Nevada
Environmental
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Project

DOE/NV--1362

Closure Report for Corrective Action Unit 563: Septic Systems, Nevada Test Site, Nevada

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Environmental Restoration
Project

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

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CLOSURE REPORT FOR CORRECTIVE ACTION UNIT 563: SEPTIC SYSTEMS, NEVADA TEST SITE, NEVADA

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

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CLOSURE REPORT FOR CORRECTIVE ACTION UNIT 563: SEPTIC SYSTEMS, NEVADA TEST SITE, NEVADA

Approved By: /s/: Kevin Cabble Date: 2-1-10

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ACRONYMS AND ABBREVIATIONS

BMP	best management practice
CAIP	Corrective Action Investigation Plan
CAP	Corrective Action Plan
CAS	Corrective Action Site
CAU	Corrective Action Unit
COC	contaminant of concern
CR	Closure Report
CSM	conceptual site model
EPA	U.S. Environmental Protection Agency
FFACO	*Federal Facility Agreement and Consent Order*
gal	gallon(s)
mg/kg	milligram(s) per kilogram
NDEP	Nevada Division of Environmental Protection
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NNSA/NV	U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office
QA	quality assurance
QAPP	*Industrial Sites Quality Assurance Project Plan*
QC	quality control
yd^3	cubic yard(s)

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EXECUTIVE SUMMARY

Corrective Action Unit (CAU) 563 is identified in the *Federal Facility Agreement and Consent Order* (FFACO) as “Septic Systems” and consists of the following four Corrective Action Sites (CASs), located in Areas 3 and 12 of the Nevada Test Site:

- CAS 03-04-02, Area 3 Subdock Septic Tank
- CAS 03-59-05, Area 3 Subdock Cesspool
- CAS 12-59-01, Drilling/Welding Shop Septic Tanks
- CAS 12-60-01, Drilling/Welding Shop Outfalls

Closure activities were conducted from September to November 2009 in accordance with the FFACO (1996, as amended February 2008) and the Corrective Action Plan for CAU 563 (U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office, 2009). The corrective action alternatives included No Further Action and Clean Closure. Closure activities are summarized in Table 1.

TABLE 1. SUMMARY OF CORRECTIVE ACTION UNIT 563 CLOSURE ACTIVITIES

CAS	CAS NAME	CLOSURE METHOD	COC	CLOSURE ACTIVITIES
03-04-02	Area 3 Subdock Septic Tank	No Further Action	None	· As a BMP, removed aboveground riser pipes and bumper posts, removed a septic tank, and sealed open pipe ends with grout
03-59-05	Area 3 Subdock Cesspool	No Further Action	None	· As a BMP, removed aboveground riser pipes and bumper posts, backfilled a cesspool, and sealed open pipe ends with grout
12-59-01	Drilling/Welding Shop Septic Tanks	Clean Closure	Chromium Arsenic	· Removed approximately 4 yd^3 of arsenic- and chromium-impacted soil · As a BMP, removed approximately 5,000 gal of liquid from the South Tank, removed the North Tank, filled the South Tank with grout and left it in place, sealed open pipe ends with grout, removed approximately 10 yd^3 of chlordane-impacted soil, and removed debris from within the CAS boundary
12-60-01	Drilling/Welding Shop Outfalls	No Further Action	None	· As a BMP, sealed three drain pipe openings and all openings on the drilling/welding shop pad with grout

BMP: best management practice
CAS: Corrective Action Site
COC: contaminant of concern
gal: gallon(s)
yd^3: cubic yard(s)

1.0 INTRODUCTION

This Closure Report (CR) documents closure activities for Corrective Action Unit (CAU) 563, Septic Systems, in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) (1996, as amended February 2008) and the Corrective Action Plan (CAP) for CAU 563 (U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office [NNSA/NSO], 2009). CAU 563 consists of the following four Corrective Action Sites (CASs), located in Areas 3 and 12 of the Nevada Test Site:

- CAS 03-04-02, Area 3 Subdock Septic Tank
- CAS 03-59-05, Area 3 Subdock Cesspool
- CAS 12-59-01, Drilling/Welding Shop Septic Tanks
- CAS 12-60-01, Drilling/Welding Shop Outfalls

1.1 PURPOSE

CAU 563, Septic Systems, consists of four CASs in Areas 3 and 12 of the Nevada Test Site. The closure alternatives included No Further Action and Clean Closure. This CR provides a summary of completed closure activities, documentation of waste disposal, and confirmation that remediation goals were met.

1.2 SCOPE

The closure strategy for CAU 563 included the following activities:

- At CAS 03-04-02, Area 3 Subdock Septic Tank, no contaminants of concern (COCs) were present above action levels. No further action was required; however, as a best management practice (BMP), all aboveground features (e.g., riser pipes and bumper posts) and a septic tank were removed and disposed as sanitary waste, and all open pipe ends were sealed with grout.
- At CAS 03-59-05, Area 3 Subdock Cesspool, no COCs were present above action levels. No further action was required; however, as a BMP, all aboveground features (e.g., riser pipes and bumper posts) were removed and disposed as sanitary waste, a cesspool was backfilled by filling it with soil, and all open pipe ends were sealed with grout.
- At CAS 12-59-01, Drilling/Welding Shop Septic Tanks, clean closure was achieved by excavating approximately 4 cubic yards (yd^3) of arsenic- and chromium-impacted soil for disposal as sanitary waste. In addition, as a BMP, liquid in the South Tank was removed and disposed as sanitary liquid remediation waste, the North Tank was removed and disposed as sanitary waste, the South Tank was filled with grout and left in place, all open pipe ends were sealed with grout, approximately 10 yd^3 of chlordane-impacted soil were excavated and disposed as sanitary waste, and debris within the CAS boundary was removed and disposed as sanitary waste.
- At CAS 12-60-01, Drilling/Welding Shop Outfalls, no COCs were present above action levels. No further action was required; however, as a BMP, three drain pipe openings and all openings on the drilling/welding shop pad were sealed with grout.

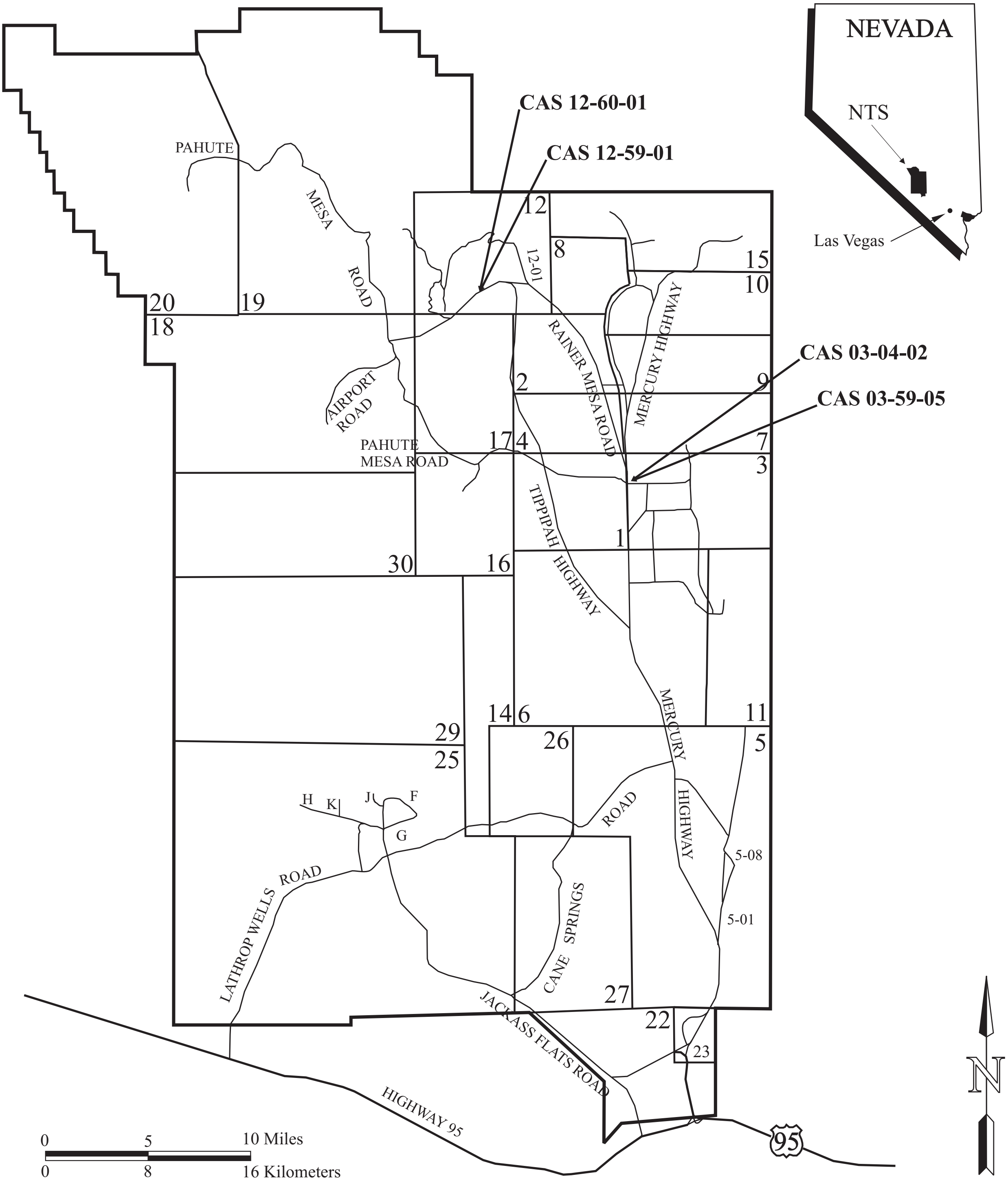

FIGURE 1. CORRECTIVE ACTION UNIT 563 SITE LOCATION MAP

1.3 CLOSURE REPORT CONTENTS

This CR includes the following sections:

- Section 1.0 – Introduction
- Section 2.0 – Closure Activities
- Section 3.0 – Waste Disposition
- Section 4.0 – Closure Verification Results
- Section 5.0 – Conclusions and Recommendations
- Section 6.0 – References
- Appendix A – Data Quality Objectives
- Appendix B – Sample Analytical Results
- Appendix C – Waste Disposition Documentation
- Appendix D – Site Closure Photographs
- Library Distribution List

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

- Corrective Action Investigation Plan (CAIP) for CAU 563 (NNSA/NSO, 2007)
- Corrective Action Decision Document for CAU 563 (NNSA/NSO, 2008)
- CAP for CAU 563 (NNSA/NSO, 2009)
- *Industrial Sites Quality Assurance Project Plan* (QAPP) (U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office [NNSA/NV], 2002)

Data quality objectives developed for site characterization of CAU 563 were presented in Appendix A of the CAIP for CAU 563 (NNSA/NSO, 2007) and are included as Appendix A of this report. Conceptual site models (CSMs) were developed based on process knowledge, historical information, and personnel interviews. No variations to the CSMs were identified, and the CSMs were confirmed by soil sample results and verified during closure activities.

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2.0 CLOSURE ACTIVITIES

This section describes closure activities, deviations from the CAP, and schedule.

2.1 DESCRIPTION OF CORRECTIVE ACTION ACTIVITIES

The following sections describe the closure activities completed for CAU 563.

2.1.1 Preplanning and Site Preparation

Prior to closure activities, the following documents were prepared:

- *National Environmental Policy Act* Checklist
- Site-Specific Health and Safety Plan
- Field Management Plan
- NNSA/NSO Real Estate/Operations Permit
- Work control packages

2.1.2 Closure Activities

The following sections detail the closure activities completed at each CAS.

2.1.2.1 Corrective Action Site 03-04-02, Area 3 Subdock Septic Tank

No COCs were present at concentrations above action levels at this site, and no further action was required. However, as a BMP, all aboveground features (e.g., riser pipes and bumper posts) and a septic tank were removed for disposal as sanitary waste, and all open pipe ends were sealed with grout. The excavation was backfilled with clean soil.

2.1.2.2 Corrective Action Site 03-59-05, Area 3 Subdock Cesspool

No COCs were present at concentrations above action levels at this site, and no further action was required. However, as a BMP, all aboveground features (e.g., riser pipes and bumper posts) were removed for disposal as sanitary waste, a cesspool was backfilled by filling it with soil, and all open pipe ends were sealed with grout.

2.1.2.3 Corrective Action Site 12-59-01, Drilling/Welding Shop Septic Tanks

This site was clean closed by removing approximately 4 yd^3 of arsenic- and chromium-impacted soil. The soil was disposed as sanitary waste because the Toxicity Characterization Leaching Procedure analytical results were below toxicity characteristic limits. Two verification samples and one blind duplicate sample were collected from the excavation and analyzed for arsenic and chromium. Verification sample results indicated that the remaining soil did not contain contamination at concentrations above the action levels; therefore, the excavation was backfilled with clean soil. A summary of the sample data is included in Section 4.0, and the laboratory data reports are included in Appendix B.

Approximately 10 yd^3 of soil with higher concentrations of chlordane were removed as a BMP. Waste characterization samples were collected from the excavated soil. Waste characterization sample results verified that the soil could be disposed as sanitary waste. The excavation was backfilled with clean soil.

As a BMP, approximately 5,000 gallons (gal) of liquid were removed from the South Tank for disposal as sanitary liquid remediation waste. In addition, as a BMP, the North Tank was removed for disposal as sanitary waste, the South Tank was filled with grout and left in place, all open pipe ends were sealed with grout, and debris within the CAS boundary that could be removed manually were removed for disposal as sanitary waste.

2.1.2.4 Corrective Action Site 12-60-01, Drilling/Welding Shop Outfalls

No COCs were present at concentrations above action levels at this site, and no further action was required. However, as a BMP, three drain pipe openings and all openings on the drilling/welding shop pad were sealed with grout.

2.2 DEVIATIONS FROM THE CORRECTIVE ACTION PLAN AS APPROVED

Deviations from the CAP (NNSA/NSO, 2009) were not necessary.

2.3 CORRECTIVE ACTION SCHEDULE AS COMPLETED

Closure activities were conducted from September to November 2009. Details of the schedule are provided in Table 2.

TABLE 2. CORRECTIVE ACTION UNIT 563 CLOSURE ACTIVITIES SCHEDULE

CORRECTIVE ACTION SITE	START DATE	END DATE
03-04-02, Area 3 Subdock Septic Tank	September 21, 2009	September 29, 2009
03-59-05, Area 3 Subdock Cesspool	September 21, 2009	September 21, 2009
12-59-01, Drilling/Welding Shop Septic Tanks	September 8, 2009	November 2, 2009
12-60-01, Drilling/Welding Shop Outfalls	September 10, 2009	September 14, 2009

2.4 SITE PLAN/SURVEY PLAT

As-built drawings were not required for CAU 563 closure activities.

3.0 WASTE DISPOSITION

This section describes the waste generated during closure activities. The waste streams are summarized in Table 3. Waste disposition documentation is included as Appendix C.

3.1 SANITARY WASTE

Sanitary waste included septic tanks, soil, riser pipes, bumper posts, and miscellaneous debris from CASs 03-04-02, 03-59-05, and 12-59-01. Sanitary waste was transported to the Area 9 U10c Sanitary Landfill for disposal.

3.2 LIQUID REMEDIATION WASTE

Liquid remediation waste included approximately 5,000 gal of liquid from the South Tank at CAS 12-59-01, which was transported to the Area 12 Sewage Lagoons for disposal.

TABLE 3. CORRECTIVE ACTION UNIT 563 WASTE DISPOSITION SUMMARY

WASTE STREAM	CORRECTIVE ACTION SITE	DESCRIPTION OF WASTE	VOLUME	WASTE CONTAINER	DISPOSITION
Sanitary Waste	03-04-02, Area 3 Subdock Septic Tank	Septic tank	10 yd^3	None	Disposed at the Area 9 U10c Sanitary Landfill
		Riser pipes and bumper posts			
	03-59-05, Area 3 Subdock Cesspool	Riser pipes and bumper posts			
	12-59-01, Drilling/Welding Shop Septic Tanks	Arsenic- and chromium-impacted soil	4 yd^3	Roll-off container	
		Debris	15 yd^3		
		Chlordane-impacted soil	10 yd^3	B-25 boxes	
		North Tank	60 yd^3	None	
Liquid Remediation Waste	12-59-01, Drilling/Welding Shop Septic Tanks	Liquid from the South Tank	5,000 gal	None	Disposed at the Area 12 Sewage Lagoon

gal: gallon(s)
yd^3: cubic yard(s)

4.0 CLOSURE VERIFICATION RESULTS

Site closure was verified by visual observations and by collecting and analyzing soil verification samples. Soil verification samples were collected from the excavation at CAS 12-59-01 and analyzed for arsenic and chromium to verify that the remaining soil did not contain contamination above action levels. The results showed that no COCs above the action levels were remaining at the site. Sample results are summarized in Table 3, and the laboratory summary data reports are included in Appendix B. Photographs documenting site conditions before and after closure activities are included as Appendix D.

TABLE 4. VERIFICATION SAMPLE RESULTS FOR CORRECTIVE ACTION SITE 12-59-01

ANALYTE	ACTION LEVEL	SAMPLE RESULTS (mg/kg)		
		V1	V2	V3
Arsenic	23 mg/kg	5.19	4.69	5.34
Chromium	450 mg/kg	9.96	8.76	9.15

mg/kg: milligram(s) per kilogram

4.1 DATA QUALITY ASSESSMENT

Accurate and defensible analytical data were collected to verify that the closure objectives were met. Analytical data results are included as Appendix C. The following sections describe the quality assurance (QA) and quality control (QC) procedures, data validation process, and a reconciliation of the CSM with actual findings during closure activities. More detail on the QA/QC procedures can be found in the CAP for CAU 563 (NNSA/NSO, 2009) and the QAPP (NNSA/NV, 2002).

4.1.1 Quality Assurance and Quality Control Procedures

Verification samples were collected with disposable sampling equipment, placed in appropriately labeled containers secured with custody seals, labeled with unique sample numbers, placed on ice, and transported under strict chain of custody. Standard QA/QC samples were collected (i.e., one blind duplicate per batch). Samples were analyzed by certified contract laboratories. Analytical results were validated at the laboratory using stringent QA/QC procedures, including matrix spike/matrix spike duplicates, spiked surrogate recovery analysis, verification of analytical results, and data quality indicator requirements.

4.1.2 Data Validation

Data validation was performed according to the QAPP (NNSA/NV, 2002), which is based on the U.S. Environmental Protection Agency (EPA) functional guidelines for data quality (EPA, 1994; 1999). Data were reviewed to ensure that samples were appropriately processed and analyzed and that the results are valid. All sample data were validated at the Tier I level.

No anomalies were discovered in the data that would discredit any of the sample results. Data met the required data quality indicators (i.e., precision, accuracy, sensitivity, completeness, comparability, and representativeness). The complete datasets, including validation reports, are maintained in the project files and available upon request.

4.1.3 Conceptual Site Models

CSMs were developed and presented in the approved CAIP for CAU 563 (NNSA/NSO, 2007). The CSMs were confirmed by soil sample results and verified during closure activities.

4.2 USE RESTRICTION

Use restrictions were not implemented for CAU 563.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The following site closure activities were performed at CAU 563 as documented in this CR:

- At CAS 03-04-02, Area 3 Subdock Septic Tank, as a BMP, aboveground features and a septic tank were removed, and all open pipe ends were sealed with grout.
- At CAS 03-59-05, Area 3 Subdock Cesspool, as a BMP, aboveground features were removed, a cesspool was backfilled, and all open pipe ends were sealed with grout.
- At CAS 12-59-01, Drilling/Welding Shop Septic Tanks, clean closure was achieved by excavating approximately 4 yd^3 of arsenic- and chromium-impacted soil. In addition, as a BMP, liquid in the South Tank was removed, the North Tank was removed, the South Tank was filled with grout and left in place, all open pipe ends were sealed with grout, approximately 10 yd^3 of chlordane-impacted soil were excavated, and debris within the CAS boundary was removed.
- At CAS 12-60-01, Drilling/Welding Shop Outfalls, as a BMP, three drain pipe openings and all openings on the drilling/welding shop pad were sealed with grout.

5.2 POST-CLOSURE REQUIREMENTS

No use restrictions were implemented, and there are no post-closure requirements.

5.3 RECOMMENDATIONS

Since closure activities for CAU 563 have been completed following the Nevada Division of Environmental Protection (NDEP)-approved CAP for CAU 563 (NNSA/NSO, 2009) as documented in this report, NNSA/NSO requests the following:

- A Notice of Completion from NDEP to NNSA/NSO for closure of CAU 563
- The transfer of CAU 563 from Appendix III to Appendix IV, Closed Corrective Action Units, of the FFACO (1996, as amended February 2008)

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6.0 REFERENCES

EPA, see U.S. Environmental Protection Agency.

Federal Facility Agreement and Consent Order, 1996 (as amended February 2008). Agreed to by the State of Nevada; U.S. Department of Energy, Environmental Management; U.S. Department of Defense; and U.S. Department of Energy, Legacy Management.

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

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

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

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

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office, 2007. *Corrective Action Investigation Plan for Corrective Action Unit 563: Septic Systems, Nevada Test Site, Nevada*. DOE/NV--1181. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office, 2008. *Corrective Action Decision Document for Corrective Action Unit 563: Septic Systems, Nevada Test Site, Nevada*. DOE/NV--1259. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office, 2009. *Corrective Action Plan for Corrective Action Unit 563: Septic Systems, Nevada Test Site, Nevada*. DOE/NV--1313. Las Vegas, NV.

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

U.S. Environmental Protection Agency, 1999. *Contract Laboratory Program National Functional Guidelines for Organic Data Review.* EPA540/R-99/008. Washington, D.C.

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APPENDIX A*

DATA QUALITY OBJECTIVES

*As presented and published in Appendix A of the approved *Corrective Action Investigation Plan for Corrective Action Unit 563: Septic Systems, Nevada Test Site, Nevada*, 2007, DOE/NV--1181. Las Vegas, NV.

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A.1.0 Introduction

The DQO process is a seven-step strategic systematic planning method used to plan data collection activities and define performance criteria for the CAU 563, Septic Systems, field investigation. The DQOs are designed to ensure that the data collected will provide sufficient and reliable information to identify, evaluate, and technically defend recommended corrective actions (i.e., no further action, closure in place, or clean closure). Existing information about the nature and extent of contamination at the CASs in CAU 563 is insufficient to evaluate and select preferred corrective actions; therefore, a CAI will be conducted.

The CAU 563 investigation will be based on the DQOs presented in this appendix as developed by representatives of the NDEP and the NNSA/NSO. The seven steps of the DQO process presented in Sections A.3.0 through A.9.0 were developed in accordance with *EPA Guidance on Systematic Planning using the Data Quality Objectives Process* (EPA, 2006).

The DQO process presents a judgmental sampling approach. In general, the procedures used in the DQO process provide:

- A method to establish performance or acceptance criteria that serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of a study.
- Criteria will be used to establish the final data collection design such as:
  - The nature of the problem that has initiated the study and a conceptual model of the environmental hazard to be investigated.
  - The decisions or estimates that need to be made and the order of priority for resolving them.
  - The type of data needed.
  - An analytic approach or decision rule that defines the logic for how the data will be used to draw conclusions from the study findings.
- Acceptable quantitative criteria on the quality and quantity of the data to be collected, relative to the ultimate use.

- A data collection design that will generate data meeting the quantitative and qualitative criteria specified. A data collection design specifies the type, number, location, and physical quantity of samples and data, as well as the QA/QC activities that will ensure that sampling design and measurement errors are managed sufficiently to meet the performance or acceptance criteria specified in the DQOs.

A.2.0 Background Information

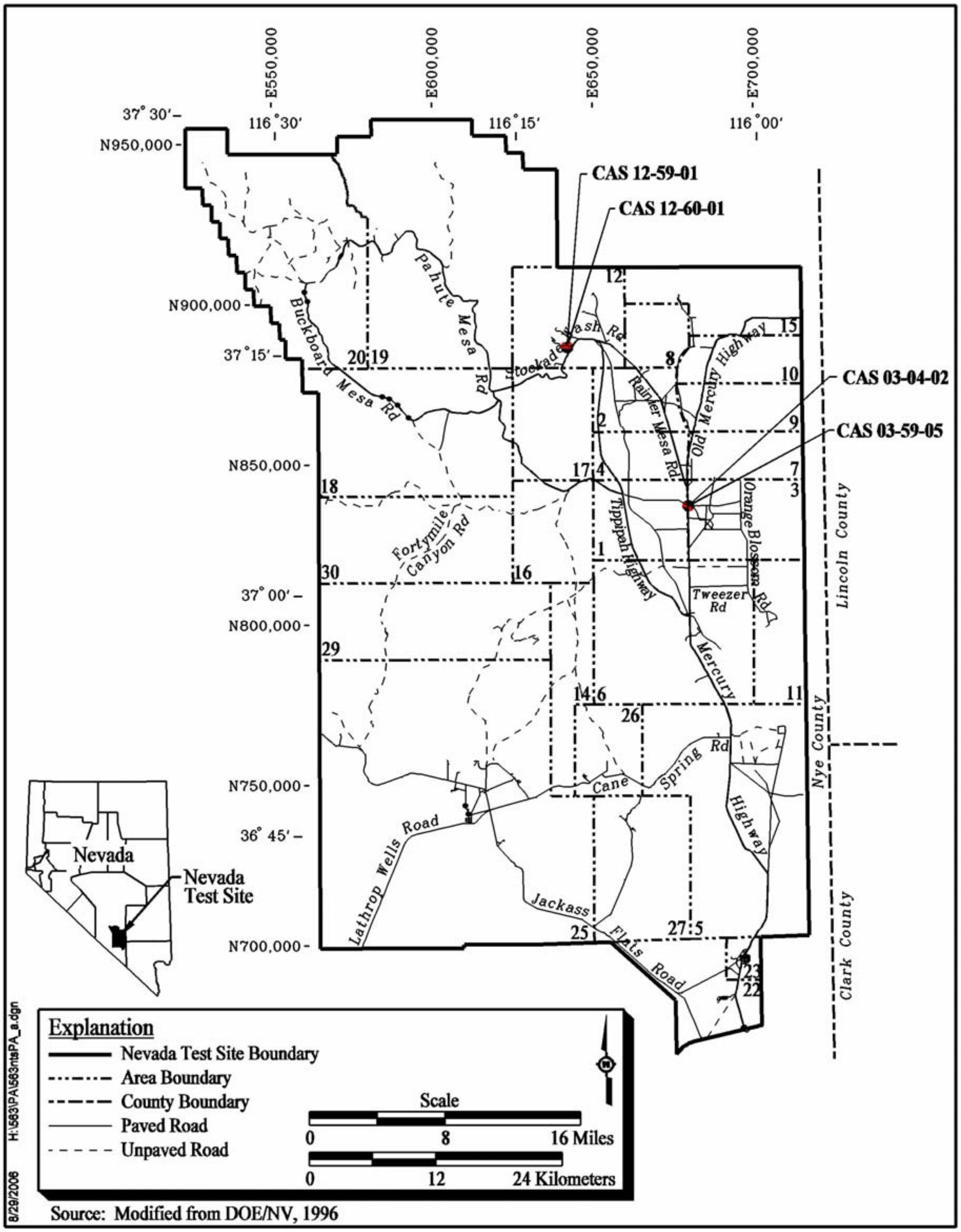
The following four CASs that comprise CAU 563 are located in Areas 3 and 12 of the NTS, as shown in Figure A.2-1:

- 03-04-02, Area 3 Subdock Septic Tank
- 03-59-05, Area 3 Subdock Cesspool
- 12-59-01, Drilling/Welding Shop Septic Tanks
- 12-60-01, Drilling/Welding Shop Outfalls

The following sections (Sections A.2.1 through A.2.4) provide a CAS description, physical setting and operational history, release information, and previous investigation results for each CAS in CAU 563. The CAS-specific COPCs are provided in the following sections. Many of the COPCs are based on a conservative evaluation of possible site activities considering the incomplete site histories of the CASs and considering contaminants found at similar NTS sites. Targeted contaminants are defined as those contaminants that are known or that could be reasonably suspected to be present within the CAS based on previous sampling or process knowledge.

A.2.1 Corrective Action Site 03-04-02, Area 3 Subdock Septic Tank

Corrective Action Site 03-04-02 is located in Area 3 at the Subdock-South location which is south of the 3-03 Road and east of Mercury Highway. The site consists of the potential environmental releases associated with a buried septic tank and the associated subsurface piping. Engineering drawings show that the tank measures 10 by 6 ft, has a capacity of approximately 2,000 gallons, and is buried approximately 2.5 ft below grade (REECo, 1971a). The tank location is identified on the surface by six striped guard posts that surround a 2-in. vent line and an 8-in. suction line. The vent line rises 3 ft above grade and is located 2 ft north of the suction line. The suction line is capped by a 12-in. diameter metal cover. Engineering drawings show that the septic tank serviced a Fenix & Scisson toilet trailer that is no longer present at the site (REECo, 1971a). Approximately 100 ft of buried asbestos concrete pipe (ACP) connected the septic tank to the northern end of the Fenix & Scisson toilet trailer. A black stick-up ACP is located 66 ft north of the guard posts and is believed to have connected to the toilet trailer. Historical documents indicate that the contents of the septic tank were pumped and transported for disposal on a bi-weekly basis (Author Unknown, 1991). See Figure A.2-2 for a diagram of the CAS components.



Source: Modified from DOE/NV, 1996

Figure A.2-1
Corrective Action Unit 563, CAS Location Map

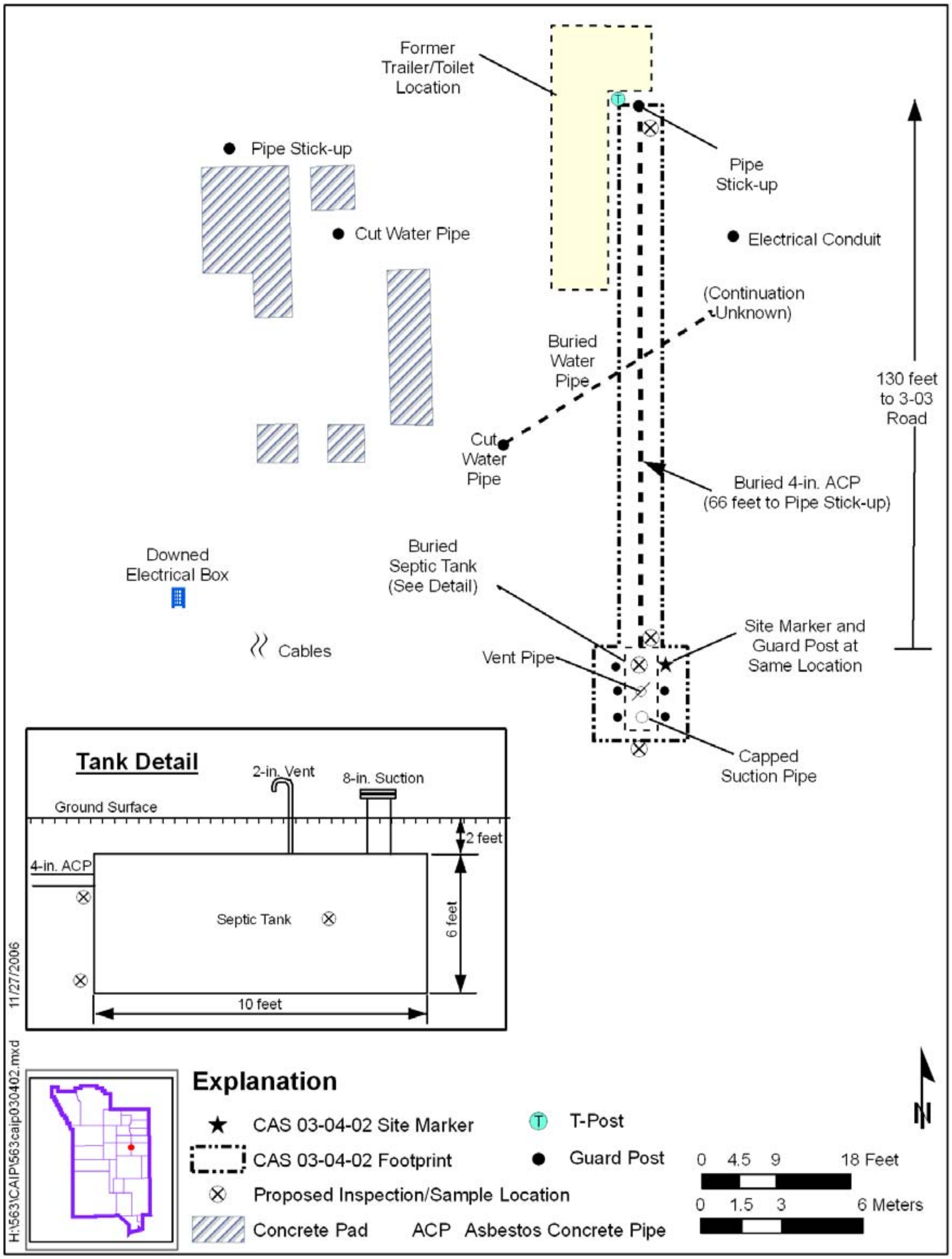


Figure A.2-2
CAS 03-04-02, Area 3 Subdock Septic Tank

Physical Setting and Operational History **–** Corrective Action Site 03-04-02 is located in the former Area 3 Subdock-South. This area formerly housed a series of trailers that interviewees and engineering drawings indicate were used as office buildings, support trailers, and toilet trailers for the former Area 3 Subdock Complex. The Area 3 Subdock-South was in operation from the 1970s to 1985, when it was relocated to Area 1. All of the buildings at the Subdock-South have been removed and only the concrete foundations remain.

Release Information **–** Sanitary waste from the Fenix & Scisson toilet trailer was disposed into the septic tank of CAS 03-04-02. There was a potential for an overflow/surface release related to pumping of the septic tank, or a subsurface release related to leaks in the tank or breaches in the associated piping. Contaminants would have been limited in volume and are expected to be located in the soil within close proximity to the septic tank. An NTS worker recalls a toilet trailer of typical design being present at this location. The toilet trailer had men’s and women’s facilities including a bed and multiple toilets. The interviewee did not recall any additional trailers adjacent to the toilet trailer and is unaware of any activities performed that may have introduced contaminants other than sanitary waste into the associated septic system (Patton, 2006).

Previous Investigation Results **–** A geophysical survey conducted in March 2004 at the Area 3 Subdock-South confirmed the presence of a buried septic tank at CAS 03-04-02. A large metallic below-ground anomaly was detected at the expected location of the buried septic tank and is labeled “septic tank location with vent pipe at surface” in the report. The report also identifies additional anomalies in the area due to the presence of surface and subsurface metallic structures and debris. No linear anomalies typical of metallic pipelines or utilities were identified (Fahringer, 2004).

A.2.2 Corrective Action Site 03-59-05, Area 3 Subdock Cesspool

Corrective Action Site 03-59-05 is located approximately 70 ft southeast of the intersection of Mercury Highway and the 3-03 Road at the Area 3 Subdock-South. The site consists of the potential environmental releases associated with a buried cesspool and associated piping. The cesspool consists of a small volume open-bottom tank or a large-diameter pipe casing; however, the actual dimensions and geometry are unknown. A 1998 environmental survey report describes the cesspool as a dry tank with sediment present at a depth of 6 ft bgs and also indicates that a capped pipe is surrounded by four posts (DOE, 1988). Engineering drawings indicate that the cesspool serviced the

Reynolds Electrical and Engineering Co., Inc. (REECo) toilet trailer, which is no longer present at the site. Approximately 100 ft of 4-in. vitrified clay pipe (VCP) connected the cesspool to the southern end of the toilet trailer (REECo, 1967a). The cesspool location is identified on the surface by the presence of four striped guard posts that surround a 4- by 4-ft area. The capped pipe described in the 1988 DOE report was not observed. See Figure A.2-3 for a diagram of the CAS.

Physical Setting and Operational History **–** Refer to Section A.2.1 for a description of the physical setting and operational history of the Area 3 Subdock.

Release Information **–** Sanitary wastes from the REECo toilet trailer were disposed of in the cesspool of CAS 03-59-05. There is no documentation indicating the design of the cesspool; however, it is expected that it was designed to release sanitary waste from the REECo toilet trailer either directly to subsurface media or to a tank (if present), as described in a previous environmental survey (DOE, 1988). There is a potential for an overflow/surface release related to potential pumping of the cesspool, and/or a subsurface release that may have been direct or from leakage of a tank (if present). Contaminants would have been limited in volume and are expected to be located in the soil within close proximity to the cesspool.

Previous Investigation Results **–** A geophysical survey was conducted in March 2004 at the Area 3 Subdock-South. A large below-ground metallic anomaly was detected at the expected location of the buried cesspool and is labeled “Septic Tank” in the report. The report also identifies additional anomalies in the area due to the presence of surface and subsurface metallic structures and debris. No linear anomalies typical of metallic pipelines or utilities were identified (Fahringer, 2004).

A.2.3 Corrective Action Site 12-59-01, Drilling/Welding Shop Septic Tanks

Corrective Action Site 12-59-01 consists of the potential environmental releases associated with two septic systems associated with the Drilling/Welding Shop in Area 12; located southwest of the intersection of Rainier Mesa Road and E-Tunnel Road. The two septic systems are separate and include a north septic tank with associated piping, a south septic tank with associated piping, and impacted soil at outwash areas. Associated piping is 6-in. VCP and includes numerous potential tie-in pipes (i.e., stick-ups). The apparent length of associated piping ranges from approximately 500 ft (north tank) to 1,000 ft (south tank). The piping associated with both tanks is believed to

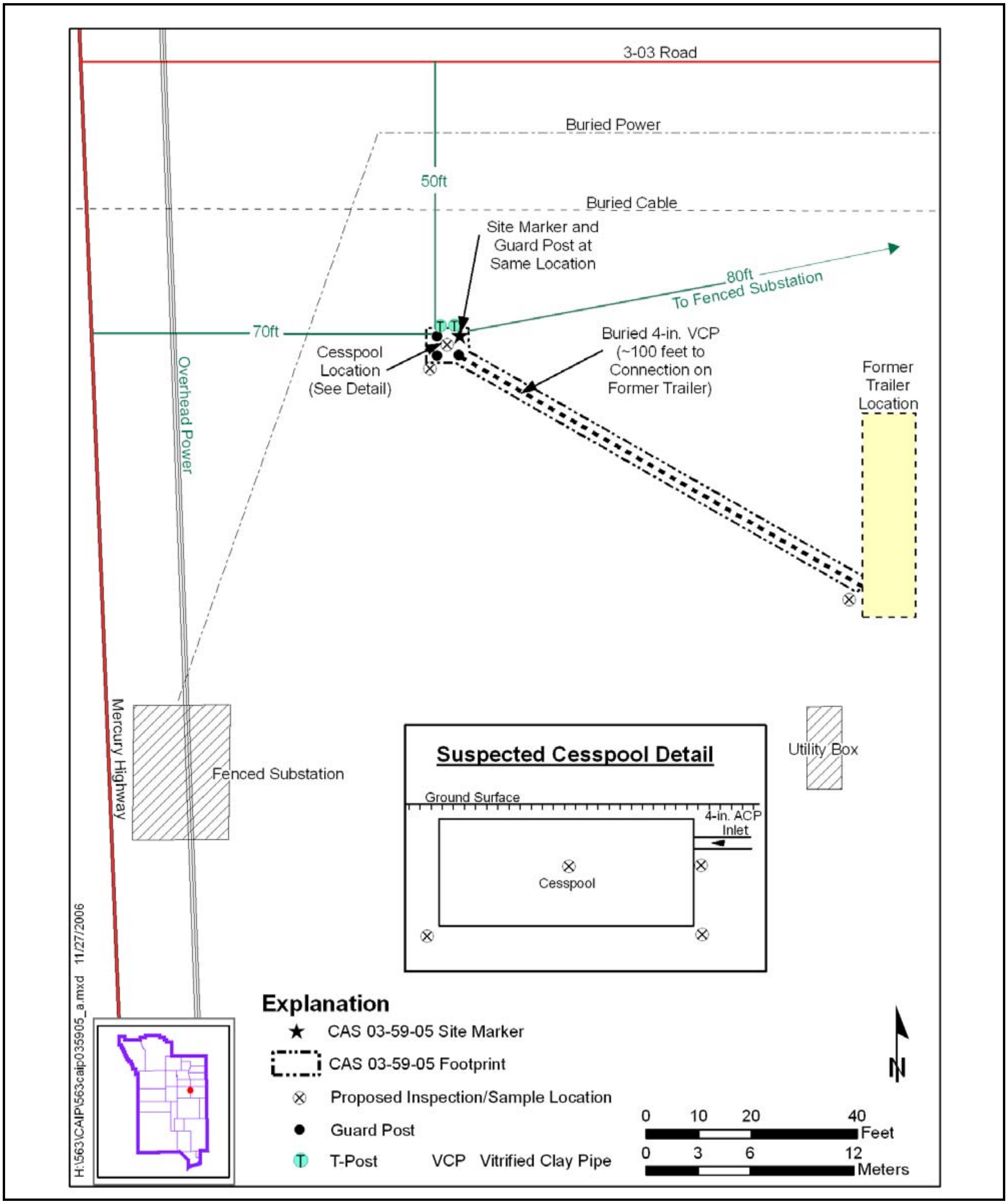


Figure A.2-3
CAS 03-59-05, Area 3 Subdock Cesspool

terminate at separate outwash areas where soil may be impacted. No lagoons or leachfields have been identified. See Figure A.2-4 for a diagram of the CAS.

Engineering drawings show that piping associated with the north septic tank extends 500 ft northwest to the former Saw Cover Building (REECo, 1971b). The north septic tank (32 x 5 ft) is above grade and has an outlet pipe that appears to have discharged effluent to a drainage channel that flows downgradient to the southeast. There is breached and broken VCP pipe debris surrounding the north tank. An as-built engineering drawing shows a toilet located at the northwest corner of the Drilling/Welding Shop that may have been connected to the north septic tank (REECo, 1967b).

Piping associated with the south septic tank (36 x 5 ft) is only partially shown on an engineering drawing (REECo, 1971b). This sewer line is shown to begin at a cleanout and extends to the southeast and off the drawing. It is unknown whether this sewer line connected to the Drilling/Welding Shop or other buildings. Three potential tie-in pipes were identified in the field near the location of the labeled cleanout. It is believed that this sewer line leads to the south septic tank and continues to the southeast where piping opens to daylight at an outfall area. The south tank is almost completely buried, and the top portion (including two manhole covers) is exposed.

***Physical Setting and Operational History* –** The Area 12 Drilling/Welding Shop was primarily used to maintain the locomotives that were used in the E-Tunnel from the late 1960s through early 1980s (Griffin, 2005). Engines would be pulled from the locomotives with the overhead cranes that were formerly located on the property. Mucking machines and other equipment may also have been brought to the shop for maintenance. This equipment was likely steam-cleaned to remove soil, gravel or grease before maintenance occurs. Trichloroethene was also used as a degreasing agent and may have entered the septic system piping. Another likely, common activity was changing oil (Soong, 2005).

***Release Information* –** The septic tanks were designed to release effluent to the surface soils via their respective outfalls. Contaminants would have been limited in volume and are expected to be located within the soil in close proximity to the tanks, subsurface piping, or outfall areas.

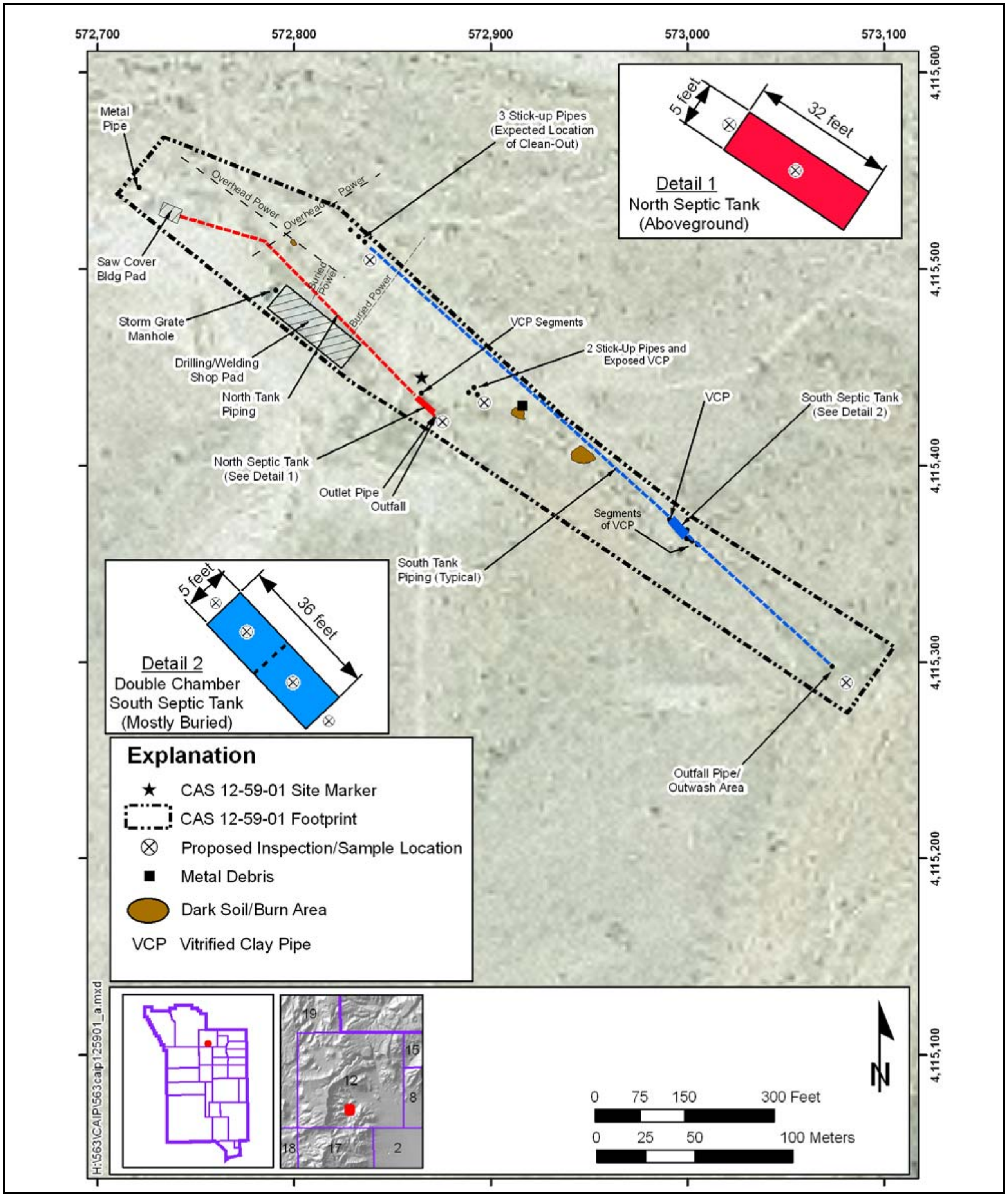


Figure A.2-4
CAS 12-59-01, Area 12 Drilling/Welding Shop Septic Tanks

Previous Investigation Results – A radiological survey of the tanks was conducted by BN personnel in 2003. Elevated alpha readings of 300 to 800 dpm/100 cm^2 (fixed plus removable) were reported for the south tank (BN, 2003).

A geophysical survey was conducted in 2006 at CAS 12-59-01 to determine the extent of subsurface piping associated with the north and south septic tanks (Weston, 2006). A buried pipe which originates near the Saw Cover Building is interpreted to represent the 3/4-in. water pipe that coincides with the 6-in. VCP pipe associated with the north septic tank. The pipe direction becomes unclear approximately 66 m from its origin at a location where it may have branched off to service the former building. From this location, the VCP appears to continue towards the north septic tank; however, the geophysical survey was not conclusive and the identifiable anomaly may be an underground utility. Results of the survey also indicate two suspected underground pipes (labeled “Pipe 4” and “Pipe 7”) that appear to originate at the location of daylighting pipe and trend southeast to the south tank. Pipe 4 is mapped as a suspect location based on the observed surface expression because data did not show a response from the expected buried VCP. Pipe 7 was mapped based on an analysis of Global Position Receiver (GPR) profiles, which show consistent hyperbolic signatures at a depth of approximately 1 m bgs. Pipe 4 is also mapped to continue from the south tank southeast to the outfall area.

A.2.4 Corrective Action Site 12-60-01, Drilling/Welding Shop Outfalls

Corrective Action Site 12-60-01 consists of the potential environmental releases associated with three outfall pipes (two 6-in. and one 12-in.) associated with the Drilling/Welding Shop in Area 12 located near the intersection of Rainier Mesa Road and E-Tunnel Road. An engineering drawing (REECo, 1971b) shows that a 6-in. drain pipe (60 ft long) ties in to a 2-in. water line to the southwest side of the concrete pad. This 2-in. water line appears to tie in to a water holding tank that was located up slope of the pad to the northwest. A manhole cover that is in line with the 6-in. drain pipe is located on an access road at the southwest side of the Drilling/Welding Shop foundation. The 12-in. drain pipe (60 ft long) is not shown to tie in to any other piping. The other 6-in. outfall pipe (length unknown) is believed to be associated with a hydraulic pipe cutter. The boundaries of the outfall areas could not be determined because there is no evidence of a defined drainage channel. See Figure A.2-5 for a diagram of the CAS.

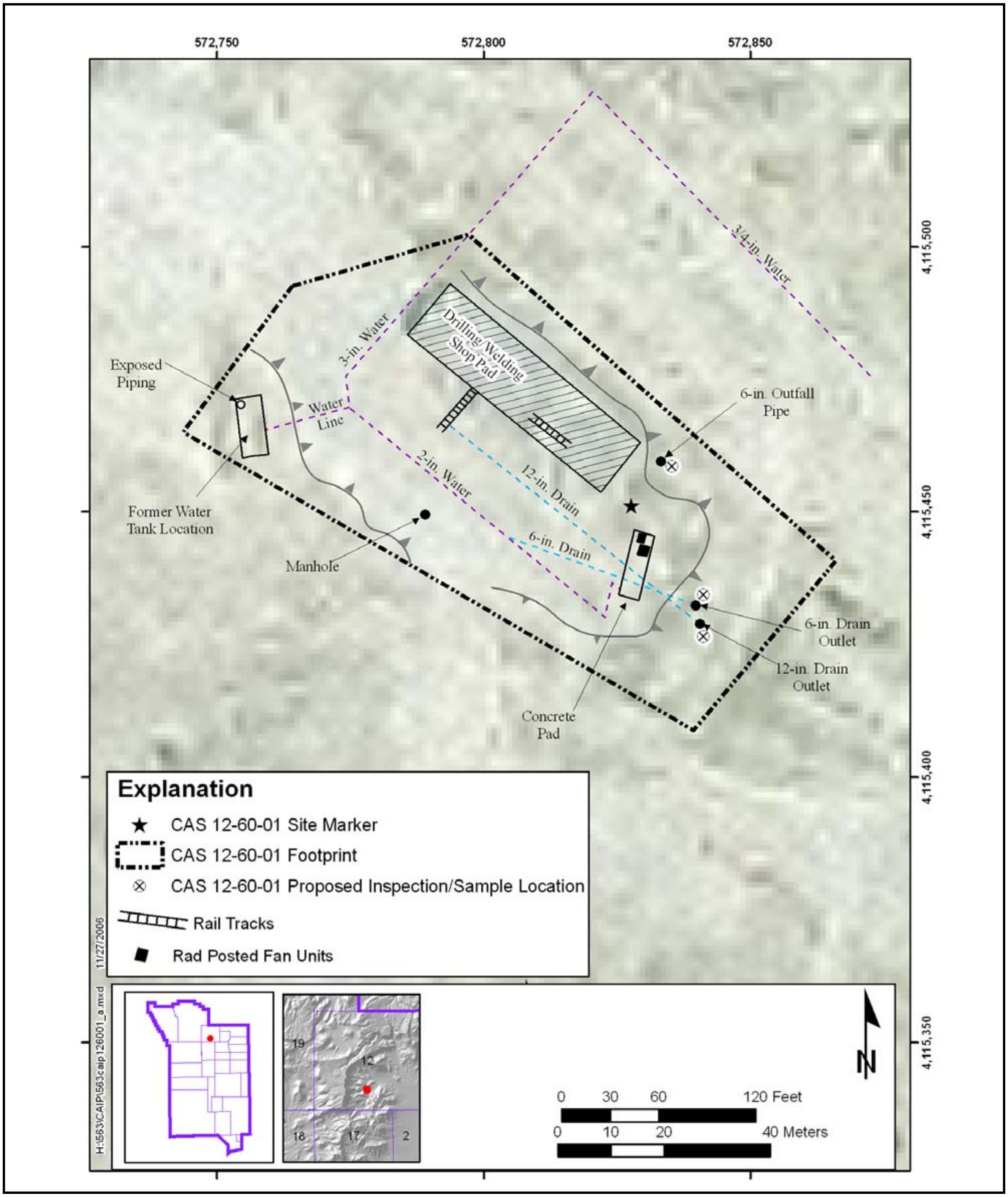


Figure A.2-5
CAS 12-60-01, Area 12 Drilling/Welding Shop Outfalls

Physical Setting and Operational History **–** See above description for CAS 12-59-01. The function of the outfall pipes is uncertain; however, they are believed to have been used to drain wastewater related to a steam cleaner and a hydraulic pipe cutter that were used at the Drilling/Welding Shop. It is also possible that a water holding tank formerly located at the site was periodically flushed and that one of the drain pipes was used to discharge this water. Trichloroethene was used as a degreaser in the Drilling/Welding Shop and may have been included in the effluent from the holding tank discharge (Soong, 2005).

Release Information **–** The outfall pipes of this CAS were designed to release effluent to the surface soils via their respective outfalls. There is a potential for industrial wastes (e.g., paints, solvents, degreasers) that consist of unknown contaminants to have been introduced to the system. If a release is determined to have occurred, contaminants would have been limited in volume and are expected to be located within the soil in close proximity to the tanks, subsurface piping, or outfall areas.

Previous Investigation Results **–** A geophysical survey was conducted in 2006 at CAS 12-60-01 to determine the extent of subsurface piping associated with the three drain pipes of this CAS (Weston, 2006). The survey maps show a suspected pipe that is mapped based on a correlation between multiple low amplitude responses and the hyperbolic signature present on a GPR profile (number 26). This pipe, which is interpreted to represent the 6-in. drain pipe that is shown on engineering drawings, is confirmed to tie-in to another buried pipe. This pipe is shown to extend approximately 15 m parallel to the concrete foundation of the Drilling/Welding Shop and is interpreted to represent the 2-in. water pipe that originated at the top of the hill where a former water holding tank was located. An additional suspected pipe is mapped in a location that correlates with the 12-in. drain pipe shown on engineering drawings. The drain pipe associated with the hydraulic pipe cutter is not shown or described in the Weston geophysical survey report.

A.3.0 Step 1 - State the Problem

Step 1 of the DQO process defines the problem that requires study; identifies the planning team, and develops a conceptual model of the environmental hazard to be investigated.

The problem statement for CAU 563 is: “Existing information on the nature and extent of potential contamination is insufficient to evaluate and recommend corrective action alternatives for the CASs in CAU 563.”

A.3.1 Planning Team Members

The DQO planning team consists of representatives from NDEP, NNSA/NSO, SNJV, and NSTec. The DQO planning team met on October 19, 2006. The primary decision-makers are the NDEP and NNSA/NSO representatives.

A.3.2 Conceptual Site Model

The CSM is used to organize and communicate information about site characteristics. It reflects the best interpretation of available information at any point in time. The CSM is the primary vehicle for communicating assumptions about release mechanisms, potential migration pathways, or specific constraints. It provides a good summary of how and where contaminants are expected to move and what impacts such movement may have. It is the basis for assessing how contaminants could reach receptors both in the present and future. The CSM describes the most probable scenario for current conditions at each site and defines the assumptions that are the basis for identifying appropriate sampling strategy and data collection methods. Accurate CSMs are important, because they serve as the basis for all subsequent inputs and decisions throughout the DQO process.

The CSM was developed for CAU 563 using information from the physical setting, potential contaminant sources, release information, historical background information, knowledge from similar sites, and physical and chemical properties of the potentially affected media and COPCs.

The CSM consists of:

- Potential contaminant releases including media subsequently affected.

- Release mechanisms (the conditions associated with the release).
- Potential contaminant source characteristics including contaminants suspected to be present and contaminant-specific properties.
- Site characteristics including physical, topographical, and meteorological information.
- Migration pathways and transport mechanisms that describe the potential for migration and where the contamination may be transported.
- The locations of points of exposure where individuals or populations may come in contact with a COC associated with a CAS.
- Routes of exposure where contaminants may enter the receptor.

If additional elements are identified during the investigation that are outside the scope of the CSM, the situation will be reviewed and a recommendation will be made as to how to proceed. In such cases, NDEP and NNSA/NSO will be notified and given the opportunity to comment on, or concur with, the recommendation.

The applicability of the CSM to each CAS is summarized in Table A.3-1 and discussed below. Table A.3-1 provides information on CSM elements that will be used throughout the remaining steps of the DQO process. Figure A.3-1 represents site conditions applicable to this CSM.

Table A.3-1
Conceptual Site Model Description of Elements for Each CAS in CAU 563

CAS Number	03-04-02	03-59-05	12-59-01	12-60-01
CAS Description	**Area 3 Subdock Septic Tank**	**Area 3 Subdock Cesspool**	**Drilling/Welding Shop Septic Tanks**	**Drilling/Welding Shop Outfalls**
Site Status	All CASs are inactive and/or abandoned.			
Exposure Scenario	All CASs are located in Occasional Use Areas.			
Sources of Potential Soil Contamination	Leaking tanks/pipes and surface spills during bi-weekly pumping.		Pipe outfall and leaking above-ground tank to surface; Leaking below-ground tank and pipes in subsurface. Effluent discharged Lubrication and cleaning of equipment; leaking tanks/pipes.	
Location of Contamination/ Release Point	Surface and subsurface soil at or near location of tanks and piping.		Surface soil at or near outfalls; Surface and subsurface soil at or near location of tanks and below piping.	
Amount Released	Unknown			
Affected Media	Surface and shallow subsurface soils.			
Potential Contaminants	Biological, chemical and radiological.			
Transport Mechanisms	Percolation of precipitation through subsurface media serves as the major driving force for migration of contaminants. Surface water runoff may provide for the transportation of some contaminants within or outside of the footprints of the CASs. Liquids released over time (e.g., leaks from tanks) may also have provided a hydraulic driver for percolation and migration of contaminants.			
Migration Pathways	Vertical transport is expected to dominate over lateral transport due to small surface gradients.		Vertical and lateral transport due to high relief and surface gradients.	
Lateral and Vertical Extent of Contamination	Contamination, if present, is expected to be contiguous to the release points. Concentrations are expected to decrease with distance and depth from the source. Groundwater contamination is not expected. Lateral and vertical extent of COC contamination is assumed to be within the spatial boundaries of the CAS.			
Exposure Pathways	The potential for contamination exposure is limited to industrial and construction workers, and military personnel conducting training. These human receptors may be exposed to COPCs through oral ingestion, inhalation, dermal contact (absorption) of soil and/or debris due to inadvertent disturbance of these materials or irradiation by radioactive materials.			

CAS = Corrective action site
COC = Contaminant of concern
COPC = Contaminant of potential concern

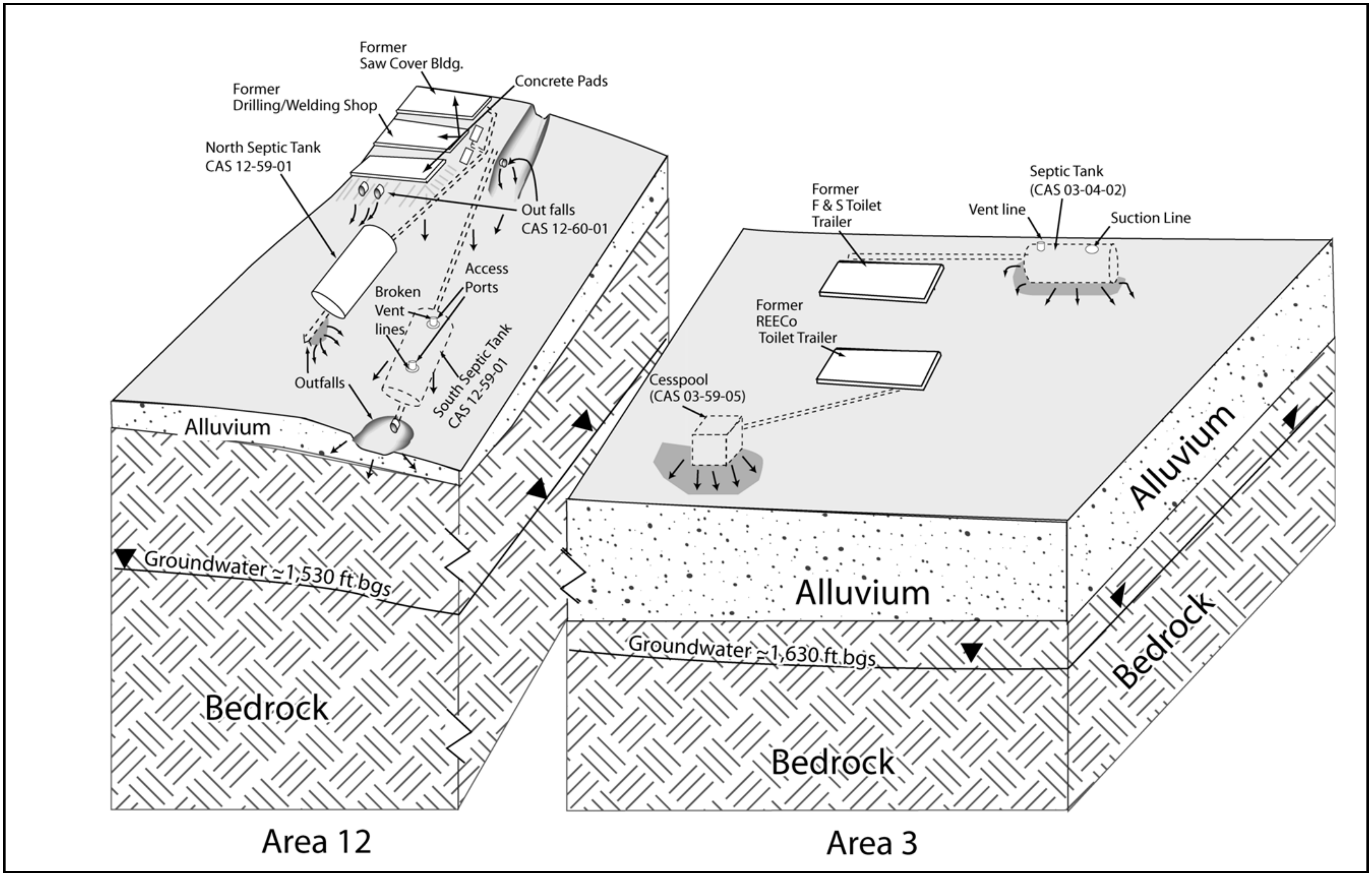


Figure A.3-1
Conceptual Site Model for CAU 563

A.3.2.1 Contaminant Release

The most likely locations of the contamination and releases to the environment are the soils directly below or adjacent to the CSM surface and subsurface components (i.e., septic tanks, cesspool, associated underground piping, and outfalls). Any contaminants migrating from a CAS, regardless of physical or chemical characteristics, are expected to exist at interfaces and in the soil, adjacent to disposal features in lateral and vertical directions.

A.3.2.2 Potential Contaminants

The COPCs were identified during the planning process through the review of site history, process knowledge, personal interviews, past investigation efforts (where available), and inferred activities associated with the CASs. Because complete information regarding activities performed at the CAU 563 sites is not available, contaminants detected at similar NTS sites were included in the contaminant lists to reduce uncertainty. The list of COPCs is intended to encompass all of the contaminants that could potentially be present at each CAS. The COPCs applicable to Decision I environmental samples from each of the CASs of CAU 563 are defined as the constituents reported from the analytical methods stipulated in Table A.3-2.

During the review of site history documentation, process knowledge information, personal interviews, past investigation efforts (where available), and inferred activities associated with the CASs, some of the COPCs were identified as targeted contaminants at specific CASs. Targeted contaminants are those COPCs for which evidence in the available site and process information suggests that they may be reasonably suspected to be present at a given CAS. The targeted contaminants are required to meet a more stringent completeness criteria than other COPCs thus providing greater protection against a decision error (see Section A.3.2). Targeted contaminants for each CAU 563 CAS are identified in Table A.3-3.

Table A.3-2
Analytical Program[a]
(Includes Waste Characterization Analyses)

Analyses	CAS 03-04-02	CAS 03-59-05	CAS 12-59-01	CAS 12-60-01
Organic COPCs				
Volatile Organic Compounds[b]	X	X	X	X
Semivolatile Organic Compounds[b]	X	X	X	X
Total Petroleum Hydrocarbons-Diesel-Range Organics	X	X	X	X
Polychlorinated Biphenyls	X	X	X	X
Inorganic COPCs				
Total RCRA Metals[b]	X	X	X	X
Radionuclide COPCs				
Gamma Spectroscopy	X	X	X	X
Isotopic Uranium	X	X	X	X
Isotopic Plutonium	X	X	X	X
Strontium-90	X	X	X	X
Waste Characterization Analyses				
Gross Alpha	(x)	(x)	(x)	(x)
Gross Beta	(x)	(x)	(x)	(x)
Tritium	(x)	(x)	(x)	(x)

[a] The COPCs are the constituents reported from results of the analyses listed.
[b] If sample(s) are collected for waste management purposes, analysis may also include *Toxicity Characteristic Leaching Procedure*.

CAS = Corrective action site
COPC = Contaminant of potential concern
RCRA = *Resource Conservation and Recovery Act*

X = Required analyses on all samples
(x) = Required analyses on samples taken from material(s) slated for disposal

Table A.3-3
Targeted Contaminants for CAU 563

Corrective Action Site	Chemical Targeted Contaminant(s)	Radiological Targeted Contaminant(s)
03-04-02	--	--
03-59-05	--	--
12-59-01	Trichloroethene	--
12-60-01	Trichloroethene	--

-- = No targeted analytes identified

A.3.2.3 Contaminant Characteristics

Contaminant characteristics include, but are not limited to: solubility, density, and adsorption potential. In general, contaminants with low solubility, high affinity for media, and high density can be expected to be found relatively close to release points. Contaminants with small particle size, high solubility, low density, and/or low affinity for media are found further from release points or in low areas where evaporation of ponding will concentrate dissolved contaminants.

A.3.2.4 Site Characteristics

Site characteristics are defined by the interaction of physical, topographical, and meteorological attributes and properties. Physical properties include permeability, porosity, hydraulic conductivity, degree of saturation, sorting, chemical composition, and organic content. Topographical and meteorological properties and attributes include slope stability, precipitation frequency and amounts, precipitation runoff pathways, drainage channels and ephemeral streams, and evapotranspiration potential.

A.3.2.5 Migration Pathways and Transport Mechanisms

Migration pathways at the CAU 563 CASs include the lateral migration of potential contaminants across surface soils/sediments at the Area 12 sites and vertical migration of potential contaminants through subsurface soils at both Area 3 and Area 12 sites. The depth of infiltration (shape of the subsurface contaminant plume) will be dependent upon the type, volume, and duration of the discharge, as well as the presence of relatively impermeable layers, that could modify vertical or horizontal transport pathways in the near surface (concrete pads, gravel trenches along pipelines), and in the shallow subsurface (e.g., bedrock, caliche layers).

Surface migration pathways at the Area 3 CASs are expected to be minor, as the land in which they are situated is relatively flat and the potential release sites are not located in or near drainages. Subsurface migration pathways at the Area 3 CASs are expected to be predominately vertical, although spills or leaks below the ground surface (e.g., base of septic tank, subsurface piping) may also have limited lateral migration before infiltration. Surface migration pathways for the Area 12 CASs are expected to be more prominent than vertical migration, because of the initial design, and the land in which they are situated is sloped, and the potential release points include outfalls and drainage channels extending downslope to the Tongue Wash.

Contaminants potentially released into the Tongue Wash are subject to higher lateral transport mechanisms than contaminants released to less sloped surface areas and to the subsurface. The Tongue Wash is generally dry but is subject to infrequent, potentially intense, stormwater flows. These stormwater events provide an intermittent mechanism for both vertical and horizontal transport of contaminants. Contaminated sediments entrained by these stormwater events would be carried by the streamflow to locations where the flowing water loses energy and the sediments drop out. These locations are typically areas along the drainage path when the gradient lessons and sediments can accumulate. The Tongue Wash eventually drains to the Yucca Lake where the potentially contaminated sediments would be deposited.

Migration is influenced by physical and chemical characteristics of the contaminants and media. Contaminant characteristics include, but are not limited to: solubility, density, and adsorption potential. Media characteristics include permeability, porosity, water saturation, sorting, chemical composition, and organic content. In general, contaminants with low solubility, high affinity for media, and high density can be expected to be found relatively close to release points. Contaminants with high solubility, low affinity for media, and low density can be expected to be found further from release points. These factors affect the migration pathways and potential exposure points for the contaminants in the various media under consideration.

Infiltration and percolation of precipitation serves as a driving force for downward migration of contaminants. However, due to high potential evapotranspiration and limited precipitation for this region, percolation of infiltrated precipitation at the NTS does not provide a significant mechanism for vertical migration of contaminants to groundwater (DOE/NV, 1992).

Annual potential evapotranspiration at the Area 3 Radiological Waste Management Site has been estimated at 62.6 in. (Shott et al., 1997), while the annual average precipitation at the Yucca Flat dry lake bed is 6.62 to 6.7 in. (Winograd and Thordarson, 1975; ARL/SORD, 2006). At the Area 12 CASs, the annual potential evapotranspiration has been estimated at 24.0 in. (Shott. et al., 1997), while the annual average precipitation at Rainier Mesa is approximately 13.8 in. (Winograd and Thordarson, 1975; ARL/SORD, 2006).

A.3.2.6 Exposure Scenarios

Human receptors may be exposed to COPCs through oral ingestion, inhalation, dermal contact (absorption) of soil or debris due to inadvertent disturbance of these materials or irradiation by radioactive materials. The land-use and exposure scenarios for the CAU 563 CASs are listed in Table A.3-4. These are based on NTS current and future land use.

Table A.3-4
Land-Use and Exposure Scenarios

CAS Number	Record of Decision Land-Use Zone	Exposure Scenario
03-04-02 03-59-05 12-59-01 12-60-01	<u>Nuclear and High Explosives Test</u> This area is designated within the Nuclear Test Zone for additional underground nuclear weapons tests and outdoor high-explosive tests. This zone includes compatible defense and nondefense research, development, and testing activities.	<u>Occasional Use Area</u> Worker will be exposed to the site occasionally (up to 80 hours per year for 5 years). Site structures are not present for shelter and comfort of the worker.

CAS = Corrective action site

Corrective Action Sites 03-04-02, 03-59-05, 12-59-01, and 12-60-01 are located in the land-use zone described as the “Nuclear and High Explosives Test Zone” (DOE/NV, 1998). This area is designated within the “Nuclear Test Zone” reserved for compatible defense and nondefense research, development, and testing activities. The “Nuclear and High Explosives Test Zone” is used for potential additional underground nuclear weapons tests and outdoor high-explosives tests. In addition, the land-use zone where the CAU 563 CASs are located are restricted and dictate future land uses will be limited to nonresidential activities (i.e., industrial).

The exposure scenario designation for the CAU 563 CASs have been categorized into the following type based on the current and projected future land uses:

- Occasional Use Area: This exposure scenario assumes exposure to industrial workers who are not assigned to the area as a regular worksite but may occasionally use the site for intermittent or short-term activities. A site worker under this scenario is assumed to be on the site for an equivalent of 8 hours per day, 10 days per year, over 5 years.

A.4.0 Step 2 - Identify the Goal of the Study

Step 2 of the DQO process states how environmental data will be used in meeting objectives and solving the problem, identifies study questions or decision statement(s), and considers alternative outcomes or actions that can occur upon answering the question(s).

A.4.1 Decision Statements

The Decision I statement is: “Is any COC present in environmental media within the CAS?” For judgmental sampling design, any analytical result for a COPC above the FAL will result in that COPC being designated as a COC. A COC may also be defined as a contaminant that, in combination with other like contaminants, is determined to jointly pose an unacceptable risk based on a multiple constituent analysis (NNSA/NSO, 2006). If a COC is detected, then Decision II must be resolved.

The Decision II statement is: “If a COC is present, is sufficient information available to evaluate potential corrective action alternatives?” Sufficient information is defined to include:

- Identifying the volume of media containing any COC bounded by analytical sample results in lateral and vertical directions.
- Information needed to characterize IDW for disposal.
- Information needed to determine potential remediation waste types.
- Information needed to evaluate the feasibility of remediation alternatives.

A corrective action will be determined for any site containing a COC. The evaluation of the need for corrective action will include the potential for wastes that are present at a site to cause the future contamination of site environmental media if the wastes were to be released. To evaluate the potential for septic tank contents to result in the introduction of a COC to the surrounding environmental media, the following conservative assumptions were made:

- The tank containment would fail at some point and the contents would be released to the surrounding media.
- The resulting concentration of contaminants in the surrounding media would be equal to the concentration of contaminants in the tank waste.

- Any liquid contaminant in the septic tanks exceeding the RCRA toxicity characteristic concentration can result in a COC introduction to the surrounding media.

Sludge containing a contaminant exceeding an equivalent FAL concentration would be considered to be potential source material and would require a corrective action. Septic tank liquids with contaminant concentrations exceeding an equivalent toxicity characteristic action level would be considered to be potential source material and would require a corrective action.

If sufficient information is not available to evaluate potential corrective action alternatives, then site conditions will be re-evaluated and additional samples will be collected (as long as the scope of the investigation is not exceeded and any CSM assumption has not been shown to be incorrect).

A.4.2 Alternative Actions to the Decisions

Depending on the possible outcomes of the investigation, alternative actions to the decisions may be taken to identify and solve the problem.

A.4.2.1 Alternative Actions to Decision I

If no COC associated with a release from the CAS is detected, then further assessment of the CAS is not required. If a COC associated with a release from the CAS is detected, then the extent of COC contamination will be determined and additional information required to evaluate potential corrective action alternatives will be collected.

A.4.2.2 Alternative Actions to Decision II

If sufficient information is available to evaluate potential corrective action alternatives, then further assessment of the CAS is not required. If sufficient information is not available to evaluate potential corrective action alternatives, then additional samples will be collected.

A.5.0 Step 3 - Identify Information Inputs

Step 3 of the DQO process identifies the information needed, determines sources for information, and identifies sampling and analysis methods that will allow reliable comparisons with FALs.

A.5.1 Information Needs

To resolve Decision I (determine whether a COC is present at a given CAS), samples need to be collected and analyzed following criteria: samples must be collected in areas most likely to contain a COC (judgmental sampling), and the analytical suite selected must be sufficient to identify any COCs present in the samples.

To resolve Decision II (determine whether sufficient information is available to evaluate potential corrective action alternatives at each CAS), samples need to be collected and analyzed to meet the following criteria:

- Samples must be collected in areas contiguous to the contamination but where contaminant concentrations are below FALs.
- Samples of the waste or environmental media must provide sufficient information to characterize the IDW for disposal.
- Samples of the waste in tanks must provide sufficient information to determine if they contain potential source material.
- The analytical suites selected must be sufficient to detect contaminants at concentrations equal to or less than their corresponding FALs.

A.5.2 Sources of Information

Information to satisfy Decision I and Decision II will be generated by collecting environmental samples using grab sampling, hand auguring, direct push, backhoe excavation or other appropriate sampling methods. These samples will be submitted to analytical laboratories meeting the quality criteria stipulated in the Industrial Sites QAPP (NNSA/NV, 2002a). Only validated data from analytical laboratories will be used to make DQO decisions. Sample collection and handling activities will follow standard procedures.

A.5.2.1 Sample Locations

Design of the sampling approaches for the CAU 563 CASs must ensure that the data collected are sufficient for selection of the corrective action alternatives (EPA, 2002). To meet this objective, the samples collected from each site should be from locations that most likely contain a COC, if present (judgmental), and properly represent any contamination at the CAS. These sample locations, therefore, can be selected by means of biasing factors used in judgmental sampling (e.g., a stain, likely containing a spilled substance). A judgmental sampling design has been developed for CAU 563 due to the presence and significance of biasing factors.

The implementation of the judgmental approach for sample location selection for CAU 563 is discussed in the following sections.

A.5.2.1.1 Judgmental Approach for Sampling Location Selection

Decision I sample locations at CAS 03-04-02, CAS 03-59-05, CAS 12-59-01, and CAS 12-60-01 will be determined based upon the likelihood of the soil containing a COC, if present at the CAS. These locations will be selected based on field-screening techniques, biasing factors, the CSM, and existing information. Analytical suites for Decision I samples will include all COPCs identified in Table A.3-2.

Field-screening techniques may be used to select appropriate sampling locations by providing semiquantitative data that can be used to comparatively select samples to be submitted for laboratory analyses from several screening locations. Field screening may also be used for health and safety monitoring and to assist in making certain health and safety decisions. The following field-screening methods may be used to select analytical samples at CAU 563:

- Alpha and beta/gamma radiation – A radiological survey instrument will be used at all CASs.
- Gamma emitting radionuclides – A dose rate instrument will be used at all CASs.

Biasing factors may also be used to select samples to be submitted for laboratory analyses based on existing site information and site conditions discovered during the investigation. The following factors will also be considered in selecting locations for analytical samples at CAU 563:

- Documented process knowledge on source and location of release (e.g., volume of release).
- Stains – Any spot or area on the soil surface that may indicate the presence of a potentially hazardous liquid. Typically, stains indicate an organic liquid (e.g, an oil) has reached the soil and may have spread out vertically and horizontally.
- Elevated radiation – Any location identified during radiological surveys that had alpha/beta/gamma levels significantly higher than surrounding background soil.
- Geophysical anomalies – Any location identified during geophysical surveys that had results indicating surface or subsurface materials existed and were not consistent with the natural surroundings (e.g., buried concrete or metal, surface metallic objects).
- Lithology – Locations where variations in lithology (soil or rock) indicate that different conditions or materials exist (interface between disturbed and undisturbed soils/rocks).
- Preselected areas based on process knowledge of the site – Locations for which evidence such as historical photographs, experience from previous investigations, or interviewee input, exists that a release of hazardous or radioactive substances may have occurred.
- Preselected areas based on process knowledge of the contaminant(s) – Locations that may reasonably have received contamination, selected on the basis of the chemical and/or physical properties of the contaminant(s) in that environmental setting.
- Previous sample results – Locations that may reasonably have been contaminated based upon the results of previous field investigations.
- Previous Experience – Experience and data from investigations of similar sites.
- Visual indicators – Discoloration, textural discontinuities, disturbance of native soils, or any other indication of potential contamination.
- Presence of debris, waste, or equipment.
- Odor.
- Physical and chemical characteristics of contaminants.

- Other biasing factors – Factors not previously defined for the CAI, but become evident once the investigation of the site is under way.

Decision II sample step-out locations will be selected based on the CSM, biasing factors, and existing data. Analytical suites will include those parameters that exceeded FALs (i.e., COCs) in prior samples. Biasing factors to support Decision II sample locations include Decision I biasing factors plus available analytical results.

A.5.2.2 Analytical Methods

Analytical methods are available to provide the data needed to resolve the decision statements. The analytical methods and laboratory requirements (e.g., detection limits, precision, and accuracy) are provided in Tables 3-4 and 3-5.

A.6.0 Step 4 - Define the Boundaries of the Study

Step 4 of the DQO process defines the target population of interest and its relevant spatial boundaries, specifies temporal and other practical constraints associated with sample/data collection, and defines the sampling units on which decisions or estimates will be made.

A.6.1 Target Populations of Interest

The population of interest to resolve Decision I ("Is any COC present in environmental media within the CAS?") is any location within the site that is contaminated with any contaminant above a FAL (judgmental sampling). The populations of interest to resolve Decision II ("If a COC is present, is sufficient information available to evaluate potential corrective action alternatives?") are:

- Each set of locations bounding contamination in lateral and vertical directions.
- Environmental media or IDW that must be characterized for disposal.
- Potential remediation waste.
- Environmental media where natural attenuation or biodegradation or construction/evaluation of barriers is considered.

A.6.2 Spatial Boundaries

Spatial boundaries are the maximum lateral and vertical extent of expected contamination at each CAS, as shown in Table A.6-1. Contamination found beyond these boundaries may indicate a flaw in the CSM and may require re-evaluation of the CSM before the investigation could continue. Each CAS is considered geographically independent and intrusive activities are not intended to extend into the boundaries of neighboring CASs.

A.6.3 Practical Constraints

Practical constraints such as military activities at the NTS, weather (i.e., high winds, rain, lightning, extreme heat), utilities, threatened or endangered animal and plants, unstable or steep terrain, and/or access restrictions may affect the ability to investigate this site. The practical constraints associated with the investigation of the CAU 563 CASs are summarized in Table A.6-2.

Table A.6-1
Spatial Boundaries of CAU 563 CASs

CAS Number	Spatial Boundaries
03-04-02	The footprint of the septic tank and associated subsurface piping, plus a 15-foot (ft) lateral buffer, and a 15-ft below ground surface (bgs) vertical boundary.
03-59-05	The footprint of the cesspool and associated subsurface piping, plus a 15-ft lateral buffer, and a 15-ft bgs vertical boundary.
12-59-01	The footprint of each septic tank outfall and associated subsurface piping, plus a 15-ft lateral buffer and a 100-ft buffer downgradient of any outfalls, and a 15-ft bgs vertical boundary.
12-60-01	The footprint of each outfall and associated subsurface piping (excluding beneath concrete pads), plus a 15-ft lateral buffer and a 100-ft buffer downgradient of outfalls, and a 15-ft bgs vertical boundary.

CAS = Corrective action site

Table A.6-2
Practical Constraints for the CAU 563 Field Investigation

CAS Number	Practical Constraints
03-04-02 and 03-59-05	Weather (i.e., high winds, rain, lightning, extreme heat), underground utilities, energized power substation, concrete pads are located in general area; located within the habitat range of the desert tortoise.[a]
12-59-01 and 12-60-01	Weather (i.e., high winds, rain, lightning, extreme heat) causing steep road uphill to site to be slippery; site is underlain by bedrock, limiting excavation methods; concrete building foundation, and loose and unconsolidated terrain located along subsurface piping; located where coyotes and wild horses frequent.

[a] Mojave Desert population of the desert tortoise is listed as a threatened species by the U.S. Fish and Wildlife Service (DOE/NV, 1996).

CAS = Corrective action site

A.6.4 Scale of Decision-Making

The scale of decision-making in Decision I is defined as the CAS. Contaminants of concern detected at any location within the CAS will cause the determination that the CAS is contaminated and needs further evaluation. The scale of decision-making for Decision II is defined as a contiguous area contaminated with any COC originating from the CAS. Resolution of Decision II requires this contiguous area to be bounded laterally and vertically.

A.7.0 Step 5 - Develop the Analytic Approach

Step 5 of the DQO process specifies appropriate population parameters for making decisions, defines action levels and generates an "If … then … else" decision rule which involves it.

A.7.1 Population Parameters

For judgmental sampling results, the population parameter is the observed concentration of each contaminant from each individual analytical sample. Each sample result will be compared to FALs to determine the appropriate resolution to Decision I and Decision II. For Decision I, a single sample result for any contaminant exceeding a FAL would cause a determination that a COC is present within the CAS.

The Decision II population parameter is an individual analytical result from a bounding sample. For Decision II, a single bounding sample result for any contaminant exceeding a FAL would cause a determination that the contamination is not bounded.

A.7.2 Action Levels

The PALs presented in this section are to be used for site screening purposes. They are not necessarily intended to be used as cleanup action levels or FALs. However, they are useful in screening out contaminants that are not present in sufficient concentrations to warrant further evaluation and, therefore, streamline the consideration of remedial alternatives. The RBCA process used to establish FALs is described in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006). This process conforms with NAC Section 445A.227, which lists the requirements for sites with soil contamination. For the evaluation of corrective actions, NAC Section 445A.22705 requires the use of ASTM Method E 1739-95 to "conduct an evaluation of the site, based on the risk it poses to public health and the environment, to determine the necessary remediation standards (i.e., FALs) or to establish that corrective action is not necessary" (ASTM, 1995).

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

- **Tier 1 –** Sample results from source areas (highest concentrations) are compared to action levels based on generic (non-site-specific) conditions (i.e., the PALs established in the CAIP). The FALs may then be established as the Tier 1 action levels or the FALs may be calculated using a Tier 2 evaluation.

- **Tier 2 –** Conducted by calculating Tier 2 SSTLs using site-specific information as inputs to the same or similar methodology used to calculate Tier 1 action levels. The Tier 2 SSTLs are then compared to individual sample results from reasonable points of exposure (as opposed to the source areas as is done in Tier 1) on a point-by-point basis. Total TPH concentrations will not be used for risk-based decisions under Tier 2 or Tier 3. Rather, the individual chemicals of concern will be compared to the SSTLs.

- **Tier 3 –** Conducted by calculating Tier 3 SSTLs on the basis of more sophisticated risk analyses using methodologies described in Method E 1739-95 that consider site-, pathway-, and receptor-specific parameters.

The comparison of laboratory results to FALs and the evaluation of potential corrective actions will be included in the investigation report. The FALs will be defined (along with the basis for their definition) in the investigation report.

A.7.2.1 Chemical PALs

Except as noted herein, the chemical PALs are defined as the EPA *Region 9 Risk-Based Preliminary Remediation Goals (PRGs)* for chemical contaminants in industrial soils (EPA, 2004). Background concentrations for RCRA metals and zinc will be used instead of PRGs when natural background concentrations exceed the PRG, as is often the case with arsenic on the NTS. Background is considered the average concentration plus two standard deviations of the average concentration 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). For detected chemical COPCs without established PRGs, the protocol used by the EPA Region 9 in establishing PRGs (or similar) will be used to establish PALs. If used, this process will be documented in the investigation report.

A.7.2.2 Total Petroleum Hydrocarbon PALs

The PAL for TPH is 100 ppm as listed in NAC 445A.2272 (NAC, 2004).

A.7.2.3 Radionuclide PALs

The PALs for radiological contaminants (other than tritium) are based on the NCRP Report No. 129 recommended screening limits for construction, commercial, industrial land-use scenarios (NCRP, 1999) scaled to 25 mrem/yr dose constraint (Murphy, 2004) and the generic guidelines for residual concentration of radionuclides in DOE Order 5400.5 (DOE, 1993). These PALs are based on the construction, commercial, and industrial land-use scenario provided in the guidance and are appropriate for the NTS based on future land-use scenarios as presented in Section A.3.2. The PAL for tritium is based on the UGTA Project limit of 400,000 pCi/L for discharge of water containing tritium (NNSA/NV, 2002b).

Solid media such as concrete and/or structures may pose a potential radiological exposure risk to site workers if contaminated. The radiological PAL for solid media will be defined as the unrestricted-release criteria defined in the NV/YMP RadCon Manual (NNSA/NSO, 2004).

A.7.3 Decision Rules

The decision rules applicable to both Decision I and Decision II are:

- If COC contamination is inconsistent with the CSM or extends beyond the spatial boundaries identified in Section A.6.2, then work will be suspended and the investigation strategy will be reconsidered, else the decision will be to continue sampling to define the extent.

The decision rules for Decision I are:

- If the population parameter any COPC in the Decision I population of interest (defined in Step 4) exceeds the corresponding FAL, then that contaminant is identified as a COC, and Decision II samples will be collected, else no further investigation is needed for that COPC in that population.
- If a COC exists at any CAS, then a corrective action will be determined, else no further action will be necessary.

- If a waste is present and that, if released, has the potential to cause the future contamination of site environmental media, then a corrective action will be determined, else no further action will be necessary.

The decision rules for Decision II are:

- If the population parameter (the observed concentration of any COC) in the Decision II population of interest (defined in Step 4) exceeds the corresponding FAL in any bounding direction, then additional samples will be collected to complete the Decision II evaluation, else the extent of the COC contamination has been defined.

- If valid analytical results are available for the waste characterization samples defined in Section A.9.0, then the decision will be that sufficient information exists determine potential remediation waste types and evaluate the feasibility of remediation alternatives, else collect additional waste characterization samples.

A.8.0 Step 6 - Specify Performance or Acceptance Criteria

Step 6 of the DQO process defines the decision hypotheses, specifies controls against false rejection and false acceptance decision errors, examines consequences of making incorrect decisions from the test, and places acceptable limits on the likelihood of making decision errors.

A.8.1 Decision Hypotheses

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

- 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 false negative or false positive errors associated with their determination. The impact of these decision errors and the methods that will be used to control these errors are discussed in the following subsections. In general terms, confidence in DQO decisions based on judgmental sampling results will be established qualitatively by:

- The development of and concurrence of CSMs (based on process knowledge) by stakeholder participants during the DQO process.

- Testing the validity of CSMs based on investigation results.

- Evaluating the quality of the data based on DQI parameters.

A.8.2 False Negative Decision Error

The false negative decision error would mean deciding that a COC is not present when it actually is (Decision I), or deciding that the extent of a COC has been defined when it has not (Decision II). In both cases the potential consequence is an increased risk to human health and environment.

A.8.2.1 False Negative Decision Error for Judgmental Sampling

In judgmental sampling, the selection of the number and location of samples is based on knowledge of the feature or condition under investigation and on professional judgment (EPA, 2002). Judgmental sampling conclusions about the target population depend upon the validity and accuracy of professional judgment.

The false negative decision error (where consequences are more severe) for judgmental sampling designs is controlled by meeting these criteria:

- For Decision I, having a high degree of confidence that the sample locations selected will identify COCs if present anywhere within the CAS. For Decision II, 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.

To satisfy the first criterion, Decision I samples must be collected in areas most likely to be contaminated by COCs (supplemented by random samples where appropriate). Decision II samples must be collected in areas that represent the lateral and vertical extent of contamination (above FALs). The following characteristics must be considered to control decision errors for 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 field-screening methods and biasing factors listed in Section A.5.2.1 will be used to further ensure that appropriate sampling locations are selected to meet these criteria. Radiological survey instruments and field-screening equipment will be calibrated and checked in accordance with the manufacturer’s instructions and approved procedures. The investigation report will present an assessment on the DQI of representativeness that samples were collected from those locations that best represent the populations of interest as defined in Section A.6.1.

To satisfy the second criterion, Decision I samples will be analyzed for the chemical and radiological parameters listed in Section 3.2. Decision II samples will be analyzed for those chemical and radiological parameters that identified unbounded COCs. The DQI of sensitivity will be assessed for all analytical results to ensure that all sample analyses had measurement sensitivities (detection limits) that were less than or equal to the corresponding FALs. If this criterion is not achieved, the affected data will be assessed (for usability and potential impacts on meeting site characterization objectives) in the investigation report.

To satisfy the third criterion, the entire dataset, as well as individual sample results, will be assessed against the DQIs of precision, accuracy, comparability, and completeness as defined in the Industrial Sites QAPP (NNSA/NV, 2002a) and in Section 6.2.2. The DQIs of precision and accuracy will be used to assess overall analytical method performance as well as to assess the need to potentially "flag" (qualify) individual contaminant results when corresponding QC sample results are not within the established control limits for precision and accuracy. Data qualified as estimated for reasons of precision or accuracy may be considered to meet the constituent performance criteria based on an assessment of the data. The DQI for completeness will be assessed to ensure that all data needs identified in the DQO have been met. The DQI of comparability will be assessed to ensure that all analytical methods used are equivalent to standard EPA methods so that results will be comparable to regulatory action levels that have been established using those procedures. Strict adherence to established procedures and QA/QC protocol protects against false negatives. Site-specific DQIs are discussed in more detail in Section 6.2.2.

To provide information for the assessment of the DQIs of precision and accuracy, the following quality control samples will be collected as required by the Industrial Sites QAPP (NNSA/NV, 2002a):

- Field duplicates (minimum of 1 per matrix per CAS)
- Laboratory QC samples (minimum of 1 per matrix per CAS)

A.8.3 False Positive Decision Error

The false positive decision error would mean deciding that a COC is present when it is not, or a COC is unbounded when it is not; resulting in increased costs for unnecessary sampling and analysis.

False positive results are typically attributed to laboratory and/or sampling/handling errors that could cause cross contamination. To control against cross contamination, decontamination of sampling equipment will be conducted according to established and approved procedures and only clean sample containers will be used. To determine whether a false positive analytical result may have occurred, the following quality control samples will be collected as required by the Industrial Sites QAPP (NNSA/NV, 2002a):

- 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 uncharacterized source lot per sampling event)
- Field blanks (minimum of 1 at Area 3 CASs, and minimum of 1 at Area 12 CASs – additional if field conditions change)

A.9.0 Step 7 - Develop the Plan for Obtaining Data

Step 7 of the DQO process selects and documents a design that will yield data that will best achieve performance or acceptance criteria. Judgmental sampling schemes will be implemented to select sample locations and evaluate analytical results for CAU 563. Sections A.9.1 and A.9.2 contain general information about collecting Decision I and Decision II samples under judgmental sampling designs, while the subsequent sections provide CAS-specific sampling activities, including proposed sample locations.

A.9.1 Decision I Sampling

A judgmental sampling design will be implemented for CAU 563. Because individual sample results, rather than an average concentration, will be used to compare to FALs at the CASs, statistical methods to generate site characteristics will not be used. Adequate representativeness of the entire target population may not be a requirement to developing a sampling design. If good prior information is available on the target site of interest, then the sampling may be designed to collect samples only from areas known to have the highest concentration levels on the target site. If the observed concentrations from these samples are below the action level, then a decision can be made that the site contains safe levels of the contaminant without the samples being truly representative of the entire area. (EPA, 2006)

All sample locations will be selected to satisfy the DQI of representativeness in that samples collected from selected locations will best represent the populations of interest as defined in Section A.6.1. To meet this criterion for judgmentally sampled sites, a biased sampling strategy will be used for Decision I samples to target areas with the highest potential for contamination, if it is present anywhere in the CAS. Sample locations will be determined based on process knowledge, previously acquired data, or the field-screening and biasing factors listed in Section A.5.2.1. If biasing factors are present in soils below locations where Decision I samples were removed, additional Decision I soil samples will be collected at depth intervals selected by the SS, based on biasing factors, to a depth where the biasing factors are no longer present. The SS has the discretion to modify the judgmental sample locations, but only if the modified locations meet the decision needs and criteria stipulated in this DQO.

A.9.2 Decision II Sampling

To meet the DQI of representativeness for Decision II samples (that Decision II sample locations represent the population of interest as defined in Section A.6.1), judgmental sampling locations at each CAS will be selected based on the outer boundary sample locations where COCs were detected, the CSM, and other field-screening and biasing factors listed in Section A.5.2. In general, sample locations will be arranged in a triangular pattern around the Decision I location or area at distances based on site conditions, process knowledge, and biasing factors. If COCs extend beyond the initial step-outs, Decision II samples will be collected from incremental step-outs. Initial step-outs will be at least as deep as the vertical extent of contamination defined at the Decision I location and the depth of the incremental step-outs will be based on the deepest contamination observed at all locations. A clean sample (i.e., COCs less than FALs) collected from each step-out direction (lateral or vertical) will define extent of contamination in that direction. The number, location, and spacing of step-outs may be modified by the SS, as warranted by site conditions.

A.9.3 Corrective Action Site 03-04-02, Area 3 Subdock Septic Tank

No surface soil staining or tank contents were observed at this CAS during recent site visits. The septic tank was designed as a holding tank and the domestic wastes were removed via bi-weekly pumping. According to historical documents and interviews, there is no evidence that the septic tank has ever leaked or released contaminants into the environment. Based on this information, Decision I sampling will consist of inspecting the septic tank; and, if contents are encountered, a sample will be collected of the material(s). The septic tank will be exposed and the subsurface soil surrounding the tank will be inspected; and, if biasing factors are present, a minimum of one soil sample will be collected for analyses. If no biasing factors are present, a minimum of two Decision I samples will be collected at the base of the tank and below the inlet pipe. All Decision I samples will be submitted to an offsite laboratory and analyzed for the parameters identified on Table A.3-2.

If any COPC is detected in the Decision I samples above the minimum detectable limit (MDL), then a video mole will be used to inspect the inlet pipe to the tank for possible breaches and additional pipe tie-ins. If pipe tie-ins are encountered and access is possible, they will also be inspected with the video mole. If broken sections of pipe are encountered, the soil beneath and surrounding the breach will be inspected. If biasing factors are present, a soil sample will be collected at this location and analyzed for the parameters that were detected above the MDLs.

Based on the Decision I sampling results for this CAS, Decision II samples may be collected at locations surrounding the Decision I sampling point and analyzed for the parameters that were detected above the MDLs. Figure A.9-1 shows a site layout and the proposed Decision I inspection/sampling locations. As discussed in Section A.2.0, radiological soil contamination at this site originating from nuclear testing is specifically excluded from this investigation. If such contamination exists, it will be addressed by the Soils Program.

A.9.4 Corrective Action Site 03-59-05, Area 3 Subdock Cesspool

No surface soil staining was observed at this CAS during recent site visits. Based on historical documentation for this site, the design of the cesspool is uncertain. During Decision I sampling, the top of the cesspool will be exposed and inspected to determine the configuration of the vessel; and, if contents remain, a sample of the material(s) will be collected. If it is determined that the design of the cesspool was to release contaminants to the environment, a minimum of one soil sample will be collected beneath the cesspool. If the cesspool is a closed tank, the septic tank will be exposed and the subsurface soil surrounding the tank will be inspected; and, if biasing factors are present, a minimum of one soil sample will be collected for analyses. If no biasing factors are present, a minimum of two Decision I samples will be collected at the base of the tank and below the inlet pipe. All Decision I samples will be submitted to an offsite laboratory and analyzed for the parameters identified on Table A.3-2.

If any COPC is detected in the Decision I samples above the MDL, then a video mole will be used to inspect the inlet pipe to the cesspool for possible breaches and additional pipe tie-ins. If pipe tie-ins are encountered, and access is possible, they will also be inspected with the video mole. If broken sections of pipe are encountered, the soil beneath and surrounding the breach will be inspected; and if biasing factors are present, a soil sample will be collected at this location for analyses.

Based on the Decision I sampling results for this CAS, Decision II samples may be collected at locations surrounding the Decision I sampling point. Figure A.9-2 shows a site layout and the proposed Decision I inspection/sampling locations. As discussed in Section A.2.0, radiological soil

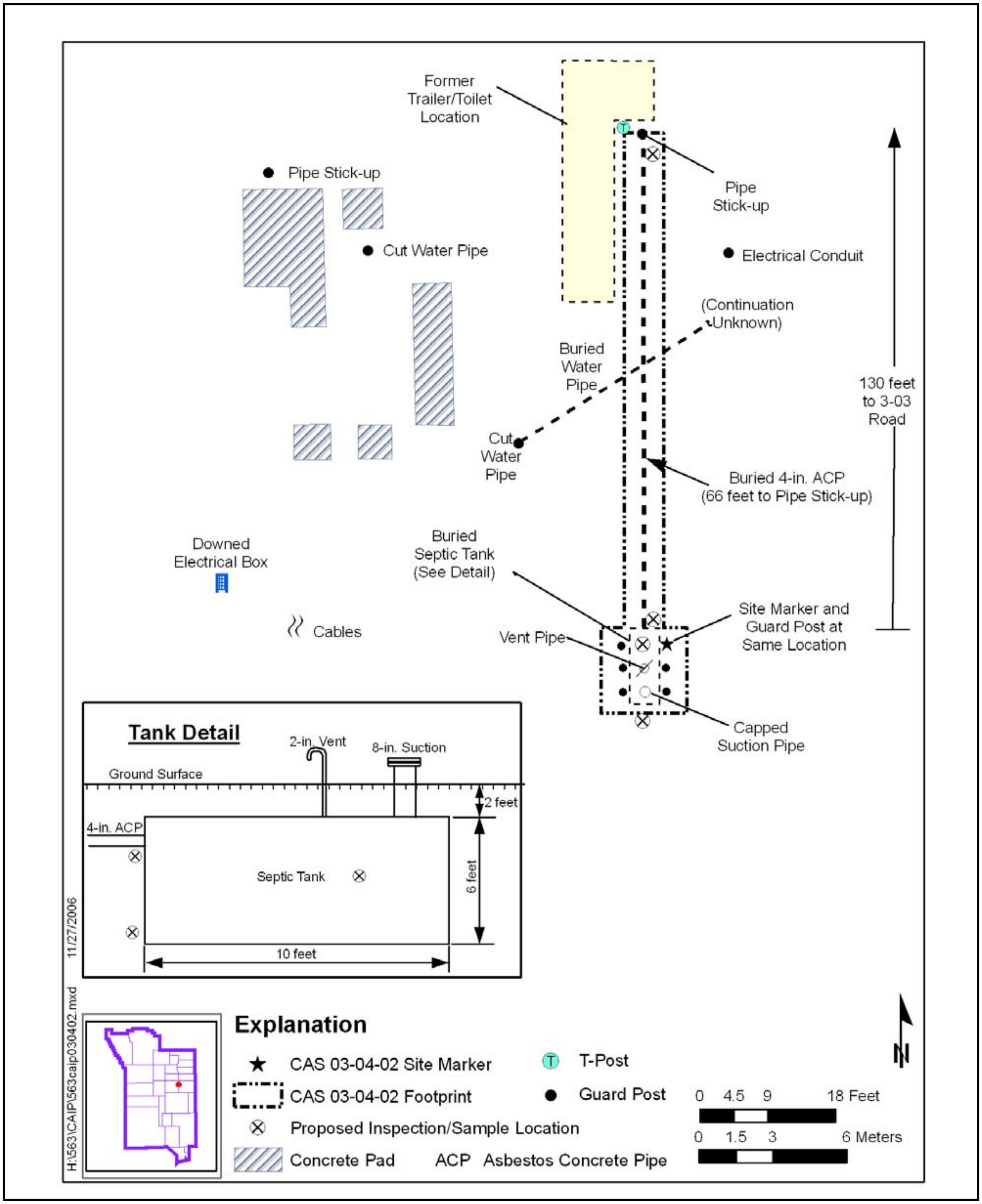


Figure A.9-1
Proposed Inspection/Sampling Locations at CAS 03-04-02,
Area 3 Subdock Septic Tank

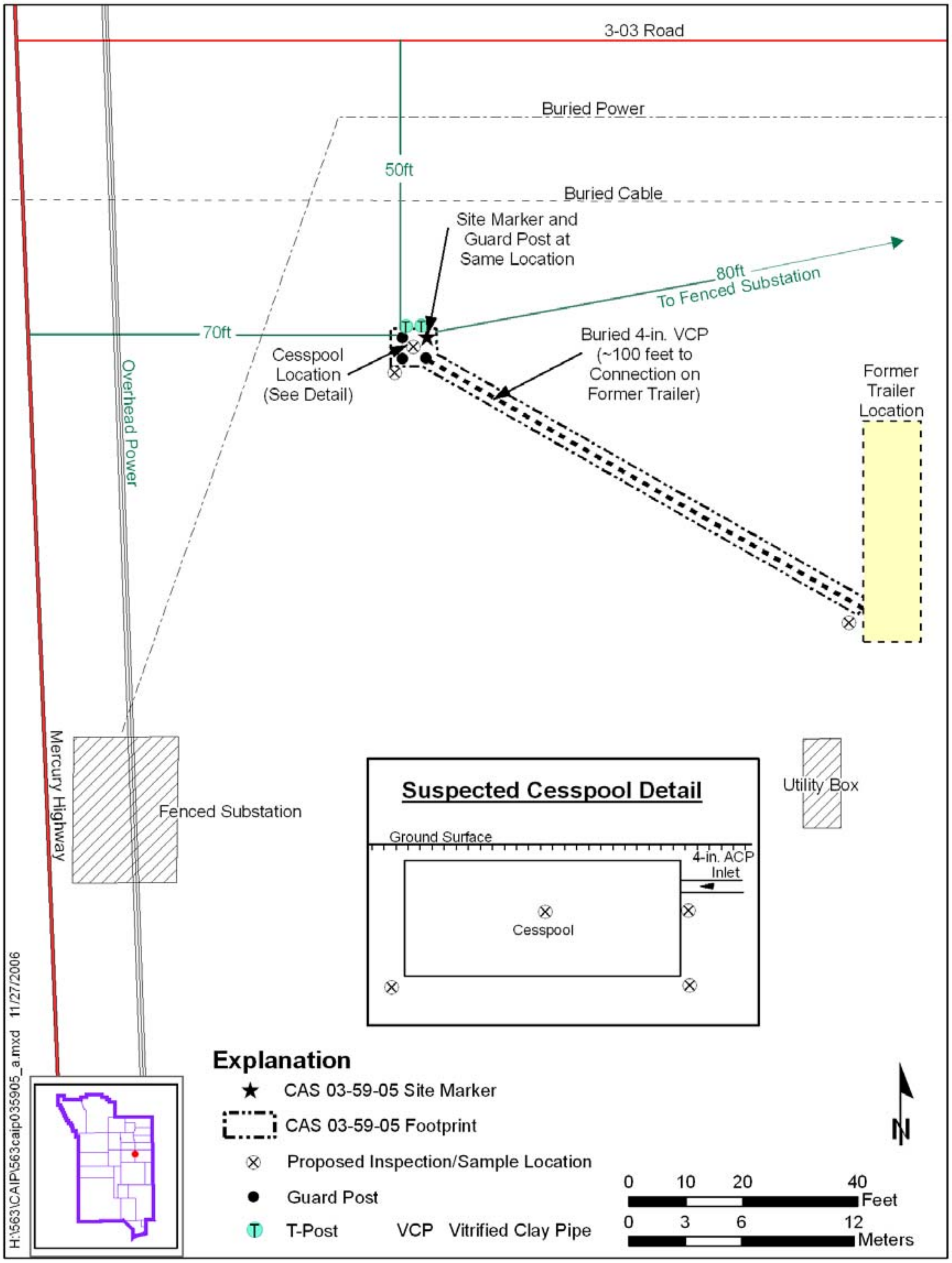


Figure A.9-2
Proposed Inspection/Sampling Locations at CAS 03-59-05, Area 3 Subdock Cesspool

contamination at this site originating from nuclear testing is specifically excluded from this investigation. If such contamination exists, it will be addressed by the Soils Program.

A.9.5 Corrective Action Site 12-59-01, Drilling/Welding Shop Septic Tanks

North Tank – It is uncertain if the septic tank contains material. No access ports were observed, and it appears that the tank may have rolled at some point. A partially exposed outlet pipe was observed on the downgradient end of the tank during a recent site visit. The soil will be sampled beneath this location. If possible, the tank will be rolled to determine if access ports exist and to provide a point of inspection for contents. If contents are observed, and if feasible, a minimum of one sample will be collected of each material or phase of material encountered. In addition, a surface soil sample will be taken at the nearest downgradient depression or catchment, and/or at locations of stained soil in the drainage path. All Decision I samples will be submitted to an offsite laboratory and analyzed for the parameters identified on Table A.3-2.

South Tank – Liquid contents were observed in both chambers of this tank. A previous radiological survey (Simonsen, 2003) showed elevated alpha readings near the tank access ports. During Decision I sampling, a radiological survey will be performed at these openings to access the current status. The liquid contents of the tank chambers will be sampled, and if a separate phase is encountered, samples will be taken of all separate phase(s). The soil surrounding the tank will be inspected for biasing factors; and if found, a minimum of one soil sample each will be collected beneath the tank, and inlet, and outlet pipes. In addition, a surface soil sample will be taken beneath the location of the downgradient pipe outfall. All Decision I samples will be submitted to an offsite laboratory and analyzed for the parameters identified on Table A.3-2.

If any COPC is detected in the Decision I samples above the MDL, the soil beneath and surrounding the breached and broken pipe segments will be inspected for biasing factors; and if present, a soil sample will be collected at each location and analyzed for the parameters that exceeded its MDL.

Based on the Decision I sampling results for this CAS, Decision II samples may be collected at locations surrounding the Decision I sampling point. Figure A.9-3 shows a site layout, the North and South Tank locations, and the proposed Decision I inspection/sampling locations.

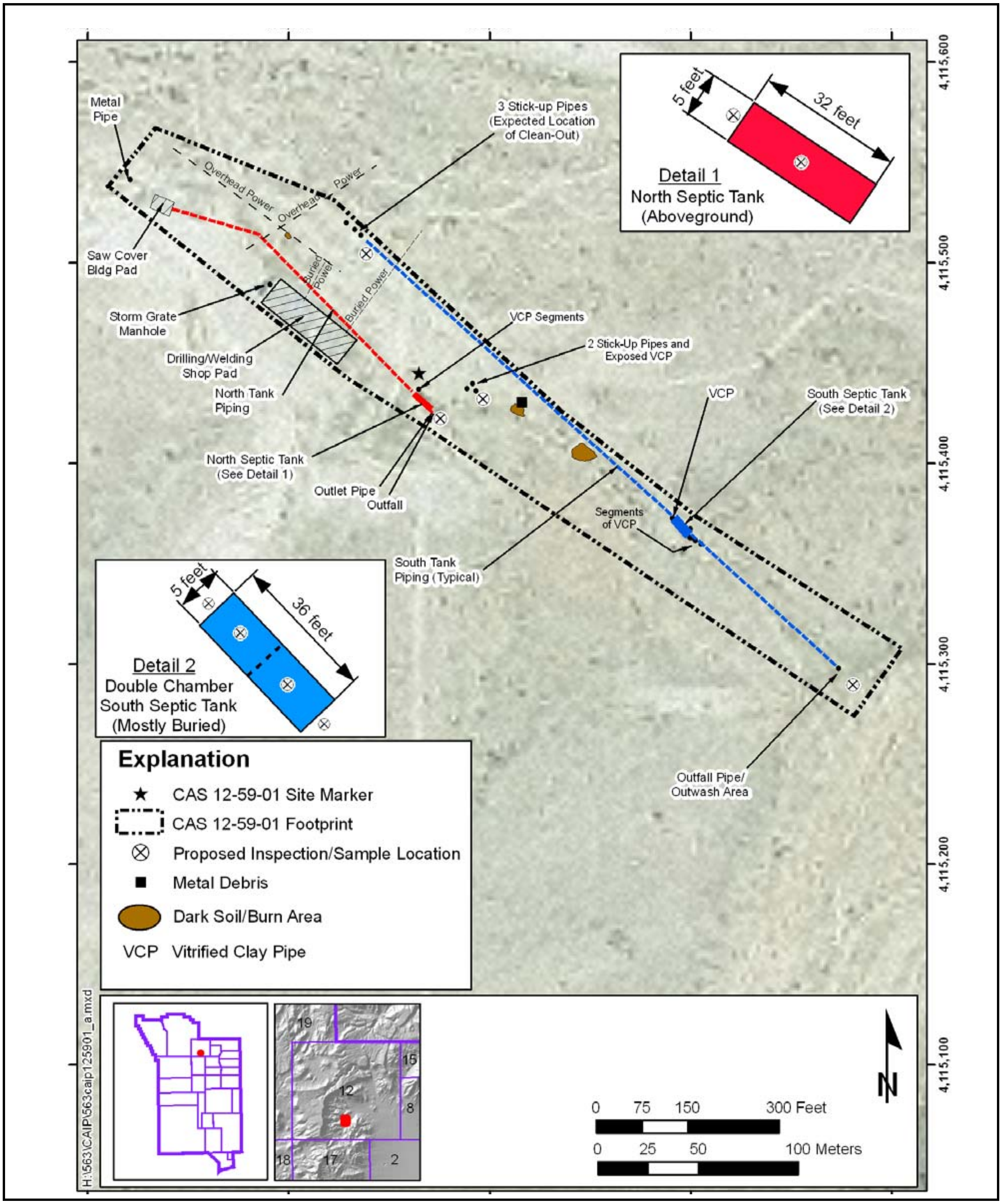


Figure A.9-3
Proposed Sampling Locations at CAS 12-59-01,
Area 12 Drilling/Welding Shop Septic Tanks

A.9.6 Corrective Action Site 12-60-01, Drilling/Welding Shop Outfalls

During Decision I sampling, the three outfall pipes will be inspected for any residual contents; and if detected, a sample will be collected of the material(s). In addition, the soil directly below each pipe outfall will be inspected and a minimum of two samples will be collected at each location: one surface soil sample from 0 to 6 in., and one soil sample from either 6 to 12 in., or 12 to 18 in., depending on biasing factors encountered. All Decision I samples will be submitted to an offsite laboratory and analyzed for the parameters identified on Table A.3-2.

If any COPC is detected in the Decision I samples above the MDL, the surface soil in the drainage channels downgradient of the outfalls will be inspected; and if biasing factors are present, a soil sample will be collected at this location and analyzed for the parameters that exceeded its MDL.

Based on the Decision I sampling results for this CAS, Decision II samples may be collected at locations surrounding the Decision I sampling point or at obvious recumbent accumulation areas within the CAS boundary. Figure A.9-4 shows a site layout of the pipe outfall locations and the proposed Decision I inspection/sampling locations.

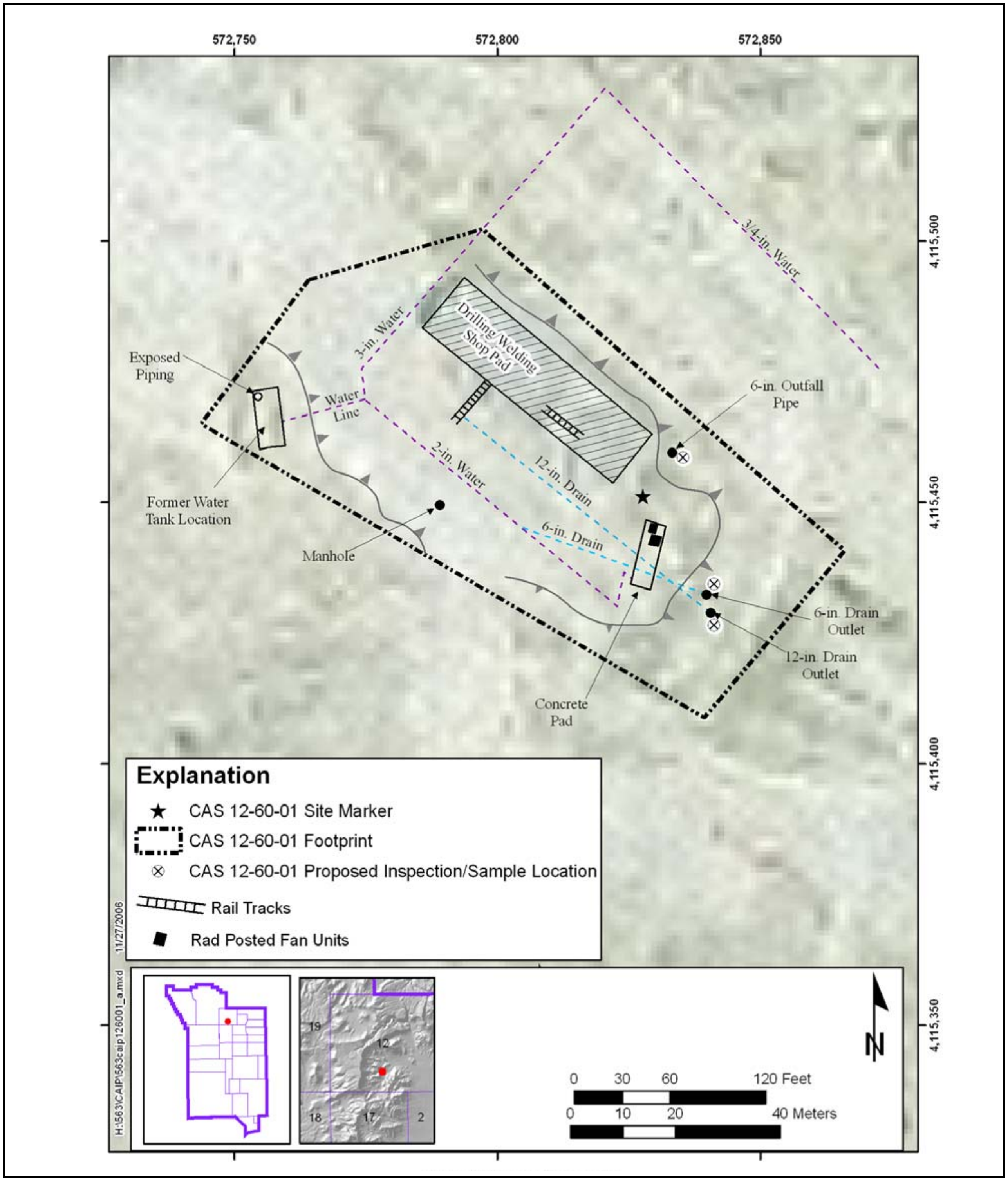


Figure A.9-4
Proposed Sampling Locations at CAS 12-60-01,
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APPENDIX B

SAMPLE ANALYTICAL RESULTS

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National Security Technologies, LLC
2621 Losee Road, Mail Stop NTS273
North Las Vegas NV, 89030

Project: BOA
Project Number: 60052-002-001
Project Manager: Ted Redding

Reported:
09/25/2009 13:47

Analytical Report for Metals by SW846 6000/7000 series

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
125901-V1	0909084-06	Soil	09/16/2009 15:40	09/18/2009 10:00
125901-V2	0909084-07	Soil	09/16/2009 15:45	09/18/2009 10:00
125901-V3	0909084-08	Soil	09/16/2009 16:00	09/18/2009 10:00

National Security Technologies, LLC 2621 Losee Road, Mail Stop NTS273 North Las Vegas NV, 89030	Project: BOA Project Number: 60052-002-001 Project Manager: Ted Redding	**Reported:** 09/25/2009 13:47

125901-V1

0909084-06 (Soil)

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
			Lionville Laboratory					
Metals by SW846 6000/7000 series								
Arsenic	5.19	0.672	mg/kg dry	1	L909191	09/22/2009	09/25/2009	SW846 6010B
Chromium	9.96	0.672	mg/kg dry	1	L909191	09/22/2009	09/25/2009	SW846 6010B

National Security Technologies, LLC 2621 Losee Road, Mail Stop NTS273 North Las Vegas NV, 89030	Project: BOA Project Number: 60052-002-001 Project Manager: Ted Redding	**Reported:** 09/25/2009 13:47

125901-V2

0909084-07 (Soil)

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
		Lionville Laboratory						
Metals by SW846 6000/7000 series								
Arsenic	**4.69**	0.850	mg/kg dry	1	L909191	09/22/2009	09/25/2009	SW846 6010B
Chromium	**8.76**	0.850	mg/kg dry	1	L909191	09/22/2009	09/25/2009	SW846 6010B

125901-V3

0909084-08 (Soil)

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Arsenic	**5.34**	0.843	mg/kg dry	1	L909191	09/22/2009	09/25/2009	SW846 6010B
Chromium	**9.15**	0.843	mg/kg dry	1	L909191	09/22/2009	09/25/2009	SW846 6010B

National Security Technologies, LLC 2621 Losee Road, Mail Stop NTS273 North Las Vegas NV, 89030	Project: BOA Project Number: 60052-002-001 Project Manager: Ted Redding	**Reported:** 09/25/2009 13:47

Metals by SW846 6000/7000 series - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L909191 - SW 3050B									
Blank (L909191-BLK1)			Prepared: 09/22/2009 Analyzed: 09/24/2009						
Arsenic	0.794 U	0.794	mg/kg wet						
Chromium	0.794 U	0.794	mg/kg wet						
Duplicate (L909191-DUP1)	**Source: 0909084-06**		Prepared: 09/22/2009 Analyzed: 09/25/2009						
Arsenic	4.62	0.691	mg/kg dry		5.19			11.7	20
Chromium	8.91	0.691	mg/kg dry		9.96			11.1	20
Matrix Spike (L909191-MS1)	**Source: 0909084-06**		Prepared: 09/22/2009 Analyzed: 09/25/2009						
Arsenic	140	0.786	mg/kg dry	157.22	5.19	85.6	75-125		
Chromium	21.1	0.786	mg/kg dry	15.722	9.96	71.0*	75-125		
Reference (L909191-SRM1)			Prepared: 09/22/2009 Analyzed: 09/24/2009						
Arsenic	114	2.50	mg/kg wet	113.85		99.9	85-115		
Chromium	76.6	2.50	mg/kg wet	77.590		98.7	76.8-123.2		

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APPENDIX C

WASTE DISPOSITION DOCUMENTATION

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NSTec
Form
FRM-0918

NTS LANDFILL LOAD VERIFICATION

Page 1

SWO USE (Select One) AREA ☐ 23 ☐ 6 ☒ 9 ☒ LANDFILL

For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.

REQUIRED: WASTE GERERATOR INFORMATION

(This form is for rolloffs, dump trucks, and other onsite disposal of materials.)

Waste Generator: MIKE FLOYD
Phone Number: 295-6653
Location / Origin: CAU 563 AREA 3

Waste Category: (check one) ☐ Commercial ☒ Industrial

Waste Type: (check one) ☒ NTS ☐ Non-Putrescible ☐ Putrescrible ☐ Asbestos Containing Material ☒ FFACO-onsite ☐ FFACO-offsite ☐ WAC Exception ☐ Historic DOE/NV

Pollution Prevention Category: (check one) ☒ Environmental management ☐ Defense Projects ☐ YMP

Pollution Prevention Category: (check one) ☒ Clean-Up ☐ Routine

Method of Characterization: (check one) ☐ Sampling & Analysis ☒ Process Knowledge ☐ Contents

Prohibited Waste at all three NTS landfills: Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).

Additional Prohibited Waste at the Area 9 U10C Landfill: Sewage Sludge, Animal carcasses, Wet garbage (food waste); and Friable asbestos

REQUIRED: WASTE CONTENTS ALLOWABLE WASTES

Check all allowable wastes that are contained within this load:

NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants, such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics; kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.

Acceptable waste at any NTS landfill: ☐ Paper ☐ Rocks / unaltered geologic materials ☐ Empty containers
☐ Asphalt ☒ Metal ☒ Wood ☒ Soil ☐ Rubber (excluding tires) ☐ Demolition debris
☐ Plastic ☐ Wire ☐ Cable ☐ Cloth ☐ Insulation (non-Asbestosform) ☐ Cement & concrete
☐ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)

Additional waste accepted at the Area 23 Mercury Landfill: ☐ Office Waste ☐ Food Waste ☐ Animal Carcasses
☐ Asbestos ☐ Friable ☐ Non-Friable (contact SWO if regulated load) Quantity: ______

Additional waste accepted at the Area 9 U10c Landfill:
☒ Non-friable asbestos ☐ Drained automobiles and military vehicles ☐ Solid fractions from sand/oil/water
☐ Light ballasts (contact SWO) ☐ Drained fuel filters (gas & diesel) ☐ Deconned Underground and Above Ground Tanks
☐ Hydrocarbons (contact SWO) ☐ Other ______

Additional waste accepted at the Area 6 Hydrocarbon Landfill: ☐
☐ Septic sludge ☐ Rags ☐ Drained fuel filters (gas & diesel) ☐ Crushed non-terne plated oil filters
☐ Plants ☐ Soil ☐ Sludge from sand/oil/water separators ☐ PCBs below 50 parts per million

REQUIRED: WASTE GENERATOR SIGNATURE

Initials: _____ (if initialed, no radiological clearance is necessary.)

The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.

To the best of my knowledge, the waste described above contains only those materials that are allowed for disposal at this site. I have verified this through the waste characterization method identified above and a review of the above-mentioned prohibited and allowable waste items. <u>I have contacted Property Management and have verified that this material/equipment is approved for disposal in the landfill</u>.

9-29-09

Print Name: MIKE FLOYD
Signature: ______ Date: 9/2

Note: "Food waste, office trash and animal carcasses do not require a radiolog must have signed removal certification statement with Load Verification."

SWO USE ONLY

Load Weight (net from scale or estimate): 5800
9-29-09
Signature of Certi

Radiological Survey Release for Waste Disposal
RCT Initials
___ This container/load meets the criteria for no added man-made radioactive material
X This container/load meets the criteria for Radcon Manual Table 4.2 release limits.
X This container/load is exempt from survey due to process knowledge and origin.
SIGNATURE: ______ **DATE:** 9-28-07

BN-0546 (10/05)

NSTec
Form
FRM-0918

NTS LANDFILL LOAD VERIFICATION

10/07/09
Rev. 01
Page 1 of 2

SWO USE (Select One) AREA ☐ 23 ☐ 6 ☒ 9/10C **LANDFILL**

For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.

REQUIRED: WASTE GERERATOR INFORMATION
(This form is for rolloffs, dump trucks, and other onsite disposal of materials.) FAX 5-7918

Waste Generator: Rebecca King Phone Number: 5-5804

Location / Origin: CAU 563, CAS 12-59-01 Area 12

Waste Category: (check one) ☐ Commercial ☒ Industrial
Waste Type: ☒ NTS ☐ Putrescrible ☒ FFACO-onsite ☐ WAC Exception
(check one) ☐ Non-Putrescible ☐ Asbestos Containing Material ☐ FFACO-offsite ☐ Historic DOE/NV
Pollution Prevention Category: (check one) ☒ Environmental management ☐ Defense Projects ☐ YMP
Pollution Prevention Category: (check one) ☒ Clean-Up ☐ Routine
Method of Characterization: (check one) ☒ Sampling & Analysis ☐ Process Knowledge ☐ Contents

Prohibited Waste at all three NTS landfills: Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).

Additional Prohibited Waste at the Area 9 U10C Landfill: Sewage Sludge, Animal carcasses, Wet garbage (food waste); and Friable asbestos

REQUIRED: WASTE CONTENTS ALLOWABLE WASTES
Check all allowable wastes that are contained within this load:

NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants, such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics; kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.

Acceptable waste at any NTS landfill: ☐ Paper ☐ Rocks / unaltered geologic materials ☐ Empty containers
☐ Asphalt ☒ Metal ☒ Wood ☒ Soil ☐ Rubber (excluding tires) ☐ Demolition debris
☐ Plastic ☐ Wire ☒ Cable ☒ Cloth ☐ Insulation (non-Asbestosform) ☐ Cement & concrete
☐ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)

Additional waste accepted at the Area 23 Mercury Landfill: ☐ Office Waste ☐ Food Waste ☐ Animal Carcasses
☐ Asbestos ☐ Friable ☐ Non-Friable (contact SWO if regulated load) Quantity:

Additional waste accepted at the Area 9 U10c Landfill:
☒ Non-friable asbestos ☐ Drained automobiles and military vehicles ☐ Solid fractions from sand/oil/water
☐ Light ballasts (contact SWO) ☐ Drained fuel filters (gas & diesel) ☐ Deconned Underground and Above Ground Tanks
☐ Hydrocarbons (contact SWO) ☐ Other

Additional waste accepted at the Area 6 Hydrocarbon Landfill: ☐
☐ Septic sludge ☐ Rags ☐ Drained fuel filters (gas & diesel) ☐ Crushed non-teme plated oil filters
☐ Plants ☐ Soil ☐ Sludge from sand/oil/water separators ☐ PCBs below 50 parts per million

REQUIRED: WASTE GENERATC

Initials (if initialed, no radiological clearance is necessary.)

The above mentioned waste was generated outside of a Controlled Wast
knowledge, does not contain radiological materials.

To the best of my knowledge, the waste described above contains only ti
site. I have verified this through the waste characterization method iden
prohibited and allowable waste items. I have contacted Property Manage
is approved for disposal in the landfill.

Radiological Survey Release for Waste Disposal
RCT Initials
This container/load meets the criteria for no added man-made radioactive material
This container/load meets the criteria for Radcon Manual Table 4.2 release limits.
This container/load is exempt from survey due to process knowledge and origin.
SIGNATURE: DATE: 10-26-09
FRM-0646 (08/06)

Print Name: David Ridgeway

Signature: Date: 11-2-09

If applicable, place FRM-0646, "Radiological Release Sticker" here. Onsite use only.

Note: "Food waste, office trash and animal carcasses do not require a radiological clearance. Freon-containing appliances must have signed removal certification statement with Load Verification."

SWO USE ONLY

Load Weight (net from scale or estimate): 9,000 11-2-09 Signature of Certifie

NSTec
Form
FRM-0918

NTS LANDFILL LOAD VERIFICATION

10/07/09
Rev. 01
Page 1 of 2

SWO USE (Select One) AREA ☐ 23 ☐ 6 ☒ 9/10C **LANDFILL**

For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.

REQUIRED: WASTE GERERATOR INFORMATION
(This form is for rolloffs, dump trucks, and other onsite disposal of materials.) Fax 5-7918

Waste Generator: Rebecca King
Phone Number: 5-5804
Location / Origin: CAU 563 CAS 12-59-01 Area 12

Waste Category: (check one) ☐ Commercial ☒ Industrial
Waste Type: (check one) ☒ NTS ☐ Non-Putrescible ☐ Putrescible ☐ Asbestos Containing Material ☒ FFACO-onsite ☐ FFACO-offsite ~~☒ Defense Projects~~ ☐ WAC Exception ☐ Historic DOE/NV ☐ YMP
Pollution Prevention Category: (check one) ☒ Environmental management
Pollution Prevention Category: (check one) ☒ Clean-Up GS ☐ Routine GS 10/15/09
Method of Characterization: (check one) ☐ Sampling & Analysis ☐ Process Knowledge ☐ Contents

Prohibited Waste at all three NTS landfills: Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).

Additional Prohibited Waste at the Area 9 U10C Landfill: Sewage Sludge, Animal carcasses, Wet garbage (food waste); and Friable asbestos

REQUIRED: WASTE CONTENTS ALLOWABLE WASTES
Check all allowable wastes that are contained within this load:

NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants, such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics; kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.

Acceptable waste at any NTS landfill: ☒ Paper ☒ Rocks / unaltered geologic materials ☐ Empty containers
☐ Asphalt ☒ Metal ☐ Wood ☒ Soil ☐ Rubber (excluding tires) ☐ Demolition debris
☒ Plastic ☐ Wire ☐ Cable ☒ Cloth ☐ Insulation (non-Asbestosform) ☐ Cement & concrete
☐ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)

Additional waste accepted at the Area 23 Mercury Landfill: ☐ Office Waste ☐ Food Waste ☐ Animal Carcasses
☐ Asbestos ☐ Friable ☐ Non-Friable (contact SWO if regulated load) Quantity: ______

Additional waste accepted at the Area 9 U10c Landfill:
☐ Non-friable asbestos ☐ Drained automobiles and military vehicles ☐ Solid fractions from sand/oil/water
☐ Light ballasts (contact SWO) ☐ Drained fuel filters (gas & diesel) ☐ Deconned Underground and Above Ground Tanks
☐ Hydrocarbons (contact SWO) ☐ Other ______

Additional waste accepted at the Area 6 Hydrocarbon Landfill: ☐
☐ Septic sludge ☐ Rags ☐ Drained fuel filters (gas & diesel) ☐ Crushed non-teme plated oil filters
☐ Plants ☐ Soil ☐ Sludge from sand/oil/water separators ☐ PCBs below 50 parts per million

REQUIRED: WASTE GENERATOR SIGNATURE

Initials: _____ **(If initialed, no radiological clearance is necessary.)**

The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.

allowed for disposal at this

To the best of my knowledge, the waste described above contains only th site. I have verified this through the waste characterization method identi prohibited and allowable waste items. <u>I have contacted Property Manager is approved for disposal in the landfill.</u>

Print Name: M. L. Flood for Rebecca King
Signature: [redacted] 10/15/09 Date:

Note: "Food waste, office trash and animal carcasses do not require a rad must have signed removal certification statement with Load Verific

Radiological Survey Release for Waste Disposal
RCT Initials
JQ This container/load meets the criteria for no added man-made radioactive material
___ This container/load meets the criteria for Radcon Manual Table 4.2 release limits.
___ This container/load is exempt from survey due to process knowledge and origin.
SIGNATURE: [redacted] **DATE:** 10-15-09
(10/05)

SWO USE ONLY
Load Weight (net from scale or estimate): 9300 10-15-09 Signature of Certifier [redacted]

Form
FRM-0918

NTS LANDFILL LOAD VERIFICATION

Page 1 of 2

SWO USE (Select One) AREA ☐ 23 ☐ 6 ☒ 9 ☒ LANDFILL

For waste characterization, approval, and/or assistance, contact Solid Waste Operation (SWO) at 5-7898.

REQUIRED: WASTE GERERATOR INFORMATION

(This form is for rolloffs, dump trucks, and other onsite disposal of materials.) Fax - 5 - 7918

Waste Generator: Christopher McGahan Phone Number: 5-6211

Location / Origin: A-12 CAU 563 CAS 12-59-01

Waste Category: (check one) ☐ Commercial ☒ Industrial

Waste Type: (check one) ☒ NTS ☐ Non-Putrescible ☐ Putrescrible ☐ Asbestos Containing Material ☐ FFACO-onsite ☐ FFACO-offsite ☐ WAC Exception ☐ Historic DOE/NV

Pollution Prevention Category: (check one) ☒ Environmental management ☐ Defense Projects ☐ YMP

Pollution Prevention Category: (check one) ☒ Clean-Up ☐ Routine

Method of Characterization: (check one) ☒ Sampling & Analysis ☐ Process Knowledge ☐ Contents

Prohibited Waste at all three NTS landfills: Radioactive waste; RCRA waste; Hazardous waste; Free liquids, PCBs above TSCA regulatory levels, and Medical wastes (needles, sharps, bloody clothing).

Additional Prohibited Waste at the Area 9 U10C Landfill: Sewage Sludge, Animal carcasses, Wet garbage (food waste); and Friable asbestos

REQUIRED: WASTE CONTENTS ALLOWABLE WASTES

Check all allowable wastes that are contained within this load:

NOTE: Waste disposal at the Area 6 Hydrocarbon Landfill must have come into contact with petroleum hydrocarbons or coolants, such as: gasoline (no benzene, lead); jet fuel; diesel fuel; lubricants and hydraulics; kerosene; asphaltic petroleum hydrocarbon; and ethylene glycol.

Acceptable waste at any NTS landfill: ☐ Paper ☐ Rocks / unaltered geologic materials ☐ Empty containers

☐ Asphalt ☒ Metal ☐ Wood ☐ Soil ☐ Rubber (excluding tires) ☐ Demolition debris

☐ Plastic ☐ Wire ☐ Cable ☐ Cloth ☐ Insulation (non-Asbestosform) ☐ Cement & concrete

☐ Manufactured items: (swamp coolers, furniture, rugs, carpet, electronic components, PPE, etc.)

Additional waste accepted at the Area 23 Mercury Landfill: ☐ Office Waste ☐ Food Waste ☐ Animal Carcasses

☐ Asbestos ☐ Friable ☐ Non-Friable (contact SWO if regulated load) Quantity: ______

Additional waste accepted at the Area 9 U10c Landfill:

☐ Non-friable asbestos ☐ Drained automobiles and military vehicles ☐ Solid fractions from sand/oil/water

☐ Light ballasts (contact SWO) ☐ Drained fuel filters (gas & diesel) ☐ Deconned Underground and Above Ground Tanks

☐ Hydrocarbons (contact SWO) ☐ Other ______

Additional waste accepted at the Area 6 Hydrocarbon Landfill: ☐

☐ Septic sludge ☐ Rags ☐ Drained fuel filters (gas & diesel) ☐ Crushed non-terne plated oil filters

☐ Plants ☐ Soil ☐ Sludge from sand/oil/water separators ☐ PCBs below 50 parts per million

REQUIRED: WASTE GENERATOR SIGNATURE

Initials: ____ (if initialed, no radiological clearance is necessary.)

The above mentioned waste was generated outside of a Controlled Waste Management Area (CWMA) and to the best of my knowledge, does not contain radiological materials.

To the best of my knowledge, the waste described above contains only those materials that are allowed for disposal at this site. I have verified this through the waste characterization method identified above and a review of the above prohibited and allowable waste items. I have contacted Property Management and hav is approved for disposal in the landfill.

Print Name: Christopher M'Gwin

Signature: [redacted] Date: 9-21-09

Note: "Food waste/office trash and animal carcasses do not require a radiological cleara must have signed removal certification statement with Load Verification."

SWO USE ONLY

Load Weight (net from scale or estimate): 3000 9-22-09 Signature of Certifier: [redacted]

Radiological Survey Release for Waste Disposal

RCT Initials

X This container/load meets the criteria for no added man-made radioactive material
This container/load meets the criteria for Radcon Manual Table 4.2 release limits.

___ This container/load is exempt from survey due to process knowledge and origin.

SIGNATURE: [redacted] **DATE:** 9-22

BN-0845 (10

APPENDIX D

SITE CLOSURE PHOTOGRAPHS

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PHOTOGRAPH LOG

PHOTOGRAPH NUMBER	DATE	CORRECTIVE ACTION SITE	DESCRIPTION
1	09/15/2009	12-59-01	Excavation of Chlordane-Impacted Soil
2	09/16/2009	12-59-01	Excavation of Arsenic- and Chromium-Impacted Soil
3	09/16/2009	12-59-01	Grouted Outfall Pipe
4	09/17/2009	12-59-01	Removed Riser Pipes
5	09/17/2009	12-59-01	Riser Pipes Cut At Grade
6	09/17/2009	12-59-01	Grouted Riser Pipe Openings
7	09/17/2009	12-60-01	Grouted Drain Pipe Opening
8	09/17/2009	12-60-01	Grouted Drain Pipe Opening
9	09/17/2009	12-60-01	Grouted Drain Pipe Opening
10	09/17/2009	12-59-01	Removal of North Tank
11	09/17/2009	12-59-01	Size Reduction of North Tank
12	09/21/2009	03-04-02	Grouted Pipe Opening
13	09/21/2009	03-59-05	Grouted Pipe Opening
14	09/21/2009	03-59-05	Uncovered Cesspool
15	09/21/2009	03-59-05	Filling Cesspool with Soil
16	09/21/2009	03-59-05	Backfilled Cesspool
17	09/22/2009	03-04-02	Excavation of Septic Tank
18	09/22/2009	03-04-02	Removal of Septic Tank
19	09/22/2009	03-04-02	Backfilled Septic Tank Excavation
20	09/24/2009	12-59-01	Grouting South Tank
21	09/24/2009	12-59-01	Grouted South Tank
22	09/28/2009	03-04-02	Septic Tank with Associated Bumper Posts and Riser Pipes for Disposal
23	09/29/2009	03-04-02	Septic Tank Loaded for Disposal
24	10/15/2009	12-59-01	Loading Chlordane-Impacted Soil for Disposal
25	10/19/2009	12-59-01	Backfilled Chlordane-Impacted Soil Excavation
26	10/19/2009	12-59-01	Backfilled Arsenic- and Chromium-Impacted Soil Excavation
27	10/19/2009	12-59-01	Backfilled North Tank Excavation

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Photograph 1: CAS 12-59-01, Excavation of Chlordane-Impacted Soil, 09/15/2009

Photograph 2: CAS 12-59-01, Excavation of Arsenic- and Chromium-Impacted Soil, 09/16/2009

Photograph 3: CAS 12-59-01, Grouted Outfall Pipe, 09/16/2009

Photograph 4: CAS 12-59-01, Removed Riser Pipes, 09/17/2009

Photograph 5: CAS 12-59-01, Riser Pipes Cut At Grade, 09/17/2009

Photograph 6: CAS 12-59-01, Grouted Riser Pipe Openings, 09/17/2009

Photograph 7: CAS 12-60-01, Grouted Drain Pipe Opening, 09/17/2009

Photograph 8: CAS 12-60-01, Grouted Drain Pipe Opening, 09/17/2009

Photograph 9: CAS 12-60-01, Grouted Drain Pipe Opening, 09/17/2009

Photograph 10: CAS 12-59-01, Removal of North Tank, 09/17/2009

Photograph 11: CAS 12-59-01, Size Reduction of North Tank, 09/17/2009

Photograph 12: CAS 03-04-02, Grouted Pipe Opening, 09/21/2009

Photograph 13: CAS 03-59-05, Grouted Pipe Opening, 09/21/2009

Photograph 14: CAS 03-59-05, Uncovered Cesspool, 09/21/2009

Photograph 15: CAS 03-59-05, Filling Cesspool with Soil, 09/21/2009

Photograph 16: CAS 03-59-05, Backfilled Cesspool, 09/21/2009

Photograph 17: CAS 03-04-02, Excavation of Septic Tank, 09/22/2009

Photograph 18: CAS 03-04-02, Removal of Septic Tank, 09/22/2009

Photograph 19: CAS 03-04-02, Backfilled Septic Tank Excavation, 09/22/2009

Photograph 20: CAS 12-59-01, Grouting South Tank, 09/24/2009

Photograph 21: CAS 12-59-01, Grouted South Tank, 09/24/2009

Photograph 22: CAS 03-04-02, Septic Tank with Associated Bumper Posts and Riser Pipes for Disposal, 09/28/2009

Photograph 23: CAS 03-04-02, Septic Tank Loaded for Disposal, 09/29/2009

Photograph 24: CAS 12-59-01, Loading Chlordane-Impacted Soil for Disposal, 10/15/2009

Photograph 25: CAS 12-59-01, Backfilled Chlordane-Impacted Soil Excavation, 10/19/2009

Photograph 26: CAS 12-59-01, Backfilled Arsenic- and Chromium-Impacted Soil Excavation, 10/19/2009

Photograph 27: CAS 12-59-01, Backfilled North Tank Excavation, 10/19/2009

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