATION	NA	✓	NA	✓
2. GC/MS INST. PERFORM.		✓		✓
3. CALIBRATIONS/WINDOWS				
4. BLANKS		✓		✓
5. SURROGATES		✓		✓
6. MATRIX SPIKE/DUP		✓		✓
7. LABORATORY CONTROL SAMPLES		✓		R
8. INTERNAL STANDARDS				
9. COMPOUND IDENTIFICATION		✓		✓
10. SYSTEM PERFORMANCE		✓		✓
11. OVERALL ASSESSMENT	✓	✓	✓	✓

HE  
 OTHER  
 KAL 3/17/98

✓ (check mark) — Acceptable: Data had no problems or qualified due to minor problems  
 N - Data qualified due to major problems  
 X - Problems, but do not affect data  
 Qualifiers: J - Estimate  
 UJ - Undetected, estimated

ACTION ITEMS: Complete Batch QC Summary Report not provided  
Requested complete summary report on future data packages

AREAS OF CONCERN: 1. Quality control analyses were acceptable  
except for 7% REC and RPD for several HE compounds  
665 did not meet acceptance criteria. Bias was low

KAL  
 3/17/98

Reviewed By: Karin A Lambert  
 Date: 3/17/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

PROJECT/TASK LEADER: \_\_\_\_\_

ACTION ITEMS: <sup>HHL 3/17/98</sup> File \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

AREAS OF CONCERN: <sup>HHL</sup> The %REC for LCS/LCSD were ~~to~~ low for  
tested in Batch 30042. MS/MSD was not reported for this  
batch. The associated sample results will be "R" coded  
A

OVERALL DATA QUALITY ASSESSMENT Date is acceptable. QC measures  
are adequate

Reviewed By: Kevin A Lambert  
Date: \_\_\_\_\_



**ORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3 DV-3)

**1.0 HOLDING TIMES AND PRESERVATION**

Indicate the holding time criteria below that was used to evaluate the samples.

SW-846, 3rd. ed.

Other: \_\_\_\_\_

List below samples that were over holding time criteria.

Sample ID	VTSR	Date Analyzed	Action

*See CVR Form*

NOTE: VTSR = Validated time of sample receipt.

Were the correct preservatives used? Yes  No

*See CVR Form*

List below samples that were incorrectly preserved.

Sample No.	Type of Sample	Deficiency	Action

*See CVR Form*

Reviewed By: Kevin A Lambert 3/17/98

Date:

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

2.0 GC/MS TUNING CRITERIA

Has a GC/MS tuning performance been analyzed for every twelve hours of sample analysis for each GC/MS instrument used? Yes  No

Was the correct standard (listed in the EPA Method) used? Yes  No

Have the ion abundance criteria been met for each tune? Yes  No

NOTE: GC/MS abundance criteria is specified by EPA method for GC/MS analysis (EPA 8240A or 8270A).

If no for any of the above, list all the data associated with the tune that either failed criteria or in which there was no tune.

Date/Time	Problem	Sample Affected (Action)
	<i>met criteria</i>	

Check for transcription/calculation errors. If errors are present, briefly summarize necessary changes:

---

---

---

Is the spectra of the mass calibration acceptable? Yes  No

Reviewed By: Kevin A Lambert  
Date: 3/17/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

3.0 GC INSTRUMENT PERFORMANCE.

*Not Applicable*

3.1 DDT Retention Time

Is DDT retention time for packed columns >12 minutes (except for OV-1 and OV-101)?

Yes  No

If no, list below the DDT standards that failed criteria: \_\_\_\_\_

Affected samples and compounds: \_\_\_\_\_

3.2 Retention Time Windows

List below compounds that were not within the retention time windows.

Date/Time	Compound	RT	RT Window	Action	Affected Samples

Reviewed By: Kevin A Lambert 3/17/98  
Date:

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

3.3 DDT and Endrin Degradation

*Not Applicable*

List below the standards that have a DDT or Endrin breakdown of >20% (or a combined breakdown of >20%).

Date/Time	Standard ID	DDT/Endrin	% Breakdown	Action	Affected Samples

3.4 DSC Retention Time Check

Is the %D between EVAL A and each analysis (quantitation and confirmation) DSC retention time within QC limits (2% for packed column, 0.3% capillary ID <0.32 mm, and 1% for megabore)?

Yes  No

Date	Sample ID	DSC %D	Action

For the above criteria outlined in Sections 8.1-8.4, check for transcription/calculation errors.

If errors are found, list below with necessary corrections: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: Kevin A Lambert  
Date: 3/17/98



ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

5.0 CONTINUING CALIBRATION

Have continuing calibration standards been analyzed at the frequency specified in the EPA method?

Yes  No

List below all compounds which did not meet continuing calibration requirements.

Instrument ID	Date	Compound	RF% <sub>D</sub>	Action	Samples Affected

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

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Reviewed By: Kevin A. Lambert  
Date: 3/17/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

6.0 BLANK ANALYSES

6.1 Method/Reagent and Instrument Blanks

Has a method/reagent blank been analyzed for each set of samples or for every 20 samples of similar matrix, whichever is more frequent? Yes  No

Has an instrument blank been analyzed at least once every twelve hours for each GC/MS system used? Yes  No

6.2 Field Rinse Equipment Blanks

Are there field rinse equipment blanks associated with each sampling day or at frequency specified in the sampling plan. Yes  No

List below compounds for which analyses were requested that were detected in any of the blanks analyzed:

Date	Blank ID	Compound	Conc. ( )	PQL ( )	Action Level	Samples Affected (Action)
<i>No analytes detected</i>						

PQL = Practical Quantitation Limit from EPA Method.

Note: 1. The sample results for HE compounds in the EB (page 106) are not provided in the Laboratory Test Results Report. The case narrative & CVR Form do not indicate any problems with sample results. No data qualified.

2. Bis(2-ethylhexyl)phthalate is "J" coded in the EB and the MB for Batch # 30040. The MB in the other 2 Batches did not detect this analyte.

Reviewed By: Kevin A. Lambert  
 Date: 3/17/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

Are there any TICs present in the blanks that are also present in the samples? Yes  No   
 If yes, list below.

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7.0 SURROGATE RECOVERY

Were surrogate recoveries evaluated for each of the samples analyzed by GC or GC/MS?  
 Yes  No

If surrogate standards other than those presented by SW-846 are used, list below with reference to applicable control limits used to evaluate the percent recoveries.

Surrogate Compound

Control Limits

Not Applicable

Lab specific

List below the percent recoveries which did not meet either SW-846 criteria or criteria listed above.

Date	Sample ID/Matrix	Surrogate Compound	%Rec	19-122	Action
1/2/98 1220	036747-002/soil	2,4,6-Tribromophenol	123		Data are not qualified since only one SVOC surrogate is out of specification
1/2/98	!!	!!	133		
					Guidance requires two or more SVOC surrogates be out of specification for data to be qualified

Reviewed By: Kim A. Lambert  
 Date: 3/17/98



### ORGANIC DATA ASSESSMENT SUMMARY FORM

(Data Verification/Validation Level 3 DV-3)

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If surrogate recovery was outside of control limits, were the samples or method blank reanalyzed?

Yes  No

Are method blank surrogate recoveries outside of limits upon reanalysis? Yes  No

Are transcription/calculation errors present? Yes  No

if yes, note necessary corrections.

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Reviewed By: Kevin A Lambert  
Date: 3/17/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

8.0 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSIS

Were MS/MSDs analyzed at the frequency required by the EPA method or QAFjP for each matrix type?

Yes  No

List below % recoveries and RPDs of compounds which did not meet criteria. Indicate on chart criteria used to evaluate recoveries and RPDs.

Date	Sample ID:Matrix	Compound	%Rec RPD	Action
30293 1/1/98	036741-002 MSD / soil	2,4-Dinitrotoluene	92.4	28-89 MS met limits. Analyte not detected in sample. No data qualified

Reviewed By: Kenn A. Zambet  
 Date: 3/17/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

9.0 LABORATORY CONTROL SAMPLE ANALYSIS

Have laboratory control samples containing a representative number of the compounds of interest been analyzed at the frequency specified in the EPA method or QAPP?

Yes  No

Evaluate percent recoveries based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

Batch	Date	Compound	%Rec	Control Limits	Action	Samples Affected
24805	12/30/97	2,4-Dinitrotoluene	106.6	24-96	MS met limit but MSD was biased	
	" 1116	"			high analyte not detected in associated	
	" 1213	"	106.7	"	samples. No data qualified	
30293	12/31/97	"	94.3	28-84		
	" 1318	"	95.2	"		
30040	1/2/98	Pentachlorophenol	112.9	17-109	MS/MSD met limits	Analyte was not
"	" 1433	"	109.3	"	detected in associated samples. No data qualified	
0042	12/23/97	tetryl	56.8	70-130	MS/MSD not reported on this batch.	
"	12/24/97	"	64.2	70-130	Associated sample results to be coded "R"	

Control Limit Reference: \_\_\_\_\_

See Attached page

Evaluate RPD based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

RPD

Batch	Date	Compound	%Rec	Control Limits	Action	Samples Affected
30042	12/24/97	Nitrobenzene	24.6	± 20	MS/MSD not reported	
	0026	O-Nitrotoluene	31.7	± 20	Associated samples results to be coded "R"	
		P-Nitrotoluene	23.5	± 20	LCS met control limit	
					No data qualified	

Control Limit Reference: \_\_\_\_\_

Reviewed By: Kevin A Lambert  
 Date: 3/17/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

10.0 INTERNAL STANDARDS EVALUATION

List below the internal standard areas of samples or blanks which did not meet criteria.

Date	Sample ID	Internal Out	Acceptable Range	Action

*Met criteria*

Are retention times of the internal standards within 30 seconds of the associated calibration standard?  
Yes  No

11.0 TARGET COMPOUND LIST ANALYTES  
11.1 GC/MS Analyses

Are the reconstructed ion chromatograms, the mass spectra for the identified compounds, and the data system printouts included? Yes  No

Is chromatographic performance acceptable with respect to:

Baseline stability? Yes  No

Resolution? Yes  No

Peak shape? Yes  No

Full-scale graph (attenuation)? Yes  No

Reviewed By: \_\_\_\_\_  
Date: \_\_\_\_\_

9.0 LCS/LCSDs

9.0 REC/RPD  
~~RPD~~ <sup>KAL 3/17/98</sup>  
~~9.0 REC~~ Control Limits

Batch	Date	Compound	9.0 REC/ RPD	Control Limits	Action	Samples Affected
30042	18/24/97 0626	2,6-Dinitrotoluene	67.4	70-130	MS/MSD not conducted reported. <del>Associated sample results</del> <del>to be coded "RU" KAL 3/17/98</del>	KAL LCS met control limits No data qualified
		Nitrobenzene	56.9	70-130		
		1,3-Dinitrobenzene	24.6 66.7	±20 70-130		
		o-Nitrotoluene	<del>16.7</del> KAL 3/17/98 59.0	70-130		
		p-Nitrotoluene	31.7 67.2	±20 70-130		
			23.5	±20		
30085	1/6/98 1816	1,3,5-Trinitrobenzene	65.9	70-130	MS/MSD met control limits Analytes not detected in associated samples No data qualified	
		2,4,6-Trinitrotoluene	65.9	70-130		
	Tetryl	37.0	70-130			
	1851 Tetryl	61.9	±20			

Kim A. Zerk  
 3/17/98



ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

Other: \_\_\_\_\_

Is the RRT of each reported compound within the limits given in the method of the standard RRT in the continuing calibration? Yes  No

Are all the ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the mass spectrum? Yes  No

Do sample and standard relative intensities agree within 20%? Yes  No

If no for any of the above, indicate below problems and qualifications made to data:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11.2 GC Analyses

*Not Applicable*

Are there any transcription/calculation errors between the raw data and the reporting forms?  
Yes  No

If yes, review errors and necessary corrections below; if errors are large, resubmittal of laboratory package may be necessary.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analysis? Yes  No

Was GC/MS confirmation performed when required by the EPA method? Yes  No

If no for any of the above, reject positive results except for retention time windows if associated standard compounds are similarly shifted.

Reviewed By: Kevin A Lambert  
Date: \_\_\_\_\_

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Check chromatograms for false negatives, especially for the multiple peak components (toxaphene and PCBs). If false negatives are apparent and the appropriate PCB standards were not analyzed, or if confirmed analysis was not present, flag the affected data.

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NOTE: Due to the complexities of PCB pesticide analysis, each analytical run should be reviewed to verify identification and column performance.

12.0 FIELD DUPLICATE ANALYSIS

Were field duplicates submitted for analysis? Yes  No

If yes, calculate RPD and use professional judgment to determine if the data needs to be qualified. List results below.

Date	Sample ID	Compound	Sample Result	Duplicate Result	RPD	Affected Samples
<i>No analytes were detected above PQL</i>						

13.0 COMPOUND QUANTITATION/REPORTED DETECTION LIMITS

Are there any transcription/calculation errors from raw data to reported results (check at least 10% of positive results)? Yes  No

In addition, verify that the correct internal standard, quantitation ion, and RRF were used to calculate the result for a minimum of 10% of sample data.

Reviewed By: Kevin A Lambert  
Date: 3/17/98



ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

13.1 Chromatogram Quality

Were baselines stable? Yes  No

Were any negative peaks or unusual peaks present? Yes  No

Were early eluting peaks resolved to baseline? Yes  No

If incorrect quantitations are evident, note corrections necessary below: \_\_\_\_\_

Are the required quantization limits (detection limits) adjusted to reflect sample dilutions and for soils, sample moisture? Yes  No

If no, make necessary corrections and note below. \_\_\_\_\_

14.0 TENTATIVELY IDENTIFIED COMPOUNDS *Not Applicable*

Are Tentatively Identified Compounds (TIC) properly identified with scan number or retention time, estimated concentration, and J qualifier? Yes  No

Are the mass spectra for TICs and associated "best match" spectra included? Yes  No

Are any TCL compounds listed as TIC compounds? Yes  No

Are each of the ions present in the reference mass spectra with a relative intensity greater than 10% also present in the sample mass spectrum? Yes  No

Reviewed By: *Kevin A Lambert*

Date: 3/17/95

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

Do TIC and "best match" standard relative ion intensities agree within 20%? Yes  No  *Not Applicable*

Comments \_\_\_\_\_  
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Reviewed By: *Kevin A Lambert*

Date: *3/17/98*

Approved By: \_\_\_\_\_

Date \_\_\_\_\_

\*Data package must be approved by Project/Task Leader.

SAMPLE FINDINGS SUMMARY

Site: Site 57A

AR COC: 510201

Data Classification: Inorganic

COPY

Sample Fraction No.	Analysis	DV Qualifiers	Comments
CCTA-57A-GR-006-0-0.5-S	(chromium) 7440-47-3	J	Field precision measurements did <sup>NOT</sup> meet acceptance criteria for field duplicate pair.
006-0-0.5-DU	↓	↓	
006-0.5-1.0-S	↓	↓	
007-0-0.5-S	↓	↓	
007-0.5-1.0-S	↓	↓	
008-0-0.5-S	↓	↓	
008-0.5-1.0-S	↓	↓	
009-0-0.5-S	↓	↓	
009-0.5-1.0-S	↓	↓	

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470.1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Kevin A Lambert Date: 3/17/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J))
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a method or reagent blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 92-03. Notify Tina Sanchez to revise list.

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

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SITE OR PROJECT Site 57A CASE NO. 7215.220300  
 ANALYTICAL LABORATORY CORE SAMPLE IDS 036725-002 to  
 LABORATORY REPORT # 973570 036735-002 ~~X~~ 036741-002 to  
 TASK LEADER ARCOC # 510201 036758-002 <sup>KAL</sup> 036736-002 to  
 NO. OF SAMPLES 36 samples 036739-002 036740-002 007 008  
34 KAL

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	✓	✓	✓	NA
2. CALIBRATIONS	✓	✓	✓	
3. BLANKS	✓	✓	✓	
4. ICS	✓			
5. LCS	✓	✓		
6. DUPLICATE ANALYSIS	✓ <sup>KAL</sup>	✓	✓	
7. MATRIX SPIKE	✓	✓	✓	
8. MSA		NA		
9. SERIAL DILUTION	✓			
10. SAMPLE VERIFICATION	✓	✓	✓	
11. OTHER QC	J	✓	✓	
12. OVERALL ASSESSMENT	✓	✓	✓	✓

✓ (check mark) — Acceptable

Other — Qualified:

J - Estimate

UJ - Undetected, estimated

R - Unusable (analyte may or may not be present)

ACTION ITEMS: Complete Batch QC Summary Report not provided. Have

AREAS OF CONCERN: Quality control analyses were acceptable. However the field duplicate pair 036741-002/036742-002 had the RPD exceed +35% for chromium (46%). Associated samples

REVIEWED BY: Kevin A Lambert

DATE REVIEWED: 3/17/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

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ACTION ITEMS: \_\_\_\_\_  
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AREAS OF CONCERN: 036741-002 to 036749-002 will have chromium results "J" coded.  
\_\_\_\_\_  
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OVERALL DATA QUALITY ASSESSMENT Data is acceptable. QC measures use adequate.  
\_\_\_\_\_  
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Reviewed By: Kevin A Lambert Date: 3/17/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

**1.0 HOLDING TIMES**

List holding time criteria used to evaluate samples, indicating which samples exceed the holding time. Holding time begins with validated time of sample collection.

Parameter	Holding Time Criteria	Sample ID	Days Holding Time was Exceeded	Action

*See CVP Form*

Were the correct preservatives used? Yes  No

List below samples that were incorrectly preserved.

Sample No.	Type of Samples	Deficiency	Action

Reviewed By: Kevin A Lambert Date: 3/13/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

**2.0 INSTRUMENT CALIBRATION**

**2.1 Percent Recovery Criteria**

Indicate %Recovery (%R) criteria used to evaluate calibration standards:

Metals: \_\_\_\_\_  
 Mercury: \_\_\_\_\_  
 Cyanide: \_\_\_\_\_  
 Other: \_\_\_\_\_

List below the analytes which did not meet %R criteria for initial and continuing calibration standards:

Analysis Date	ICV/CCV #	Analyte	%R	Action	Samples Affected

*Met criteria*

**2.2 Analytical Sequence**

Did the laboratory use the proper number of standards for calibration as described in the EPA method? Yes  No

Have initial calibrations been performed at the beginning of each analysis and at the frequency indicated by the EPA method? Yes  No

Have continuing calibration standards been analyzed at the beginning of sample analysis and at a minimum frequency indicated by the EPA method and at the end of the analysis sequence? Yes  No

If no for any of the above, outline deviations and actions taken below:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewed By: Kevin A Lambert Date: 3/17/98



**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

Were the correlation coefficients for the calibration curves for AA, Hg, CN, and other spectrophotometric methods  $\geq 0.995$ ? (Check calculations performed for calibration curves.) Yes  No

If no, list: \_\_\_\_\_

Date	Analyte	Coefficient	Action	Samples Affected

Check for transcription and calculation errors involving calibration summary forms and raw data. Briefly summarize errors and associated actions when data quality might have been affected.

**3.0 BLANK ANALYSIS**

**3.1 Initial and Continuing Calibration Blanks**

Have Initial and Continuing Calibration Blanks (ICB/CCB) been analyzed at the frequency required in the EPA method? Yes  No

If no, summarize problems and resolutions in the narrative report.

List analytes detected in ICB and CCBs below:

NOTE: For soil samples, convert blank values to mg/kg using digestion weights and volumes.

Analysis Date	ICB/CCB No.	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected

*Met criteria*

Reviewed By: Kevin A. Lambert Date: 3/17/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

3.2 Method Blank

Was one method blank analyzed for:

- Each of 20 samples? Yes  No   
Each digestion batch? Yes  No   
Each matrix type? Yes  No   
Both AA and ICP when both are used for the same analyte? Yes  No   
or  
At the frequency indicated in the EPA method or QAPjP? Yes  No

NOTE: Method blank is the same as the calibration blank for mercury and for wet chemistry analysis.

List analytes detected in method blank samples below. NOTE: For soil samples, be sure to calculate blank values using digestion weights and volumes.

Preparation Date	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>PASSED</i>					
<i>criteria</i>					

Is concentration in the method blank below the detection limit? Yes  No

Affected samples: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: Kevin A Lambert Date: 3/13/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

**3.3 Field/Rinse/Equipment Blanks**

Was a field/equipment blank analyzed as required by the EPA method or QAPP? Yes  No

List below analytes detected in the field blanks. NOTE: For soil samples, calculate blank values using digestion weights and volumes.

~~\_\_\_\_\_~~  
~~\_\_\_\_\_~~  
~~\_\_\_\_\_~~  
~~\_\_\_\_\_~~

Collection Date	Blank ID	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>No analytes detected</i>						

**4.0 ICP INTERFERENCE CHECK SAMPLE ANALYSIS**

Was an ICP interference check sample (ICS) analyzed at the beginning and end of a run or at least twice every 8 hours? (Not required for Ca, Mg, K, and Na) Yes  No

Samples affected: \_\_\_\_\_

Are the values of the ICS for solution AB within 80-120%R? Yes  No

If no, is the concentration of Al, Ca, Fe, or Mg lower than in ICS? Yes  No

Reviewed By: Kevin A. Lambert Date: 3/13/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

If no, list below all analytes which did not meet %R criteria and in which the concentration of Al, Ca, Fe, or Mg is higher than in the ICS:

Date	Analyte	%R	Action	Samples Affected

Are any results > IDL for those analytes which are not present in the ICS solution A? Yes  No

If yes, results >2 (absolute value of the IDL) indicate either a positive or negative interference and must be qualified.

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

**5.0 LABORATORY CONTROL SAMPLES (LCS)**

Was an LCS analyzed at required frequency? Yes  No

Samples affected: The LCS/LCSD % recoveries were outside  
acceptance limits<sup>1</sup> however a 2<sup>nd</sup> pair of LCS/LCSD the %  
recoveries met acceptance limits on 1/15/98. See  
case <sup>HH</sup> narrative for further details

Reviewed By: Kevin A Lambert Date: 5/13/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

List below any LCS recoveries not within limits.

Preparation Date	Analyte	%R	Action	Samples Affected

6.0 LABORATORY DUPLICATE ANALYSIS

Were laboratory duplicates analyzed at required frequency? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_

Was laboratory duplicate analysis performed on field or equipment blanks? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_

Is any value for sample duplicate pair  $<PQL$  and the other value  $>10xPQL$ ? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_

Reviewed By: Kevin A Lambert Date: 3/13/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

List below concentrations of any analyte that did not meet criteria for duplicate precision:

Sample ID	Matrix	Preparation Date	Analyte	PQL	RPD	Action	Samples Affected

*Met  
Criteria*

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

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**7.0 FIELD DUPLICATE SAMPLE ANALYSIS**

Were field duplicates collected at the frequency indicated in the EPA method or QAPjP?

Yes  No

If yes, qualify data associated only with the field duplicate pair. Calculate RPDs for each analyte in which both values are greater than the IDL.

Is any value for sample duplicate < practical quantitation limit (PQL) and other value > 10xPQL? Yes  No

Reviewed By: Kevin A Lambert Date: 3/13/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

List below the analytes that do not meet RPD or PQL criteria. Use the same criteria as those used for laboratory duplicate analysis or criteria specified in EPA method or sampling plan.

Sample ID	Matrix	Collection Date	RPD	Control Limit	Action	Samples Affected
036734-002	Soil	12/17/97	35%	±35%	Chromium	Slightly exceed limit
036735-002	Soil	12/17/97	46%	±35%	Chromium	No data qualified
036741-002	Soil	12/17/97				"J" code associated
036742-002	Soil	12/17/97				Samples

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

8.0 MATRIX SPIKE ANALYSIS

NOTE: This matrix spike is a predigestion/predistillation spike.

Was a matrix spike prepared and analyzed at the required frequency? Yes  No

Reviewed By: Kevin A Lambert Date: 3/17/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

Were matrix spikes performed at the concentrations specified by the EPA method? Yes  No

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Was matrix spike analysis performed on field or equipment blanks? Yes  No

If equipment or field blanks are the only aqueous samples, matrix spike analysis may be performed; however, matrix spike samples must be present for the other matrices.

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

List below the % recoveries for analytes that did not meet the criteria:

Sample ID	Matrix	Preparation Date	Analyte	%R	Action	Samples Affected
036741-002	Soil	1/13/98	Arsenic	59.8	80-120	3/17/98 KAC MS met limit. No data qualified

Check for transcription/calculation errors. Also check to ensure matrix spike concentrations are not affected by sample dilutions performed. If matrix spike concentrations are diluted below or close to IDL based on sample dilutions performed, use professional judgment in qualifying data. Ensure that the laboratory performed sample dilutions only when necessary as indicated by QA/QC requirements. Briefly summarize errors and associated actions when data quality might have been affected.

Reviewed By: Kevin A Lambert Date: 3/17/98



INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

Page 13 of 16

NOTE: If preparation blank spikes are analyzed, evaluate recoveries. These recoveries can indicate whether excursions in matrix spike recovery are caused by sample matrix effects or poor digestion efficiencies and/or problems with matrix spike solution. For example, if matrix spike recovery for selenium is 0% and preparation blank spike recovery for selenium is 92%, this may indicate sample matrix effects.

9.0 FURNACE ATOMIC ABSORPTION ANALYSIS

Were duplicate injections present for each sample, including required QC analyses (not required if MSA is done)? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Were postdigestion spikes analyzed for samples, including QC samples? Yes  No

Were postdigestion spikes analyzed at the required concentration? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Was a dilution analyzed for samples with postdigestion spike recovery <40%? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

MSA Analysis (Method of Standard Additions)—MSA is required when serial dilutions are not within  $\pm 10\%$ . Was MSA required for any sample but not performed? Yes  No

Are MSA calculations outside the linear range of the calibration curve? Yes  No

Reviewed By: Kevin A Lambert Date: 3/17/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

NOTE: Ensure the spiking concentrations used for MSA analysis were at 50–100% and 150% of sample concentration or absorbance.

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**10.0 SERIAL DILUTION ANALYSIS**

NOTE: Serial dilution analysis (ICP) is required only for initial concentrations equal to or greater than 10xIDL.

If applicable, was a serial dilution performed for:

*Not Applicable*

Each 20 samples? Yes  No

Each matrix type? Yes  No

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_

List below results which did not meet criteria of %D <10% for analyte concentrations greater than 50xIDL before dilution:

Analysis Date	Sample ID	Analyte	IDL	%D	Action	Samples Affected

Check for calculation errors and negative interferences.

Reviewed By: *Kevin A Lambert* Date: *3/17/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

Page 15 of 16

11.0 SAMPLE RESULT VERIFICATION

11.1 Verification of Instrumental Parameters

*KAL 3/17/98*  
~~Not Reported~~

Are instrument detection limits present and verified on a quarterly basis? Yes  No  *Not Reported*

Are IDLs present for each analyte and each instrument used? Yes  No

Is the IDL greater than the required detection limits for any analyte? Yes  No   
(If IDL > required detection limits, flag values less than 5xIDL.)

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are ICP Interelement Correction Factors established and verified annually? Yes  No  *Not Reported*

Are ICP Linear Ranges established and verified quarterly? Yes  No  *Not Reported*

If no for any of the above, review problems and resolutions in narrative report. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11.2 Reporting Requirements

Were sample results reported down to the PQL? Yes  No

If no, indicate necessary corrections. \_\_\_\_\_  
\_\_\_\_\_

Were sample results that were analyzed by ICP for Se, Tl, As, or Pb at least 5xIDL? Yes  No

Were sample weights, volumes, and dilutions taken into account when reporting sample results and detection limits? Yes  No  *Not Reported*

Reviewed By: *Kevin A Lambert* Date: *3/17/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

If no for any of the above, sample results may be inaccurate. Note necessary changes and if errors are present, request resubmittal of laboratory package.

\_\_\_\_\_  
\_\_\_\_\_

Were any sample results higher than the linear range of calibration curve and not subsequently reanalyzed at the appropriate dilution? Yes  No  *Not Reported*

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11.3 Sample Quantitation

Check a minimum of 10% of positive sample results for transcription calculation errors. Summarize necessary corrections. If errors are large, request resubmittal of laboratory package.

Comments:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_

\*Task/Project Leader is responsible for approval of data set.

Reviewed By: *Kevin A. Lambert* Date: *3/17/98*

SAMPLE FINDINGS SUMMARY

COPY

Site: 57A

AR/COC: 510202

Data Classification: Radiometrics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
<i>No data is qualified</i>			
<i>Data is acceptable</i>			
<i>QC measures are adequate</i>			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470-1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Kevin A Lambert Date: 4/21/98

DOCUMENTATION COMPLETENESS CHECKLIST  
(DATA VERIFICATION/VALIDATION LEVEL 1 - DV1)

*David 11-9-95*

Project Leader Joe Pavletich  
AR/COC No. 06122

Project Name Central Coyote Test Area 57A  
Analytical Lab ERCL

Case No. 8834.2057A0  
SDG No. NA

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record

Line No.	Item	Complete?		If no, explain	Resolved?	
		Yes	No		Yes	No
1.1	All items on COC complete - data entry clerk initialed and dated	NA		Not applicable		
1.2	Container type(s) correct for analyses requested	✓				
1.3	Sample volume adequate for # and types of analyses requested	✓				
1.4	Preservative correct for analyses requested	✓				
1.5	Custody records continuous and complete	✓				
1.6	Lab sample number(s) provided	✓				
1.7	Condition upon receipt information provided		✓			
1.8	Trillium Screen data provided (Rad labs)	NA		Non-RMMA location		

2.0 Analytical Laboratory Report

Line No.	Item	Complete?		If no, explain	Resolved?	
		Yes	No		Yes	No
2.1	Data reviewed, signature		✓			
2.2	Date samples received	✓				
2.3	Method reference number(s) complete and correct	✓				
2.4	Quality control data provided (MB, LCS, LCD, Detection Limit)			No QA/QC information provided.		
2.5	Matrix spike/matrix spike duplicate data provided (# requested)	NR		Not requested		
2.6	Narrative provided		✓			
2.7	TAT met	NA		Not applicable		
2.8	Hold times met		✓	No extraction dates (TCLP suoc, metals)		
2.9	All requested result data provided	✓				

Based on the review, this data package is complete  Yes  No For Qualitative Purposes Only

If no, provide: correction request tracking # \_\_\_\_\_ and date correction request was submitted \_\_\_\_\_

Reviewed by: Jeffrey A. Rabe Date: 3/8/98 Closed by: \_\_\_\_\_ Date: \_\_\_\_\_

Site: S.T. 57A

**COPY**

1/2

AR/COC: 510207

Data Classification: ORGANICS

CTA-57A-  
↓  
CCTA-57A-

Sample Fraction No.	Analysis	DV Qualifiers	Comments
GR-000-EB ↓	92-87-5 (Benzidine) 479-45-8 (Tetryl)	R R	RPD exceeded acceptance criteria Sample result is non-detects LCS/LCSD was below acceptance criteria for TOREC. Sample results are non-detects
GR-016-0.5-S -016-0-0.5-DU -016-0.5-1.0-S	479-45-8 (Tetryl)	R	
-017-0-0.5-S -017-0.5-1.0-S -018-0-0.5-S			
-018-0.5-1.0-S -019-0-0.5-S -019-0-0.5-DU			
-019-0.5-1.0-S -020-0-0.5-S -020-0.5-1.0-S			
-021-0-0.5-S -021-0.5-1.0-S -022-0-0.5-S			
-022-0.5-1.0-S -023-0-0.5-S -023-0.5-1.0-S			
-023-0.5-1.0-DU -032-0-0.5-S -032-0.5-1.0-S			
-033-0-0.5-S -033-0-0.5-DU -033-0.5-1.0-S			
-034-0-0.5-S -034-0.5-1.0-S -035-0-0.5-S -035-0.5-1.0-S			
-036-0-0.5-S -036-0.5-1.0-S			

SV6

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: 5/26/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998



Site: 57A

2/2

AR COC: 510217

Data Classification: ORGANICS

Sample Fraction No.	SVOC Analysis	DV Qualifiers	Comments
CCTA-57A-GR-019-0.5-1.0-S	121-14-2 (2,4-DNT)	UJ	The field precision measurements for the field duplicate pair did not meet acceptance criteria for RPD.
-020-0-0.5-S		J	
-020-0.5-1.0-S		J	
-021-0-0.5-S		J	
-021-0.5-1.0-S		J	
-022-0-0.5-S		J	
-022-0.5-1.0-S		J	
-023-0-0.5-S		J	
-023-0.5-1.0-S		J	
-023-0.5-1.0-DU		J	
CCTA-57A-GR-019-0.5-1.0-S	606-20-2 (2,6-DNT)	UJ	
-020-0-0.5-S		UJ	
-020-0.5-1.0-S		UJ	
-021-0-0.5-S		UJ	
-021-0.5-1.0-S		J	
-022-0-0.5-S		UJ	
-022-0.5-1.0-S		J	
-023-0-0.5-S		UJ	
-023-0.5-1.0-S		UJ	
-023-0.5-1.0-DU		J	
CCTA-57A-GR-019-0.5-1.0-S	86-30-6 (N-Nitrosodi-phenylamine)	UJ	
-020-0-0.5-S		UJ	
-020-0.5-1.0-S		UJ	
-021-0-0.5-S		UJ	
-021-0.5-1.0-S		J	
-022-0-0.5-S		UJ	
-022-0.5-1.0-S		J	
-023-0-0.5-S		UJ	
-023-0.5-1.0-S		UJ	
-023-0.5-1.0-DU		J	
CCTA-57A-GR-016-0-0.5-DU	121-14-2 (2,4-DNT)	J, A	The LCS/LCSD 90 REC exceeded upper control limit.
-019-0-0.5-S		UJ, A	
-019-0-0.5-DU		UJ, A	
-034-0-0.5-S		J, A	
-034-0.5-1.0-S	J, A		

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: 5/26/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

SITE OR PROJECT Site 57A, CCTA  
 ANALYTICAL LABORATORY CORE  
 LABORATORY REPORT # 973560  
 CASE NO. 7215.2203  
 ARCOL # 510207

SAMPLE IDS 30 soil, 2 aqueous (EL)  
 NO. OF SAMPLES 036759-002 to 036788-002,  
036802-007, 036802-008

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	HE OTHER	
1. HOLDING TIMES/PRESERVATION	NA	✓	NA	✓	KHL 5/22/98
2. GC/MS INST. PERFORM.		✓		✓	
3. CALIBRATIONS WINDOWS		✓		✓	
4. BLANKS		✓		✓	
5. SURROGATES		✓		✓	
6. MATRIX SPIKE/DUP		✓		✓	
7. LABORATORY CONTROL SAMPLES		J+R		R	
8. INTERNAL STANDARDS		✓		✓	
9. COMPOUND IDENTIFICATION		✓		✓	
10. SYSTEM PERFORMANCE		✓		✓	
11. OVERALL ASSESSMENT	↓	✓	↓	✓	

✓ (check mark) — Acceptable: Data had no problems or qualified due to minor problems

N - Data qualified due to major problems

X - Problems, but do not affect data

Qualifiers: J - Estimate

UJ - Undetected, estimated

NA - Not Applicable

R - Unusable (Analyte major may not be present)

KHL 5/26/98

ACTION ITEMS: ① The samples were prepared and analyzed with specified methods and accepted procedures.

KHL 5/26/98

AREAS OF CONCERN: ② No MS/MSD was run on ARCOL groups for Batch # 29763, 29953, + 30042. The Lab did not address acceptability of MS/MSD for these batches from other ARCOL groups. Seek Corrective Action

Reviewed By: Kevin A. Lambert

Date: 5/26/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

PROJECT/TASK LEADER: \_\_\_\_\_

KAL 5/26/98 HE &  
ACTION ITEMS: ③ SVOC Analysis: Calibration met acceptance criteria. No target analytes were detected in the blanks (MB & EB). Surrogate recoveries met acceptance criteria except for 3,4-Dinitrotoluene in MB, EB, and one soil sample. No action is taken since two or more surrogates must not meet acceptance criteria to qualify data. The MS/MSDs met acceptance criteria except for HMX which slightly exceeded the upper control limit in an MS. The MSD and LCS/LCSD met acceptance criteria. No data is qualified. The LCS/LCSDs met acceptance criteria except for 2,4-Dinitrotoluene, Benzidine, 2,4-Dimethylphenol,

KAL 5/26/98  
AREAS OF CONCERN: Tetra, 2,6-Dinitrotoluene, Nitrobenzene, 1,3-Dinitrobenzene, o-nitrotoluene, m-nitrotoluene, p-nitrotoluene, 4-Amino-2,6-Dinitrotoluene & 1,3,5-Trinitrobenzene. Only 3 analytes (Benzidine, 2,4-Dinitrotoluene & Tetra) will have sample results qualified based on LCS/LCSD findings. See Sample Findings Summary & WPPak. One field duplicate pair had RPDs exceed acceptance criteria ( $\pm 35\%$ ) for 3 analytes (2,4-Dinitrotoluene, 2,6-Dinitrotoluene & n-Nitrosodiphenylamine). Associated samples will be coded "5" positive results and non-detects will be "UJ" coded.

④ Data is acceptable

⑤ QC Measures are adequate except MS/MSD acceptability

KAL 5/26/98  
OVERALL DATA QUALITY ASSESSMENT is not addressed for all Batches

Reviewed By: Kevin A. Lambert  
Date: 5/26/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

1.0 HOLDING TIMES AND PRESERVATION

Indicate the holding time criteria below that was used to evaluate the samples.

SW-846, 3rd. ed.

Other: \_\_\_\_\_

List below samples that were over holding time criteria.

Sample ID	VTSR	Date Analyzed	Action

*See CVR Form*

NOTE: VTSR = Validated time of sample receipt.

Were the correct preservatives used? Yes  No

List below samples that were incorrectly preserved.

Sample No.	Type of Sample	Deficiency	Action

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

2.0 GC/MS TUNING CRITERIA

Has a GC/MS tuning performance been analyzed for every twelve hours of sample analysis for each GC/MS instrument used? Yes  No

Was the correct standard (listed in the EPA Method) used? Yes  No

Have the ion abundance criteria been met for each tune? Yes  No

NOTE. GC/MS abundance criteria is specified by EPA method for GC/MS analysis (EPA 8240A or 8270A).

If no for any of the above, list all the data associated with the tune that either failed criteria or in which there was no tune.

Date/Time	Problem	Sample Affected (Action)
<i>Met Criteria</i>		

Check for transcription/calculation errors. If errors are present, briefly summarize necessary changes:

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Is the spectra of the mass calibration acceptable? Yes  No

Reviewed By: Kevin A Lambert  
Date: 5/22/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

3.0 GC INSTRUMENT PERFORMANCE.

3.1 DDT Retention Time *Not Applicable*

Is DDT retention time for packed columns >12 minutes (except for OV-1 and OV-101)?

Yes  No

If no, list below the DDT standards that failed criteria: \_\_\_\_\_

Affected samples and compounds: \_\_\_\_\_

3.2 Retention Time Windows *Not Applicable*

List below compounds that were not within the retention time windows.

Date/Time	Compound	RT	RT Window	Action	Affected Samples

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

3.3 DDT and Endrin Degradation

*Not Applicable*

List below the standards that have a DDT or Endrin breakdown of >20% (or a combined breakdown of >20%).

Date/Time	Standard ID	DDT/Endrin	% Breakdown	Action	Affected Samples

3.4 DBC Retention Time Check

Is the %D between EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% capillary ID < 0.52 mm, and 1% for megabore)?

Yes  No

Date	Sample ID	DBC %D	Action

For the above criteria outlined in Sections 8.1-8.4, check for transcription/calculation errors.

If errors are found, list below with necessary corrections: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Reviewed By: *Kevin A Lambert*  
 Date: *7/22/94*





ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

5.0 CONTINUING CALIBRATION

Have continuing calibration standards been analyzed at the frequency specified in the EPA method?

Yes  No

List below all compounds which did not meet continuing calibration requirements.

Instrument ID	Date	Compound	RPD/D	Action	Samples Affected
<i>Met Criteria</i>					

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

---

---

---

---

Reviewed By: Kevin A Lambert  
Date: 5/22/98

**ORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3 DV-3)

**6.0 BLANK ANALYSES**

**6.1 Method/Reagent and Instrument Blanks**

Has a method/reagent blank been analyzed for each set of samples or for every 20 samples of similar matrix, whichever is more frequent? Yes  No

Has an instrument blank been analyzed at least once every twelve hours for each GC/MS system used? Yes  No

**6.2 Field Rinse Equipment Blanks**

Are there field rinse/equipment blanks associated with each sampling day or at frequency specified in the sampling plan. Yes  No

List below compounds for which analyses were requested that were detected in any of the blanks analyzed:

Date	Blank ID	Compound	Conc. ( )	PQL ( )	Action Level	Samples Affected (Action)

*Met  
Criteria*

PQL = Practical Quantitation Limit from EPA Method.

Reviewed By: *Kevin A Lambert*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

Are there any TICs present in the blanks that are also present in the samples? Yes  No

If yes, list below.

---



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7.0 SURROGATE RECOVERY

Were surrogate recoveries evaluated for each of the samples analyzed by GC or GC/MS?

Yes  No

If surrogate standards other than those presented by SW-845 are used, list below with reference to applicable control limits used to evaluate the percent recoveries.

Surrogate Compound

Control Limits

---



---



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---

List below the percent recoveries which did not meet either SW-845 criteria or criteria listed above.

Date	Sample ID/Matrix	Surrogate Compound	%Rec		Action
12/29/97	2129 MB4111 Aqueous	3,4-DNT	140	70-130	Two or more surrogates must not meet acceptance criteria to take action. No data is qualified.
12/30/97	0102 CCTA-57A-GR-016-0-0.5-S soil	↓	131	↓	
12/24/97	0137 CCTA-57A-GR-000-EB Aqueous	↓	50	↓	

Batch #  
 30068  
 ↓ MS  
 30042

Reviewed By: Karin A. Lambert  
 Date: 5/22/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

If surrogate recovery was outside of control limits, were the samples or method blank reanalyzed?

Yes  No  *90 REC was not < 10%, therefore reanalysis is not required*

Are method blank surrogate recoveries outside of limits upon reanalysis? Yes  No  *Not Applicable*

Are transcription/calculation errors present? Yes  No

if yes, note necessary corrections. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: *Karin A Lambert*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

8.0 MATRIX SPIKE: MATRIX SPIKE DUPLICATE (MS:MSD) ANALYSIS

Were MS:MSDs analyzed at the frequency required by the EPA method or QAPJP for each matrix type?

Yes  No  *No MS/MSD was run for Batch 29763, 29933, 29944, 30042, 30048. The lab did not address acceptability of MS/MSD for batches from other ARCO group. Seek Corrective Action.*

List below % recoveries and RPDs of compounds which did not meet criteria. Indicate on chart criteria used to evaluate recoveries and RPDs.

Date	Sample ID: Matrix	Compound	%Rec RPD	Action
<i>12/30/97</i>	<i>CC1A-57A-GR-016-0-0.5-5 5011</i>	<i>HMX</i>	<i>135</i>	<i>70-130 The MSD met acceptability criteria as well as LCL/CCSD. No data is qualified</i>

*Batch # 30068 MS*

Reviewed By: *Kevin A Lambert*  
 Date: *5/22/98*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

9.0 LABORATORY CONTROL SAMPLE ANALYSIS

Have laboratory control samples containing a representative number of the compounds of interest been analyzed at the frequency specified in the EPA method or QAPJP?

Yes  No

Evaluate percent recoveries based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

Date	Compound	%Rec	Control Limits	Action	Samples Affected
12/29/97	1111 2,4-DNT	105	24-96		Sample result is non-detect No data is qualified
1209	↓	108	↓		↓
1209	Benzidine	102	±50		Sample result is non-detect and will be qualified "R"
1209	2,4-Dimethylphenol	27	32-119		The LCS met acceptance criteria No data is qualified

Control Limit Reference: \_\_\_\_\_

Evaluate RPD based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

Date	Compound	%Rec	Control Limits	Action	Samples Affected
12/31/97	1216 2,4-DNT	94	28-89		%RFC Slightly exceeds upper limit Positive sample results will be qualified "J". Non-detects will not be qualified
12/23/97	1318 ↓	95	↓		↓
12/23/97	1639 ↓	94	↓		↓
12/23/97	1738 ↓	93	↓		↓
12/23/97	2350 Tetrahydrocannabinol	57	70-130		LCS was below control limit, Sample results are non-detect and will be coded "R"
12/24/97	0026 2,6-DNT	67	70-130	} The LCS met acceptance criteria Sample results are non-detects No data is qualified	
	Nitrobenzene	57	70-130		
	1,3-DNB	25	±20		
	0-NT	67	70-130		
		59	70-130		
		32	±20		

Continued next page

Reviewed By: \_\_\_\_\_

Date: \_\_\_\_\_

**ORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3 DV-3)

**10.0 INTERNAL STANDARDS EVALUATION**

List below the internal standard areas of samples or blanks which did not meet criteria.

Date	Sample ID	Internal Out	Acceptable Range	Action
1/2/98 0636	CLTA-57A-GR- 035-0.5-1.0-5	2103902		<p>perylene d-12 was below acceptance criteria. Upon reanalysis analyte met acceptance criteria. No data is qualified. See case report.</p>

Are retention times of the internal standards within 30 seconds of the associated calibration standard?

Yes  No

**11.0 TARGET COMPOUND LIST ANALYTES**

**11.1 GC/MS Analyses**

Are the reconstructed ion chromatograms, the mass spectra for the identified compounds, and the data system printouts included? Yes  No

Is chromatographic performance acceptable with respect to:

Baseline stability? Yes  No

Resolution? Yes  No

Peak shape? Yes  No

Full-scale graph (attenuation)? Yes  No

Reviewed By: Karin A Lambert  
 Date: 5/22/98



Batal Date Compound % REC/RPD Control Limit Action

Batal	Date	Compound	% REC/RPD	Control Limit	Action
30042	LCSD 12/24/97 0026	M-Nitrotoluene	65	70-130	<p>The LCS met acceptance criteria. Sample results are non-detected. No data is qualified.</p> <p>LCS was 6 lower than control limit. Sample results are non-detected and will be called "R".</p> <p>LCSD did not accept sample criteria. Sample results are non-detected and will be called "R".</p> <p>The LCS met acceptance criteria. Sample results are non-detected. No data is qualified.</p> <p>LCS failed criteria. Sample results are non-detected and will be called "R".</p> <p>LCS exceeded upper control limit. Sample results are non-detected. No data is qualified.</p> <p>Sample results are non-detected and will be called "R" and will be called "R".</p>
↓	↓	P-Nitrotoluene	67	70-130 ± 20	
↓	↓	Tetryl	24	70-130 ± 20	
↓	↓	Tetryl	64	70-130 ± 20	
30068	LCSD 12/29/97 2205	4-Amino-2,6-DNT	36	70-130 ± 20	
↓	↓	1,3,5-TNB	152	70-130 ± 20	
↓	↓	Tetryl	23	70-130 ± 20	
↓	↓	4-Amino-2,6-DNT	69	70-130 ± 20	
↓	↓	Tetryl	141	70-130 ± 20	
↓	↓	↓	63	70-130 ± 20	
↓	↓	↓	64	70-130 ± 20	
LCSD 12/29/97 2240	↓	↓	↓	↓	↓
LCSD 1/2/98 1241	↓	↓	↓	↓	↓
LCSD 1/2/98 1316	↓	↓	↓	↓	↓

Kevin H. Lambert  
 5/22/98



ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

Other: \_\_\_\_\_

Is the RRT of each reported compound within the limits given in the method of the standard RRT in the continuing calibration? Yes  No

Are all the ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the mass spectrum? Yes  No

Do sample and standard relative intensities agree within 20%? Yes  No

If no for any of the above, indicate below problems and qualifications made to data:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11.2 GC Analyses

*Not Applicable*

Are there any transcription/calculation errors between the raw data and the reporting forms?

Yes  No

If yes, review errors and necessary corrections below; if errors are large, resubmittal of laboratory package may be necessary.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analysis? Yes  No

Was GC/MS confirmation performed when required by the EPA method? Yes  No

If no for any of the above, reject positive results except for retention time windows if associated standard compounds are similarly shifted.

Reviewed By: *Kevin A. Lambert*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

Samples affected: Not Applicable

Check chromatograms for false negatives, especially for the multiple peak components (toxaphene and PCBs). If false negatives are apparent and the appropriate PCB standards were not analyzed, or if confirmed analysis was not present, flag the affected data.

Samples affected: \_\_\_\_\_

NOTE: Due to the complexities of PCB pesticide analysis, each analytical run should be reviewed to verify identification and column performance.

12.0 FIELD DUPLICATE ANALYSIS

Were field duplicates submitted for analysis? Yes  No

If yes, calculate RPD and use professional judgment to determine if the data needs to be qualified. List results below.

collected Date	Sample ID	Compound	Sample Result $\mu\text{g}/\text{kg}$	Duplicate Result $\mu\text{g}/\text{kg}$	RPD	Affected Samples
12/16/97	CCIA-37A-GR-019-0-0.5	2,4-DNT	37000	1200	197%	Associated samples will be coded "UJ" for positive samples results. ND will be "UJ" coded.
↓	↓	2,6-DNT	2900	62	192%	
↓	↓	n-Nitrosodiphenylamine	100	55	58%	

13.0 COMPOUND QUANTITATION/REPORTED DETECTION LIMITS

Are there any transcription/calculation errors from raw data to reported results (check at least 10% of positive results)? Yes  No

In addition, verify that the correct internal standard, quantitation ion, and RRF were used to calculate the result for a minimum of 10% of sample data.

Reviewed By: Kevin A. Lambert  
 Date: 5/22/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

13.1 Chromatogram Quality

Were baselines stable? Yes  No

Were any negative peaks or unusual peaks present? Yes  No

Were early eluting peaks resolved to baseline? Yes  No

If incorrect quantitations are evident, note corrections necessary below: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are the required quantitation limits (detection limits) adjusted to reflect sample dilutions and for soils, sample moisture? Yes  No

If no, make necessary corrections and note below.  
\_\_\_\_\_  
\_\_\_\_\_

14.0 TENTATIVELY IDENTIFIED COMPOUNDS

*Not Applicable*

Are Tentatively Identified Compounds (TIC) properly identified with scan number or retention time, estimated concentration, and J qualifier? Yes  No

Are the mass spectra for TICs and associated "best match" spectra included? Yes  No

Are any TCL compounds listed as TIC compounds? Yes  No

Are each of the ions present in the reference mass spectra with a relative intensity greater than 10% also present in the sample mass spectrum? Yes  No

Reviewed By: *Kevin H. Lambert*  
Date: *8/22/98*



Site: Site 57A**COPY**1/23  
HM  
5/26/98AR/COC: 510207Data Classification: INORGANICS

Sample Fraction No.	Analysis	DV Qualifiers	Comments
<u>CCTA-57A-GR-016-0-0.5-S</u> <u>-016-0.5-1.0-S</u> <u>-017-0-0.5-S</u> <u>-017-0.5-1.0-S</u> <u>-018-0-0.5-S</u> <u>-018-0.5-1.0-S</u> <u>-019-0.5-1.0-S</u> <u>-023-0.5-1.0-S</u> <u>-033-0-0.5-DU</u>	7439-92-1 (Lead)	J, P	Lab precision measurements for LCS/LCSD did not meet acceptance criteria
<u>CCTA-57A-GR-016-0-0.5-S</u> <u>-016-0-0.5-DU</u>	7440-41-7 (Beryllium)	J, P	Lab precision measurements for LCS/LCSD did not meet acceptance criteria
<u>-016-0-0.5-S</u> <u>-016-0-0.5-DU</u>	7440-43-9 (Cadmium)	J, P	
<u>-016-0-0.5-S</u> <u>-016-0-0.5-DU</u>	7440-47-3 (Chromium)	J, P	
<u>-016-0-0.5-S</u> <u>-016-0-0.5-DU</u>	7440-22-9 (Silver)	J, P	
<u>CCTA-57A-GR-016-0-0.5-S</u> <u>-016-0-0.5-DU</u> <u>-017-0-0.5-S</u> <u>-016-0.5-1.0-S</u> <u>-017-0.5-1.0-S</u> <u>-018-0-0.5-S</u> <u>-018-0.5-1.0-S</u> <u>-019-0-0.5-S</u> <u>-019-0-0.5-DU</u>	7440-39-3 (Barium)	J	Field precision measurements for field duplicate pair did not meet acceptance criteria

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Karin A Lambert Date: 5/26/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A, J))
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998



Site: SIT 57A

2/23  
KHL  
5/26/98

AR COC: 510207

Data Classification: Inorganic

ETA-57A

CCTA-57A

Sample Fraction No.	Analysis	DV Qualifiers	Comments	
GR-023-0.5-1.0-S -023-0.5-1.0-DU -032-0-0.5-S	7439-97-6 (Mercury)	J	Full precision measurement for field duplicate pair did not meet acceptance criteria	
-032-0.5-1.0-S -033-0-0.5-S -033-0-0.5-DU				
GR-016-0-0.5-S -016-0-0.5-DU -016-0.5-1.0-S	7440-38-2 (Arsenic)	J, A2		Lab accuracy measurement for MS/MSD did not meet acceptance criteria
-017-0.5-1.0-S -018-0-0.5-S -018-0.5-1.0-S				
-019-0-0.5-S -019-0-0.5-DU -019-0.5-1.0-S				
-020-0-0.5-S -021-0-0.5-S -021-0.5-1.0-S				
-022-0-0.5-S -022-0.5-1.0-S -023-0-0.5-S				
-023-0.5-1.0-S -023-0.5-1.0-DU -032-0-0.5-S				
-032-0.5-1.0-S -033-0-0.5-S -033-0-0.5-DU				
-033-0.5-1.0-S -034-0-0.5-S -034-0.5-1.0-S				
-035-0-0.5-S -035-0.5-1.0-S -036-0-0.5-S				
-036-0.5-1.0-S				

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470.1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Kevin A Lambert Date: 5/26/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J))
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998

Site: Site 57A

3/3

AR/COC: 510207

Data Classification: Inorganics

CCTA-57A-

Sample Fraction No.	Analysis	DV Qualifiers	Comments
GR-016-0-0.5-DU -016-0.5-1.0-S -017-0-0.5-S	7782-49-2 (Selenium)	UJ, AR	Lab accuracy measurement for MS/MSD did not meet acceptance criteria
-017-0.5-1.0-S -018-0-0.5-S -018-0.5-1.0-S			
-019-0-0.5-S -019-0-0.5-DU -019-0.5-1.0-S			
-020-0-0.5-S -020-0.5-1.0-S -021-0-0.5-S			
-021-0.5-1.0-S -022-0-0.5-S -022-0.5-1.0-S			
-023-0-0.5-S -023-0.5-1.0-S -023-0.5-1.0-DU			
-032-0-0.5-S -032-0.5-1.0-S -033-0-0.5-S			
-033-0-0.5-DU -033-0.5-1.0-S -034-0-0.5-S			
-034-0.5-1.0-S -035-0-0.5-S -035-0.5-1.0-S			
-036-0-0.5-S -036-0.5-1.0-S			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method. use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate. needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470'1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Karin A Lambert Date: 5/26/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

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SITE OR PROJECT 57A, CCTA CASE NO. 7215.2203  
 ANALYTICAL LABORATORY CORE SAMPLE IDS 036759-002 to  
 LABORATORY REPORT # 973560 036788-002, 036802-005  
 TASK LEADER ARCO#510207  
 NO. OF SAMPLES 30 soil, 1 aqueous (EB)

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	✓	✓	✓	NA
2. CALIBRATIONS	✓	✓	✓	
3. BLANKS	✓	✓	✓	
4. ICS	✓			
5. LCS	✓	✓		
6. DUPLICATE ANALYSIS	J	J	✓	
7. MATRIX SPIKE	J	J	✓	
8. MSA		✓		
9. SERIAL DILUTION	✓			
10. SAMPLE VERIFICATION	✓	✓	✓	
11. OTHER QC	J	J	J	
12. OVERALL ASSESSMENT	✓	✓	✓	↓

✓ (check mark) — Acceptable

Other — Qualified:

J - Estimate

UJ - Undetected, estimated

R - Unusable (analyte may or may not be present)

NA - Not Applicable

KAC 5/26/98

ACTION ITEMS: ① The samples were prepared and analyzed with specified methods and accepted procedures

KAC 5/26/98

AREAS OF CONCERN: ② Metals Analysis: Calibration met acceptance criteria. No target analytes were detected above the RL in the MB. Barium & Arsenic were observed at

REVIEWED BY: 5/26/98 Kevin Lambert

DATE REVIEWED: KAC 5/26/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

KH 5/26/98

ACTION ITEMS:

estimated values ("J" coded). Sample results are > 5X blank concentration. No data is qualified. Lead was detected at the RL in the EB. Sample results is > 5X the blank concentration. No data is qualified. The LCS/LCSD 70 REC met acceptance criteria except for Lead in DCS-1. The LCS-1 met acceptance criteria. No data is qualified. Several analytes (Lead, Beryllium, Barium, Cadmium, Chromium & Silver) exceeded RPD criteria. <sup>KH 5/26/98</sup> Barium will not be qualified since RPD is within 19% rounding error. Sample results for the other 5 analytes will be "J" coded in accordance with EPA guidance. The MS/MSD met acceptance criteria except for Selenium, Arsenic, Barium & Silver 70 REC. Barium & Silver

KH 5/26/98

AREAS OF CONCERN:

70 REC met acceptance criteria in the MSD. No data is qualified. Arsenic and Selenium will be qualified due soil heterogeneity. Positive sample results will be "J" coded and non-detects will be "UJ" coded. The RPD for field duplicate pair met acceptance criteria ( $\pm 35\%$ ) except for Barium, Lead, & Mercury. Associated sampler will be "J" coded.

③ Data is acceptable. Soil heterogeneity is suspected to result in the variability observed in sample results. Sample results have been qualified using EPA guidance & professional judgment.

KH 5/26/98

OVERALL DATA QUALITY ASSESSMENT

④ QC measures are adequate

Reviewed By: Kevin A Lambert Date: 5/26/98



INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

2.0 INSTRUMENT CALIBRATION

2.1 Percent Recovery Criteria

Indicate %Recovery (%R) criteria used to evaluate calibration standards:

Metals: \_\_\_\_\_  
Mercury: \_\_\_\_\_  
Cyanide: \_\_\_\_\_  
Other: \_\_\_\_\_

List below the analytes which did not meet %R criteria for initial and continuing calibration standards:

Analysis Date	ICV/CCV #	Analyte	%R	Action	Samples Affected

*Met  
Criteria*

2.2 Analytical Sequence

Did the laboratory use the proper number of standards for calibration as described in the EPA method? Yes  No

Have initial calibrations been performed at the beginning of each analysis and at the frequency indicated by the EPA method? Yes  No

Have continuing calibration standards been analyzed at the beginning of sample analysis and at a minimum frequency indicated by the EPA method and at the end of the analysis sequence? Yes  No

If no for any of the above, outline deviations and actions taken below:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: Kevin A Lambert Date: 5/22/98



**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

Were the correlation coefficients for the calibration curves for AA, Hg, CN, and other spectrophotometric methods  $\geq 0.995$ ? (Check calculations performed for calibration curves.) Yes  No

If no, list: \_\_\_\_\_

Date	Analyte	Coefficient	Action	Samples Affected
<i>Met Criteria</i>				

Check for transcription and calculation errors involving calibration summary forms and raw data. Briefly summarize errors and associated actions when data quality might have been affected.

**3.0 BLANK ANALYSIS**

**3.1 Initial and Continuing Calibration Blanks**

Have Initial and Continuing Calibration Blanks (ICS/CCB) been analyzed at the frequency required in the EPA method? Yes  No

If no, summarize problems and resolutions in the narrative report.

List analytes detected in ICB and CCBs below:

NOTE: For soil samples, convert blank values to mg/kg using digestion weights and volumes.

Analysis Date	ICS/CCB No.	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>Met Criteria</i>						

Reviewed By: Kevin A Lambert Date: 5/22/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

3.2 Method Blank

Was one method blank analyzed for:

Each of 20 samples? Yes  No

Each digestion batch? Yes  No

Each matrix type? Yes  No

Both AA and ICP when both are used for the same analyte? Yes  No  *Not App. RAC 5/21/98*

or  
 At the frequency indicated in the EPA method or QAFJP? Yes  No

NOTE: Method blank is the same as the calibration blank for mercury and for wet chemistry analysis.

List analytes detected in method blank samples below. NOTE: For soil samples, be sure to calculate blank values using digestion weights and volumes.

Preparation Date	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>No target analytes were detected above the PQL</i>					

Is concentration in the method blank below the detection limit? Yes  No

Affected samples: Barium (Batch # 30074) and Arsenic (Batch # 30289)  
were observed at estimated values ("J" coded) in the MBs.  
Barium and Arsenic are > 5x the blank concentration. No data is qualified.

Reviewed By: Kevin A Lambert Date: 5/22/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

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3.3 Field/Rinse/Equipment Blanks

Was a field/equipment blank analyzed as required by the EPA method or OAPJP? Yes  No  *Eg. Blank*

List below analytes detected in the field blanks. NOTE: For soil samples, calculate blank values using digestion weights and volumes.

*Barium was observed at an estimated value ("J" coded) in the E.B. Sample results are > 5x the blank concentration. No data is qualified.*

Collection Date	Blank ID	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
12/16/97	<i>CTA-57A+ ER-000-EB</i>	<i>Lead</i>	<i>0.002 mg/l</i>	<i>0.002 mg/l</i>		<i>Sample results are &gt; 5x the blank concentration. No data is qualified.</i>

4.0 ICP INTERFERENCE CHECK SAMPLE ANALYSIS

Was an ICP interference check sample (ICS) analyzed at the beginning and end of a run or at least twice every 8 hours? (Not required for Ca, Mg, K, and Na) Yes  No

Samples affected: \_\_\_\_\_

Are the values of the ICS for solution AB within 80-120%R? Yes  No

If no, is the concentration of Al, Ca, Fe, or Mg lower than in ICS? Yes  No  *Not Applicable*

Reviewed By: *Kevin A Lambert* Date: *5/22/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

If no, list below all analytes which did not meet %R criteria and in which the concentration of Al, Ca, Fe, or Mg is higher than in the ICS: *Not Applicable*

Date	Analyte	%R	Action	Samples Affected

Are any results > IDL for those analytes which are not present in the ICS solution A? Yes  No

If yes, results >2 (absolute value of the IDL) indicate either a positive or negative interference and must be qualified.

Samples affected: \_\_\_\_\_  
\_\_\_\_\_

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

5.0 LABORATORY CONTROL SAMPLES (LCS)

Was an LCS analyzed at required frequency? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: Kevin A. Lambert Date: 5/22/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

List below any LCS recoveries not within limits.

Batch #  
30104

Preparation Date	Analyte	%R	Action	Samples Affected
DCS-2	LEAD	132	73-127	The LCS met acceptance criteria No data qualified

6.0 LABORATORY DUPLICATE ANALYSIS

Were laboratory duplicates analyzed at required frequency? Yes  No

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_

Was laboratory duplicate analysis performed on field or equipment blanks? Yes  No

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_

Is any value for sample duplicate pair <PQL and the other value >10xPQL? Yes  No

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_

Reviewed By: Kevin A Lambert Date: 5/22/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

List below concentrations of any analyte that did not meet criteria for duplicate precision:

Batch #  
 30104  
 30237  
 ↓  
 ↓  
 ↓

Sample ID	Matrix	Preparation Date	Analyte	PQL	RPD	Action	Samples Affected
DCS-1	soil	11/9/98 1449	Lead		21.1 ±20		Sample results will be "5" coded
DCS-1	soil	11/6/98 1805	Barium		20.2 ±20		Within rounding error (±1%) No data qualified
↓	↓	↓	Beryllium		21.3 ±20		Sample results will be "5" coded
↓	↓	↓	Cadmium		24.8 ±20		
↓	↓	↓	Chromium		20.4 ±20		
↓	↓	↓	Silver		27.2 ±20		

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

7.0 FIELD DUPLICATE SAMPLE ANALYSIS

Were field duplicates collected at the frequency indicated in the EPA method or QAPjP?

Yes  No

If yes, qualify data associated only with the field duplicate pair. Calculate RPDs for each analyte in which both values are greater than the IDL.

Is any value for sample duplicate < practical quantitation limit (PQL) and other value >10xPQL? Yes  No

Reviewed By: Kurt A Lambert Date: 5/22/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

List below the analytes that do not meet RPD or PQL criteria. Use the same criteria as those used for laboratory duplicate analysis or criteria specified in EPA method or sampling plan.

Sample ID	Matrix	Collection Date	RPD	Control Limit	Action	Samples Affected
CCIA-57A-GK-016-0-0.5-DU	soil	12/16/97 1045	192	±35%	Barium	Associated samples will be "J" coded
CCIA-57A-GK-023-0.5-1.0-DU	soil	12/16/97 1307	37	±35%	Lead	↓
↓	↓	↓	114	↓	Mercury	↓

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**8.0 MATRIX SPIKE ANALYSIS**

NOTE: This matrix spike is a predigestion/predistillation spike.

Was a matrix spike prepared and analyzed at the required frequency? Yes  No

Reviewed By: Karin A. Lambert Date: 5/22/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

Were matrix spikes performed at the concentrations specified by the EPA method? Yes  No

Samples affected: \_\_\_\_\_

Was matrix spike analysis performed on field or equipment blanks? Yes  No

*Eg. BLANK only aqueous sample*

If equipment or field blanks are the only aqueous samples, matrix spike analysis may be performed; however, matrix spike samples must be present for the other matrices.

Samples affected: \_\_\_\_\_

List below the % recoveries for analytes that did not meet the criteria:

Sample ID	Matrix	Preparation Date	Analyte	%R	Action	Samples Affected
58 MS CCTA-57A-GR-019-0.5-1.0-S	soil	1/8/98	1318 Selenium	76	80-120	Sample results will be "J" coded
MSD CCTA-57A-GR-019-0.5-1.0-S	soil	↓	↓	67	↓	due to soil heterogeneity
60 MS CCTA-57A-GR-021-0.5-1.0-S	soil	1/8/98	2240 ARSENIC	15	80-120	on "UJ" coded.
MSD ↓	↓	↓	2245	43	±20	↓
37 MS CCTA-57A-GR-016-0-0.5-S	soil	1/6/98	1821 BARIUM	62	80-120	MSD met criteria No data provided
MS ↓	↓	↓	1 Silver	79	80-120	↓
89 MS ↓	↓	1/8/98	0043 ARSENIC	68	80-120	Sample results will be "J" coded due to soil heterogeneity
MSD ↓	↓	↓	0049	70	80-120	Soil heterogeneity

Check for transcription/calculation errors. Also check to ensure matrix spike concentrations are not affected by sample dilutions performed. If matrix spike concentrations are diluted below or close to IDL based on sample dilutions performed, use professional judgment in qualifying data. Ensure that the laboratory performed sample dilutions only when necessary as indicated by QA/QC requirements. Briefly summarize errors and associated actions when data quality might have been affected.

Reviewed By: Keri A Lambert Date: 5/22/98



INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

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NOTE: If preparation blank spikes are analyzed, evaluate recoveries. These recoveries can indicate whether excursions in matrix spike recovery are caused by sample matrix effects or poor digestion efficiencies and/or problems with matrix spike solution. For example, if matrix spike recovery for selenium is 0% and preparation blank spike recovery for selenium is 92%, this may indicate sample matrix effects.

9.0 FURNACE ATOMIC ABSORPTION ANALYSIS

Were duplicate injections present for each sample, including required QC analyses (not required if MSA is done)? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Were postdigestion spikes analyzed for samples, including QC samples? Yes  No

Were postdigestion spikes analyzed at the required concentration? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Was a dilution analyzed for samples with postdigestion spike recovery <40%? Yes  No  *Not Applicable*

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

MSA Analysis (Method of Standard Additions)—MSA is required when serial dilutions are not within  $\pm 10\%$ . Was MSA required for any sample but not performed? Yes  No  *Not Applicable*

Are MSA calculations outside the linear range of the calibration curve? Yes  No  *Not Applicable*

Reviewed By: Kevin A. Lambert Date: 5/22/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

NOTE: Ensure the spiking concentrations used for MSA analysis were at 50–100% and 150% of sample concentration or absorbance. *Not Applicable*

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10.0 SERIAL DILUTION ANALYSIS

*Not Applicable*

NOTE: Serial dilution analysis (ICP) is required only for initial concentrations equal to or greater than 10xIDL.

If applicable, was a serial dilution performed for:

- Each 20 samples? Yes  No   
Each matrix type? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_

List below results which did not meet criteria of %D  $\leq$  10% for analyte concentrations greater than 50xIDL before dilution:

Analysis Date	Sample ID	Analyte	IDL	%D	Action	Samples Affected

Check for calculation errors and negative interferences.

Reviewed By: *Kevin A Lambert* Date: *5/22/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

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11.0 SAMPLE RESULT VERIFICATION

11.1 Verification of Instrumental Parameters

Are instrument detection limits present and verified on a quarterly basis? Yes  No  *Not Applicable*

Are IDLs present for each analyte and each instrument used? Yes  No

Is the IDL greater than the required detection limits for any analyte? Yes  No   
(If IDL > required detection limits, flag values less than 5xIDL)

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are ICP Interelement Correction Factors established and verified annually? Yes  No  *Not Applicable*

Are ICP Linear Ranges established and verified quarterly? Yes  No  *Not Applicable*

If no for any of the above, review problems and resolutions in narrative report. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11.2 Reporting Requirements

Were sample results reported down to the PQL? Yes  No

If no, indicate necessary corrections. \_\_\_\_\_  
\_\_\_\_\_

Were sample results that were analyzed by ICP for Se, Ti, As, or Pb at least 5xIDL? Yes  No

Were sample weights, volumes, and dilutions taken into account when reporting sample results and detection limits? Yes  No

Reviewed By: Kevin A Lambert Date: 5/22/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

If no for any of the above, sample results may be inaccurate. Note necessary changes and if errors are present, request resubmittal of laboratory package.

Were any sample results higher than the linear range of calibration curve and not subsequently reanalyzed at the appropriate dilution? Yes  No

Samples affected: \_\_\_\_\_

11.3 Sample Quantitation

Check a minimum of 10% of positive sample results for transcription calculation errors. Summarize necessary corrections. If errors are large, request resubmittal of laboratory package.

Comments:

*OK Look good*

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_

\*Task/Project Leader is responsible for approval of data set.

Reviewed By: Kevin A Lambert Date: 5/22/98

Project: Site 57A  
ARLOC# 510208

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Attachment B  
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DATA QUALITY INDICATOR CHECKLIST  
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

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KAL 4/2/98

SAMPLE FINDINGS SUMMARY CONTINUATION SHEET

Sample/ Fraction No.	Analysis	Qualifiers	Comments
			No data is qualified
			Data is acceptable
			QC measures are adequate

Reviewed by: Kevin A Lambert Approved by: \_\_\_\_\_  
Date: 4/2/98 Date: \_\_\_\_\_

\*Task/Project Leader must approve data package.



DATA QUALITY INDICATOR CHECKLIST  
 (DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Project Name Site 57A Page 1 of 5  
 Case Number 7215.2203  
 Sample Numbers 036759-001 to 036777-001, 036802-004 (EB)

AR/COC No. 510208 Analytical laboratory GEL SDG No. 9712535  
 AR/COC No. \_\_\_\_\_ Analytical laboratory \_\_\_\_\_ SDG No. \_\_\_\_\_  
 AR/COC No. \_\_\_\_\_ Analytical laboratory \_\_\_\_\_ SDG No. \_\_\_\_\_  
 AR/COC No. \_\_\_\_\_ Analytical laboratory \_\_\_\_\_ SDG No. \_\_\_\_\_  
 Method: Gross Alpha/Beta

1.0 EVALUATION

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
1) Sample volume, container, and preservation correct?			
2) Holding times met for all samples?			
3) Reporting units appropriate for the matrix and meet project-specific requirements?			<u>See CVR</u>
4) Quantitation limit met for all samples?			
5) Accuracy			
a) Laboratory control sample accuracy reported and met for all samples?			
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?			

Reviewed by: Kevin A Lambert  
 Date: 4/2/98

**DATA QUALITY INDICATOR CHECKLIST  
 (DATA VERIFICATION/VALIDATION LEVEL 2—DV2)**

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
c) Matrix spike recovery data reported and met for all samples for which it was requested?			<i>See CVR Form</i>
6) Precision			
a) Laboratory control sample precision reported and met for all samples?			
b) Matrix spike duplicate RPD data reported and met for all samples for which it was requested?			
7) Blank data			
a) Method or reagent blank data reported and met for all samples?			
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?			
8) Narrative included, correct, and complete?			

**2.0 COMMENTS:** All items marked "No" above must be explained in this section. For each item, give SNL/NM ID No. and the analysis, if appropriate, of all samples affected by the finding.

- ① All samples were prepared and analyzed in accordance with specified methods and accepted procedures.
- ② The MS/MSD was not run on the sample specified on ARCO C but was instead run on another sample in the SDG. The

Reviewed by: Kenn A Lambert

Date: 4/2/98



DATA QUALITY INDICATOR CHECKLIST  
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Page 3 of 5

2.0 COMMENTS CONTINUATION SHEET

data quality is not affected by  
this use of another sample as the MS/MSD. No data is qualified.  
③ For Gross Alpha / Gross Beta: No target analytes were detected  
in the MBs for the 3 batches. The LCSs for the 3 batches  
met acceptance criteria. No LCSDs were run on samples in this  
SDG. A<sup>KHL</sup> Sample duplicates were run on only 1 batch (113628) from  
samples in this SDG. The sample duplicate for Batch 113628 met  
acceptance criteria. The<sup>KHL</sup> No sample duplicates in Batch  
113391 and 113629 were run on samples in this SDG. An  
MS/MSD was run on only Batch 113628 from samples in this SDG.  
The MS/MSD met acceptance criteria. No MS/MSDs in for the other  
2 batches were run on samples in this SDG. No data is qualified.  
The EB shows Gross Alpha & Gross Beta being detected above  
the DL but below RL. Sample results are > 5X  
the EB concentration. No data is qualified. Three  
field dup. pairs were analyzed and the RPDs met acceptance  
criteria. No data is qualified

Data is acceptable

QC measures are adequate

Reviewed by: Kevin A Lambert

Date: 4/2/98

**DATA QUALITY INDICATOR CHECKLIST  
 (DATA VERIFICATION/VALIDATION LEVEL 2—DV2)**

**3.0 SUMMARY:** Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted. Use the qualifiers given at the end of the table if possible. Explain any other qualifiers in the comments column.

Sample/ Fraction No.	Analysis	Qualifiers	Comments
<i>See Continuation Sheet</i>			

AL227 continuation sheet for additional samples

**QUALIFIERS:**

- J = Estimated quantity (provide reason)
- B = Contamination in blank (indicate which blank)
- P = Laboratory precision does not meet criteria
- R = Reporting units inappropriate
- N = There is presumptive evidence of the presence of the material
- UJ = The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
- Q = Quantitation limit does not meet criteria
- A = Laboratory accuracy does not meet criteria
- U = Analyte is undetected (indicate which analyte and reason for qualification)
- NJ = There is presumptive evidence of the presence of the material at an estimated quantity.

Reviewed by: *Kenn A Lambert*

Date: *4/2/98*

SAMPLE FINDINGS SUMMARY

**COPY**

Site: Site 57A

AR/COC: 510216

Data Classification: ORGANICS

Sample Fraction No.	Analysis	DV Qualifiers	Comments
CCTA-57A-GR-027-C	(Tetryl)	R	
028-C	479-45-8		
028-C-DU			
029-C			
030-C			
031-C			
049-C			
054-C			
059-C			
064-C			
060-0-0.5-S			
061-0-0.5-S			
062-0-0.5-S			
062-0-0.5-S-DU			
063-0-0.5-S			
065-0-0.5-S			
066-0-0.5-S			
067-0-0.5-S			
068-0-0.5-S			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470'1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Kevin A Lambert Date: 3/13/98

Y900

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J))
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a method or reagent blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

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SITE OR PROJECT Site 57A  
 ANALYTICAL LABORATORY CORE  
 LABORATORY REPORT # 973540  
 CASE NO. 510216<sup>RM</sup> 7215.2203  
 ARCO # 510216

SAMPLE IDS \_\_\_\_\_  
 NO. OF SAMPLES \_\_\_\_\_

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	<del>HE</del> OTHER
1. HOLDING TIMES/PRESERVATION	✓	✓	✓	✓
2. GC/MS INST. PERFORM.				
3. CALIBRATIONS/WINDOWS				
4. BLANKS	✓	✓	✓	✓
5. SURROGATES	✓	✓	✓	✓
6. MATRIX SPIKE/DUP	✓	✓	✓	✓
7. LABORATORY CONTROL SAMPLES	✓	✓	✓	✓
8. INTERNAL STANDARDS	✓	✓	✓	✓
9. COMPOUND IDENTIFICATION	✓	✓	✓	✓
10. SYSTEM PERFORMANCE	✓	✓	✓	✓
11. OVERALL ASSESSMENT	✓	✓	✓	✓

✓ (check mark) — Acceptable: Data had no problems or qualified due to minor problems  
 N - Data qualified due to major problems  
 X - Problems, but do not affect data  
 Qualifiers: J - Estimate  
 UJ - Undetected, estimated

ACTION ITEMS: Did Not receive complete Batch QC Summary Report  
Have requested all future packages contain complete report. Available QC measurements adequate

AREAS OF CONCERN: Minor problem <sup>HE</sup> with LCS/LCSD for HE  
that do not affect data quality. However one compound (Tetragh) did not meet control limits for LCS/LCSD

Reviewed By: Kevin A Lambert  
 Date: 3/13/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

PROJECT/TASK LEADER: \_\_\_\_\_

ACTION ITEMS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

AREAS OF CONCERN: and MS/MSD. 70 Recovery was low  
in all instances. Sample results were non-detect  
Data will be qualified "R"

OVERALL DATA QUALITY ASSESSMENT Data is acceptable RC measures  
adequate

Reviewed By: Kevin A Lambert  
Date: 3/13/98

**ORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3 DV-3)

**1.0 HOLDING TIMES AND PRESERVATION**

Indicate the holding time criteria below that was used to evaluate the samples.

SW-846, 3rd. ed.

Other: \_\_\_\_\_

List below samples that were over holding time criteria.

Sample ID	VTSR	Date Analyzed	Action

*SEE CUR Form*

NOTE: VTSR = Validated time of sample receipt.

Were the correct preservatives used? Yes  No

List below samples that were incorrectly preserved.

Sample No.	Type of Sample	Deficiency	Action

Reviewed By: *Kim L. Holt*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

2.0 GC/MS TUNING CRITERIA

Has a GC/MS tuning performance been analyzed for every twelve hours of sample analysis for each GC/MS instrument used? Yes  No

Was the correct standard (listed in the EPA Method) used? Yes  No

Have the ion abundance criteria been met for each tune? Yes  No

NOTE: GC/MS abundance criteria is specified by EPA method for GC/MS analysis (EPA 8240A or 8270A).

If no for any of the above, list all the data associated with the tune that either failed criteria or in which there was no tune.

Date/Time	Problem	Sample Affected (Action)
	Passed criteria	

Check for transcription/calculation errors. If errors are present, briefly summarize necessary changes:

---

---

---

Is the spectra of the mass calibration acceptable? Yes  No

Reviewed By: Kevin A. Lambert  
Date: 3/13/98



ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

3.0 GC INSTRUMENT PERFORMANCE.

3.1 DDT Retention Time

Is DDT retention time for packed columns >12 minutes (except for OV-1 and OV-101)?

Yes  No

If no, list below the DDT standards that failed criteria: \_\_\_\_\_

Affected samples and compounds: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

3.2 Retention Time Windows

List below compounds that were not within the retention time windows.

Date/Time	Compound	RT	RT Window	Action	Affected Samples
<i>Met criteria</i>					

Reviewed By: *Kevin A Lambert 3/13/98*

**ORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3 DV-3)

**3.3 DDT and Endrin Degradation**

List below the standards that have a DDT or Endrin breakdown of >20% (or a combined breakdown of >20%).

Date/Time	Standard ID	DDT/Endrin	% Breakdown	Action	Affected Samples

**3.4 DSC Retention Time Check**

Is the %D between EVAL A and each analysis (quantitation and confirmation) DSC retention time within QC limits (2% for packed column, 0.3% capillary ID < 0.32 mm, and 1% for megabore)?

Yes  No

Date	Sample ID	DSC %D	Action

For the above criteria outlined in Sections 8.1-8.4, check for transcription/calculation errors.

If errors are found, list below with necessary corrections: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewed By: Kenneth Lambert  
 Date: 2/12/04

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

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4.0 INITIAL CALIBRATION

Has initial calibration been performed as required in the EPA method? Yes  No

Were the correct number of standards used to calibrate the instrument? Yes  No

For GC analyses of PCBs and Pesticides, did the laboratory follow the correct 72-hour sequence of analysis?  
Yes  No

List below compounds which did not meet initial calibration criteria outlined by the EPA method.

Instrument ID	Date	Compound	FF: %RSD	Action	Samples Affected

*Passed  
Criteria*

Check for transcription/calculation errors. If errors are present, summarize necessary corrections below:

*Note poor response exhibited by <sup>typical</sup> analytes identified  
by guidelines. Does not affect data quality.  
No data qualified*

Reviewed By: *Kevin Alexander*  
Date: *2/17/01*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

5.0 CONTINUING CALIBRATION

Have continuing calibration standards been analyzed at the frequency specified in the EPA method?

Yes  No

List below all compounds which did not meet continuing calibration requirements.

Instrument ID	Date	Compound	RFID	Action	Samples Affected

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

*Note: some analytes exhibit poor response as identified in Guidelines. Does not affect data quality. No data qualified*

Reviewed By: *Karin A Lambert*  
Date: *3/13/98*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

6.0 BLANK ANALYSES

6.1 Method/Reagent and Instrument Blanks

Has a method/reagent blank been analyzed for each set of samples or for every 20 samples of similar matrix, whichever is more frequent? Yes  No

Has an instrument blank been analyzed at least once every twelve hours for each GC/MS system used? Yes  No

6.2 Field Rinse Equipment Blanks

Are there field rinse equipment blanks associated with each sampling day or at frequency specified in the sampling plan. Yes  No

List below compounds for which analyses were requested that were detected in any of the blanks analyzed:

Date	Blank ID	Compound	Conc. ( )	PQL ( )	Action Level	Samples Affected (Action)
<i>No target analytes were detected above PQL</i>						

PQL = Practical Quantitation Limit from EPA Method.

*Two SVOC analytes and one HE analyte were identified at estimate values below PQL in EB.  
 SVOC => Bis(2-ethylhexyl) phthalate and Di-n-butyl phthalate  
 HE => Octahydro-1357 tetranitro-1357 tetrazocine*

Reviewed By: *Kevin A Lambert*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

Are there any TICs present in the blanks that are also present in the samples? Yes  No

If yes, list below.

*Not Reported*

7.0 SURROGATE RECOVERY

Were surrogate recoveries evaluated for each of the samples analyzed by GC or GC/MS?

Yes  No

If surrogate standards other than those presented by SW-845 are used, list below with reference to applicable control limits used to evaluate the percent recoveries.

Surrogate Compound

Control Limits

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\_\_\_\_\_

List below the percent recoveries which did not meet either SW-845 criteria or criteria listed above.

Date	Sample ID/Matrix	Surrogate Compound	%Rec	Action

*Met Criteria*

Reviewed By: Kevin A Lambert  
 Date: 3/13/98

**ORGANIC DATA ASSESSMENT SUMMARY FORM**

(Data Verification/Validation Level 3 DV-3)

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If surrogate recovery was outside of control limits, were the samples or method blank reanalyzed?

Yes  No

*Not Applicable*

Are method blank surrogate recoveries outside of limits upon reanalysis? Yes  No

Are transcription/calculation errors present? Yes  No

if yes, note necessary corrections. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: 3/13/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

8.0 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSIS

Were MS/MSDs analyzed at the frequency required by the EPA method or QAFJP for each matrix type?

Yes  No

List below % recoveries and RPDs of compounds which did not meet criteria. Indicate on chart criteria used to evaluate recoveries and RPDs.

Date	Sample ID/Matrix	Compound	%Rec RPD	Action
12/30/97	036833-002 MSD	hexachlorobutadiene	87.2	23-86 No data qualified MS, LCS/LCSD met control limits. Analyte NOT detected in sample
12/24/97	036833-002 MS	m-Nitrotoluene	155.1	70-130 LCS/DCS met limits No data qualified
↓	↓	Tetryl	38.4	70-130 LCS/DCS bias low "R" code sample
12/24/97	036833-002 MSD	m-Nitrotoluene	206.3	70-130 LCS/DCS met limits No data qualified
"	"	Tetryl	28.3	±20 LCS/DCS bias low "R" code sample
"	"	Tetryl	40.3	70-130 LCS/DCS bias low "R" code sample

Reviewed By: Kevin A Lambert  
 Date: 3/13/98



ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

9.0 LABORATORY CONTROL SAMPLE ANALYSIS

Have laboratory control samples containing a representative number of the compounds of interest been analyzed at the frequency specified in the EPA method or QAPjP?

Yes  No

Evaluate percent recoveries based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

	Date	Compound	%Rec	Control Limits	Action	Samples Affected
LCS	12/29/97 111	2,4-Dinitrotoluene	105.1	24-96	MS/MSD met control limits	
DCS	12/29/97 1209	"	108.4	24-96	No analytes detected in samples	
LCS	12/29/97, 209	2,4-Dimethylphenol	27.3	32-119		
DCS	12/29/97, 705	2,4-Dinitrotoluene	101.7	28-89		✓

Control Limit Reference: \_\_\_\_\_

\* See Attached Page

Evaluate RPD based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

RPD <sup>KAL</sup>

	Date	Compound	%Rec	Control Limits	Action	Samples Affected
DCS	12/29/97 1209	Benzidine	102.3	± 50	MS/MSD met control limits	
DCS	12/29/97, 002	Nitrobenzene	24.6	± 20	No analytes detected in samples	
		o-Nitrotoluene	31.7	± 20		
		p-Nitrotoluene	23.7 <sub>KAL</sub>	23.5 ± 20		✓

Control Limit Reference: \_\_\_\_\_

Reviewed By: \_\_\_\_\_  
 Date: \_\_\_\_\_

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

10.0 INTERNAL STANDARDS EVALUATION *Not Reported*

List below the internal standard areas of samples or blanks which did not meet criteria.

Date	Sample ID	Internal Out	Acceptable Range	Action

Are retention times of the internal standards within 30 seconds of the associated calibration standard?  
Yes  No

11.0 TARGET COMPOUND LIST ANALYTES  
11.1 GC/MS Analyses *Not Reported*

Are the reconstructed ion chromatograms, the mass spectra for the identified compounds, and the data system printouts included? Yes  No

Is chromatographic performance acceptable with respect to:

Baseline stability? Yes  No

Resolution? Yes  No

Peak shape? Yes  No

Full-scale graph (attenuation)? Yes  No

Reviewed By: Kevin A Lambert  
Date: 3/13/98



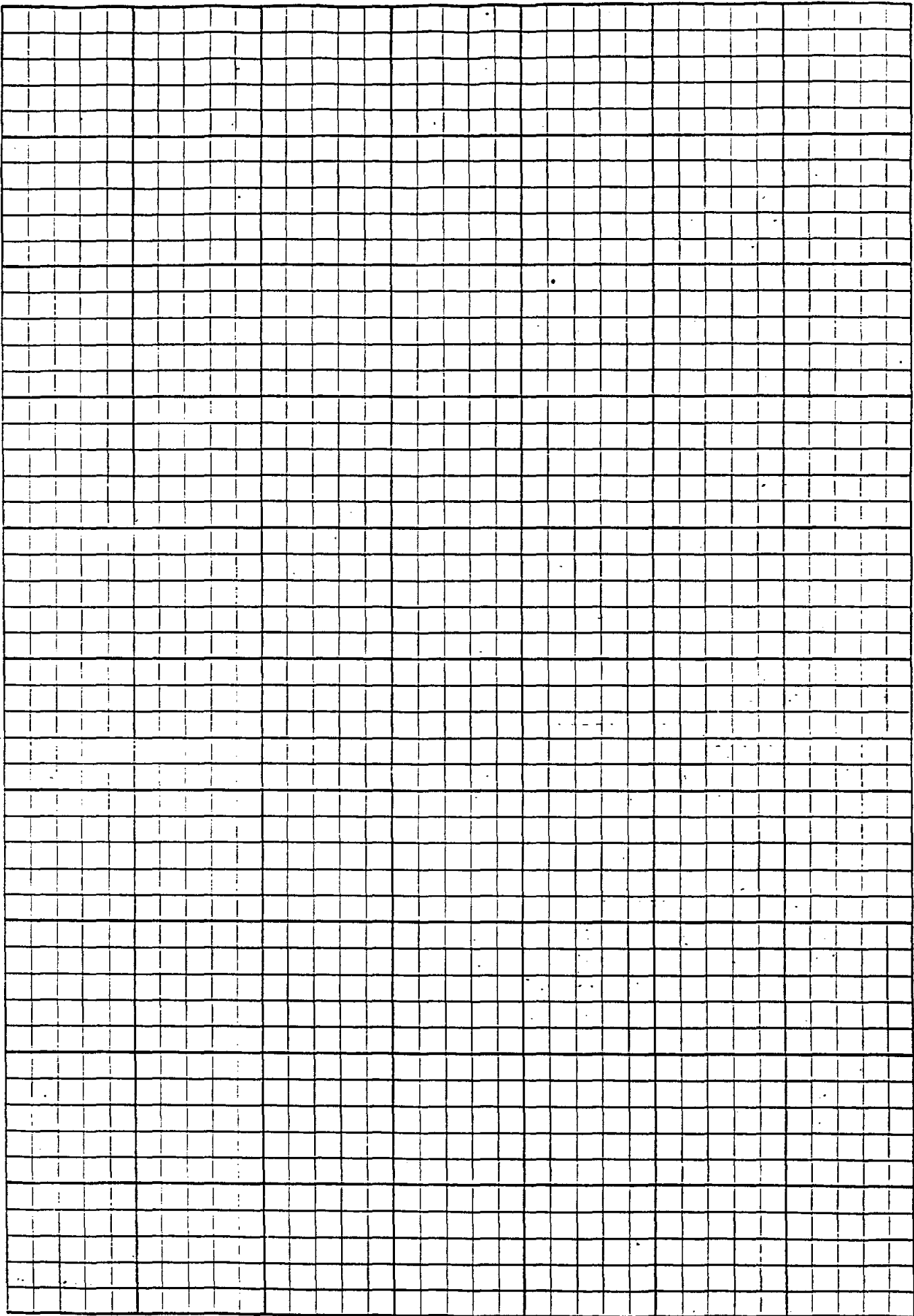
\*  
9.0 LCS Analysis

LCS	12/23/97	2350	Tetryl	56.8	70-130
DCS	12/24/97	0026	2,6 Dinitrotoluene	67.4	70-130
			Nitrobenzene	56.4	
			1,3-Dinitrobenzene	66.7	
			o-Nitrotoluene	59.0	
			m-Nitrotoluene	65.4	
			p-Nitrotoluene	67.2	
			Tetryl	64.2	

MS/MSD bias low All samples coded "R"  
LCS, MS/MSD met control limits  
No analytes were detected in the samples  
No data qualified

MS/MSD bias low All samples coded "R"

Kenneth J. ...  
3/13/98



ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

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Other: \_\_\_\_\_

Is the RRT of each reported compound within the limits given in the method of the standard RRT in the continuing calibration? Yes  No

Are all the ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the mass spectrum? Yes  No

Do sample and standard relative intensities agree within 20%? Yes  No

If no for any of the above, indicate below problems and qualifications made to data:

11.2 GC Analyses

Are there any transcription/calculation errors between the raw data and the reporting forms?

Yes  No

If yes, review errors and necessary corrections below; if errors are large, resubmittal of laboratory package may be necessary.

Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analysis? Yes  No

Was GC/MS confirmation performed when required by the EPA method? Yes  No

If no for any of the above, reject positive results except for retention time windows if associated standard compounds are similarly shifted.

Reviewed By: *Kevin A. Lambert*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Check chromatograms for false negatives, especially for the multiple peak components (toxaphene and PCBs). If false negatives are apparent and the appropriate PCB standards were not analyzed, or if confirmed analysis was not present, flag the affected data.

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

NOTE: Due to the complexities of PCB pesticide analysis, each analytical run should be reviewed to verify identification and column performance.

12.0 FIELD DUPLICATE ANALYSIS

Were field duplicates submitted for analysis? Yes  No

If yes, calculate RPD and use professional judgment to determine if the data needs to be qualified. List results below.

Date	Sample ID	Compound	Sample Result	Duplicate Result	RPD	Affected Samples

*Met criteria*

13.0 COMPOUND QUANTITATION/REPORTED DETECTION LIMITS

Are there any transcription/calculation errors from raw data to reported results (check at least 10% of positive results)? Yes  No

In addition, verify that the correct internal standard, quantitation ion, and RRF were used to calculate the result for a minimum of 10% of sample data.

Reviewed By: Kevin A Lambert  
 Date: 3/13/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

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13.1 Chromatogram Quality

*Not Assessed*

Were baselines stable? Yes  No

Were any negative peaks or unusual peaks present? Yes  No

Were early eluting peaks resolved to baseline? Yes  No

If incorrect quantitations are evident, note corrections necessary below:

Are the required quantitation limits (detection limits) adjusted to reflect sample dilutions and for soils, sample moisture? Yes  No

If no, make necessary corrections and note below.

14.0 TENTATIVELY IDENTIFIED COMPOUNDS

*Not Reported*

Are Tentatively Identified Compounds (TIC) properly identified with scan number or retention time, estimated concentration, and J qualifier? Yes  No

Are the mass spectra for TICs and associated "best match" spectra included? Yes  No

Are any TCL compounds listed as TIC compounds? Yes  No

Are each of the ions present in the reference mass spectra with a relative intensity greater than 10% also present in the sample mass spectrum? Yes  No

Reviewed By:

*Kevin A Lambert*

Date:

*3/13/98*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

Do TIC and "best match" standard relative ion intensities agree within 20%? Yes  No

Comments \_\_\_\_\_  
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Reviewed By: Kevin A. Lambert

Date: 3/13/98

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_

\*Data package must be approved by Project/Task Leader.



List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A-J))
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a method or reagent blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available. see TOP 94-03. Notify Tina Sanchez to revise list.

COPY

Site: 57A

AR/COC: 510216

Data Classification: Inorganic

Sample Fraction No.	Analysis	DV Qualifiers	Comments
CCTA-57A-GR-027-C	(CALCIUM) 7440-70-2	J	
-028-C	↓	↓	
-028-C-DU			
-029-C			
-030-C			
<del>-031-C</del> <sup>KAL</sup>			
-031-C			
CCTA-57A-GR-060-0-0.5-S	(LEAD) 7439-92-1	J	
061-0-0.5-S	(SILVER) 7440-22-4	↓	
062-0-0.5-S	↓	↓	
062-0-0.5-DU			
063-0-0.5-S			
065-0-0.5-S			
066-0-0.5-S			
067-0-0.5-S			
068-0-0.5-S			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470-1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Kevin A. Lambert Date: 3/12/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

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SITE OR PROJECT: Site 57A  
 ANALYTICAL LABORATORY CORE  
 LABORATORY REPORT # 973540  
 TASK LEADER ARCOC# 510216  
 NO. OF SAMPLES 20; 19 soil, 1 water

CASE NO. 7215.2203  
 SAMPLE IDS 036825-002 to  
036844-002, 036845-005

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	/	/	/	NA
2. CALIBRATIONS	/	/	/	
3. BLANKS	/	/	/	
4. ICS	/			
5. LCS	/	/		
6. DUPLICATE ANALYSIS	J	J	/	
7. MATRIX SPIKE	/	/	/	
8. MSA	-	NA		
9. SERIAL DILUTION	/			
10. SAMPLE VERIFICATION	J	/	/	
11. OTHER QC	/	/	/	
12. OVERALL ASSESSMENT	/	/	/	

✓ (check mark) — Acceptable  
 Other — Qualified:

J - Estimate  
 UJ - Undetected, estimated  
 R - Unusable (analyte may or may not be present)

NA - Not Applicable

ACTION ITEMS: Batch QC KHL 4/2/98

AREAS OF CONCERN: Batch Complete QC Summary Report not provided  
Have requested laboratories to provide entire report in  
future Current QC measures are adequate. Data is qualified

REVIEWED BY: Kim A Lambert

DATE REVIEWED: 3/12/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

ACTION ITEMS:

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AREAS OF CONCERN: due to field duplicate pairs showing poor precision (RPD) for calcium (ICAP), and lead and silver (GFAA).  
The first LCS/LCSD pair for ICAP metals exhibited poor precision (RPD). However a second LCS/LCSD pair was run and RPDs met control limits. No data was qualified.  
The 90 REC for lead by GFAA in an LCSD was high but the 90 REC in LCS met control limits, No data qualified.

Minor blank contamination was exhibited in EB but all sample results > 5X blank concentration. No data qualified.

OVERALL DATA QUALITY ASSESSMENT <sup>KAC</sup> Several analytes were detected at estimated values in method blanks. Sample results were generally non-detects or > 5X the blank concentration.

Data is acceptable. QC measures are adequate.

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Reviewed By: Kevin A Lambert Date: 3/12/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

**1.0 HOLDING TIMES**

List holding time criteria used to evaluate samples, indicating which samples exceed the holding time. Holding time begins with validated time of sample collection.

Parameter	Holding Time Criteria	Sample ID	Days Holding Time was Exceeded	Action
<i>Met criteria SEE CVR FORM</i>				

Were the correct preservatives used? Yes  No

List below samples that were incorrectly preserved.

Sample No.	Type of Samples	Deficiency	Action
<i>Met criteria SEE CVR FORM</i>			

Reviewed By: Kevin A Lambert Date: 3/12/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

2.0 INSTRUMENT CALIBRATION

2.1 Percent Recovery Criteria

*Not Reported*

Indicate %Recovery (%R) criteria used to evaluate calibration standards:

Metals: \_\_\_\_\_  
Mercury: \_\_\_\_\_  
Cyanide: \_\_\_\_\_  
Other: \_\_\_\_\_

List below the analytes which did not meet %R criteria for initial and continuing calibration standards:

Analysis Date	ICV/CCV #	Analyte	%R	Action	Samples Affected

2.2 Analytical Sequence

Did the laboratory use the proper number of standards for calibration as described in the EPA method? Yes  No

Have initial calibrations been performed at the beginning of each analysis and at the frequency indicated by the EPA method? Yes  No

Have continuing calibration standards been analyzed at the beginning of sample analysis and at a minimum frequency indicated by the EPA method and at the end of the analysis sequence? Yes  No

If no for any of the above, outline deviations and actions taken below:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: *Kevin A Lambert* Date: *3/12/98*

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

Were the correlation coefficients for the calibration curves for AA, Hg, CN, and other spectrophotometric methods  $\geq 0.995$ ? (Check calculations performed for calibration curves.) Yes  No

If no, list: \_\_\_\_\_

*Not Reported*

Date	Analyte	Coefficient	Action	Samples Affected

Check for transcription and calculation errors involving calibration summary forms and raw data. Briefly summarize errors and associated actions when data quality might have been affected.

**3.0 BLANK ANALYSIS**

**3.1 Initial and Continuing Calibration Blanks**

Have Initial and Continuing Calibration Blanks (ICB/CCB) been analyzed at the frequency required in the EPA method? Yes  No

If no, summarize problems and resolutions in the narrative report.

List analytes detected in ICB and CCBs below:

NOTE: For soil samples, convert blank values to mg/kg using digestion weights and volumes.

Analysis Date	ICB/CCB No.	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected

Reviewed By: Kevin A. Lambert Date: 3/12/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

3.2 Method Blank

Was one method blank analyzed for:

- Each of 20 samples? Yes  No
- Each digestion batch? Yes  No
- Each matrix type? Yes  No
- Both AA and ICP when both are used for the same analyte? Yes  No
- or
- At the frequency indicated in the EPA method or OAPJP? Yes  No

NOTE: Method blank is the same as the calibration blank for mercury and for wet chemistry analysis.

List analytes detected in method blank samples below. NOTE: For soil samples, be sure to calculate blank values using digestion weights and volumes.

Preparation Date	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>No target analytes were detected above required detection limits</i>					

Is concentration in the method blank below the detection limit? Yes  No

Affected samples: Several analytes were "J" coded in method blanks below RDL. However, sample results were NON-detects or > 5x the blank concentration. No data qualified

Reviewed By: Karin A Lambert Date: 3/12/98



**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

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**3.3 Field/Rinse/Equipment Blanks**

Was a field/equipment blank analyzed as required by the EPA method or QAPjP? Yes  No

List below analytes detected in the field blanks. NOTE: For soil samples, calculate blank values using digestion weights and volumes.

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Collection Date	Blank ID	Analyte	Conc. <sup>mg/l</sup>	Required Detection Limits <sup>mg/l</sup>	Action Level	Samples Affected
12/15/97	ETA-574 GR-000-89	ALUMINUM	0.19	0.05		No data qualified
"	"	IRON	0.104	0.03		Sample results are > 5x the blank concentration
"	"	MAGNESIUM	0.279	0.1		
"	"	ZINC	0.010	0.01		

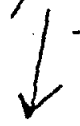
**4.0 ICP INTERFERENCE CHECK SAMPLE ANALYSIS**

Was an ICP interference check sample (ICS) analyzed at the beginning and end of a run or at least twice every 8 hours? (Not required for Ca, Mg, K, and Na) Yes  No

Samples affected: \_\_\_\_\_

Are the values of the ICS for solution AB within 80-120%R? Yes  No  *Not Reported*

If no, is the concentration of Al, Ca, Fe, or Mg lower than in ICS? Yes  No



Reviewed By: Keri A Lambert Date: 3/12/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

If no, list below all analytes which did not meet %R criteria and in which the concentration of Al, Ca, Fe, or Mg is higher than in the ICS:

Date	Analyte	%R	Action	Samples Affected
<i>Not Reported</i>				

Are any results > IDL for those analytes which are not present in the ICS solution A? Yes  No

If yes, results >2 (absolute value of the IDL) indicate either a positive or negative interference and must be qualified.

Samples affected: *Not Reported*

Check for transcription/calculation errors: Briefly summarize errors and associated actions when data quality might have been affected. —

5.0 LABORATORY CONTROL SAMPLES (LCS)

Was an LCS analyzed at required frequency? Yes  No

Samples affected: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: *Karin A Lambert* Date: *3/12/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

List below any LCS recoveries not within limits.

Preparation Date	Analyte	%R	Action	Samples Affected
1/9/98	Lead	131.9	<del>73.4</del> 73.4-127.2	LCS met control limit no data qualified

ch# 30104  
 LCSD

6.0 LABORATORY DUPLICATE ANALYSIS

Were laboratory duplicates analyzed at required frequency? Yes  No

Samples affected: \_\_\_\_\_

Was laboratory duplicate analysis performed on field or equipment blanks? Yes  No

Samples affected: \_\_\_\_\_

Is any value for sample duplicate pair <PQL and the other value >10xPQL? Yes  No

Samples affected: \_\_\_\_\_

Reviewed By: Kevin A Lambert Date: 3/12/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

List below concentrations of any analyte that did not meet criteria for duplicate precision:

Sample ID	Matrix	Preparation Date	Analyte	PQL	RPD	Action	Samples Affected
AP 29971	soil	1/6/98	Barium		20.2	±20%	No data qualified within sampling error
ICAP 29971	soil	1/6/98	Beryllium		21.3		
"	"	"	Cadmium		24.8		Second LCS/LCSD pair met control limits
"	"	"	Chromium		20.4		
"	"	"	Cobalt		22.9		No data qualified
"	"	"	Zinc		26.3		
"	"	"	Lead		23.4		
GFAA 30104	"	1/9/98	Lead		21.1		

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected. *KAL*

7.0 FIELD DUPLICATE SAMPLE ANALYSIS

Were field duplicates collected at the frequency indicated in the EPA method or QAPJP?

Yes  No

If yes, quality data associated only with the field duplicate pair. Calculate RPDs for each analyte in which both values are greater than the IDL.

Is any value for sample duplicate < practical quantitation limit (PQL) and other value >10xPQL? Yes  No

Reviewed By: Kevin A Lambert Date: 3/12/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

List below the analytes that do not meet RPD or PQL criteria. Use the same criteria as those used for laboratory duplicate analysis or criteria specified in EPA method or sampling plan.

Sample ID	Matrix	Collection Date	RPD	Control Limit	Action	Samples Affected
036826-002 036827-002	Soil	12/15/97	42%	±35%	Calcium "J"	Coded all samples associated w/ duplicate pair
036838-002 036839-002	Soil	12/15/97	44%	±35%	Lead "J"	
"	"	"	46%	"	Silver "J"	Coded all samples associated w/ duplicate pair

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**8.0 MATRIX SPIKE ANALYSIS**

NOTE: This matrix spike is a predigestion/predistillation spike.

Was a matrix spike prepared and analyzed at the required frequency? Yes  No

Reviewed By: Kevin A Lambert Date: 3/12/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

Were matrix spikes performed at the concentrations specified by the EPA method? Yes  No

Samples affected: \_\_\_\_\_

\_\_\_\_\_

Was matrix spike analysis performed on field or equipment blanks? Yes  No

If equipment or field blanks are the only aqueous samples, matrix spike analysis may be performed; however, matrix spike samples must be present for the other matrices.

Samples affected: \_\_\_\_\_

\_\_\_\_\_

List below the % recoveries for analytes that did not meet the criteria:

Sample ID	Matrix	Preparation Date	Analyte	%R	Action	Samples Affected

*Met Criteria*

Check for transcription/calculation errors. Also check to ensure matrix spike concentrations are not affected by sample dilutions performed. If matrix spike concentrations are diluted below or close to IDL based on sample dilutions performed, use professional judgment in qualifying data. Ensure that the laboratory performed sample dilutions only when necessary as indicated by QA/QC requirements. Briefly summarize errors and associated actions when data quality might have been affected.

Reviewed By: *Kevin A Lambert* Date: *3/12/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

NOTE: If preparation blank spikes are analyzed, evaluate recoveries. These recoveries can indicate whether excursions in matrix spike recovery are caused by sample matrix effects or poor digestion efficiencies and/or problems with matrix spike solution. For example, if matrix spike recovery for selenium is 0% and preparation blank spike recovery for selenium is 92%, this may indicate sample matrix effects.

9.0 FURNACE ATOMIC ABSORPTION ANALYSIS

*Not Reported*

Were duplicate injections present for each sample, including required QC analyses (not required if MSA is done)? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Were postdigestion spikes analyzed for samples, including QC samples? Yes  No

Were postdigestion spikes analyzed at the required concentration? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Was a dilution analyzed for samples with postdigestion spike recovery <40%? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

MSA Analysis (Method of Standard Additions)—MSA is required when serial dilutions are not within  $\pm 10\%$ . Was MSA required for any sample but not performed? Yes  No

Are MSA calculations outside the linear range of the calibration curve? Yes  No

Reviewed By: *Ken A Lambert* Date: *3/12/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

NOTE: Ensure the spiking concentrations used for MSA analysis were at 80-100% and 150% of sample concentration or absorbance.

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10.0 SERIAL DILUTION ANALYSIS

*Not Reported*

NOTE: Serial dilution analysis (ICP) is required only for initial concentrations equal to or greater than 10xIDL.

If applicable, was a serial dilution performed for:

Each 20 samples? Yes  No

Each matrix type? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_

List below results which did not meet criteria of %D  $\leq$  10% for analyte concentrations greater than 50xIDL before dilution:

Analysis Date	Sample ID	Analyte	IDL	%D	Action	Samples Affected

Check for calculation errors and negative interferences.

Reviewed By: *Kevin A Lambert* Date: *3/12/98*



INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

Page 15 of 16

11.0 SAMPLE RESULT VERIFICATION

11.1 Verification of Instrumental Parameters

Are instrument detection limits present and verified on a quarterly basis? Yes  No  *Not Reported*

Are IDLs present for each analyte and each instrument used? Yes  No

Is the IDL greater than the required detection limits for any analyte? Yes  No   
(If IDL > required detection limits, flag values less than 5xIDL.)

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are ICP Interelement Correction Factors established and verified annually? Yes  No  *Not Reported*

Are ICP Linear Ranges established and verified quarterly? Yes  No  *Not Reported*

If no for any of the above, review problems and resolutions in narrative report. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11.2 Reporting Requirements

Were sample results reported down to the PQL? Yes  No

If no, indicate necessary corrections. \_\_\_\_\_  
\_\_\_\_\_

Were sample results that were analyzed by ICP for Se, Tl, As, or Pb at least 5xIDL? Yes  No

Were sample weights, volumes, and dilutions taken into account when reporting sample results and detection limits? Yes  No  *Not Reported*

Reviewed By: *Kevin A. Lambert* Date: *3/12/98*



List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A-J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998

Sample Fraction No.	Analysis	DV Qualifiers	Comments
CCTA-57A-GR-000-EB	479-45-8 (Tetryl)	R	The data are unusable for intended purpose
CCTA-57A-GR-037-0-0.5-S	49-35-4 (1,3,5-trinitrobenzene)	R	(Analyte may or may not be present)
-037-0.5-1.0-S	479-45-8 (Tetryl)		
-038-0-0.5-S			
-038-0.5-1.0-S			
-039-0-0.5-S			
-039-0.5-1.0-S			
-039-0.5-1.0-DU			
-040-0-0.5-S			
-040-0.5-1.0-S			
-041-0-0.5-S			
-041-0.5-1.0-S			
-042-0-0.5-S			
-042-0.5-1.0-S			
-043-0-0.5-S			
-043-0.5-1.0-S			
-044-0-0.5-S			
-044-0.5-1.0-S			
-045-0-0.5-S			
-045-0.5-1.0-S			
-046-0-0.5-S			
-046-0.5-1.0-S			
-045-0.5-1.0-DU			
-047-0-0.5-S			
-047-0.5-1.0-S			
-048-0-0.5-S			
-048-0.5-1.0-S			
-050-0-0.5-S			
-050-0.5-1.0-S			
-051-0-0.5-S			
-052-0-0.5-S			
-053-0-0.5-S			
-054-0-0.5-S			

SEE NEXT PAGE

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, EPAS015B, EPAS081, EPAS260, EPA8260-M3, EPAS270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by:

Kevin A. Lambert

Date:

5/21/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998

AR/COC: 510218Data Classification: Organics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
CCTA-57A-GR-055-0-0.5-5 -056-0-0.5-5	CONTINUED FROM PREVIOUS PAGE		
-057-0-0.5-5			
-058-0-0.5-5			
Data is acceptable			
QC measures are adequate			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470-1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Kevin A LambertDate: 5/21/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

SITE OR PROJECT Site 57A  
 ANALYTICAL LABORATORY CORE  
 LABORATORY REPORT # 973575  
 CASE NO. 7215.2203

SAMPLE IDS 34 soil, 2 aqueous (EB)  
 NO. OF SAMPLES 036789-002 to  
036823-002, 036824-007 &  
036824-008

ARCO# 510218

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	FEST/PCB	<del>HE OTHER</del> <i>NA 5/19/98</i>
1. HOLDING TIMES/PRESERVATION	NA	✓	NA	✓
2. GC/MS INST. PERFORM.		✓		✓
3. CALIBRATIONS/WINDOWS		✓		✓
4. BLANKS		✓		✓
5. SURROGATES		✓		✓
6. MATRIX SPIKE/DUP		✓		✓
7. LABORATORY CONTROL SAMPLES		✓		R
8. INTERNAL STANDARDS		✓		✓
9. COMPOUND IDENTIFICATION		✓		✓
10. SYSTEM PERFORMANCE		✓		✓
11. OVERALL ASSESSMENT	↓	✓	↓	✓

✓ (check mark) — Acceptable: Data had no problems or qualified due to minor problems

N - Data qualified due to major problems

X - Problems, but do not affect data

Qualifiers: J - Estimate

UJ - Undetected, estimated

NA - Not Applicable

R - Unusable (Analyte may or may not be present)

*NA 5/21/98*

ACTION ITEMS: *(1) All samples were prepared and analyzed with specified methods and accepted procedures.*  
*(2) SVOC Analysis: Calibration met acceptance criteria.*

*NA 5/21/98*

AREAS OF CONCERN: *No target analytes were detected above the PQL in the MBE. The EB had ~~three~~ analytes detected (bis(2-ethylhexyl)phthalate, & diethyl phthalate & HPAH) below the PQL (i.e. "J" values). No data is*

Reviewed By: *Kevin A. Lambert*  
 Date: *5/21/98*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

PROJECT/TASK LEADER: \_\_\_\_\_

KAC 5/21/98

ACTION ITEMS:

qualified since sample results were non-detects or below the PQL ("J" values). Surrogate recoveries & internal standards met acceptance criteria. The MS/MSD for all 5 VOC batches met acceptance criteria. The LCS/LCSD for the 5 VOC batches met acceptance criteria except 2 compounds in soil batches and 1 compound in aqueous batch. The % REC was slightly high for the compounds and sample results were non-detects. No data is qualified. No target analytes were detected in the field duplicate pairs. No data is qualified.  
(3) HE Analysis: Calibration met acceptance criteria.

KAC 5/21/98

AREAS OF CONCERN:

No target analytes were detected above the PQL in the MB. HMX was observed at estimated value ("J" value) in the EB. Sample results were non-detects or below the PQL ("J" values). No data is qualified. Surrogate recoveries met acceptance criteria. The MS/MSD met acceptance criteria except for % REC of MS/MSD for 2,6-DNT and the % REC + RPD of the MSD for 2,4-DNT. The LCS/LCSD met acceptance criteria for 2,6-DNT and sample results were non-detects or below the PQL ("J" value). No data is qualified. The MS met acceptance criteria for 2,4-DNT and sample results were non-detects or below PQL except for two samples. Since the MSD % REC + RPD are biased high, 2,4-DNT will not be qualified in field samples. The LCS/LCSD met acceptance criteria except for 7 compounds in the EB and 5 compounds in the field samples. Only 1 of

KAC 5/21/98

OVERALL DATA QUALITY ASSESSMENT

of the 7 compounds (Tetryl) had % REC outside control limits (low) for the LCS/LCSD pair. Sample results were non-detects; however they will be qualified "R". The remaining 6 compounds will not be qualified since the LCS met acceptance criteria. Two of the 5 compounds (1,3,5-TNB & Tetryl) had % REC outside control limits (low) for an LCS/LCSD pair. Sample results were non-detects; however they will be qualified "R". The remaining 3 compounds will not be qualified since either the LCS or LCSD met acceptance criteria. No target analytes were detected in the field duplicate pair.

(4) Data is acceptable.  
QC measures are adequate

Reviewed By:

Kevin A. Lambert

Date:

5/21/98



**ORGANIC DATA ASSESSMENT SUMMARY FORM**  
(Data Verification/Validation Level 3 DV-3)

**1.0 HOLDING TIMES AND PRESERVATION**

Indicate the holding time criteria below that was used to evaluate the samples.

SW-846, 3rd. ed.

Other: \_\_\_\_\_

List below samples that were over holding time criteria.

Sample ID	VTSR	Date Analyzed	Action

*See CVP  
Form*

NOTE: VTSR = Validated time of sample receipt.

Were the correct preservatives used? Yes  No

List below samples that were incorrectly preserved.

Sample No.	Type of Sample	Deficiency	Action

Reviewed By: *Kevin A. Lambert* 5/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

2.0 GC/MS TUNING CRITERIA

Has a GC/MS tuning performance been analyzed for every twelve hours of sample analysis for each GC/MS instrument used? Yes  No

Was the correct standard (listed in the EPA Method) used? Yes  No

Have the ion abundance criteria been met for each tune? Yes  No

NOTE: GC/MS abundance criteria is specified by EPA method for GC/MS analysis (EPA 8240A or 8270A).

If no for any of the above, list all the data associated with the tune that either failed criteria or in which there was no tune.

Date/Time	Problem	Sample Affected (Action)
	<i>Met</i>	
	<i>Criteria</i>	

Check for transcription/calculation errors. If errors are present, briefly summarize necessary changes:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Is the spectra of the mass calibration acceptable? Yes  No

Reviewed By: Kevin A Lambert  
Date: 5/21/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

3.0 GC INSTRUMENT PERFORMANCE.

3.1 DDT Retention Time

*Not Applicable*

Is DDT retention time for packed columns >12 minutes (except for OV-1 and OV-101)?

Yes  No

If no, list below the DDT standards that failed criteria: \_\_\_\_\_

Affected samples and compounds: \_\_\_\_\_

3.2 Retention Time Windows

List below compounds that were not within the retention time windows.

Date/Time	Compound	RT	RT Window	Action	Affected Samples

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

3.3 DDT and Endrin Degradation

*Not Applicable*

List below the standards that have a DDT or Endrin breakdown of >20% (or a combined breakdown of >20%).

Date/Time	Standard ID	DDT/Endrin	% Breakdown	Action	Affected Samples

3.4 DBC Retention Time Check

Is the %D between EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% capillary ID <0.32 mm, and 1% for megabore)?

Yes  No

Date	Sample ID	DBC %D	Action

For the above criteria outlined in Sections 8.1-8.4, check for transcription/calculation errors.

If errors are found, list below with necessary corrections: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewed By: *Karin A Lambert*  
 Date: *7/10/94*

**ORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3 DV-3)

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**4.0 INITIAL CALIBRATION**

Has initial calibration been performed as required in the EPA method? Yes  No

Were the correct number of standards used to calibrate the instrument? Yes  No

For GC analyses of PCBs and Pesticides, did the laboratory follow the correct 72-hour sequence of analysis?  
 Yes  No  *Not Applicable*

List below compounds which did not meet initial calibration criteria outlined by the EPA method.

Instrument ID	Date	Compound	RP%RSD	Action	Samples Affected

*Met criteria*

Check for transcription/calculation errors. If errors are present, summarize necessary corrections below:

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Reviewed By: *Kevin A. Lambert*  
 Date: *5/21/98*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

5.0 CONTINUING CALIBRATION

Have continuing calibration standards been analyzed at the frequency specified in the EPA method?

Yes  No

List below all compounds which did not meet continuing calibration requirements.

Instrument ID	Date	Compound	RPD	Action	Samples Analyzed
<i>Met Criteria</i>					

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

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Reviewed By: *Kevin A. Lambert*  
Date: *5/21/98*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

6.0 BLANK ANALYSES

6.1 Method/Reagent and Instrument Blanks

Has a method/reagent blank been analyzed for each set of samples or for every 20 samples of similar matrix, whichever is more frequent? Yes  No

Has an instrument blank been analyzed at least once every twelve hours for each GC/MS system used? Yes  No

6.2 Field Rinse Equipment Blanks

Are there field rinse equipment blanks associated with each sampling day or a frequency specified in the sampling plan. Yes  No

List below compounds for which analyses were requested that were detected in any of the blanks analyzed:

Date	Blank ID	Compound	Conc. <del>ug/kg</del>	PQL <del>ug/kg</del>	Action Level	Samples Affected (Action)
1/2/98	MB4137	Bis(2-ethylhexyl) phthalate	1.7 <del>ug/kg</del>	330 <del>ug/kg</del>	5/9/98 10ug/kg	Sample results were non-detect or below the PQL ("M" values). No data is qualified. MB
12/30/97	036824-007	↓	2.3 <del>ug/l</del>	10 <del>ug/l</del>	↓	↓
↓	↓	Diethyl phthalate	2.5 <del>ug/l</del>	10 <del>ug/l</del>	↓	↓
12/24/97	036824-008	HMX	0.3 <del>ug/l</del>	0.5 <del>ug/l</del>	↓	↓

PQL = Practical Quantitation Limit from EPA Method.

Reviewed By: Kevin A. Lambert

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

Are there any TICs present in the blanks that are also present in the samples? Yes  No

If yes, list below.

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7.0 SURROGATE RECOVERY

Were surrogate recoveries evaluated for each of the samples analyzed by GC or GC/MS?

Yes  No

If surrogate standards other than those presented by SW-846 are used, list below with reference to applicable control limits used to evaluate the percent recoveries.

Surrogate Compound

Control Limits

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List below the percent recoveries which did not meet either SW-846 criteria or criteria listed above.

Date	Sample ID/Matrix	Surrogate Compound	% Rec.	Action

*Met  
criteria*

Reviewed By: Kevin A. Lambert  
Date: 5/19/98



ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

If surrogate recovery was outside of control limits, were the samples or method blank reanalyzed?

Yes  No  *Not Applicable*

Are method blank surrogate recoveries outside of limits upon reanalysis? Yes  No  *Not Applicable*

Are transcription/calculation errors present? Yes  No

if yes, note necessary corrections. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: *Kevin A. Lambert*  
Date: *5/10/00*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

8.0 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSIS

Were MS/MSDs analyzed at the frequency required by the EPA method or OAPJP for each matrix type?

Yes  No

List below % recoveries and RPDs of compounds which did not meet criteria. Indicate on chart criteria used to evaluate recoveries and RPDs.

atch #  
 0127 MS  
 ↓  
 MSD  
 ↓

Date	Sample ID:Matrix	Compound	%Rec	RPD	Action
1/8/98 1056	CCTA-37A-GR- 039-0.5-1.0-DU soil	2,6-Dinitrotoluene	12	70-130	LCS/MSD met acceptance criteria. Sample results were non-detects or below the PQL ("J" value) except for two samples where 2,4-DNT was detected above the PQL. The MS met criteria and the MSD %REC + RPD are high, therefore these samples will not be qualified.
4/8/98 1244	↓	↓	139 168	70-130 ±20	
↓	↓	2,4-Dinitrotoluene	505 124	70-130 ±20	

Reviewed By: Kevin J. Lambert  
 Date: 5/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

9.0 LABORATORY CONTROL SAMPLE ANALYSIS

Have laboratory control samples containing a representative number of the compounds of interest been analyzed at the frequency specified in the EPA method or CAFJP?

Yes  No

Evaluate percent recoveries based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

Date	Compound	%Rec	Control Limits	Action	Samples Affected
12/30/97 1116	2,4-DNT	107	24-96		Sample results were non-detects and %REC is > the upper limit
↓ 12/13	↓	107	24-96		No data is qualified
11/2/98 1831	Pentachlorophenol	113	17-109		The LCS met acceptance criteria. Sample results were non-detects. No data is qualified.
12/23/97 2350	Tetryl	57	70-130		Sample results is non-detect and %REC < the lower limit.
12/24/97 0026	Tetryl	64	70-130		Data will be qualified "R".

Control Limit Reference: \_\_\_\_\_

Evaluate RPD based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

Date	Compound	%Rec	Control Limits	Action	Samples Affected
12/24/97 0026	2,6-DNT	67	70-130		The LCS met acceptance criteria. No data is qualified.
	Nitrobenzene	57 25	70-130 ±20		
	1,3-DNB	67	70-130		
	o-Nitrotoluene	59 32	70-130 ±20		

Control Limit Reference: \_\_\_\_\_

*Kevin A. Lambert*

Reviewed By: 5/21/98  
 Date:

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

10.0 INTERNAL STANDARDS EVALUATION

List below the internal standard areas of samples or blanks which did not meet criteria.

Date	Sample ID	Internal Out	Acceptable Range	Action

*Met criteria*

Are retention times of the internal standards within 30 seconds of the associated calibration standard?  
Yes  No

11.0 TARGET COMPOUND LIST ANALYTES

11.1 GC MS Analyses

Are the reconstructed ion chromatograms, the mass spectra for the identified compounds, and the data system printouts included? Yes  No

Is chromatographic performance acceptable with respect to:

Baseline stability? Yes  No

Resolution? Yes  No

Peak shape? Yes  No

Full-scale graph (attenuation)? Yes  No

Reviewed By: Kevin A. Lambert  
Date: 5/21/98





ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

Samples affected: Not Applicable

Check chromatograms for false negatives, especially for the multiple peak components (toxaphene and PCEs). If false negatives are apparent and the appropriate PCB standards were not analyzed, or if confirmed analysis was not present, flag the affected data.

Samples affected: \_\_\_\_\_

NOTE: Due to the complexities of PCB pesticide analysis, each analytical run should be reviewed to verify identification and column performance.

12.0 FIELD DUPLICATE ANALYSIS

Were field duplicates submitted for analysis? Yes  No

If yes, calculate RPD and use professional judgment to determine if the data needs to be qualified. List results below.

Date	Sample ID	Compound	Sample Result	Duplicate Result	RPD	Affected Samples
<i>No target analytes were detected above PQLs</i>						

13.0 COMPOUND QUANTITATION/REPORTED DETECTION LIMITS

Are there any transcription/calculation errors from raw data to reported results (check at least 10% of positive results)? Yes  No

In addition, verify that the correct internal standard, quantitation ion, and RRF were used to calculate the result for a minimum of 10% of sample data.

Reviewed By: Kurt A. Lambert  
Date: 5/19/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
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Other: \_\_\_\_\_

Is the RRT of each reported compound within the limits given in the method of the standard RRT in the continuing calibration? Yes  No

Are all the ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the mass spectrum? Yes  No

Do sample and standard relative intensities agree within 20%? Yes  No

If no for any of the above, indicate below problems and qualifications made to data:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11.2 GC Analysas

*No Applicable*

Are there any transcription/calculation errors between the raw data and the reporting forms?  
Yes  No

If yes, review errors and necessary corrections below; if errors are large, resubmittal of laboratory package may be necessary.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analysis? Yes  No

Was GC/MS confirmation performed when required by the EPA method? Yes  No

If no for any of the above, reject positive results except for retention time windows if associated standard compounds are similarly shifted.

Reviewed By:

*Kenneth A. Lambert*

Date:

*5/21/07*



ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

13.1 Chromatogram Quality

Were baselines stable? Yes  No

Were any negative peaks or unusual peaks present? Yes  No

Were early eluting peaks resolved to baseline? Yes  No

If incorrect quantizations are evident, note corrections necessary below: \_\_\_\_\_

Are the required quantization limits (detection limits) adjusted to reflect sample dilutions and for soils, sample moisture? Yes  No

If no, make necessary corrections and note below.

14.0 TENTATIVELY IDENTIFIED COMPOUNDS

*Not Applicable*

Are Tentatively Identified Compounds (TIC) properly identified with scan number or retention time, estimated concentration, and J qualifier? Yes  No

Are the mass spectra for TICs and associated "best match" spectra included? Yes  No

Are any TCL compounds listed as TIC compounds? Yes  No

Are each of the ions present in the reference mass spectra with a relative intensity greater than 10% also present in the sample mass spectrum? Yes  No

Reviewed By: Kevin A Lambert

Date: 5/21/98



List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998

Site: Site 57A**COPY**AR/COC: 510218Data Classification: Inorganic

Sample Fraction No.	Analysis	DV Qualifiers	Comments
	<i>No data is qualified</i>		
	<i>Data is acceptable</i>		
	<i>QC measures are adequate except no raw data package is provided</i>		

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470-1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Ken A. Lambert Date: 5/21/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

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SITE OR PROJECT SITE 57A, CCTA CASE NO. 7215.2203  
 ANALYTICAL LABORATORY CORE SAMPLE IDS 036789-002 to  
 LABORATORY REPORT # 973575 036823-002, 036824-005  
~~ARCOC # 510218~~ ARCOC # 510218  
 NO. OF SAMPLES 34 soil, 1 aqueous

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	✓	✓	✓	NA
2. CALIBRATIONS	NR	NR	NR	
3. BLANKS	✓	✓	✓	
4. ICS	NR			
5. LCS	✓	✓		
6. DUPLICATE ANALYSIS	✓	✓	✓	
7. MATRIX SPIKE	✓	✓	✓	
8. MSA		NR		
9. SERIAL DILUTION	NR			
10. SAMPLE VERIFICATION	✓	✓	✓	
11. OTHER QC	✓	✓	✓	
12. OVERALL ASSESSMENT	✓	✓	✓	↓

✓ (check mark) — Acceptable  
 Other — Qualified:

J - Estimate

UJ - Undetected, estimated

R - Unusable (analyte may or may not be present)

NA - Not Applicable

NR - Not Reported

KHL 5/21/98

ACTION ITEMS:

① All samples were prepared and analyzed with specified methods and accepted procedures  
 ② NOTE: 'RAW DATA PACKAGE' REQUESTED ON ARCOG

KHL 5/21/98

AREAS OF CONCERN:

BUT NOT REPORTED. SEEK CORRECTIVE ACTION.

REVIEWED BY: Karin A. Lambert

DATE REVIEWED: 5/21/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

KAL 5/21/98

~~ACTION ITEMS.~~ ③ ICP Analysis: No Calibration data reported. No target analytes were detected above the RL in the MB. LCS/LCSD and MS/MSD met acceptance criteria. No target analytes were detected in field duplicate pair and Eq. Blank.

④ GFAA Analysis: ~~None~~ KAL 5/21/98 No calibration data reported. No target analytes were detected above the RL in the MB. No target analytes were detected in the field duplicate pair and Eq. Blank. LCS/LCSD met acceptance criteria except

KAL 5/21/98 the 90 REC for Pb did not meet upper control limit in LCS. No data qualified since LCSD met acceptance criteria. The field duplicate pair met acceptance criteria except for As RPD. No data is

KAL 5/21/98

~~AREAS OF CONCERN.~~ qualified since the MS/MSD and LCS/LCSD met acceptance criteria. Variability results from soil heterogeneity. The MS/MSD met acceptance criteria except for As in Batch 30297, Se in Batch 30335, and Se in Batch 30336. The LCS/LCSD for these batches met acceptance criteria; therefore No data is qualified. Variability results from soil heterogeneity.

⑤ Mercury Analysis: No calibration data reported. No target analyte detected in MB and Eq. Blank. LCS/LCSD and MS/MSD met acceptance criteria. No target analytes detected in the field duplicate pair. No data is qualified.

KAL 5/21/98

~~OVERALL DATA QUALITY ASSESSMENT~~ ⑥ Data is acceptable

⑦ Q.C. measures are adequate except raw data package is not reported.

Reviewed By: Kenn A Lambert Date: 5/21/98



INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

**NOTE:**

2.0 INSTRUMENT CALIBRATION

*No data reported. The ARCO  
requested Raw data package  
Seek Corrective*

2.1 Percent Recovery Criteria

Indicate %Recovery (%R) criteria used to evaluate calibration standards:

Metals: \_\_\_\_\_  
Mercury: \_\_\_\_\_  
Cyanide: \_\_\_\_\_  
Other: \_\_\_\_\_

List below the analytes which did not meet %R criteria for initial and continuing calibration standards:

Analysis Date	ICV/CCV #	Analyte	%R	Action	Samples Affected

2.2 Analytical Sequence

Did the laboratory use the proper number of standards for calibration as described in the EPA method? Yes  No

Have initial calibrations been performed at the beginning of each analysis and at the frequency indicated by the EPA method? Yes  No

Have continuing calibration standards been analyzed at the beginning of sample analysis and at a minimum frequency indicated by the EPA method and at the end of the analysis sequence? Yes  No

If no for any of the above, outline deviations and actions taken below:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: *Kevin A. Lambert* Date: *5/21/98*



Note:

No data reported. ARCOOC  
requested raw data packages  
Seek corrective

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Were the correlation coefficients for the calibration curves for AA, Hg, CN, and other spectrophotometric methods  $\geq 0.995$ ? (Check calculations performed for calibration curves.) Yes  No

If no, list: \_\_\_\_\_

Date	Analyte	Coefficient	Action	Samples Affected

Check for transcription and calculation errors involving calibration summary forms and raw data. Briefly summarize errors and associated actions when data quality might have been affected.

3.0 BLANK ANALYSIS

3.1 Initial and Continuing Calibration Blanks

Have Initial and Continuing Calibration Blanks (ICB/CCE) been analyzed at the frequency required in the EPA method? Yes  No

If no, summarize problems and resolutions in the narrative report.

List analytes detected in ICB and CCEs below:

NOTE: For soil samples convert blank values to mg/kg using digestion weights and volumes.

Analysis Date	ICB/CCE No.	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected

Reviewed By: Ken A Lambert Date: 5/21/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

3.2 Method Blank

Was one method blank analyzed for:

- Each of 20 samples? Yes  No   
 Each digestion batch? Yes  No   
 Each matrix type? Yes  No   
 Both AA and ICP when both are used for the same analyte? Yes  No   
 or  
 At the frequency indicated in the EPA method or QAPP? Yes  No

NOTE: Method blank is the same as the calibration blank for mercury and for wet chemistry analysis.

List analytes detected in method blank samples below. NOTE: For soil samples, be sure to calculate blank values using digestion weights and volumes.

Preparation Date	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>No target analytes were detected above RL</i>					

Is concentration in the method blank below the detection limit? Yes  No

Affected samples: Barium was detected at estimated value ("5" coded) in batch  
Sample results are >5X the blank concentration.  
No data is qualified

Reviewed By: Kevin A Lambert Date: 5/15/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

**3.3 Field/Rinse/Equipment Blanks**

Was a field/equipment blank analyzed as required by the EPA method or QAPP? Yes  No

List below analytes detected in the field blanks. NOTE: For soil samples, calculate blank values using digestion weights and volumes.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Collection Date	Blank ID	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>No target analytes were detected</i>						

**4.0 ICP INTERFERENCE CHECK SAMPLE ANALYSIS** *NOTE: No data reported. ARCO requested raw data package.*

Was an ICP interference check sample (ICS) analyzed at the beginning and end of a run or at least twice every 8 hours? (Not required for Ca, Mg, K, and Na) Yes  No

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_

Are the values of the ICS for solution AB within 80-120%R? Yes  No

If no, is the concentration of Al, Ca, Fe, or Mg lower than in ICS? Yes  No

Reviewed By: Kevin A Lambert Date: 5/21/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

*No data reported. Seek corrective  
Action*

If no, list below all analytes which did not meet %R criteria and in which the concentration of Al, Ca, Fe, or Mg is higher than in the ICS:

*KK  
5/19/98*

Date	Analyte	%R	Action	Samples Affected

Are any results > IDL for those analytes which are not present in the ICS solution A? Yes  No

If yes, results >2 (absolute value of the IDL) indicate either a positive or negative interference and must be qualified.

Samples affected: \_\_\_\_\_  
\_\_\_\_\_

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

5.0 LABORATORY CONTROL SAMPLES (LCS)

Was an LCS analyzed at required frequency? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: *Kevin A. Lambert* Date: *5/21/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
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List below any LCS recoveries not within limits.

Preparation Date	Analyte	%R	Action	Samples Affected
11/14/99 2313	Lead	133	75-26	LCSB met acceptance limits No data is qualified

*Batal*  
30247

6.0 LABORATORY DUPLICATE ANALYSIS

Were laboratory duplicates analyzed at required frequency? Yes  No

Samples affected: \_\_\_\_\_

Was laboratory duplicate analysis performed on field or equipment blanks? Yes  No  *KAC 5/15/98*

Samples affected: \_\_\_\_\_

Is any value for sample duplicate pair <PQL and the other value >10xPQL? Yes  No

Samples affected: \_\_\_\_\_

Reviewed By: *Kevin A Lambert* Date: *5/15/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

List below concentrations of any analyte that did not meet criteria for duplicate precision:

Sample ID	Matrix	Preparation Date	Analyte	PQL	RPD	Action	Samples Affected

*Met Criteria*

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

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7.0 FIELD DUPLICATE SAMPLE ANALYSIS

Were field duplicates collected at the frequency indicated in the EPA method or QAPP?

Yes  No

If yes, quality data associated only with the field duplicate pair. Calculate RPDs for each analyte in which both values are greater than the IDL.

Is any value for sample duplicate < practical quantitation limit (PQL) and other value > 10xPQL? Yes  No

Reviewed By: Kevin A Lambert Date: 5/15/98



INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

Were matrix spikes performed at the concentrations specified by the EPA method? Yes  No

Samples affected: \_\_\_\_\_

Was matrix spike analysis performed on field or equipment blanks? Yes  No

*Eg. Blank was the only aqueous sample*

If equipment or field blanks are the only aqueous samples, matrix spike analysis may be performed; however, matrix spike samples must be present for the other matrices.

Samples affected: \_\_\_\_\_

List below the % recoveries for analytes that did not meet the criteria:

Sample ID	Matrix	Preparation Date	Analyte	%R	Action	Samples Affected	Batch#
CTA-57A-GR-034-0.5-40-DU	MS Soil	1/15/98 1805	AS	53.2	80-120	LCS/LQSV met acceptance criteria	30297
↓	MSD ↓	↓ 1823	↓	71.8	↓	soil heterogeneity cause of low recovery	↓
↓	MS ↓	1/17/98 1958	Se	65.5	↓	Since LCS/LQSD met control limit	30335
↓	MSD ↓	↓ 2003	↓	64.8	↓	↓	↓
TA-57A-GR-047-0-0.5-S	MS	1/18/98 1415	↓	77.3	↓	No data is qualified	30336
↓	MSD ↓	↓ 1420	↓	76.2	↓	↓	↓

Check for transcription/calculation errors. Also check to ensure matrix spike concentrations are not affected by sample dilutions performed. If matrix spike concentrations are diluted below or close to IDL based on sample dilutions performed, use professional judgment in qualifying data. Ensure that the laboratory performed sample dilutions only when necessary as indicated by QA/QC requirements. Briefly summarize errors and associated actions when data quality might have been affected.

Reviewed By: *Kevin A. Lambert* Date: *5/21/98*



Note: FAA - No data reported  
ARCOC requested raw  
data package. Seek  
Corrective Action

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NOTE: If preparation blank spikes are analyzed, evaluate recoveries. These recoveries can indicate whether excursions in matrix spike recovery are caused by sample matrix effects or poor digestion efficiencies and/or problems with matrix spike solution. For example, if matrix spike recovery for selenium is 0% and preparation blank spike recovery for selenium is 92%, this may indicate sample matrix effects.

9.0 FURNACE ATOMIC ABSORPTION ANALYSIS

Were duplicate injections present for each sample, including required QC analyses (not required if MSA is done)? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Were postdigestion spikes analyzed for samples, including QC samples? Yes  No

Were postdigestion spikes analyzed at the required concentration? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Was a dilution analyzed for samples with postdigestion spike recovery <40%? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

MSA Analysis (Method of Standard Additions)—MSA is required when serial dilutions are not within  $\pm 10\%$ . Was MSA required for any sample but not performed? Yes  No

Are MSA calculations outside the linear range of the calibration curve? Yes  No

Reviewed By: Kim A Lambert Date: 5/21/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

NOTE: Ensure the spiking concentrations used for MSA analysis were at 50-100% and 150% of sample concentration or absorbance.

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10.0 SERIAL DILUTION ANALYSIS

*No data reported. ARLOC requested  
new data package. Seek corrective action.*

NOTE: Serial dilution analysis (ICP) is required only for initial concentrations equal to or greater than 10xIDL.

If applicable, was a serial dilution performed for:

- Each 20 samples? Yes  No   
Each matrix type? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_

List below results which did not meet criteria of %D < 10% for analyte concentrations greater than 50xIDL before dilution:

Analysis Date	Sample ID	Analyte	IDL	%D	Action	Samples Affected

Check for calculation errors and negative interferences.

Reviewed By: Kevin A. Lambert Date: 5/21/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

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11.0 SAMPLE RESULT VERIFICATION

11.1 Verification of Instrumental Parameters

Are instrument detection limits present and verified on a quarterly basis? Yes  No  *Not Applicable*

Are IDLs present for each analyte and each instrument used? Yes  No

Is the IDL greater than the required detection limits for any analyte? Yes  No   
(If IDL > required detection limits, flag values less than 5x(IDL.)

Samples affected: \_\_\_\_\_

Are ICP Inter-element Correction Factors established and verified annually? Yes  No  *Not Applicable*

Are ICP Linear Ranges established and verified quarterly? Yes  No  *Not Applicable*

If no for any of the above, review problems and resolutions in narrative report. \_\_\_\_\_

11.2 Reporting Requirements

Were sample results reported down to the PQL? Yes  No

If no, indicate necessary corrections. \_\_\_\_\_

Were sample results that were analyzed by ICP for Se, Tl, As, or Pb at least 5xIDL? Yes  No

Were sample weights, volumes, and dilutions taken into account when reporting sample results and detection limits? Yes  No  *Not Applicable*

Reviewed By: Kim A Lambert Date: 5/21/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

If no for any of the above, sample results may be inaccurate. Note necessary changes and if errors are present, request resubmittal of laboratory package.

\_\_\_\_\_

\_\_\_\_\_

Were any sample results higher than the linear range of calibration curve and not subsequently reanalyzed at the appropriate dilution? Yes  No  *Not Applicable*

Samples affected: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

11.3 Sample Quantitation

Check a minimum of 10% of positive sample results for transcription calculation errors. Summarize necessary corrections. If errors are large, request resubmittal of laboratory package.

Comments:

*OK Look good*

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_

\*Task/Project Leader is responsible for approval of data set.

Reviewed By: *Kevin A Lambert* Date: *5/19/98*

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998

SITE: STA, CCTA

COPY

AR/COC: 510219

Data Classification: Organics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
CCTA-STA-GR- 000-EB	2691-41-0 (HMX)	R	
↓	121-82-4 (RDX)	↓	
<i>Data is acceptable</i>			
<i>QC measures appear to be adequate</i>			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470.1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Karin A. Lambert Date: 6/2/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tima Sanchez to revise list.

Updated: March 10, 1998

Site: 57A, CCTA

1/2

**COPY**

AR/COC: 510219

Data Classification: INORGANICS

Sample Fraction No.	Analysis	DV Qualifiers	Comments
			See Page 2
			Data is acceptable
			QC data is adequate
			Matrix interference is suspected
			to result in the variability
			observed in the data

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: 5/29/98





INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

Page 1 of 16

SITE OR PROJECT Site 57A, CCTA

CASE NO. 7215.2203

ANALYTICAL LABORATORY CORE

SAMPLE IDS 036855-002, 036856-002,

LABORATORY REPORT # 980371

036857-002, 036858-002, 036859-002,

TASK LEADER ARCOC # 510219

036860-002, 036861-002, 036862-002,

NO. OF SAMPLES 10; 8 soil, 2 aqueous

036863-005 (EB), 036863-008 (EB)

DATA ASSESSMENT SUMMARY

KHL  
5/27/98

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	✓	✓	✓	NA
2. CALIBRATIONS	✓	✓	✓	
3. BLANKS	✓	✓	✓	
4. ICS	✓			
5. LCS	✓ J, P	✓		
6. DUPLICATE ANALYSIS	✓ J, P	✓ J, P	✓	
7. MATRIX SPIKE	✓ J, UJ, A <sup>2</sup>	✓ J, UJ, A <sup>2</sup>	✓	
8. MSA		✓		
9. SERIAL DILUTION	✓			
10. SAMPLE VERIFICATION	✓	✓	✓	
11. OTHER QC	✓	✓	✓	
12. OVERALL ASSESSMENT	✓	✓	✓	↓

✓ (check mark) — Acceptable  
 Other — Qualified:

J - Estimate  
 UJ - Undetected, estimated  
 R - Unusable (analyte may or may not be present)

NA - Not Applicable

KHL 5/26/98  
 ACTION ITEMS: ① All sample were prepared and analyzed with specified methods and accepted procedures

KHL 5/26/98  
 AREAS OF CONCERN: ② SMO requested revision to data package on 4/13/98 to address 3 items (see Activity Report). A revised data package was received 4/21/98 with the appropriate corrections

REVIEWED BY: Kevin A Lambert

DATE REVIEWED: 5/29/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

KAL 5/29/98

ACTION ITEMS

③ Metal Analysis (ICAP & GFAA): Calibration met acceptance criterion. No target analytes were detected above the RL in the MBs, ICB, & CCB. ~~MBs, EBs, KAL 5/29/98~~ Several analytes were observed at estimated values ("J" coded) <sup>in the MBs</sup> however sample results are > 5X blank concentration. No data is qualified. No target analytes were detected above the RL in the EBs except for Al, Ca, & Fe, Zn. The sample results were > 5X the blank concentration, no data is qualified. Several analytes were observed at estimated values ("J" coded), however no data is qualified since sample results are > 5X the blank concentration. The LCS/LCSD met acceptance criterion except for Arsenic 70 REC in LCS, Silver 70 REC in LCSD, and

KAL 5/29/98

AREAS OF CONCERN

Arsenic, Barium, Antimony, Thallium, & Silver RPDs <sup>KAL 5/29/98</sup> Sample results are qualified "J" due to poor precision associated with LCS/LCSD. The MS/MSD 70 REC for several analytes were outside acceptance criterion. These analytes (Ba, Be, Ce, Ag, Cd, Sb, Cu, Fe, Mn, Ni, V, Ca, Mg, K, Na, + Zn) will be qualified accordingly based on sample results (positives - "J", estimated - "UJ", + non-detects - "UJ"). Also since qualification is due to poor accuracy the sample results will be coded "A2". Sample heterogeneity is suspected to result in the observed variability and poor recovery experienced. No Full dup pair was submitted on ARIQC group. All other ~~and KAL~~ QC data met acceptance criterion.

KAL 5/29/98

OVERALL DATA QUALITY ASSESSMENT

Data is acceptable

QC data is adequate

Matrix interference is suspected to result in the variability observed in the data.

Reviewed By: Kevin A. Lambert Date: 5/29/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

**1.0 HOLDING TIMES**

List holding time criteria used to evaluate samples, indicating which samples exceed the holding time. Holding time begins with validated time of sample collection.

Parameter	Holding Time Criteria	Sample ID	Days Holding Time was Exceeded	Action

*SEE C V R Activity Report #825  
 And Revised Data Package  
 dated 4/20/98*

Were the correct preservatives used? Yes  No

List below samples that were incorrectly preserved.

Sample No.	Type of Samples	Deficiency	Action

Reviewed By: Kevin A. Lambert Date: 5/26/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

2.0 INSTRUMENT CALIBRATION

2.1 Percent Recovery Criteria

Indicate %Recovery (%R) criteria used to evaluate calibration standards:

Metals: \_\_\_\_\_  
Mercury: \_\_\_\_\_  
Cyanide: \_\_\_\_\_  
Other: \_\_\_\_\_

List below the analytes which did not meet %R criteria for initial and continuing calibration standards:

Analysis Date	ICV/CCV #	Analyte	%R	Action	Samples Affected

*Met  
criteria*

2.2 Analytical Sequence

Did the laboratory use the proper number of standards for calibration as described in the EPA method? Yes  No

Have initial calibrations been performed at the beginning of each analysis and at the frequency indicated by the EPA method? Yes  No

Have continuing calibration standards been analyzed at the beginning of sample analysis and at a minimum frequency indicated by the EPA method and at the end of the analysis sequence? Yes  No

If no for any of the above, outline deviations and actions taken below:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: Kevin A Lambert Date: 5/29/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

Were the correlation coefficients for the calibration curves for AA, Hg, CN, and other spectrophotometric methods  $\geq 0.995$ ? (Check calculations performed for calibration curves.) Yes  No

If no, list: \_\_\_\_\_

Date	Analyte	Coefficient	Action	Samples Affected
<i>Met criteria</i>				

Check for transcription and calculation errors involving calibration summary forms and raw data. Briefly summarize errors and associated actions when data quality might have been affected.

**3.0 BLANK ANALYSIS**

**3.1 Initial and Continuing Calibration Blanks**

Have Initial and Continuing Calibration Blanks (ICB/CCB) been analyzed at the frequency required in the EPA method? Yes  No

If no, summarize problems and resolutions in the narrative report.

List analytes detected in ICB and CCBs below:

NOTE: For soil samples, convert blank values to mg/kg using digestion weights and volumes.

Analysis Date	ICB/CCB No.	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>No target analytes were detected above RL</i>						

Reviewed By: Kevin A Lambert Date: 5/29/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

3.2 Method Blank

Was one method blank analyzed for:

- Each of 20 samples? Yes  No   
 Each digestion batch? Yes  No   
 Each matrix type? Yes  No   
 Both AA and ICP when both are used for the same analyte? Yes  No   
 or  
 At the frequency indicated in the EPA method or QAPP? Yes  No

NOTE: Method blank is the same as the calibration blank for mercury and for wet chemistry analysis.

List analytes detected in method blank samples below. NOTE: For soil samples, be sure to calculate blank values using digestion weights and volumes.

Preparation Date	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>No target analytes were detected above the PL</i>					

Is concentration in the method blank below the detection limit? Yes  No

Affected samples: *Several analytes were observed at estimated values ("I" coded). Sample results are > 5x blank concentration. No data is qualified.*

Reviewed By: Kevin A Lambert Date: 5/26/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

**3.3 Field/Rinse/Equipment Blanks**

Was a field/equipment blank analyzed as required by the EPA method or QAFJP? Yes  No

List below analytes detected in the field blanks. NOTE: For soil samples, calculate blank values using digestion weights and volumes.

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Collection Date	Blank ID	Analyte	ng/l Conc.	Required Detection Limits	Action Level	Samples Affected
2/11/98	CLM-5M-6R-000-EB	Aluminum	0.0995	0.05		Sample results are > 5X blank concentration. No data is qualified.
		Calcium	0.367	0.1		
		Iron	0.0494	0.03		
		Mercury	0.0000975	0.0004		
		Potassium	1.085	5		
		Silver	0.003315	0.01		
		Sodium	0.7815	1		
		ZINC	0.0335	0.01		Sample results are > 5X blank concentration. No data is qualified.

**4.0 ICP INTERFERENCE CHECK SAMPLE ANALYSIS**

Was an ICP interference check sample (ICS) analyzed at the beginning and end of a run or at least twice every 8 hours? (Not required for Ca, Mg, K, and Na) Yes  No

Samples affected: \_\_\_\_\_

Are the values of the ICS for solution AB within 80-120%R? Yes  No

If no, is the concentration of Al, Ca, Fe, or Mg lower than in ICS? Yes  No  Not Applicable

Reviewed By: Kevin A Lambert Date: 5/29/98



INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

If no, list below all analytes which did not meet %R criteria and in which the concentration of Al, Ca, Fe, or Mg is higher than in the ICS:

Date	Analyte	%R	Action	Samples Affected
			<i>Met</i>	
			<i>criteria</i>	

Are any results > IDL for those analytes which are not present in the ICS solution A? Yes  No

If yes, results >2 (absolute value of the IDL) indicate either a positive or negative interference and must be qualified.

Samples affected: \_\_\_\_\_  
\_\_\_\_\_

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

5.0 LABORATORY CONTROL SAMPLES (LCS)

Was an LCS analyzed at required frequency? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: Kevin A Lambert Date: 5/29/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

List below any LCS recoveries not within limits.

*tel*  
 888  
 004

Preparation Date	Analyte	%R	Action	Samples Affected
3/4/98 1520	ARSENIC	56	71-129	LCS met acceptance criteria No data qualified
3/6/98 1348	SILVER	28	80-120	LCS met acceptance criteria No data qualified

6.0 LABORATORY DUPLICATE ANALYSIS

Were laboratory duplicates analyzed at required frequency? Yes  No

Samples affected: \_\_\_\_\_

Was laboratory duplicate analysis performed on field or equipment blanks? Yes  No  *EB only aqueous samples*

Samples affected: \_\_\_\_\_

Is any value for sample duplicate pair <PQL and the other value >10xPQL? Yes  No

Samples affected: \_\_\_\_\_

Reviewed By: Kevin A Lambert Date: 5/27/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

List below concentrations of any analyte that did not meet criteria for duplicate precision:

Sample ID	Matrix	Preparation Date	Analyte	PQL	% RPD	Action	Samples Affected
31888	soil	3/4/98 1520	ARSENIC	✓	33.5 ±20		
31995	soil	3/6/98 1152	BARIIUM	✓	26.2 ±20		
31703	soil	2/25/98 1230	ANITMONY	✓	34.1 ±20		
31795	soil	3/2/98 1349	Thallium	✓	21.7 ±20		
32004	soil <del>soil</del> water	3/6/98 1354	Silver	✓	106.7 ±20	↓	

Batch

Sample results will be the 114 "P" coded on "114" + "P" coded.

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

7.0 FIELD DUPLICATE SAMPLE ANALYSIS

Were field duplicates collected at the frequency indicated in the EPA method or QAPjP?

Yes  No

If yes, qualify data associated only with the field duplicate pair. Calculate RPDs for each analyte in which both values are greater than the IDL.

Is any value for sample duplicate < practical quantitation limit (PQL) and other value >10xPQL? Yes  No

Not Applicable

Reviewed By: Kevin A Lambert Date: 5/29/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

List below the analytes that do not meet RPD or PQL criteria. Use the same criteria as those used for laboratory duplicate analysis or criteria specified in EPA method or sampling plan.

Sample ID	Matrix	Collection Date	RPD	Control Limit	Action	Samples affected
<i>No samples submitted on ARCO group.</i>						

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8.0 MATRIX SPIKE ANALYSIS

NOTE: This matrix spike is a predigestion/predistillation spike.

Was a matrix spike prepared and analyzed at the required frequency? Yes  No

Reviewed By: Kevin A. Lambert Date: 5/29/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

Were matrix spikes performed at the concentrations specified by the EPA method? Yes  No

Samples affected: \_\_\_\_\_

Was matrix spike analysis performed on field or equipment blanks? Yes  No  *Eg. Blank only aqueous sample*

If equipment or field blanks are the only aqueous samples, matrix spike analysis may be performed; however, matrix spike samples must be present for the other matrices.

Samples affected: \_\_\_\_\_

List below the % recoveries for analytes that did not meet the criteria:

Sample ID	Matrix	Preparation Date	Analyte	%R	Action	Samples Affected
ECTA-37A-6K-069-C	concrete	3/6/98	Barium	61	80-120	Sample results will be qualified: positive results = 5 estimated "10/15" non-detects = "115" and the results will also be coded "A2"
↓	↓	↓	1223	↓	46	
↓	↓	↓	1221	↓	72	
↓	↓	↓	1223	↓	67	
↓	↓	↓	1221	↓	67	
↓	↓	↓	1223	↓	63	↓

ICAP ↓

Check for transcription/calculation errors. Also check to ensure matrix spike concentrations are not affected by sample dilutions performed. If matrix spike concentrations are diluted below or close to IDL based on sample dilutions performed, use professional judgment in qualifying data. Ensure that the laboratory performed sample dilutions only when necessary as indicated by QA/QC requirements. Briefly summarize errors and associated actions when data quality might have been affected.

Reviewed By: Kevin A. Lambert Date: 5/29/98





INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

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NOTE: If preparation blank spikes are analyzed, evaluate recoveries. These recoveries can indicate whether excursions in matrix spike recovery are caused by sample matrix effects or poor digestion efficiencies and/or problems with matrix spike solution. For example, if matrix spike recovery for selenium is 0% and preparation blank spike recovery for selenium is 92%, this may indicate sample matrix effects.

9.0 FURNACE ATOMIC ABSORPTION ANALYSIS

Were duplicate injections present for each sample, including required QC analyses (not required if MSA is done)? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Were postdigestion spikes analyzed for samples, including QC samples? Yes  No

Were postdigestion spikes analyzed at the required concentration? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Was a dilution analyzed for samples with postdigestion spike recovery <40%? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

MSA Analysis (Method of Standard Additions)—MSA is required when serial dilutions are not within  $\pm 10\%$ . Was MSA required for any sample but not performed? Yes  No

Are MSA calculations outside the linear range of the calibration curve? Yes  No  *Not Applicable*

Reviewed By: Kevin A. Lambert Date: 5/29/98



INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

NOTE: Ensure the spiking concentrations used for MSA analysis were at 50–100% and 150% of sample concentration or absorbance.

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10.0 SERIAL DILUTION ANALYSIS

NOTE: Serial dilution analysis (ICP) is required only for initial concentrations equal to or greater than 10xIDL.

If applicable, was a serial dilution performed for: *Not Applicable*

Each 20 samples? Yes  No   
Each matrix type? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_

List below results which did not meet criteria of %D <10% for analyte concentrations greater than 50xIDL before dilution:

Analysis Date	Sample ID	Analyte	IDL	%D	Action	Samples Affected

Check for calculation errors and negative interferences.

Reviewed By: *Kevin A. Lambert* Date: *5/29/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

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11.0 SAMPLE RESULT VERIFICATION

11.1 Verification of Instrumental Parameters

Are instrument detection limits present and verified on a quarterly basis? Yes  No  *Not Applicable*

Are IDLs present for each analyte and each instrument used? Yes  No

Is the IDL greater than the required detection limits for any analyte? Yes  No   
(If IDL > required detection limits, flag values less than 5xIDL.)

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are ICP Interelement Correction Factors established and verified annually? Yes  No  *Not Applicable*

Are ICP Linear Ranges established and verified quarterly? Yes  No  *Not Applicable*

If no for any of the above, review problems and resolutions in narrative report. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11.2 Reporting Requirements

Were sample results reported down to the PQL? Yes  No

If no, indicate necessary corrections. \_\_\_\_\_  
\_\_\_\_\_

Were sample results that were analyzed by ICP for Se, Tl, As, or Pb at least 5xIDL? Yes  No

Were sample weights, volumes, and dilutions taken into account when reporting sample results and detection limits? Yes  No

Reviewed By: Kevin A Lambert Date: 5/29/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

If no for any of the above, sample results may be inaccurate. Note necessary changes and if errors are present, request resubmittal of laboratory package.

Were any sample results higher than the linear range of calibration curve and not subsequently reanalyzed at the appropriate dilution? Yes  No  *Not Applicable*

Samples affected: \_\_\_\_\_

11.3 Sample Quantitation

Check a minimum of 10% of positive sample results for transcription/calculation errors. Summarize necessary corrections. If errors are large, request resubmittal of laboratory package.

Comments:

*OK No major problems*

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_

\*Task/Project Leader is responsible for approval of data set.

Reviewed By: *Kevin A Lambert* Date: *5/29/98*

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A-J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998

Site: 57A, CCTA

AR/COC: 510219

**COPY**

Data Classification: Radiometrics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
			<i>No data is qualified</i>
			<i>Data is acceptable</i>
			<i>QC measures appear to be adequate</i>

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470-1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Kevin A. Lambert Date: 6/2/98

**ANALYTICAL RADIOCHEMISTRY DATA VALIDATION  
CHECKLIST (CONTINUED)**

Project Name				Site Name
Laboratory Name/Job No./Batch No.				Chain of Custody No.
Analysis Method			Parameter List:	
REVIEW ITEM	YES	NO	NA	COMMENTS
4. Preparation: Entire procedure?	✓			
<b>H. ANALYTE DETECTION</b>				
1. Detection limit sample/batch specific?	✓			
2. Errors evaluated?	✓			
3. False positives/negatives suspected?		✓		

Reviewed by: Kevin A. Lambert

- ① All samples were prepared and analyzed with specified methods and accepted procedures.
- ② No MS/MSD was run on soil samples from ARCO group. The acceptability of the MS/MSD was not addressed for batch from other ARCO group.
- ③ Radiometric Analysis: Calibration met acceptance <sup>criteria</sup>. No target analytes were detected above RL in MB. LCS/LCSD met acceptance criteria. The MS/MSD for EB met criteria. No target analytes were detected above RL in the EB. No field duplicate pair was submitted on ARCO group.

*Data is acceptable*

*QC measures appear to be adequate*

# ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST

*YAL 5/26/78*

Project Name <i>Site 57A, CCTA</i>	Site Name <i>CASE# 7215.2203</i>
Laboratory Name/Job No./Batch No. <i>CORE / 980371</i>	Chain of Custody No. <i>510219</i>
Analysis Method <i>EPA 900.0</i>	Parameter List: <i>Gross Alpha/Beta</i>

REVIEW ITEM	YES	NO	NA	COMMENTS
<b>A. HOLDING TIMES</b>				
1. Preparation and analysis holding times met?				<i>SEE CVR FORM</i>
2. Short-half life parameters analyzed for and checked?				
<b>B. CALIBRATION VERIFICATION</b>				
1. Detectors numbered and documented?	✓			<i>Met criteria</i>
2. Frequency: Daily <input checked="" type="checkbox"/> , weekly <input type="checkbox"/> , or monthly <input type="checkbox"/> ?	✓			
3. Acceptance criteria: Met?	✓			
<b>C. LABORATORY CONTROL SAMPLES</b>				
1. Standard: Independent, certified reference material?	✓			<i>Met criteria</i>
2. Frequency: Each batch?	✓			
3. % Recovery 80-120% or _____?	✓			
<b>METHOD BLANK</b>				
1. Frequency: Each batch?	✓			<i>No target analytes were detected above the RL</i>
2. Matrix: Matrix specific?	✓			
3. Preparation: Entire procedure?	✓			
4. Blanks show contamination?		✓		
<b>E. MATRIX SPIKE</b>				
1. Frequency: Each batch?	✓	✓		<i>No MS/MSD was run on soil samples from ARCO group. MS/MSD acceptability is not addressed. An MS/MSD was run on EB and met acceptance criteria</i>
2. Matrix: Matrix specific?	✓			
3. Preparation: Entire procedure?	✓			
4. % Recovery: 75-125% or _____?	✓			
<b>F. ANALYTICAL YIELDS/OTHER</b>				
1. Tracer: Correct type, recovery met?	✓			
2. Ingrowth and/or decay: Correct factors applied?	✓			
3. Solids density: Planchette loading <5 mg/cm <sup>2</sup> ?	✓			
<b>G. DUPLICATE</b>				
1. Type: Lab or field?	✓			<i>Control Lab<sup>n</sup> Duplicates run on soil samples MSD &amp; LCSD run on aqueous samples</i>
2. Frequency: Each batch?	✓			
3. Matrix: Matrix specific?	✓			

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J))
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998



Site: Site 57A, CCTA

AR/COC: 510221

Data Classification: ORGANICS

Sample Fraction No.	Analysis	DV Qualifiers	Comments
<u>CCTA-57A-GR-073-0-0.5-S</u>	<u>84-74-2</u>	<u>J</u>	<u>Field precision measurements for the field duplicate pair don't meet acceptance criteria</u>
<u>CCTA-57A-GR-073-0-0.5-DU</u>	<u>(Di-n-butyl phthalate)</u>		
<u>CCTA-57A-GR-073-0-0.5-S</u>	<u>121-14-2</u>	<u>J, A2</u>	<u>Matrix interference is suspected to result in poor recovery</u>
<u>CCTA-57A-GR-073-0-0.5-DU</u>	<u>(2,4-Dinitrotoluene)</u>		
<u>Data is acceptable</u>			
<u>QC <del>data</del> measures are adequate</u>			
<u>KAL 6/4/98</u>			

KAL 6/4/98  
**COPY**

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470-1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Kevin A. Lambert Date: 6/4/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

SITE OR PROJECT Site 57A, CLTA  
 ANALYTICAL LABORATORY CORE  
 LABORATORY REPORT # 980372  
 CASE NO. 7215.2203

SAMPLE IDS 2 soil  
 NO. OF SAMPLES 2  
036864-002  
036865-002

ARCO# 510221

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	HE <del>OTHER</del> <u>KAL 6/4/98</u>
1. HOLDING TIMES/PRESERVATION	NA	✓	NA	✓
2. GC/MS INST. PERFORM.		✓		✓
3. CALIBRATIONS/WINDOWS		✓		✓
4. BLANKS		✓		✓
5. SURROGATES		✓		J
6. MATRIX SPIKE/DUP		✓		J
7. LABORATORY CONTROL SAMPLES		✓		✓
8. INTERNAL STANDARDS		✓		✓
9. COMPOUND IDENTIFICATION		✓		✓
10. SYSTEM PERFORMANCE		✓		✓
11. OVERALL ASSESSMENT	✓	✓	✓	✓

✓ (check mark) — Acceptable: Data had no problems or qualified due to minor problems  
 N - Data qualified due to major problems  
 X - Problems, but do not affect data  
 Qualifiers: J - Estimate  
 UJ - Undetected, estimated

NA - Not Applicable

KAL 6/4/98  
 ACTION ITEMS: NOTE: This ARCO group is associated with ARCO# 510221 and is composed of a Field Duplicate pair for soil samples during the sampling event.

KAL 6/4/98  
 AREAS OF CONCERN: (2) All sample were prepared and analyzed with specified methods and accepted procedures.

Reviewed By: Kevin A Lambert  
 Date: 6/4/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

PROJECT/TASK LEADER: \_\_\_\_\_

~~XXL 6/4/98~~  
ACTION ITEMS.

③ SVOC Analysis: Calibration met acceptance criteria. No target analytes were detected in IB, MB, & EB. Surrogate recovery & internal stds met acceptance criteria. MS/MSD and LCS/LCSD met acceptance criteria. The RPDs for the field duplicate pair met acceptance criteria except for Di-n-butyl phthalate (4670). This analyte is a non-detect except for the field duplicate pair. Sample results for this analyte will be "J" coded only in the field duplicate pair.

~~XXL 6/4/98~~  
AREAS OF CONCERN.

④ HE Analysis: Calibration met acceptance criteria. No target analytes were detected in the IB, MB, & EB. Surrogate recovery was outside acceptance criteria for 3,4-Dinitrotoluene (broad high) in the field sample (CCTA-57A-GR-073-D-0.5-5) and the MS/MSD. These sample were reanalyzed and comparable results were obtained. Sample results are non-detects except for 2,4-Dinitrotoluene which will be "J" coded. No other data will be qualified since sample results are non-detects. Matrix interference (i.e. sample heterogeneity) is suspected to result in poor surrogate recovery. The MS/MSD met acceptance criteria except for HMX 70 REC in the MS and MSD, 2,4-Dinitrotoluene 70 REC and RPD and 2,6-Dinitrotoluene 70 REC and RPD in MSD, and 4-Amino-2,6-di

~~XXL 6/4/98~~

OVERALL DATA QUALITY ASSESSMENT

Nitrotoluene 70 REC in MS. These analytes were all non-detects except for 2,4-Dinitrotoluene which will be "J" coded. The MSD was reanalyzed and comparable recovery results were obtained for 2,4-Dinitrotoluene. Matrix interference (i.e. sample heterogeneity) is suspected to result in the poor recovery. The LCS/LCSD met acceptance criteria. No RPDs for field dup pair were outside acceptance criteria.

⑤ Data is acceptable

⑥ QC measures are adequate

Reviewed By: Kevin A Lambert  
Date: 6/4/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

1.0 HOLDING TIMES AND PRESERVATION

Indicate the holding time criteria below that was used to evaluate the samples.

SW-846, 3rd. ed.

Other: \_\_\_\_\_

List below samples that were over holding time criteria.

Sample ID	VTSR	Date Analyzed	Action

SEE CUR Form

NOTE: VTSR = Validated time of sample receipt.

Were the correct preservatives used? Yes  No

List below samples that were incorrectly preserved.

Sample No.	Type of Sample	Deficiency	Action

Reviewed By: Kevin Lambert 6/14/00

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

2.0 GC/MS TUNING CRITERIA

Has a GC/MS tuning performance been analyzed for every twelve hours of sample analysis for each GC/MS instrument used? Yes  No

Was the correct standard (listed in the EPA Method) used? Yes  No

Have the ion abundance criteria been met for each tune? Yes  No

NOTE: GC/MS abundance criteria is specified by EPA method for GC/MS analysis (EPA 8240A or 8270A).

If no for any of the above, list all the data associated with the tune that either failed criteria or in which there was no tune.

Date/Time	Problem	Sample Affected (Action)
<i>Met Criteria</i>		

Check for transcription/calculation errors. If errors are present, briefly summarize necessary changes:

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Is the spectra of the mass calibration acceptable? Yes  No

Reviewed By: Kevin A Lambert  
Date: 6/4/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

3.0 GC INSTRUMENT PERFORMANCE.

3.1 DDT Retention Time

*Not Applicable*

Is DDT retention time for packed columns >12 minutes (except for OV-1 and OV-101)?

Yes  No

If no, list below the DDT standards that failed criteria:

Affected samples and compounds:

3.2 Retention Time Windows

*Not Applicable*

List below compounds that were not within the retention time windows.

Date/Time	Compound	RT	RT Window	Action	Affected Samples

Reviewed By: *Kevin A Lambert 1/15/00*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

3.3 DDT and Endrin Degradation

*Not Applicable*

List below the standards that have a DDT or Endrin breakdown of >20% (or a combined breakdown of >20%).

Date/Time	Standard ID	DDT/Endrin	% Breakdown	Action	Affected Samples

3.4 DBC Retention Time Check

Is the %D between EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% capillary ID < 0.32 mm, and 1% for megabore)?

Yes  No

Date	Sample ID	DBC %D	Action

For the above criteria outlined in Sections 8.1-8.4, check for transcription/calculation errors.

If errors are found, list below with necessary corrections: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: Kevin A. Lambert  
Date: 6/4/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

4.0 INITIAL CALIBRATION

Has initial calibration been performed as required in the EPA method? Yes  No

Were the correct number of standards used to calibrate the instrument? Yes  No

For GC analyses of PCBs and Pesticides, did the laboratory follow the correct 72-hour sequence of analysis?  
Yes  No  *Not Applicable*

List below compounds which did not meet initial calibration criteria outlined by the EPA method.

Instrument ID	Date	Compound	RP%RSD	Action	Samples Affected
<i>Met Criteria</i>					

Check for transcription/calculation errors. If errors are present, summarize necessary corrections below:

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Reviewed By: *Kevin A Lambert*  
Date: *6/4/98*



ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

5.0 CONTINUING CALIBRATION

Have continuing calibration standards been analyzed at the frequency specified in the EPA method?

Yes  No

List below all compounds which did not meet continuing calibration requirements.

Instrument ID	Date	Compound	RFSD	Action	Samples Affected
<i>Met Criteria</i>					

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

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Reviewed By: Kevin A. Lambert  
Date: 6/4/98

**ORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3 DV-3)

**6.0 BLANK ANALYSES**

**6.1 Method/Reagent and Instrument Blanks**

Has a method/reagent blank been analyzed for each set of samples or for every 20 samples of similar matrix, whichever is more frequent? Yes  No

Has an instrument blank been analyzed at least once every twelve hours for each GC/MS system used? Yes  No

**6.2 Field Rinse/Equipment Blanks**

Are there field rinse/equipment blanks associated with each sampling day or at frequency specified in the sampling plan. Yes  No  *EB is associated w/ ARCO # 510221*

List below compounds for which analyses were requested that were detected in any of the blanks analyzed:

Date	Blank ID	Compound	Conc. ( )	PQL ( )	Action Level	Samples Affected (Action)
<i>No Target Analytes were detected</i>						
<i>No Target Analytes were detected</i>						
<i>No Target Analytes were detected</i>						
<i>No Target Analytes were detected</i>						
<i>No Target Analytes were detected</i>						
<i>No Target Analytes were detected</i>						
<i>No Target Analytes were detected</i>						

PQL = Practical Quantitation Limit from EPA Method.

Reviewed By: *Kevin A. Lambert*  
 Date:

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

Are there any TICs present in the blanks that are also present in the samples? Yes  No   
 If yes, list below.

7.0 SURROGATE RECOVERY

Were surrogate recoveries evaluated for each of the samples analyzed by GC or GC/MS?  
 Yes  No

If surrogate standards other than those presented by SW-845 are used, list below with reference to applicable control limits used to evaluate the percent recoveries.

Surrogate Compound

Control Limits

List below the percent recoveries which did not meet either SW-845 criteria or criteria listed above.

Date	Sample ID/Matrix	Surrogate Compound	%Rec	Action
2/19/98 1156	CCTA-57A-GR-073- 0-0.5-S soil	3,4-Dinitrotoluene	168	Sample results are non-detects except for 2,4-Dinitrotoluene which will be "J" coded due to sample heterogeneity. No other data which be qualified since all sample results are non-detects.
3/5/98 1620	↓		140	
2/19/98 1234	CCTA-57A-GR-073- 0-0.5-S/MS soil		136	
3/5/98 1707	↓		136	
2/19/98 1313	CCTA-57A-GR-073- 0-0.5-S/MSD-soil		146	
2/19/98 1351	CCTA-57A-GR-073- 0-0.5-DU		142	
3/6/98 0949	↓		141	

Reviewed By: Karin A. Lambert  
 Date: 6/4/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

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If surrogate recovery was outside of control limits, were the samples or method blank reanalyzed?

Yes  No

Are method blank surrogate recoveries outside of limits upon reanalysis? Yes  No

Are transcription/calculation errors present? Yes  No

if yes, note necessary corrections. Matrix interference is suspected  
to result in the recovery being outside (high)  
acceptance criteria (i.e. sample heterogeneity)

Reviewed By:

*Kevin A. Smith*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

8.0 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSIS

Were MS/MSDs analyzed at the frequency required by the EPA method or QAFJP for each matrix type?

Yes  No

List below % recoveries and RPDs of compounds which did not meet criteria. Indicate on chart criteria used to evaluate recoveries and RPDs.

Date	Sample ID:Matrix	Compound	%Rec RPD	Action
2/19/98 1234	CCTA-57A-GR-073 0-0.5-5/MS soil	HMX	136.24	70-130 Analyte was not detected No data is qualified
↓	↓	↓	138	↓
↓	↓	2,4-Dinitrotoluene	678	70-130 Positive results will be "J" coded, Non-detects
↓	↓	2,6-Dinitrotoluene	153	70-130 Analyte was not detected No data is qualified
↓	↓	4-Amino-2,6-dinitro toluene	130.2	70-130
3/6/98 0911	CCTA-57A-GR-073 0-0.5-5/MSD soil	2,4-Dinitrotoluene	591	70-130 Positive results will be "J" coded, Non-detects "UJ" coded
			53	±20

Matrix interference is suspected to result in analytes being outside acceptance criteria (i.e. Sample heterogeneity)

"UJ" coded  
 6/4/98

Reviewed By: Kevin A. Lambert  
 Date: 6/4/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

9.0 LABORATORY CONTROL SAMPLE ANALYSIS

Have laboratory control samples containing a representative number of the compounds of interest been analyzed at the frequency specified in the EPA method or QAPJP?

Yes  No

Evaluate percent recoveries based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

Date	Compound	%Rec	Control Limits	Action	Samples Affected
			<i>Met</i>		
			<i>Criteria</i>		

Control Limit Reference: \_\_\_\_\_

Evaluate RPD based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

Date	Compound	%Rec	Control Limits	Action	Samples Affected
			<i>Met</i>		
			<i>Criteria</i>		

Control Limit Reference: \_\_\_\_\_

Reviewed By: Kevin A. Lambert  
Date: 6/4/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

10.0 INTERNAL STANDARDS EVALUATION

List below the internal standard areas of samples or blanks which did not meet criteria.

Date	Sample ID	Internal Out	Acceptable Range	Action
<i>Met Criteria</i>				

Are retention times of the internal standards within 30 seconds of the associated calibration standard?

Yes  No

11.0 TARGET COMPOUND LIST ANALYTES

11.1 GC/MS Analyses

Are the reconstructed ion chromatograms, the mass spectra for the identified compounds, and the data system printouts included? Yes  No

Is chromatographic performance acceptable with respect to:

Baseline stability? Yes  No

Resolution? Yes  No

Peak shape? Yes  No

Full-scale graph (attenuation)? Yes  No

Reviewed By: Kevin A. Lambert  
Date: 6/4/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

Page 15 of 18

Other: \_\_\_\_\_

Is the RRT of each reported compound within the limits given in the method of the standard RRT in the continuing calibration? Yes  No

Are all the ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the mass spectrum? Yes  No

Do sample and standard relative intensities agree within 20%? Yes  No

If no for any of the above, indicate below problems and qualifications made to data:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11.2 GC Analyses

*Not Applicable*

Are there any transcription/calculation errors between the raw data and the reporting forms?  
Yes  No

If yes, review errors and necessary corrections below; if errors are large, resubmittal of laboratory package may be necessary.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analysis? Yes  No

Was GC/MS confirmation performed when required by the EPA method? Yes  No

If no for any of the above, reject positive results except for retention time windows if associated standard compounds are similarly shifted.

Reviewed By: *Kevin A. Lambert*



ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

Samples affected: Not Applicable

Check chromatograms for false negatives, especially for the multiple peak components (toxaphene and PCBs). If false negatives are apparent and the appropriate PCB standards were not analyzed, or if confirmed analysis was not present, flag the affected data.

Samples affected: \_\_\_\_\_

NOTE: Due to the complexities of PCB pesticide analysis, each analytical run should be reviewed to verify identification and column performance.

12.0 FIELD DUPLICATE ANALYSIS

Were field duplicates submitted for analysis? Yes  No

If yes, calculate RPD and use professional judgment to determine if the data needs to be qualified. List results below.

Date	Sample ID	Compound	Sample Result	Duplicate Result	RPD	Affected Samples
2/11/98	CCIA-57A- GR-073-0-0.55/D4	Di-N-butyl phthalate	1100 ug/kg	690 ug/kg	46%	Analyte is not detected for samples in ARCO #510219. Only that two samples had positive results. Sample results will be used.

13.0 COMPOUND QUANTITATION/REPORTED DETECTION LIMITS

Are there any transcription/calculation errors from raw data to reported results (check at least 10% of positive results)? Yes  No

In addition, verify that the correct internal standard, quantitation ion, and RRF were used to calculate the result for a minimum of 10% of sample data.

Reviewed By: Kevin A Lambert  
 Date: 6/4/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

13.1 Chromatogram Quality

Were baselines stable? Yes  No

Were any negative peaks or unusual peaks present? Yes  No

Were early eluting peaks resolved to baseline? Yes  No

If incorrect quantitations are evident, note corrections necessary below: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are the required quantitation limits (detection limits) adjusted to reflect sample dilutions and for soils, sample moisture? Yes  No

If no, make necessary corrections and note below.  
\_\_\_\_\_  
\_\_\_\_\_

14.0 TENTATIVELY IDENTIFIED COMPOUNDS

*Not Applicable*

Are Tentatively Identified Compounds (TIC) properly identified with scan number, or retention time, estimated concentration, and J qualifier? Yes  No

Are the mass spectra for TICs and associated "best match" spectra included? Yes  No

Are any TCL compounds listed as TIC compounds? Yes  No

Are each of the ions present in the reference mass spectra with a relative intensity greater than 10% also present in the sample mass spectrum? Yes  No

Reviewed By: Kevin A. Lambert  
Date: 6/4/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

Do TIC and "best match" standard relative ion intensities agree within 20%? Yes  No

*Not Applicable*

Comments

*[The comment area is crossed out with a diagonal line.]*

Reviewed By: *Kevin A. Lambert*

Date: *6/4/98*

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_

\*Data package must be approved by Project/Task Leader.

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998

Site: Site 57A, CCTA

1/2

AR/COC: 510221

Data Classification: INORGANICS

COPY

Sample Fraction No.	Analysis	DV Qualifiers	Comments
	SEE Next Page		
	Data is acceptable		
	QC measures are adequate except MS/MSD acceptability is not addressed		

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470-1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Kevin A Lambert Date: 6/4/98



INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

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SITE OR PROJECT Site 57A, CCTA  
 ANALYTICAL LABORATORY CORE  
 LABORATORY REPORT # 980372  
 TASK LEADER ARCO# 510221  
 NO. OF SAMPLES 3 2 soil  
KM 6/4/98

CASE NO. 7215.2203  
 SAMPLE IDS 036864-002 4  
036865-002

DATA ASSESSMENT SUMMARY

	ICP	AA	MERCURY	CYANIDE
1. HOLDING TIMES	✓	✓	✓	NA
2. CALIBRATIONS	✓	✓	✓	
3. BLANKS	✓	✓	✓	
4. ICS	✓			
5. LCS	✓	✓		
6. DUPLICATE ANALYSIS	J	J	✓	
7. MATRIX SPIKE	NA	NA	NA	
8. MSA		NA		
9. SERIAL DILUTION	NA			
10. SAMPLE VERIFICATION	✓	✓	✓	
11. OTHER QC	✓	✓	✓	
12. OVERALL ASSESSMENT	✓	✓	✓	↓

✓ (check mark) — Acceptable  
 Other — Qualified:

J - Estimate  
 UJ - Undetected, estimated  
 R - Unusable (analyte may or may not be present)

NA - Not Applicable

KM 6/4/98  
 ACTION ITEMS: NOTE: This ARCO group is associated w/ ARCO# 510219 and is composed of the Field Dup Pair for the sampling event for the soil samples. TAL metals were requested on the  
KM 6/4/98  
 AREAS OF CONCERN: Field Dup Pair and are not requested on the soil samples on ARCO# 510219. When reviewing data use both ARCO groups.  
KM 6/4/98

REVIEWED BY: Kevin A Lambert  
 DATE REVIEWED: 6/4/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

KAL 6/14/98

ACTION ITEMS: (2) All sample were prepared and analyzed with specified methods and accepted procedures.

(3) No MS/MSD was run on the ARCOE group. The MS/MSD acceptability is not addressed for the batches from another ARCOE group. Seek Corrective Action.

(4) NOTE: The case narrative statement regarding the recovery of the LCS for Hg by CVAA (Batch 31669) being outside acceptance criteria is not supported by the QC Report. Seek Corrective Action

(5) NOTE: Antimony in Sample CCTA-57A-GR-073-D-0.5-DU is not "J" coded. The RL is 0.6 and sample result is 0.588. Seek Corrective Action

(6) Metals Analysis: Calibration met acceptance criteria.

KAL 6/14/98

AREAS OF CONCERN: No target analytes were detected above the RL in ICB, CCB, MB, and EB (ARCOE510219). The LCS/LCSD met acceptance criteria except for % REC of ARSENIC in the LCS and RPDs for Thallium, Arsenic, Antimony, & Barium. Sample results for Arsenic will not be qualified due % REC being outside control limits in the LCS since the LCSD met control limits. However, sample results for Thallium, arsenic, antimony, & barium will be "J" or "UJ" coded due to RPDs being outside control limits. No MS/MSD was run on this ARCOE group. The RPDs for the field duplicate pair met control limits except for barium, beryllium, & van. Associated sample results will be "J" or "UJ" coded.

KAL 6/14/98

OVERALL DATA QUALITY ASSESSMENT: Barium has already been qualified based on LCS/LCSD results.

(7) Data is acceptable

(8) QC measures appear to be adequate except MS/MSD acceptability is not addressed

Reviewed By: Kevin A Lambert Date: 6/14/98





INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

2.0 INSTRUMENT CALIBRATION

2.1 Percent Recovery Criteria

Indicate %Recovery (%R) criteria used to evaluate calibration standards:

Metals: \_\_\_\_\_  
Mercury: \_\_\_\_\_  
Cyanide: \_\_\_\_\_  
Other: \_\_\_\_\_

List below the analytes which did not meet %R criteria for initial and continuing calibration standards:

Analysis Date	ICV/CCV ≠	Analyte	%R	Action	Samples Affected

*Met Criteria*

2.2 Analytical Sequence

Did the laboratory use the proper number of standards for calibration as described in the EPA method? Yes  No

Have initial calibrations been performed at the beginning of each analysis and at the frequency indicated by the EPA method? Yes  No

Have continuing calibration standards been analyzed at the beginning of sample analysis and at a minimum frequency indicated by the EPA method and at the end of the analysis sequence? Yes  No

If no for any of the above, outline deviations and actions taken below:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: Kevin A. Lambert Date: 6/14/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

Were the correlation coefficients for the calibration curves for AA, Hg, CN, and other spectrophotometric methods  $\geq 0.995$ ? (Check calculations performed for calibration curves.) Yes  No

If no, list: \_\_\_\_\_

Date	Analyte	Coefficient	Action	Samples Affected
<i>Met Criteria</i>				

Check for transcription and calculation errors involving calibration summary forms and raw data. Briefly summarize errors and associated actions when data quality might have been affected.

**3.0 BLANK ANALYSIS**

**3.1 Initial and Continuing Calibration Blanks**

Have Initial and Continuing Calibration Blanks (ICB/CCB) been analyzed at the frequency required in the EPA method? Yes  No

If no, summarize problems and resolutions in the narrative report.

List analytes detected in ICB and CCBs below:

NOTE: For soil samples, convert blank values to mg/kg using digestion weights and volumes.

Analysis Date	ICB/CCB No.	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>Met Criteria</i>						

Reviewed By: *Kevin A Lambert* Date: *6/4/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

3.2 Method Blank

Was one method blank analyzed for:

- Each of 20 samples? Yes  No   
 Each digestion batch? Yes  No   
 Each matrix type? Yes  No   
 Both AA and ICP when both are used for the same analyte? Yes  No   
 or  
 At the frequency indicated in the EPA method or QAPP? Yes  No

NOTE: Method blank is the same as the calibration blank for mercury and for wet chemistry analysis.

List analytes detected in method blank samples below. NOTE: For soil samples, be sure to calculate blank values using digestion weights and volumes.

Preparation Date	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>No target analytes were detected above the PL</i>					

Is concentration in the method blank below the detection limit? Yes  No

Affected samples: Hg (CVAA) and Al, Cr, Fe, & Zn (ICAP) were observed at estimated values ("J" coded). Sample results are >5X the blank concentration. No data is qualified

Reviewed By: Kevin A Lambert Date: 6/2/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

**3.3 Field/Rinse/Equipment Blanks**

Was a field/equipment blank analyzed as required by the EPA method or OAPJP? Yes  No

List below analytes detected in the field blanks. NOTE: For soil samples, calculate blank values using digestion weights and volumes.

*NOTE: ARCO # 510219 - <sup>site</sup> ~~is~~ <sup>was</sup> associated w/ this ARCO group and an EB was sampled. No target analytes were detected above the PL in the EB*

Collection Date	Blank ID	Analyte	Conc.	Required Detection Limits	Action Level	Samples Affected
<i>No submitted ARCO</i>						

**4.0 ICP INTERFERENCE CHECK SAMPLE ANALYSIS**

Was an ICP interference check sample (ICS) analyzed at the beginning and end of a run or at least twice every 8 hours? (Not required for Ca, Mg, K, and Na) Yes  No

Samples affected: \_\_\_\_\_

Are the values of the ICS for solution AB within 80-120%R? Yes  No

If no, is the concentration of Al, Ca, Fe, or Mg lower than in ICS? Yes  No  *Not Applicable*

Reviewed By: *Kevin A Lambert* Date: *6/4/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

If no, list below all analytes which did not meet %R criteria and in which the concentration of Al, Ca, Fe, or Mg is higher than in the ICS:

Date	Analyte	%R	Action	Samples Affected
			<i>Met</i>	
			<i>Criteria</i>	

Are any results > IDL for those analytes which are not present in the ICS solution A? Yes  No

If yes, results >2 (absolute value of the IDL) indicate either a positive or negative interference and must be qualified.

Samples affected: \_\_\_\_\_

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

5.0 LABORATORY CONTROL SAMPLES (LCS)

Was an LCS analyzed at required frequency? Yes  No

Samples affected: Note: The QC Report does not support Case Narrative statement regarding the recovery of the LCS for Hg by CVRA (Batch 31669) being outside acceptance criteria. The recoveries (88% + 97%) in the QC Report for the LCSs are within the QC Limits (80-120%). Seek Corrective Action. I Calculated % Recoveries based on data provided and % Rec agrees with value reported in QC Report.  
*REC 6/4/98*

Reviewed By: Kevin A Lambert Date: 6/4/98

**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

List below any LCS recoveries not within limits.

Preparation Date	Analyte	%R	Action	Samples Affected
3/4/98 1520	ARSENIC	55.6	71-129	LCS D, not acceptance criteria No data is qualified

**6.0 LABORATORY DUPLICATE ANALYSIS**

Were laboratory duplicates analyzed at required frequency? Yes  No

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_

Was laboratory duplicate analysis performed on field or equipment blanks? Yes  No

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Is any value for sample duplicate pair <PQL and the other value >10xPQL? Yes  No

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewed By: Kevin A. Lambert Date: 6/4/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

List below concentrations of any analyte that did not meet criteria for duplicate precision:

atch  
 1795  
 888  
 2300  
 2301

Sample ID	Matrix	Preparation Date	Analyte	PQL	RPD	Action	Samples Affected
LCSD	SOIL	3/2/98 1349	Thallium	0.6	21.7 ±20		Sample results will be as per on "J" coded ↓ GFAA ↓ ICAP
		3/4/98 1520	ARSENIC	1.2	33.5 ±20		
		2/25/98 1230	ANTIMONY	0.6	34.1 ±20		
		3/6/98 1152	BARIIUM	1	26.2 ±20		

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

*Antimony (0.588)*  
 Note: *Antimony* in Sample 036865-002 is not above the RL (0.6) and is not "J" coded by the Lab. Potential rounding error may attribute to discrepancy. Seek Corrective Action.

7.0 FIELD DUPLICATE SAMPLE ANALYSIS

Were field duplicates collected at the frequency indicated in the EPA method or QAPJP?  
 Yes  No

If yes, quality data associated only with the field duplicate pair. Calculate RPDs for each analyte in which both values are greater than the IDL.

Is any value for sample duplicate < practical quantitation limit (PQL) and other value >10xPQL? Yes  No

Reviewed By: Kevin A. Lambert Date: 6/4/98



**INORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3—DV3)

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

List below the analytes that do not meet RPD or PQL criteria. Use the same criteria as those used for laboratory duplicate analysis or criteria specified in EPA method or sampling plan.

Sample ID	Matrix	Collection Date	RPD	Control Limit	Action	Samples Affected
<i>CCTA-57A-GR-073-0-0.5 S/DX</i>	<i>soil</i>	<i>2/11/98</i>	<i>46</i>	<i>±35</i>	<i>Barium</i>	<i>Sample results will be "J" or "UJ" coded.</i>
↓	↓	↓	<i>47</i>	<i>±35</i>	<i>Berillium</i>	
↓	↓	↓	<i>43</i>	<i>±35</i>	<i>IRON</i>	

Check for transcription/calculation errors. Briefly summarize errors and associated actions when data quality might have been affected.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**8.0 MATRIX SPIKE ANALYSIS**

NOTE: This matrix spike is a predigestion/predistillation spike.

Was a matrix spike prepared and analyzed at the required frequency? Yes  No

*No MS/MSD was run on ARCO group. The MS/MSD acceptability for the batches is not addressed from another ARCO group. Seek Corrective Action*

Reviewed By: Kevin A. Lambert Date: 6/4/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3—DV3)

Were matrix spikes performed at the concentrations specified by the EPA method? Yes  No  *Not Applicable*

Samples affected: *Note: ARCO C 510219 is associated with this ARCO C*  
*The MS/MSD for ARCO C 510219 showed % recoveries outside of acceptance*  
*criteria for several analytes. See ARCO C 510219 Data Validation*  
*Sample Findings Summary and DV Checklist for data qualification.*

Was matrix spike analysis performed on field or equipment blanks? Yes  No

If equipment or field blanks are the only aqueous samples, matrix spike analysis may be performed; however, matrix spike samples must be present for the other matrices.

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

List below the % recoveries for analytes that did not meet the criteria:

Sample ID	Matrix	Preparation Date	Analyte	%R	Action	Samples Affected
<i>No MS/MSD was run on ARCO C group and acceptance criteria were not checked for bottles from another ARCO C group.</i>						

Check for transcription/calculation errors. Also check to ensure matrix spike concentrations are not affected by sample dilutions performed. If matrix spike concentrations are diluted below or close to IDL based on sample dilutions performed, use professional judgment in qualifying data. Ensure that the laboratory performed sample dilutions only when necessary as indicated by QA/QC requirements. Briefly summarize errors and associated actions when data quality might have been affected.

Reviewed By: Kevin A Lambert Date: 6/9/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

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NOTE: If preparation blank spikes are analyzed, evaluate recoveries. These recoveries can indicate whether excursions in matrix spike recovery are caused by sample matrix effects or poor digestion efficiencies and/or problems with matrix spike solution. For example, if matrix spike recovery for selenium is 0% and preparation blank spike recovery for selenium is 92%, this may indicate sample matrix effects.

9.0 FURNACE ATOMIC ABSORPTION ANALYSIS

Were duplicate injections present for each sample, including required QC analyses (not required if MSA is done)? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Were postdigestion spikes analyzed for samples, including QC samples? Yes  No

Were postdigestion spikes analyzed at the required concentration? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Was a dilution analyzed for samples with postdigestion spike recovery <40%? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

MSA Analysis (Method of Standard Additions)—MSA is required when serial dilutions are not within  $\pm 10\%$ . Was MSA required for any sample but not performed? Yes  No

Are MSA calculations outside the linear range of the calibration curve? Yes  No  *Not Applicable*

Reviewed By: Kevin A Lambert Date: 6/4/98

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

NOTE: Ensure the spiking concentrations used for MSA analysis were at 50–100% and 150% of sample concentration or absorbance.

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

10.0 SERIAL DILUTION ANALYSIS

NOTE: Serial dilution analysis (ICP) is required only for initial concentrations equal to or greater than 10xIDL.

If applicable, was a serial dilution performed for:

*Not Applicable*

Each 20 samples? Yes  No

Each matrix type? Yes  No

Samples affected: \_\_\_\_\_  
\_\_\_\_\_

List below results which did not meet criteria of %D < 10% for analyte concentrations greater than 50xIDL before dilution:

Analysis Date	Sample ID	Analyte	IDL	%D	Action	Samples Affected
<i>Not Applicable</i>						

Check for calculation errors and negative interferences.

Reviewed By: *Kevin A Lambert* Date: *Kevin A Lambert*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

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11.0 SAMPLE RESULT VERIFICATION

11.1 Verification of Instrumental Parameters

Are instrument detection limits present and verified on a quarterly basis? Yes  No  *Not Applicable*

Are IDLs present for each analyte and each instrument used? Yes  No

Is the IDL greater than the required detection limits for any analyte? Yes  No   
(If IDL > required detection limits, flag values less than 5xIDL.)

Samples affected: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are ICP Interelement Correction Factors established and verified annually? Yes  No  *Not Applicable*

Are ICP Linear Ranges established and verified quarterly? Yes  No  *Not Applicable*

If no for any of the above, review problems and resolutions in narrative report. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11.2 Reporting Requirements

Were sample results reported down to the PQL? Yes  No

If no, indicate necessary corrections. \_\_\_\_\_  
\_\_\_\_\_

Were sample results that were analyzed by ICP for Se, Tl, As, or Pb at least 5xIDL? Yes  No  *NA 6/4/98*  
*Not Applicable*

Were sample weights, volumes, and dilutions taken into account when reporting sample results and detection limits? Yes  No

Reviewed By: *Karin Lambert* Date: *6/4/98*

INORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3—DV3)

If no for any of the above, sample results may be inaccurate. Note necessary changes and if errors are present, request resubmittal of laboratory package.

Were any sample results higher than the linear range of calibration curve and not subsequently reanalyzed at the appropriate dilution? Yes  No

Samples affected: \_\_\_\_\_

11.3 Sample Quantitation

Check a minimum of 10% of positive sample results for transcription/calculation errors. Summarize necessary corrections. If errors are large, request resubmittal of laboratory package.

Comments:

*Minor transcription errors between Case Narrative & QC report and data not appropriately "5" coded. See Section 5.046.0*

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_

\*Task/Project Leader is responsible for approval of data set.

Reviewed By: Kevin A. Lambert Date: 6/14/98

Site: Site 57A, CLTA

AR/COC: 510221

Data Classification: Radiometrics

COPY

Sample Fraction No.	Analysis	DV Qualifiers	Comments
			No data is 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: Kevin A Lambert Date: 6/5/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: March 10, 1998



# ANALYTICAL RADIOCHEMISTRY DATA VALIDATION CHECKLIST

Project Name <i>Site 57A, CLTA</i>			Site Name <i>ARC Coast 7215.2203</i>	
Laboratory Name/Job No./Batch No. <i>CORE / 980372</i>			Chain of Custody No. <i>510221</i>	
Analysis Method <i>EPA 902.0</i>			Parameter List: <i>Gross Alpha/Beta</i>	
REVIEW ITEM	YES	NO	NA	COMMENTS
<b>A. HOLDING TIMES</b>				
1. Preparation and analysis holding times met?				<i>SEE CVP FORM</i>
2. Short-half life parameters analyzed for and checked?				
<b>B. CALIBRATION VERIFICATION</b>				
1. Detectors numbered and documented?	✓			
2. Frequency: Daily <input checked="" type="checkbox"/> weekly <input type="checkbox"/> or monthly <input type="checkbox"/> ?	✓			
3. Acceptance criteria: Met?	✓			
<b>C. LABORATORY CONTROL SAMPLES</b>				
1. Standard: Independent, certified reference material?	✓			<i>LCS met acceptance criteria</i>
2. Frequency: Each batch?	✓			
3. % Recovery 80-120% or ____?	✓			
<b>ETHOD BLANK</b>				
1. Frequency: Each batch?	✓			<i>Target analytes were not detected above MDA</i>
2. Matrix: Matrix specific?	✓			
3. Preparation: Entire procedure?	✓			
4. Blanks show contamination?		✓		
<b>E. MATRIX SPIKE</b>				
1. Frequency: Each batch?			✓	<i>No MS/MSD was run on ARCDC group</i>
2. Matrix: Matrix specific?			✓	
3. Preparation: Entire procedure?			✓	
4. % Recovery: 75-125% or ____?			✓	
<b>F. ANALYTICAL YIELDS/OTHER</b>				
1. Tracer: Correct type, recovery met?	✓			
2. Ingrowth and/or decay: Correct factors applied?	✓			
3. Solids density: Planchette loading <5 mg/cm <sup>2</sup> ?	✓		✓	
<b>G. DUPLICATE</b>				
1. Type: Lab or field?	✓			<i>LCS D met acceptance criteria</i>
2. Frequency: Each batch?	✓			
3. Matrix: Matrix specific?	✓			

**ANALYTICAL RADIOCHEMISTRY DATA VALIDATION  
CHECKLIST (CONTINUED)**

Project Name				Site Name
Laboratory Name/Job No./Batch No.				Chain of Custody No.
Analysis Method			Parameter List	
REVIEW ITEM	YES	NO	NA	COMMENTS
4. Preparation: Entire procedure?	✓			
<b>H. ANALYTE DETECTION</b>				
1. Detection limit sample/batch specific?	✓			
2. Errors evaluated?	✓			
3. False positives/negatives suspected?		✓		

Reviewed by: Kevin A Lambert 6/4/98

- ① All samples <sup>MAC 6/4/98</sup> met were prepared and analyzed with specified methods and accepted procedures.
- ② All QC measures met acceptance criteria: No target analytes above MDA in MB. LCS/LCSD met control limits. No MS/MSD was run on ARCOL group. The RPDs for field duplicate pair met acceptance criteria.
- ③ Data is acceptable.
- ④ QC measure appear to be adequate.

Site: 57A

AR/COC: 510223

Data Classification: ORGANIC

CCTA -  
↓

Sample Fraction No.	Analysis	DV Qualifiers	Comments
57A-GR-027-C	EPA 8270	R	Poor surrogate recovery due to sample matrix
↓ -028-C	↓	↓	Confirmation analysis not performed due to apparent damage to instrumentation. <small>REL 4/13/98</small>
↓ -029-C	↓	↓	
<small>- PROBABLY SINCE ALL SWG'S WERE HD, &amp; ASSUMING WERE VASE, THEY MAY ACTUALLY BE SOME SWG'S IN SAND - CONFIRM W/ TELL SWG VALUES</small>			
Data is acceptable except for 3 samples identified above.			
QC measures are adequate			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions\_CE, EPA6010, EPA6020, EPA7470'1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH\_ALK, HACH\_NO2, HACH\_NO3, MEKC\_HE, PCBRISC

Reviewed by: Kevin A Lambert Date: 4/13/98

List of Data Qualifiers used in Data Validation and Associated Comment Responses

Qualifier	Comment
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample (LCS) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike (MS) do not meet acceptance criteria.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in continuing calibration blank.
J	The associated value is an estimated quantity. (Note: this qualifier may be used in conjunction with other qualifiers (i.e., A,J)
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.
Q	Quantitation limit reported does not meet Data Quality Objective (DQO) requirements.
R	The data are unusable for their intended purpose (Note: Analyte may or may not be present.)
U	The analyte is a common laboratory contaminant. The associated result is less than ten times the concentration in any blank.
U1	The analyte was also detected in a blank. The associated result is less than five times the concentration in any blank.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

\* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

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ARCOC # 510223

SITE OR PROJECT 57A  
 ANALYTICAL LABORATORY CORE  
 LABORATORY REPORT # 980373  
 CASE NO. 7212 ~~7512-2203~~

SAMPLE IDS 6: 5 soil, 1 water  
 NO. OF SAMPLES 036867-002 to 036871-002,  
036872-007

KPL  
 4/3/98

7512-2203  
 7215-2203

DATA ASSESSMENT SUMMARY

Describe problems/qualifications below (Action Items and Areas of Concern)

	VOC	SVOC	PEST/PCB	OTHER
1. HOLDING TIMES/PRESERVATION	NA	✓	NA	NA
2. GC/MS INST. PERFORM.		✓		
3. CALIBRATIONS/WINDOWS		✓		
4. BLANKS		✓		
5. SURROGATES		N R <sup>KPL</sup> 4/3/98		
6. MATRIX SPIKE/DUP		NA		
7. LABORATORY CONTROL SAMPLES		✓		
8. INTERNAL STANDARDS		✓		
9. COMPOUND IDENTIFICATION		✓		
10. SYSTEM PERFORMANCE		✓		
11. OVERALL ASSESSMENT	↓	✓	↓	↓

✓ (check mark) — Acceptable: Data had no problems or qualified due to minor problems

N - Data qualified due to major problems

X - Problems, but do not affect data

Qualifiers: J - Estimate

UJ - Undetected, estimated

NA - Not Applicable

R - Unusable

KPL 4/3/98

ACTION ITEMS: (1) All samples were prepared and analyzed with specified methods and accepted procedures. (2) All QC data met acceptance criteria except for surrogate <sup>KPL</sup>

4/3/98

AREAS OF CONCERN: <sup>KPL</sup> recoveries for <sup>one</sup> two compounds in 3 samples, and one compd in 2 samples. The low recoveries for these two surrogates is due to matrix interferences. All detected

Reviewed By: Kevin A. Lambert

Date: 4/3/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

PROJECT/TASK LEADER: \_\_\_\_\_

KAC 4/3/98

ACTION ITEMS: analytes will be "J" coded and nondetects will be "R" coded for the appropriate field samples.

(3) No MS/MSD was submitted/reported for this SDG. (4) No field dup pair was submitted for this SDG. (5) Confirmatory analysis for the low surrogate recoveries was not performed due to apparent damage to instrumentation.

Data is acceptable except for those 3 samples with low surrogate recoveries. These samples

KAC 4/3/98

AREAS OF CONCERN: will have analytes "R" coded.

QC measures are adequate. See cover letter for discussion on poor surrogate recovery.

OVERALL DATA QUALITY ASSESSMENT See above

Reviewed By: Kevin A Lambert  
Date: 4/3/98

**ORGANIC DATA ASSESSMENT SUMMARY FORM**  
(Data Verification/Validation Level 3 DV-3)

**1.0 HOLDING TIMES AND PRESERVATION**

Indicate the holding time criteria below that was used to evaluate the samples.

SW-845, 3rd. ed.  
Other: \_\_\_\_\_

List below samples that were over holding time criteria.

Sample ID	VTSR	Date Analyzed	Action

*See CVR Form*

NOTE: VTSR = Validated time of sample receipt.

Were the correct preservatives used? Yes  No

List below samples that were incorrectly preserved.

Sample No.	Type of Sample	Deficiency	Action

Reviewed By: *V. L. P. 1 + 2/100*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

2.0 GC/MS TUNING CRITERIA

Has a GC/MS tuning performance been analyzed for every twelve hours of sample analysis for each GC/MS instrument used? Yes  No

Was the correct standard (listed in the EPA Method) used? Yes  No

Have the ion abundance criteria been met for each tune? Yes  No

NOTE: GC/MS abundance criteria is specified by EPA method for GC/MS analysis (EPA 8240A or 8270A).

If no for any of the above, list all the data associated with the tune that either failed criteria or in which there was no tune.

Date/Time	Problem	Sample Affected (Action)
	<i>Met</i>	
	<i>Criteria</i>	

Check for transcription/calculation errors. If errors are present, briefly summarize necessary changes:

---

---

---

Is the spectra of the mass calibration acceptable? Yes  No

Reviewed By: \_\_\_\_\_  
Date: \_\_\_\_\_



ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

3.0 GC INSTRUMENT PERFORMANCE. *Not Applicable*

3.1 DDT Retention Time

Is DDT retention time for packed columns >12 minutes (except for OV-1 and OV-101)?

Yes  No

If no, list below the DDT standards that failed criteria: \_\_\_\_\_

Affected samples and compounds: \_\_\_\_\_

3.2 Retention Time Windows

List below compounds that were not within the retention time windows.

Date/Time	Compound	RT	RT Window	Action	Affected Samples

*VIP 11.1*

**ORGANIC DATA ASSESSMENT SUMMARY FORM**  
 (Data Verification/Validation Level 3 DV-3)

**3.3 DDT and Endrin Degradation**

List below the standards that have a DDT or Endrin breakdown of >20% (or a combined breakdown of >20%).

Date/Time	Standard ID	DDT/Endrin	% Breakdown	Action	Affected Samples

**3.4 DBC Retention Time Check**

Is the %D between EVAL A and each analysis (quantitation and confirmation) DBC retention time within QC limits (2% for packed column, 0.3% capillary ID <0.32 mm and 1% for megabore)?

Yes  No

Date	Sample ID	DBC %D	Action

For the above criteria outlined in Sections 8.1-8.4, check for transcription/calculation errors.

If errors are found, list below with necessary corrections: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewed By: Kevin A. Lambert  
 Date: 4/3/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

4.0 INITIAL CALIBRATION

Has initial calibration been performed as required in the EPA method? Yes  No

Were the correct number of standards used to calibrate the instrument? Yes  No

For GC analyses of PCBs and Pesticides, did the laboratory follow the correct 72-hour sequence of analysis?  
Yes  No  *Not Applicable*

List below compounds which did not meet initial calibration criteria outlined by the EPA method.

Instrument ID	Date	Compound	RP%RSD	Action	Samples Affected
<i>Met Criteria</i>					

Check for transcription/calculation errors. If errors are present, summarize necessary corrections below:

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Reviewed By: *Kevin A Lambert*  
Date: *4/2/98*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

5.0 CONTINUING CALIBRATION

Have continuing calibration standards been analyzed at the frequency specified in the EPA method?

Yes  No

List below all compounds which did not meet continuing calibration requirements.

Instrument ID	Date	Compound	RP% <sub>D</sub>	Action	Samples Affected
<i>Met Criteria</i>					

Check for transcription and calculation errors. If errors are found, briefly summarize necessary corrections below:

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Reviewed By: *Kevin A. Lambert*  
Date: *4/3/98*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

6.0 BLANK ANALYSES

6.1 Method/Reagent and Instrument Blanks

Has a method/reagent blank been analyzed for each set of samples or for every 20 samples of similar matrix, whichever is more frequent? Yes  No

Has an instrument blank been analyzed at least once every twelve hours for each GC/MS system used? Yes  No

6.2 Field Rinse Equipment Blanks

Are there field rinse/equipment blanks associated with each sampling day or at frequency specified in the sampling plan. Yes  No

List below compounds for which analyses were requested that were detected in any of the blanks analyzed:

Date	Blank ID	Compound	Conc. <i>ug/L</i>	PQL <i>ug/L</i>	Action Level	Samples Affected (Action)
2/12/98	CCTA-57A-GR-000-EB	Bis(2-ethylhexyl) phthalate	2.0 J	10		Not detected in samples and < PQL. No data is qualified

PQL = Practical Quantitation Limit from EPA Method.

Reviewed By: Kevin A. Lambert

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

Are there any TICs present in the blanks that are also present in the samples? Yes  No   
 If yes, list below.

7.0 SURROGATE RECOVERY

Were surrogate recoveries evaluated for each of the samples analyzed by GC or GCMS?  
 Yes  No

If surrogate standards other than those presented by SW-845 are used, list below with reference to applicable control limits used to evaluate the percent recoveries.

Surrogate Compound

Control Limits

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\_\_\_\_\_

List below the percent recoveries which did not meet either SW-845 criteria or criteria listed above.

Date	Sample ID/Matrix	Surrogate Compound	%Rec	Action
2/24/98	CCTA-57A-GR-027-C	2,4,6-Tribromophenol	9 (19-122)	Low %REC due to sample matrix/contaminant
↓	028-C	↓	1	No confirmation
	029-C	↓	3	analysis performed
2/25/98	CCTA-57A-GR-028-C	2-Fluorophenol	16 (25-121)	due to apparent damage to instrumentation.
↓	029-C	↓	14	If % Rec in many surrogate fractions is qualified.
				10% appropriate.
				11/2/98 (i.e. said). All detected will be "J" coded, non detected "B" coded.

Reviewed By: Karin A. Lambert  
 Date: 4/3/98

ORGANIC DATA ASSESSMENT SUMMARY FORM

(Data Verification/Validation Level 3 DV-3)

If surrogate recovery was outside of control limits, were the samples or method blank reanalyzed?

Yes  No  *See table previous page for discussion*

Are method blank surrogate recoveries outside of limits upon reanalysis? Yes  No

Are transcription/calculation errors present? Yes  No

if yes, note necessary corrections. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed By: *Kevin A. Lambert*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

8.0 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSIS

Were MS/MSDs analyzed at the frequency required by the EPA method or OAPJP for each matrix type?

Yes  No  *Not Submitted/Not Reported*

List below % recoveries and RPDs of compounds which did not meet criteria. Indicate on chart criteria used to evaluate recoveries and RPDs.

Date	Sample ID:Matrix	Compound	%Rec RPD	Action
<i>Not Submitted</i>				
<i>Not Reported</i>				

Reviewed By: *Kevin A Lambert*  
Date: *4/3/98*



ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

9.0 LABORATORY CONTROL SAMPLE ANALYSIS

Have laboratory control samples containing a representative number of the compounds of interest been analyzed at the frequency specified in the EPA method or QAPP?

Yes  No

Evaluate percent recoveries based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

Date	Compound	%Rec	Control Limits	Action	Samples Affected
<i>Met Criteria</i>					

Control Limit Reference: \_\_\_\_\_

Evaluate RPD based on control limits established in individual EPA methods, or use established laboratory control limits. List below recoveries of compounds which did not meet criteria with reference to control limits used.

Date	Compound	%Rec	Control Limits	Action	Samples Affected
<i>Met Criteria</i>					

Control Limit Reference: \_\_\_\_\_

Reviewed By: *Kevin A Lambert*  
Date: \_\_\_\_\_

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

10.0 INTERNAL STANDARDS EVALUATION

List below the internal standard areas of samples or blanks which did not meet criteria.

Date	Sample ID	Internal Out	Acceptable Range	Action

*Met Criteria*

Are retention times of the internal standards within 30 seconds of the associated calibration standard?

Yes  No

11.0 TARGET COMPOUND LIST ANALYTES

11.1 GC/MS Analyses

Are the reconstructed ion chromatograms, the mass spectra for the identified compounds, and the data system printouts included? Yes  No

Is chromatographic performance acceptable with respect to:

Baseline stability? Yes  No

Resolution? Yes  No

Peak shape? Yes  No

Full-scale graph (attenuation)? Yes  No

Reviewed By: *Kenn A Lambert*  
 Date: 4/3/98

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

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Other: \_\_\_\_\_

Is the RRT of each reported compound within the limits given in the method of the standard RRT in the continuing calibration? Yes  No

Are all the ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the mass spectrum? Yes  No

Do sample and standard relative intensities agree within 20%? Yes  No

If no for any of the above, indicate below problems and qualifications made to data:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11.2 GC Analyses

*Not Applicable*

Are there any transcription/calculation errors between the raw data and the reporting forms?  
Yes  No

If yes, review errors and necessary corrections below; if errors are large, resubmittal of laboratory package may be necessary.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Are retention times of sample compounds within the calculated retention time windows for both quantitation and confirmation analysis? Yes  No

Was GC/MS confirmation performed when required by the EPA method? Yes  No

If no for any of the above, reject positive results except for retention time windows if associated standard compounds are similarly shifted.

Reviewed By:

*Kevin A. Lusk*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
 (Data Verification/Validation Level 3 DV-3)

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Check chromatograms for false negatives, especially for the multiple peak components (toxaphene and FCEs). If false negatives are apparent and the appropriate PCB standards were not analyzed, or if confirmed analysis was not present, flag the affected data.

Samples affected: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

NOTE: Due to the complexities of PCB pesticide analysis, each analytical run should be reviewed to verify identification and column performance.

12.0 FIELD DUPLICATE ANALYSIS

Were field duplicates submitted for analysis? Yes  No

If yes, calculate RPD and use professional judgment to determine if the data needs to be qualified. List results below.

Date	Sample ID	Compound	Sample Result	Duplicate Result	RPD	Affected Samples
<i>No. Submitted</i>						

13.0 COMPOUND QUANTITATION/REPORTED DETECTION LIMITS

*Not Applicable*

Are there any transcription/calculation errors from raw data to reported results (check at least 10% of positive results)? Yes  No

In addition, verify that the correct internal standard, quantitation ion, and RRF were used to calculate the result for a minimum of 10% of sample data.

Reviewed By: *Kenn A Lambert*  
 Date: *4/3/98*

ORGANIC DATA ASSESSMENT SUMMARY FORM  
(Data Verification/Validation Level 3 DV-3)

13.1 Chromatogram Quality

*Not Applicable*

Were baselines stable? Yes  No

Were any negative peaks or unusual peaks present? Yes  No

Were early eluting peaks resolved to baseline? Yes  No

If incorrect quantitations are evident, note corrections necessary below:

Are the required quantitation limits (detection limits) adjusted to reflect sample dilutions and for soils, sample moisture? Yes  No

If no, make necessary corrections and note below.

14.0 TENTATIVELY IDENTIFIED COMPOUNDS

*Not Applicable*

Are Tentatively Identified Compounds (TIC) properly identified with scan number or retention time, estimated concentration, and J qualifier? Yes  No

Are the mass spectra for TICs and associated "best match" spectra included? Yes  No

Are any TCL compounds listed as TIC compounds? Yes  No

Are each of the ions present in the reference mass spectra with a relative intensity greater than 10% also present in the sample mass spectrum? Yes  No

Reviewed By: *Kenn A Lambert*  
Date: *4/3/98*





**ANNEX 7-C**  
**Risk Screening Assessment**





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## **SWMU 57A: RISK SCREENING ASSESSMENT**

### **I. Site Description and History**

Sandia National Laboratories/New Mexico (SNL/NM) Solid Waste Management Unit (SWMU) 57A is identified as the Workman Site: Firing Site, in the Hazardous and Solid Waste Amendments Module of SNL/NM's Resource Conservation and Recovery Act (RCRA) Permit. SWMU 57A is located on the northeast corner of the intersection of Lovelace Road and Isleta Road in the south-central portion of Kirtland Air Force Base (KAFB). SWMU 57A is a former artillery firing area that was used during World War II for the development of the proximity fuze – a radar-activated, variable-timed bomb fuze used in anti-aircraft defense munitions. A variety of artillery pieces were used to fire test shells at targets suspended between the two former towers at SWMU 57B, Workman Site: Target Area, located approximately 2 miles to the east. Subsequent activities may have included the storage of vehicles from the Nevada Test Site and unknown activities associated with the utility pole/steel plate area, and in the underground bunker. At some unrecorded date, the largest concrete slab, Pad 1, was graded over and three piles of debris were collected and burned on the new ground surface.

The site includes two small buildings, five concrete slabs, two concrete gun mount positions, three wood utility poles set around a fixed metal plate, and an underground bunker. Three debris mounds, containing burned trash, were sampled and removed as a Voluntary Corrective Measure (VCM) in January 1997.

### **II. Comparison of Results to Data Quality Objectives**

The confirmatory soil sampling at SWMU 57A was designed to collect adequate samples to:

- Determine the nature and extent of possible constituents of concern (COCs) in soil and concrete at the site features
- Provide sufficient Level 3 analytical data to support risk screening assessments.

Table 1 summarizes the sampling strategy for SWMU 57A. The potential COCs at this site were radionuclides, RCRA metals, high explosives (HE), and semivolatile organic compounds (SVOC). Based upon their know history, certain site features also had the potential for additional COCs such as volatile organic compounds (VOC), and polychlorinated biphenyls (PCB). Concrete slabs were also typically sampled for Toxicity Characteristic Leaching Procedure (TCLP) metals and SVOC analysis.

The number and locations of the samples collected depended on limited historical information, surface features, newly discovered features, and consultations with New Mexico Environment Department – Hazardous and Radioactive Materials Bureau (NMED-HRMB) and Department of Energy Oversight Bureau (DOE-OB) personnel.

**Table 1**  
**Summary of RFI Sampling Performed at**  
**SWMU 57A to Meet Data Quality Objectives**

<b>SWMU Feature</b>	<b>Potential COCs</b>	<b>Number and Type of Samples Collected</b>	<b>Sampling Location Rationale</b>
Site Specific Background	NA	5 soil at 2 depths (0-0.5, 0.5-1.0 ft)	To establish site-specific background concentration numbers for comparison with RFI samples.
Pad 1	Radionuclides, RCRA and TCLP Metals, HE, SVOCs	5 concrete, 5 soil at 2 depths (0-0.5, 0.5-1.0 ft) along east edge of slab	Locations selected based upon air photo locations for slab staining and former artillery firing positions.
Former Building Foundation	RCRA and TCLP Metals, HE, SVOCs	1 concrete, 4 soil at 0-0.5ft	To sample the floor of the structure and around the perimeter for indications of a release.
Former Gun Mount Positions	RCRA Metals, HE, SVOCs	12 soil at 2 depths (0-0.5, 0.5-1.0 ft)	To sample areas around known and inferred artillery positions for evidence of surface contamination.
Buildings 9900 and 9902	RCRA Metals, HE, SVOCs	4 soil at 2 depths (0-0.5, 0.5-1.0 ft) around each building	To sample around the perimeter of each building for evidence of a release.
Former Wind Tunnel/Machine Shop Pad	Radionuclides, RCRA and TCLP Metals, HE, SVOCs, VOCs	1 concrete, 4 soil at 0-0.5ft	To sample the slab and perimeter for evidence of a release
Former Transformer Pad	Radionuclides, RCRA and TCLP Metals, HE, SVOCs, PCBs	1 concrete, 4 soil at 0-0.5ft	To sample the slab and perimeter for evidence of a release
Pad 3, Steel Plate and Utility Pole Area	Radionuclides, RCRA Metals, HE, SVOCs	10 soil at 2 depths (0-0.5, 0.5-1.0 ft) around the pad and utility poles	To sample this area for evidence of a release
Pad 2	Radionuclides, RCRA and TCLP Metals, HE, SVOCs	1 concrete, 4 soil at 0-0.5ft	To sample the slab and perimeter for evidence of a release
Underground Bunker	Radionuclides, RCRA and TCLP Metals, HE, SVOCs	4 concrete, 4 soil beneath the concrete, 1 from floor drain.	To sample the bunker floor and floor drain for evidence of a release
Three Debris Mounds	Radionuclides, RCRA Metals, HE, SVOCs, VOCs	1 sample from the center of each mound and 1 soil sample directly beneath the mound contact with the original grade.	To characterize the mound material for disposal and to sample the underlying soil for evidence of a release

COC = Constituent of concern.  
ft = Feet.  
HE = High explosives.  
NA = Not applicable.  
PCB = Polychlorinated biphenyl.

RFI = RCRA facility investigation.  
SVOC = Semivolatile organic compound.  
SWMU = Solid waste management unit.  
VOC = Volatile organic compound.

Table 2 summarizes the analytical methods and data quality requirements necessary to support risk screening assessments. The SNL/NM Environmental Restoration Laboratory results were used to characterize the three debris mounds, not for risk assessment purposes. The SNL/NM Radiation Protection Sample Diagnostics Laboratory was used gamma spectroscopy analyses. The remainder of the analyses were performed at Core Laboratories in Denver, Colorado, or General Engineering Laboratories (GEL) in Charleston, South Carolina.

The SNL/NM Sample Management Office conducted Data Validation 1 and 2 reviews for all off-site data in accordance with Technical Operating Procedure 94-03, Rev. O. (SNL/NM July 1994). A Level 3 data validation was also performed by SNL/NM Environmental Restoration personnel on all off-site data in accordance with this same Technical Operating Procedure. All gamma spectroscopy data was reviewed by SNL/NM Department 7713 in accordance with the Radiation Protection Sample Diagnostics Procedure RPSD-02-11 (SNL/NM July 1996). The data quality objectives (DQOs) for SWMU 57A have been met.

### **III. Determination of Nature, Rate of Migration, and Extent of Contamination**

#### **III.1 Introduction**

The nature, rate of migration, and extent of contamination at SWMU 57A was determined based upon an initial conceptual model validated by confirmatory sampling at the site. The initial conceptual model was developed from historical background information including numerous site inspections, personnel interviews, historical photographs, radiological surveys, and exploratory trenching. The DQOs contained in the OU 1334 Work Plan (SNL/NM October 1994) identified some sample locations, sample density, sample depths, and analytical requirements. Based upon new site information, additional sampling locations and analyses were requested by NMED-HRMB personnel. The soil samples were collected in accordance with the procedures described in Field Operating Procedure 94-15 (SNL/NM April 1996). Concrete samples were collected by chipping the surface of the slab with an electric hammer drill. The data collected were subsequently used to develop the final conceptual model for SWMU 57A, which is presented in Section 7.7 of the associated no further action (NFA) proposal. The data specifically used to determine the nature, rate of migration, and extent of contamination are described below.

#### **III.2 Nature of Contamination**

The nature of contamination at SWMU 57A was determined with analytical testing of soil, concrete, and debris and an evaluation of the potential for degradation of relevant COCs (Section V). The analytical requirements for confirmatory sampling included radionuclides (gamma spectrum, isotopic uranium and thorium, gross alpha/gross beta), metals (RCRA, TAL, TCLP), high explosives, semivolatile organic compounds (including TCLP SVOCs), volatile organic compounds, and polychlorinated biphenyls. These analytes and methods are appropriate to characterize the possible COCs at the site.

**Table 2**  
**Summary of SWMU 57A Data Quality Requirements**

Analytical Requirement	Data Quality Level	Radiation Protection Sample Diagnostics Laboratory, Department 7713, SNL/NM	Environmental Restoration Chemistry Laboratory, Department 6132, SNL/NM	Core Laboratories Denver CO., and Casper Wyoming	General Engineering Laboratories, Charleston, South Carolina
Radionuclides (gamma spectroscopy)	Level 2	62	--	--	--
Radionuclides (Isotopic uranium and thorium)	Level 3	--	--	--	11
Radionuclides (gross alpha/gross beta)	Level 3	--	--	10	44
RCRA Metals plus Beryllium	Level 2	--	17	--	--
RCRA Metals plus Beryllium	Level 3	--	--	122	--
TAL Metals	Level 2	--	7	--	--
TAL Metals	Level 3	--	--	12	--
High Explosives	Level 2	--	7	--	--
High Explosives	Level 3	--	--	115	--
Semivolatile Organic Compounds	Level 2	--	8	--	--
Semivolatile Organic Compounds	Level 3	--	--	110	--
Volatile Organic Compounds	Level 2	--	8	--	--
Volatile Organic Compounds	Level 3	--	--	6	--
TCLP SVOCs	Level 2	--	4	--	--
TCLP SVOCs	Level 3	--	--	14	--
TCLP Metals plus Mercury	Level 2	--	4	--	--
TCLP Metals plus Mercury	Level 3	--	--	14	--
Polychlorinated Biphenyls	Level 3	--	--	5	--

RCRA = Resource Conservation and Recovery Act.  
 SNL/NM = Sandia National Laboratories, New Mexico.  
 SVOC = Semivolatile organic compound.  
 SWMU = Solid waste management unit.  
 TAL = Target Analyte list  
 TCLP = Toxicity characteristic leaching procedure.  
 -- = Not applicable.

### III.3 Rate of Contaminant Migration

The rate of COC migration in soil predominantly depends on site meteorological and surface hydrologic processes as described in Section V. Data available from the Site-Wide Hydrogeologic Characterization Project (published annually); numerous SNL/NM air, surface water, and radiological monitoring programs; biological surveys; and other governmental atmospheric monitoring at the KAFB (i.e., National Oceanographic and Atmospheric Administration) are adequate to characterize the rate of COC migration at SWMU 57A. COC migration from concrete is not considered in this discussion, since TCLP analyses do not indicate the release of any COCs via leaching.

### III.4 Extent of Contamination

Confirmatory soil and concrete samples were collected in areas expected to have the highest potential for contamination. These sample locations were deemed appropriate to determine the possible vertical extent of COC migration.

The sample density was determined based upon the size of the SWMU, the size of individual features under investigation, and the number of likely areas for possible contaminant releases. The sample number was deemed sufficient to establish the presence or absence of COCs at these features.

In summary, the design of the confirmatory sampling was appropriate and adequate to determine the nature, rate of migration, and extent of contamination.

## IV. Comparison of COCs to Background Screening Levels

Site history and characterization activities are used to identify potential COCs. The identification of COCs and the sampling to determine the concentration levels of those COCs across the site are described in the SWMU 57A NFA proposal. Generally, COCs evaluated in this risk assessment include all detected organics and radiologicals and all inorganic COCs that were analyzed for. If the detection limit of an organic compound was too high (could possibly cause an adverse effect to human health or the environment), the compound was retained. Nondetect organics not included in this assessment were determined to have sufficiently low detection limits to ensure protection of human health and the environment. In order to provide conservatism in this risk assessment, the calculation uses only the maximum concentration value of each COC determined for the entire site. The approved SNL/NM maximum background concentration (Dinwiddie September 1997) was selected to provide the background screen in Tables 3 and 4. If applicable, human health nonradiological COCs were also compared to SNL/NM Subparts S action levels (IT July 1994).

Nonradiological inorganics that are essential nutrients such as iron, magnesium, calcium, potassium, and sodium are not included in this risk assessment (EPA 1989a). Both radiological and nonradiological COCs are evaluated. The nonradiological COCs evaluated include high explosives (HE), volatile and semivolatile organic compounds, and inorganics.



**Table 3**  
**Nonradiological COCs for Human Health and Ecological Risk Assessment at**  
**SWMU 57A with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K<sub>ow</sub>**

COC Name	Maximum Concentration (mg/kg)	SNL/NM Background Concentration (mg/kg) <sup>a</sup>	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Log K <sub>ow</sub> (for organic COCs)	Is COC a Bioaccumulator? <sup>b</sup> (BCF>40, Log K <sub>ow</sub> >4)
Antimony	0.799	3.9	Yes	16,000 <sup>r</sup>	NA	Yes
Arsenic	6.42	5.6	No	44 <sup>c</sup>	NA	Yes
Barium	321	130	No	170 <sup>d</sup>	NA	Yes
Beryllium	0.736	0.65	No	19 <sup>c</sup>	NA	No
Cadmium	3.84	<1	No	64 <sup>c</sup>	NA	Yes
Chromium, total	14.1	12.8	No	16 <sup>c</sup>	NA	No
Cobalt	7.66	5.2	No	10,000 <sup>m</sup>	NA	Yes
Copper	52	15.4	No	6 <sup>c</sup>	NA	No
Lead	133	11.8	No	49 <sup>c</sup>	NA	Yes
Mercury	2.55	<0.1	No	5500 <sup>c</sup>	NA	Yes
Nickel	14.7	11.5	No	47 <sup>c</sup>	NA	Yes
Selenium	0.72 J	<1	Unknown	800 <sup>e</sup>	NA	Yes
Silver	4.63	<1	No	0.5 <sup>c</sup>	NA	No
Thallium	0.155 J	<1.1	Unknown	119 <sup>e</sup>	NA	Yes
Vanadium	26.7	20.4	No	3,000 <sup>d</sup>	NA	Yes
Zinc	214	62	No	47 <sup>c</sup>	NA	Yes
Isopropylbenzene	0.0012 J	NA	NA	35.5 <sup>f</sup>	3.66 <sup>f</sup>	No
Methylene chloride	0.0018 J	NA	NA	5 <sup>g</sup>	1.25 <sup>g</sup>	No
Acenaphthylene	0.25 J	NA	NA	575 <sup>h</sup>	4.07 <sup>h</sup>	Yes
Anthracene	0.256 J	NA	NA	917 <sup>c</sup>	4.45 <sup>c</sup>	Yes
Benzo(a)anthracene	0.20 J	NA	NA	10,000 <sup>h</sup>	5.61 <sup>h</sup>	Yes
Benzo(b)fluoranthene	0.42	NA	NA	--	6.124 <sup>h</sup>	Yes
Benzo(k)fluoranthene	0.29 J	NA	NA	93,325 <sup>h</sup>	6.84 <sup>h</sup>	Yes
Benzo (g,h,i)perylene	0.25 J	NA	NA	58,884 <sup>h</sup>	6.58 <sup>h</sup>	Yes
Benzo(a)pyrene	0.3 J	NA	NA	3,000 <sup>c</sup>	6.04 <sup>c</sup>	Yes
bis (2-ethylhexyl) phthalate	4.7	NA	NA	851 <sup>i</sup>	7.6 <sup>h</sup>	Yes
Butyl benzyl phthalate	0.083 J	NA	NA	663 <sup>g</sup>	4.77 <sup>h</sup>	Yes

Refer to footnotes at end of table.

**Table 3 (Continued)**  
**Nonradiological COCs for Human Health and Ecological Risk Assessment at**  
**SWMU 57A with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K<sub>ow</sub>**

COC Name	Maximum Concentration (mg/kg)	SNL/NM Background Concentration (mg/kg) <sup>a</sup>	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Log K <sub>ow</sub> (for organic COCs)	Is COC a Bioaccumulator? <sup>b</sup> (BCF>40, Log K <sub>ow</sub> >4)
Chrysene	0.29 J	NA	NA	18,000 <sup>h</sup>	5.91 <sup>h</sup>	Yes
Dibenzofuran	0.051 J	NA	NA	2,800 <sup>h</sup>	4.12 <sup>h</sup>	Yes
Diethyl phthalate	0.047 J	NA	NA	117 <sup>i</sup>	2.47 <sup>i</sup>	Yes
Di-n-butyl phthalate	4.7	NA	NA	6,761 <sup>i</sup>	4.61 <sup>h</sup>	Yes
Di-n-octyl phthalate	0.055 J	NA	NA	9,334 <sup>h</sup>	5.22 <sup>h</sup>	Yes
Fluoranthene	0.42	NA	NA	12,302 <sup>h</sup>	4.90 <sup>h</sup>	Yes
Indeno(1,2,3-cd)pyrene	0.18 J	NA	NA	59,407 <sup>h</sup>	6.58 <sup>h</sup>	Yes
2-Methylnaphthalene	0.24 J	NA	NA	2,800 <sup>h</sup>	3.86 <sup>h</sup>	Yes
Naphthalene	0.1 J	NA	NA	1,000 <sup>h</sup>	3.30 <sup>h</sup>	Yes
n-Nitrosodiphenylamine	0.33 J	NA	NA	217 <sup>h</sup>	3.13 <sup>h</sup>	Yes
Pentachlorophenol	0.1 J	NA	NA	776 <sup>i</sup>	5.09 <sup>h</sup>	Yes
Phenanthrene	0.57	NA	NA	23,800 <sup>c</sup>	4.63 <sup>c</sup>	Yes
Pyrene	0.61	NA	NA	36,300 <sup>c</sup>	5.32 <sup>h</sup>	Yes
2,4-Dinitrotoluene	7.6	NA	NA	204 <sup>h</sup>	1.98 <sup>h</sup>	Yes
2,6-Dinitrotoluene	2.9	NA	NA	5,225 <sup>h</sup>	1.72 <sup>h</sup>	Yes
m-Nitrotoluene	0.16 J	NA	NA	16 <sup>h</sup>	2.45 <sup>h</sup>	No
p-Nitrotoluene	0.38	NA	NA	<100 <sup>h</sup>	2.37 <sup>h</sup>	Yes
Nitrobenzene	0.099 J	NA	NA	24 <sup>h</sup>	1.85 <sup>h</sup>	No
RDX	0.24 J	NA	NA	9 <sup>k</sup>	0.87 <sup>h</sup>	No
HMX	1.2	NA	NA	--	0.26 <sup>i</sup>	No
Aroclor 1254	0.013 J	NA	NA	31,200 <sup>c</sup>	6.72 <sup>c</sup>	Yes
Aroclor 1260	0.0068 J	NA	NA	31,200 <sup>c</sup>	6.72 <sup>c</sup>	Yes

**Table 3 (Concluded)**  
**Nonradiological COCs for Human Health and Ecological Risk Assessment at**  
**SWMU 57A with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K<sub>ow</sub>**

<sup>a</sup>From Dinwiddie (September 1997) CTF Super Group.

<sup>b</sup>NMED (March 1998).

<sup>c</sup>BCF and/or Log K<sub>ow</sub> from Yanicak (March 1997).

<sup>d</sup>BCF from Neumann (1976).

<sup>e</sup>BCF from Callahan et al. (1979).

<sup>f</sup>BCF and/or Log K<sub>ow</sub> from Howard (1997).

<sup>g</sup>BCF and/or Log K<sub>ow</sub> from Howard (1990).

<sup>h</sup>BCF and/or Log K<sub>ow</sub> from Micromedex, Inc (1998).

<sup>i</sup>BCF and/or Log K<sub>ow</sub> from Howard (1989).

<sup>j</sup>BCF and/or Log K<sub>ow</sub> from Howard (1991).

<sup>k</sup>BCF and/or Log K<sub>ow</sub> from Talmage et al. (1996).

<sup>l</sup>BCF and/or Log K<sub>ow</sub> from Maxwell and Opresko (1996).

<sup>m</sup>BCF from Vanderploeg et al. (1975)

B = Associated analyte was also observed in the method blank.

BCF = Bioconcentration factor.

COC = Constituent of concern.

CTF = Coyote Test Field.

J = Estimated concentration.

K<sub>ow</sub> = Octanol-water partition coefficient.

Log = Logarithm (base 10).

mg/kg = Milligram(s) per kilogram.

NA = Not applicable (organic COCs do not have accepted background concentrations).

NMED = New Mexico Environment Department.

SNL/NM = Sandia National Laboratories/New Mexico.

SWMU = Solid waste management unit.

-- = Value could not be found in the literature.

**Table 4**  
**Radiological COCs for Human Health and Ecological Risk Assessment at SWMU 57A with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K<sub>ow</sub>**

COC Name	Maximum Concentration (pCi/g)	SNL/NM Background Concentration (pCi/g) <sup>a</sup>	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Is COC a Bioaccumulator? <sup>c</sup> (BCF>40, Log K <sub>ow</sub> >4)
Cs-137	0.286	0.079	No	3000 <sup>b</sup>	Yes <sup>b</sup>
Th-232	0.88	1.01	Yes	3000 <sup>d</sup>	Yes <sup>b</sup>
U-235	0.29	0.18	No	900 <sup>d</sup>	Yes <sup>d</sup>
U-238	4.08	1.4	No	900 <sup>d</sup>	Yes <sup>d</sup>

<sup>a</sup>From Dinwiddie (September 1997), CTF Super Group.

<sup>b</sup>BCF from Yanicak (March 1997).

<sup>c</sup>NMED (March 1998).

<sup>d</sup>Baker and Soldat (1992).

BCF = Bioconcentration factor.

COC = Constituent of concern.

CTF = Coyote Test Field.

DU = Depleted uranium.

K<sub>ow</sub> = Octanol-water partition coefficient.

Log = Logarithm (base 10).

pCi/g = Picocurie(s) per gram.

SNL/NM = Sandia National Laboratories/New Mexico.

SWMU = Solid waste management unit.

Table 3 lists nonradiological COCs for the human health and ecological risk assessment at SWMU 57A. Table 4 lists radiological COCs for human health and ecological risk assessment. All tables show the associated approved SNL/NM maximum background concentration values (Dinwiddie September 1997). Sections VI.4, VII.2 and VII.3 provide discussion of Tables 3 and 4.

## V. Fate and Transport

The primary releases of COCs at SWMU 57A were to the surface soil. A second release appears to be related to the underground floor bunker floor drain, which is also considered in this discussion. Wind, water, and biota are natural mechanisms of COC transport from the primary release points. Excavation and removal of soil are potential human-caused mechanisms of transport. Winds can be strong in the open, grassland environment at SWMU 57A. Moderate winds can transport soil particles with adsorbed COCs (or COCs in particulate form) as suspended dust, capable of dry or wet deposition away from the site. Strong winds may move larger (sand-sized) particles by saltation. Vegetation and physical structures provide windbreaks, thereby limiting the potential for significant wind erosion at the site. No above-background particulate radioactive COCs have been observed (SNL/NM June 1997).

Water at SWMU 57A is received as precipitation (rain or occasionally snow). The average annual precipitation in this area is about 8 inches (NOAA 1990) and the evapotranspiration value is 95 percent of the total rainfall (Thomson and Smith 1985). Precipitation will either infiltrate or form runoff. Infiltration at the site is enhanced by the nearly flat relief and the sandy nature of the soil (the soil in the area of the site is primarily Tijeras gravelly fine sandy loam [USDA June 1977]). The vegetative cover will also slow runoff, increasing infiltration and loss by evapotranspiration. Runoff from the site is probably only significant during intense rainfall events and during extended rainfall periods when soils are near saturation from previous rainfall. Surface runoff in the area of SWMU 57A is to the west; however, the western side of the site is bounded by Lovelace Road. Therefore, surface runoff from the site will be carried by the bar ditch along this road toward an internal drainage basin on the west side of Kirtland Air Force Base. Runoff may carry soil particles with adsorbed COCs. The distance of transport will depend on the size of the particle and the velocity of the water, which is expected to be low due to the flat terrain.

Water that infiltrates into the soil will continue to percolate through the soil until field capacity is reached. COCs desorbed from the soil particles into the soil solution may be leached into the subsurface soil with this percolation. The effective rooting depths of the soil at SWMU 57A is about 60 inches [USDA June 1977], indicating the depth of the system's transient water cycling zone (the dynamic balance between percolation/infiltration and evapotranspiration). Because groundwater at this site is approximately 82 feet below ground surface (bgs), the potential for COCs to reach groundwater through the unsaturated zone above the watertable is very small. As water from the surface evaporates, the direction of COC movement may be reversed with capillary rise of the soil water. Vegetation increases the rate of water loss from the subsurface soil through transpiration.

Plant roots can take up COCs that are in the soil solution. This may be a passive process, but active (i.e., requiring energy expenditure on the part of the plant) uptake or exclusion of some

constituents in the soil solution may also take place. COCs taken up by the roots may be transported to the aboveground tissues with the xylem stream. Aboveground tissues can take up adsorbed constituents directly from the air or by contact with dust particles. Organic constituents in plant tissues may be metabolized or released through volatilization. That which remains in the tissue may be consumed by herbivores or eventually returned to the soil as litter. Aboveground litter is capable of transport by wind until consumed by decomposer organisms in the soil. Constituents in plant tissues that are consumed by herbivores may pass through the gut and be returned to the soil in feces (at the site or transported from the site in the herbivore), or be absorbed into tissues, to be held, metabolized, or later excreted. The herbivore may be eaten by a primary carnivore or scavenger and the constituents still held in the consumed tissues will repeat the sequence of absorption, metabolism, excretion, and consumption by higher predators, scavengers, and decomposers. The potential for transport of the constituents within the food chain is dependent upon the mobility of the species that comprise the food chain and the potential for the constituent to be transferred across the links in the food chain.

Degradation of COCs at SWMU 57A may result from biotic or abiotic processes. Inorganic COCs at SWMU 57A are elemental in form and are therefore not considered to be degradable. Radiological COCs, however, undergo decay to stable isotopes or radioactive daughter elements. Other transformations of inorganics may include changes in valence (oxidation/reduction reactions) or incorporation into organic forms (e.g., the conversion of selenite or selenate from soil to seleno-amino acids in plants). Degradation processes for organic COCs may include photolysis, hydrolysis, and biotransformation. Photolysis requires light, and therefore takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water, and may occur in the soil solution. Biotransformation (i.e., transformation due to plants, animals, and microorganisms) may occur; however, biological activity may be limited by the aridity of the environment at this site.

Table 5 summarizes the fate and transport processes that may occur at SWMU 57A. COCs at this site include a variety of inorganics (metals, radionuclides and others) and organics (HE, polychlorinated biphenyls [PCBs], and others) in surface soil. Because the topography of the site is flat and the site is moderately vegetated, the potential for transport of COCs by wind or surface-water runoff is moderate to low. Significant leaching into the subsoil is unlikely for most COCs and leaching to the groundwater at this site is highly unlikely. Because of the diversity of COCs at this site, the potential for uptake into the food chain is highly variable, depending on the specific COC in question. The potential for food chain uptake for most metals and radionuclides is expected to be low; however, that for PCBs may be high due to their highly lipophilic nature (as measured by the octanol/water partition coefficient,  $K_{ow}$ ) and their resistance to biotransformation and degradation. For other organics, the potential for food chain uptake will generally be moderate to low due to either lower lipophilicity or higher potential for biotransformation. Degradation of the inorganic COCs is insignificant and the decay of radiological COCs is also insignificant due to their long half lives.

**Table 5**  
**Summary of Fate and Transport at SWMU 57A**

Transport and Fate Mechanism	Existence at Site	Significance
Wind	Yes	Moderate to low
Surface runoff	Yes	Moderate to low
Migration to groundwater	No	None
Food chain uptake	Yes	Variable
Transformation/degradation	Yes	Variable

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 approved SNL/NM maximum background screening value. COCs that are not eliminated during the first screening procedure are subjected to a second screening procedure that compares the maximum concentration of the COC to the SNL/NM proposed Subpart S action level.
Step 4.	Toxicological parameters are identified and referenced for COCs that were not eliminated during the screening steps.
Step 5.	Potential toxicity effects (specified as a Hazard Index [HI]) and excess cancer risks are calculated for nonradiological COCs and background. For radiological COCs, the incremental total effective dose equivalent (TEDE) and incremental estimated cancer risk are calculated by subtracting applicable background concentrations directly from maximum on-site contaminant values. This background subtraction only occurs when a radiological COC occurs as contamination and exists as a natural background radionuclide.
Step 6.	These values are compared with guidelines established by the EPA and U.S. Department of Energy (DOE) to determine if further evaluation, and potential site clean-up, is required. Nonradiological COC risk values are also compared to background risk so that an incremental risk may be calculated.
Step 7.	Uncertainties are discussed in the previous steps.

VI.2 Step 1. Site Data

Section 1 provides the description and history for SWMU 57A. Section II presents a comparison of results to DQOs. Section III describes the determination of the nature, rate, and extent of contamination.

VI.3 Step 2. Pathway Identification

SWMU 57A has been designated a future land-use scenario of industrial (DOE and USAF March 1996) (see Appendix 1 for default exposure pathways and parameters). Because of the location and the characteristics of the potential contaminants, the primary pathway for human exposure is considered to be soil ingestion for the nonradiological COCs and direct gamma exposure for the radiological COCs. The inhalation pathway for both nonradiological and radiological COCs is included because of the potential to inhale dust and volatiles (volatile inhalation for nonradiologicals only). Soil ingestion is included for the radiological COCs as well. No water pathways to the groundwater are considered. Depth to groundwater at SWMU 57A is approximately 82 feet bgs. Because of the lack of surface water or other significant mechanisms for dermal contact, the dermal exposure pathway is considered not to be significant. No intake routes through plant, meat, or milk ingestion are considered appropriate for the industrial land-use scenario. However, plant uptake is considered for the residential land-use scenario.

**Pathway Identification**

<b>Nonradiological Constituents</b>	<b>Radiological Constituents</b>
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

Step 3 is discussed in this section and includes two screening procedures. The first screening procedure is a comparison of the maximum COC concentration to the background screening level. The second screening procedure compares maximum COC concentrations to SNL/NM proposed Subpart S action levels. This second procedure is applied only to COCs that are not eliminated during the first screening procedure.

VI.4.1 Background Screening Procedure

*VI.4.1.1 Methodology*

Maximum concentrations of nonradiological COCs are compared to the approved SNL/NM maximum screening level for this area. The approved SNL/NM maximum background



concentration is selected to provide the background screen in Table 3 and used to calculate risk attributable to background in Table 9. Only the COCs that are above their respective approved SNL/NM maximum background screening levels or do not have a quantifiable background screening level are considered in further risk assessment analyses.

For radiological COCs that exceed the approved SNL/NM background screening levels, background values are subtracted from the individual maximum radionuclide concentrations. Those that do not exceed these background levels are not carried any further in the risk assessment. This approach is consistent with DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (DOE 1993). Radiological COCs that do not have a background value and are detected above the analytical minimum detectable activity are carried through the risk assessment at their maximum levels. The resultant radiological COCs remaining after this step are referred to as background-adjusted radiological COCs.

#### *VI.4.1.2 Background Screening Procedure Results*

Tables 3 and 4 present a comparison of SWMU 57A maximum COC concentrations to the approved SNL/NM maximum background values (Dinwiddie September 1997) for the human health risk assessment. For the nonradiological COCs, thirteen COCs exceeded their respective background screening levels. Two nonradiological COCs have no quantifiable background concentration, so it is not known whether those COCs exceeded background. Thirty-three of the COCs are organic compounds and do not have background screening levels.

The maximum concentration value for lead is 133 milligrams per kilogram (mg/kg). The EPA intentionally does not provide any human health toxicological data on lead, and therefore no risk parameter values can be calculated. However, EPA Region 6 guidance for the screening value for lead for an industrial land-use scenario is 2,000 mg/kg (EPA 1996a); for a residential land-use scenario, the EPA screening guidance value is 400 mg/kg (EPA 1994). The maximum concentration value for lead at this site is less than both screening values, and therefore lead is eliminated from further consideration in the human health risk assessment.

For the radiological COCs, three constituents had maximum measured activities greater than their respective background (U-235, U-238, and Cs-137).

#### *VI.4.2 Subpart S Screening Procedure*

##### *VI.4.2.1 Methodology*

The maximum concentrations of nonradiological COCs not eliminated during the background screening process were compared with action levels (IT July 1994) calculated using methods and equations promulgated in the proposed RCRA Subpart S (EPA 1990) and Risk Assessment Guidance for Superfund (RAGS) (EPA 1989a) documentation. Accordingly, all calculations were based upon the assumption that receptor doses from both toxic and potentially carcinogenic compounds result most significantly from ingestion of contaminated soil. Because the samples were all taken from the surface and near-surface, this assumption is considered valid. If there were ten or fewer COCs and each had a maximum concentration less

than one-tenth of the action level, then the site would be judged to pose no significant health hazard to humans. If there were more than ten COCs, the Subpart S screening procedure is not performed.

#### VI.4.2.2 Results

Because the SWMU 57A sample set has more than 10 COCs that continue past the first screening level (including COCs that do not have background screening values), the proposed Subpart S screening process was not performed. All nonradiological COCs that are not eliminated during the background screening process for SWMU 57A have a calculated hazard quotient and excess cancer risk value.

Radiological COCs have no predetermined action levels analogous to proposed Subpart S levels, and therefore this step in the screening process is not performed for radiological COCs.

#### VI.5 Step 4. Identification of Toxicological Parameters

Tables 6 (nonradiological) and 7 (radiological) show the COCs retained in the risk assessment and the values for the available toxicological information. The toxicological values used for nonradiological COCs in Table 6 are from the Integrated Risk Information System (IRIS) (EPA 1998a), Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), and EPA Region 9 (EPA 1996b) and EPA Region 3 (EPA 1997c) electronic databases. Dose conversion factors (DCF) used in determining the excess TEDE values for radiological COCs for the individual pathways were the default values provided in the RESRAD computer code (Yu et al. 1993a) as developed in the following documents:

- DCFs for ingestion and inhalation are taken from "Federal Guidance Report No. 11, Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion" (EPA 1988a).
- DCFs for surface contamination (contamination on the surface of the site) were taken from DOE/EH-0070, "External Dose-Rate Conversion Factors for Calculation of Dose to the Public" (DOE 1988).
- DCFs for volume contamination (exposure to contamination deeper than the immediate surface of the site) were calculated using the methods discussed in "Dose-Rate Conversion Factors for External Exposure to Photon Emitters in Soil" (Health Physics 28:193-205 [Kocher 1983]) and in ANL/EAIS-8, "Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil" (Yu et al. 1993b).

#### VI.6 Step 5. Exposure Assessment and Risk Characterization

Section VI.6.1 describes the exposure assessment for this risk assessment. Section VI.6.2 provides the risk characterization, including the hazard index (HI) and the excess cancer risk for both the potential nonradiological COCs and associated background for industrial and

**Table 6**  
**Toxicological Parameter Values for SWMU 57A Nonradiological COCs**

COC Name	RfD <sub>o</sub> (mg/kg-day)	Confidence <sup>a</sup>	RfD <sub>inh</sub> (mg/kg-day)	Confidence <sup>a</sup>	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>inh</sub> (mg/kg-day) <sup>-1</sup>	Cancer Class <sup>b</sup>
Arsenic	3E-4 <sup>c</sup>	M	--	--	1.5E+0 <sup>c</sup>	1.5E+1 <sup>c</sup>	A
Barium	7E-2 <sup>c</sup>	M	1.4E-4 <sup>d</sup>	--	--	--	--
Beryllium	2E-3 <sup>c</sup>	L to M	5.7E-6 <sup>c</sup>	M	--	8.4E+0 <sup>c</sup>	B1
Cadmium	5E-4 <sup>c</sup>	H	5.7E-5 <sup>d</sup>	--	--	6.3E+0 <sup>c</sup>	B1
Chromium III	1E+0 <sup>c</sup>	L	5.7E-7 <sup>e</sup>	--	--	--	--
Chromium VI	5E-3 <sup>c</sup>	L	--	--	--	4.2E+1 <sup>c</sup>	A
Cobalt	6E-2 <sup>d</sup>	--	2.9E-4 <sup>d</sup>	--	--	--	--
Copper	3.7E-2 <sup>d</sup>	--	--	--	--	--	D
Mercury	3E-4 <sup>f</sup>	--	8.6E-5 <sup>c</sup>	M	--	--	D
Nickel	2E-2 <sup>c</sup>	M	--	--	--	--	--
Selenium	5E-3 <sup>c</sup>	H	--	--	--	--	D
Silver	5E-3 <sup>c</sup>	L	--	--	--	--	D
Thallium <sup>h</sup>	8E-5 <sup>c</sup>	L	--	--	--	--	D
Vanadium	7E-3 <sup>f</sup>	--	--	--	--	--	--
Zinc	3E-1 <sup>c</sup>	M	--	--	--	--	D
Isopropylbenzene	1E-1 <sup>c</sup>	L	1.1E-1 <sup>c</sup>	M	--	--	D
Methylene chloride	6E-2 <sup>c</sup>	M	8.6E-1 <sup>f</sup>	--	7.5E-3 <sup>c</sup>	1.7E-3 <sup>c</sup>	B2
Acenaphthylene	--	--	--	--	--	--	D
Anthracene	3E-1 <sup>c</sup>	L	3E-1 <sup>d</sup>	--	--	--	D
Benzo(a)anthracene	--	--	--	--	7.3E-1 <sup>d</sup>	7.3E-1 <sup>d</sup>	--
Benzo(b)fluoranthene	--	--	--	--	7.3E-1 <sup>d</sup>	7.3E-1 <sup>d</sup>	B2
Benzo(k)fluoranthene	--	--	--	--	7.3E-2 <sup>d</sup>	7.3E-2 <sup>d</sup>	B2
Benzo(g,h,i)perylene	--	--	--	--	--	--	D
Benzo(a)pyrene	--	--	--	--	7.3E+0 <sup>c</sup>	7.3E+0 <sup>d</sup>	B2
bis (2-Ethylhexyl) phthalate	2E-2 <sup>d</sup>	--	2.2E-2 <sup>d</sup>	--	1.4E-2 <sup>d</sup>	1.4E-2 <sup>d</sup>	--
Butyl benzyl phthalate	2E-1 <sup>c</sup>	L	2E-1 <sup>d</sup>	--	--	--	C
Chrysene	--	--	--	--	7.3E-3 <sup>d</sup>	7.3E-3 <sup>d</sup>	B2
Dibenzofuran	4E-3 <sup>d</sup>	--	4E-3 <sup>d</sup>	--	--	--	D
Diethyl phthalate	8E-1 <sup>c</sup>	L	8E-1 <sup>d</sup>	--	--	--	D
Di-n-butyl phthalate	1E-1 <sup>c</sup>	L	1E-1 <sup>d</sup>	--	--	--	D
Di-n-octyl phthalate	2E-2 <sup>f</sup>	--	2E-2 <sup>f</sup>	--	--	--	--
Fluoranthene	4E-2 <sup>c</sup>	L	4E-2 <sup>d</sup>	--	--	--	D
Indeno(1,2,3-cd) pyrene	--	--	--	--	7.3E-1 <sup>d</sup>	7.3E-1 <sup>d</sup>	B2
2-Methylnaphthalene	--	--	--	--	--	--	--
Naphthalene	4E-2 <sup>d</sup>	--	4E-2 <sup>d</sup>	--	--	--	D
n-Nitrosodiphenylamine	--	--	--	--	4.9E-3 <sup>c</sup>	4.9E-3 <sup>d</sup>	B2
Pentachlorophenol	3E-2 <sup>c</sup>	M	3E-2 <sup>d</sup>	--	1.2E-1 <sup>c</sup>	1.2E-1 <sup>d</sup>	B2
Phenanthrene	--	--	--	--	--	--	D
Pyrene	3E-2 <sup>c</sup>	L	3E-2 <sup>d</sup>	--	--	--	D

Refer to footnotes at end of table.

**Table 6 (Concluded)**  
**Toxicological Parameter Values for SWMU 57A Nonradiological COCs**

COC Name	RfD <sub>o</sub> (mg/kg-day)	Confidence <sup>a</sup>	RfD <sub>inh</sub> (mg/kg-day)	Confidence <sup>a</sup>	SF <sub>o</sub> (mg/kg-day) <sup>-1</sup>	SF <sub>inh</sub> (mg/kg-day) <sup>-1</sup>	Cancer Class <sup>b</sup>
2,4-Dinitrotoluene	2E-3 <sup>c</sup>	H	2E-3 <sup>d</sup>	--	6.8E-1 <sup>c</sup>	6.8E-1 <sup>d</sup>	B2
2,6-Dinitrotoluene	1E-3 <sup>f</sup>	--	1E-3 <sup>d</sup>	--	6.8E-1 <sup>c</sup>	6.8E-1 <sup>d</sup>	B2
m-Nitrotoluene	1E-2 <sup>f</sup>	--	1E-2 <sup>d</sup>	--	--	--	--
p-Nitrotoluene	1E-2 <sup>f</sup>	--	1E-2 <sup>d</sup>	--	--	--	--
Nitrobenzene	5E-4 <sup>c</sup>	L	5.7E-4 <sup>d</sup>	--	--	--	D
RDX	3E-3 <sup>c</sup>	H	3E-3 <sup>d</sup>	--	1.1E-1 <sup>c</sup>	1.1E-1 <sup>d</sup>	C
HMX	5E-2 <sup>c</sup>	L	5E-2 <sup>d</sup>	--	--	--	D
Aroclor 1254 <sup>g</sup>	2E-5 <sup>c</sup>	M	2E-5 <sup>d</sup>	--	2E+0 <sup>c</sup>	4E-1 <sup>c</sup>	B2
Aroclor 1260 <sup>g</sup>	--	--	--	--	2E+0 <sup>c</sup>	4E-1 <sup>c</sup>	B2

<sup>a</sup>Confidence associated with IRIS (EPA 1998) database values. Confidence - L = low, M = medium, H = high.

<sup>b</sup>EPA weight-of-evidence classification system for carcinogenicity (EPA 1989) taken from IRIS (EPA 1998):

A = Human carcinogen.

B1 = Probable human carcinogen. Indicates that limited human data are available.

B2 = Probable human carcinogen. Indicates sufficient evidence in animals and inadequate or no evidence in humans.

C = Possible human carcinogen.

D = Not classifiable as to human carcinogenicity.

<sup>c</sup>Toxicological parameter values from IRIS electronic database (EPA 1998).

<sup>d</sup>Toxicological parameter values from EPA Region 9 electronic database (EPA 1996b).

<sup>e</sup>Toxicological parameter values from EPA Region 3 electronic database (EPA 1997c).

<sup>f</sup>Toxicological parameter values from HEAST database (EPA 1997a).

<sup>g</sup>Slope factors are for PCBs, total.

<sup>h</sup>Toxicological parameter values for thallium sulfate

COC = Constituent of concern.

EPA = U.S. Environmental Protection Agency.

HEAST = Health Effects Assessment Summary Tables.

IRIS = Integrated Risk Information System.

mg/kg-day = Milligram(s) per kilogram day.

(mg/kg-day)<sup>-1</sup> = Per milligram per kilogram day.

RfD<sub>inh</sub> = Inhalation chronic reference dose.

RfD<sub>o</sub> = Oral chronic reference dose.

SF<sub>inh</sub> = Inhalation slope factor.

SF<sub>o</sub> = Oral slope factor.

SWMU = Solid waste management unit.

-- = Information not available.

**Table 7**  
**Radiological Toxicological Parameter Values for SWMU 57A COCs Obtained from RESRAD Risk Coefficients<sup>a</sup>**

COC Name	SF <sub>o</sub> (1/pCi)	SF <sub>inh</sub> (1/pCi)	SF <sub>ev</sub> (g/pCi-yr)	Cancer Class <sup>b</sup>
Cs-137	3.20E-11	1.90E-11	2.10E-06	A
U-238	6.20E-11	1.20E-08	6.60E-08	A
U-235	4.70E-11	1.30E-08	2.70E-07	A

<sup>a</sup>From Yu et al. (1993a).

<sup>b</sup>EPA weight-of-evidence classification system for carcinogenicity (EPA 1989): A - human carcinogen.

1/pCi = One per picocurie.

COC = Constituents of concern.

EPA = U.S. Environmental Protection Agency.

g/pCi-yr = Gram(s) per picocurie-year.

SF<sub>ev</sub> = External volume exposure slope factor.

SF<sub>inh</sub> = Inhalation slope factor.

SF<sub>o</sub> = Oral (ingestion) slope factor.

SWMU = Solid waste management unit.

residential land uses. The incremental TEDE and incremental estimated cancer risk are provided for the background-adjusted radiological COCs for both industrial and residential land uses.

#### VI.6.1 Exposure Assessment

Appendix 1 shows the equations and parameter input values used in calculating intake values and subsequent HI and excess cancer risk values for the individual exposure pathways. The appendix shows parameters for both industrial and residential land-use scenarios. The equations for nonradiological COCs are based upon the RAGS (EPA 1989a). Parameters are based upon information from the RAGS (EPA 1989a) and other EPA guidance documents and reflect the reasonable maximum exposure (RME) approach advocated by the RAGS (EPA 1989). For radiological COCs, the coded equations provided in RESRAD computer code are used to estimate the incremental TEDE and cancer risk for individual exposure pathways. Further discussion of this process is provided in the *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD*, Version 5.0 (Yu et al. 1993a).

Although the designated land-use scenario is industrial for this site, risk and TEDE values for a residential land-use scenario are also presented. These residential risk and TEDE values are presented only to provide perspective of potential risk to human health under the more restrictive land-use scenario.

#### VI.6.2 Risk Characterization

Table 8 shows an HI of 0.04 for the SWMU 57A nonradiological COCs, and an excess cancer risk of 8E-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

**Table 8**  
**Risk Assessment Values for SWMU 57A Nonradiological COCs**

COC Name	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario <sup>a</sup>		Residential Land-Use Scenario <sup>a</sup>	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Arsenic	6.42	0.02	3E-6	0.37	7E-5
Barium	321	0.00	--	0.05	--
Beryllium	0.736	0.00	3E-10	0.00	6E-10
Cadmium	3.84	0.01	1E-9	3.14	2E-9
Chromium, total <sup>b</sup>	14.1	0.00	3E-8	0.01	5E-8
Cobalt	7.66	0.00	--	0.00	--
Copper	52	0.00	--	0.25	--
Mercury	2.55	0.01	--	4.39	--
Nickel	14.7	0.00	--	0.02	--
Selenium	0.72 J	0.00	--	0.25	--
Silver	4.63	0.00	--	0.19	--
Thallium <sup>c</sup>	0.155 J	0.00	--	0.01	--
Vanadium	26.7	0.00	--	0.02	--
Zinc	214	0.00	--	0.39	--
Isopropylbenzene	0.0012 J	0.00	--	0.00	--
Methylene chloride	0.0018 J	0.00	1E-10	0.00	1E-8
Acenaphthylene	0.25 J	--	--	--	--
Anthracene	0.256 J	0.00	--	0.00	--
Benzo(a)anthracene	0.20 J	0.00	5E-8	0.00	7E-7
Benzo(b)fluoranthene	0.42	0.00	1E-7	0.00	1E-6
Benzo(k)fluoranthene	0.29 J	0.00	7E-9	0.00	7E-8
Benzo(g,h,l)perylene	0.25 J	--	--	--	--
Benzo(a)pyrene	0.3 J	0.00	8E-7	0.00	7E-6
Bis (2-Ethylhexyl) phthalate	4.7	0.00	2E-8	0.00	2E-7
Butyl benzyl phthalate	0.083 J	0.00	--	0.00	--
Chrysene	0.29 J	0.00	8E-10	0.00	1E-8
Dibenzofuran	0.051 J	0.00	--	0.00	--
Diethyl phthalate	0.047 J	0.00	--	0.00	--
Di-n-butyl phthalate	4.7	0.00	--	0.00	--
Di-n-octyl phthalate	0.055 J	0.00	--	0.00	--
Fluoranthene	0.42	0.00	--	0.00	--
Indeno(1,2,3-cd) pyrene	0.18 J	0.00	5E-8	0.00	3E-7
2-Methylnaphthalene	0.24 J	--	--	--	--
Naphthalene	0.1 J	0.00	--	0.00	--
n-Nitrosodiphenylamine	0.33 J	0.00	7E-10	0.00	1E-7
Pentachlorophenol	0.1 J	0.00	4E-9	0.00	1E-7
Phenanthrene	0.57	--	--	--	--
Pyrene	0.61	0.00	--	0.00	--
2,4-Dinitrotoluene	7.6	0.00	3E-6	3.5	9E-6
2,6-Dinitrotoluene	2.9	0.00	1E-6	0.01	4E-6
m-Nitrotoluene	0.16 J	0.00	--	0.00	--

Refer to footnotes at end of table.

**Table 8 (Concluded)**  
**Risk Assessment Values for SWMU 57A Nonradiological COCs**

COC Name	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario <sup>a</sup>		Residential Land-Use Scenario <sup>a</sup>	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
p-Nitrotoluene	0.38	0.00	--	0.09	--
Nitrobenzene	0.099 J	0.00	--	0.22	--
RDX	0.24 J	0.00	9E-9	0.00	4E-8
HMX	1.2	0.00	--	0.89	--
Aroclor 1254	0.013 J	0.00	1E-8	0.01	5E-8
Aroclor 1260	0.0068 J	0.00	7E-9	0.00	2E-8
<b>Total</b>		<b>0.04</b>	<b>8E-6</b>	<b>15</b>	<b>9E-5</b>

<sup>a</sup>EPA (1989).

<sup>b</sup>Chromium, total assumed to be chromium VI (most conservative).

<sup>c</sup>Toxicological parameter values for thallium sulfate

B = Associated analyte was also observed in the method blank.

COC = Constituent of concern.

J = Estimated concentration.

mg/kg = Milligram(s) per kilogram.

SWMU = Solid waste management unit.

-- = Information not available.

**Table 9**  
**Risk Assessment Values for SWMU 57A Nonradiological Background Constituents**

COC Name	Background Concentration <sup>a</sup> (mg/kg)	Industrial Land-Use Scenario <sup>b</sup>		Residential Land-Use Scenario <sup>b</sup>	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Arsenic	5.6	0.02	3E-6	0.32	6E-5
Barium	130	0.00	--	0.02	--
Beryllium	0.65	0.00	3E-10	0.00	5E-10
Cadmium	<1	--	--	--	--
Chromium, total <sup>c</sup>	12.8	0.00	--	0.00	--
Cobalt	5.2	0.00	--	0.00	--
Copper	15.4	0.00	--	0.07	--
Mercury	<0.1	--	--	--	--
Nickel	11.5	0.00	--	0.02	--
Selenium	<1	--	--	--	--
Silver	<1	--	--	--	--
Thallium	<1.1	--	--	--	--
Vanadium	20.4	0.00	--	0.02	--
Zinc	62	0.00	--	0.11	--
<b>Total</b>		<b>0.02</b>	<b>3E-6</b>	<b>0.6</b>	<b>6E-5</b>

<sup>a</sup>From Dinwiddie (September 1997), CTF Super Group.

<sup>b</sup>EPA (1989).

<sup>c</sup>Chromium, total assumed to be chromium III (most conservative for background screening).

COC = Constituent of concern.

EPA = U.S. Environmental Protection Agency.

mg/kg = Milligram(s) per kilogram.

SWMU = Solid waste management unit.

-- = Information not available.

shows an HI of 0.02 and an excess cancer risk of 3E-6 assuming the maximum background concentrations of the SWMU 57A background constituents for the designated industrial land-use scenario.

For the radioactive COCs, contribution from the direct gamma exposure pathway is included. For the industrial land-use scenario, a TEDE was calculated for an industrial office worker who spends a majority of his time indoors and for an industrial worker who evenly splits his time indoors and outdoors on the site. After analyzing these two scenarios, the most conservative is the 50/50 time split. This resulted in an incremental TEDE of 0.21 millirem per year (mrem/yr). In accordance with EPA guidance found in OSWER Directive No. 9200.4-18 (EPA 1997c), an incremental TEDE of 15 mrem/yr is used for the probable land-use scenario (industrial in this case); the calculated dose value for SWMU 57A for the industrial land use is well below this guideline. The estimated excess cancer risk is 2.5E-6.

For the residential land-use scenario nonradioactive COCs, the HI is 14, and the excess cancer risk is 9E-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 is included because of the potential for soil in Albuquerque, New Mexico, to be eroded and, subsequently, for dust to be present in predominantly residential areas. Because of the nature of the local soil, other exposure pathways are not considered (see Appendix 1). Table 9 shows that for the SWMU 57A associated background constituents, the HI is 0.6 and the excess cancer risk is  $6E-5$ .

For the radiological COCs, the incremental TEDE for the residential land-use scenario is 0.57 mrem/yr. The guideline being used is an excess TEDE of 75 mrem/yr (SNL/NM February 1998) for a complete loss of institutional controls (residential land use in this case); the calculated dose value for SWMU 57A for the residential land-use scenario is well below this guideline. Consequently, SWMU 57A is eligible for unrestricted radiological release as the residential land-use scenario resulted in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated excess cancer risk is  $7.2E-6$ . The excess cancer risk from the nonradiological COCs and the radiological COCs is not additive, as noted in the RAGS (EPA 1989a).

#### 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 a industrial land-use scenario (the designated land-use scenario for this site) and a residential land-use scenario.

For the industrial land-use scenario nonradiological COCs, the HI calculated is 0.04 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). Excess cancer risk is estimated at  $8E-6$ . 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 B2 carcinogens and less than  $1E-5$  for Class C carcinogens (NMED March 1998). The excess cancer risk is driven by arsenic, benzo (a) pyrene, 2,4-dinitrotoluene, and 2,6-dinitrotoluene, which are Class A and B carcinogens, thus the excess cancer risk for this site is 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. For nonradiological COCs, assuming the industrial land-use scenario, the HI is 0.02 and the excess cancer risk is  $3E-6$ . Incremental risk is determined by subtracting risk associated with background from potential COC risk. These numbers are not rounded before the difference is determined and, therefore, may appear to be inconsistent with numbers presented in tables and within the text. Incremental HI is 0.02, and incremental cancer risk is  $5E-6$  for the industrial land-use scenario.

For radiological COCs of the industrial land-use scenario, incremental TEDE is 0.21 mrem/yr, which is significantly less than EPA's numerical guideline of 15 mrem/yr. Incremental estimated excess cancer risk is  $2.5E-6$ .

The calculated HI for the residential land-use scenario nonradiological COCs is 14, which is above the numerical guidance. Excess cancer risk is estimated at  $9E-5$ . Excess cancer risk is driven by arsenic and several organics. Assuming the most restrictive class (A), the excess cancer risk for this site is above the suggested acceptable risk value ( $1E-6$ ). The HI for

associated background for the residential land-use scenario is 0.6 and the excess cancer risk is  $6E-5$ . The incremental HI is 13.25, and the incremental cancer risk is  $3.3E-5$  for the residential land-use scenario. These incremental risk calculations indicate potentially significant contribution to human health risk from the COCs considering a residential land-use scenario.

The incremental TEDE for a residential land-use scenario from the radiological components is 0.57 mrem/yr, which is significantly less than the numerical guideline of 75 mrem/yr suggested in the SNL/NM RESRAD Input Parameter Assumptions and Justification (SNL/NM February 1998). The estimated excess cancer risk is  $7.2E-6$ .

## VI.8 Step 7. Uncertainty Discussion

Because of the location, history of the site, and future land use (DOE and USAF March 1996), there is low uncertainty in the land-use scenario and the potentially affected populations that were considered in making the risk assessment analysis. Because the COCs are found in surface and near-surface soils and because of the location and physical characteristics of the site, there is little uncertainty in the exposure pathways relevant to the analysis.

A reasonable-maximum-exposure (RME) approach was used to calculate the risk assessment values. This means that the parameter values in the calculations are conservative and that calculated intakes are probably overestimates. Maximum measured values of COC concentrations are used to provide conservative results.

Table 8 shows the uncertainties (confidence) in nonradiological toxicological parameter values. There is a mixture of estimated values and values from IRIS (EPA 1998), HEAST (EPA 1997a), and EPA Region 9 (EPA 1996b) and EPA Region 3 (1997c) databases. Where values are not provided, information is not available from the HEAST (EPA 1997a), IRIS (EPA 1998a), or the EPA regions (EPA 1996b, 1997c). Four compounds do not have toxicological values (Table 8). However, because of their low reported concentrations, the risk associated with these compounds is considered to be insignificant. Because of the conservative nature of the RME approach, uncertainties in toxicological values are not expected to change the conclusion from the risk assessment analysis.

Incremental HI values for nonradiological COCs are below the human health acceptable range for the industrial land-use scenario compared to established numerical guidance. Though the incremental excess cancer risk is above the proposed numerical standard, maximum concentrations were used in the calculations. Because the site has been adequately characterized it is more realistic to use average concentrations in the risk calculation. The 95<sup>th</sup> upper confidence limit (UCL) of the mean concentration for arsenic (3.63 mg/kg) is below background, thus there is no incremental excess cancer risk and arsenic is not considered further. The 95<sup>th</sup> UCL of the mean concentration for benzo (a) pyrene (0.071 mg/kg); for 2,4-dinitrotoluene (0.792 mg/kg); and for 2,6-dinitrotoluene (0.70 mg/kg) summed with the other constituents minus arsenic for the site produce an incremental excess cancer risk of  $8E-7$  (below the proposed guideline of  $1E-6$ ).

For radiological COCs, the conclusion of the risk assessment is that potential effects on human health for both industrial and residential land-use scenarios are within guidelines and are a

small fraction of the estimated 360 mrem/yr received by the average U.S. population (NCRP 1987).

The overall uncertainty in all of the steps in the risk assessment process is considered not significant with respect to the conclusion reached.

## VI.9 Summary

SWMU 57A has identified COCs consisting of some inorganic, organic, and radiological compounds. Because of the location of the site, the designated industrial land-use scenario, and the nature of contamination, potential exposure pathways identified for this site included soil ingestion and dust and volatile inhalation for chemical constituents and soil ingestion, dust inhalation, and direct gamma exposure for radionuclides. Plant uptake was included as an exposure pathway for the residential land-use scenario.

Using conservative assumptions and employing an RME approach to risk assessment, calculations for nonradiological COCs show that for the industrial land-use scenario the HI of 0.04 is significantly less than the accepted numerical guidance from the EPA. The excess cancer risk of  $8E-6$  is above the acceptable risk value provided by the NMED for a industrial land use scenario (NMED March 1998). The incremental HI is 0.02 and the incremental cancer risk is  $5E-6$ . Though the incremental excess cancer risk is above the proposed numerical standard, maximum concentrations were used in the calculations. Because the site has been adequately characterized it is more realistic to use average concentrations in the risk calculation. The 95<sup>th</sup> upper confidence limit (UCL) of the mean concentration for arsenic (3.63 mg/kg) is below background, thus there is no incremental excess cancer risk and arsenic is not considered further. The 95<sup>th</sup> UCL of the mean concentration for benzo (a) pyrene (0.071 mg/kg); for 2,4-dinitrotoluene (0.792 mg/kg); and for 2,6-dinitrotoluene (0.70 mg/kg) summed with the other constituents minus arsenic for the site produce an incremental excess cancer risk of  $8E-7$  (below the proposed guideline of  $1E-6$ ).

Incremental TEDE and corresponding estimated cancer risk from radiological COCs are much less than EPA guidance values; the estimated TEDE is 0.21 mrem/yr for the industrial land-use scenario. This value is much less than the numerical guidance of 15 mrem/yr in EPA guidance (EPA 1997b). The corresponding incremental estimated cancer risk value is  $2.5E-6$  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 is only 0.57 mrem/yr with an associated risk of  $7.2E-6$ . The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, SWMU 57A is eligible for unrestricted radiological release.

Uncertainties associated with the calculations are considered small relative to the conservativeness of risk assessment analysis. It is therefore concluded that this site does not have potential to affect human health under an industrial land-use scenario.

## VII. Ecological Risk Screening Assessment

### VII.1 Introduction

This section addresses the ecological risks associated with exposure to constituents of potential ecological concern (COPEC) in soils at SWMU 57A. A component of the NMED Risk-Based Decision Tree is to conduct an ecological screening assessment that corresponds with that presented in EPA's Ecological Risk Assessment Guidance for Superfund (EPA 1997d). The current methodology is tiered and contains an initial scoping assessment followed by a more detailed screening assessment. Initial components of NMED's decision tree (a discussion of DQOs, a data assessment, and evaluations of bioaccumulation and fate-and-transport potential) are addressed of this report. Following the completion of the scoping assessment, a determination is made as to whether a more detailed examination of potential ecological risk is necessary. If deemed necessary, the scoping assessment proceeds to a screening assessment whereby a more quantitative estimate of ecological risk is conducted. Although this assessment incorporates conservatism in the estimation of ecological risks, ecological relevance and professional judgment are also used as recommended by the EPA (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 of exposure of biota at/or adjacent to the site to be exposed to constituents associated with site activities. Included in this section are an evaluation of existing data and a comparison of maximum detected concentrations to background concentrations, examination of bioaccumulation potential, and fate and transport potential. A Scoping Risk Management Decision will involve a summary of the scoping results and a determination as to whether further examination of potential ecological impacts is necessary.

#### VII.2.1 Data Assessment

As indicated in Section IV (Tables 3 and 4), inorganic constituents in soil within the 0- to 5-foot depth interval that exceeded background concentrations were:

- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium (total)
- Cobalt
- Copper
- Lead
- Mercury
- Nickel
- Selenium

- Silver
- Thallium
- Vanadium
- Zinc
- Cs-137.

Although U-235 and U-238 were not detected, the reported detection limits exceeded background concentrations.

Several organic analytes were detected in soil which include:

- 2-Methylnaphthalene
- 2,4-Dinitrotoluene
- 2,6-Dinitrotoluene
- Acenaphthylene
- Anthracene
- Aroclor-1254
- Aroclor-1260
- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(a)pyrene
- Bis(2-ethylhexyl)phthalate
- Butyl benzyl phthalate
- Chrysene
- Dibenzofuran
- Diethyl phthalate
- Di-n-butyl phthalate
- Di-n-octyl phthalate
- Fluoranthene
- Indeno(1,2,3-cd)pyrene
- Isopropylbenzene
- Methylene chloride
- Nitrobenzene
- m-Nitrotoluene
- p-Nitrotoluene
- Naphthalene
- n-Nitrosodiphenylamine
- Pentachlorophenol
- Phenanthrene
- Pyrene
- HMX
- RDX

## VII.2.2 Bioaccumulation

Among the COPECs listed in Section VII.2.1, the following were considered to have bioaccumulation potential in aquatic environments (Section IV, Tables 3 and 4):

- Arsenic
- Barium
- Cadmium
- Cobalt
- Lead
- Mercury
- Nickel
- Selenium
- Thallium
- Vanadium
- Zinc
- Cs-137
- U-235
- U-238
- 2-Methylnaphthalene
- 2,4-Dinitrotoluene
- 2,6-Dinitrotoluene
- Acenaphthylene
- Anthracene
- Aroclor-1254
- Aroclor-1260
- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(a)pyrene
- Bis(2-ethylhexyl)phthalate
- Butyl benzyl phthalate
- Chrysene
- Dibenzofuran
- Diethyl phthalate
- Di-n-butyl phthalate
- Di-n-octyl phthalate
- Fluoranthene
- Indeno(1,2,3-cd)pyrene
- Naphthalene
- p-Nitrotoluene
- n-Nitrosodiphenylamine
- Pentachlorophenol
- Phenanthrene
- Pyrene

It should be noted, however, that as directed by the NMED (NMED March 1998), bioaccumulation for inorganics is assessed exclusively based upon maximum reported bioconcentration factors (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 3 (Section V), wind and surface-water runoff are expected to be of moderate to low significance as transport mechanisms for COPECs at this site. Migration to groundwater is not anticipated. Because of the diversity of COCs, both food chain uptake and degradation/transformation will be highly variable. For some organic COPECs, such as PCBs, the bioaccumulation potential is high and that for biotransformation/degradation is low. Therefore, transport in the food chain may be significant. For other organics (e.g., HE), the potential for bioaccumulation is low and/or the potential for biotransformation/degradation is high, resulting in moderate to low potential for transport in the food chain. For most inorganics and radionuclides, the potential for degradation and food chain uptake is 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 involves a quantitative estimate of current ecological risks using exposure models in association with exposure parameters and toxicity information obtained from the literature. The estimation of potential ecological risks is conservative to ensure ecological risks are not underpredicted.

Components within the screening assessment include:

- Problem Formulation—sets the stage for the evaluation of potential exposure and risk.
- Exposure Estimation—provides a quantitative estimate of potential exposure.
- Ecological Effects Evaluation—presents benchmarks used to gauge the toxicity of COPECs to specific receptors.

- Risk Characterization—characterizes the ecological risk associated with exposure of the receptors to environmental media at the site.
- Uncertainty Assessment—discusses uncertainties associated with the estimation of exposure and risk.
- Risk Interpretation—evaluates ecological risk in terms of HQs and ecological significance.
- Screening Assessment Scientific/Management Decision Point—presents the decision to risk managers based upon the results of the Screening Assessment.

### VII.3.1 Problem Formulation

Problem Formulation is the initial stage of the screening assessment that provides the introduction to the risk evaluation process. Components that are addressed in this section include a discussion of ecological pathways and the ecological setting, identification of COPECs, and selection of ecological receptors. The conceptual model, ecological food webs, and ecological endpoints (other components commonly addressed in a screening assessment) are presented in the "Predictive Ecological Risk Assessment Methodology for SNL/NM ER Program" (IT July 1998) and are not duplicated here.

#### VII.3.1.1 *Ecological Pathways and Setting*

SWMU 57A is approximately 4.22 acres in size. The site is located in grassland habitat; however, much of the habitat at this site was disturbed during active use. The grassland habitat is partially restored through natural succession. Wildlife may use the buildings (bunkers) at this site as shelter, but the dryness of the interiors will prevent plant growth, making the food chain pathway insignificant for COPECs within these buildings. A biological and sensitive species survey of this site was conducted in 1994 (IT February 1995) with no sensitive species being found, and none are expected due to 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. 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 COCs at this site.

#### VII.3.1.2 *COPECs*

The Workman Site: Firing Site (SWMU 57A) was first used in about 1942 for testing proximity fuzes using shells fired from various artillery pieces on fixed and moveable mounts. The target area for this firing site, designated SWMU 57B, is approximately 2 miles east of the site.



Activity at the site ended prior to 1951. Little documentation remains of the testing activities and subsequent cleanup by the military. The site underwent decontamination/decommissioning prior to 1951, cleanup in the early 1980's, and a VCM in 1994. The COPECs at SWMU 57A include metals, radionuclides, and various organics including HE, PCBs, VOCs, and SVOCs.

In order to provide conservatism in this ecological risk assessment, the assessment is based upon the maximum soil concentrations of the COPECs as measured in soil samples within the first 5 feet of soil. Both radiological and nonradiological COPECs are evaluated. The nonradiological COCs consist of inorganic analytes (i.e., metals). Organic analytes were also detected in these soil samples. Inorganic analytes and radionuclides were screened against background concentrations, and those that exceeded the approved SNL/NM background screening levels (Dinwiddie September 24, 1997) for the area were considered to be COPECs. All organic analytes detected are considered to be COPECs for the site. Maximum COPEC concentrations are reported in Tables 3 and 4. Nonradiological inorganics that are essential nutrients such as iron, magnesium, calcium, potassium, and sodium were not included in this risk assessment per the EPA (1989).

### 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 associate with the site. A deer mouse (*Peromyscus maniculatus*) and burrowing owl (*Speotyto cunicularia*) were used to represent wildlife use. Because of its opportunistic food habits, the deer mouse was used to represent a mammalian herbivore, omnivore, and insectivore. The burrowing owl was selected as the top predator. The burrowing owl is present at SNL/NM and is designated as a species of management concern by the U.S. Fish and Wildlife Service in Region 2, which includes the state of New Mexico (USFWS September 1995).

### VII.3.2 Exposure Estimation

Direct uptake of COPECs from the soil was considered the only significant route of exposure for terrestrial plants. Exposure modeling for the wildlife receptors was limited to food and soil ingestion pathways. Inhalation and dermal contact were considered insignificant pathways with respect to ingestion (Sample and Suter 1994). Drinking water was also considered an insignificant pathway because of the lack of surface water at this site. The deer mouse was modeled under three dietary regimes: as an herbivore (100 percent of its diet as plant material), as an omnivore (50 percent of its diet as plants and 50 percent as soil invertebrates), and an insectivore (100 percent of its diet as soil invertebrates). The burrowing owl was modeled as a strict predator on small mammals (100 percent of its diet as deer mice). Because the exposure in the burrowing owl from a diet consisting of equal parts of herbivorous, omnivorous, and insectivorous mice would be equivalent to the exposure consisting of only omnivorous mice, the diet of the burrowing owl was modeled with intake of omnivorous mice only. Both species were modeled with soil ingestion comprising 2 percent of the total dietary intake. Table 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).

**Table 10**  
**Exposure Factors for Ecological Receptors at SWMU 57A**

Receptor Species	Class/Order	Trophic Level	Body Weight (kg) <sup>a</sup>	Food Intake Rate (kg/day) <sup>b</sup>	Dietary Composition <sup>c</sup>	Home Range (acres)
Deer Mouse ( <i>Peromyscus maniculatus</i> )	Mammalia/ Rodentia	Herbivore	2.39E-2 <sup>d</sup>	3.72E-3	Plants: 100% (+ Soil at 2% of intake)	2.7E-1 <sup>e</sup>
Deer Mouse ( <i>Peromyscus maniculatus</i> )	Mammalia/ Rodentia	Omnivore	2.39E-2 <sup>d</sup>	3.72E-3	Plants: 50% Invertebrates: 50% (+ Soil at 2% of intake)	2.7E-1 <sup>e</sup>
Deer Mouse ( <i>Peromyscus maniculatus</i> )	Mammalia/ Rodentia	Insectivore	2.39E-2 <sup>d</sup>	3.72E-3	Invertebrates: 100% (+ Soil at 2% of intake)	2.7E-1 <sup>e</sup>
Burrowing owl ( <i>Speotyto cunicularia</i> )	Aves/ Strigiformes	Carnivore	1.55E-1 <sup>f</sup>	1.73E-2	Rodents: 100% (+ Soil at 2% of intake)	3.5E+1 <sup>g</sup>

<sup>a</sup>Body weights are in kilograms wet weight.

<sup>b</sup>Food intake rates are estimated from the allometric equations presented in Nagy (1987). Units are kilograms dry weight per day.

<sup>c</sup>Dietary compositions are generalized for modeling purposes. Default soil intake value of 2% of food intake.

<sup>d</sup>From Silva and Downing (1995).

<sup>e</sup>EPA (1993), based upon the average home range measured in semiarid shrubland in Idaho.

<sup>f</sup>From Dunning (1993).

<sup>g</sup>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.

Although home range is also included in this table, exposures for this risk assessment were modeled using an area use factor of 1, implying that all food items and soil ingested are from the site being investigated. The maximum measured COPEC concentrations from surface soil samples were used to conservatively estimate potential exposures and risks to plants and wildlife at this site.

For the radiological dose rate calculations, the deer mouse was modeled as an herbivore (100 percent of its diet as plants), and the burrowing owl was modeled as a strict predator on small mammals (100 percent of its diet as deer mice). Both were modeled with soil ingestion comprising 2 percent of the total dietary intake. Receptors are exposed to radiation both internally and externally from Cs-137, U-235, U-238. Internal and external dose rates to the deer mouse and burrowing owl are approximated using modified dose rate models from the *Hanford Site Risk Assessment Methodology* (DOE 1995) as presented in the ecological risk assessment methodology document for the SNL/NM ER Program (IT July 1998). Radionuclide-dependent data for the dose rate calculations were obtained from Baker and Soldat (1992). The external dose rate model examines the total-body dose rate to a receptor residing in soil exposed to radionuclides. The soil surrounding the receptor is assumed to be an infinite medium uniformly contaminated with gamma-emitting radionuclides. The external dose rate model is the same for both the deer mouse and the burrowing owl. The internal total-body dose rate model assumes that a fraction of the radionuclide concentration ingested by a receptor is absorbed by the body and concentrated at the center of a spherical body shape. This provides for a conservative estimate for absorbed dose. This concentrated radiation source at the center of the body of the receptor is assumed to be a "point" source. Radiation emitted from this point source is absorbed by the body tissues to contribute to the absorbed dose. Alpha and beta emitters are assumed to transfer 100 percent of their energy to the receptor as they pass through tissues. Gamma emitting radionuclides only transfer a fraction of their energy to the tissues because gamma rays interact less with matter than do beta or alpha emitters. The external and internal dose rate results are summed to calculate a total dose rate due to 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

**Table 11**  
**Transfer Factors Used in Exposure Models for**  
**Constituents of Potential Ecological Concern at SWMU 57A**

Constituent of Potential Ecological Concern	Soil-to-Plant Transfer Factor	Soil-to-Invertebrate Transfer Factor	Food-to-Muscle Transfer Factor
<b>Inorganic</b>			
Arsenic	4.0E-2 <sup>a</sup>	1.0E+0 <sup>b</sup>	2.0E-3 <sup>a</sup>
Barium	1.5E-1 <sup>a</sup>	1.0E+0 <sup>b</sup>	2.0E-4 <sup>c</sup>
Beryllium	1.0E-2 <sup>a</sup>	1.0E+0 <sup>b</sup>	1.0E-3 <sup>a</sup>
Cadmium	5.5E-1 <sup>a</sup>	6.0E-1 <sup>d</sup>	5.5E-4 <sup>a</sup>
Chromium (total)	4.0E-2 <sup>c</sup>	1.3E-1 <sup>e</sup>	3.0E-2 <sup>c</sup>
Cobalt	4.0E-1 <sup>c</sup>	1.0E+0 <sup>b</sup>	3.0E-2 <sup>c</sup>
Copper	8.0E-1 <sup>e</sup>	2.5E-1 <sup>d</sup>	1.0E-2 <sup>a</sup>
Lead	9.0E-2 <sup>c</sup>	4.0E-2 <sup>d</sup>	8.0E-4 <sup>c</sup>
Mercury	1.0E+0 <sup>c</sup>	1.0E+0 <sup>b</sup>	2.5E-1 <sup>a</sup>
Nickel	2.0E-1 <sup>c</sup>	3.8E-1 <sup>f</sup>	6.0E-3 <sup>a</sup>
Selenium	5.0E-1 <sup>c</sup>	1.0E+0 <sup>b</sup>	1.0E-1 <sup>c</sup>
Silver	1.0E+0 <sup>c</sup>	2.5E-1 <sup>d</sup>	5.0E-3 <sup>c</sup>
Thallium	4.0E-3 <sup>a</sup>	1.0E+0 <sup>b</sup>	4.0E-2 <sup>a</sup>
Vanadium	5.5E-3 <sup>a</sup>	1.0E+0 <sup>b</sup>	2.5E-3 <sup>a</sup>
Zinc	1.5E+0 <sup>a</sup>	3.0E-1 <sup>d</sup>	1.0E-1 <sup>a</sup>
<b>Organic<sup>g</sup></b>			
2-Methylnaphthalene	2.3E-1	2.1E+1	1.8E-4
Acenaphthylene	1.7E-1	2.1E+1	3.0E-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(k)fluoranthene	4.3E-3	2.9E+1	2.1E-1
Benzo(g,h,i)perylene	2.6E-3	3.0E+1	5.4E-1
Bis(2-ethylhexyl)phthalate	2.3E-3	3.1E+1	6.4E-1
Butyl benzyl phthalate	6.8E-2	2.3E+1	1.6E-3
Chrysene	1.5E-2	2.6E+1	2.3E-2
Dibenzofuran	1.6E-1	2.1E+1	3.3E-4
Diethyl phthalate	1.45E+0	1.8E+1	6.6E-6
Di-n-butyl phthalate	8.4E-2	2.2E+1	1.1E-3
Di-n-octyl phthalate	3.7E-2	2.4E+1	4.5E-3
Fluoranthene	3.2E-2	2.4E+1	5.9E-3
Indeno(1,2,3-cd)pyrene	1.5E-3	3.2E+1	1.5E+0
Isopropylbenzene	3.0E-1	2.0E+1	1.1E-4
Methylene chloride	7.3E+0	1.5E+1	3.6E-7

Refer to footnotes at end of table.

**Table 11 (Concluded)**  
**Transfer Factors Used in Exposure Models for**  
**Constituents of Potential Ecological Concern at SWMU 57A**

Constituent of Potential Ecological Concern	Soil-to-Plant Transfer Factor	Soil-to-Invertebrate Transfer Factor	Food-to-Muscle Transfer Factor
Naphthalene	4.8E-1	1.9E+1	4.7E-5
n-Nitrosodiphenylamine	6.0E-1	1.9E+1	3.2E-5
Pentachlorophenol	4.4E-2	2.4E+1	3.3E-3
Phenanthrene	8.8E-2	2.2E+1	9.7E-4
Pyrene	3.3E-2	2.4E+1	5.8E-3
2,4-Dinitrotoluene	2.8E+0	1.7E+1	2.0E-6
2,6-Dinitrotoluene	3.9E+0	1.6E+1	1.1E-6
m-Nitrotoluene	1.5E+0	1.7E+1	6.3E-6
p-Nitrotoluene	1.7E+0	1.7E+1	5.2E-6
Nitrobenzene	3.3E+0	1.6E+1	1.5E-6
HMX	2.7E+1	1.4E+1	1.4E+1
RDX	1.2E+1	1.5E+1	1.5E-7
Aroclor 1254	1.3E-2	2.6E+1	3.2E-2
Aroclor 1260	1.1E-2	2.7E+1	3.8E-2

<sup>a</sup>From Baes et al. (1984).

<sup>b</sup>Default value.

<sup>c</sup>From NCRP (January 1989).

<sup>d</sup>From Stafford et al. (1991).

<sup>e</sup>From IAEA (1994).

<sup>f</sup>From Ma (1982).

<sup>g</sup>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 ( $K_{ow}$  = the octanol-water partition coefficient).

SWMU = Solid waste management unit.

**Table 12**  
**Media Concentrations<sup>a</sup> for Constituents of**  
**Potential Ecological Concern at SWMU 57A**

Constituent of Potential Ecological Concern	Soil (maximum) <sup>a</sup>	Plant Foliage <sup>b</sup>	Soil Invertebrate <sup>b</sup>	Deer Mouse Tissues <sup>c</sup>
<b>Inorganic</b>				
Arsenic	6.4E+0	2.6E-1	6.4E+0	2.2E-2
Barium	3.2E+2	4.8E+1	3.2E+2	1.2E-1
Beryllium	7.4E-1	7.4E-3	7.4E-1	1.2E-3
Cadmium	3.8E+0	2.1E+0	2.3E+0	3.9E-3
Chromium (total)	1.4E+1	5.6E-1	1.8E+0	1.4E-1
Cobalt	7.7E+0	3.1E+0	7.7E+0	5.2E-1
Copper	5.2E+1	4.2E+1	1.3E+0	8.9E-1
Lead	1.3E+2	1.2E+1	5.3E+0	2.8E-2
Mercury	2.6E+0	2.6E+0	2.6E+0	2.0E+0
Nickel	1.5E+1	2.9E+0	5.6E+0	8.5E-2
Selenium	7.2E-1	3.6E-1	7.2E-1	1.7E-1
Silver	4.6E+0	4.6E+0	1.2E+0	4.7E-2
Thallium	1.6E-1	6.2E-4	1.6E-1	1.0E-2
Vanadium	2.7E+1	6.1E-1	2.7E+1	1.1E-1
Zinc	2.1E+2	3.2E+2	6.4E+1	6.2E+1
<b>Organic</b>				
2-Methylnaphthalene	2.4E-1	5.5E-2	4.9E+0	1.4E-3
Acenaphthylene	2.5E-1	4.3E-2	5.3E+0	2.4E-3
Anthracene	2.6E-1	2.7E-2	5.6E+0	6.4E-3
Benzo(a)anthracene	2.0E-1	4.4E-3	5.0E+0	9.0E-2
Benzo(a)pyrene	3.0E-1	3.4E-3	8.0E+0	4.7E-1
Benzo(b)fluoranthene	4.2E-1	2.6E-3	1.2E+1	2.1E+0
Benzo(k)fluoranthene	2.9E-1	1.3E-3	8.4E+0	2.8E+0
Benzo(g,h,i)perylene	2.5E-1	1.5E-3	7.0E+0	1.3E+0
Bis(2-ethylhexyl)phthalate	4.7E+0	7.4E-3	1.5E+2	3.0E+2
Butyl benzyl phthalate	8.3E-2	5.6E-3	1.9E+0	4.6E-3
Chrysene	2.9E-1	4.3E-3	7.5E+0	2.8E-1
Dibenzofuran	5.1E-2	8.2E-3	1.1E+0	5.6E-4
Diethyl phthalate	4.7E-2	6.8E-2	8.2E-1	9.1E-6
Di-n-butyl phthalate	4.7E+0	3.9E-1	1.1E+2	1.8E-1
Di-n-octyl phthalate	5.5E-2	2.1E-3	1.3E+0	9.4E-3
Fluoranthene	4.2E-1	2.4E-2	9.7E+0	3.2E-2
Indeno(1,2,3-cd)pyrene	1.8E-1	1.1E-3	5.1E+0	9.1E-1
Isopropylbenzene	1.2E-3	3.6E-4	2.4E-2	4.3E-6
Methylene chloride	1.8E-3	1.3E-2	2.7E-2	2.3E-8

Refer to footnotes at end of table.

**Table 12 (Concluded)**  
**Media Concentrations<sup>a</sup> for Constituents of**  
**Potential Ecological Concern at SWMU 57A**

Constituent of Potential Ecological Concern	Soil (maximum) <sup>a</sup>	Plant Foliage <sup>b</sup>	Soil Invertebrate <sup>b</sup>	Deer Mouse Tissues <sup>c</sup>
Naphthalene	1.0E-1	4.8E-2	1.9E+0	1.5E-4
n-Nitrosodiphenylamine	3.3E-1	2.0E-1	6.2E+0	3.2E-4
Pentachlorophenol	1.0E-1	4.4E-3	2.4E+0	1.2E-2
Phenanthrene	5.7E-1	5.1E-2	1.3E+1	1.9E-2
Pyrene	6.1E-1	2.0E-2	1.5E+1	1.3E-1
2,4-Dinitrotoluene	7.6E+0	2.1E+1	1.3E+2	4.7E-4
2,6-Dinitrotoluene	2.9E+0	1.1E+1	4.7E+1	1.0E-4
m-Nitrotoluene	1.6E-1	2.4E-1	2.8E+0	3.0E-5
p-Nitrotoluene	3.8E-1	6.3E-1	6.6E+0	5.8E-5
HMX	1.2E+0	3.3E+1	1.6E+1	2.6E-6
Nitrobenzene	9.9E-2	3.3E-1	1.6E+0	4.6E-6
RDX	2.4E-1	2.9E+0	3.5E+0	1.5E-6
Aroclor 1254	1.3E-2	1.6E-4	3.4E-1	1.7E-2
Aroclor 1260	6.8E-3	7.7E-5	1.8E-1	1.1E-2

<sup>a</sup>In milligrams per kilogram. All are based upon dry weight of the media.

<sup>b</sup>Product of the soil concentration and the corresponding transfer factor.

<sup>c</sup>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).

EPA = U.S. Environmental Protection Agency.

SWMU = Solid waste management unit.

**Table 13**  
**Toxicity Benchmarks for Ecological Receptors at SWMU 57A**

Constituent of Potential Ecological Concern	Plant Benchmark <sup>a,b</sup>	Mammalian NOAELs			Avian NOAELs		
		Mammalian Test Species <sup>c,d</sup>	Test Species NOAEL <sup>d,e</sup>	Deer Mouse NOAEL <sup>e,f</sup>	Avian Test Species <sup>d</sup>	Test Species NOAEL <sup>d,e</sup>	Burrowing Owl NOAEL <sup>e,g</sup>
<b>Inorganic</b>							
Arsenic	10	Mouse	0.126	0.13	Mallard	5.14	5.14
Barium	500	Rat <sup>h</sup>	5.1	10.5	Chicks	20.8	20.8
Beryllium	10	Rat	0.66	1.29	---	---	---
Cadmium	3	Rat <sup>j</sup>	1.0	1.9	Mallard	1.45	1.45
Chromium (total)	1	Rat	2,737	5,354	Black duck	1.0	1.0
Cobalt	20	---	---	---	---	---	---
Copper	100	Mink <sup>k</sup>	11.7	29.8	Chicks	47	47
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
Nickel	30	Rat	40	78	Mallard	77.4	77.4
Selenium	1	Rat	0.20	0.39	Screech owl	0.44	0.44
Thallium	1	Rat	0.0074	0.015	---	---	---
Vanadium	2	Rat <sup>l</sup>	0.21	0.38	Mallard	11.4	11.4
Zinc	50	Rat <sup>m</sup>	160	313	Chicken	14.5	14.5
<b>Organic</b>							
2-Methylnaphthalene	18	Rat <sup>n</sup>	2.45 <sup>n</sup>	4.79	---	---	---
Acenaphthylene	20	Mouse <sup>o</sup>	1.0 <sup>o</sup>	1.06	---	---	---
Anthracene	18	Mouse <sup>p</sup>	100 <sup>p</sup>	106	---	---	---
Benzo(a)anthracene	18	Mouse <sup>o</sup>	1.0 <sup>o</sup>	1.06	---	---	---
Benzo(a)pyrene	18	Mouse	1.0	1.06	---	---	---
Benzo(b)fluoranthene	18	Mouse <sup>o</sup>	1.0 <sup>o</sup>	1.06	---	---	---
Benzo(k)fluoranthene	18	Mouse <sup>o</sup>	1.0 <sup>o</sup>	1.06	---	---	---
Benzo(g,h,i)perylene	18	Mouse <sup>o</sup>	1.0 <sup>o</sup>	1.06	---	---	---

Refer to footnotes at end of table.



Table 13 (Continued)  
Toxicity Benchmarks for Ecological Receptors at SWMU 57A

Constituent of Potential Ecological Concern	Plant Benchmark <sup>a,b</sup>	Mammalian NOAELs			Avian NOAELs		
		Mammalian Test Species <sup>c,d</sup>	Test Species NOAEL <sup>d,e</sup>	Deer Mouse NOAEL <sup>e,f</sup>	Avian Test Species <sup>d</sup>	Test Species NOAEL <sup>d,e</sup>	Burrowing Owl NOAEL <sup>e,g</sup>
Bis(2-ethylhexyl)phthalate	---	Mouse	18.3	19.4	---	---	---
Butyl benzyl phthalate	---	Rat	159	311	---	---	---
Chrysene	18	Mouse <sup>o</sup>	1.0 <sup>o</sup>	1.06	---	---	---
Dibenzofuran	---	---	---	---	---	---	---
Diethyl phthalate	---	Mouse <sup>q</sup>	75.3 <sup>q</sup>	79.7	---	---	---
Di-n-butyl phthalate	---	Mouse	550	582	---	---	---
Di-n-octyl phthalate	---	Mouse <sup>r</sup>	79.4 <sup>r</sup>	84.1	---	---	---
Fluoranthene	18	Mouse <sup>s</sup>	12.5 <sup>s</sup>	13.2	---	---	---
Indeno(1,2,3-cd)pyrene	18	Mouse <sup>o</sup>	1.0 <sup>o</sup>	1.06	---	---	---
Isopropylbenzene	---	Rat <sup>t</sup>	116 <sup>t</sup>	227	---	---	---
Methylene chloride	---	Rat	5.85	11.4	---	---	---
Naphthalene	18	Mouse <sup>u</sup>	5.0 <sup>u</sup>	5.29	---	---	---
n-Nitrosodiphenylamine	---	Rat <sup>v</sup>	4.23 <sup>v</sup>	8.28	---	---	---
Pentachlorophenol	---	Rat	0.24	0.47	---	---	---
Phenanthrene	18	Mouse <sup>o</sup>	1.0 <sup>o</sup>	1.06	---	---	---
Pyrene	18	Mouse <sup>p</sup>	7.5 <sup>p</sup>	7.94	---	---	---
2,4-Dinitrotoluene	---	Rat <sup>w</sup>	3.8 <sup>w</sup>	7.43	---	---	---
2,6-Dinitrotoluene	---	Rat <sup>w</sup>	7.2 <sup>w</sup>	14.1	---	---	---
m-Nitrotoluene	---	Rat <sup>x</sup>	2.16 <sup>x</sup>	4.22	---	---	---
p-Nitrotoluene	---	Rat <sup>y</sup>	3.94 <sup>y</sup>	7.71	---	---	---
Nitrobenzene	---	White-footed Mouse <sup>z</sup>	6.95 <sup>z</sup>	6.52	---	---	---
HMX	---	Mouse <sup>aa</sup>	3.0 <sup>aa</sup>	2.97	---	---	---
RDX	---	Mouse <sup>bb</sup>	7.0 <sup>bb</sup>	7.8	---	---	---
Aroclor 1254	40	Oldfield mouse <sup>cc</sup>	0.067	0.059	Ring-necked pheasant	0.18	0.18
Aroclor 1260	---	Rat <sup>dd</sup>	0.04 <sup>dd</sup>	0.08	---	---	---

Refer to footnotes at end of table.

**Table 13 (Concluded)**  
**Toxicity Benchmarks for Ecological Receptors at SWMU 57A**

<sup>a</sup>In milligrams per kilogram soil.

<sup>b</sup>From Efrogmson et al. (1997).

<sup>c</sup>Body weights (in kilograms) for the no-observed-adverse-effect level (NOAEL) conversion are as follows: lab mouse, 0.030; lab rat, 0.350 (except where noted).

<sup>d</sup>From Sample et al. (1996), except where noted.

<sup>e</sup>In milligrams per kilogram body weight per day.

<sup>f</sup>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.

<sup>g</sup>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.

<sup>h</sup>Body weight: 0.435 kilogram.

<sup>i</sup>--- designates insufficient toxicity data.

<sup>j</sup>Body weight: 0.303 kilogram.

<sup>k</sup>Body weight: 1.0 kilogram.

<sup>l</sup>Body weight: 0.365 kilogram.

<sup>m</sup>Body weight: 0.26 kilogram.

<sup>n</sup>Based upon a rat NOAEL for pyrene (EPA 1989a) and the ratio of rat LD<sub>50</sub> values for pyrene and 2-methylnaphthalene (Micromedex 1998).

<sup>o</sup>Insufficient toxicity data available for this compound. The NOAEL for benzo(a)pyrene is used as a default.

<sup>p</sup>Based upon a toxicity information from EPA (1989a).

<sup>q</sup>Based upon a mouse NOAEL for bis(2-ethylhexyl)phthalate and the ratio of LD<sub>50</sub> values for bis(2-ethylhexyl)phthalate and diethyl phthalate (Micromedex 1998).

<sup>r</sup>Based upon a mouse NOAEL for bis(2-ethylhexyl)phthalate and the ratio of LD<sub>50</sub> values for bis(2-ethylhexyl)phthalate and di-n-octyl phthalate (Micromedex 1998).

<sup>s</sup>Based upon a toxicity information from EPA (1988b).

<sup>t</sup>Based upon a rat NOAEL for ethylbenzene (EPA 1998) and the ratio of rat LD<sub>50</sub> values for ethylbenzene and isopropylbenzene (Micromedex 1998).

<sup>u</sup>Based upon a mouse NOAEL for pyrene and the ratio of mouse LD<sub>50</sub> values for pyrene and naphthalene (Micromedex 1998).

<sup>v</sup>Based upon a rat NOAEL for n-nitrosodiethylamine (EPA 1998) and the ratio of rat LD<sub>50</sub> values for n-nitrosodiethylamine and n-nitrosodiphenylamine (Micromedex 1998).

<sup>w</sup>Based upon toxicity information from Etnier (1987).

<sup>x</sup>Based upon a rat NOAEL for TNT (Talmage and Opresko 1995) and the ratio of rat LD<sub>50</sub> values for TNT and m-nitrotoluene (Micromedex 1998).

<sup>y</sup>Based upon a rat NOAEL for TNT (Talmage and Opresko 1995) and the ratio of rat LD<sub>50</sub> values for TNT and p-nitrotoluene (Micromedex 1998).

<sup>z</sup>Based upon a white-footed mouse NOAEL for sym-dinitrobenzene (EPA 1998) and the ratio of rat LD<sub>50</sub> values for sym-dinitrobenzene and nitrobenzene (Micromedex 1998).

<sup>aa</sup>Based upon toxicity information from Maxwell and Opresko (1996).

<sup>bb</sup>Based upon toxicity information from Talmage et al. (1996).

<sup>cc</sup>Body weight of the oldfield mouse is 0.014 kg (McCoy et al. 1995).

<sup>dd</sup>Based upon a rat NOAEL for Aroclor-1254 and the ratio of rat LD<sub>50</sub> values for Aroclor-1254 and Aroclor-1260 (Micromedex 1998).

SWMU = Solid waste management unit.

TNT = Trinitrotoluene.

than vertebrates (Whicker and Schultz 1982), the dose of 0.1 rad per day should also offer sufficient protection to other components within the terrestrial habitat of SWMU 57A.

#### VII.3.4 Risk Characterization

Maximum concentrations in soil and estimated dietary exposures were compared to plant and wildlife benchmark values, respectively. Results of these comparisons are presented in Table 14. HQs are used to quantify the comparison with benchmarks for plants and wildlife exposure.

Analytes with HQs exceeding unity for plants were cadmium, chromium (total), lead, mercury, silver, vanadium, and zinc. Arsenic, barium, vanadium, and 2,4-dinitrotoluene had HQs greater than unity for both the omnivorous and insectivorous deer mouse, but not the herbivorous deer mouse. HMX had HQs greater than unity for the herbivorous and omnivorous deer mouse, but not the insectivorous deer mouse. Thallium, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)fluoranthene, chrysene, phenanthrene, and bis(2-ethylhexyl)phthalate resulted in HQs greater than 1.0 for the insectivorous diet of the deer mouse, but not for either of the other two dietary regimes. Mercury, when assumed to be entirely in organic form, resulted in HQs greater than 1.0 for the burrowing owl and the deer mouse (all dietary regimes). Bis(2-ethylhexyl)phthalate also resulted in an HQ greater than unity for the burrowing owl. HQs for cobalt could not be determined for either of the wildlife receptors. HQs for the burrowing owl could not be determined for beryllium, silver, and most organic analytes. As directed by the NMED, hazard indices (HI) were calculated for each of the receptors (the HI is the sum of chemical-specific hazard quotients for all pathways for a given receptor). All receptors had total HIs greater than unity, with a maximum HI of 68 for the burrowing owl. The HIs for the inorganic analytes only were also greater than unity for all receptors. The HIs for polycyclic aromatic hydrocarbons (PAH) and polychlorinated biphenyls (PCBs) exceeded unity for the insectivorous deer mice. The HI for PAHs also exceeded unity for the omnivorous deer mouse. For the deer mice (all dietary regimes) and burrowing owl, inorganic analytes accounted for more than half of the total HI.

Tables 15 and 16 summarize the internal and external dose rate model results for the six radionuclides. The total radiation dose rate to the deer mouse was predicted to be  $7.9E-5$  rad/day. Total dose rate to the burrowing owl was predicted to be  $5.0E-5$  rad/day. The external dose rate due to 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 57A. These uncertainties result from assumptions used in calculating risk that may overestimate or underestimate true risk presented at a site. For this risk assessment, assumptions are made that are more likely to overestimate exposures and risk rather than to underestimate them. These conservative assumptions are used to be more protective of the ecological resources potentially affected by the site. Conservatism incorporated into this risk assessment include; the use of maximum measured analyte concentrations in soil to evaluate risk, the use of wildlife

**Table 14  
Hazard Quotients for Ecological Receptors at SWMU 57A**

Constituent of Potential Ecological Concern	Plant HQ <sup>a</sup>	Deer Mouse HQ (Herbivorous) <sup>a</sup>	Deer Mouse HQ (Omnivorous) <sup>a</sup>	Deer Mouse HQ (Insectivorous) <sup>a</sup>	Burrowing Owl HQ <sup>a</sup>
<b>Inorganic</b>					
Arsenic	6.4E-1	4.5E-1	4.1E+0	7.6E+0	3.3E-3
Barium	6.4E-1	8.1E-1	2.8E+0	4.8E+0	3.5E-2
Beryllium	7.4E-2	2.7E-3	4.7E-2	9.1E-2	---
Cadmium	1.3E+0	1.8E-1	1.9E-1	2.0E-1	6.2E-3
Chromium (total)	1.4E+1	2.5E-5	4.3E-5	6.2E-5	4.7E-2
Cobalt	3.8E-1	---	---	---	---
Copper	5.2E-1	2.2E-1	1.5E-1	7.3E-2	4.6E-3
Lead	2.7E+0	1.5E-1	1.1E-1	7.9E-2	7.8E-2
Mercury (inorganic)	8.5E+0	2.9E-2	2.9E-2	2.9E-2	5.2E-1
Mercury (organic)	8.5E+0	6.5E+0	6.5E+0	6.5E+0	3.6E+1
Nickel	4.9E-1	6.4E-3	9.1E-3	1.2E-2	5.5E-4
Selenium	7.2E-1	1.5E-1	2.2E-1	2.9E-1	4.8E-2
Silver	2.3E+0	2.1E-2	1.3E-2	5.6E-3	---
Thallium	1.6E-1	4.0E-2	8.6E-1	1.7E+0	---
Vanadium	1.3E+1	2.8E-1	5.7E+0	1.1E+1	6.3E-3
Zinc	4.3E+0	1.6E-1	9.8E-2	3.4E-2	5.1E-1
<b>Organic</b>					
2-Methylnaphthalene	1.3E-2	1.9E-3	8.1E-2	1.6E-1	---
Acenaphthylene	1.4E-2	7.1E-3	3.9E-1	7.7E-1	---
Anthracene	1.4E-2	4.7E-5	4.2E-3	8.3E-3	---
Benzo(a)anthracene	1.1E-2	1.2E-3	3.7E-1	7.4E-1	---
Benzo(a)pyrene	1.7E-2	1.4E-3	5.9E-1	1.2E+0	---
Benzo(b)fluoranthene	2.3E-2	1.6E-3	8.7E-1	1.7E+0	---
Benzo(k)fluoranthene	1.6E-2	1.0E-3	6.2E-1	1.2E+0	---
Benzo(g,h,i)perylene	1.4E-2	1.0E-3	5.2E-1	1.0E+0	---
Bis(2-ethylhexyl)phthalate	---	8.1E-4	6.0E-1	1.2E+0	3.1E+1

Refer to footnotes at end of table.

Table 14 (Concluded)  
Hazard Quotients for Ecological Receptors at SWMU 57A

Constituent of Potential Ecological Concern	Plant HQ <sup>a</sup>	Deer Mouse HQ (Herbivorous) <sup>a</sup>	Deer Mouse HQ (Omnivorous) <sup>a</sup>	Deer Mouse HQ (Insectivorous) <sup>a</sup>	Burrowing Owl HQ <sup>a</sup>
Butyl benzyl phthalate	---	3.6E-6	4.8E-4	9.5E-4	---
Chrysene	1.6E-2	1.5E-3	5.6E-1	<b>1.1E+0</b>	---
Dibenzofuran	---	---	---	---	---
Diethyl phthalate	---	1.4E-4	8.7E-4	1.6E-3	---
Di-n-butyl phthalate	---	1.3E-4	1.4E-2	2.8E-2	2.7E-1
Di-n-octyl phthalate	---	5.8E-6	1.2E-3	2.5E-3	---
Fluoranthene	2.3E-2	3.8E-4	5.7E-2	1.1E-1	---
Indeno(1,2,3-cd)pyrene	1.0E-2	6.9E-4	3.7E-1	7.4E-1	---
Isopropylbenzene	---	2.6E-7	8.4E-6	1.7E-5	---
Methylene chloride	---	1.8E-4	2.8E-4	3.7E-4	---
Naphthalene	5.6E-3	1.5E-3	2.9E-2	5.7E-2	---
n-Nitrosodiphenylamine	---	3.9E-3	6.1E-2	1.2E-1	---
Pentachlorophenol	---	2.1E-3	3.9E-1	7.8E-1	---
Phenanthrene	3.2E-2	9.1E-3	9.4E-1	<b>1.9E+0</b>	---
Pyrene	3.4E-2	6.3E-4	1.5E-1	2.9E-1	---
2,4-Dinitrotoluene	---	4.5E-1	<b>1.5E+0</b>	<b>2.6E+0</b>	---
2,6-Dinitrotoluene	---	1.3E-1	3.2E-1	5.1E-1	---
m-Nitrotoluene	---	8.9E-3	5.6E-2	1.0E-1	---
p-Nitrotoluene	---	1.3E-2	7.3E-2	1.3E-1	---
HMX	---	<b>1.7E+0</b>	<b>1.3E+0</b>	8.5E-1	---
RDX	---	5.9E-2	6.4E-2	7.0E-2	---
Aroclor 1254	3.3E-4	1.1E-3	4.5E-1	9.0E-1	1.1E-2
Aroclor 1260	1.7E-4	4.3E-4	1.8E-1	3.6E-1	---
HI <sup>c</sup>	<b>5.0E+1</b>	<b>1.1E+1</b>	<b>3.1E+1</b>	<b>5.0E+1</b>	<b>6.8E+1</b>

<sup>a</sup> **Bold** text indicates HQ or HI exceeds unity.

<sup>b</sup> --- designates insufficient toxicity data available for risk estimation purposes.

<sup>c</sup> The HI is the sum of individual hazard quotients using the value for organic mercury as a conservative estimate of the HI.

HI = Hazard index.

HQ = Hazard quotient.

SWMU = Solid waste management unit.

**Table 15**  
**Internal and External Dose Rates for**  
**Deer Mice Exposed to Radionuclides at SWMU 57A**

Radionuclide	Maximum Concentration (pCi/g)	Internal Dose (rad/day)	External Dose (rad/day)	Total Dose (rad/day)
Cs-137	2.9E-1	8.9E-6	1.3E-5	2.2E-5
U-235 <sup>a</sup>	2.9E-1	3.2E-6	4.8E-6	8.0E-6
U-238	4.0E+0	4.1E-5	8.2E-6	4.9E-5
Total		5.3E-5	2.6E-5	7.9E-5

<sup>a</sup>The U-235 value was calculated using the U-238 concentration and assuming that the U-238 to U-235 ratio was equal to that detected during waste characterization of depleted uranium-contaminated soils generated during the radiological voluntary corrective measures project, where U-235=U-238/73 (Miller June 1998).

pCi/g = Picocurie(s) per gram.

rad/day = Radiation absorbed dose per day.

SWMU = Solid waste management unit.

**Table 16**  
**Internal and External Dose Rates for**  
**Burrowing Owls Exposed to Radionuclides at SWMU 57A**

Radionuclide	Maximum Concentration (pCi/g)	Internal Dose (rad/day)	External Dose (rad/day)	Total Dose (rad/day)
Cs-137	2.9E-1	5.8E-6	1.3E-5	1.9E-5
U-235 <sup>a</sup>	2.9E-1	1.3E-6	4.8E-6	6.1E-6
U-238	4.0E+0	1.7E-5	8.2E-6	2.5E-5
Total		2.4E-5	2.6E-5	5.0E-5

<sup>a</sup>The U-235 value was calculated using the U-238 concentration and assuming that the U-238 to U-235 ratio was equal to that detected during waste characterization of depleted uranium-contaminated soils generated during the radiological voluntary corrective measures project, where U-235=U-238/73 (Miller June 1998).

pCi/g = Picocurie(s) per gram.

rad/day = Radiation absorbed dose per day.

SWMU = Solid waste management unit.

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 U-235, U-238, and Cs-137 are primarily related to those inherent in the radionuclide-specific data. Radionuclide-dependent data are measured values that have their associated errors, which are typically negligible. The dose rate models used for these calculations are based upon conservative estimates on receptor shape, radiation absorption by body tissues, and intake parameters. The goal is to provide a realistic, but conservative, estimate of a receptor's exposure to radionuclides in soil, both internally and externally.

One large uncertainty associated with the prediction of ecological risks at this site is the use of the maximum measured concentrations in soil to evaluate risk. This results in a conservative exposure scenario that does not necessarily reflect actual site conditions. This is also true with regard to the use of detection limits in the estimation of risk. The assumption of an area use factor of 1.0 is a source of uncertainty for the burrowing owl. Because SWMU 57A is approximately 4.2 acres in size, an area use factor of approximately 0.12 would be justified for this receptor. This is sufficient to reduce the HQs for organic mercury and bis(2-ethylhexyl)phthalate to values less than 5.

Analytical data were examined more closely to assess variability within the data. To assess the potential degree of overestimation due to the use of the maximum measured soil concentration in the exposure assessment, average soil concentrations were calculated for each COPEC exhibiting one or more HQs greater than unity. These values were used to determine whether the exceedence can be solely accounted for by the magnitude of the extreme measurement. For the ten inorganics that showed HQs greater than 1.0 (arsenic, barium, cadmium, chromium, lead, mercury, silver, thallium, vanadium, and zinc), the average concentrations were 3.44, 124, 0.209, 7.75, 22.1, 0.0665, 1.10, 0.226, 17.7, and 84.5 mg/kg, respectively (full detection limits were used for nondetects to determine the averages). For arsenic, barium, and chromium, the averages were below their respective background concentrations values; therefore, the HQs were less than the HQ values for background as shown in Table 17. For cadmium, lead, mercury, silver, and vanadium, the HQs based upon the average values were less than unity. For the six PAHs that resulted in HQs greater than 1.0 (benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, and phenanthrene), the average concentrations (5.83, 10.1, 6.87, 5.36, 9.51, and 9.01 µg/kg, respectively) all resulted HQs less than 0.05. For the two HE compounds that resulted in HQs greater than 1.0 (2,4-dinitrotoluene and HMX), the average concentrations (222 and 56.2 µg/kg, respectively) resulted in HQs less than 1.0. For bis(2-ethylhexyl)phthalate the average concentration value (169 µg/kg) reduced the maximum HQ value to 1.1 but did not entirely account for the exceedence. Because the maximum HQ is for the burrowing owl, the incorporation of an area use factor that better describes the size of the site relative to that of owl's home range as described above will reduce the HQ well below unity. Based upon this analysis, most of the HQ values exceeding unity can be accounted for solely by the use of the maximum soil concentration in the exposure assessment. For bis(2-ethylhexyl)phthalate, the remaining exceedence is accounted for by the conservative area use factor for the burrowing owl.

Table 17  
 HQs for Ecological Receptors Exposed to Background Concentrations for SWMU 57A

Constituent of Potential Ecological Concern	Plant HQ <sup>a</sup>	Deer Mouse HQ (Herbivorous) <sup>a</sup>	Deer Mouse HQ (Omnivorous) <sup>a</sup>	Deer Mouse HQ (Insectivorous) <sup>a</sup>	Burrowing Owl HQ <sup>a</sup>
<b>Inorganic</b>					
Arsenic	5.6E-1	3.9E-1	<b>3.5E+0</b>	<b>6.7E+0</b>	2.8E-3
Barium	2.6E-1	3.3E-1	<b>1.1E+0</b>	<b>2.0E+0</b>	1.4E-2
Beryllium	6.5E-2	2.4E-3	4.1E-2	8.0E-2	---
Cadmium	3.0E-1	4.2E-2	4.4E-2	4.6E-2	1.5E-3
Chromium (total)	<b>1.3E+1</b>	2.2E-5	3.9E-5	5.6E-5	4.3E-2
Cobalt	2.6E-1	---	---	---	---
Copper	5.2E-2	2.2E-2	1.5E-2	7.3E-3	4.6E-4
Lead	2.4E-1	1.3E-2	1.0E-2	7.0E-3	6.9E-3
Mercury (inorganic)	3.3E-1	1.1E-3	1.1E-3	1.1E-3	2.0E-2
Mercury (organic)	3.3E-1	2.5E-1	2.5E-1	2.5E-1	<b>1.4E+0</b>
Nickel	3.8E-1	5.0E-3	7.1E-3	9.2E-3	4.3E-4
Selenium	5.0E-1	5.6E-2	8.3E-2	1.1E-1	2.0E-2
Silver	2.5E-1	2.3E-3	1.4E-3	6.0E-4	---
Thallium	5.5E-1	1.4E-1	<b>3.1E+0</b>	<b>6.0E+0</b>	---
Vanadium	<b>1.0E+1</b>	2.1E-1	<b>4.4E+0</b>	<b>8.5E+0</b>	4.8E-3
Zinc	<b>1.2E+0</b>	4.7E-2	2.8E-2	9.9E-3	1.5E-1
HI <sup>c</sup>	<b>2.8E+1</b>	<b>1.5E+0</b>	<b>1.3E+1</b>	<b>2.4E+1</b>	<b>1.7E+0</b>

<sup>a</sup> **Bold** text indicates HQ or HI exceeds unity.

<sup>b</sup> --- designates insufficient toxicity data available for risk estimation purposes.

<sup>c</sup> 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.



In the estimation of ecological risk, background concentrations are included as a component of maximum on-site concentrations. Table 17 illustrates risk estimates associated with exposure of each of the receptors to background concentrations of the metal COPECs. With respect to the plant, HQs greater than 1.0 were obtained for chromium (total), vanadium, and zinc. HQs greater than unity were also obtained for the omnivorous and insectivorous deer mouse exposed to arsenic, barium, thallium, and vanadium at the background concentrations. The background concentration for thallium, however, was estimated at one half the detection limit from background samples. This value is greater than the maximum concentration measured at SWMU 57A; therefore, the contribution by naturally-occurring thallium is uncertain. Mercury resulted in an HQ greater than 1.0 for the burrowing owl when it was assumed that the background concentration is entirely composed of mercury in organic form. About 9 percent of the maximum on-site lead and about 11 percent of the maximum on-site silver were associated with background. However, the HQs for these two analytes are relatively small (the maximum HQ for lead is 2.7 and that for silver is 2.3, both in plants). About 87 percent of the maximum on-site arsenic and 91 percent of chromium (total) was associated with background. Finally, analyses for thallium, vanadium, and zinc were only performed on four soil samples and two duplicate samples. Thallium was only detected in one of the samples (a duplicate) and vanadium and zinc were only measured above background in one sample and its duplicate (the same duplicate sample in which thallium was detected). This sample and duplicate were from the underground bunker where exposure to most ecological receptors is unlikely. Because of the uncertainties associated with exposure and toxicity, it is unlikely that arsenic and chromium, thallium, vanadium, and zinc, with exposure concentrations largely attributable to background, present significant ecological risk.

Based upon this uncertainty analysis, ecological risks at SWMU 57A are expected to be very low. HQs greater than unity were initially predicted; however, closer examination of the exposure assumptions revealed an overestimation of risk primarily attributed to exposure concentration, background risk, quality of analytical data, and the utilization of detection limits as exposure concentrations.

### VII.3.6 Risk Interpretation

Ecological risks associated with SWMU 57A were estimated through a screening assessment that incorporated site-specific information when available. Overall, risks to ecological receptors are expected to be low due to the fact that predicted risks associated with exposure to COPECs are based upon calculations using maximum detected values. Predicted risks from exposure to cadmium, lead, mercury, silver, vanadium, PAHs, and HE were attributed to using maximum detected values. In addition, average arsenic, barium, and total chromium concentrations at the site were within the range of background concentrations. Thallium and zinc concentrations that resulted in HQs greater than unity were limited to a single sampling location where exposure is unlikely to be significant. Bis(2-ethylhexyl)phthalate was predicted to be hazardous to the burrowing owl; however, potential risks associated with this compound were evaluated using maximum detected values and an area use factor for the owl of 1.0, both of which can account for the HQ exceeding unity. Therefore, the actual risk due to this compound is expected to be low. Based upon this final analysis, ecological risks associated with SWMU 57A 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 additional data collected to more thoroughly assess actual ecological risk at the site. 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

Sandia National Laboratories (SNL/NM) proposes that a default set of exposure routes and associated default parameter values be developed for each future land-use designation being considered for SNL/NM Environmental Restoration (ER) project sites. This default set of exposure scenarios and parameter values would be invoked for risk assessments unless site-specific information suggested other parameter values. Because many SNL/NM solid waste management units (SWMU) have similar types of contamination and physical settings, SNL/NM believes that the risk assessment analyses at these sites can be similar. A default set of exposure scenarios and parameter values will facilitate the risk assessments and subsequent review.

The default exposure routes and parameter values suggested are those that SNL/NM views as resulting in a Reasonable Maximum Exposure (RME) value. Subject to comments and recommendations by the U.S. Environmental Protection Agency (EPA) Region VI and New Mexico Environment Department (NMED), SNL/NM proposes that these default exposure routes and parameter values be used in future risk assessments.

At SNL/NM, all SWMUs exist within the boundaries of the Kirtland Air Force Base (KAFB). Approximately 157 potential waste and release sites have been identified where hazardous, radiological, or mixed materials may have been released to the environment. Evaluation and characterization activities have occurred at all of these sites to varying degrees. Among other documents, the SNL/NM ER draft Environmental Assessment (DOE 1996) presents a summary of the hydrogeology of the sites, the biological resources present and proposed land-use scenarios for the SNL/NM SWMUs. At this time, all SNL/NM SWMUs have been tentatively designated for either industrial or recreational future land use. The NMED has also requested that risk calculations be performed based upon a residential land-use scenario. All three land-use scenarios will be addressed in this document.

The SNL/NM ER project has screened the potential exposure routes and identified default parameter values to be used for calculating potential intake and subsequent hazard index (HI), risk and dose values. The EPA (EPA 1989a) provides a summary of exposure routes that could potentially be of significance at a specific waste site. These potential exposure routes consist of:

- Ingestion of contaminated drinking water
- Ingestion of contaminated soil
- Ingestion of contaminated fish and shell fish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming
- Dermal contact with chemicals in water
- Dermal contact with chemicals in soil
- Inhalation of airborne compounds (vapor phase or particulate)



- External exposure to penetrating radiation (immersion in contaminated air; immersion in contaminated water and exposure from ground surfaces with photon-emitting radionuclides).

Based upon the location of the SNL/NM SWMUs and the characteristics of the surface and subsurface at the sites, we have evaluated these potential exposure routes for different land-use scenarios to determine which should be considered in risk assessment analyses (the last exposure route is pertinent to radionuclides only). At SNL/NM SWMUs, there does not currently occur any consumption of fish, shell fish, fruits, vegetables, meat, eggs, or dairy products that originate on site. Additionally, no potential for swimming in surface water is present due to the high-desert environmental conditions. As documented in the RESRAD computer code manual (ANL 1993), risks resulting from immersion in contaminated air or water are not significant compared to risks from other radiation exposure routes.

For the industrial and recreational land-use scenarios, SNL/NM ER has, therefore, excluded the following four potential exposure routes from further risk assessment evaluations at any SNL/NM SWMU:

- Ingestion of contaminated fish and shell fish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming.

That part of the exposure pathway for radionuclides related to immersion in contaminated air or water is also eliminated.

For the residential land-use scenario, we will include ingestion of contaminated fruits and vegetables because of the potential for residential gardening.

Based upon this evaluation, for future risk assessments, the exposure routes that will be considered are shown in Table 1. Dermal contact is included as a potential exposure pathway in all land use scenarios. However, the potential for dermal exposure to inorganics is not considered significant and will not be included. In general, the dermal exposure pathway is generally considered to not be significant relative to water ingestion and soil ingestion pathways but will be considered for organic components. Because of the lack of toxicological parameter values for this pathway, the inclusion of this exposure pathway into risk assessment calculations may not be possible and may be part of the uncertainty analysis for a site where dermal contact is potentially applicable.

#### Equations and Default Parameter Values for Identified Exposure Routes

In general, SNL/NM expects that ingestion of compounds in drinking water and soil will be the more significant exposure routes for chemicals; external exposure to radiation may also be significant for radionuclides. All of the above routes will, however, be considered for their appropriate land use scenarios. The general equations for calculating potential intakes via these routes are shown below. The equations are from the Risk Assessment Guidance for Superfund (RAGS): Volume 1 (EPA 1989a, 1991). These general equations also apply to calculating potential intakes for radionuclides. A more in-depth discussion of the equations

**Table 1**  
**Exposure Pathways Considered for Various Land Use Scenarios**

<b>Industrial</b>	<b>Recreational</b>	<b>Residential</b>
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/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)

$$= C \times (CR \times EFD/BW/AT) \times \text{Toxicity Effect} \tag{1}$$

where

- C = contaminant concentration (site specific)
- CR = contact rate for the exposure pathway
- EFD= exposure frequency and duration
- BW = body weight of average exposure individual
- AT = time over which exposure is averaged.

The total risk/dose (either cancer risk or HI) is the sum of the risks/doses for all of the site-specific exposure pathways and contaminants.

The evaluation of the carcinogenic health hazard produces a quantitative estimate for excess cancer risk resulting from the constituents of concern (COC) present at the site. This estimate is evaluated for determination of further action by comparison of the quantitative estimate with the potentially acceptable risk range of  $10^{-4}$  to  $10^{-6}$ . The evaluation of the noncarcinogenic health hazard produces a quantitative estimate (i.e., the HI) for the toxicity resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of this quantitative estimate with the EPA standard HI of unity (1). The evaluation of the health hazard due to radioactive compounds produces a quantitative estimate of doses resulting from the COCs present at the site.

The specific equations used for the individual exposure pathways can be found in RAGS (EPA 1989a) and the RESRAD Manual (ANL 1993). Table 2 shows the default parameter values suggested for use by SNL/NM at SWMUs, based upon the selected land use scenario. References are given at the end of the table indicating the source for the chosen parameter values. The intention of SNL/NM is to use default values that are consistent with regulatory guidance and consistent with the RME approach. Therefore, the values chosen will, in general, provide a conservative estimate of the actual risk parameter. These parameter values are suggested for use for the various exposure pathways based upon the assumption that a particular site has no unusual characteristics that contradict the default assumptions. For sites for which the assumptions are not valid, the parameter values will be modified and documented.

### Summary

SNL/NM proposes the described default exposure routes and parameter values for use in risk assessments at sites that have an industrial, recreational or residential future land-use scenario. There are no current residential land-use designations at SNL/NM ER sites, but this scenario has been requested to be considered by the NMED. For sites designated as industrial or recreational land-use, SNL/NM will provide risk parameter values based upon a residential land-use scenario to indicate the effects of data uncertainty on risk value calculations or in order to potentially mitigate the need for institutional controls or restrictions on SNL/NM ER sites. The parameter values are based upon EPA guidance and supplemented by information from other government sources. The values are generally consistent with those proposed by Los Alamos National Laboratory, with a few minor variations. If these exposure routes and parameters are acceptable, SNL/NM will use them in risk assessments for all sites where the assumptions are consistent with site-specific conditions. All deviations will be documented.

### References

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DOE, see U.S. Department of Energy.

EPA, see U.S. Environmental Protection Agency.

**Table 2**  
**Default Parameter Values for Various Land Use Scenarios**

Parameter	Industrial	Recreational	Residential
<b>General Exposure Parameters</b>			
Exposure frequency (day/yr)	***	***	***
Exposure duration (yr)	30 <sup>a,b</sup>	30 <sup>a,b</sup>	30 <sup>a,b</sup>
Body weight (kg)	70 <sup>a,b</sup>	56 <sup>a,b</sup>	70 adult <sup>a,b</sup> 15 child
Averaging Time (days) for carcinogenic compounds (= 70 y x 365 day/yr)	25550 <sup>a</sup>	25550 <sup>a</sup>	25550 <sup>a</sup>
for noncarcinogenic compounds (= ED x 365 day/yr)	10950	10950	10950
<b>Soil Ingestion Pathway</b>			
Ingestion rate	100 mg/day <sup>c</sup>	6.24 g/yr <sup>d</sup>	114 mg-yr/kg-day <sup>a</sup>
<b>Inhalation Pathway</b>			
Inhalation rate (m <sup>3</sup> /yr)	5000 <sup>a,b</sup>	146 <sup>d</sup>	5475 <sup>a,b,d</sup>
Volatilization factor (m <sup>3</sup> /kg)	chemical specific	chemical specific	chemical specific
Particulate emission factor (m <sup>3</sup> /kg)	1.32E9 <sup>a</sup>	1.32E9 <sup>a</sup>	1.32E9 <sup>a</sup>
<b>Water Ingestion Pathway</b>			
Ingestion rate (L/day)	2 <sup>a,b</sup>	2 <sup>a,b</sup>	2 <sup>a,b</sup>
<b>Food Ingestion Pathway</b>			
Ingestion rate (kg/yr)	NA	NA	138 <sup>b,d</sup>
Fraction ingested	NA	NA	0.25 <sup>b,d</sup>
<b>Dermal Pathway</b>			
Surface area in water (m <sup>2</sup> )	2 <sup>b,e</sup>	2 <sup>b,e</sup>	2 <sup>b,e</sup>
Surface area in soil (m <sup>2</sup> )	0.53 <sup>b,e</sup>	0.53 <sup>b,e</sup>	0.53 <sup>b,e</sup>
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.

<sup>a</sup>RAGS, Vol 1, Part B (EPA 1991).

<sup>b</sup>Exposure Factors Handbook (EPA 1989b)

<sup>c</sup>EPA Region VI guidance.

<sup>d</sup>For radionuclides, RESRAD (ANL 1993) is used for human health risk calculations; default parameters are consistent with RESRAD guidance.

<sup>e</sup>Dermal Exposure Assessment (EPA 1992).

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**Justification for  
Class III Permit Modification**

**April 2000**

**Solid Waste Management Unit 57A  
Operable Unit 1334  
Round 11**

RSI Originally Submitted September 1999

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OU 1335

## Site-Specific Comments

### OU 1334

#### *ER Site 57A, Workman Site: Firing Site*

**ER Site 57A is appropriate for NFA, pending submittal of the below requested information.**

**Page 7-71, Table 4.4.4-17 -- The unit of measurement ( $\mu\text{g}/\text{kg}$ ) is likely incorrect. Please verify the unit of measurement, and if erroneous, submit a revised table.**

Response: The units and method detection limits in Table 4.4.4-17 were incorrectly reported by the laboratory. This error will be corrected and the NFA will be resubmitted under separate cover also to incorporate the Underground Bunker sampling results into the Risk Assessment as discussed in a meeting with New Mexico Environment Department personnel on October 23, 1998.