DOE/NV--1074

Nevada
Environmental
Restoration
Project

Corrective Action Plan for Corrective Action Unit 322: Areas 1 and 3 Release Sites and Injection Wells, Nevada Test Site, Nevada

Controlled Copy No.:_____

Revision: 0

September 2005

Environmental Restoration
Division

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

DISCLAIMER

DOE/NV--1074

CORRECTIVE ACTION PLAN FOR CORRECTIVE ACTION UNIT 322: AREAS 1 AND 3 RELEASE SITES AND INJECTION WELLS, NEVADA TEST SITE, NEVADA

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

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CORRECTIVE ACTION PLAN
FOR CORRECTIVE ACTION UNIT 322:
AREAS 1 AND 3 RELEASE SITES
AND INJECTION WELLS,
NEVADA TEST SITE, NEVADA

Approved By: SIGNATURE APPROVED Date: 8/31/05
Sabine Curtis, Acting Project Manager
Industrial Sites Project

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Janet Appenzeller-Wing, Acting Division Director
Environmental Restoration Division

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ACRONYMS AND ABBREVIATIONS

Am	Americium
AST	Aboveground Storage Tank
bgs	below ground surface
BMP	best management practice
BN	Bechtel Nevada
BOP	Blowout Preventer
CADD	Corrective Action Decision Document
CAIP	Corrective Action Investigation Plan
CAP	Corrective Action Plan
CAS	Corrective Action Site(s)
CAU	Corrective Action Unit
COC	contaminant(s) of concern
CR	Closure Report
DOE	U.S. Department of Energy
DOE/NV	U.S. Department of Energy, Nevada Operations Office
DQI	data quality indicator
DQO	data quality objective
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
FFACO	Federal Facility Agreement and Consent Order
ft	foot (feet)
LLW	low-level waste
mg/kg	milligrams per kilogram
NAC	Nevada Administrative Code
NCRP	National Council on Radiation Protection and Measurement
NDEP	Nevada Division of Environmental Protection
NEPA	National Environmental Policy Act
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NTS	Nevada Test Site
OI	Organization Instruction

ACRONYMS AND ABBREVIATIONS (continued)

OP	Organization Procedure
PAL	preliminary action level
PCB	polychlorinated biphenyls
pCi/g	picoCuries per gram
PPE	personal protective equipment
Pu	Plutonium
QA	quality assurance
QC	quality control
REOP	Real Estate Operations Permit
RPD	relative percent difference
RWP	Radiological Work Permit
TPH	total petroleum hydrocarbons
TSD	treatment, storage, and disposal
UR	Use Restriction
WGS	Waste Generator Services
yd^3	cubic yards
%R	percent recovery

EXECUTIVE SUMMARY

Corrective Action Unit (CAU) 322: Areas 1 and 3 Release Sites and Injection Wells, is listed in Appendix III of the *Federal Facility Agreement and Consent Order of 1996*. CAU 322 consists of three Corrective Action Sites (CASs) located in Areas 1 and 3 of the Nevada Test Site (NTS), which is approximately 65 miles northwest of Las Vegas, Nevada. CAU 322 consists of the following three CASs:

- CAS 01-25-01, AST Release
- CAS 03-20-05, Injection Wells
- CAS 03-25-03, Mud Plant AST Diesel Release

From April 2004 through September 2004, CAU 322 site characterization activities were conducted, and are reported in Appendix A of the CAU 322 Corrective Action Decision Document (CADD) (U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office [NNSA/NSO], 2004). The recommended corrective action as stated in the approved CADD for all three of the CAU 322 CASs is Closure in Place with Administrative Controls.

The site characterization results and the recommended closure activities according to the approved CADD (NNSA/NSO, 2004) for each CAS include the following:

- **CAS 01-25-01** is located in the northern portion of the Area 1 Shaker Plant and consists of a bermed area that is the former location of a diesel fuel above ground storage tank (AST). The AST has been relocated to a concrete pad 40 feet (ft) southeast of the CAS. Total petroleum hydrocarbons (TPH) as diesel-range organics (DRO) were the only contaminants of concern (COC) detected above action levels at the site (NNSA/NSO, 2004). TPH-DRO contamination was reportedly due to releases/spills while filling the former AST. As stated in the approved CADD, because there is no current source for additional TPH-DRO contamination and because of its isolated location, access to the CAS can effectively be limited by implementing administrative controls. In addition, over time, natural bio-attenuation will reduce the remaining TPH-DRO contamination remaining on site.

  CAS 01-25-01 will be closed in place with administrative controls by erecting a fence around the perimeter of the existing berm, posting appropriate Use Restriction (UR) warning signs, and implementing a land UR.

- **CAS 03-20-05** is located at the Area 3 Blowout Preventer (BOP) Shop. The CAS consists of three holding tanks/cellars and associated transfer piping inside the BOP Shop building, and an injection well located east of the shop. The CADD reports TPH-DRO contaminated liquids are present in two of the holding tanks, and TPH-DRO, lead, cadmium, and radiological contaminants are present in the soil inside the injection well cellar/casing (NNSA/NSO, 2004). In addition, at one sample location immediately north of injection well, polychlorinated biphenyls (PCBs) and plutonium-239 are present in soil at concentrations above action levels.

EXECUTIVE SUMMARY (continued)

The holding tanks and transfer piping inside the BOP Shop will be closed in place with administrative controls. As a best management practice (BMP), the standing liquids in the tanks and cellars will be removed, solidified, and disposed of. Any void space in the tanks, cellars, and piping runs will be filled with grout to the level of the shop floor. UR warning signs will be posted, and a land UR implemented.

The injection well will be closed in place with administrative controls. As a BMP, a minimum of 2 ft of soil (volume less than 5 cubic yards) with the highest concentrations of COC will be removed from inside the well casing. The injection well and casing will be grouted to the top of the casing, UR warning signs posted, and a land UR implemented.

Finally, the small area of soil (2 by 2 by 2 ft) (volume approximately 0.3 cubic yards) contaminated with PCBs and plutonium-239 located north of the injection well will be removed and disposed. To confirm that no PCBs above action levels remain on site, soil verification samples will be collected and submitted to an offsite laboratory for PCBs and isotopic plutonium analysis.

- **CAS 03-25-03** consists of two areas (A and B) located at the Area 3 Mud Plant. Area A is in the western portion of the CAS and consists of a J-shaped earthen berm that once enclosed an AST. The AST is no longer present and no COC were found above action levels (NNSA/NSO, 2004). Area A will be closed by taking no further action.

  Area B is an irregularly shaped area located east of the Mud Plant and bounded by the Mud Plant, a Mud Disposal Crater, and the Mud Plant Pond. TPH-DRO was the only COC found above action levels (NNSA/NSO, 2004). The TPH release is suspected to be from fueling operations of generators that are no longer present on site. Area B will be closed in place with administrative controls. UR warning signs will be posted at the Area B corner locations, and a land UR implemented.

1.0 INTRODUCTION

Corrective Action Unit (CAU) 322: Areas 1 and 3 Release Sites and Injection Wells is listed in Appendix III of the *Federal Facility Agreement and Consent Order (FFACO)* which was agreed to by the State of Nevada, the U.S. Department of Energy (DOE), and the U.S. Department of Defense (FFACO, 1996). CAU 322 sites are located in Areas 1 and 3 of the Nevada Test Site (NTS), which is approximately 65 miles northwest of Las Vegas, Nevada. CAU 322 consists of the following three Corrective Action Sites (CASs) (Figure 1):

- CAS 01-25-01, AST Release
- CAS 03-20-05, Injection Wells
- CAS 03-25-03, Mud Plant AST Diesel Release

Details of the site history are provided in the CAU 322 Corrective Action Investigation Plan (CAIP) (U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office [NNSA/NSO], 2003), and the CAU 322 Corrective Action Decision Document (CADD) (NNSA/NSO, 2004).

1.1 PURPOSE

The purpose of this Corrective Action Plan (CAP) is to provide the detailed scope of work required to implement the recommended corrective actions as specified in the approved CADD (NNSA/NSO, 2004).

CAU 322 consists of three CASs located in Areas 1 and 3 of the NTS. The sites were characterized in 2004 according to the approved CAIP (NNSA/NSO, 2003). The results of the site characterization are reported in Appendix A of the CAU 322 CADD (NNSA/NSO, 2004).

CAS 01-25-01 is located in the northern portion of the Area 1 Shaker Plant facility and consists of an earthen berm enclosing the location of a former aboveground storage tank (AST). The CAS is the site of a potential release and/or spill from filling the diesel fuel AST. Total petroleum hydrocarbons (TPH) as diesel-range organics (DRO) are the only contaminants of concern (COC) present above action levels (NNSA/NSO, 2004).

CAS 03-25-03 is located at the Area 3 Mud Plant near the Area 3 Main Camp and consists of two areas (A and B). Area A is in the western portion of the CAS and consists of a J-shaped earthen berm that encloses the former location of an AST. No COCs are present above action levels (NNSA/NSO, 2004).

Area B is an irregularly shaped area located east of the Mud Plant and bounded by the Mud Plant, a mud disposal crater, and the Mud Plant Pond. TPH-DRO is the only COC present at concentrations above action levels (NNSA/NSO, 2004).

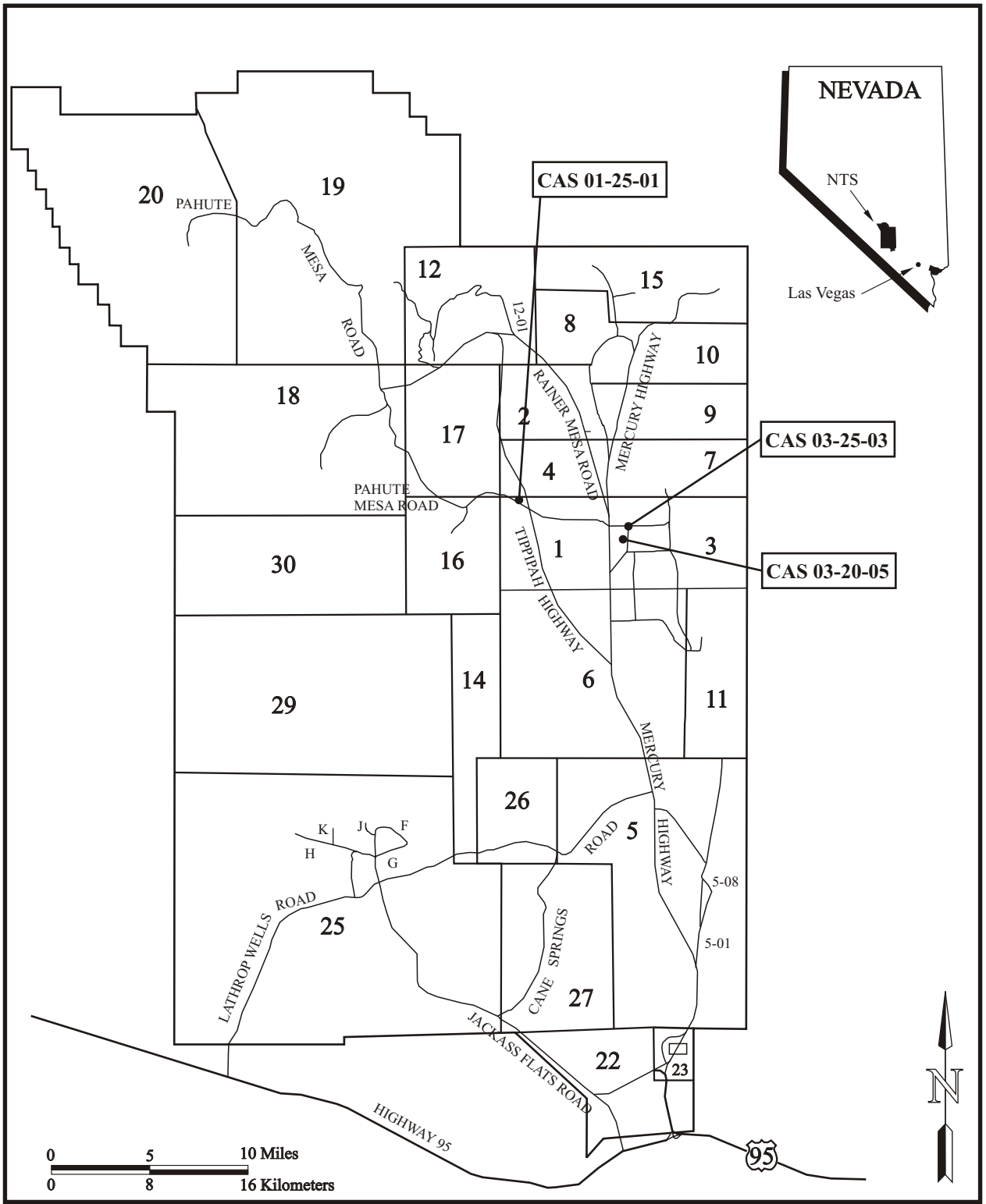


FIGURE 1
CAU 322 SITE LOCATION MAP

CAS 03-20-05 is located at the Area 3 Blowout Preventer (BOP) Shop. The CAS consists of three holding tanks/cellars and associated transfer piping within the BOP Shop, and an injection well located east of the shop. TPH-DRO concentrations above action levels are present in standing liquids in two of the holding tanks. TPH-DRO, lead, cadmium, Plutonium (Pu)-239, and Americium (Am)-241 contaminants are present above action levels in the top 10 feet (ft) of soil within the injection well cellar casing (NNSA/NSO, 2004). In addition, at a location immediately north of the injection well, a small area of soil (2 by 2 by 2 ft) has polychlorinated biphenyls (PCBs) and Pu-239 concentrations above action levels.

1.2 SCOPE

The CADD identifies *Closure in Place with Administrative Controls* as the preferred corrective action for the three CAU 322 CASs (NNSA/NSO, 2004). Briefly, the scope of work to implement this corrective action includes the following:

CAS 01-25-01 will be closed in place with administrative controls by erecting a fence around the perimeter of the existing berm, posting appropriate Use Restriction (UR) warning signs, and implementing a land UR.

CAS 03-25-03 will be closed with administrative controls by taking no further action at Area A and posting UR warning signs and implementing a land UR at Area B.

CAS 03-20-05 will be closed in place with administrative controls. As a best management practice (BMP), any standing liquids in the tanks and cellars inside the BOP Shop will be removed and solidified; any void space in the tanks, cellars, and transfer piping will be grouted to the shop floor. A minimum of 2 ft of soil with the highest concentrations of COC will be removed from inside the well casing, and the injection well and casing grouted to the top of the casing. UR warning signs will be posted, and land URs implemented for both the tanks and the injection well. A small area contaminated with PCBs and Pu-239 will be removed, as well.

1.3 CORRECTIVE ACTION PLAN CONTENTS

This CAP is comprised of the following sections and appendices:

Section 1.0 Introduction
Section 2.0 Detailed Statement of Work
Section 3.0 Schedule
Section 4.0 Post-Closure Plan
Section 5.0 References
Appendix A.1 Engineering Specifications and Drawings
Appendix A.2 Sampling and Analysis Plan
Appendix A.3 Project Organization
Library Distribution List

Appendix A.1 is included in this CAP as required by the approved FFACO CAP outline, but contains no material because engineering specification or drawings are not necessary for site

closure. Similarly, Appendix A.2 is included as required but contains no material, because Sections 2.1.3 and 2.4 provide sufficient detail on sample collection.

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

- Federal Facility Agreement and Consent Order (FFACO, 1996)
- Corrective Action Investigation Plan for Corrective Action Unit 322 (NNSA/NSO, 2003)
- Corrective Action Decision Document for Corrective Action Unit 322 (NNSA/NSO, 2004)

2.0 DETAILED STATEMENT OF WORK

2.1 CORRECTIVE ACTIONS

Three corrective action alternatives for CAU 322 were identified in the CADD (NNSA/NSO, 2004):

Alternative 1 – No Further Action
Alternative 2 – Clean Closure
Alternative 3 – Closure in Place with Administrative Controls

Of the three alternatives listed above, the approved corrective action is *Closure in Place with Administrative Controls (Alternative 3)* for the CASs listed below (NNSA/NSO, 2004).

2.1.1 CAS 01-25-01

CAS 01-25-01, AST Release, is located in the northern portion of the Area 1 Shaker Plant and consists of an earth and gravel berm that enclosed a former 10,000-gallon AST (Figure 2). The current AST is located 40 ft southeast of the CAS. As reported in the CAU 322 CADD, the area within the berm is the location of repeated diesel fuel releases due to AST refilling operations.

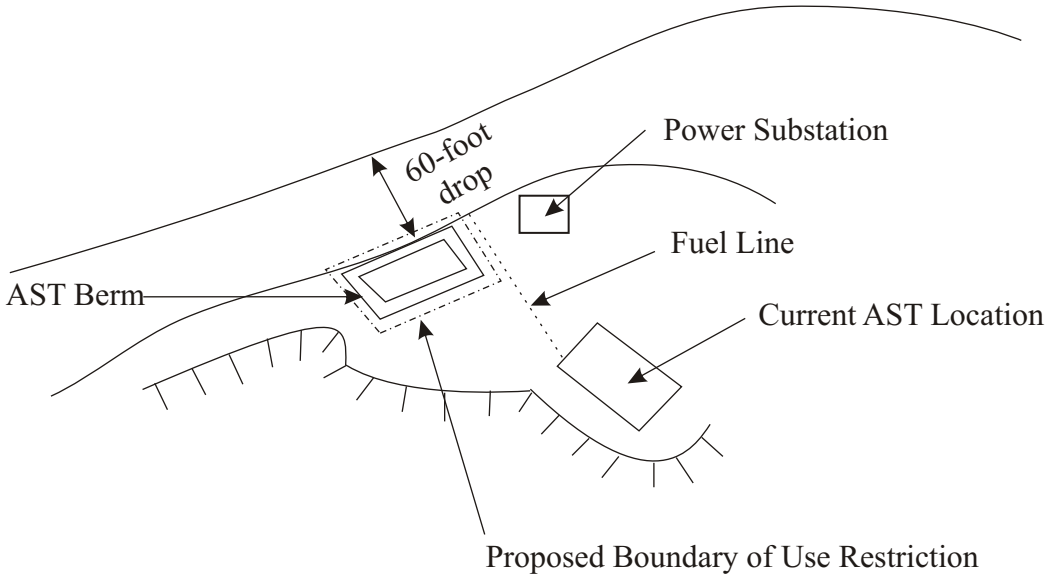
Site characterization found TPH-DRO as the only COC in the soil at the CAS. TPH-DRO contamination within the berm is present at concentrations exceeding the Nevada State Action Level of 100 milligrams per kilogram (mg/kg) (Nevada Administrative Code [NAC], 2003) and extends to an extrapolated depth of 12 ft below ground surface (bgs). Results for step-out samples confirmed that TPH contamination has not spread laterally beyond the berm.

Because there is no current source of TPH-DRO contamination, natural bio-attenuation will reduce the TPH-DRO concentration over time. Due to the isolated location and limited access to the CAS, the site will be closed in place with administrative controls. A land UR will be implemented for the area within the berm. The outside perimeter of the berm will be fenced and UR warning signs posted according to the FFACO UR posting guidance (FFACO, 2003).

2.1.2 CAS 03-25-03

CAS 03-25-03 consists of two areas (A and B) located at the Area 3 Mud Plant. Area A is located in the western portion of the CAS and consists of a J-shaped earthen berm that once enclosed a diesel fuel AST (Figure 3). Area B is an irregular area located east of the Mud Plant, and is bounded by the Mud Plant, the Mud Disposal Crater, and the Mud Plant Pond (Figure 4).

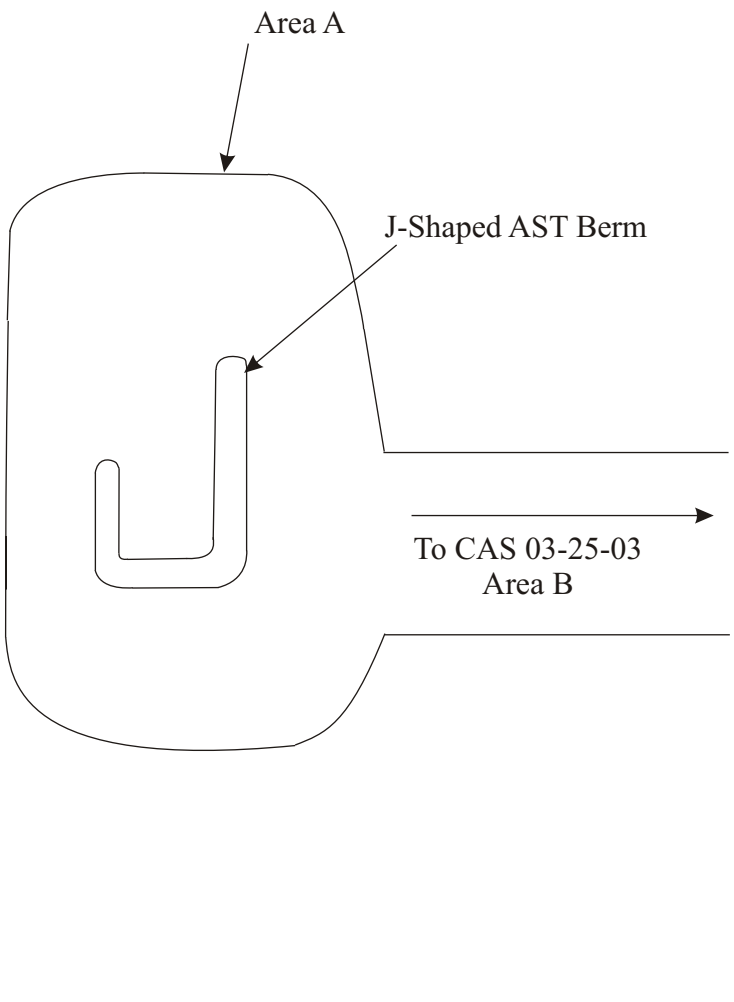
No COC above the preliminary action levels (PALs) were found at Area A; therefore no further action will be taken at this site. TPH-DRO contamination above the PAL was found at several locations and various depths at Area B. The TPH-DRO contamination is suspected to be the result of random spills, leaks, and overflows associated with mobile equipment, mobile vehicles, or fixed equipment that required diesel fuel for power generation. The vertical extent of



Source: NNSA/NSO, 2004

Not to Scale

FIGURE 2
CAS 01-25-01, AST RELEASE, AREA 1 BATCH PLANT



Source: NNSA/NSO, 2004

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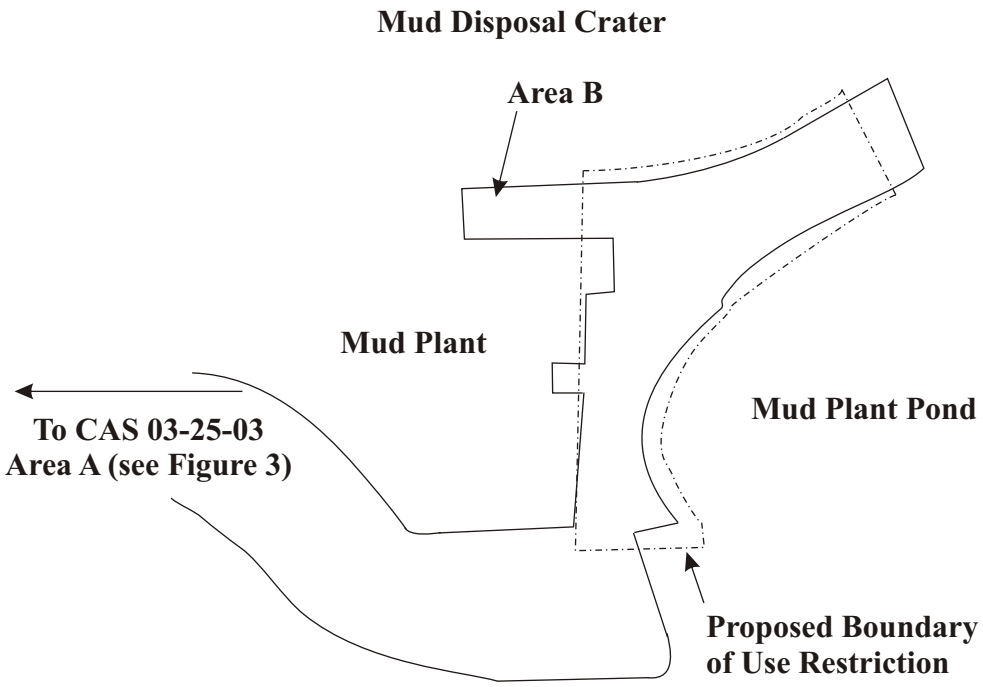
FIGURE 3
CAS 03-25-03, MUD PLANT AST
DIESEL RELEASE, AREA A, AREA 3 MUD PLANT



Source: NNSA/NSO, 2004

Not to Scale

FIGURE 4
CAS 03-25-03, MUD PLANT AST
DIESEL RELEASE, AREA B, AREA 3 MUD PLANT

contamination was variable; however, the deepest contamination identified was confined to 10 ft bgs. Currently there is no identifiable source for further TPH contamination at Area B. Area B will be closed in place with administrative controls. A fence will be erected along the perimeter of Area B, appropriate UR warning signs posted per the FFACO UR guidance (FFACO, 2003), and a land UR implemented.

2.1.3 CAS 03-20-05

CAS 03-20-05 consists of three holding/cleaning tanks within the BOP Shop, the injection well outside the BOP Shop, and the transfer piping running from the tanks to the injection well (Figure 5). The depth of the holding/cleaning tanks within the BOP Shop is assumed to be 30 to 50 ft bgs. The depth of the injection well sump is estimated to be between 60 and 100 ft bgs (NNSA/NSO, 2004).

Injection Well Outside BOP Shop: Site characterization found TPH-DRO, lead, cadmium, Pu-239, and Am-241 at concentrations exceeding the action levels in the upper 10 ft of soil present within injection well casing (NNSA/NSO, 2004). The highest concentrations of COC are within the first 2 ft of soil. Due to configuration of the casing, it is not feasible to remove 10 ft of contaminated soil from within the casing. As a BMP, a minimum of 2 ft of soil (less than 5 cubic yards [yd^3]) will be removed, using hand tools and a backhoe with a trenching bucket. The contaminated soil will be placed in approved containers, and, if necessary, a waste disposal profile developed by Bechtel Nevada (BN) Waste Generator Services (WGS). The waste will be transported to an approved waste disposal facility. The voids in the injection well and casing will be filled with grout to the top of the casing. UR warning signs will be posted per the FFACO UR guidance (FFACO, 2003), and a land UR implemented.

Tanks and Cellars Inside BOP Shop: Holding Tanks 1 and 3 inside the BOP Shop contain liquids with TPH concentrations above the 100 mg/kg PAL (NAC, 2003). All standing liquids (water and oil) will be removed from the tanks and cellars using a submersible pump, pumped into a lined basin or appropriate container, and solidified. The pump will be positioned approximately 0.5 ft above the bottom of the standing liquid to prevent clogging. All liquids will be solidified using NTS native fill or with an appropriate solidification agent. The waste will be packaged in appropriate containers and managed appropriately. If necessary, the waste will be sampled and characterized for disposal purposes. Any residual liquids remaining in the tanks and cellars will be solidified in place with grout or equivalent. Any remaining voids in the tanks and cellars will be filled with grout to the shop floor grade. Additionally, the transfer piping runs from the tanks within the shop floor will be grouted to the level of the shop floor. The piping will be disconnected or cut at floor level prior to grouting the pipe runs. UR warning signs will be posted per the FFACO UR guidance (FFACO, 2003) at each of the three tanks, and a land UR implemented.

Soil Area North of Injection Well: Characterization results for soil in the 0- to 0.5-ft depth at location C08 (see Figure 5) showed Pu-239 at 40.4 picoCuries per gram (pCi/g), exceeding the PAL of 12.7 pCi/g (Nevada Division of Environmental Protection [NDEP], 2004 and National Council on Radiation Protection and Measurements [NCRP], 1999), and Aroclor-1254 at 1.1 mg/kg (U.S. Environmental Protection Agency [EPA], 2002a). As a BMP, a small amount

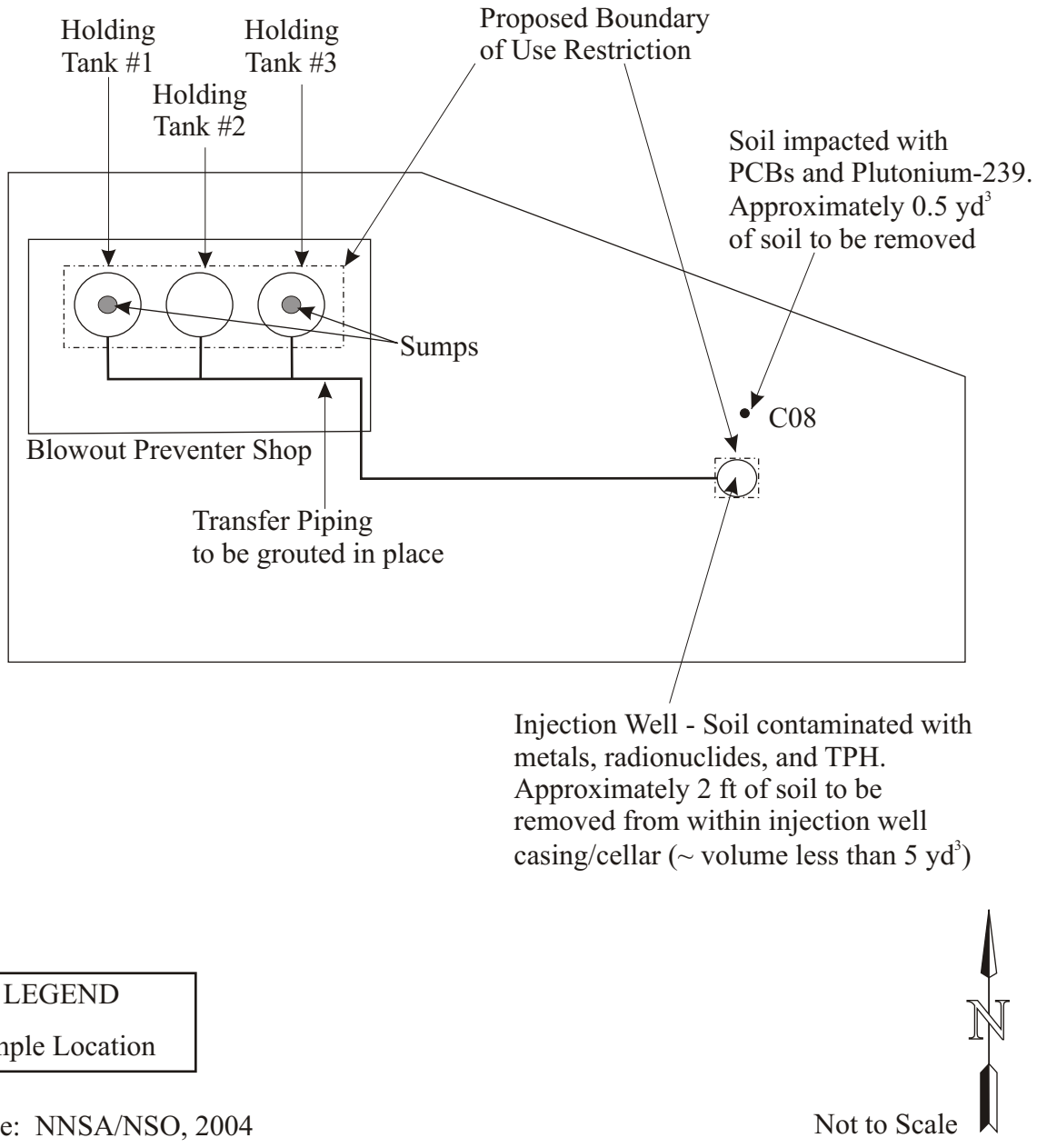


FIGURE 5
CAS 03-20-05, INJECTION WELLS, AREA 3 BLOWOUT PREVENTER SHOP

of radiologically and PCB-impacted soil will be removed from an area measuring approximately 2 by 2 by 2 ft (volume approximately 0.3 yd^3). During soil removal, a Radiological Control Technician will survey the soil, equipment, and personnel to determine radioactivity levels. All radiological surveys will be conducted in accordance with the BN Company Directives and Radiological Operations Organization Instructions (OI). After the estimated volume of soil has been removed, a minimum of two soil verification samples will be collected from the excavated area. Samples will be analyzed for PCBs and isotopic plutonium to verify that the contaminated soil has been removed below the action levels. NTS native fill will be used to backfill the excavation. Contaminated soil will be placed in appropriate containers. A waste disposal profile will be developed by BN WGS and, based on results, disposed of appropriately.

Administrative controls will limit access to the CAS. As a BMP, appropriate signs will be posted around injection well outside BOP Shop and sumps inside BOP Shop to control access to the CAS.

2.2 CONSTRUCTION QUALITY ASSURANCE / QUALITY CONTROL

Construction activities are limited to excavation, backfilling, removal of liquids from the sumps inside the BOP Shop, and solidification of removed liquids. No engineered structures will be constructed as part of site closure. Therefore, a construction quality assurance/quality control (QA/QC) plan will not be required.

2.2.1 Construction Field Sample Collection Activities

Construction field samples are not necessary for the closure of the CAS 03-20-05 listed in this CAP, although samples will be collected for the purpose of waste stream characterization and to verify that the approved closure alternatives have been met. Field sample collection activities are addressed in Sections 2.1.3 and 2.4.

2.2.2 Construction Laboratory/Analytical Data Quality Indicators

CAU 322 closure activities are limited to debris removal, site fencing and posting, non-structural excavation and backfilling, and draining of oil and liquid from holding tank sumps and the holding tank. Therefore, a construction QA/QC plan is not required and Construction data quality indicators (DQIs) are not applicable. To ensure that backfill material remains consistent, all fill will be taken from an approved NTS borrow source.

2.3 WASTE MANAGEMENT

All waste will be managed and disposed of in accordance with applicable state and federal regulations, DOE Orders, U.S. Department of Transportation and Contractor's waste management procedures. CAU 322 closure activities are expected to generate sanitary waste/construction debris, hydrocarbon waste, low-level waste (LLW), PCBs/hazardous waste, and mixed waste at CAS 03-20-05. Waste generated during closure activities will be properly managed and shipped to onsite or offsite disposal facilities. Confirmation of waste disposal or transfer to BN WGS for management and disposal shall be included in the CAU 322 Closure Report (CR).

2.3.1 Waste Minimization

All work activities that generate waste will follow the BN Waste Minimization and Pollution Prevention Program. Special care will be given to properly characterize and segregate the waste streams to avoid the generation of additional waste.

2.3.2 Waste Types

Sanitary Waste
Sanitary waste (e.g., non-impacted personal protective equipment [PPE] and general trash) and construction debris (e.g., wood, concrete, block, metal, plastic) removed from sites will be screened for free release (U.S. Department of Energy, Nevada Operations Office [DOE/NV], 2000) and disposal. It will be disposed of in an onsite landfill.

Hydrocarbon Waste
All hydrocarbon waste will be analyzed for gamma-emitting radionuclides by either the In-Situ Object Counting System or laboratory analysis, in order to satisfy the landfill disposal restrictions. Upon receipt of the analytical results, the waste will be properly characterized and disposed. Any waste meeting the land disposal restrictions as specified in the landfill permit will be disposed in the Area 6 Hydrocarbon Landfill. Hydrocarbon waste not meeting the landfill disposal restrictions will be stored in a waste accumulation area until a disposal pathway is identified.

Low-Level Waste
Closure activities will include removal of contaminated soil impacted with PCBs and Pu-239 at location C08. The characterization results from the CADD reported Pu-239 exceeding the PAL (NDEP, 2004, and NCRP, 1999). All LLW will be characterized by laboratory analysis, and a profile for disposal will be prepared. Analyses of the waste will include PCBs and isotopic plutonium. All LLW shall be managed and disposed in accordance with BN Organization Procedure (OP) OP-2151.304, "Radioactive Waste Tracking, Handling, and Management at the NTS," (BN, 2004a), and all applicable state and federal regulations. All LLW will be packaged in the presence of a Waste Certification Official and WGS personnel according to OP-2151.304 (BN, 2004a). All LLW will be stored in a Radioactive Materials Area until a waste disposal profile is prepared and approved. The LLW will then be disposed appropriately.

PCBs/Hazardous Waste
It is anticipated that a limited quantity of hazardous waste will be generated during soil removal activities from within the injection well casing/cellar for CAS 03-20-05. The waste will be characterized by WGS, and a waste profile will be prepared. The waste will be managed and disposed according to all applicable BN procedures and state and federal regulations. Upon generation, the waste shall be containerized and stored in a satellite accumulation area or a 90-Day Hazardous Waste Accumulation Area, depending on the amount of waste generated. After an approved waste profile is generated, the waste will be disposed of at an appropriate permitted treatment, storage, and disposal (TSD) facility.

Mixed Waste
Mixed waste may be generated during closure activities and will be managed and disposed of in accordance with all applicable BN and NNSA/NSO procedures and regulations.

Personal Protective Equipment
All PPE that becomes contaminated during closure activities shall be disposed of with the appropriate waste stream. All wastes generated during closure activities will be properly disposed of in onsite landfills or at a permitted offsite TSD facility.

Decontamination Waste
Equipment that becomes contaminated during closure activities will be decontaminated onsite. Dry decontamination will be the preferred method. For larger pieces of equipment that cannot be effectively decontaminated using dry decontamination techniques, wet decontamination techniques shall be used over a drum or waste pile. For larger equipment, a decontamination pad consisting of a lined bermed area will be used. The equipment will be driven onto the pad and decontaminated using pressurized water. Smaller equipment and/or tools may be decontaminated with soap and water. All decontamination rinsate will be managed appropriately in accordance with all applicable regulations, and once characterized, properly disposed.

2.4 CONFIRMATION OF CORRECTIVE ACTIONS

Accurate and defensible analytical data will be collected to characterize waste and to verify that the closure objectives outlined in this CAP have been met.

2.4.1 Sample Collection Methods

All samples will be collected by qualified BN Environmental Restoration personnel. Surface soil samples will be collected using scoop and trowel or hand auger. Subsurface soil samples will be collected using drilling methods (e.g., hollow-stem auger or other applicable methods). Samples collected for required analysis are discussed in Section 2.1.3. All sampling activities will follow BN Organization Instruction (OI) -2152.108, "Soil Sampling" (BN, 2000a).

Sample traceability is established and maintained by completing a BN chain of custody form, as detailed in BN "Sample Chain of Custody," OI-2152.100.(BN, 2002). Sample collection date, time, and other pertinent information will be logged on a "Service Request and Chain of Custody Record," Form BN-0732 (BN, 2002), and placed in a bound project field notebook.

All samples will be collected in clean containers, labeled appropriately, sealed with a tamper-proof seal, bagged, placed on ice in a cooler, and transported to the BN Environmental Technical Services group under a BN sample chain of custody form (BN, 2000b).
BN Environmental Technical Services group will be responsible for sample management and shipment of the samples to an approved offsite laboratory for analysis. Samples will be analyzed by EPA-approved analytical methods at EPA-approved laboratories (EPA, 1996). Sample analysis will include laboratory analysis of QA/QC samples and will follow stringent QA/QC procedures (EPA, 1996). Sample analysis for isotopic plutonium will be performed in accordance with *Environmental Measurements Laboratory Procedures Manual* (DOE, 1997).

All verification samples will be labeled with a unique sample identification number using the CAS number followed by the sample number (e.g., 032005-V1). Waste characterization samples will be identified by the CAS number followed by the sample number (e.g., 032005-WC1).

One set of QA/QC samples will be collected for every 20 environmental samples. QA/QC samples will include blind duplicates and matrix spike/matrix spike duplicates. The blind duplicate will be labeled with a unique sample number.

2.4.2 Laboratory/Analytical Data Quality Objectives

Data quality objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to support closure of a site. The DQOs for CAU 322 site investigations were defined in the CAIP (NNSA/NSO, 2003) using the seven-step DQO process developed by EPA (EPA, 2000). Two conceptual site models for the CAU 322 CASs were defined in the CAIP (NNSA/NSO, 2003), and these models were reconciled with the results of the site investigation in the CADD (NNSA/NSO, 2004). (See Appendix A of the CADD.)

Sample analytical results will be generated during closure activities for the CAS. The CAS that will be clean closed will require the collection and analysis of verification soil samples. All laboratory data generated during closure activities will be reviewed by project personnel, to ensure the data are usable and complete according to the CAU 322 DQOs. In addition, as specified in the *Industrial Sites Quality Assurance Project Plan* (NNSA/NV, 2002), a minimum of 100 percent of the final data packages for verification samples will be evaluated at the Tier I and Tier II levels using the applicable BN OIs. These include OI-2151.303 (BN, 2004b) for validating radiological data, and OI-2154.459 (BN, 2003) for validating inorganic chemical data. OI-2154.459 is based on EPA Functional Guidelines (EPA, 2002b). Any data determined not to be valid will be identified in the CR. More details on the proposed number and location of the verification samples are given in Section 2.1.3 of this CAP.

DQIs are qualitative and quantitative statements that specify the data requirements of a project. The DQIs include precision, accuracy completeness, representativeness, comparability, and sensitivity. These DQIs are discussed below.

Precision

Precision is a measure of agreement among a replicate set of measurement of the same property under similar conditions. This agreement is expressed as the relative percent difference (RPD) between duplicate measurements (EPA, 1996). Precision applies to parameters sampled and analyzed in duplicate.

One duplicate sample will be collected per set of 20 or fewer verification samples. All duplicate samples will be collected from the same medium and analyzed for the same set of analytes as verification samples. The precision of the analytical results will be assessed by calculating the RPD for a verification sample and its duplicate sample results. An RPD of less than or equal to 30 percent indicates acceptable precision (NNSA/NV, 2002).

Accuracy/Bias

Accuracy is a measure of the closeness of an individual measurement or the average of a number of measurements to the true value. Accuracy includes a combination of random error (precision) and systematic error (bias) components that result from sampling and analytical operations. This closeness is represented as percent recovery (%R) (EPA, 1996). Accuracy will be assessed by

examining the %R of laboratory control and spiked samples. A %R within the range of 70-130 percent indicates satisfactory analytical accuracy (NNSA/NV, 2002).

Representativeness

Representativeness is a qualitative evaluation of measurement system performance. It is 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, 1996). Representativeness will be attained by ensuring that the sample locations, analytical parameters, analytical methods, sampling protocols, and sample handling all meet the project-specific objectives.

Comparability

Comparability is a qualitative measure that expresses the confidence that one data set can be compared to another. It will be achieved by using standardized field sampling procedures and same analytical methods for sample analysis. Sample results will be reported in standard units to allow for comparison of the data.

Completeness

Completeness is a quantitative measure of data quality expressed as the percentage of valid data obtained that satisfies the project-specific requirements. Because a limited number of samples will be collected for both waste characterization and verification of closure, 100 percent of the data collected needs to be of acceptable quality to maintain acceptable QA/QC standards.

Sensitivity

Sensitivity is the capability of a method or instrument to discriminate between measurement responses representing different levels of a variable of interest. This indicator is determined from the value of the standard deviation at the concentration level of interest. It represents the minimum difference of concentration that can be distinguished between two samples with a high degree of confidence. Sensitivity must be sufficient to detect contaminants at or below decision levels. Sensitivity will be achieved by analyzing all samples using appropriate EPA-approved analytical laboratories, methods, and instruments.

2.5 PERMITS

Prior to beginning field closure activities, planning documents and permits will be prepared. These documents will include a Field Management Plan, National Environmental Policy Act (NEPA) Checklist, NNSA/NSO Real Estate/Operations Permit (REOP), Radiological Work Permits (RWP), excavation permits, and blind penetration permits.

National Environmental Policy Act Checklist

A NEPA Checklist will be completed prior to all excavation activities at the site. Excavation activities will follow all applicable federal, state, and local laws, regulations, and permits regarding protection of the environment.

NNSA/NSO Real Estate/Operations Permit

A REOP will be obtained prior to beginning closure activities. The permit will establish the NNSA/NSO as the prime authority possessing control of the site.

Radiological Work Permit

RWPs will be required for work at any radiologically-impacted site when radiological conditions require, as determined by BN Health Physics. RWPs will inform workers of the specific PPE necessary to protect them while performing their tasks and identify site-specific controls. The workers will be required to sign the permits and acknowledge their understanding of the requirements before entry into any contamination area, if present. The RWPs will be maintained by Radiological Control Technician at the entrance to the contamination area. All site workers will be required to be Radiation Worker II trained to perform any work within a radiologically controlled area.

Excavation Permits and Blind Penetration Permits

An excavation permit will be obtained prior to beginning any excavation activities. These permits require that a utility clearance will also be performed. A copy of the permit will be filed on the site throughout the duration of the project.

3.0 SCHEDULE

All preparation and field activities are scheduled for completion in Fiscal Year 2006. The FFACO deadline for the CR has not yet been determined. Sufficient flexibility has been incorporated into the field schedule to allow for minor difficulties (e.g., weather, equipment failure). The NNSA/NSO shall notify the NDEP of any condition or event that may impact the project schedule.

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4.0 POST-CLOSURE PLAN

Corrective Action Alternative 3 - Closure in Place with Administrative Controls requires post-closure site inspections. The Administrative Controls will include implementing URs at CAS 01-25-01, CAS 03-25-03, and CAS 03-20-05 to prohibit any unauthorized intrusive activities.

4.1 INSPECTIONS

Annual inspections will be completed at CAS 01-25-01, CAS 03-25-03, and CAS 03-20-05. Inspections consist of annual (yearly) visual inspections of the posting(s) to verify that the posting(s) are in place, readable, and URs are maintained. Any identified maintenance and repair requirements will be reported to NDEP and maintenance scheduled within 90 working-days of discovery.

Results of all inspections in a given year will be included in the annual NTS Industrial Sites Post-Closure letter report. The annual letter report will include the following information:

- Discussion of observations and inspections
- Copies of the site inspection checklists
- Any maintenance records

A copy of each annual letter report will be submitted to the NDEP.

4.2 MONITORING

Because no sampling or collection of data will be performed after closure of the site, no post-closure monitoring is required at any CAS in CAU 322. However, post-closure inspections will be performed for CASs identified in Section 4.1, "Inspections."

4.3 MAINTENANCE AND REPAIR

If any maintenance and repair requirements are identified during the annual inspection of CAS 01-25-01, CAS 03-25-03, and CAS 03-20-05, the NDEP will be notified, funding will be requested, and the repairs scheduled. Any repair or maintenance performed at this site shall be documented in writing at the time of the repair and included in the annual letter report.

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5.0 REFERENCES

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DOE, see U.S. Department of Energy

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NAC, see Nevada Administrative Code.

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Nevada Division of Environmental Protection. 2004. Review of Industrial Sites Project Document "Calculating Industrial Sites Project Remediation Goals for Radionuclides in Soil Using the Residual Radiation (RESRAD) Computer Code," letter from Tim Murphy (Chief for the Bureau of Federal Facilities) to Robert Bangerter (Acting Director Environmental Restoration Division) dated November 19, 2004. Las Vegas, NV.

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APPENDIX A.1

ENGINEERING SPECIFICATIONS AND DRAWINGS

NOTE: Engineering specifications and drawings are not required for closure of CAU 322. This Appendix is included here as required by the approved Federal Facility Agreement and Consent Order outline for a Corrective Action Plan.

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APPENDIX A.2

SAMPLING AND ANALYSIS PLAN

NOTE: Sufficient details on the type, number, and location of verification samples to be collected to verify site closure activities has been provided in Sections 2.1.3, "CAS 03-20-05, Injection Wells," and 2.4, "Confirmation of Corrective Actions." This Appendix is included here as required by the approved Federal Facility Agreement and Consent Order outline for a Corrective Action Plan.

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APPENDIX A.3
PROJECT ORGANIZATION

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PROJECT ORGANIZATION

The U.S. Department of Energy National Nuclear Security Administration Nevada Site Office (NNSA/NSO) point of contact for this project is as follows:

NNSA/NSO Acting Project Manager : Sabine Curtis
Telephone Number: (702) 295-0542

NNSA/NSO Task Manager: Sabine Curtis
Telephone Number: (702) 295-0542

The identification of the project Health and Safety Officer and the Quality Assurance Officer can be found in the appropriate plan. However, personnel are subject to change and it is suggested that the appropriate U.S. Department of Energy Project Manager be contacted for further information. The Task Manager will be identified in the Federal Facility Agreement and Consent Order Monthly Activity Report prior to the start of field activities.

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