Nevada
Environmental
Restoration
Project

DOE/NV--554

Corrective Action Decision Document
for Corrective Action Unit 321:
Area 22 Weather Station Fuel Storage,
Nevada Test Site, Nevada

Controlled Copy No.: ____

Revision No.: 0

July 1999

Approved for public release; further dissemination unlimited.

Environmental Restoration
Division

U.S. Department of Energy
Nevada Operations Office

Available to the public from -

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

Available electronically at <http://www.doe.gov/bridge>. Available to
U.S. Department of Energy and its contractors in paper from -

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062
(423) 576-8401

*Reference herein to any specific commercial product, process, or service by
trade name, trademark, manufacturer, or otherwise, does not necessarily
constitute or imply its endorsement, recommendation, or favoring by the
United States Government or any agency thereof or its contractors or
subcontractors.*

**CORRECTIVE ACTION DECISION DOCUMENT
FOR CORRECTIVE ACTION UNIT 321:
AREA 22 WEATHER STATION FUEL STORAGE,
NEVADA TEST SITE, NEVADA**

DOE Nevada Operations Office
Las Vegas, Nevada

Controlled Copy No.: ____

Revision No.: 0

July 1999

Approved for public release; further dissemination unlimited.

**CORRECTIVE ACTION DECISION DOCUMENT
FOR CORRECTIVE ACTION UNIT 321:
AREA 22 WEATHER STATION FUEL STORAGE,
NEVADA TEST SITE, NEVADA**

Approved by: _____ Date: _____

Janet Appenzeller-Wing, Project Manager
Industrial Sites Project

Approved by: _____ Date: _____

Runore C. Wycoff, Division Director
Environmental Restoration Division

Table of Contents

List of Figures.....	iii
List of Tables.....	iv
List of Acronyms and Abbreviations	v
Executive Summary	ES-1
1.0 Introduction.....	1
1.1 Purpose	1
1.2 Scope.....	1
1.3 CADD Contents	3
2.0 Corrective Action Investigation Summary.....	4
2.1 Investigation Activities.....	4
2.2 Results.....	4
2.3 Need for Corrective Action.....	5
3.0 Evaluation of Alternatives	6
3.1 Corrective Action Objectives	6
3.1.1 Contaminants of Concern.....	6
3.1.2 Potential Exposure Pathways	6
3.2 Screening Criteria	7
3.2.1 Corrective Action Standards.....	7
3.2.2 Remedy Selection Decision Factors.....	9
3.3 Development of Corrective Action Alternatives	10
3.3.1 Alternative 1 - No Further Action	13
3.3.2 Alternative 2 - Clean Closure by Excavation and Disposal	14
3.4 Evaluation and Comparison of Alternatives.....	14
4.0 Recommended Alternative	18
5.0 References.....	19

Appendix A - Corrective Action Investigation Report for CAU 321: Area 22 Weather Station Fuel Storage, Nevada Test Site, Nevada

A.1.0 Introduction.....	A-2
A.1.1 Project Objectives.....	A-2
A.1.2 Report Content	A-2
A.2.0 Field Investigation and Sampling Activities.....	A-4
A.2.1 Site Descriptions and Conditions	A-4
A.2.2 Sampling Logistics	A-5

Table of Contents (Continued)

A.2.2.1	Sample Locations	A-5
A.2.2.2	Geoprobe® Soil Sampling	A-5
A.2.3	Field Screening	A-7
A.2.4	Number of Samples Collected and Submitted for Analyses	A-8
A.2.5	Geology	A-11
A.2.6	Hydrology	A-11
A.3.0	Investigation Results	A-12
A.3.1	Total Volatile Organic Compound Analytical Results	A-12
A.3.2	Total Semivolatile Organic Compound Analytical Results	A-13
A.3.3	Total Petroleum Hydrocarbon Results	A-13
A.3.4	Total Lead Results	A-14
A.3.5	TCLP Lead Results	A-14
A.3.6	Gamma Spectroscopy Results	A-14
A.4.0	Quality Assurance	A-17
A.4.1	Precision	A-17
A.4.2	Accuracy	A-17
A.4.3	Representativeness	A-18
A.4.4	Completeness	A-18
A.4.5	Comparability	A-18
A.4.6	Tier I and Tier II Data Evaluations	A-19
A.4.6.1	Tier I Evaluation	A-19
A.4.6.2	Tier II Evaluation	A-20
A.4.6.3	Tier III	A-20
A.4.7	Quality Control Samples	A-21
A.4.7.1	Field Quality Control Samples	A-21
A.4.7.2	Laboratory Quality Control Samples	A-23
A.4.8	Field Nonconformances	A-25
A.4.9	Laboratory Nonconformances	A-25
A.5.0	Summary	A-26

Appendix B - Cost Estimates

Appendix C - Response to NDEP Comments

List of Figures

<i>Number</i>	<i>Title</i>	<i>Page</i>
1-1	CAU 321 Weather Station Fuel Storage Location Map, Nevada Test Site.	2
A.2-1	Soil Sample Locations for the CAU 321 Fuel Storage Area Corrective Action Investigation.	A-6

List of Tables

<i>Number</i>	<i>Title</i>	<i>Page</i>
3-1	Detailed Evaluation of Alternatives.	15
3-2	Comparative Evaluation of Alternatives	17
A.2-1	Samples Collected and Submitted for Laboratory Analyses for the CAU 321 Fuel Storage Area Corrective Action Investigation.	A-8
A.3-1	Laboratory Analytical Methods Conducted for Samples Collected During the CAU 321 Fuel Storage Area Corrective Action Investigation	A-12
A.3-2	Soil Sample Results for Total Volatile Organic Compounds Detected Above Minimum Reporting Limits, CAU 321 Fuel Storage Area, Nevada Test Site	A-13
A.3-3	Soil Sample Results for Total Petroleum Hydrocarbons Detected Above Minimum Reporting Limits, CAU 321 Fuel Storage Area, Nevada Test Site	A-14
A.3-4	Summary of Total Lead Results Detected Above Minimum Reporting Limits, CAU 321 Fuel Storage Area, Nevada Test Site	A-15

List of Acronyms and Abbreviations

bgs	Below ground surface
CADD	Corrective Action Decision Document
CAIP	Corrective Action Investigation Plan
CAS	Corrective Action Site
CAU	Corrective Action Unit
CFR	<i>Code of Federal Regulations</i>
CLP	Contract Laboratory Program
COC	Contaminant(s) of concern
COPC	Contaminant(s) of potential concern
CRDL	Contract-required detection limit(s)
DOE/NV	U.S. Department of Energy, Nevada Operations Office
DQO	Data Quality Objective(s)
EPA	U.S. Environmental Protection Agency
FFACO	<i>Federal Facility Agreement and Consent Order</i>
ft	Foot (feet)
ICP	Inductively coupled plasma
in.	Inch(es)
LCS	Laboratory control sample(s)
mg/kg	Milligram(s) per kilogram
mi	Mile(s)
MS/MSD	Matrix spike and matrix spike duplicate
NAC	<i>Nevada Administrative Code</i>
NDEP	Nevada Division of Environmental Protection
NRS	<i>Nevada Revised Statutes</i>
NTS	Nevada Test Site
PAL	Preliminary action level(s)
PB	Preparation blank(s)

List of Acronyms and Abbreviations (Continued)

ppm	Part(s) per million
PRG	Preliminary Remediation Goals
PVC	Polyvinyl chloride
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
RCRA	<i>Resource Conservation and Recovery Act</i>
RPD	Relative percent difference
SDG	Sample delivery group
SVOC	Semivolatile organic compound(s)
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total petroleum hydrocarbon(s)
VOC	Volatile organic compound(s)
%R	Percent recovery
µg/kg	Microgram(s) per kilogram

Executive Summary

This Corrective Action Decision Document has been prepared for Corrective Action Unit 321, Area 22 Weather Station Fuel Storage, Nevada Test Site, Nevada, in accordance with the *Federal Facility Agreement and Consent Order* of 1996 (FFACO, 1996). Corrective Action Unit 321 is located at the Nevada Test Site, Nevada, and is comprised of Corrective Action Site 22-99-05, Fuel Storage Area.

The purpose of this Corrective Action Decision Document is to identify and provide a rationale for the selection of a recommended corrective action alternative for the Corrective Action Site.

The scope of this Corrective Action Decision Document consists of the following tasks:

- Develop corrective action objectives.
- Identify corrective action alternative screening criteria.
- Develop corrective action alternatives.
- Perform detailed and comparative evaluations of the corrective action alternatives in relation to the corrective action objectives and screening criteria.
- Recommend and justify a preferred corrective action alternative for the Corrective Action Site.

A corrective action investigation was performed in February 1999 as set forth in the *Corrective Action Investigation Plan for Corrective Action Unit 321: Area 22 Weather Station Fuel Storage, Nevada Test Site, Nye County, Nevada* (DOE/NV, 1999). The only contaminant of concern above preliminary action levels was total petroleum hydrocarbons as diesel range organics at two sample locations. Details regarding the investigation can be found in Appendix A of this document.

Based on the potential exposure pathways, the following corrective action objectives have been identified for Corrective Action Unit 321:

- Prevent or mitigate exposure to near-surface soil containing contaminants of concern at concentrations exceeding preliminary action levels as defined in the Corrective Action Investigation Plan (DOE/NV, 1999).
- Prevent spread of contaminants of concern beyond the corrective action unit.

Based on the review of existing data, future use, and current operations at the Nevada Test Site, the following alternatives were developed for consideration at the Weather Station Fuel Storage:

- Alternative 1 - No Further Action
- Alternative 2 - Clean Closure by Excavation and Disposal

The corrective action alternatives were evaluated based on four general corrective action standards and five remedy selection decision factors. Based on the results of this evaluation, the preferred alternative for Corrective Action Unit 321 is Alternative 2, Clean Closure by Excavation and Disposal.

The preferred corrective action alternative was evaluated on technical merit; focusing on performance, reliability, feasibility, and safety. Alternative 2 was judged to meet all requirements for the technical components evaluated. The alternative meets all applicable state and federal regulations for closure of the site and will eliminate potential future exposure pathways to the contaminated soils at the Weather Station Fuel Storage site.

1.0 Introduction

This Corrective Action Decision Document (CADD) has been prepared for Corrective Action Unit (CAU) 321, Area 22 Weather Station Fuel Storage, in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) of 1996 that was agreed to by the U.S. Department of Energy, Nevada Operations Office (DOE/NV); the Nevada Division of Environmental Protection (NDEP); and the U.S. Department of Defense (FFACO, 1996). The CADD provides or references the specific information necessary to recommend corrective actions for the single Corrective Action Site (CAS) 22-99-05 within CAU 321, Area 22 Weather Station Fuel Storage.

Corrective Action Unit 321 is located at the Nevada Test Site (NTS) in Area 22. The NTS is approximately 65 miles (mi) northwest of Las Vegas, Nevada. The Fuel Storage Area is an area approximately 325 by 540 feet (ft) located southwest of Mercury, Nevada. The Fuel Storage Area was used to store fuel and other petroleum products necessary for motorized operations at the historical Camp Desert Rock facility which was operational from 1951 to 1958 ([Figure 1-1](#)).

1.1 Purpose

This CADD identifies and provides a rationale for the selection of a recommended corrective action alternative for the CAU. The need for evaluation of corrective action alternatives is based on process knowledge and the results of investigative activities conducted in accordance with the *Corrective Action Investigation Plan for Corrective Action Unit 321: Area 22 Weather Station Fuel Storage, Nevada Test Site, Nevada* (CAIP) (DOE/NV, 1999).

1.2 Scope

The scope of this CADD consists of the following:

- Develop corrective action objectives.
- Identify corrective action alternative screening criteria.
- Develop corrective action alternatives.

Explanation

- Nevada Test Site Boundary
- - - Area Boundary
- - - County Boundary
- Paved Road
- Unpaved Road

Scale

0 1.3 2.6 Kilometers

0 1 2 Miles

Figure 1-1
CAU 321
Weather Station Fuel Storage
Location Map, Nevada Test Site

Source: Modified From USGS Digital Topographic Base Maps (BN, 1997)
 Modified From Raytheon Services Nevada, 1992

- Perform detailed and comparative evaluations of corrective action alternatives in relation to corrective action objectives and screening criteria.
- Recommend and justify a preferred corrective action alternative for the CAU.

1.3 CADD Contents

This CADD is divided into the following sections:

Section 1.0 - Introduction: summarizes the purpose, scope, and contents of this CADD.

Section 2.0 - Corrective Action Investigation Summary: summarizes the investigation field activities, the results of the investigation, and the need for corrective action.

Section 3.0 - Evaluation of Alternatives: documents steps taken to determine a preferred corrective action alternative.

Section 4.0 - Recommended Alternative: presents the preferred corrective action alternative and the rationale for its selection based on the corrective action objectives and alternative screening criteria.

Section 5.0 - References: provides a list of all referenced documents.

Appendix A: *Corrective Action Investigation Report for CAU 321: Area 22 Weather Station Fuel Storage, Nevada Test Site, Nevada.*

Appendix B: Cost estimates.

All work was performed in accordance with the following documents:

- *Corrective Action Investigation Plan for Corrective Action Unit 321: Area 22 Weather Station Fuel Storage, Nevada Test Site, Nevada* (DOE/NV, 1999)
- *Industrial Sites Quality Assurance Project Plan* (DOE/NV, 1996)
- FFACO (1996)
- *Project Management Plan* (DOE/NV, 1994)

2.0 Corrective Action Investigation Summary

The following sections describe and summarize the results of the investigation activities conducted at CAU 321. For detailed investigation results, please refer to [Appendix A](#).

2.1 Investigation Activities

From February 16 through 18, 1999, corrective action investigation activities were performed at CAU 321 as set forth in the CAIP (DOE/NV, 1999). The purpose of the investigation was as follows:

- Identify the presence and nature of contaminants of potential concern (COPCs) at the CAU.
- Determine the vertical and lateral extent of COPCs.
- Provide sufficient information and sample analytical data from which corrective action alternatives may be developed and evaluated in this CADD for the CAU.

The investigation activities performed are summarized below:

- Collected 42 surface/near-surface soil samples from 18 locations using a Geoprobe Macrocore® sampler. These samples were collected at 2 ft intervals from 0 to 6 ft below ground surface (bgs).
- Field-screened soil samples for volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), and alpha/beta emitters.
- Twenty-six samples were submitted for laboratory analysis. The number and location of samples selected for laboratory analysis were based on field-screening results.
- Analyzed soil samples for total VOCs; total semivolatile organic compounds (SVOCs); total lead; TPH as gasoline; and TPH as diesel/waste oil.

2.2 Results

The corrective action investigation analytical results indicated:

- All total VOC, total SVOC, and total lead results were below the preliminary action levels (PALs) outlined in the CAIP (DOE/NV, 1999).

- The TPH-diesel range organics concentrations exceeded the NDEP action level of 100 milligrams per kilogram (mg/kg) at sample locations FSA00003 and FSA00012, with concentrations ranging from 124 mg/kg to 377 mg/kg ([Table A.3-3](#) and [Figure A.2-1](#)). The TPH-gasoline was detected at sample location FSA00003 at a concentration level of 9.03 mg/kg, which is below the NDEP action level of 100 mg/kg ([Table A.3-3](#) and [Figure A.2-1](#)).

The details of the methods used and results found during the investigation are presented in [Appendix A](#). Based on these results, the nature and extent of contaminants of concern (COCs) at CAU 321 have been adequately identified to develop and evaluate corrective action alternatives.

2.3 Need for Corrective Action

Analytes detected during the corrective action investigation were evaluated against PALs to determine COCs for CAU 321. The only analyte that exceeded the NDEP action level of 100 mg/kg was TPH-diesel range organics at sample locations FSA00003 and FSA00012, where concentrations ranged from 124 mg/kg to 377 mg/kg ([Table A.3-3](#) and [Figure A.2-1](#)). An estimated combined total volume of eight cubic yards of near-surface soil are impacted at these sample locations. No other COCs were identified above PALs at the site. Based on the identification of COCs above PALs in these areas, potential corrective action alternatives are identified and evaluated in this CADD to ensure worker, public, and environmental protection against potential exposure to COCs in accordance with the *Nevada Administrative Code* (NAC) 445A (NAC, 1998b).

Site-specific characteristics which may constrain remediation include the following:

- Ongoing activities in the surrounding areas
- Desert tortoise habitat in the area

3.0 Evaluation of Alternatives

The purpose of this section is to present the corrective action objectives for CAU 321, describe the general standards and decision factors used to screen the corrective action alternatives, and develop and evaluate a set of corrective action alternatives that could be used to meet the corrective action objectives.

3.1 Corrective Action Objectives

The corrective action objectives are media-specific goals for protecting human health and the environment. Based on the potential exposure pathways ([Section 3.1.2](#)), the following corrective action objectives have been identified for CAU 321:

- Prevent or mitigate exposure to near-surface soil containing COCs at concentrations exceeding PALs as defined in the CAIP (DOE/NV, 1999).
- Prevent spread of COCs beyond the CAU.
- Prevent adverse impacts to groundwater quality.

3.1.1 Contaminants of Concern

Contaminants of potential concern were determined in the Data Quality Objective (DQO) process as listed in the CAIP (DOE/NV, 1999). Analytical results obtained from the corrective action investigation were evaluated to determine if COPCs were detected above PALs. If the PALs are exceeded, those components would be COCs for CAU 321 that must be addressed by corrective action. Based on the results of this evaluation, TPHs (as diesel range hydrocarbons) were identified as the only COC for the site.

3.1.2 Potential Exposure Pathways

As identified in the CAIP, the future use for the CAU is assumed to be similar to its current use as light industrial. As part of the CAIP (DOE/NV, 1999), a conceptual model for CAU 321 was developed which identified the potential exposure mechanism as disturbance of contaminated soil by site workers. This implies a potential exposure pathway through ingestion of, inhalation of, and

dermal contact with contaminated soil under industrial scenarios. Site workers could potentially be exposed to contaminated soil during excavation activities associated with general maintenance or through construction and maintenance of underground utilities. Contaminant migration to groundwater is not considered to be an exposure pathway because of the large depth to groundwater, the arid environment, surficial geology, and the lack of a sufficient driving force.

3.2 Screening Criteria

The screening criteria used to evaluate and select the preferred corrective action alternatives are identified in the U.S. Environmental Protection Agency (EPA) *Guidance on RCRA Corrective Action Decision Documents* (EPA, 1991) and the *Final RCRA Corrective Action Plan* (EPA, 1994c).

Corrective action alternatives will be evaluated based on four general corrective action standards and five remedy selection decision factors. All corrective action alternatives must meet the general standards to be selected for evaluation using the remedy selection decision factors.

The general corrective action standards are as follows:

- Protection of human health and the environment
- Compliance with media cleanup standards
- Control the source(s) of the release
- Compliance with applicable federal, state, and local standards for waste management

The remedy selection decision factors are as follows:

- Short-term reliability and effectiveness
- Reduction of toxicity, mobility, and/or volume
- Long-term reliability and effectiveness
- Feasibility
- Cost

3.2.1 Corrective Action Standards

The following text describes the corrective action standards used to evaluate the corrective action alternatives:

Protection of Human Health and the Environment

Protection of human health and the environment is a general mandate of the *Resource Conservation and Recovery Act* (RCRA) statute (EPA, 1994c). This mandate requires that the corrective action

include any protective measures that are needed. These measures may or may not be directly related to media cleanup, source control, or management of wastes. The corrective action alternatives are evaluated for the ability to meet corrective action objectives as defined in [Section 3.1](#).

Compliance with Media Cleanup Standards

Each corrective action alternative must meet the proposed media cleanup standards as set forth in applicable state and federal regulations and as specified in the CAIP (DOE/NV, 1999). For CAU 321, the EPA's Region IX Preliminary Remediation Goals (EPA, 1996a), which are derived from the Integrated Risk Information System, are the basis for establishing the PALs for chemical contaminants in accordance with NAC 445A.2272 (NAC, 1998c). The PAL for petroleum substances in soil is 100 mg/kg in accordance with NAC 445A.2272 (NAC, 1998c).

Control the Source(s) of the Release

An objective of a corrective action remedy is to stop further environmental degradation by controlling or eliminating additional releases that may pose a threat to human health and the environment. Unless source control measures are taken, efforts to clean up releases may be ineffective or, at best, will essentially involve a perpetual cleanup. Therefore, each corrective action alternative must use an effective source control program to ensure the long-term effectiveness and protectiveness of the corrective action.

Comply with Applicable Federal, State, and Local Standards for Waste Management

During implementation of any corrective action alternative, all waste management activities must be conducted in accordance with applicable state and federal regulations including: *Nevada Revised Statutes* [NRS] 459.400 - 459.600, "Disposal of Hazardous Waste" (NRS, 1996); 40 *Code of Federal Regulations* [CFR] 260 - 282, "RCRA Regulations" (CFR, 1998); NAC 444, "Solid Waste Disposal" (NAC, 1998a); and NAC 459.9974, "Disposal and Evaluation of Contaminated Soil" (NAC, 1998d). The requirements for management of the waste, if any, derived from the corrective action will be determined based on applicable state and federal regulations, field observations, process knowledge, characterization data, and data collected and analyzed during corrective action implementation. Administrative controls (e.g., decontamination procedures and corrective action strategies) will minimize waste generated during site corrective action activities. Decontamination activities will be performed in accordance with approved procedures.

3.2.2 Remedy Selection Decision Factors

The following text describes the remedy selection decision factors used to evaluate the corrective action alternatives:

Short-Term Reliability and Effectiveness

Each corrective action alternative must be evaluated with respect to its effects on human health and the environment during the construction and implementation of the corrective action. The following factors will be addressed for each alternative:

- Protection of the community from potential risks associated with implementation such as fugitive dusts, transportation of hazardous materials, and explosion
- Protection of workers during construction and implementation
- Environmental impacts that may result from construction and implementation
- The amount of time until the corrective action objectives are achieved

Reduction of Toxicity, Mobility, and/or Volume

Each corrective action alternative must be evaluated for its ability to reduce the toxicity, mobility, and/or volume of the contaminated media. Reduction in toxicity, mobility, and/or volume refers to changes in one or more characteristics of the contaminated media by the use of corrective measures that decrease the inherent threats associated with that media.

Long-Term Reliability and Effectiveness

Each corrective action alternative must be evaluated in terms of risk remaining at the CAU after the corrective action alternative has been implemented. The primary focus of this evaluation is on the extent and effectiveness of the controls that may be required to manage risk posed by treatment residuals and/or untreated wastes.

Feasibility

The feasibility criterion addresses the technical and administrative feasibility of implementing a corrective action alternative and the availability of services and materials needed during implementation. Each corrective action alternative must be evaluated for the following criteria:

- **Construction and Operation:** This refers to the feasibility of implementing a corrective action alternative given the existing set of waste and site-specific conditions.
- **Administrative Feasibility:** This refers to the administrative activities needed to implement the corrective action alternative (e.g., permits, public acceptance, rights-of-way, off-site approval).
- **Availability of Services and Materials:** This refers to the availability of adequate off-site and on-site treatment, storage capacity, disposal services, necessary technical services and materials, and prospective technologies for each corrective action alternative.

Cost

Costs for each alternative are estimated for comparison purposes only. The cost estimate for each corrective action alternative includes both capital and operation and maintenance costs, as applicable.

The following is a brief description of each component:

- **Capital Costs:** These costs include both direct and indirect costs. Direct costs may consist of materials, labor, mobilization, demobilization, site preparation, construction materials, equipment purchase and rental, sampling and analysis, waste disposal, and health and safety measures. Indirect costs include such items as engineering design, permits and/or fees, start-up costs, and any contingency allowances.
- **Operation and Maintenance:** These costs include labor, training, sampling and analysis, maintenance materials, utilities, and health and safety measures.

Cost summaries for this CADD are provided in [Appendix B](#).

3.3 Development of Corrective Action Alternatives

This section identifies and briefly describes the viable corrective action alternative technologies considered for the affected media. Based on the review of existing data, future use, and current operations at the NTS, the following alternatives have been developed for consideration at CAU 321:

- Alternative 1 - No Further Action
- Alternative 2 - Clean Closure by Excavation and Disposal

Other alternatives such as partial removal of COCs or administrative controls were considered.

However, both of these alternatives were considered unnecessary due to the limited nature and extent of COCs and potential future uses of the site.

The following is an evaluation of NAC 445A.227 (2) (a-k) (NAC, 1998c):

- a. In Mercury Valley (Area 22), the depth to groundwater is approximately 800 to 1,100 ft bgs (Winograd and Thordarson, 1975; Robie et al., 1995). The depth to groundwater for two wells near the CAU 321 site is 785 ft at Army Well 1 and 1,164 ft at SM-23-1, a monitoring well for the Mercury sewage treatment plant (Wood, 1999; USGS, 1999). The field screening and analytical data indicate that COCs are confined primarily from 0 to 2 ft bgs. Due to the large depth to groundwater and the limited nature and minor extent of COCs, groundwater is not expected to be impacted at this site.
- b. The distance to the nearest water-supply well, Army Well 1, is approximately 2.75 mi southwest of the Weather Station Fuel Storage site (LaCamera and Westenberg, 1994). Army Well 1 is primarily used as a backup water supply for Mercury, Nevada. The groundwater flow direction is generally to the southwest (Laczniak et al., 1996).
- c. Soil at the Weather Station Fuel Storage site is silty-to-sandy gravels with some clay. No geotechnical data were collected because COCs were assumed to occur near the ground surface. Field screening and analytical data indicate that COCs are confined primarily from 0 to 2 ft bgs.
- d. Average annual precipitation for valleys in the South-Central Great Basin ranges from 3 to 6 inches (in.) (Winograd and Thordarson, 1975). Annual mean precipitation data for the Desert Rock weather station, located near the CAU 321 site, for the time period from 1961-1990, is 5.68 in. (Wood, 1999). Annual evaporation is roughly 5 to 25 times the annual precipitation (Winograd and Thordarson, 1975). The high evaporation and low precipitation rates create a negative water balance for the area; therefore, no driving force associated with precipitation is available to mobilize COCs vertically. Localized heavy precipitation events may mobilize the COCs laterally (downgradient) within the bermed area and ponding may occur in topographically low areas at the CAU 321 site within the bermed area. However, no significant off-site releases of COCs are expected to occur from flooding that may occur at the site.
- e. The types of regulated substances released at the site are diesel range petroleum hydrocarbons. Any downward migration of COCs is slowed by the following parameters:
 - The length of time since the releases - approximately 40 years have past since the Fuel Storage Area was actively used as part of the Camp Desert Rock facility. No evidence of weathered or historical releases at the site have been identified through process knowledge or during the site investigation and sampling conducted in February 1999. However,

analytical results and chromatograms from the February 1999 site investigation indicate that the TPH-diesel range organics concentration (of 124 mg/kg for FSA00003B) detected at the FSA00003 location is relatively recent and not weathered. The site shows evidence that wood was burned at the location, perhaps a shed or some wood pallets as evidenced by pieces of burnt wood and nails. The diesel range organics found at this location was most likely from an accelerant used to start the wood fire. From the chromatogram, it was not possible to identify the specific type of diesel range organics contaminant. The sample collection log indicates that sample FSA00003B was stained and had a petroleum odor. The field screening results from the Hanby soil test kit detected TPH at about 200 parts per million (ppm).

At the FSA00012 location, the analytical results and chromatogram for sample FSA00012B show the presence of TPH-diesel range organics at concentrations of 271 mg/kg (initial analysis) and 377 mg/kg (on reanalysis). The chromatograph indicates that the TPH contamination is recent. The specific type of TPH-diesel range organic contaminant was identified as lubricating oil. During the collection of this sample there was no visible stains, odors, or other evidence that would indicate this location is contaminated. The Hanby field screening for TPH was nondetect at this location. A possible explanation for the contamination found at the FSA00012 location is that sample FSA00012B was contaminated during the sample collection process and no contamination is present at this location.

- Volume of release - the release at the FSA00003 location was probably from a relatively small volume of an unidentified TPH-diesel range organics fuel used as an accelerant to start a fire for purposes of burning wood debris (e.g., a shed or pallets). The release at the FSA00012 location was most likely from a few drops of lubricating oil from tools or equipment that contaminated the soil sample during the sampling process.
 - Soil saturation - the soil is unsaturated and is dry near the surface where the COCs are primarily concentrated.
- f. The lateral extent of contamination is within the bermed areas of the CAU 321. The vertical extent of contamination is near the ground surface and COCs are primarily concentrated between 0 to 2 ft bgs ([Appendix A](#)).
- g. Presently, CAU 321 is located within the NTS, a government-controlled facility. The NTS is a restricted area and unauthorized personnel are not allowed at the facility. Future use for the CAU 321 area is designated for light industrial use (e.g., development of a solar energy power-generation facility, industrial park, or for commercial manufacturing).
- h. Preferred routes of migration are limited since the source of the release has been eliminated. Lateral migration of COCs is unlikely because sample location FSA00003 is protected from ephemeral flooding by a berm that would divert water from this location to the east or west. The lateral migration of COCs at the FSA00012 sample location may potentially be mobilized from precipitation runoff because the rectangular berm that surrounds the site is open on the

corners and near the center berm. Flood water could move through the site and potentially mobilize COCs from the FSA00012 location. However, contamination at this site is not expected and the TPH-diesel range organics detected and identified as lubricating oil were probably introduced during the sample collection process (see paragraph “e” of this section). Vertical migration of the COCs is unlikely because this area experiences high evaporation and low precipitation rates which creates a negative water balance; therefore, no driving force associated with precipitation is available to mobilize COCs vertically. No significant vertical movement of COCs are expected to occur from ponding or flooding that may occur at the site. The analytical results show that COCs are primarily concentrated between 0 to 2 ft bgs.

- i. The Fuel Storage Area has not been operational since 1958, when activities at Camp Desert Rock ceased and the camp was dismantled. The area within the berms has generally returned to native conditions. There are no surface or subsurface impoundments within the bermed area.
- j. The potential for a hazard related to fire, vapor, or explosion is virtually nonexistent for the COCs at the CAU.
- k. There were no VOCs or SVOCs identified as COCs. The low TPH-diesel range organics concentrations range from 124 mg/kg to 377 mg/kg are not expected to be toxic to flora or fauna within the area. No other site-specific factors are known at this time.

Based on this evaluation, impacts to groundwater are not expected and no corrective action is required. Therefore, groundwater monitoring is not proposed for this site and is not considered an element of the alternatives.

3.3.1 Alternative 1 - No Further Action

Under the Alternative 1 - No Further Action, no corrective actions are planned. This alternative is used as a starting point to establish a baseline for comparison with the other corrective action alternatives. This alternative meets the corrective action objectives for the CAU 321 site and no corrective measures are required to prevent exposure to the COCs or to prevent the spread of contamination. The TPH-diesel organics range contamination is limited to two sample locations with concentration levels that range from 124 mg/kg to 377 mg/kg. The contamination is biodegradable and contaminant levels are expected to naturally decrease over time to below action levels. No toxic VOCs or SVOCS were identified above action levels. An evaluation of NAC 445A.227(2)(a-k) (NAC, 1998c) requirements is presented in [Section 3.3](#). This evaluation provides support that conditions at the CAU will not adversely impact the groundwater beneath the CAU or any nearby drinking water wells, and no corrective action is required.

3.3.2 Alternative 2 - Clean Closure by Excavation and Disposal

Alternative 2 consists of removing soil with COC concentrations greater than the PALs at the two sample locations, FSA00003 and FSA00012. Before soil is removed, confirmatory sampling should be conducted at the FSA00012 location to verify whether contamination at this location is present. Also, step-out sampling near the FSA00003 location could be conducted prior to excavation to verify the lateral extent of the TPH contamination. The TPH contaminated soil at these locations above the PAL of 100 mg/kg will be excavated and disposed of at an appropriate disposal facility. The excavated areas will be returned to surficial conditions compatible with existing operations. Clean borrow soil from a nearby location will be excavated and used to backfill the areas where the COC contaminated soil was removed.

Under this alternative, soil will be excavated to a depth of 3 ft bgs in the vicinity of FSA00003 and in the vicinity of FSA00012 as necessary ([Figure A.2-1](#)). Activities will include excavation, confirmatory sampling, and proper disposal of an estimated volume of eight cubic yards of contaminated soil. The confirmatory sampling will be performed in approximately the same locations as those identified in the investigation as having COC concentrations exceeding PALs. This will ensure complete removal of soil contaminated by COCs at concentrations exceeding the PALs.

The Area 22 Weather Station Fuel Storage will be closed as described in this section and in accordance with NAC 445A (NAC, 1998b).

3.4 Evaluation and Comparison of Alternatives

The general corrective action standards and the remedy selection decision factors described in [Section 3.2](#) were used to conduct detailed and comparative analyses of each corrective action alternative. The advantages and disadvantages of each alternative were assessed to select a preferred alternative for CAU 321. [Table 3-1](#) presents a summary of the detailed analysis of the alternatives.

[Table 3-2](#) presents the comparative analysis of alternatives. Cost summaries are provided in [Appendix B](#).

Table 3-1
Detailed Evaluation of Alternatives
(Page 1 of 2)

Evaluation Criteria	Alternative 1 No Further Action	Alternative 2 Clean Closure by Excavation and Disposal
Closure Standards		
Protection of Human Health and the Environment	<ul style="list-style-type: none"> • Low risk of exposure to COCs. The toxic components of TPH-diesel range organics are not present at the site. • Low concentration levels of near-surface contamination limit the spread of COCs. • NAC 445A.227 (2) (a-k) analysis shows the contaminants are not impacting groundwater and there is no need for corrective action. • No worker exposure associated with implementation. • The contamination is biodegradable. Contamination levels are expected to naturally decrease over time. 	<ul style="list-style-type: none"> • The toxic components of TPH-diesel range organics are not present at the site and treatment of the contaminated soil is not required before disposal. • Meets corrective action objectives by removal of contaminated soil. • Low to moderate worker exposure associated with fugitive dust and/or contact with impacted media. • Low risk to public because of remote location and controlled access to the NTS. • NAC 445A.227 (2) (a-k) analysis shows the contaminants are not impacting groundwater and there is no need for corrective action. • Moving contaminated soil to an appropriate disposal facility addresses the persistence of contaminants.
Compliance with Media Cleanup Standards	<ul style="list-style-type: none"> • Complies with media cleanup standards for all COPCs except TPH-diesel range organics. • NAC 445A.227 (2) (a-k) analysis shows the contaminants are not impacting groundwater and there is no need for corrective action. • The contamination is biodegradable. Contamination levels are expected to naturally decrease over time. 	<ul style="list-style-type: none"> • Complies with media cleanup standards because soil containing COCs at concentrations exceeding PALs will be excavated and disposed of at an appropriate facility. • Cleanup standards will be verified with confirmation sampling. • NAC 445A.227 (2) (a-k) analysis shows the contaminants are not impacting groundwater.
Control the Source(s) of Release	<ul style="list-style-type: none"> • The fuel storage operations at the Area 22 Weather Station Fuel Storage site have been discontinued. 	<ul style="list-style-type: none"> • The source (fuel storage operations) at the Area 22 Weather Station Fuel Storage site has been discontinued. • The contamination will be removed.
Comply with Applicable Federal, State, and Local Standards for Waste Management	<ul style="list-style-type: none"> • No waste generated. 	<ul style="list-style-type: none"> • All waste generated (primarily contaminated soil and disposable personal protective equipment) will be handled and disposed of in accordance with applicable standards.

Table 3-1
Detailed Evaluation of Alternatives
(Page 2 of 2)

Evaluation Criteria	Alternative 1 No Further Action	Alternative 2 Clean Closure by Excavation and Disposal
Remedy Selection Decision Factors		
Short-Term Reliability and Effectiveness	<ul style="list-style-type: none"> No risk to workers. Public protected by remote location and NTS site access controls Environmental impacts are not anticipated due to implementation. Toxic elements not present, so minimal risk to environment. 	<ul style="list-style-type: none"> Low risk to workers associated with fugitive dusts and heavy equipment. Public protected by remote location and NTS site access controls. Environmental impacts are not anticipated due to implementation. Appropriate measures will be taken at the site to protect desert tortoises during implementation. Implementation should not require an extended period of time.
Reduction of Toxicity, Mobility, and/or Volume	<ul style="list-style-type: none"> Low concentration levels of contamination would remain at the site. No toxic VOCs or SVOCs were identified above PALs. The contamination is biodegradable. Contamination levels are expected to naturally decrease over time. Negligible chance for mobility; small volume of contaminated soil at low concentration levels. 	<ul style="list-style-type: none"> The toxic components of TPH-diesel range organics are not present at the site and no treatment to the contaminated soil is required before disposal. Clean closure would effectively eliminate associated toxicity, mobility, and volume of wastes at the Area 22 Weather Station Fuel Storage site. Landfill disposal of the waste after removal would result in a reduction of mobility.
Long-Term Reliability and Effectiveness	<ul style="list-style-type: none"> Low risks currently present and the risks are expected to decrease with time. No maintenance required. 	<ul style="list-style-type: none"> All risk will be eliminated upon completion. No maintenance required. Area 22 Weather Station Fuel Storage site clean closed. Moving contaminated soil to an appropriate disposal facility addresses the persistent adsorption of contaminants to the soil.
Feasibility	<ul style="list-style-type: none"> Closure of Area 22 Weather Station Fuel Storage site is easily implemented. 	<ul style="list-style-type: none"> Closure of Area 22 Weather Station Fuel Storage site is practicable.
Cost	\$0	\$15,244

Table 3-2
Comparative Evaluation of Alternatives

Evaluation Criteria	Comparative Evaluation
Closure Standards	
Protection of Human Health and the Environment	<p>Alternative 1 does not meet corrective action objectives; however, there is only minimal risk to human health and the environment by leaving it in place. No worker exposure risks are associated with Alternative 1.</p> <p>Alternative 2 meets corrective action objectives. Minimal risks are associated with Alternative 2. NAC 445A.227 (2) (a-k) analysis shows the contaminants are not threatening groundwater and there is no need for any groundwater corrective actions.</p>
Compliance with Media Cleanup Standards	<p>Alternative 1 complies with media cleanup standards with NAC 445A.227(2) (a-k) analysis showing no need for corrective action.</p> <p>Alternative 2 meets media cleanup standards by removing soil containing COCs at concentrations exceeding PALs and eliminating exposure pathways at the sites.</p>
Control the Source(s) of the Release	The source (fuel storage operations) at the Area 22 Weather Station Fuel Storage site has been discontinued.
Comply with Applicable Federal, State, and Local Standards for Waste Management	<p>Alternative 1 does not generate waste.</p> <p>Alternative 2 will generate waste that will be handled in accordance with applicable standards.</p>
Remedy Selection Decision Factors	
Short-Term Reliability and Effectiveness	<p>No risks are associated with Alternative 1.</p> <p>Low risks are associated with Alternative 2.</p>
Reduction of Toxicity, Mobility, and/or Volume	<p>Alternative 1 results in a reduction of toxicity, mobility, and volume at CAU 321 over time through natural biodegradation processes.</p> <p>Alternative 2 results in an immediate reduction of toxicity, mobility, and volume.</p>
Long-Term Reliability and Effectiveness	Residual risk at the CAS is low for Alternative 1 and nonexistent for Alternative 2.
Feasibility	<p>Alternatives 1 and 2 are feasible; however, Alternative 2 requires special consideration during implementation and involves more coordination.</p> <p>Alternative 2 requires heavy equipment, operating personnel, and disposal of wastes.</p>
Cost	<p>The cost for Alternative 1 is \$0.</p> <p>The estimated cost for Alternative 2 is \$15,244 for excavation and disposal.</p>

4.0 Recommended Alternative

The results of the detailed and comparative analysis of the potential corrective action alternatives presented in this document indicate the preferred corrective action alternative for CAU 321 is Alternative 2, Clean Closure by Excavation and Disposal. Alternative 2 was selected because:

- It reduces health risks by preventing worker and public access to the contaminated soil at the Area 22 Weather Station Fuel Storage site by removal and proper disposal of contaminated soil.
- No toxic VOCs or SVOCs were identified above PALs.
- All waste will be handled and disposed of in accordance with applicable standards.
- There is no long-term risk
- Easily implemented and no coordination or maintenance of the site will be required.
- Provides the most cost-effective method for achieving protection and meeting closure requirements.

The preferred corrective action alternative was evaluated on its technical merits, focusing on performance, reliability, feasibility, and safety. Alternative 2 was judged to meet all requirements for the technical components evaluated. The alternative meets all applicable state and federal regulations for closure of the site and will eliminate potential future exposure pathways to the contaminated soil at the Area 22 Weather Station Fuel Storage site. No use restrictions are required to be placed on the CAU because no contamination will remain at the site.

5.0 References

Bordelois, B. (IT Corporation). 1998. Memorandum to Ronald Jackson titled "CAU 321, CAS 22-99-05 Sampling Report," 17 March. Las Vegas, NV.

BN, see Bechtel Nevada.

Bechtel Nevada. 1997. "Point of Rocks Quadrangle *Federal Facility Agreement and Consent Order* Corrective Action Site," July 1997. Modified from the U.S. Geological Survey digital topographic maps. Las Vegas, NV.

Bechtel Nevada. 1999. Results of the survey for the CAU 321 sample locations conducted by Bechtel Nevada, 22 February. Las Vegas, NV.

CFR, see *Code of Federal Regulations*.

Code of Federal Regulations. 1998. Title 40 CFR Parts 260 - 282, "RCRA Regulations." Washington, DC: U.S. Government Printing Office.

DOE/NV, see U.S. Department of Energy, Nevada Operations Office.

EPA, see U.S. Environmental Protection Agency.

FFACO, see *Federal Facility Agreement and Consent Order*.

Federal Facility Agreement and Consent Order. 1996 (as amended). Agreed to by the State of Nevada, the U.S. Department of Energy, and the U.S. Department of Defense.

ITLV, see IT Corporation, Las Vegas Office.

IT Corporation, Las Vegas Office. 1999a. Results of a global positioning survey conducted by IT Corporation, February 2 and 3. Las Vegas, NV.

IT Corporation, Las Vegas Office. 1999b. *Site-Specific Health and Safety Plan, CAU 321 Fuel Storage Area, Nevada Test Site*. Las Vegas, NV.

LaCamera, R.J., and C.L. Westenburg. 1994. *Selected Ground-Water Data for Yucca Mountain Region, Southern Nevada and Eastern California, Through December 1992*. Carson City, NV: U.S. Geological Survey.

Laczniak, R.J., J.C. Cole, D.A. Sawyer, and D.T. Trudeau. 1996. *Summary of Hydrogeological Controls on Ground-Water Flow at the Nevada Test Site, Nye County, Nevada*, U.S. Geological Survey Water-Resources Investigations Report 96-4109. Denver, CO: U.S. Geological Survey.

NAC, see *Nevada Administrative Code*.

Nevada Administrative Code. 1998a. NAC 444, "Solid Waste Disposal." Carson City, NV.

Nevada Administrative Code. 1998b. NAC 445A, "Water Pollution Control." Carson City, NV.

Nevada Administrative Code. 1998c. NAC 445A.227, "Contamination of soil: Order by director of corrective action; factors to be considered in determining whether corrective action is required." Carson City, NV.

Nevada Administrative Code. 1998d. NAC 459.9974, "Disposal and Evaluation of Contaminated Soil." Carson City, NV.

NRS, see *Nevada Revised Statutes*.

Nevada Revised Statutes. 1996. NRS 459.400-459.600, "Disposal of Hazardous Waste." Carson City, NV.

Raytheon Services Nevada. 1992. "Road and Facility Map, Nevada Test Site," Nevada Test Site - All Areas. Las Vegas, NV.

Robie, L., S. Reiner, and G. Locke. 1995. *Ground-water Data for the Nevada Test Site, 1992, and for Selected Other Areas in South-Central Nevada, 1952-92*, USGS-OFR-284. Denver, CO: U.S. Geological Survey.

USACE, see U.S. Army Corps of Engineers.

U.S. Army Corps of Engineers. 1958. "Basic Information Maps for Camp Desert Rock." Barstow, CA.

U.S. Department of Energy, Nevada Operations Office. 1994. *Project Management Plan*, Rev. 0. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1996. *Industrial Sites Quality Assurance Project Plan*, Nevada Test Site, Nevada, Rev. 1, DOE/NV--372. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1999. *Corrective Action Investigation Plan for Corrective Action Unit 321: Area 22 Weather Station Fuel Storage, Nevada Test Site, Nye County, Nevada*, Rev. 0, DOE/NV--531. Las Vegas, NV: IT Corporation.

U.S. Environmental Protection Agency. 1987. *Data Quality Objectives for Remedial Response Activities*, EPA/540/G-87-003. Washington, DC.

U.S. Environmental Protection Agency. 1991. *Guidance on RCRA Corrective Action Decision Documents*, EPA/540/G-91/011. Washington, DC: Office of Research and Development.

U.S. Environmental Protection Agency. 1994a. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*, EPA 540/R-94/012. Washington, DC.

U.S. Environmental Protection Agency. 1994b. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA 540/R-94/013. Washington, DC.

U.S. Environmental Protection Agency. 1994c. *Final RCRA Corrective Action Plan*, EPA/520-R-94-004. Washington, DC: Office of Solid Waste and Emergency Response.

U.S. Environmental Protection Agency. 1994d. *Guidance for the Data Quality Objectives Process*, EPA QA/G-4. Washington, DC.

U.S. Environmental Protection Agency. 1996a. Memo from S.J. Smucker to PRG Table Mailing List regarding Region 9 Preliminary Remediation Goals (PRGs), 1 August. San Francisco, CA.

U.S. Environmental Protection Agency. 1996b. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846*, CD ROM which contains updates for 1986, 1992, 1994 and 1996. Washington, DC.

USGS, see U.S. Geological Survey.

U.S. Geological Survey. 1999. Environmental Restoration (ER) Program's Wells: Depth-to-water measurements. Available from <http://nevada.usgs.gov/gw-cgi/data.pl>

Winograd, I.J., and W. Thordarson. 1975. *Hydrologic and Hydrochemical Framework, South-Central Great Basin, Nevada-California, with Special Reference to the Nevada Test Site*, U.S. Geological Survey Professional Paper 712C. Washington, DC: U.S. Government Printing Office.

Wood, D.B. U.S. Geological Survey. 1999. Communication with Juliana Herrington, Science Applications International Corporation regarding Army Well 1 depth-to water data and Desert Rock weather station precipitation information, 8 July. Las Vegas, NV: Depth-to-water data available at USGS Water Resource Division Las Vegas, NV. Precipitation data for the Desert Rock Weather Station are available at <http://nimbo.wrh.noaa.gov/Lasvegas/RTPLAS.shtml>.

Appendix A

Corrective Action Investigation Report for CAU 321: Area 22 Weather Station Fuel Storage, Nevada Test Site, Nevada

A.1.0 Introduction

This appendix presents corrective action investigation activities and analytical results for the CAU 321, Area 22 Weather Station Fuel Storage, CAS 22-99-05, Fuel Storage Area, Nevada Test Site, Nevada (FFACO, 1996). The corrective action investigation was conducted in accordance with the *Corrective Action Investigation Plan for Corrective Action Unit 321, Area 22 Weather Station Fuel Storage, Nevada Test Site, Nevada* (DOE/NV, 1999) as developed under the FFACO (1996). For purposes of this discussion, the site will be referred to as either CAU 321 or the Fuel Storage Area.

The Fuel Storage Area was investigated because process knowledge indicated that petroleum products were stored and possibly spilled at the site. Preliminary analytical results from surface soil samples collected on August 16, 1997, did not identify the presence of any COPCs (Bordelois, 1998). Additional information regarding the history of the Fuel Storage Area and the planning and scope of the field investigation is included in the CAIP (DOE/NV, 1999).

A.1.1 Project Objectives

The primary objectives of the investigation were as follows:

- Identify the presence and the vertical and lateral extent of COPCs, specifically petroleum hydrocarbons (e.g., as gasoline and diesel/waste oil).
- Provide sufficient information and data to develop appropriate corrective action alternatives for the Fuel Storage Area.

The selection of soil sample locations for CAU 321 was statistically based, as well as biased, at suspected worst-case areas. The sampling strategy and locations were developed during the DQO process (EPA, 1994d) and outlined in the CAIP (DOE/NV, 1999).

A.1.2 Report Content

This report contains information and data in sufficient detail to support the selection of a preferred corrective action alternative in the CADD. The contents of this report are as follows:

- [Section A.1.0](#) describes the investigation background, objectives, and the report content.

- [Section A.2.0](#) provides information regarding the field activities and sampling methods.
- [Section A.3.0](#) summarizes the results of the laboratory analysis from the investigation sampling.
- [Section A.4.0](#) discusses the quality assurance (QA) and quality control (QC) procedures that were followed and the results of the QA/QC activities.
- [Section A.5.0](#) is a summary of the investigation results for CAU 321, Area 22 Weather Station Fuel Storage site.
- Cited references are provided in [Section 5.0](#) of the CADD.

The complete field documentation and laboratory data, including Field Activity Daily Logs, Sample Collection Logs, Analysis Request/Chain-of-Custody Forms, laboratory certificates of analyses, analytical results, and surveillance results are retained in project files.

A.2.0 Field Investigation and Sampling Activities

The field investigation and sampling activities were conducted from February 16 through February 18, 1999. Soil samples were collected with a Geoprobe[®] between 0 to 6 ft bgs. At the conclusion of the field investigation, soil samples not sent to the laboratory were returned to the associated sample location and the Geoprobe[®] holes were filled with dry bentonite.

The field investigation and sampling program was managed in accordance with the requirements set forth in the CAIP (DOE/NV, 1999). The sampling coordinates identified in the CAIP were not accurate and have been corrected for this report; however, the sampling locations remained the same. The field activities were performed in accordance with an approved Site-Specific Health and Safety Plan (ITLV, 1999b). The samples were collected and documented by following approved sampling, field activity and sample collection documentation, decontamination, chain of custody, shipping, and radiation survey protocols and procedures as indicated in the CAIP (DOE/NV, 1999). Quality control samples (e.g., field blanks, equipment rinsate blanks, trip blanks, source blanks, and field duplicates) were collected in accordance with the *Industrial Sites Quality Assurance Project Plan* (QAPP) (DOE/NV, 1996) and approved procedures. During field activities, waste minimization practices were followed according to approved procedures, including segregation of the waste by waste stream.

A.2.1 Site Descriptions and Conditions

The Fuel Storage Area is located in Area 22 of the Nevada Test Site ([Figure 1-1](#) of the CADD). The site is rectangular in shape and elongated east to west with dimensions approximately 325 by 540 ft ([Figure 4-1](#) of the CAIP). In general, the site is bermed on all four sides with a berm down the middle (off center). The berm on the northwest side of the Fuel Storage Area has been partially removed. The overall topography in Area 22 is flat and slopes slightly to the southwest. During the investigation, the weather conditions at the CAU 321 site were generally favorable, partly cloudy to sunny, cool to warm temperatures, breezy at times with directional wind changes. Weather conditions did not present any major impacts to sampling activities or the field investigation schedule. The directional wind changes caused the generator exhaust to fluctuate near the sample preparation location at times, but there were no apparent impacts to the analytical sampling results.

Soil conditions at the site made sample collection difficult at times because of the alluvial fan material (i.e., abundant gravel and cobbles). No caliche was encountered at any of the sample locations.

A.2.2 Sampling Logistics

This section describes sample collection and investigation activities for the Fuel Storage Area.

A.2.2.1 Sample Locations

The sampling locations were statistically based for random sample collection. Biased sample locations were also selected and placed in areas where COPCs could have accumulated. For example, the biased sample locations were placed in the stained area and in topographically low areas where ponding could have occurred (Figure 4-1 of the CAIP). Actual sample locations are shown in [Figure A.2-1](#). Some locations vary slightly from those planned because of field observations or conditions encountered during sampling. The soil sample locations for the Fuel Storage Area were numbered FSA00001 through FSA00018. At the end of each soil sample number is a designation letter “A, B, C, or D” to indicate the depth of the sampling interval. The depth interval “A” is 0 to 1 ft; “B” is 1 to 2 ft; “C” is 3 to 4 ft; and “D” is 5 to 6 ft bgs. Sampling information was documented on Sample Collection Logs available in the project files.

A.2.2.2 Geoprobe® Soil Sampling

A Geoprobe® was used to collect soil samples at 18 sample locations within the Fuel Storage Area in 2-ft intervals from approximately 0 to 6 ft bgs. Soil samples were collected using a Geoprobe Macrocore® sampler (2-in. outside diameter) with polyvinyl chloride (PVC) liners. In general, the samples were removed from the PVC liner in 1-ft intervals. At all 18 sample locations, soil samples were collected from 0 to 1 ft and 1 to 2 ft bgs. At sample location number 3, additional soil samples were collected from the 3- to 4-ft and 5- to 6-ft intervals because Hanby TPH results detected an approximate 200 ppm concentration of diesel/waste oil from the 1- to 2-ft interval. At sample locations 8 and 18 (locations selected prior to start of investigation), additional samples were collected from the 3- to 4-ft interval as planned. All samples were collected as planned in the CAIP (DOE/NV, 1999). The VOC, TPH-gasoline, headspace, and Hanby field-screening soil samples were collected first and immediately placed into appropriate containers, sealed, and placed on ice. The soil

Explanation

- Statistically Based Sample Locations
- Biased Sample Locations

Berm Perimeter from GPS Coordinates

Sample Location Numbers	Northing	Easting
	Statistically Based Sample Locations	
①	4053408.7615	587979.4968
②	4053409.3641	588016.6941
③	4053413.4775	588056.4906
④	4053409.4199	588089.9524
⑤	4053372.9536	587980.8094
⑥	4053372.9762	588016.8845
⑦	4053373.6544	588054.9792
⑧	4053373.1377	588090.6355
⑨	4053335.3574	587979.9022
⑩	4053336.0579	588016.6790
⑪	4053336.5930	588049.9605
⑫	4053336.8369	588090.2084
Biased Sample Locations		
⑬	4053415.7459	588066.1878
⑭	4053395.1379	588077.9586
⑮	4053345.3132	588038.6124
⑯	4053360.4739	588057.7194
⑰	4053369.8590	588103.6948
⑱	4053334.5351	588071.5082
N.E. Corner	4053427.2746	588102.1385

Sample locations where TPH - diesel range organics were detected above the preliminary action level

Note

Projection : Universal Transverse Mercator, Zone 11,
1927 North American Datum, Meters

Figure A.2-1
Soil Sample Locations for the
CAU 321 Fuel Storage Area
Corrective Action Investigation

for TPH-diesel/waste oil, SVOCs, total lead, and Toxicity Characteristic Leaching Procedure (TCLP)-lead soil samples was homogenized in a steel bowl and then placed into appropriate sample containers, sealed, and placed on ice. Typically, three side-by-side direct-push cores were collected with the Geoprobe Macrocore[®] sampler at each sampling location to obtain an adequate volume of soil for analysis. Double soil volume was needed for QC samples and up to five or six side-by-side direct-push cores were obtained from those sampling locations.

A.2.3 Field Screening

Field-screening levels (Section 3.0 of the CAIP) were used to guide sample collection and to provide a basis for the collection of additional environmental samples. The field-screening level for TPH field-screening results was established at 100 ppm in accordance with the NDEP action level for TPH (NAC, 1998c). The field-screening level for VOCs was 20 ppm or 2.5 times background, whichever was higher. The survey level for radiological monitoring was established at two times background levels (DOE/NV, 1999). Field-screening results for all except one sample location were below the established field-screening levels for COPCs. Field screening and surveys were performed as specified in the CAIP (DOE/NV, 1999). The screening and survey methods included the following:

- Radiological survey for alpha and beta emitters using an Electra instrument
- Headspace screening for VOCs using a photoionization detector
- TPH screening using a colorimetric field testing kit manufactured by Hanby Environmental Laboratory Procedures, Inc.

In general, two consecutive “nondetect” samples, as measured by field-screening methods and confirmed through off-site laboratory analyses, were used to define the lower or vertical limits of the impacted soils. At sample location FSA00012 the VOC and TPH field-screening results were nondetect and the sampling was stopped at 2 ft bgs. There was no staining or odor detected at sample location FSA00012. However, the analytical results for FSA00012B indicated the presence of TPH-diesel range organics above the preliminary action level ([Table A.3-3](#)). The sample was then reextracted and reanalyzed (FSA00012BRE) to confirm the diesel detection and the results again were above the preliminary action level ([Table A.3-3](#)). Subsequent review of the analytical chromatogram for FSA00012B indicates the contamination is fresh and the TPH-diesel range

organics contaminant is lubricating oil. This sample was most likely contaminated during the sample collection process and the FSA00012 location is probably not contaminated.

At sample location FSA00003, TPH-diesel/waste oil was detected at a 200 ppm concentration at the 1 to 2 ft interval with the Hanby soil test kit. There are small pieces of burnt wood, nails, and stained soil at this location that indicates something made of wood (e.g., a shed or pallets) was burned. The TPH contamination detected at this location is most likely from an accelerant used to start the fire. The laboratory analytical chromatogram for sample FSA00003 indicates the TPH contamination is relatively recent and not weathered. The specific type of TPH-diesel range organics contaminant could not be identified from the chromatogram. The vertical contamination at the FSA00003 location is not expected to be deeper than 3 ft bgs and the extent of contamination will be confirmed during remediation activities when the COC contaminated soil is excavated (see [Section 3.3.2](#) in the CADD). Verification sampling at the FSA00012 location will also be conducted to confirm the presence or absence of TPH contamination at that location (see [Section 3.3.2](#) in the CADD).

A.2.4 Number of Samples Collected and Submitted for Analyses

Forty-two soil samples were collected from 18 sample locations ([Figure A.2-1](#)) and 26 samples were submitted to the laboratory for analyses ([Table A.2-1](#)). The soil samples not sent into the laboratory were returned to the associated sample location.

Table A.2-1
Samples Collected and Submitted for Laboratory Analyses
for the CAU 321 Fuel Storage Area Corrective Action Investigation
(Page 1 of 3)

Sample Location	Depth (feet below ground surface)	Sample Matrix	Quality Control Comments	Parameters Analyzed
FSA00001B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00002B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00003A	0 - 1	Soil	MS/MSD Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00003B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00003C	3 - 4	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead

Table A.2-1
Samples Collected and Submitted for Laboratory Analyses
for the CAU 321 Fuel Storage Area Corrective Action Investigation
(Page 2 of 3)

Sample Location	Depth (feet below ground surface)	Sample Matrix	Quality Control Comments	Parameters Analyzed
FSA00003D	5 - 6	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00004B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00005B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00006B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00007B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00008B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00008C	3 - 4	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00009B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00009B1	1 - 2	Soil	Field Duplicate to FSA00009B	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00010B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00011A	1 - 2	Soil	Environmental Sample	TPH-gasoline*
FSA00011B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-diesel, Total lead
FSA00012B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00013B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00014B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00015B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00015B1	1 - 2	Soil	Field Duplicate to FSA00015B	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00016B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00017B	1 - 2	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00018B	1 - 2	Soil	MS/MSD Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00018C	3 - 4	Soil	Environmental Sample	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead

Table A.2-1
Samples Collected and Submitted for Laboratory Analyses
for the CAU 321 Fuel Storage Area Corrective Action Investigation
(Page 3 of 3)

Sample Location	Depth (feet below ground surface)	Sample Matrix	Quality Control Comments	Parameters Analyzed
Quality Control				
FSA00025	NA	Water	Trip Blank	VOC
FSA00026	NA	Water	Trip Blank	VOC
FSA00027	NA	Water	Trip Blank	VOC
FSA00028	NA	Water	Trip Blank	VOC
FSA00029	NA	Water	Equipment Rinsate Blank	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00030	NA	Water	Field Blank	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00031	NA	Water	Equipment Rinsate Blank	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00032	NA	Water	Field Blank	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00033	NA	Water	Trip Blank	VOC
FSA00034	NA	Water	Trip Blank	VOC
FSA00035	NA	Water	Trip Blank	VOC
FSA00036	NA	Water	Trip Blank	VOC
FSA00037	NA	Water	Trip Blank	VOC
FSA00038	NA	Water	Source Blank	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00039	NA	Water	Trip Blank	VOC
FSA00040	NA	Water	Source Blank	VOC, SVOC, TPH-gasoline, TPH-diesel, Total lead
FSA00041	NA	Water	Trip Blank	VOC

MS/MSD = Matrix spike and matrix spike duplicate

NA = Not applicable

VOC = Volatile organic compounds

TPH = Total petroleum hydrocarbons

SVOC = Semivolatile organic compounds

TCLP = Toxicity Characteristic Leaching Procedure

* Sample FSA00011A was submitted for gasoline analysis for sample location 11 because a gasoline sample for FSA00011B was not collected.

A.2.5 *Geology*

The alluvial fan soil at the Area 22 sites consists of poorly-sorted silt, sand, abundant gravel, and cobbles. No caliche was encountered at any of the sample locations.

A.2.6 *Hydrology*

Groundwater at the Fuel Storage Area is not expected to be impacted by COPC migration due to the depth to groundwater. At Mercury Valley, the depth to groundwater ranges from 800 to 1,100 ft bgs (Winograd and Thordarson, 1975; Robie et al., 1995).

There are no perennial surface water sources at the Fuel Storage Area. However, the CAU 321 site could potentially be impacted by ephemeral drainage due to localized flooding. The rectangular berm around the site adds protection from flood waters, except for where the berm is open on the corners and near a center berm that divides the site.

A.3.0 Investigation Results

The analytical results of samples collected from the CAU 321 Fuel Storage Area have been compiled and evaluated to determine the presence and/or extent of contamination. The analytical results that are above the minimum reporting limits are summarized in the following subsections. A list of the samples collected and analyzed for the investigation are shown in [Table A.2-1](#). The analytical parameters and laboratory analytical methods conducted for the CAU 321 investigation are shown in [Table A.3-1](#).

Table A.3-1
Laboratory Analytical Methods Conducted for Samples Collected
During the CAU 321 Fuel Storage Area Corrective Action Investigation

Analytical Parameter	Analytical Method
Total volatile organic compounds	EPA 8260B ^a
Total petroleum hydrocarbons - gasoline and diesel/oil	EPA 8015B (modified) ^a
Total semivolatile organic compounds	EPA 8270C ^a
Total lead	EPA 6010B ^a

^aEPA *Test Methods for Evaluating Solid Waste*, 3rd Edition, Parts 1-4, SW-846 (EPA, 1996b)

The analytical parameters were selected through the application of site process knowledge according to the EPA's *Guidance for the Data Quality Objectives Process* (EPA, 1994d). Preliminary action levels for off-site laboratory analytical methods were determined during the DQO process and are documented in the CAIP (DOE/NV, 1999). Sampling activities were conducted to confirm or disprove assumptions (i.e., models outlined in CAIP) made in the DQO process (DOE/NV, 1999).

A.3.1 Total Volatile Organic Compound Analytical Results

The total VOC analytical results detected above minimum reporting limits established in the CAIP (DOE/NV, 1999), along with the associated preliminary action levels, are presented in [Table A.3-2](#). None of these results exceed the PALs (DOE/NV, 1999).

The two constituents (acetone and methylene chloride) above the minimum reporting limit are common laboratory-introduced contaminants, their presence in some soil samples cannot be

attributed solely to this factor (see [Section A.4.7.1](#)). However, the concentrations of these two contaminants are well below PALs.

Table A.3-2
Soil Sample Results for Total Volatile Organic Compounds Detected
Above Minimum Reporting Limits, CAU 321 Fuel Storage Area, Nevada Test Site

Sample Location	Sample Depth (ft bgs)	Contaminants of Potential Concern in Micrograms per Kilogram (µg/kg)	
		Methylene Chloride	Acetone
	Industrial PRG ^a	20,000	6,100,000
FSA00003D	5-6	0.998 (J)	--
FSA00011B	1-2	2.69 (J)	--
FSA00012B	1-2	0.965 (J)	--
FSA00013B	1-2	1.06 (J)	--
FSA00015B1	1-2	0.574 (J)	--
FSA00016B	1-2	0.901 (J)	--
FSA00017B	1-2	0.647 (J)	--
FSA00018B	1-2	--	19.6 (J)

^aEnvironmental Protection Agency Region 9, Industrial Preliminary Remediation Goals (PRG) (EPA, 1996a)

J = Estimated value

-- = Not detected above minimum reporting limit

A.3.2 Total Semivolatile Organic Compound Analytical Results

All SVOC results were reported as nondetects or at concentrations below their minimum reporting limits; therefore, SVOCs were not detected at concentrations exceeding PALs.

A.3.3 Total Petroleum Hydrocarbon Results

Total petroleum hydrocarbons were detected in the diesel range above the NDEP regulatory action level of 100 mg/kg for samples FSA00003B and FSA00012B as shown in [Table A.3-3](#). Total petroleum hydrocarbons were detected in the diesel and gasoline ranges; however, they were below the NDEP regulatory action level for samples FSA00003A, FSA00003B, and FSA0007B as shown in [Table A.3-3](#).

Table A.3-3
Soil Sample Results for Total Petroleum Hydrocarbons Detected Above Minimum Reporting Limits, CAU 321 Fuel Storage Area, Nevada Test Site

Sample Number	Sample Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)	
		Diesel	Gasoline
FSA00003A	0-1	77	--
FSA00003B	1-2	124	9.03 (J)
FSA00007B	1-2	13.6	--
FSA00012B	1-2	271	--
FSA00012BRE	1-2	377 (J)*	--

-- = Not detected above minimum reporting limit

J = Estimated value

* Sample was reextracted and reanalysed on 4/2/99 to confirm the diesel detection; however, the sample was extracted outside the specified holding time but analyzed within the analytical holding time.

Shading indicates analytical results that exceed the 100 mg/kg NDEP established action level.

A.3.4 Total Lead Results

The total lead results detected above the minimum reporting limits (DOE/NV, 1999) are presented in [Table A.3-4](#). The total lead results were all below the PAL (DOE/NV, 1999).

A.3.5 TCLP Lead Results

No TCLP lead analyses were conducted because total lead levels (see [Table A.3-4](#)) did not exceed PALs (DOE/NV, 1999).

A.3.6 Gamma Spectroscopy Results

No radiological analyses were conducted for this site because all the field survey results were within background levels (DOE/NV, 1999).

Table A.3-4
Summary of Total Lead Results Detected
Above Minimum Reporting Limits, CAU 321 Fuel Storage Area, Nevada Test Site
(Page 1 of 2)

Sample Number	Sample Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)
		Lead
	Industrial PRG ^a	1000
FSA00001B	1-2	2.71 (J)
FSA00002B	1-2	5.66 (J)
FSA00003A	0-1	4.76 (J)
FSA00003B	1-2	1.86 (J)
FSA00003C	3-4	1.44 (J)
FSA00003D	5-6	3.29 (J)
FSA00004B	1-2	1.60 (J)
FSA00005B	1-2	3.02 (J)
FSA00006B	1-2	4.57 (J)
FSA00007B	1-2	1.11 (J)
FSA00008B	1-2	1.74 (J)
FSA00008C	3-4	0.896 (J)
FSA00009B	1-2	4.75 (J)
FSA00009B1	1-2	4.54 (J)
FSA00010B	1-2	2.21 (J)
FSA00011B	1-2	0.959 (J)
FSA00012B	1-2	1.58 (J)
FSA00013B	1-2	3.30 (J)
FSA00014B	1-2	1.78 (J)
FSA00015B	1-2	1.28 (J)
FSA00015B1	1-2	1.26 (J)

Table A.3-4
Summary of Total Lead Results Detected
Above Minimum Reporting Limits, CAU 321 Fuel Storage Area, Nevada Test Site
(Page 2 of 2)

Sample Number	Sample Depth (ft bgs)	Contaminants of Potential Concern (mg/kg)
		Lead
	Industrial PRG ^a	1000
FSA00016B	1-2	1.83 (J)
FSA00017B	1-2	2.54 (J)
FSA00018B	1-2	3.23 (J)
FSA00018C	3-4	1.24 (J)

^aEPA Region 9 Industrial PRGs (EPA, 1996a)

J = Estimated value

-- = Not detected above minimum reporting limit

A.4.0 Quality Assurance

The results of the QA/QC activities for the CAU 321 Fuel Storage Area corrective action investigation sampling events are summarized in the following text. Detailed information regarding the QA program is contained in the Industrial Sites QAPP (DOE/NV, 1996).

Quality control results are typically judged in terms of precision, accuracy, representativeness, completeness, and comparability and are described in the following sections.

A.4.1 Precision

Precision is a quantitative measure of the variability of a group of measurements from their average value. Precision is assessed for inorganic analysis by collecting and analyzing duplicate field samples and comparing the results with the original sample. Precision is also assessed by creating, preparing, analyzing, and comparing laboratory duplicates from one or more field samples in inorganic analyses and matrix spike and matrix spike duplicate (MS/MSD) samples for organic analyses. Precision is reported as relative percent difference (RPD) which is calculated as the difference between the measured concentrations of duplicate samples, divided by the average of the two concentrations, and multiplied by 100. Any deviation from these requirements has been documented and explained and the related data qualified accordingly. The qualification process is described in [Section A.4.7.1](#).

A.4.2 Accuracy

Analytical accuracy is defined as the nearness of a measurement to the true or accepted reference value. It is the composite of the random and systematic components of the measurement system and measures bias in the measurement system. The random component of accuracy is measured and documented through the analyses of spiked samples. Sampling accuracy is assessed by evaluating the results of spiked samples and laboratory control samples. Accuracy measurements are calculated as percent recovery by dividing the measured sample concentration by the true concentration and multiplying the quotient by 100.

Field accuracy is assessed by confirming that the documents of record track the sample from its origin, through transfer of custody, to disposal. The goal of field accuracy is for all samples to be

collected from the correct locations at the correct time, placed in a correctly labeled container with the correct preservative, and sealed with custody tape to prevent tampering. All samples in this sampling event were properly collected and forwarded to the laboratories as described above.

A.4.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition (EPA, 1987). Sample representativeness was achieved through the implementation of a sampling program designed to ensure proper sampling locations, number of samples, and the use of validated analytical methods. Representativeness was assessed through analysis of duplicate samples. Representativeness of the samples taken in this sampling event was assured by collecting the specified number of samples (DOE/NV, 1999) and by analyzing them by the approved analytical methods shown in [Table A.3-1](#).

A.4.4 Completeness

Completeness is defined as a percentage of measurements made that are judged to be valid. A sampling and analytical requirement of 80 percent completeness was established and achieved for this project (DOE/NV, 1996).

The specified sampling locations were utilized as planned. All samples were collected as specified in the CAIP (DOE/NV, 1999), and all sample containers reached the laboratory intact and properly preserved. Sample temperatures were maintained during shipment to the laboratory, and sample chain of custody was maintained during sample storage and/or shipment.

A.4.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another (EPA, 1987). To ensure comparability, the field and sampling activities at the Fuel Storage Area were performed and documented in accordance with approved procedures, and all samples were collected in accordance with the CAIP (DOE/NV, 1999). Approved standardized methods and procedures were also used to analyze and report the data (e.g., Contract Laboratory Program [CLP] and/or CLP-like data packages). This approach ensures that the data from this project

can be compared to other data sets. Based on the minimum comparability requirements specified in the Industrial Sites QAPP (DOE/NV, 1996), all requirements were met.

Field (i.e., sample-handling) documentation, laboratory nonconformance reports, and the precision and accuracy of quality-control sample results were evaluated for their effect on the results of the associated environmental soil samples. The environmental sample results were then qualified according to processes outlined in the following sections. Documentation of the data qualifications resulting from these reviews is retained in project files as both hard copy and electronic media.

A.4.6 Tier I and Tier II Data Evaluations

All laboratory data from samples collected at the CAU 321 Fuel Storage Area have been evaluated for data quality according to the EPA Functional Guidelines (EPA, 1994a and 1994b). These guidelines are implemented in a tiered process and are presented in the following text. No data rejected during the data evaluation process were used to draw the conclusions presented in the CADD. Only valid data, whether estimated (i.e., J-qualified) or not, were used.

The changes resulting from the data evaluation process were documented in project files and were summarized in memoranda for each sample delivery group (SDG). These memoranda are maintained in project files.

A.4.6.1 Tier I Evaluation

Tier I evaluation for chemical 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 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.4.6.2 Tier II Evaluation

Tier II evaluation for chemical analysis examines (but is not limited to):

Chemical:

- Sample date, preparation date, and analysis date for each sample
- Holding time criteria met
- QC 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
- MS/MSD percent recoveries (%R) and RPDs evaluated and applied to laboratory results/qualifiers
- Field duplicate RPDs evaluated using professional judgement and applied to laboratory results/qualifiers
- Laboratory duplicate RPDs evaluated and applied to laboratory results/qualifiers
- Surrogate %R evaluated and applied to laboratory results/qualifiers
- Laboratory control sample %R evaluated and applied to laboratory results/qualifiers
- Initial and continuing calibration evaluated and applied to laboratory results/qualifiers
- Internal standard evaluated and applied to laboratory results/qualifiers
- Recalculation of 10 percent of laboratory results from raw data

A.4.6.3 Tier III

Data quality considerations that are included in EPA data review functional guidelines (EPA, 1994a and 1994b) used as a Tier III review include the additional evaluations:

Chemical:

- Mass spectrometer tuning criteria
- Initial and continuing calibration verification
- Internal standard evaluation

- Organic compound quantitation
- Inductively coupled plasma (ICP) interference check sample evaluation
- Graphite furnace atomic absorption quality control
- ICP serial dilution effects
- Recalculation of all laboratory results from raw data

A Tier III review of at least five percent of the sample analytical data was performed by Quanterra Incorporated, Knoxville, Tennessee. There were no changes to the analytical data summaries as a result of the Tier III review.

A.4.7 Quality Control Samples

There were 11 trip blanks, 2 field blanks, 2 source blanks, 2 equipment rinsate blanks, 2 MS/MSD, and 2 field duplicates collected and submitted for laboratory analysis as shown in [Table A.2-1](#). The quality control samples and duplicates were assigned individual sample numbers and sent to the laboratory “blind.” Additional samples were selected by the laboratory to be analyzed as laboratory duplicates. The field blanks were taken by placing distilled water into appropriate sample bottles and preserving them according to the requirements specified in the Industrial Sites QAPP (DOE/NV, 1996). The equipment rinsate blanks were obtained by collecting the final rinse solution (i.e., deionized water), which was poured over the decontaminated sampling equipment into the appropriate sample bottles and preserved as applicable. A source blank was collected for the deionized water used for project decontamination by pouring the deionized water directly into a sample container and preserved as applicable. A source blank was also collected for the Geoprobe MacroCore® PVC liners by pouring water directly over the liners into sample containers and preserving them as appropriate. The trip blanks were received sealed and preserved from the laboratory and were placed in each cooler containing VOC samples. The results of the QC samples are discussed in the following sections.

A.4.7.1 Field Quality Control Samples

Review of the field-blank analytical data for the CAU 321 soil sampling indicates that cross-contamination from field methods did not occur during sample collection. Field, equipment rinsate, and source blanks were analyzed for the parameters listed in [Table A.3-1](#) and trip blanks were analyzed for VOCs only. None of the results for these field blanks exceeded the minimum laboratory reporting limits (DOE/NV, 1999). Several contaminants (acetone, bromodichloromethane,

chloroform, and methylene chloride) were detected but they were below the contract-required detection limits (CRDLs) and could be attributed to laboratory-introduced contamination. There were a few detections of methylene chloride above the CRDLs that cannot be solely attributed to laboratory contamination.

During the sampling event, two field duplicate soil samples were sent as blind samples to the laboratory to be analyzed for the investigation parameters listed in [Table A.3-1](#). For these samples, the duplicate results precision (i.e., RPDs between the environmental sample results and their corresponding field duplicate sample results) were evaluated to the guidelines set forth in EPA Functional Guidelines (EPA, 1994a and 1994b). The EPA Functional Guidelines state that there are no required review criteria for field duplicate analyses comparability, but allow the data reviewer to exercise professional judgement. The RPD between the environmental samples results and their corresponding field duplicate sample results did not exceed the 20 percent criteria stated in the Industrial Sites QAPP (DOE/NV, 1996).

The laboratory duplicate samples were compared to the criteria set forth in the EPA Functional Guidelines (EPA, 1994b) and the associated sample results were qualified accordingly. Both detections and nondetections have been qualified as estimated (J and UJ, respectively) if the relative percent difference between an environmental sample and its laboratory duplicate fell outside established criteria.

Two field samples were selected for use as MS/MSD samples. The percent recoveries of these samples (a measure of accuracy) and the relative percent differences in these sample results (a measure of precision) were compared to EPA Functional Guideline criteria (EPA, 1994a and 1994b). The results were used to qualify associated environmental sample results accordingly.

The EPA Functional Guidelines for review of organic data state that no data qualification action is taken on the basis of MS/MSD results alone. The data reviewer exercises professional judgement in considering these results in conjunction with the results of laboratory control samples (LCSs) and other QC criteria in applying qualifications to the data.

The inorganic data review in EPA Functional Guidelines allows professional judgement to be applied in evaluating the results of both matrix spikes and laboratory duplicates. Generally, if spike recovery

is greater than the upper acceptance limits, nondetections are not qualified. If spike recovery is greater than the upper acceptance limit or less than the lower acceptance limit, positive results are qualified as estimated (J) and nondetections are qualified as estimated (UJ). If spike recovery is less than 30 percent (grossly low), positive results are not qualified and nondetections are qualified as unusable (R).

A.4.7.2 Laboratory Quality Control Samples

Analysis of method blanks, surrogate spikes, and laboratory control samples for organic analyses and preparation blanks, initial and continuing calibration blanks, and laboratory control samples for total lead were performed for each SDG by EMAX laboratory. The results of these analyses were used to qualify associated environmental sample results according to EPA Functional Guidelines (EPA, 1994a and 1994b).

The EPA Functional Guidelines (EPA, 1994a and 1994b) state that no qualification action is taken if a compound is found in an associated blank, but not in the sample or if a compound is found in the sample, but not in an associated blank. The action taken when a compound is detected in both the sample and the associated blank varies depending upon the analyte involved and is described in the “The 5X/10X Rule.”

For VOCs and SVOCs, if an analyte is detected in the sample and was also detected in an associated blank the result is qualified as undetected (U) if the sample concentration is less than 5 times (5X) the blank concentration.

For the common laboratory contaminants (e.g., methylene chloride, acetone, 2-butanone [methyl ethyl ketone or MEK], and phthalate esters [especially bis(2-ethylhexyl)phthalate]), the factor is raised to 10 times (10X) the blank concentration. The sample result is elevated to the quantitation limit if it is less than the quantitation limit or remains unaltered if the sample result is greater than or equal to the quantitation limit.

For inorganics (i.e., total lead), sample results greater than the instrument detection limit, but less than five times (5X) the amount found in an associated initial and continuing blank, are qualified as undetected (U). There are no metallic common laboratory contaminants, so there is no “10X Rule”

for metals, and the sample result is never altered. When applying the 5X criteria to soil sample data or calibration blank data, the raw data results are used to evaluate and qualify the reported results on the Certificate of Analysis. Preparation blanks (PB) are evaluated for each matrix, with every SDG, or with each batch of samples digested, whichever is more frequent. The analyte concentration in the PB should be below the CRDL. If any analyte concentration in the PB is above the CRDL, the lowest concentration of that analyte in the associated samples must be ten times (10X) the PB concentration. Otherwise, all samples associated with the PB with the analyte's concentration less than 10X the PB concentration, and above the CRDL, should be redigested and reanalyzed. If the concentration of the PB is less than or equal to the CRDL, no corrective action to the associated sample is required.

Surrogate spikes, or system monitoring compounds, are added to the environmental samples analyzed by chromatographic techniques for VOCs, SVOCs, gasoline, and diesel, for the Fuel Storage Area. Surrogate compounds are analytes that are not expected to be present in associated environmental samples, but behave the same as similar target compounds chromatographically. Known amounts of each surrogate are added prior to sample preparation and are carried throughout the preparation/analysis procedure. The percent recoveries of these surrogate compounds give some measure of the anticipated recoveries of the target compounds whose chromatographic behavior they mimic.

If any surrogate percent recoveries are out of the acceptable range (which differs for each surrogate in each method), laboratory protocol calls for the sample to be reprepared and/or reanalyzed. When the surrogate recoveries are acceptable on the second run, only the second analysis results are reported. When both analyses yield the same unacceptable range, the results of both analyses are reported.

The evaluation of surrogate spike percent recovery results is not straightforward. The functional guidelines suggest several optional approaches, but require the data reviewer to exercise professional judgement in reviewing surrogate data and qualifying associated data as estimated (J or UJ, for detections or nondetections, respectively) or unusable (R). Documentation of data qualifications resulting from the application of these guidelines is retained in the project files as both hard copy and electronic media.

One laboratory duplicate analysis per matrix and for each SDG was performed for the reported total lead. The duplicate results are compared to the results of the original sample to give a measure of

analytical laboratory precision. If the results from a duplicate analysis for a particular analyte fall outside the control limits, the EPA Functional Guidelines for Inorganic Data Review (EPA, 1994b) call for all results for that analyte in all associated samples of the same matrix to be qualified as estimated (J). Documentation of data qualifications resulting from the application of these guidelines is retained in the project files as both hard copy and electronic media.

Laboratory control samples, also known as blank spikes, consist of known concentrations of target compounds added to purified sand or deionized, distilled water prepared and analyzed along with the environmental samples in the sample delivery group. The percent recoveries of the compounds in the LCS give a measure of laboratory accuracy. The functional guidelines call for the data reviewer to use professional judgement to qualify associated data according to established criteria.

Documentation of data qualifications resulting from the application of these guidelines is retained in project files as both hard copy and electronic media.

A.4.8 *Field Nonconformances*

During the corrective action investigation, QA oversight was conducted by IT Corporation to verify that sampling activities were performed in accordance with applicable requirements. The QA oversight activities indicated no findings, deficiencies, or nonconformances with sampling activities as they met the requirements of the plans and procedures governing the activities at the site.

A.4.9 *Laboratory Nonconformances*

Laboratory nonconformances are generally due to inconsistencies in analytical instrumentation operation, sample preparations/extractions, analysis and fluctuations in internal standard and calibration results. No laboratory nonconformances were documented for this project. All nondetect acetone results were rejected due to the compounds response in the initial calibration. The laboratory is not required to generate nonconformance for this type of deficiency as long as the laboratory met all the required QC criteria for the initial calibration analysis. Documentation of these results is retained in project files.

A.5.0 Summary

Analysis of the data generated from corrective action investigation activities conducted at the CAU 321 Fuel Storage Area indicates the following:

- The only analytical results that exceeded the PALs were those for TPH concentrations in the diesel organics range. Samples FSA00003B and FSA00012B had TPH concentrations of 124 mg/kg and 271 mg/kg (377 mg/kg on reanalysis) respectively. These exceeded the NDEP action level of 100 mg/kg for diesel, gasoline, or waste oil ranges.
- The PALs were not exceeded in any of the samples collected for total VOCs, total SVOCs, or total lead.

Appendix B

Cost Estimates

EST: CAU 321 CADD	BN ENVIRONMENTAL RESTORATION COST ESTIMATE SUMMARY	Prep Date: 5/3/99 Print Date: 5/18/99						
TO: SHANNON PARSONS-DEPRY - Environmental Restoration Task Manager FROM: ABDEL AGALLOUCH - ER Project Controls								
SUBJECT: REMEDIAL ALTERNATIVES		TEC: \$15,244						
WORK PKGE: CAU 321 Area 22 Weather Station Fuel Storage		WBS: 1040102130227						
TAP: INACTIVE TANKS SOURCE GROUP		LOCATION: Area 22- NTS						
<table style="width: 100%; border: none;"> <tr> <th style="text-align: center; border-bottom: 1px solid black;">TYPE OF ESTIMATE</th> <th style="text-align: center; border-bottom: 1px solid black;">PRELIMINARY TITLE II</th> </tr> <tr> <td style="border: none;"> ☒ ORDER OF MAGNITUDE ☐ PLANNING/STUDY ☐ CONCEPTUAL/BUDGET ☐ TITLE I / PRELIMINARY </td> <td style="border: none;"> ☐ WORK ORDER ☐ COMPARATIVE ☐ OTHER </td> </tr> </table>		TYPE OF ESTIMATE	PRELIMINARY TITLE II	☒ ORDER OF MAGNITUDE ☐ PLANNING/STUDY ☐ CONCEPTUAL/BUDGET ☐ TITLE I / PRELIMINARY	☐ WORK ORDER ☐ COMPARATIVE ☐ OTHER	<table style="width: 100%; border: none;"> <tr> <th style="text-align: center; border-bottom: 1px solid black;">TYPE OF WORK</th> </tr> <tr> <td style="border: none;"> ☐ RI / FS ☒ REMEDIATION ☒ CONSTRUCTION ☐ OTHER </td> </tr> </table>	TYPE OF WORK	☐ RI / FS ☒ REMEDIATION ☒ CONSTRUCTION ☐ OTHER
TYPE OF ESTIMATE	PRELIMINARY TITLE II							
☒ ORDER OF MAGNITUDE ☐ PLANNING/STUDY ☐ CONCEPTUAL/BUDGET ☐ TITLE I / PRELIMINARY	☐ WORK ORDER ☐ COMPARATIVE ☐ OTHER							
TYPE OF WORK								
☐ RI / FS ☒ REMEDIATION ☒ CONSTRUCTION ☐ OTHER								
BN REMEDIATION PROJECT ESTIMATOR: Abdel Agallouch 702-295-5275 TASK MGR: Shannon Parsons Depry 702-295-0645 PROJ MGR: Steve Nacht 702-295-7234		WORK TO BE PERFORMED BY ☒ DOE PRIME CONTRACTOR NATIONAL LAB ☐ NTS GENERAL SUBCONTRACT ☐ NTS MAINTENANCE OTHER						
<p><u>STATEMENT OF WORK:</u></p> <p>This estimate has been prepared to provide remedial alternative costs for the closure of Corrective Action Unit (CAU) 321, an environmental restoration site listed in the Federal Facilities and Consent Order (FFACO). CAU 321 is specifically described as the Area 22 Weather Station Fuel Storage. Two alternatives will be evaluated for closure of the site: I) No Further action- no associated costs or administrative controls, II) Clean closure by excavation. This estimate will be used to identify the most cost effective alternative for closure of the site while being protective of human health and the environment. Total estimated costs are intended for comparative analysis of remedial field work and field management only. Costs for project management, plan preparation, project support, or other overhead functions are not included.</p> <p><u>SCOPE</u></p> <p>Provide site closure using one of the following alternatives:</p> <p>I) NO FURTHER ACTION -NO ASSOCIATED COSTS OR ADMINISTRATIVE CONTROLS</p> <p>II) CLEAN CLOSURE BY EXCAVATION</p> <p><u>BASIS OF ESTIMATE AND ASSUMPTIONS</u></p> <p><u>Alternative II: Partial excavation</u></p> <ul style="list-style-type: none"> • The total volume of TPH-diesel contaminated soil to be excavated and disposed of is approximately 8.4 CY from two locations: 1.2 CY from vicinity of B-12 (3ft X 3ft X 3ft), and 7.2 CY from vicinity of B-3 (6ft X 9ft X 3ft) • Total volume includes an expansion factor of 20 percent. • Assume excavation and backfill operations will require approximately 2 days • Required support will include equipment operators, laborers, and teamsters. • The soil will be disposed of at Area 6 Hydrocarbon Landfill. • Assume backfill material available at a nearby location. The backfill material will minimize surface depression at the site. • Backfill material for excavated areas will be compacted using a backhoe/loader. • 3 verification soil samples will be required. 1 sample will be for QA/decontamination of equipment. Samples will be analyzed for TPH-diesel. • No waste characterization samples will be required. • Assume no hazardous material will be encountered during the excavation operations. • PPE requirements will include level D. <p><u>ESCALATION:</u></p> <p>Escalation is not included in this estimate. All costs are in FY99 dollars</p> <p><u>CONTINGENCY:</u></p> <p>Contingency costs are not included in this estimate.</p> <p><u>COST SUMMARY- TOTAL ESTIMATED COST PER REMEDIAL ALTERNATIVE</u></p> <table style="width: 100%; border: none;"> <tr> <td>• NO FURTHER ACTION -NO ASSOCIATED COSTS OR ADMINISTRATIVE CONTROLS</td> <td style="text-align: right;">\$0</td> </tr> <tr> <td>• CLEAN CLOSURE BY EXCAVATION</td> <td style="text-align: right;">\$15,244</td> </tr> </table>			• NO FURTHER ACTION -NO ASSOCIATED COSTS OR ADMINISTRATIVE CONTROLS	\$0	• CLEAN CLOSURE BY EXCAVATION	\$15,244		
• NO FURTHER ACTION -NO ASSOCIATED COSTS OR ADMINISTRATIVE CONTROLS	\$0							
• CLEAN CLOSURE BY EXCAVATION	\$15,244							
Review / Concurrence: <div style="display: flex; justify-content: space-between; align-items: flex-end; margin-top: 10px;"> <div style="text-align: center;"> Abdel Agallouch Estimator </div> <div style="text-align: center;"> 5/19/99 Date </div> <div style="text-align: center;"> Checked By </div> <div style="text-align: center;"> 5/19/99 Date </div> </div>								

Appendix C

Response to NDEP Comments

NEVADA ENVIRONMENTAL RESTORATION PROJECT DOCUMENT REVIEW SHEET

1. Document Title/Number: Corrective Action Decision Document for Corrective Action Unit 321: Area 22 Weather Station Fuel Storage, Nevada Test Site, Nevada			2. Document Date: May 1999	
3. Revision Number: 0			4. Originator/Organization: IT Corporation	
5. Responsible DOE/NV ERP Subproject Mgr.: Janet Appenzeller-Wing			6. Date Comments Due:	
7. Review Criteria: Full				
8. Reviewer/Organization/Phone No.: Clemens Goewert, NDEP, 645-9720			9. Reviewer's Signature:	

10. Comment Number/ Location	11. Type*	12. Comment	13. Comment Response	14. Accept
1) Page 12, Item g		Future land use is described as, "...the development of a solar energy power-generation facility, and light industrial equipment and commercial manufacturing capability..." This is a general future land use described in the "Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada" (August 1996). However, the NTS Development Corporation has more specific plans for use of the Desert Rock Airfield area as a potential industrial park. The Area 22 Weather Station would be included in this area. Since these plans are more reflective of future land use for this Corrective Action unit, they should be included in the A through K analysis, and considered in the alternative selection process.	The future use as described in the "Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada" (August 1996) is consistent with the NTS Development Corporation Industrial Park concept. The main point of the sentence is the area is to be used for light industrial activities and not residential. Paragraph changed to: Presently, CAU 321 is located within the NTS, a government-controlled facility. The NTS is a restricted area and unauthorized personnel are not allowed at the facility. Future use for the CAU 321 area is designated for light industrial use (e.g., development of a solar energy power-generation facility, industrial park, or for commercial manufacturing).	Yes, in Part
2) Page 12, Item d		A regional value for precipitation is referenced here. This site is located adjacent to a weather station that has a historical record of precipitation. It would be more appropriate to use the more exact values from the weather station than regional general values.	The regional value for precipitation is consistent with the Desert Rock weather station data. The following sentence will be added to the paragraph: "Annual mean precipitation data for the Desert Rock weather station, located near the CAU 321 site, for the time period from 1961-1990, is 5.68 in. (Wood, 1999)."	Yes
3) Page 18, Last Paragraph		"...No land use restrictions are required..." This is incorrect. Since the site is not a clean closure, land use restrictions are required, and the restrictions will have to be recorded.	No use restrictions will be necessary because the preferred alternative has been changed to Alternative 2, Clean Closure by Excavation and Disposal.	No

NEVADA ENVIRONMENTAL RESTORATION PROJECT DOCUMENT REVIEW SHEET

10. Comment Number/ Location	11. Type*	12. Comment	13. Comment Response	14. Accept
4) Page 12, 2nd Bullet		<p><i>"...The length of time since releases - 40 years have past since the Fuel Storage Area was actively used..."</i> While it has been 40 years since the area was actively used, has it been determined that the release is 40 years or more old?</p>	<p>See pages 11 and 12, item "e".</p> <p>e. The types of regulated substances released at the site are diesel range petroleum hydrocarbons. Any downward migration of COCs is slowed by the following parameters:</p> <p>*The length of time since the releases - approximately 40 years have past since the Fuel Storage Area was actively used as part of the Camp Desert Rock facility. No evidence of weathered or historical releases at the site have been identified through process knowledge or during the site investigation and sampling conducted in February 1999. However, analytical results and chromatograms from the February 1999 site investigation show that the TPH-diesel range organics concentration (of 124 mg/kg for FSA00003B) detected at the FSA00003 site is relatively recent and not weathered. The site shows evidence that wood was burned at the location, perhaps a shed or some wood pallets as evidenced by pieces of burnt wood and nails. The diesel range organics found at this location was most likely from an accelerant used to start the wood fire. From the chromatogram, it was not possible to identify the specific type of diesel range organics contaminant. The sample collection log indicates that sample FSA00003B was stained and had a petroleum odor. The field-screening results from the Hanby soil test kit detected TPH at about 200 parts per million (ppm).</p> <p>*At the FSA00012 location, the analytical results and chromatogram for sample FSA00012B show the presence of TPH-diesel range organics at concentrations of 271 mg/kg (initial analysis) and 377 mg/kg (on reanalysis). The chromatograph indicates that TPH contamination is recent. The specific type of TPH-diesel range organic contaminant was identified as lubricating oil.</p>	Yes

NEVADA ENVIRONMENTAL RESTORATION PROJECT DOCUMENT REVIEW SHEET

10. Comment Number/ Location	11. Type*	12. Comment	13. Comment Response	14. Accept
5) General		No where on the figures in the CADD is the location of the area of the hydrocarbon contamination indicated. This area should be included on a figure in Appendix A, minimally. The coordinates of the spill site should also be identified.	The figure has been modified to show locations where TPH-diesel was detected above the preliminary action level.	Yes
6) General		The groundwater levels given in the CADD are based upon the results of Winograd and Thordarson, 1975. The site is located relatively near two wells; i.e., Army Well No. 1, and the monitoring well at the Sewage treatment plant. A more accurate depth to groundwater could be given by using measurements from these wells rather than using the general estimates from Winograd and Thordarson.	Page 11. Bullet "a." The groundwater levels cited are consistent with the well data near the site. A sentence has been added to the paragraph that states the depth-to-water for Army Well 1 and SM-23-1. The sentence is as follows: "The depth to groundwater for two wells near the CAU 321 site is 785 ft at Army Well 1 and 1,164 ft at SM-23-1, a monitoring well for the Mercury sewage treatment plant (Wood, 1999; USGS, 1999)."	Yes
7) General		If the site evaluation still determines that the recommended alternative is to leave the contamination in place, the site should be marked with a sign and recorded. This would identify the location and prevent unintentional intrusion.	No use restrictions will be necessary because the preferred alternative has been changed to Alternative 2, Clean Closure by Excavation and Disposal.	No

^a Comment Types: M = Mandatory, S = Suggested.

Return Document Review Sheets to DOE/NV Environmental Restoration Division, Attn: QAC, M/S 505.

Distribution

*Provide copy in distribution of Rev. 0 and subsequent revisions if applicable. Copies of only the NDEP-approved document will be distributed to others.

Copies

Paul J. Liebendorfer
State of Nevada
Bureau of Federal Facilities
Division of Environmental Protection
333 W. Nye Lane, Room 138
Carson City, NV 89706-0851

2 (Controlled)*

Michael McKinnon
State of Nevada
Bureau of Federal Facilities
Division of Environmental Protection
555 E. Washington, Suite 4300
Las Vegas, NV 89101

1 (Controlled)*

Sabrina Lawrence
Environmental Restoration Division
DOE/Nevada Operations Office
P.O. Box 98518, M/S 505
Las Vegas, NV 89193-8518

1 (Controlled)*

Janet Appenzeller-Wing
Environmental Restoration Division
DOE/Nevada Operations Office
P.O. Box 98518, M/S 505
Las Vegas, NV 89193-8518

1 (Uncontrolled)*

Sabine Curtis
Environmental Restoration Division
DOE/Nevada Operations Office
P.O. Box 98518, M/S 505
Las Vegas, NV 89193-8518

1 (Uncontrolled)*

Steve Nacht
Bechtel Nevada
P.O. Box 98521, M/S NTS306
Las Vegas, NV 89193-8521

1 (Uncontrolled)*

Shannon Parsons-DePry
Bechtel Nevada
P.O. Box 98521, M/S NTS306
Las Vegas, NV 89193-8521

1 (Uncontrolled)*

IT Corporation Central Files
IT Corporation
P.O. Box 93838
Las Vegas, NV 89193

1 (Uncontrolled)*

Juliana Herrington
SAIC
P.O. Box 93838
Las Vegas, NV 89193

1 (Controlled)*

Jeff Johnson
IT Corporation
P.O. Box 93838
Las Vegas, NV 89193

1 (Uncontrolled)*

Technical Information Resource Center
DOE/Nevada Operations Office
P.O. Box 98518, M/S 505
Las Vegas, NV 89193-8518

1 (Uncontrolled)

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831

1 (Uncontrolled, electronic copy)

Manager Southern Nevada FFACO
Public Reading Room
P.O. Box 98521, M/S NLV040
Las Vegas, NV 89193-8521

1 (Controlled)

1 (Uncontrolled)

Manager Northern Nevada FFACO
Public Reading Room
c/o Rosa Silver
IT Corporation
P.O. Box 93838
Las Vegas, NV 89193

1 (Uncontrolled)