Nevada
Environmental
Restoration
Project

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SAFER Work Plan
for CAUs 452, 454, 456, and 464
Closure of Historical
UST Release Sites
Nevada Test Site

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**SAFER WORK PLAN FOR
CAUs 452, 454, 456, AND 464
CLOSURE OF HISTORICAL UST RELEASE SITES
NEVADA TEST SITE**

**Prepared for the
U. S. Department of Energy
Nevada Operations Office
Under Contract No. DE-AC08-96NV11718**

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**Prepared by
Bechtel Nevada
Remediation Projects**

August 1997

**SAFER WORK PLAN FOR
CAUs 452, 454, 456, AND 464
CLOSURE OF HISTORICAL UST RELEASE SITES
NEVADA TEST SITE**

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ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CAS	Corrective Action Site
CAU	Corrective Action Unit
CGA	Combustible Gas Analyzer
CO ₂	carbon dioxide
CX	Categorical Exclusion
DOE/NV	U.S. Department of Energy/Nevada Operations Office
EPA	U.S. Environmental Protection Agency
ESS&H	Environmental Safety, Security, and Health
FFACO	Federal Facility Agreement and Consent Order
ft	feet
gal	gallon
L	liter
m	meter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NAC	Nevada Administrative Code
NDEM	Nevada Division of Environmental Management
NDEP	Nevada Division of Environmental Protection
NTS	Nevada Test Site

ACRONYMS AND ABBREVIATIONS (continued)

O ₂	oxygen
PCB	Polychlorinated Biphenyl
PID	Photoionization Detector
ppm	parts per million
Rad Safe	Radiological Safety
RCRA	Resource Conservation and Recovery Act
SAFER	Streamlined Approach for Environmental Restoration
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbon
UST	Underground Storage Tank
VOC	Volatile Organic Compound

1.0 INTRODUCTION

1.1 SCOPE

This plan addresses characterization and closure of nine underground storage tank (UST) petroleum hydrocarbon release sites. The sites are located at the Nevada Test Site (NTS) in Areas 2, 9, 12, 23, and 25 (Figure 1). The sites are identified in the Federal Facility Agreement and Consent Order (FFACO) in Appendix II (currently proposed to be moved into Appendix III) and are assigned as Corrective Action Units (CAUs) 452, 454, 456, and 464. Each tank and associated hydrocarbon release has been assigned a Corrective Action Site (CAS) Number (Table 1). Closure of the associated USTs have been accepted by the Nevada Division of Environmental Protection (NDEP). Releases associated with the tanks have not been closed, therefore, this Streamlined Approach for Environmental Restoration (SAFER) Work Plan only addresses closure of the spills associated with each tank.

The USTs associated with the release sites and addressed by this plan were closed between 1990 and 1996 by the U.S. Department of Energy, Nevada Operations Office (DOE/NV). One UST was closed in place (23-111-1) while the remaining eight were closed by removal. Hydrocarbon releases were identified at each of the sites based upon laboratory analytical data from samples collected below the tank bottoms. Hydrocarbon concentrations exceeded the Nevada Administrative Code (NAC) Action Level of 100 milligrams per kilogram (mg/kg) (NAC 459.9973, 1995). Each release was reported to the NDEP and the Nevada Division of Emergency Management (NDEM) within 24 hours of identification. NDEM numbers were assigned to each site except for 23-111-1. The release at this site was identified prior to the time period when NDEM assigned tracking numbers. Tank locations are shown on Figure 1 and identified in Table 1.

1.2 OBJECTIVE

The objective of this plan is to provide a method for implementing characterization and closure of historical UST hydrocarbon release sites. This plan is prepared under the SAFER concept. The SAFER concept recognizes that technical decisions may be made based on incomplete but sufficient information and the experience of the decision maker. Any uncertainties are addressed by documented assumptions that are verified by sampling and analysis, data evaluation, and on-site observations as planned activities progress, and by contingency plans as necessary. If, at any time during the site closure, new information is developed that indicates that the closure method or underlying assumptions should be revised, the decision makers will redirect the closure activities to more appropriately protect human health and the environment.

TABLE 1 - HYDROCARBON RELEASE SITES IDENTIFIED FOR CLOSURE

CAU ¹ NUMBER	UST ID ²	UST CAS NUMBER ³	RELEASE CAS NUMBER ⁴	NDEM NUMBER ⁵	LOCATION	DATE REMOVED/ CLOSED ⁶	CONC. DETECTED ⁷ (mg/kg)
452	25-3101-1	25-02-13	25-25-09	H940825C	Area 25 Control Point Facility	July 20, 1994	544 Diesel
	25-3102-3	25-02-18	25-25-14	H940314E	Area 25 Control Point Facility	March 9, 1994	620 Diesel/Oil
	25-3152-1	25-02-19	25-25-15	H941020E	Area 25 Former Rad Safe Building	August 24, 1994	1,900 Diesel
454	12-B-1	12-02-07	12-25-08	H950524F	Area 12 "B" Tunnel	March 1, 1995	570 Diesel
	12-B-3	12-02-06	12-25-09	960722-02	Area 12 "B" Tunnel	May 6, 1996	310 Waste Oil
	12-COMM-1	12-02-09	12-25-10	H950919A	Area 12 Communications Building	August 7, 1995	1,600 Diesel/Oil
456	23-111-1	23-02-03	23-02-03	Not Assigned	Area 23 ESS&H Building	September 6, 1990	191 Heating Oil
464	2-300-1	02-02-03	02-02-03	960603-771	Area 2 300 Bunker	April 30, 1996	9,600 Diesel
	9-300-1	09-02-01	09-02-01	960701-849	Area 9 300 Bunker	May 2, 1996	3,300 Diesel

¹ Corrective Action Unit Number identified in the FFACO.

² Underground Storage Tank Identification Number.

³ Corrective Action Site Number assigned to the UST within the FFACO.

⁴ Corrective Action Site Number assigned to the hydrocarbon release within the FFACO. UST Sites 23-111-1, 2-300-1, and 9-300-1 were assigned the same CAS Numbers for both the UST and associated release.

⁵ Nevada Division of Environmental Management Number assigned at time of release identification.

⁶ Date which tank was closed by removal or closed in place.

⁷ Concentration detected at maximum sample depth reported in milligrams per kilogram.

Closure for each site will be completed by:

- Excavation of impacted soils for clean closure (12-B-1, 12-COMM-1, and 9-300-1).
- Delineation of the hydrocarbon impacted soils for potential administrative closure (25-3101-1, 25-3102-3, 25-3152-1, and 2-300-1).
- Site evaluation without excavation or drilling (12-B-3 and 23-111-1).

1.3 SAFER PLAN CONTENTS

This SAFER Plan has been developed in a manner to support the proposed characterization and closure of nine UST petroleum hydrocarbon release sites. The format of the plan is as follows:

- Introduction, background, and closure approach (Section 1.0).
- CAU site location and description (Section 2.0).
- Scope of work (Section 3.0).
- Waste management and disposal (Section 4.0).
- Schedule of closure activities (Section 5.0).
- Closure documentation (Section 6.0).

This plan was developed using information and guidance provided from the following documents:

- Nevada Environmental Restoration Project, Project Management Plan, Revision 0, DOE, 1994.
- Nevada Environmental Restoration Project, Health and Safety Plan, Revision 2, DOE, 1996.
- Nevada Environmental Restoration Project, Industrial Sites, Quality Assurance Project Plan, Nevada Test Site, Revision 1, DOE, 1996.

1.4 SAFER PLAN ASSUMPTIONS

The closure approach is based on the following assumptions:

General Assumption

- Each site is impacted by petroleum hydrocarbons only. Samples will not be analyzed for Resource Conservation and Recovery Act (RCRA) constituents since they were not identified in previous soil samples collected below the tank bottoms or by process knowledge.

Clean Closure by Excavation

- At sites to be excavated for clean closure (12-B-1, 12-COMM-1, and 9-300-1) hydrocarbon concentrations greater than 100 mg/kg do not extend 3 meters (m) (10 feet [ft]) below the former tank bottom.
- A maximum of two excavation and sampling events will be conducted at each clean closure site. If after two events, the verification sample results indicate the presence of hydrocarbons above the regulatory limit of 100 mg/kg, the remediation plan for that site will be re-evaluated.

Administrative Closure by Site Characterization (Drilling)

- At sites requiring drilling (25-3101-1, 25-3102-3, 25-3152-1 and 2-300-1), the extent of the hydrocarbon release does not extend beyond 30 m (100 ft) below ground surface (bgs) and has not impacted the groundwater.
- Information collected from the proposed soil boreholes will be sufficient to support closure using the NAC "A through K" evaluation (NAC 459.9973, 1995).

1.5 APPROACH FOR CLEAN CLOSURE

Clean closure will be completed at former tank sites 12-B-1, 12-COMM-1, and 9-300-1 by excavation and sampling to verify that the soil is below the petroleum hydrocarbon Action Level of 100 mg/kg (NAC 459.9973, 1995). Petroleum impacted soils will be excavated using a backhoe or front end loader. These sites have been identified for clean closure based upon site observations at the time of tank removal, equipment accessibility, and the low total petroleum hydrocarbon (TPH) soil concentrations identified subsequent to tank removal.

1.6 APPROACH FOR SITE CHARACTERIZATION AND CLOSURE

Site characterization and closure will be completed at former tank sites 25-3101-1, 25-3102-3, 25-3152-1, and 2-300-1. The approach for completing additional site characterization and closure will be to define the lateral and vertical extent of the hydrocarbon impacted soil using drilling equipment. Drilling is preferred at these sites based on the findings of previous remedial excavation efforts. Additional site characterization is anticipated to provide sufficient data to complete an "A through K" evaluation to support an administrative closure.

1.7 APPROACH FOR SITE EVALUATION

Former tank sites 12-B-3 and 23-111-1 require additional site evaluation. The 12-B-3 site evaluation consists of collecting additional soil samples to confirm that hydrocarbons identified are from past site activities and are not from a release from UST 12-B-3. The 23-111-1 site evaluation consists of collecting air samples from two passive venting wells to determine if hydrocarbons are still present. The passive venting wells were installed during the tank closure activities to enhance bioremediation at the site. It is anticipated that the findings of the evaluation will provide sufficient information to support an administrative (A through K) closure.

2.0 SITE LOCATION AND DESCRIPTION

2.1 CAU 452, AREA 25 RELEASE SITES

Activities at sites 25-3101-1, 25-3102-3, and 25-3152-1 consist of collecting soil samples in an effort to characterize the lateral and vertical extent of the hydrocarbon plume. Characterization will be completed using hollow-stem auger or air rotary drilling equipment. It is anticipated that drilling will not extend greater than 30 m (100 ft) bgs. Clean closure will not be attempted at these sites based upon the assumed extent of the subsurface impacted area and proximity to buildings and/or subsurface utilities. Figures are provided in Section 3.0.

Data collected from the characterization will be used to complete an "A through K" evaluation for each site. It is anticipated that the analysis along with the concentrations and limits defined in the site characterization will support administrative closures of these sites.

2.1.1 UST 25-3101-1 (NDEM No. H940825C, Release CAS No. 25-25-09)

UST 25-3101-1 was located on the south side of Building 25-3101 within the Area 25 Control Point Facility. The tank had an approximate capacity of 15,000 liters (L) (4,000 gallons [gal]) and was used for storing diesel fuel. One soil sample collected below the east tank bottom, at the time of tank removal on July 20, 1994, had a TPH concentration of 2,400 mg/kg at a depth of approximately 3 m (9.5 ft) bgs. Analytical results from subsequent soil sampling on October 24, 1994, had a TPH concentration of 544 mg/kg at a depth of approximately 4 m (12.5 ft) bgs. Additional excavation was not completed in this area due to the following site limitations:

- The tank excavation is bordered by a concrete loading dock to the north (within 0.9 m [3 ft]).
- A 0.3 m (1 ft) diameter utility (water) line was identified within the southern sidewall of the excavation. The utility line is buried at an approximate depth of 1.5 m (5 ft) bgs.

2.1.2 UST 25-3102-3 (NDEM No. H940314E, Release CAS No. 25-25-14)

UST 25-3102-3 was located on the southwest corner of Building 25-3102 within the Area 25 Control Point Facility. The tank had an approximate capacity of 2,100 L (560 gal) and was used for storing waste oil. Analysis of the tank contents identified waste oil, polychlorinated biphenyls (PCBs), and barium. The tank contents were characterized as hazardous and subsequently removed and treated following appropriate State and Federal Regulations. The tank was removed on March 9, 1994 and triple rinsed prior to disposal.

Soil samples collected below the north and south tank bottom from approximately 3 m (10 ft) bgs had petroleum hydrocarbon concentrations of 981 mg/kg and 157 mg/kg, respectively. PCBs and barium were not detected in the soil samples collected below the tank bottom.

Additional excavation was completed on May 1, 1995. Samples collected from a depth of approximately 4 m (12 ft) bgs from the north and south end had hydrocarbon concentrations of 170 mg/kg and 620 mg/kg, respectively. Further remedial activities were not completed at the site due to the following limitations:

- The tank excavation is bordered by Building 25-3102 to the north.
- The site is on a sloped embankment limiting backhoe accessibility.
- A five centimeter (2 inch) utility line is located diagonally across the south end of the excavation footprint limiting the range of movement of the backhoe.

2.1.3 UST 25-3152-1 (NDEM No. H941020E, Release CAS No. 25-25-15)

UST 25-3152-1 was located on the west side of the former Radiological Safety (Rad Safe) Building 25-3152 in Area 25. The tank had an approximate capacity of 3,800 L (1,000 gal) and supplied fuel oil for a boiler. The tank was removed on August 24, 1994. A soil sample collected below the south excavation bottom from approximately 3 m (10 ft) bgs had a TPH concentration of 372 mg/kg. Additional excavation was completed on May 8, 1995. A sample collected from a depth of approximately 6 m (20 ft) bgs from the south end had a TPH concentration of 1,900 mg/kg. TPH was not detected in sidewall samples collected. Additional sampling is required to better define the extent of petroleum hydrocarbons.

2.2 CAU 454, AREA 12 RELEASE SITES

Each of the Area 12 release sites are located west of the Area 12 Camp. Activities at these sites will consist of clean closure (12-B-3 and 12-COMM-1) and additional site evaluation (12-B-3). Figures are provided in Section 3.0. A brief site description and summary of tank closure activity follows:

2.2.1 UST 12-B-1 (NDEM No. H950524F, Release CAS No. 12-25-08)

UST 12-B-1 was located east of the main portal entrance to "B" Tunnel. The tank had an approximate capacity of 1,900 L (500 gal) and contained approximately 1,500 L (400 gal) of

diesel fuel at the time of identification. The tank was situated on a hillside slope and was partially exposed at the surface. The tank was removed on March 1, 1995. Soil samples collected 0.3 m (1 ft) below the east and west tank bottom had TPH as diesel concentrations of 120 mg/kg and 570 mg/kg, respectively.

2.2.2 UST 12-B-3 (NDEM No. 960722-02, Release CAS No. 12-25-09)

UST 12-B-3 was located west of the main portal-entrance to "B" Tunnel. The tank was located on top of an abandoned bunker facility constructed into the mountainside. The tank had an approximate capacity of 1,900 L (500 gal) and was empty at the time of identification. Upon exposing the tank it was discovered that it was constructed of galvanized steel and was most likely used for water storage. The tank was removed on May 6, 1996.

One sample collected 0.3 m (1 ft) below the tank bottom had a TPH as waste oil concentration of 310 mg/kg. Since it is not likely that the hydrocarbon identified was released from this tank, additional sampling will be completed to verify the presence of a hydrocarbon source independent from the tank.

2.2.3 UST 12-COMM-1 (NDEM No. H950919A, Release CAS No. 12-25-10)

UST 12-COMM-1 was located north of a former communications building and was approximately 50 percent exposed at the time of identification. The tank had an approximate capacity of 1,900 L (500 gal) and was used to store waste oil hydrocarbons. The tank contents were determined to be hazardous due to the presence of lead (19 milligrams per liter [mg/L]), barium (4,400 mg/L) and silver (8.9 mg/L) at concentrations above the Toxicity Characteristic Leaching Procedure (TCLP) Action Levels. The tank contents were subsequently removed and treated following appropriate State and Federal Regulations. The tank was removed on August 7, 1995 and triple rinsed prior to disposal. Soil samples collected 0.3 m (1 ft) below the north and south tank bottom contained only petroleum hydrocarbons at concentrations of 1,300 mg/kg and 1,600 mg/kg, respectively.

2.3 CAU 456, AREA 23 RELEASE SITE

2.3.1 UST 23-111-1 (NDEM No. Not Assigned, UST/Release CAS No. 23-02-03)

UST 23-111-1 is located north of the Environmental Safety, Security, and Health (ESS&H) Building (former DOE/Nevada Test Site Office). The tank was closed in place on September 6, 1990, due to numerous underground utilities, a high voltage transformer pad, and overhead

power lines. The tank was closed by filling it with low strength cement grout. The tank had an approximate capacity of 3,400 L (900 gal) and was used to store heating oil. A figure is provided in Section 3.0.

Soil samples collected below the tank bottom at an approximate depth of 3 m (10 ft) had TPH concentrations of 115 mg/kg and 119 mg/kg. Two passive venting wells were installed at the tank ends to a depth of 3 m (10 ft) to monitor the progress of biodegradation at the site. Quarterly air sampling was completed for analysis of volatile organic compounds (VOCs) using a photoionization detector (PID), oxygen (O₂) using a Combustible Gas Analyzer (CGA), and carbon dioxide (CO₂) using Dräger® Tubes. Monitoring was discontinued after a period of approximately one year since data indicated that a considerable amount of biodegradation was not occurring at the site. In addition, O₂ and CO₂ concentrations were observed at ambient atmospheric levels. In addition to the numerous utilities present at the site, the former tank is now covered by an above ground storage tank.

2.4 CAU 464, AREAS 2 AND 9 RELEASE SITES

CAU 464 consists of two bunker facility sites. The sites were placed within CAU 464 based upon their close proximity and similar tank configuration. Figures are provided in Section 3.0. A brief site description and summary of tank closure activity follows:

2.4.1 UST 2-300-1 (NDEM No. 960603-771, UST/Release CAS No. 02-02-03)

UST 2-300-1 was located on the east side of Area 2 Bunker 300. The tank had an approximate capacity of 1,900 L (500 gal) and supplied diesel fuel for generators. The tank was removed on April 30, 1996. A soil sample collected from approximately 0.3 m (1 ft) below the south tank bottom had a TPH concentration of 230 mg/kg. Additional excavation was completed on May 23, 1996. A sample collected from a depth of approximately 2.7 m (9 ft) below the tank bottom had a TPH concentration of 9,600 mg/kg.

Equipment access to this site is limited due to the release location within the physical depression of the bunker facility. Based upon the findings of the remedial excavation completed on May 23, 1996, drilling will be required to define the lateral and vertical extent of hydrocarbon impacted soil. It is anticipated that drilling will not extend greater than 30 m (100 ft) bgs. Data collected from the characterization will be used to complete an "A through K" evaluation.

2.4.2 UST 9-300-1 (NDEM No. 960701-849, UST/Release CAS No. 09-02-01)

UST 9-300-1 was located on the east side of Area 9 Bunker 300. The tank had an approximate capacity of 1,900 L (500 gal) and supplied diesel fuel for generators. The tank was removed on May 2, 1996. A soil sample collected from approximately 0.5 m (1.5 ft) below the south tank bottom had a TPH concentration of 3,300 mg/kg. Based on field observations at the time of the tank removal and greater access for excavation equipment, it is anticipated that the impacted soils can be removed using backhoe equipment.

3.0 SCOPE OF WORK

3.1 PRE-FIELD IMPLEMENTATION ACTIVITIES

The following activities have been completed, or will be completed prior to the implementation of this plan:

- Tortoise habitat and endangered species investigation.
- Preparation of National Environmental Protection Act documentation.
- Preparation of a Health & Safety Plan.
- A Cultural Resource Survey is not required since all work will be completed in previously disturbed areas. Off road driving in areas surrounding the site is not allowed.

3.1.1 Tortoise Habitat and Endangered Species Investigation

The release sites located in Areas 23 and 25 are within the range of the desert tortoise. Desert tortoise surveys will be requested for these sites. During all site activities, the terms and conditions of the NTS Biological Opinion (US Fish and Wildlife Services, 1992) will be followed.

3.1.2 National Environmental Protection Act Documentation

A Categorical Exclusion (CX) Determination for completing UST removal and related site remediation and characterization was prepared and signed on August 25, 1994 (CX, 1994).

3.1.3 Health and Safety Plan

A Hazard Assessment and Health & Safety Plan have been prepared for this project. The sites are considered Level D. Upgrading to a higher protection will be determined based upon conditions identified at each site.

3.2 CONSTITUENTS OF CONCERN

The constituents of concern identified at each of the sites are TPH as diesel or oil. Sites which have had hazardous constituents identified in the tank contents (12-COMM-1 and 25-3102-3) did not have the hazardous constituents identified in the soil samples taken below the tank bottom.

3.3 FIELD ACTIVITIES

Field activities will include:

- Excavation of hydrocarbon impacted soils using a backhoe or front end loader. Excavation activities will be completed in an effort to clean close Sites 12-B-1, 12-COMM-1, and 9-300-1.
- Site characterization by drilling and sample collection. Drilling activities will be completed in an effort to obtain sufficient information to support an administrative closure using the "A through K" evaluation for Sites 2-300-1, 25-3101-1, 25-3102-3, and 25-3152-1.
- Site evaluation by collecting additional soil or air samples. Site evaluation will be completed in an effort to determine present site conditions for Sites 23-111-1 and 12-B-3. Information will be collected from soil or air samples and examined as to whether or not site closure can be supported using the "A through K" evaluation or if additional characterization or remediation activities are warranted.

The approach, closure methodology, and sample requirements for completing the field activities are summarized in Table 2.

3.3.1 Sample Collection and Handling

Soil samples will be collected using decontaminated equipment specified on Table 2. The location of the sample will be documented in a bound field logbook along with field observations. All entries into the logbook will be with black indelible ink. Soil samples collected during drilling will be retained in brass liners, sealed on each end with teflon® tape and plastic caps, labeled with the date, depth, sampler's initials and sample identification number, and placed in sealable plastic bags. Soil samples collected during clean closure and evaluation activities will be placed into clean laboratory grade 250 milliliter jars, sealed, and labeled. For quality assurance and quality control purposes, one blind replicate sample will be submitted for every ten samples collected.

TABLE 2 - SUMMARY OF CLOSURE APPROACH, METHODOLOGY, AND SAMPLE REQUIREMENTS

CAU ¹ NUMBER	UST/SITE ID ²	CLOSURE APPROACH	CLOSURE METHODOLOGY	SAMPLE EQUIPMENT	SAMPLE ANALYSIS ³	SAMPLE CONTAINER
452	25-3101-1	Administrative Closure	Drilling	Split Spoon	TPH as Diesel	Brass Ring
	25-3102-3	Administrative Closure	Drilling	Split Spoon	TPH as Diesel/Oil	Brass Ring
	25-3152-1	Administrative Closure	Drilling	Split Spoon	TPH as Diesel	Brass Ring
454	12-B-1	Clean Closure	Backhoe/Loader	Hand Auger/ Sample Scoop	TPH as Diesel	250 ml jar
	12-B-3	Site Evaluation/ Administrative Closure	Soil Samples Only	Hand Auger/ Sample Scoop	TPH as Oil	250 ml jar
	12-COMM-1	Clean Closure	Backhoe	Hand Auger/ Sample Scoop	TPH as Diesel /Oil	250 ml jar
456	23-111-1	Site Evaluation/ Administrative Closure	Air Samples Only	Vacuum Pump	TPH, VOCs, O ₂ , CO ₂	Tedlar Bag
464	2-300-1	Administrative Closure	Drilling	Split Spoon	TPH as Diesel	Brass Ring
	9-300-1	Clean Closure	Backhoe/Loader	Hand Auger/ Sample Scoop	TPH a Diesel	250 ml jar

¹ Corrective Action Unit Number identified in the FFACO.

² Underground Storage Tank/Site Identification Number.

³ TPH analyzed using Environmental Protection Agency (EPA) Method 8015M; VOCs analyzed using PID; O₂ analyzed using a CGA; CO₂ analyzed using a Dräger Tube.

All soil samples will be placed in an ice chest, cooled to approximately four degrees Centigrade (39.2 degrees Fahrenheit) and transported to the Bechtel Nevada Analytical Services Section in Mercury, Nevada, following standard chain-of-custody procedures. Soil samples will be analyzed by a subcontract laboratory for TPH using EPA Method 8015 Modified.

Duplicate soil samples will also be collected for analysis of volatile headspace readings using a PID. These samples assist in screening soil samples for laboratory analysis and provide information on possible exposure of VOCs to site workers. Headspace samples do not replace laboratory analysis of soil samples. Headspace readings of each sample will be collected using a PID calibrated to 100 parts per million (ppm) Isobutylene. The readings will be collected by placing approximately 100 grams of soil into a sealable plastic bag. After the soil is allowed to equilibrate for approximately 20 minutes, the probe of the PID will be inserted into the bag and the highest reading will be recorded in the field notes.

Samples will be labeled using the following numbering system. For example, Sample Number "9-300/S-10" indicates the following:

"9" is the NTS Area
"300" is the Building Number
"S-10" is the sample location (south) and sample depth.

3.3.2 Clean Closure

The following sites will be clean closed by excavating the impacted soils and collecting verification soil samples. A maximum of two excavation and sampling events will be conducted at each clean closure site. If after two events, the verification sample results indicate the presence of hydrocarbons above the regulatory limit of 100 mg/kg, the remediation plan for that site will be re-evaluated. Excavations will not be backfilled until analytical results have been received and determined to be below the NAC Action Level of 100 mg/kg or it is determined that excavation is not a viable closure option. Excavations will be backfilled with clean native soils and/or Type II fill material.

3.3.2.1 Release Site 12-B-1

This site will be clean closed using a backhoe or loader (Figure 2). It is anticipated that the depth of excavation will not exceed 1.2 m (4 ft). Verification samples will be collected from the east and west excavation bottom using a decontaminated stainless steel trowel and analyzed for TPH as diesel.

Figure 2
UST Release Site 12-B-1 - Site Layout

3.3.2.2 Release Site 12-COMM-1

This site will be clean closed using a backhoe (Figure 3). It is anticipated that the depth of excavation will not exceed 1.2 m (4 ft). Verification samples will be collected from the north and south excavation bottom using a decontaminated stainless steel trowel and analyzed for TPH as diesel and oil.

3.3.2.3 Release Site 9-300-1

This site will be clean closed using a backhoe or loader (Figure 4). It is anticipated that the depth of excavation will not exceed 3 m (10 ft) below the former tank bottom. A verification sample will be collected from the south excavation bottom using a decontaminated stainless steel trowel and/or the backhoe bucket and analyzed for TPH as diesel.

3.3.3 Administrative Closure

Sites 2-300-1, 25-3101-1, 25-3102-3, and 25-3152-1 will be characterized to obtain data to support an administrative closure (A through K evaluation). The objective for completing the drilling is to define the hydrocarbon impacted area. Based on previous site observations it is assumed that impacted soils do not extend greater than 30 m (100 ft). Prior to drilling, the proposed borehole locations will be cleared for underground utilities (Goldak). The boreholes will be drilled using continuous flight, hollow-stem auger or air rotary drilling equipment. Prior to each sampling event, equipment will be decontaminated in a nonphosphatic cleaning solution and rinsed with distilled water.

Soil samples for logging and chemical analysis will be collected at approximate 1.5 m (5 ft) intervals by advancing a split-spoon sampler, equipped with brass liners, into the undisturbed soil beyond the tip of the cutting head. The top brass ring sample will not be used as it typically contains slough material not representative of the soil interval sampled. The first sample depth is specific to each site based upon the former UST depth and location.

Soil samples will be screened in the field using a hydrocarbon detection kit or an NTS screening laboratory. If hydrocarbons are detected in the screened samples the boreholes will be advanced until field screening indicates two non-detects in a row. The last screened sample which indicated the presence of hydrocarbons and the two subsequent confirmatory "clean" samples will be submitted to an off-site laboratory. Once the vertical extent is defined then borehole locations will be stepped out to define the lateral extent following the same screening process. If hydrocarbons are not present in the screened samples then one sample will be collected at the depth of the tank bottom followed by two confirmatory "clean" samples. The samples will be submitted to an off-site laboratory.

Figure 3
UST Release Site 12-COMM-1 - Site Layout

Figure 4
UST Release Site 9-300-1 - Site Layout

A detailed boring log will be recorded for each exploratory borehole from auger-cuttings and undisturbed soil samples. Soils will be logged by an Bechtel Nevada geologist/scientist using the lithologic description of the Unified Soil Classification System. Field observations such as lithologic changes, staining, odor, and headspace readings will be noted for each borehole. Upon completion, each borehole will be backfilled with graded sand and capped with a 1.5 m (5 ft) expanding cement seal to surface grade. Each borehole will be located to submeter accuracy using Global Positioning System coordinates.

3.3.3.1 Release Site 2-300-1

Due to the site constraints, only two boreholes are proposed at this former UST site (Figure 5). The tank was located in the depression of the 2-300 Bunker entrance. Access to the release area is only available from a narrow sloping driveway leading to the entrance of the bunker complex. The driveway is located south of the release location. The concrete structure of the generator room borders the site to the west. An approximate 1:1 slope borders the release area to the north. One borehole will be located in the driveway approximately 0.9 m (3 ft) south of the former excavation (2-300-B1) and one will be located on the level ground surface approximately 3 m (10 ft) to the north of the release area (2-300-B2).

The collection of samples from Borehole 2-300-B1 will start at a depth of 1.5 m (5 ft) bgs to evaluate lateral migration of the hydrocarbon release. Samples collected from Borehole 2-300-B2 will start from a depth of 3.7 m (12 ft) bgs which is approximately 0.3 m (1 ft) below the former tank bottom measured from the ground surface. The depth of the borehole will be dependant on field observations (staining) and headspace readings. Samples collected from each borehole will be analyzed for TPH as diesel.

3.3.3.2 Release Site 25-3101-1

Three shallow boreholes are proposed at this former UST site (Figure 6). One within the east end of the former excavation (3101-B1), one approximately 1.5 m (5 ft) east (outside) of the former excavation footprint (3101-B2), and one approximately 1.5 m (5 ft) south of the former excavation footprint and utility line (3101-B3). Boreholes are not proposed at the west end of the former excavation since soil samples collected below the west tank bottom did not indicate the presence of hydrocarbons.

The collection of samples from Borehole 3101-B1 will start at a depth of 4 m (12.5 ft) bgs since this is the maximum depth previously excavated. Samples collected from Boreholes 3101-B2 and 3101-B3 will start from a depth of 3 m (10 ft) bgs which is approximately 0.6 m (2 ft) below the former tank bottom. Samples will be collected from each borehole and analyzed for TPH as diesel.

Figure 5
UST Release Site 2-300-1- Proposed Borehole Locations

Figure 6
UST Release Sites 25-3101-1 & 25-3102-3
Site Layout & Proposed Borehole Locations

3.3.3.3 Release Site 25-3102-3

Three shallow boreholes are proposed at this former UST site (Figure 6). One borehole (3102-B1) will be placed in proximity of the former tank center in an effort to determine the vertical extent of impacted soils. The borehole will be placed in the center of the former excavation since the tank only had a 2,100 L (560 gal) capacity. Since the excavation has been backfilled with pea gravel, Borehole 3102-B1 may require casing to a depth of 4 m (14 ft) bgs in order to complete the borehole. The second borehole (3102-B2) will be placed approximately 1.5 m (5 ft) to the west of the excavation footprint and the third (3102-B3) approximately 0.9 m (3 ft) to the east of the excavation footprint. Access to the eastern end of the excavation is limited due to aboveground piping and a fixed blower/ventilation support system. Boreholes 3102-B2 and 3102-B3 are located in an effort to determine the lateral extent of impacted soils.

Borehole 3102-B1 samples will start at a depth of 4.3 m (14 ft) since this is the maximum depth previously excavated. Samples collected from Boreholes 3102-B2 and 3102-B3 will start from a depth of 3 m (10 ft) which is approximately 0.6 m (2 ft) below the former tank bottom. Samples collected from each borehole will be analyzed for TPH as diesel and oil.

3.3.3.4 Release Site 25-3152-1

Four boreholes are proposed at this former UST site (Figure 7). One borehole (3152-B1) will be placed at the southern extent of the excavation footprint in an effort to delineate the vertical extent of impacted soils. Sidewall samples collected in this area during remedial excavation activities did not contain hydrocarbons. However, the lateral extent of the release will be verified by completing a second borehole (3152-B2) placed approximately 1.5 meters (5 ft) to the west of the excavation footprint, a third borehole (3152-B3) placed approximately 1.5 m (5 ft) to the south of the excavation footprint, and a fourth borehole (3152-B4) placed approximately 0.6 m (2 ft) east of the excavation footprint. The eastern borehole location is contingent on accessibility due to the close proximity to Building 25-3152.

Borehole 3152-B1 samples will start at a depth of 6 m (20 ft) bgs since this is the maximum depth previously excavated. Samples collected from Boreholes 3152-B2, 3152-B3, and 3152-B4 will start from a depth of 2.7 m (9 ft) which is approximately 0.6 m (2 ft) below the former tank bottom. Samples collected from each borehole will be analyzed for TPH as diesel. A water well located south of the tank excavation may require sampling if impacted soils are encountered at depths exceeding 30 m (100 ft) bgs.

Figure 7
UST Release Site 25-3152-1 - Proposed Borehole Locations

3.3.4 Site Evaluation

The following sites will be evaluated to determine present site conditions. Information will be collected from soil and air samples and evaluated as to whether or not site closure can be supported using the "A through K" evaluation, or if additional site characterization or remediation is warranted.

3.3.4.1 Release Site 12-B-3

Soil samples will be collected from this suspected release site to verify that the petroleum hydrocarbons identified are a result of other activities and not a tank release. Possible sources of the petroleum hydrocarbons identified are:

- Past dust suppression.
- Use of hydrocarbon impacted soil as backfill or site grading.
- Treated wood used in construction of the bunker facility.

It is not anticipated that additional excavation will be required at this former tank site. The excavation was not backfilled after the tank was removed due to limited equipment access, secured access to the site, and the necessity to complete additional evaluation of the site (Figure 8). Soil samples will be collected using decontaminated hand auger equipment and stainless steel scoops. Samples will be analyzed for TPH as oil. Samples will be collected in an effort to verify that the tank was not the source of petroleum hydrocarbons at the following locations:

- Center bottom of excavation (verify presence of hydrocarbons).
- Base of excavation (wood sample from construction framing of bunker).
- Approximately 1.5 m (5 ft) north of excavation at a depth of 0.3 m (1 ft) bgs.
- Approximately 1.5 m (5 ft) south of excavation at a depth of 0.3 m (1 ft) bgs.
- Approximately 1.5 m (5 ft) west of excavation at a depth of 0.3 m (1 ft) bgs in the area of the former roadway.
- Approximately 4.5 m (15 ft) north of excavation at a depth of 0.3 m (1 ft) bgs.

Figure 8
UST Release Site 12-B-3 - Site Layout

It is anticipated that samples collected in the excavation vicinity will identify background conditions for the site and support the assumption that the hydrocarbons identified are not due to a release from UST 12-B-3. The excavation will remain open until NDEP provides concurrence that the site can be closed and backfilled based upon the findings of the additional sampling.

3.3.4.2 Release Site 23-111-1

Air samples will be collected from both of the two passive venting wells installed at the tank ends (Figure 9). Samples will be withdrawn using a vacuum pump from approximately 1.5 m (5 ft) inside each well by using clean plastic tygon tubing. The sample will be drawn into three tedlar bags. Two bag samples will be transported to the analytical laboratory for TPH analysis. The third bag sample will be analyzed for volatile organics using a PID, O₂ using a CGA, and CO₂ using a Dräger Tube. It is anticipated that based on the findings of previous samples collected at the site, the small volume of impacted soils beneath the tank, depth to groundwater, and the results of the proposed air samples, there will be sufficient information to support site closure using the "A through K" evaluation.

Figure 9
UST Release Site 23-111-1 - Site Layout

4.0 WASTE MANAGEMENT

Waste generated from the closure and characterization activities will consist of hydrocarbon impacted soils and decontamination rinseate water. Soils will be managed by one of the following methods:

- Soil will be excavated and loaded directly into a truck(s) on-site for transport to the Area 6 Hydrocarbon Landfill. This is contingent on the availability of labor and equipment; or
- Soil will be stored at the respective site and placed on and covered with plastic sheeting at the end of each work day. The soil piles will be inspected weekly so that they remain covered and undisturbed. The plastic sheeting will be secured with sandbags. Soils will remain on-site pending disposal coordination. The soil pile will be tracked using the NTS Waste Tracking System. A Waste Tracking Number will be assigned to the pile and entered into the Tracking System creating a record which documents the date of generation along with the method and date of disposal. Once coordination with Waste Management Project personnel is completed, the soils will be transported to the Area 6 Hydrocarbon Landfill for disposal.

Decontamination rinseate water will be generated from sampling and drilling equipment. Decontamination of the sampling equipment will be completed using an Alconox wash and tap water rinse. Decontamination of the drilling augers/equipment will be completed using a high pressure steam cleaner. The rinseate will be managed for disposal by first placing it into 208 L (55 gal) drums. Since the sampling equipment and augers will be in contact with hydrocarbon impacted soils, the rinseate will be solidified as a best management practice. The rinseate will be solidified using the soil cuttings generated at the drilling sites or by adding bentonite. For solidification purposes, each drum will not be filled with rinseate beyond 114 L (30 gal). An NTS Waste Tracking Number will be assigned to each drum generated and locked pending disposal.

Landfill acceptance of the soil and solidified rinseate will be based on the past knowledge of hydrocarbon concentrations and/or laboratory analysis of the additional verification and characterization samples. A radiological "green tag," bill of lading, and weight ticket will accompany each load of soil to the Area 6 Hydrocarbon Landfill.

5.0 SCHEDULE

The closure field activities are anticipated to begin within 90 calendar days of the date that NDEP approves this Plan and are outlined as follows:

- Begin field closure activities within 90 calendar days of SAFER Work Plan approval.
- Complete excavation and sampling for clean closure activities (one week).
- Complete drilling for site characterization activities (three weeks).
- Complete air or soil sampling at sites requiring additional evaluation (three days).
- Analyze soil samples to verify clean closure and delineation of hydrocarbon plumes (60-day turnaround).
- Complete additional excavation or drilling for site characterization activities if sufficient data was not collected (two weeks).
- Backfill excavation sites upon confirmation of clean closure (4 days).
- Prepare a Closure Report for each CAU (Draft report within 90 days from receipt of final analytical data).

The schedule will require modification if conditions exist that are outside the assumptions on which the schedule was developed. Flexibility has been placed in the project schedule to account for minor difficulties (weather, equipment breakdowns, etc.). The DOE will keep the NDEP apprised of any condition that may impact the project schedule.

6.0 CLOSURE DOCUMENTATION

Upon completion of field activities a Closure Report will be prepared for each CAU and will include the following:

- Background
- Site Description
- Summary of Findings
- A through K Evaluation
- Waste Disposal Activities
- Recommendations and Conclusions
- Appendices - Analytical Data Checklist prepared for each analytical data packet, borehole logs, and field notes.

7.0 REFERENCES

CX, 1994, Categorical Exclusion No. CX NV-94-058 signed by Nick C. Aquilina, DOE Nevada Field Office Manager, August 25, 1994.

NAC 459.9973, 1995, Nevada Administrative Code, Chapter 459, Hazardous Materials, Storage Tanks.

US Fish and Wildlife Services, 1992, The Nevada Test Site Biological Opinion, Terms and Conditions.

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