Nevada
Environmental
Restoration
Project

DOE/NV--1134

National Nuclear Security Administration

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

Controlled Copy No.:_____

Revision: 0

June 2006

Environmental Restoration
Division

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

DISCLAIMER

DOE/NV--1134

CLOSURE REPORT 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

Controlled Copy No.____

Revision: 0

June 2006

THIS PAGE INTENTIONALLY LEFT BLANK

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

Approved By: ________________________ Date: 6-20-06
Kevin J. Cabble
Federal Industrial Sites Sub-project Director
Environmental Restoration Project

Approved By: ________________________ Date: 6/21/06
Janet L. Appenzeller-Wing, Director
Environmental Restoration Division

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

ACRONYMS AND ABBREVIATIONS

ACM	Asbestos Containing Material
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
CAU	Corrective Action Unit
cm	centimeters
COC	contaminant(s) of concern
CR	Closure Report
DOE	U.S. Department of Energy
DOE/NV	U.S. Department of Energy, Nevada Operations Office
DQO	Data Quality Objective
DRO	Diesel Range Organics
EPA	U.S. Environmental Protection Agency
FFACO	Federal Facility Agreement and Consent Order
ft	foot/feet
ft^2	square foot/feet
gal	gallon
GPS	Global Positioning System
in.	inch
Iso-Pu	isotopic Plutonium
kg	kilogram
lb	pound(s)

ACRONYMS AND ABBREVIATIONS (continued)

lb/ft^2	pound(s) per square foot
m	meter(s)
m^2	square meter(s)
m^3	cubic meter(s)
mg/kg	milligram(s) per kilogram
NA	not analyzed
NAC	Nevada Administrative Code
ND	not detectable at laboratory minimum reporting limit
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
NV	Nevada
PAL	Preliminary Action Level
PCB	polychlorinated biphenyls
pCi/g	picoCuries per gram
Pu	Plutonium
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
TPH	Total Petroleum Hydrocarbons
UR	use restriction(s)/use-restricted
yd^3	cubic yard(s)

EXECUTIVE SUMMARY

Corrective Action Unit (CAU) 322 is located in Areas 1 and 3 of the Nevada Test Site (NTS). The CAU is listed in the *Federal Facility Agreement and Consent Order* (FFACO, 1996) as “CAU 322 – Areas 1 and 3 Release Sites and Injection Wells,” and is comprised of three Corrective Action Sites (CASs):

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

The Nevada Division of Environmental Protection (NDEP)-approved corrective action alternative for all CASs in CAU 322 is closure in place with administrative controls. Closure activities included:

- Installing fencing at CASs 01-25-01 and 03-25-03, as needed, for site control.
- Implementing Use Restrictions (UR) at each CAS as delineated in the Corrective Action Decision Document.
- Posting UR warning signs around UR areas.
- Removing, solidifying, and disposing of standing liquids in the CAS 03-20-05 Blowout Preventer Shop holding tanks as a best management practice (BMP).
- Removing and disposing of the first 2 feet of soil within the exterior injection well casing and a small area of soil just north of the injection well at CAS 03-20-05 as a BMP.

CAU 322 was closed in accordance with the NDEP-approved CAU 322 Corrective Action Plan (CAP) (U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office [NNSA/NSO], 2005). The closure activities specified in the CAP were based on the recommendations presented in the CAU 322 Corrective Action Decision Document (NNSA/NSO, 2004). This Closure Report documents the closure activities.

The proposed post-closure monitoring plan consists of annual site inspections for the first 5 years, followed by inspections every 5 years for a total of 30 years. The inspections are to determine the condition of posted signs and fencing, if applicable, and whether URs have been maintained. Any repairs will be documented in writing at the time of repair. Results of all inspections and repairs for a given year will be included in the combined NTS post-closure letter report submitted annually to NDEP.

THIS PAGE INTENTIONALLY LEFT BLANK

1.0 INTRODUCTION

Corrective Action Unit (CAU) 322 is listed in Appendix III of the *Federal Facility Agreement and Consent Order* (FFACO, 1996), an agreement between the U.S. Department of Energy (DOE), the U.S. Department of Defense, and the State of Nevada, as "CAU 322 – Areas 1 and 3 Release Sites and Injection Wells." CAU 322 consists of three Corrective Action Sites (CASs) located in Areas 1 and 3 of the Nevada Test Site (NTS), which is located approximately 65 miles northwest of Las Vegas, Nevada (NV). Figure 1 depicts the approximate CAS locations within NTS. Specifically, CAU 322 includes:

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

The three sites reportedly included aboveground storage tank (AST) releases/spills, an injection well with associated holding tanks and transfer piping, and an area of contaminant-impacted soil. None of the CASs are directly adjacent to active facilities. Historical details of the CASs 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).

The corrective actions described in the corrective action plan (CAP), (NNSA/NSO, 2005) were implemented from February 2006 through May 2006. This closure report (CR) has been prepared for CAU 322 in accordance with the FFACO and the Nevada Division of Environmental Protection (NDEP)-approved CAP.

1.1 PURPOSE

The purpose of this CR is to document that the closure of CAU 322 complied with the NDEP-approved CAP closure requirements (NNSA/NSO, 2005). The closure activities specified in the CAP were based on the approved corrective action alternatives presented in the CAU 322 CADD (NNSA/NSO, 2004).

1.2 SCOPE

The approved closure strategy for CAU 322 was specified in the CAU 322 CADD (NNSA/NSO, 2004). The approved alternative for all three CASs was Closure in Place with Administrative Controls. The strategy for implementing this closure was presented in the CAU 322 CAP (NNSA/NSO, 2005).

Closure activities included:

- Removal, solidification, and disposal of standing liquids from the holding tanks and transfer piping at CAS 03-20-05 as a best management practice (BMP).
- Removal and disposal of the top 2 feet (ft) of impacted soil from within the CAS 03-20-05 exterior injection well casing, as well as a nearby area of impacted surface soil, as a BMP.

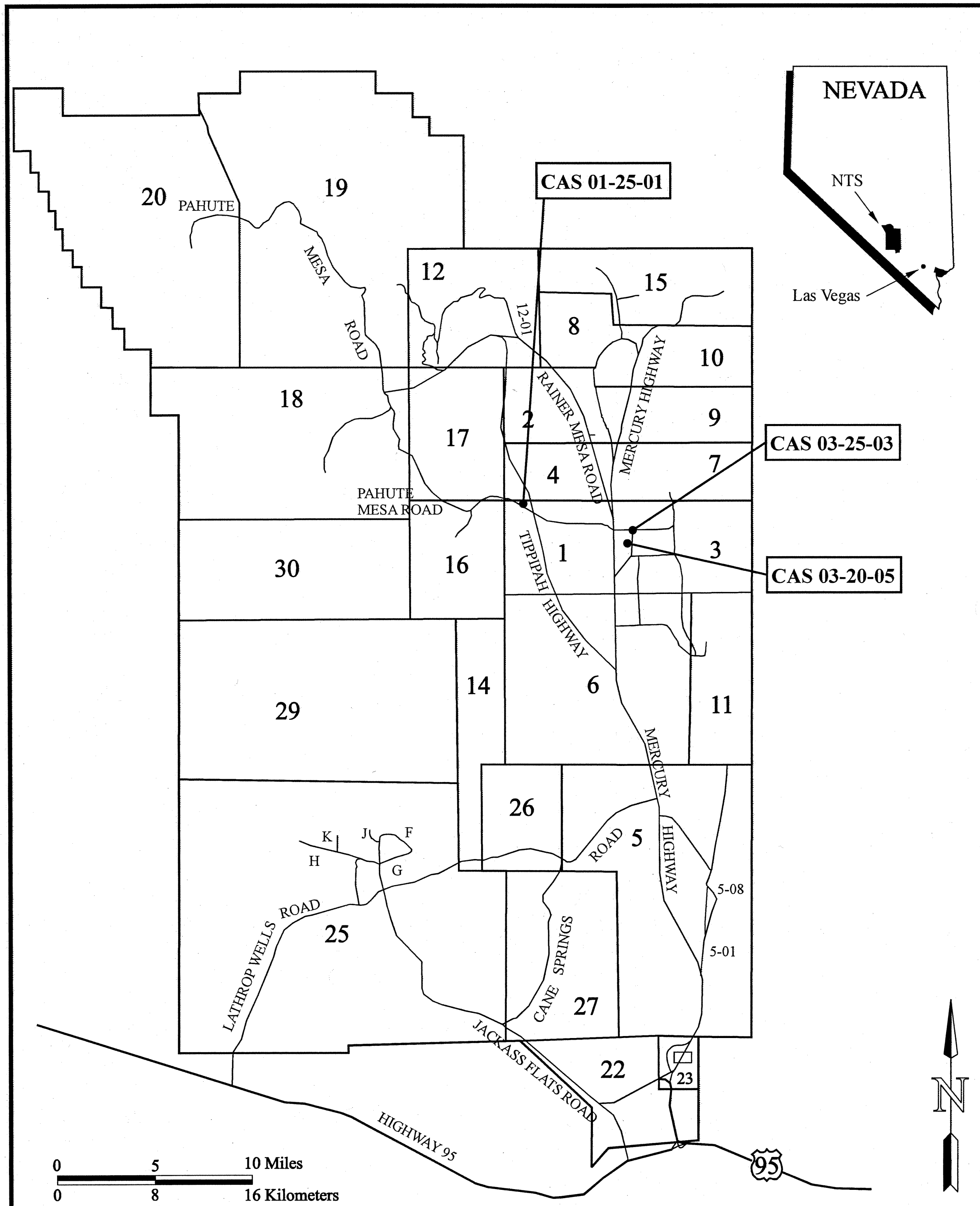


FIGURE 1
CAU 322 CORRECTIVE ACTION SITES LOCATION MAP

- Grouting the CAS 03-20-05 injection well to the casing surface, and grouting the associated holding tanks and transfer piping void spaces to the Blowout Preventer (BOP) Shop floor.
- Installation of fencing at two CAS areas (CASs 03-25-03 and 01-25-01) to restrict access to hydrocarbon-impacted soils at those locations.
- Implementation of Use Restrictions (UR) for the CAS areas as they were defined and delineated in the CAP.
- Posting of warning signs around the UR area at all three CASs.

Detailed site-specific closure activities are presented in Section 2.0 of this report.

Data Quality Objectives (DQOs) were developed for the CAU 322 site characterization (NNSA/NSO, 2003) and are included in Appendix A of this report. Site closure was verified through inspections, sampling, observations, and documentation of waste disposal.

1.3 CLOSURE REPORT CONTENTS

This CR is divided into the following sections:

- 1.0 "Introduction" presents purpose, general scope, cleanup criteria, and an overview of report contents.
- 2.0 "Closure Activities" describes the corrective actions completed, any deviations from the CAP, and the general closure schedule.
- 3.0 "Waste Disposition" describes the wastes generated and documents disposition.
- 4.0 "Closure Verification Results" describes the testing, inspections, and other measures used to confirm the completion of the corrective actions and quality of results.
- 5.0 "Conclusions and Recommendations" describes results, completion of implementation of the CAP, and any proposed changes to the post-closure monitoring plan.
- 6.0 "References" lists the supporting documents.

The appendices include relevant supporting documents.

- Appendix A, "Data Quality Objectives," presents the DQOs developed in the CAU 322 CAIP (NNSA/NSO, 2003).
- Appendix B, "Analytical Results," presents the summary analytical results for the soil verification samples collected at CAS 03-20-05 from the soil excavation north of the exterior injection well.
- Appendix C, "Waste Disposition Documentation," contains copies of the load verification forms and recycling forms.

- Appendix D, "Field Photographs," contains photographs of the CASs taken prior to, during, and after closure activities.
- Appendix E, "Use Restriction Information," contains copies of the UR forms and figures to be filed.
- Appendix F, "*National Environmental Policy Act* (NEPA) Environmental Evaluation Checklist," includes the checklist evaluating the environmental impact of site activities.

2.0 CLOSURE ACTIVITIES

This section of the CR details the specific activities involved in the closure of CAU 322.

2.1 DESCRIPTION OF CORRECTIVE ACTION ACTIVITIES

Closure of CAU 322 was completed using the approved CAP for CAU 322 (NNSA/NSO, 2005). The CAP was based on the recommendations found in the CADD for CAU 322 (NNSA/NSO, 2004).

Prior to beginning closure activities, the following pre-field activities were completed:

- Preparation of the NEPA documentation (NEPA Checklist).
- Preparation of a field management plan for CAU 322 (Bechtel Nevada [BN], 2005a).
- Preparation of the site-specific health and safety plan for closure activities at CAU 322, (BN, 2005b).
- Preparation of the work packages to control work.
- Completion of waste characterization profiling of materials at CAS 03-20-05 to fulfill landfill waste acceptance requirements.
- Preparation of Real Estate/Operation Permits to cover the work.
- Biological surveys to identify potential impacts to wildlife and vegetation and for planning mitigation strategies, as necessary.

Closure activities began on February 27, 2006, and were completed on May 10, 2006. Surveys of UR areas were completed April 18, 2006. The following sections detail the closure activities implemented for CAU 322.

2.1.1 CAS 01-25-01

Figure 2 shows the site plan and UR area for CAS 01-25-01, which is located in the northern portion of the Area 1 Shaker Plant and consists of an isolated earth and gravel berm that served as the former enclosure for a 10,000-gallon AST, which was removed in 1997.

Site characterization (NNSA/NSO, 2004) found total petroleum hydrocarbons-diesel range organics (TPH-DRO) to be the only contaminant of concern (COC) in the soil at CAS 01-25-01, due to filling releases/spills. TPH-DRO contamination is contained completely within the bounds of the AST berm and extends to a depth of approximately 12 ft below ground surface (bgs). Without any current source for additional TPH-DRO, access to the CAS was planned to be limited via administrative controls, with bio-attenuation acting to reduce the contamination over time.

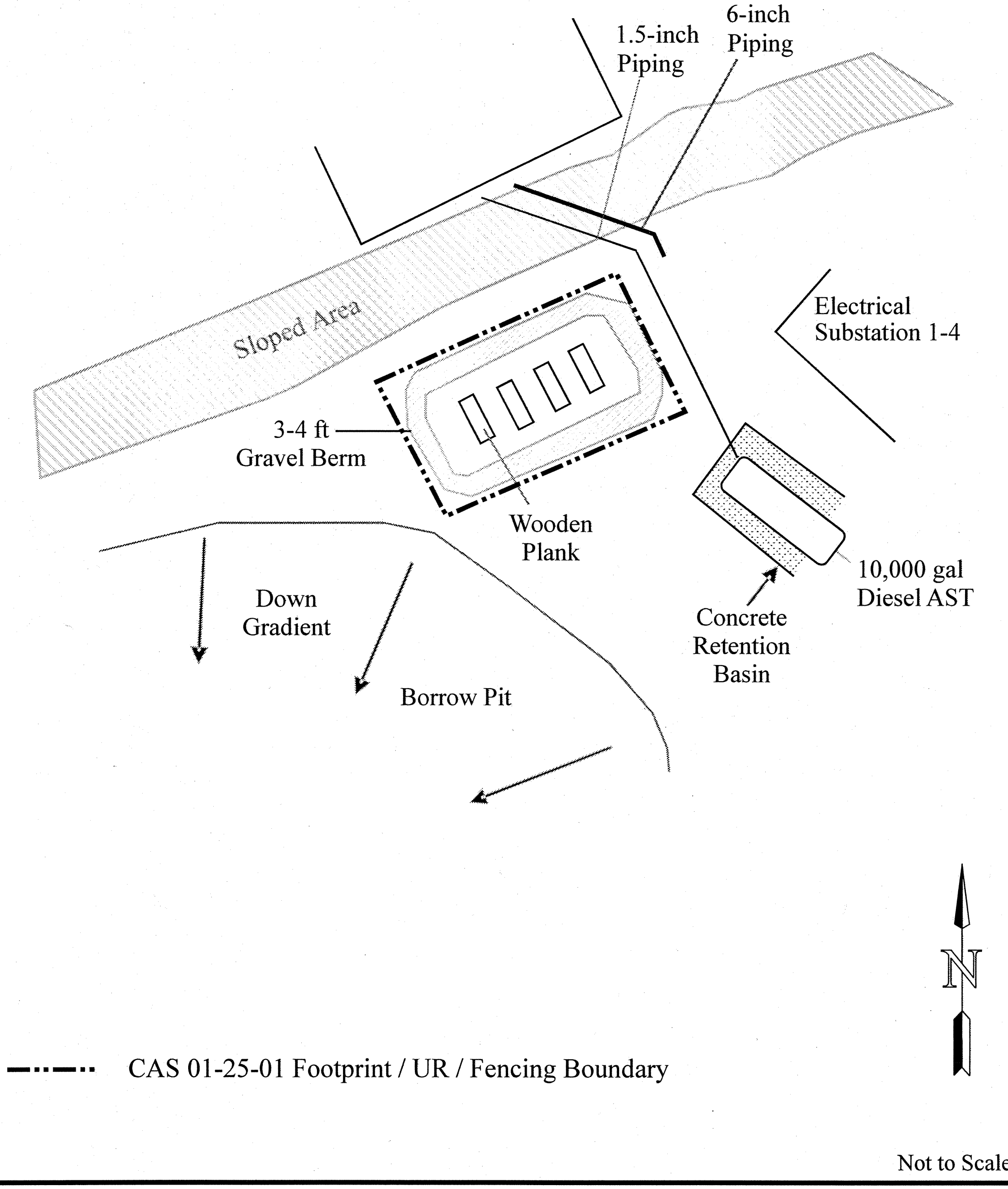


FIGURE 2
CAS 01-25-01 USE RESTRICTION AREA

The CAS 01-25-01 site-specific closure activities included:

- Fencing was erected around the rectangular AST berm to limit access to the interior of the berm.
- Four UR signs were posted around the perimeter of the berm.
- General housekeeping was performed as a BMP.

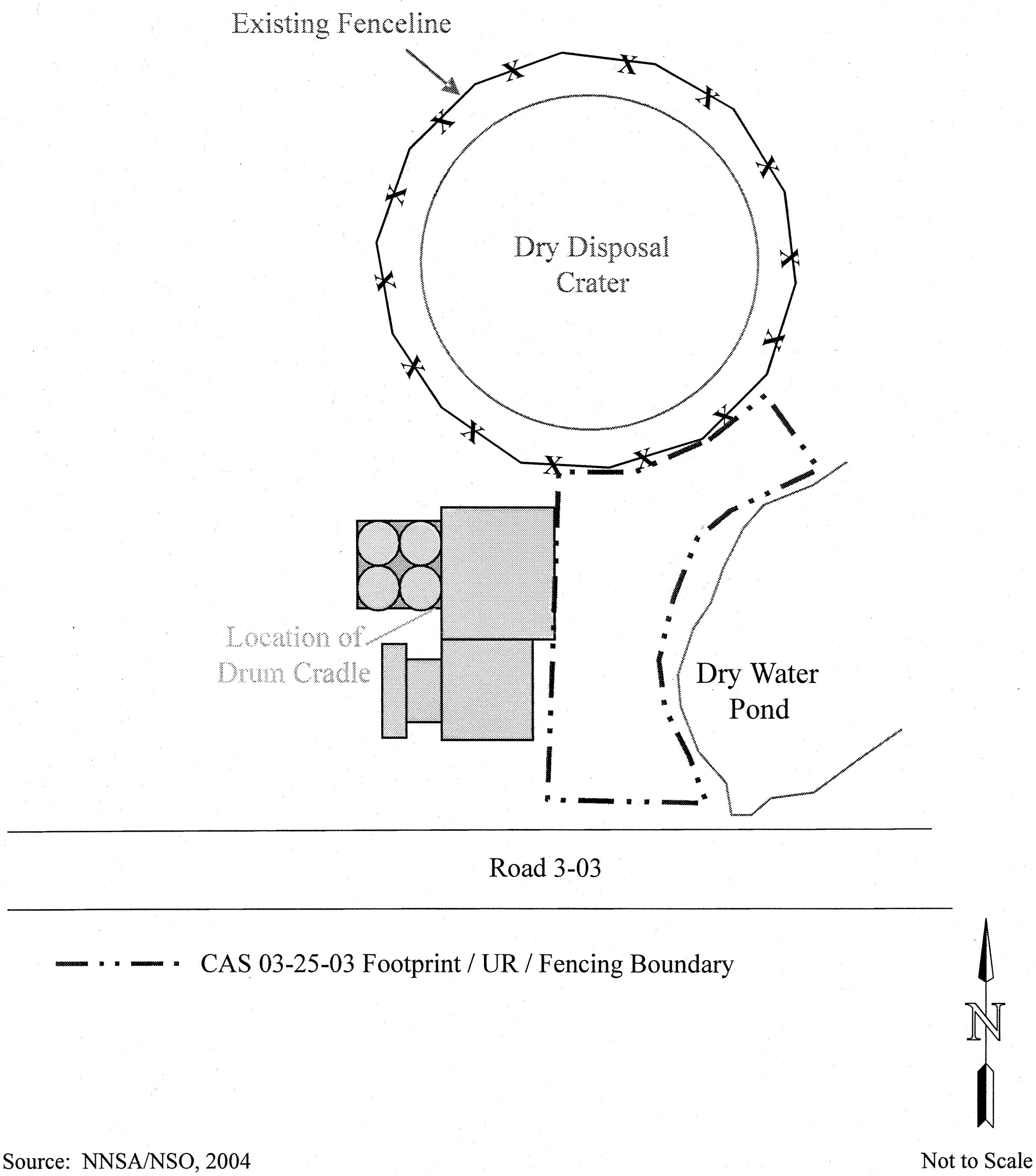
2.1.2 CAS 03-25-03

Figure 3 shows the site plan and UR area for CAS 03-25-03. This CAS is located at the eastern end of the Area 3 Mud Plant and is bounded by the Mud Plant to the west, the Mud Disposal Crater to the north, and the Mud Plant Pond to the east. TPH-DRO, the only COC identified above action levels during the development of the CAU 322 CADD (NNSA/NSO, 2004), is suspected to have been released during the fueling operations of generators that are no longer present on site. Closure activities included the following:

- Fencing was erected along the Mud Plant boundary, connecting with existing fencing surrounding the Mud Plant Pond and Mud Disposal Crater to limit access to the interior of the contaminated area.
- Six UR signs, no more than 30.5 meters (m) (100 feet [ft]) apart, were installed around the impacted area between the Mud Plant, the Mud Plant Pond, and the Mud Disposal Crater.
- General housekeeping activities were performed as a BMP.

2.1.3 CAS 03-20-05

Figure 4 shows the site plan and UR area for CAS 03-20-05. In Appendix E, “Field Photographs,” Photos 1 through 7 show portions of the site before and after corrective actions. Closure activities included the removal and solidification of standing fluids in the BOP Shop holding tanks, the grouting of the holding tanks and transfer pipe trenching to the shop floor surface, the excavation of the uppermost 2 ft of soil from within the exterior injection well casing, grouting the casing to the casing surface, the excavation of a small area of soil impacted with polychlorinated biphenyls (PCB) and Plutonium (Pu)-239, the posting of UR warning signs, and the implementation of a UR.



Source: NNSA/NSO, 2004

Not to Scale

FIGURE 3
CAS 03-25-03 USE RESTRICTION AREA

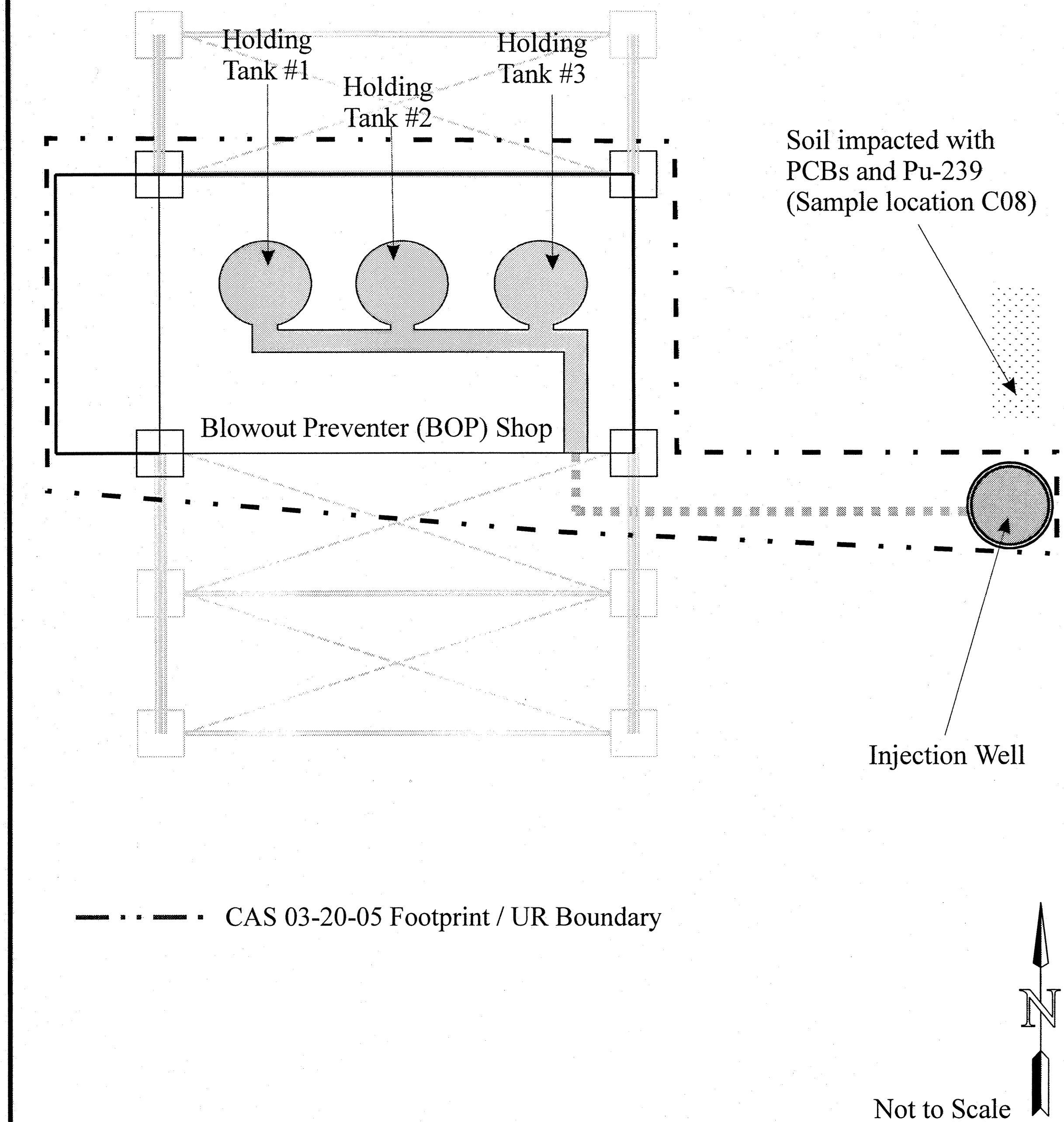


FIGURE 4
CAS 03-20-05 USE RESTRICTION LOCATION

2.1.3.1 Remediating the Los Alamos National Laboratory Post-Shot Shop (BOP Shop)

Holding Tanks 1 and 3 inside the BOP Shop were found to contain liquids with TPH concentrations above the 100 milligrams per kilogram (mg/kg) Preliminary Action Level (PAL) (Nevada Administrative Code [NAC], 2003). Consequently, all standing liquids within the holding tanks (including Holding Tank 2 as a BMP) were removed using a peristaltic pump and pumped into a lined solidification basin. The liquids were solidified using NTS native soil, samples were taken and analyzed via gamma-ray spectroscopy to verify the absence of radionuclides, and the waste was then disposed of at the Area 6 Hydrocarbon Landfill. Residual liquid within the holding tanks was solidified with bentonite prior to grouting the remaining tank and cellar void spaces to the floor shop grade. The transfer piping from the tanks within the shop floor was disconnected and/or severed, and the pipe trenching within the BOP Shop was grouted to the floor shop grade. UR warning signs were posted around the BOP Shop per the FFACO UR guidance (FFACO, 2003), and a land UR was implemented.

2.1.3.2 Remediating the Injection Well and Adjacent Soil Area

In the upper 10 ft of soil within the exterior injection well casing, site characterization found TPH-DRO, lead, cadmium, Pu-239, and americium (Am)-241 above action levels (NNSA/NSO, 2004). Due to the relatively inaccessible configuration of the casing, the uppermost 2 ft of soil were removed using a backhoe and trenching bucket, as a BMP. The contaminated soil was then placed into B-25 boxes and stored in an onsite 90-Day Accumulation Area for eventual retrieval and disposal by Envirocare. The remaining void space within the injection well and injection well casing was then filled with grout to the surface of the injection well casing. Four UR warning signs were posted around the well as per the FFACO UR posting guidance (FFACO, 2003), and a land UR was implemented.

Also, an area adjacent to and just north of the injection well (sample location C08) was found to be PCB and Pu-239 impacted (NNSA/NSO, 2004). Due to conflicting information in the CADD, the precise location of sample location C08 could not be determined. As a result, the excavation was widened from a 2 x 2 x 2-ft cube to a 2 x 15 x 3-ft rectangular prism, with the lengthened side extending north along the axis of least certainty. Six verification samples were taken from the excavation in addition to a gamma-ray spectroscopy sample used to generate a waste disposal profile, and, based on the results, the northernmost end of the excavation was widened on the northernmost side by an additional cubic yard. Soil from the initial excavation was deposited into 55-gallon (gal) drums and disposed of at the Area 9 U10c Landfill. Soil from the expanded excavation was deposited into an end-dump truck and disposed of at the same landfill. A second round of verification samples was collected. Upon receiving verification results reported below action levels, NTS native fill was then used to backfill the excavation to grade.

2.2 DEVIATIONS FROM CORRECTIVE ACTION PLAN AS APPROVED

Minor deviations performed during the implementation of the original CAU 322 CAP included:

- Due to difficulty in locating the characterization sample location that marked the position of the Pu-239 and PCB-impacted soil to the north of the CAS 03-20-05 injection well, the excavation area was extended from 2-ft x 2-ft x 2-ft as detailed in the CAP to 2-ft x 15-ft x 3-ft, as a BMP. Subsequent verification sampling indicated elevated Pu levels at the northernmost boundary of this extended excavation. As a result, an additional cubic yard of soil was excavated around the sampling point to ensure complete contaminant removal.
- While the liquids within BOP Shop Holding Tank 2 were not found to contain COCs above action levels, all standing liquids were removed, solidified, and disposed of at the Area 6 Hydrocarbon Landfill as a BMP.
- Due to poor visibility inside the BOP Shop holding tanks and cellars, and to prevent the displacement of impacted ‘sludge’ during the grouting of the holding tanks, bentonite plugs were deposited into the holding tanks prior to grouting to absorb any residual liquid.
- Though the transfer piping between the BOP Shop and the exterior injection well is technically not included in CAS 03-20-05, UR warning signs were posted along the length of the piping to alert future workers in the area (likely demolition crews) to the existence of the underground piping and potential contamination therein.

2.3 CORRECTIVE ACTION SCHEDULE AS COMPLETED

The completed closure field activities schedule is presented in Table 1.

TABLE 1. CAU 322 CLOSURE SCHEDULE

SITE	DATE CORRECTIVE ACTIONS COMPLETED*
CAS 01-25-01	March 09, 2006
CAS 03-20-05	May 10, 2006
CAS 03-25-03	March 09, 2006
Notes: * Corrective action activities do not include post-closure surveying and photo documentation site visits. Closure documentation work was completed May 10, 2005.	

THIS PAGE INTENTIONALLY LEFT BLANK

3.0 WASTE DISPOSITION

Waste generated during CAU 322 closure activities included TPH-impacted waste, mixed waste, and non-hazardous waste. All waste was surveyed and managed according to state and federal regulations, DOE orders, and BN procedures. At the BOP Shop, where radiologically-impacted material had historically been transported and decontaminated, a handheld direct-reading instrument was used to screen surface waste for radioactivity. A Ludlum 2929 alpha/beta counter was used to evaluate surface swipes collected to determine if removable radioactive contamination was present. Some waste required sampling to verify the appropriate waste disposition. All waste was containerized, as needed, for proper disposal in an approved landfill. Table 2 summarizes disposition of each waste stream by site.

TABLE 2. DISPOSITION OF WASTE

CAS	MATERIAL	VOLUME OR WEIGHT ESTIMATE	DISPOSITION
03-20-05	Hydrocarbon impacted soil	11 yd^3 (8.4 m^3)	Area 6 Hydrocarbon Landfill
	PCB and Pu-239 impacted soil	6.0 yd^3 (4.6 m^3)	Area 9 U10c Landfill
	TPH-DRO, lead, cadmium, Pu-239, and Am-241 impacted soil	4.8 yd^3 (3.7 m^3)	Envirocare
	Metal covers, crane hook, construction debris	3 yd^3 (2.3 m^3)	Area 3 Well Yard for potential offsite scrap recycling or reuse
01-25-01	No waste generated	NA	NA
03-25-03	No waste generated	NA	NA

3.1 WASTE MINIMIZATION

Industry standard waste minimization practices were applied throughout the course of field activities. These practices included:

- Using laboratory analysis to characterize and classify waste streams.
- Identifying items for potential reuse at the Area 3 Well Yard (See Section 3.4, “Non-Hazardous Waste”).

3.2 HYDROCARBON-IMPACTED WASTE

At CAS 03-20-05, approximately one end-dump truckload of TPH-DRO-impacted solidified soil was removed. The material was disposed at the Area 6 Hydrocarbon Landfill. Soil samples were collected and analyzed to verify that no radiological constituents were present. See Section 4.0 for verification sampling details. See Appendix G for load verification forms.

3.3 MIXED WASTE

Two B-25 boxes of mixed waste in the form of soil excavated from within the CAS 03-20-05 exterior injection well casing were disposed of by EnviroCare. Disposable personal protective equipment waste from the abatement work (i.e., Tyvek suits, vinyl booties, and leather gloves) was managed accordingly and was also disposed by EnviroCare. Waste disposal documentation is included in Appendix G of this report.

3.4 NON-HAZARDOUS WASTE

Non-hazardous waste, such as sanitary trash, personal protective equipment, and miscellaneous construction debris, was disposed at the NTS Area 9 U10c Landfill. Waste disposal documentation is included in Appendix G of this report.

For waste minimization, four steel cellar covers for the BOP Shop holding tanks, the injection well cover, and the piping trench cover panels were radiologically cleared and sent to the NTS Excess Yard for potential recycling.

4.0 CLOSURE VERIFICATION RESULTS

Site closure was verified by analyses, tests, and visual inspections. The removal of TPH and Pu-239-impacted soil from an area adjacent to the injection well associated with CAS 03-20-05 was confirmed by collecting and analyzing ten verification soil samples and two duplicate samples from the base of the shallow excavation. Figure 9 shows the approximate sampling locations.

The samples were collected on April 19, 2005, and handled according to the *Industrial Sites Quality Assurance Project Plan* (QAPP) (NNSA/NV, 2002). The samples were shipped under chain of custody to an approved offsite laboratory for analysis of TPH-DRO and isotopic plutonium (Iso-Pu). Table 3, "Verification Sample Analytical Results," and Appendix B, "Analytical Results," summarize the results. The analytical results for soil verification samples collected from the excavation north of the CAS 03-20-05 injection well were below the action standard for PCBs of 100 mg/kg and Iso-Pu of 12.7 picoCuries per gram (pCi/g).

Samples collected from the north end of the excavation adjacent to the injection well indicated the presence of Pu above action levels, requiring that the excavation be expanded and a second round of verification samples be collected.

Critera for verification sampling and backfilling were provided in the approved CAP (NNSA/NSO, 2005).

Photographs of the sites before, during, and after closure activities are presented in Appendix D.

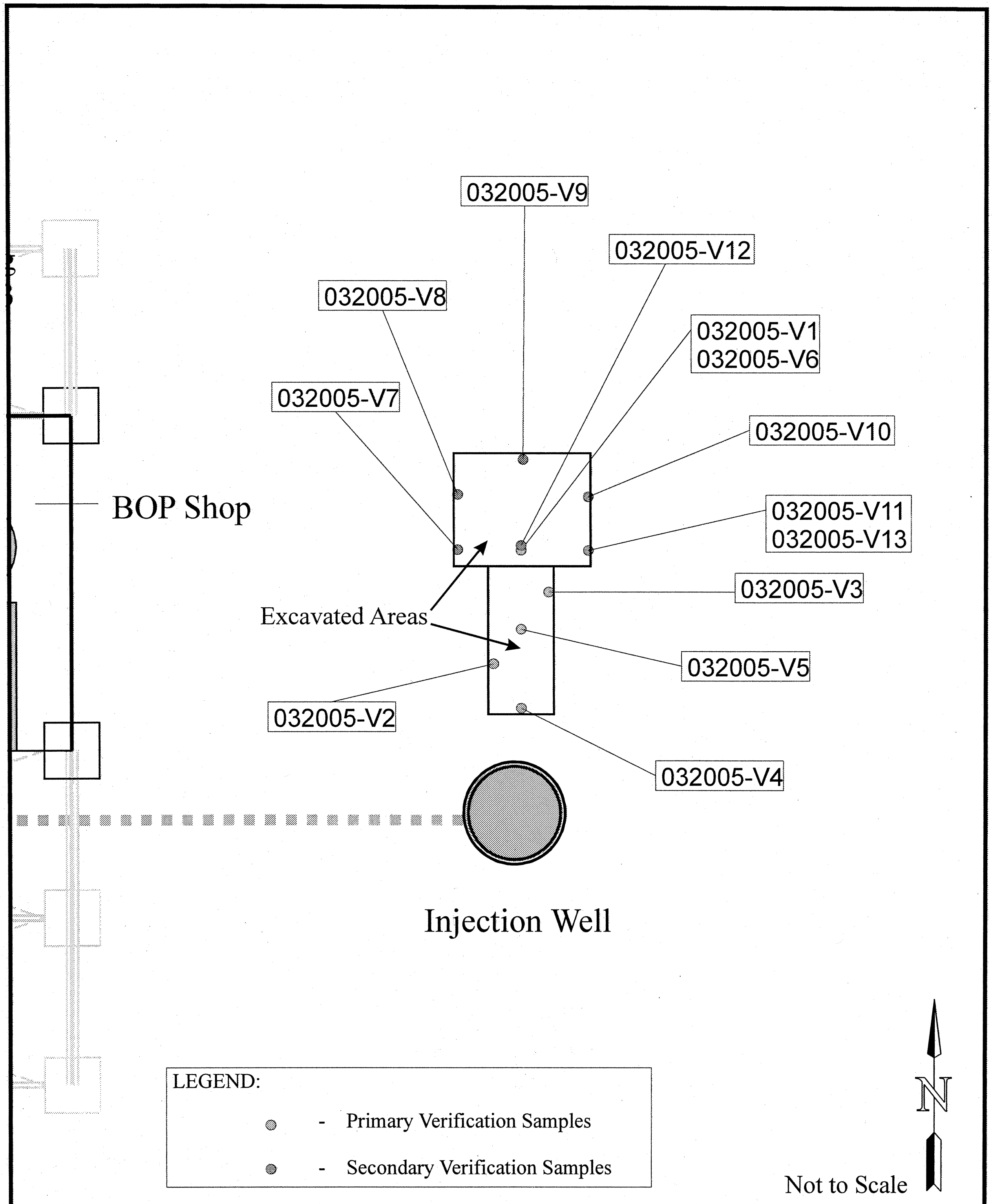


FIGURE 5
VERIFICATION SAMPLE LOCATIONS

TABLE 3. VERIFICATION SAMPLE ANALYTICAL RESULTS

ANALYSIS ORDER	RESULTS	
SAMPLE NAME (PCB PAL = 100 mg/kg) (Pu-239 PAL = 12.7 pCi/g)	**Pu-239 (pCi/g)**	**PCBs (mg/kg)**
032005-V1	42.7	0.0066
032005-V2	0.977	0.14
032005-V3	1.01	0.037
032005-V4	0.187	0.0042
032005-V5	0.035	0.015
032005-V6 (PCB Duplicate of 032005-V1) (Iso-Pu Duplicate of 032005-V5)	0.374	0.0062
032005-R1	ND	NA
032005-R2	NA	ND
032005-V7	0.067	NA
032005-V8	2.51	NA
032005-V9	0.215	NA
032005-V10	0.571	NA
032005-V11	0.174	NA
032005-V12	0.689	NA
032005-V13 (Duplicate of 032005-V11)	7.53	NA
032005-R3	0.006	NA

Notes:

mg/kg = milligrams per kilogram
ND = Not detected at laboratory minimum reporting limit
NA = Not Analyzed
PAL = Preliminary Action Level

4.1 DATA QUALITY ASSESSMENT

Because all three sites were closed in place and there was very little surface contamination to remediate, minimal analytical data were needed to verify the corrective actions for CAU 322. Accurate and defensible analytical data were collected to verify that wastes and verification samples were properly characterized, managed, and disposed. The DQOs for the characterization of waste generated at CAS 03-20-05 of CAU 322 are included in Appendix A. The following sections describe the quality assurance/quality control (QA/QC) procedures, data validation process, and reconciliation of the conceptual site model with the observations and findings during the closure activities.

4.1.1 Quality Assurance/Quality Control Procedures

Detailed information about the QA/QC program can be found in the Industrial Sites QAPP (NNSA/NV, 2002). A duplicate verification sample was submitted blind to the laboratory for analysis. Analytical results for waste characterization samples were validated by the laboratory with respect to the Data Quality Indicators. Matrix spikes, matrix spike duplicates, recoveries, and other standard QA/QC procedures were followed. The laboratory reports and validation reports indicate no problems with the usability of the data.

4.1.2 Data Validation

Data validation was performed in accordance with the Industrial Sites QAPP (NNSA/NV, 2002). All sample data were internally validated using Tier I. No anomalies were discovered in the data that would discredit any of the waste classification or verification samples collected and analyzed for CAU 322. Summary laboratory QA/QC data for verification samples are presented in Appendix B. The complete data set and verification reports are available on request. These data are maintained in project files in Mercury, Nevada.

4.1.3 Conceptual Site Model

There were no discrepancies between the Conceptual Site Model presented in the DQOs and that observed in the field.

4.2 USE RESTRICTIONS

The CAU 322 CASs have been closed according to the approved CAP (NNSA/NSO, 2004). The future use of the land within these posted UR areas shall not include any activity that may alter or modify the containment control as approved by the state of Nevada and identified in this document and any other CAU 322 documentation, unless appropriate concurrence from the NDEP is obtained in advance.

The specific location and post-closure monitoring requirements for each CAU 322 site UR are recorded on a “CAU Use Restriction Information Form.” The information on the completed form was added to the Facility Information Management System and the Central Data Repository. The original “CAU Use Restriction Form” was filed with the CAU 322 project files. A copy of the CAU 322 UR information for each of the sites, along with site plans showing the approximate location of the UR areas, is included in Appendix E of this report.

5.0 CONCLUSIONS AND RECOMMENDATIONS

CAU 322 was closed in accordance with the FFACO and the NDEP-approved CAP for CAU 322 (NNSA/NSO, 2005). Closure of CAU 322 was accomplished in accordance with the CAP by completing the following tasks:

- Solidifying and removing TPH-impacted liquid from the holding tanks at CAS 03-20-05.
- Excavating and disposing of the uppermost 2 ft of soil from the interior of the CAS 03-20-05 injection well.
- Grouting the holding tanks and piping trenching to the pad surface at the CAS 03-20-05 BOP Shop.
- Grouting the CAS 03-20-05 injection well to the well casing surface.
- Installing fencing and signs within and around the UR areas to prevent unauthorized disturbance of subsurface or surface contamination.
- Implementing UR at each of the CASs.
- Removing surface debris as a BMP at CASs 01-25-01, 03-20-05, and 03-25-03.

5.1 POST-CLOSURE MONITORING REQUIREMENTS

5.1.1 Inspections

Inspections will be performed on an annual basis for the first 5 years and once every 5 years thereafter, for a total of 30 years. Inspections will consist of visual observations to verify that the fencing installed at CASs 01-25-01 and 03-25-03 is in good condition, warning signs at each CAS are in place and readable, and URs are maintained. The interiors of the UR areas will also be inspected to confirm there have been no disturbances to the area. If any maintenance and repair requirements are identified, funding will be requested and the repairs scheduled. Any repairs will be documented in writing at the time of repair.

The condition of the fencing, postings, and landfill cover will be documented in the combined NTS post-closure annual letter report. The letter report will include a discussion of observations and provide a record of maintenance activities. A copy of the letter report will be submitted to NDEP.

5.2 NOTICE OF COMPLETION

Based upon the completion of site activities, it is requested that a “Notice of Completion” be provided by NDEP for CAU 322. Upon closure approval, CAU 322 will be moved from Appendix III to Appendix IV, “Closed Corrective Action Units,” of the FFACO.

THIS PAGE INTENTIONALLY LEFT BLANK

6.0 REFERENCES

BN, see Bechtel Nevada.

Bechtel Nevada. 2004a. *Field Management Plan for Corrective Action Unit 322: Areas 1 and 3 Release Sites and Injection Wells, Nevada Test Site, Nevada.* December 2005. Las Vegas, NV.

Bechtel Nevada. 2004b. *Site-Specific Site Health and Safety Plan for CAU 322*. Las Vegas, NV.

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.

Federal Facility Agreement and Consent Order. 2003. Use Restriction Posting Guidance.

NAC, see Nevada Administrative Code.

Nevada Administrative Code. 2005. NAC 445A.2272, "Contamination of Soil: Establishment of Action Levels," Carson City, NV.

NNSA/NSO, see U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office.

U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2002. *Industrial Sites Quality Assurance Project Plan, Nevada Test Site, Nevada*, Rev. 3. DOE/NV--372. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2004. *Corrective Action Decision Document for Corrective Action Unit 322: Areas 1 and 3 Release Sites and Injection Wells, Nevada Test Site, Nevada*, Rev. 0. DOE/NV--930. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2005. *Corrective Action Plan for Corrective Action Unit 322: Areas 1 and 3 Release Sites and Injection Wells, Nevada Test Site, Nevada*, Rev. 0. DOE/NV--986. Las Vegas, NV.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A

DATA QUALITY OBJECTIVES

- As previously published in the CAU 322 CAIP (NNSA/NSO, 2003)

THIS PAGE INTENTIONALLY LEFT BLANK

A.1 Data Quality Objectives Process

The DQO process described in this appendix is a seven-step strategic planning approach based on the scientific method that was used to plan site characterization data collection activities at CAU 322: Areas 1 & 3 Release Sites and Injection Wells at the NTS, Nevada (Figure A.1-1). The DQOs are designed to ensure that the data collected will provide sufficient and reliable information to identify, evaluate, and technically defend corrective actions (i.e., no further action, closure in place, or clean closure). The existing information about the nature and extent of contamination at the three CASs in CAU 322 is insufficient to evaluate and select preferred corrective actions; therefore, a CAI will be conducted.

The CAU 322 investigation will be based on DQOs presented in this appendix as developed by representatives of the NDEP and the NNSA/NSO. The seven steps of the DQO process developed for CAU 322 and presented in Sections A.1.2 through A.1.8 were developed based on the CAS-specific information presented in Section A.1.1.

A.1.1 Corrective Action Site-Specific Information

Corrective Action Unit 322 consists of one CAS in Areas 1 and two CASs in Area 3 of the NTS as shown in Figure A.1-2. These CASs are:

- CAS 01-25-01 - AST Release - Area 1
- CAS 03-25-03 - Mud Plant AST Diesel Release - Area 3
- CAS 03-20-05 - Injection Wells - Area 3

Suspected COPCs are divided into critical COPCs and noncritical COPCs, and the critical analyte parameters are given greater emphasis in the decision making process relative to other COPCs. For this reason, more stringent performance criteria are specified for critical parameter DQIs. Refer to Section 6.0 of the CAIP.

Suspected contaminants for each CAS are described in the following descriptions and listed in Table A.1-1. Critical COPCs are defined as those contaminants that are known or expected to be present within a CAS. Noncritical COPCs are defined as classes of contaminants (e.g., VOCs, TPH) and include all the parameters reported from the representative analytical methods that have PALs

THIS PAGE INTENTIONALLY LEFT BLANK

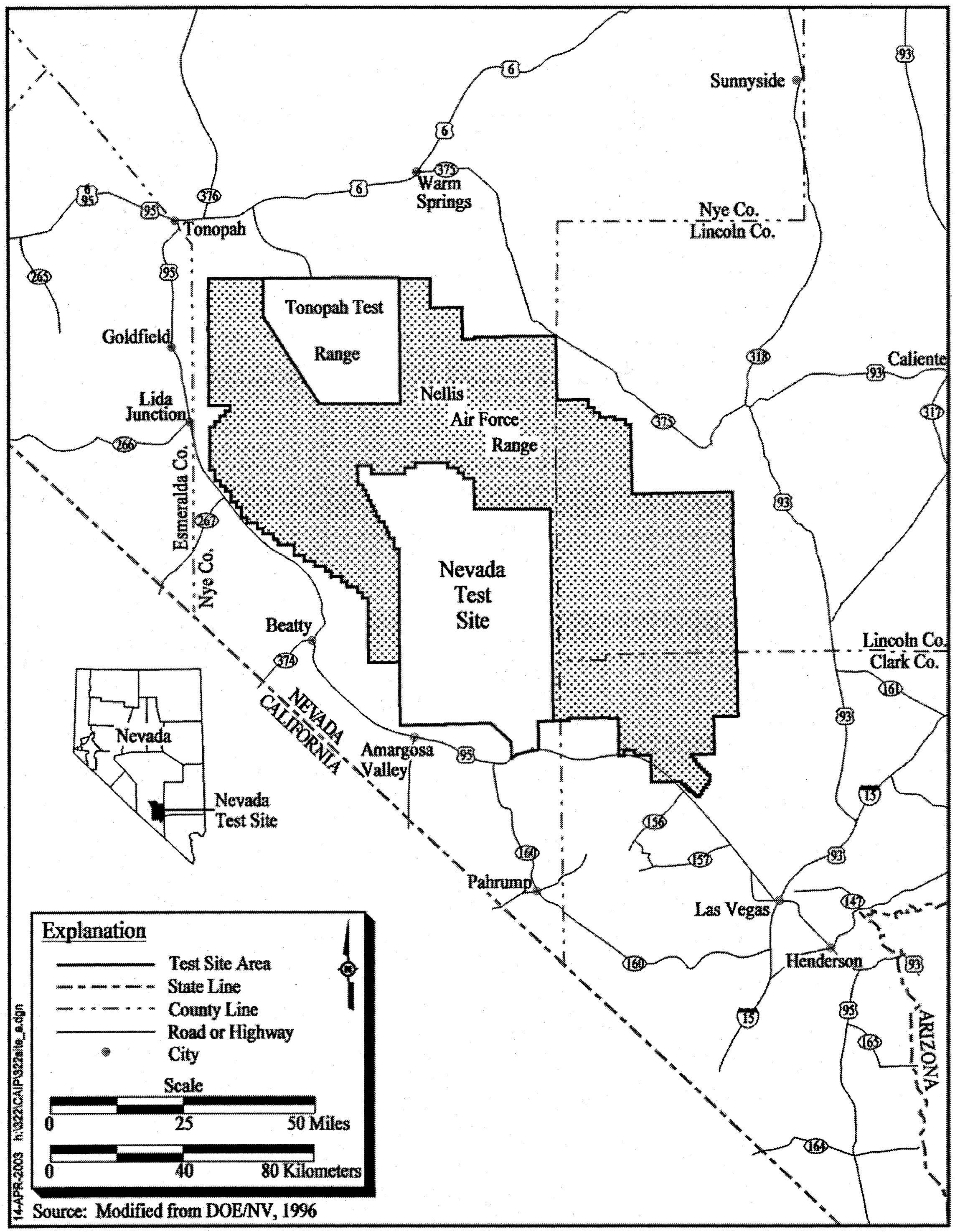


Figure A.1-1
Nevada Test Site Location Map

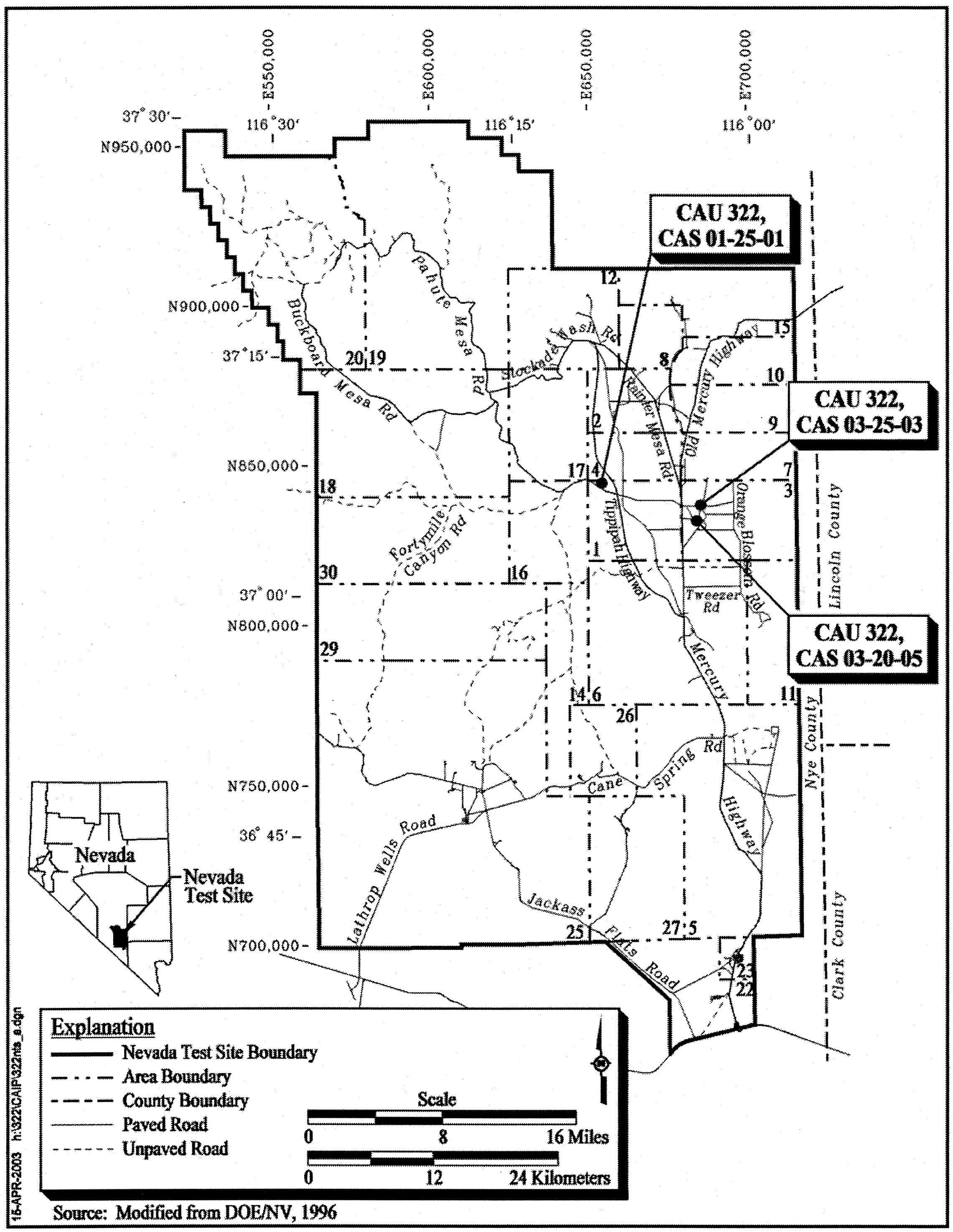


Figure A.1-2
Corrective Action Unit 322 Location Map

Table A.1-1
Phase I Suspected CAS-Specific Contaminants of Potential Concern Per CAS[a]

COPC		CAS 01-25-01	CAS 03-25-03 Area A, AST Release	CAS 03-25-03 Area B, Diesel Generator	CAS 03-20-05
Organics					
VOCs		N	N	N	C
SVOCs		N	N	N	C
PCBs		N	N	N	C
TPH Petroleum Hydrocarbons [C_6 - C_{38}]	GR0	C	C	C	C
	DRO	C	C	C	C
Metals					
RCRA Metals			N	N	C
Beryllium			N	N	N
Radionuclides					
Americium-241[b]			N	N	C
Cesium-137[b]			N	N	C
Strontium-90[b]			N	N	C
Plutonium-238[b] and -239/240[b]			N	N	C
Uranium-234[b] ,-235[b], -238[b]			N	N	C
Tritium					C
Cobalt					C

[a]For those COPCs identified that include multiple parameters, the parameters with PALs will be evaluated.
[b]National Council on Radiation Protection and Measurements (NCRP) Report No. 129, "*Recommended Screening Limits for Contaminated Surface Soil and Review of Factors Relevant to Site-Specific Studies.*" (NCRP, 1999)

C = Critical COPCs; N = Noncritical COPCs

Some radionuclides will be sampled for the purpose of waste management and IDW characterization. The table does not include identification of analysis anticipated to be performed for the purpose of waste management and IDW characterization.

listed in Section A.1.4.2. If a COPC is detected in any sample at a concentration above a PAL, the COPC will be identified as a COC. All COCs are considered critical parameters. If a COC is identified, the CAS containing the COC will be further investigated to determine the extent of COC contamination.

A.1.1.1 CAS 01-25-01, AST Release

Scope of CAS - The scope of the CAS consists of a gravel containment pit suspected to be the location of a former AST, as shown in Figure A.1-3. Contamination may be present at the surface, and possibly in the subsurface soil within the pit due to the past site use. The scope of this investigation will be to determine if contamination is present in the soil at the containment pit.

The determination of the nature and extent of possible contamination will be limited to releases from sources within the CAS boundary. There are no other CASs adjacent to CAS 01-25-01 that would interfere with the determination of the nature and extent of contamination. The investigation of radiological contamination will not be performed. However, analysis of samples for radionuclides may be performed for the purpose of waste management and IDW characterization. Radiological contamination associated with atmospheric testing, if present, will be addressed by the Soils Project.

Physical Setting and Operational History - CAS 01-25-01 is a 27- by 60-ft gravel containment pit located at the edge of a bluff overlooking the Area 1 Shaker Plant. The gravel containment pit is located approximately 25 ft north of Electrical Substation 1-4. Four wooden planks are set into the gravel at the bottom of the pit. An existing AST is located approximately 40 ft southeast of the CAS. In addition, a partially buried 1-1/2-in. steel fuel line is located approximately 15 ft northeast of the CAS. The fuel line appears to supply the Shaker Plant with diesel fuel (Figure A.1-3). The gravel structure was constructed as a containment pit for an AST. The tank had a capacity of 10,000 gal and was reported to store diesel fuel for the Shaker Plant.

An electrical conduit with wire leads was observed in the southern end of the gravel containment area. In addition, a portion of a steel pipe was observed protruding through the east berm. The pipe appears to be part of an abandoned fuel line. No historical information is available that identifies a release of petroleum product at the site. Evidence of staining (e.g., fuel oil) was not observed within

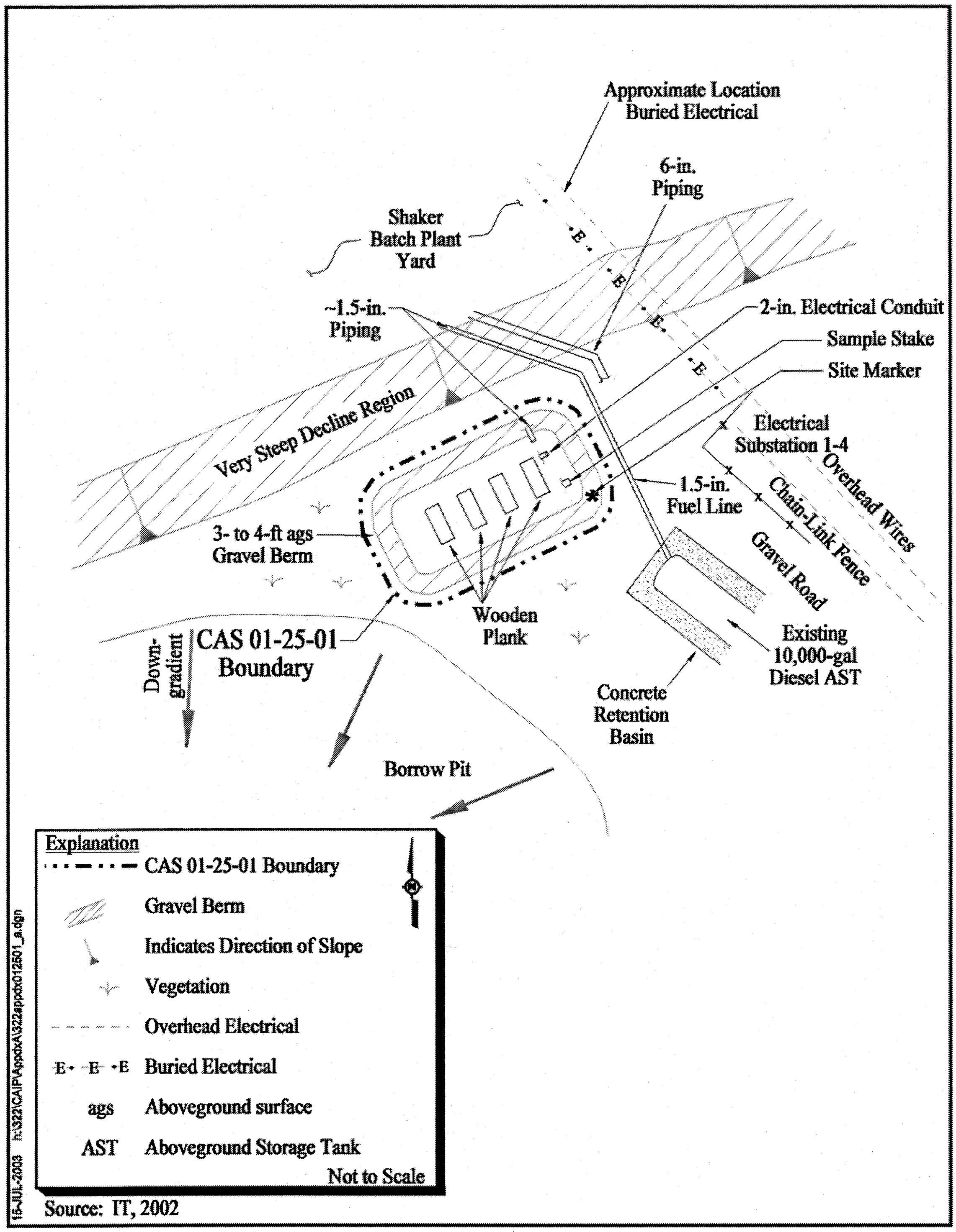


Figure A.1-3
CAS 01-25-01, Site Plan of AST Release

the CAS. A wooden sample marker stake (ERS 00179) was located in the northern portion of the gravel containment area.

Sources of Potential Contamination - Historical records indicated the 10,000-gal AST was relocated from the gravel containment pit to a concrete containment pit located nearby. The nearby AST has a capacity of 10,000 gal and is believed to be the relocated tank. The AST was used to store fuel oil (i.e., diesel) and serviced the Shaker Plant. No evidence of a spill (e.g., staining) was observed and available records did not contain information indicating a release of fuel oil occurred at the CAS. Although there are no documented releases, overfills and small spills may have released petroleum hydrocarbons to the soil within the CAS.

Previous Investigation Results - A soil sample was collected in 2002 from within the northern portion of the gravel containment area and analyzed for VOCs, SVOCs, PCBs, RCRA metals, and radionuclides. Acetone was detected at a concentration of 0.023 mg/kg, which is below the PAL. The PCB concentrations were below the detection level of 0.033 mg/kg, except for Aroclor-1248 at a concentration of 0.064 mg/kg. All reported radionuclides (Cs-137, gross alpha, gross beta, and potassium-40) results were within background levels. Results of the analyses for RCRA metals reported an arsenic concentration of 7.7 mg/kg, which exceeded the PAL of 2.7 mg/kg. Although the arsenic concentration exceeded the PAL, the reported level was considered representative of ambient conditions at the site (NBMG, 1998; Moore, 1999). The remaining parameters were within background levels.

Suspected Contaminants of Potential Concern - The critical COPCs identified for this CAS are TPH (DRO and GRO) based on available test results, process knowledge, interviews, and available records. The presence of acetone was identified in a preliminary sample analysis. However, the presence of acetone in the sample might have been the result of a laboratory artifact and not an indication of contamination; therefore, acetone will not be considered a critical COPC.

The noncritical COPCs identified below are based on test results and common NTS concerns:

- PCBs are considered a noncritical COPC; detection of Aroclor-1248 was slightly above the detection limit and may not be an indicator of a contaminant at the site.
- VOCs and SVOCs are representative of general characteristics of fuel oil.

A.1.1.2 CAS 03-25-03, Mud Plant AST Diesel Release

Scope of the CAS - The scope of the CAS 03-25-03 includes a fuel spill area consisting of a bermed gravel containment where a former diesel AST once resided. The scope also includes all affected soil following a speculative pathway proceeding east and downgradient towards the southeast side of the Mud Plant building (Figure A.1-4), and affected soil in a former roadway area located east of the Mud Plant building. In the eastern portion of the site, the boundaries of this CAS are adjacent to those of CAU 34: CASs 03-44-01, 03-09-06, and 03-47-02, although the extent of the impacted soil is uncertain.

The estimated CAS boundaries and footprint were established based on observations during the PA site visits, previous investigations, review of historical records, and aerial photographs. However, the boundary of this CAS may change based on the planned effort to define the nature and extent of suspected contamination. Sampling activities are expected to extend into the boundaries of neighboring areas of environmental concern (e.g., CAS 03-44-01 or another CAS). The investigation of radiological contamination, if necessary, will be limited to the sources associated with the CAS. Radiological contamination associated with atmospheric testing will be addressed by the Soils Project.

Physical Setting and Operational History - This CAS is located in the former Area 3 Camp at the northwest corner of the intersection of Road 3-03 and Blast Line Road within the former Mud Plant compound (Figure A.1-4). The Mud Plant began operation in February 1962 and was used to formulate mud mixtures in support of drilling operations for the UGTA Program. Operation of the Mud Plant ceased in December 1995. An AST containing fuel oil and a fuel dispensing station were located approximately 350 ft west of the Mud Plant. Available records indicate the AST had a capacity of approximately 10,000 gal and was located in a gravel containment pit. Aerial photos indicate the fuel dispensing station was located south of the AST. Information was not available regarding the type of equipment or physical condition of the fuel dispensing station. The AST and fuel station were removed; however, the date of the removal was not available. Documentation indicated diesel generators were present in the eastern portion of the site. No information was available regarding when the generators were at the site.

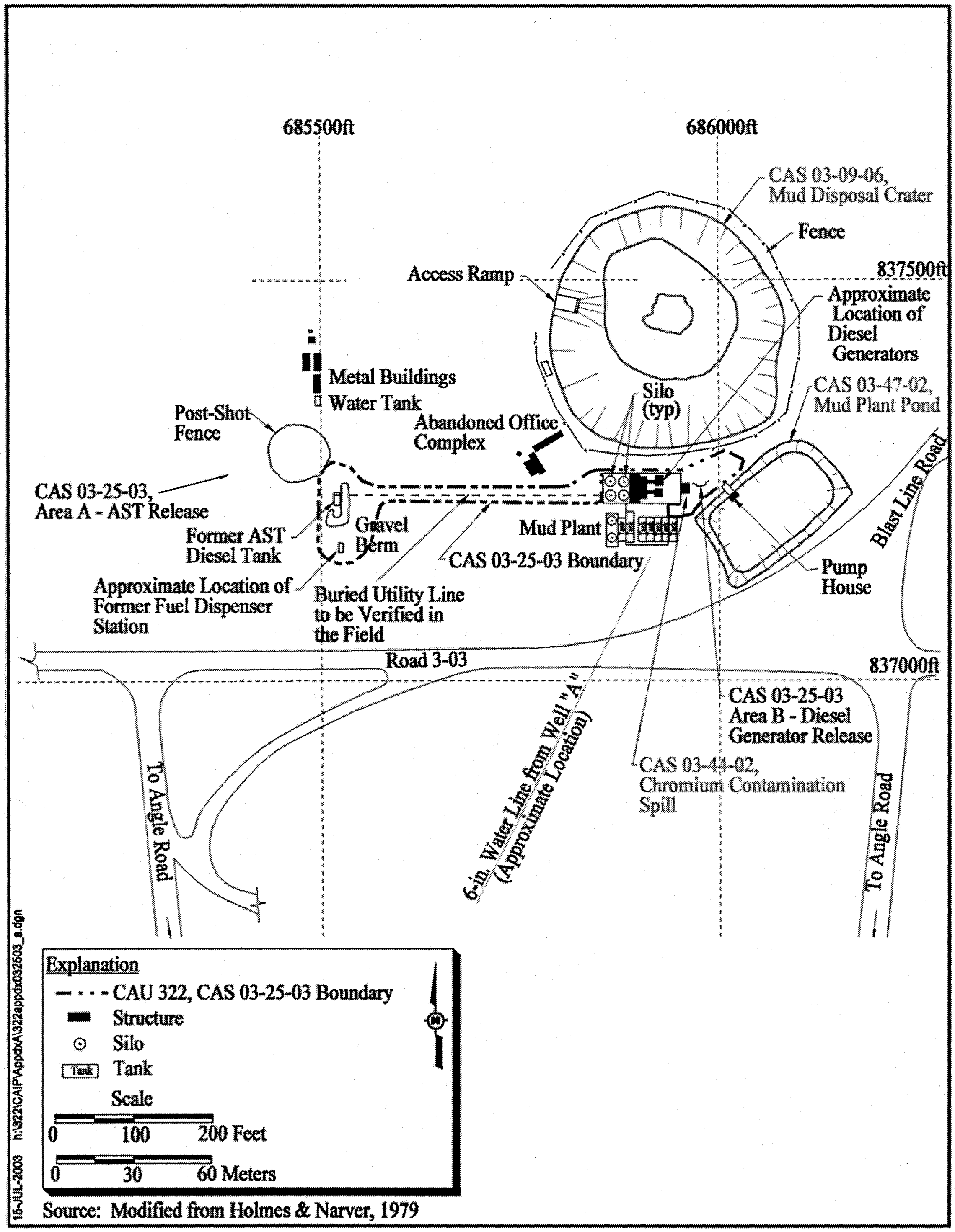


Figure A.1-4
CAS 03-25-03, Site Plan of Mud Plant AST Diesel Release

Sources of Potential Contamination **-** CAS 03-25-03 consists of three petroleum hydrocarbon releases at the former Mud Plant compound. Two of the reported releases occurred in the western portion of the complex referred to as Area A for this investigation and shown on Figure A.1-4. Available documents regarding the Area 3 Camp Mud Plant included information about a release of diesel fuel which occurred at the fuel dispensing station (Area A). The release occurred on February 20, 1992, during the unattended refueling of a service truck. The spill was assigned EPD Case Number 92A03-15 and approximately 50 to 100 gal of diesel fuel was reported to have been spilled. The spill was reported to the EPD on February 24, 1992 (REECo, 1994). Cleanup activities were undertaken following the notification and included the excavation of soil contaminated with diesel fuel oil and the collection of confirmation samples.

A second release of diesel fuel, also in Area A, was discovered during the cleanup of the initial fuel spill. Soil contaminated with fuel oil was observed as a result of a leaking buried valve on the fuel line connecting the AST and the fuel dispensing station. Approximately 8,100 cubic feet (ft^3) of soil was excavated as a result of the two diesel fuel releases. The fuel-contaminated soil was subsequently disposed of in the U-10C crater (Stewart, 1992).

The third hydrocarbon contamination area, within CAS 03-25-03, is located adjacent to the east wall of the Area 3 Camp Mud Plant building (Figure A.1-4 [Area B]). Contaminated soil was discovered when analytical results for CAU 34, CAS 03-44-02, were analyzed for petroleum hydrocarbons and results indicated TPH-DRO concentrations above the PAL of 100 mg/kg. The contamination is believed to be the result of diesel generators that were stored and/or operated in the study area. Sources of the contamination might have been overfilling or spills of diesel fuel during operation and refueling of the generators. Another alternative source of the contamination may have been fuel oil originating in the area of the western AST (Area A fuel spill) that migrated downgradient following buried utility lines to the east end of the building.

Radiological analysis may be required to satisfy health and safety planning needs and to support waste management decisions and IDW disposal. However, the radiological data are not intended to guide the identification and delineation of contamination within CAS 03-25-03. In addition, radiological contamination resulting from atmospheric testing is outside the scope of CAU 322.

Previous Investigation Results - The release of diesel fuel at the AST and fuel dispensing station exceeded the State of Nevada action level of 10 ft^3 of soil containing greater than 100 mg/kg TPH and 25 gal of a petroleum product released. Soil samples were collected at the time of the cleanup. A soil sample of the ground surface in the area of the fuel spill had a TPH concentration of 34,600 mg/kg. In addition, two soil samples were collected at a depth of 0.8 ft bgs and had TPH concentrations below the method detection limit of 10 mg/kg.

During the cleanup and excavation of contaminated soil resulting from the fuel spill, the second area of contaminated soil was discovered. Interview statements reported contaminated soil was excavated to a depth of between 10 to 16 ft. Two composite soil samples were collected from the side walls of the excavation. Results of the two sidewall tests were below the method detection limit. However, a bottom sample had a TPH concentration of 55,500 mg/kg.

The third reported area of contaminated soil within CAS 03-25-03 is located adjacent to the east side of the Mud Plant facility. The TPH contamination was detected during the investigation study for CAS 03-44-02, and analytical results indicated TPH (DRO) concentrations above the PAL of 100 mg/kg in 10 of 14 samples. The TPH concentrations in the soil ranged from 60 mg/kg, detected at a depth of 1 to 2 ft bgs, to 23,000 mg/kg detected at a depth of 6 to 7 ft bgs. In addition, samples were analyzed for total chromium, TCLP chromium, VOCs, SVOCs, and RCRA metals. The results of the sampling are presented below:

- VOCs were not detected in soil samples at concentrations exceeding the PALs (EPA, 2002b).
- SVOCs were not detected in soil samples at concentrations exceeding PALs (EPA, 2002b).
- Except for arsenic and chromium, all the total metal results were below PALs (DOE/NV, 2001; EPA, 2002b).
- Radionuclide analyses were at background levels.

The arsenic is considered to be within background levels based on the references presented previously. Chromium was detected at or above the PAL of 450 mg/kg in two soil samples from CAS 03-44-02. The chromium concentrations for the samples exceeding PALs were 530 mg/kg to 450 mg/kg. Additional TCLP chromium analyses were performed for three samples 0.12 mg/L, 0.59 mg/L, and 0.11 mg/L. The presence of chromium was addressed in the CAU 34 CADD/CR and is not addressed in this investigation.

Contaminants of Potential Concern - The critical COPCs identified for this CAS are TPH (DRO and GRO) based on available test results, process knowledge, interviews, and available records.

The noncritical COPCs identified below are based on test results and common NTS concerns:

- SVOCs representative of diesel fuel products
- PCBs, VOCs, RCRA metals, and beryllium are common concerns at the NTS and have not been ruled out based upon process knowledge.
- Radiological-contaminated materials may be present at the site due to prior activities associated with the handling of mud disposal at an adjacent CAS.

A.1.1.3 CAS 03-20-05, Injection Wells

Scope of CAS - CAS 03-20-05 includes the BOP Shop Building, three below grade holding tanks, and an injection well. The BOP Shop structure is located in the LANL Post-Shot Yard and is identified in the NTS Facilities and Infrastructure Database as Building 03-3C-02 (Post-Shot Shop). Markings on the side of the building indicated it is the LAPS Building. For the purpose of this document, the building will be referred to as the BOP Shop. (BN, 2002)

There are three below grade holding tanks located in the interior of the BOP Shop. While the three below grade tanks at the BOP Shop have historically been referred to as holding tanks, they meet the current definition of USTs (NAC 459.9929 [NAC, 2002b], which adopts the 40 CFR 280.12 definition [CFR, 2002]). This regulation states that USTs and their associated piping will be part of the UST system. Therefore, for the purpose of this investigation, the three holding tanks and associated piping described at CAS 03-20-05 will be treated as USTs.

An injection well is located to the east of the BOP Shop and consists of a below grade well vault and injection well. The design of the well vault and the injection well allowed for the separation of liquid phase product from discharged wastewater. As the level of the wastewater rose within the vault, the lighter separate phase product would discharge into the injection well and the remaining wastewater was allowed to infiltrate into the soil below the well vault. In this respect, the well vault resembled an oil/water separator and a dry well.

Soil contamination may be present at the surface and in subsurface soil due to the potential for a release, spill, or discharge of wastewater to the environment at the site. Existing data indicates previous operations at the site included the use of acids, oil, and petroleum hydrocarbon products, and solvents as part of the cleaning of blowout preventer equipment. In addition, the dry well and injection well received discharged wastewater from the holding tanks through a 2-in. buried drain line. Potential for soil contamination exists in the subsurface soil as a result of discharging wastewater into the injection well, dry well, and leakage of wastewater through the bottom of the well vault and sump. Additional sources of potential surface and near-surface soil contamination may have been caused by spillage of wastewater onto the BOP's concrete floor and runoff at the outside edge, and leakage from a buried 2-in. drain line.

The determination of nature and extent will be limited to releases from sources within the CAS boundary. The estimated site boundaries and footprint as identified in PA site visits, historical records, and aerial photographs are shown on Figure A.1-5. However, the boundary of this CAS may change based on the planned effort to define the nature and extent of suspected contamination. Sampling activities are not expected to extend into the boundaries of neighboring areas of environmental concern (e.g., CAU 145, CAS 03-20-08). The investigation of radiological contamination, if necessary, will be limited to the sources associated with the CAS. Radiological contamination associated with atmospheric testing will be addressed by the Soils Project.

Physical Setting and Operational History - The BOP building is a two-story metal frame building with a concrete slab floor. Three below grade holding tanks (i.e., USTs) are located inside the northern end of the building. An office and mezzanine occupied the western side of the building. Bathroom facilities were not observed or documented in the PA information. The top of each holding tank is open and flush with the floor. Each tank has a diameter of approximately 8 ft and depth of about 7 ft. Below each tank is a sump constructed of steel casing. The walls of the tanks are steel and the bottom of the tanks are concrete. It is believed that each sump is about 8-in. diameter and 35-ft deep and is an integrated/closed unit with the holding tank. The sumps were constructed on a steel casing and reported to be sealed. The PA documentation indicated two of the tanks (eastern and

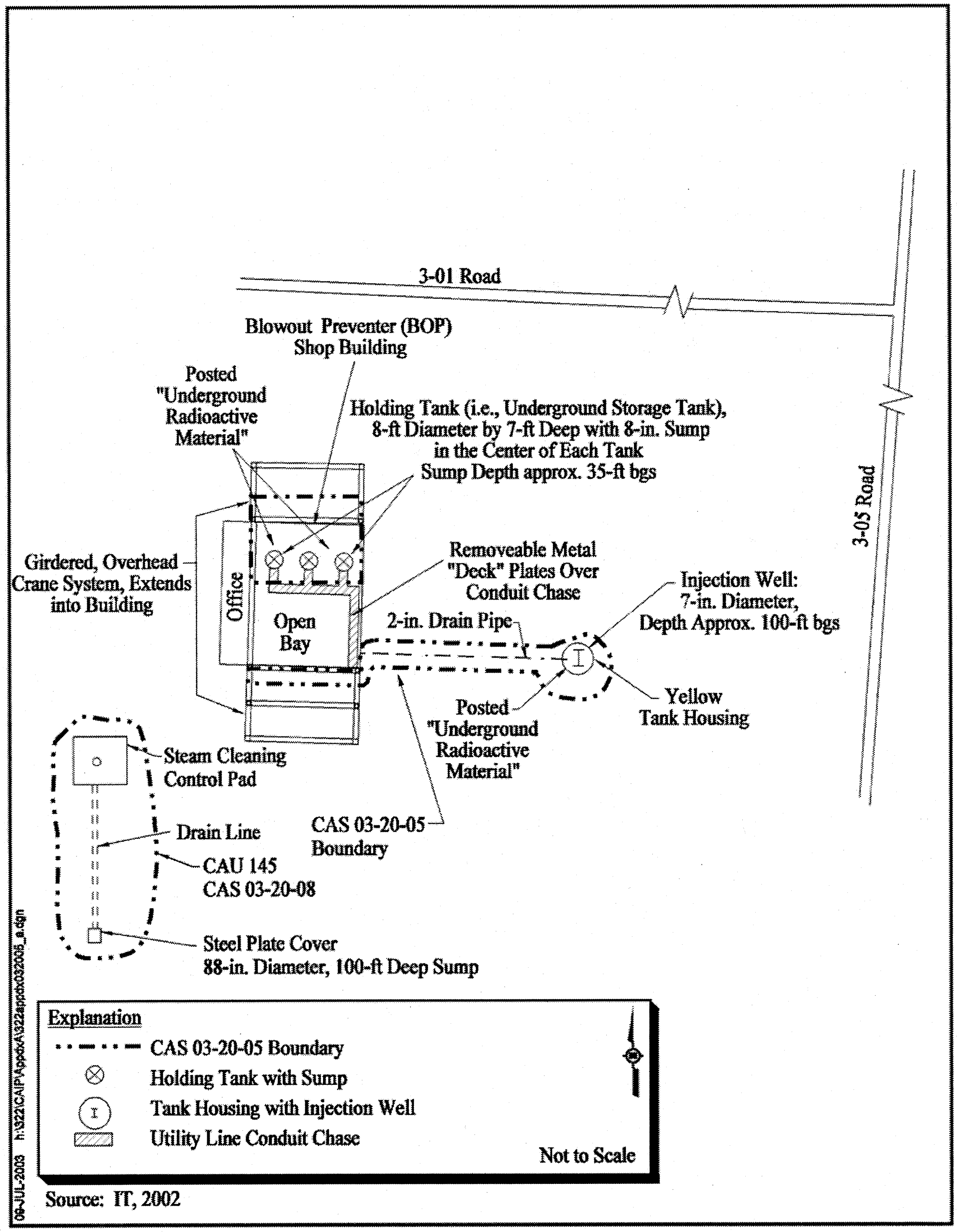


Figure A.1-5
CAS 03-20-05, Site Map Injection Wells

western) were used in the cleaning and servicing of the blowout equipment. The center tank was not used in the servicing of the blowout equipment. Two of the tanks are posted, "Underground Radioactive Material," and all three are covered with circular steel plates.

An injection well is located about 50 ft east of the BOP building and adjacent to the demolished Linesman Shop. The injection well is housed within a circular, below ground well vault structure. Documentation indicated the bottom of the well vault was crushed stone. A 2-in. drain line enters the well vault from the west (direction toward the BOP building). The well vault and injection well are covered by an aboveground steel protective shelter approximately 7 ft in diameter with a height of about 3-1/24 ft. Access to the interior of the shelter is limited. The shelter is painted yellow and has a posted warning that reads, "Underground Radioactive Material," and is surrounded by an orange, high-visibility fence (Figure A.1-5).

Documentation indicated the injection well has a casing diameter of approximately 7-in. and depth of about 100 ft bgs. Photographs of the interior of the shelter revealed a circular well vault (depth not available) and the well casing extended above the bottom of the vault. A residual material of an undetermined nature covered the bottom of the vault. Documentation about the construction of the well vault (e.g., concrete sides) was not available. The 2-in. diameter pipe, which enters the vault from the west side, is believed to be the drain from the holding tanks. The casing of the injection well extends above the bottom of the well vault, and the invert of the 2-in. drain appears to range between 6- to 8-in. below the top of the injection well casing.

The well vault appeared to have contained liquids (e.g., wastewater) based on the appearance of a stain along the inside wall of the vault. In addition, the raised position of the well casing would have allowed the well vault and injection well to perform as an oil/water separator. A rise of the wastewater level within the vault would have allowed floating material and separate phase product, if any, to drain into the well and allow the remaining wastewater to infiltrate the soil beneath the vault (i.e., the vault is a dry well).

Documentation revealed the sump casing within each holding tank extends above the bottom of the tank floor (24 in.) and is fitted with a flanged end. Interview information indicated blowout preventer equipment was bolted to the flange and cleaned using air pressure and water mixed with a variety of chemicals (e.g., acid, hydraulic oil, solvents). Wastewater was stored in the holding tanks during the cleaning operations and discharged periodically to the injection well (IT, 2002).

Based on interview information, the holding tank and the sump were a closed system and sealed to prevent leakage of cleaning fluid into the surrounding subsurface. Documentation also indicated the operation for cleaning and testing of the blowout preventer equipment was performed in the two outer tanks at the site and the center tank was empty.

In addition, documented interviews with former plant operators revealed the injection well became clogged with waste material and subsequent discharges of wastewater were pumped to a concrete decontamination pad located west of the BOP building. The scope of CAU 145, CAS 03-20-08 (currently pending preliminary assessment), includes the evaluation of the discharge of wastewater at the decontamination pad.

The facilities were deactivated and decommissioned in December 1989 and are currently inactive.

Sources of Potential Contamination - Information indicates the wastewater liquid from the BOP holding tanks contained water, solvents, lubricating oils, oil and grease, and possibly radionuclides. The estimated monthly discharge was about 20 gal per month based on information from interviews with former employees (IT, 2002). The discharge of wastewater into the well vault and injection well potentially contaminated the underlying subsurface soil and groundwater around and beneath the well vault and the injection well. Other potential sources of contamination include runoff of wastewater from the building floor to the soil along the front and rear of the BOP building. In addition, a possible release of contaminated wastewater might have occurred into the underlying soil if the buried 2-in. drain pipe had a leak or a possible disconnect.

Radiological analysis is anticipated to be performed on the floor of the building, the interior of the holding tanks, and the interior of the well vault. In addition, radiological analysis may be required to satisfy health and safety planning needs and to support waste management decisions and IDW disposal. Radiological contamination associated with atmospheric testing is outside the scope of CAU 322.

Previous Investigation Results - Preliminary sampling and analysis was conducted by BN in 2001 on samples of liquid, soil, and sludge from within the holding tanks, well vault, and injection well to determine the concentration of VOCs, SVOCs, TPH, total metals, and radionuclides.

- VOCs were not detected in soil and liquid samples at concentrations exceeding the PALs (EPA, 2002b).
- SVOCs were detected in liquid samples at concentrations exceeding PALs (EPA, 2002b).
- TPH was detected in soil and sludge samples at concentrations exceeding PALs (EPA, 2002b).
- Radionuclide data was not available.

Except for arsenic, all the total RCRA metal results were below PALs (EPA, 2002b).

Contaminants of Potential Concern - The following critical COPCs identified for this CAS are based on prior test results, interviews, and process knowledge:

- TPH (DRO and GRO), hydraulic oil, and oil and grease from the servicing and decontamination of equipment
- VOCs: Chlorobenzene, isopropylbenzene, n-propylbenzene; 1,2,4-trimethylbenzene; 1,2-dichlorobenzene; 1,3,5-trimethylbenzene; o-xylene; chloroform, choroethane; chloromethane
- SVOCs: 4-methylphenol, bis (2-ethylhexyl) phthalate, and naphthalene
- Radionuclides: Cs-137; Sr-90; and Pu-238, -239/240; Am-241; and U-234, -235 from the posted radioactive warning signs and process knowledge for the decontamination of drilling equipment
- RCRA metals: Arsenic
- Polychlorinated biphenyls are common concerns at the NTS and have not been ruled out based upon process knowledge

Similarly, the noncritical COPCs identified below are based on interviews, common NTS concerns, and process knowledge:

- The remaining VOCs and SVOCs in the target compound list (TCL) and metals are representative of the constituents in the waste liquid and decontamination of drilling equipment.

A.1.2 Seven-Step DQO Process

This section presents the seven-step DQO process for an investigation as applied to CAU 322.

A.1.2.1 Step 1 – State the Problem

This step identifies the DQO planning team members, describes the problem that has initiated the CAU 322 site investigation, and develops the CSMs.

A.1.2.2 Planning Team Members

The DQO planning team consists of representatives from NDEP; NNSA/NSO; Shaw Environmental, Inc. (Shaw); and BN. The primary decision-makers include NDEP and NNSA/NSO representatives. Table A.1-2 lists representatives from each organization in attendance at the DQO meeting on February 10, 2003.

Table A.1-2
DQO Meeting Participants

Participant	Affiliation	Function
Syl Hersh	Shaw	Quality Processes Representative
Sabine Curtis	NNSA/NSO	Environmental Restoration Division Task Manager
Amber Steed	Shaw	Preliminary Assessments Liaison
Dudley Emer	BN	Task Manager
Lynn Kidman	Shaw	IS Task Manager
George Petersen	Shaw	IS CAU Lead
Charlotte Franky	Shaw	Environmental Compliance and Waste Management Lead
Steve Mergenmeier	Shaw	Quality Processes Representative
Greg Raab	NDEP	Oversight/Representative

BN - Bechtel Nevada
IS - Industrial Sites
Shaw - Shaw Environmental, Inc.
NDEP - Nevada Division of Environmental Protection
NNSA/NSO - U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office

A.1.2.3 Describe the Problem

Corrective Action Unit 322 is being investigated because:

- Oil, grease, hazardous and/or radioactive constituents may be present at concentrations and locations that could potentially pose a threat to human health and the environment.
- Disposed waste may be present without appropriate controls (i.e., use restrictions, adequate cover).
- Effluent discharges into the dry well and injection wells potentially contaminated the soil surrounding the discharge structures and possibly groundwater.

As a result of the above activities, hazardous and/or radioactive constituents may be present at these CASs at concentrations that could pose a potential threat to human health and the environment. The problem statement for CAU 322 is, "Existing information as to the nature and extent of potential contamination is insufficient to evaluate and recommend corrective action alternatives."

A.1.2.4 Develop Conceptual Site Model

Two CSMs have been developed for CAU 322 using assumptions formulated from the physical setting, potential contaminant sources and release information, and historical background information. The applicability of the following CSMs to each CAS is summarized in Table A.1-3 and discussed in the following sections.

The CSMs describe the most probable scenarios for current conditions at specific sites and define the assumptions that are the basis for identifying appropriate sampling strategy and data collection methods. They set the stage for assessing how contaminants could reach receptors both in the present and future by addressing contaminant nature and extent, transport mechanisms and pathways, potential receptors, and potential exposures to receptors. An accurate CSM is important because it serves as the basis for all subsequent inputs and decisions throughout the DQO process.

The CSMs are termed:

- Surface/Near-Surface, CSM #1
- Deep Injection, CSM #2

Section A.1.2.4.1 and Section A.1.2.4.2 develop and discuss these two CSMs, respectively.

Table A.1-3
Conceptual Site Models and Applicable CASs

Conceptual Site Models	01-25-01	03-25-03	03-20-05
Surface/Near-Surface	AST and possible buried distribution piping	AST and fuel dispenser, diesel generator, and buried distribution piping	Spill/run-off from floor slab; buried distribution piping and leakage of holding tanks
Deep Injection	----	----	Subsurface holding tank sumps and injection wells

An important element of a CSM is the expected fate and transport of contaminants, which infer how contaminants move through site media and where they can be expected in the environment. The expected fate and transport is based on distinguishing physical characteristics of the contaminants and media. Contaminant characteristics include solubility, density, particle size, and affinity to nonmobile particles. Media characteristics include permeability, saturation, sorting, chemical composition, adsorption coefficients, porosity, and hydraulic conductivity. In general, contaminants with low solubility and high density can be expected to be found relatively close to release points. Contaminants with high solubility and low density can be expected to be found further from release points or in areas where settling may occur.

Vapor phase diffusion is limited by the vapor pressure of the contaminant and is expected to be limited to relatively short distances from the contaminant source. Migration attributed to each of these driving forces under conditions found at the NTS would result in contaminant concentrations that decrease with distance from the contaminant source.

A.1.2.4.1 Surface/Near-Surface, Conceptual Site Model #1

The Surface/Near-Surface CSM #1 applies to the release of fuel oil at the ASTs, fuel dispensing station, and near-surface fuel contamination at CASs 01-25-01 and 03-25-03. For illustrative purposes, surface and near-surface discharge mechanisms at CAS 03-20-05 are presented in CSM #2. The possible spillage of wastewater potentially caused runoff across the BOP Shop floor slab. Surface spillage and the discharge of wastewater to the well vault potentially caused a release of contaminants to the soil.

Upon release from the source, the fuel product and/or wastewater is anticipated to have spread over the ground surface and infiltrated into the ground affecting the surface and shallow subsurface soil. For the near-surface release, the products infiltrated directly into the surface soil surrounding the release point and into the nearby soil. Figure A.1-6 shows a generalized representation of the Surface/Near-Surface CSM #1. The following discussion of the CSM #1 parameters provide additional details to supplement this model.

Exposure Scenario - The land-use designation for CASs 01-25-01 and 03-25-03 is within the Nuclear and High Explosive Test Zone for additional underground nuclear weapons tests and outdoor high-explosive tests. Based on the land-use designations, the potential for exposure to contaminants is limited to construction and industrial workers who may be exposed to COPCs through inadvertent oral ingestion, inhalation, or dermal contract (absorption) of soils and/or debris during excavation or other activities that would distribute the potentially contaminated soils.

Affected Media - The potentially affected medium is the surface and shallow subsurface soil beneath the former AST and associated underground piping, and surface soil throughout the CASs.

Location of Contamination/Release Points - The highest concentrations of contamination are expected to be beneath the outlet and piping connection of the AST and any breaches in the associated buried piping, in the area of the former fuel dispenser station, and in the area of the former diesel generators. Migration of contamination would be expected to be primarily downward with horizontal migration to a lesser extent.

Transport Mechanisms - Infiltration and percolation of liquid fuel and precipitation through soil serve as driving forces for downward migration.

Preferential Pathways - Preferential pathways for contaminant migration at CASs 01-25-01, 03-25-03, and 03-20-05 (for surface spills) are anticipated to be vertically into the soil. The presence of relatively impermeable layers (e.g., caliche layers, buried utilities) could modify transport pathways both on the ground surface and in the subsurface. At CASs 01-25-01 and 03-25-03, small gullies, ground-surface grading, and buried utilities, if present, could channel runoff and increase lateral transport prior to infiltration. Contamination could travel laterally to a small degree under all three scenarios, prior to infiltration. Although the preferential pathways for contaminant migration will be considered in the development of sampling schemes and sampling contingencies discussed in the CAIP, primary consideration will be given to the release mechanisms.

Lateral and Vertical Extent of Contamination - The degree of contaminant migration, if any, at these sites is unknown, but it is assumed to be minimal based on the ambient environmental conditions at the NTS such as low precipitation (i.e., 3 to 10 in. per year), high evapotranspiration, and the limited mobility of COPCs (USGS, 1975). If contamination is present, it is expected to be limited to the surface and shallow subsurface at the site. Concentrations of contamination are expected to decrease with depth and distance from release points. Migration of contamination for release scenarios would be expected to be primarily downward, with horizontal migration to a lesser extent. Surface migration may occur as a result of storm events when precipitation rates exceed infiltration (stormwater runoff). However, these events are infrequent. Surface migration is a biasing factor considered in the selection of sampling points. As stated previously, downward contamination transport is expected to be very limited but is unknown because the quantities of hazardous material released is unknown.

Infiltration and percolation of precipitation through subsurface media and vapor phase diffusion serve as the major driving forces for migration of contaminants. However, due to the arid environment, the magnitude of infiltration and percolation of precipitation at the NTS is very small and migration of contaminants has been shown to be very limited. Evapotranspiration and arid environment greatly exceeds the infiltration of precipitation. The annual potential evaporation rate ranges from 60 to 82 in. per year, or roughly 5 to 25 times the annual precipitation. (USGS, 1975).

Groundwater contamination is not considered a likely scenario at CAU 322, due to minimal precipitation, high evapotranspiration, strong attenuation of suspected contaminants in the soil, and significant depths to groundwater. For example, the depth to groundwater at Area 1 is approximately 750 ft bgs at CAS 01-25-10, as measured in UE-16d Eleana Water Well located approximately 1-1/2 mi west of the site. The regional water table is assumed to be at about 1,600 ft bgs in Area 3 at CAS 03-25-03, as measured in U.S. Geological Survey (USGS) Water Well A located southeast of CAS 03-20-03 (USGS, 2002).

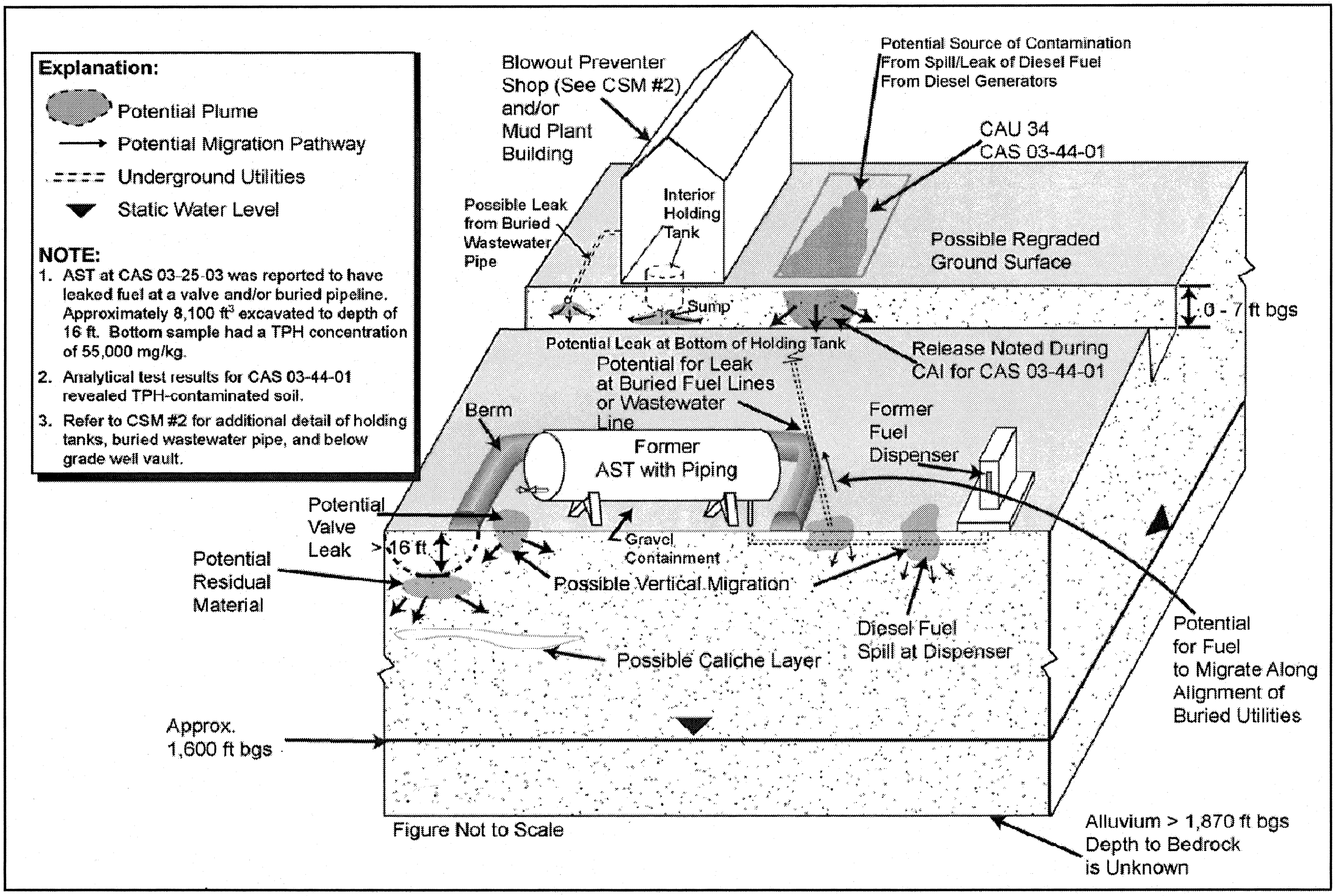


Figure A.1-6
Surface/Near-Surface Conceptual Site Model #1 for CAU 322, CASs 03-25-03 and 01-25-01

In addition, contaminants migrating to regional aquifers are not considered a likely scenario at CAU 322 due to the low mobility of expected COPCs (e.g., SVOCs, petroleum hydrocarbons, metals).

A.1.2.4.2 Deep Injection, Conceptual Site Model #2

Discharges of wastewater and potential hazardous materials to the well vault and in an unpermitted injection well are creating probable soil contamination and the potential for groundwater contamination. Wastewater discharges into the wells may be causing contaminants to build up in subsurface soil.

The Deep Injection CSM #2 applies to CAS 03-20-05. Effluent wastewater was discharged into the dry well and into deep injection wells. The bottom of the dry well was reported to be gravel stone covered with an oily residue. The bottom of the well vault is not known; however, it is expected to be less than 10 ft bgs. The injection well is expected to be 100 ft bgs with a screened casing forming the bottom portion of the well. The screen casing would allow for the infiltration and percolation of the wastewater into the subsurface soil. The length of the screened portion is not known. Figure A.1-7 shows a general representation of the Deep Injection CSM #2.

Exposure Scenario - The land-use designation for CAS 03-20-05 is within the Nuclear and High Explosives Test Zone for additional underground nuclear weapons tests and outdoor high-explosive tests. Based on this land-use designation, the potential for exposure to contaminants is limited to construction and industrial workers who may be exposed to COPCs through inadvertent oral ingestion, inhalation, or dermal contract (absorption) of soils and/or debris during excavation or other activities that would distribute the potentially contaminated soils.

Affected Media - Subsurface soil surrounding and beneath the base of the injection wells. Although the depth of this well (approximately 100 ft) is well above the regional water table (approximately 1,600 ft bgs), the potential for groundwater contamination exists from repeated discharge at these point source locations. This potential for groundwater contamination is greater from subsurface release rather than for discharges directly to the land surface because vertical movement of contaminated water released into the subsurface will not be affected by evaporation and the continued release would tend to push the contamination deeper into the subsurface.

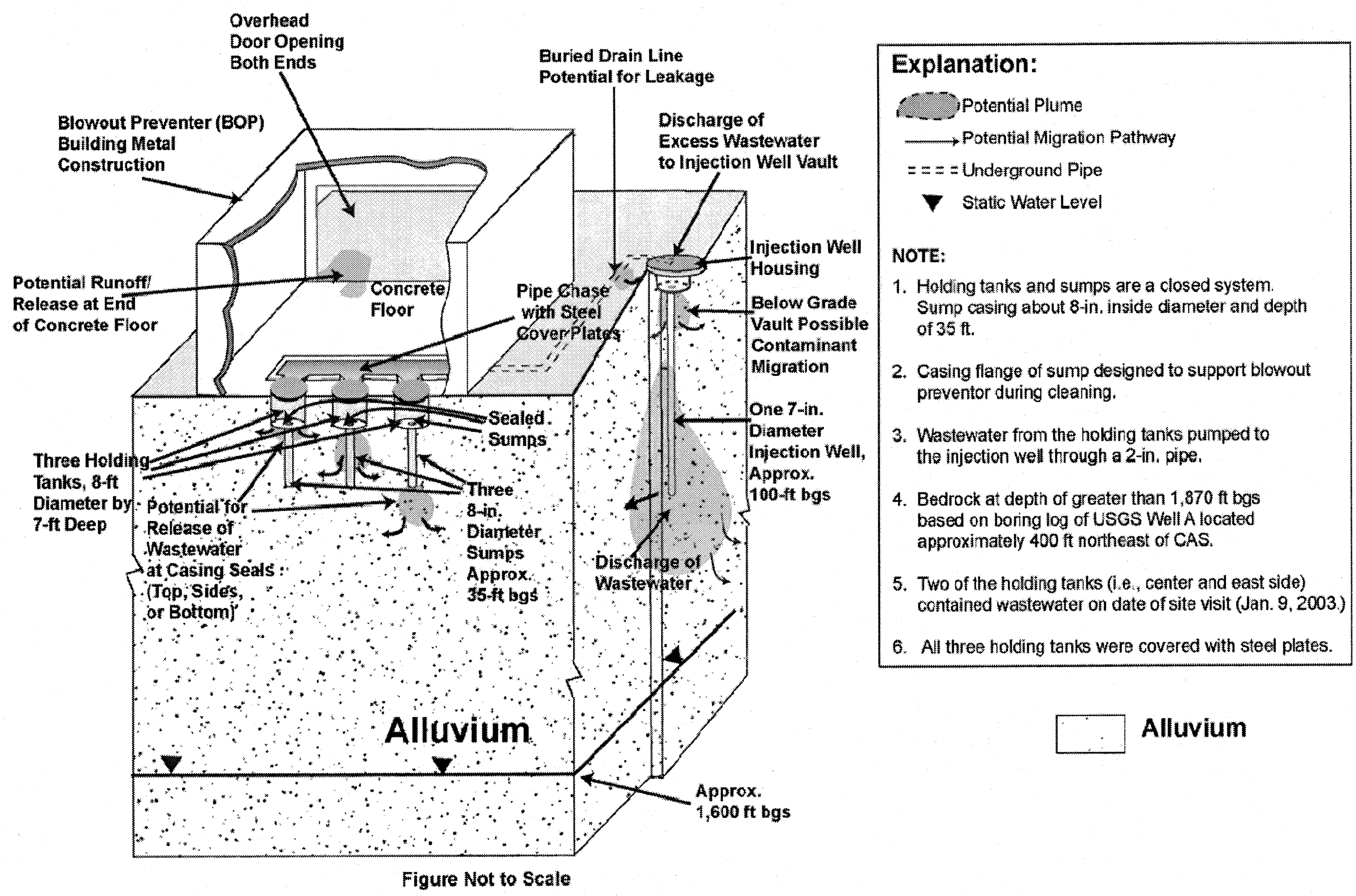


Figure A.1-7
Deep Injection Conceptual Site Model #2 for CAU 322, CAS 03-20-05

In addition to the potential release of contaminants through the injection wells, if the tanks leaked or fluid spilled, contamination would have been released onto the concrete floor to the building and then flowed onto the adjacent soil outside of the building.

Location of Contamination/Release Points - The injection well is believed to have multiple release points through a screened casing. If present, soluble contaminants are expected throughout the length of the injection well with large particle contaminants expected at the lower portions of the injection wells. In addition, contaminant release might have occurred (1) at the edges of the concrete slab surrounding the three holding tanks, (2) within the steel housing of the external injection well, and (3) beneath any breaches in the buried drain lines.

Transport Mechanisms - The injection of wastewater into the injection wells was the primary transport mechanism. Infiltration and percolation through soil is a secondary mechanism that moves contaminants deeper into the soil. Prior to sealing the wells beneath the holding tanks, liquid waste in the tanks served as a continuing source of contamination.

Preferential Pathways - Preferential pathways for contaminant migration continues to be a downward movement of contaminants through the gravel-filled injection wells and any potential surface runoff from the concrete pad of the building. Contaminants would be expected to migrate away from the release point, primarily downward and, to a lesser degree, horizontally.

Lateral and Vertical Extent of Contamination - The degree of contamination migration at the dry wells are unknown, but is assumed to be greatest at near the bottom of the wells. Percolation of contaminants at the surface is assumed to be minimal because of low precipitation (i.e., 3 to 10 in. per year), high evapotranspiration, and the mobility of COPCs (USGS, 1975). Any contamination in the injection wells is anticipated to be contiguous with contamination increasing with depth and decreasing with distance from the release point.

A.1.3 Step 2 - Identify the Decision

This step is to identify the decision that requires new environmental data to address each CAS's potential contamination problem. It identifies decisions and alternative actions needed for performing an effective Phase 1 and possibly Phase II investigation(s).

A.1.3.1 Develop a Decision Statement

The primary problem statement is, "Insufficient amount of information available concerning the nature and extent of contamination potentially released at CASs to determine if there is an unacceptable risk to human health and the environment." Because existing information at these CASs is insufficient to resolve the problem statement, the following two decision statements have been established as criteria for determining the adequacy of the data collected during the CAI.

Decision I statement is, *"Is a contaminant present within a CAS at a concentration that could pose an unacceptable risk to human health and the environment."* Any contaminant detected in the environmental media at concentrations exceeding the corresponding PALs, defined in Section A.1.4.2, will be considered a COC for the purpose of evaluating risk to human health and the environment. The presence of a contaminant within each CAS is defined as the analytical detection of a COC. Samples used to resolve Decision I are identified as Phase I samples.

The Decision II statement is, *"If a COC is present, is sufficient information available to evaluate appropriate corrective action alternatives?"* Sufficient information is defined as the data needs identified in this DQO process to include the maximum lateral and vertical extent of all COCs within each CAS. Samples used to resolve Decision II are identified as Phase II samples.

A.1.3.2 Alternative Actions to the Decision

For each decision identified in the previous section there is an alternative decision.

The alternative for Decision I is, "If no COCs are present, further assessment of the CAS is not required. If a COC is present, resolve Decision II."

The alternative for Decision II is, "If the extent of COCs are defined in both the lateral and vertical directions, further assessment of the CAS is not required. If the extent of COCs are not defined, reevaluate site conditions and collect additional samples."

A.1.4 Step 3 - Identify the Inputs to the Decision

This step identifies the information needed, determines sources for information, determines the basis for establishing the action levels, and identifies sampling and analysis methods that can meet the data requirements. To determine if a COC is present, each sample result or population parameter (Section A.1.6.1) is compared to the PAL (Section A.1.4.2). If any sample result or population parameter is greater than the PAL, then the CAS is advanced to Decision II (define the lateral and vertical extent) for that analyte. This approach does not use a statistical mean/average for comparison to the PAL, but rather the individual result, to identify COCs.

A.1.4.1 Information Needs and Information Sources

In order to determine if a COC is present at a CAS, sample data must be collected and analyzed following these two criteria: (1) samples must be collected in areas most likely to contain a COC, and (2) the analytical suite selected must be sufficient to detect any COCs present in the samples. Biasing factors to support these criteria include:

- Previous sample results
- Documented process knowledge on source and location of release
- Field observations
- Field-screening data
- Experience and data from investigations of similar sites
- Professional judgment

In order to determine the extent of a COC for Decision II, sample data must be collected and analyzed at locations to bound the lateral and vertical extent of COCs. The data required to satisfy the information needed for each COC is a sample result that is below the PAL. Step-out locations as defined in Section A.1.8 will be selected. Samples will only be analyzed for those parameters that exceeded PALs (i.e., COCs) in prior samples. Biasing factors to support these information needs may include the factors previously listed and Phase I analytical results.

When analytical results or other biasing factors suggest that the COC concentrations at the step-out location(s) may still exceed the PAL, then an additional step-out distance may be used to define the lateral extent of contamination. At CAS 01-25-01, the step-out location will be limited to the lateral limits of the gravel containment area berm. At CASs 03-25-03 and 03-20-05, the step-out locations will be limited to not more than 25 ft outside the lateral boundaries or physical features. If a location where the PAL is exceeded is surrounded by clean locations, then lateral step-outs may not be necessary. In that case, sampling may consist only of sampling from deeper intervals at or near the original location to determine the vertical extent of contamination. Vertical extent samples will be collected from depth intervals that will meet DQO objectives in a manner that will conserve resources during possible remediation. Biasing factors to support these information needs may include the factors previously listed and Phase I analytical results. Sampling locations may be moved due to access, underground utilities, or safety issues; however, the modified locations must meet the decision requirements and criteria necessary to fulfill the information needs.

Table A.1-4 lists the information needs, the source of information for each need, and the proposed methods to collect the data needed to resolve Decisions I and II. The last column addresses the QA/QC data type and associated metric. The data type is determined by the intended use of the resulting data in decision making, such as selecting the appropriate corrective action.

Data types are discussed in the following text. All data to be collected are classified into one of three measurement quality categories: quantitative, semiquantitative, and qualitative. The categories for measurement quality are defined below.

Quantitative Data

Quantitative data results from direct measurement of a characteristic or component within the population of interest. These data require the highest level of QA/QC in collection and measurement systems because the intended use of the data is to resolve the primary decision (i.e., rejecting or accepting the null hypothesis) and/or verifying closure standards have been met. Laboratory analytical data are usually assigned as quantitative data.

Semiquantitative Data

Semiquantitative data is generated from a measurement system that indirectly measures the quantity or amount of a characteristic or component of interest. Inferences are drawn about the quantity or amount of a characteristic or component because a correlation has been shown to exist between results from the indirect measurement and the quantitative measurement. The QA/QC requirements on semiquantitative collection and measurement systems are high but may not be as rigorous as the quantitative measurement system. Semiquantitative data contribute to decision making, but are not generally used alone to resolve primary decisions. Field-screening data are generally considered semiquantitative. The data are often used to guide investigations toward quantitative data collection.

Table A.1-4
Information Needs to Resolve Decisions I and II
(Page 1 of 3)

Information Need	Information Source	Collection Method	Biasing Factors to Consider	Data Type/Metric
Decision I (Phase I): Determine if a COC is present. Criteria I: Samples must be collected in areas most likely to contain a COC.				
Source and location of release points	Process knowledge, historical documentation, and previous investigations of similar sites	Information documented in CSM and public reports – no additional data needed	None	Qualitative - CSM has not been shown to be inaccurate
	Field observations	Conduct site visits and document field observations	Visible evidence of contamination, topographic lows, gullies	Qualitative - CSM has not been shown to be inaccurate
	Aerial photographs	Review and interpret aerial photographs	Disturbed areas, visible evidence of contamination, location of possible sources	Semiquantitative - Sampling based on biasing criteria stipulated in DQO Step 3
	Field screening	Review and interpret field-screening results (FSRs)	Bias sample locations/ intervals based on elevated FSRs	Semiquantitative - Sampling based on biasing criteria stipulated in DQO Step 3
	Radiological surveys	Review and interpret radiological surveys	Bias sample locations/ intervals based on elevated FSRs	Semiquantitative - Sampling based on biasing criteria stipulated in DQO Step 3
	Existing analytical data	Review and interpret sampling results	Bias sample locations based on previous results	Semiquantitative - Sampling based on biasing criteria stipulated in DQO Step 3
Nature of contamination	Biased samples	Collect samples from locations/depths based on biasing factors	Send samples with highest survey/screening results to laboratory	Semiquantitative - Sampling based on survey and screening results
	Biased samples	Collect samples from additional locations near CAS features	Worst-case locations such as edge of pad	Semiquantitative - Sampling based on CAS features

Table A.1-4
Information Needs to Resolve Decisions I and II
(Page 2 of 3)

Information Need	Information Source	Collection Method	Biasing Factors to Consider	Data Type/Metric
Decision I (Phase I): Determine if a COC is present. Criteria 2: Analyses must be sufficient to detect any COCs in samples.				
Identification of all potential contaminants	Process knowledge and previous investigations of similar sites; use analytical suite in Table A.1-6.	Information documented in CSM and public reports – no additional data needed; comprehensive analytical suite developed to account for uncertainty	None	Qualitative - CSM has not been shown to be inaccurate
Analytical results	Data packages from biased samples	Appropriate sampling techniques and approved analytical methods will be used; minimum reporting limits (MRLs) are sufficient to provide quantitative results for comparison to PALs	None	Quantitative - Validated analytical results will be compared to PALs
Decision II (Phase II): Determine the extent of a COC. Criteria: Sample collection and analysis methods must be sufficient to bound extent of COC.				
Identification of applicable COCs	Data packages of Phase I samples	Review analytical results and compare to PALs to select COCs	None	Quantitative - Only COCs identified will be analyzed in future sampling events
Extent of contamination	Field observations	Document field observations	Visible evidence of contamination	Qualitative - CSM has not been shown to be inaccurate
	Field screening	Conduct field screening using appropriate methods	Bias sample locations/ intervals based on FSRs	Semiquantitative - FSRs will be compared to field-screening levels
	Step-out samples	Generate locations based on previous sampling results and biasing factors	Locations selected based on the initial sampling results for both horizontal and vertical sampling	Semiquantitative - Sampling based on previous results and biasing factors
	Data packages of analytical results	Appropriate sampling techniques and approved analytical methods will be used to bound COCs; MRLs are sufficient to provide quantitative results for comparison to PALs	None	Quantitative - Validated analytical results will be compared to PALS to determine COC extent

Table A.1-4
Information Needs to Resolve Decisions I and II
(Page 3 of 3)

Information Need	Information Source	Collection Method	Biasing Factors to Consider	Data Type/Metric
Decision: Determine if sufficient information exists to characterize waste. Criteria: Analyses must be sufficient to allow disposal options to be accurately identified and estimated.				
Analytical results	Data packages of analytical results; use analytical suite in Table A.1-6; require TCLP if results are >20X TCLP limits or if PCB contamination exceeds 50 ppm	Appropriate sampling techniques and approved analytical methods will be used; MRLs and minimum detectable activities are sufficient to provide quantitative results for comparison to disposal requirements	Sufficient material must be available for analysis	Quantitative - Validated analytical results will be compared to disposal criteria

Qualitative Data

Qualitative data identifies or describes the characteristics or components of the population of interest. The QA/QC requirements for qualitative data are the least rigorous on data collection methods and measurement systems. Professional judgment is often used to generate qualitative data. The intended use of the data is for information purposes, to refine conceptual models, and guide investigations rather than resolve primary decisions. This measurement of quality is typically associated with historical information and data where QA/QC may be highly variable or not known. Professional judgment is often used to generate qualitative data.

Metrics provide a tool to determine if the collected data support decision making as intended. Metrics tend to be numerical for quantitative and semiquantitative data and descriptive for qualitative data.

A.1.4.2 Determine the Basis for the Preliminary Action Levels

Industrial site workers and construction/remediation workers may be exposed to contaminants through oral ingestion, inhalation, external (radiological), or dermal contact (absorption) of soil during disturbance of this media. Laboratory analytical results for soils will be compared to the following PALs to evaluate if COPCs are present at levels that may pose an unacceptable risk to human health and/or the environment (i.e., COCs):

- EPA Region IX Risk-Based PRGs for Industrial Soils (EPA, 2002b).
- For detected COPCs without established PRGs, a similar protocol to that used by EPA Region IX will be used in establishing an action level for those COPCs listed in IRIS (EPA, 2002a)
- Background concentrations for RCRA will be used instead of PRGs when natural background exceeds the PRG, as is often the case with arsenic on the NTS. Background is considered the mean plus two times the standard deviation of the mean for sediment samples collected by the Nevada Bureau of Mines and Geology throughout the Nevada Test and Training Range (formerly the Nellis Air Force Range) (NBMG, 1998; Moore, 1999).
- TPH action level of 100 mg/kg per the NAC 445A.2272 (NAC, 2002a).
- The PALs for radionuclides are isotope-specific and defined as the maximum concentration for that isotope found in environmental samples taken from undisturbed background locations in the vicinity of the NTS, as presented in McArthur and Miller (1989) and US Ecology and Atlan-Tech (1991). The PAL is equal to the minimum detectable activity (MDA) for isotopes not reported in soil samples from undisturbed background locations or if the PAL is less than the MDA. PALs are defined as the isotope-specific concentration in units of pCi/g and presented in Table 3-4 of the CAIP.

The assumptions used were soil is likely to be disturbed due to present or future construction activities, activities involving earthmoving, and/or industrial or commercial activities; children will not be present; and there will be no dwellings on site. The critically exposed group consists of adult workers exposed to external radiation and/or subjected to inhalation and ingestion of suspended contaminated soil. The doses from construction and earthmoving activities are likely to be short-term; therefore, the screening limits will be more conservative than long-term exposures.

A.1.4.3 Potential Sampling Techniques and Appropriate Analytical Methods

As defined in Step 3, the collection, measurement, and analytical methods will be determined such that results will be generated for all of the identified potential contaminants as well as other suspected contaminants at a CAS. This effort will include field sampling, soil sampling, and laboratory analysis to determine the presence of COPCs and extent of identified COCs.

For the three CASs, site characterization sampling and analysis are the focus of the DQO process. However, waste characterization sampling and analysis has been included to support the decision-making process for waste management and to ensure an efficient field program. Soil samples will be submitted for IDW analysis, as necessary. Specific analyses required for the disposal of IDW are identified in Section 5.0 of the CAIP.

A.1.4.3.1 Geophysical Surveys

Electromagnetic surveys will be used to determine presence/lateral extent of buried utility lines, buried structures, and potential for buried waste at CASs 03-25-03 and 03-20-05. Resistivity surveys will be used to determine presence/vertical depth of possible buried utilities, buried structures, and waste.

A.1.4.3.2 Field Screening

Field-screening activities may be conducted for the following analytes and/or parameters:

- ***Alpha, Beta, and Gamma Radiation*** - A handheld radiological survey instrument or method may be used because radiologically contaminated soil or concrete may be present at CASs 03-25-03 and 03-20-05 based on the historical information and posted sign warnings of potential for radiological contamination.

- ***Gamma Radiation*** - Gamma spectroscopy, or equivalent instrument or method, may be used on an as needed basis at CASs 03-20-03 and 03-25-03. Gamma spectroscopy may be needed at CAS 03-20-05 injection wells and the BOP Shop based on process knowledge and posted radiological warning signs. Gamma dose rates may also be monitored during CAS 03-25-03 Mud Plant investigation to determine the potential dose in personnel to gamma radiation from previous site activities at the mud disposal pit.

- ***VOCs*** - A photoionization detector (PID), and/or equivalent instrument or method, will be used to conduct headspace analysis at all CASs because VOCs are a common concern at the NTS and have not been ruled out based on process knowledge at CAU 322.

- ***TPH*** - A gas chromatograph, or equivalent instrument or method, will be used at all CASs because TPH contamination has been detected at CASs 03-25-03 and 03-20-05. It is representative of general characteristics of petroleum hydrocarbon/diesel fuel, and is a common concern at the NTS that has not been ruled out based upon process knowledge at CAU 322.

Based on the results of previous CAU investigations and common NTS practices, the aforementioned field-screening techniques may be applied during Phase I and Phase II sampling at all CASs. These field-screening techniques will provide semiquantitative data that can be used to guide confirmatory soil sampling activities.

A.1.4.3.3 Soil Sampling

Hand sampling, augering, direct-push, excavation, drilling, or other appropriate sampling methods will be used to collect soil samples for laboratory analysis. Sample collection and handling activities will be conducted in accordance with the contractor's approved procedures.

A.1.4.3.4 Analytical Program

The analytical program for each CAS in CAU 322 are listed in Table A.1-5, and was developed based on the suspected-contamination information presented in Section A.1.1. The table identifies the critical and noncritical COPCs for each CAS and Table A.1-6 provides the laboratory methods for each analyte. The COPCs are TPH-DRO and oil-range organics, VOCs, SVOCs, RCRA metals, PCBs, and radionuclides.

The critical and noncritical COPCs are known or suspected of being present at each CAS based on process knowledge, preliminary sampling, and other historic information. The critical COPCs are given greater importance in the decision-making process relative to noncritical COPCs. For this reason, more stringent performance criteria are specified for critical analytical DQIs (Section 6.0 of the CAIP). Noncritical COPCs are defined as classes of contaminants that include all the analytes reported from the respective analytical methods that have PALs. Table A.1-7 lists the analytes for CAU 322. The noncritical COPCs also aid in reducing the uncertainty concerning the history and potential releases from the CAS and help in the accurate evaluation of potential contamination. If a COPC, either critical or noncritical, is detected in any sample at a concentration above the respective PAL, the COPC will be identified as a COC and considered critical in the decision process.

Section 3.0 and Section 6.0 the CAIP provide the analytical methods and laboratory requirements (e.g., detection limits, precision, and accuracy) to be followed during this CAI, respectively. Sample volumes are laboratory- and method-specific and will be determined in accordance with laboratory

Table A.1-5
Analytical Program for CAU 322

Analyses[a]	CAS 01-25-01	CAS 03-25-03	CAS 03-20-05
Organics			
Total Petroleum Hydrocarbons (Diesel-, and Oil-Range Organics)	C	C	C
Volatile Organic Compounds	X	X	C
Polychlorinated Biphenyls	X	X	C
Semivolatile Organic Compounds	X	X	C
Radiological			
Radiological Screening	None	X	C
Metals			
Total *Resource Conservation and Recovery Act* Metals[b]	X	X	C
Beryllium	X	X	X

[a]If the volume of material is limited, prioritization of the analyses will be necessary.
[b]May also include Toxicity Characteristic Leaching Procedure metals if the sample is collected for waste management purposes.

C = Critical COPCs X = Non-critical COPCs

requirements. Analytical requirements (e.g., methods, detection limits, precision, and accuracy) are specified in the Industrial Sites QAPP (NNSA/NV, 2002), unless superseded by the CAIP. These requirements will ensure that laboratory analyses are sufficient to detect contamination in samples at concentrations exceeding the MRLs. Specific analyses, if any, required for the disposal of IDW are identified in Section 5.0 of the CAIP.

For sampling performed to define the extent of contamination (Decision II) at the individual CASs, samples will be collected and analyzed only for COCs identified in samples collected to resolve Decision I. However, if extent samples are collected prior to nature-of-contamination data becoming available, the extent samples will be analyzed for the full list parameters given in Table A.1-5. For samples collected to define the extent of contamination, critical analytes are unbounded COCs.

The analyses to be conducted for samples collected for this CAU are listed in Table A.1-6, and Table A.1-7 lists the analytes reported by the various analytical methods that are considered to be COPCs.

Table A.1-6
Analytical Methods for Laboratory Analysis

Analytical Parameter	Analytical Method	
	Liquid	Soil/Sediment/Sludge
Total Volatile Organic Compounds	SW-846 8260B[a]	SW-846 8260B[a]
Total Semivolatile Organic Compounds	SW-846 8270C[a]	SW-846 8270C[a]
Total RCRA Metals, plus Beryllium	SW-846 6010B[a] (mercury - 7470A[a])	SW-846 6010B[a] (mercury - 7471A[a])
Polychlorinated Biphenyls	SW-846 8082[a]	SW-846 8082[a]
Total Petroleum Hydrocarbons, GRO and DRO (C_6 - C_{38})	SW-846 8015B[a] (modified)	SW-846 8015B[a] (modified)
Gamma Spectrometry (gamma emitters, e.g., Cs-137)	EPA Procedure 901.1[b]	HASL-300[c]
Strontium-90	ASTM D5811-00[d]	HASL-300[c]
Isotopic Plutonium	ASTM D3865-97[e]	ASTM C1001-90[f]
Isotopic Uranium	ASTM D3972-97[g]	ASTM E1000-90[h]

ASTM = American Society of Testing and Materials
RCRA = *Resource Conservation and Recovery Act*
SW = Solid Waste

[a]*EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* 3rd Edition, Parts 1-4, SW-846 (EPA, 1996)
[b]*Prescribed Procedure for Measurements of Radioactivity in Drinking Water* (EPA, 1980)
[c]*The Procedures Manual of the Environmental Measurements Laboratory* (DOE, 1997)
[d]*Standard Test Method for Strontium-90 in Water* (ASTM, 2000c)
[e]*Standard Test Method for Plutonium in Water* (ASTM, 2000b)
[f]*Standard Test Method for Radiochemical Determination of Plutonium in Soil by Alpha Spectroscopy* (ASTM, 2000a)
[g]*Standard Test Method for Isotopic Uranium in Water by Radiochemistry* (ASTM, 2002)
[h]*Standard Test Method for Radiochemical Determination of Uranium Isotopes in Soil by Alpha Spectrometry* (ASTM, 2000b)

A.1.5 Step 4 - Define the Boundaries of the Study

The purpose of this step is to define the target population of interest, specify the spatial and temporal features of the population that are pertinent for decision making, determine practical constraints on data collection, and define the scale of decision making relevant to target populations for Decision I and Decision II.

A.1.5.1 Define the Target Population

Decision I target populations represent locations within the CAS that contain COCs, if present. Decision II target populations are areas within the CAS where COC concentrations are less than PALs and are contiguous to areas of COC contamination. The target populations are dependent upon

Table A.1-7
Analytes for CAU 322

Volatile Organic Compounds	Semivolatile Organic Compounds	Total Petroleum Hydrocarbons	Polychlorinated Biphenyls	Metals	Radionuclides
1,1,1-Trichloroethane	1,2,4-Trichlorobenzene[a]	Total Petroleum Hydrocarbons	Aroclor-1016	Arsenic	Americum-241
1,1,2,2-Tetrachloroethane	1,2-Dichlorobenzene[a]	$[C_6-C_{38}]$	Aroclor-1221	Barium	Cesium-137
1,1,2-Trichloroethane	1,3-Dichlorobenzene[a]	DRO, GRO	Aroclor-1232	Cadmium	Plutonium-238
1,1-Dichloroethane	1,4-Dichlorobenzene[a]		Aroclor-1242	Chromium	Plutonium-239/240
1,1-Dichloroethene	2,4,5-Trichlorophenol		Aroclor-1248	Lead	Strontium-90
cis-1,2-Dichloroethene	2,4,6-Trichlorophenol		Aroclor-1254	Mercury	Uranium-234
cis-1,3-Dichloropropene	2,4-Dichlorophenol		Aroclor-1260	Selenium	Uranium-235
trans-1,2-Dichloroethene	2,4-Dimethylphenol			Silver	Uranium-238
1,2-Dichloroethane	2,4-Dinitrophenol			Beryllium	Cobalt-60
1,2-Dichloropropane	2,4-Dinitrotoluene				Tritium
2-Butanone	2,6-Dinitrotoluene				
2-Hexanone	2-Chloronaphthalene				
4-Methyl-2-pentanone	2-Chlorophenol				
Acetone	2-Methylphenol				
Benzene	2-Nitroaniline				
Bromochloromethane	3,3'-Dichlorobenzidine				
Bromodichloromethane	4-Bromophenyl phenyl ether				
Bromoform	4-Chloroaniline				
Bromomethane	4-Methylphenol				
Carbon disulfide	4-Nitrophenol				
Carbon tetrachloride	Acenaphthene				
Chlorobenzene	Acenaphthylene				
Chloroethane	Anthracene				
Chloroform	Benzo(a)anthracene				
Chloromethane	Benzo(a)pyrene				
Dibromochloromethane	Benzo(b)fluoranthene				
Ethylbenzene	Benzo(g,h,i)perylene				
Methyl tertiary butyl ether	Benzo(k)fluoranthene				
Methylene chloride	Bis(2-chloroethoxy) methane				
Styrene	Bis(2-chloroethyl)ether				
Tetrachloroethene	Bis(2-chloroisopropyl)ether				
Toluene	Bis(2-ethylhexyl) phthalate				
trans 1,3-Dichloropropene	Butyl benzyl phthalate				
Trichloroethene	Chrysene				
Vinyl acetate	Dibenzo(a,h)anthracene				
Vinyl chloride	Dibenzofuran				
Xylene	Diethyl Phthalate				
1,1,1,2-Terrachloroethane	Dimethyl Phthalate				
1,2,3-Trichloropropare	Di-n-butyl Phthalate				
1,2,4-Trimethyl-benzene	Di-n-octyl Phthalate				
1,2-Dibromo-3-chloropropane	Fluoranthene				
1,2-Dibromoethane	Fluorene				
1,3,5-Trimethylbenzene	Hexachlorobenzene				
1,3-Dichloropropane	Hexachlorobutadiene[a]				
Trichlorofluoromethane	Hexachlorocyclopentadiene				
Trichlorotrifluoroethane	Hexachloroethane				
n-propyl benzene	Indeno(1,2,3-cd)pyrene				
2-chloltoluene	Isophorone				
Bromobenzene	Naphthalene[a]				
Dichlorodifluoromethane	Nitrobenzene				
Iodomethane	N-Nitroso-di-n-propylamine				
Isopropyl Benzene	N-Nitrosodimethylamine				
n-Butylbenzene	N-Nitrosodiphenylamine				
sec-butylbenzene	Pentachlorophenol				
terr-butylbenzene	Phenanthrene				
	Phenol				
	Pyrene				
	Pyridine				

[a]May be reported with VOCs.

RCRA = *Resource Conservation and Recovery Act* the CSM developed for CAS 25-27-03. These target populations represent locations within the CAS that, when sampled, will provide sufficient data to resolve the primary problem statement (Section A.1.3.1).

A.1.5.2 Identify the Spatial and Temporal Boundaries

In general, geographic (spatial) boundaries (Table A.1-8) are defined by the area impacted from releases attributed to each CAS. Intrusive sampling activities are not intended to extend into the boundaries of neighboring areas of environmental concern (e.g., other CASs).

Temporal boundaries are those time constraints set up by weather conditions and project schedules. Significant temporal constraints due to weather conditions are not expected. Moist weather may place constraints on sampling and field screening of contaminated soils because of the attenuating effect of moisture in samples (e.g., alpha-emitting radionuclides). There are no time constraints on collecting samples as environmental conditions at all sites will not significantly change in the near future and conditions would have stabilized over the years since the site was last used.

A.1.5.3 Identify Practical Constraints

The NTS-controlled activities may affect the ability to characterize some CASs. The effects of these activities (i.e., practical constraints) will be addressed in this section on a CAS-specific basis.

Table A.1-8
Spatial Boundaries for CAU 322

CAS	Spatial Boundary	
	Horizontal	Vertical
01-25-01	The exterior edge of the gravel containment berm	A maximum of 15 ft bgs
03-25-03	350 ft laterally along the anticipated north-south centerline through the former AST containment area	A maximum of 50 ft bgs
03-25-03	80 ft laterally extending from the building towards the east, north and south, approximately 10 ft to the west (concrete slab)	A maximum of 50 ft bgs
03-20-05	25 ft laterally extending from the edge of concrete slab	A maximum of 50 ft bgs
03-20-05	Up to 350 ft laterally around the injection wells	A maximum of 500 ft bgs

Practical constraints include underground utilities and overhead utilities, rough terrain, which may limit intrusive sampling locations. Access restrictions include both scheduling conflicts on the NTS with other entities and areas posted as contamination areas requiring appropriate work controls, physical barriers (e.g., fences, steep slopes), and areas requiring authorized access. Underground utility surveys will be conducted at each CAS prior to the start of investigation activities to determine if utilities exist, and, if so, determine the limit of spatial boundaries for intrusive activities.

A.1.5.4 Define the Scale of Decision Making

The scale of decision making in Phase I is defined as the CAS. The scale of decision making in Phase II is defined as a contiguous area contaminated with any COC originating from the CAS.

A.1.6 Step 5 - Develop a Decision Rule

This step integrates outputs from the previous step with the inputs developed in this step into a decision rule ("If..., then...") statement. This rule describes the conditions under which possible alternative actions would be chosen.

A.1.6.1 Specify the Population Parameter

The population parameter for Phase I data collected from biased sample locations is the maximum observed concentration of each COC within the target population.

The population parameter for Phase II will be the observed concentration of each unbounded chemical COC in any sample.

A.1.6.2 Choose an Action Level

Action levels are defined as the PALs, which are specified in Section A.1.4.2.

A.1.6.3 Decision Rule

If the concentration of any COPC in a target population exceeds the PAL for a COPC in a Phase I sample, then that COPC is identified as a COC, and the extent of contamination (Phase II) sampling will be conducted. If the Site Supervisor determines that an indicator of contamination is present, then Phase II sampling may be conducted before the results of Phase I sampling are available. If all

COPC concentrations are less than the corresponding PALs, then the decision will be no further actions. Based on prior sampling results, the CAI at CAS 25-27-03 will include extent (Phase II) sampling.

If the observed population parameter of any COC in a Phase II sample exceeds the PALs, then additional samples will be collected to complete the Phase II evaluation. If all observed COC population parameters are less than PALs, then the decision will be that the extent of contamination has been defined in the lateral and vertical directions.

If contamination is inconsistent with the CSM or extends beyond the identified spatial boundaries, then work will be suspended and the investigation strategy will be reevaluated. If contamination is consistent with the CSM and is within spatial boundaries, then the decision will be to continue sampling to define extent.

A.1.7 Step 6 - Specify the Tolerable Limits on Decision Errors

The sampling approach for the investigation relies on biased sampling locations; therefore, statistical analysis is not appropriate. Only validated analytical results (quantitative data) will be used to determine if COCs are present (Phase I) or the extent of a COC (Phase II), unless otherwise stated. The baseline condition (i.e., null hypothesis) and alternative condition for Phase I are:

- Baseline condition – A COC is present
- Alternative condition – A COC is not present

The baseline condition (i.e., null hypothesis) and alternative condition for Phase II are:

- Baseline condition – The extent of a COC has not been defined
- Alternative condition – The extent of a COC has been defined

Decisions and/or criteria have an alpha (false rejection) or beta (false acceptance) error associated with their determination (discussed in the following subsections). Since quantitative chemical data are individually compared to action levels on a point-by-point basis, statistical evaluations of the data such as averages or confidence intervals are not appropriate.

A.1.7.1 False Rejection Decision Error

The false negative (rejection of the null hypothesis or alpha error) decision error would mean:

- Deciding that a COC is not present when it actually is (Decision I).
- Deciding that the extent of a COC has been defined when it actually has not (Decision II).

In both cases, this would result in an increased risk to human health and the environment.

For Decision I, a false negative decision error (where the consequences are more severe) is controlled by meeting the following criteria:

- Having a high degree of confidence that the sample locations selected will identify COCs if present anywhere within the CAS.

- Having a high degree of confidence that analyses selected will be sufficient to detect any COCs present in the sampled media and that the detection limits are adequate to ensure an accurate quantification of the COCs.

For Decision II, the false negative decision error is reduced by :

- Having a high degree of confidence that the sample locations selected will identify the extent of COCs.

- Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.

- Having a high degree of confidence that the dataset is of sufficient quality and completeness. The sample locations selected will identify the extent of COCs.

To satisfy the first criterion for both decisions, Phase I samples will be collected in areas most likely to be contaminated by any COPCs, and Phase II samples will be collected in areas that represent the lateral and vertical extent of COCs. The following characteristics are considered during both phases to accomplish the first criterion:

- Source and location of release
- Chemical nature and fate properties
- Physical transport pathways and properties
- Hydrologic drivers

These characteristics were considered during the development of the CSMs and selection of sampling locations. The biasing factors listed in Table A.1-4 of Section A.1.4.1 will be used to further ensure that these criteria are met.

To satisfy the second criterion for Decision I, all samples used to define the nature of contamination will be analyzed for the parameters listed in Section A.1.4.3.4 using analytical methods that are capable of producing quantitative data at concentrations below or equal to PALs (unless stated otherwise in the CAIP). To satisfy the second criterion for Decision II, Phase II samples will be analyzed for those parameters that identified unbounded COCs.

To satisfy the third criterion for Decision II, the entire dataset, as well as individual sample results, will be assessed against the DQIs of precision, accuracy, comparability, completeness, and representativeness, as defined in the Industrial Sites QAPP (NNSA/NV, 2002). The goal for the DQI of completeness is that 90 percent of the critical COPC results are valid for every sample. Critical COPCs are defined as those contaminants that are known or expected to be present within a CAS (Section A.1.4.3.3). In addition, sensitivity has been included as a DQI for laboratory analyses. Site-specific DQIs are discussed in more detail in Section 6.0 of the CAIP. Strict adherence to established procedures and QA/QC protocol protects against false negatives.

A.1.7.2 False Positive Decision Error

The false positive (acceptance of the null hypothesis or beta) decision error would mean:

- Deciding that a COC is present when it actually is not (Decision I).
- Accepting that the extent of a COC has not been defined when it really has (Decision II).

These errors result in increased costs for unnecessary characterization or corrective actions.

The false positive decision error is controlled by protecting against false positive analytical results. False positive results are typically attributed to laboratory and/or sampling/handling errors. Quality assurance/quality control samples such as field blanks, trip blanks, laboratory control samples, and method blanks are used to determine if a false positive analytical result may have occurred. Other measures include proper decontamination of sampling equipment and using certified clean sample containers to avoid cross contamination.

A.1.7.3 Quality Assurance/Quality Control

Radiological survey instruments and field-screening equipment will be calibrated and checked in accordance with the manufacturer's instructions or approved procedures.

Quality control samples will be collected as required by the Industrial Sites QAPP (NNSA/NV, 2002) and in accordance with established procedures. The required QA field samples include:

- Trip blanks (1 per sample cooler containing VOC environmental samples)
- Equipment blanks (1 per sampling event for each type of decontamination procedure)
- Source blanks (1 per lot for such things as polyurethane bags or direct-push liners)
- Field duplicates (minimum of 1 per matrix per 20 environmental samples or 1 per CAS if less than 20 collected)
- Field blanks (minimum of 1 per 20 environmental samples or 1 per CAS if less than 20 collected)
- Matrix spike/matrix spike duplicate (minimum of 1 per 20 environmental samples or 1 per CAS per matrix if less than 20 collected, not required for all radionuclide measurements)

Additional QC samples may be submitted based on site conditions.

Data quality indicators of precision, accuracy, comparability, completeness, and representativeness are defined in the Industrial Sites QAPP (NNSA/NV, 2002). In addition, sensitivity has been included as a DQI for laboratory analyses. Site-specific DQIs are discussed in more detail in Section 6.0 of the CAIP.

A.1.8 Step 7 - Optimize the Design for Obtaining Data

This section presents an overview of the resource-effective strategy to be used to obtain the data required to meet the project DQOs developed in the previous six steps. Section A.1.8.1 provides general investigation strategy. Sections A.1.8.1.1, A.1.8.1.2, and A.1.8.1.3 provide the detailed sampling approach to resolve the decision statements for CAU 322.

A.1.8.1 General Investigation Strategy

The initial activities to be conducted will be a visual inspection and geophysical survey of the proposed study areas at each CAS within CAU 322. The visual inspections and geophysical surveys will provide additional biasing factors for locating soil samples and to identify any potential conditions that may affect sampling and sample locations.

Following visual inspection and geophysical surveys, surface soil field-screening sample locations will be established. When available, this effort will use the data from previously collected samples and other biasing factors to identify sampling points at each parcel. Previous analytical data will be used in the decision process if the data meets the quality criteria specified in the DQOs.

Once sampling locations have been selected, surface soil samples may be collected and field screened for CAS-specific parameters. Where COCs are known to exist, based on previous sampling and field-screening results, Phase I (Decision I) surface and shallow subsurface soil samples will be collected for laboratory analysis for the parameters identified in Section A.1.4.3.4.

Phase II (step-out) sampling locations at each parcel will be selected based on the outer boundary sample locations where COCs were detected, the CSM, other biasing factors, and field/site conditions (e.g., limitations posed by steep terrain, existing structure). If biasing factors indicate COCs extend beyond planned Phase II sample locations, locations may be modified or additional Phase II samples may be collected from incremental step-out locations. If the step-out locations from different original locations approach each other, then the Site Supervisor may consider this as one area, and collect samples only in the outward directions.

Contaminants determined not to be present in Phase I samples will be eliminated from Phase II analytical suites. In general, samples submitted for off-site analysis will be those that define the nature and extent (lateral and vertical) of COCs.

The following are the primary biasing factors to be considered in the selection of the surface soil field-screening sample locations:

- Aerial photograph review and evaluation
- Visual indicators (e.g., staining, topography, areas of preferential surface runoff)

- Existing site-specific analytical data (PA and CAU 262 sampling data)
- Known or suspected sources and locations of release
- Process knowledge and experience at similar sites
- Information and/or data from adjacent CASs
- Geologic and/or hydrologic conditions
- Physical and chemical characteristics of suspected contaminants

Existing data will provide a semiquantitative evaluation of the presence and extent of potential contamination in surface soil. The adequacy of the TPH and VOC field-screening methods will be assessed by comparing results with the results of laboratory analysis performed on split samples. Samples will be submitted to support Decision I (from worst-case locations) and to support Decision II (confirm the horizontal extent of contamination). Data collected during previous sampling events (if any), FSRs, and the other biasing factors listed above will be used to select locations. If necessary, additional surface soil samples will be submitted for laboratory analysis to ensure that the extent of contamination is defined.

The subsurface soil sample intervals will be based on biasing factors such as presence of debris, staining, odor, FSRs, or professional judgment. For subsurface sampling locations, generally two consecutive soil samples with results below field-screening action levels will be required to define the vertical extent of contamination. Generally, the uppermost "clean" sample from each location will be submitted for laboratory analysis.

Surface soil samples will be collected by hand. Rotary sonic drilling, hollow-stem auger drilling, direct-push, handheld augers, or excavation may be used, as appropriate, to collect subsurface samples. Samples for waste characterization purposes may also be collected at the three CASs.

Due to the nature of buried features possibly present (e.g., structures, buried debris, and utilities), sample locations may be relocated, based upon the review of engineering drawings, and information obtained during the site visit. However, the new locations must meet the decision needs and criteria stipulated in Section A.1.4.1.

The following sections describe the Phase I and II field activities to be conducted at the following CAS locations of CAU 322. Samples will be collected from the proposed biased locations as discussed in the following sections and shown in Figures A.1-8, A.1-9, A.1-11, and A.1-12.

A.1.8.1.1 CAS 01-25-01, AST Release

Phase I activities consist of collecting a minimum of two samples to investigate the vertical and lateral extent of potential contamination in the gravel containment pit. Additional locations may be sampled based on FSRs or at the discretion of the Site Supervisor.

The first sample locations will correspond with the ends of the former tank and beneath the former piping. Samples will be collected at the gravel-native soil interface (0 to 0.5 ft bgs) and at approximately 1-ft intervals at these locations. Additional samples may be collected, at the discretion of the Site Supervisor, to adequately characterize the nature and extent of potential contamination. Samples will be field screened for TPH and VOCs.

Three step-out (both vertical and horizontal) sample locations are arranged around the perimeter of the gravel containment berm. Additional samples will be collected to delineate the extent of the potential hot spots and will be based on the discretion of the Site Supervisor, existing data, and other biasing factors. Depending on the results of the screening, additional step-outs will be performed as necessary. Refer to Figure A.1-8 for proposed sample locations.

A.1.8.1.2 CAS 03-25-03, Mud Plant AST Diesel Release

Area - A: Phase I activities will be performed to confirm the nature of suspected contaminants that may have originated from a former AST and fuel dispenser. Initial activities will include collecting surface and shallow subsurface soil samples for field screening. A minimum of seven locations will be sampled to investigate the vertical and lateral extent of the potential contamination in the area of the former AST and fuel dispenser. Additional locations may be sampled based on FSRs or at the discretion of the Site Supervisor.

The first sample location will be in the center of the former AST gravel containment pit, based on visual observations. The next sampling points will be located at 25-ft intervals north, south, east, and west from the center of the gravel containment area. Additional sampling points will be established at 25- to 50-ft step-out locations in a similar pattern, if initial sampling results exceed FSLs. Field-screening locations will also be established moving east from the AST gravel containment berm along the alignment of buried utilities toward the Mud Plant. No sampling is planned within the

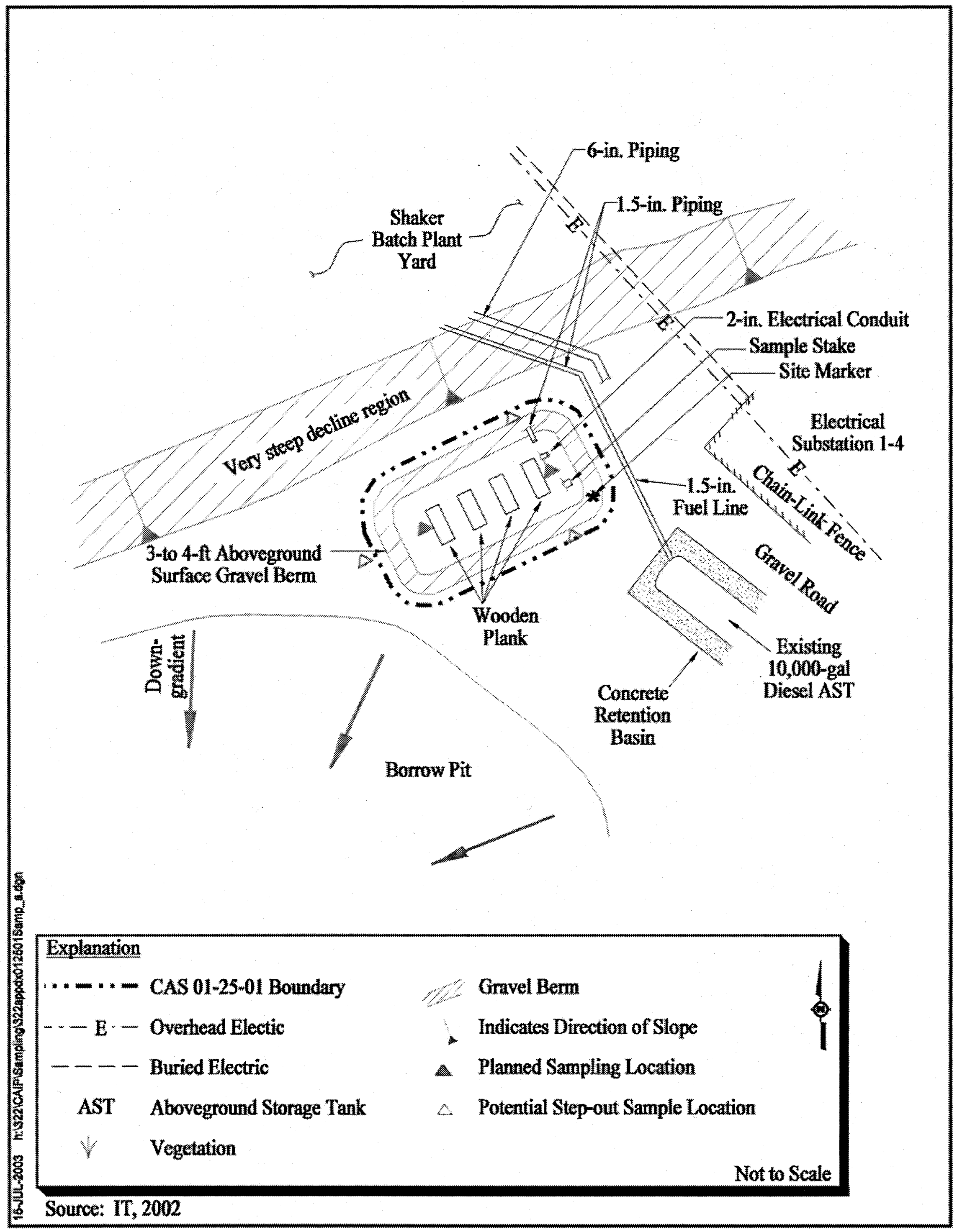


Figure A.1-8
Sampling Plan for CAS 01-25-01 AST Release

post-shot area. Figure A.1-9 shows a generalized sampling plan for field screening within Area 1 at CAS 03-25-03. Confirmation samples will be selected as previously discussed.

Area - B: Phase I activities will be performed to confirm the nature of suspected contaminants that may have originated from former diesel generators or other potential sources of fuel spills and releases in the area east of the Mud Plant building. Initial activities will include drilling surface and shallow subsurface soil sample for field screening. A minimum of eight locations will be sampled to investigate the vertical and lateral extent of the potential contamination. Additional locations may be sampled based on FSRs or at the discretion of the Site Supervisor. The initial investigation efforts will characterize the site where COCs have been confirmed (CAS 03-44-02) to be present based on existing analytical data. Refer to Figure A.1-10 for a summary of the TPH analytical data.

Samples will be collected during the Phase II sampling to delineate the extent of the potential hot spots identified during the Phase I investigation. During Phase II, step-out sample locations will be selected based on biasing factors (i.e., analytical data, field observations). Initial step-outs will be located beside the Phase I sample locations where COCs were detected. At each Phase II location, soil samples will be collected at the depth where COCs were encountered in Phase I and at 2 sample intervals below the lowest depth where COCs were encountered. Confirmation samples will be selected as previously discussed. Depending on the results of the screening, additional step-outs will be performed, as necessary. Figure A.1-11 shows a generalized sampling plan for field screening at CAS 03-20-05.

Five potential step-out locations have been selected based on field observations, review of existing analytical data, and physical constraints at the site. Additional locations may be sampled based on FSRs or at the discretion of the Site Supervisor.

A.1.8.1.3 CAS 03-20-05, Injection Wells

A minimum of three locations will be selected for collection of deep subsurface samples in order to investigate the lateral and vertical extent of contamination at the BOP holding tanks and sumps and the injection well. Additional locations may be sampled based on FSRs or at the discretion of the Site Supervisor. The first sample locations will be located in close proximity to the three holding tanks and sumps, northwest corner and northeast side of the BOP. Selected locations are in close proximity

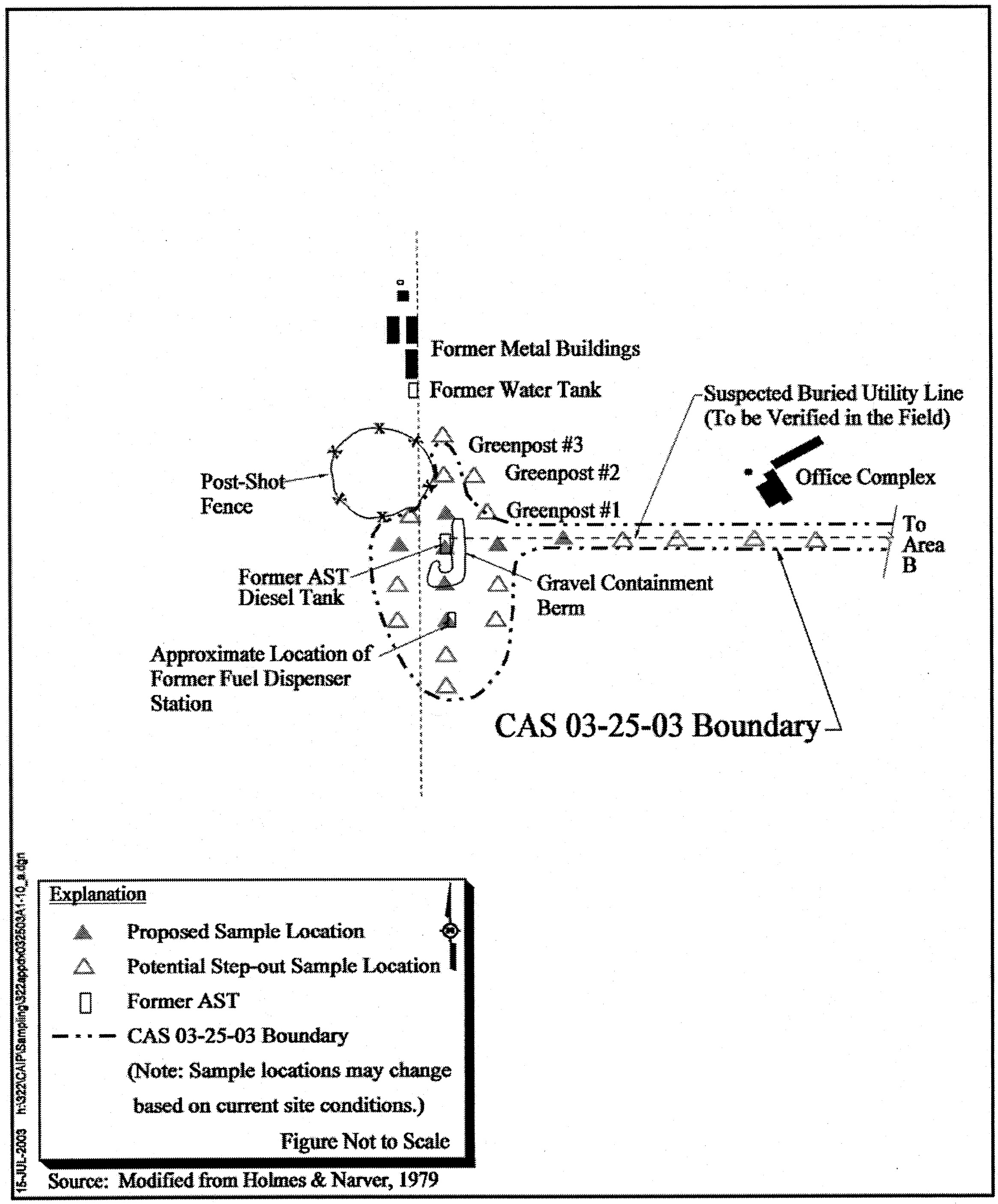


Figure A.1-9
Sample Location Plan for Area A CAS 03-25-03
Mud Plant AST Diesel Release

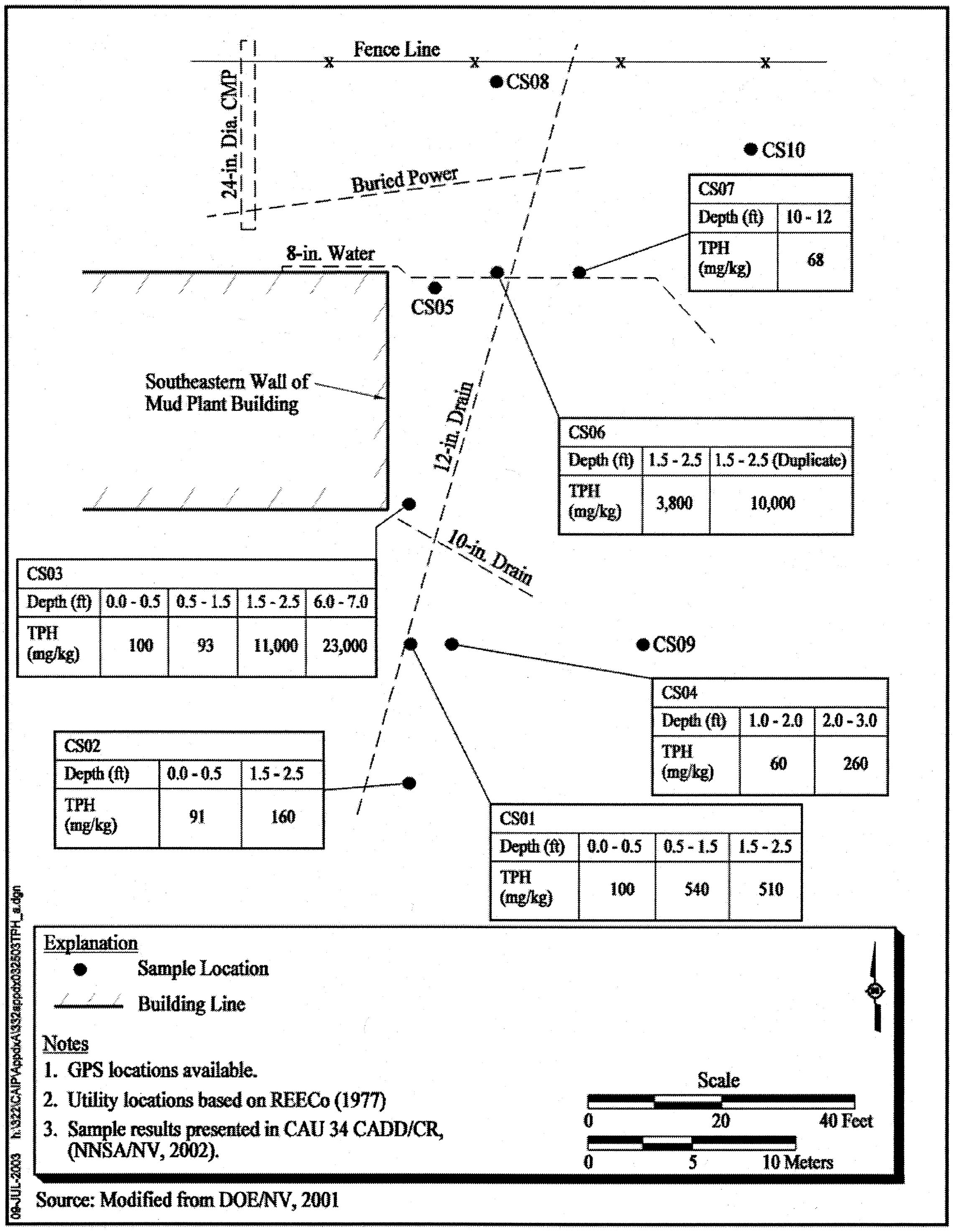


Figure A.1-10
CAS 03-25-03, Summary of TPH Analytical Results for Soil Samples Collected During CAU 34, CAS 03-44-01 Investigation

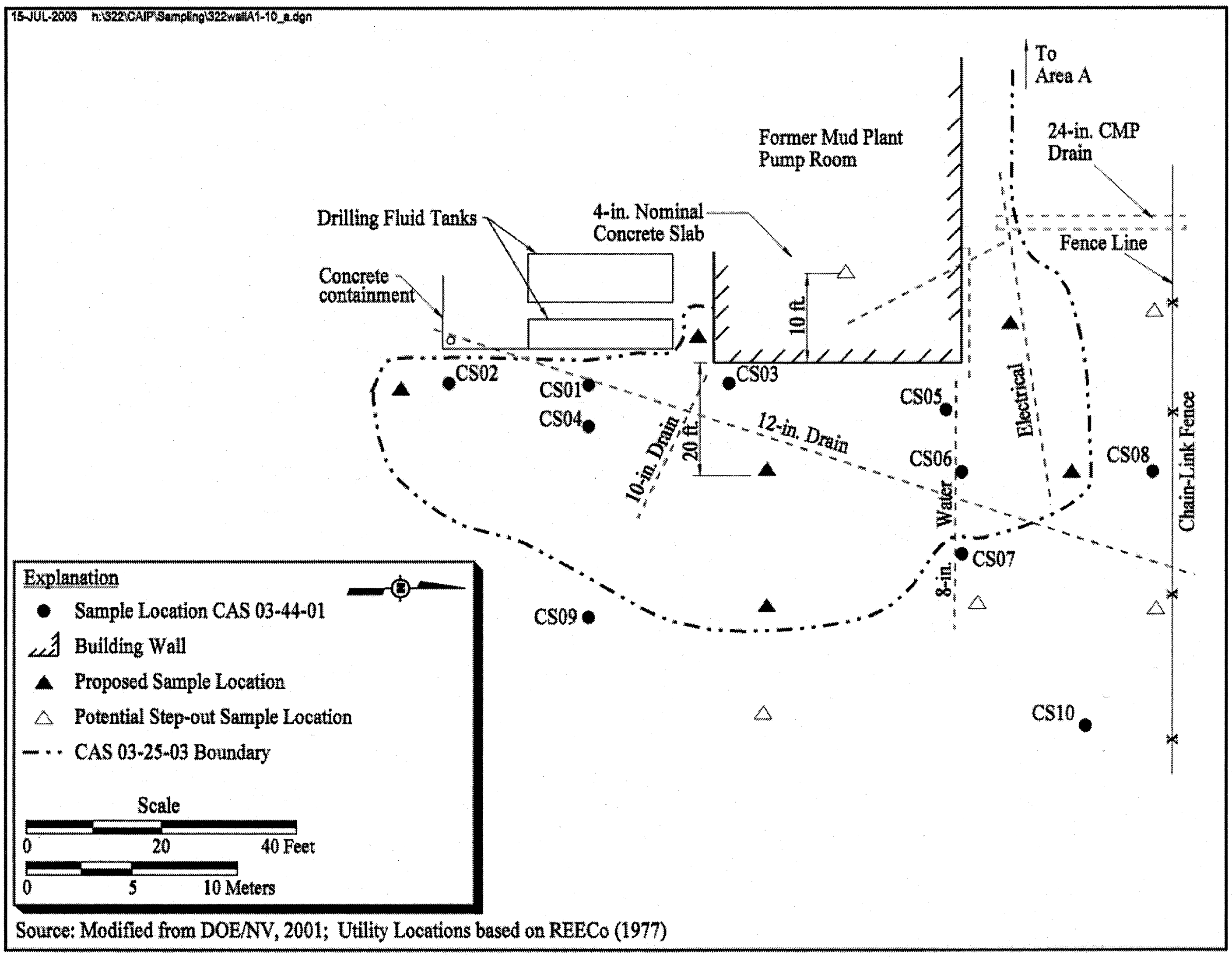


Figure A.1-11
Sample Location Plan for Area B CAS 03-25-03 Mud Plant AST Diesel Release

to the two holding tanks used during the cleaning of the blowout preventer equipment. The third sampling location is adjacent to the injection well.

The sample locations were selected in areas where suspected COCs are present. A rotary drill rig method will be used to collect soil samples at the deep boring locations. Subsurface soil samples (200 ft) will be taken at intervals of either 5, 10, or 20 ft depending on FSRs or other site-specific conditions or observations. In addition, a minimum of three locations will be sampled to investigate the lateral and vertical extent of surface contamination. The samples will be collected near the entrances to the building (edge of slab), at the injection well housing, and along the alignment of a suspected buried drain line. Surface and subsurface soil samples (0 to 5.0 ft bgs) will be collected and field screened for TPH and VOCs.

The initial Phase II investigation efforts will consist of further characterizing the site where COCs have been confirmed to be present. Step-out (both vertical and horizontal) sampling points will be established and samples will be collected during the Phase II sampling to delineate the extent of hot spots identified during Phase I. During Phase II, step-out sample locations will be selected based on biasing factors and Phase I results and located on three sides of the locations where COCs were detected. At each Phase II location, soil samples will be collected at the depth where COCs were encountered in Phase I and at 2 ft below the lowest depth where COCs were encountered. Confirmation samples will be selected as previously discussed. Depending on the results of the screening, additional step-outs will be performed, as necessary. Figure A.1-12 shows a generalized sampling plan at CAS 03-20-05.

A radiological survey of the building floor, interior walls of the holding tanks, and the interior walls of the well vault will be conducted to identify any hot spots. A hot spot on the concrete floor or the tank and vault walls will be defined as any reading exceeding 1,000 dpm/100 cm^2 over background. If hot spots are identified on the floor or walls, samples may be collected at those locations for waste determination purposes. The Site Supervisor has the discretion of selecting sample locations that best represent potential contamination.

A minimum of two surface soil/sludge samples will be collected from within the injection well, well vault, and holding tanks for the purpose of waste characterization and waste profile preparation. The Site Supervisor has the discretion of selecting or modifying the locations based on results of the

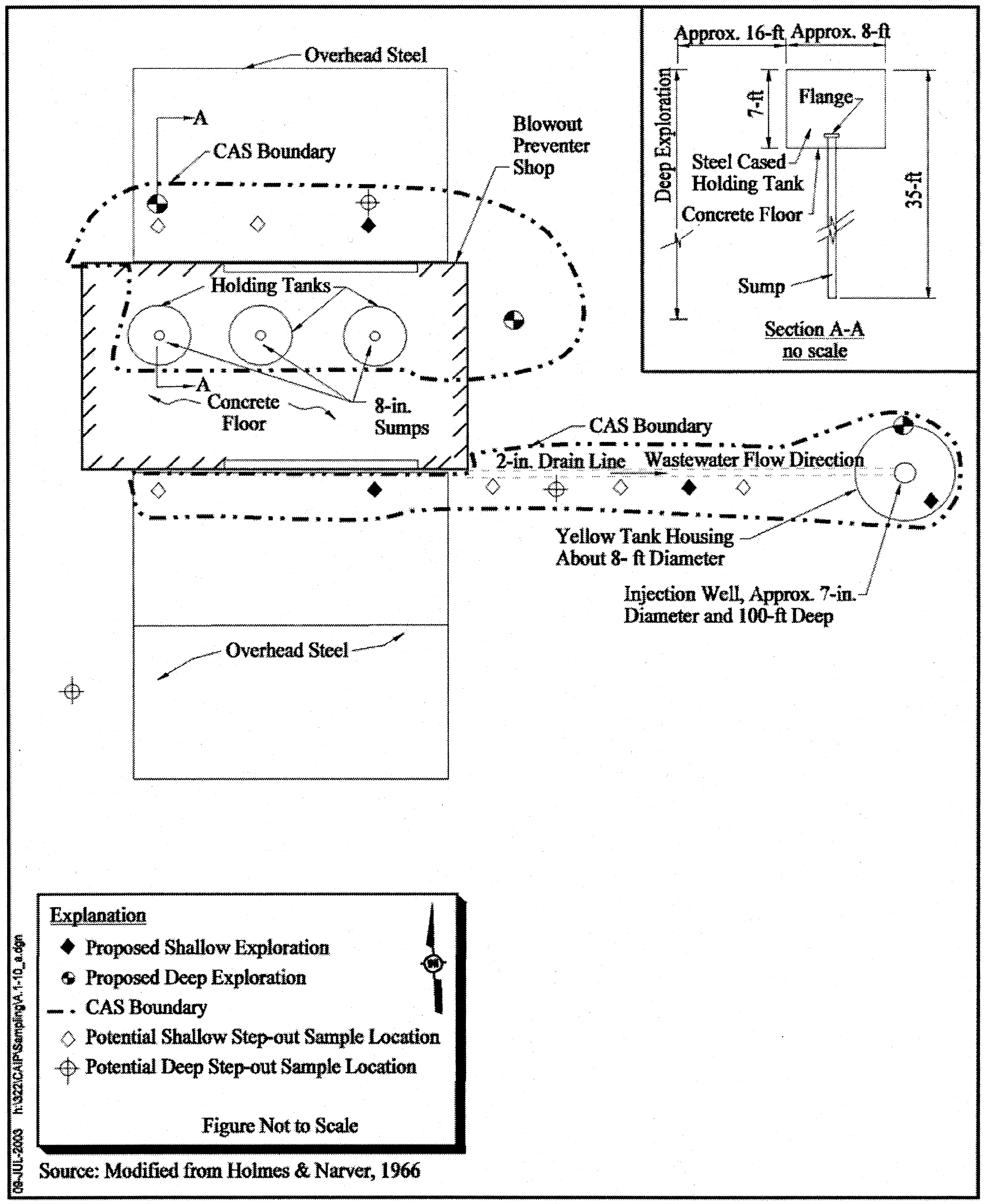


Figure A.1-12
Sample Location Plan for CAS 03-20-03 Injection Wells

planned radiological walkover survey. In addition, a sample will be collected of the liquid waste in each of the holding tanks, if present, and the injection well, if present. Samples will be used for waste characterization and waste profile preparations. Both soil/sludge and liquid samples will be analyzed for VOCs, SVOCs, TPH, PCB, radionuclides, total metals, and TCLP metals. In addition, samples will be analyzed for TCLP VOCs and TCLP SVOCs, if required.

Sampling will not be performed on the structural frame of the BOP building because it is not considered a source of continuing contamination; therefore, it is not part of the CAS.

A.1.9 References

AEC, see U.S. Atomic Energy Commission.

ASTM, see American Society for Testing and Materials.

American Society for Testing and Materials. 2000a. *Standard Test Method for Radiochemical Determination of Plutonium in Soil by Alpha Spectroscopy,* C1001-2000. Philadelphia, PA.

American Society for Testing and Materials. 2000b. *Standard Test Method for Plutonium in Water,* D-3865-02. Philadelphia, PA.

American Society for Testing and Materials. 2000c. *Standard Test Method for Strontium-90 in Water,* D5811-2000. Philadelphia, PA.

American Society for Testing and Materials. 2002. *Standard Test Method for Isotopic Uranium in Water by Radiochemistry,* D-3972-2002. Philadelphia, PA.

BN, see Bechtel Nevada.

Bechtel Nevada. 1996. *U.S. Department of Energy Nevada Operations Office Environmental Data Report for the Nevada Test Site - 1994.* Prepared by S.C. Black and Y.E. Townsend. Las Vegas, NV.

Bechtel Nevada. 2002. Aerial photographs of CAU 322, October. Nellis Air Force Base, NV: Remote Sensing Laboratory Photo Library.

CFR, see *Code of Federal Regulations.*

Code of Federal Regulations. 2002. Title 40 CFR, "Protection of the Environment," Parts 260-282. Washington, DC: U.S. Government Printing Office.

DOE, see U.S. Department of Energy.

DOE/NSO, see U.S. Department of Energy, Nevada Site Office.

EPA, see U.S. Environmental Protection Agency.

Edward B. Hendricks Associates. 1965. Engineering Drawing entitled, "Area 3, L.A.S.L. Post Shot Yard," 5 May. Las Vegas, NV.

Holmes & Narver, Inc. 1966. Engineering Drawing NV-35-82-01.1 entitled, "L.A.S.L. Post Shot Yard Floor Plan," As-Built, 12 January. Mercury, NV: Archives and Records Center.

Holmes & Narver, Inc. 1979. Engineering drawing entitled, "Area 3 Mud Plant," 1 April. Las Vegas, NV.

IT, see IT Corporation.

IT Corporation. 2002. CAU 34, CAS 03-25-03 file. Las Vegas, NV.

McArthur, R.D., and F.L. Miller, Jr. 1989. *Off-Site Radiation Exposure Review Project, Phase II Soil Program*, DOE/NV/10384-23. Las Vegas, NV: Desert Research Institute.

Moore, J., Science Applications International Corporation. 1999. Memorandum to M. Todd (Science Applications International Corporation) entitled, "Background Concentrations for NTS and TTR Soil Samples," 3 February. Las Vegas, NV.

NAC, see *Nevada Administrative Code.*

NBMG, see Nevada Bureau of Mines and Geology.

NCRP, see National Council on Radiation Protection and Measurements.

NNSA/NSO, see U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office.

National Council on Radiation Protection and Measurement. 1999. *Recommended Screening Limits for Contaminated Surface Soil and Review of Factors Relevant to Site-Specific Studies*, NCRP Report No. 129.

Nevada Administrative Code. 2002a. NAC 445A.2272, "Contamination of Soil: Establishment of Action Levels." Carson City, NV.

Nevada Administrative Code. 2002b. NAC 459.9929, "Storage Tanks." Carson City, NV.

Nevada Bureau of Mines and Geology. 1998. *Mineral and Energy Resource Assessment of the Nellis Air Force Range*, Open-File Report 98-1. Prepared by J.V. Tingley, S.B. Castor, S.I. Weiss, L.J. Garside, J.G. Price, D.D. LaPointe, H.F. Bonham, and T.P. Lugaski. Reno, NV.

REECo, see Reynolds Electrical & Engineering Co. Inc.

Reynolds Electrical & Engineering Co., Inc. 1977. Engineering drawing entitled, "Mud Plant Distribution Power Plan & Detail," 6 May. Mercury, NV: Archives and Records Center.

Reynolds Electrical & Engineering Co., Inc. 1994. *Spill Report Status*, 24 May. Las Vegas, NV.

Sanders, F.W. 1965. *Health Physics Advisor's Report for Week Ending 4-18-65,* 19 April. Las Vegas, NV.

Stewart, J.D., U.S. Department of Energy, Nevada Operations Office. 1992. Memorandum to D.R. Elle (DOE/NV) entitled, "Transmittal of 45-Day Report for Two Diesel Fuel Releases at the Area 3 Mud Plant, Nevada Division of Emergency Management (NDEM) Case Number H9Z0225C," 23 April. Mercury, NV.

USGS, see U.S. Geological Survey.

U.S. Department of Energy. 1997. *Environmental Measurements Laboratory Procedures Manual*, HASL-300, 28th Ed., Vol. I. New York, NY.

U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2002. *Industrial Sites Quality Assurance Project Plan, Nevada Test Site, Nevada*, Rev. 3, DOE/NV-372. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1996. *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada*, DOE/EIS-0243. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 2001. *Corrective Action Decision Document for Corrective Action Unit 262: Area 25 Septic Systems and Underground Discharge Point, Nevada Test Site, Nevada,* DOE/NV--744-REV 1. Las Vegas, NV.

U.S. Environmental Protection Agency. 1980. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA 600/4-80-032 (NTIS/PB80-224744; CD ROM; NEPIS/http://www.epa.gov/cincl). Washington, DC.

US Ecology and Atlan-Tech. 1991. *Environmental Monitoring Report for the Proposed Low-Level Radioactive Waste (LLRW) Facility, Ward Valley, California*. Auburn, CA.

U.S. Environmental Protection Agency. 1996. *Test Method for Evacuating Solid Waste Physical/Chemical Methods*, SW-846, 3rd Edition, CD-ROM PB97-501928GEI.

U.S. Environmental Protection Agency. 2002a. Integrated Risk Information System Web Page http://www.epa.gov/iriswebp/iris/index.html as accessed on 2 December.

U.S. Environmental Protection Agency. 2002b. *Region IX Preliminary Remediation Goals (PRGs)*. Prepared by S.J. Smucker. October. San Francisco, CA.

U.S. Geological Survey. 1975. *Hydrogeologic and Hydrochemical Framework, South-Central Great Basin, Nevada-California, with Special Reference to the Nevada Test Site*, USGS-PR-712-C. Prepared by I.J. Winogard and W. Thordarson on behalf of the U.S. Atomic Energy Commission. Denver, CO.

U.S. Geological Survey. 2002. "USGS/DOE Nevada Water Use Wells." As assessed at http://nevada.usgs.gov/doe-nv/wateruse/on 7 February.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

ANALYTICAL RESULTS

THIS PAGE INTENTIONALLY LEFT BLANK

COVER PAGE

Sanford Cohen & Associates
Southeastern Environmental Laboratory
1000 Monticello Court
Montgomery, Alabama 36117

Laboratory Code: SCA Subcontract Number: 30025

Laboratory Report Identification Code: 6677, 6678, 6687 SDG V2639

Sample Matrix: Soil (6677)

Site Sample Number	Laboratory Sample Number
032005-V1	NTS06-6677-01
032005-V2	NTS06-6677-02
032005-V3	NTS06-6677-03
032005-V4	NTS06-6677-04
032005-V5	NTS06-6677-05
032005-V6	NTS06-6677-06
Preparation Blank (PB)	SCAQC-6677-PB1
Laboratory Control (LC)	SCAQC-6677-LC1
Laboratory Duplicate (LD)	SCAQC-6677-LD1

Sample Matrix: Water (6678)

Site Sample Number	Laboratory Sample Number
032005-R2	NTS06-6678-01
Preparation Blank (PB)	SCAQC-6678-PB1
Laboratory Control (LC)	SCAQC-6678-LC1
Laboratory Duplicate (LD)	SCAQC-6678-LD1

COVER PAGE (Continued)

Sanford Cohen & Associates
Southeastern Environmental Laboratory
1000 Monticello Court
Montgomery, Alabama 36117

Laboratory Code: SCA   Subcontract Number: 30025

Laboratory Report Identification Code: 6677, 6678, 6687   SDG V2639

Sample Matrix: Soil (6687)
(Re-analysis of 6677-01)

Site Sample Number	Laboratory Sample Number
032005-V1	NTS06-6687-01
Preparation Blank (PB)	SCAQC-6687-PB1
Laboratory Control (LC)	SCAQC-6687-LC1
Laboratory Duplicate (LD)	SCAQC-6687-LD1

Comments: There were no problems encountered during sample receiving.

"I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard-copy sample data package and the computer-readable EDD, as applicable, submitted on diskette or by modem, has been authorized by the Vice President or the Vice President's designee, as verified by the following signature."

Cynthia White
Signature

for Edwin L. Sensintaffar   Vice President   03/21/2006
Name   Title   Date

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2639

Project Name: Bechtel Nevada	Chain-of-Custody Number:		Matrix: Soil
Site Sample ID: 032005-V1			
Other Sample ID:	Collection Date: 3/9/2006 3:00:00 PM		Date Received: 3/14/2006 9:00:00
	Batch Number: 6677		Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6677-01	0.031	0.018	0.020	0.014
ACW03	PU-239/240	NTS06-6677-01	2.68	0.250	0.591	0.006

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6677-LC1	SCAQC-6677-LD1		SCAQC-6677-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2639

Project Name: Bechtel Nevada	Chain-of-Custody Number:		Matrix: Soil
Site Sample ID: 032005-V2			
Other Sample ID:	Collection Date: 3/9/2006 3:05:00 PM		Date Received: 3/14/2006 9:00:00
	Batch Number: 6677		Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6677-02	0.152	0.042	0.051	0.015
ACW03	PU-239/240	NTS06-6677-02	0.977	0.124	0.232	0.007

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6677-LC1	SCAQC-6677-LD1		SCAQC-6677-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2639

Project Name:	Bechtel Nevada	Chain-of-Custody Number:		Matrix:	Soil
Site Sample ID:	032005-V3				
Other Sample ID:		Collection Date:	3/9/2006 3:10:00 PM	Date Received:	3/14/2006 9:00:00
		Batch Number:	6677	Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6677-03	0.140	0.041	0.050	0.007
ACW03	PU-239/240	NTS06-6677-03	1.01	0.132	0.242	0.007

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6677-LC1	SCAQC-6677-LD1		SCAQC-6677-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2639

Project Name: Bechtel Nevada	Chain-of-Custody Number:		Matrix: Soil
Site Sample ID: 032005-V4			
Other Sample ID:	Collection Date: 3/9/2006 3:15:00 PM		Date Received: 3/14/2006 9:00:00
	Batch Number: 6677		Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6677-04	0.003	0.010	0.010	0.017
ACW03	PU-239/240	NTS06-6677-04	0.187	0.045	0.058	0.007

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6677-LC1	SCAQC-6677-LD1		SCAQC-6677-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2639

Project Name: Bechtel Nevada	Chain-of-Custody Number:		Matrix: Soil
Site Sample ID: 032005-V5			
Other Sample ID:	Collection Date: 3/9/2006 3:20:00 PM		Date Received: 3/14/2006 9:00:00
	Batch Number: 6677		Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6677-05	0.005	0.008	0.008	0.007
ACW03	PU-239/240	NTS06-6677-05	0.035	0.020	0.021	0.007

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6677-LC1	SCAQC-6677-LD1		SCAQC-6677-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2639

Project Name:	Bechtel Nevada	Chain-of-Custody Number:		Matrix:	Soil
Site Sample ID:	032005-V6				
Other Sample ID:		Collection Date:	3/9/2006 3:25:00 PM	Date Received:	3/14/2006 9:00:00
		Batch Number:	6677	Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6677-06	0.032	0.019	0.020	0.007
ACW03	PU-239/240	NTS06-6677-06	0.347	0.067	0.096	0.007

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6677-LC1	SCAQC-6677-LD1		SCAQC-6677-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2639

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Water
Site Sample ID: 032005-R2			
Other Sample ID:	Collection Date: 3/9/2006 3:35:00 PM	Date Received:	3/14/2006 9:00:00
	Batch Number: 6678	Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/L)	2 σ TPU (pCi/L)	Total Error (pCi/L)	MDA (pCi/L)
ACW03	PU-238	NTS06-6678-01	0.000	0.000	0.000	0.017
ACW03	PU-239/240	NTS06-6678-01	0.000	0.000	0.000	0.017

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6678-LC1	SCAQC-6678-LD1		SCAQC-6678-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2639

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Soil
Site Sample ID: 032005-V1			
Other Sample ID:	Collection Date: 3/9/2006 3:00:00 PM		Date Received: 3/14/2006 9:00:00
	Batch Number: 6687		Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6687-01	0.124	0.040	0.047	0.020
ACW03	PU-239/240	NTS06-6687-01	1.29	0.160	0.304	0.008

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6687-LC1	SCAQC-6687-LD1		SCAQC-6687-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Laboratory Control (LC1)

Report Identification Number: V2639

Project Name:	Bechtel Nevada	Chain-of-Custody Number:	None	Matrix:	Soil
Site Sample ID:	N/A				
Other Sample ID:	LC1	Collection Date:	3/14/2006 9:00:00 AM	Date Received:	3/14/2006 9:00:00
				Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-239/240	SCAQC-6677-LC1	2.03	0.232	0.468	0.010

Quality Control Samples				
Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6677-LC1	SCAQC-6677-LD1		SCAQC-6677-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Laboratory Control (LC1)

Report Identification Number: V2639

Project Name:	Bechtel Nevada	Chain-of-Custody Number:	None	Matrix:	Water
Site Sample ID:	N/A				
Other Sample ID:	LC1	Collection Date:	3/14/2006 9:00:00 AM	Date Received:	3/14/2006 9:00:00
				Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/L)	2 σ TPU (pCi/L)	Total Error (pCi/L)	MDA (pCi/L)
ACW03	PU-239/240	SCAQC-6678-LC1	1.99	0.205	0.447	0.008

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6678-LC1	SCAQC-6678-LD1		SCAQC-6678-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Laboratory Control (LC1)

Report Identification Number: V2639

Project Name: Bechtel Nevada	Chain-of-Custody Number: None		Matrix: Soil
Site Sample ID: N/A			
Other Sample ID: LC1	Collection Date: 3/14/2006 9:00:00 AM		Date Received: 3/14/2006 9:00:00
			Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-239/240	SCAQC-6687-LC1	1.99	0.217	0.454	0.009

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6687-LC1	SCAQC-6687-LD1		SCAQC-6687-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Duplicate (LD1)

Report Identification Number: V2639

Project Name: Bechtel Nevada	Chain-of-Custody Number:		Matrix: Soil
Site Sample ID: 032005-V1			
Other Sample ID: LD1	Collection Date: 3/9/2006 3:00:00 PM	Date Received:	3/14/2006 9:00:00
		Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	SCAQC-6677-LD1	13.3	1.05	2.86	0.006
ACW03	PU-239/240	SCAQC-6677-LD1	42.7	3.24	9.13	0.013

Laboratory Samples for Duplicates

Radionuclide	Laboratory Sample ID	Duplicate of Sample ID
PU-238	SCAQC-6677-LD1	NTS06-6677-01
PU-239/240	SCAQC-6677-LD1	NTS06-6677-01

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6677-LC1	SCAQC-6677-LD1		SCAQC-6677-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Duplicate (LD1)

Report Identification Number: V2639

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Water
Site Sample ID: 032005-R2			
Other Sample ID: LD1	Collection Date: 3/9/2006 3:35:00 PM		Date Received: 3/14/2006 9:00:00
			Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/L)	2 σ TPU (pCi/L)	Total Error (pCi/L)	MDA (pCi/L)
ACW03	PU-238	SCAQC-6678-LD1	0.006	0.012	0.012	0.016
ACW03	PU-239/240	SCAQC-6678-LD1	0.000	0.000	0.000	0.016

Laboratory Samples for Duplicates

Radionuclide	Laboratory Sample ID	Duplicate of Sample ID
PU-238	SCAQC-6678-LD1	NTS06-6678-01
PU-239/240	SCAQC-6678-LD1	NTS06-6678-01

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6678-LC1	SCAQC-6678-LD1		SCAQC-6678-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Duplicate (LD1)

Report Identification Number: V2639

Project Name:	Bechtel Nevada	Chain-of-Custody Number: NONE	Matrix: Soil
Site Sample ID:	032005-V1		
Other Sample ID:	LD1	Collection Date: 3/9/2006 3:00:00 PM	Date Received: 3/14/2006 9:00:00
			Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	SCAQC-6687-LD1	0.014	0.013	0.013	0.008
ACW03	PU-239/240	SCAQC-6687-LD1	1.81	0.202	0.414	0.008

Laboratory Samples for Duplicates

Radionuclide	Laboratory Sample ID	Duplicate of Sample ID
PU-238	SCAQC-6687-LD1	NTS06-6687-01
PU-239/240	SCAQC-6687-LD1	NTS06-6687-01

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6687-LC1	SCAQC-6687-LD1		SCAQC-6687-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Preparation Blank (PB)

Report Identification Number: V2639

Project Name:	Bechtel Nevada	Chain-of-Custody Number:	None	Matrix:	Soil
Site Sample ID:	N/A				
Other Sample ID:	PB	Collection Date:	3/14/2006 9:00:00 AM	Date Received:	3/14/2006 9:00:00
				Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	SCAQC-6677-PB1	0.001	0.012	0.012	0.023
ACW03	PU-239/240	SCAQC-6677-PB1	0.000	0.000	0.000	0.009

Quality Control Samples				
Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6677-LC1	SCAQC-6677-LD1		SCAQC-6677-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Preparation Blank (PB)

Report Identification Number: V2639

Project Name:	Bechtel Nevada	Chain-of-Custody Number:	None	Matrix:	Water
Site Sample ID:	N/A				
Other Sample ID:	PB	Collection Date:	3/14/2006 9:00:00 AM	Date Received:	3/14/2006 9:00:00
				Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/L)	2 σ TPU (pCi/L)	Total Error (pCi/L)	MDA (pCi/L)
ACW03	PU-238	SCAQC-6678-PB1	0.011	0.016	0.016	0.015
ACW03	PU-239/240	SCAQC-6678-PB1	0.000	0.000	0.000	0.015

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6678-LC1	SCAQC-6678-LD1		SCAQC-6678-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Preparation Blank (PB)

Report Identification Number: V2639

Project Name:	Bechtel Nevada	Chain-of-Custody Number:	None	Matrix:	Soil
Site Sample ID:	N/A				
Other Sample ID:	PB	Collection Date:	3/14/2006 9:00:00 AM	Date Received:	3/14/2006 9:00:00
				Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	SCAQC-6687-PB1	-0.003	0.006	0.006	0.021
ACW03	PU-239/240	SCAQC-6687-PB1	0.000	0.000	0.000	0.010

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6687-LC1	SCAQC-6687-LD1		SCAQC-6687-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample Evaluation

Report Identification Number: V2639

Project Name: Bechtel Nevada
Matrix: Soil
Laboratory Code: SCA

Laboratory Contol Sample (LC1) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	(CV) Decay Corrected Activity of Spike Added (pCi/g)	(OV) Laboratory Control Sample Activity (pCi/g)	Laboratory Control Sample % Recovery (Accuracy)	Number of σ Between CV and OV
ACW03	PU-239/240	SCAQC-6687-LC1	2.04 ± 0.102	1.99 ± 0.454	97.7	0.149
ACW03	PU-239/240	SCAQC-6677-LC1	2.04 ± 0.102	2.03 ± 0.468	99.4	0.036

Laboratory Duplicate Sample (LD1) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	Original Sample Activity (pCi/g)	Duplicate Sample Activity (pCi/g)	Difference Between Original Activity and Duplicate Sample Activity (F)	Ratio of the Difference Between the Sample Activity and the Propagated Measurement at 1 σ (F/E)
ACW03	PU-238	SCAQC-6687-LD1	0.124 ± 0.047	0.014 ± 0.013	0.109	4.44
ACW03	PU-238	SCAQC-6677-LD1	0.031 ± 0.020	13.3 ± 2.86	13.2	9.28
ACW03	PU-239/240	SCAQC-6687-LD1	1.29 ± 0.304	1.81 ± 0.414	0.517	2.01
ACW03	PU-239/240	SCAQC-6677-LD1	2.68 ± 0.591	42.7 ± 9.13	40.0	8.74

Laboratory Contol Sample (PB) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	MDA (pCi/g)	RDL (pCi/g)	All Samples Detected	All Samples > RDL	All Samples < RDL	Accept PB
ACW03	PU-238	SCAQC-6687-PB1	-0.003	0.021	0.020	Yes	Yes	No	Yes
ACW03	PU-238	SCAQC-6677-PB1	0.001	0.023	0.020	No	No	No	Yes
ACW03	PU-239/240	SCAQC-6687-PB1	0.000	0.010	0.020	Yes	Yes	No	Yes
ACW03	PU-239/240	SCAQC-6677-PB1	0.000	0.009	0.020	No	Yes	No	Yes

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample Evaluation

Report Identification Number: V2639

Project Name: Bechtel Nevada
Matrix: Water
Laboratory Code: SCA

Laboratory Contol Sample (LC1) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	(CV) Decay Corrected Activity of Spike Added (pCi/L)	(OV) Laboratory Control Sample Activity (pCi/L)	Laboratory Control Sample % Recovery (Accuracy)	Number of σ Between CV and OV
ACW03	PU-239/240	SCAQC-6678-LC1	2.04 ± 0.102	1.99 ± 0.447	97.4	0.170

Laboratory Duplicate Sample (LD1) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	Original Sample Activity (pCi/L)	Duplicate Sample Activity (pCi/L)	Difference Between Original Activity and Duplicate Sample Activity (F)	Ratio of the Difference Between the Sample Activity and the Propagated Measurement at 1 σ (F/E)
ACW03	PU-238	SCAQC-6678-LD1	0.000 ± 0.000	0.006 ± 0.012	0.006	0.995
ACW03	PU-239/240	SCAQC-6678-LD1	0.000 ± 0.000	0.000 ± 0.000	0.000	0.000

Laboratory Contol Sample (PB) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/L)	MDA (pCi/L)	RDL (pCi/L)	All Samples Detected	All Samples > RDL	All Samples < RDL	Accept PB
ACW03	PU-238	SCAQC-6678-PB1	0.011	0.015	0.060	No	No	Yes	Yes
ACW03	PU-239/240	SCAQC-6678-PB1	0.000	0.015	0.060	No	No	Yes	Yes

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Tracer Yield

Report Identification Number: V2639

Project Name: Bechtel Nevada   Laboratory Code: SCA

Laboratory Sample ID	Pu-242
NTS06-6677-01	82.91
NTS06-6677-01	82.91
NTS06-6677-02	84.66
NTS06-6677-02	84.66
NTS06-6677-03	75.78
NTS06-6677-03	75.78
NTS06-6677-04	87.36
NTS06-6677-04	87.36
NTS06-6677-05	80.83
NTS06-6677-05	80.83
NTS06-6677-06	85.34
NTS06-6677-06	85.34
NTS06-6678-01	89.05
NTS06-6678-01	89.05
NTS06-6687-01	76.33
NTS06-6687-01	76.33
SCAQC-6677-LC1	92.37
SCAQC-6677-LC1	92.37
SCAQC-6677-LD1	96.73
SCAQC-6677-LD1	96.73
SCAQC-6677-PB1	102.42
SCAQC-6677-PB1	102.42
SCAQC-6678-LC1	92.81
SCAQC-6678-LC1	92.81
SCAQC-6678-LD1	97.01
SCAQC-6678-LD1	97.01
SCAQC-6678-PB1	92.27
SCAQC-6678-PB1	92.27
SCAQC-6687-LC1	101.25
SCAQC-6687-LC1	101.25
SCAQC-6687-LD1	75.47
SCAQC-6687-LD1	75.47
SCAQC-6687-PB1	81.87
SCAQC-6687-PB1	81.87

1000 Monticello Court * Montgomery, Alabama * 36117 * 334.272.2234 * FAX 334.213.0407

Lionville Laboratory, Inc.
PCB ANALYTICAL DATA PACKAGE FOR
BECHTEL NEVADA V2640

DATE RECEIVED: 03/14/06 LVL LOT # :0603L514

CLIENT ID	LVL #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
032005-V1	001	S	06LE0194	03/09/06	03/15/06	03/21/06
032005-V1	001 MS	S	06LE0194	03/09/06	03/15/06	03/21/06
032005-V1	001 MSD	S	06LE0194	03/09/06	03/15/06	03/21/06
032005-V2	002	S	06LE0194	03/09/06	03/15/06	03/20/06
032005-V3	003	S	06LE0194	03/09/06	03/15/06	03/20/06
032005-V4	004	S	06LE0194	03/09/06	03/15/06	03/20/06
032005-V5	005	S	06LE0194	03/09/06	03/15/06	03/20/06
032005-V6	006	S	06LE0194	03/09/06	03/15/06	03/20/06
032005-R1	007	W	06LE0195	03/09/06	03/15/06	03/21/06

LAB QC:

PBLKDH	MB1	S	06LE0194	N/A	03/15/06	03/20/06
PBLKDH	MB1 BS	S	06LE0194	N/A	03/15/06	03/20/06
PBLKDG	MB1	W	06LE0195	N/A	03/15/06	03/21/06
PBLKDG	MB1 BS	W	06LE0195	N/A	03/15/06	03/21/06
PBLKDG	MB1 BSD	W	06LE0195	N/A	03/15/06	03/21/06

1D
PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

032005-V1

Lab Name: Lionville Labs, Inc. Work Order: 60052001001

Client: BECHTEL NEVADA V2640

Matrix: SOIL

Lab Sample ID: 0603L514-001

Sample wt/vol: 30.0 (g/mL) G

Lab File ID: BLKLACHJ.02

Level: (low/med) LOW

Date Received: 03/14/06

% Moisture: not dec. 7 dec.

Date Extracted: 03/15/06

Extraction: (SepF/Cont/Sonc) SONC

Date Analyzed: 03/21/06

GPC Cleanup: (Y/N) N pH: ____

Dilution Factor: 1.00

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	Concentration	Q
12674-11-2	Aroclor-1016	14	U
11104-28-2	Aroclor-1221	14	U
11141-16-5	Aroclor-1232	14	U
53469-21-9	Aroclor-1242	14	U
12672-29-6	Aroclor-1248	14	U
11097-69-1	Aroclor-1254	14	U
11096-82-5	Aroclor-1260	6.6	J

FORM 1 PEST 12/88 Rev.

1D
PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

032005-V2

Lab Name: Lionville Labs, Inc. Work Order: 60052001001

Client: BECHTEL NEVADA V2640

Matrix: SOIL

Lab Sample ID: 0603L514-002

Sample wt/vol: 30.0 (g/mL) G

Lab File ID: BLKLACHJ.02

Level: (low/med) LOW

Date Received: 03/14/06

% Moisture: not dec. 6 dec.

Date Extracted: 03/15/06

Extraction: (SepF/Cont/Sonc) SONC

Date Analyzed: 03/20/06

GPC Cleanup: (Y/N) N pH: ____

Dilution Factor: 1.00

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	Concentration	Q
12674-11-2	Aroclor-1016	14	U
11104-28-2	Aroclor-1221	14	U
11141-16-5	Aroclor-1232	14	U
53469-21-9	Aroclor-1242	14	U
12672-29-6	Aroclor-1248	14	U
11097-69-1	Aroclor-1254	140	
11096-82-5	Aroclor-1260	14	U

1D
PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

032005-V3

Lab Name: Lionville Labs, Inc. Work Order: 60052001001

Client: BECHTEL NEVADA V2640

Matrix: SOIL

Lab Sample ID: 0603L514-003

Sample wt/vol: 30.0 (g/mL) G

Lab File ID: BLKLACHJ.02

Level: (low/med) LOW

Date Received: 03/14/06

% Moisture: not dec. 7 dec.

Date Extracted: 03/15/06

Extraction: (SepF/Cont/Sonc) SONC

Date Analyzed: 03/20/06

GPC Cleanup: (Y/N) N pH: ____

Dilution Factor: 1.00

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND		
12674-11-2	Aroclor-1016	14	U
11104-28-2	Aroclor-1221	14	U
11141-16-5	Aroclor-1232	14	U
53469-21-9	Aroclor-1242	14	U
12672-29-6	Aroclor-1248	14	U
11097-69-1	Aroclor-1254	14	U
11096-82-5	Aroclor-1260	37	

FORM 1 PEST 12/88 Rev.

1D

PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

032005-V4

Lab Name: Lionville Labs, Inc. Work Order: 60052001001

Client: BECHTEL NEVADA V2640

Matrix: SOIL

Lab Sample ID: 0603L514-004

Sample wt/vol: 30.0 (g/mL) G

Lab File ID: BLKLACHJ.02

Level: (low/med) LOW

Date Received: 03/14/06

% Moisture: not dec. 9 dec.

Date Extracted: 03/15/06

Extraction: (SepF/Cont/Sonc) SONC

Date Analyzed: 03/20/06

GPC Cleanup: (Y/N) N pH: ____

Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
12674-11-2	Aroclor-1016	15	U
11104-28-2	Aroclor-1221	15	U
11141-16-5	Aroclor-1232	15	U
53469-21-9	Aroclor-1242	15	U
12672-29-6	Aroclor-1248	15	U
11097-69-1	Aroclor-1254	15	U
11096-82-5	Aroclor-1260	4.2	J

FORM 1 PEST 12/88 Rev.

1D

PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

032005-V5

Lab Name: Lionville Labs, Inc. Work Order: 60052001001

Client: BECHTEL NEVADA V2640

Matrix: SOIL

Lab Sample ID: 0603L514-005

Sample wt/vol: 30.0 (g/mL) G

Lab File ID: BLKLACHJ.02

Level: (low/med) LOW

Date Received: 03/14/06

% Moisture: not dec. 10 dec.

Date Extracted: 03/15/06

Extraction: (SepF/Cont/Sonc) SONC

Date Analyzed: 03/20/06

GPC Cleanup: (Y/N) N pH: ____

Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	
12674-11-2	Aroclor-1016	15	U
11104-28-2	Aroclor-1221	15	U
11141-16-5	Aroclor-1232	15	U
53469-21-9	Aroclor-1242	15	U
12672-29-6	Aroclor-1248	15	U
11097-69-1	Aroclor-1254	6.1	J
11096-82-5	Aroclor-1260	15	U

FORM 1 PEST 12/88 Rev.

1D
PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

032005-V6

Lab Name: Lionville Labs, Inc. Work Order: 60052001001

Client: BECHTEL NEVADA V2640

Matrix: SOIL | Lab Sample ID: 0603L514-006

Sample wt/vol: 30.0 (g/mL) G | Lab File ID: BLKLACHJ.02

Level: (low/med) LOW | Date Received: 03/14/06

% Moisture: not dec. 8 dec. | Date Extracted: 03/15/06

Extraction: (SepF/Cont/Sonc) SONC | Date Analyzed: 03/20/06

GPC Cleanup: (Y/N) N pH: ____ | Dilution Factor: 1.00

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND		
12674-11-2	Aroclor-1016	15	U
11104-28-2	Aroclor-1221	15	U
11141-16-5	Aroclor-1232	15	U
53469-21-9	Aroclor-1242	15	U
12672-29-6	Aroclor-1248	15	U
11097-69-1	Aroclor-1254	6.2	J
11096-82-5	Aroclor-1260	15	U

1D
PESTICIDE ORGANICS ANALYSIS SHEET

CLIENT SAMPLE NO.

032005-R1

Lab Name: Lionville Labs, Inc. Work Order: 60052001001

Client: BECHTEL NEVADA V2640

Matrix: WATER

Lab Sample ID: 0603L514-007

Sample wt/vol: 1000 (g/mL) ML

Lab File ID: BLKLACHJ.02

Level: (low/med) LOW

Date Received: 03/14/06

% Moisture: not dec. ____ dec.

Date Extracted: 03/15/06

Extraction: (SepF/Cont/Sonc) CONT

Date Analyzed: 03/21/06

GPC Cleanup: (Y/N) N pH: 7.0

Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
12674-11-2	Aroclor-1016	0.40	U
11104-28-2	Aroclor-1221	0.40	U
11141-16-5	Aroclor-1232	0.40	U
53469-21-9	Aroclor-1242	0.40	U
12672-29-6	Aroclor-1248	0.40	U
11097-69-1	Aroclor-1254	0.40	U
11096-82-5	Aroclor-1260	0.40	U

COVER PAGE

Sanford Cohen & Associates
Southeastern Environmental Laboratory
1000 Monticello Court
Montgomery, Alabama 36117

Laboratory Code: SCA   Subcontract Number: 30025

Laboratory Report Identification Code: 6726, 6727   SDG V2664

Sample Matrix: Soil

Site Sample Number	Laboratory Sample Number
032005-V7	NTS06-6726-01
032005-V8	NTS06-6726-02
032005-V9	NTS06-6726-03
032005-V10	NTS06-6726-04
032005-V11	NTS06-6726-05
032005-V12	NTS06-6726-06
032005-V13	NTS06-6726-07
Preparation Blank (PB)	SCAQC-6726-PB1
Laboratory Control (LC)	SCAQC-6726-LC1
Laboratory Duplicate (LD)	SCAQC-6726-LD1

Sample Matrix: Water

Site Sample Number	Laboratory Sample Number
032005-R3	NTS06-6727-01
Preparation Blank (PB)	SCAQC-6727-PB1
Laboratory Control (LC)	SCAQC-6727-LC1
Laboratory Duplicate (LD)	SCAQC-6727-LD1

Comments: There were no problems encountered during sample receiving.

"I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard-copy sample data package and the computer-readable EDD, as applicable, submitted on diskette or by modem, has been authorized by the Vice President or the Vice President's designee, as verified by the following signature."

Signature

Edwin L. Sensintaffar   Vice President   04/24/2006
Name   Title   Date

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Soil
Site Sample ID: 032005-V7			
Other Sample ID:	Collection Date: 4/12/2006 1:00:00 AM	Date Received: 4/18/2006 9:15:00	
	Batch Number: 6726	Laboratory Code: SCA	

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6726-01	0.005	0.010	0.010	0.014
ACW03	PU-239/240	NTS06-6726-01	0.067	0.023	0.027	0.005

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6726-LC1	SCAQC-6726-LD1		SCAQC-6726-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Soil
Site Sample ID: 032005-V8			
Other Sample ID:	Collection Date: 4/12/2006 1:03:00 AM	Date Received: 4/18/2006 9:15:00	
	Batch Number: 6726	Laboratory Code: SCA	

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6726-02	0.094	0.030	0.035	0.014
ACW03	PU-239/240	NTS06-6726-02	2.51	0.219	0.547	0.006

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6726-LC1	SCAQC-6726-LD1		SCAQC-6726-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Soil
Site Sample ID: 032005-V9			
Other Sample ID:	Collection Date: 4/12/2006 1:06:00 AM	Date Received: 4/18/2006 9:15:00	
	Batch Number: 6726	Laboratory Code: SCA	

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6726-03	0.003	0.010	0.010	0.014
ACW03	PU-239/240	NTS06-6726-03	0.215	0.044	0.062	0.006

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6726-LC1	SCAQC-6726-LD1		SCAQC-6726-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Soil
Site Sample ID: 032005-V10			
Other Sample ID:	Collection Date: 4/12/2006 1:09:00 AM	Date Received: 4/18/2006 9:15:00	
	Batch Number: 6726	Laboratory Code: SCA	

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6726-04	0.023	0.014	0.015	0.006
ACW03	PU-239/240	NTS06-6726-04	0.571	0.078	0.138	0.014

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6726-LC1	SCAQC-6726-LD1		SCAQC-6726-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Soil
Site Sample ID: 032005-V11			
Other Sample ID:	Collection Date: 4/12/2006 1:17:00 AM	Date Received:	4/18/2006 9:15:00
	Batch Number: 6726	Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6726-05	0.006	0.007	0.007	0.005
ACW03	PU-239/240	NTS06-6726-05	0.174	0.038	0.052	0.005

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6726-LC1	SCAQC-6726-LD1		SCAQC-6726-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Soil
Site Sample ID: 032005-V12			
Other Sample ID:	Collection Date: 4/12/2006 1:12:00 AM	Date Received: 4/18/2006 9:15:00	
	Batch Number: 6726	Laboratory Code: SCA	

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6726-06	0.092	0.028	0.033	0.005
ACW03	PU-239/240	NTS06-6726-06	0.689	0.088	0.163	0.005

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6726-LC1	SCAQC-6726-LD1		SCAQC-6726-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Soil
Site Sample ID: 032005-V13			
Other Sample ID:	Collection Date: 4/12/2006 1:18:00 AM	Date Received:	4/18/2006 9:15:00
	Batch Number: 6726	Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	NTS06-6726-07	1.68	0.156	0.370	0.005
ACW03	PU-239/240	NTS06-6726-07	7.53	0.533	1.60	0.014

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6726-LC1	SCAQC-6726-LD1		SCAQC-6726-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Report Identification Number: V2664

Project Name:	Bechtel Nevada	Chain-of-Custody Number:	NONE	Matrix:	Water
Site Sample ID:	032005-R3				
Other Sample ID:		Collection Date:	4/12/2006 1:31:00 AM	Date Received:	4/18/2006 9:15:00
		Batch Number:	6727	Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/L)	2 σ TPU (pCi/L)	Total Error (pCi/L)	MDA (pCi/L)
ACW03	PU-238	NTS06-6727-01	0.023	0.023	0.024	0.016
ACW03	PU-239/240	NTS06-6727-01	0.006	0.012	0.012	0.016

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6727-LC1	SCAQC-6727-LD1		SCAQC-6727-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Laboratory Control (LC1)

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: None		Matrix: Soil
Site Sample ID: N/A			
Other Sample ID: LC1		Collection Date: 4/14/2006 9:15:00 AM	Date Received: 4/18/2006 9:15:00
			Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-239/240	SCAQC-6726-LC1	1.87	0.154	0.405	0.004

Quality Control Samples				
Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6726-LC1	SCAQC-6726-LD1		SCAQC-6726-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Laboratory Control (LC1)

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: None	Matrix: Water	
Site Sample ID: N/A			
Other Sample ID: LC1	Collection Date: 4/14/2006 9:15:00 AM	Date Received:	4/18/2006 9:15:00
		Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/L)	2 σ TPU (pCi/L)	Total Error (pCi/L)	MDA (pCi/L)
ACW03	PU-239/240	SCAQC-6727-LC1	2.13	0.221	0.480	0.008

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6727-LC1	SCAQC-6727-LD1		SCAQC-6727-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Duplicate (LD1)

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Soil
Site Sample ID: 032005-V7			
Other Sample ID: LD1	Collection Date: 4/12/2006 1:00:00 AM	Date Received:	4/18/2006 9:15:00
		Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	SCAQC-6726-LD1	-0.001	0.008	0.008	0.014
ACW03	PU-239/240	SCAQC-6726-LD1	0.098	0.029	0.035	0.005

Laboratory Samples for Duplicates

Radionuclide	Laboratory Sample ID	Duplicate of Sample ID
PU-238	SCAQC-6726-LD1	NTS06-6726-01
PU-239/240	SCAQC-6726-LD1	NTS06-6726-01

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6726-LC1	SCAQC-6726-LD1		SCAQC-6726-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Duplicate (LD1)

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: NONE		Matrix: Water
Site Sample ID: 032005-R3			
Other Sample ID: LD1	Collection Date: 4/12/2006 1:31:00 AM		Date Received: 4/18/2006 9:15:00
			Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/L)	2 σ TPU (pCi/L)	Total Error (pCi/L)	MDA (pCi/L)
ACW03	PU-238	SCAQC-6727-LD1	0.006	0.012	0.012	0.016
ACW03	PU-239/240	SCAQC-6727-LD1	0.000	0.000	0.000	0.016

Laboratory Samples for Duplicates

Radionuclide	Laboratory Sample ID	Duplicate of Sample ID
PU-238	SCAQC-6727-LD1	NTS06-6727-01
PU-239/240	SCAQC-6727-LD1	NTS06-6727-01

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6727-LC1	SCAQC-6727-LD1		SCAQC-6727-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Preparation Blank (PB)

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: None		Matrix: Soil
Site Sample ID: N/A			
Other Sample ID: PB	Collection Date: 4/14/2006 9:15:00 AM	Date Received:	4/18/2006 9:15:00
		Laboratory Code:	SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	2 σ TPU (pCi/g)	Total Error (pCi/g)	MDA (pCi/g)
ACW03	PU-238	SCAQC-6726-PB1	0.002	0.003	0.003	0.005
ACW03	PU-239/240	SCAQC-6726-PB1	0.000	0.000	0.000	0.005

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6726-LC1	SCAQC-6726-LD1		SCAQC-6726-PB1

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample
Preparation Blank (PB)

Report Identification Number: V2664

Project Name: Bechtel Nevada	Chain-of-Custody Number: None		Matrix: Water
Site Sample ID: N/A			
Other Sample ID: PB	Collection Date: 4/14/2006 9:15:00 AM		Date Received: 4/18/2006 9:15:00
			Laboratory Code: SCA

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/L)	2 σ TPU (pCi/L)	Total Error (pCi/L)	MDA (pCi/L)
ACW03	PU-238	SCAQC-6727-PB1	0.006	0.012	0.012	0.016
ACW03	PU-239/240	SCAQC-6727-PB1	0.000	0.000	0.000	0.016

Quality Control Samples

Radionuclide	Laboratory Control (LC)	Laboratory Duplicate (LD)	Matrix Spike (MS)	Preparation Blank (PB)
Pu	SCAQC-6727-LC1	SCAQC-6727-LD1		SCAQC-6727-PB1

1000 Monticello Court * Montgomery, Alabama * 36117 * 334.272.2234 * FAX 334.213.0407

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample Evaluation

Report Identification Number: V2664

Project Name: Bechtel Nevada
Matrix: Soil
Laboratory Code: SCA

Laboratory Contol Sample (LC1) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	(CV) Decay Corrected Activity of Spike Added (pCi/g)	(OV) Laboratory Control Sample Activity (pCi/g)	Laboratory Control Sample % Recovery (Accuracy)	Number of σ Between CV and OV
ACW03	PU-239/240	SCAQC-6726-LC1	2.04 ± 0.102	1.87 ± 0.405	91.9	0.563

Laboratory Duplicate Sample (LD1) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	Original Sample Activity (pCi/g)	Duplicate Sample Activity (pCi/g)	Difference Between Original Activity and Duplicate Sample Activity (F)	Ratio of the Difference Between the Sample Activity and the Propagated Measurement at 1 σ (F/E)
ACW03	PU-238	SCAQC-6726-LD1	0.005 ± 0.010	-0.001 ± 0.008	0.006	0.918
ACW03	PU-239/240	SCAQC-6726-LD1	0.067 ± 0.027	0.098 ± 0.035	0.031	1.42

Laboratory Contol Sample (PB) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/g)	MDA (pCi/g)	RDL (pCi/g)	All Samples Detected	All Samples > RDL	All Samples < RDL	Accept PB
ACW03	PU-238	SCAQC-6726-PB1	0.002	0.005	0.020	No	No	No	Yes
ACW03	PU-239/240	SCAQC-6726-PB1	0.000	0.005	0.020	Yes	Yes	No	Yes

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Sample Evaluation

Report Identification Number: V2664

Project Name: Bechtel Nevada
Matrix: Water
Laboratory Code: SCA

Laboratory Contol Sample (LC1) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	(CV) Decay Corrected Activity of Spike Added (pCi/L)	(OV) Laboratory Control Sample Activity (pCi/L)	Laboratory Control Sample % Recovery (Accuracy)	Number of σ Between CV and OV
ACW03	PU-239/240	SCAQC-6727-LC1	2.04 ± 0.102	2.13 ± 0.480	104	0.266

Laboratory Duplicate Sample (LD1) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	Original Sample Activity (pCi/L)	Duplicate Sample Activity (pCi/L)	Difference Between Original Activity and Duplicate Sample Activity (F)	Ratio of the Difference Between the Sample Activity and the Propagated Measurement at 1 σ (F/E)
ACW03	PU-238	SCAQC-6727-LD1	0.023 ± 0.024	0.006 ± 0.012	0.018	1.31
ACW03	PU-239/240	SCAQC-6727-LD1	0.006 ± 0.012	0.000 ± 0.000	0.006	0.995

Laboratory Contol Sample (PB) Evaluation

Method Number	Radionuclide	Laboratory Sample ID	Activity (pCi/L)	MDA (pCi/L)	RDL (pCi/L)	All Samples Detected	All Samples > RDL	All Samples < RDL	Accept PB
ACW03	PU-238	SCAQC-6727-PB1	0.006	0.016	0.060	No	No	Yes	Yes
ACW03	PU-239/240	SCAQC-6727-PB1	0.000	0.016	0.060	No	No	Yes	Yes

Sanford Cohen & Associates
Southeastern Environmental Laboratory

Radioanalytical Results

Quality Control Tracer Yield

Report Identification Number: V2664

Project Name: Bechtel Nevada   Laboratory Code: SCA

Laboratory Sample ID	Pu-242
NTS06-6726-01	86.44
NTS06-6726-01	86.44
NTS06-6726-02	80.37
NTS06-6726-02	80.37
NTS06-6726-03	82.41
NTS06-6726-03	82.41
NTS06-6726-04	76.83
NTS06-6726-04	76.83
NTS06-6726-05	81.56
NTS06-6726-05	81.56
NTS06-6726-06	79.29
NTS06-6726-06	79.29
NTS06-6726-07	85.78
NTS06-6726-07	85.78
NTS06-6727-01	90.05
NTS06-6727-01	90.05
SCAQC-6726-LC1	106.44
SCAQC-6726-LC1	106.44
SCAQC-6726-LD1	85.27
SCAQC-6726-LD1	85.27
SCAQC-6726-PB1	99.39
SCAQC-6726-PB1	99.39
SCAQC-6727-LC1	93.36
SCAQC-6727-LC1	93.36
SCAQC-6727-LD1	89.82
SCAQC-6727-LD1	89.82
SCAQC-6727-PB1	95.02
SCAQC-6727-PB1	95.02

APPENDIX C

WASTE DISPOSITION DOCUMENTATION

THIS PAGE INTENTIONALLY LEFT BLANK

FORM 540 EnergySolutions, LLC

UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST
SHIPPING PAPER

1. EMERGENCY TELEPHONE NUMBER (Include Area Code): 702-295-0311

ORGANIZATION: Waste Generator Services

2. IS THIS AN "EXCLUSIVE USE" SHIPMENT? ☐ YES ☑ NO

3. TOTAL NUMBER OF PACKAGES IDENTIFIED ON THIS MANIFEST =====> 2

4. DOES EPA REGULATED WASTE REQUIRING A MANIFEST ACCOMPANY THIS SHIPMENT? ☑ YES ☐ NO
If "Yes," provide Manifest Number =====>
EPA MANIFEST NUMBER: 06016

5. SHIPPER – NAME AND FACILITY
Bechtel Nevada
PO Box 98521
Las Vegas, NV 89193

SHIPPER I.D. NUMBER: 9316-03-0002
☐ COLLECTOR
☐ PROCESSOR
☑ GENERATOR TYPE (Specify) G

Utah Generator Site Access Permit No.: 0510003453
SHIPMENT NUMBER: 9316-03-0002
CONTACT: Stefan Duke
TELEPHONE NUMBER (Include Area Code): 702-295-7365

6. CARRIER – Name and Address
CAST Transportation
9050 Havana Street
Henderson, CO 80640

EPA I.D. NUMBER: UTD988074712
SHIPPING DATE: 05/10/2006
CONTACT: Randy Withrow
TELEPHONE (Include Area Code): 800-369-6374
SIGNATURE – Authorized carrier acknowledging waste receipt: [signature]
DATE: 5-10-06

7. FORM 540 AND 540A — PAGE 1 OF 1 PAGE(S)
FORM 541 AND 541A — 2 PAGE(S)
FORM 542 AND 542A — None PAGE(S)
ADDITIONAL INFORMATION — None PAGE(S)

8. MANIFEST NUMBER (Use this number on all continuation pages): 06016

9. CONSIGNEE - Name and Facility
EnergySolutions, LLC
Clive Disposal Site (Treatment Facility)
Interstate 80, Exit 49
Clive, UT 84029
M09548

CONTACT: Shipping and Receiving
TELEPHONE (Include Area Code): (435)884-0155

SIGNATURE – Authorized consignee acknowledging waste receipt: [signature]
DATE: 05/11/06

10. CERTIFICATION

This is to certify that the herein-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. This also certifies that the materials are classified, packaged, marked, and labeled and are in proper condition for transportation and disposal as described in accordance with the requirements of 10 CFR Parts 20 and 61, or equivalent state regulations. [signature]

AUTHORIZED SIGNATURE: Stefan Duke — See consignee block below
TITLE: WGS
DATE: 5/8/2006

11. U.S. DEPARTMENT OF TRANSPORTATION DESCRIPTION (Including proper shipping name, hazard class, UN ID number, and any additional information)	12. DOT LABEL "RADIOACTIVE"	13 TRANSPORT INDEX	14 PHYSICAL AND CHEMICAL FORM	15 INDIVIDUAL RADIONUCLIDES				16. TOTAL PACKAGE ACTIVITY MBq	16. mCi	17. LSA/SCO CLASS	18. TOTAL WEIGHT OR VOLUME (Use appropriate units)	19. IDENTIFICATION NUMBER OF PACKAGE
NA3077, Hazardous waste solid, n.o.s., 9, PG III, (cadmium)	NA	NA	solid oxide	Ac-228	Am-241	Bi-212	Bi-214	1.6453E+00	4.4467E-02	NA	5700 LBS; 96 FT3	151436
				Cs-137	Pb-212	Pb-214	Pu-238					
				Pu-239	Sr-90	Th-234	Tl-208					
				U-234	U-235	U-238						
NA3077, Hazardous waste solid, n.o.s., 9, PG III, (cadmium)	NA	NA	solid oxide	Ac-228	Am-241	Bi-212	Bi-214	2.3555E+00	6.3663E-02	NA	7740 LBS; 96 FT3	~~151438~~ 151468
				Cs-137	Pb-212	Pb-214	Pu-238					
				Pu-239	Sr-90	Th-234	Tl-208					
				U-234	U-235	U-238						

FOR CONSIGNEE USE ONLY

The original signed manifest resides with:
Bechtel Nevada for USDOE
PO Box 98521
Las Vegas, NV 89193-8521
7022957365

- ___ Record Waste Description Inadequate
- ___ Contamination or Leakage Detected
- ___ Unexpected Exposure Rates Detected
- ___ Labels, Markings, etc. Inadequate
- ___ Container Integrity Inadequate
- ___ Other
- X No Violations Detected on this Shipment

20. TERMS AND CONDITIONS

A. HAZARDOUS MATERIALS: Generator represents & warrants that Waste Material __ is (or) ✓ is not a hazardous waste as defined in 40 CFR 261. Where the material is a hazardous waste, this shipment is also accompanied by a separate and completed hazardous waste manifest, along with the appropriate land-disposal restriction notice and/or certification as required by 40 CFR 268.1.

B. TITLE: Upon acceptance at the disposal site by EnergySolutions, LLC, and all appropriate regulatory authorities, title to the Waste Material which conforms to Generator's representations herein shall thereupon transfer from Generator and be vested in EnergySolutions, LLC

C. WASTE MATERIAL: Generator represents and warrants that all data set forth in this (UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST) are true and correct in all respects and in accordance with all applicable governmental laws, rules, regulations and EnergySolutions LLC's facility license.

D. INDEMNIFICATION: Generator agrees to indemnify EnergySolutions, LLC, its officers, employees and agents against all losses and liability whatsoever if such losses or liability results from the failure of the Waste Material to conform in all material respects to the data supplied on the (UNIFORM LOW-LEVEL RADIOACTIVE WASTE MANIFEST,) or if this shipment fails to meet the standards prescribed by the Department of Transportation or any governmental agency having jurisdiction over such matters.

THIS PAGE INTENTIONALLY LEFT BLANK

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) *Form Approved. OMB No. 2050-0039.*

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. NV3890090001	Manifest Document No. 06016	2. Page 1 of 2	Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Bechtel Nevada for US DOE
PO Box 98521 M/S NTS110
Las Vegas, NV 89193

4. Generator's Phone (702) 295 - 0311 ATTN: Stefan Duke

A. State Manifest Document Number

B. State Generator's ID

5. Transporter 1 Company Name: CAST Transportation
6. US EPA ID Number: COR000005389

C. State Transporter's ID

D. Transporter's Phone

7. Transporter 2 Company Name
8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
Energy Solutions, LLC
Clive Disposal Site (Treatment Facility)
Interstate 80, Exit 49;
Clive, UT. 84029.

10. US EPA ID Number: UTD982598898

G. State Facility's ID

H. Facility's Phone [illegible]

HM	11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. X	NA3077, Hazardous waste solid, n.o.s., 9, PG III, (Cadmium) non-DOT regulated radioactive material	002	CM	6096	K	D006
b.						
c.						
d.						

J. Additional Descriptions for Materials Listed Above
Line a: ERG# 171; profile 9316-03; MEF F06005
Utah Permit number: 0501003462
PAX #, Description, and TID # as applicable are on page 2.

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
24-hour emergency contact number (702) 295-0311 collect.
Use proper PPE when handling containers.
Certificate of Disposal is required. Shipment ID 9316-03-0002

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; **OR**, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month Day Year
Stefan Duke	[signature]	05 10 06

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year
BOB APPLEGATE	Bob Applegate	05 10 06

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month Day Year

GENERATOR / TRANSPORTER / FACILITY

EPA Form 8700-22 (Rev. 9-88) Previous editions are obsolete.

GENERATOR COPY

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039.

UNIFORM HAZARDOUS WASTE MANIFEST *(Continuation Sheet)*

21. Generator's US EPA ID No.	Manifest Document No.	22. Page	Information in the shaded areas is not required by Federal law.
NV3890090001	06016	2 of 2	

23. Generator's Name

Bechtel Nevada for US DOE
PO Box 98521 M/S NTS403
Las Vegas, NV 89193
ATTN: Stefan Duke
[illegible]

L. State Manifest Document Number

M. State Generator's ID

24. Transporter ___ Company Name	25. US EPA ID Number

N. State Transporter's ID

O. Transporter's Phone

26. Transporter ___ Company Name	27. US EPA ID Number

P. State Transporter's ID

Q. Transporter's Phone

	HM	28. US DOT Description *(Including Proper Shipping Name, Hazard Class, and ID Number)*	29. Containers No.	29. Containers Type	30. Total Quantity	31. Unit Wt/Vol	R. Waste No.
a.		PKG# 151436, 1514~~36~~ 68, Solids, 6096 kg, TID#401535, 401574, 401503, 401537					
b.							
c.							
d.							
e.							
f.							
g.							
h.							
i.							

S. Additional Descriptions for Materials Listed Above

[illegible]

T. Handling Codes for Wastes Listed Above

32. Special Handling Instructions and Additional Information

24-hour emergency contact number (702) 295-0311 collect.
Use proper PPE when handling containers.
Certificate of Disposal is required.

GENERATOR

33. Transporter ___ Acknowledgement of Receipt of Materials		Date		
Printed/Typed Name	Signature	Month	Day	Year

34. Transporter ___ Acknowledgement of Receipt of Materials		Date		
Printed/Typed Name	Signature	Month	Day	Year

TRANSPORTER

35. Discrepancy Indication Space

FACILITY

GENERATOR COPY

APPENDIX D

FIELD PHOTOGRAPHS

THIS PAGE INTENTIONALLY LEFT BLANK

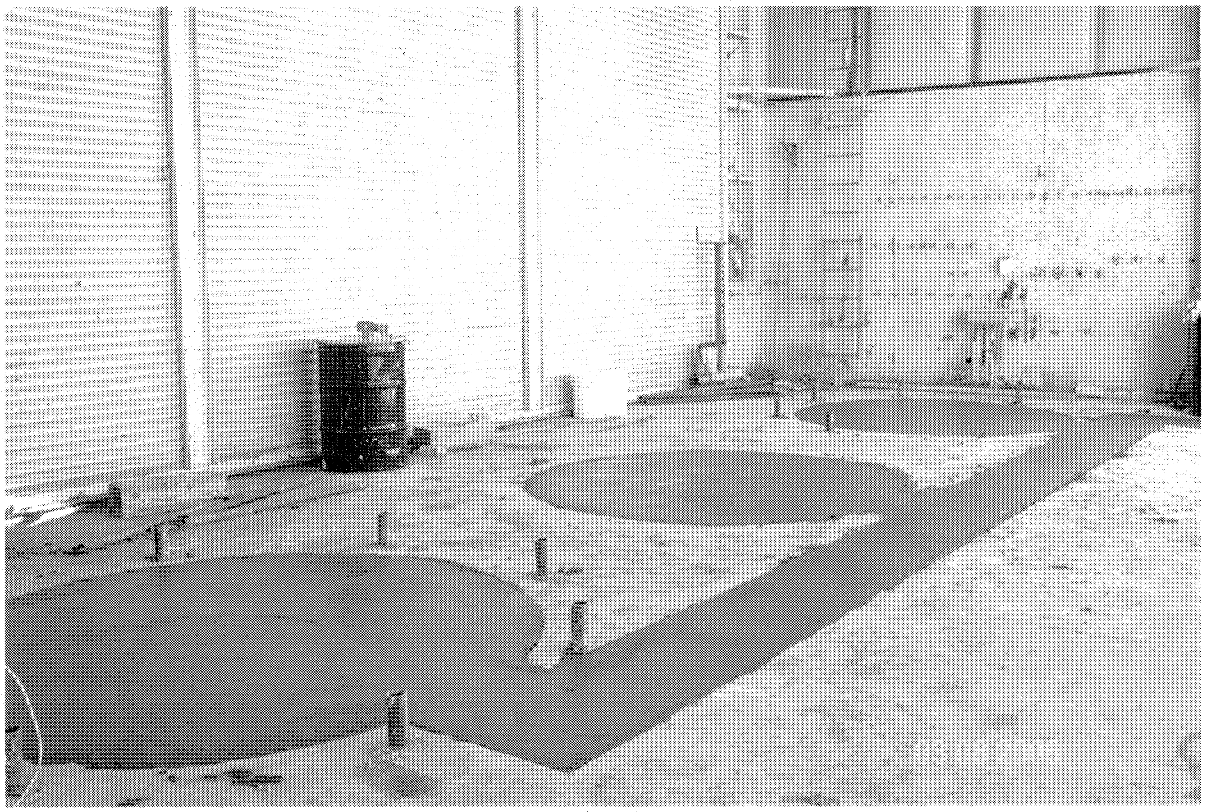
PHOTOGRAPHIC LOG

IMAGE NUMBER	DATE	CORRECTIVE ACTION SITE	DESCRIPTION
1	04-13-2005	CAS 03-20-05	Holding tank covers / trenching before closure
2	03-08-2006	CAS 03-20-05	Holding tanks / trenching during corrective action
3	03-08-2006	CAS 03-20-05	Holding tanks / trenching after corrective action
4	04-13-2005	CAS 03-20-05	Injection well before corrective action
5	03-02-2006	CAS 03-20-05	Injection well during soil excavation
6	03-08-2006	CAS 03-20-05	Injection well after corrective action
7	03-08-2006	CAS 03-20-05	Sample location C08 trench after excavation

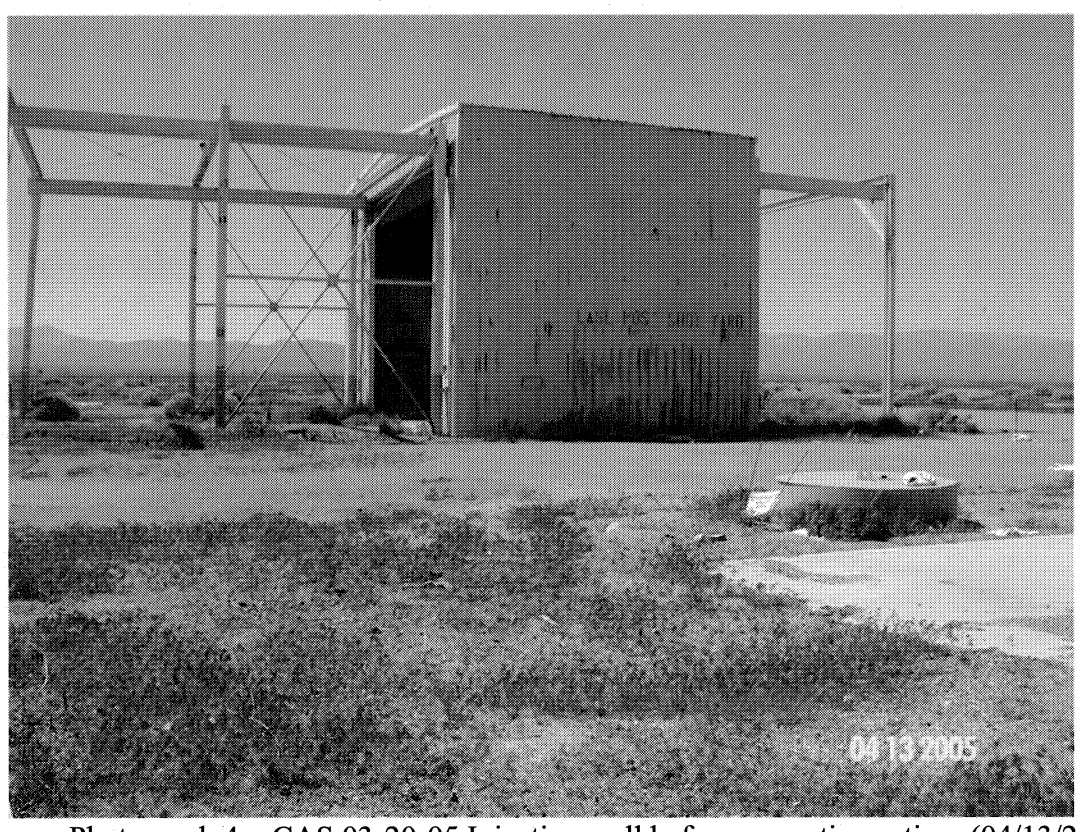
THIS PAGE INTENTIONALLY LEFT BLANK

Photograph 1: CAS 03-20-05 Holding tank covers / trenching before closure. (04/13/2005)

Photograph 2: CAS 03-20-05 Holding tanks / trenching during corrective action. (03/08/2006)

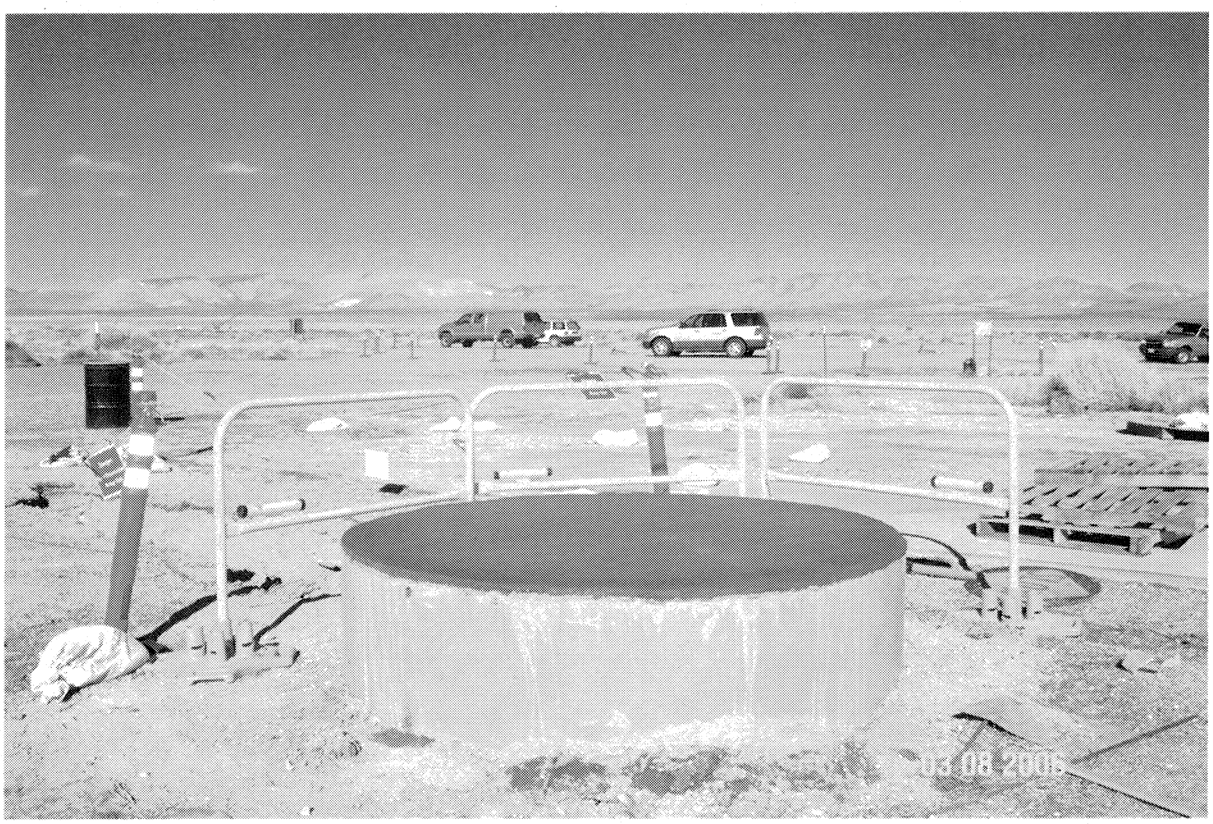


Photograph 3: CAS 03-20-05 Holding tanks / trenching after corrective action. (03/08/2006)



Photograph 4: CAS 03-20-05 Injection well before corrective action. (04/13/2005)

Photograph 5: CAS 03-20-05 Injection well during soil excavation. (03/02/2006)



Photograph 6: CAS 03-20-05 Injection well after corrective action. (03/08/2006)

Photograph 7: CAS 03-20-05 Sample location C08 trench after excavation. (03/08/2006)

APPENDIX E

USE RESTRICTION INFORMATION

THIS PAGE INTENTIONALLY LEFT BLANK

CAU Use Restriction Information

CAU Number/Description: CAU 322, Areas 1 and 3 Release Sites and Injection Wells

Applicable CAS Numbers/Descriptions: CAS 01-25-01, AST Release

Contact (organization/project): NNSA/NSO Industrial Sites Project Manager

Surveyed Area (UTM, Zone 11, NAD 27, meters):

		Northing	Easting
1	NW corner	4,102,604.409	576,658.301
2	SW corner	4,102,592.205	576,661.015
3	SE corner	4,102,605.769	576,685.548
4	NE corner	4,102,615.535	576,679.058

Survey Date: April 18, 2006 **Survey Method (GPS, etc):** GPS

Site Monitoring Requirements: Periodic visual inspection of use restriction postings and fencing.

Required Frequency (quarterly, annually?): Annual post closure monitoring for first five years, followed by every five years, for a total of thirty years.

If Monitoring Has Started, Indicate last Completion Date: N/A

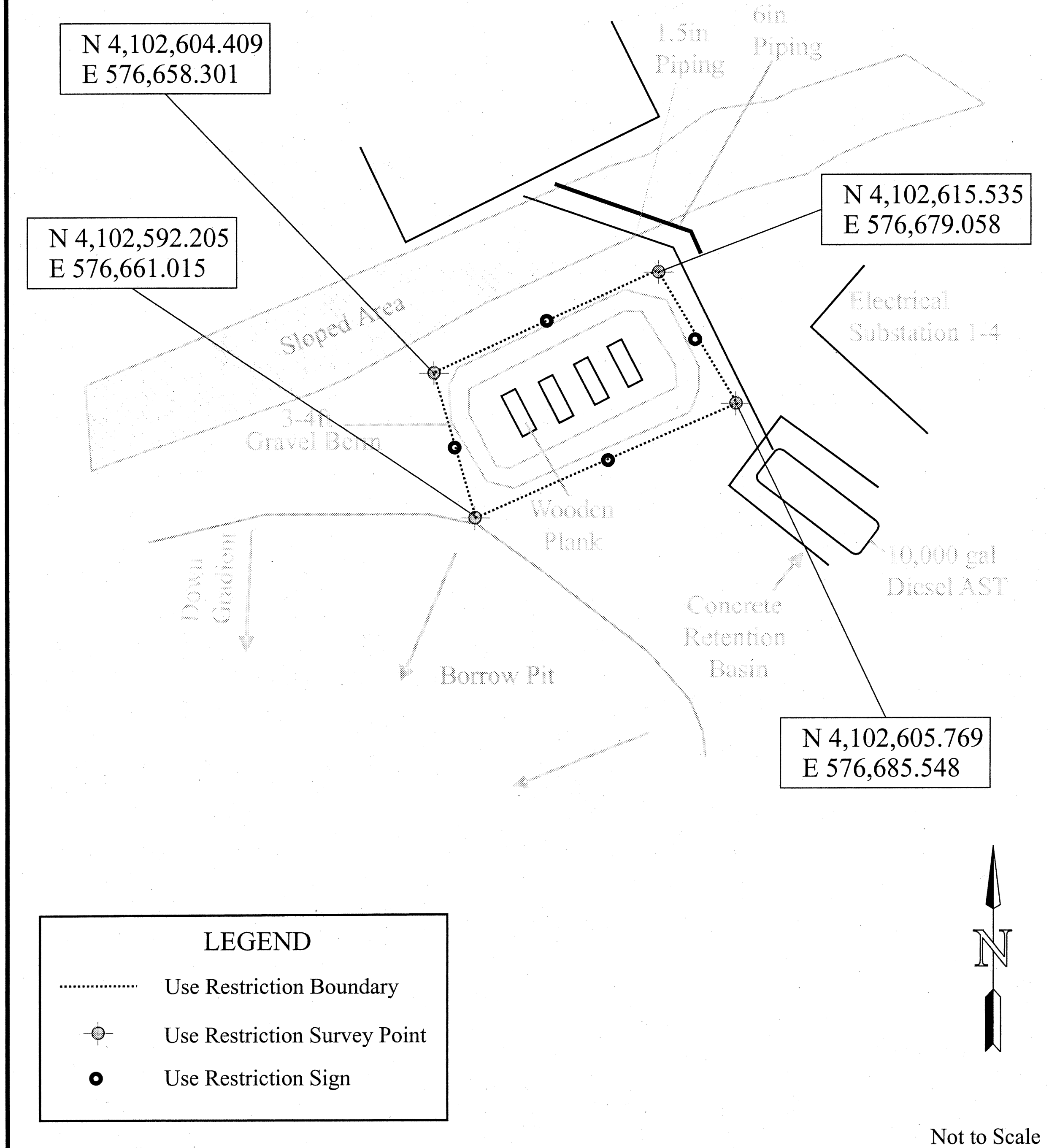
Use Restrictions

The future use of any land related to this Corrective Action Unit (CAU), as described by the above surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as approved by the state and identified in the CAU Closure Report or other CAU documentation unless appropriate concurrence is obtained in advance.

Comments: A berm with TPH contaminants is present beneath this location in the area identified by the above-surveyed locations. Refer to the Closure Report for more details: *Closure Report for Corrective Action Unit 322: Areas 1 and 3 Release Sites and Injection Wells, Nevada Test Site, Nevada (DOE/NV--1134).* This document is available at the Office of Scientific and Technical Information, the NNSA Technical Library, the Southern Nevada Public Reading Facility, and the Northern Nevada FFACO Public Reading Facility.

Submitted By: Sabine Curtis **Date:** 6-22-06

cc with copy of survey map (paper and digital (dgn) formats):
CAU Files (2 copies)



CAS 01-25-01 AST RELEASE
USE RESTRICTION BOUNDARY

CAU Use Restriction Information

CAU Number/Description: CAU 322, Areas 1 and 3 Release Sites and Injection Wells

Applicable CAS Numbers/Descriptions: CAS 03-20-05, Injection Wells

Contact (organization/project): NNSA/NSO Industrial Sites Project Manager

Surveyed Area (UTM, Zone 11, NAD 27, meters):

		Northing	Easting
1	BOP SW corner	4,099,045.870	585,711.713
2	BOP NW corner	4,099,056.536	585,712.282
3	BOP NE corner	4,099,055.717	585,728.566
4	BOP SE corner	4,099,047.998	585,728.259
5	IW NE corner	4,099,045.917	585,747.384
6	IW SE corner	4,099,042.866	585,747.355
7	S vertex	4,099,044.730	585,728.193

Survey Date: April 18, 2006 **Survey Method (GPS, etc):** GPS

Site Monitoring Requirements: Periodic visual inspection of use restriction postings, fencing, and landfill cover condition.

Required Frequency (quarterly, annually?): Annual post closure monitoring for first five years, followed by every five years, for a total of thirty years.

If Monitoring Has Started, Indicate last Completion Date: N/A

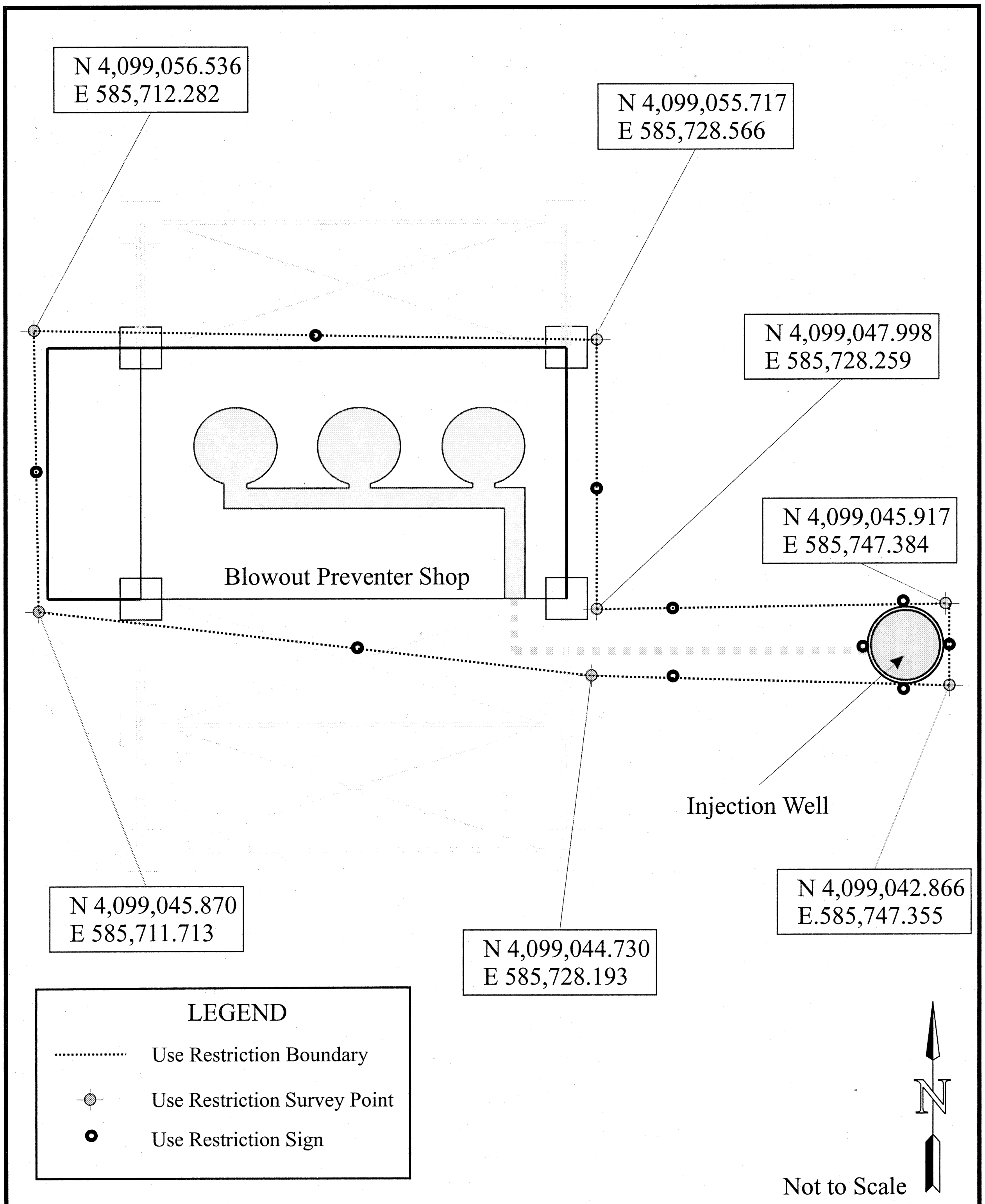
Use Restrictions

The future use of any land related to this Corrective Action Unit (CAU), as described by the above surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as approved by the state and identified in the CAU Closure Report or other CAU documentation unless appropriate concurrence is obtained in advance.

Comments: An injection well, holding tanks, and underground piping with TPH and/or radiological contaminants are present beneath this location in the area identified by the above-surveyed locations. Refer to the Closure Report for more details: *Closure Report for Corrective Action Unit 322: Area 1 and 3 Release Sites and Injection Wells, Nevada Test Site, Nevada (DOE/NV--1134)*. This document is available at the Office of Scientific and Technical Information, the NNSA Technical Library, the Southern Nevada Public Reading Facility, and the Northern Nevada FFACO Public Reading Facility.

Submitted By: Sabine Curtis **Date:** 6-22-06

cc with copy of survey map (paper and digital (dgn) formats):
CAU Files (2 copies)



CAS 03-20-05 INJECTION WELLS
USE RESTRICTION BOUNDARY

CAU Use Restriction Information

CAU Number/Description: CAU 322, Areas 1 and 3 Release Sites and Injection Wells

Applicable CAS Numbers/Descriptions: CAS 03-25-03, Mud Plant AST Diesel Release

Contact (organization/project): NNSA/NSO Industrial Sites Project Manager

Surveyed Area (UTM, Zone 11, NAD 27, meters):

		Northing	Easting
1	NW corner	4,100,503.577	586,307.377
2	SW corner	4,100,458.738	586,299.741
3	SE corner	4,100,461.429	586,312.155
4	E vertex	4,100,486.736	586,316.619
5	NE corner	4,100,507.650	586,341.250
6	N vertex	4,100,517.907	586,332.691

Survey Date: April 18, 2006 **Survey Method (GPS, etc):** GPS

Site Monitoring Requirements: Periodic visual inspection of use restriction postings, fencing, and landfill cover condition.

Required Frequency (quarterly, annually?): Annual post closure monitoring for first five years, followed by every five years, for a total of thirty years.

If Monitoring Has Started, Indicate last Completion Date: N/A

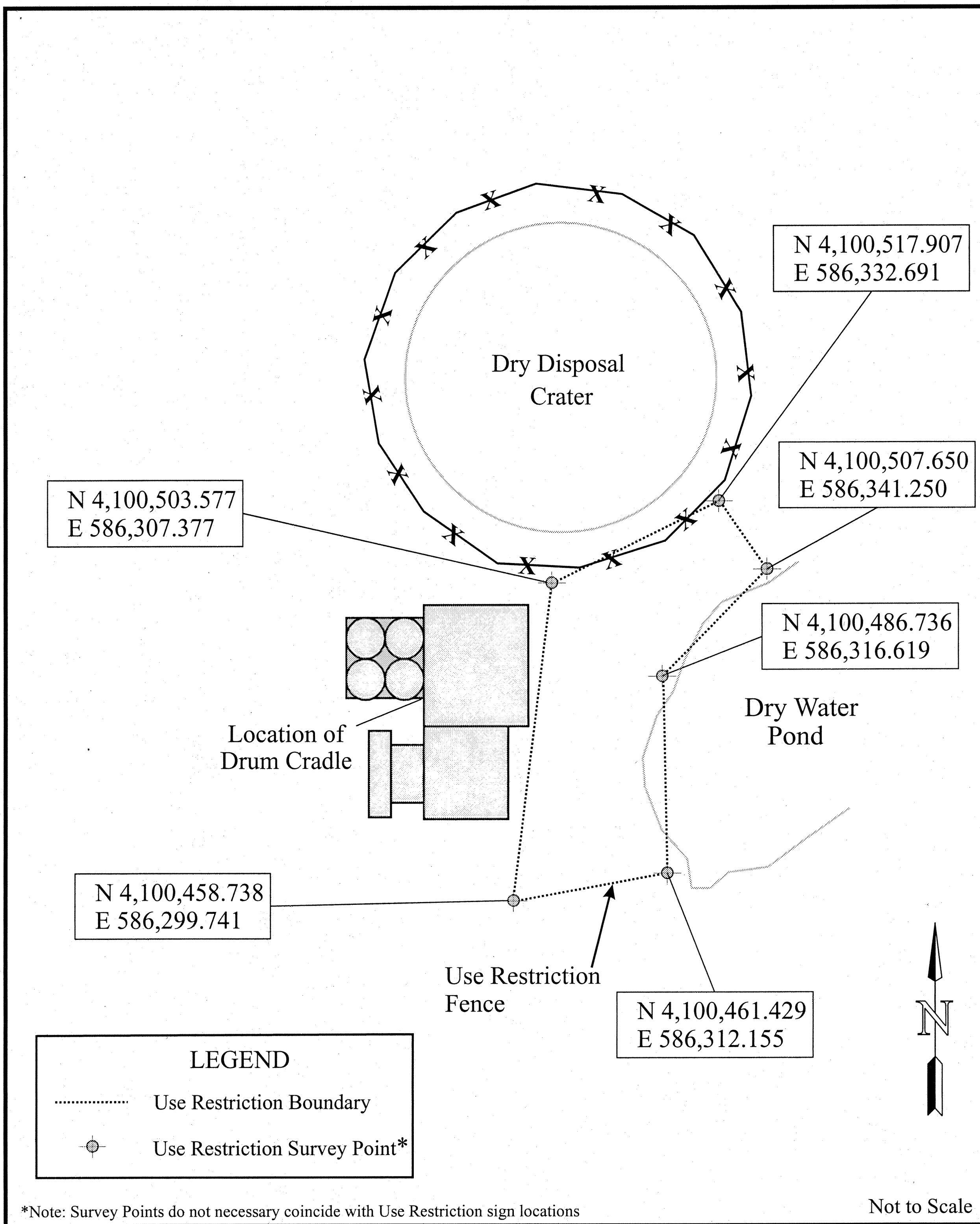
Use Restrictions

The future use of any land related to this Corrective Action Unit (CAU), as described by the above surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as approved by the state and identified in the CAU Closure Report or other CAU documentation unless appropriate concurrence is obtained in advance.

Comments: An area of soil with TPH contaminants is present beneath this location in the area identified by the above-surveyed locations. Refer to the Closure Report for more details: *Closure Report for Corrective Action Unit 322: Areas 1 and 3 Release Sites and Injection Wells, Nevada Test Site, Nevada (DOE/NV--1134)*. This document is available at the Office of Scientific and Technical Information, the NNSA Technical Library, the Southern Nevada Public Reading Facility, and the Northern Nevada FFACO Public Reading Facility.

Submitted By: Sabine Curtis **Date:** 6-22-06

cc with copy of survey map (paper and digital (dgn) formats):
CAU Files (2 copies)



CAS 03-25-03 MUD PLANT AST DIESEL RELEASE
USE RESTRICTION BOUNDARY

APPENDIX F

NATIONAL ENVIRONMENTAL POLICY ACT ENVIRONMENTAL EVALUATION CHECKLIST

THIS PAGE INTENTIONALLY LEFT BLANK

NV-2006-023

NV-16
(Rev. 11/2003)
Other Editions Obsolete

U.S. DEPARTMENT OF ENERGY
NATIONAL NUCLEAR SECURITY ADMINISTRATION NEVADA SITE OFFICE
NEPA ENVIRONMENTAL EVALUATION CHECKLIST

FOLLOW ATTACHED PROCEDURES FOR COMPLETING CHECKLIST A. Project/Activity Title (Attach a brief description of proposed project) **CAU 322 CLOSURE/CLEANUP ACTIVITIES**	Date **12/12/2005** Anticipated Start Date **2/13/2006**
Project Location **NTS - AREA 1 AND 3**	Proposed By (if other than NNSA/NSO)
NNSA/NSO Line Management Organization	NNSA/NSO Project/Program Manager **Kevin J. Cabble**

ENVIRONMENTAL CONSIDERATIONS: If any phase of the project/activity involves any of the following considerations, check yes and explain in project description. See NV-16A for consideration guidelines and examples.

CONSIDERATION	YES	NO	UNK	CONSIDERATION	YES	NO	UNK
WASTE				**AIR EMISSIONS**			
1 Non-Rad Solid Waste	X			1 Biological Material/Chemical Release		X	
2 Hazardous Waste	X			2 Dust/Particulate Matter	X		
3 Low-level Rad Waste	X			3 Explosives		X	
4 Mixed Waste	X			4 Diesel Generators		X	
5 TRU/Mixed TRU Waste		X		5 Open Burning		X	
6 Wastewater (domestic/industrial)		X					
				SITE LOCATION/OTHER			
HAZARDOUS MATERIALS				1 Environmental Restoration Site (CAU)	X		
1 Petroleum/Fuel (storage/use)	X			2 Excavation/Land Surface Disturbance	X		
2 Underground Storage Tanks		X		3 Off road travel		X	
3 Aboveground Storage Tanks		X		4 Biological/Tortoise Resource Area		X	
4 PCBs/Asbestos		X		5 Cultural/Historic Resource Area		X	
5 Pesticides/Herbicides		X		6 Change in Existing Drainage Pattern		X	
6 Radioactive Materials	X			7 Impact to Environmental Monitoring System		X	
7 Biological Materials/Simulants		X		8 Unexploded Ordnance Area		X	
8 Beryllium		X		9 Noise	X		
9 Chemical storage/use		X		10 Radiation controlled area	X		
10 Use of explosives/firearms		X		11 Drinking water system involvement		X	

DO NOT TYPE OR WRITE BELOW THIS LINE. FOR ESHD USE ONLY.

B. Is the project/activity included in the final NTS EIS and the ROD or other NEPA document?
Yes __X__ (complete Sections C, D, and E) No ____ (complete Sections D, E, and F)

C. This project/activity is included in the NTS EIS/ROD (or other NEPA document) under the following section and page no.:
NTS/EIS Volume 1, Appendix A, A.3.1.3 – Environmental Restoration Program – Industrial Sites Project

D. Does the proposed project/activity require any local, state, or federal permits or notifications? Yes __X__ No ____

E. If, based on the project description and the preliminary environmental considerations noted above, the proposed action fits within a class of action listed in Subpart D of 10 CFR 1021, write in the space below, the paragraph number and short title from the appropriate table of contents of Subpart D, Appendix B, C, or D, for a CX, EA, or EIS. If the proposed action does not fit within any class of action, write "Not Listed" below.

F. **NEPA COMPLIANCE OFFICER DETERMINATION OR RECOMMENDATION:**
I have determined that the proposed activity as described in item A above, has been adequately addressed in the document cited in item C for the purpose of NEPA. No further analysis or documentation is required pursuant to NEPA.

Linda M. Cohn, Deputy — 01/19/06
NNSA/NSO NEPA Compliance Officer — Date

CAU 322: AREAS 1 AND 3 RELASE SITES AND INJECTION WELLS CLOSURE/CLEANUP ACTIVITIES

Project Description

Corrective Action Unit (CAU) 322 consists of three Corrective Action Sites (CASs), located in Areas 1 and 3 of the Nevada Test Site (NTS). The sites will be closed by implementing land use restrictions (UR) at two CASs, and at the remaining CAS removing and solidifying standing liquids, grouting tank and piping void spaces, removing contaminated soil, implementing UR. Closure activities at each CAS are briefly described below.

AREA 1

CAS 01-25-01, AST Release
Closure activities will include erecting a fence around the perimeter of the existing berm, posting UR warning signs, and implementing a land use restriction.

AREA 3

CAS 03-25-03, Mud Plant AST Diesel Release
Closure activities will include erecting a fence around the perimeter of an area of hydrocarbon impacted soil near the Area 3 Mud Plant, posting UR warning signs, and implementing a land use restriction.

CAS 03-20-05, Injection Wells
Closure activities will include the removal and solidification of standing liquids in the tanks and cellars inside the Blowout Preventer Shop and grouting any void spaces in the tanks, cellars and piping runs. Additionally, a minimum of 2 feet of impacted soil will be removed from inside the injection well casing located approximate 20 feet southeast of the Shop building and the casing will be grouted to the casing surface. Also a small area (approximately eight cubic feet) of PCB and Pu-239 impacted soil located just north of the injection well will be removed. UR warning signs will be posted, and a land use restriction will be implemented for the injection well and Blowout Preventer Shop.

Environmental Considerations

Waste

1. **Non-Rad Solid Waste:** Sanitary waste from verification sampling activities and discarded Personal Protective Equipment will be generated as part of the site closure. This waste will be managed and disposed of as sanitary waste.

2. **Hazardous Waste:** Soil removed from the injection well at CAS 03-20-05 is anticipated to be RCRA hazardous waste for Lead and Cadmium. The hazardous 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 offsite facility.

3. **Low-level Rad Waste:** Low-level Rad Waste is anticipated at CAS 03-20-05 as excavated soil. All Low-Level Waste will be stored in a RMA, packaged in approved containers, and characterized. The waste will then be transported to an appropriate onsite disposal facility.

4. **Mixed Waste:** Mixed Waste is anticipated at CAS 03-20-05 and it 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 (SAA) or a 90-Day

Hazardous Waste Accumulation Area depending on the amount of waste generated. In addition the SAA/90 Day Area will be posted as a Radioactive Materials Area and managed accordingly. After an approved waste profile is generated, the waste will be disposed of at an appropriate offsite facility.

Hazardous Materials

1. **Petroleum/Fuel (storage/use):** Heavy equipment, if employed, will use petroleum fuel. No fuel will be stored on site outside of the equipment. Absorbent pads will be used if equipment appears to be leaking petroleum.

6. **Radioactive Materials:** Soil at CAS 03-20-05 has been determined by characterization samples to be above the cleanup criteria for Pu-239. This soil will be excavated, stored in a RMA, packaged in approved containers, and characterized. The waste will then be transported to an appropriate onsite disposal facility.

Air Emissions

2. **Dust/Particulate Matter:** Dust/Particulate Matter will be controlled during soil excavation by the use of water sprays.

Site Location/Other

1. **Environmental Restoration Site:** These sites are included in the Federal Facility Agreement and Consent Order between the Department of Energy and the state of Nevada as part of Corrective Action Unit 322.

2. **Excavation/Land Surface Disturbance:** Excavation will occur at CAS 03-20-05 to remove impacted soil. Soil may be removed by using a backhoe or front-end loader, and all excavations will be backfilled with clean fill or equivalent from an approved borrow source and contoured to the surrounding grade.

9. **Noise:** Elevated noise levels may result from the operation of backhoe and/or loader equipment. Personnel not directly involved with operation of this equipment will be kept back at least 15 feet while equipment is in use. The equipment operator will follow the instructions as directed in the CAU 322 Site Specific Health and Safety Plan.

10. **Radiation controlled area:** The CASs in CAU 322 are located in controlled areas, and work will be performed under the supervision of a radiological control technician as needed. An RWP will be obtained if required by Health Physics.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX G

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION COMMENTS

THIS PAGE INTENTIONALLY LEFT BLANK

NEVADA ENVIRONMENTAL RESTORATION PROJECT
DOCUMENT REVIEW SHEET

1. Document Title/Number: Draft Closure Report for Corrective Action Unit 322: Areas 1 and 3, Release Sites and Injection Wells, Nevada Test Site, Nevada

2. Document Date: June 2005

3. Revision Number: 0

4. Originator/Organization: Bechtel Nevada

5. Responsible NNSA/NSO ERP Project Manager: Sabine Curtis

6. Date Comments Due: June 22, 2006

7. Review Criteria: Full

8. Reviewer/Organization/Phone No.: DonElle and Greg Raab, NDEP, 486-2850-0331

9. Reviewer's Signature

10. Comment Number/Location	11. Type[a]	12. Comment	13. Comment Response	14. Accept
1. Appendix A	M	The Header reads CAU 322 CAIP and should be CAU 322 CR.	DQOs are included in this CR as supporting documentation that was previously published in the CAIP (NNSA/NSO, 2003). This format is in accordance with the Standardized Outline for Closure Report dated July 17, 2001.	No
2. Appendix E	M	The CAU Use Restriction forms are not signed. If they are not signed, NDEP will find the document substantially deficient.	The Use Restriction forms will be signed in the Final Closure Report	Yes

[a] Comment Types: M = Mandatory, S = Suggested

THIS PAGE INTENTIONALLY LEFT BLANK

LIBRARY DISTRIBUTION LIST

THIS PAGE INTENTIONALLY LEFT BLANK

LIBRARY DISTRIBUTION LIST

U.S. Department of Energy National Nuclear Security Administration Nevada Site Office Technical Library P.O. Box 98518, M/S 505 Las Vegas, NV 89193-8518	1 (Uncontrolled copy)
U.S. Department of Energy Office of Scientific and Technical Information P.O. Box 62 Oak Ridge, TN 37831-0062	1 (Uncontrolled, electronic copy)
Southern Nevada Public Reading Facility c/o Nuclear Testing Archive P.O. Box 98521, M/S 400 Las Vegas, NV 89193-8521	2 (Uncontrolled, electronic copies)
Manager, Northern Nevada FFACO Public Reading Facility c/o Nevada State Library and Archives Carson City, NV 89701-4285	1 (Uncontrolled, electronic copy)

THIS PAGE INTENTIONALLY LEFT BLANK