

**FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (FFACO)
RECORD OF TECHNICAL CHANGE (ROTC)**

Corrective Action Unit (CAU) Number: 219

CAU Description: Septic Systems and Injection Wells

CAU Owner: Industrial Sites - Environmental Restoration (ER)

ROTC No. DOE/NV--1125-ROTC 1 **Page** 1 of 9

Document Type Corrective Action Decision Document/Closure Report (CADD/CR) **Date** 12/15/2021

The following technical changes (including justification) are requested by:

Tiffany Gamero

Requestor Name

Long-Term Monitoring Activity Lead

Requestor Title

Description of Change:

1. This ROTC replaces the Use Restriction (UR) information listed in the documentation for CAU 219.

UR forms have been updated to list all UR requirements, including but not limited to: post-closure site controls (signs, fencing, etc.), inspection and maintenance requirements, and Geographic Information Systems (GIS) coordinate information. The UR requirements and form(s) included in this ROTC represent the current corrective action requirements for each Corrective Action Site (CAS) in this CAU and supersede information concerning corrective action and post-closure requirements in existing documentation.

2. The UR boundary coordinate values changed due to conversion from North American Datum (NAD) 1927 to NAD 1983.
3. The Administrative UR for Corrective Action Sites (CASs) 16-

Justification:

1. Some changes in the UR requirements from those found in closure documents have been subsequently modified in letters, memos, and inspection reports. This has resulted in difficulty in determining current post-closure requirements. A review of the post-closure requirements for this CAU has been conducted to ensure that all requirements have been identified and documented on the new UR form. The new UR form was developed to be inclusive of all requirements for long-term monitoring and standardize information contained in the URs consistent with current protocols.
2. UR boundary coordinates need to be in one standardized coordinate system.
3. Current protocol is to have separate URs for each CAS. The separate UR

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Description of Change:

- 04-01, 16-04-02, and 16-04-03 was separated into URs for each CAS.
- 4. Remove Administrative URs for CASs 16-04-01, 16-04-02.
- 5. New UR coordinates were established for the portion of the original UR boundary pertaining to CAS 16-04-03.

Justification:

- boundaries were determined from the CAU 219 CADD/CR.
- 4. Based on an evaluation that concentrations of hazardous contaminants at these CASs do not exceed industrial action levels and do not warrant an Administrative UR.
- 5. A new boundary was required due to separating the original UR into separate URs for each CAS.

Schedule Impacts:

No impacts to schedule.

ROTC applies to the following document(s):

- U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2006. Corrective Action Decision Document/Closure Report for Corrective Action Unit 219: Septic Systems and Injection Wells, Nevada Test Site, Nevada, Rev. 0, DOE/NV--1125. Las Vegas, NV.

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ROTC No. DOE/NV--1125-ROTC 1 **Page** 3 of 9

Document Type Corrective Action Decision Document/Closure Report (CADD/CR) **Date** 12/15/2021

Approvals:

Tiffany A. Gamero Digitally signed by Tiffany A. Gamero
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Tiffany Gamero

Activity Lead

Environmental Management (EM) Nevada Program

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Deputy Program Manager, Operations

Environmental Management (EM) Nevada Program

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Christine Andres

Chief, Bureau of Federal Facilities

Nevada Division of Environmental Protection (NDEP)

U.S. Department of Energy, Environmental Management Nevada Program

Use Restriction Information

General Information

Use Restriction (UR) Type(s):	Administrative Only
Corrective Action Unit (CAU) Number & Description:	219 - Septic Systems and Injection Wells
Corrective Action Site (CAS) Number & Description:	16-04-03 - Sewer Pipes
CAU/CAS Owner:	Industrial Sites - ER
Note:	CAS previously shared UR Form with CASs 16-04-01 and 16-04-02.

Section I. Federal Facility Agreement and Consent Order (FFACO) UR

An FFACO UR is not identified for this site.

Section II. Administrative UR

Basis for Administrative UR

Summary Statement: This Administrative UR is established to protect workers should future land use result in increased exposure to site contaminants. Chemical contaminants are assumed to be present that exceed action levels under the Industrial Area (2,000 hours) exposure scenario.

U.S. Department of Energy, Environmental Management Nevada Program

Use Restriction Information

Administrative UR Physical Description

Surveyed Area (UTM, Zone 11, NAD 83, meters):

UR Boundary	UR Point ¹	Easting ²	Northing ²
Admin Boundary	1	572,100	4,100,670
	2	572,091	4,100,673
	3	572,097	4,100,702
	4	572,122	4,100,731
	5	572,128	4,100,728
	6	572,106	4,100,700
	7	572,100	4,100,670

¹UR Points are listed clockwise beginning at the southernmost point. If multiple points share the southernmost Northing coordinate, the easternmost point is listed as Point 1.

²UR coordinate values presented herein were transformed from the North American Datum of 1927, and rounded to the nearest meter; resultant coordinates may not reflect the original precision of values contained within the source GIS data set.

Boundary Applies to: Both Surface and Subsurface

Starting Depth: 0

Ending Depth: 3

Depth Unit: Meters

Survey Source: GIS

Administrative UR Requirements

Administrative URs do not require onsite postings or other physical barriers, and they do not require periodic inspections or maintenance.

Site Controls:

This Administrative UR is recorded as described in **Section IV. Recordation Requirements** to restrict activities within the area defined by the coordinates listed above and depicted in the attached figure without prior notification of NDEP unless the activities are conducted under the provisions of 10 CFR, Part 835, Occupational Radiation Protection and 10 CFR, Part 851, Worker Safety and Health Program.

U.S. Department of Energy, Environmental Management Nevada Program Use Restriction Information

Section III. Supporting Documentation

UR Source Document(s)

ROTC 1 for CAU 219 CR (DOE/NV--1125), dated 12/15/2021.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2006. Corrective Action Decision Document/Closure Report for Corrective Action Unit 219: Septic Systems and Injection Wells, Nevada Test Site, Nevada, Rev. 0, DOE/NV--1125. Las Vegas, NV.

Attachments

- Administrative UR Boundary Map (UTM, Zone 11, NAD 83 meters)
- Supplemental Information Figure (UTM, Zone 11, NAD 83 meters)

Section IV. Recordation Requirements

Recordation:

The above UR(s) are recorded in the:

- FFACO Database
- NNSA M&O Contractor GIS
- EM Nevada Program CAU/CAS Files

Section V. EM Nevada Program Approval

Tiffany A. Gamero

Digitally signed by Tiffany A.
Gamero
Date: 2022.01.12 11:28:16 -08'00'

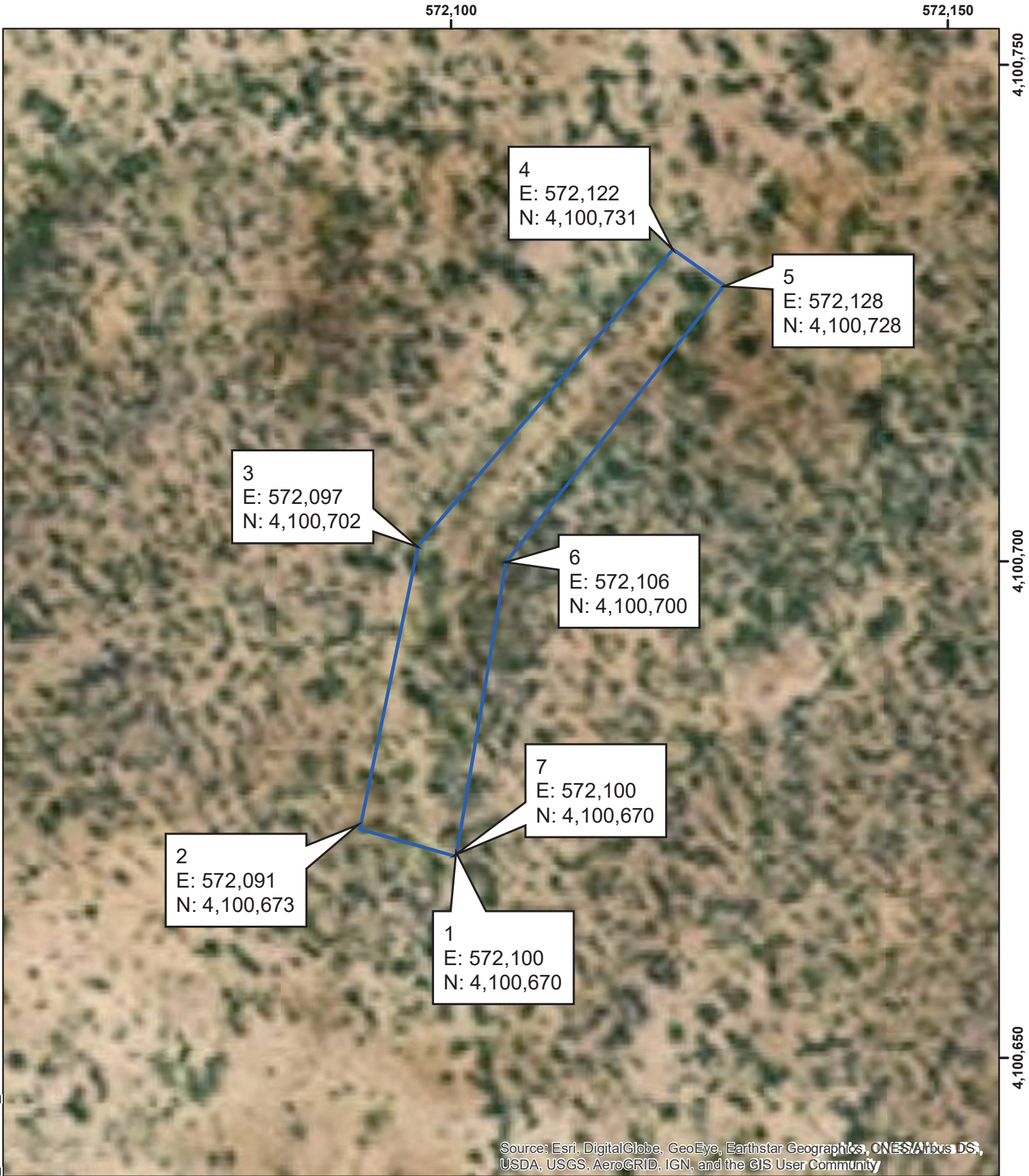
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Tiffany Gamero

Activity Lead

EM Nevada Program

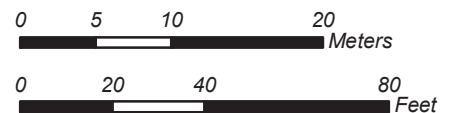
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CAU 219, CAS 16-04-03
Sewer Pipes
Administrative UR Boundary

Explanation

 Administrative UR



Supplemental Information Figure

The attached supplemental information figure(s) are included to capture site feature information that was available in previous iterations of this Use Restriction (UR) to prevent loss of that information.

572,000

572,050

572,100

572,150

4,100,750

4,100,700

4,100,650

4,100,600

4,100,550

Explanation	
	Administrative UR
	4-inch piping
	6-inch piping
	Acces Road
	Drainage Channel
	Footprint
	Septic Tanks
	Soil Overburden
	Sump

Distribution Box

Outfall

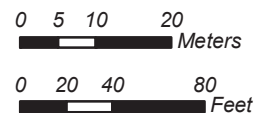
Open Manhole

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



CAU 219, CAS 16-04-03 **Supplemental Information** **General Location of Site Features**

Source: Navarro GIS, 2020



NOTE: Size and location of features are approximated.
 Coordinate System: NAD 1983 UTM Zone 11N, Meter

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Nevada
Environmental
Restoration
Project

DOE/NV--1125



Corrective Action Decision Document/ Closure Report for Corrective Action Unit 219: Septic Systems and Injection Wells Nevada Test Site, Nevada

Controlled Copy No.: UNCONTROLLED
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May 2006

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Environmental Restoration
Division



U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office

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**CORRECTIVE ACTION DECISION DOCUMENT/
CLOSURE REPORT
FOR CORRECTIVE ACTION UNIT 219:
SEPTIC SYSTEMS AND INJECTION WELLS
NEVADA TEST SITE, NEVADA**

U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office
Las Vegas, Nevada

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NEVADA TEST SITE, NEVADA**

Approved by: APPROVED SIGNATURE

Date: 5/25/2006

Kevin Cabbie,
Federal Sub-Project Director
Environmental Restoration Project

Approved by: APPROVED SIGNATURE

Date: 5/25/2006

Janet Appenzeller-Wing,
Federal Project Director
Environmental Restoration Project

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List of Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
bgs	Below ground surface
BMP	Best management practice
°C	Degrees Celsius
CADD/CR	Corrective Action Decision Document/Closure Report
CAI	Corrective Action Investigation
CAIP	Corrective Action Investigation Plan
CAS	Corrective Action Site
CAU	Corrective Action Unit
CFR	<i>Code of Federal Regulations</i>
CLP	Contract Laboratory Program
cm	Centimeter
cm ³ /cm ³	Cubic centimeters per cubic centimeter
COC	Contaminant of concern
COPC	Contaminant of potential concern
CSM	Conceptual site model
cyd	Cubic yard
day/yr	Days per year
DNA	U.S. Defense Nuclear Agency
DOE	U.S. Department of Energy
DQA	Data quality assessment
DQI	Data quality indicator
DQO	Data quality objective
DRO	Diesel-range organics
EPA	U.S. Environmental Protection Agency
FADL	Field activity daily log

List of Acronyms and Abbreviations (Continued)

FAL	Final action level
FD	Field duplicate
FFACO	<i>Federal Facility Agreement and Consent Order</i>
FSL	Field-screening level
FSR	Field-screening result
ft	Foot
g/g	Grams per gram
gal	Gallon
GPS	Global Positioning System
GRO	Gasoline-range organics
HAE	Height above ellipsoid
HWAA	Hazardous Waste Accumulation Area
ID	Identification
IDW	Investigation-derived waste
IRIS	Integrated Risk Information System
kg/day	Kilograms per day
in.	Inch
LCS	Laboratory control sample
MDC	Minimum detectable concentration
mg/kg	Milligrams per kilogram
mi	Mile
mrem/yr	Millirem per year
MS	Matrix spike
MSD	Matrix spike duplicate
NAC	<i>Nevada Administrative Code</i>
N/A	Not applicable

List of Acronyms and Abbreviations (Continued)

NAD	North American Datum
NCRP	National Council on Radiation Protection and Measurement
NDEP	Nevada Division of Environmental Protection
NIST	National Institute for Standards and Technology
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NTS	Nevada Test Site
NV/YMP	Nevada/Yucca Mountain Project
PAH	Polynuclear aromatic hydrocarbon
PAI	Paragon Analytics, Inc.
PAL	Preliminary action level
PB	Preparation blank
PCB	Polychlorinated biphenyl
pCi/g	Picocuries per gram
PID	Photoionization detector
POC	Performance objective criteria
ppm	Parts per million
PRG	Preliminary Remediation Goal
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
RadCon	Radiological Control
RAIS	Risk Assessment Information System
RBCA	Risk-based corrective action
RBSL	Risk-based screening level
RCRA	<i>Resource Conservation and Recovery Act</i>
REEC	Reynolds Electrical & Engineering Co., Inc.

List of Acronyms and Abbreviations (Continued)

ROTC	Record of Technical Change
RPD	Relative percent difference
SCL	Sample collection log
SDG	Sample delivery group
SNJV	Stoller-Navarro Joint Venture
SSTL	Site-specific target level
SVOC	Semivolatile organic compound
T.A.	Tank Access
TCLP	Toxicity characteristic leaching procedure
Th	Thorium
TPH	Total petroleum hydrocarbons
TSCA	<i>Toxic Substance Control Act</i>
UTM	Universal Transverse Mercator
VOC	Volatile organic compound
yr	Year
µg/kg	Micrograms per kilogram

Executive Summary

This Corrective Action Decision Document/Closure Report has been prepared for Corrective Action Unit (CAU) 219, Septic Systems and Injection Wells, in Areas 3, 16, and 23 of the Nevada Test Site, Nevada, in accordance with the *Federal Facility Agreement and Consent Order* (1996). Corrective Action Unit 219 is comprised of the following corrective action sites (CASs):

- 03-11-01, Steam Pipes and Asbestos Tiles
- 16-04-01, Septic Tanks (3)
- 16-04-02, Distribution Box
- 16-04-03, Sewer Pipes
- 23-20-01, DNA Motor Pool Sewage and Waste System
- 23-20-02, Injection Well

The purpose of this Corrective Action Decision Document/Closure Report is to provide justification and documentation supporting the recommendation for closure of CAU 219 with no further corrective action beyond the application of a use restriction at CASs 16-04-01, 16-04-02, and 16-04-03. To achieve this, corrective action investigation (CAI) activities were performed from June 20 through October 12, 2005, as set forth in the CAU 219 Corrective Action Investigation Plan and Record of Technical Change No. 1. A best management practice was implemented at CASs 16-04-01, 16-04-02, and 16-04-03, and corrective action was performed at CAS 23-20-01 between January and April 2006. In addition, a use restriction will be applied to CASs 16-04-01, 16-04-02, and 16-04-03 to provide additional protection to Nevada Test Site personnel. The purpose of the CAI was to fulfill the following data needs as defined during the data quality objective (DQO) process:

- Determine whether contaminants of concern (COCs) are present.
- If COCs are present, determine their nature and extent.
- Provide sufficient information and data to complete appropriate corrective actions.

The CAU 219 dataset from the investigation results was evaluated based on the data quality indicator parameters. This evaluation demonstrated the quality and acceptability of the dataset for use in fulfilling the DQO data needs.

Analytes detected during the CAI were evaluated against final action levels (FALs) established in this document. A Tier 2 evaluation was conducted, and a FAL of 185,000 micrograms per kilogram was

calculated for chlordane at CASs 16-04-01, 16-04-02, and 16-04-03 based on an occasional use area exposure scenario. This evaluation of chlordane based on the Tier 2 FAL determined that no FALs were exceeded. Therefore, the DQO data needs were met, and it was determined that no corrective action (based on risk to human receptors) is necessary for the site.

The following contaminants were determined to be present at concentrations exceeding their corresponding FALs:

- The surface soil surrounding the main concrete pad at CAS 23-20-01 contained Aroclor-1254, Aroclor-1260, and chlordane above the FALs. This soil, along with the COCs, was subsequently removed at CAS 23-20-01.
- The sludge in the concrete box of the catch basin at the large concrete pad at CAS 23-20-01 contained lead and benzo(a)pyrene above the FALs. This contamination was limited to the sludge in the concrete box of the catch basin and did not migrate to the subsurface features beneath it. The contaminated and the concrete box of the catch basin were subsequently recovered at CAS 23-20-01.

Therefore, the U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office provides the following recommendations:

- No further corrective action for CAU 219.
- No Corrective Action Plan.
- A Notice of Completion to the U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office is requested from the Nevada Division of Environmental Protection for closure of CAU 219.
- Corrective Action Unit 219 should be moved from Appendix III to Appendix IV of the *Federal Facility Agreement and Consent Order*.

1.0 Introduction

This Corrective Action Decision Document/Closure Report (CADD/CR) has been prepared for Corrective Action Unit (CAU) 219, Septic Systems and Injection Wells, Nevada Test Site (NTS), Nevada. The corrective actions proposed in this document are in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) that was agreed to by the State of Nevada, U.S. Department of Energy (DOE), and the U.S. Department of Defense (FFACO, 1996). The NTS is approximately 65 miles (mi) northwest of Las Vegas, Nevada ([Figure 1-1](#)).

Corrective Action Unit 219 is comprised of the six inactive and abandoned corrective action sites (CASs) that are shown on [Figure 1-2](#) and listed below:

- 03-11-01, Steam Pipes and Asbestos Tiles
- 16-04-01, Septic Tanks (3)
- 16-04-02, Distribution Box
- 16-04-03, Sewer Pipes
- 23-20-01, DNA Motor Pool Sewage and Waste System
- 23-20-02, Injection Well

One CAS is located at the former Area 3 Subdock. Three CASs are located at the former Area 16 Camp. The final two CASs are located in Mercury (one at the former U.S. Defense Nuclear Agency [DNA] Motor Pool and the other at the former Reynolds Electrical & Engineering Co., Inc. [REECo] Motor Pool).

The Area 3 Subdock was in operation from the 1970s through 1985, when it was relocated to Area 1. The complex served as the support facility for REECo drilling activities (Patton, 2003). All of the buildings have since been demolished, and only the concrete pads remain. Corrective Action Site 03-11-01 consists of surface debris on or near one of these concrete pads. The debris consists of asbestos-containing floor tiles, four pieces of steam pipe wrapped in insulation, a 15-foot (ft) rubber hose, and miscellaneous metal on the pad.

The Area 16 Camp was in operation from the early 1960s through the late 1960s. The camp was residential in nature and housed the Area 16 Tunnel workers (Metcalf, 2004). All of the trailers have since been removed, leaving only the septic system. The septic system that serviced the camp

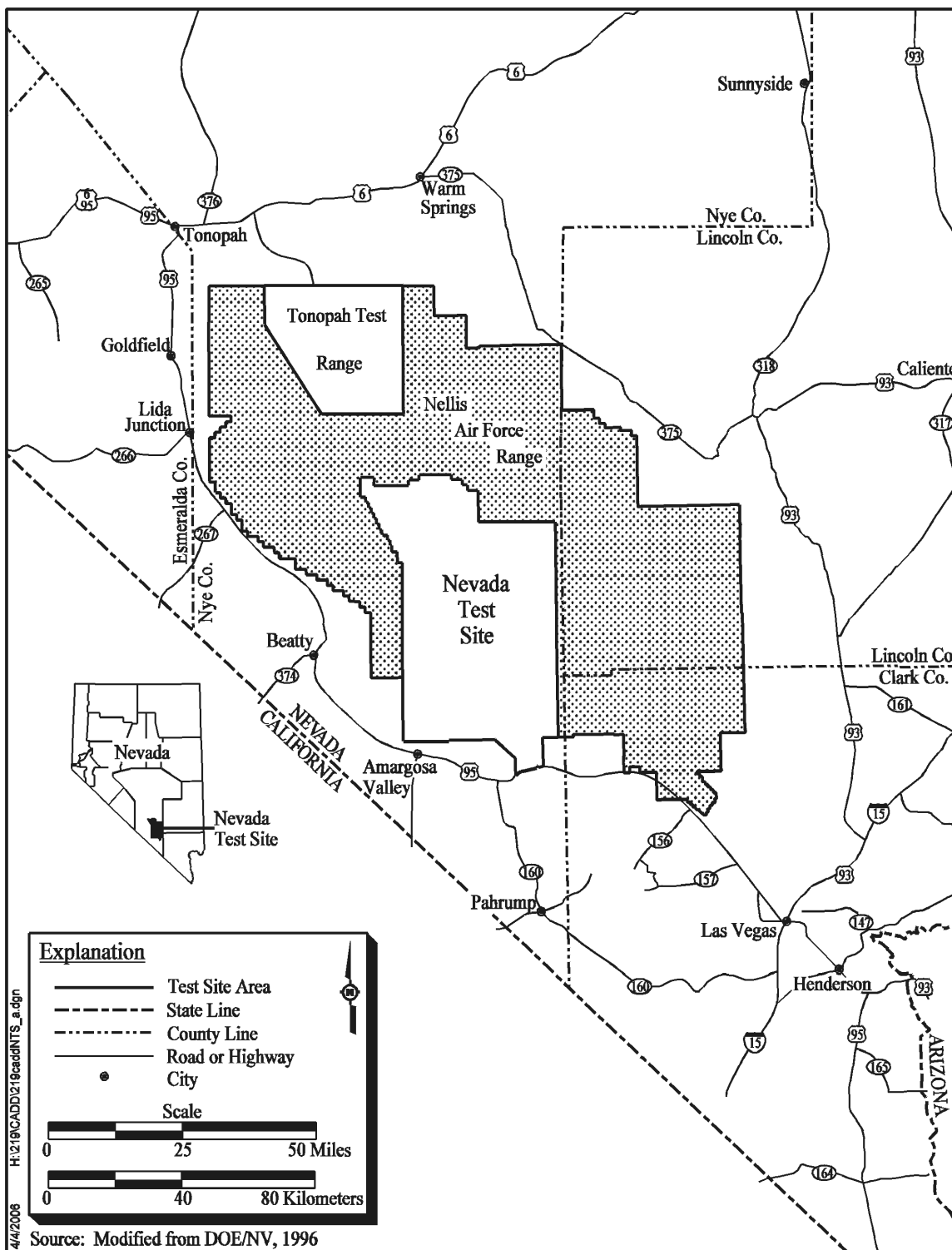


Figure 1-1
Nevada Test Site

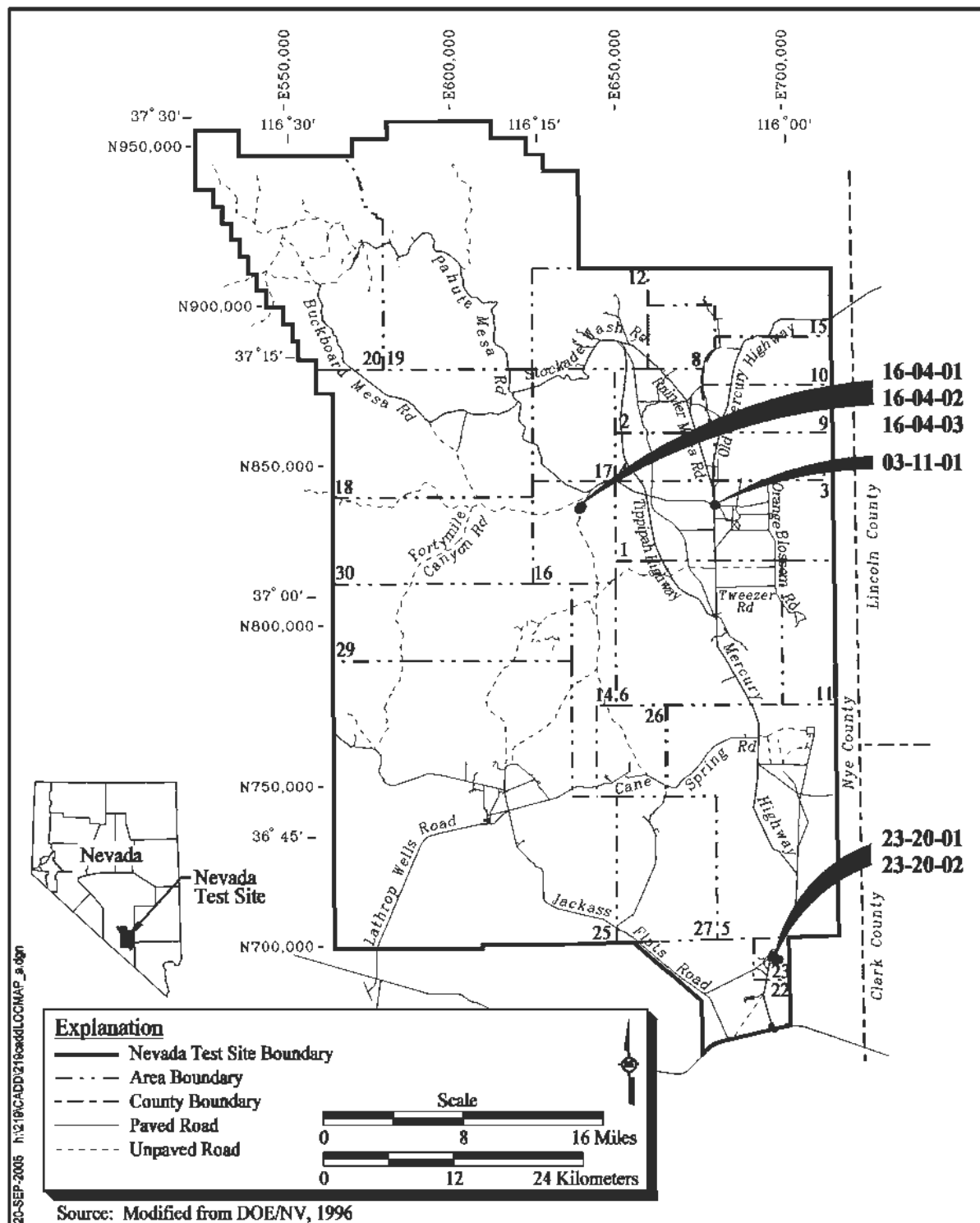


Figure 1-2
Corrective Action Unit 219, CAS Location Map

consists of three septic tanks (CAS 16-04-01), a distribution box (CAS 16-04-02), and the associated sewer piping (CAS 16-04-03). The discharge channel and sump excavation downgradient of the discharge of CAS 16-04-03 were added to the investigation during the data quality objective (DQO) process but not assigned to a specific CAS. These two areas were included in the scope of CAS 16-04-03 but are considered to be impacted by all three CASs.

The DNA Motor Pool (Building 210) was built in 1952 and was employed for vehicle maintenance activities until 1991, when it became a storage facility for nonhazardous waste (Olsen, 2004). Building 210 was demolished in 2001 and only the concrete foundation, the decontamination pad, and the metal battery shed remain. Corrective Action Site 23-20-01 consists of the sewage and waste system associated with the former motor pool. The waste system is comprised of two grease pits, a catch basin, a floor drain, an oil interceptor, a sand trap inside the decontamination pad, a sump under the decontamination pad, and the associated piping.

The REECO Motor Pool at the original Building 132 was built in 1952 and used for basic vehicle maintenance (Olsen, 2004). In 1965, the facility was moved to its current location, and the building and its foundation were demolished (Gonzalez, 2004). The area is currently a storage yard south of the Building 160 Warehouse. Corrective Action Site 23-20-02 consists of an unknown collection feature believed to be a sump, injection well, or similar structure associated with the former motor pool.

A detailed discussion of the history of this CAU is presented in the *Corrective Action Investigation Plan (CAIP) for Corrective Action Unit 219: Septic Systems and Injection Wells* (NNSA/NSO, 2005).

1.1 Purpose

This CADD/CR provides justification for the closure of CAU 219 without further corrective action beyond the application of the use restriction at CASs 16-04-01, 16-04-02, and 16-04-03. This justification is based on process knowledge and the results of the investigative activities conducted in accordance with the CAIP (NNSA/NSO, 2005). The CAIP provides information relating to the history, planning, and scope of the investigation; therefore, this information will not be repeated in this CADD/CR.

1.2 Scope

The scope of this CADD/CR is to justify and recommend that no further corrective action is required at CAU 219, Septic Systems and Injection Wells. To achieve this scope, the following actions were implemented:

- Evaluation of current site conditions, including the nature and extent of contaminants of concern (COCs).
- Removal of surface debris at CAS 03-11-01.
- Closure of septic tanks and distribution box at CAS 16-04-01 and CAS 16-04-02.
- Closure in place with use restriction was implemented to prevent exposure of industrial and construction workers to unacceptable risks at CASs 16-04-01, 16-04-02, and 16-04-03.
- Removal and disposal of soil surrounding the concrete pad at CAS 23-20-01 contaminated with polychlorinated biphenyls (PCBs) and chlordane.
- Grouting of the inactive sewer line at CAS 03-23-01.

1.3 Corrective Action Decision Document/Closure Report Contents

This CADD/CR is divided into the following sections and appendices:

Section 1.0 – Introduction: Summarizes the purpose, scope, and contents of this CADD/CR.

Section 2.0 – Corrective Action Investigation (CAI) Summary: Summarizes the investigation field activities, the results of the investigation, justification for no further corrective action, and the results of the DQO assessment.

Section 3.0 – Recommendation: States that no further action is required and requests closure.

Section 4.0 – References: Provides a list of all referenced documents used to prepare this CADD/CR.

Appendix A – Corrective Action Investigation Results: Provides a description of the project objectives, field investigation and sampling activities, investigation results, waste management, and quality assurance (QA).

Appendix B – Data Assessment: Provides a data quality assessment (DQA) that reconciles DQO assumptions and requirements to the investigation results.

Appendix C – Evaluation of Risk: Presents an evaluation of risk associated with the recommended no further action.

Appendix D – Closure Activity Summary: Provides details on the completed closure activities and includes the required verification activities and supporting documentation for CAU 219.

Appendix E – Use Restrictions: Presents the completed use-restriction form and associated documentation submitted as part of the best management practice (BMP) implemented at CASs 16-04-01, 16-04-02, and 16-04-03.

Appendix F – Sample Location Coordinates: Provides investigation sample locations coordinates.

1.3.1 Applicable Programmatic Plans and Documents

Investigation activities were performed in accordance with the following documents:

- CAIP for CAU 219, *Septic Systems and Injection Wells* (NNSA/NSO, 2005)
- Record of Technical Change (ROTC) No. 1 for the CAIP for CAU 219, *Septic Systems and Injection Wells*
- *Industrial Sites Quality Assurance Project Plan* (QAPP) (NNSA/NV, 2002)
- FFACO (1996)
- Approved standard quality practices and detailed operating procedures

1.3.2 Data Quality Assessment Summary

The DQOs identified in the CAIP are as follows:

- Determine whether COCs are present.
- If COCs are present, determine their nature and extent. Obtain sufficient information to evaluate potential corrective action alternatives.

The data quality indicators (DQIs) as discussed in [Appendix B](#) were achieved and the DQOs established in the CAIP were met.

2.0 Corrective Action Investigation Summary

The following sections summarize the investigation activities and investigation results, and justify why no further corrective action is needed at CAU 219. Detailed investigation activities and results for individual CAU 219 CASs are presented in [Appendix A](#) of this document.

2.1 Investigation Activities

Corrective action investigation activities were performed as set forth in the CAU 219 CAIP (NNSA/NSO, 2005) from June 20 through October 12, 2005. In addition, a BMP was implemented at CASs 16-04-01, 16-04-02, and 16-04-03, and corrective action was performed at CAS 23-20-01 between January and April 2006 (see [Appendix D](#)). The purpose of the CAU 219 CAI was to address the decision statements in the project-specific DQOs by:

- Determining whether COCs are present in the soils associated with CAU 219.
- Determining the lateral and vertical extent of identified COCs.
- Ensuring adequate data have been collected to close the sites under the Nevada Division of Environmental Protection (NDEP), *Resource Conservation and Recovery Act* (RCRA) (CFR, 2003a), *Toxic Substance Control Act* (TSCA) (CFR, 2003b), and DOE requirements.

The scope of the CAI included the following activities:

- Removing and disposing of surface debris.
- Conducting visual surveys to identify any indication of potential contamination source.
- Performing geophysical surveys to locate previously unidentified features.
- Conducting video-mole surveys of collection features, septic tanks, and associated piping to identify residual materials, breaches, and/or tie-ins.
- Field screening soil samples for volatile organic compounds (VOCs) and total alpha and beta/gamma radiation, and conducting on-site screening for total petroleum hydrocarbons (TPH)-diesel-range organics (DRO) and gamma-emitting radionuclides.
- Collecting environmental samples for laboratory analyses to determine the presence of COCs and to define the vertical and lateral extent of COCs, if present.

- Collecting liquid and solid waste samples from septic system components to identify whether these structures are sources of environmental contamination and support future waste disposal activities. Total fecal coliform bacteria analysis was also conducted on site for select liquid and sludge for the purpose of worker protection.
- Collecting QC samples for laboratory analyses to ensure that the data generated from the analysis of investigation samples meet the requirements of the DQIs.
- Staking, when appropriate, and surveying sample locations with global positioning system (GPS) instrumentation.

A combination of judgmental (nonprobabilistic) and random sampling schemes were implemented to select sample locations and evaluate analytical results, as outlined in the CAIP. Judgmental sampling allows the methodical selection of sample locations that target the populations of interest (defined in the DQOs) rather than non-selective random locations. Random sample locations were used in the absence of biasing factors. According to the CAIP, contamination found in any of the random samples will be assumed to exist in the entire CAS.

Because individual sample results (rather than average concentrations) were used to compare to action levels, statistical methods to generate site characteristics (averages) were not necessary. Section 0.4.4 of the U.S. Environmental Protection Agency (EPA) *Data Quality Objectives Process for Hazardous Waste Site Investigations* (EPA QA/G-4HW) guidance states that the use of statistical methods may not be warranted by program guidelines or site-specific sampling objectives (EPA, 2000). The need for statistical methods depends on the decisions being made. Section 7.1 of the EPA QA/G-4HW guidance states that a nonprobabilistic (judgmental) sampling design is developed when there is sufficient information on the contamination sources and history to develop a valid conceptual site model (CSM) and to select specific sampling locations. This design was used to confirm the existence of contamination at specific locations and provide information (such as extent of contamination) about specific areas of the site.

Confidence in judgmental sampling results was established qualitatively by the validation of the conceptual site model developed and concurred to by stakeholder participants (DOE, National Nuclear Security Administration Nevada Site Office [NNSA/NSO] and NDEP) during the DQO process, investigation results, and the DQA.

Waste characterization activities were conducted to gather sufficient information and data to support waste disposal decisions. Information regarding waste characterization is presented in [Section A.7.0](#) of [Appendix A](#).

The following sections describe specific investigation activities conducted at each CAS. Additional information regarding the investigation is presented in [Appendix A](#).

2.1.1 Steam Pipes and Asbestos Tiles (CAS 03-11-01)

This CAS consisted of the debris removed from on or near a concrete pad at the Area 3 Subdock of the NTS. The following sections summarize the debris removal, visual inspection, field screening, and sample collection activities conducted at CAS 03-11-01.

2.1.1.1 Debris Removal

Asbestos-containing floor tiles, four pieces of steam pipe wrapped with insulation, a 15-ft rubber hose, and miscellaneous metal on the pad were removed and properly disposed of at the appropriate facility.

2.1.1.2 Visual Inspection

Visual inspections were conducted on and around the concrete pad to identify biasing factors (i.e., staining, elevated radiation levels, odor). No biasing factors were identified; therefore, no additional biased samples were collected other than those proposed in the CAIP.

2.1.1.3 Field Screening

Investigation samples were field screened for gross alpha and beta/gamma radiation using handheld radiological survey instruments. The field-screening results (FSRs) were compared to field-screening levels (FSLs) to guide subsequent sampling decisions, and no exceedances were observed.

2.1.1.4 Sample Collection

Decision I sampling activities included the collection of four environmental surface soil samples from beneath the steam pipe pieces. Samples were collected for verification purposes using grab sampling

methods. The sample identification (ID) numbers, locations, types, and analyses are listed in [Table A.3-1](#), and the sample locations are depicted in [Section A.3.1](#).

No waste characterization or quality control (QC) samples were collected at CAS 03-11-01.

2.1.1.5 Conceptual Site Model Validation

A CSM was not applicable to CAS 03-11-01 because the removal of the surface debris at the site was planned.

2.1.2 Septic Tanks (3), Distribution Box, and Sewer Pipes (CASs 16-04-01, 16-04-02, and 16-04-03)

These three CASs comprise the septic system that serviced the former Area 16 Camp of the NTS. The following sections summarize the visual inspection, video survey, field screening, and sample collection activities conducted at CASs 16-04-01, 16-04-02, and 16-04-03.

2.1.2.1 Visual Inspection

Visual inspections were conducted in the area surrounding the septic system to identify biasing factors (i.e., staining, elevated radiation levels, odor). No biasing factors were identified; however, the number of biased sample locations downgradient of the outfall was increased to better represent the topography of the area.

2.1.2.2 Video Survey

Video-mole surveys were conducted on most of the sewer pipe north of the open manhole. No breaches or residual materials were identified in the piping. The two pipes running from the distribution box to the outside septic tanks had been previously grouted, but the center pipe remains open. Some of the sewer piping just north of the tank outlets was not surveyed with the video mole due to blockage approximately 10 ft north of the septic tanks.

2.1.2.3 Field Screening

Investigation samples were field screened for VOCs using a photoionization detector (PID), gross alpha and beta/gamma radiation using handheld radiological survey instruments, and

gamma-emitting radionuclides using an on-site gamma spectrometer. The FSRs were compared to the FSLs to guide subsequent sampling decisions. Five samples exceeded the FSLs for VOCs, and 37 samples exceeded the FSLs for gross alpha and beta/gamma radiation. No exceedances of gamma-emitting radionuclides FSLs were observed.

Total fecal coliform bacteria analysis was conducted on the liquid and sludge samples collected from the septic tanks for the protection of workers and off-site laboratory personnel. All total fecal coliform results were negative with the exception of the liquid from the center tank.

2.1.2.4 Sample Collection

Decision I sampling activities included the collection of 69 environmental surface and subsurface soil samples (including four field duplicates [FDs]) from around the septic tanks and distribution box as well as downgradient of the outfall. Samples were collected using grab, hand auger, and backhoe sampling methods. The sample ID numbers, locations, types, and analyses are listed in [Tables A.4-1 through A.4-3](#). The sample locations around the septic tanks and distribution box are depicted in [Figure A.4-2](#), and the sample locations downgradient of the outfall are depicted in [Figure A.4-3](#).

Investigation activities also included the collection of 11 waste samples (including one FD) of liquid and sludge from the septic tanks. Samples were collected using Teflon[®] scoops and a peristaltic pump with Mylar[®] tubing. The analytical data were reviewed to determine a recommended waste disposal path for the waste streams present. The sample locations are depicted in [Figure A.7-1](#).

Three equipment rinsate blanks and two field blanks were collected at the Area 16 Camp for QC purposes.

2.1.2.5 Conceptual Site Model Validation

The CSM addresses the surface and subsurface soils, beneath and immediately adjacent to septic system components at the former Area 16 Camp of the NTS that were potentially impacted by the release of radiological and/or chemical contaminants from liquid and solid wastes. The CSM assumes that contaminant migration would be limited based on the affinity of the contaminants of potential concern (COPCs) for soil particles, and the limited infiltration of stormwater (based on low annual precipitation rates and high potential evapotranspiration rates typical of the NTS

environment). The migration pathway and release mechanism information gathered during the CAI were consistent with the CSM and all information gathered during the CAI support and validate the CSM as presented in the CAIP.

2.1.3 DNA Motor Pool Sewage and Waste System (CAS 23-20-01)

This CAS consists of the sewage and waste system at the former DNA Motor Pool in Mercury of the NTS. The following sections summarize the visual inspection, video survey, field screening, and sample collection activities conducted at CAS 23-20-01.

2.1.3.1 Visual Inspection

Visual inspections were conducted on and around the concrete pads to identify biasing factors (i.e., staining, elevated radiation levels, odor). Staining was identified on the concrete of the decontamination pad; and therefore, the surficial concrete was sampled.

2.1.3.2 Video Survey

Video-mole surveys were conducted on most of the piping in the system. No breaches or residual materials were found. The main pipe exiting the site is partially blocked by what appears to be mineral deposits. However, the main pipe is not grouted at its junction with the main pipe from Building 211 system, and the two systems remain integrated. Because the sand trap and oil interceptor had been previously filled with concrete, SNJV was unable to survey these features with the video mole.

2.1.3.3 Field Screening

Investigation samples were field screened for VOCs using a PID, TPH-DRO using an on-site gas chromatograph, gross alpha and beta/gamma radiation using handheld radiological survey instruments, and gamma-emitting radionuclides using an on-site gamma spectrometer. The FSRs were compared to the FSLs to guide subsequent sampling decisions. The FSLs used for on-site screening of gamma-emitting radionuclides are the industrial preliminary action level (PAL) values. On-site gamma-emitting radionuclide results are used for screening purposes only. The FSRs for TPH and gamma emitting radionuclides did not exceed FSLs. One sample exceeded the FSLs for

VOCs, and eight samples exceeded the FSLs for gross alpha and beta/gamma radiation. Samples with FSRs that exceeded FSLs were sent off site for laboratory analysis.

2.1.3.4 Sample Collection

Decision I sampling activities included the collection of 18 environmental surface and subsurface soil samples (including two FDs) initially from around the concrete pads and beneath the collection features. Eight additional surface soil samples were subsequently collected around the main concrete pad, and three background asphalt samples were collected from the surface east of the main concrete pad. Surface soil samples were collected at three locations after the corrective action was completed to verify that the PCB and chlordane contaminated soil had been removed. These samples were collected at locations where asphalt was not present or not observed after the soil was removed. Samples were collected using grab, hand auger, and backhoe sampling methods. The sample ID numbers, locations, types, and analyses are listed in [Table A.5-1](#), and the sample locations are depicted in [Figure A.5-2](#).

Investigation activities also included the collection of six waste samples of fill, sludge, and concrete from the grease pits, catch basin, and decontamination pad, respectively. Samples were collected using backhoe, grab, and scabbling sampling methods. The analytical data were reviewed to determine a recommended waste disposal path for the waste streams present. The sample locations are depicted in [Figure A.7-2](#).

One source blank from the decontamination trailer, one field blank, and six trip blanks were collected at CAS 23-20-01 for QC purposes.

2.1.3.5 Conceptual Site Model Validation

The CSM addresses the surface and subsurface soils, beneath and immediately adjacent to drains, catch basins, and piping at this CAS that were potentially impacted by the release of radiological and/or chemical contaminants from liquid and solid wastes. The CSM assumes that contaminant migration would be limited based on the affinity of the COPCs for soil particles, and the limited infiltration of stormwater (based on low annual precipitation rates and high potential evapotranspiration rates typical of the NTS environment). The migration pathway and release

mechanism information gathered during the CAI were consistent with of the CSM, and all information gathered during the CAI support and validate the CSM as presented in the CAIP.

2.1.4 Injection Well (CAS 23-20-02)

This CAS consists of a collection feature believed to be an injection well at the former REEC Co Motor Pool in Mercury of the NTS. The following sections summarize the geophysical survey, visual inspection, field screening, and sample collection activities conducted at CAS 23-20-02.

2.1.4.1 Geophysical Survey

A geophysical survey was conducted in the area of the former REEC Co Motor Pool. The survey identified an anomaly with a high probability of being the injection well due to its comparable size and location (Fahringer, 2005). [Figure A.6-1](#) depicts the map generated from the survey data.

2.1.4.2 Visual Inspection

Visual inspections were conducted in the area surrounding the anomaly to identify biasing factors (i.e., staining, elevated radiation levels, odor). No biasing factors were identified; and therefore, no additional biased samples were collected other than those proposed in the CAIP.

2.1.4.3 Field Screening

Investigation samples were field screened for gross alpha and beta/gamma radiation using handheld radiological survey instruments. The FSRs were compared to the FSLs to guide subsequent sampling decisions. No exceedances of FSLs were observed.

2.1.4.4 Sample Collection

Decision I sampling activities included the collection of two environmental subsurface soil samples (including one FD) from a location approximately 7 ft east of the anomaly. Samples were collected for verification purposes using power auger and hand auger sampling methods. The sample ID numbers, locations, types, and analyses are listed in [Table A.6-1](#), and the sample location is shown on [Figure A.6-1](#).

At CAS 23-20-02, samples were not collected for waste characterization purposes, but one field blank and one trip blank were collected for QC purposes.

2.1.4.5 Conceptual Site Model Validation

The CSM addresses the surface and subsurface soils, beneath and immediately adjacent to the collection feature (e.g., injection well or similar structure) at this CAS that were potentially impacted by the release of radiological and/or chemical contaminants from liquid and solid wastes. The CSM assumes that contaminant migration would be limited based on the affinity of the COPCs for soil particles, and the limited infiltration of stormwater (based on low annual precipitation rates and high potential evapotranspiration rates typical of the NTS environment). The migration pathway and release mechanism information gathered during the CAI were consistent with the CSM and all information gathered during the CAI support and validate the CSM as presented in the CAIP.

2.2 Results

The summary of data from the CAI provided in [Section 2.2.1](#) defines the nature and extent of COCs identified in CAU 219. [Section 2.2.2](#) summarizes the assessment made in [Appendix B](#), which demonstrates that the investigation results satisfy the DQO data requirements.

2.2.1 Summary of Analytical Data

Chemical and radiological results for investigation samples collected at each of the CASs are summarized in [Sections 2.2.1.1](#) through [2.2.1.4](#). The PALs for the CAU 219 investigation were determined during the DQO process and are discussed in Section 3.3 of the CAIP (NNSA/NSO, 2005). The final action levels (FALs) are presented in [Section 2.3.1](#). Details about the methods used during this investigation and a comparison of environmental sample results to the FALs are presented in [Appendix A](#). Establishment of FALs is presented in [Appendix C](#).

2.2.1.1 Steam Pipes and Asbestos Tiles (CAS 03-11-01)

With the exception of lead, all concentrations of the reported parameters were compared to and were less than the PALs. The FALs for all detected constituents at CAS 03-11-01 were established at the

PAL concentrations. Although lead exceeds the FAL at this CAS, it is not considered to be a COC. The maximum concentration of each detected contaminant at this CAS is listed in [Table 2-1](#).

Table 2-1
Maximum Concentration of Detected Contaminants for CAS 03-11-01,
Steam Pipes and Asbestos Tiles

Constituent	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Arsenic	6.1	219A003	0.0 - 0.5	A03	23	mg/kg
Barium	370	219A004	0.0 - 0.5	A04	67,000	mg/kg
Beryllium	0.82	219A003	0.0 - 0.5	A03	1,900	mg/kg
Cadmium	4.1	219A002, 219A003	0.0 - 0.5	A02, A03	450	mg/kg
Chromium	34	219A003	0.0 - 0.5	A03	450	mg/kg
Lead	820	219A004	0.0 - 0.5	A04	800	mg/kg
Mercury	0.091	219A004	0.0 - 0.5	A04	310	mg/kg
Silver	0.22	219A001	0.0 - 0.5	A01	5,100	mg/kg
Actinium-228	1.37	219A004	0.0 - 0.5	A04	5	pCi/g
Cesium-137	0.49	219A004	0.0 - 0.5	A04	12.2	pCi/g
Lead-212	1.53	219A004	0.0 - 0.5	A04	5	pCi/g
Lead-214	1.14	219A003	0.0 - 0.5	A03	5	pCi/g
Thallium-208	0.53	219A003	0.0 - 0.5	A03	5	pCi/g

FAL = Final action level
ft bgs = Feet below ground surface
mg/kg = Milligrams per kilogram
pCi/g = Picocuries per gram

The lead is believed to be associated with past site activities conducted at CAS 03-25-01 at CAU 145 based on the lead concentrations identified in surface samples collected during the CAU 145 CAI and its close proximity to the CAS itself. The lead contamination will be addressed in the CAU 145 CADD; therefore, lead is not a COC at CAS 03-11-01.

2.2.1.2 Septic Tanks (3), Distribution Box, Sewer Pipes (CASs 16-04-01, 16-04-02, and 16-04-03)

With the exception of chlordane, all concentrations of the reported parameters in environmental samples were compared to and were less than the PALs. Benzo(a)pyrene, TPH-DRO, Aroclor, chlordane were identified in waste management samples in the sludge in the septic tanks which

makes the sludge a potential source material. Therefore, FALs were established as the PALs with the exception previously mentioned. The maximum concentration of each detected contaminant at this CAS is listed in [Table 2-2](#).

Five surface and subsurface soil samples collected at CAS 16-04-03 (219D008, 219D009, 219D010, 219D011, and 219D020) exceeded the PAL of 6,500 micrograms per kilogram ($\mu\text{g}/\text{kg}$) for chlordane. The maximum concentration was 34,000 $\mu\text{g}/\text{kg}$ for sample 219D009 at location D02. One waste management sludge sample (219B503) collected from the center septic tank at CAS 16-04-01 exceeded the PAL with a concentration of 9,100 $\mu\text{g}/\text{kg}$. The chlordane was moved on to a Tier 2 evaluation, and a FAL of 185,000 $\mu\text{g}/\text{kg}$ was established for the occasional use area exposure scenario using site-specific parameters. The concentrations of chlordane did not exceed the FAL; therefore, chlordane was not considered a COC and no Decision II sampling was warranted. The establishment of FALs is presented in [Appendix C](#).

Benzo(a)pyrene was detected in waste management sludge samples (219B503, 219B507, and 219B508) collected from the center septic tank at CAS 16-04-01 at concentrations (490 to 850 $\mu\text{g}/\text{kg}$) that exceed the PAL (210 $\mu\text{g}/\text{kg}$). Concentrations of TPH-DRO were detected in waste management sludge samples 219B503, 219B506, 219B507, and 219B508 at concentrations (240 to 2,800 $\mu\text{g}/\text{kg}$) that exceed the PAL. Aroclor-1260 was detected in the waste management sludge samples (219B507 and 219B508) collected from the center septic tank at CAS 16-04-01 at concentrations (1,000 $\mu\text{g}/\text{kg}$) that exceed the PAL of 740 $\mu\text{g}/\text{kg}$. The results for the waste management sample for this CAS are shown in [Table A.7-1](#).

2.2.1.3 DNA Motor Pool Sewage and Waste System (CAS 23-20-01)

Concentrations of TPH-DRO, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-Cd)pyrene, Aroclor-1254, Aroclor-1260, and chlordane exceeded the PALs at CAS 23-20-01. The FALs were established as the PALs at CAS 23-20-01, and a corrective action was performed. The maximum concentration of each detected contaminant at this CAS is listed in [Table 2-3](#).

Six surface and subsurface soil samples (219E004, 219E006, 219E010, 219E012, 219E013, and 219E017) collected in various areas within the CAS exceeded the PAL of 100 milligrams per

Table 2-2
Maximum Concentration of Detected Contaminants for CASs 16-04-01,
Septic Tanks (3); 16-04-02, Distribution Box; and 16-04-03, Sewer Pipes
(Page 1 of 2)

Constituent	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Arsenic	9.6	219B001	0.0 - 0.5	B01	23	mg/kg
Barium	180	219B037, 219C009, 219D012	7.5 - 8.0, 6.5 - 7.0, 0.0 - 0.5	B15, C04, D11	67,000	mg/kg
Beryllium	1.2	219B005, 219B019, 219B024, 219B025, 219B027, 219D018	0.0 - 0.5, 7.5 - 8.0, 7.0 - 7.5, 7.0 - 7.5, 7.5 - 8.0, 0.0 - 0.5	B03, B09, B13, B14, B14, D09	1,900	mg/kg
Chromium	13	219D012	0.0 - 0.5	D11	450	mg/kg
Lead	28	219B001	0.0 - 0.5	B01	800	mg/kg
Lithium	6.4	219B004	0.5 - 1.5	B02	20,000	mg/kg
Mercury	0.043	219B037	7.5 - 8.0	B15	310	mg/kg
Nickel	7.4	219B004	0.5 - 1.5	B02	20,000	mg/kg
Selenium	1.3	219B001	0.0 - 0.5	B01	5,100	mg/kg
Silver	0.11	219B023, 219B025	3.0 - 3.5, 7.0 - 7.5	B12, B14	5,100	mg/kg
Acetone	12	219D011A, 219D022A	1.0 - 1.5, 0.0 - 0.5	D03, D04	6,000,000	µg/kg
P-Isopropyltoluene	2	219D010A	0.0 - 0.5	D03	2,000,000	µg/kg
Styrene	1.4	219B005, 219D020A	0.0 - 0.5, 0.0 - 0.5	B03, D05	1,700,000	µg/kg
Tetrachloroethene	1	219B031	7.0 - 7.5	B18	3,400	µg/kg
1, 3, 5 Trimethylbenzene	100*	219B507	N/A	T.A. #4	70,000	µg/kg
N-Propylbenzene	2.9*	219B503	N/A	T.A. #3	240,000	µg/kg
N-Butylbenzene	130*	219B508	N/A	T.A. #4	240,000	µg/kg
Napthalene	570*	219B507	N/A	T.A. #4	190,000	µg/kg
Benzo(a)anthracene	650*	219B508	N/A	T.A. #4	2,100	µg/kg
2-Methylnapthalene	3,900*	219B508	N/A	T.A. #4	190,000	µg/kg
Toluene	5	219B014A	0.0 - 0.5	B07	520,000	µg/kg
Benzo(A)Pyrene	850*	219B508	N/A	T.A. #4	6,470	µg/kg
Benzo(B)Fluoranthene	25	219B003	0.0 - 0.5	B02	2,100	µg/kg
Bis(2-Ethylhexyl)Phthalate	1,000	219B007	0.5 - 1.5	B03	120,000	µg/kg
Diesel-Range Organics	2,800*	219B503	N/A	T.A. #3	100	mg/kg
Gasoline-Range Organics	0.52	219B022	3.0 - 3.5	B12	100	mg/kg
Aroclor-1260	1,000*	219B507, 219B508	N/A	T.A. #4	28,800	µg/kg

Table 2-2
Maximum Concentration of Detected Contaminants for CASs 16-04-01,
Septic Tanks (3); 16-04-02, Distribution Box; and 16-04-03, Sewer Pipes
(Page 2 of 2)

Constituent	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
4,4'-DDD	2,100	219D009	0.5 - 1.0	D02	10,000	µg/kg
4,4'-DDE	4,100	219D020	0.0 - 0.5	D05	7,000	µg/kg
4,4'-DDT	3,200	219D007	0.5 - 1.5	D07	7,000	µg/kg
Chlordane	34,000	219D009	0.5 - 1.0	D02	185,000	µg/kg
Delta-BHC	3.4	219C007	6.5 - 7.0	C03	360	µg/kg
Endosulfan I	2.6	219C008	6.5 - 7.0	C03	3,700,000	µg/kg
Endosulfan II	33	219D013	0.5 - 1.5	D11	3,700,000	µg/kg
Endosulfan Sulfate	3	219D001	0.0 - 0.5	D06	3,700,000	µg/kg
Heptachlor	42	219D004	0.5 - 1.5	D01	380	µg/kg
Heptachlor Epoxide	31	219D008	0.0 - 0.5	D02	190	µg/kg
Actinium-228	2.71	219D018	0.0 - 0.5	D09	15	pCi/g
Bismuth-212	5.3	219B011	0.5 - 1.5	B05	15	pCi/g
Bismuth-214	1.44	219B018	7.0 - 7.5	B09	15	pCi/g
Lead-212	2.29	219B009	0.5 - 1.5	B04	15	pCi/g
Lead-214	1.44	219B031	7.0 - 7.5	B18	15	pCi/g
Thallium-208	0.89	219B020	3.5 - 4.0	B10	15	pCi/g

* Concentration identified in sludge sample(s)

FAL = Final action level
ft bgs = Feet below ground surface
µg/kg = Micrograms per kilogram
mg/kg = Milligrams per kilogram

N/A = Not applicable
pCi/g = Picocuries per gram
T.A. = Tank Access

kilogram (mg/kg) for TPH-DRO. The maximum concentration was 320 mg/kg for sample 219E017 at location E13. In addition, TPH-DRO was detected in a concrete sample (219E501) collected at location E07 and in a sludge sample (219E502) collected from the catch basin (location E09) at concentrations of 430 and 170 mg/kg, respectively. The TPH-DRO concentrations detected in samples 219E004, 219E006, and 219E017 were attributed to asphalt in the samples and were not considered COCs. The TPH-DRO concentrations in samples 219E010, 219E012, 219E013, 219E501, and 219E502 were moved on to a Tier 2 evaluation, and the hazardous constituents of TPH-DRO were evaluated in the VOCs and semivolatile organic compounds (SVOCs) evaluations. Of the hazardous constituents of TPH in samples 219E010, 219E012, 219E013, 219E501, and

Table 2-3
Maximum Concentration of Detected Contaminants for CAS 23-20-01,
DNA Motor Pool Sewage and Waste System
(Page 1 of 2)

Constituent	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Arsenic	20	219E010	2.5 - 3.0	E11	23	mg/kg
Barium	210	219E010	2.5 - 3.0	E11	67,000	mg/kg
Beryllium	0.52	219E003	0.0 - 0.5	E06	1,900	mg/kg
Cadmium	2.9	219E010	2.5 - 3.0	E11	450	mg/kg
Chromium	30	219E016	8.5 - 9.0	E14	450	mg/kg
Lead	670	219E006	0.0 - 0.5	E04	800	mg/kg
Lithium	17	219E008, 219E018	6.5 - 7.0, 8.0 - 8.5	E08, E13	20,000	mg/kg
Mercury	0.55	219E005	0.0 - 0.5	E04	310	mg/kg
Nickel	14	219E005	0.0 - 0.5	E04	20,000	mg/kg
Silver	0.92	219E010	2.5 - 3.0	E11	5,100	mg/kg
1,2,4-Trichlorobenzene	1.2	219E010	2.5 - 3.0	E11	3,000,000	µg/kg
1,2,4-Trimethylbenzene	2.7	219E017	6.0 - 6.5	E13	170,000	µg/kg
Styrene	4.1	219E003	0.0 - 0.5	E06	1,700,000	µg/kg
Tetrachloroethene	3.4	219E012	2.5 - 3.0	E10	3,400	µg/kg
Tetrachloroethene	1	219B031	7.0 - 7.5	B18	3,400	µg/kg
1, 3, 5 Trimethylbenzene	58**	219E502	5.5 - 6.0	E09	70,000	µg/kg
N-Propylbenzene	19**	219E502	5.5 - 6.0	E09	240,000	µg/kg
Ethylbenzene	67**	219E502	5.5 - 6.0	E09	400,000	µg/kg
Benzene	10**	219E502	5.5 - 6.0	E09	1,400	µg/kg
Xylenes	311**	219E502	5.5 - 6.0	E09	420,000	µg/kg
N-Butylbenzene	24**	219E502	5.5 - 6.0	E09	240,000	µg/kg
Toluene	4.6	219E001	0.0 - 0.5	E01	520,000	µg/kg
2,3,4,6-Tetrachlorophenol	24	219E005	0.0 - 0.5	E04	18,000,000	µg/kg
2-Methylnaphthalene	95	219E004	0.0 - 0.5	E05	190,000	µg/kg
Acenaphthene	1,000	219E004	0.0 - 0.5	E05	29,000,000	µg/kg
Anthracene	1,500	219E004	0.0 - 0.5	E05	100,000,000	µg/kg
Benzo(A)Anthracene	6,100*	219E004	0.0 - 0.5	E05	2,100	µg/kg
Benzo(A)Pyrene	6,800*	219E004	0.0 - 0.5	E05	210	µg/kg
Benzo(B)Fluoranthene	9,700*	219E004	0.0 - 0.5	E05	2,100	µg/kg
Benzo(G,H,I)Perylene	3,400	219E004	0.0 - 0.5	E05	29,000,000	µg/kg
Benzo(K)Fluoranthene	4,400	219E004	0.0 - 0.5	E05	21,000	µg/kg
Bis(2-Ethylhexyl)Phthalate	1,200	219E006	0.0 - 0.5	E04	120,000	µg/kg

Table 2-3
Maximum Concentration of Detected Contaminants for CAS 23-20-01,
DNA Motor Pool Sewage and Waste System
(Page 2 of 2)

Constituent	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Butyl Benzyl Phthalate	330	219E004	0.0 - 0.5	E05	100,000,000	µg/kg
Carbazole	1,200	219E004	0.0 - 0.5	E05	86,000	µg/kg
Chrysene	6,600	219E004	0.0 - 0.5	E05	210,000	µg/kg
Dibenzo(A,H)Anthracene	890*	219E004	0.0 - 0.5	E05	210	µg/kg
Dibenzofuran	390	219E004	0.0 - 0.5	E05	3,100,000	µg/kg
Di-N-Butyl Phthalate	750	219E004	0.0 - 0.5	E05	100,000,000	µg/kg
2-Methylnaphthalene	590**	219E501	N/A	E07	190,000	µg/kg
Di-N-Octyl Phthalate	59	219E006	0.0 - 0.5	E04	25,000,000	µg/kg
Fluoranthene	12,000	219E004	0.0 - 0.5	E05	22,000,000	µg/kg
Fluorene	750	219E004	0.0 - 0.5	E05	26,000,000	µg/kg
Indeno(1,2,3-Cd)Pyrene	3,200*	219E004	0.0 - 0.5	E05	2,100	µg/kg
Naphthalene	220	219E004	0.0 - 0.5	E05	190,000	µg/kg
Phenanthrene	7,700	219E004	0.0 - 0.5	E05	100,000,000	µg/kg
Pyrene	8,700	219E004	0.0 - 0.5	E05	29,000,000	µg/kg
Diesel-Range Organics	320	219E017	6.0 - 6.5	E13	N/A ^a	mg/kg
Aroclor-1254	5,400	219E023	0.0 - 0.5	E19	740	µg/kg
Aroclor-1260	1,200	219E022	0.0 - 0.5	E18	740	µg/kg
4,4'-DDD	87	219E005	0.0 - 0.5	E04	10,000	µg/kg
4,4'-DDE	13	219E004	0.0 - 0.5	E05	7,000	µg/kg
4,4'-DDT	92	219E004	0.0 - 0.5	E05	7,000	µg/kg
Chlordane	65,000	219E021	0.0 - 0.5	E17	6,500	µg/kg
Delta-BHC	0.36	219E012	2.5 - 3.0	E10	360	µg/kg
Endrin Aldehyde	25	219E023	0.0 - 0.5	E19	180,000	µg/kg
Heptachlor Epoxide	0.56	219E013	2.5 - 3.0	E10	380	µg/kg
Methoxychlor	5	219E012	2.5 - 3.0	E10	3,100,000	µg/kg
Lead-212	0.84	219E001	0.0 - 0.5	E01	5	pCi/g
Lead-214	0.79	219E005	0.0 - 0.5	E04	5	pCi/g

^aA value for the FAL for total petroleum hydrocarbons-diesel-range organics is not applicable because the FALs for the hazardous constituents of diesel were used to evaluate the results that exceeded the PAL of 100 mg/kg (ASTM, 1995).

*Constituent is attributed to asphalt; therefore, it is not considered a contaminant of concern.

**Concentration identified in sludge sample(s)

FAL = Final action level

ft bgs = Feet below ground surface

N/A = Not applicable

PAL = Preliminary action levels

pCi/g = Picocuries per gram

µg/kg = Micrograms per kilogram

mg/kg = Milligrams per kilogram

219E502, only benzo(a)pyrene in sample 219E502 exceeded the FAL. Therefore, the sludge from the catch basin of the large concrete pad is considered to be potential source material.

The surface soil samples collected at locations E19 and E20 exceeded the FAL of 740 µg/kg for Aroclor-1254. The maximum concentration for Aroclor-1254 was 5,400 µg/kg in sample 219E023. The surface soil samples collected at locations E04 and E18 exceeded the FAL of 740 µg/kg for Aroclor-1260. The maximum concentration for Aroclor-1260 was 1,200 µg/kg in sample 219E022. Aroclor-1254 and Aroclor-1260 are considered COCs at this CAS.

The surface soil samples collected at locations E16 and E17 exceeded the FAL of 6,500 µg/kg for chlordane. The maximum concentration was 65,000 µg/kg for sample 219E021. Chlordane is considered a COC at this CAS.

Seven surface and subsurface soil samples (219E001, 219E003, 219E004, 219E005, 219E006, 219E007, and 219E017) exceeded the FAL of 210 µg/kg for benzo(a)pyrene, two surface soil samples (219E004 and 219E006) exceeded the FAL for benzo(b)fluoranthene, and 219E004 exceeded the FALs for benzo(a)anthracene, dibenzo(a,h)anthracene, and indeno(1,2,3-Cd)pyrene. The sludge sample (219E502) collected from the catch basin at the site had a benzo(a)pyrene concentration that exceeded the FAL. The contaminated sludge and the concrete box of the catch basin were subsequently removed as part of the corrective action.

Three surface asphalt samples were collected east of the main pad and analyzed for SVOCs. The polynuclear aromatic hydrocarbons (PAHs) (benzo[a]pyrene, benzo[a]anthracene, benzo[b]fluoranthene, dibenzo[a,h]anthracene, and indeno[1,2,3-Cd]pyrene) were found at concentrations exceeding the FALs in the contiguous asphalt. Because the seven CAS 23-20-01 samples with detections of PAHs were collected above decomposing asphalt, contained particles of asphalt, and are consistent with the PAHs found in the background asphalt samples, these PAHs are not considered COCs for CAS 23-20-01. However, this soil was removed due to PCB and chlordane contamination.

Aroclor-1254, Aroclor-1260, and chlordane were identified in the surface soil surrounding the main concrete pad at concentrations that exceed their respective FALs. Aroclor-1254 was identified above the FAL in the surface soil at locations E19 and E20 and Aroclor-1260 was identified above the FAL

in the surface soil at locations E04 and E18. Chlordane was also identified above the FAL in the surface soil at locations E16 and E17. The contaminated soil surrounding the pad was between 4 and 6 inches (in.) deep and extended as far out as 12 ft.

2.2.1.4 Injection Well (CAS 23-20-02)

All concentrations of the reported parameters were compared to and were less than the PALs; therefore, FALs were established as the PAL at this CAS. Therefore, no COCs are present, and Decision II sampling is not warranted. The maximum concentration of each detected contaminant at this CAS is listed in [Table 2-4](#).

Table 2-4
Maximum Concentration of Detected Contaminants for
CASs 23-20-02, Injection Well

Constituent	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Arsenic	4	219F002	2.0 - 2.5	F01	23	mg/kg
Barium	69	219F002	2.0 - 2.5	F01	67,000	mg/kg
Chromium	6.2	219F002	2.0 - 2.5	F01	450	mg/kg
Lead	4.6	219F002	2.0 - 2.5	F01	800	mg/kg
Methylene Chloride	9.1	219F001	2.0 - 2.5	F01	21,000	µg/kg
Lead-212	0.44	219F001	2.0 - 2.5	F01	15	pCi/g
Lead-214	0.5	219F001	2.0 - 2.5	F01	15	pCi/g

FAL = Final action level
 ft bgs = Feet below ground surface
 µg/kg = Micrograms per kilogram
 mg/kg = Milligrams per kilogram
 pCi/g = Picocuries per gram

2.2.2 Data Assessment Summary

The DQA is presented in [Appendix B](#). The DQA process helps ensures that the type, quality, and quantity of data identified as necessary in the DQO are used to support the resolution of DQO decisions at an appropriate level of confidence. Using both the DQO and DQA processes help to ensure that DQO decisions are sound and defensible.

The DQA process as presented in [Appendix B](#) consists of the following steps:

- Step 1: Review DQOs and Sampling Design.
- Step 2: Conduct a Preliminary Data Review.
- Step 3: Select the Test.
- Step 4: Verify the Assumptions.
- Step 5: Draw Conclusions from the Data.

Sample locations that support the presence and/or extent of contamination at each CAS are shown in [Appendix B](#). Based on the results of the DQA presented in [Appendix B](#), the DQO requirements have been met. The CSM assumptions and the data collected support their intended use in the decision-making process.

2.3 Justification for No Further Action

No further action is justified at CAU 219 CASs based on the evaluation of risk to ensure protection of the public and the environment in accordance with *Nevada Administrative Code* (NAC) 445A (NAC, 2003), feasibility, and cost effectiveness. The decision that no further action is needed was determined from DQO decision statements based on a comparison of the analyte concentrations detected in CAI soil samples to the FALs established in [Appendix C](#) and closure activities performed at CAS 03-11-01, CAS 16-04-01, CAS16-04-02, CAS 16-04-03, and CAS 23-20-01. The details of the evaluation of risk and closure activities that support the justification for no further action are presented in [Appendix C](#) and [Appendix D](#), respectively, and summarized below. The BMPs implemented at CAU 219 CASs are also presented in [Appendix D](#).

No further action is recommended for CAS 03-11-01 and CAS 23-20-02 because COCs resulting from the activities directly associated with these CASs were not identified. In addition, the surface debris present at CAS 03-11-01 was removed from the site and properly disposed.

Activities performed at CASs 16-04-01, 16-04-02, and 16-04-03 included the closure in place of CAS features (i.e., septic tanks and a distribution box) with administrative controls. The three septic tanks and distribution box at the CASs were closed in place as a BMP to avoid future releases of potential contamination. The water was removed from all three septic tanks, and each tank was filled with soil and dry cement, sealed using a wet grout, and covered with soil. The distribution box was sealed using grout. A use restriction was applied to all three CASs and entered into the database to avoid the

inadvertent exposure of site workers under an industrial or remote area exposure scenario. Based on the completion of the BMPs and the implementation of a use restriction, no further action is required at CASs 16-04-01, 16-04-02, and 16-04-03.

Aroclor-1254, Aroclor-1260, and chlordane were identified in the surface soil surrounding the concrete pad at CAS 23-20-01 as COCs under the industrial use exposure scenario. A corrective action was conducted to remove PCB- and chlordane-contaminated soil from the area surrounding the large concrete pad down to the underlying asphalt. Benzo(a)pyrene and lead were identified as COCs in the sludge in the catch basin at concentrations that make the sludge a potential source material. A corrective action was conducted at the CAS to remove the contaminated sludge and concrete box in the catch basin. This contaminated soil was managed as a hydrocarbon waste and an estimated total of 43 cubic yards (cyds) were disposed of in the Hydrocarbon Landfill in Area 6 of the NTS.

Other corrective action activities conducted at CAS 23-20-01 included abandoning in place an inactive sewer line and the removal and proper disposal of asbestos-containing tiles from the concrete pad and debris from the grease pits. An estimated total of 2 cyds of debris and non-friable asbestos-containing tile were disposed of in the U10c Landfill in Area 9 of the NTS. Based on the completion of the corrective action, no further action is recommended at CAS 23-20-01.

2.3.1 Final Action Levels

The CAU 219 FALs are risk-based cleanup goals that, if met, will ensure that each release site will not pose an unacceptable risk to human health and the environment and that conditions at each site are in compliance with all applicable laws and regulations. The risk-based corrective action (RBCA) process used to establish FALs is described in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006). This process conforms with NAC Section 445A.227, which lists the requirements for sites with soil contamination (NAC, 2003). For the evaluation of corrective actions, NAC Section 445A.22705 requires the use of American Society for Testing and Materials (ASTM) Method E1739-95 to “conduct an evaluation of the site, based on the risk it poses to public health and the environment, to determine the necessary remediation standards (i.e., FALs) or to establish that corrective action is not necessary.”

This RBCA process defines three tiers (or levels) of evaluation involving increasingly sophisticated analyses:

- Tier 1 evaluation - sample results from source areas (highest concentrations) are compared to action levels based on generic (non-site-specific) conditions (i.e., the PALs established in the CAIP). The FALs may then be established as the Tier 1 action levels or the FALs may be calculated using a Tier 2 evaluation.
- Tier 2 evaluation - conducted by calculating Tier 2 Site-Specific Target Levels (SSTLs) using site-specific information as inputs to the same or similar methodology used to calculate Tier 1 action levels. The Tier 2 SSTLs are then compared to individual sample results from reasonable points of exposure (as opposed to the source areas as is done in Tier 1) on a point by point basis. Total TPH concentrations will not be used for risk-based decisions under Tier 2 or Tier 3. Rather, the individual chemicals of concern will be compared to the SSTLs.
- Tier 3 evaluation - conducted by calculating Tier 3 SSTLs on the basis of more sophisticated risk analyses using methodologies described in Method E1739-95 that consider site-, pathway-, and receptor-specific parameters.

A Tier 1 evaluation was conducted for all COPCs to determine whether contaminant levels satisfy the criteria for a quick regulatory closure or warrant a more site-specific assessment. This was accomplished by comparing individual source area contaminant concentration results to the Tier 1 action levels (the PALs established in the CAIP). Constituents detected at CAU 219 for which PALs were not established were:

- endosulfan I
- endosulfan II
- endosulfan sulfate
- endrin aldehyde

Except for 2-methylnaphthalene, the PALs for these constituents were established as the PALs of the surrogate constituents listed in [Table 2-5](#). The PAL for 2-methylnaphthalene was calculated using the Oak Ridge National Laboratory Risk Assessment Information System (RAIS) (ORNL, 2006).

The constituents detected at the CAU 219 CASs that exceeded Tier 1 action levels were:

- Lead at CAS 03-11-01
- Chlordane at CAS 16-04-03 and CAS 23-20-01
- TPH-DRO at CAS 23-20-01
- PAHs at CAS 23-20-01

Table 2-5
Surrogate Chemical Preliminary Action Levels

Chemical	Surrogate Chemical	Rationale
Benzo(G,H,I)Perylene	Pyrene	The surrogate is based on structural similarity. The difference between the two chemicals is the additional two benzene rings. The additional benzene rings add stability to the structure making the surrogate pyrene more reactive than benzo(g,h,i)perylene.
Endosulfan I	Endosulfan	Endosulfan I is an isomer of endosulfan. These chemicals have the same molecular weight and the same atoms. The melting point of endosulfan and endosulfan I is 106 degrees Celsius (°C) and 108°C, respectively.
Endosulfan II	Endosulfan	Endosulfan II is an isomer of endosulfan. These chemicals have the same molecular weight and the same atoms. The melting point of endosulfan and endosulfan II is 106°C and 207°C, respectively.
Endosulfan Sulfate	Endosulfan	Endosulfan and its primary metabolite, endosulfan sulfate, exhibit similar toxicities and are both believed to be responsible for the toxicity observed in animals. The use of endosulfan as a surrogate for endosulfan sulfate could lead to an overestimation of the risk posed by endosulfan sulfate because the other primary metabolite (endosulfan diol) could be mainly responsible for the toxicity instead of endosulfan sulfate.
Endrin Aldehyde	Endrin	Endrin aldehyde is an impurity and breakdown product of Endrin.
Phenanthrene	Anthracene	The surrogate is based on structural similarity. The difference between the two chemicals is the position of the benzene rings. Under the same conditions, these chemicals react similarly. Phenanthrene is more polar and therefore more reactive than anthracene.

- PCBs at CAS 23-20-01

The concentrations of all constituents at CASs not listed above were below Tier 1 action levels and the corresponding FALs were established as the Tier 1 action levels. Of the constituents at CASs that exceeded Tier 1 action levels, all but TPH-DRO, PAHs, PCBs, and pesticides at CAS 23-20-01 were passed on to a Tier 2 evaluation. For TPH-DRO, PAHs, PCBs, and pesticides at CAS 23-20-1, the FALs were established as the Tier 1 action levels.

The Tier 2 evaluation of chlordane at CAS 16-04-01, 16-04-02, and 16-04-03 used site-specific inputs to standard risk procedures contained in the RAIS. The chlordane-specific risk input parameters used in the RAIS calculation is from the RAIS chemical-specific database. The site-specific input parameters used were the “NTS standard” parameter values and are described in [Appendix C](#). A site-specific calculated Tier 2 action level of 185,000 µg/kg was established as the FAL at CAS 16-04-01, 16-04-02, and 16-04-03 under the occasional use area exposure scenario.

The Tier 2 evaluation of TPH-DRO at CAS 23-20-01 followed ASTM Method E1739-95 (ASTM, 1995) and compared the analytical results for the hazardous constituents (i.e., VOCs, and SVOCs) of TPH. Because these constituents are included in the VOCs and SVOCs analyses, they were included in the evaluations for the VOCs and SVOCs. Additional details of the Tier 2 evaluations for TPH-DRO are provided in [Appendix C](#).

The FALs for all CAU 219 COPCs are shown in [Table 2-6](#).

Table 2-6
Definition of Final Action Levels for CAU 219
Contaminants of Potential Concern

COPCs	Tier 1 Based FALs	Tier 2 Based FALs	Tier 3 Based FALs
VOCs	PALs	None	N/A
SVOCs (except benzo(a)pyrene)	PALs	None	N/A
PCBs (except Aroclor-1260)	PALs	None	N/A
Benzo(a)pyrene	PAL except for CAS 16-04-01	6,470 mg/kg for CAS 16-04-01	N/A
Aroclor-1260	PAL except for CAS 16-04-01	28,000 µg/kg for CAS 16-04-01	N/A
Pesticides (except for Chlordane)	PALs	None	N/A
Chlordane	PAL except for CASs 16-04-01 and 16-04-03	185,000 µg/kg for CASs 16-04-01 and 16-04-03	N/A
Ethylene Glycol	PALs	None	N/A
RCRA Metals, Beryllium, Lithium, Nickel (except for Lead)	PALs	None	N/A
TPH-GRO	PAL	None	N/A
TPH-DRO	PAL	Region 9 PRGs ^a for TPH-DRO constituents	N/A
Radionuclides	PALs	None	N/A

^aBased on U.S. Environmental Protection Agency, Region 9 Preliminary Remediation Goals (PRGs) (EPA, 2004).

COPC = Contaminant of potential concern
DRO = Diesel-range organics
FAL = Final action level compound
GRO = Gasoline-range organics
µg/kg = Micrograms per kilogram
N/A = Not applicable

PAL = Preliminary action level
RCRA = *Resource Conservation and Recovery Act*
SVOC = Semivolatile organic
TPH = Total petroleum hydrocarbons
VOC = Volatile organic compound

3.0 Recommendation

No further corrective action is required at CAU 219. Selection of this corrective action is consistent with past practices for CASs that do not contain COCs. No further action was evaluated based on technical merits focusing on performance, reliability, feasibility, and safety. However, as an additional protective measure, an administrative use restriction was applied as a BMP for CASs 16-04-01, 16-04-02, and 16-04-03. The coordinates for the area will be entered into the NNSA/NSO Facility Information Management system, but the area will not be marked with a physical barrier (e.g., a fence) or posted. The signed use restriction form is presented in [Appendix E](#).

The NNSA/NSO requests that NDEP issue a Notice of Completion for this CAU and approval to move the CAU from Appendix III to Appendix IV of the FFACO.

4.0 References

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Appendix A

Corrective Action Investigation Results

A.1.0 Introduction

This appendix presents the CAI activities and analytical results for CAU 219, Septic Systems and Injection Wells. Corrective Action Unit 219 is located in Areas 3, 16, and 23 of the NTS (see [Figure 1-1](#)), and is comprised of six CASs:

- CAS 03-11-01, Steam Pipes and Asbestos Tiles
- CAS 16-04-01, Septic Tanks (3)
- CAS 16-04-02, Distribution Box
- CAS 16-04-03, Sewer Pipes
- CAS 23-20-01, DNA Motor Pool Sewage and Waste System
- CAS 23-20-02, Injection Well

Corrective Action Site 03-11-01, Steam Pipes and Asbestos Tiles, is located at the former Area 3 Subdock. The Area 3 Subdock was used as a support facility for REEC Co drilling activities (Patton, 2003). The CAS consists of the housekeeping debris found on or near a concrete pad, and the potential releases associated with this debris. The debris is comprised of floor tiles, steam pipe pieces, a rubber hose, and miscellaneous metal.

Corrective Action Sites 16-04-01, Septic Tanks (3); 16-04-02, Distribution Box; and 16-04-03, Sewer Pipes consist of the releases associated with the septic system that serviced the former Area 16 Camp. The Area 16 Camp was used to house the Area 16 Tunnel workers (Metcalf, 2004). In addition to the distribution box, three septic tanks, and associated piping, the system contains a drainage channel and sump excavation downgradient of the outfall.

Corrective Action Site 23-20-01, DNA Motor Pool Sewage and Waste System, consists of the releases associated with the interconnected sewage and waste system at the former DNA Motor Pool, Building 210. The DNA Motor Pool was used for vehicle maintenance activities until 1991, when it became a storage facility for nonhazardous waste (Olsen, 2004). The system is comprised of two grease pits, a catch basin, a floor drain, an oil interceptor, a sand trap inside the decontamination pad, a sump beneath the decontamination pad, and the associated piping.

Corrective Action Site 23-20-02, Injection Well, consists of the releases associated with a collection feature at the former REEC Co Motor Pool, the original Building 132. The REEC Co Motor Pool was

used for basic vehicle maintenance activities (Olsen, 2004). When the motor pool was moved in 1965 to its current location, Building 132 and its foundation were demolished (Gonzalez, 2004). The area is currently an active storage yard south of the Building 160 Warehouse.

Additional information regarding the history of each site, planning, and the scope of the investigation is presented in the CAU 219 CAIP (NNSA/NSO, 2005).

A.1.1 Investigation Objectives

The primary objective of the investigation was to provide sufficient information and data to document completion of appropriate corrective actions for each CAS in CAU 219 to support a recommendation that no further action is necessary for the CASs in CAU 219.

A.1.2 Contents

This appendix describes the investigation and presents the results. The contents of this appendix are as follows:

- [Section A.1.0](#) describes the investigation background, objectives, and content.
- [Section A.2.0](#) provides an investigation overview.
- [Sections A.3.0](#) through [A.6.0](#) provides CAS-specific information regarding the field activities, sampling methods, and laboratory analytical results from investigation sampling.
- [Section A.7.0](#) summarizes waste management activities.
- [Section A.8.0](#) discusses the QA and QC procedures followed and results of the QA/QC activities.
- [Section A.9.0](#) is a summary of the investigation results.
- [Section A.10.0](#) lists the cited references.

The complete field documentation and laboratory data, including field activity daily logs (FADLs), sample collection logs (SCLs), analysis request/chain-of-custody forms, soil sample descriptions, laboratory certificates of analyses, analytical results, and surveillance results are retained in project files as hard-copy files or electronic media.

A.2.0 Investigation Overview

Field investigation and sampling activities for the CAU 219 CAI were conducted from June 20 to October 12, 2005. [Table A.2-1](#) lists the CAI activities that were conducted at each of the CASs.

The investigation and sampling program was managed in accordance with the requirements set forth in the CAU 219 CAIP (NNSA/NSO, 2005). Field activities were performed in compliance with the Industrial Sites Field Work Permit for CAU 219 that was developed in accordance with the approved *Industrial Sites Project Health and Safety Plan* (SNJV, 2004) that is consistent with the DOE Integrated Safety Management System. Samples were collected and documented following approved protocols and procedures indicated in the CAU 219 CAIP. Quality control samples (e.g., field blanks, equipment rinsate blanks, trip blanks, and duplicate samples) were collected as required by the Industrial Sites QAPP (NNSA/NV, 2002) and the CAU 219 CAIP (NNSA/NSO, 2005). During field activities, waste minimization practices were followed according to approved procedures, including segregation of waste by waste stream.

Weather conditions mostly remained constant throughout the investigation. Ambient temperatures in the high 80s and low 90s were commonly encountered along with light to strong winds. Strong wind gusts were a daily occurrence but did not delay site operations. Rain did suspend site operations on occasion due to the inability to monitor for alpha radiation.

The CASs were investigated by conducting radiological surface screening and surveys, and by sampling potential contaminant sources, and surface and subsurface soils. Surface soil samples were collected by hand excavation. Subsurface soil samples were collected using a hand auger, a power auger, and/or a backhoe. The soil samples were field screened at specific locations for VOCs, total alpha and beta/gamma radiation, gamma-emitting radionuclides, and TPH. The results were compared against FSLs to guide in the CAS-specific investigations. Samples of various media (e.g., sludge, concrete, liquid) were collected to support both environmental and waste characterization using Teflon® bailers and scoops, scabbling, and a peristaltic pump with Mylar® tubing. Soil waste samples were field screened for VOCs and total alpha and beta/gamma radiation.

Table A.2-1
Corrective Action Investigation Activities Conducted at Each Corrective Action Site
To Meet Corrective Action Investigation Plan Requirements for CAU 219

Corrective Action Investigation Activities	Corrective Action Site					
	03-11-01	16-04-01	16-04-02	16-04-03	23-20-01	23-20-02
Inspected and verified the CAS components identified in the Corrective Action Investigation Plan.	X	X	X	X	X	--
Performed site walkovers to identify biased sampling locations.	X	X	X	X	X	X
Conducted geophysical surveys.	--	--	--	--	--	X
Collected biased soil samples.	X	X	X	X	X	X
Collected randomly located soil samples.	--	--	--	--	X	--
Removed and disposed of debris.	X	--	--	--	X	--
Field screened samples for total alpha and beta/gamma radiation using a handheld survey instrument.	X	X	X	X	X	X
Field screened samples for gamma-emitting radionuclides using a high-purity germanium gamma spectrometer (Building 23-153, Mercury, NV).	--	X	--	--	X	--
Field screened soil samples for volatile organic compounds using the headspace method and a photoionization detector.	--	X	X	X	X	--
Field screened samples for total petroleum hydrocarbons using an SRI gas chromatograph (Building 23-153, Mercury, NV).	--	--	--	--	X	--
Collected liquid, sludge, and/or concrete samples from septic and waste system features for waste characterization to support disposal recommendations and determine whether the waste could be a potential source of contamination.	--	X	--	--	X	--
Conducted video surveys using a video-mole survey instrument on the septic and waste system features and the associated piping to identify any residual material, breaches, or unknown tie-ins.	--	X	X	X	X	--
Conducted analysis for total fecal coliform bacteria for the protection of workers and off-site laboratory personnel.	--	X	--	--	--	--
Submitted select samples for off-site laboratory analysis.	X	X	X	X	X	X
Collected GPS coordinates for sample locations and points of interest.	X	X	X	X	X	X

-- = Not applicable

These readings were also used to guide sampling decisions, and health and safety controls, and to meet transportation and laboratory requirements. Sludge and liquid waste samples were field screened for gamma radiation due to the presence of free liquid in the samples. Select samples were shipped to off-site laboratories to be analyzed for appropriate chemical and radiological analyses as determined in the CAU 219 CAIP (NNSA/NSO, 2005).

Except as noted in the following CAS-specific sections, CAU 219 Decision I sampling locations were accessible, and sampling activities at planned locations were not restricted.

[Sections A.2.1](#) through [A.2.6](#) provide the investigation methodology, site geology and hydrology, and laboratory analytical information. Additional activity-specific details for the individual CASs are presented in [Sections A.3.0](#) through [A.6.0](#).

A.2.1 Sample Locations

Investigation locations selected for sampling were based on interpretation of existing engineering drawings, interviews with former and current site employees, information obtained during site visits, and site conditions as provided in the CAU 219 CAIP (NNSA/NSO, 2005). Sampling points for each site were selected based on the approach provided in the CAIP. The planned biased and random sample locations are discussed in text and represented on figures in the CAIP. Actual environmental sample locations are shown on the figures included in [Sections A.3.0](#) through [A.6.0](#). Some locations were modified slightly from planned positions due to field conditions and observations. Sample locations were staked, where appropriate, and surveyed with a GPS instrument. Sample locations and additional points of interest associated with each CAS have been plotted based on the coordinates collected by the GPS instrument and are provided in [Appendix F](#).

A.2.2 Investigation Activities

The investigation activities performed at CAU 219 were based on field investigation activities discussed in the CAU 219 CAIP (NNSA/NSO, 2005). The technical approach consisted of the activities listed in [Table A.2-1](#). The investigation strategy allowed the nature and extent of contamination associated with each CAS to be established. The following sections describe the specific investigation activities that took place at CAU 219.

A.2.2.1 Radiological Surveys

Radiological surveys (i.e., scanning, static, and swipe collection) were performed at all the CASs during the CAI. Radiological surveys were performed to identify the presence, the nature, and the extent of radiological contaminants at activities statistically greater than background. To conduct radiological static surveys to detect total alpha and beta/gamma radiation, a handheld instrument was held within an inch over the sample for one minute. To support unrestricted release determinations per the *NV/YMP Radiological Control (RadCon) Manual* (NNSA/NSO, 2004), radiological surveys were performed at the appropriate CASs using a NE Technology Electra with dual-alpha and beta/gamma radiation scintillation probe. Swipe samples were also collected for identification of removable contamination.

A.2.2.2 Site Walkovers

Site walkovers were performed at all the CASs within CAU 219 to visually inspect and identify biased (i.e., stained soil, unidentified out-of-place objects) sampling locations. Results are discussed in the CAS-specific locations.

A.2.2.3 Geophysical Surveys

A geophysical survey was performed at CAS 23-20-02, Injection Well, to identify the presence of a subsurface anomaly that was believed to be an injection well associated with Building 210. The survey was conducted using an EM61 metal detector and the results are discussed in [Section A.6.1](#).

A.2.2.4 Field Screening

Field-screening activities for VOCs, TPH, total alpha and beta/gamma radiation, and gamma-emitting radionuclides were performed as specified in the CAU 219 CAIP (NNSA/NSO, 2005). The FSL for VOC headspace was established at 20 parts per million (ppm) or 2.5 times background, whichever was greater. The TPH FSL was established at 75 ppm. Site-specific FSLs for total alpha and beta/gamma radiation were defined as the mean background activity level plus two times the standard deviation of readings from 10 background locations selected near each CAS. The total alpha and beta/gamma radiation FSLs are instrument-specific and were established for each instrument and CAS before use on a daily basis, with the exception of the high-purity germanium gamma spectrometer. The FSLs for samples screened for gamma-emitting radionuclides at Building 23-153

using the on-site gamma spectrometer are based on the industrial PAL values. Results from the on-site gamma spectrometer were used for screening purposes only.

All field screening for VOCs was conducted using a PID. During Decision I activities, VOC field screening was conducted at all CASs except for the verification samples collected at CASs 03-11-01 and 23-20-02. A total alpha and beta/gamma radiation screening was performed at each CAS using a NE Technology Electra or E-600 fitted with a DP6 dual-alpha and beta/gamma radiation scintillation probe. Field screening for TPH and gamma radiation was conducted using an SRI gas chromatograph and a high-purity germanium gamma spectrometer, respectively, located in Building 23-153 in Mercury, Nevada.

Total fecal coliform bacteria analysis was conducted on samples of sludge and liquid collected from the septic tanks at CAS 16-04-01 for the protection of workers and off-site laboratory personnel.

The CAS-specific sections of this document identify the CASs where field screening was conducted and how the FSLs were used to aid in the selection of sample locations. Field-screening results are recorded on SCLs that are retained in project files.

A.2.2.5 Surface and Subsurface Soil Sampling

Soil samples were collected using “scoop and trowel” (surface hand-grab sampling), hand auger, power auger, and/or backhoe. All sample locations were initially field screened for total alpha and beta/gamma radiation before the start of sampling. Additional screening was conducted during sample collection to both guide the investigation and serve as a health and safety control to protect the sampling team. Labeled sample containers were filled according to the following sequence: VOCs and TPH-gasoline-range organics (GRO) sample containers were filled with soil directly from the sample location, followed by the collection of soil for VOC field screening using headspace analysis. Additional soil was transferred into an aluminum tray, homogenized, and field screened for total alpha and beta/gamma radiation. Samples for the analysis of gamma radiation and TPH-DRO were then collected from the homogenized soil. All remaining sample containers were then filled. To reduce the number of sample jars used or if matrix volumes were limited, samples collected for VOC field screening were used for TPH field screening after the headspace analysis was completed.

Excess soil was returned to its original location and the sample containers appropriately disposed (based on field-screening and/or analytical results).

Surface soil samples were collected from 0.0 to 0.5 ft bgs at biased locations focusing on topography (i.e., low points), surface features (i.e., beneath debris), and surface migration pathway (i.e., downgradient from an outfall). Subsurface samples were collected below most surface sample locations to bound any potential surface contamination, and from the soil horizon at the base of septic and waste system components (i.e., collection features, tanks, piping) to evaluate the structural integrity of the components. At CAS 23-20-02, subsurface samples were collected in close proximity to the base of the feature. In addition to the collection of samples from biased locations, random surface sample locations were generated around the perimeters of the concrete pads at CAS 23-20-01.

A.2.2.6 Waste Characterization Sampling

Characterization of CAS-specific components, objects, materials, and waste was performed to support recommendations for disposal of these items during anticipated closure activities and to determine whether the waste in question at these CASs could be acting as a source of potential soil contamination. Investigation methods included visual inspection, radiological surveys, and direct sampling of the contents of the septic and waste system components. Waste characterization activities were intended to gather adequate information and data about the material to support decisions regarding the disposal of materials located within each CAS.

Samples were analyzed in accordance with the procedures specified in the CAU 219 CAIP (NNSA/NSO, 2005). The specific analyses for each CAS are listed in the CAS-specific sections, and the analytical results are compared to the federal limits for hazardous waste, NDEP hydrocarbon action limit (NDEP, 1997a and b), landfill acceptance criteria, and the limits in the NTS performance objective criteria (POC) (BN, 1995). The POC limits have been established for NTS hazardous waste generators to ensure that all hazardous waste being shipped off-site contains no “added radioactivity.”

Waste characterization sampling activities associated with site features were conducted at the following CASs:

- Waste characterization samples were collected from all three septic tanks at CAS 16-04-01. Liquid and sludge samples were collected from the eastern tank at location Tank Access

(T.A.) 1, from the center tank at location T.A. 3, and from the western tank at location T.A. 5. Sludge samples only were collected from the center septic tank at location T.A. 4.

- A sludge sample was collected from inside of the catch basin (location E09) at CAS 23-20-01.
- Soil samples were collected from four debris piles (locations NW Pile, NE Pile, SW Pile, and SE pile) to support disposal requirements for the media removed from the two grease pits at CAS 23-20-01.
- A concrete sample was collected from the surface of the decontamination pad (location E07) at CAS 23-20-01.

A.2.2.7 Debris Removal

Debris removal activities were conducted as a best management practice at CASs 03-11-01 and 23-20-01. Before proper disposal of site debris at an NTS landfill, the material was surveyed and characterized. The results and documentation associated with debris removal/disposal activities are presented in the CAS-specific sections and [Appendix D](#).

A.2.2.8 Video Surveying

Video surveys were conducted using a video mole on septic/waste system components and piping to identify any residual material, breaches, or unknown tie-ins. No breaches and/or residual materials were found during video surveying, and no sections of piping were breached to gain access for the video-mole survey. Video-mole surveys were conducted at all CASs with the exception of CASs 03-11-01 and 23-20-02, because no piping or other features that would warrant surveying activities were identified.

A.2.2.9 Sample Location Documentation

A Trimble Pathfinder ProXRSTM GPS instrument was used for determining the sample location coordinates as well as CAS points of interest. [Appendix F](#) presents these data in a tabular format.

A.2.3 Laboratory Analytical Information

Chemical and radiological analyses were performed by Paragon Analytics, Inc., of Fort Collins. The analytical suites and laboratory analytical methods used to analyze investigation samples are listed in [Table A.2-2](#). Organic and inorganic analytical results are reported in this appendix if they were

detected above the minimum detectable concentrations (MDCs) established in Table 3-2 of the CAU 219 CAIP (NNSA/NSO, 2005). Radionuclide analytical results are reported in this appendix if they are detected at or above MDCs established in Table 3-3 of the CAIP. The complete laboratory data packages are available in the project files.

Table A.2-2
Laboratory Analytical Analyses and Methods,
CAU 219 Investigation Samples^a

Analytical Parameter	Analytical Method
Total volatile organic compounds	Water and Soil - SW-846 8260B ^b
Total semivolatile organic compounds	Water and Soil - SW-846 8270C ^b
Total petroleum hydrocarbons (gasoline-range organics)	Water and Soil - SW-846 8015B (modified) ^b
Total petroleum hydrocarbons (diesel-range organics)	Water and Soil - SW-846 8015B (modified) ^b
RCRA metals ^c , beryllium, lithium, and nickel	Water - SW-846 6010B ^b , 7470A ^b Soil - SW-846 6010B ^b , 7471A ^b
Polychlorinated biphenyls	Water and Soil - SW-846 8082 ^b
Ethylene glycol	Water and Soil - SW-846 8015B (modified) ^b
Total pesticides	Water and Soil - SW-846 8081A
TCLP volatile organic compounds	Water - SW-846 1311 ^b and 8260B ^b
TCLP semivolatile organic compounds	Water - SW-846 1311 ^b and 8270C ^b
TCLP RCRA metals ^c	Water - SW-846 1311 ^b , 6010B ^b , and 7470A ^b
Gamma spectroscopy	Water and Soil - PAI 713R8 ^d and 739R8 ^d
Gross alpha/beta	Water - PAI 724R8 ^e and 702R16 ^e
Tritium	Water - PAI 704R6 ^f and 700R9 ^f

^aInvestigation samples include both environmental and waste characterization samples and associated quality control samples.

^bU. S. Environmental Protection Agency (EPA) *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, 3rd Edition, Parts 1-4, SW-846 CD ROM (EPA, 1996).

^cArsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver

^dPAI Standard Operating Procedures (SOPs) (PAI, 1999-2003) are a variant of and incorporate all the intentions of EPA Procedure 901.1 and DOE/Environmental Measurements Laboratory Procedure 4.5.2.3.

^ePAI SOPs (PAI, 1999-2003) are principally similar to EPA Procedure 900.0.

^fPAI SOPs (PAI, 1999-2003) are similar to EPA Procedure 906.0.

PAI = Paragon Analytics, Inc.

RCRA = *Resource Conservation and Recovery Act*

TCLP = Toxicity Characteristic Leaching Procedure

Validated analytical data for CAU 219 investigation samples have been compiled and evaluated to confirm the presence of contamination and define the extent of contamination, if present. The

analytical results for each CAS are presented in [Sections A.3.0 through A.6.0](#). The laboratory analyses are CAS-specific and were selected through the DQO process.

A.2.4 Comparison to Action Levels

Chemicals and radionuclides detected in samples at concentrations greater than FALs are identified as COCs. If COCs are present, corrective action must be considered for the CAS. The FALs for the CAU 219 investigation are defined for each CAS in [Section 2.3.1](#). Results that are equal to or greater than FALs are identified by bold text in the CAS-specific results tables ([Sections A.3.0 through A.6.0](#)).

A.2.5 Geology

Regional native surface soil consists of moderately consolidated, alluvial silty sands with gravel, and some cobble-sized volcanic and sedimentary detritus. Subsurface soil ranged from gravelly sands with fines to well-graded sands. The percentage of organic matter in the soil is low and decreases with depth beyond the native soil interface.

A field description for each sample was recorded on SCLs. A more detailed description of the regional geology for Areas 3, 16, and Area 23 of the NTS is provided in the CAU 219 CAIP (NNSA/NSO, 2005).

A.2.6 Hydrology

Corrective Action Site 03-11-01 is located within the intermontane basin of Yucca Flat in the eastern section of the NTS. The area is generally flat with a slight slope towards Yucca Lake. The average annual precipitation rate is approximately 6.62 in. (ARL/SORD, 2003). Transpiration rates at CAS 03-11-01 are unknown. Water Well A is located approximately 1.2 mi southeast of CAS 03-11-01. This well is saturated 1,610 ft bgs at an elevation of 2,403 ft above sea level (USGS, 1961).

The Area 16 CASs are located within the Shoshone Mountain Range. The Area 16 Camp gently slopes north with a preferential flow of surface water north of the septic tanks. The drainage channel and sump excavation may collect and hold surface water until it dissipates through evaporation or infiltration. In Area 16, the average annual precipitation rate is approximately 8.64 in.

(ARL/SORD, 2005) and the depth to groundwater in USGS Water Well UE-16f located approximately 10,500 ft southeast of the CASs is 367 ft bgs (USGS, 1965).

Corrective Action Sites 23-20-01 and 23-20-02 are located within the Mercury Valley. The area is generally flat with a slight slope towards the southwest. The average annual precipitation rate at the Mercury gauging station is approximately 5.59 in. (DRI, 1988). The closest water well to the Area 23 CASs, Army #1 WW, is located approximately 5 mi southwest of Mercury. The depth to groundwater is 785 ft bgs (BN, 1997).

Potential evapotranspiration at the NTS is significantly greater than precipitation, thus limiting vertical migration of contaminants. The annual average precipitation for this region is only 3 to 6 in. per year (USGS, 1975). The potential annual evaporation is the dominant factor influencing the movement of water in the upper saturated zone. Therefore, recharge to groundwater from precipitation is not significant at the NTS and does not provide a significant mechanism for migration of contaminants to groundwater.

Due to the depth to groundwater and climatic conditions, groundwater at the NTS in Areas 3, 16, and 23 is not expected to have been impacted by COPCs. No saturated zones (e.g., perched water, contaminant saturation) were found anywhere in the subsurface adjacent to or below the CASs.

A.3.0 CAS 03-11-01, Steam Pipes and Asbestos Tiles

Corrective Action Site 03-11-01 is located within the Area 3 Subdock along the western edge of Area 3. The CAS consists of surface debris located on or near a concrete pad. All of the debris removed from the site was on or near a concrete pad approximately 79 ft long and 33 ft wide. Asbestos-containing tiles (9 by 9 in.) were attached to the northern end of the pad and scattered nearby on the surface soil. The four pieces of steam pipe wrapped in insulation were all approximately 3 ft long with a diameter of 4 in. Three of the pieces were located just west of the concrete pad with the fourth approximately 130 ft northwest of the pad. Lying across the southern portion of the concrete pad and attached to one of the pieces of steam pipe was a 15-ft rubber hose. Miscellaneous metal was also found lying on the pad in close proximity to the hose. A diagram of the site is shown in [Figure A.3-1](#). Additional detail is provided in the CAU 219 CAIP (NNSA/NSO, 2005).

A.3.1 Corrective Action Investigation

During investigation activities at CAS 03-11-01, asbestos-containing floor tiles, four pieces of steam pipe wrapped with insulation, a 15-ft rubber hose, and miscellaneous metal on the pad were removed for disposal. A total of four verification soil samples were collected at the surface from where the steam pipe pieces had been located. The sample IDs, locations, types, and analyses are listed in [Table A.3-1](#). The specific CAI activities conducted to satisfy the CAIP requirements at this CAS are described in the following sections.

A.3.1.1 Field Screening

Investigation samples were field screened for total alpha and beta/gamma radiation. The FSRs were compared to FSLs to guide subsequent sampling decisions, and no exceedances were observed.

A.3.1.2 Visual Inspections

A walkover was conducted around the concrete pad to identify additional sample locations based on biasing factors (i.e., staining). No additional biased sample locations were identified.

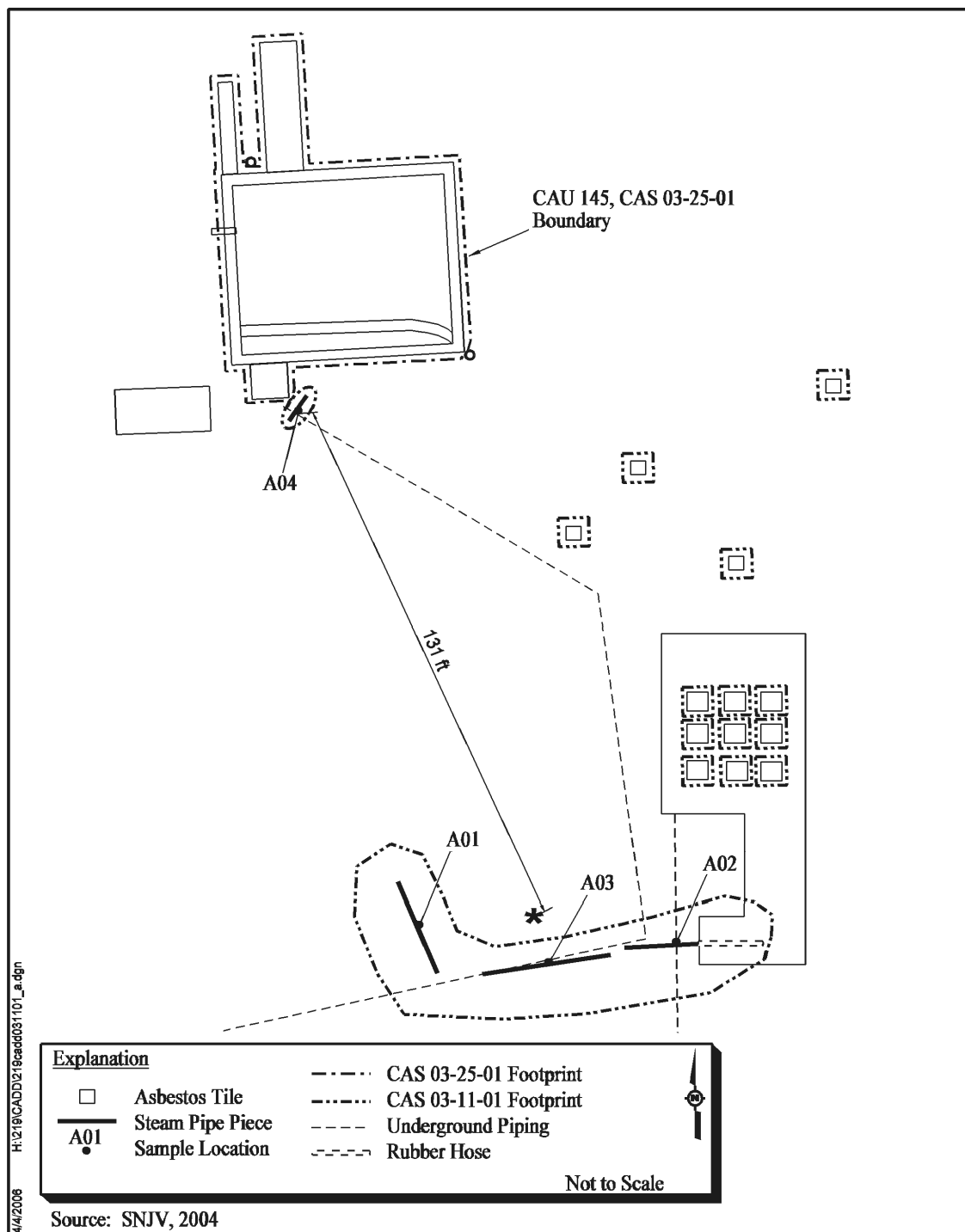


Figure A.3-1
CAS 03-11-01, Steam Pipes and Asbestos Tiles Sample Locations

Table A.3-1
Samples Collected at CAS 03-11-01, Steam Pipes and Asbestos Tiles

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	Analyses
A01	219A001	0.0 - 0.5	Soil	Environmental	Set 1
A02	219A002	0.0 - 0.5	Soil	Environmental	Set 1
A03	219A003	0.0 - 0.5	Soil	Environmental	Set 1
A04	219A004	0.0 - 0.5	Soil	Environmental	Set 1

Set 1 = *Resource Conservation and Recovery Act* metals and gamma spectroscopy

ft bgs = Feet below ground surface

A.3.1.3 Debris Removal

Debris removal activities were conducted as a BMP for this CAS. The surface debris at the CAS was inventoried and surveyed in accordance with the *NNSA Sectors Clean-Up Work Plan For Housekeeping Category Waste Sites* (NNSA/NSO, 2003) before disposal. The results and documentation associated with the removal activities conducted at this CAS are presented in [Appendix D](#).

A.3.1.4 Sample Collection

During Decision I environmental sampling activities, biased surface soil samples were collected beneath the four pieces of steam pipe to account for the potential release of contaminants. Sample locations A01, A02, A03, and A04 are shown in [Figure A.3-1](#). Investigation samples were collected as outlined in the CAU 219 CAIP (NNSA/NSO, 2005) and submitted for laboratory analysis.

Decision II samples were not collected at this CAS because no COCs were identified.

A.3.1.5 Deviations

There were no deviations to planned activities at CAS 03-11-01.

A.3.2 Investigation Results

The following sections provide analytical results from the samples collected to complete investigation activities as outlined in the CAIP. Investigation samples were analyzed for the

CAIP-specified COPCs, which included RCRA metals and gamma-emitting radionuclides. The laboratory analyses and methods used to analyze the investigation samples are listed in [Table A.2-2](#). [Table A.3-1](#) lists the sample-specific analytical suite for CAS 03-11-01.

Analytical results from the soil samples with concentrations exceeding MDCs are summarized in the following sections. An evaluation was conducted on all constituents detected above MDCs by comparing individual concentration or activity results against the PALs established in the CAIP. If the constituent concentrations were below their respective PALs, the FALs were established as the corresponding PAL concentrations or activities ([Appendix C](#)).

A.3.2.1 RCRA Metals

The RCRA metals analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in [Table A.3-2](#). Lead was the only metal identified at this CAS that exceeded the PAL of 800 mg/kg with a concentration of 820 mg/kg (location A04). Although lead exceeded the PAL, it is not considered to be a COC at this CAS. The lead concentration at location A04 is believed to be associated with past site activities conducted at CAS 03-25-01 at CAU 145 based on the lead concentrations identified in surface samples collected during the CAU 145 CAI and its close proximity to the CAS itself. Therefore, no COCs are considered to be present at CAS 03-11-01, and the lead contamination identified at location A04 will be addressed in the CAU 145 CADD.

A.3.2.2 Gamma-Emitting Radionuclides

Gamma-emitting radionuclides analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in [Table A.3-3](#). No radionuclides were detected at concentrations exceeding the PALs.

A.3.3 Nature and Extent of Contamination

Based on the analytical results for soil samples collected at CAS 03-11-01, no COCs were identified. The requirements for Decision I have been met.

Table A.3-2
Sample Results for Metals Detected Above MDCs
at CAS 03-11-01, Steam Pipes and Asbestos Tiles

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)							
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Silver
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	450 ^b	800 ^b	310 ^b	5,100 ^b
A01	219A001	0.0 - 0.5	4.9	240	0.81	0.8	11	96	0.019 (B)	0.22 (B)
A02	219A002	0.0 - 0.5	4.2	250	0.64	4.1	17	130	0.011 (B)	--
A03	219A003	0.0 - 0.5	6.1	250	0.82	4.1	34	360	0.026 (B)	0.17 (B)
A04	219A004	0.0 - 0.5	4.8	370	0.61	0.14 (J-)	15	820 ^c	0.091	--

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

^cThis constituent will be addressed as a COC under CAU 145 CAS 03-25-01 and is not considered to be a COC for CAU 219 CAS 03-11-01.

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

B = Value less than the contract required detection limit, but greater than or equal to the instrument detection limit.

J- = The result is an estimated quantity, but the result may be biased low.

-- = Not detected above minimum detectable concentrations.

A.3.4 Revised Conceptual Site Model

The CAIP requirements were met at this CAS, and no revisions were necessary to the CSM.

Table A.3-3
Samples Results for Gamma-Emitting Radionuclides Detected Above MDCs
at CAS 03-11-01, Steam Pipes and Asbestos Tiles

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)				
			Actinium-228 ^a	Cesium-137 ^b	Lead-212 ^a	Lead-214 ^a	Thallium-208 ^a
Final Action Levels			5	12.2	5	5	5
Depth bgs (cm)			<15		<15	<15	<15
A01	219A001	0.0 - 0.5	--	--	1.35 (J)	0.84 (G, J)	--
A02	219A002	0.0 - 0.5	--	--	1 (J)	1.01 (G, J)	--
A03	219A003	0.0 - 0.5	--	--	1.29 (J)	1.14 (G, J)	0.53 (G)
A04	219A004	0.0 - 0.5	1.37 (G)	0.49 (G, LT)	1.53 (J)	0.92 (G, J)	--

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, thallium-208, and thorium-232, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes are specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

^bTaken from the construction, commercial, industrial land use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 25-mrem/yr dose.

cm = Centimeter

ft bgs = Feet below ground surface

mrem/yr = Millirem per year

pCi/g = Picocuries per gram

-- = Not detected above minimum detectable concentrations

< = Less than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

LT = Result is less than the requested minimum detectable concentration, greater than the sample specific minimum detectable concentration.

A.4.0 CASs 16-04-01, Septic Tanks (3); 16-04-02, Distribution Box; and 16-04-03, Sewer Pipes

Corrective Action Sites 16-04-01, 16-04-02, and 16-04-03 are located at the Area 16 Camp in the northern section of Area 16. These CASs, along with a drainage channel and sump excavation, comprise the septic system that serviced the camp. The drainage channel and excavated sump were added to CAS 16-04-03 for investigation purposes. The major components of the septic system are located north of the Area 16 Camp. The two sewer pipes exiting the camp converge at an open manhole northeast of the access road. The main pipe then continues approximately 115 ft to another manhole, the “distribution box,” where it is split into three pipes. Each of these three pipes continues approximately 16.4 ft to a separate septic tank. The three tanks lie parallel to one another and are covered by soil. Each tank is approximately 26 ft long and 8 ft in diameter. A pipe continues out of each tank and the three converge approximately 8 ft north of the septic tanks between the center and eastern tank. This pipe then continues approximately 98.4 ft north to the outfall where effluent flows into a drainage channel approximately 196.8 ft in length. Adjacent to the northern end of the drainage channel is a sump excavation measuring approximately 98.4 by 33 ft. A natural wash intersects the drainage channel just north of the outfall and empties into the excavated sump. [Figure A.4-1](#) is a diagram of the septic system north of the access road. Each of these five components was identified in the CAIP for investigation. Additional detail is provided in the CAU 219 CAIP (NNSA/NSO, 2005).

A.4.1 Corrective Action Investigation

A total of 69 environmental samples (including four FDs) were collected during investigation activities at CASs 16-04-01, 16-04-02, and 16-04-03. The sample IDs, locations, types, and analyses are listed in [Tables A.4-1](#), through [A.4-3](#), respectively. The specific CAI activities conducted to satisfy the CAIP requirements at this CAS are described in the following sections.

A.4.1.1 Field Screening

Investigation samples were field screened for VOCs, total alpha and beta/gamma radiation, and gamma-emitting radionuclides. The FSRs were compared to FSLs to guide subsequent sampling decisions where appropriate. The VOC head space FSLs were exceeded for five samples. Gross

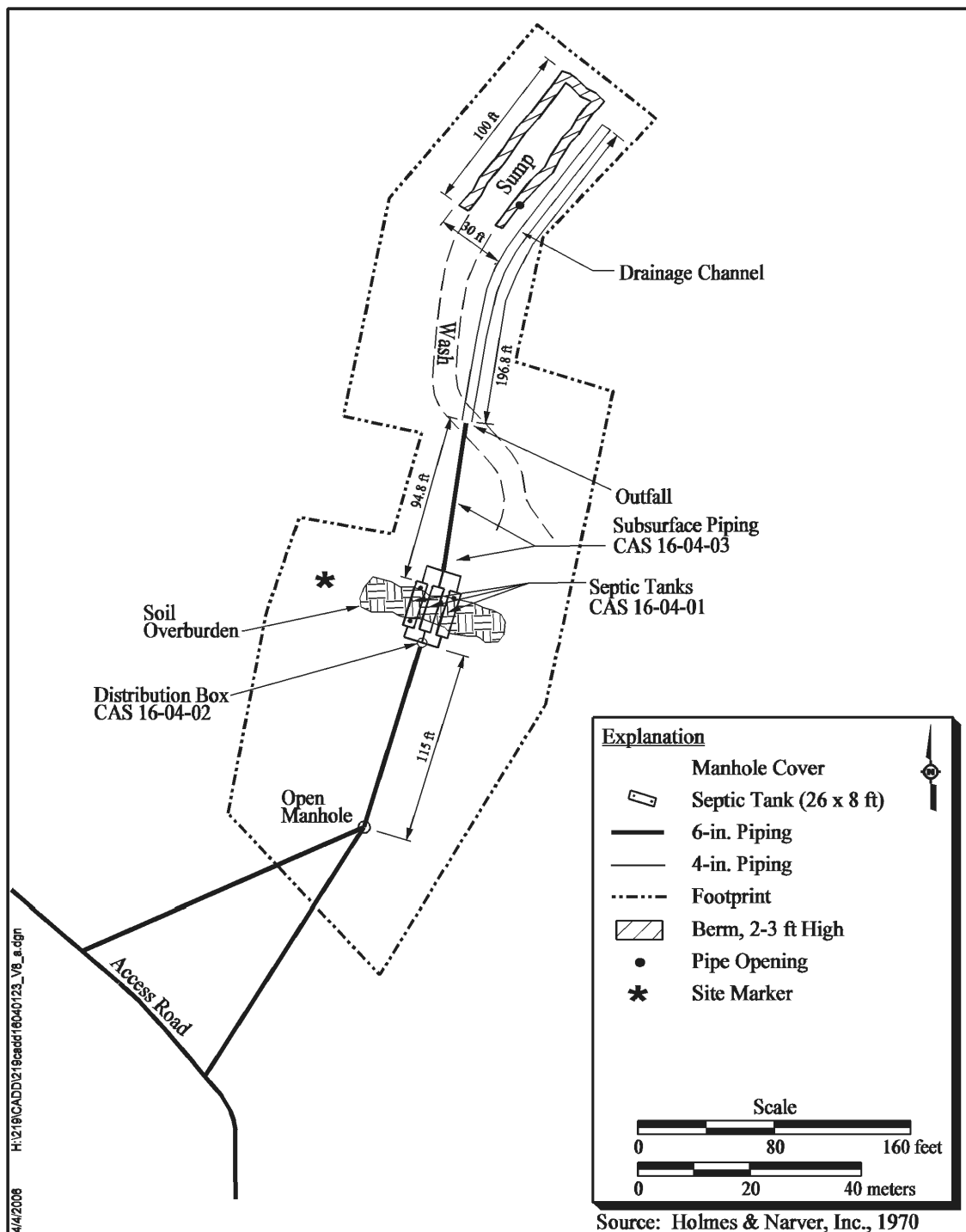


Figure A.4-1
CASs 16-04-01, 16-04-02, and 16-04-03,
Area 16 Camp Septic System

Table A.4-1
Samples Collected at CAS 16-04-01, Septic Tanks (3)
(Page 1 of 3)

Sample Location	Sample Number	Depth (ft bgs)	Sample Matrix	Purpose	Analyses
B01	219B001	0.0 - 0.5	Soil	Environmental	Set 1
	219B002	0.5 - 1.5	Soil	Environmental	Set 1
B02	219B003	0.0 - 0.5	Soil	Environmental	Set 1
	219B004	0.5 - 1.5	Soil	Environmental, MS/MSD	Set 1
B03	219B005	0.0 - 0.5	Soil	Environmental	Set 1
	219B006	0.5 - 1.5	Soil	Environmental	Set 1
	219B007	0.5 - 1.5	Soil	Field Duplicate of #219B006	Set 1
B04	219B008	0.0 - 0.5	Soil	Environmental	Set 1
	219B009	0.5 - 1.5	Soil	Environmental	Set 7
B05	219B010	0.0 - 0.5	Soil	Environmental	Set 7
	219B011	0.5 - 1.5	Soil	Environmental	Set 1
B06	219B012	0.0 - 0.5	Soil	Environmental	Set 1
	219B013	0.5 - 1.5	Soil	Environmental	Set 7
B07	219B014	0.0 - 0.5	Soil	Environmental	Set 2
	219B014A	0.0 - 0.5	Soil	Environmental, Recollected	Set 3
	219B015	0.5 - 1.5	Soil	Environmental	Set 2
	219B015A	0.5 - 2.0	Soil	Environmental, Recollected	Set 3
B08	219B016	0.0 - 0.5	Soil	Environmental	Set 2
	219B016A	0.0 - 0.5	Soil	Environmental, Recollected	Set 3
	219B017	0.5 - 1.5	Soil	Environmental	Set 2
	219B017A	1.5 - 2.0	Soil	Environmental, Recollected	Set 3
B09	219B018	7.0 - 7.5	Soil	Environmental	Set 1
	219B019	7.5 - 8.0	Soil	Environmental	Set 1
B10	219B020	3.5 - 4.0	Soil	Environmental	Set 1
B11	219B021	3.0 - 3.5	Soil	Environmental, MS/MSD	Set 1
B12	219B022	3.0 - 3.5	Soil	Environmental	Set 1
	219B023	3.0 - 3.5	Soil	Field Duplicate of #219B022	Set 1
B13	219B024	7.0 - 7.5	Soil	Environmental	Set 1
	219B026	7.5 - 8.0	Soil	Environmental	Set 1
B14	219B025	7.0 - 7.5	Soil	Environmental	Set 1
	219B027	7.5 - 8.0	Soil	Environmental	Set 1

Table A.4-1
Samples Collected at CAS 16-04-01, Septic Tanks (3)
(Page 2 of 3)

Sample Location	Sample Number	Depth (ft bgs)	Sample Matrix	Purpose	Analyses
B15	219B028	1.5 - 2.0	Soil	Environmental	Set 1
	219B036	7.0 - 7.5	Soil	Environmental	Set 1
	219B037	7.5 - 8.0	Soil	Environmental	Set 1
B16	219B029	1.5 - 2.0	Soil	Environmental	Set 1
B17	219B030	1.5 - 2.0	Soil	Environmental	Set 1
B18	219B031	7.0 - 7.5	Soil	Environmental	Set 1
	219B032	8.0 - 8.5	Soil	Environmental	Set 1
B19	219B033	1.5 - 2.0	Soil	Environmental	Set 1
B20	219B034	7.0 - 7.5	Soil	Environmental	Set 1
	219B035	7.5 - 8.0	Soil	Environmental	Set 1
N/A	219B301	N/A	Water	Trip Blank	VOCs
N/A	219B302	N/A	Water	Trip Blank	VOCs
N/A	219B303	N/A	Water	Field Blank	Set 2
N/A	219B304	N/A	Water	Equipment Rinsate Blank	Set 2
N/A	219B305	N/A	Water	Trip Blank	VOCs
N/A	219B306	N/A	Water	Trip Blank	VOCs
N/A	219B307	N/A	Water	Trip Blank	VOCs
N/A	219B308	N/A	Water	Trip Blank	VOCs
N/A	219B309	N/A	Water	Trip Blank	VOCs
N/A	219B310	N/A	Water	Trip Blank	VOCs
N/A	219B311	N/A	Water	Trip Blank	VOCs
N/A	219B312	N/A	Water	Trip Blank	VOCs
N/A	219B313	N/A	Water	Trip Blank	VOCs
N/A	219B314	N/A	Water	Trip Blank	VOCs
N/A	219B315	N/A	Water	Field Blank	Set 1
N/A	219B316	N/A	Water	Trip Blank	VOCs
N/A	219B317	N/A	Water	Trip Blank	VOCs
N/A	219B318	N/A	Water	Equipment Rinsate Blank	Set 1
N/A	219B319	N/A	Water	Trip Blank	VOCs
N/A	219B320	N/A	Water	Trip Blank	VOCs
N/A	219B321	N/A	Water	Equipment Rinsate Blank	Set 1

Table A.4-1
Samples Collected at CAS 16-04-01, Septic Tanks (3)
(Page 3 of 3)

Sample Location	Sample Number	Depth (ft bgs)	Sample Matrix	Purpose	Analyses
T.A. #1	219B502	N/A	Liquid	Waste Management, Fecal Coliform	Set 4
	219B504	N/A	Sludge	Waste Management, Fecal Coliform	Set 5
	219B512	N/A	Sludge	Waste Management	Set 6
T.A. #3	219B501	N/A	Liquid	Waste Management, Fecal Coliform, MS/MSD	Set 4
	219B503	N/A	Sludge	Waste Management, Fecal Coliform	Set 5
	219B509	N/A	Sludge	Waste Management	Set 6
	219B510	N/A	Sludge	Waste Management	Set 6
	219B511	N/A	Sludge	Waste Management	Set 6
T.A. #4	219B507	N/A	Sludge	Waste Management, Fecal Coliform, MS/MSD	Set 5
	219B508	N/A	Sludge	Field Duplicate of #219B507	Set 5
	219B514	N/A	Sludge	Waste Management	Set 6
T.A. #5	219B505	N/A	Liquid	Waste Management, Fecal Coliform	Set 4
	219B506	N/A	Sludge	Waste Management, Fecal Coliform	Set 5
	219B513	N/A	Sludge	Waste Management	Set 6

Set 1 = VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO and TPH-GRO, PCBs, pesticides, and gamma spectroscopy

Set 2 = Gamma spectroscopy

Set 3 = VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO and TPH-GRO, and PCBs

Set 4 = VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO and TPH-GRO, PCBs, gamma spectroscopy, gross alpha/beta, and tritium

Set 5 = VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO and TPH-GRO, PCBs, pesticides, gamma spectroscopy, TCLP VOCs, TCLP SVOCs, and TCLP RCRA metals

Set 6 = TCLP pesticides

Set 7 = VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO and TPH-GRO, PCBs, and gamma spectroscopy

ft bgs = Feet below ground surface

MS/MSD = Matrix spike/matrix spike duplicate

N/A = Not applicable

PCB = Polychlorinated biphenyl

RCRA = *Resource Conservation and Recovery Act*

SVOC = Semivolatile organic compound

T.A. = Tank Access

TCLP = Toxicity Characteristic Leaching Procedure

TPH-DRO = Total petroleum hydrocarbons, diesel-range organics

TPH-GRO = Total petroleum hydrocarbons, gasoline-range organics

VOC = Volatile organic compound

alpha radiation FSLs were exceeded in one sample, and total beta/gamma radiation FSLs were exceeded in 37 samples. Sludge and liquid samples were screened for gamma-emitting radionuclides using the on-site gamma spectrometer at Building 23-153, and no exceedances of the FSLs were

Table A.4-2
Samples Collected at CAS 16-04-02, Distribution Box

Sample Location	Sample Number	Depth (ft bgs)	Sample Matrix	Purpose	Analyses
C01	219C001	3.5 - 4.0	Soil	Environmental	Set 1
	219C003	5.0 - 5.5	Soil	Environmental	Set 1
C02	219C002	3.5 - 4.0	Soil	Environmental	Set 1
	219C004	5.0 - 5.5	Soil	Environmental, MS/MSD	Set 1
C03	219C005	3.5 - 4.0	Soil	Environmental	Set 1
	219C007	6.5 - 7.0	Soil	Environmental	Set 1
	219C008	6.5 - 7.0	Soil	Field Duplicate of #219C007	Set 1
C04	219C006	3.5 - 4.0	Soil	Environmental	Set 1
	219C009	6.5 - 7.0	Soil	Environmental	Set 1

Set 1 = VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO and TPH-GRO, PCBs, pesticides, and gamma spectroscopy

ft bgs = Feet below ground surface

MS/MSD = Matrix spike/matrix spike duplicate

PCB = Polychlorinated biphenyl

RCRA = *Resource Conservation and Recovery Act*

SVOC = Semivolatile organic compound

TPH-DRO = Total petroleum hydrocarbons, diesel-range organics

TPH-GRO = Total petroleum hydrocarbons, gasoline-range organics

VOC = Volatile organic compound

Table A.4-3
Samples Collected at CAS 16-04-03, Sewer Pipes
(Page 1 of 3)

Sample Location	Sample Number	Depth (ft bgs)	Sample Matrix	Purpose	Analyses
D01	219D003	0.0 - 0.5	Soil	Environmental, MS/MSD	Set 1
	219D003A	0.0 - 0.5	Soil	Environmental, MS/MSD, Recollected	Set 2
	219D004	0.5 - 1.5	Soil	Environmental	Set 1
	219D004A	0.5 - 1.5	Soil	Environmental, Recollected	Set 2
D02	219D008	0.0 - 0.5	Soil	Environmental	Set 1
	219D008A	0.0 - 0.5	Soil	Environmental, Recollected	Set 2
	219D009	0.5 - 1.0	Soil	Environmental	Set 1
	219D009A	1.0 - 1.5	Soil	Environmental, Recollected	Set 2
D03	219D010	0.0 - 0.5	Soil	Environmental	Set 1
	219D010A	0.0 - 0.5	Soil	Environmental, Recollected	Set 2
	219D011	0.5 - 2.0	Soil	Environmental	Set 1
	219D011A	1.0 - 1.5	Soil	Environmental, Recollected	Set 2
D04	219D022	0.0 - 0.5	Soil	Environmental	Set 1
	219D022A	0.0 - 0.5	Soil	Environmental, Recollected	Set 2

Table A.4-3
Samples Collected at CAS 16-04-03, Sewer Pipes
(Page 2 of 3)

Sample Location	Sample Number	Depth (ft bgs)	Sample Matrix	Purpose	Analyses
D04	219D023	0.5 - 1.5	Soil	Environmental	Set 1
	219D023A	1.0 - 1.5	Soil	Environmental, Recollected	Set 2
D05	219D020	0.0 - 0.5	Soil	Environmental	Set 1
	219D020A	0.0 - 0.5	Soil	Environmental, Recollected	Set 2
	219D021	1.5 - 2.0	Soil	Environmental	Set 1
	219D021A	1.5 - 2.0	Soil	Environmental, Recollected	Set 2
D06	219D001	0.0 - 0.5	Soil	Environmental	Set 1
	219D001A	0.0 - 0.5	Soil	Environmental, Recollected	Set 2
	219D002	0.5 - 1.5	Soil	Environmental	Set 1
	219D002A	0.5 - 1.0	Soil	Environmental, Recollected	Set 2
D07	219D005	0.0 - 0.5	Soil	Environmental	Set 1
	219D005A	0.0 - 0.5	Soil	Environmental, Recollected	Set 2
	219D006	0.0 - 0.5	Soil	Field Duplicate of #219D005	Set 1
	219D006A	0.0 - 0.5	Soil	Field Duplicate of #219D005A	Set 2
	219D007	0.5 - 1.5	Soil	Environmental	Set 1
	219D007A	0.5 - 1.5	Soil	Environmental, Recollected	Set 2
D08	219D016	0.0 - 0.5	Soil	Environmental	Set 1
	219D016A	0.0 - 0.5	Soil	Environmental, Recollected	Set 2
	219D017	0.5 - 1.5	Soil	Environmental	Set 1
	219D017A	0.5 - 1.5	Soil	Environmental, Recollected	Set 2
D09	219D018	0.0 - 0.5	Soil	Environmental	Set 1
	219D018A	0.0 - 0.5	Soil	Environmental, Recollected	Set 2
	219D019	1.5 - 2.0	Soil	Environmental	Set 1
	219D019A	1.5 - 2.0	Soil	Environmental, Recollected	Set 2
D10	219D014	0.0 - 0.5	Soil	Environmental	Set 1
	219D014A	0.0 - 0.5	Soil	Environmental, Recollected	Set 2
	219D015	0.5 - 1.5	Soil	Environmental	Set 1
	219D015A	1.5 - 2.0	Soil	Environmental, Recollected	Set 2
D11	219D012	0.0 - 0.5	Soil	Environmental	Set 1
	219D012A	0.0 - 0.5	Soil	Environmental, Recollected	Set 2
	219D013	0.5 - 1.5	Soil	Environmental	Set 1
	219D013A	1.5 - 2.0	Soil	Environmental, Recollected	Set 2
N/A	219D301	N/A	Water	Trip Blank	Analysis Cancelled

Table A.4-3
Samples Collected at CAS 16-04-03, Sewer Pipes
(Page 3 of 3)

Sample Location	Sample Number	Depth (ft bgs)	Sample Matrix	Purpose	Analyses
N/A	219D302	N/A	Water	Trip Blank	Analysis Cancelled
N/A	219D303	N/A	Water	Trip Blank	VOCs

Set 1 = SVOCs, RCRA metals, beryllium, TPH-DRO, PCBs, pesticides, and gamma spectroscopy

Set 2 = VOCs and TPH-GRO

ft bgs = Feet below ground surface

MS/MSD = Matrix spike/matrix spike duplicate

N/A = Not applicable

PCB = Polychlorinated biphenyl

RCRA = Resource Conservation and Recovery Act

SVOC = Semivolatile organic compound

TPH-DRO = Total petroleum hydrocarbons, diesel-range organics

TPH-GRO = Total petroleum hydrocarbons, gasoline-range organics

VOC = Volatile organic compound

observed. Total fecal coliform bacteria analysis was conducted on samples of liquid and sludge from the three septic tanks for the protection of workers and off-site personnel. Results were negative for all samples with the exception of the liquid collected from the center tank. All samples with FSRs exceeding FSLs were sent off site for laboratory analysis.

A.4.1.2 Visual Inspections

A walkover was conducted around the septic system to identify additional sample locations based on biasing factors. Based on the results of the walkover, the number of biased sample locations downgradient of the outfall was increased to better represent the topography of the area. Eight sample locations were added to investigate this area.

A.4.1.3 Video Surveys

Video-mole surveys were conducted on most of the sewer piping north of the open manhole where the two main lines merge. No breaches and/or residual materials were found in the piping. The two pipes running from the distribution box to the outside septic tanks had been grouted. The outfall pipe is blocked by an animal nest approximately 9.8 ft north of the septic tank outlets. No additional sample locations were identified as a result of video-surveying activities.

A.4.1.4 Sample Collection

Decision I environmental sampling activities included the collection of biased surface and subsurface soil samples surrounding the septic system components ([Figure A.4-2](#)). Subsurface soil samples were collected beneath the inlets and outlets of the distribution box (locations C01, C02, C03, and C04) and the three tanks (locations B10, B11, B12, B15, B16, and B17) to account for potential leakage. Subsurface soil samples were also collected beneath each tank at both ends (locations B09, B13, B14, B15, B18 and, B20) and beneath the junction of the three outlet pipes (location B19) to account for any potential breaches. The soil overburden was also sampled at eight low points between and beside the septic tank access ports (locations B01, B02, B03, B04, B05, B06, B07, and B08) to account for any potential overflow.

Decision I environmental sampling activities also included the collection of biased surface and subsurface soil samples downgradient of the outfall ([Figure A.4-3](#)) to account for potentially contaminated effluent. Five surface and five subsurface soil samples were collected along the drainage channel at locations D01, D02, D03, D04, and D05, and three surface and three subsurface soil samples were collected from the sump excavation at locations D08, D09, and D10. Two surface and two subsurface soil samples were also collected inside the wash with one location between the outfall and the sump (location D07) and the other upgradient of the outfall (location D06). The samples from location D06 were collected to verify that any potential contaminants identified were released from the outfall. In addition, a surface and subsurface soil sample were collected between the wash and the drainage channel (location D11) to account for any potential overflow.

Eleven sludge and three liquid samples were collected at this CAS for the purpose of waste characterization and disposal determination. One liquid (219B502) and two sludge (219B504 and 219B512) samples were collected from location T.A. #1, which is located at the south end of the septic tank to the east. One liquid (219B501) and four sludge (219B503, 219B509, 219B510, and 219B511) samples were collected at location T.A. #3, which is located on the south end of the center septic tank. Three sludge samples (219B507, 219B508, and 219B514) were collected at location T.A. #4, which is located on the north end of the center septic tank. One liquid (219B505) and two sludge (219B506 and 219B513) samples were collected at location T.A. #5, which is located on the south end of the septic tank to the west. The septic tank sample locations are shown in [Figure A.7-1](#) ([Section A.7.0](#)). The results of the waste management samples collected at this CAS were also

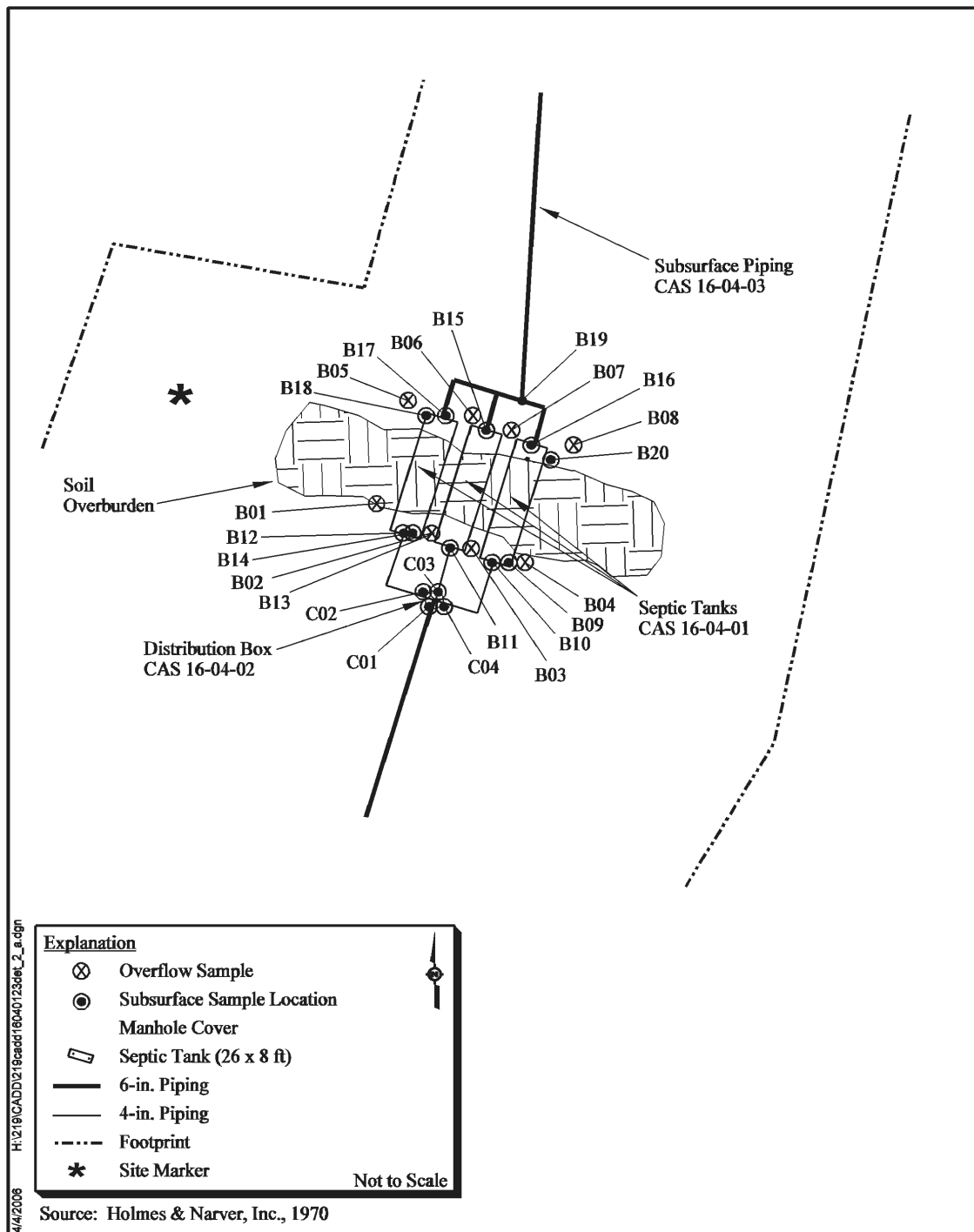


Figure A.4-2
CAS 16-04-01, Septic Tanks, and CAS 16-04-02,
Distribution Box Sample Locations

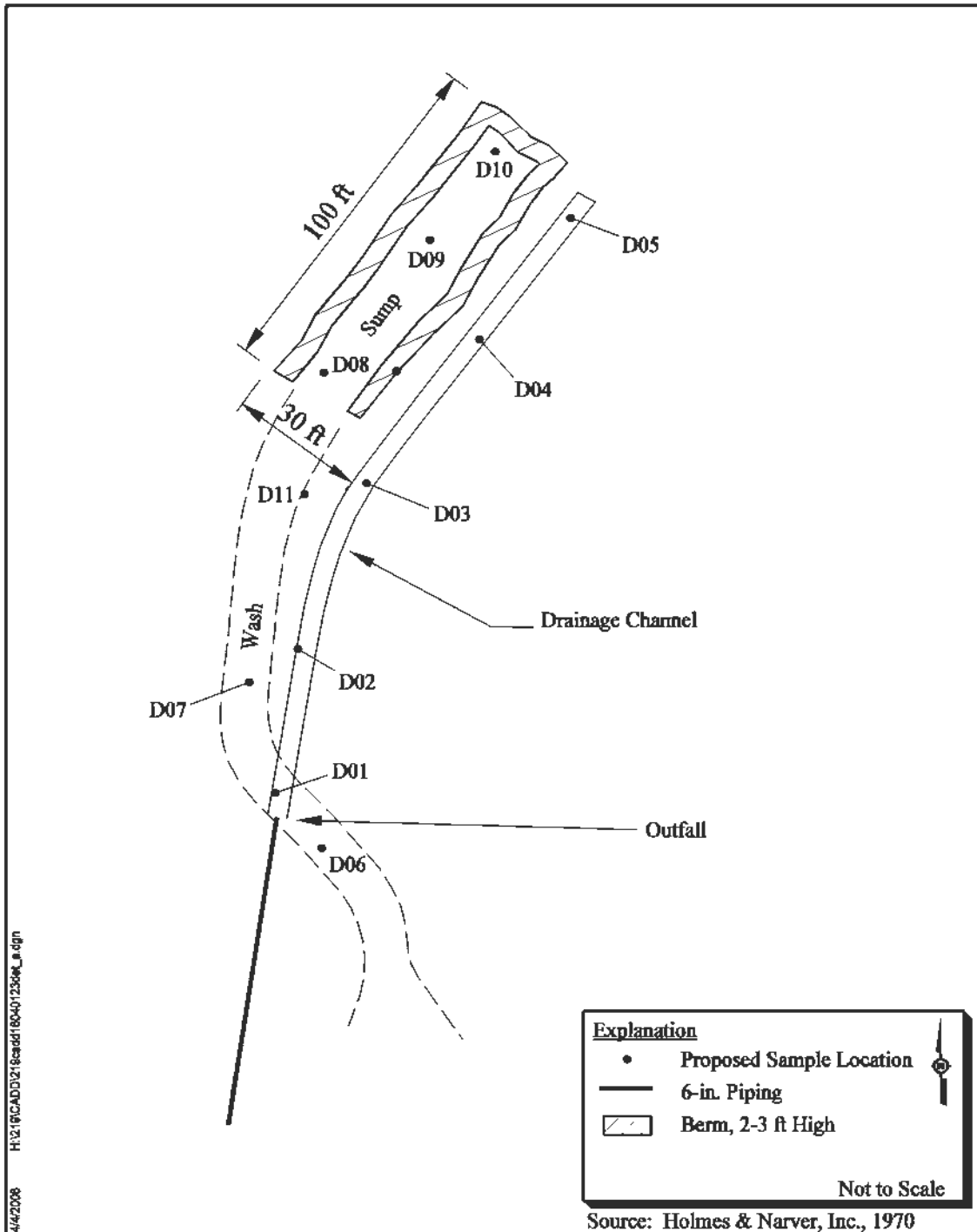


Figure A.4-3
CAS 16-04-03, Sewer Pipe Sample Locations

compared to PRGs to identify potential COCs. The analytical results for waste characterization samples are presented in [Section A.7.0](#).

A.4.1.5 Deviations

There were several deviations from the sampling plan. Some of the sewer piping at the tank outlets was not surveyed with the video mole due to blockage approximately 100 ft upgradient from the outfall and because the ground at the location of the blockage was too steep to safely excavate with the backhoe. This deviation is not a significant impact because the magnitude of contamination was identified in the septic tanks and at the outfall area. The concentrations of COPCs at these locations were less than FALs. In addition, a use restriction will be applied to all three CASs as a BMP.

Sludge samples from the northern ends of the two outside septic tanks were not collected due to insufficient material. This deviation does not impact the results of the CAI at this CAS because this demonstrates that there is not adequate source material to adversely impact the environment. In addition, samples were collected beneath the tanks to determine their integrity. All samples from CASs 16-04-01, 16-04-02, and 16-04-03 were analyzed for pesticides after preliminary results for PCBs tentatively identified the presence of pesticides. This deviation provided additional chemical data to better characterize the CAS.

A.4.2 Investigation Results

The following sections provide analytical results from the samples collected to complete investigation activities as outlined in the CAIP. Investigation samples were analyzed for the CAIP-specified COPCs, which included VOCs, SVOCs, TPH-DRO and TPH-GRO, RCRA metals, and gamma-emitting radionuclides. Beryllium and PCBs analyses were added because these constituents are common contaminant and health and safety concerns at the NTS. Pesticides were also added after being tentatively identified in preliminary PCB data. The laboratory analyses and methods used for investigation samples are listed in [Table A.2-2](#), [Table A.4-1](#), [Table A.4-2](#), and [Table A.4-3](#) list the sample-specific analytical suite for CASs 16-04-01, 16-04-02, and 16-04-03, respectively. The waste characterization analytical results for toxicity characteristic leaching procedure (TCLP) VOCs, TCLP SVOCs, TCLP RCRA metals, TCLP pesticides, gross alpha/beta, and tritium are presented in [Table A.7-1](#) in [Section A.7.0](#).

Analytical results from the soil samples with concentrations exceeding MDCs are summarized in the following sections. An evaluation was conducted on all constituents detected above MDCs by comparing individual concentration or activity results against the PALs established in the CAIP. If the constituent concentrations were below their respective PALs, the FALs were established as the corresponding PAL concentrations or activities ([Appendix C](#)).

A.4.2.1 Volatile Organic Compounds

The VOC analytical results for environmental samples collected at these CASs that were detected above MDCs are presented in [Table A.4-4](#) (CAS 16-04-01) and [Table A.4-5](#) (CAS 16-04-03). No VOCs were detected at concentrations exceeding their PALs.

Table A.4-4
Sample Results for VOCs Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)		
			Styrene	Tetrachloroethene	Toluene
Final Action Levels ^a			1,700,000	1,300	520,000
B03	219B005	0.0 - 0.5	1.4 (J)	--	1.9 (J)
B04	219B008	0.0 - 0.5	--	--	1.5 (J)
B05	219B010	0.0 - 0.5	--	--	1.2 (J)
B07	219B014A	0.0 - 0.5	--	--	5 (J)
B08	219B016A	0.0 - 0.5	--	--	1.9 (J)
B15	219B028	1.5 - 2.0	--	--	1.1 (J)
B18	219B031	7.0 - 7.5	--	1 (J)	--
	219B032	8.0 - 8.5	--	0.98 (J)	--

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

-- = Not detected above minimum detectable concentrations.

Table A.4-5
Sample Results for VOCs Detected Above
MDCs at CAS 16-04-03, Sewer Pipes

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)			
			Acetone	P-Isopropyltoluene	Styrene	Toluene
Final Action Levels ^a			54,000,000	2,000,000	1,700,000	520,000
D01	219D003A	0.0 - 0.5	--	--	1.2 (J)	1.3 (J)
	219D004A	0.5 - 1.5	--	--	0.94 (J)	1.3 (J)
D03	219D010A	0.0 - 0.5	7.1 (J)	2 (J)	--	--
	219D011A	1.0 - 1.5	12 (J)	--	1 (J)	1.2 (J)
D04	219D022A	0.0 - 0.5	12 (J)	--	--	0.94 (J)
D05	219D020A	0.0 - 0.5	--	--	1.4 (J)	1.4 (J)
D06	219D001A	0.0 - 0.5	--	0.97 (J)	--	--
	219D002A	0.5 - 1.0	--	1 (J)	--	0.95 (J)
D07	219D006A	0.0 - 0.5	--	--	--	1.2 (J)
	219D007A	0.5 - 1.5	--	--	--	1.1 (J)
D08	219D016A	0.0 - 0.5	--	--	1.3 (J)	--
D09	219D018A	0.0 - 0.5	--	--	0.9 (J)	2.1 (J)
D11	219D012A	0.0 - 0.5	--	--	1 (J)	--

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

-- = Not detected above minimum detectable concentrations.

A.4.2.2 Semivolatile Organic Compounds

The SVOC analytical results for environmental samples collected at these CASs that were detected above MDCs are presented in [Table A.4-6](#) (CAS 16-04-01), [Table A.4-7](#) (CAS 16-04-02), and [Table A.4-8](#) (CAS 16-04-03). The SVOCs were not detected in environmental samples at concentrations greater than PALs; however, benzo(a)pyrene was detected in waste management sludge samples (219B503, 219B507, and 219B508) collected from the center septic tank at CAS 16-04-01 at concentrations that exceed the PAL of 210 µg/kg. Concentrations range from 490 to 850 µg/kg as shown in the waste management data in [Table A.7-1](#). A Tier 2 evaluation was conducted because if left in place, the sludge could be a source of potential contamination. A FAL of 6,470 µg/kg was established for benzo(a)pyrene. No SVOCs were detected at concentrations exceeding their FALs. The establishment of FALs is presented [Appendix C](#).

Table A.4-6
Samples for SVOCs Detected Above
MDCs at CAS 16-04-01, Septic Tank (3)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)		
			Benzo(a)Pyrene	Benzo(b)Fluoranthene	Bis(2-Ethylhexyl)Phthalate
Final Action Levels ^a			6,470 ^b	2,100	120,000
B01	219B001	0.0 - 0.5	--	--	28 (J)
	219B002	0.5 - 1.5	--	--	27 (J)
B02	219B003	0.0 - 0.5	24 (J)	25 (J)	29 (J)
	219B004	0.5 - 1.5	--	--	55 (J)
B03	219B005	0.0 - 0.5	--	--	60 (J)
	219B007	0.5 - 1.5	--	--	1,000
B04	219B008	0.0 - 0.5	--	--	32 (J)
	219B009	0.5 - 1.5	--	--	52 (J)
B06	219B012	0.0 - 0.5	--	--	45 (J)
	219B013	0.5 - 1.5	--	--	160 (J)
B07	219B015A	0.5 - 2.0	--	--	87 (J)
B09	219B019	7.5 - 8.0	--	--	42 (J)
B10	219B020	3.5 - 4.0	--	--	160 (J)
B12	219B022	3.0 - 3.5	--	--	83 (J)
B15	219B028	1.5 - 2.0	--	--	50 (J)
B16	219B029	1.5 - 2.0	--	--	90 (J)
B19	219B033	1.5 - 2.0	--	--	40 (J)
B20	219B035	7.5 - 8.0	--	--	57 (J)

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

^bBased on Oak Ridge National Laboratory Risk Assessment Information System (ORNL, 2006).

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

-- = Not detected above minimum detectable concentrations.

A.4.2.3 Total Petroleum Hydrocarbons

The TPH-DRO and TPH-GRO analytical results for environmental samples collected at these CASs that were detected above MDCs are presented in [Table A.4-9](#) (CAS 16-04-01), [Table A.4-10](#)

Table A.4-7
Sample Results for SVOCs Detected
Above MDCs at CAS 16-04-02, Distribution Box

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)
			Bis(2-Ethylhexyl)Phthalate
Final Action Levels ^a			120,000
C01	219C003	5.0 - 5.5	42 (J)
C03	219C005	3.5 - 4.0	170 (J)
	219C007	6.5 - 7.0	34 (J)
	219C008	6.5 - 7.0	260 (J)
C04	219C006	3.5 - 4.0	30 (J)

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

Table A.4-8
Sample Results for SVOCs Detected
Above MDCs at CAS 16-04-03, Sewer Pipes

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)
			Bis(2-Ethylhexyl)Phthalate
Final Action Levels ^a			120,000
D08	219D016	0.0 - 0.5	47 (J)
	219D017	0.5 - 1.5	30 (J)
D10	219D015	0.5 - 1.5	87 (J)

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

(CAS 16-04-02), and [Table A.4-11](#) (CAS 16-04-03). Concentrations of TPH-GRO and TPH-DRO were not detected in environmental samples at levels exceeding their PALs. Total petroleum hydrocarbons-DRO were detected at concentrations exceeding the PAL of 100 mg/kg in waste management sludge samples 219B503, 219B506, 219B507, and 219B508. Concentrations range from 240 to 2,800 mg/kg as shown in [Table A.7-1](#). Tier 2 evaluations for TPH-DRO consisted of assessing the hazardous constituents (i.e., VOCs and SVOCs) of this COPC because if left in place, the sludge is a potential source of contamination. These evaluations are addressed in [Sections A.4.2.1](#)

Table A.4-9
Sample Results for TPH-DRO and TPH-GRO Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)	
			Diesel-Range Organics	Gasoline-Range Organics
Final Action Levels ^a			100	100
B01	219B001	0.0 - 0.5	7.6 (Z)	--
	219B002	0.5 - 1.5	5.1 (J)	--
B02	219B003	0.0 - 0.5	25 (M, Z)	--
	219B004	0.5 - 1.5	9.6 (M)	--
B03	219B005	0.0 - 0.5	18 (M, Z)	--
	219B006	0.5 - 1.5	24 (M)	--
	219B007	0.5 - 1.5	9.3 (M)	--
B04	219B008	0.0 - 0.5	4.7 (J)	--
	219B009	0.5 - 1.5	3.2 (J)	--
B05	219B010	0.0 - 0.5	2.8 (J)	--
B06	219B012	0.0 - 0.5	5.2 (Z)	--
B07	219B014A	0.0 - 0.5	5.1 (Z)	--
	219B015A	0.5 - 2.0	3.4 (J)	--
B08	219B016A	0.0 - 0.5	6.3 (Z)	--
	219B017A	1.5 - 2.0	2.2 (J)	--
B10	219B020	3.5 - 4.0	--	0.24 (J)
B12	219B022	3.0 - 3.5	--	0.52 (H)
	219B023	3.0 - 3.5	4.6 (J)	--
B15	219B028	1.5 - 2.0	13 (Z)	--
	219B036	7.0 - 7.5	2.7 (J)	--

^aBased on *Nevada Administrative Code*; Contamination of soil: Establishment of action levels (NAC, 2002)

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

H = Fuel pattern in the heavier end of retention time window.

J = Estimated value.

M = A pattern resembling motor oil was detected.

Z = Result did not resemble any common TPH products.

-- = Not detected above minimum detectable concentrations.

Table A.4-10
Sample Results for TPH-GRO Detected Above
MDCs at CAS 16-04-02, Distribution Box

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)
			Gasoline-Range Organics
Final Action Levels ^a			100
C03	219C007	6.5 - 7.0	0.5 (J)

^aBased on *Nevada Administrative Code*; Contamination of soil: Establishment of action levels (NAC, 2002)

ft bgs = Feet below ground surface
mg/kg = Milligrams per kilogram
J = Estimated value.

Table A.4-11
Sample Results for TPH-DRO Detected Above
MDCs at CAS 16-04-03, Sewer Pipes
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)
			Diesel-Range Organics
Final Action Levels ^a			100
D01	219D003	0.0 - 0.5	13 (Z)
	219D004	0.5 - 1.5	12 (Z)
D02	219D008	0.0 - 0.5	10 (Z)
	219D009	0.5 - 1.0	25 (Z)
D03	219D010	0.0 - 0.5	21 (Z)
	219D011	0.5 - 2.0	16 (Z)
D04	219D022	0.0 - 0.5	13 (Z)
	219D023	0.5 - 1.5	2.1 (J)
D05	219D020	0.0 - 0.5	16 (Z)
	219D021	1.5 - 2.0	5.4 (Z)
D06	219D001	0.0 - 0.5	7.3 (Z)
	219D002	0.5 - 1.5	9.1 (Z)
D07	219D005	0.0 - 0.5	5.3 (Z)
	219D006	0.0 - 0.5	6 (Z)
	219D007	0.5 - 1.5	11 (Z)
D08	219D016	0.0 - 0.5	5.7 (Z)
	219D017	0.5 - 1.5	5.2 (J)

Table A.4-11
Sample Results for TPH-DRO Detected Above
MDCs at CAS 16-04-03, Sewer Pipes
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)
			Diesel-Range Organics
Final Action Levels ^a			100
D09	219D018	0.0 - 0.5	14 (Z)
	219D019	1.5 - 2.0	6.1 (Z)
D10	219D014	0.0 - 0.5	5.5 (Z)
	219D015	0.5 - 1.5	2.5 (J)
D11	219D012	0.0 - 0.5	2.9 (J)
	219D013	0.5 - 1.5	9.7 (Z)

^aBased on *Nevada Administrative Code*; Contamination of soil: Establishment of action levels (NAC, 2002)

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

J = Estimated value.

Z = Result did not resemble any common TPH products.

and [A.4.2.2](#). Based on the Tier 2 evaluations, the hazardous constituents of TPH-DRO did not exceed FALs; therefore, this COPC is not considered a COC. The establishment of FALs is presented in [Appendix C](#).

A.4.2.4 RCRA Metals and Beryllium

The RCRA metals and beryllium analytical results for environmental samples collected at these CASs that were detected above MDCs are presented in [Table A.4-12](#) (CAS 16-04-01), [Table A.4-13](#) (CAS 16-04-02), and [Table A.4-14](#) (CAS 16-04-03). No metals were detected at concentrations exceeding their PALs.

A.4.2.5 Polychlorinated Biphenyls

Polychlorinated biphenyls analytical results for environmental samples collected at these CASs that were detected above MDCs are presented in [Table A.4-15](#) (CAS 16-04-01). Although PCBs were not detected in environmental samples at concentrations greater than PALs, Aroclor-1260 was detected in the waste management sludge samples (219B507 and 219B508) collected from the center septic tank at CAS 16-04-01 at concentrations that exceed the PAL of 740 µg/kg. Concentrations were

Table A.4-12
Sample Results for Metals Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)							
			Arsenic	Barium	Beryllium	Chromium	Lead	Mercury	Selenium	Silver
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	800 ^b	310 ^b	5,100 ^b	5,100 ^b
B01	219B001	0.0 - 0.5	9.6	150	0.96	6.5	28	0.024 (J-)	1.3	--
	219B002	0.5 - 1.5	3.9	140	1.1	6.9	14	0.021 (J-)	--	--
B02	219B003	0.0 - 0.5	4.2	110	0.94	6.5	13	0.031 (J-)	--	--
	219B004	0.5 - 1.5	3.5	120	0.91	5.2	11	0.0076 (J-)	--	--
B03	219B005	0.0 - 0.5	4.2	99	1.2	6.2	13	0.021 (J-)	--	--
	219B006	0.5 - 1.5	4.5	130	1	6	13	0.015 (J-)	--	--
	219B007	0.5 - 1.5	3.8	110	1	7.6	16	0.014 (J-)	--	--
B04	219B008	0.0 - 0.5	3.9	95	0.96	6.8	11	0.015 (J-)	--	--
	219B009	0.5 - 1.5	4.7	120	1.1	7.7	13	0.021 (J-)	--	--
B05	219B010	0.0 - 0.5	3.9	110	0.9	6.1	12	0.019 (J-)	--	--
	219B011	0.5 - 1.5	3.8	98	0.95	6	10	0.015 (J-)	--	--
B06	219B012	0.0 - 0.5	4.5	110	1.1	7.5	15	0.025 (J-)	--	--
	219B013	0.5 - 1.5	3.8	97	0.93	5.7	8.7	0.011 (J-)	--	--
B07	219B014A	0.0 - 0.5	4.2	98	1.1	6.9	14	0.02 (J-)	--	--
	219B015A	0.5 - 2.0	4.1	110	1.1	6.8	11	0.016 (J-)	--	--
B08	219B016A	0.0 - 0.5	4.8	110	1.1	7.7	14	0.024 (J-)	--	--
	219B017A	1.5 - 2.0	4.2	120	1.1	7.4	13	0.02 (J-)	--	--
B09	219B018	7.0 - 7.5	4.6	120	1.1	7	14	0.018 (B)	--	0.1 (B)
	219B019	7.5 - 8.0	4.4	120	1.2	7.8	12	0.021 (B)	--	--
B10	219B020	3.5 - 4.0	3.8	92	0.97	6.2	9.5	0.016 (B)	--	0.081 (B)
B11	219B021	3.0 - 3.5	3.8	100	0.93	6.1	9.7	0.013 (B)	--	--
B12	219B022	3.0 - 3.5	4.1	93	0.95	5.9	9.4	0.013 (B)	0.61	--
	219B023	3.0 - 3.5	5	99	0.96	6.1	11	0.015 (B)	--	0.11 (B)
B13	219B024	7.0 - 7.5	4	120	1.2	6.3	11	0.024 (B)	--	0.093 (B)
	219B026	7.5 - 8.0	4.8	120	1.1	6.1	15	0.021 (B)	--	--
B14	219B025	7.0 - 7.5	4.2	110	1.2	6.8	11	0.026 (B)	--	0.11 (B)
	219B027	7.5 - 8.0	4.1	170	1.2	5.9	17	0.02 (B)	--	0.08 (B)

Table A.4-12
Sample Results for Metals Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)							
			Arsenic	Barium	Beryllium	Chromium	Lead	Mercury	Selenium	Silver
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	800 ^b	310 ^b	5,100 ^b	5,100 ^b
B15	219B028	1.5 - 2.0	4.5	120	0.96	6.5	14	0.036	--	--
	219B036	7.0 - 7.5	4.9	120	0.97	7	13	0.024 (B)	--	--
	219B037	7.5 - 8.0	3.9	180	0.84	6.9	27	0.043	--	--
B16	219B029	1.5 - 2.0	4.7	110	1.1	6.6	11	0.022 (J-)	--	--
B17	219B030	1.5 - 2.0	4.1	110	0.88	5.4	12	0.015 (J-)	--	--
B18	219B031	7.0 - 7.5	4	130	1	6.9	16	0.022 (J-)	--	--
	219B032	8.0 - 8.5	4.2	160	1.1	7	13	0.021 (J-)	--	--
B19	219B033	1.5 - 2.0	4.2	94	0.93	5.8	12	0.016 (J-)	--	--
B20	219B034	7.0 - 7.5	3.7	150	1	6.4	13	0.023 (J-)	--	--
	219B035	7.5 - 8.0	3.8	140	0.98	5.6	13	0.02 (J-)	--	--

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

B = Value less than the contract required detection limit, but greater than or equal to the instrument detection limit.

J- = The result is an estimated quantity, but the result may be biased low.

-- = Not detected above minimum detectable concentrations.

Table A.4-13
Sample Results for Metals Detected Above
MDCs at CAS 16-04-02, Distribution Box

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)					
			Arsenic	Barium	Beryllium	Chromium	Lead	Mercury
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	800 ^b	310 ^b
C01	219C001	3.5 - 4.0	4	84	0.79	5.2	9.4	0.012 (B)
	219C003	5.0 - 5.5	4	120	1.1	5.9	16	0.026 (B)
C02	219C002	3.5 - 4.0	5.1	97	0.89	5.9	11	0.021 (B)
	219C004	5.0 - 5.5	3.9	120	1.1	6.1	12	0.027 (B)
C03	219C005	3.5 - 4.0	4	87	0.79	5.2	9.2	0.013 (B)
	219C007	6.5 - 7.0	3.8	94	0.91	5.5	8.8	0.017 (B)
	219C008	6.5 - 7.0	4.3	120	0.89	6	19	0.014 (B)
C04	219C006	3.5 - 4.0	3.8	110	0.84	5.2	14	0.011 (B)
	219C009	6.5 - 7.0	3.9	180	0.89	5.7	13	0.013 (B)

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

B = Value less than the contract required detection limit, but greater than or equal to the instrument detection limit.

Table A.4-14
Sample Results for Metals Detected Above
MDCs at CAS 16-04-03, Sewer Pipes
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)						
			Arsenic	Barium	Beryllium	Chromium	Lead	Mercury	Selenium
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	800 ^b	310 ^b	5,100 ^b
D01	219D003	0.0 - 0.5	3.3	110	0.68	4.6	11	--	--
	219D004	0.5 - 1.5	3.5	110	0.69	5.6	12	0.0032 (J-)	--
D02	219D008	0.0 - 0.5	3.3	120	0.78	4.7	10	0.0022 (J-)	--
	219D009	0.5 - 1.0	3.4	120	0.8	6.9	12	0.004 (J-)	--
D03	219D010	0.0 - 0.5	3.8	96	0.88	6.6	12	0.013 (J-)	--
	219D011	0.5 - 2.0	4.2	110	1	8.6	15	0.013 (J-)	--
D05	219D020	0.0 - 0.5	3.4	100	0.76	5.5	13	0.0054 (J-)	--
	219D021	1.5 - 2.0	3.6	170	0.86	5.6	12	--	--

Table A.4-14
Sample Results for Metals Detected Above
MDCs at CAS 16-04-03, Sewer Pipes
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)						
			Arsenic	Barium	Beryllium	Chromium	Lead	Mercury	Selenium
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	800 ^b	310 ^b	5,100 ^b
D04	219D022	0.0 - 0.5	3.3	140	0.69	5.4	12	0.0038 (J-)	--
	219D023	0.5 - 1.5	3.3	150	0.8	5.2	9.8	0.0013 (J-)	--
D06	219D001	0.0 - 0.5	4	93	0.78	5.3	11	0.008 (J-)	--
	219D002	0.5 - 1.5	3.7	91	0.79	5.4	11	0.0074 (J-)	--
D07	219D005	0.0 - 0.5	3.4	130	0.71	4.7	11	0.0039 (J-)	--
	219D006	0.0 - 0.5	3.2	110	0.71	4.4	11	0.0024 (J-)	--
	219D007	0.5 - 1.5	3.6	140	0.7	5.5	11	0.0039 (J-)	--
D08	219D016	0.0 - 0.5	3.2	110	0.63	5.1	11	--	--
	219D017	0.5 - 1.5	3.9	120	0.81	6.8	12	--	0.39 (J+)
D09	219D018	0.0 - 0.5	5.2	120	1.2	9.5	15	0.018 (J-)	--
	219D019	1.5 - 2.0	3.5	140	0.89	6.3	12	--	0.37 (J+)
D10	219D014	0.0 - 0.5	3.8	130	0.81	6.4	13	0.0017 (J-)	--
	219D015	0.5 - 1.5	3.2	140	0.85	5.7	9.6	--	--
D11	219D012	0.0 - 0.5	3.1	180	0.71	13	16	--	--
	219D013	0.5 - 1.5	3.2	150	0.64	5.4	14	0.0041 (J-)	--

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

J+ = The result is an estimated quantity, but the result may be biased high.

J- = The result is an estimated quantity, but the result may be biased low.

-- = Not detected above minimum detectable concentrations.

1,000 µg/kg as shown in [Table A.7-1](#). A Tier 2 evaluation was conducted and a FAL of 28,800 µg/kg was established for Aroclor-1260 for an occasional use area exposure scenario. No PCBs were detected at concentrations exceeding FALs. The establishment of FALs is presented in [Appendix C](#).

A.4.2.6 Pesticides

Pesticides analytical results for environmental samples collected at these CASs that were detected above MDCs are presented in [Table A.4-16](#) (CAS 16-04-01), [Table A.4-17](#) (CAS 16-04-02), and

Table A.4-15
Sample Results for PCBs Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)
			Aroclor-1260
Final Action Levels ^a			28,800
B15	219B028	1.5 - 2.0	30 (J)

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface
µg/kg = Micrograms per kilogram
J = Estimated value.

Table A.4-18 (CAS 16-04-03). Five environmental samples collected from the surface and near-surface soils at CAS 16-04-03 (locations D02, D03, and D05) exceeded the PAL of 6,500 µg/kg for chlordane with concentrations ranging from 8,100 to 34,000 µg/kg. One waste management sludge sample (219B503) collected from the center septic tank at CAS 16-04-01 exceeded the PAL with a concentration of 9,100 µg/kg as shown in **Table A.7-1**. A Tier 2 evaluation was completed, and a FAL of 185,000 was established for chlordane; therefore, this constituent is not considered to be a COC.

Table A.4-16
Sample Results for Pesticides Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3) (Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)			
			4,4'-DDD	4,4'-DDE	4,4'-DDT	Chlordane
Final Action Levels ^a			10,000	7,000	7,000	185,000 ^b
B01	219B001	0.0 - 0.5	--	25 (J)	21 (J)	58 (J)
	219B002	0.5 - 1.5	11 (J)	39 (J)	47 (J)	82 (J)
B02	219B003	0.0 - 0.5	--	270 (J)	160 (J)	680 (J)
	219B004	0.5 - 1.5	32 (J)	170 (J)	160 (J)	470 (J)
B03	219B005	0.0 - 0.5	--	16 (J)	20 (J)	50 (J)
	219B006	0.5 - 1.5	--	25 (J)	42 (J)	95 (J)
	219B007	0.5 - 1.5	--	38 (J)	65 (J)	150 (J)
B04	219B008	0.0 - 0.5	--	14 (J)	16 (J)	32 (J)

Table A.4-16
Sample Results for Pesticides Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3) (Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)			
			4,4'-DDD	4,4'-DDE	4,4'-DDT	Chlordane
Final Action Levels ^a			10,000	7,000	7,000	185,000 ^b
B05	219B011	0.5 - 1.5	--	21 (J)	23 (J)	44 (J)
B06	219B012	0.0 - 0.5	--	7.6 (J)	--	31 (J)
B09	219B018	7.0 - 7.5	--	1.3 (J)	2 (J)	--
	219B019	7.5 - 8.0	--	0.7 (J)	1.9 (J)	--
B10	219B020	3.5 - 4.0	--	6.3	5.7 (J)	12 (J)
B11	219B021	3.0 - 3.5	0.95 (J)	22 (J)	18 (J)	35 (J)
B12	219B022	3.0 - 3.5	--	4.2	2.2 (J)	6.4 (J)
	219B023	3.0 - 3.5	--	4.1	2.2 (J)	7.6 (J)
B13	219B024	7.0 - 7.5	--	8.5	3.8 (J)	14 (J)
B14	219B025	7.0 - 7.5	--	0.71 (J)	--	--
B13	219B026	7.5 - 8.0	--	27	19	28 (J)
B14	219B027	7.5 - 8.0	0.64 (J)	9.2 (J)	6.7 (J)	15 (J)
B15	219B028	1.5 - 2.0	67 (J)	85 (J)	420 (J)	170 (J)
	219B036	7.0 - 7.5	6.9 (J)	1.7 (J)	2.9 (J)	9.1 (J)
B17	219B030	1.5 - 2.0	--	450 (J)	83 (J)	2,100 (J)
B19	219B033	1.5 - 2.0	--	1.5 (J)	2.6 (J)	--

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

^bBased on Oak Ridge National Laboratory Risk Assessment Information System (ORNL, 2006).

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

-- = Not detected above minimum detectable concentrations.

A.4.2.7 Gamma-Emitting Radionuclides

Gamma-emitting radionuclides analytical results for environmental samples collected at these CASs that were detected above MDCs are presented in [Table A.4-19](#), [Table A.4-20](#), and [Table A.4-21](#). No radionuclides were detected at concentrations exceeding the PALs.

Table A.4-17
Sample Results for Pesticides Detected Above
MDCs at CAS 16-04-02, Distribution Box

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (μg/kg)					
			4,4'-DDD	4,4'-DDE	4,4'-DDT	Chlordane	Delta-BHC	Endosulfan
Final Action Levels ^a			10,000	7,000	7,000	185,000 ^b	360	3,700,000
C01	219C001	3.5 - 4.0	--	63 (J)	29 (J)	120 (J)	--	--
	219C003	5.0 - 5.5	4.2 (J)	81 (J)	67 (J)	150 (J)	--	--
C02	219C002	3.5 - 4.0	--	86 (J)	48 (J)	130 (J)	--	--
	219C004	5.0 - 5.5	--	63 (J)	43 (J)	83 (J)	--	--
C03	219C005	3.5 - 4.0	--	49 (J)	28 (J)	100 (J)	--	--
	219C007	6.5 - 7.0	--	40	24	71	3.4 (J)	1.1 (J)
	219C008	6.5 - 7.0	0.86 (J)	42	26	70	0.58 (J)	2.6 (J)
C04	219C006	3.5 - 4.0	7 (J)	170 (J)	130 (J)	300 (J)	--	--
	219C009	6.5 - 7.0	--	9	6.3	14 (J)	1.4 (J)	--

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

^bBased on Oak Ridge National Laboratory Risk Assessment Information System (ORNL, 2006).

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

-- = Not detected above minimum detectable concentrations.

Table A.4-18
Sample Results for Pesticides Detected Above MDCs at CAS 16-04-03, Sewer Pipes
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)							
			4,4'-DDD	4,4'-DDE	4,4'-DDT	Chlordane	Endosulfan II	Endosulfan Sulfate	Heptachlor	Heptachlor Epoxide
Final Action Levels ^a			10,000	7,000	7,000	185,000 ^b	3,700,000	3,700,000	380	190
D01	219D003	0.0 - 0.5	270 (J)	1,900 (J)	280 (J)	3,200 (J)	--	--	--	--
	219D004	0.5 - 1.5	330 (J)	2,100 (J)	500 (J)	3,600 (J)	--	--	42 (J)	--
D02	219D008	0.0 - 0.5	--	980 (J)	270 (J)	8,900 (J)	--	--	--	31 (J)
	219D009	0.5 - 1.0	2,100 (J)	4,000 (J)	2,100 (J)	34,000 (J)	--	--	--	--

Table A.4-18
Sample Results for Pesticides Detected Above MDCs at CAS 16-04-03, Sewer Pipes
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)							
			4,4'-DDD	4,4'-DDE	4,4'-DDT	Chlordane	Endosulfan II	Endosulfan Sulfate	Heptachlor	Heptachlor Epoxide
Final Action Levels ^a			10,000	7,000	7,000	185,000 ^b	3,700,000	3,700,000	380	190
D03	219D010	0.0 - 0.5	--	2,000 (J)	550 (J)	8,100 (J)	--	--	--	--
	219D011	0.5 - 2.0	520 (J)	2,100 (J)	640 (J)	8,100 (J)	--	--	--	--
D04	219D022	0.0 - 0.5	25 (J)	280 (J)	18 (J)	1,100 (J)	--	--	--	--
	219D023	0.5 - 1.5	--	340 (J)	210 (J)	1,500 (J)	--	--	--	--
D05	219D020	0.0 - 0.5	--	4,100 (J)	890 (J)	19,000 (J)	--	--	--	--
	219D021	1.5 - 2.0	56 (J)	430 (J)	42 (J)	2,300 (J)	--	--	--	--
D06	219D001	0.0 - 0.5	--	20 (J)	13 (J)	430 (J)	--	3 (J)	--	5.2 (J)
	219D002	0.5 - 1.5	--	33	21 (J)	350	--	--	--	6.7 (J)
D07	219D005	0.0 - 0.5	550 (J)	1,000 (J)	2,200 (J)	220 (J)	--	--	--	--
	219D006	0.0 - 0.5	480 (J)	950 (J)	1,500 (J)	190 (J)	--	--	--	--
	219D007	0.5 - 1.5	350 (J)	1,200 (J)	3,200 (J)	220 (J)	--	--	--	--
D08	219D016	0.0 - 0.5	--	8.1 (J)	2.5 (J)	25 (J)	--	0.65 (J)	--	--
	219D017	0.5 - 1.5	--	11 (J)	3.3 (J)	23 (J)	--	2.5 (J)	--	--
D09	219D018	0.0 - 0.5	420 (J)	3,500 (J)	340 (J)	290 (J)	--	--	--	--
	219D019	1.5 - 2.0	95 (J)	710 (J)	66 (J)	--	--	--	--	--
D10	219D014	0.0 - 0.5	10 (J)	180 (J)	7.9 (J)	--	--	--	--	--
	219D015	0.5 - 1.5	--	14	1.8	4.3 (J)	--	--	--	--
D11	219D012	0.0 - 0.5	--	30	8.3 (J)	19 (J)	--	--	--	--
	219D013	0.5 - 1.5	32 (J)	330 (J)	40 (J)	150 (J)	33 (J)	--	--	--

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

^bBased on Oak Ridge National Laboratory Risk Assessment Information System (ORNL, 2006).

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

-- = Not detected above minimum detectable concentrations.

Table A.4-19
Sample Results for Gamma-Emitting Radionuclides
Detected Above MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)											
			Actinium-228		Bismuth-212		Bismuth-214		Lead-212		Lead-214		Thallium-208	
Final Action Levels ^a			5	15	5	15	5	15	5	15	5	15	5	15
Depth bgs (cm)			<15	>15	<15	>15	<15	>15	<15	>15	<15	>15	<15	>15
B01	219B001	0.0 - 0.5	1.99 (G)	N/A	--	N/A	0.9 (G, J)	N/A	1.6 (J)	N/A	1.12 (G, J)	N/A	0.39 (G)	N/A
	219B002	0.5 - 1.5	N/A	1.87	N/A	--	N/A	1.08 (J)	N/A	1.88	N/A	1.25 (J)	N/A	0.5
B02	219B003	0.0 - 0.5	--	N/A	--	N/A	0.94 (G, J)	N/A	1.65 (J)	N/A	0.97 (G, J)	N/A	0.55 (G)	N/A
	219B004	0.5 - 1.5	N/A	2.19	N/A	--	N/A	1.15 (J)	N/A	1.4	N/A	1.3 (J)	N/A	0.65
B03	219B005	0.0 - 0.5	1.56 (G)	N/A	--	N/A	1.11	N/A	1.63 (J)	N/A	1.11 (G, J)	N/A	0.53 (G)	N/A
	219B006	0.5 - 1.5	N/A	1.92	N/A	--	N/A	0.74 (J)	N/A	1.81	N/A	0.93 (J)	N/A	0.52
	219B007	0.5 - 1.5	N/A	--	N/A	--	N/A	1.17 (J)	N/A	1.88	N/A	0.92 (J)	N/A	0.52
B04	219B008	0.0 - 0.5	1.37	N/A	--	N/A	1.04 (J)	N/A	1.4	N/A	1.07 (J)	N/A	0.68	N/A
	219B009	0.5 - 1.5	N/A	1.96	N/A	--	N/A	0.97 (J)	N/A	2.29	N/A	1.41 (J)	N/A	0.62
B05	219B010	0.0 - 0.5	1.53 (G)	N/A	--	N/A	1.04 (G, J)	N/A	1.5 (J)	N/A	1.11 (G, J)	N/A	0.51 (G)	N/A
	219B011	0.5 - 1.5	N/A	1.63	N/A	5.3 (TI)	N/A	0.99 (J)	N/A	1.45	N/A	0.98 (J)	N/A	0.81
B06	219B012	0.0 - 0.5	1.7 (G)	N/A	--	N/A	1.11 (G, J)	N/A	1.62 (J)	N/A	1.07 (G, J)	N/A	0.54 (G)	N/A
	219B013	0.5 - 1.5	N/A	1.62	N/A	--	N/A	0.93 (J)	N/A	2.06	N/A	1.08 (J)	N/A	0.48
B07	219B014	0.0 - 0.5	1.81 (G)	N/A	--	N/A	--	N/A	2.04 (J)	N/A	1.11 (G, J)	N/A	0.51 (G)	N/A
	219B015	0.5 - 1.5	N/A	--	N/A	--	N/A	1.2 (G, J)	N/A	1.48 (J)	N/A	1.16 (G, J)	N/A	0.8 (G)
B08	219B016	0.0 - 0.5	2.09 (G)	N/A	--	N/A	0.78 (G, J)	N/A	2 (J)	N/A	1.13 (G, J)	N/A	0.46 (G)	N/A
	219B017	0.5 - 1.5	N/A	2 (G, TI)	N/A	--	N/A	1.27 (G, J)	N/A	2.19 (J)	N/A	0.8 (G, J)	N/A	--
B09	219B018	7.0 - 7.5	N/A	1.87 (G)	N/A	--	N/A	1.44 (G, J)	N/A	1.87 (J)	N/A	1.34 (G, J)	N/A	0.81 (G)
	219B019	7.5 - 8.0	N/A	--	N/A	--	N/A	0.99 (G, J)	N/A	1.87 (J)	N/A	0.91 (G, J)	N/A	0.6 (G)
B10	219B020	3.5 - 4.0	N/A	2.11 (G)	N/A	--	N/A	--	N/A	1.64 (J)	N/A	1.04 (G, J)	N/A	0.89 (G)
B11	219B021	3.0 - 3.5	N/A	1.82 (G)	N/A	--	N/A	--	N/A	1.79 (J)	N/A	1.01 (G, J)	N/A	0.8 (G)
B12	219B022	3.0 - 3.5	N/A	1.73 (G, TI)	N/A	--	N/A	0.96 (G, J)	N/A	2.03 (J)	N/A	0.97 (G, J)	N/A	0.56 (G)
	219B023	3.0 - 3.5	N/A	1.99 (G)	N/A	--	N/A	0.98 (G, J)	N/A	1.44 (J)	N/A	1.19 (G, J)	N/A	0.62 (G)
B13	219B024	7.0 - 7.5	N/A	1.85 (G)	N/A	--	N/A	--	N/A	1.84 (J)	N/A	--	N/A	--
	219B026	7.5 - 8.0	N/A	--	N/A	--	N/A	--	N/A	1.96 (J)	N/A	1.2 (G, J)	N/A	0.51 (G)

Table A.4-19
Sample Results for Gamma-Emitting Radionuclides
Detected Above MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)											
			Actinium-228		Bismuth-212		Bismuth-214		Lead-212		Lead-214		Thallium-208	
Final Action Levels ^a			5	15	5	15	5	15	5	15	5	15	5	15
Depth bgs (cm)			<15	>15	<15	>15	<15	>15	<15	>15	<15	>15	<15	>15
B14	219B025	7.0 - 7.5	N/A	2.27 (G)	N/A	--	N/A	1.26 (G, J)	N/A	1.64 (J)	N/A	1.32 (G, J)	N/A	0.49 (G)
	219B027	7.5 - 8.0	N/A	--	N/A	--	N/A	--	N/A	1.78 (J)	N/A	1.12 (G, J)	N/A	--
B15	219B028	1.5 - 2.0	N/A	--	N/A	--	N/A	1.04 (G, J)	N/A	1.81 (J)	N/A	0.87 (G, J)	N/A	--
	219B036	7.0 - 7.5	N/A	2.25 (G)	N/A	--	N/A	--	N/A	2.11 (J)	N/A	1.1 (G, J)	N/A	0.74 (G)
	219B037	7.5 - 8.0	N/A	2.04 (G)	N/A	--	N/A	--	N/A	1.75 (J)	N/A	1.04 (G, J)	N/A	0.55 (G)
B16	219B029	1.5 - 2.0	N/A	2.08 (G)	N/A	--	N/A	1.14 (G, J)	N/A	1.63 (J)	N/A	1.08 (G, J)	N/A	0.72 (G)
B17	219B030	1.5 - 2.0	N/A	1.87 (G)	N/A	--	N/A	--	N/A	1.92 (J)	N/A	1.19 (G, J)	N/A	0.69 (G)
B18	219B031	7.0 - 7.5	N/A	--	N/A	--	N/A	1.35 (G, J)	N/A	1.94 (J)	N/A	1.44 (G, J)	N/A	--
	219B032	8.0 - 8.5	N/A	2.31 (G)	N/A	--	N/A	1.12 (G, J)	N/A	1.75 (J)	N/A	0.93 (G, J)	N/A	0.54 (G)
B19	219B033	1.5 - 2.0	N/A	--	N/A	--	N/A	--	N/A	2.23 (J)	N/A	0.89 (G, J)	N/A	0.58 (G)
B20	219B034	7.0 - 7.5	N/A	1.94 (G)	N/A	--	N/A	--	N/A	1.77 (J)	N/A	0.99 (G, J)	N/A	0.62 (G)
	219B035	7.5 - 8.0	N/A	1.96 (G, TI)	N/A	--	N/A	1.12 (G, J)	N/A	1.88 (J)	N/A	0.89 (G, J)	N/A	0.62 (G)

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, thallium-208, and thorium-232, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes are specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

ft bgs = Feet below ground surface

cm = Centimeter

N/A - Not applicable

pCi/g = Picocuries per gram

-- = Not detected above minimum detectable concentrations

< = Less than

> = Greater than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

TI = Nuclide identification is tentative.

Table A.4-20
Sample Results for Gamma-Emitting Radionuclides Detected
Above MDCs at CAS 16-04-02, Distribution Box

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)				
			Actinium-228	Bismuth-214	Lead-212	Lead-214	Thallium-208
Final Action Levels ^a			15	15	15	15	15
Depth bgs (cm)			>15	>15	>15	>15	>15
C01	219C001	3.5 - 4.0	1.77 (G)	--	1.74 (J)	0.94 (G, J)	0.63 (G)
	219C003	5.0 - 5.5	--	1.24 (G, J)	1.87 (J)	1.13 (G, J)	0.7 (G)
C02	219C002	3.5 - 4.0	1.98 (G)	--	1.89 (J)	1.06 (G, J)	--
	219C004	5.0 - 5.5	--	--	1.74 (J)	1.01 (G, J)	--
C03	219C005	3.5 - 4.0	1.65 (G)	1.19 (G, J)	1.8 (J)	0.97 (G, J)	--
	219C007	6.5 - 7.0	--	--	1.97 (J)	1.36 (G, J)	--
	219C008	6.5 - 7.0	1.96 (G)	1.1 (G, J)	1.62 (J)	1.43 (G, J)	0.74 (G)
C04	219C006	3.5 - 4.0	--	1.15 (G, J)	1.59 (J)	1.28 (G, J)	0.51 (G)
	219C009	6.5 - 7.0	--	1.24 (G, J)	1.75 (J)	1.35 (G, J)	0.62 (G)

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, thallium-208, and thorium-232, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes are specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

cm = Centimeter

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

-- = Not detected above minimum detectable concentrations

> = Greater than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

A.4.3 Nature and Extent of Contamination

Based on the analytical results for soil samples collected at CASs 16-04-01, 16-04-02, 16-04-03; no COCs were identified. As no VOCs, metals, or gamma-emitting radionuclides were detected above PALs, the additive effects of multiple contaminants were not assessed for these constituents. An MCA was not conducted for the benzo(a)pyrene, TPH-DRO, Aroclor-1260, and chlordane concentrations identified in the sludge of the center septic tank at CAS 16-04-01 because these constituents were addressed as part of the closure activities conducted at the site. An MCA was not conducted for chlordane because it was the only toxic constituent identified in the surface and near surface soils at this CAS that exceeded PALs. The requirements for Decision I have been met.

Table A.4-21
Samples Results for Gamma-Emitting Radionuclides Detected
Above MDCs at CAS 16-04-03, Sewer Pipes
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)									
			Actinium-228		Bismuth-214		Lead-212		Lead-214		Thallium-208	
Final Action Levels ^a			5	15	5	15	5	15	5	15	5	15
Depth bgs (cm)			<15	>15	<15	>15	<15	>15	<15	>15	<15	>15
D01	219D003	0.0 - 0.5	2.54 (G)	N/A	--	N/A	1.72 (J)	N/A	1.09 (G, J)	N/A	--	N/A
	219D004	0.5 - 1.5	N/A	2.23 (G)	N/A	1.13 (G, J)	N/A	2.14 (J)	N/A	1.09 (G, J)	NA	0.54 (G)
D02	219D008	0.0 - 0.5	1.86 (G)	N/A	0.78 (G, J)	N/A	1.7 (J)	N/A	1.06 (G, J)	N/A	0.44 (G)	N/A
	219D009	0.5 - 1.0	N/A	1.89 (G)	N/A	1.15 (G, J)	N/A	1.66 (J)	N/A	1.04 (G, J)	N/A	0.5 (G)
D03	219D010	0.0 - 0.5	--	N/A	--	N/A	2.1 (J)	N/A	1.25 (G, J)	N/A	0.75 (G)	N/A
	219D011	0.5 - 2.0	N/A	2.04 (G)	N/A	--	N/A	2.16 (J)	N/A	1.35 (G, J)	N/A	0.78 (G)
D05	219D020	0.0 - 0.5	2.38 (G)	N/A	1.06 (G, J)	N/A	1.7 (J)	N/A	1.06 (G, J)	N/A	--	N/A
	219D021	1.5 - 2.0	N/A	1.74 (G)	N/A	1.03 (G, J)	N/A	1.49 (J)	N/A	1.22 (G, J)	N/A	0.58 (G)
D04	219D022	0.0 - 0.5	1.9 (G)	N/A	0.85 (G, J)	N/A	1.77 (J)	N/A	0.98 (G, J)	N/A	0.5 (G)	N/A
	219D023	0.5 - 1.5	N/A	1.89 (G)	N/A	0.96 (G, J)	N/A	1.74 (J)	N/A	1.04 (G, J)	N/A	0.72 (G)
D06	219D001	0.0 - 0.5	--	N/A	0.89 (G, J)	N/A	2.23 (J)	N/A	1.08 (G, J)	N/A	0.61 (G)	N/A
	219D002	0.5 - 1.5	N/A	1.82 (G)	N/A	0.82 (G, J)	N/A	1.98 (J)	N/A	1.12 (G, J)	N/A	0.57 (G)
D07	219D005	0.0 - 0.5	1.64	N/A	0.92 (J)	N/A	2.09	N/A	0.86 (J)	N/A	0.57	N/A
	219D006	0.0 - 0.5	--	NA	0.93 (J)	N/A	1.99	N/A	0.93 (J)	NA	0.59	N/A
	219D007	0.5 - 1.5	N/A	2.01 (G)	N/A	0.95 (G, J)	N/A	1.87 (J)	N/A	1.33 (G, J)	N/A	0.72 (G)
D08	219D016	0.0 - 0.5	1.39	N/A	1.07 (J)	N/A	1.8	N/A	1.17 (J)	N/A	0.51	N/A
	219D017	0.5 - 1.5	N/A	2.18	N/A	--	N/A	1.62	N/A	0.94 (J)	N/A	0.51
D09	219D018	0.0 - 0.5	2.71 (G)	N/A	--	N/A	1.72 (J)	N/A	0.89 (G, J)	N/A	0.69 (G)	N/A
	219D019	1.5 - 2.0	N/A	1.88 (G)	N/A	--	N/A	1.54 (J)	N/A	0.99 (G, J)	N/A	0.53 (G)

Table A.4-21
Samples Results for Gamma-Emitting Radionuclides Detected
Above MDCs at CAS 16-04-03, Sewer Pipes
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)									
			Actinium-228		Bismuth-214		Lead-212		Lead-214		Thallium-208	
Final Action Levels ^a			5	15	5	15	5	15	5	15	5	15
Depth bgs (cm)			<15	>15	<15	>15	<15	>15	<15	>15	<15	>15
D10	219D014	0.0 - 0.5	1.71 (G)	N/A	1.03 (G, J)	N/A	1.8 (J)	N/A	1.06 (G, J)	N/A	0.54 (G)	N/A
	219D015	0.5 - 1.5	N/A	--	N/A	--	N/A	1.93 (J)	N/A	1.01 (G, J)	N/A	0.48 (G)
D11	219D012	0.0 - 0.5	1.75 (G)	N/A	0.98 (G, J)	N/A	2.09 (J)	N/A	1.04 (G, J)	N/A	0.56 (G)	N/A
	219D013	0.5 - 1.5	N/A	1.77	N/A	0.92 (J)	N/A	2.06	N/A	0.97 (J)	NA	0.58

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, thallium-208, and thorium-232, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes are specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

ft bgs = Feet below ground surface

cm = Centimeter

N/A = Not applicable

pCi/g = Picocuries per gram

-- = Not detected above minimum detectable concentrations

< = Less than

> = Greater than

G = Sample density differs by more than 15% of laboratory control sample density.

J = Estimated value.

A.4.4 Revised Conceptual Site Model

The CAIP requirements were met at this CAS, and no revisions were necessary to the CSM.

A.5.0 CAS 23-20-01, DNA Motor Pool Sewage and Waste System

Corrective Action Site 23-20-01 is located in Area 23 at the eastern edge of Mercury. The CAS is an interconnected sewage and waste system at the former DNA Motor Pool, Building 210. The system is comprised of two grease pits, a catch basin, a floor drain, a sand trap, an oil interceptor, a sump, and the associated piping. In addition to the sewage and waste system, the site consists of the main concrete pad and surrounding impacted soil, a decontamination pad, and a metal battery storage shed. Most of the site at CAS 23-20-01 is enclosed by fencing and covered with asphalt. Inside the perimeter, there is a large concrete pad, a much smaller decontamination pad, and a metal battery shed. The soil surrounding the large pad ranges from 4 to 6 in. deep, extends up to 12 ft out from the pad, and is underlain with asphalt. The decontamination pad and metal battery shed are located just north of and adjacent to the main pad. Three manholes lying to the west of the main concrete pad mark the main line of the waste and sewage system. The northern most manhole lies outside of the fencing and marks the junction of the system with the Building 211 system. The southern most manhole lies just south of the main pad and marks the junction with the sewage pipes exiting the bathroom. The central manhole lies beside the northern end of the main pad and marks the junction with the waste line from the main pad.

The waste line from the main pad is linked to four collection features. Located inside the northwest section of the main pad are two elongated grease pits that had previously been filled with soil, gravel, and debris. The two pits are 27 by 3 ft, lie parallel to each other, and have drains at the eastern ends that connect to the waste line. Further down the waste line located inside the northeastern section of the main pad are a 6-by-6 in. floor drain and a catch basin. A concrete box (approximately 64 by 34 in.) was located inside the catch basin and had previously been covered with concrete. Asbestos-containing floor tiles are also attached to the main concrete pad in two southern areas.

Although not marked by a manhole, another waste line flows to the main line from the decontamination pad. An oil interceptor is located on this line between the main line and the decontamination pad. The line continues to and ends at the sand trap located inside of the decontamination pad. Both the oil interceptor and sand trap are 5.5 by 5.5 ft and had previously been filled with concrete. A 10-by-10 in. access port to the sump beneath the decontamination pad was

also identified at the southern edge of the decontamination pad. [Figure A.5-1](#) depicts the sewage and waste system and the associated concrete pads. All of these components were identified in the CAIP for investigation. Additional detail is provided in the CAU 219 CAIP (NNSA/NSO, 2005).

A.5.1 Corrective Action Investigation

A total of 26 environmental samples (including two FDs) were collected during investigation activities at CAS 23-20-01. The verification samples were collected from locations surrounding the large concrete pad after the corrective action was completed. The sample IDs, locations, types, and analyses are listed in [Table A.5-1](#). The specific CAI activities conducted to satisfy the CAIP requirements at this CAS are described in the following sections.

A.5.1.1 Field Screening

Investigation samples were field screened for VOCs, TPH, total alpha and beta/gamma radiation, and gamma-emitting radionuclides. The FSRs were compared to FSLs to guide subsequent sampling decisions where appropriate. The VOC head space FSLs were exceeded for one sample. None of the TPH samples exceeded the FSL. Gross alpha radiation FSLs were exceeded in just two samples whereas total beta/gamma radiation FSLs were exceeded for eight samples. The sludge sample collected from the catch basin at this CAS was screened for gamma-emitting radionuclides using the on-site gamma spectrometer at Building 23-153. The FSRs for this sample were compared to the FSLs, and no exceedances were observed. All samples with FSRs greater than FSLs were sent for analysis to an off-site laboratory.

A.5.1.2 Visual Inspections

A walkover was conducted around the concrete pads to identify additional sample locations based on biasing factors (i.e., staining). A scabble sample was collected at location E07 from the concrete due to a stain identified on the decontamination pad during the visual inspection.

During the CAI, debris and fill material were removed from the grease pits at the CAS to collect samples from the bottom of the features. The fill material consisted of soil, asphalt, and wood debris. Subsequent visual inspections of the grease pits indicated that residual debris was still present in the CAS features.

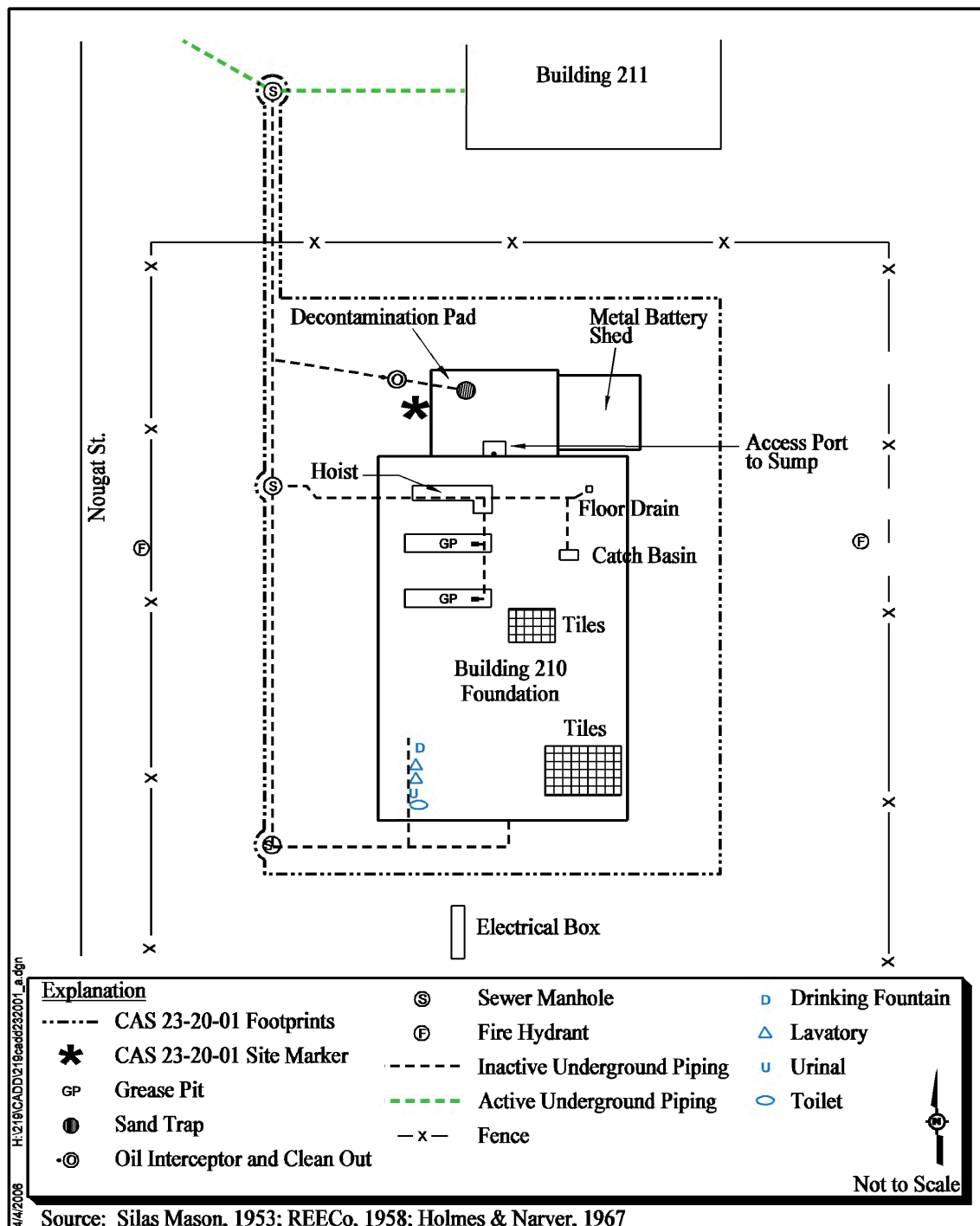


Figure A.5-1
CAS 23-20-01, DNA Motor Pool Sewage and Waste System

Table A.5-1
Samples Collected at CAS 23-20-01,
DNA Motor Pool Sewage and Waste Systems
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Sample Matrix	Purpose	Analyses
E01	219E001	0.0 - 0.5	Soil	Environmental	Set 1
E02	219E007	0.0 - 0.5	Soil	Environmental, MS/MSD	Set 1
E03	219E002	0.0 - 0.5	Soil	Environmental	Set 1
E04	219E005	0.0 - 0.5	Soil	Environmental	Set 1
	219E006	0.0 - 0.5	Soil	Field Duplicate of #219E005	Set 1
E05	219E004	0.0 - 0.5	Soil	Environmental	Set 1
E06	219E003	0.0 - 0.5	Soil	Environmental	Set 1
E08	219E009	6.0 - 6.5	Soil	Environmental	Set 3
	219E008	6.5 - 7.0	Soil	Environmental	Set 6
E09	219E011	5.5 - 6.0	Soil	Environmental	Set 6
E10	219E012	2.5 - 3.0	Soil	Environmental	Set 1
	219E013	2.5 - 3.0	Soil	Field Duplicate of #219E012	Set 1
E11	219E010	2.5 - 3.0	Soil	Environmental, MS/MSD	Set 1
E12	219E014	5.5 - 6.0	Soil	Environmental	Set 6
E13	219E017	6.0 - 6.5	Soil	Environmental	Set 6
	219E018	8.0 - 8.5	Soil	Environmental	Set 6
E14	219E015	6.5 - 7.0	Soil	Environmental	Set 6
	219E016	8.5 - 9.0	Soil	Environmental	Set 6
E15	219E019	0.0 - 0.5	Soil	Environmental	Set 4
E16	219E020	0.0 - 0.5	Soil	Environmental	Set 4
E17	219E021	0.0 - 0.5	Soil	Environmental	Set 4
E18	219E022	0.0 - 0.5	Soil	Environmental	Set 4
E19	219E023	0.0 - 0.5	Soil	Environmental	Set 4
E20	219E024	0.0 - 0.5	Soil	Environmental	Set 4
E21	219E025	0.0 - 0.5	Soil	Environmental	Set 4
E22	219E026	0.0 - 0.5	Soil	Environmental	Set 4
E26	219E027	0.0 - 0.5	Soil	Environmental	PCBs and Chlordane
E27	219E028	0.0 - 0.5	Soil	Environmental	PCBs and Chlordane
E28	219E029	0.0 - 0.5	Soil	Environmental	PCBs and Chlordane
N/A	219E301	N/A	Water	Trip Blank	VOCs

Table A.5-1
Samples Collected at CAS 23-20-01,
DNA Motor Pool Sewage and Waste Systems
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Sample Matrix	Purpose	Analyses
N/A	219E302	N/A	Water	Trip Blank	VOCs
N/A	219E303	N/A	Water	Source Blank	Set 6
N/A	219E304	N/A	Water	Trip Blank	VOCs
N/A	219E305	N/A	Water	Field Blank	Set 6
N/A	219E306	N/A	Water	Trip Blank	VOCs
N/A	219E307	N/A	Water	Trip Blank	VOCs
N/A	219E308	N/A	Water	Trip Blank	VOCs
E07	219E501	N/A	Concrete	Waste Management	Set 7
E09	219E502	1.0 - 1.5	Sludge	Waste Management	Set 7
NE Pile	219E503	N/A	Soil	Waste Management	Set 7
NW Pile	219E504	N/A	Soil	Waste Management	Set 7
SE Pile	219E505	N/A	Soil	Waste Management	Set 2
SW Pile	219E506	N/A	Soil	Waste Management	Set 2
E23	219E901	0.0 - 0.5	Asphalt	Background	Set 5
E24	219E902	0.0 - 0.5	Asphalt	Background	Set 5
E25	219E903	0.0 - 0.5	Asphalt	Background	Set 5

Set 1 = VOCs, SVOCs, RCRA metals, beryllium, lithium, nickel, TPH-DRO and TPH-GRO, PCBs, pesticides, ethylene glycol, and gamma spectroscopy

Set 2 = VOCs, SVOCs, RCRA metals, beryllium, lithium, nickel, TPH-DRO and TPH-GRO, PCBs, pesticides, ethylene glycol, gamma spectroscopy, TCLP VOCs, TCLP SVOCs, and TCLP RCRA metals

Set 3 = VOCs, SVOCs, RCRA metals, beryllium, lithium, nickel, TPH-DRO and TPH-GRO, PCBs, and ethylene glycol

Set 4 = PCBs, pesticides, and TCLP pesticides

Set 5 = SVOCs only

Set 6 = VOCs, SVOCs, RCRA metals, beryllium, lithium, nickel, TPH-DRO and TPH-GRO, PCBs, ethylene glycol, and gamma spectroscopy

Set 7 = VOCs, SVOCs, RCRA metals, beryllium, lithium, nickel, TPH-DRO and TPH-GRO, PCBs, pesticides, ethylene glycol, gamma spectroscopy, TCLP VOCs, TCLP SVOCs, and TCLP RCRA metals

ft bgs = Feet below ground surface

MS/MSD = Matrix spike/matrix spike duplicate

N/A = Not applicable

PCB = Polychlorinated biphenyl

RCRA = *Resource Conservation and Recovery Act*

SVOC = Semivolatile organic compound

TCLP = Toxicity Characteristic Leaching Procedure

TPH-DRO = Total petroleum hydrocarbons, diesel-range organics

TPH-GRO = Total petroleum hydrocarbons, gasoline-range organics

VOC = Volatile organic compound

A.5.1.3 Video Surveys

Video-mole surveys were conducted on most of the piping in the system. No breaches were found.

The main pipe exiting the site is partially blocked by what appears to be mineral deposits. However,

the main pipe was not grouted at its junction with the main pipe from Building 211 system, and the two systems remained integrated. Because the sand trap and oil interceptor had been previously filled with concrete, these features could not be inspected with the video mole.

A.5.1.4 Debris Removal

Debris/fill (i.e., asphalt, gravel, soil, wood) in the grease pits was removed and disposed of as a BMP for this CAS. The debris was removed from the grease pits to access the floor of the features to collect soil samples. Before disposal, the debris was surveyed and sampled to support waste disposal decisions. The results of waste characterization activities are presented in [Section A.7.0](#).

A.5.1.5 Sample Collection

Decision I environmental sampling activities included the collection of biased and random surface and subsurface soil samples surrounding the concrete pads and beneath the collection features ([Figure A.5-2](#)). Six biased surface soil samples (locations E01, E02, E03, E04, E05, and E06) were collected along the perimeters of the main pad and decontamination pad to account for any potential runoff. Subsurface soil samples were collected beneath the grease pits (locations E13 and E14), the catch basin (location E09), the floor drain (location E10), the sand trap (location E08), and the oil interceptor (location E12) to account for any potential leakage. A subsurface soil sample was also collected from inside the access port to the sump (location E11) to account for any potential waste disposal.

Additional environmental samples were collected from the surface soil surrounding the main concrete pad. Due to elevated concentrations of PCBs in the surface soil samples collected at location E04 and the fact that the CSM could not account for its presence, eight new locations around the perimeter (locations E15, E16, E17, E18, E19, E20, E21, and E22) were randomly selected and sampled for PCBs, pesticides, and TCLP pesticides. These eight locations were randomly plotted in a grid around the main pad using *Visual Sample Plan* software (PNNL, 2002) ([Figure A.5-3](#)). In addition, surface asphalt samples were collected from three locations east of the pad (locations E23, E24, and E25) to account for any background SVOCs.

Surface soil samples were collected at three locations at this CAS to verify that all of the PCB- and chlordane-contaminated soil surrounding the large concrete pad was removed during the corrective

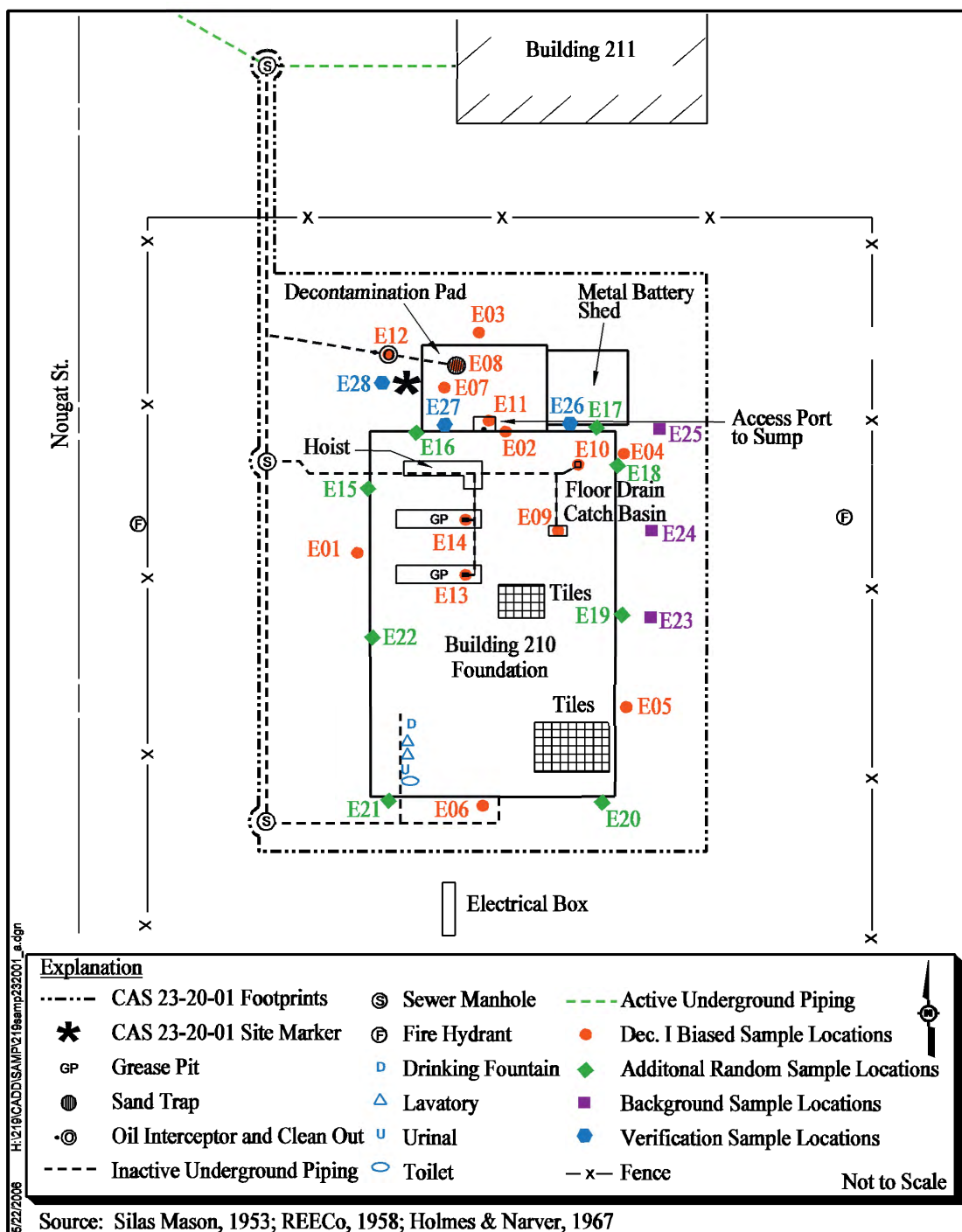


Figure A.5-2
CAS 23-20-01 Sample Locations

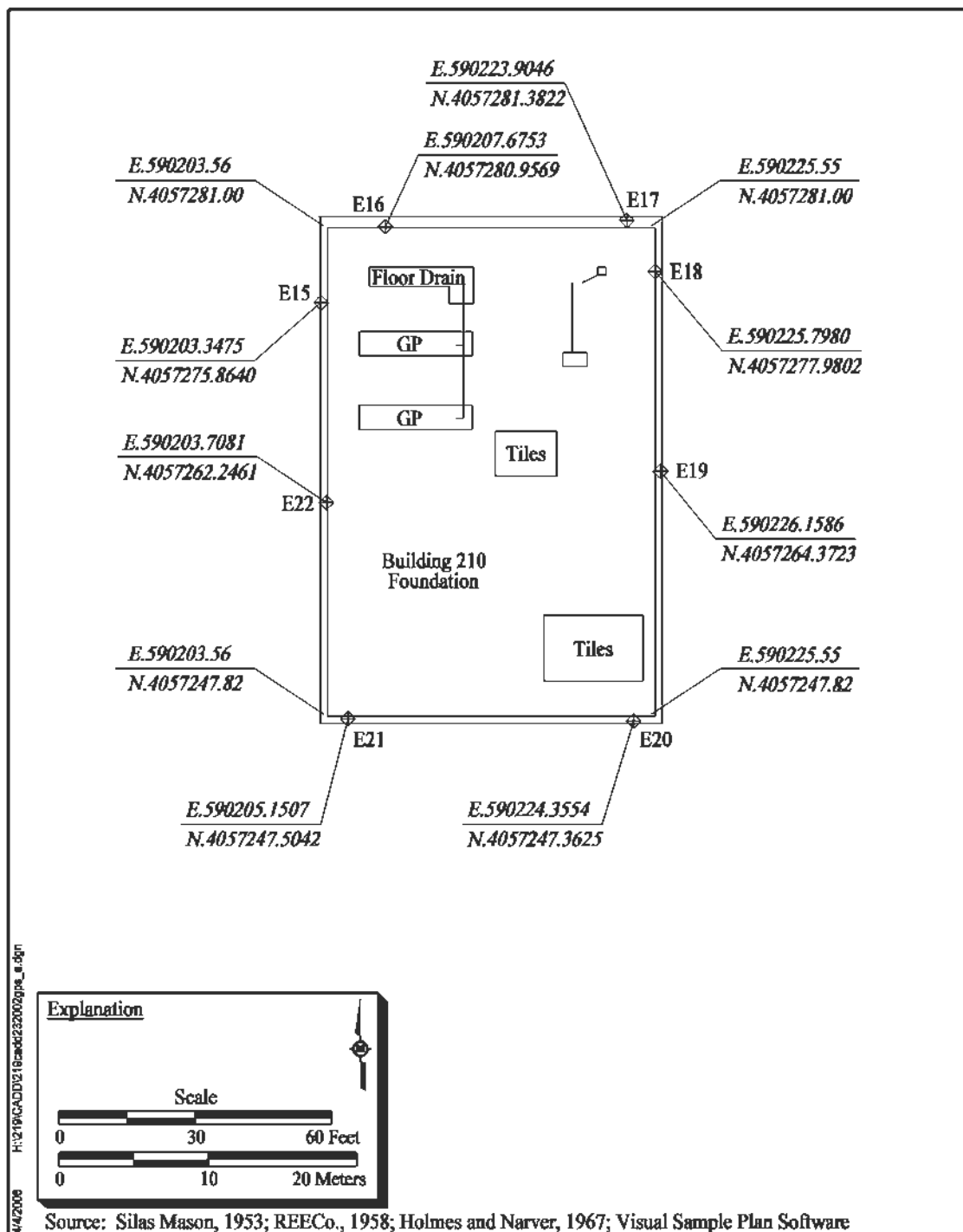


Figure A.5-3
CAS 23-20-01 Random Sample Locations

action. These samples were collected at locations of the CAS where asphalt was not observed beneath the removed soil.

One concrete, one sludge, and four soil samples were collected at this CAS for the purpose of waste characterization and disposal determination. A concrete sample (219E501) was collected from the surface of the decontamination pad at location E07. A sludge sample (219E502) was collected from the catch basin at location E09. Four soil samples (219E503 through 506) were collected from the piles (i.e., locations NE Pile, NW Pile, SE Pile, and SW Pile) formed during debris removal activities conducted at the grease pits at the main concrete pad as shown in Figure A.7-2 ([Section A.7.0](#)). The results of the waste management samples collected at this CAS were also compared to PRGs to identify potential COCs. The analytical results for waste characterization samples are presented and discussed in [Section A.7.0](#).

A.5.1.6 Deviations

There were some deviations from the planned sampling. During the investigation, it was identified that the access port to the sump allows direct access to the soil beneath the decontamination pad so the soil inside was sampled. Staining was identified on the decontamination pad so the surficial concrete was sampled for waste characterization purposes. Because PCBs were identified at a location east of the main pad that had no biasing factors, eight additional surface samples were collected around the main pad and analyzed for PCBs and pesticides. Three asphalt samples were also collected and analyzed to identify the SVOC constituents of the material so a comparison could be made to the PAHs identified in the contiguous soil. In addition, all CAS 23-20-01 environmental samples were analyzed for pesticides after preliminary results for PCBs tentatively identified the presence of pesticides. Deviations from planned activities provided additional data considered necessary for the accurate evaluation of potential contamination of the CAS and do not adversely impact the result.

A.5.2 Investigation Results

The following sections provide analytical results from the samples collected to complete investigation activities as outlined in the CAIP. Investigation samples were analyzed for the CAIP-specified COPCs, which included VOCs, SVOCs, TPH-DRO and TPH-GRO, RCRA metals, lithium, nickel, ethylene glycol, and gamma-emitting radionuclides. Beryllium and PCBs analyses

were added because these constituents are common contaminant and health and safety concerns at the NTS. Pesticides were also added after preliminary PCB results indicated their presence. The laboratory analyses and methods used to analyze the investigation samples are listed in [Table A.2-2](#). [Table A.5-1](#) lists the sample-specific analytical suite for CAS 23-20-01. The waste characterization analytical results for TCLP VOCs, TCLP SVOCs, TCLP RCRA metals, gross alpha/beta, and tritium are presented in [Table A.7-2](#).

Analytical results from the soil samples with concentrations exceeding MDCs are summarized in the following sections. An evaluation was conducted on all constituents detected above MDCs by comparing individual concentration or activity results against the PAL established in the CAIP. If the constituent concentrations were below their respective PALs, then the FALs were established as the corresponding PAL concentrations or activities.

A.5.2.1 Volatile Organic Compounds

The VOC analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in [Table A.5-2](#). No VOCs were detected at concentrations exceeding the PALs.

Table A.5-2
Sample Results for VOCs Detected Above MDCs
at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)					
			1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene	Naphthalene	Styrene	Tetrachloroethene	Toluene
Final Action Levels ^a			3,000,000	170,000	190,000	1,700,000	3,400	520,000
E01	219E001	0.0 - 0.5	--	--	--	--	--	4.6 (J)
E03	219E002	0.0 - 0.5	--	--	--	1.2 (J)	--	2.1 (J)
E04	219E005	0.0 - 0.5	--	--	--	--	--	2 (J)
	219E006	0.0 - 0.5	--	--	--	--	--	1.5 (J)
E05	219E004	0.0 - 0.5	--	--	1.1 (J)	1.2 (J)	--	2.5 (J)
E06	219E003	0.0 - 0.5	--	--	--	4.1 (J)	--	7

Table A.5-2
Sample Results for VOCs Detected Above MDCs
at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)					
			1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene	Naphthalene	Styrene	Tetrachloroethene	Toluene
Final Action Levels ^a			3,000,000	170,000	190,000	1,700,000	3,400	520,000
E09	219E011	5.5 - 6.0	--	--	--	--	1.6 (J)	--
E10	219E012	2.5 - 3.0	--	--	--	--	3.4 (J)	--
	219E013	2.5 - 3.0	--	--	--	--	1.8 (J)	--
E11	219E010	2.5 - 3.0	1.2 (J)	--	--	--	--	--
E13	219E017	6.0 - 6.5	--	2.7 (J)	--	1.2 (J)	--	1 (J)
	219E018	8.0 - 8.5	--	--	--	0.94 (J)	--	--
E14	219E015	6.5 - 7.0	--	--	--	0.96 (J)	--	1.1 (J)
	219E016	8.5 - 9.0	--	--	--	1.1 (J)	--	--

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

-- = Not detected above minimum detectable concentrations.

A.5.2.2 Semivolatile Organic Compounds

The SVOC analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in [Table A.5-3](#). Polynuclear aromatic hydrocarbons were detected at concentrations exceeding PALs at locations E01, E02, E04, E05, E06, E09 (sludge) and E13. The PAHs identified in one or more samples collected from these locations included benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. All of these PAHs are attributed to the asphalt materials that are part of the debris/fill removed from the grease pits or part of the parking surface at the site as confirmed by the results of the background asphalt samples collected at locations E23, E24, and E25 with the exception of the benzo(a)pyrene concentration in the sample (219E502) collected from location E09. Therefore, the PAHs detected at

Table A.5-3
Sample Results for SVOCs Detected Above MDCs at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 1 of 2)

Sample Location		Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)																					
				2,3,4,6-Tetrachlorophenol	2-Methylnaphthalene	Acenaphthene	Anthracene	Benzo(a)Anthracene	Benzo(a)Pyrene	Benzo(b)Fluoranthene	Benzo(g,h,i)Perylene	Benzo(k)Fluoranthene	Bis(2-Ethylhexyl)Phthalate	Butyl Benzyl Phthalate	Carbazole	Chrysene	Dibenzo(a,h)Anthracene	Dibenzofuran	Di-N-Butyl Phthalate	Di-N-Octyl Phthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)Pyrene*	Naphthalene	Phenanthrene
Final Action Levels ^a			18,000,000	190,000	29,000,000	100,000,000	2,100	210	2,100	29,000,000	21,000	120,000	100,000,000	86,000	210,000	210	1,600,000	100,000,000	25,000,000	22,000,000	26,000,000	2,100	190,000	100,000,000	29,000,000
E01	219E001	0.0 - 0.5	--	--	60 (J)	88 (J)	550	600 (J)*	960 (J)	210 (J)	440 (J)	110 (J)	45 (J)	77 (J)	620	--	20 (J)	23 (J)	--	990	41 (J)	200 (J)	--	490	1,600
E02	219E007	0.0 - 0.5	--	--	98 (J)	110 (J)	460	550*	960	100 (J)	430	230 (J)	160 (J)	96 (J)	620	--	37 (J)	59 (J)	--	1,100	70 (J)	110 (J)	31 (J)	690	790
E03	219E002	0.0 - 0.5	--	--	--	--	--	--	24 (J)	--	--	--	--	--	--	--	--	--	--	29 (J)	--	--	--	--	22 (J)
E04	219E005	0.0 - 0.5	24 (J)	--	170 (J)	230 (J)	1,000	1,200 (J)*	1,900 (J)	580 (J)	820 (J)	890	310 (J)	180 (J)	1,300	170 (J)	55 (J)	240 (J)	54 (J)	2,200	130 (J)	500 (J)	26 (J)	1,300	2,400
	219E006	0.0 - 0.5	--	--	190 (J)	240 (J)	1,200	1,400 (J)*	2,300 (J)*	700 (J)	760 (J)	1,200	320 (J)	220 (J)	1,600	--	61 (J)	280 (J)	59 (J)	2,400	120 (J)	660 (J)	36 (J)	1,400	2,600
E05	219E004	0.0 - 0.5	--	95 (J)	1,000	1,500	6,100*	6,800*	9,700*	3,400 (J)	4,400	840	330 (J)	1,200	6,600	890 (J)*	390 (J)	750	--	12,000	750 (J)	3,200 (J)*	220 (J)	7,700	8,700
E06	219E003	0.0 - 0.5	--	--	61 (J)	78 (J)	460	520 (J)*	790 (J)	240 (J)	410 (J)	990	34 (J)	67 (J)	590	--	19 (J)	--	--	860	38 (J)	220 (J)	--	450	1,200
E08	219E008	6.5 - 7.0	--	--	--	--	--	--	--	--	--	29 (J)	--	--	--	--	--	--	--	--	--	--	--	--	--
	219E009	6.0 - 6.5	--	--	--	--	--	--	--	--	--	50 (J)	--	--	--	--	--	--	--	--	--	--	--	--	--
E10	219E012	2.5 - 3.0	--	--	--	--	140 (J)	160 (J)	280 (J)	59 (J)	130 (J)	130 (J)	--	--	150 (J)	--	--	--	--	240 (J)	--	48 (J)	--	95 (J)	290 (J)
	219E013	2.5 - 3.0	--	--	--	--	140 (J)	170 (J)	310 (J)	78 (J)	100 (J)	280 (J)	--	--	170 (J)	--	--	--	--	290 (J)	--	76 (J)	--	130 (J)	410
E11	219E010	2.5 - 3.0	--	--	--	19 (J)	130 (J)	120 (J)	230 (J)	87 (J)	97 (J)	570 (J)	110 (J)	30 (J)	170 (J)	--	--	52 (J)	--	280 (J)	--	69 (J)	--	150 (J)	250 (J)
E13	219E017	6.0 - 6.5	--	40 (J)	80 (J)	150 (J)	360 (J)	380*	440	170 (J)	220 (J)	100 (J)	--	89 (J)	470	--	47 (J)	--	--	910	75 (J)	170 (J)	29 (J)	690	660
	219E018	8.0 - 8.5	--	--	--	25 (J)	74 (J)	68 (J)	69 (J)	40 (J)	30 (J)	--	--	--	77 (J)	--	--	--	--	130 (J)	--	41 (J)	--	95 (J)	130 (J)
E14	219E016	8.5 - 9.0	--	--	27 (J)	46 (J)	120 (J)	130 (J)	150 (J)	41 (J)	57 (J)	50 (J)	--	28 (J)	130 (J)	--	--	--	--	260 (J)	26 (J)	42 (J)	--	200 (J)	210 (J)
E23	219E901	0.0 - 0.5	--	--	230	330	1,600	1,900*	2,500*	1,300	1,600	1,200	--	410	2,300	--	--	--	--	3,300	--	1,100	--	2,300	4,900

Table A.5-3
Sample Results for SVOCs Detected Above MDCs at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 2 of 2)

Sample Location Sample Number Depth (ft bgs)			Contaminants of Potential Concern (µg/kg)																							
			2,3,4,6-Tetrachlorophenol	2-Methylnaphthalene	Acenaphthene	Anthracene	Benzo(a)Anthracene	Benzo(a)Pyrene	Benzo(b)Fluoranthene	Benzo(g,h,i)Perylene	Benzo(k)Fluoranthene	Bis(2-Ethylhexyl)Phthalate	Butyl Benzyl Phthalate	Carbazole	Chrysene	Dibenzo(a,h)Anthracene	Dibenzofuran	Di-N-Butyl Phthalate	Di-N-Octyl Phthalate	Fluoranthene	Fluorene	Indeno(1,2,3-cd)Pyrene*	Naphthalene	Phenanthrene	Pyrene	
Final Action Levels ^a			18,000,000	190,000	29,000,000	100,000,000	2,100	210	2,100	29,000,000	21,000	120,000	100,000,000	86,000	210,000	210	1,600,000	100,000,000	25,000,000	22,000,000	26,000,000	2,100	190,000	100,000,000	29,000,000	
E24	219E902	0.0 - 0.5	-	-	-	-	580	650*	970	420	340	1,700	-	-	630	-	-	-	-	1,200	-	-	-	560	1,300	
E25	219E903	0.0 - 0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	400 (J)	

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

*Contamination is no longer present at this CAS, because it was removed during the corrective action.

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

-- = Not detected above minimum detectable concentrations.

locations E01, E02, E04, E05, E06, and E13 are not considered COCs. The benzo(a)pyrene concentration of 290 µg/kg, that was detected in the waste management sample collected from location E09 exceeds the PAL of 210 µg/kg, which was established as the FAL at this CAS (Table A.7-2). Therefore, benzo(a)pyrene is considered to be a COC at CAS 23-20-01.

A.5.2.3 Total Petroleum Hydrocarbons

The TPH-DRO analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in Table A.5-4. Six soil samples collected from locations E04, E05, E10, E11, and E13 exceeded the PAL of 100 mg/kg for TPH-DRO with concentrations ranging from 100 to 320 mg/kg. A waste management concrete sample (219E501) collected at location E07 and the sludge sample (219E502) collected at location E09 had TPH-DRO concentrations of 430 and 170 mg/kg, respectively, as shown in Table A.7-2. The TPH-DRO concentrations detected in samples 219E004, 219E006, and 219E017 were attributed to asphalt in the samples and were not considered COCs, so a Tier 2 evaluation was not required for these samples. The TPH-DRO concentrations in samples 219E010, 219E012, 219E013, 219E501, and 219E502 were moved on to a Tier 2 evaluation and the hazardous constituents of TPH-DRO were evaluated in Sections A.5.2.1 and A.5.2.2. Although the concentrations of the hazardous constituents in samples 219E010, 219E012, 219E013, and 219E501 do not exceed the FALs, TPH-DRO is considered to be a COC because the hazardous constituents (i.e., VOCs and SVOCs) of this COPC exceeded FALs at location E09.

A.5.2.4 RCRA Metals, Beryllium, Lithium, and Nickel

The RCRA metals, lithium, nickel, and beryllium analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in Table A.5-5. No metals were detected in the environmental samples at concentrations exceeding the PALs. However, lead was detected at a concentration exceeding the PAL of 800 mg/kg in waste management sludge sample 219E502 at a concentration of 1,700 mg/kg as shown in Table A.7-2.

A.5.2.5 Polychlorinated Biphenyls

Polychlorinated biphenyls analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in Table A.5-6. The PCBs were detected at concentrations that exceed the PAL at locations E04, E18, E19, and E20. The FAL for Aroclor-1254 and -1260 was

Table A.5-4
Sample Results for TPH-DRO Detected Above MDCs
at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)
			Diesel-Range Organics
Final Action Levels ^a			100
E01	219E001	0.0 - 0.5	59 (M, Z)
E02	219E007	0.0 - 0.5	82 (M, Z)
E03	219E002	0.0 - 0.5	43 (M)
E04	219E005	0.0 - 0.5	93 (M, Z)
	219E006	0.0 - 0.5	120 (M, Z)*
E05	219E004	0.0 - 0.5	120 (M, Z)*
E06	219E003	0.0 - 0.5	55 (M, Z)
E08	219E008	6.5 - 7.0	8 (M)
	219E009	6.0 - 6.5	35 (H, M)
E09	219E011	5.5 - 6.0	3 (J)
E10	219E012	2.5 - 3.0	100 (H)*
	219E013	2.5 - 3.0	110 (M)*
E11	219E010	2.5 - 3.0	140 (M, Z)*
E12	219E014	5.5 - 6.0	19 (M, Z)
E13	219E017	6.0 - 6.5	320 (H, M)*
	219E018	8.0 - 8.5	11 (M, Z)
E14	219E015	6.5 - 7.0	13 (M, Z)
	219E016	8.5 - 9.0	98 (M)

^aBased on *Nevada Administrative Code*; Contamination of soil: Establishment of action levels (NAC, 2002)

*Contamination is no longer present at this CAS, because it was removed during the corrective action.

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

H = Fuel pattern in the heavier end of retention time window.

J = Estimated value.

M = A pattern resembling motor oil was detected.

Z = Result did not resemble any common total petroleum hydrocarbons products.

Table A.5-5
Sample Results for Metals Detected Above MDCs
at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)									
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Lithium	Mercury	Nickel	Silver
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	450 ^b	800 ^b	20,000 ^b	310 ^b	20,000 ^b	5,100 ^b
E01	219E001	0.0 - 0.5	6.2	89	--	0.19 (J-)	8.7 (J)	58	12	0.026 (J+)	6.2 (J)	--
E02	219E007	0.0 - 0.5	4.9	95	--	1.4	11 (J)	300	8.9	0.39 (J+)	5.5 (J)	--
E03	219E002	0.0 - 0.5	5.5	62	--	0.37 (J-)	3.9 (J)	44	9.7	0.062 (J+)	5.3 (J)	--
E04	219E005	0.0 - 0.5	6.5	130	--	2.5	29 (J)	540	9.9	0.55 (J+)	14 (J)	--
	219E006	0.0 - 0.5	6.4	130	--	2.8	27 (J)	670	9.3	0.41 (J+)	10 (J)	--
E05	219E004	0.0 - 0.5	5.6	110	--	1.2	21 (J)	430	11	0.25 (J+)	8 (J)	--
E06	219E003	0.0 - 0.5	5.3	90	0.52	0.27 (J-)	7.3 (J)	41	12	0.033 (J+)	6.4 (J)	--
E08	219E008	6.5 - 7.0	5.3	42 (J)	0.27 (J-)	--	2.5 (J)	6 (J)	17	0.0048 (J-)	3.1 (J)	--
E08	219E009	6.0 - 6.5	9.3	40 (J)	0.28 (J-)	--	3.3 (J)	15 (J)	9	0.0071 (J-)	3.7 (J)	0.064 (B)
E09	219E011	5.5 - 6.0	5.3	54 (J)	0.29 (J-)	--	2.9 (J)	5.7 (J)	16	0.0053 (J-)	3.9 (J)	--
E10	219E012	2.5 - 3.0	4.5	51 (J)	0.25 (J-)	--	6 (J)	49 (J)	9.1	0.027 (J-)	3.8 (J)	--
	219E013	2.5 - 3.0	5	57 (J)	0.27 (J-)	0.61 (J)	6.8 (J)	62 (J)	10	0.017 (J-)	4 (J)	--
E11	219E010	2.5 - 3.0	20	210 (J)	0.31 (J-)	2.9 (J)	26 (J)	510 (J)	9.2	0.11	7.2 (J)	0.92 (B)
E12	219E014	5.5 - 6.0	4.4	44 (J)	0.28 (J-)	--	2.4 (J)	9.4 (J)	9.2	0.0062 (J-)	3.4 (J)	--
E13	219E017	6.0 - 6.5	4.6	50	--	0.11 (J-)	3.5	22	12	0.022 (J-)	2.9	--
	219E018	8.0 - 8.5	6.4	38	--	0.14 (J-)	3.2	6.7	17	--	3.8	--
E14	219E015	6.5 - 7.0	4.1	46	--	0.1 (J-)	2.3	4.8	14	0.0033 (J-)	2.6	--
	219E016	8.5 - 9.0	4.7	75	--	0.27 (J-)	30	160	13	0.0037 (J-)	3.2	--

Table A.5-5
Sample Results for Metals Detected Above MDCs
at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)									
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Lithium	Mercury	Nickel	Silver
Final Action Levels			23 ^a	67,000 ^b	1,900 ^b	450 ^b	450 ^b	800 ^b	20,000 ^b	310 ^b	20,000 ^b	5,100 ^b

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

B = Value less than the contract required detection limit, but greater than or equal to the instrument detection limit.

J = Estimated value.

J+ = The result is an estimated quantity, but the result may be biased high.

J- = The result is an estimated quantity, but the result may be biased low.

-- = Not detected above minimum detectable concentrations.

established as the PAL for this CAS; therefore, Aroclor-1254 and -1260 are considered to be COCs at this CAS.

Table A.5-6
Sample Results for PCBs Detected Above MDCs
at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)	
			Aroclor-1254	Aroclor-1260
Final Action Levels ^a			740	740
E01	219E001	0.0 - 0.5	--	43
E02	219E007	0.0 - 0.5	--	36 (J)
E03	219E002	0.0 - 0.5	--	140
E04	219E005	0.0 - 0.5	--	860*
	219E006	0.0 - 0.5	--	840*
E05	219E004	0.0 - 0.5	--	250
E06	219E003	0.0 - 0.5	--	81
E08	219E009	6.0 - 6.5	--	5.4 (J)
E10	219E012	2.5 - 3.0	--	6.6 (J)
	219E013	2.5 - 3.0	--	13 (J)
E11	219E010	2.5 - 3.0	--	480 (J)
E13	219E017	6.0 - 6.5	17 (J)	--
E18	219E022	0.0 - 0.5	--	1,200 (J)*
E19	219E023	0.0 - 0.5	5,400 (J)*	--
E20	219E024	0.0 - 0.5	1,300 (J)*	--
E21	219E025	0.0 - 0.5	96 (J)	--
E22	219E026	0.0 - 0.5	180 (J)	--
E28	219E029	0.0 - 0.5	--	49

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

*Contamination is no longer present at this CAS, because it was removed during the corrective action.

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

-- = Not detected above minimum detectable concentrations.

A.5.2.6 Ethylene Glycol

Ethylene glycol was not detected above the MDC in environmental samples collected at CAS 23-20-01.

A.5.2.7 Pesticides

Pesticides analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in [Table A.5-7](#). Two soil samples collected from locations E16 and E17 exceeded the PAL of 6,500 µg/kg for chlordane with concentrations of 40,000 µg/kg and 65,000 µg/kg. The FAL for chlordane was established as the PAL; therefore, chlordane is considered to be a COC at this CAS. These samples were also analyzed for TCLP pesticide, because their concentration exceeded RCRA limits. All TCLP pesticide results for chlordane at this CAS were less than the MDC.

A.5.2.8 Gamma-Emitting Radionuclides

Gamma-emitting radionuclides analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in [Table A.5-8](#). No gamma-emitting radionuclides were detected at concentrations exceeding the PALs.

A.5.3 Nature and Extent of Contamination

Aroclor-1254, Aroclor-1260, and chlordane were identified in the surface soil surrounding the main concrete pad at concentrations that exceed their respective FALs. Aroclor-1254 was identified above the FAL in the surface soil at locations E19 and E20, and Aroclor-1260 was identified above the FAL in the surface soil at locations E04 and E18. Chlordane was also identified above the FAL in the surface soil at locations E16 and E17. The contaminated soil surrounding the pad was between 4 and 6 in. deep and extended as far out as 12 ft. The additive effect of multiple contaminants was not evaluated because the contaminated soil was removed and disposed of during a corrective action conducted at this CAS. Lead and benzo(a)pyrene were detected above the FALs in the sludge sample collected from the concrete box of the catch basin (location E09); however, the contaminants do not extend beyond the collection feature. The additive effects of these contaminants were not evaluated because the contaminated sludge and the concrete box were removed as part of the corrective action at this CAS. All contaminated soil and sludge that exceeded PALs at this CAS were removed during the corrected action.

Table A.5-7
Sample Results for Pesticides Detected Above MDCs
at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)							
			4,4'-DDD	4,4'-DDE	4,4'-DDT	Chlordane	Delta-BHC	Endrin Aldehyde	Heptachlor	Methoxychlor
Final Action Levels ^a			10,000	7,000	7,000	6,500	360	180,000	380	3,100,000
E01	219E001	0.0 - 0.5	7.7 (J)	3.1 (J)	14 (J)	170 (J)	--	--	--	--
E02	219E007	0.0 - 0.5	--	--	--	5,400 (J)	--	--	--	--
E03	219E002	0.0 - 0.5	--	--	--	43 (J)	--	--	--	--
E04	219E005	0.0 - 0.5	87 (J)	7.5 (J)	--	910 (J)	--	--	--	--
	219E006	0.0 - 0.5	57 (J)	10 (J)	--	790 (J)	--	--	--	--
E05	219E004	0.0 - 0.5	16 (J)	13 (J)	92 (J)	480 (J)	--	--	--	--
E06	219E003	0.0 - 0.5	--	11 (J)	34 (J)	170 (J)	--	--	--	--
E10	219E012	2.5 - 3.0	3.9 (J)	--	1.5 (J)	41 (J)	0.36 (J)	--	0.54 (J)	5 (J)
	219E013	2.5 - 3.0	4.5 (J)	--	4.3 (J)	48 (J)	0.31 (J)	--	0.56 (J)	4.4 (J)
E11	219E010	2.5 - 3.0	--	--	--	1,800 (J)	--	--	--	--
E16	219E020	0.0 - 0.5	--	--	--	40,000 (J)*	--	--	--	--
E17	219E021	0.0 - 0.5	--	--	--	65,000 (J)*	--	--	--	--
E18	219E022	0.0 - 0.5	--	--	--	1,200 (J)	--	--	--	--
E19	219E023	0.0 - 0.5	--	--	--	--	--	25 (J)	--	--
E20	219E024	0.0 - 0.5	--	--	--	780 (J)	--	--	--	--
E21	219E025	0.0 - 0.5	--	--	--	130 (J)	--	--	--	--

Table A.5-7
Sample Results for Pesticides Detected Above MDCs
at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)							
			4,4'-DDD	4,4'-DDE	4,4'-DDT	Chlordane	Delta-BHC	Endrin Aldehyde	Heptachlor	Methoxychlor
Final Action Levels ^a			10,000	7,000	7,000	6,500	360	180,000	380	3,100,000
E22	219E026	0.0 - 0.5	--	--	33 (J)	440 (J)	--	19 (J)	--	--
E27	219E028	0.0 - 0.5	--	--	--	2,300	--	--	--	--
E28	219E029	0.0 - 0.5	--	--	--	230	--	--	--	--

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

*Contamination is no longer present at this CAS, because it was removed during the corrective action.

ft bgs = Feet below ground surface

µg/kg = Micrograms per kilogram

J = Estimated value.

-- = Not detected above minimum detectable concentrations.

**Table A.5-8
Sample Results for Gamma-Emitting Radionuclides
Detected Above MDCs at CAS 23-20-01
DNA Motor Pool Sewage and Waste Systems**

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)			
			Lead-212		Lead-214	
Final Action Levels ^a			5	15	5	15
Depth bgs (cm)			<15	>15	<15	>15
E01	219E001	0.0 - 0.5	0.84	N/A	0.69 (J)	N/A
E02	219E007	0.0 - 0.5	--	N/A	0.6 (J)	N/A
E04	219E005	0.0 - 0.5	0.63	N/A	0.79 (J)	N/A
	219E006	0.0 - 0.5	0.69	N/A	0.66 (J)	N/A
E05	219E004	0.0 - 0.5	0.73	N/A	--	N/A
E06	219E003	0.0 - 0.5	0.71	N/A	0.65 (J)	N/A
E11	219E010	2.5 - 3.0	N/A	--	N/A	0.49 (J)
E13	219E018	8.0 - 8.5	N/A	0.34	N/A	--

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, thallium-208, and thorium-232, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes are specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

cm = Centimeter

ft bgs = Feet below ground surface

N/A = Not applicable

pCi/g = Picocuries per gram

< = Less than

> = Greater than

-- = Not detected above minimum detectable concentrations.

J = Estimated value.

A.5.4 Revised Conceptual Site Model

The CSM was revised to account for contamination identified in the surface soils surrounding the main concrete pad at CAS 23-20-01. The portions of the CSM that were revised included the Sources of Potential Soil Contamination and the Location of Contamination/Release Point elements. The Sources of Potential Soil Contamination element was revised to indicate that COCs released to the environment may have resulted from runoff from the main and decontamination pads at this CAS.

The Location of Contamination/Release Point element was revised to indicate that the surface and near-surface soils surrounding and adjacent to the main concrete and decontamination pads would also have the highest potential for releases to the environment. Based on the revisions to the CSM for CAU 219, the sampling requirements of the CAIP were met.

A.6.0 CAS 23-20-02, Injection Well

Corrective Action Site 23-20-02 is located in Area 23 in the northeastern section of Mercury. This CAS consists of the potential releases from an injection well associated with the former REECo Motor Pool, the original Building 132. The building was demolished, and the site is now used as a parking area. It is not known whether the injection well was removed along with the foundation. Additional detail is provided in the CAU 219 CAIP (NNSA/NSO, 2005).

A.6.1 Geophysical Surveys

A geophysical survey was conducted in the area of the former motor pool to identify the injection well allegedly located at this CAS. The results of the survey are shown on [Figure A.6-1](#). An anomaly suspected of being the injection well was identified in the southeastern portion of site based on size, location, and depth (i.e., greater than 2 ft bgs) as shown in (Fahringer, 2005). The anomaly lies approximately 46 ft south of the fence separating the Building 160 Warehouse and the storage yard, and is surrounded by unknown utility lines as shown in [Figure A.6-2](#).

A.6.2 Corrective Action Investigation

A total of two environmental samples (including one FD) were collected during investigation activities at CAS 23-20-02 to verify the presence of the injection well. The sample IDs, locations, types, and analyses are listed in [Table A.6-1](#). The specific CAI activities conducted to satisfy the CAIP requirements at this CAS are described in the following sections.

A.6.2.1 Field Screening

Investigation samples were field screened for total alpha and beta/gamma radiation. The FSRs were compared to FSLs to guide subsequent sampling decisions where appropriate. Neither the gross alpha radiation FSLs nor the total beta/gamma radiation FSLs were exceeded for any samples.

A.6.2.2 Visual Inspections

A walkover was conducted at the CAS to identify additional sample locations based on biasing factors (i.e., staining). No additional biased sample locations were identified.

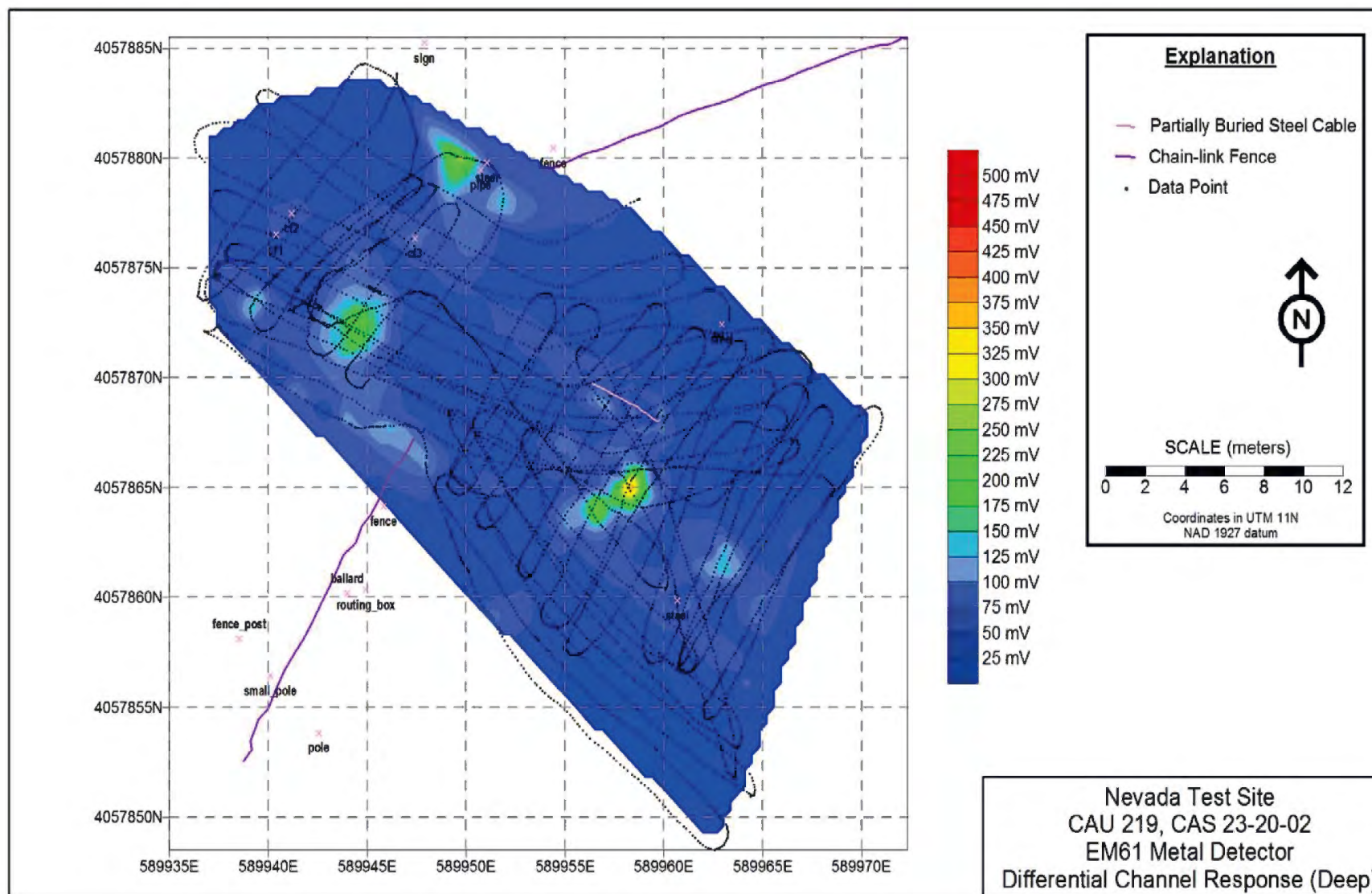


Figure A.6-1
CAS 23-20-02 Geophysical Survey

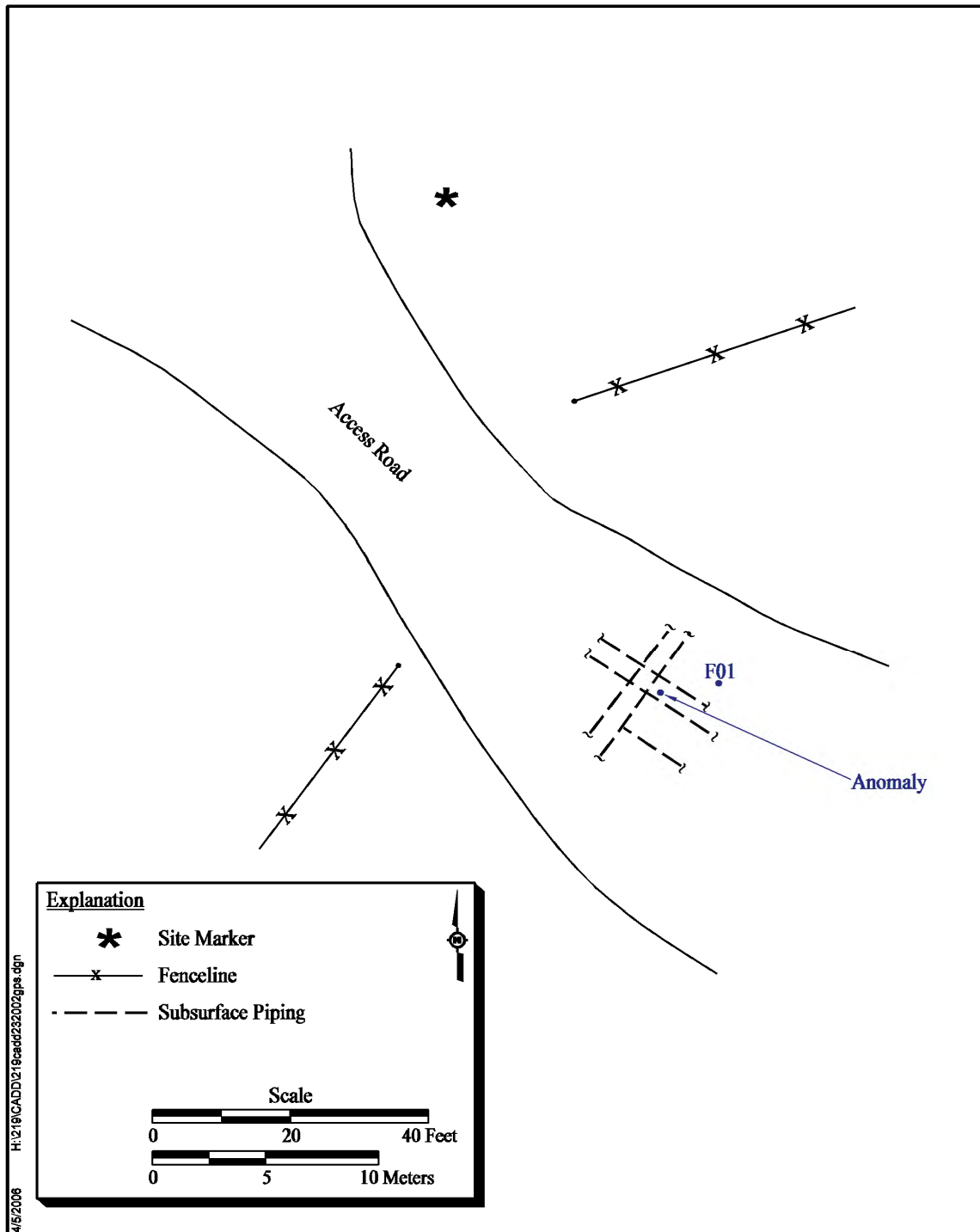


Figure A.6-2
CAU 219, CAS 23-20-02 Sample Location

Table A.6-1
Samples Collected at CAS 23-20-02, Injection Well

Sample Location	Sample Number	Depth (ft bgs)	Sample Matrix	Purpose	Analyses
F01	219F001	2.0 - 2.5	Soil	Environmental	Set 1
	219F002	2.0 - 2.5	Soil	Field Duplicate of #219F001	Set 1
N/A	219F301	N/A	Water	Trip Blank	VOCs
N/A	219F302	N/A	Water	Field Blank	Set 1

Set 1 = VOCs, SVOCs, RCRA metals, beryllium, TPH-DRO and TPH-GRO, PCBs, ethylene glycol, and gamma spectroscopy

ft bgs = Feet below ground surface

N/A = Not applicable

PCB = Polychlorinated biphenyl

RCRA = *Resource Conservation and Recovery Act*

SVOC = Semivolatile compound

TPH-DRO = Total petroleum hydrocarbons, diesel-range organics

TPH-GRO = Total petroleum hydrocarbons, gasoline-range organics

VOC = Volatile compound

A.6.2.1 Sample Collection

It was not possible to excavate at the exact location of the anomaly because of its close proximity to several unknown utility lines. To account for any potential release from the anomaly, subsurface soil samples (219F001 and F002) were collected at location F01 and as close as possible (i.e., approximately 7 ft) to the geophysical anomaly as shown in [Figure A.6-2](#).

A.6.2.2 Deviations

It was not possible to excavate and examine the anomaly because of the presence of unknown utility lines. Drilling and sampling occurred at a safe distance away from these lines. Due to refusal, it was also not possible to collect the sample at the target depth interval of 4 to 5 ft bgs.

A.6.3 Investigation Results

The following sections provide analytical results from the samples collected to complete investigation activities as outlined in the CAIP. Investigation samples were analyzed for the CAIP-specified COPCs, which included VOCs, SVOCs, TPH-DRO and TPH-GRO, RCRA metals, ethylene glycol, and gamma-emitting radionuclides. Beryllium and PCB analyses were added because these constituents are common contaminant and health and safety concerns at the NTS. The laboratory analyses and methods used to analyze the investigation samples are listed in [Table A.2-2](#). [Table A.6-1](#) lists the sample-specific analytical suite for CAS 23-20-02.

Table A.6-2
Sample Results for VOCs Detected Above
MDCs at CAS 23-20-02, Injection Well

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (µg/kg)
			Methylene Chloride
Final Action Levels ^a			21,000
F01	219F001	2.0 - 2.5	9.1
	219F002	2.0 - 2.5	6.7

^aBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface
µg/kg = Micrograms per kilogram

Analytical results from the soil samples with concentrations exceeding MDCs are summarized in the following sections. An evaluation was conducted on all constituents detected above MDCs by comparing individual concentration or activity results against the PALs established in the CAIP. If the constituent concentrations were below their respective PALs, then the FALs were established as the corresponding PAL concentrations or activities ([Appendix C](#)).

A.6.3.1 Volatile Organic Compounds

The VOCs analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in [Table A.6-2](#). No VOCs were detected at concentrations exceeding the PALs.

A.6.3.2 Semivolatile Organic Compounds

No SVOCs were detected above MDCs in environmental samples collected at CAS 23-20-02.

A.6.3.3 Total Petroleum Hydrocarbons

Concentrations of TPH-DRO and TPH-GRO were not detected above MDCs in environmental samples collected at CAS 23-20-02.

A.6.3.4 RCRA Metals and Beryllium

The RCRA metals and beryllium analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in [Table A.6-3](#). No metals were detected at concentrations exceeding the PALs.

Table A.6-3
Sample Results for Metals Detected Above
MDCs at CAS 23-20-02, Injection Well

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)			
			Arsenic	Barium	Chromium	Lead
Final Action Levels			23 ^a	67,000 ^b	450 ^b	800 ^b
F01	219F001	2.0 - 2.5	3.8	65	4.8	4.4
	219F002	2.0 - 2.5	4	69	6.2	4.6

^aBased on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (NBMG, 1998; Moore, 1999).

^bBased on U.S. Environmental Protection Agency, *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

ft bgs = Feet below ground surface

mg/kg = Milligrams per kilogram

A.6.3.5 Polychlorinated Biphenyls

No PCBs were detected above MDCs in environmental samples collected at CAS 23-20-02.

A.6.3.6 Ethylene Glycol

Ethylene glycol was not detected above MDCs in environmental samples collected at CAS 23-20-02.

A.6.3.7 Gamma-Emitting Radionuclides

Gamma-emitting radionuclides analytical results for environmental samples collected at this CAS that were detected above MDCs are presented in [Table A.6-4](#). No gamma-emitting radionuclides were detected at concentrations exceeding the PALs.

Table A.6-4
Sample Results for Gamma-Emitting Radionuclides Detected Above
MDCs at CAS 23-20-02, Injection Well

Sample Location	Sample Number	Depth (ft bgs)	Contaminants of Potential Concern (pCi/g)	
			Lead-212	Lead-214
Final Action Levels ^a			15	15
Depth bgs (cm)			>15	>15
F01	219F001	2.0 - 2.5	0.44	0.5 (J)
	219F002	2.0 - 2.5	--	0.49 (J)

^aTaken from the generic guidelines for residual concentrations of actinium-228, bismuth-214, lead-212, lead-214, thallium-208, and thorium-232, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993). The PALs for these isotopes are specified as 5 pCi/g averaged over the first 15 cm of soil and 15 pCi/g for deeper soils (DOE, 1993). For purposes of this document, 15 cm is assumed to be equivalent to 0.5 ft (6 inches); therefore, 5 pCi/g represents the PALs for these radionuclides in the surface soil (0 to 0.5 ft depth).

cm = Centimeter

ft bgs = Feet below ground surface

pCi/g = Picocuries per gram

-- = Not detected above minimum detectable concentrations

> = Greater than

J = Estimated value.

A.6.4 Nature and Extent of Contamination

Based on the analytical results for soil samples collected at CAS 23-20-02; no COCs were identified. Therefore, the additive effects of multiple contaminants were not assessed for these constituents. The requirements for Decision I have been met.

A.6.5 Revised Conceptual Site Model

The CAIP requirements were met at this CAS, and no revisions were necessary to the CSM.

A.7.0 Waste Management

Sections A.7.1 through A.7.3 address investigation-derived waste (IDW) whereas Section A.7.4 addresses the results of the waste characterization samples collected from various potential remediation waste streams.

A.7.1 Investigation-Derived Waste

Investigation-derived waste was generated during the field investigation activities of CAU 219. The waste streams generated include decontamination rinse water at various CASs and waste from the fecal coliform analysis of septic tank samples. Investigation-derived waste was segregated to the greatest extent possible, and waste minimization techniques were integrated into the field activities to reduce the amount of waste generated. Controls were in place to minimize the use of hazardous materials and the unnecessary generation of hazardous and/or mixed waste. Decontamination activities were planned and executed to minimize the volume of rinsate generated.

Two hazardous waste accumulation areas (HWAAs) and one satellite accumulation area were established to manage hazardous and potentially hazardous waste generated during the CAI. The amount, type, and source of waste placed into each drum was recorded in waste management logbooks that are maintained in the project file. Waste generated during a CAI that is known to be hazardous based on process knowledge and/or sample analytical results are placed in containers and labeled as “Hazardous Waste.” There were no drums of hazardous waste generated from the CAI. Potentially hazardous waste generated during the CAI was placed in containers and labeled as “Hazardous Waste - Pending Analysis.” Three drums of potentially hazardous waste were generated during the CAI.

A.7.2 Waste Streams

Investigation-derived waste generated during the investigation was segregated into the following waste streams:

- Decontamination rinsate
- Fecal coliform test kit waste
- Soil from a hydrocarbon cleanup

A.7.3 Investigation-Derived Waste Generated

A total of four drums of IDW were generated during the investigation:

- Two drums were characterized as sanitary waste and recommendation for disposal at the NTS-permitted sanitary facilities. These drums were generated at CASs 16-04-01, 16-04-03, and 23-20-02.
- One drum containing fecal coliform test kit waste from CAS 16-04-01 was characterized as sanitary waste and is recommended for disposal at the NTS-permitted sanitary facilities. This drum was generated at Building 23-153 in Mercury, Nevada.
- One drum contains hydrocarbon waste and is recommended for disposal at the NTS-permitted facilities to receive hydrocarbons. This drum was generated at CAS 16-04-02.

Office waste and lunch trash was disposed of in designated sanitary waste bins allocated for disposal at the NTS sanitary landfill. Sanitary industrial waste was inspected and disposed of in designated sanitary industrial waste bins located at Building 23-153 and allocated for disposal at the NTS industrial waste landfill.

A.7.4 Non-IDW Waste Characterization

Waste characterization activities were conducted during the CAU 219 CAI to support waste disposal decisions. Waste characterization samples were not required at CAS 03-11-01; however, the debris at this site was surveyed for radiological purposes before removal and disposal. Waste characterization samples were collected from the septic tanks at CAS 16-04-01 and the collection features at CAS 23-20-01. These sample locations are shown in [Figures A.7-1](#) and [A.7-2](#), respectively. The analytical suite was tailored to characterize the waste for disposal and to support recommended actions. Results were reviewed against federal regulations, state regulations, and DOE directives/policies/guidance and waste disposal criteria for NTS facilities. Sections [A.7.4.1](#) through [A.7.4.3](#) summarize waste characterization activities conducted at CAU 219 CASs during the CAI. Complete results (including non-detect results) for all samples are maintained in project files.

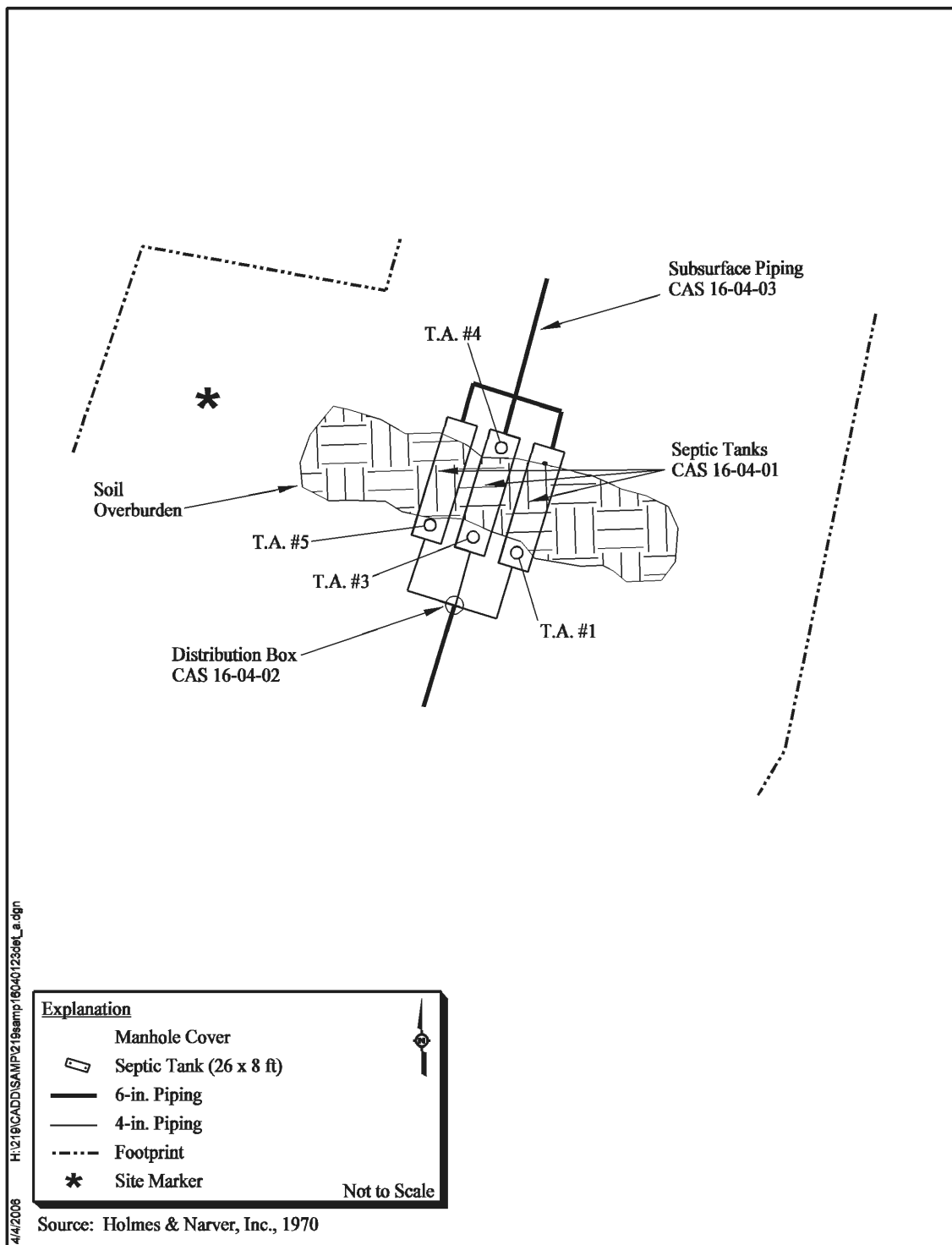


Figure A.7-1
CAS 16-04-01 Sample Locations Detail

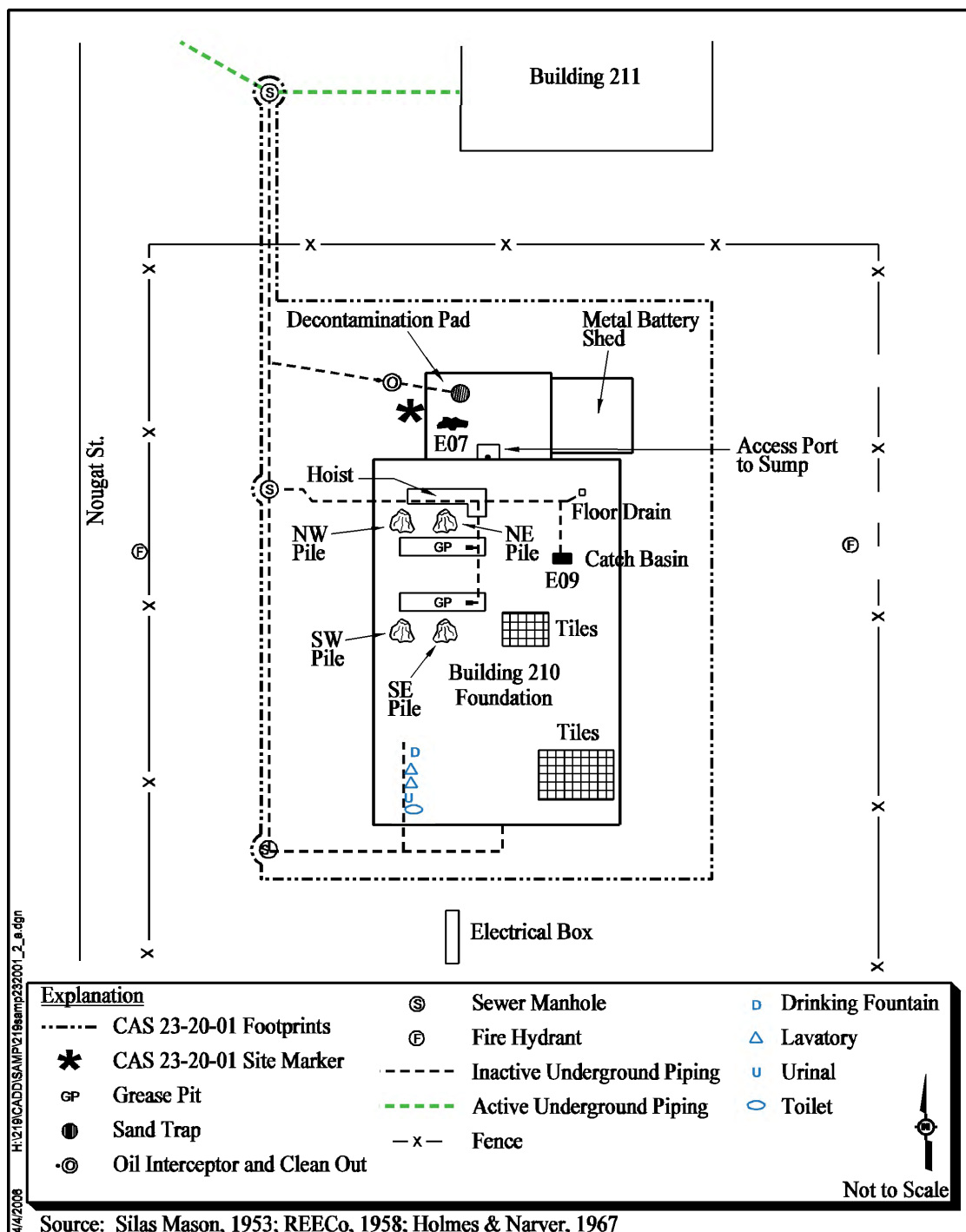


Figure A.7-2
CAS 23-20-01, DNA Motor Pool Sewage and Waste System

A.7.4.1 CAS 03-11-01, Steam Pipes and Asbestos Tiles

All of the surface debris was inventoried and surveyed before disposal. No exceedances of waste disposal criteria were observed.

A.7.4.2 CAS 16-04-01, Septic Tanks (3)

Eight waste characterization samples (including one FD) of liquid and sludge were collected from four locations at this CAS (T.A. #1, T.A. #3, T.A. #4, and T.A. #5) and analyzed for the constituents listed in [Table A.4-1](#). The analytical results for waste management samples collected at this CAS that were detected above MDCs are presented [Table A.7-1](#). All analytical data were reviewed to determine a recommended waste disposal path for the waste streams present. The liquid in the septic tanks was the only media removed and it was managed as a sanitary waste at the lagoons in Area 23 of the NTS as discussed in [Appendix D](#). All other constituents were less than FALs.

Table A.7-1
Waste Management Samples Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 1 of 8)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
T.A. #3 (Center Septic Tank)	219B501	Liquid	Chromium	0.0036 (B)	mg/L
			Silver	0.00086 (B)	mg/L
			1, 4-DiChlorobenzene	12	µg/L
			Chlorobenzene	17	µg/L
			Ethylbenzene	1.2 (J)	µg/L
			Toluene	0.55 (J)	µg/L
			1, 4-DiChlorobenzene	21	µg/L
			Bis(2-Ethylhexyl)Phthalate	2 (J)	µg/L
			Gross Beta	41.7	pCi/L
T.A. #1 (East Septic Tank)	219B502	Liquid	Arsenic	0.0062 (B)	mg/L
			Acetone	16 (J)	µg/L
			Bis(2-Ethylhexyl)Phthalate	1.7 (J)	µg/L
			Gross Beta	34	pCi/L

Table A.7-1
Waste Management Samples Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 2 of 8)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
T.A. #3 (Center Septic Tank)	219B503	Sludge	Bismuth-214	1.26 (G, J)	pCi/g
			Cesium-137	0.66 (G)	pCi/g
			Lead-212	1.94 (J)	pCi/g
			Arsenic	5.3	mg/kg
			Barium	130	mg/kg
			Beryllium	1.4	mg/kg
			Cadmium	1.1	mg/kg
			Chromium	13	mg/kg
			Lead	37	mg/kg
			TCLP Arsenic	0.037 (B)	mg/L
			TCLP Lead	0.022 (B)	mg/L
			Mercury	0.15	mg/kg
			Gasoline-Range Organics	52 (H)	mg/kg
			Diesel-Range Organics	2,800 (H, M)	mg/kg
			4,4'-DDD	2,300 (J)	µg/kg
			4,4'-DDE	2,700 (J)	µg/kg
			4,4'-DDT	200 (J)	µg/kg
			Alpha-Chlordane	1,400 (J)	µg/kg
			Chlordane	9,100 (J)	µg/kg
			Gamma-Chlordane	2,100 (J)	µg/kg
			Aroclor-1260	420 (J)	µg/kg
			1, 4-DiChlorobenzene	4,700	µg/kg
			Chlorobenzene	270 (J)	µg/kg
			Naphthalene	310 (J)	µg/kg
			Styrene	84 (J)	µg/kg
			TCLP Chlorobenzene	0.014 (J)	mg/L
			1, 4-DiChlorobenzene	4,700	µg/kg
			2-Methylnaphthalene	1,200	µg/kg
			Anthracene	42 (J)	µg/kg
			Benzo(a)Anthracene	430 (J)	µg/kg
			Benzo(a)Pyrene	490 (J)	µg/kg
			Benzo(b)Fluoranthene	560 (J)	µg/kg

Table A.7-1
Waste Management Samples Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 3 of 8)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
T.A. #3 (Center Septic Tank) (cont.)	219B503 (cont.)	Sludge	Benzo(g,h,i)Perylene	210 (J)	µg/kg
			Benzo(k)Fluoranthene	300 (J)	µg/kg
			Bis(2-Ethylhexyl)Phthalate	1,000	µg/kg
			Chrysene	510 (J)	µg/kg
			Fluoranthene	510 (J)	µg/kg
			Indeno(1,2,3-cd)Pyrene	200 (J)	µg/kg
			Naphthalene	220 (J)	µg/kg
			Phenanthrene	160 (J)	µg/kg
			Pyrene	650 (J)	µg/kg
			TCLP 1,4-DiChlorobenzene	0.0083 (J)	mg/L
	219B503RR1	Sludge	1,2,4-Trimethylbenzene	120	µg/kg
			1,2-Dichlorobenzene	54	µg/kg
			1,3,5-Trimethylbenzene	40	µg/kg
			2-Butanone	16 (J)	µg/kg
			Acetone	55	µg/kg
			Carbon Disulfide	1.9 (J)	µg/kg
			Ethylbenzene	2.8 (J)	µg/kg
			N-Butylbenzene	29	µg/kg
			N-Propylbenzene	2.9 (J)	µg/kg
			P-Isopropyltoluene	39	µg/kg
T.A. #1 (East Septic Tank)	219B504	Sludge	Sec-Butylbenzene	8.6 (J)	µg/kg
			Toluene	2.2 (J)	µg/kg
			Actinium-228	2.14 (G, TI)	pCi/g
			Cesium-137	0.86 (G)	pCi/g
			Lead-212	1.6 (J)	pCi/g
			Arsenic	7.6	mg/kg
			Barium	190	mg/kg
			Beryllium	2.7	mg/kg
			Cadmium	0.21 (J-)	mg/kg
			Chromium	23	mg/kg
			Lead	47	mg/kg
			TCLP Arsenic	0.049 (B)	mg/L

Table A.7-1
Waste Management Samples Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 4 of 8)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
T.A. #1 (East Septic Tank) (cont.)	219B504 (cont.)	Sludge	Mercury	0.1 (J-)	mg/kg
			Diesel-Range Organics	83 (M)	mg/kg
			4,4'-DDD	550 (J)	µg/kg
			4,4'-DDE	900 (J)	µg/kg
			4,4'-DDT	72 (J)	µg/kg
			Alpha-Chlordane	240 (J)	µg/kg
			Chlordane	1,700 (J)	µg/kg
			Gamma-Chlordane	400 (J)	µg/kg
			Aroclor-1260	160 (J)	µg/kg
			1,2-DiChlorobenzene	12 (J)	µg/kg
			1, 4-DiChlorobenzene	5.5 (J)	µg/kg
			Benzo(a)Anthracene	120 (J)	µg/kg
			Benzo(a)Pyrene	110 (J)	µg/kg
			Benzo(b)Fluoranthene	150 (J)	µg/kg
			Bis(2-Ethylhexyl)Phthalate	310 (J)	µg/kg
			Chrysene	98 (J)	µg/kg
			Fluoranthene	110 (J)	µg/kg
			Pyrene	120 (J)	µg/kg
T.A. #5 (West Septic Tank)	219B505	Liquid	Arsenic	0.0036 (B)	mg/L
			Cadmium	0.00089 (B)	mg/L
			Gross Beta	23.2	pCi/L
			Lead	0.0022 (B)	mg/L
			1, 4-DiChlorobenzene	11	µg/L
			Chlorobenzene	12	µg/L
			Toluene	1.5 (J)	µg/L
			1, 4-DiChlorobenzene	9 (J)	µg/L
	219B506	Sludge	Lead-212	2.1 (J)	pCi/g
			Lead-214	0.96 (G, J)	pCi/g
			Thallium-208	0.59 (G)	pCi/g
			Arsenic	5	mg/kg
			Barium	100	mg/kg
			Beryllium	1.3	mg/kg

Table A.7-1
Waste Management Samples Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 5 of 8)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
T.A. #5 (West Septic Tank) (cont.)	219B506 (cont.)	Sludge	Chromium	13	mg/kg
			Lead	23	mg/kg
			TCLP Chromium	0.0058 (B)	mg/L
			Mercury	0.087	mg/kg
			Diesel-Range Organics	240 (M)	mg/kg
			4,4'-DDD	490 (J)	µg/kg
			4,4'-DDE	400 (J)	µg/kg
			4,4'-DDT	30 (J)	µg/kg
			Alpha-Chlordane	190 (J)	µg/kg
			Chlordane	1,300 (J)	µg/kg
			Gamma-Chlordane	360 (J)	µg/kg
			Aroclor-1260	230	µg/kg
			1, 4-DiChlorobenzene	110	µg/kg
			Chlorobenzene	12	µg/kg
			1, 4-DiChlorobenzene	680 (J)	µg/kg
			Benzo(a)Anthracene	130 (J)	µg/kg
			Benzo(a)Pyrene	180 (J)	µg/kg
			Benzo(b)Fluoranthene	220 (J)	µg/kg
			Benzo(k)Fluoranthene	98 (J)	µg/kg
			Bis(2-Ethylhexyl)Phthalate	2,300	µg/kg
			Chrysene	140 (J)	µg/kg
			Fluoranthene	150 (J)	µg/kg
			Pyrene	190 (J)	µg/kg
T.A. #4 (Center Septic Tank)	219B507	Sludge	Cesium-137	1.6 (G)	pCi/g
			Lead-212	2.14 (J)	pCi/g
			Thallium-208	0.49 (G)	pCi/g
			Arsenic	14	mg/kg
			Barium	180	mg/kg
			Chromium	29 (J)	mg/kg
			Lead	58	mg/kg
			TCLP Selenium	0.036 (B)	mg/L
			Mercury	0.73	mg/kg

Table A.7-1
Waste Management Samples Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 6 of 8)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
T.A. #4 (Center Septic Tank) (cont.)	219B507 (cont.)	Sludge	Gasoline-Range Organics	82 (H)	mg/kg
			Diesel-Range Organics	2,600 (J)	mg/kg
			4,4'-DDD	400 (J)	µg/kg
			4,4'-DDE	1,100 (J)	µg/kg
			4,4'-DDT	260 (J)	µg/kg
			Alpha-Chlordane	650 (J)	µg/kg
			Chlordane	3,400 (J)	µg/kg
			Gamma-Chlordane	710 (J)	µg/kg
			Aroclor-1260	1,000 (J)	µg/kg
			1, 4-DiChlorobenzene	3,600	µg/kg
			1, 4-DiChlorobenzene	5,200 (J)	µg/kg
			2-Methylnaphthalene	3,300 (J)	µg/kg
			Benzo(a)Anthracene	420 (J)	µg/kg
			Benzo(a)Pyrene	500 (J)	µg/kg
			Benzo(b)Fluoranthene	790 (J)	µg/kg
			Bis(2-Ethylhexyl)Phthalate	6,100 (J)	µg/kg
			Naphthalene	480 (J)	µg/kg
			Pyrene	830 (J)	µg/kg
			TCLP 1,4-DiChlorobenzene	0.01 (J)	mg/L
	219B507RR1	Sludge	1,2,4-TRIMethylbenzene	290	µg/kg
			1,2-DiChlorobenzene	730	µg/kg
			1,3,5-TRIMethylbenzene	100	µg/kg
			2-Butanone	92 (J)	µg/kg
			Acetone	200 (J)	µg/kg
			Carbon Disulfide	16 (J)	µg/kg
			Naphthalene	570	µg/kg
			N-Butylbenzene	110	µg/kg
			P-Isopropyltoluene	130	µg/kg
	219B508	Sludge	Cesium-137	1.75 (G)	pCi/g
			Lead-212	1.51 (J)	pCi/g
			Thallium-208	0.58 (G)	pCi/g

Table A.7-1
Waste Management Samples Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 7 of 8)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
T.A. #4 (Center Septic Tank) (cont.)	219B508 (cont.)	Sludge	Arsenic	8.9	mg/kg
			Barium	260	mg/kg
			Cadmium	4.6	mg/kg
			Chromium	19 (J)	mg/kg
			Lead	73	mg/kg
			TCLP Arsenic	0.036 (B)	mg/L
			Mercury	0.49	mg/kg
			Gasoline-Range Organics	69	mg/kg
			Diesel-Range Organics	2,600 (H, M)	mg/kg
			4,4'-DDD	860 (J)	µg/kg
			4,4'-DDE	1,200 (J)	µg/kg
			4,4'-DDT	230 (J)	µg/kg
			Alpha-Chlordane	860 (J)	µg/kg
			Chlordane	5,000 (J)	µg/kg
			Gamma-Chlordane	1,000 (J)	µg/kg
			Aroclor-1260	1,000 (J)	µg/kg
			1, 4-DiChlorobenzene	5,300	µg/kg
			1, 4-DiChlorobenzene	4,500 (J)	µg/kg
			2-Methylnaphthalene	3,900 (J)	µg/kg
			Benzo(a)Anthracene	650 (J)	µg/kg
			Benzo(a)Pyrene	850 (J)	µg/kg
			Benzo(b)Fluoranthene	770 (J)	µg/kg
			Bis(2-Ethylhexyl)Phthalate	1,200 (J)	µg/kg
			Chrysene	630 (J)	µg/kg
			Fluoranthene	930 (J)	µg/kg
			Naphthalene	400 (J)	µg/kg
			Phenanthrene	470 (J)	µg/kg
			Pyrene	1,300 (J)	µg/kg
			TCLP 1,4-Dichlorobenzene	0.0095 (J)	mg/L
	219B508RR1	Sludge	1,2,4-Trimethylbenzene	300	µg/kg
			1,2-Dichlorobenzene	710	µg/kg
			1,3,5-Trimethylbenzene	100	µg/kg

Table A.7-1
Waste Management Samples Detected Above
MDCs at CAS 16-04-01, Septic Tanks (3)
(Page 8 of 8)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
T.A. #4 (Center Septic Tank) (cont.)	219B508RR1 (cont.)	Sludge	2-Butanone	160 (J)	µg/kg
			Acetone	430	µg/kg
			Carbon Disulfide	30 (J)	µg/kg
			Naphthalene	510	µg/kg
			N-Butylbenzene	130	µg/kg
			P-Isopropyltoluene	160	µg/kg

µg/kg = Micrograms per kilogram
µg/L = Micrograms per liter
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
pCi/g = Picocuries per gram
T.A. = Tank Access

B = Value less than the contract required detection limit, but greater than or equal to the instrument detection limit.
J = Estimated value.
J- = The result is an estimated quantity, but the result may be biased low.
G = Sample density differs by more than 15% of laboratory control sample density.
H = Fuel pattern in the heavier end of retention time window.
M = A pattern resembling motor oil was detected.
TI = Nuclide identified is tentative.

A.7.4.3 CAS 23-20-01, DNA Motor Pool Sewage and Waste System

Six waste characterization samples of fill (NW Pile, NE Pile, SW Pile, and SE Pile), sludge (location E09), and concrete (location E07) were collected at this CAS and analyzed for the constituents listed in [Table A.5-1](#). The analytical results for waste management samples collected at this CAS that were reported at concentrations above the MDCs are presented [Table A.7-2](#). All analytical data were reviewed to determine a recommended waste disposal path for the waste streams present.

The sludge collected from inside the catch basin (location E09) was characterized as a hydrocarbon waste based on TCLP results. The sludge was removed during the corrective action conducted at the CAS and disposed of in the Hydrocarbon Landfill in Area 6 of the NTS.

The samples collected from the NE, NW, SE, and SW piles were used to characterize the media as a hydrocarbon waste. Approximately 2 cubic yards of the debris from the grease pits and the asbestos-containing tiles were removed from the site during the corrective action and disposed of at the U-10c landfill in Area 6 of the NTS as discussed in [Appendix D](#).

Table A.7-2
Waste Management Samples Detected Above
MDCs at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 1 of 7)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
E07	219E501	Concrete	Lead-214	0.55 (J)	pCi/g
			Lead	5.9	mg/kg
			Lithium	4.4	mg/kg
			Nickel	2.7	mg/kg
			Arsenic	7.8	mg/kg
			Barium	41	mg/kg
			Beryllium	0.19 (J-)	mg/kg
			Chromium	4.1	mg/kg
			TCLP Arsenic	0.034 (B)	mg/L
			Mercury	0.0026 (J-)	mg/kg
			Gasoline-Range Organics	0.06 (J)	mg/kg
			Ethylene Glycol	1,000,000 (J)	µg/kg
			Diesel-Range Organics	430 (H, M)	mg/kg
			Aroclor-1260	13 (J)	µg/kg
			Toluene	1.3 (J)	µg/kg
			Acetone	15 (J)	µg/kg
			Naphthalene	3.2 (J)	µg/kg
			Phenanthrene	140 (J)	µg/kg
			Naphthalene	27 (J)	µg/kg
			2-Methylnaphthalene	590	µg/kg
E09	219E502	Sludge	Actinium-228	3.3 (G)	pCi/g
			Bismuth-214	1.7 (J, G)	pCi/g
			Thallium-208	0.66 (G)	pCi/g
			Lead-214	1.93 (J, G)	pCi/g
			Lead-212	3.04 (J)	pCi/g
			Lead	1700	mg/kg
			Lithium	22	mg/kg
			Nickel	19	mg/kg
			Silver	0.48 (B)	mg/kg
			Arsenic	12	mg/kg
			Barium	640	mg/kg

Table A.7-2
Waste Management Samples Detected Above
MDCs at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 2 of 7)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
E09 (cont.)	219E502 (cont.)	Sludge	Beryllium	1.1 (J-)	mg/kg
			Cadmium	5.7	mg/kg
			Chromium	140	mg/kg
			Selenium	1 (B)	mg/kg
			TCLP Lead	2.6	mg/L
			Arsenic	0.03 (B)	mg/L
			Selenium	0.042 (J-)	mg/L
			Mercury	0.2	mg/kg
			Gasoline-Range Organics	37 (H)	mg/kg
			Diesel-Range Organics	170 (H, M, Z)	mg/kg
			Aroclor-1260	320 (J)	µg/kg
			Aroclor-1254	510 (J)	µg/kg
			Ethylbenzene	67 (J)	µg/kg
			N-Propylbenzene	19 (J)	µg/kg
			N-Butylbenzene	24 (J)	µg/kg
			1,3,5-Trimethylbenzene	58 (J)	µg/kg
			Toluene	17 (J)	µg/kg
			Chlorobenzene	2.8 (J)	µg/kg
			1,2,4-Trichlorobenzene	6.3 (J)	µg/kg
			M+P-Xylene	220 (J)	µg/kg
			Acetone	100 (J)	µg/kg
			Benzene	10 (J)	µg/kg
			2-Butanone	22 (J)	µg/kg
			Naphthalene	24 (J)	µg/kg
			O-Xylene	91 (J)	µg/kg
			1,2,4-Trimethylbenzene	140 (J)	µg/kg
			Isopropylbenzene	3.9 (J)	µg/kg
			P-Isopropyltoluene	5.9 (J)	µg/kg
			Bis(2-Ethylhexyl)Phthalate	45,000	µg/kg
			Di-N-Octyl Phthalate	1,200 (J)	µg/kg
			Pyrene	570 (J)	µg/kg
			Benzo(b)Fluoranthene	570 (J)	µg/kg
			Benzo(a)Pyrene	290 (J)	µg/kg

Table A.7-2
Waste Management Samples Detected Above
MDCs at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 3 of 7)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
E09 (cont.)	219E502 (cont.)	Sludge	Di-N-Butyl Phthalate	660 (J)	µg/kg
			Butyl Benzyl Phthalate	5,000 (J)	µg/kg
			Naphthalene	290 (J)	µg/kg
			2-Methylnaphthalene	420 (J)	µg/kg
NE Pile	219E503	Solid	Bismuth-214	0.49 (G, J)	pCi/g
			Lead-214	0.52 (G, J)	pCi/g
			Lead-212	0.54 (J)	pCi/g
			Lead	110	mg/kg
			Lithium	9.3	mg/kg
			Nickel	5.1	mg/kg
			Arsenic	5.2	mg/kg
			Barium	84	mg/kg
			Cadmium	0.15 (J-)	mg/kg
			Chromium	11	mg/kg
			Mercury	0.1	mg/kg
			Diesel-Range Organics	97 (M, Z)	mg/kg
			Aroclor-1260	13 (J)	µg/kg
			Bis(2-Ethylhexyl)Phthalate	100 (J)	µg/kg
			Anthracene	210 (J)	µg/kg
			Pyrene	1,300	µg/kg
			Dibenzofuran	68 (J)	µg/kg
			Benzo(g,h,i)Perylene	270 (J)	µg/kg
			Indeno(1,2,3-cd)Pyrene	270 (J)	µg/kg
			Benzo(b)Fluoranthene	760	µg/kg
			Fluoranthene	1,100	µg/kg
			Benzo(k)Fluoranthene	380	µg/kg
			Chrysene	630	µg/kg
			Benzo(a)Pyrene	610	µg/kg
			Benzo(a)Anthracene	560	µg/kg
			Acenaphthene	120 (J)	µg/kg
			Phenanthrene	860	µg/kg
			Fluorene	110 (J)	µg/kg

Table A.7-2
Waste Management Samples Detected Above
MDCs at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 4 of 7)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
NE Pile (cont.)	219E503 (cont.)	Solid	Carbazole	120 (J)	µg/kg
			Naphthalene	30 (J)	µg/kg
NW Pile	219E504	Solid	Lead-214	0.55 (J)	pCi/g
			Lead-212	0.5	pCi/g
			Lead	110	mg/kg
			Lithium	10	mg/kg
			Nickel	5.4	mg/kg
			Arsenic	5.7	mg/kg
			Barium	92	mg/kg
			Cadmium	0.088 (J-)	mg/kg
			Chromium	22	mg/kg
			Mercury	0.067	mg/kg
			Diesel-Range Organics	100 (M, Z)	mg/kg
			Aroclor-1260	25 (J)	µg/kg
			Naphthalene	2.6 (J)	µg/kg
			TCLP Lead	0.017 (B)	mg/L
			Bis(2-Ethylhexyl)Phthalate	600	µg/kg
			Anthracene	830	µg/kg
			Dibenzofuran	240 (J)	µg/kg
			Benzo(b)Fluoranthene	3,100 (J)	µg/kg
			Benzo(k)Fluoranthene	1,300 (J)	µg/kg
			Chrysene	2,500	µg/kg
			Benzo(a)Pyrene	2,400 (J)	µg/kg
			Dibenzo(a,h)Anthracene	270 (J)	µg/kg
			Benzo(a)Anthracene	2,200	µg/kg
			Acenaphthene	490	µg/kg
			Di-N-Butyl Phthalate	36 (J)	µg/kg
			Fluorene	420	µg/kg
			Carbazole	520	µg/kg
			Naphthalene	210 (J)	µg/kg
			2-Methylnaphthalene	74 (J)	µg/kg

Table A.7-2
Waste Management Samples Detected Above
MDCs at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 5 of 7)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
NW Pile (cont.)	219E504RR1	Solid	Pyrene	4,000	µg/kg
			Benzo(g,h,i)Perylene	840 (J)	µg/kg
			Indeno(1,2,3-cd)Pyrene	900 (J)	µg/kg
			Fluoranthene	4,200	µg/kg
			Phenanthrene	3,200	µg/kg
SE Pile	219E505	Solid	Bismuth-214	0.68 (J)	pCi/g
			Lead-214	0.64 (J)	pCi/g
			Lead-212	0.46	pCi/g
			Lead	38	mg/kg
			Lithium	7.5	mg/kg
			Nickel	4.7	mg/kg
			Arsenic	3.9	mg/kg
			Barium	67	mg/kg
			Cadmium	0.22 (J-)	mg/kg
			Chromium	6.7	mg/kg
			TCLP Lead	0.028 (B)	mg/L
			Mercury	0.041	mg/kg
			Diesel-Range Organics	91 (M, Z)	mg/kg
			Chlordane	270 (J)	µg/kg
			4,4'-DDT	31 (J)	µg/kg
			Alpha-Chlordane	32 (J)	µg/kg
			Gamma-Chlordane	29 (J)	µg/kg
			4,4'-DDD	14 (J)	µg/kg
			4,4'-DDE	3.6 (J)	µg/kg
			Aroclor-1260	24 (J)	µg/kg
			Toluene	1.2 (J)	µg/kg
			Bis(2-Ethylhexyl)Phthalate	470	µg/kg
			Dibenzofuran	280 (J)	µg/kg
			Benzo(g,h,i)Perylene	1,100 (J)	µg/kg
			Indeno(1,2,3-cd)Pyrene	1,100 (J)	µg/kg
			Dibenzo(a,h)Anthracene	310 (J)	µg/kg
			Acenaphthene	560	µg/kg

Table A.7-2
Waste Management Samples Detected Above
MDCs at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 6 of 7)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
SE Pile (cont.)	219E505 (cont.)	Solid	Carbazole	460	µg/kg
			2-Methylnaphthalene	90 (J)	µg/kg
	219E505RR1	Solid	Anthracene	800	µg/kg
			Pyrene	5,000	µg/kg
			Benzo(b)Fluoranthene	2,800 (J)	µg/kg
			Fluoranthene	4,100	µg/kg
			Benzo(k)Fluoranthene	1,300 (J)	µg/kg
			Chrysene	2,400	µg/kg
			Benzo(a)Pyrene	2,100 (J)	µg/kg
			Benzo(a)Anthracene	2,100	µg/kg
			Phenanthrene	3,300	µg/kg
			Fluorene	470	µg/kg
			Naphthalene	210	µg/kg
SW Pile	219E506	Solid	Lead-214	0.44 (J)	pCi/g
			Lead	130	mg/kg
			Lithium	7.2	mg/kg
			Nickel	4.9	mg/kg
			Arsenic	4.1	mg/kg
			Barium	93	mg/kg
			Cadmium	0.34 (J-)	mg/kg
			Chromium	19	mg/kg
			TCLP Lead	0.098	mg/L
			TCLP Cadmium	0.0029 (J-)	mg/L
			Mercury	0.074	mg/kg
			Diesel-Range Organics	130 (Z, M)	mg/kg
			Chlordane	260 (J)	µg/kg
			4,4'-DDT	24 (J)	µg/kg
			Alpha-Chlordane	25 (J)	µg/kg
			Gamma-Chlordane	30 (J)	µg/kg
			4,4'-DDD	14 (J)	µg/kg
			Aroclor-1260	48 (J)	µg/kg
			Aroclor-1254	250	µg/kg

Table A.7-2
Waste Management Samples Detected Above
MDCs at CAS 23-20-01, DNA Motor Pool Sewage and Waste Systems
(Page 7 of 7)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Units
SW Pile (cont.)	219E506	Solid	Toluene	1.1 (J)	µg/kg
			Bis(2-Ethylhexyl)Phthalate	200 (J)	µg/kg
			Dibenzofuran	260 (J)	µg/kg
			Benzo(g,h,i)Perylene	1,100 (J)	µg/kg
			Indeno(1,2,3-cd)Pyrene	1,000 (J)	µg/kg
			Dibenzo(a,h)Anthracene	340 (J)	µg/kg
			Benzo(a)Anthracene	3,100	µg/kg
			Acenaphthene	610	µg/kg
			Fluorene	500	µg/kg
			Carbazole	540	µg/kg
			Naphthalene	210 (J)	µg/kg
			2-Methylnaphthalene	87 (J)	µg/kg
			219E506RR1	Anthracene	910
	Pyrene			7,400	µg/kg
	Benzo(b)Fluoranthene			5,000 (J)	µg/kg
	Fluoranthene			6,800	µg/kg
	Benzo(k)Fluoranthene			2,100 (J)	µg/kg
	Chrysene			3,400	µg/kg
	Benzo(a)Pyrene			3,200 (J)	µg/kg
	Phenanthrene		4,000	µg/kg	

µg/kg = Micrograms per kilogram
mg/kg = Milligrams per kilogram
mg/L = Milligrams per liter
pCi/g = Picocuries per gram

B = Value less than the contract required detection limit, but greater than or equal to the instrument detection limit.
G = Sample density differs by more than 15% of laboratory control sample density.
H = Fuel pattern in the heavier end of retention time window.
J = Estimated value.
J- = The result is an estimated quantity, but the result may be biased low.
M = A pattern resembling motor oil was detected.
Z = Result did not resemble any common total petroleum hydrocarbons products.

A.8.0 Quality Assurance

This section contains a summary of QA/QC measures implemented during the sampling and analysis activities conducted in support of the CAU 219 CAI. The following sections discuss the data validation process, QC samples, and nonconformances. A detailed evaluation of the DQIs is presented in [Appendix B](#).

Laboratory analyses were conducted for samples used in the decision-making process to provide a quantitative measurement of any COPCs present. Rigorous QA/QC was implemented for all laboratory samples including documentation, verification and validation of analytical results, and affirmation of DQI requirements related to laboratory analysis. Detailed information regarding the QA program is contained in the Industrial Sites QAPP (NNSA/NV, 2002).

A.8.1 Data Validation

Data validation was performed in accordance with the Industrial Sites QAPP and approved protocols and procedures. All laboratory data from samples collected and analyzed for CAU 219 were evaluated for data quality according to the EPA Functional Guidelines (EPA, 1994 and 1999). These guidelines are implemented in a tiered process and are presented in [Sections A.8.1.1 through A.8.1.3](#). Data were reviewed to ensure that samples were appropriately processed and analyzed, and the results were evaluated using validation criteria. Documentation of the data qualifications resulting from these reviews is retained in project files as a hard copy and electronic media.

One hundred percent of the data analyzed as part of this investigation were subjected to Tier I and Tier II evaluations. A Tier III evaluation was performed on approximately 5 percent of the data analyzed.

A.8.1.1 Tier I Evaluation

Tier I evaluation for chemical and radiochemical analysis examines, but is not limited to:

- Sample count/type consistent with chain of custody.
- Analysis count/type consistent with chain of custody.
- Correct sample matrix.
- Significant problems stated in cover letter or case narrative.

- Completeness of certificates of analysis.
- Completeness of Contract Laboratory Program (CLP) or CLP-like packages.
- Completeness of signatures, dates, and times on chain of custody.
- Condition-upon-receipt variance form included.
- Requested analyses performed on all samples.
- Date received/analyzed given for each sample.
- Correct concentration units indicated.
- Electronic data transfer supplied.
- Results reported for field and laboratory QC samples.
- Whether or not the deliverable met the overall objectives of the project.

A.8.1.2 Tier II Evaluation

Tier II evaluation for chemical and radiochemical analysis examines, but is not limited to:

Chemical:

- Correct detection limits achieved.
- Sample date, preparation date, and analysis date for each sample.
- Holding time criteria met.
- Quality control batch association for each sample.
- Cooler temperature upon receipt.
- Sample pH for aqueous samples, as required.
- Detection limits properly adjusted for dilution, as required.
- Blank contamination evaluated and applied to sample results/qualifiers.
- Matrix spike (MS)/matrix spike duplicate (MSD) percent recoveries and relative percent differences (RPDs) evaluated and qualifiers applied to laboratory results, as necessary.
- Field duplicate RPDs evaluated using professional judgment and qualifiers applied to laboratory results, as necessary.
- Laboratory duplicate RPDs evaluated and qualifiers applied to laboratory results, as necessary.
- Surrogate percent recovery evaluated and qualifiers applied to laboratory results, as necessary.
- Laboratory control sample (LCS) percent recovery evaluated and qualifiers applied to laboratory results, as necessary.
- Initial and continuing calibration evaluated and qualifiers applied to laboratory results, as necessary.
- Internal standard evaluation.

- Mass spectrometer tuning criteria.
- Organic compound quantitation.
- Inductively coupled plasma interference check sample evaluation.
- Graphite furnace atomic absorption QC.
- Inductively coupled plasma serial dilution effects.
- Recalculation of 10 percent of laboratory results from raw data.

Radioanalytical:

- Correct detection limits achieved.
- Blank contamination evaluated and, if significant, qualifiers are applied to sample results.
- Certificate of Analysis consistent with data package documentation.
- Quality control sample results (duplicates, LCSs, laboratory blanks) evaluated and used to determine laboratory result qualifiers.
- Sample results, uncertainty, and MDC evaluated.
- Detector system calibrated with National Institute for Standards and Technology (NIST)-traceable sources.
- Calibration sources preparation was documented, demonstrating proper preparation and appropriateness for sample matrix, emission energies, and concentrations.
- Detector system response to daily or weekly background and calibration checks for peak energy, peak centroid, peak full-width half-maximum, and peak efficiency, depending on the detection system.
- Tracers NIST-traceable, appropriate for the analysis performed, and recoveries that met QC requirements.
- Documentation of all QC sample preparation complete and properly performed.
- Spectra lines, photon emissions, particle energies, peak areas, and background peak areas support the identified radionuclide and its concentration.

A.8.1.3 Tier III

The Tier III review is an independent examination of the Tier II evaluation. A Tier III review of 5 percent of the sample analytical data was performed by TechLaw, Inc., of Lakewood, Colorado.

Tier II and Tier III results were compared and where differences are noted, data were reviewed and changes were made accordingly. This review included the following additional evaluations:

Chemical:

- Recalculation of all laboratory results from raw data.

Radioanalytical:

- QC sample results (e.g., calibration source concentration, percent recovery, and RPD) verified.
- Radionuclides and their concentration validated as appropriate considering their decay schemes, half-lives, and process knowledge and history of the facility and site.
- Each identified line in spectra verified against emission libraries and calibration results.
- Independent identification of spectra lines, area under the peaks, and quantification of radionuclide concentration in a random number of sample results.

A.8.2 Field Quality Control Samples

Field QC samples consisted of 26 trip blanks, three equipment rinsate blanks, four field blanks, one source blank, nine MS/MSDs, and nine FDs collected and submitted for analysis by the laboratory analytical methods shown in [Table A.2-2](#). The QC samples were assigned individual sample numbers and sent to the laboratory “blind.” Additional samples were selected by the laboratory to be analyzed as laboratory duplicates.

Review of the source blank analytical data resulted in one sample collected from the decontamination trailer at CAS 23-20-01 (219E303) that exceeded the MDC for VOCs, and review of the field blank analytical data resulted in one sample from the Area 16 Camp (219B315) that exceeded the MDC for metals and VOCs. Review of the equipment rinsate blank analytical data resulted in one sample from the Area 16 Camp (219B318) that exceeded the MDC for metals and SVOCs, and another from the Area 16 Camp (219B321) that exceeded the MDC for SVOCs only. These exceedances are addressed and accounted for in the Tier II data validation process. Field blanks, source blanks, and equipment rinsates were analyzed for the applicable constituents listed in [Table A.2-2](#), and trip blanks were analyzed for VOCs only.

During the CAI, nine FDs were sent as blind samples to the laboratory to be analyzed for the investigation constituents listed in [Table A.2-2](#). For these samples, the duplicate results precision

(i.e., RPDs between the environmental sample results and their corresponding FD sample results) were evaluated to the guidance set forth in the approved procedures.

A.8.2.1 Laboratory Quality Control Samples

Analysis of method QC blanks were performed on each sample delivery group (SDG) for inorganics. Analysis for surrogate spikes and preparation blanks (PBs) were performed on each SDG for organics only. Initial and continuing calibration and LCSs were performed for each SDG. The results of these analyses were used to qualify associated environmental sample results according to the EPA Functional Guidelines (EPA, 1994 and 1999). Documentation of data qualifications resulting from the application of these guidelines is retained in project files as both hard copy and electronic media.

The laboratory included a PB, LCS, and a laboratory duplicate sample with each batch of field samples analyzed for radionuclides.

A.8.3 Field Nonconformances

There were no field nonconformances identified for the CAI.

A.8.4 Laboratory Nonconformances

Laboratory nonconformances are generally due to inconsistencies in the analytical instrumentation operation, sample preparations, extractions, missed holding times, and fluctuations in internal standard and calibration results. Nine nonconformances were issued by the laboratories that may or may not have resulted in qualifying data. These laboratory nonconformances have been accounted for and resolved during the data qualification process.

A.9.0 Summary

Organics, inorganics, and radionuclide constituents detected in environmental samples during the CAI were evaluated against FALs to determine the nature and extent of COCs for CAU 219. Assessment of the data generated from investigation activities indicates that FALs were exceeded for at CASs 16-04-01 and 23-20-01 before closure activities. The following summarizes the results for each CAS.

CAS 03-11-01, Steam Pipes and Asbestos Tiles

Based on the observations made and the analytical results of the environmental samples collected at this CAS, no COCs are present at this CAS.

CASs 16-04-01, Septic Tanks (3); 16-04-02, Distribution Box; and 16-04-03, Sewer Pipes

Based on the observations made and the analytical results of the environmental samples collected, no COCs are present at these CASs.

CAS 23-20-01, DNA Motor Pool Sewage and Waste System

Based on field observations and the analytical results of environmental samples, PCBs, chlordane, lead, and benzo(a)pyrene were identified as COCs at this CAS. Although PAHs were detected at concentrations exceeding their respective FALs, the source of PAH contamination identified at the CAS is attributed to the presence of asphalt in the surface soil around the pad and in the fill inside the grease pits and not activities associated with the sewage and waste system with the exception of the sludge in the catch basin. All of the soil and sludge containing COCs were removed during the corrective action conducted at this CAS and disposed of in the Hydrocarbon Landfill in Area 6 of the NTS. Verification sampling confirmed that COCs are no longer present at the CAS.

CAS 23-20-02, Injection Well

Based on the observations made and the analytical results of the environmental samples collected, no COCs are present in the soils at this CAS.

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Appendix B

Data Assessment

B.1.0 Data Assessment

The DQA process is the scientific evaluation of the actual investigation results to determine whether the DQO criteria established in the CAU 219 CAIP (NNSA/NSO, 2005) were met and whether DQO decisions can be resolved at the desired level of confidence. The DQO process ensures that the right type, quality, and quantity of data will be available to support the resolution of those decisions at an appropriate level of confidence. Using both the DQO and DQA processes help to ensure that DQO decisions are sound and defensible.

The DQA involves five steps that begin with a review of the DQOs and end with an answer to the DQO decisions. The five steps are briefly summarized as follows:

Step 1: Review DQOs and Sampling Design – Review the DQO process to provide context for analyzing the data. State the primary statistical hypotheses, confirm the limits on decision errors for committing false negative (Type I) or false positive (Type II) decision errors, and review any special features, potential problems, or any deviations to the sampling design.

Step 2: Conduct a Preliminary Data Review – A preliminary data review should be performed by reviewing QA reports and inspecting the data both numerically and graphically, validating and verifying the data to ensure that the measurement systems performed in accordance with the criteria specified, and using the validated dataset to determine whether the quality of the data is satisfactory.

Step 3: Select the Test – Select the test based on the population of interest, population parameter, and the hypotheses. Identify the key underlying assumptions that could cause a change in one of the DQO decisions.

Step 4: Verify the Assumptions – Perform tests of assumptions. If data are missing or are censored, determine the impact on DQO decision error.

Step 5: Draw Conclusions from the Data – Perform the calculations required for the test.

B.1.1 Review DQOs and Sampling Design

This section contains a review of the DQO process presented in Appendix A of the CAU 219 CAIP (NNSA/NSO, 2005). The DQO decisions are presented with the DQO provisions to limit false negative or false positive decision errors. Special features, potential problems, or any deviations to the sampling design are also presented.

B.1.1.1 Decision I

The Decision I statement as presented in the CAU 219 CAIP: “Is a contaminant present within a CAS at a concentration that could pose an unacceptable risk to human health and the environment.”

Decision I Rules:

- If the population parameter of any COPC in a target population exceeds the FAL for that COPC, then that COPC is identified as a COC.
- If a COC is detected, then the Decision II statement must be resolved.
- If COCs are not identified, then the investigation is complete.

Population Parameter: The maximum observed sample result

B.1.1.1.1 DQO Provisions To Limit False Negative Decision Error

A false negative decision error (where consequences are more severe) was controlled by meeting the following criteria:

1. Having a high degree of confidence that locations selected will identify COCs if present anywhere within the CAS.
2. Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.
3. Having a high degree of confidence that the dataset is of sufficient quality and completeness.

Criterion 1:

The following methods (stipulated in the CAU 219 DQOs [NNSA/NSO, 2005]) were used in selecting sample locations.

1. Selection of sampling locations associated with field screening results was accomplished by analyzing samples for TPH-DRO using a gas chromatograph, VOCs using a photoionization detector, alpha and beta/gamma emitting radionuclides using a handheld NE Technology Electra, and gamma emitting radionuclides using a gamma spectrometer.
2. Selection of sampling locations associated with breaches in piping was accomplished by performing a video survey of the pipes.
3. Selection of sampling locations associated with surface and subsurface staining, presence of debris, topography (i.e., low points), and similar items was accomplished by visual field observations.
4. Selection of sampling locations associated with outfalls was accomplished by identifying the following three areas:
 - A: At the discharge point of the outfall
 - B: Upgradient locations within washes
 - C: Downgradient from the discharge (may be multiple locations based on COCs)
5. Selection of sampling locations associated with professional judgment based on acceptable knowledge was accomplished by:
 - Source and location of release
 - Chemical nature and fate properties
 - Physical transport pathways and properties
 - Transport drivers

Criterion 2:

All samples were analyzed using the analytical methods listed in Table A.3-3 of the CAIP and for the chemical and radiological constituents listed in Table A.3-4 of the CAIP. [Table B.1-1](#) provides a reconciliation of samples analyzed to the planned analytical program.

Sample results were assessed against the acceptance criterion for the DQI of sensitivity as defined in the Industrial Sites QAPP (NNSA/NV, 2002). The sensitivity acceptance criterion defined in the CAIP is that analytical detection limits will be less than the corresponding action level. This criterion

Table B.1-1
CAU 219 Analyses Performed

Corrective Action Site	Analytes								
	Total VOCs	Total SVOCs	PCBs	Metals	TPH-DRO	TPH-GRO	Pesticides	Ethylene Glycol	Gamma Spectroscopy
03-11-01	--	--	--	RS	--	--	--	--	RS
16-04-01	RS	RS	RS	RS	RS	RS	S	--	RS
16-04-02	RS	RS	RS	RS	RS	RS	S	--	RS
16-04-03	RS	RS	RS	RS	RS	RS	S	--	RS
23-20-01	RS	RS	RS	RS	RS	RS	S	RS	RS
23-20-02	RS	RS	RS	RS	RS	RS	--	RS	RS

DRO = Diesel-range organics
GRO = Gasoline-range organics
PCB = Polychlorinated biphenyl
SVOC = Semivolatile organic compound
TPH = Total petroleum hydrocarbons

RS = Required and submitted
R = Required but not submitted
S = Not required but submitted
-- = Not required

was not achieved for the analytical results listed in [Table B.1-2](#). Results not meeting the sensitivity acceptance criterion will not be used in making DQO decisions and will therefore be considered as rejected data. The impact on DQO decisions is addressed in the assessment of completeness.

Table B.1-2
Analytes Failing Sensitivity Criteria
(Page 1 of 2)

Sample Number	Parameter	Minimum Detectable Concentration	Final Action Level	Units
219D009	Aldrin	410	100	µg/kg
219D020	Aldrin	500	100	µg/kg
219E020	Aldrin	500	100	µg/kg
219E021	Aldrin	490	100	µg/kg
219D009	Aroclor-1260	830	740	µg/kg
219D010	Aroclor-1260	810	740	µg/kg
219D011	Aroclor-1260	820	740	µg/kg
219D020	Aroclor-1260	800	740	µg/kg
219D009	Dieldrin	140	110	µg/kg

Table B.1-2
Analytes Failing Sensitivity Criteria
(Page 2 of 2)

Sample Number	Parameter	Minimum Detectable Concentration	Final Action Level	Units
219E020	Dieldrin	170	110	µg/kg
219E021	Dieldrin	170	110	µg/kg
219D003	Toxaphene	1,800	1,600	µg/kg
219D004	Toxaphene	1,800	1,600	µg/kg
219D005	Toxaphene	1,800	1,600	µg/kg
219D007	Toxaphene	3,500	1,600	µg/kg
219D008	Toxaphene	1,700	1,600	µg/kg
219D009	Toxaphene	14,000	1,600	µg/kg
219D011	Toxaphene	1,800	1,600	µg/kg
219D018	Toxaphene	3,500	1,600	µg/kg
219D020	Toxaphene	8,700	1,600	µg/kg
219E020	Toxaphene	18,000	1,600	µg/kg
219E021	Toxaphene	17,000	1,600	µg/kg

µg/kg = Micrograms per kilogram

Criterion 3:

To satisfy the third criterion, the entire dataset, as well as individual sample results, were assessed against the acceptance criteria for the DQIs of precision, accuracy, comparability, completeness, and representativeness, as defined in the Industrial Sites QAPP (NNSA/NV, 2002). The DQI acceptance criteria are presented in Table 6-1 of the CAU 219 CAIP (NNSA/NSO, 2005). As presented in [Tables B.1-2](#) through [B.1-5](#), these criteria were met for each of the DQIs.

Precision

For the purpose of determining the data precision of chemical analyses, the relative percent difference between duplicate analyses was calculated. [Table B.1-3](#) provides the chemical and radiological precision analysis results for all constituents that were qualified for precision. The chemical analytes qualified for precision were lead, chromium, benzo(a)pyrene, benzo(b)fluoranthene,

benzo(g,h,i)perylene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. The only radionuclides qualified for precision was thorium (Th)-227.

Table B.1-3
Precision Measurements

Parameter	User Test Panel	Number of Analytes Qualified	Number of Measurements Performed	Percent within Criteria
Benzo(a)Pyrene	EPA8270	1	98	99.0
Benzo(b)Fluoranthene	EPA8270	1	98	99.0
Benzo(g,h,i)Perylene	EPA8270	1	98	99.0
Benzo(k)Fluoranthene	EPA8270	1	98	99.0
Dibenzo(a,h)Anthracene	EPA8270	1	98	99.0
Indeno(1,2,3-cd)Pyrene	EPA8270	1	98	99.0
Lead	EPA6010	6	99	93.9
Chromium	EPA6010	7	99	92.9
Thorium-227	HASL300	9	98	90.8

EPA = U.S. Environmental Protection Agency, SW-846 methods (EPA, 1999 and 2002)
HASL = Health and Safety Laboratory

As shown in [Table B.1-3](#), the precision rate for the two metals, six semivolatile organics, and Th-227 were above the CAIP acceptance criterion of 80 percent. The precision rate for all other constituents is 100 percent. As the precision rate for all constituents exceeds the acceptance criteria for precision, the dataset is determined to be acceptable for the DQI of precision.

Accuracy

For the purpose of determining data accuracy of sample analyses, environmental soil samples were evaluated and incorporated into the accuracy calculation. [Table B.1-4](#) provides the chemical accuracy analysis results for all constituents qualified for accuracy. Accuracy rates are above the CAIP criterion of 80 percent for all chemical analytes except pesticides. The pesticides were qualified for high surrogate recoveries (bias high), which indicates that the associated samples may have been reported at concentrations higher than actual. This inaccuracy could impact a DQO decision by causing a false positive decision error. However, this did not occur at CAU 219 because the concentrations of samples that were biased high did not exceed FALs. As the accuracy rate for all other constituents exceed the acceptance criteria for accuracy, the dataset is determined to be

acceptable for the DQI of accuracy. All radiological data met the CAIP criterion of 80 percent for accuracy.

Table B.1-4
Accuracy Measurements
(Page 1 of 2)

Parameter	CAS Number	User Test Panel	Number of Analytes Qualified	Number of Measurements Performed	Percent within Criteria
1,2,4-TRICHLOROBENZENE	120-82-1	SVOCs	1	98	99
1,2,4-TRIMETHYLBENZENE	95-63-6	VOCS	1	97	99
1,3,5-TRIMETHYLBENZENE	108-67-8	VOCS	1	97	99
2,3,4,6-TETRACHLOROPHENOL	58-90-2	SVOCs	2	98	98
2,4,5-TRICHLOROPHENOL	95-95-4	SVOCs	2	98	98
2,4,6-TRICHLOROPHENOL	88-06-2	SVOCs	2	98	98
2,4-DICHLOROPHENOL	120-83-2	SVOCs	2	98	98
2,4-DIMETHYLPHENOL	105-67-9	SVOCs	2	98	98
2,4-DINITROPHENOL	51-28-5	SVOCs	2	98	98
2-BUTANONE	78-93-3	VOCs	1	97	99
2-CHLOROPHENOL	95-57-8	SVOCs	2	98	98
2-METHYLPHENOL	95-48-7	SVOCs	2	98	98
2-NITROPHENOL	88-75-5	SVOCs	2	98	98
3+4-METHYLPHENOL	108-39-4	SVOCs	2	95	97.9
4,4'-DDD	72-54-8	Pesticides	7	80	91.3
4,4'-DDE	72-55-9	Pesticides	17	81	79
4,4'-DDT	50-29-3	Pesticides	18	80	77.5
4,6-DINITRO-2-METHYLPHENOL	534-52-1	SVOCs	2	98	98
4-CHLORO-3-METHYLPHENOL	59-50-7	SVOCs	2	98	98
4-NITROPHENOL	100-02-7	SVOCs	2	98	98
ACETONE	67-64-1	VOCs	1	97	99
ALPHA-CHLORDANE	5103-71-9	Pesticides	17	80	78.8
AROCLOR-1016	12674-11-2	PCBs	7	103	93.2
AROCLOR-1221	11104-28-2	PCBs	7	103	93.2
AROCLOR-1232	11141-16-5	PCBs	7	103	93.2
AROCLOR-1242	53469-21-9	PCBs	7	103	93.2
AROCLOR-1248	12672-29-6	PCBs	7	103	93.2
AROCLOR-1254	11097-69-1	PCBs	7	103	93.2
AROCLOR-1260	11096-82-5	PCBs	7	103	93.2
BENZENE	71-43-2	VOCs	1	97	99

Table B.1-4
Accuracy Measurements
(Page 2 of 2)

Parameter	CAS Number	User Test Panel	Number of Analytes Qualified	Number of Measurements Performed	Percent within Criteria
BENZOIC ACID	65-85-0	SVOCs	2	98	98
CHLORDANE	12789-03-6	Pesticides	19	81	76.5
CHLOROBENZENE	108-90-7	VOCs	2	97	97.9
Diesel Range Organics	68334-30-5	DRO	1	95	98.9
ENDRIN ALDEHYDE	7421-93-4	Pesticides	1	80	98.8
ETHYLBENZENE	100-41-4	VOCs	1	97	99
GAMMA-CHLORDANE	5103-74-2	Pesticides	18	80	77.5
GASOLINE RANGE ORGANICS	8006-61-9	GRO	11	96	88.5
ISOPROPYLBENZENE	98-82-8	VOCs	1	97	99
M+P-XYLENE	136777-61-2	VOCs	1	97	99
MERCURY	7439-97-6	Metals	6	99	93.9
NAPHTHALENE	91-20-3	SVOCs	1	98	99
N-BUTYLBENZENE	104-51-8	VOCs	1	97	99
N-PROPYLBENZENE	103-65-1	VOCs	1	97	99
O-XYLENE	95-47-6	VOCs	1	97	99
PENTACHLOROPHENOL	87-86-5	SVOCs	2	98	98
PHENOL	108-95-2	SVOCs	2	98	98
P-ISOPROPYLTOLUENE	99-87-6	VOCs	1	97	99
SILVER	7440-22-4	Metals	6	99	93.9
TOLUENE	108-88-3	VOCs	2	97	97.9
TRICHLOROETHENE	79-01-6	VOCs	1	97	99

CAS = Chemical Abstract Services
DRO = Diesel-range organics
GRO = Gasoline-range organics
PCB = Polychlorinated biphenyl
SVOC = Semivolatile organics
VOC = Volatile organics

Representativeness

The DQO process as identified in Appendix A of the CAU 219 CAIP (NNSA/NSO, 2005) was used to address sampling and analytical requirements for CAU 219. During this process, appropriate locations were selected that enabled the samples collected to be representative of the population parameters identified in the DQO (the most likely locations to contain contamination and locations

that bound COCs). The sampling locations identified in the Criterion 1 discussion meet this criteria. Therefore, the analytical data acquired during the CAU 219 CAI are considered representative of the population parameters.

Comparability

Field sampling, as described in the CAU 219 CAIP (NNSA/NSO, 2005), was performed and documented in accordance with approved procedures that are comparable to standard industry practices. Approved analytical methods and procedures per DOE were used to analyze, report, and validate the data. These are comparable to other methods used not only in industry and government practices, but most importantly are comparable to other investigations conducted for the NTS. Therefore, project datasets are considered comparable to other datasets generated using these same standardized DOE procedures, thereby meeting DQO requirements.

Also, standard, approved field and analytical methods ensured that data were appropriate for comparison to the investigation action levels specified in the CAIP.

Completeness

The CAU 219 CAIP (NNSA/NSO, 2005) defines acceptable criteria for completeness to be 80 percent of CAS-specific non-critical analytes identified in the CAIP having valid results and 100 percent of critical analytes (including Decision II samples) having valid results. Also, the dataset must be sufficiently complete to be able to make the DQO decisions. Critical analytes for CAU 219 are identified as lead, chlordane, and the hazardous constituents of TPH-DRO where a Tier 2 evaluation was required.

Rejected data (either qualified as rejected or data that failed the criterion of sensitivity) were not used in the resolution of DQO decisions and are not counted toward meeting the completeness acceptance criterion. [Table B.1-5](#) provides the rejected data for the site. Completeness rates are above the CAIP criterion of 80 percent for all chemical and radiological analytes. All data for critical analytes for CAU 219 are within the acceptable criteria (i.e., 100 percent).

**Table B.1-5
Rejected Measurements**

Parameter	CAS Number	User Test Panel	Number of Analytes Qualified	Number of Measurements Performed	Percent within Criteria
BENZO(B)FLUORANTHENE	205-99-2	SVOCs	1	98	99
BENZO(A)PYRENE	50-32-8	SVOCs	1	98	99
4-NITROPHENOL	100-02-7	SVOCs	2	98	98
2,4-DIMETHYLPHENOL	105-67-9	SVOCs	2	98	98
3+4-METHYLPHENOL	108-39-4	SVOCs	2	95	98
PHENOL	108-95-2	SVOCs	2	98	98
2,4-DICHLOROPHENOL	120-83-2	SVOCs	2	98	98
BENZO(G,H,I)PERYLENE	191-24-2	SVOCs	2	98	98
INDENO(1,2,3-CD)PYRENE	193-39-5	SVOCs	2	98	98
BENZO(K)FLUORANTHENE	207-08-9	SVOCs	2	98	98
2,4-DINITROPHENOL	51-28-5	SVOCs	2	98	98
4,6-DINITRO-2-METHYLPHENOL	534-52-1	SVOCs	2	98	98
2,3,4,6-TETRACHLOROPHENOL	58-90-2	SVOCs	2	98	98
4-CHLORO-3-METHYLPHENOL	59-50-7	SVOCs	2	98	98
BENZOIC ACID	65-85-0	SVOCs	2	98	98
PENTACHLOROPHENOL	87-86-5	SVOCs	2	98	98
2,4,6-TRICHLOROPHENOL	88-06-2	SVOCs	2	98	98
2-NITROPHENOL	88-75-5	SVOCs	2	98	98
2-METHYLPHENOL	95-48-7	SVOCs	2	98	98
2-CHLOROPHENOL	95-57-8	SVOCs	2	98	98
2,4,5-TRICHLOROPHENOL	95-95-4	SVOCs	2	98	98
DIELDRIN	60-57-1	Pesticides	3	80	96
ALDRIN	309-00-2	SVOCs	4	80	95
AROCLOR-1260	11096-82-5	PCBs	4	103	96
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	SVOCs	6	98	94
TOXAPHENE	8001-35-2	Pesticides	13	88	85
DIBENZO(A,H)ANTHRACENE	53-70-3	SVOCs	14	98	86

CAS = Chemical Abstract Services
PCB = Polychlorinated biphenyl
SVOC = Semivolatile organic compound

B.1.1.1.2 DQO Provisions To Limit False Positive Decision Error

The false positive decision error was controlled by assessing the potential for false positive analytical results. Quality assurance/QC samples such as field blanks, trip blanks, LCSs, and method blanks were used to determine whether a false positive analytical result may have occurred. Of 34 QA/QC samples submitted, no false positive analytical results were detected.

Proper decontamination of sampling equipment and the use of certified clean sampling equipment and containers also minimized the potential for cross contamination that could lead to a false positive analytical result.

B.1.1.2 Decision II

Decision II as presented in the CAU 219 CAIP: “If a COC is present, is sufficient information available to evaluate appropriate corrective action alternatives?”

Decision Rules:

- If the observed concentration of any COC in a Decision II sample exceeds the PALs, then additional samples will be collected to complete the determination of the extent.
- If observed COC concentrations in a sample from all bounding directions are less than the PALs, then the decision will be that the extent of contamination has been defined in the lateral and/or vertical direction.
- If wastes are to be generated as part of a corrective action, samples will be collected to sufficiently characterize the potential wastes.

Population Parameters – The population parameters for Decision II data will be the observed concentration of each unbounded COC in any sample or the observed concentration of each sample used to characterize the potential waste streams.

B.1.1.2.1 DQO Provisions To Limit False Negative Decision Error

A false negative decision error (where consequences are more severe) is controlled by meeting the following criteria:

1. Having a high degree of confidence that the sample locations selected will identify the extent of the COCs.
2. Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.
3. Having a high degree of confidence that the dataset is of sufficient quality and completeness.
4. Having a high degree of confidence that the potential waste streams are characterized.

Criterion 1:

In general, soil sample results demonstrated that the vertical and lateral extent of COCs were defined. Due to the fact that the PCB and pesticide contaminated surface soil at CAS 23-20-01 is underlain by a layer of asphalt and laterally bound by the limited extent of the soil surrounding the pad (i.e., up to 12 ft from the pad), no areas were identified as requiring further delineation of COCs.

Criterion 2:

All samples were analyzed for the COCs present at the corresponding CAS:

- CAS 23-20-01: PCB-1260
- CAS 23-20-01: PCB-1254
- CAS 23-20-01: Chlordane

The second criterion for extent (sensitivity) was accomplished for all analyses as demonstrated in [Table B.1-2](#).

Criterion 3:

To satisfy the third criterion for extent, the entire dataset, as well as individual sample results, were assessed against the DQIs of precision, accuracy, comparability, completeness, and representativeness, as defined in the Industrial Sites QAPP (NNSA/NV, 2002). The DQI discussion is presented under Criteria 3 for Decision I.

B.1.1.2.2 DQO Provisions To Limit False Positive Decision Error

The false positive decision error was controlled by assessing the potential for false positive analytical results. Quality assurance/QC samples such as field blanks, trip blanks, LCSs, and method blanks were used to determine whether a false positive analytical result may have occurred. Of 34 QA/QC samples submitted, no false positive analytical results were detected.

Proper decontamination of sampling equipment and the use of certified clean sampling equipment and containers also minimized the potential for cross contamination that could lead to a false positive analytical result.

B.1.1.3 Sampling Design

The CAIP made the following commitments for sampling:

1. Random sampling will be conducted at CAS 23-20-01.

Result: All random sample locations designated by the Visual Sample Plan were collected and analyzed for the appropriate COPCs.

2. Biased locations will have soil samples collected beneath and/or adjacent to collection and distribution systems to identify releases of contaminants and investigate the integrity of collection features, tanks, and piping.

Result: All collection and distribution system components at each CAS, except 03-11-01 and 23-20-02, were investigated by excavation and soil samples were collected adjacent to and from beneath the required components such as collection features, tanks, junctions in piping, and system outfalls. Corrective Action Site 03-11-01 does not contain a collection and distribution system, and the potential collection feature at CAS 23-20-02 is inaccessible due to surrounding utility lines.

B.1.2 Conduct a Preliminary Data Review

A preliminary data review was conducted by reviewing QA reports and inspecting the data. The contract analytical laboratories generate a QA non-conformance report when data quality does not meet contractual requirements. All data received from the analytical laboratories met contractual requirements, and a QA non-conformance report was not generated. Data were validated and verified to ensure that the measurement systems performed in accordance with the criteria specified. The validated dataset quality was found to be satisfactory.

B.1.3 Select the Test and Identify Key Assumptions

The test for making DQO Decision I was the comparison of the maximum analyte result from each CAS to the corresponding FAL. The test for making DQO Decision II was the comparison of all COC analyte results from each bounding sample to the corresponding FALs.

The key assumptions that could impact a DQO decision are listed in [Table B.1-6](#).

**Table B.1-6
Key Assumptions**

Exposure Scenario	Site workers are only exposed to contaminants of concern (COCs) through oral ingestion, inhalation, external exposure to radiation, or dermal contact (by absorption) of COCs absorbed onto the soils. Exposure to contamination is limited to industrial site workers, construction/remediation workers, and military personnel conducting training. The investigation results did not reveal any potential exposures than those identified in the conceptual site models (CSMs).
Affected Media	Surface soil, shallow subsurface soil, and potentially perched (shallow) groundwater. Deep groundwater contamination is not a concern. Contaminants migrating to regional aquifers are not considered. The investigation results did not reveal any affected media other than those identified in the CSMs.
Location of Contamination/ Release Points	The area of contamination is contiguous The extent of COC concentration decreases away from the area of contamination. The investigation results did not reveal any locations of contamination or release points other than those identified in the CSMs.
Transport Mechanisms	Surface transport may occur as a result of a spill or storm water runoff. Surface transport beyond shallow substrate is not a concern. The investigation results did not reveal any transport mechanisms other than those identified in the CSMs.
Preferential Pathways	None. The investigation results did not reveal any preferential pathways other than those identified in the CSMs.
Lateral and Vertical Extent of Contamination	Subsurface contamination, if present, is contiguous and decreases with distance and depth from the source. Surface contamination may occur laterally as a result of a spill or storm water runoff. The investigation results did not reveal any lateral and vertical extent of contamination other than those identified in the CSMs.
Groundwater impacts	None. The investigation results did not reveal groundwater impacts other than those identified in the CSMs.
Future Land Use	Nonresidential. The investigation results did not reveal any future land uses other than those identified in the CSMs.

B.1.4 Verify the Assumptions

The results of the investigation support the key assumptions identified in the CAU 219 DQOs and [Table B.1-6](#) except as listed below:

- Exception: At CAS 23-20-01, the CSM could not account for the release of PCBs to the surface soil surrounding the main concrete pad at one location that had no biasing factors. In response, eight additional samples were collected from this surface soil.
- Impact: No impact to the CSM.

All data collected during the CAI supported CSMs with the exceptions noted in this section. These exceptions did not invalidate the CSMs presented in the CAIP, nor did they necessitate revisions to the CSMs.

B.1.4.1 Other DQO Commitments

The CAIP made the following commitments for sampling:

- If a COPC is identified in a Decision I sample at a concentration that exceeds the corresponding action level, then additional Decision II samples will be collected to determine the vertical and lateral extent of the contamination.

Result: Although Decision I samples from the surface soil surrounding the main concrete pad at CAS 23-20-01 identified contaminants at concentrations exceeding the corresponding action levels, no Decision II samples were collected. This was due to the contaminants being bounded vertically by the underlying asphalt and laterally by the limited extent of the soil around the building.

B.1.5 Results

This section resolves the two DQO decisions for each of the CAU 219 CASs.

B.1.5.1 Decision Rules for Decision I

Decision Rule: If the concentration of any COPC in a target population exceeds the FAL for that COPC during the initial investigation, then that COPC is identified as a COC and Decision II sampling will be conducted.

Result: The following COCs were identified in the following CASs.

- CAS 23-20-01: PCB-1260
- CAS 23-20-01: PCB-1254
- CAS 23-20-01: Chlordane

Decision Rule: If all COPC concentrations are less than the corresponding FALs, then the decision will be no further action.

Result: No COCs were identified in samples collected from CASs 03-11-01, 16-04-01, 16-04-02, 16-04-03, and 23-20-02. No further action was identified as the recommended corrective action alternative for these CASs.

B.1.5.2 Decision Rules for Decision II

Decision Rule: If the observed concentration of any COC in a Decision II sample exceeds the FALs, then additional samples will be collected to complete the determination of the extent.

Result: Although COCs were identified at CAS 23-20-01, no Decision II samples were collected.

Decision Rule: If all observed COC population parameters are less than the FALs, then the decision will be that the extent of contamination has been defined in the lateral and/or vertical direction.

Result: Although some COC population parameters exceeded the FALs, bounding the vertical and lateral extent of contamination at CAS 23-20-01 was not necessary because it was assumed that the entire soil volume was impacted by releases that occurred at the site.

B.2.0 References

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Appendix C

Evaluation of Risk

C.1.0 Evaluation of Risk

This section contains documentation of the ASTM Method E1739-95 risk-based corrective action process as applied to CAU 219 (ASTM, 1995). Method E1739-95 defines three tiers (or levels) in evaluating DQO decisions involving increasingly sophisticated analyses:

- Tier 1 – sample results from source areas (highest concentrations) compared to risk-based screening levels (RBSLs) (i.e., PALs) based on generic (non-site-specific) conditions.
- Tier 2 – sample results from exposure points compared to SSTLs calculated using site-specific inputs and Tier 1 formulas (from the ASTM procedure).
- Tier 3 – sample results from exposure points compared to SSTLs and points of compliance calculated using chemical fate/transport and probabilistic modeling.

The risk-based corrective action decision process stipulated in ASTM Method E1739-95 is summarized in [Figure C.1-1](#).

C.1.1 Scenario

Corrective Action Unit 219, Septic Systems and Injection Wells, consists of the following six inactive sites within Area 3, Area 6, and Area 23 of the NTS:

- 03-11-01, Steam Pipes and Asbestos Tiles
- 16-04-01, Septic Tanks (3)
- 16-04-02, Distribution Box
- 16-04-03, Sewer Pipes
- 23-20-01, DNA Motor Pool Sewage and Waste System
- 23-20-02, Injection Well

Corrective Action Site 03-11-01, Steam Pipes and Asbestos Tiles, is located at the former Area 3 Subdock. The CAS consists of housekeeping debris found on or near a concrete pad. The debris is comprised of asbestos-containing floor tiles, steam pipe pieces wrapped in insulation, a 15-ft rubber hose, and miscellaneous metal. The Area 3 Subdock was used as a support facility for REEC drilling activities, and was in operation from the 1970s through 1985 when it was relocated to Area 1. All of the buildings have since been demolished, and only the concrete pads remain. Corrective Action Site 03-11-01 consists of surface debris on or near one of these concrete pads.

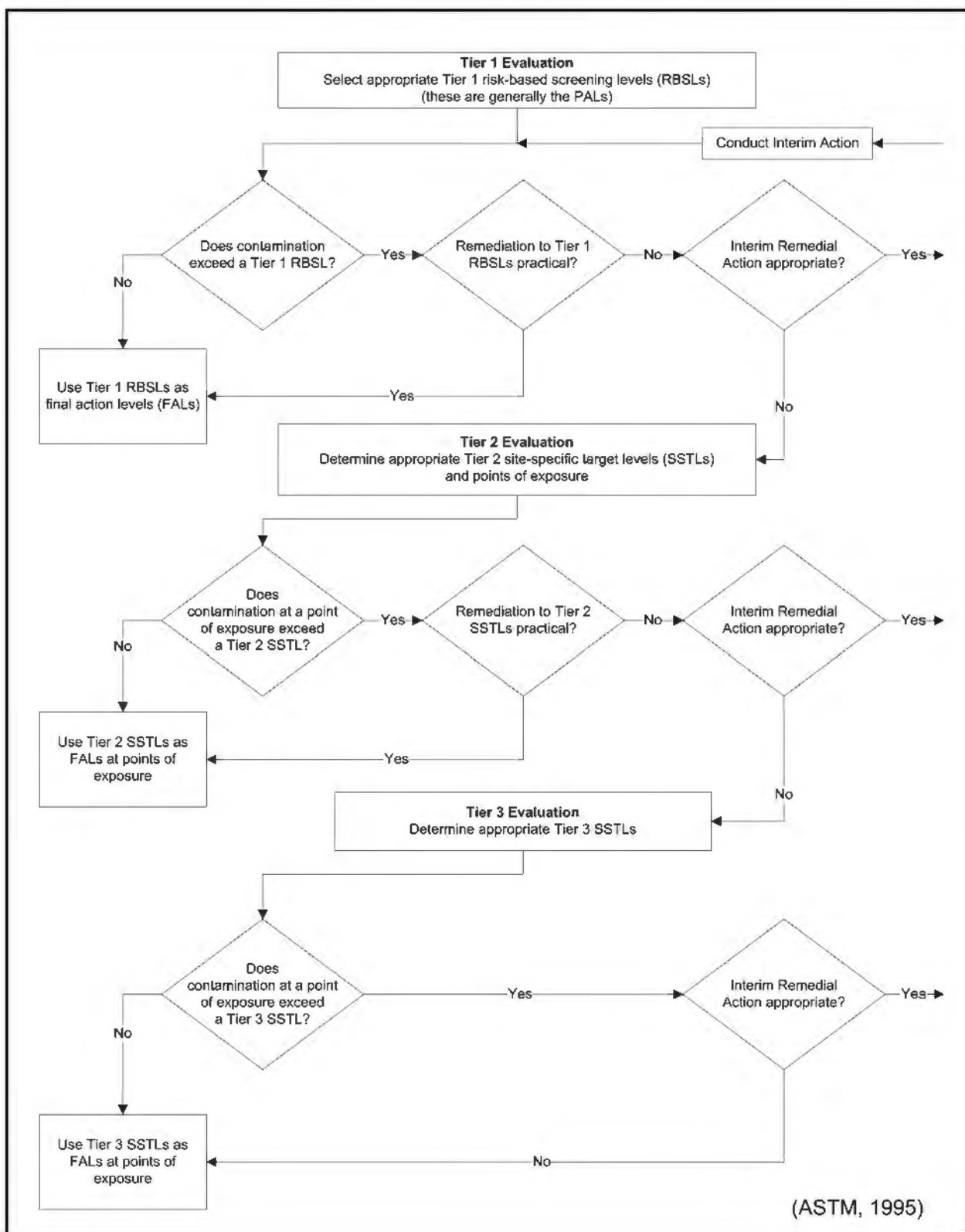


Figure C.1-1
Risk-Based Corrective Action Decision Process

Corrective Action Sites 16-04-01, Septic Tanks (3); 16-04-02, Distribution Box; and 16-04-03, Sewer Pipes, comprise the septic system that serviced the former Area 16 Camp. The system contains a drainage channel and sump excavation downgradient of the outfall in addition to the distribution box, three septic tanks, and associated piping. The Area 16 Camp was used to house the Area 16 Tunnel workers and was in operation from the early 1960s through the late 1960s. All of the trailers have since been removed, leaving only the septic system.

Corrective Action Site 23-20-01, DNA Motor Pool Sewage and Waste System, consists of the interconnected sewage and waste system at the former DNA Motor Pool, Building 210. The system is comprised of two grease pits, a catch basin, a floor drain, an oil interceptor, a sand trap inside the decontamination pad, a sump beneath the decontamination pad, and the associated piping. The DNA Motor Pool was built in 1952 and was employed for vehicle maintenance activities until 1991, when it became a storage facility for nonhazardous waste. Building 210 was demolished in 2001 and only the concrete foundation, the decontamination pad, and the metal battery shed remain.

Corrective Action Site 23-20-02, Injection Well, consists of a collection feature believed to be an injection well at the former REECO Motor Pool, the original Building 132. The REECO Motor Pool was built in 1952 and used for basic vehicle maintenance. When the motor pool was moved in 1965 to its current location, the building and its foundation were demolished. The area is currently an active storage yard south of the Building 160 Warehouse.

C.1.2 Site Assessment

The CAI at CAS 03-11-01 involved the removal and disposal of surface debris identified in the CAIP. All of the surface debris was inventoried and surveyed before disposal, before and after photographs of the site were taken, and a Sectored Housekeeping Site Closure Verification Form was completed. Surface soil samples were then collected beneath the steam pipe pieces for verification purposes. No COCs were identified in the surface soil at CAS 03-11-01.

The CAI at CASs 16-04-01, 16-04-02, and 16-04-03 involved visual inspection through video-mole survey and/or excavation and soil sampling adjacent to and/or beneath structural components identified in the CAIP as potential sources for contaminant releases. The CAI results indicate residual materials are present in the septic tanks; however, the structural integrity of the effluent

collection/distribution system components (e.g., tanks, piping) are intact and not currently releasing contaminants to the surrounding environment. No COCs were identified in the soils surrounding the distribution box, the three tanks, or downgradient of the outfall.

The CAI at CAS 23-20-01 involved visual inspections through video-mole survey and excavation and soil sampling adjacent to and/or beneath structural components identified in the CAIP as potential sources for contaminant releases. The CAI results indicate COCs (specifically PCB-1254, PCB-1254, and chlordane) are present in the surface soil around the main concrete pad. Due to the underlain asphalt layer and the fact that PCBs and pesticides are very immobile, it is believed that the migration of the soil contaminants from these locations has been minimal. The source, release point, and nature and extent of the COCs are consistent with the CSM presented in the CAIP. In addition, lead and benzo(a)pyrene were identified as COCs in the sludge in the catch basin of this CAS; however, these constituents were limited to the concrete box inside the collection feature.

The CAI at CAS 23-20-02 involved locating anomalies through geophysical surveys. The soil was sampled near the anomaly of higher probability to account for any potential contaminant releases. The CAI results of the subsurface soil indicate that COCs are not present near this anomaly.

The maximum concentration of constituent identified at each CAS, and their corresponding PALs are presented in [Table C.1-1](#).

C.1.3 Site Classification and Initial Response Action

The four major site classifications listed in Table 3 of the ASTM Standard are: (1) immediate threat to human health, safety, and the environment; (2) short-term (0 to 2 years) threat to human health, safety, and the environment; (3) long-term (greater than 2 years) threat to human health, safety, or the environment; and (4) no demonstrated long-term threats.

Based on the CAI, none of the CASs present an immediate threat to human health, safety, and the environment; therefore, no interim response actions are necessary at these sites. The CAI demonstrated that the contamination present at the various CASs within CAU 219 is limited to the points of release (e.g., edges of the concrete pad, the concrete box of the catch basin). The results further showed that there has been limited migration away from the source of the contamination.

Table C.1-1
Maximum Reported Value for Tier I Comparison
(Page 1 of 3)

CAS No.	Parameter	Preliminary Action Level	Units	Maximum Reported Value			
				03-11-01	16-04-01, 16-04-02, 16-04-03	23-20-01	23-20-02
7440-38-2	Arsenic	23	mg/kg	6.1	9.6	20	4
7440-39-3	Barium	67,000	mg/kg	370	180	210	69
7440-41-7	Beryllium	1,900	mg/kg	0.82	1.2	0.52	--
7440-43-9	Cadmium	450	mg/kg	4.1	--	2.9	--
7440-47-3	Chromium	450	mg/kg	34	13	30	6.2
7439-92-1	Lead	750	mg/kg	820	28	670	4.6
7439-97-6	Mercury	310	mg/kg	0.091	0.043	0.55	--
7782-49-2	Selenium	5,100	mg/kg	--	1.3	--	--
7440-22-4	Silver	5,100	mg/kg	0.22	0.11	0.92	--
67-64-1	Acetone	6,000,000	µg/kg	--	12	--	--
120-82-1	1,2,4-Trichlorobenzene	3,000,000	µg/kg	--	--	1.2	--
95-63-6	1,2,4-Trimethylbenzene	170,000	µg/kg	--	--	2.7	--
75-09-2	Methylene Chloride	21,000	µg/kg	--	--	--	9.1
99-87-6	P-Isopropyltoluene	2,000,000	µg/kg	--	2	--	--
100-42-5	Styrene	1,700,000	µg/kg	--	1.4	4.1	--
127-18-4	Tetrachloroethene	3,400	µg/kg	--	1	3.4	--
108-67-8	1,3,5 Trimethylbenzene	70,000	µg/kg	--	100	58	--
103-65-1	N-Propylbenzene	240,000	µg/kg	--	2.9	19	--
100-41-4	Ethylbenzene	400,000	µg/kg	--	--	67	--
71-43-2	Benzene	1,400	µg/kg	--	--	10	--
1330-20-7	Xylene	420,000	µg/kg	--	--	311	--
104-51-8	N-Butylbenzene	240,000	µg/kg	--	130	24	--
108-88-3	Toluene	520,000	µg/kg	--	5	17**	--
58-90-2	2,3,4,6-Tetrachlorophenol	18,000,000	µg/kg	--	--	24	--
91-57-6	2-Methylnaphthalene	190,000	µg/kg	--	3,900**	590**	--
83-32-9	Acenaphthene	29,000,000	µg/kg	--	--	1,000	--

Table C.1-1
Maximum Reported Value for Tier I Comparison
(Page 2 of 3)

CAS No.	Parameter	Preliminary Action Level	Units	Maximum Reported Value			
				03-11-01	16-04-01, 16-04-02, 16-04-03	23-20-01	23-20-02
120-12-7	Anthracene	100,000,000	µg/kg	--	--	1,500	--
56-55-3	Benzo(A)Anthracene	2,100	µg/kg	--	650**	6,100*	--
50-32-8	Benzo(A)Pyrene	210	µg/kg	--	850**	6,800*	--
205-99-2	Benzo(B)Fluoranthene	2,100	µg/kg	--	25	9,700*	--
191-24-2	Benzo(G,H,I)Perylene	29,000,000	µg/kg	--	--	3,400	--
207-08-9	Benzo(K)Fluoranthene	21,000	µg/kg	--	--	4,400	--
117-81-7	Bis(2-Ethylhexyl) Phthalate	120,000	µg/kg	--	1,000	1,700	--
85-68-7	Butyl Benzyl Phthalate	100,000,000	µg/kg	--	--	330	--
86-74-8	Carbazole	86,000	µg/kg	--	--	1,200	--
218-01-9	Chrysene	210,000	µg/kg	--	--	6,600	--
53-70-3	Dibenzo(A,H) Anthracene	210	µg/kg	--	--	890*	--
132-64-9	Dibenzofuran	3,100,000	µg/kg	--	--	390	--
84-74-2	Di-N-Butyl Phthalate	100,000,000	µg/kg	--	--	750	--
117-84-0	Di-N-Octyl Phthalate	25,000,000	µg/kg	--	--	59	--
206-44-0	Fluoranthene	22,000,000	µg/kg	--	--	12,000	--
86-73-7	Fluorene	26,000,000	µg/kg	--	--	750	--
193-39-5	Indeno(1,2,3-Cd)Pyrene	2,100	µg/kg	--	--	3,200	--
91-20-3	Naphthalene	190,000	µg/kg	--	570**	290**	--
85-01-8	Phenanthrene	100,000,000	µg/kg	--	--	7,700	--
129-00-0	Pyrene	29,000,000	µg/kg	--	--	8,700	--
68334-30-5	Diesel-Range Organics	100	mg/kg	--	2,800**	320*	--
8006-61-9	Gasoline- Range Organics	100	mg/kg	--	0.52	--	--
11097-69-1	Aroclor-1254	740	µg/kg	--	--	5,400	--
11096-82-5	Aroclor-1260	740	µg/kg	--	1,000**	1,200	--
72-54-8	4,4'-DDD	10,000	µg/kg	--	2,100	87	--

Table C.1-1
Maximum Reported Value for Tier I Comparison
(Page 3 of 3)

CAS No.	Parameter	Preliminary Action Level	Units	Maximum Reported Value			
				03-11-01	16-04-01, 16-04-02, 16-04-03	23-20-01	23-20-02
72-55-9	4,4'-DDE	7,000	µg/kg	--	4,100	13	--
50-29-3	4,4'-DDT	7,000	µg/kg	--	3,200	92	--
12789-03-6	Chlordane	6,500	µg/kg	--	34,000	65,000	--
319-86-8	Delta-BHC	360	µg/kg	--	3.4	0.36	--
959-98-8	Endosulfan I	3,700,000	µg/kg	--	2.6	--	--
33213-65-9	Endosulfan II	3,700,000	µg/kg	--	33	--	--
1031-07-8	Endosulfan Sulfate	3,700,000	µg/kg	--	3	--	--
7421-93-4	Endrin Aldehyde	180,000	µg/kg	--	--	25	--
76-44-8	Heptachlor	380	µg/kg	--	42	0.56	--
1024-57-3	Heptachlor Epoxide	190	µg/kg	--	31	--	--
72-43-5	Methoxychlor	3,100,000	µg/kg	--	--	5	--
14331-83-0	Actinium-228	15	pCi/g	1.37	2.71	--	--
14913-49-6	Bismuth-212	15	pCi/g	--	5.3	--	--
14733-03-0	Bismuth-214	15	pCi/g	--	1.44	--	--
10045-97-3	Cesium-137	12.2	pCi/g	0.49	--	--	--
15092-94-1	Lead-212	15	pCi/g	1.53	2.29	0.84	0.44
15067-28-4	Lead-214	15	pCi/g	1.14	1.44	0.79	0.5
14913-50-9	Thallium-208	15	pCi/g	0.53	0.89	--	--

*Concentration attributed to asphalt present at the CAS and the constituent is not considered to be a contaminant of concern unless otherwise specified in the CAS-specific sections of [Appendix A](#).

**Concentration identified in sample collected from sludge

CAS = Chemical Abstract Services

µg/kg = Micrograms per kilogram

mg/kg = Milligrams per kilogram

pCi/g = Picocuries per gram

-- = No analytical results were above preliminary action levels

A detailed discussion of the nature and extent of contamination is presented in [Appendix A](#) of this report. Based on this information, five of the six CASs are determined to be Classification 4 sites as defined by ASTM Method E1739-95 and pose no demonstrated near- or long-term threats. At

CAS 23-20-01, COCs were identified that may pose long-term threats to human health, safety, or the environment, which leads to the CAS being determined a Classification 3 site as defined by ASTM Method E1739-95.

C.1.4 Development of Tier 1 Look-Up Table of RBSL Selection

Tier 1 action levels have been defined as the PALs established during the DQO process. The PALs are a tabulation of chemical-specific (but not site-specific) screening levels based on the type of media (soil) and potential exposure scenarios (industrial). These are very conservative estimates of risk, are preliminary in nature, and are used as action levels for site screening purposes. Although the PALs are not intended to be used as FALs, a FAL may be defined as the Tier 1 action level (i.e., PAL) value if individual constituent analytical results are below the corresponding Tier 1 action level value. The FAL may also be established as the Tier 1 action level value if individual constituent analytical results exceed the corresponding Tier 1 action level value and implementing a corrective action based on the FAL is practical. The PALs are defined as:

- EPA Region 9 Risk-Based PRGs for Industrial Soils (2004).
- Background concentrations for RCRA metals will be evaluated when natural background exceeds the PAL, as is often the case with arsenic. Background is considered the mean plus two times the standard deviation of the mean based on data published in Mineral and Energy Resource Assessment of the Nellis Air Force Range (NBMG, 1998; Moore, 1999).
- TPH concentrations above the action level of 100 mg/kg per NAC 445A.2272 (NAC, 2003).
- For COPCs without established PRGs, a protocol similar to EPA Region 9 will be used to establish an action level; otherwise, an established PRG from another EPA region may be chosen.
- The PALs for material, equipment, and structures with residual surface contamination are the allowable total residual surface contamination values for unrestricted release of material and equipment listed in the DOE Order 5400.5 (DOE, 1993), which is also Table 4-2 of the NV/YMP Radcon Manual (NNSA/NSO, 2004).
- The PALs for radioactive contaminants are based on the NCRP Report No. 129 recommended screening limits for construction, commercial, industrial land-use scenarios (NCRP, 1999) scaled to 25 millirem per year dose constraint (Appenzeller-Wing, 2004) and the generic guidelines for residual concentration of radionuclides in DOE Order 5400.5 (DOE, 1993).

The PALs were developed based on an industrial scenario. Because the CAU 219 CASs in Areas 3 and 16 are not assigned work stations and are considered to be in occasional use areas, the use of industrial reuse based PALs is conservative. The Tier 1 lookup table is defined as the PAL concentrations or activities defined in the CAIP.

C.1.5 Exposure Pathway Evaluation

The DQOs stated that site workers would only be exposed to COCs through oral ingestion, inhalation, or dermal contact (absorption) due to exposure to potentially contaminated media (i.e., soil) at the CASs. The results of the CAI showed that all COCs identified at CASs within CAU 219 are localized near the release point and have not migrated more than 15 ft vertically or laterally. Because COCs were only identified in the surface soil surrounding the large concrete pad and the sludge in the catch basin is a potential source material (not a COC) at CAS 23-20-01, the only potential exposure pathways would be through worker contact with the contaminated soil or sludge. The limited migration demonstrated by the analytical results, elapsed time since the suspected release, and depth to groundwater supports the selection and evaluation only surface and shallow subsurface contact as the complete exposure pathways. Groundwater is not considered to be a significant exposure pathway.

C.1.6 Comparison of Site Conditions with Tier 1 RBSLs

All analytical results from CAU 219 samples were less than corresponding Tier 1 action levels (i.e., PALS except for those listed in [Table C.1-2](#)).

Table C.1-2
Contaminants of Potential Concern Detected Above Preliminary Action Levels

Corrective Action Site(s)	Lead	Chlordane	TPH-DRO	Benzo(a)pyrene	Aroclor-1260
03-11-01.	X	--	--	--	--
16-04-01, 16-04-02, and 16-04-03.	--	X	X*	X*	X*
23-20-01.	X*	X	X	X	X
23-20-02.	--	--	--	--	--

*Constituent identified in sludge sample(s)

TPH-DRO =Total petroleum hydrocarbons, diesel-range organics
-- = Not detected above preliminary action levels

C.1.7 Evaluation of Tier 1 Results

For all constituents at all CASs not listed in [Table C.1-2](#), the FALs were established as the Tier 1 RBSLs. It was determined that no further action is required for these constituents at these CASs.

Although lead exceeded the PAL of 800 mg/kg at CAS 03-11-01, it is not considered to be a COC at CAS 03-11-01. The lead concentration detected at location A04 is believed to be associated with past site activities conducted at CAS 03-25-01 based on the lead concentrations identified in surface samples collected during the CAU 145 CAI and its close proximity to the CAS itself. Therefore, no COCs are considered to be present at CAS 03-11-01 and the lead contamination identified at location A04 is addressed in the CAU 145 CADD.

Benzo(a)pyrene, TPH-DRO, Aroclor-1260, and chlordane were detected at CAS 16-04-01 at concentrations that exceeded their respective PALs. It was determined that remediation at this CAS was not feasible; therefore, Tier 2 SSTLs will be calculated for these constituents.

Chlordane was detected at CAS 16-04-03 at concentrations that exceeded the PALs. No corrective actions are planned for this CAS; therefore, a Tier 2 SSTL will be calculated for this constituent.

The FALs for the PCBs, chlordane, lead, and PAHs at CAS 23-20-01 were established as the Tier 1 RBSLs. It was determined that a corrective action was practical to address the contaminated material (i.e., soil and sludge) present at the CAS. The soil surrounding the large concrete pad that

was contaminated with PCBs and chlordane was removed and properly disposed of in the Hydrocarbon Landfill in Area 6 of the NTS. The sludge from the catch basin that was contaminated with benzo(a)pyrene, TPH-DRO, and lead and the concrete box inside the collection feature were removed and properly disposed of in the Hydrocarbon Landfill in Area 6 of the NTS. Therefore, no COCs are present at CAS 23-20-01.

C.1.8 Tier 1 Remedial Action Evaluation

Corrective Action Site 03-11-01

No actions are proposed to remediate the lead to the Tier 1 action level under the scope of the CAU 219 CADD/CR. This issue is addressed in the CAU 145 CADD.

Corrective Action Site 16-04-01

No actions are proposed to remediate the benzo(a)pyrene, Aroclor-1260, and chlordane to the Tier 1 action levels; therefore, these constituents were moved to a Tier 2 evaluation.

Corrective Action Site 16-04-02

No actions are proposed to remediate the chlordane to the Tier 1 action level; therefore, this constituent was moved to a Tier 2 evaluation.

Corrective Action Site 16-04-03

A corrective action was conducted at CAS 23-20-01 to remediate PCBs, chlordane, lead, and benzo(a)pyrene to Tier 1 action levels; therefore, the Tier 1 action levels were established as the FALs at this CAS. Additional details regarding the corrective action are presented in Appendix D.

C.1.9 Tier 2 Evaluation

No additional data were needed to complete a Tier 2 evaluation.

C.1.10 Development of Tier 2 Table of Site-Specific Target Levels

Tier 2 SSTLs were calculated for chlordane, Aroclor-1260, and benzo(a)pyrene using site-specific inputs to standard risk procedures contained in the RAIS (ORNL, 2006) located on the website: http://risk.lsd.ornl.gov/cgi-bin/prg/PRG_search. The chlordane-specific risk input parameters used

in the RAIS calculation is from the RAIS chemical-specific database. These parameters were compiled or derived from information found in the Integrated Risk Information System (EPA, 2005) and Health Effects Assessment Summary Tables (EPA, 1997b). The site-specific input parameters used for these calculations were the “NTS standard” parameter values listed in [Table C.1-3](#) for the occasional use area exposure scenario.

Table C.1-3
Site-Specific Input Parameters with Proposed NTS Standard Values

Parameter	Definition	Units	EPA Region 9 Default Value	Exposure Scenario		
				Industrial Area	Remote Work Area	Occasional Use Area
ED	Exposure duration	yr	25	25	25	5 ^a
EF	Exposure frequency	day/yr	250	250	42 ^b	10 ^c
IR	Soil ingestion rate	kg/day	0.0001	0.00005 ^a	0.00005 ^d	0.00005 ^d
foc	Fraction organic carbon in soil	g/g	0.006	0.001 ^b	0.001 ^b	0.001 ^b
θ_w	Water-filled soil porosity	cm ³ /cm ³	0.15	0.1 ^c	0.1 ^c	0.1 ^c
V	Fraction of vegetative cover	unitless	0.5	0.1 ^d	0.2 - .06 ^d	0.2 - .06 ^d
TR	Target excess individual lifetime cancer risk	unitless	1E-06	1E-06	1E-05	1E-05

Rationale for non-default input values:

^aEPA Exposure Factors Handbook (EPA/600/P-95/002Fa) (EPA, 1997a)

^bEstimated value based on reduced total organic carbon content of NTS soils

^cEstimated value based on reduced soil moisture content of NTS soils

^dEstimated value based on reduced vegetative cover at NTS

cm³/cm³ = Cubic centimeters per cubic centimeter

day/yr = Days per year

EPA = U.S. Environmental Protection Agency

g/g = Grams per gram

kg/day = Kilograms per day

NTS = Nevada Test Site

yr = Year

The Tier 2 SSTL for lead was determined using the Adult Lead Model documented in “Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil” (EPA, 2003).

Evaluation of Chlordane SSTL

A Tier 2 SSTL was calculated for chlordane due to exceedances of the PAL for this constituent at CAS 16-04-01 and 16-04-03. The FAL for chlordane is 185,000 µg/kg.

Evaluation of Aroclor-1260 SSTL

A Tier 2 SSTL was calculated for Aroclor-1260 due to exceedances of the PAL for this constituent at CAS 16-04-01. The FAL for Aroclor-1260 is 28,000 µg/kg.

Evaluation of Benzo(a)pyrene SSTL

A Tier 2 SSTL was calculated for benzo(a)pyrene due to exceedances of the PAL for this constituent at CAS 16-04-01. The risk-based Tier 2 SSTL for benzo(a)pyrene is 6,470 µg/kg.

Evaluation of TPH-DRO SSTL

Method E1739-95 stipulates that risk evaluations for TPH-DRO contamination be calculated and evaluated based on the risk posed by the potentially hazardous constituents of these contaminants. Section 6.4.3 of ASTM Method E1739-95 states: “TPHs should not be used for risk assessment because the general measure of TPH provides insufficient information about the amounts of individual chemical(s) of concern present” (see also Sections X1.5.4 and X1.42 of Method E1739-95 in ASTM, 1995). Therefore, the individual potentially hazardous constituents in samples with TPH-DRO concentrations exceeding the PAL of 100 mg/kg were compared to the EPA *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004) to evaluate the need for corrective action at all the CASs. The hazardous constituents of diesel are shown in [Table C.1-4](#).

C.1.11 Comparison of Site Conditions with Tier 2 Table Site-Specific Target Levels

The Tier 2 action levels are typically compared to individual sample results from reasonable points of exposure (as opposed to the source areas as is done in Tier 1) on a point-by-point basis. Points of exposure are defined as those locations or areas at which an individual or population may come in contact with a contaminant of concern originating from a CAS. For CAU 219, the Tier 2 action levels were compared to maximum constituent concentrations from each sample location.

As shown in [Table C.1-1](#), the maximum concentrations for chlordane (34,000 µg/kg) from CAU 219 CASs was less than corresponding Tier 2 action level of 185,000 µg/kg for the occasional

Table C.1-4
Tier 2 SSTLs and CAU 219 Results for Hazardous Constituents of Diesel

Common Name	SSTL (mg/kg)	Maximum Reported Value (mg/kg)			
		03-11-01	16-04-01, 16-04-02, 16-04-03	03-20-01	23-20-02
1,3,5-Trimethylbenzene	70	ND	0.1**	0.058**	ND
2-Methylnaphthalene ^a	190	ND	3.9**	0.59**	ND
Benzo(a)anthracene	2.1	ND	0.65**	6.1*	ND
Benzene	1.4	ND	ND	0.010**	ND
Benzo(a)pyrene	6.47 ^b	ND	0.85**	6.8*	ND
Ethylbenzene	400	ND	ND	0.67**	ND
Naphthalene	190	ND	0.57**	0.29**	ND
Toluene	520	ND	0.005	0.017**	ND
Xylenes ^c	420	ND	ND	0.311**	ND
n-Butylbenzene	240	ND	0.13**	0.024**	ND
n-Propylbenzene	240	ND	0.0029**	0.019**	ND

^aUses PRG for naphthalene as surrogate

^bSSTL calculated based on occasional use scenario - all other SSTLs are equal to the preliminary action levels

^cTotal of m-, o-, and p-xylenes

*Concentration attributed to asphalt present at the CAS

**Concentration identified in sludge sample(s)

CAS = Chemical Abstract Services

mg/kg = Milligrams per kilogram

ND = Nondetect

SSTL = Site-specific target level

use area exposure scenario. The maximum concentration for benzo(a)pyrene (not attributed to asphalt) from CAU 219 CASs was less than the Tier 2 action level of 6,470 µg/kg for the occasional use area exposure scenario. The maximum concentration of Aroclor-1260 (1,000 µg/kg) from CAS 16-04-01 was less than the Tier 2 action level of 28,800 µg/kg. Therefore, the FALs for chlordane, benzo(a)pyrene, and Aroclor-1260 were established as the Tier 2 SSTLs.

C.1.12 Tier 2 Remedial Action Evaluation

Although COPCs are less than the FALs at CAS 16-04-03 based on an occasional use area exposure scenario, a use restriction was applied to the CAS as a BMP. As all contaminant FALs were established as Tier 1 or Tier 2 action levels, a Tier 3 evaluation was not considered necessary.

C.2.0 Recommendations

As all of the site contaminant concentrations from the analysis of CAU 219 samples were less than the corresponding FALs for CASs 03-11-01, 16-04-01, 16-04-02, 16-04-03, and 23-20-02, and at CAS 23-20-01 following soil removal, it was determined that contamination at these CASs does not warrant corrective action (does not pose a significant risk to human health or the environment). As an additional protective measure, an administrative use restriction is recommended as a BMP for CASs 16-04-01, 16-04-02, and 16-04-03.

C.3.0 References

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EPA, see U.S. Environmental Protection Agency.

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Appendix D

Closure Activity Summary

D.1.0 Closure Activity Summary

The following sections document the closure activities completed for CAU 219 at CASs 03-11-01, 16-04-0, 16-04-01, 16-04-01, and 23-20-01. Closure activities were not necessary at CAS 23-20-02 of CAU 219 and are not discussed in this appendix.

D.1.1 CAS 03-11-01, Steam Pipes and Asbestos Tiles

All of the surface debris was inventoried and surveyed before disposal. Before and after photographs of the site were taken, and a *Site Closure Verification Form* was completed. The locations of the items inventoried are depicted in [Figure A.3-1](#), the item inventory and respective radiological screening results are presented in [Figure D.1-1](#), the before and after photographs are presented in [Figures D.1-2](#) and [D.1-3](#), and the Sectorized Housekeeping Site Closure Verification Form is provided in [Figure D.1-4](#).

D.1.2 CASs 16-04-01, Septic Tanks (3); 16-04-02, Distribution Box; and 16-04-03, Sewer Pipes

Closure activities were performed at CASs 16-04-01, 16-04-02, and 16-04-03 as a BMP and consisted of closing in place the three septic tanks and the distribution box that serviced the Area 16 camp. The work was conducted between January 17 and February 2, 2006.

The soil covering the tanks was removed to allow access to the top of the tanks. The top of each tank was cut with an acetylene torch to provide access for the pump truck and the backhoe. The opening to each tank was approximately 5 ft wide by 9 ft long.

After the tanks were accessed, a pump truck was used to remove the free liquid from the bottom of the tanks and transport it to the Area 6 treatment unit and the Area 23 sewage lagoon for disposal. Liquid was removed from each tank until there was approximately 8 in. left above the sludge. Caution was exercised to prevent the removal of any sludge with liquid due to waste disposal issues. An estimated total of 12,000 gal of liquid was removed from the tanks.

After most of the liquid was removed, the sludge and remaining liquid in the tanks were solidified using a mixture of dry sand and cement. Once the sludge and liquid were solidified, the pieces cut

 RADIOLOGICAL SURVEY FORM		Survey Number: <u>140 JFJC 07/14/2005</u>					
Project Name: <u>CAU-219</u>		Page: <u>1</u> of <u>4</u>					
Project Number: <u>IS05-300</u>							
Survey Description: Radiological survey of items at CAS031101		Survey Date: <u>Thursday, July 14, 2005</u>					
Print Name: <u>Juvencio S. Castro</u>		CAU #: <u>219</u>					
Signature: <u>/s/ Signature on file</u>		CAS #: <u>031101</u>					
Review By: <u>/s/ Signature on file</u>		Date: <u>8-1-05</u>					
Drawing Attached ☒ YES ☐ NO							
Instrument (1) Instrument Model: <u>Electra</u> Instrument Number: <u>1686</u> Probe Number: <u>793</u> Calibration Due: <u>3/22/2006</u> Efficiency: α <u>13.00%</u> β <u>25.20%</u> BKG: α <u>53.8</u> β <u>1933</u> MDA: α <u>118</u> β <u>419</u>		Instrument (2) Instrument Model: <u>Tennelec</u> Instrument Number: <u>84165</u> Probe Number: <u>N/A</u> Calibration Due: <u>5/9/2006</u> Efficiency: α <u>26.53%</u> β <u>43.11%</u> BKG: α <u>0.1</u> β <u>1.3</u> MDA: α <u>14</u> β <u>15</u>					
		Instrument (3) Instrument Model: <u>N/A</u> Instrument Number: <u>N/A</u> Calibration Due: <u>N/A</u> BKG: <u>N/A</u> μ rem/hr.					
Survey Point	Fixed + Removable Contamination		Removable Contamination		Dose Rate (Units)	Instrument Used	Comments/Additional Information
	Alpha (dpm/100cm ²)	Beta/Gamma (dpm/100cm ²)	Alpha net (dpm/100cm ²)	Beta/Gamma net (dpm/100cm ²)			
1 - 10	47	63	3.7	4.7	N/A	1 & 2	Asbestos tiles not on pad (see map)
11 - 35	138	567	3.7	10.97	N/A	1 & 2	Asbestos tiles on cement pad (see map)
36 - 40	46.2	163	0	8.62	N/A	1 & 2	Bull hose (see map)
41 - 43	61.5	83.3	3.7	6.27	N/A	1 & 2	Electrical mount (see map)
44	76.9	278	0	-0.78	N/A	1 & 2	Braided cable (see map)
45 - 47	-7.7	833	0	3.92	N/A	1 & 2	Steam pipe
48 - 49	-7.7	833	0	1.57	N/A	1 & 2	Steam pipe
50 - 52	61.5	786	0	6.27	N/A	1 & 2	Steam pipe NW corner
							Last item
<u>7/18/05</u> /s/ Signature on file							

Figure D.1-1
Item Inventory and Radiological Survey



Figure D.1-2
CAS 03-11-01 Photos

The photos in this figure show the asbestos-containing tiles and debris on the concrete pad at the site and confirm the removal of the media.

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Figure D.1-3
CAS 03-11-01 Photos

The photos in this figure show debris on the concrete pad at the site and confirm the removal of the media.

Uncontrolled When Printed

SECTORED HOUSEKEEPING SITE CLOSURE VERIFICATION FORM

Closure Verification Date: September 14, 2005

CAS Number: 03-11-01, Steam Pipes and Asbestos Tiles

CAU Number: 219, Septic Systems and Injection Wells

Sector Designation: Area 3

Housekeeping Site General Location: Northeast of Mercury Highway and 3-03 Road intersection

Elevation: 1230 m

Northing: 4100612

Easting: 584382.0

Latitude: 37.04977

Longitude: -116.05104

Coordinate/Elevation Data Obtained from: (North American Datum, 1927)

Site Access Route: Head north on Mercury Highway. Turn right onto dirt path approximately 25 m north of 3-03 Road.

Waste Item(s) Originally at Site	Apparent Waste Type*
Floor Tiles	Asbestos
Steam Pipe Pieces	Ordinary
Rubber Hose	Ordinary
Miscellaneous Metal	Scrap Metal

* Ordinary, Scrap Metal, Asbestos, PCB, Salvageable, Radioactive, Mixed, Unknown, Other

* See Attachments	* See Attachments
Housekeeping Site Before Closure (taken date)	Housekeeping Site After Closure (taken date)

Current Site Description/Observations: The steam pipe, asbestos tiles, rubber hose, and miscellaneous metal have been removed.

X No Further Action Required at Housekeeping Site

Robert Boehlecke

/s/ Robert Boehlecke

Corrective Action Coordinator/Designee

(Signature)

Date

9/14/05

Figure D.1-4
Site Closure Verification Form

from the top of the tanks were put into the tanks, and the rest of the tank was filled to within approximately 18 in. of the top with a dry sand cement mix. The remaining portion of the tank was sealed with wet grout. Once the grout set up, the tanks were covered with the soil that had been removed to expose the features. The closure process for the tanks is shown in [Figure D.1-5](#). In addition to grouting the tanks, the distribution box (which had been filled with native material) was sealed with grout as shown in [Figure D.1-6](#).

A use restriction will be applied to CASs 16-04-01, 16-04-02, and 16-04-03 as a BMP to provide additional protection to NTS personnel. The coordinates for the area encompassing the CASs will be entered into the NTS database; however, the area will not be fenced or posted. The use restriction form for CASs 16-04-01, 16-04-02, and 16-04-03 is shown in [Appendix E](#).

D.1.3 CAS 23-20-01, DNA Motor Pool Sewage and Waste System

The corrective action performed at CAS 23-20-01 consisted of the removal and disposal of asbestos tile, removal of contaminated soil and sludge, as well as the abandonment of an inactive sewer line. This work was conducted between January 17 and April 13, 2006. An estimated total of 2 cyds of asbestos-containing material and the debris removed from the grease pits were disposed in the Area 9 U10c Landfill at the NTS. An estimated total of 43 cyds of contaminated soil and sludge were disposed of in the Hydrocarbon Landfill in Area 6. Copies of the completed NTS Landfill Load forms are presented as Attachment E-1 of this Appendix.

Certified asbestos workers scraped up the tiles on the foundation and containerized them in approved packages. These packages were then put in 55-gal U.S. Department of Transportation approved drums, shipped to the Area 9 10C landfill, and disposed of as non-friable asbestos. All of the work was completed under the requirements of an approved asbestos abatement plan. The before and after photographs are presented in [Figures D.1-7](#) and [D.1-8](#).

During the sampling activities conducted at the grease pits, the fill material inside the structures was removed using a backhoe. This fill material consisted of soil and debris such as asphalt, plastic, wood, metal, and other various items (e.g., paper, cloth, etc.). This material was containerized and disposed of in the Area U10c Landfill.

The soil surrounding the foundation of Building 210 was contaminated with chlordane and PCBs at concentrations exceeding their respective FALs. The soil was approximately 4 to 6 in. thick, extended as much as 12 ft from the foundation, and underlain with asphalt over most of the CAS. This material was removed down to the asphalt (where applicable) using a backhoe, loaded into an end dump container, and transported to the Area 6 TPH landfill for disposal. Three verification samples were collected at three locations where asphalt was not present to confirm that PCB and chlordane contamination had been removed. The soil sample results were less than FALs. The sample locations are shown in [Figure A.5-2](#) and the sample results are presented in Section A.5.2. Before and after photographs showing the cleanup at CAS 23-20-01 are presented in [Figure D.1-9](#).

The sludge contaminated with benzo(a)pyrene and lead and the concrete box inside the catch basin were removed using a backhoe as part of the corrective action conducted at CAS 23-20-01. The sludge and concrete box were properly disposed of in the Hydrocarbon Landfill in Area 6 of the NTS. No verification samples were collected after the corrective action at this location because all contents were removed.

The inactive sewer line between the site fence and the west side of the Building 210 foundation was abandoned in place using grout. The pipe is approximately 7 ft bgs and was accessed at a location between the north end of the foundation and the site fence. The ends of the pipe were sealed with grout, and the hole was backfilled.



Figure D.1-5
CAS 16-04-01 Photos

This figure shows the “Before” photos (from left to right) of the uncovering of the tanks and the liquid present in the tanks, and the “After” photos of the filled tanks sealed with wet grout and the tanks covered with clean soil.

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Figure D.1-6
CAS 16-04-02 Photos

This photo shows the distribution box filled with a wet cement grout.

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Figure D.1-7
CAS 23-20-01 Photos

The photos (from left to right) in this figure show the asbestos-containing tiles located on the southeast and northeast corners of the main concrete pad, respectively, and confirm the removal of the media.



Figure D.1-8
CAS 23-20-01 Photos

The photos show the asbestos-containing tiles located on the southwest corner of the main concrete pad and confirm the removal of the media.



Figure D.1-9
CAS 23-20-01 Photos

The photos show the contaminated soil along the eastern edge of the large concrete pad and confirm the removal of the media.



Figure D.1-10
CAS 23-20-01 Photos
West Side of Large Concrete Pad
(View looking south)



Figure D.1-11
CAS 23-20-01 North Side of Decontamination Pad
(View looking east)

Attachment D-1

NTS Landfill Load Verification

(9 Pages)

Bechtel Nevada

NTS Landfill Load Verification

(Waste definitions are available on page 2)

SWO USE (Circle One Area) AREA

26

X

9

LANDFILL

For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.

REQUIRED: WASTE GENERATOR INFORMATION

(This form is for rolloffs, dump trucks, and other onsite disposal of materials.)

Waste Generator: Stoller-Navarro Joint Venture

Phone Number: 53033

Location / Origin: CAU 219 CAS 23-20-01 Waaa Piles for Disposal at 10C Landfill

Waste Category: (check one)

☐ Commercial

☒ Industrial

Waste Type:
(check one)

☒ NTS

☐ Putrescible

☒ FFACO-onsite

☐ WAC Exception

☐ Non-Putrescible

☐ Asbestos Containing Material

☐ FFACO-offsite

☐ Historic DOE/NV

Pollution Prevention Category: (check one)

☒ Environmental management

☐ Defense Projects

☐ YMP

Pollution Prevention Category: (check one)

☒ Clean-Up

☐ Routine

Method of Characterization: (check one)

☒ Sampling & Analysis

☐ Process Knowledge

☐ Contents

Prohibited Waste
at all three NTS landfills:

Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).

Additional Prohibited Waste
at the Area 9 U10c Landfill:

Sewage Sludge; Animal carcasses; Wet garbage (food waste); and Friable asbestos

REQUIRED: WASTE CONTENTS ALLOWABLE WASTES

Check all allowable wastes that are contained within this load:

NOTE: Waste disposed at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulic; kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.

Acceptable waste at any NTS landfill:

☒ Paper

☒ Rocks / unaltered geologic materials

☒ Empty containers

☐ Asphalt

☒ Metal

☒ Wood

☒ Soil

☐ Rubber (excluding tires)

☐ Demolition debris

☐ Plastic

☒ Wire

☒ Cable

☒ Cloth

☐ Insulation (non-Asbestosform)

☒ Cement & concrete

☒ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)

Additional waste accepted at the Area 23 Mercury Landfill:

☐ Office waste

☐ Food Waste

☐ Animal Carcasses

☐ Asbestos:

☐ Friable

☐ Non-Friable (contact SWO if regulated load)

Quantity:

Additional waste accepted at the Area 9 U10c Landfill:

☐ Non-friable asbestos

☐ Drained automobiles and military vehicles

☐ Solid fractions from sand/oil/water separators

☐ Light ballasts (contact SWO)

☐ Drained fuel filters (gas & diesel)

☐ Decanned Underground and Above Ground

☐ Hydrocarbons (contact SWO)

☐ Other

☐ Tanks

Additional waste accepted at the Area 6 Hydrocarbon Landfill:

☐ Other

☐ Septic sludge

☐ Rags

☐ Drained fuel filters (gas & diesel)

☐ Crushed non-terne plated oil filters

☐ Plants

☐ Soil

☒ Sludge from sand/oil/water separators

☐ PCBs below 50 parts per million

REQUIRED: WASTE GENERATOR SIGNATURE

Initials: DS (If initialed, no radiological clearance is necessary.)

The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.

the best of my knowledge, the Waste described above contains only those materials that are allowed for disposal at this site. I have verified this through the waste characterization method identified above and a review of the above-mentioned prohibited and allowable waste items.

Print Name: DAVID SCHROCK

Signature: /s/ David Schrock

Date: 10/3/05

If applicable, place BN-0648, "Radiological Release Sticker" here. Onsite use only.

Note: Food waste, office trash and/or animal carcasses are considered not to contain added radioactivity, and therefore do not require a radiological clearance.

SWO USE ONLY

Load Weight (net from scale or estimate): 2500 Signature of Certifier: /s/ Signature on file

Revision Code: ENV 5.0

BN-0518 (04/03)

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NTS LANDFILL LOAD VERIFICATION

(Waste definitions are available on page 2)

SWO USE (Select One) AREA ☐ 23 ☒ 6 ☐ 9 ☐ LANDFILL

For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.

REQUIRED: WASTE GENERATOR INFORMATION

(This form is for rollofs, dump trucks, and other onsite disposal of materials.)

Waste Generator: Stoller Navarro Joint Vneture Phone Number: 5-2033Location / Origin: CAU 219 / CASE ~~16-04-01, 16-04-02, 16-04-03~~ 23-20-01

Waste Category: (check one) ☐ Commercial ☒ Industrial

Waste Type: (check one) ☐ NTS ☐ Putrescible ☒ FFACO-onsite ☐ WAC Exception

(check one) ☐ Non-Putrescible ☐ Asbestos Containing Material ☐ FFACO-offsite ☐ Historic DOE/NV

Pollution Prevention Category: (check one) ☒ Environmental management ☐ Defense Projects ☐ YMP

Pollution Prevention Category: (check one) ☒ Clean-Up ☐ Routine

Method of Characterization: (check one) ☒ Sampling & Analysis ☐ Process Knowledge ☐ Contents

Prohibited Waste at all three NTS landfills: Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).

Additional Prohibited Waste at the Area 9 U10C Landfill: Sewage Sludge, Animal carcasses, Wet garbage (food waste); and Friable asbestos

REQUIRED: WASTE CONTENTS ALLOWABLE WASTES

Check all allowable wastes that are contained within this load:

NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics' kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.

Acceptable waste at any NTS landfill: ☐ Paper ☒ Rocks & unaltered geologic materials ☐ Empty containers

☐ Asphalt ☒ Metal ☐ Wood ☒ Soil ☐ Rubber (excluding tires) ☐ Demolition debris

☒ Plastic ☐ Wire ☐ Cable ☐ Cloth ☐ Insulation (non-Asbestosform) ☐ Cement & concrete

☐ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)

Additional waste accepted at the Area 23 Mercury Landfill: ☐ Office Waste ☐ Food Waste ☐ Animal Carcasses

☐ Asbestos ☐ Friable ☐ Non-Friable (contact SWO if regulated load) Quantity: _____

Additional waste accepted at the Area 9 U10c Landfill:

☐ Non-friable asbestos ☐ Drained automobiles and military vehicles ☐ Solid fractions from sand/oil/water separators

☐ Light ballasts (contact SWO) ☐ Drained fuel filters (gas & diesel) ☐ Deconned Underground and Above Ground Tanks

☐ Hydrocarbons (contact SWO) ☐ Other _____

Additional waste accepted at the Area 6 Hydrocarbon Landfill: ☐ Other _____

☒ Septic sludge ☐ Rags ☐ Drained fuel filters (gas & diesel) ☐ Crushed non-teme plated oil filters

☐ Plants ☒ Soil ☐ Sludge from sand/oil/water separators ☐ PCBs below 50 parts per million

REQUIRED: WASTE GENERATOR SIGNATUREInitials: DS (if initialed, no radiological clearance is necessary.)

The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.

To the best of my knowledge, the waste described above contains only those materials that are allowed for disposal at this site. I have verified this through the waste characterization method identified above and a review of the above-mentioned prohibited and allowable waste items. I have contacted Property Management and have verified that this material/equipment is approved for disposal in the landfill.

Print Name: DAVID SCHROCKSignature: /s/ David SchrockDate: 2-6-06

If applicable, place BN-0646, "Radiological Release Sticker" here. Onsite use only.

Note: Food waste, office trash and/or animal carcasses are considered not to contain added radioactivity, and therefore do not require a radiological clearance.

SWO USE ONLYLoad Weight (net from scale or estimate): 39890 Signature of Certifier: /s/ Signature on file

①



NTS LANDFILL LOAD VERIFICATION

(Waste definitions are available on page 2)

SWO USE (Select One)		AREA		☐ 23	☐ 6	☒ 9	☐ LANDFILL
For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.							
REQUIRED: WASTE GENERATOR INFORMATION							
(This form is for rollofs, dump trucks, and other onsite disposal of materials)							
Waste Generator:		<u>STOLLER-NAVARRO JOINT VENTURE</u>				Phone Number: <u>5-2033</u>	
Location / Origin		<u>CAUTION, CAS 23-20-01</u>					
Waste Category: (check one)		☐ Commercial		☒ Industrial			
Waste Type: (check one)		☐ NTS		☐ Putrescible		☒ FFACO-onsite	
		☐ Non-Putrescible		☐ Asbestos Containing Material		☐ FFACO-offsite	
Pollution Prevention Category: (check one)		☒ Environmental management		☐ Defense Projects		☐ YMP	
Pollution Prevention Category: (check one)		☒ Clean-Up		☐ Routine			
Method of Characterization: (check one)		☒ Sampling & Analysis		☐ Process Knowledge		☐ Contents	
Prohibited Waste at all three NTS landfills:		Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharp, bloody clothing)					
Additional Prohibited Waste at the Area 9 U10C Landfill:		Sewage Sludge, Animal carcasses, Wet garbage (food waste); and Friable asbestos					
REQUIRED: WASTE CONTENTS ALLOWABLE WASTES							
Check all allowable wastes that are contained within this load							
NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as gasoline (no benzene, lead), jet fuel, diesel fuel, lubricants and hydraulics' kerosene, asphaltic petroleum hydrocarbon, and ethylene glycol							
Acceptable waste at any NTS landfill:		☐ Paper		☒ Rocks / or altered geologic materials		☐ Empty containers	
☐ Asphalt		☐ Metal		☒ Soil		☐ Rubber (excluding tires)	
☒ Plastic		☐ Wire		☐ Cloth		☐ Insulation (non-Asbestos form)	
☒ Manufactured items (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc)		☐ Cable		☐ Cement & concrete			
Additional waste accepted at the Area 23 Mercury Landfill:		☐ Office Waste		☐ Food Waste		☐ Animal Carcasses	
☐ Asbestos		☐ Friable		☐ Non-Friable (contact SWO if regulated load)		Quantity: _____	
Additional waste accepted at the Area 9 U10c Landfill:							
☒ Non-friable asbestos		☐ Drained automobiles and military vehicles		☐ Solid fractions from sand/oil/water separators			
☐ Light ballasts (contact SWO)		☐ Drained fuel filters (gas & diesel)		☐ Deconned Underground and Above Ground Tanks			
☐ Hydrocarbons (contact SWO)		☐ Other _____					
Additional waste accepted at the Area 6 Hydrocarbon Landfill:							
☐ Septic sludge		☐ Rags		☐ Drained fuel filters (gas & diesel)		☐ Crushed non-teme plated oil filters	
☐ Plants		☐ Soil		☐ Sludge from sand/oil/water separators		☐ PCBs below 50 parts per million	
REQUIRED: WASTE GENERATOR SIGNATURE							
(Initials: <u>DS</u> (if initialed, no radiological clearance is necessary.))							
The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.							
To the best of my knowledge, the waste described above contains only those materials that are allowed for disposal at this site. I have verified this through the waste characterization method identified above and a review of the above-mentioned prohibited and allowable waste items. I have contacted Property Management and have verified that this material/equipment is approved for disposal in the landfill.							
Print Name:		<u>DAVID SCHROCK</u>				If applicable, place BN-0646, "Radiological Release Sticker" here. Onsite use only.	
Signature: <u>/s/ David Schrock</u>		Date: <u>2-8-06</u>					
Note: Food waste, office trash and/or animal carcasses are considered not to contain added radioactivity, and therefore do not require a radiological clearance.							
SWO USE ONLY							
Load Weight (net from scale or estimate):		<u>500</u>		Signature of Certifier: <u>/s/ Signature on file</u>			

NTS LANDFILL LOAD VERIFICATION

(Waste definitions are available on page 2)

SWO USE (Select One) AREA ☐ 23 ☒ 6 ☐ 9 ☐ LANDFILL

For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.

REQUIRED: WASTE GENERATOR INFORMATION

(This form is for rollofs, dump trucks, and other onsite disposal of materials.)

Waste Generator: Stoller Navarro Joint VenturePhone Number: 5-2033Location / Origin: CAU 219 / CAS 23-20-01

Waste Category: (check one)

☐ Commercial☒ Industrial

Waste Type:

☐ NTS☐ Putrescible☒ FFACO-onsite☐ WAC Exception

(check one)

☐ Non-Putrescible☐ Asbestos Containing Material☐ FFACO-offsite☐ Historic DOE/NV

Pollution Prevention Category: (check one)

☒ Environmental management☐ Defense Projects☐ YMP

Pollution Prevention Category: (check one)

☒ Clean-Up☐ Routine

Method of Characterization: (check one)

☒ Sampling & Analysis☐ Process Knowledge☐ Contents

Prohibited Waste at all three NTS landfills:

Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).

Additional Prohibited Waste at the Area 9 U10C Landfill:

Sewage Sludge, Animal carcasses, Wet garbage (food waste); and Friable asbestos

REQUIRED: WASTE CONTENTS ALLOWABLE WASTES

Check all allowable wastes that are contained within this load:

NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; lubricants and hydraulics' kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.

Acceptable waste at any NTS landfill:

☒ Paper☒ Rocks & unaltered geologic materials☐ Empty containers☒ Asphalt☒ Metal☐ Wood☐ Soil☐ Rubber (excluding tires)☐ Demolition debris☒ Plastic☐ Wire☐ Cable☐ Cloth☐ Insulation (non-Asbestosform)☒ Cement & concrete☐ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)

Additional waste accepted at the Area 23 Mercury Landfill:

☐ Office Waste☐ Food Waste☐ Animal Carcasses☐ Asbestos☐ Friable☐ Non-Friable (contact SWO if regulated load)

Quantity: _____

Additional waste accepted at the Area 9 U10c Landfill:

☐ Non-friable asbestos☐ Drained automobiles and military vehicles☐ Solid fractions from sand/oil/water separators☐ Light ballasts (contact SWO)☐ Drained fuel filters (gas & diesel)☐ Deconned Underground and Above Ground☐ Hydrocarbons (contact SWO)☐ Other _____

Tanks

Additional waste accepted at the Area 6 Hydrocarbon Landfill:

☐ Other _____

Septic sludge

☐ Rags☐ Drained fuel filters (gas & diesel)☐ Crushed non-teme plated oil filters☐ Plants☒ Soil☐ Sludge from sand/oil/water separators☒ PCBs below 50 parts per million

REQUIRED: WASTE GENERATOR SIGNATURE

Initials: DS (if initialed, no radiological clearance is necessary.)

The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.

To the best of my knowledge, the waste described above contains only those materials that are allowed for disposal at this site. I have verified this through the waste characterization method identified above and a review of the above-mentioned prohibited and allowable waste items. I have contacted Property Management and have verified that this material/equipment is approved for disposal in the landfill.

Print Name: DAVID SCHROCKSignature: /s/ David SchrockDate: 4-3-06

If applicable, place BN-0646, "Radiological Release Sticker" here. Onsite use only.

Note: Food waste, office trash and/or animal carcasses are considered not to contain added radioactivity, and therefore do not require a radiological clearance.

SWO USE ONLY

Load Weight (net from scale or estimate) 19,000

Signature of Certifier: _____

/s/ Signature on file



NTS LANDFILL LOAD VERIFICATION

(Waste definitions are available on page 2)

SWO USE (Select One)		AREA		☐ 23	☒ 6	☐ 9	☐ LANDFILL
For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.							
REQUIRED: WASTE GENERATOR INFORMATION (This form is for rollofs, dump trucks, and other onsite disposal of materials.)							
Waste Generator: <u>Stoller Navarro Joint Venture</u>				Phone Number: <u>5-2033</u>			
Location / Origin: <u>CAU 219 1CAS 23-20-01</u>							
Waste Category: (check one)		☐ Commercial		☒ Industrial			
Waste Type: (check one)		☐ NTS		☐ Putrescible		☒ FFACO-onsite	
		☐ Non-Putrescible		☐ Asbestos Containing Material		☐ FFACO-offsite	
Pollution Prevention Category: (check one)		☒ Environmental management		☐ Defense Projects		☐ WAC Exception	
		☒ Clean-Up		☐ Routine		☐ Historic DOE/NV	
Method of Characterization: (check one)		☒ Sampling & Analysis		☐ Process Knowledge		☐ YMP	
				☐ Contents			
Prohibited Waste at all three NTS landfills:		Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).					
Additional Prohibited Waste at the Area 9 U10C Landfill:		Sewage Sludge, Animal carcasses, Wet garbage (food waste): and Friable asbestos					
REQUIRED: WASTE CONTENTS ALLOWABLE WASTES Check all allowable wastes that are contained within this load:							
NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics' kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.							
Acceptable waste at any NTS landfill:		☒ Paper		☒ Rocks / unaltered geologic materials		☐ Empty containers	
☒ Asphalt	☒ Metal	☐ Wood	☒ Soil	☐ Rubber (excluding tires)		Demolition debris	
☒ Plastic	☐ Wire	☐ Cable	☐ Cloth	☐ Insulation (non-Asbestosform)		☐ Cement & concrete	
☒ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)							
Additional waste accepted at the Area 23 Mercury Landfill:				☐ Office Waste		☐ Food Waste	
☐ Asbestos				☐ Friable		☐ Animal Carcasses	
☐ Non-Friable (contact SWO if regulated load)				Quantity: _____			
Additional waste accepted at the Area 9 U10c Landfill:							
☐ Non-friable asbestos		☐ Drained automobiles and military vehicles		☐ Solid fractions from sand/oil/water separators			
☐ Light ballasts (contact SWO)		☐ Drained fuel filters (gas & diesel)		☐ Deconned Underground and Above Ground Tanks			
☐ Hydrocarbons (contact SWO)		☐ Other _____					
Additional waste accepted at the Area 6 Hydrocarbon Landfill:							
☐ Septic sludge		☐ Rags		☐ Drained fuel filters (gas & diesel)		☐ Crushed non-teme plated oil filters	
☐ Plants		☐ Soil		☐ Sludge from sand/oil/water separators		☒ PCBs below 50 parts per million	
REQUIRED: WASTE GENERATOR SIGNATURE							
Initials: <u>DS</u> (if initialed, no radiological clearance is necessary.)							
The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.							
To the best of my knowledge, the waste described above contains only those materials that are allowed for disposal at this site. I have verified this through the waste characterization method identified above and a review of the above-mentioned prohibited and allowable waste items. I have contacted Property Management and have verified that this material/equipment is approved for disposal in the landfill.							
Print Name: <u>DAVID SCHROCK</u>				If applicable, place BN-0646, "Radiological Release Sticker" here. Onsite use only.			
Signature: <u>/s/David Schrock</u> Date: <u>4-3-06</u>							
Note: Food waste, office trash and/or animal carcasses are considered not to contain added radioactivity, and therefore do not require a radiological clearance.							
SWO USE ONLY							
Load Weight (net from scale or estimate): <u>10,000</u>				Signature of Certifier: <u>/s/</u> Signature on file _____			

NTS LANDFILL LOAD VERIFICATION

(Waste definitions are available on page 2)

SWO USE (Select One)		AREA		☐ 23	☒ 6	☐ 9	☐ LANDFILL
For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.							
REQUIRED: WASTE GENERATOR INFORMATION							
(This form is for rollofs, dump trucks, and other onsite disposal of materials.)							
Waste Generator: <u>Stoller-Navarro Joint Venture</u>				Phone Number: <u>5-2033</u>			
Location / Origin: <u>CAU 219, NTS; Area 16 One (1) drum Hydrocarbon-contaminated soil. Drum #: 219B02.</u>							
Waste Category: (check one)		☐ Commercial		☒ Industrial			
Waste Type: (check one)		☐ NTS		☐ Putrescible		☒ FFACO-onsite	
		☐ Non-Putrescible		☐ Asbestos Containing Material		☐ FFACO-offsite	
						☐ WAC Exception	
						☐ Historic DOE/NV	
Pollution Prevention Category: (check one)		☒ Environmental management		☐ Defense Projects		☐ YMP	
Pollution Prevention Category: (check one)		☒ Clean-Up		☐ Routine			
Method of Characterization: (check one)		☒ Sampling & Analysis		☐ Process Knowledge		☐ Contents	
Prohibited Waste at all three NTS landfills:				Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).			
Additional Prohibited Waste at the Area 9 U10C Landfill:				Sewage Sludge, Animal carcasses, Wet garbage (food waste); and Friable asbestos			
REQUIRED: WASTE CONTENTS ALLOWABLE WASTES							
Check all allowable wastes that are contained within this load:							
NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics' kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.							
Acceptable waste at any NTS landfill:		☒ Paper		☐ Rocks / unaltered geologic materials		☒ Empty containers	
☐ Asphalt		☒ Metal		☐ Wood		☒ Soil	
☒ Plastic		☐ Wire		☐ Cable		☐ Rubber (excluding tires)	
		☒ Cloth		☐ Insulation (non-Asbestosform)		☐ Demolition debris	
☒ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)						☐ Cement & concrete	
Additional waste accepted at the Area 23 Mercury Landfill:				☐ Office Waste			
☐ Asbestos				☐ Food Waste			
☐ Friable				☐ Animal Carcasses			
☐ Non-Friable (contact SWO if regulated load)				Quantity: _____			
Additional waste accepted at the Area 9 U10c Landfill:							
☐ Non-friable asbestos		☐ Drained automobiles and military vehicles		☐ Solid fractions from sand/oil/water separators			
☐ Light ballasts (contact SWO)		☐ Drained fuel filters (gas & diesel)		☐ Deconned Underground and Above Ground Tanks			
☐ Hydrocarbons (contact SWO)		☐ Other _____					
Additional waste accepted at the Area 6 Hydrocarbon Landfill:				☐ Other _____			
☐ Septic sludge		☐ Rags		☐ Drained fuel filters (gas & diesel)		☐ Crushed non-teme plated oil filters	
☐ Plants		☒ Soil		☐ Sludge from sand/oil/water separators		☐ PCBs below 50 parts per million	
REQUIRED: WASTE GENERATOR SIGNATURE							
Initials: _____ (if initialed, no radiological clearance is necessary.)							
The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.							
To the best of my knowledge, the waste described above contains only those materials have verified this through the waste characterization method identified above and a review of the above mentioned waste items. I have contacted Property Management and have verified the disposal in the landfill.							
Print Name: <u>DAVID SCHROCK</u>				Signature: <u>/s/ David Schrock</u>			
				Date: <u>4/20/06</u>			
Note: Food waste, office trash and/or animal carcasses are considered not to contain added radiological materials and require a radiological clearance.							
SWO USE ONLY							
Load Weight (net from scale or estimate): <u>50</u>				Signature of Certifier: _____			
				/s/ Signature on file _____			

Radiation Survey Release for Waste Disposal	
I am allowed for disposal at this site.	
This container/load is free of external radioactive contamination.	
This container/load is exempt from survey due to process knowledge and origin.	
This container/load is free of radioactive contamination based on radiological analysis.	
SIGNATURE: <u>/s/ Signature on file</u>	DATE: <u>3/29/06</u>
BN-0645 (09/99)	

NTS LANDFILL LOAD VERIFICATION

(Waste definitions are available on page 2)

SWO USE (Select One)		AREA		☐ 23	☐ 6	☒ 9	☐ LANDFILL
For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.							
REQUIRED: WASTE GENERATOR INFORMATION (This form is for rollofs, dump trucks, and other onsite disposal of materials.)							
Waste Generator: <u>Stoller-Navarro Joint Venture</u>				Phone Number: <u>5-2033</u>			
Location / Origin: <u>CAU 219, NTS; Area 16. One (1) drum of solidified rinsate. Drum #: 219B01.</u>							
Waste Category: (check one)		☐ Commercial		☒ Industrial			
Waste Type: (check one)		☐ NTS		☐ Putrescible		☒ FFACO-onsite	
		☐ Non-Putrescible		☐ Asbestos Containing Material		☐ FFACO-offsite	
Pollution Prevention Category: (check one)		☒ Environmental management		☐ Defense Projects		☐ YMP	
Pollution Prevention Category: (check one)		☒ Clean-Up		☐ Routine			
Method of Characterization: (check one)		☒ Sampling & Analysis		☐ Process Knowledge		☐ Contents	
Prohibited Waste at all three NTS landfills:				Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).			
Additional Prohibited Waste at the Area 9 U10C Landfill:				Sewage Sludge, Animal carcasses, Wet garbage (food waste); and Friable asbestos			
REQUIRED: WASTE CONTENTS ALLOWABLE WASTES Check all allowable wastes that are contained within this load:							
NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics' kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.							
Acceptable waste at any NTS landfill:		☒ Paper		☐ Rocks / unaltered geologic materials		☐ Empty containers	
☐ Asphalt	☐ Metal	☐ Wood	☐ Soil	☐ Rubber (excluding tires)	☐ Demolition debris		
☒ Plastic	☐ Wire	☐ Cable	☐ Cloth	☐ Insulation (non-Asbestosform)	☐ Cement & concrete		
☐ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)							
Additional waste accepted at the Area 23 Mercury Landfill:				☐ Office Waste ☐ Food Waste ☐ Animal Carcasses			
☐ Asbestos ☐ Friable ☐ Non-Friable (contact SWO if regulated load)				Quantity: _____			
Additional waste accepted at the Area 9 U10c Landfill:							
☐ Non-friable asbestos		☐ Drained automobiles and military vehicles		☐ Solid fractions from sand/oil/water separators			
☐ Light ballasts (contact SWO)		☐ Drained fuel filters (gas & diesel)		☐ Decorned Underground and Above Ground Tanks			
☐ Hydrocarbons (contact SWO)		☐ Other _____					
Additional waste accepted at the Area 6 Hydrocarbon Landfill: ☐ Other _____							
☐ Septic sludge		☐ Rags		☐ Drained fuel filters (gas & diesel)		☐ Crushed non-teme plated oil filters	
☐ Plants		☐ Soil		☐ Sludge from sand/oil/water separators		☐ PCBs below 50 parts per million	
REQUIRED: WASTE GENERATOR SIGNATURE							
Initials: _____ (if initialed, no radiological clearance is necessary.)							
The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.							
To the best of my knowledge, the waste described above contains only those materials have verified this through the waste characterization method identified above and a review of the waste and allowable waste items. I have contacted Property Management and have verified the disposal in the landfill.							
Print Name: <u>DAVID SCHROCK</u>				Signature: <u>/s/ David Schrock</u> Date: <u>4/20/06</u>			
Note: Food waste, office trash and/or animal carcasses are considered not to contain radiological materials and require a radiological clearance.							
SWO USE ONLY							
Load Weight (net from scale or estimate): <u>100</u>				Signature of Certifier: <u>/s/ Signature on file</u>			

Radiation Survey Release for Waste Disposal	
RGT-Initials: _____	
☒	This container/load is free of external radioactive contamination.
☐	This container/load is exempt from survey due to process knowledge and origin.
☐	This container/load is free of radioactive contamination based on radiological analysis.
SIGNATURE: <u>/s/ Signature on file</u> DATE: <u>3/29/06</u>	
BN-0646 (03/99)	

NTS LANDFILL LOAD VERIFICATION

(Waste definitions are available on page 2)

SWO USE (Select One)		AREA		☐ 23	☐ 6	☒ 9	☐ LANDFILL
For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.							
REQUIRED: WASTE GENERATOR INFORMATION (This form is for rollofs, dump trucks, and other onsite disposal of materials.)							
Waste Generator: <u>Stoller-Navarro Joint Venture</u>				Phone Number: <u>5-2033</u>			
Location / Origin: <u>CAU 219, NTS; Area 16. One (1) Plastic Liner</u>							
Waste Category: (check one)		☐ Commercial		☒ Industrial			
Waste Type: (check one)		☐ NTS		☐ Putrescible		☒ FFACO-onsite	
		☐ Non-Putrescible		☐ Asbestos Containing Material		☐ FFACO-offsite	
Pollution Prevention Category: (check one)		☒ Environmental management		☐ Defense Projects		☐ YMP	
Pollution Prevention Category: (check one)		☒ Clean-Up		☐ Routine			
Method of Characterization: (check one)		☒ Sampling & Analysis		☐ Process Knowledge		☐ Contents	
Prohibited Waste at all three NTS landfills:				Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).			
Additional Prohibited Waste at the Area 9 U10C Landfill:				Sewage Sludge, Animal carcasses, Wet garbage (food waste); and Friable asbestos			
REQUIRED: WASTE CONTENTS ALLOWABLE WASTES Check all allowable wastes that are contained within this load:							
NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics' kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.							
Acceptable waste at any NTS landfill:		☐ Paper		☒ Rocks / unaltered geologic materials		☐ Empty containers	
☐ Asphalt		☐ Metal		☒ Soil		☐ Rubber (excluding tires)	
☒ Plastic		☐ Wire		☐ Cloth		☐ Insulation (non-Asbestosform)	
☐ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)		☐ Wood		☐ Demolition debris		☐ Cement & concrete	
Additional waste accepted at the Area 23 Mercury Landfill:				☐ Office Waste			
☐ Asbestos				☐ Food Waste			
☐ Friable				☐ Animal Carcasses			
☐ Non-Friable (contact SWO if regulated load)				Quantity: _____			
Additional waste accepted at the Area 9 U10c Landfill:							
☐ Non-friable asbestos		☐ Drained automobiles and military vehicles		☐ Solid fractions from sand/oil/water separators			
☐ Light ballasts (contact SWO)		☐ Drained fuel filters (gas & diesel)		☐ Deconned Underground and Above Ground Tanks			
☐ Hydrocarbons (contact SWO)		☐ Other _____					
Additional waste accepted at the Area 6 Hydrocarbon Landfill:							
☐ Septic sludge		☐ Rags		☐ Drained fuel filters (gas & diesel)		☐ Crushed non-teme plated oil filters	
☐ Plants		☐ Soil		☐ Sludge from sand/oil/water separators		☐ PCBs below 50 parts per million	
REQUIRED: WASTE GENERATOR SIGNATURE							
Initials: _____ (if initialed, no radiological clearance is necessary.)							
The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.							
To the best of my knowledge, the waste described above contains only those materials I have verified this through the waste characterization method identified above and a review of the waste manifest and allowable waste items. I have contacted Property Management and have verified that the waste is suitable for disposal in the landfill.							
Print Name: <u>DAVID SCHROCK</u>				Signature: <u>/s/ David Schrock</u>			
				Date: <u>4/20/06</u>			
Note: Food waste, office trash and/or animal carcasses are considered not to contain added radioactivity, and therefore do not require a radiological clearance.							
SWO USE ONLY							
Load Weight (net from scale or estimate): <u>510</u>				Signature of Certifier: <u>/s/</u> Signature on file			

Radiation Survey Release for Waste Disposal	
☒ This container/load is free of external radioactive contamination and is approved for disposal at this site. ☐ This container/load is exempt from survey due to process knowledge and origin. ☐ If a container/load is free of radioactive contamination based on radioanalysis.	
SIGNATURE: <u>/s/</u> Signature on file DATE: <u>3/29/06</u> BN-0646 (09/99)	



NTS LANDFILL LOAD VERIFICATION

(Waste definitions are available on page 2)

SWO USE (Select One)		AREA	☐ 23	☐ 6	☒ 9	☐ LANDFILL
<i>For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.</i>						
REQUIRED: WASTE GENERATOR INFORMATION (This form is for rollofs, dump trucks, and other onsite disposal of materials.)						
Waste Generator:		Stoller-Navarro Joint Venture			Phone Number: 5-2033	
Location / Origin:		CAU 219, NTS; Area 23. Two (2) drums: Solidified rinsate (# 219F01) and solidified liquid (# SNN0517).				
Waste Category: (check one)		☐ Commercial		☒ Industrial		
Waste Type: (check one)		☐ NTS		☐ Putrescible		☒ FFACO-onsite
		☐ Non-Putrescible		☐ Asbestos Containing Material		☐ WAC Exception
				☐ FFACO-offsite		☐ Historic DOE/NV
Pollution Prevention Category: (check one)		☒ Environmental management		☐ Defense Projects		☐ YMP
Pollution Prevention Category: (check one)		☒ Clean-Up		☐ Routine		
Method of Characterization: (check one)		☒ Sampling & Analysis		☐ Process Knowledge		☐ Contents
Prohibited Waste at all three NTS landfills:		Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).				
Additional Prohibited Waste at the Area 9 U10C Landfill:		Sewage Sludge, Animal carcasses, Wet garbage (food waste); and Friable asbestos				
REQUIRED: WASTE CONTENTS ALLOWABLE WASTES Check all allowable wastes that are contained within this load:						
NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics' kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.						
Acceptable waste at any NTS landfill:		☒ Paper		☐ Rocks / unaltered geologic materials		☐ Empty containers
☐ Asphalt		☐ Metal	☐ Wood	☐ Soil	☐ Rubber (excluding tires)	☐ Demolition debris
☒ Plastic		☐ Wire	☐ Cable	☐ Cloth	☐ Insulation (non-Asbestosform)	☐ Cement & concrete
☐ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)						
Additional waste accepted at the Area 23 Mercury Landfill:		☐ Office Waste		☐ Food Waste		☐ Animal Carcasses
☐ Asbestos		☐ Friable	☐ Non-Friable (contact SWO if regulated load)		Quantity: _____	
Additional waste accepted at the Area 9 U10c Landfill:						
☐ Non-friable asbestos		☐ Drained automobiles and military vehicles		☐ Solid fractions from sand/oil/water separators		
☐ Light ballasts (contact SWO)		☐ Drained fuel filters (gas & diesel)		☐ Deconned Underground and Above Ground Tanks		
☐ Hydrocarbons (contact SWO)		☐ Other _____				
Additional waste accepted at the Area 6 Hydrocarbon Landfill:		☐ Other _____				
☐ Septic sludge		☐ Rags	☐ Drained fuel filters (gas & diesel)		☐ Crushed non-teme plated oil filters	
☐ Plants		☒ Soil	☐ Sludge from sand/oil/water separators		☐ PCBs below 50 parts per million	
REQUIRED: WASTE GENERATOR SIGNATURE						
Initials: <u>DS</u> (if initialed, no radiological clearance is necessary.)						
The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.						
To the best of my knowledge, the waste described above contains only those materials that are allowed for disposal at this site. I have verified this through the waste characterization method identified above and a review of the above-mentioned prohibited and allowable waste items. I have contacted Property Management and have verified that this material/equipment is approved for disposal in the landfill.						
Print Name:		<u>DAVID SCHROCK</u>			If applicable, place BN-0646, "Radiological Release Sticker" here. Onsite use only.	
Signature:		<u>/s/ David Schrock</u>				
		Date:		<u>4/24/06</u>		
Note: Food waste, office trash and/or animal carcasses are considered not to contain added radioactivity, and therefore do not require a radiological clearance.						
SWO USE ONLY						
Load Weight (net from scale or estimate):		<u>150</u>		Signature of Certifier: <u>/s/</u> Signature on file		

Appendix E

Use Restrictions

Appendix E

CAU Use Restriction Information

CAU Number/Description: CAU 219, Septic Systems and Injection Wells

Applicable CAS Number(s)/Description(s):

- CAS 16-04-01, Septic Tanks (3)
- CAS 16-04-02, Distribution Box
- CAS 16-04-03, Sewer Pipes

Contact (organization/project): NNSA/NSO Industrial Sites Project Manager

Surveyed Area (UTM, Zone 11, NAD 27, meters):

Northwest Corner:	N = 4100534.18	E = 572201.94
Northeast Corner:	N = 4100530.53	E = 572207.09
Eastern Midpoint	N = 4100502.68	E = 572185.11
Southeast Corner:	N = 4100429.43	E = 572173.89
Southwest Corner:	N = 4100431.36	E = 572161.29
Western Mid Point	N = 4100504.35	E = 572176.28

Survey Date: April 2006

Survey Method (GPS, etc.): Map coordinates

Site Monitoring Requirements: Not Applicable (N/A)

Required Frequency (quarterly, annually?): N/A

If Monitoring Has Started, Indicate last Completion Date: N/A

Use Restrictions

The future use of any land related to this Corrective Action Unit (CAU), as described by the above surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as approved by the state and identified in the CAU Closure Report or other CAU 219 documentation, unless appropriate concurrence is obtained in advance.

Comments: This Use Restriction is for activities relating to surface and subsurface disturbances that would cause an exposure to any site worker greater than 50 working days. CASs 16-04-01, 16-04-02, and 16-04-03 are restricted from the surface to an approximate depth of 10 ft bgs. The restricted area is not posted with signs but the coordinates for the boundary of the area will be entered in the NTS database. Annual post-closure inspections are not required. See the Corrective Action Decision Document/Closure Report for additional information on the condition of the site.

Submitted By: /s/ Signature on file

Date: 5-25-06

cc with copy of survey map (paper and digital (.dgn) formats):

CAU Files (2 copies)

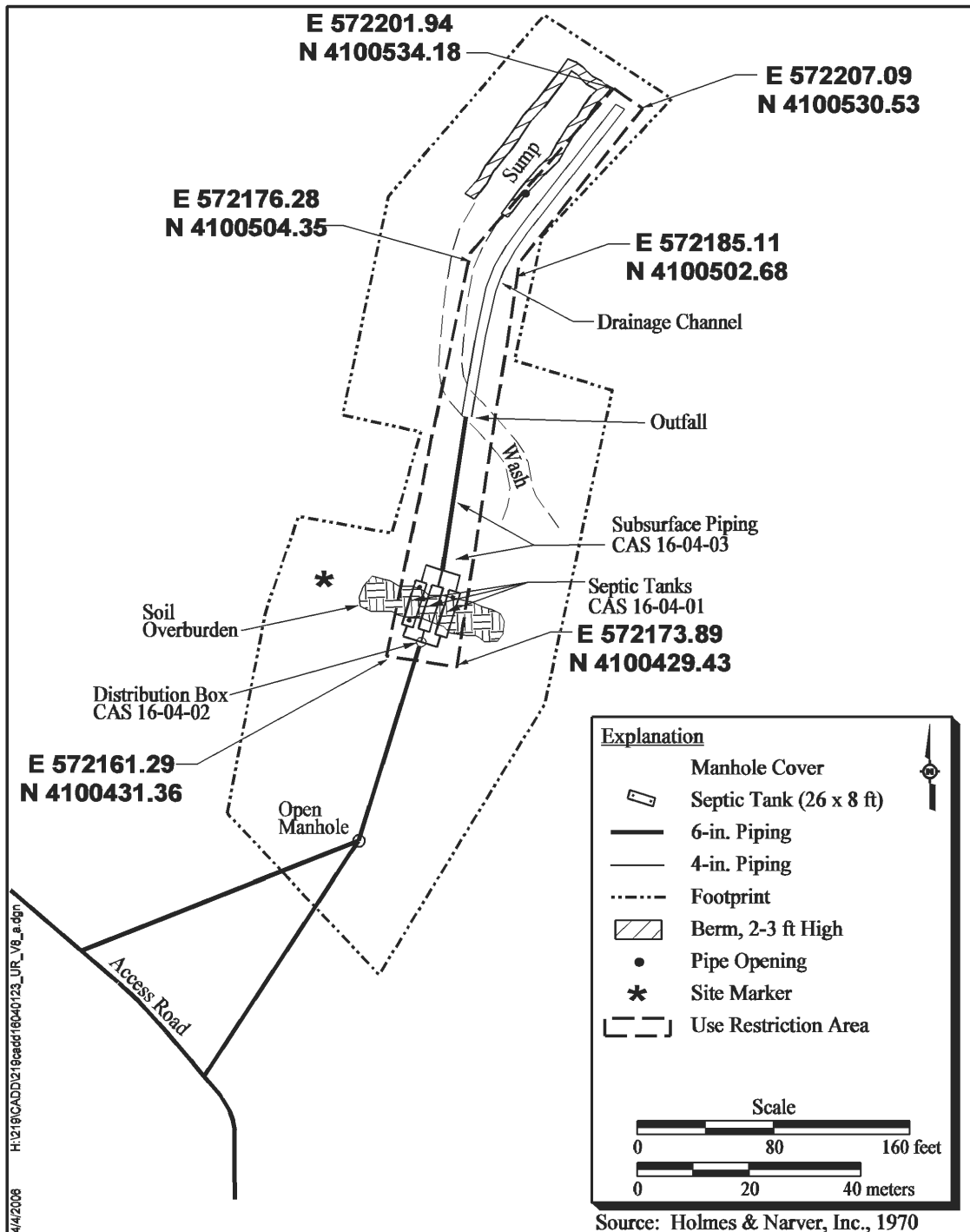


Figure E.1-1
CASs 16-04-01, 16-04-02, and 16-04-03
Use Restriction Area

Appendix F

Sample Location Coordinates

F.1.0 Sample Location Coordinates

F.1.1 CAS 03-11-01, Steam Pipes and Asbestos Tiles

Sample location coordinates were collected during the corrective action investigation using a Trimble GPS, Model TSCI. These coordinates identify the field sampling locations (e.g., latitude, longitude, elevation) at CAU 219, CAS 03-11-01.

Sample locations and pertinent locations of interest for CAS 03-11-01 are shown on [Figure A.3-1](#). The corresponding coordinates for the sample locations are listed in [Table F.1-1](#).

Table F.1-1
Sample Locations for CAS 03-11-01, Steam Pipes and Asbestos Tiles

Latitude	Longitude	Northing ^a	Easting ^a	HAE (meters)	Location
37.04976633	-116.0510780	4100610.843	584379.413	1230.865	A01
37.04976977	-116.0510563	4100611.244	584381.344	1230.822	A02
37.04978703	-116.0510599	4100613.156	584381.000	1230.611	A03
37.05011297	-116.0511737	4100649.213	584370.525	1230.906	A04

^aUniversal Transverse Mercator (UTM) Zone 11, North American Datum (NAD) 1927 (U.S. Western)

HAE = Height above ellipsoid

F.1.2 CASs 16-04-01, Septic Tanks (3); 16-04-02, Distribution Box; and 16-04-03, Sewer Pipes

Sample location coordinates were collected during the corrective action investigation using a Trimble GPS, Model TSCI. These coordinates identify the field sampling locations (e.g., latitude, longitude, elevation) at CAU 219, CASs 16-04-01, 16-04-02, and 16-04-03.

Sample locations and pertinent locations of interest for CASs 16-04-01, 16-04-02, and 16-04-03 are shown on [Figures A.4-2](#) and [A.4-3](#). The corresponding coordinates for the sample locations are listed in [Tables F.1-2](#) through [F.1-4](#).

Table F.1-2
Sample Locations for CAS 16-04-01, Septic Tanks (3)

Latitude	Longitude	Northing ^a	Easting ^a	HAE (meters)	Location
37.04923947	-116.1884646	4100439.305	572163.064	1518.494	B01
37.04921693	-116.1884227	4100436.836	572166.814	1519.171	B02
37.04920826	-116.1883938	4100435.896	572169.395	1518.875	B03
37.04919911	-116.1883536	4100434.912	572172.974	1518.669	B04
37.04930045	-116.1884399	4100446.088	572165.205	1518.655	B05
37.04929074	-116.1883921	4100445.048	572169.466	1518.891	B06
37.04928306	-116.1883623	4100444.218	572172.974	1518.791	B07
37.04927307	-116.1883161	4100443.145	572176.240	1518.589	B08
37.04920195	-116.1883652	4100435.218	572171.941	1519.296	B09
37.04920333	-116.1883779	4100435.361	572170.808	1518.849	B10
37.04921260	-116.1884090	4100436.367	572168.041	1518.870	B11
37.04922088	-116.1884446	4100437.257	572164.862	1519.414	B12
37.04921574	-116.1884203	4100436.707	572167.032	1519.703	B13
37.04921590	-116.1884380	4100436.711	572165.454	1519.940	B14
37.04928477	-116.1883813	4100444.393	572170.429	1519.047	B15
37.04927511	-116.1883480	4100443.347	572173.400	1519.018	B16
37.04929432	-116.1884117	4100445.430	572167.722	1518.846	B17
37.04928906	-116.1884268	4100444.834	572166.384	1518.960	B18
37.04929718	-116.1883550	4100445.790	572172.756	1518.653	B19
37.04926499	-116.1883330	4100442.235	572174.748	1518.957	B20

^aUniversal Transverse Mercator (UTM) Zone 11, North American Datum (NAD) 1927 (U.S. Western)

HAE = Height above ellipsoid

Table F.1-3
Sample Locations for CAS 16-04-02, Distribution Box

Latitude	Longitude	Northing ^a	Easting ^a	HAE (meters)	Location
37.04917021	-116.1884262	4100431.650	572166.552	1519.317	C01
37.04918058	-116.1884305	4100432.798	572166.155	1519.419	C02
37.04918485	-116.1884189	4100433.281	572167.180	1519.497	C03
37.04917221	-116.1884139	4100431.881	572167.639	1519.335	C04

^aUniversal Transverse Mercator (UTM) Zone 11, North American Datum (NAD) 1927 (U.S. Western)

HAE = Height above ellipsoid

Table F.1-4
Sample Locations for CAS 16-04-03, Sewer Pipes

Latitude	Longitude	Northing ^a	Easting ^a	HAE (meters)	Location
37.04957883	-116.1883220	4100477.060	572175.432	1513.513	D01
37.04969347	-116.1882985	4100489.796	572177.411	1512.785	D02
37.04983258	-116.1882289	4100505.281	572183.468	1511.910	D03
37.04994876	-116.1881148	4100518.255	572193.502	1511.372	D04
37.05004652	-116.1880223	4100529.171	572201.631	1511.261	D05
37.04953701	-116.1882765	4100472.455	572179.516	1514.566	D06
37.04966898	-116.1883470	4100487.041	572173.123	1513.560	D07
37.04992171	-116.1882707	4100515.137	572179.666	1511.327	D08
37.05002482	-116.1881638	4100526.656	572189.076	1510.766	D09
37.05009775	-116.1880973	4100534.797	572194.914	1510.716	D10
37.04981920	-116.1882907	4100503.749	572177.986	1512.229	D11

^aUniversal Transverse Mercator (UTM) Zone 11, North American Datum (NAD) 1927 (U.S. Western)

HAE = Height above ellipsoid

F.1.3 CAS 23-20-01, DNA Motor Pool Sewage and Waste System

Sample location coordinates were collected during the corrective action investigation using a Trimble GPS, Model TSCI. These coordinates identify the field sampling locations (e.g., latitude, longitude, elevation) at CAU 219, CAS 23-20-01

Sample locations and pertinent locations of interest for CAS 23-20-01 are shown on [Figure A.5-2](#).

The corresponding coordinates for the sample locations are listed in [Table F.1-5](#)

Table F.1-5
Sample Locations for CAS 23-20-01,
DNA Motor Pool Sewage and Waste System
(Page 1 of 2)

Latitude	Longitude	Northing ^a	Easting ^a	HAE (meters)	Location
36.65857539	-115.9907512	4057270.187	590202.429	1161.006	E01
36.65867352	-115.9906010	4057281.214	590215.737	1160.955	E02
36.65875174	-115.9906275	4057289.867	590213.274	1160.790	E03
36.65864917	-115.9904830	4057278.624	590226.314	1161.478	E04
36.65844409	-115.9904823	4057255.875	590226.616	1161.118	E05
36.65836090	-115.9906289	4057246.509	590213.607	1161.006	E06
36.65871167	-115.9906623	4057285.389	590210.216	1160.745	E07
36.65872413	-115.9906495	4057286.783	590211.346	1160.681	E08
36.65859350	-115.9905497	4057272.386	590220.411	1160.728	E09
36.65864632	-115.9905286	4057278.265	590222.239	1160.875	E10
36.65868451	-115.9906176	4057282.418	590214.242	1160.661	E11
36.65873360	-115.9907179	4057287.769	590205.216	1160.802	E12
36.65855400	-115.9906431	4057267.917	590212.110	1160.513	E13
36.65859730	-115.9906424	4057272.721	590212.126	1160.538	E14
36.65862638	-115.9907402	4057275.854	590203.348	--	E15
36.65867196	-115.9906912	4057280.957	590207.675	--	E16
36.65867426	-115.9905096	4057281.382	590223.905	--	E17
36.65864341	-115.9904888	4057277.980	590225.798	--	E18
36.65852072	-115.9904864	4057264.372	590226.159	--	E19
36.65836757	-115.9905086	4057247.363	590224.355	--	E20
36.65837067	-115.9907234	4057247.504	590205.151	--	E21
36.65850368	-115.9907378	4057262.246	590203.708	--	E22
36.65851889	-115.9904564	4057264.198	590228.845	1161.038	E23

Table F.1-5
Sample Locations for CAS 23-20-01,
DNA Motor Pool Sewage and Waste System
(Page 2 of 2)

Latitude	Longitude	Northing ^a	Easting ^a	HAE (meters)	Location
36.65858933	-115.9904544	4057272.013	590228.941	1161.078	E24
36.65867372	-115.9904451	4057281.384	590229.669	1161.089	E25
36.65865222	-115.99138722	4057283.93	590222.61	1162.89	E26
36.65864056	-115.99152583	4057282.49	590210.23	1163.25	E27
36.65866778	-115.99131056	4057285.45	590204.62	1163.36	E28

^aUniversal Transverse Mercator (UTM) Zone 11, North American Datum (NAD) 1927 (U.S. Western)

HAE = Height above ellipsoid

-- = Not available

F.1.4 CAS 23-20-02, Injection Well

The sample location coordinate was collected during the corrective action investigation using a Trimble GPS, Model TSCI. This coordinate identifies the field sampling location (e.g., latitude, longitude, elevation) at CAU 219, CAS 23-20-02.

The sample location and pertinent locations of interest for CAS 23-20-02 are shown on [Figure A.6-2](#). The corresponding coordinates for the anomaly and sample location are listed in [Table F.1-6](#).

Table F.1-6
Sample Locations for CAS 23-20-02, Injection Well

Latitude	Longitude	Northing ^a	Easting ^a	HAE (meters)	Location
36.66396473	-115.9934126	4057865.524	589958.280	1160.222	Anomaly
36.66396832	-115.9933838	4057865.949	589960.849	1158.139	F01

^aUniversal Transverse Mercator (UTM) Zone 11, North American Datum (NAD) 1927 (U.S. Western)

HAE = Height above ellipsoid

N/A = Not applicable

Appendix G

Nevada Division of Environmental Protection Comments

(1 Page)

NEVADA ENVIRONMENTAL RESTORATION PROJECT

DOCUMENT REVIEW SHEET

1. Document Title/Number: Draft Draft Corrective Action Decision Document for Corrective Action Unit 219: Septic Systems and Injection Wells, Nevada Test Site, Nevada	2. Document Date: 05/09/2006
3. Revision Number: 0	4. Originator/Organization: Stoller-Navarro
5. Responsible NNSA/NV ERP Project Manager: Sabine T. Curtis	6. Date Comments Due: 05/05/2006
7. Review Criteria: Full	
8. Reviewer/Organization/Phone No: Don Elle and Greg Raab, NDEP, 486-2850	9. Reviewer's Signature:

10. Comment Number/Location	11. Type*	12. Comment	13. Comment Response	14. Accept
1.) Section 2.2.1.1, Page 16 of 32, Last Sentence		"The lead contamination will be addressed in the CAU 145 CADD: therefore, lead is not a COC at CAS 03-11-01." NDEP notes NNSA/NSO will close this CAS in place under CAU 145.	An ROTC (CADD-1) to the CAU 145 CADD was submitted to include the lead contamination at CAS 03-11-01 into CAS 03-25-01.	
2.) Appendix A, Page A-56, 3rd Paragraph, 3rd Sentence		"These eight locations were randomly plotted in a grid around the main pad using Visual Software Plan (PNNL, 2002)." The name of the software is Visual Sample Plan.	Revised text per comment.	
3.) Appendix A, Page A-105, 4th Paragraph, 4th Sentence		"The concentration of benzo(a)pyrene detected in the sludge sample collected from the catch basin is a COC, and this material will be removed...before the submission of the final CADD/CR." If NNSA/NSO does not complete this as planned, NDEP will find the final CADD/CR substantially deficient.	The text was revised to document that the concrete box of the catch basin and the sludge contaminated with benzo(a)pyrene and lead were removed during the corrective action conducted at CAS 23-20-01 and properly disposed of in the Hydrocarbon Landfill in Area 6 of the NTS.	
4.) Appendix E, Page E-1		NNSA/NSO must have the proper signature on the land use restriction form.	The land use restriction form was signed by NNSA/NSO.	

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