Nevada
Environmental
Restoration
Project

DOE/NV--1277

National Nuclear Security Administration

Corrective Action Investigation Plan for Corrective Action Unit 557: Spills and Tank Sites Nevada Test Site, Nevada

Controlled Copy No.: ___
Revision No.: 0

July 2008

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

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CORRECTIVE ACTION INVESTIGATION PLAN FOR CORRECTIVE ACTION UNIT 557: SPILLS AND TANK SITES NEVADA TEST SITE, NEVADA

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

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Signature: /s/ Joseph Johnston

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CORRECTIVE ACTION INVESTIGATION PLAN
FOR CORRECTIVE ACTION UNIT 557:
SPILLS AND TANK SITES
NEVADA TEST SITE, NEVADA

Approved by: /s/ Kevin Cabble Date: 6/25/2008

Kevin J. Cabble
Federal Sub-Project Director
Industrial Sites Sub-Project

Approved by: /s/ Robert Boehlecke Date: 6/25/2008

Robert F. Boehlecke
Federal Project Director
Environmental Restoration Project

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List of Acronyms and Abbreviations

AST	Aboveground storage tank
ASTM	American Society for Testing and Materials
bgs	Below ground surface
BJY	Buster Jangle Wye
CAI	Corrective action investigation
CAIP	Corrective action investigation plan
CAS	Corrective action site
CAU	Corrective action unit
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CFR	*Code of Federal Regulations*
COC	Contaminant of concern
CP	Control Point
cps	Counts per second
COPC	Contaminant of potential concern
CSM	Conceptual site model
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DQI	Data quality indicator
DQO	Data quality objective
DRO	Diesel-range organics
E-MAD	Engine Maintenance, Assembly, and Disassembly
EPA	U.S. Environmental Protection Agency
ETSM	Engine Transport System Maintenance
FAL	Final action level

List of Acronyms and Abbreviations *(Continued)*

FFACO	*Federal Facility Agreement and Consent Order*
FSR	Field-screening result
ft	Foot
HASL	Health and Safety Laboratory
HWAA	Hazardous waste accumulation area
IDW	Investigation-derived waste
in.	Inch
ISMS	Integrated Safety Management System
LCS	Laboratory control sample
MDC	Minimum detectable concentration
mg/kg	Milligrams per kilogram
mi	Mile
mrem/yr	Millirem per year
MS	Matrix spike
MSD	Matrix spike duplicate
N/A	Not applicable
NAC	*Nevada Administrative Code*
NAD	North American Datum
NCRP	National Council on Radiation Protection and Measurement
ND	Normalized difference
NDEM	Nevada Division of Emergency Management
NDEP	Nevada Division of Environmental Protection
NEPA	*National Environmental Policy Act*

List of Acronyms and Abbreviations *(Continued)*

NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NRS	*Nevada Revised Statutes*
NSTec	National Security Technologies, LLC
NTS	Nevada Test Site
NTSWAC	*Nevada Test Site Waste Acceptance Criteria*
NV/YMP	Nevada Yucca Mountain Project
PAL	Preliminary action level
PCB	Polychlorinated biphenyl
POC	Performance Objective for the Certification of Nonradioactive Hazardous Waste
PPE	Personal protective equipment
PRG	Preliminary remediation goal
PSM	Potential source material
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
RadCon	Radiological Control
RBCA	Risk-based corrective action
RCA	Radiologically controlled area
RCRA	*Resource Conservation and Recovery Act*
RESRAD	Residual Radioactive
RL	Reporting limit
RMA	Radioactive material area
RPD	Relative percent difference

List of Acronyms and Abbreviations *(Continued)*

SDWS	Safe Drinking Water Standards
SNJV	Stoller-Navarro Joint Venture
SSTL	Site-specific target level
SVOC	Semivolatile organic compound
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total petroleum hydrocarbons
TSCA	*Toxic Substances Control Act*
USGS	U.S. Geological Survey
UST	Underground storage tank
UTM	Universal Transverse Mercator
VOC	Volatile organic compound
yd^3	Cubic yard
%R	Percent recovery

Executive Summary

Corrective Action Unit (CAU) 557 is located in Areas 1, 3, 6, and 25 of the Nevada Test Site, which is approximately 65 miles northwest of Las Vegas, Nevada, and is comprised of the four corrective action sites (CASs) listed below:

- 01-25-02, Fuel Spill
- 03-02-02, Area 3 Subdock UST
- 06-99-10, Tar Spills
- 25-25-18, Train Maintenance Bldg 3901 Spill Site

These sites are being investigated because existing information on the nature and extent of potential contamination is insufficient to evaluate and recommend corrective action alternatives. Additional information will be obtained by conducting a corrective action investigation before evaluating corrective action alternatives and selecting the appropriate corrective action for each CAS. The results of the field investigation will support a defensible evaluation of viable corrective action alternatives that will be presented in the Corrective Action Decision Document.

The sites will be investigated based on the data quality objectives (DQOs) developed on April 3, 2008, by representatives of the Nevada Division of Environmental Protection (NDEP); U.S. Department of Energy (DOE), National Nuclear Security Administration Nevada Site Office; Stoller-Navarro Joint Venture; and National Security Technologies, LLC. The DQO process was used to identify and define the type, amount, and quality of data needed to develop and evaluate appropriate corrective actions for CAU 557.

Appendix A provides a detailed discussion of the DQO methodology and the DQOs specific to each CAS.

The scope of the corrective action investigation for CAU 557 includes the following activities:

- Move surface debris and/or materials, as needed, to facilitate sampling.
- Conduct radiological survey at CAS 25-25-18.
- Perform field screening.
- Collect and submit environmental samples for laboratory analysis to determine whether contaminants of concern are present.

- If contaminants of concern are present, collect additional step-out samples to define the extent of the contamination.
- Collect samples of investigation-derived waste, as needed, for waste management purposes.

This Corrective Action Investigation Plan has been developed in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) that was agreed to by the State of Nevada; DOE, Environmental Management; U.S. Department of Defense; and DOE, Legacy Management (FFACO, 1996; as amended February 2008). Under the FFACO, this Corrective Action Investigation Plan will be submitted to NDEP for approval. Fieldwork will be conducted following approval of this plan.

1.0 Introduction

This Corrective Action Investigation Plan (CAIP) contains project-specific information including facility descriptions, environmental sample collection objectives, and criteria for conducting site investigation activities at Corrective Action Unit (CAU) 557: Spills and Tank Sites, Nevada Test Site (NTS), Nevada.

This CAIP has been developed in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) that was agreed to by the State of Nevada; U.S. Department of Energy (DOE), Environmental Management; U.S. Department of Defense; and DOE, Legacy Management (FFACO, 1996; as amended February 2008).

Corrective Action Unit 557 is located in Areas 1, 3, 6, and 25 of the NTS, which is approximately 65 miles (mi) northwest of Las Vegas, Nevada (Figure 1-1). Corrective Action Unit 557 is comprised of the four corrective action sites (CASs) shown on Figure 1-1 and listed below:

- 01-25-02, Fuel Spill
- 03-02-02, Area 3 Subdock UST
- 06-99-10, Tar Spills
- 25-25-18, Train Maintenance Bldg 3901 Spill Site

The Corrective Action Investigation (CAI) will include field inspections, a radiological survey, sampling of environmental media, analysis of samples, and assessment of investigation results, where appropriate. Data will be obtained to support corrective action alternative evaluations and waste management decisions.

1.1 Purpose

The CASs in CAU 557 are being investigated because hazardous and/or radioactive constituents may be present in concentrations that could potentially pose a threat to human health and the environment. Existing information on the nature and extent of potential contamination is insufficient to evaluate and recommend corrective action alternatives for the CASs. Additional information will be generated by conducting a CAI before evaluating and selecting corrective action alternatives.

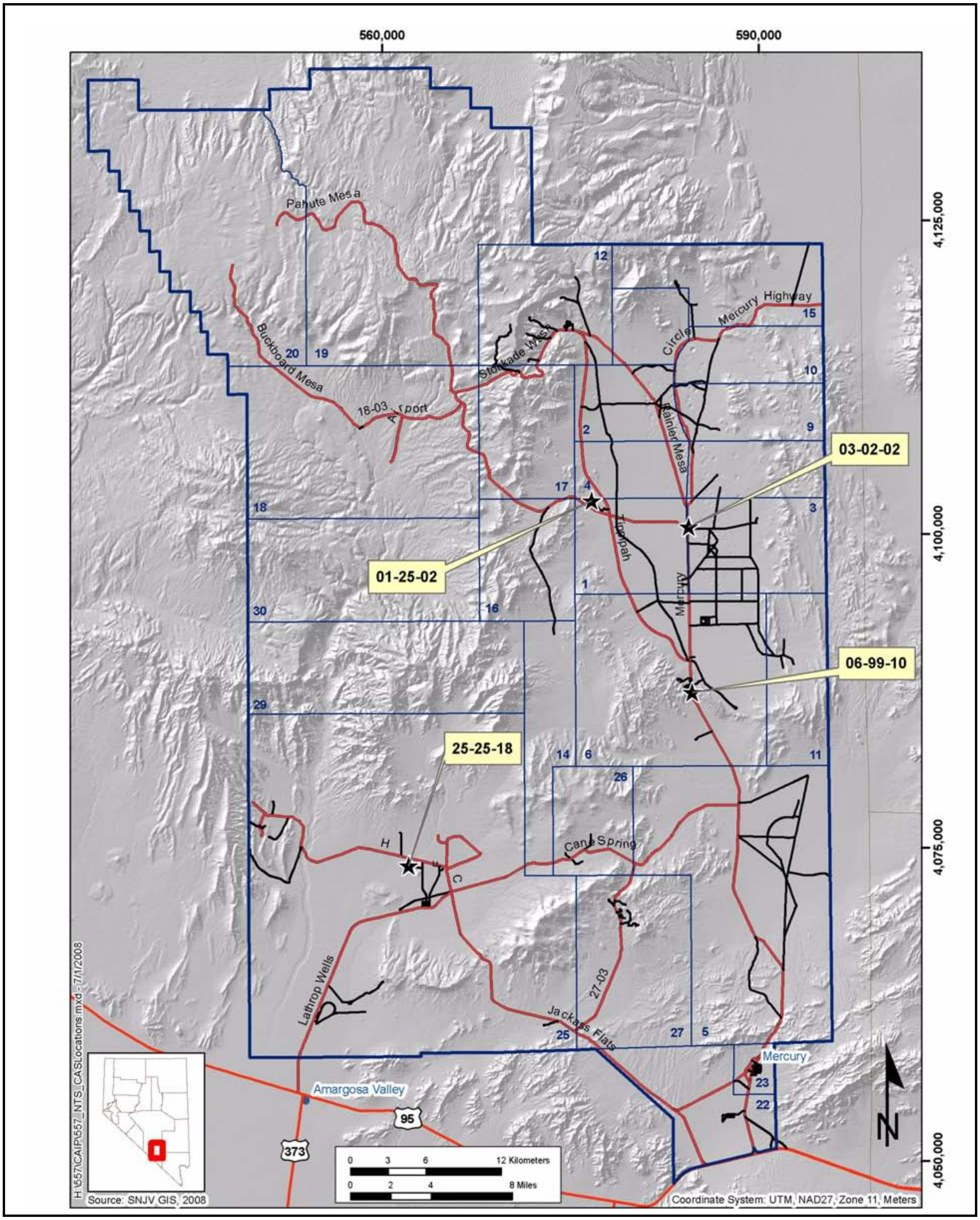


Figure 1-1
Nevada Test Site Map with CAU 557 CAS Locations

1.1.1 Corrective Action Unit 557 History and Description

Corrective Action Unit 557, Spills and Tank Sites, consists of four inactive sites located in Areas 1, 3, 6, and 25 of the NTS. These four CASs consist of two hydrocarbon fuel spills, one tar spill, and one subsurface metal structure that could be a disposal or storage feature. Activities at the CAU 557 sites were performed to support nuclear testing conducted at the NTS during the 1960s through the mid-1980s. Operational histories for each CAU 557 CAS are detailed in Section 2.2.

1.1.2 Data Quality Objective Summary

The sites will be investigated based on data quality objectives (DQOs) developed by representatives of the Nevada Division of Environmental Protection (NDEP); DOE, National Nuclear Security Administration Nevada Site Office (NNSA/NSO); Stoller-Navarro Joint Venture (SNJV); and National Security Technologies, LLC (NSTec). The DQOs are used to identify and define the type, amount, and quality of data needed to develop and evaluate appropriate corrective actions for CAU 557. This CAIP describes the investigative approach developed to collect the data needs identified in the DQO process. While a detailed discussion of the DQO methodology and the DQOs specific to each CAS are presented in Appendix A, a summary of the DQO process is provided below.

The DQO problem statement for CAU 557 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 557.”

To address this problem statement, the resolution of two decisions statements is required:

- Decision I: “Is any contaminant of potential concern (COPC) associated with the CAS present in environmental media at a concentration exceeding its corresponding final action level (FAL)?” For judgmental sampling, any contaminant associated with a CAS activity that is present at concentrations exceeding its corresponding FAL will be defined as a contaminant of concern (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, 2006a). If a COC is detected, then Decision II must be resolved. If a COC is not detected, the investigation for that CAS is complete.

- Decision II: "If a COC is present, is sufficient information available to evaluate potential corrective action alternatives?" Sufficient information is defined to include:
  - Identifying the lateral and vertical extent of COC contamination in media.
  - The information needed to determine potential remediation waste types.
  - The information needed to evaluate the feasibility of remediation alternatives. (e.g., bioassessment if natural attenuation or biodegradation is considered, and geotechnical data if construction or evaluation of barriers is considered)

The informational inputs and data needs to resolve the problem statement and the decision statements were generated as part of the DQO process for this CAU and are documented in Appendix A. The information necessary to resolve the DQO decisions will be generated for each CAU 557 CAS by collecting and analyzing samples generated during a field investigation.

The presence of contamination at each CAS will be determined by collecting and analyzing samples from areas most likely to contain a COC, as agreed to by the decision-makers in the DQO process.

1.2 Scope

To generate information needed to resolve the decision statements identified in the DQO process, the scope of the CAI for CAU 557 includes the following activities:

- Move surface debris and/or materials, as needed, to facilitate sampling.
- Conduct radiological walkover surveys.
- Perform field screening.
- Collect and submit environmental samples for laboratory analysis to determine the nature and extent of any contamination released by each CAS.
- Collect samples of source material, if present, to determine the potential for a future release.
- Collect samples of potential remediation waste(s).
- Collect quality control (QC) samples.

Contamination of environmental media originating from activities not identified in the conceptual site model (CSM) of any CAS will not be considered as part of this CAU unless the CSM and the DQOs are modified to include the release. If not included in the CSM, contamination originating from these sources will not be considered for sample location selection, and/or will not be considered COCs. If such contamination is present, the contamination will be identified as part of another CAS (new or existing).

1.3 Corrective Action Investigation Plan Contents

Section 1.0 presents the purpose and scope of this CAIP, while Section 2.0 provides background information about CAU 557. Objectives of the investigation, including CSMs, are presented in Section 3.0. Field investigation and sampling activities are discussed in Section 4.0, and waste management issues for this project are discussed in Section 5.0. General field and laboratory quality assurance (QA) (including collection of QA samples) are presented in Section 6.0 and in the Industrial Sites Quality Assurance Project Plan (QAPP) (NNSA/NV, 2002a). The project schedule and records availability are discussed in Section 7.0. Section 8.0 provides a list of references.

Appendix A provides a detailed discussion of the DQO methodology and the DQOs specific to each CAS, and Appendix B contains information on the project organization. Appendix C contains NDEP comments on the draft version of this document.

2.0 Facility Description

Corrective Action Unit 557 is comprised of four CASs that were grouped together based on the geographical location, technical similarities, and the agency responsible for closure. The four sites include CASs 01-25-02, 03-02-02, 06-99-10, and 25-25-18. All sites, except CAS 03-02-02, are grouped based on spill sites; CAS 03-02-02 is identified as an underground storage tank (UST) site.

2.1 Physical Setting

The following sections describe the general physical settings of Areas 1, 3, 6, and 25 of the NTS. General background information pertaining to topography, geology, hydrogeology, and climatology are provided for these specific areas of the NTS region in the *Geologic Map of the Nevada Test Site, Southern Nevada* (USGS, 1990); *CERCLA Preliminary Assessment of DOE's Nevada Operations Office Nuclear Weapons Testing Areas* (DRI, 1988); *Final Environmental Impact Statement, Nevada Test Site, Nye County, Nevada* (ERDA, 1977); and the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DOE/NV, 1996).

Geological and hydrological setting descriptions for each of the CASs are detailed in the following subsections based on the hydrogeographic area in which they are located.

2.1.1 Yucca Flat

Corrective Action Sites 01-25-02, 03-02-02, and ***06-99-10*** are located within the Yucca Flat Hydrographic Area of the NTS. Yucca Flat is a closed basin, which is slowly being filled with alluvial deposits eroding from the surrounding mountains. Carbonate rocks primarily underlie the alluvium in parts of Yucca Flat and form much of the surrounding mountains in this area (USGS, 1996).

The direction of groundwater flow in Yucca Flat generally is from the northeast to southwest. Lateral groundwater flow occurs within the overlying alluvial and volcanic aquifers from the margins to the center of the basin and downward into the carbonate aquifer (USGS, 1996). The average annual precipitation measures near these sites is 6.35 inches (in.) at the Buster Jangle Wye (BJY) rain station, which is located near the intersection of Rainier Mesa Road and Mercury Highway

(ARL/SORD, 2008). The recharge rate to the Yucca Flat area is relatively low (1.76 millimeters per year), while the unsaturated zone extends to more than 600 feet (ft) below ground surface (bgs) (USGS, 1996).

Corrective Action Site 01-25-02 is located in the northwest region of Area 1 at the Shaker Plant. The nearest well, UE-16d (Eleana Water Well), is located approximately 1.5 mi west of the site. The depth to groundwater near the site is approximately 623 ft bgs, as measured in November 2007 at Well UE-17a, which is located approximately 1.3 mi to the northwest of the site (USGS and DOE, 2008). The thickness of alluvium at this site is unknown; however, 2,631 ft of alluvium was encountered while drilling U.S. Geological Survey (USGS) Well ER 3-2, which is located approximately 6 mi southeast of the site (DOE/NV, 1995). Refer to Figure A.9-1 for a site layout of CAS 01-25-02.

Corrective Action Site 03-02-02 is located in the northwest region of Area 3 at the former Area 3 Subdock. The nearest well to CAS 03-02-02 is the USGS Water Well A (WW-A), an active well located approximately 1.2 mi southeast of this site. The recorded depth to the water table is approximately 1,600 ft bgs, as measured at USGS WW-A in December 2007 (USGS and DOE, 2008). The thickness of alluvium at this site is unknown; however, USGS Well ER 3-2, which is also located approximately 1.2 mi to the southeast of the site, penetrated 2,631 ft of alluvium (DOE/NV, 1995). Refer to Figure A.9-2 for a site layout of CAS 03-02-02.

Corrective Action Site 06-99-10 is located in the central portion of Area 6 at the NTS approximately 500 ft south of Bldg CP-72, just west of Mercury Highway off a utility access road. The nearest well to this site, ER-6-2, is located approximately 2.5 mi to the northwest. The depth to groundwater near the site is approximately 1,782 ft bgs, as measured in December 2007 at Well ER-6-2 (USGS and DOE, 2008). The thickness of alluvium at this site is unknown; however, Well ER-6-2 penetrated approximately 101 ft of alluvium (DOE/NV, 1995). Refer to Figure A.9-3 for a site layout of CAS 06-99-10.

2.1.2 Jackass Flats

Corrective Action Site 25-25-18 is located within the Jackass Flats basin in the central portion of Area 25 of the NTS. The basin is surrounded on the southwest by a low-lying drainage divide; on the northwest by the southeastern slopes of Lookout Peak on the north and northeast by small rugged hills; and on the south by the northern slopes of Skull Mountain. The erosion of the surrounding Tertiary and Paleozoic uplands has filled the basin and created a layer of alluvium and colluvium to a depth of up to 1,205 ft (DRI, 1988).

The direction of groundwater flow in this area is to the southwest. The average precipitation for this area has been reported at 5.75 in., as measured at the Jackass Flats Station (4JA), which is located in central Area 25 (ARL/SORD, 2008). The closest well to CAS 25-25-18 is the J-11 Water Well, which is located approximately 1.72 mi to the southwest of this site. The depth to groundwater is reported as 1,040 ft bgs, as measured in the J-11 Water Well in February 2008 (USGS and DOE, 2008). The thickness of alluvium at this site is unknown; however, while drilling the J-11 Water Well, volcanic rock was encountered at a depth of approximately 425 ft bgs. Refer to Figure A.9-4 for a site layout of CAS 25-25-18.

2.2 Operational History

The following subsections provide a description of the use and history of each CAS in CAU 557 that may have resulted in potential releases to the environment. The CAS-specific summaries are designed to describe the current definition of each CAS and illustrate all significant, known activities.

2.2.1 Corrective Action Site 01-25-02, Fuel Spill

This CAS consists of a historical diesel oil release from an unknown source located at the former Batch Plant, which is part of the Area 1 Shaker Plant. This facility was operational from 1965 to 1985 when the Batch Plant operations were discontinued. The machinery and equipment at the Shaker Plant are presently in use. Figure A.9-1 shows the location of the historical spill at the Batch Plant.

2.2.2 Corrective Action Site 03-02-02, Area 3 Subdock UST

This CAS consists of potential releases of wastes associated with the cleaning and repair of drill bits at the Area 3 Subdock; however, the source of the waste is unknown. This facility was operational from the early 1970s to 1985, at which time the Subdock was relocated to Area 1. Figure A.9-2 shows the location of CAS 03-02-02 at the former Area 3 Subdock.

2.2.3 Corrective Action Site 06-99-10, Tar Spills

This CAS consists of potential releases of wastes associated with a tar spill located in Area 6 approximately 500 ft south of the CP-72 Building. The source of the tar is unknown. The tar spills are situated just off the Utility Road along the west side of Mercury Highway. Figure A.9-3 shows the location of CAS 06-99-10 in Area 6.

2.2.4 Corrective Action Site 25-25-18, Train Maintenance Bldg 3901 Spill Site

This CAS consists of potential releases of wastes associated with soil stains identified in Area 25 at the Engine Maintenance, Assembly, and Disassembly (E-MAD) facility adjacent to the north end of the Train Maintenance Building 3901 (ETSM [Engine Transport System Maintenance] Building). The ETSM Building was operational from 1965 to 1985. The E-MAD facility, including the ETSM Building, is not currently active. Figure A.9-4 shows the layout of CAS 25-25-18.

2.3 Waste Inventory

Available documentation, interviews with former site employees, process knowledge, and general historical NTS practices were used to identify wastes that may be present. Historical information and site visits indicate that the sites contain miscellaneous debris.

2.3.1 Corrective Action Site 01-25-02, Fuel Spill

No solid waste items have been identified at CAS 01-25-02. Potential waste types include sanitary waste, investigation-derived waste (IDW), and hydrocarbon waste.

2.3.2 Corrective Action Site 03-02-02, Area 3 Subdock UST

Solid waste items identified at CAS 03-02-02 include a small amount of miscellaneous building material debris. Potential waste types include sanitary waste, IDW, hydrocarbon waste, *Resource Conservation and Recovery Act* (RCRA)-hazardous waste, radioactive waste, and mixed waste.

2.3.3 Corrective Action Site 06-99-10, Tar Spills

Solid waste items identified at CAS 06-99-10 include a small amount of miscellaneous construction debris. Potential waste types include sanitary waste, IDW, hydrocarbon waste, and RCRA-hazardous waste. Radioactive waste or mixed waste is not expected at this site.

2.3.4 Corrective Action Site 25-25-18, Train Maintenance Bldg 3901 Spill Site

Solid waste items identified at CAS 25-25-18 include a small amount of miscellaneous building material debris. Potential waste types include sanitary waste, IDW, hydrocarbon waste, and RCRA-hazardous waste.

2.4 Release Information

Known or suspected releases from the CASs, including potential release mechanisms, and migration routes associated with each of the CASs are described in the following subsections. Beyond the current status of the CAU 557 CASs, there has been no known migration of contamination. Potentially affected media for all CASs include surface and shallow subsurface soil. Exposure routes to site workers include ingestion, inhalation, and/or dermal contact (absorption) from disturbance of contaminated soils, debris, and/or structures. Site workers may also be exposed to radiation by performing activities in proximity to radiologically contaminated materials.

At the CAU 557 CASs, surface soils may have been impacted by contamination associated with previous atmospheric testing at the NTS. This contamination is not associated with a release from any of the CAU 557 CASs and will not be included in the subsequent evaluation of the sites, as it will be addressed by the Soils Program.

The following subsections contain CAS-specific descriptions of known or suspected releases associated with CAU 557.

2.4.1 Corrective Action Site 01-25-02, Fuel Spill

This CAS is a hydrocarbon spill with unknown origin that was discovered in 1993 during excavation for the addition of a new concrete pad (Boehlecke, 2007). The impacted soil was partially removed from late 1993 to early 1994. A discussion of preliminary analytical results is presented in

Section 2.5.1. The remaining diesel contaminants, if any, are expected to be limited in volume and located in the soil within close proximity to the former excavation.

2.4.2 Corrective Action Site 03-02-02, Area 3 Subdock UST

There is no information currently available that suggests contaminants have been released from the subsurface structure at CAS 03-02-02 to the surrounding soils. The design and use of the subsurface feature is unknown; however, it is suspected that this feature may have been used to collect steam cleaning effluent from operations at the Area 3 Subdock. Contaminants, if any, are expected to be found in the subsurface soils at an unknown volume and extent.

2.4.3 Corrective Action Site 06-99-10, Tar Spills

This CAS is a surficial tar spill(s) with unknown origin. There is no information currently available that suggests contaminants have been released from this spill to the surrounding soils. If contaminants are detected, they are expected to be very limited in volume and depth in the underlying soil or within close proximity to the tar spill(s).

2.4.4 Corrective Action Site 25-25-18, Train Maintenance Bldg 3901 Spill Site

This CAS is a hydrocarbon spill of unknown origin that has migrated from the initial spill(s) or from repeated spills that may have occurred during maintenance of the locomotive engines used at Building 3901. The hydrocarbon contaminants, if any, are expected to be limited in volume and found in the underlying soil at unknown lateral and vertical extents.

2.5 Investigative Background

The following subsections summarize the previous investigations conducted at the CAU 557 sites. More detailed discussions of these investigations are found in Appendix A.

2.5.1 Corrective Action Site 01-25-02, Fuel Spill

Previous analytical sampling results indicate that soil samples were collected from the fuel spill during excavation of the immediate area in late 1993 and early 1994 (REECo, 1994a). The stained soil resulting from the fuel spill was sampled at two different depths on two separate dates. The initial sampling effort was conducted in November 1993 after approximately 6 to 8 cubic yards (yd^3) of soil had been removed from the spill location (REECo, 1994b). Analytical results showed the excavated soil had total petroleum hydrocarbons (TPH)-diesel-range organics (DRO) was present at a concentration of 3,560 milligrams per kilogram (mg/kg) (diesel was present at a concentration of 1,530 mg/kg and motor oil was present at a concentration of 2,030 mg/kg) (REECo, 1994c). In January 1994, the stained soil was further excavated to a depth of approximately 15 ft bgs and additional samples were collected. Analytical results of this second sampling effort show that TPH contamination still existed at the bottom of the excavation at a concentration of 1,740 mg/kg (REECo, 1994c). Sample results for radionuclides, polychlorinated biphenyls (PCBs), RCRA metals, base neutrals, and volatiles were not detected at levels above regulatory limits.

2.5.2 Corrective Action Site 03-02-02, Area 3 Subdock UST

No previous analytical sampling results have been identified for soils or materials currently present at CAS 03-02-02.

2.5.3 Corrective Action Site 06-99-10, Tar Spills

No previous analytical sampling results have been identified for soils or materials currently present at CAS 06-99-10.

2.5.4 Corrective Action Site 25-25-18, Train Maintenance Bldg 3901 Spill Site

No previous analytical sampling results have been identified for soils or materials currently present at CAS 25-25-18.

2.6 National Environmental Policy Act

The *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DOE/NV, 1996) includes site investigation activities such as those proposed for CAU 557.

In accordance with the NNSA/NSO *National Environmental Policy Act* (NEPA) Compliance Program, a NEPA checklist will be completed before beginning site investigation activities at CAU 557. This checklist requires NNSA/NSO project personnel to evaluate their proposed project activities against a list of potential impacts that include, but are not limited to: air quality, chemical use, waste generation, noise level, and land use. Completion of the checklist results in a determination of the appropriate level of NEPA documentation by the NNSA/NSO NEPA Compliance Officer. This will be accomplished before mobilization for the field investigation.

3.0 Objectives

This section presents an overview of the DQOs for CAU 557 and formulation of the CSM. Also presented is a summary listing of the contaminants reasonably suspected to be present at each CAS (i.e., target contaminants), the COPCs, the preliminary action levels (PALs) for the investigation, and the process used to establish FALs. Additional details and figures depicting the CSM are located in Appendix A.

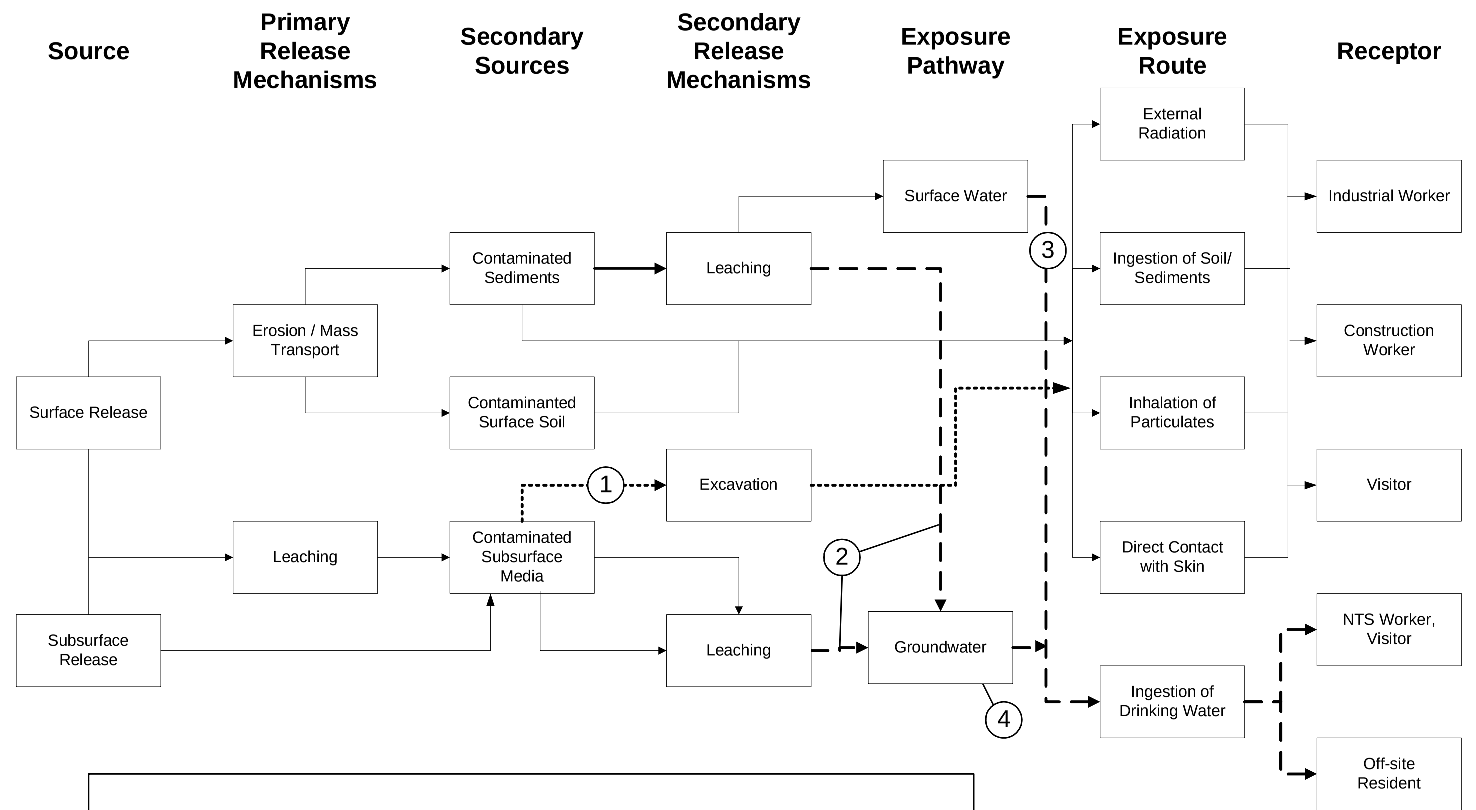
3.1 Conceptual Site Model

The CSM describes the most probable scenario for current conditions at each site and defines the assumptions that are the basis for identifying the future land use, contaminant sources, release mechanisms, migration pathways, exposure points, and exposure routes. The CSM is also used to support appropriate sampling strategies and data collection methods. The CSM has been developed for CAU 557 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. Figure 3-1 depicts the conceptual pathways to receptors from CAU 557 sources. Figure 3-2 depicts a graphical representation of the CSM. If evidence of contamination that is not consistent with the presented CSM is identified during investigation activities, the situation will be reviewed, the CSM revised, the DQOs re-assessed, and a recommendation made as to how best to proceed. In such cases, decision-makers listed in Section A.3.1 will be notified and given the opportunity to comment on and/or concur with the recommendation.

The following sections discuss future land use and the identification of exposure pathways (i.e., combination of source, release, migration, exposure point, and receptor exposure route) for CAU 557.

3.1.1 Land-Use and Exposure Scenarios

Land-use zones where the CAU 557 CASs are located dictate future land use and restrict current and future land use to nonresidential (i.e., industrial) activities.



1. Potential Pathway - This pathway would exist only if the subsurface media were excavated. This pathway is controlled through excavation permit requirements (e.g., dust suppression).
2. Incomplete Pathway - Characterization of regional hydrogeology and environmental data have shown that leaching of contaminants is limited .
3. Incomplete Pathway - There are no surface waters within the NTS, or that leave the NTS, used as a source for drinking water.
4. Groundwater within the NTS, that may flow offsite, is used as a source for drinking water.

Figure 3-1
Conceptual Site Model Diagram

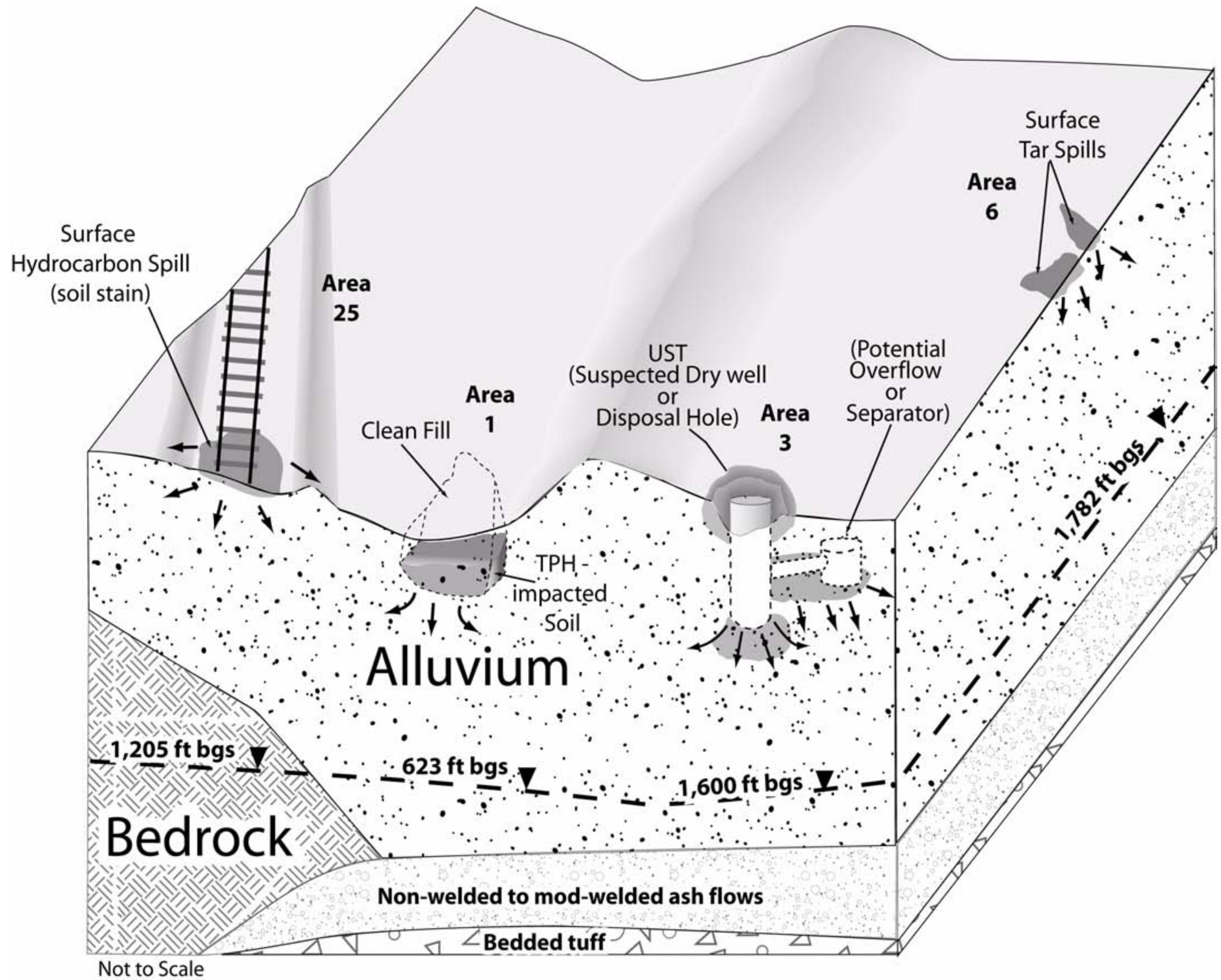


Figure 3-2
Corrective Action Unit 557 Conceptual Site Model

Corrective Action Sites 01-25-02 and 03-02-02 are located in the land-use zone described as the "Nuclear and High Explosives Test Zone." 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 (DOE/NV, 1998).

Corrective Action Site 06-99-10 is located in the land-use zone described as the "Defense Industrial Zone." This area is designated for stockpile management of weapons, including production, assembly, disassembly or modification, staging, repair, retrofit, and surveillance. Permanent facilities are used for stockpile stewardship operations involving equipment and activities such as radiography, lasers, material processing, and pulsed power (DOE/NV, 1998).

Corrective Action Site 25-25-18 is located in the land-use zone described as the "Research, Test, and Experiment Zone." This area is designated for small-scale research and development projects and demonstrations; pilot projects; outdoor tests; and experiments for the development, quality assurance, or reliability of material and equipment under controlled conditions. This zone includes compatible defense and nondefense research, development, and testing projects and activities (DOE/NV, 1998).

Exposure scenarios for the CAU 557 CASs have been categorized into the following two types based on current and projected future land uses:

- ***Occasional Use Area for CASs 01-25-02 and 03-02-02.*** This exposure scenario addresses 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, for a duration of 5 years. The site is assumed to be an outdoor area that is not regularly visited, and time spent indoors is zero because there are no buildings on the site that can be used for shelter.

- ***Industrial Use Area for CAS 06-99-10 and 25-25-18***. This exposure scenario assumes industrial use of a site and addresses exposure to industrial workers who are exposed daily to contaminants in soil during an average workday. A site worker under this scenario is assumed to be on the site for an entire career (225 days per year, 10 hours per day for a duration of 25 years). Active powered buildings with toilets are present at or near the site and can be used for shelter.

3.1.2 Contaminant Sources

The contamination sources for the CAU 557 CSM are:

- Accidental hydrocarbon surface spills.
- Unintentional subsurface releases.
- Intentional subsurface releases.

3.1.3 Release Mechanisms

Release mechanisms for the CSM are accidental hydrocarbon spills or leaks onto surface soils, unintentional leaks of material(s) into subsurface soils, and intentional subsurface releases of materials into the subsurface soils. Spills and leaks onto surface soils can occur from objects such as drilling muds or equipment; from processes such as dumping from mud trucks onto the surface; from dumping of debris onto the surface; or by erosion onto the surface from formerly stored materials. Unintentional releases into subsurface soils can occur when underground structures, such as piping, well casings or tanks fail and leak their contents into the surrounding soil. Intentional releases into subsurface soils can occur by effluent from steam-cleaning activities that are diverted from the surface into a collection system that is designed to discharge its contents into the surrounding soils, or that later fails and leaks its contents into the surrounding soils.

3.1.4 Migration Pathways

Surface migration pathways at the CAU 557 CASs (except CAS 25-25-18) are expected to be minor as all the CASs have shallow surface slopes and the potential release sites are not located in or near drainages.

Subsurface migration pathways at the CAU 557 CASs (except CAS 06-99-10) are expected to be predominately vertical although spills or leaks at the ground surface may also have limited lateral migration before infiltration. 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, both on the ground surface (e.g., concrete) and in the subsurface (e.g., caliche layers).

Migration pathways include the lateral migration of potential contaminants across surface soils/sediments and vertical migration of potential contaminants through subsurface soils. The NTS is generally dry but is subject to infrequent, potentially intense, stormwater flows. These stormwater flow 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.

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 (annual potential evapotranspiration at the Area 3 Radiological Waste Management Site has been estimated at 62.6 in. [Shott et al., 1997]) and limited precipitation for this region (average annual precipitation is 6.62 in. [ARL/SORD, 2008]), percolation of infiltrated precipitation at the NTS does not provide a significant mechanism for vertical migration of contaminants to groundwater (DOE/NV, 1992).

3.1.5 Exposure Points

Exposure points for both CSMs are expected to be areas of surface contamination where visitors and site workers will come in contact with soil surface. Subsurface exposure points may also exist if construction workers come in contact with contaminated media during excavation activities.

3.1.6 Exposure Routes

Exposure routes to site workers include ingestion, inhalation, and/or dermal contact (absorption) from disturbance of, or direct contact with, contaminated media. Site workers may also be exposed to radiological contamination by performing activities in proximity to radiologically contaminated materials.

3.1.7 Additional Information

Information concerning topography, geology, climatic conditions, hydrogeology, floodplains, and infrastructure at the CAU 557 CASs are available and are presented in Section 2.1 as they pertain to the investigation. This information has been addressed in the CSM and will be considered during the evaluation of corrective action alternatives, as applicable.

3.2 Contaminants of Potential Concern

The COPCs for CAU 557 are defined as the list of constituents represented by the analytical methods identified in Table 3-1 for Decision I environmental samples taken at each of the CASs. The constituents reported for each analytical method are listed in Table 3-2.

The list of COPCs is intended to encompass all of the contaminants that could potentially be present at each CAS. These 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. Contaminants detected at other similar NTS sites were also included in the COPC list to reduce the uncertainty about potential contamination at the CASs because complete information regarding activities performed at the CAU 557 sites is not available.

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.3.2.2, Table A.3-3, and Section 8.0). Targeted contaminants for each CAU 557 CAS are identified in Table 3-3.

Table 3-1
CAU 557 Analytical Program[a]

Analyses	CAS 01-25-02	CAS 03-02-02	CAS 06-99-10	CAS 25-25-18
Organic COPCs				
Total Petroleum Hydrocarbons-Diesel-Range Organics	X	X	X	X
Polychlorinated Biphenyls	--	X	X	X[b]
Semivolatile Organic Compounds	X	X	X	X
Volatile Organic Compounds	X	X	X	X
Pesticides	--	--	--	X[c]
Inorganic COPCs				
RCRA Metals	--	X	--	X
Beryllium	--	--	--	X[d]
Radionuclide COPCs				
Gamma Spectroscopy	--	X	--	X
Isotopic Uranium	--	X	--	X
Isotopic Plutonium	--	X	--	X
Strontium-90	--	X	--	X

[a]The COPCs are the constituents reported from the listed analyses.
[b]Sampling locations for PCBs selected based on proximity to Building 3901.
[c]Sampling locations for pesticides selected based on proximity to Building 3901. If results show total pesticides above PALs, then additional analysis for TCLP pesticides may be performed.
[d]Sampling locations for beryllium selected based on proximity to Building 3901.

COPC = Contaminant of potential concern
PAL = Preliminary action level
PCB = Polychlorinated biphenyl
RCRA = *Resource Conservation and Recovery Act*
TCLP = Toxicity Characteristic Leaching Procedure

X = Required analysis
-- = Initial analysis not required

Table 3-2
Constituents Reported by Analytical Methods

VOCs		SVOCs		TPH	PCBs	Pesticides	Metals	Isotopic Radionuclides
1,1,1-Trichloroethane	Chloroprene	2,3,4,6-Tetrachlorophenol	Di-n-butyl phthalate	TPH (Diesel-Range Organics)	Aroclor 1016	4,4'-DDD	Arsenic	Gross Alpha/Beta
1,1,1,2-Tetrachloroethane	Dibromochloromethane	2,4-Dimethylphenol	Di-n-octyl Phthalate		Aroclor 1221	4,4'-DDE	Barium	Plutonium-238
1,1,2,2-Tetrachloroethane	Dichlorodifluoromethane	2,4-Dinitrotoluene	Dimethyl phthalate		Aroclor 1232	4,4'-DDT	Beryllium	Plutonium-239/240
1,1,2-Trichloroethane	Ethyl methacrylate	2,4,5-Trichlorophenol	Fluoranthene		Aroclor 1242	Aldrin	Cadmium	Strontium-90
1,1-Dichloroethane	Ethylbenzene	2,4,6-Trichlorophenol	Fluorene		Aroclor 1248	alpha-BHC	Chromium	Uranium-234
1,1-Dichloroethene	Isobutyl alcohol	2-Chlorophenol	Hexachlorobenzene		Aroclor 1254	alpha-Chlordane	Lead	Uranium-235
cis-1,2-Dichloroethene	Isopropylbenzene	2-Methylnaphthalene	Hexachlorobutadiene		Aroclor 1260	beta-BHC	Mercury	Uranium-238
1,2-Dichloroethane	m-Dichlorobenzene (1,3)	2-Methylphenol	Hexachloroethane		Aroclor 1268	Chlordane	Selenium	Tritium
1,2-Dichloropropane	Methacrylonitrile	2-Nitrophenol	Indeno(1,2,3-cd)pyrene			delta-BHC	Silver	**Gamma-Emitting Radionuclides**
1,2,4-Trichlorobenzene	Methyl methacrylate	3-Methylphenol[a]	Naphthalene			Dieldrin		
1,2,4-Trimethylbenzene	Methylene chloride	4-Chloroaniline	Nitrobenzene			Endosulfan I		Actinium-228
1,2-Dibromo-3-chloropropane	N-Butylbenzene	4-Methylphenol[a]	N-Nitroso-di-n-propylamine			Endosulfan II		Americium-241
1,3,5-Trimethylbenzene	N-Propylbenzene	4-Nitrophenol	Pentachlorophenol			Endosulfan Sulfate		Cobalt-60
1,4-Dioxane	o-Dichlorobenzene (1,2)	Acenaphthene	Phenanthrene			Endrin		Cesium-137
2-Butanone	p-Dichlorobenzene (1,4)	Acenaphthylene	Phenol			Endrin Aldehyde		Europium-152
2-Chlorotoluene	p-isopropyltoluene	Aniline	Pyrene			Endrin Ketone		Europium-154
2-Hexanone	sec-Butylbenzene	Anthracene	Pyridine			gamma-BHC		Europium-155
4-Methyl-2-pentanone	Styrene	Benzo(a)anthracene				gamma-Chlordane		Potassium-40
Acetone	tert-Butylbenzene	Benzo(a)pyrene				Heptachlor		Niobium-94
Acetonitrile	Tetrachloroethene	Benzo(b)fluoranthene				Heptachlor epoxide		Lead-212
Allyl chloride	Toluene	Benzo(g,h,i)perylene				Methoxychlor		Lead-214
Benzene	Total Xylenes	Benzo(k)fluoranthene				Toxaphene		Thorium-234
Bromodichloromethane	Trichloroethene	Benzoic Acid						Thallium-208
Bromoform	Trichlorofluoromethane	Benzyl Alcohol						Uranium-235
Bromomethane	Vinyl acetate	Bis(2-ethylhexyl) phthalate						
Carbon disulfide	Vinyl chloride	Butyl benzyl phthalate						
Carbon tetrachloride		Carbazole						
Chlorobenzene		Chrysene						
Chloroethane		Dibenzo(a,h)anthracene						
Chloroform		Dibenzofuran						
Chloromethane		Diethyl Phthalate						

[a]May be reported as 3,4-methylpenol hydrocarbons

PCB = Polychlorinated biphenyl
SVOC = Semivolatile organic compound
TPH = Total petroleum hydrocarbons
VOC = Volatile organic compound

Table 3-3
Targeted Contaminants for CAU 557

CAS	Chemical Targeted Contaminant(s)	Radiological Targeted Contaminant(s)
01-25-02	TPH-DRO; VOC and SVOC (hazardous constituents of diesel only)	--
03-02-02	--	--
06-99-10	TPH-DRO, SVOCs, VOCs (hazardous constituents of diesel only)	--
25-25-18	TPH-DRO; and VOC and SVOC (hazardous constituents of diesel only)	--

DRO = Diesel-range organics
SVOC = Semivolatile organic compound
TPH = Total petroleum hydrocarbons
VOC = Volatile organic compound
-- = No targeted contaminants identified

3.3 Preliminary 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, therefore, streamlining the consideration of remedial alternatives. The risk-based corrective action (RBCA) process used to establish FALs is described in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006a). This process conforms with *Nevada Administrative Code* (NAC) Section 445A.227, which lists the requirements for sites with soil contamination (NAC, 2007b). For the evaluation of corrective actions, NAC Section 445A.22705 (NAC, 2007c) requires the use of American Society for Testing and Materials (ASTM) Method E 1739-95 (ASTM, 1995) 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."

This RBCA process, summarized in Figure 3-3, defines three tiers (or levels) of evaluation involving increasingly sophisticated analyses:

- Tier 1 evaluation – 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.

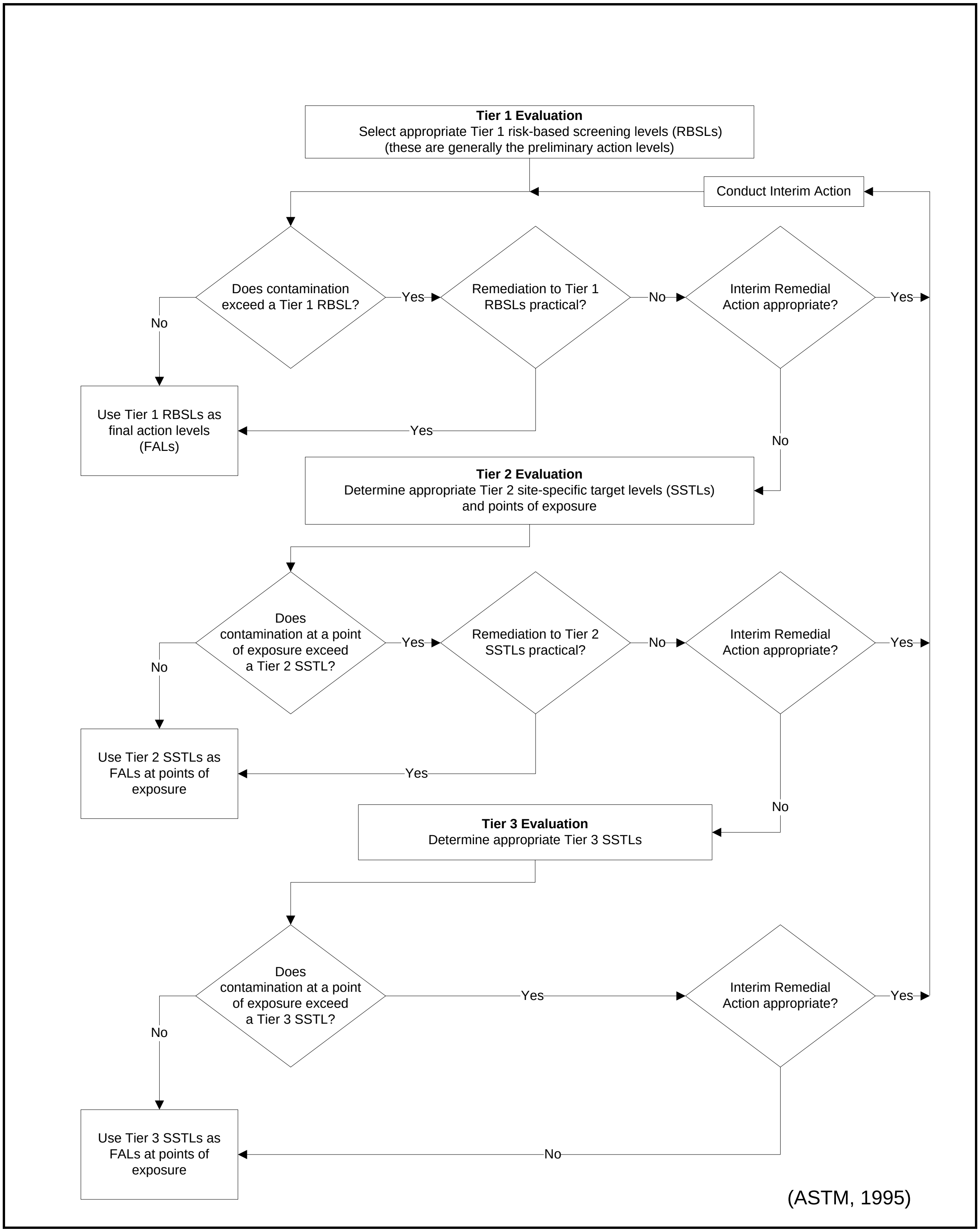


Figure 3-3
Risk-Based Corrective Action Decision Process

- Tier 2 evaluation – Conducted by calculating Tier 2 Site-Specific Target Levels (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. The 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 evaluation – 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.

This process includes a provision for conducting an interim remedial action if necessary and appropriate. The decision to conduct an interim action may be made at any time during the investigation and at any level (tier) of analysis. Concurrence of the decision-makers listed in Section A.3.1 will be obtained before any interim action is implemented. Evaluation of DQO decisions will be based on conditions at the site following completion of any interim actions. Any interim actions conducted will be reported in the investigation report.

The FALs (along with the basis for selection) will be proposed in the investigation report, and compared to laboratory results in the evaluation of potential corrective actions.

3.3.1 Chemical PALs

Except as noted herein, the chemical PALs are defined as the U.S. Environmental Protection Agency (EPA) *Region 9 Risk-Based Preliminary Remediation Goals (PRGs)* for contaminant constituents in industrial soils (EPA, 2004a). Background concentrations for RCRA metals 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 mean plus two standard deviations 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.

3.3.2 Total Petroleum Hydrocarbon PALs

The PAL for TPH is 100 milligrams per kilograms (mg/kg) listed in NAC 445A.2272 (NAC, 2007d).

3.3.3 Radionuclide PALs

The PALs for radiological contaminants (other than tritium) are based on the National Council on Radiation Protection and Measurement (NCRP) Report No. 129 recommended screening limits for construction, commercial, industrial land-use scenarios (NCRP, 1999) using a 25 millirem per year (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 3.1.1.

3.4 Data Quality Objective Process Discussion

This section contains a summary of the DQO process that is presented in Appendix A. The DQO process is a strategic planning approach based on the scientific method that is designed to ensure that the data collected will provide sufficient and reliable information to identify, evaluate, and technically defend the recommendation of viable corrective actions (e.g., no further action, clean closure, or closure in place).

The DQO strategy for CAU 557 was developed at a meeting held on April 3, 2008. The DQOs were developed to: identify data needs; clearly define the intended use of the environmental data; and design a data collection program that will satisfy these purposes. During the DQO discussions for this CAU, the informational inputs or data needs to resolve problem statements and decision statements were documented for the project files.

The problem statement for CAU 557 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 557.” To address this problem statement, the resolution of two decisions statements is required:

- Decision I: "Is any COC present in environmental media within the CAS?" If a COC is detected, then Decision II must be resolved. Otherwise, the investigation for that CAS is complete.

- Decision II: "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.

  - The information needed to determine potential remediation waste types.

  - The information needed to evaluate the feasibility of remediation alternatives.

The presence of a COC would require a corrective action. A corrective action may also be necessary if there is a potential for wastes that are present at a site to impose COCs into site environmental media if the wastes were to be released. To evaluate the potential for subsurface structure contents to result in the introduction of a COC to the surrounding environmental media, the following conservative assumptions were made:

- The structure 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.

- That any liquid contaminant in the subsurface structures exceeding the RCRA-toxicity characteristic concentration could result in the introduction of the COC(s) to the surrounding media.

Solids containing a contaminant exceeding an equivalent FAL concentration would be considered to be potential source material (PSM) and would require a corrective action. Liquids with contaminant concentrations exceeding an equivalent toxicity characteristic action level would be considered to be PSM and require a corrective action.

Decision I samples will be submitted to analytical laboratories for the analyses listed in Table 3-1. Decision II samples will be submitted for the analysis of all unbounded COCs. In addition, samples will be submitted for analyses as needed to support waste management or health and safety decisions.

The data quality indicators (DQIs) of precision, accuracy, representativeness, completeness, comparability, and sensitivity needed to satisfy DQO requirements are discussed in Section 6.2. Laboratory data will be assessed in the investigation report to confirm or refute the CSM and determine whether the DQO data needs were met.

To satisfy the DQI of sensitivity (presented in Section 6.2.8), the analytical methods must be sufficient to detect contamination that is present in the samples at concentrations less than or equal to the corresponding FALs. Analytical methods and target minimum detectable concentrations (MDCs) for each CAU 557 COPC are provided in Tables 3-4 and 3-5. The MDC is the lowest concentration of a chemical or radionuclide parameter that can be detected in a sample within an acceptable level of error. Due to changes in analytical methodology and changes in analytical laboratory contracts, information in Tables 3-4 and 3-5 that varies from corresponding information in the QAPP will supersede the QAPP (NNSA/NV, 2002a).

Table 3-4
Analytical Requirements for Radionuclides for CAU 557

Analysis[a]	Matrix	Analytical Method	Minimum Detectable Concentration (MDC)[b]	Laboratory Precision (RPD)	Laboratory Accuracy (%R)
Gamma-Emitting Radionuclides					
Gamma Spectroscopy	Aqueous	EPA 901.1[c]	< Preliminary Action Levels	RPD 35%[e] ND[f] -2<N[f]<2	Laboratory Control Sample 80-120 %R
	Nonaqueous	HASL-300[d]			
Other Radionuclides					
Tritium	Aqueous	EPA 906.0[c]	< Preliminary Action Levels	RPD 35%[e] ND[f] -2<ND[f]<2	Laboratory Control Sample 80-120 %R Chemical Yield 30-105 %R (not applicable for tritium and gross-alpha/beta) Matrix Spike Sample 61-140 %R (tritium and gross alpha/beta only)
	Nonaqueous	Approved Laboratory Procedure[g]			
Gross Alpha	All	EPA 900.0[c]			
Gross Beta	All	EPA 900.0[c]			
Plutonium-238	All	HASL-300[d]			
Plutonium-239/240	All	HASL-300[d]			
Strontium-90	All	HASL-300[d]			
Uranium-234	All	HASL-300[d]			
Uranium-235	All	HASL-300[d]			
Uranium-238	All	HASL-300[d]			

[a]Applicable constituents are listed in Table 3-2.
[b]The MDC is the lowest concentration of a radionuclide present in a sample and can be detected with a 95% confidence level.
[c]Prescrib*ed Procedures for Measurement of Radioactivity in Drinking Water* (EPA, 1980)
[d]*The Procedures Manual of the Environmental Measurements Laboratory*, HASL-300 (DOE, 1997a)
[e]*Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) with Guidance* (EPA, 2000)
[f]ND is not RPD; rather, it is another measure of precision used to evaluate duplicate analyses. The ND is calculated as the difference between two results divided by the square root of the sum of the squares of their total propagated uncertainties. *Evaluation of Radiochemical Data Usability* (DOE, 1997b)
[g]Laboratory procedure must be approved by appropriate project personnel.

EPA = U.S. Environmental Protection Agency
HASL = Health and Safety Laboratory
ND = Normalized difference
RPD = Relative percent difference
%R = Percent recovery

Table 3-5
Analytical Requirements for Chemical COPCs for CAU 557

Analysis[a]	Matrix	Analytical Method (SW-846)[b]	Minimum Detectable Concentration (MDC)[c]	Laboratory Precision (RPD)[d]	Laboratory Accuracy (%R)[d]
ORGANICS					
Total Volatile Organic Compounds	All	8260B	< Preliminary Action Levels	Lab-specific	Lab-specific
TCLP Volatile Organic Compounds	Leachate	1311/8260B	≤ Regulatory Limits	Lab-specific	Lab-specific
Total Semivolatile Organic Compounds	All	8270C	< Preliminary Action Levels	Lab-specific	Lab-specific
TCLP Semivolatile Organic Compounds	Leachate	1311/8270C	≤ Regulatory Limits	Lab-specific	Lab-specific
Polychlorinated Biphenyls	All	8082	< Preliminary Action Levels	Lab-specific	Lab-specific
Total Petroleum Hydrocarbons-Diesel-Range Organics	All	8015B (modified)		Lab-specific	Lab-specific
Total Pesticides	All	8081A		Lab-specific	Lab-specific
TCLP Pesticides	Leachate	1311/8081A	≤ Regulatory Limits	Lab-specific	Lab-specific
INORGANICS					
Total RCRA Metals and Beryllium	All	6010B	< Preliminary Action Levels	RPD 35% (nonaqueous)[e] 20% (aqueous)[e] Absolute Difference[f] ±2x RL (nonaqueous)[f] ±1x RL (aqueous)[f]	Matrix Spike Sample 75-125 %R[b] Laboratory Control Sample 80-120 %R[f]
Total Mercury	Aqueous	7470A			
	Nonaqueous	7471A			
TCLP RCRA Metals	Leachate	1311/6010B	≤ Regulatory Limits		
TCLP Mercury	Leachate	1311/7470A			

[a]Applicable constituents are listed in Table 3-2.
[b]*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846) (EPA, 1996).
[c]The MDC is the lowest concentration that can be reliably achieved within specified limits of accuracy and precision.
[d]RPD and %R performance criteria are developed by the analytical laboratory according to approved procedures.
[e]*Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) with Guidance* (EPA, 2000).
[f]*USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 2004b).

RCRA = *Resource Conservation and Recovery Act*
RL = Reporting limit
RPD = Relative percent difference
TCLP = Toxicity Characteristic Leaching Procedure
%R = Percent recovery

4.0 Field Investigation

This section contains a description of the activities to be conducted to gather and document information from the CAU 557 field investigation.

4.1 Technical Approach

The information necessary to satisfy the DQO data needs will be generated for each CAU 557 CAS by collecting and analyzing samples generated during a field investigation. The presence and nature of contamination at the CAU 557 CASs will be evaluated using a judgmental approach.

If there is a waste present that, if released, has the potential to release significant contamination into site environmental media, that waste will be sampled. If it is determined that a COC is present at any CAS, that CAS will be further addressed by determining the extent of contamination before evaluating corrective action alternatives.

Because this CAIP only addresses contamination originating from the CAU, it may be necessary to distinguish overlapping contamination originating from other sources. For example, widespread surface radiological contamination originating from atmospheric tests will not be addressed in the CAU 557 investigation. To determine whether contamination is from the CAU or from other sources, soil samples may be collected from locations outside the influence of releases from the CAS at selected CASs.

Modifications to the investigative strategy may be required should unexpected field conditions be encountered at any CAS. Significant modifications shall be justified and documented before implementation. If an unexpected condition indicates that conditions are significantly different than the corresponding CSM, the activity will be rescoped and the identified decision-makers will be notified.

4.2 Field Activities

Field activities at CAU 557 include site preparation, sample location selection, and sample collection activities.

4.2.1 Site Preparation Activities

Site preparation activities conducted by the NTS Management and Operating Contractor before the investigation may include, but not be limited to: relocation or removal of surface debris, equipment, and structures; construction of hazardous waste accumulation areas (HWAAs) and site exclusion zones; providing sanitary facilities; construction of decontamination facilities; and temporarily moving staged equipment.

Before mobilization for collecting investigation samples, the following preparatory activities will also be performed:

- Radiological survey at CAS 25-25-18 along the railroad tracks leading to Building 3901.
- Visual surveys at all CAU 557 CASs to identify any staining, discoloration, disturbance of native soils, or other indication of potential contamination.

4.2.2 Sample Location Selection

The selection of sampling locations will be accomplished using biasing factors (including field-screening results [FSRs]) to collect the most appropriate samples from a particular location for submittal to the analytical laboratory. Biasing factors to be used for selection of sampling locations are listed in Section A.5.2.1 of Appendix A. As biasing factors are identified and used for sample location selection, they will be documented in the appropriate field documents.

The CAS-specific sampling strategy and the estimated locations of biased samples for each CAS are presented in Appendix A. The number, location, and spacing of step-outs may be modified by the Task Manager or Site Supervisor, as warranted by site conditions to achieve DQO criteria stipulated in Appendix A. Where sampling locations are modified by the Task Manager or Site Supervisor, the justification for these modifications will be documented in the field logbook.

4.2.3 Sample Collection

The CAU 557 sampling program will consist of the following activities:

- Collect and analyze samples from locations as described in this section.

- Collect required QC samples.
- Collect waste management samples.
- Collect soil samples from locations outside the influence of releases from the CAS, if necessary.
- Collect and analyze bioassessment samples, if necessary.
- Perform radiological characterization surveys of construction materials and debris as necessary for disposal purposes.
- Record global positioning system coordinates for each environmental sample location.

Decision I surface and subsurface soil samples will be collected at the CAU 557 sites. If biasing factors are present in soils below locations where Decision I samples were collected, subsurface Decision I soil samples will also be collected by hand auguring, backhoe excavation or drilling techniques, as appropriate. Decision I subsurface soil samples will collected at depth intervals selected by the Task Manager or Site Supervisor based on biasing factors to a depth where the biasing factors are no longer present.

The contents of any features will be sampled to characterize the waste for potential disposal.

Decision II sampling will consist of further defining the extent of contamination where COCs have been confirmed. Step-out (Decision II) sampling locations at each CAS will be selected based on the CSM, biasing factors, FSRs, existing data, and the outer boundary sample locations where COCs were detected. In general, step-out sample locations will be arranged in a triangular pattern around areas containing a COC at distances based on site conditions, COC concentrations, process knowledge, and biasing factors. If COCs extend beyond step-out locations, additional Decision II samples will be collected from locations further from the source. If a spatial boundary is reached, the CSM is shown to be inadequate, or the Site Supervisor determines that extent sampling needs to be re-evaluated, then work will be temporarily suspended, NDEP will be notified, and the investigation strategy will be re-evaluated. A minimum of one analytical result less than the action level from each lateral and vertical direction will be required to define the extent of COC contamination. The lateral and vertical extent of COCs will only be established based on validated laboratory analytical results (i.e., not field screening).

4.2.4 Sample Management

The laboratory requirements (i.e., MDCs, precision, and accuracy) to be used when analyzing the COPCs are presented in Tables 3-4 and 3-5. The analytical program for each CAS is presented in Table 3-1. All sampling activities and QC requirements for field and laboratory environmental sampling will be conducted in compliance with the Industrial Sites QAPP (NNSA/NV, 2002a) and other applicable, approved procedures.

4.3 Safety

A site-specific health and safety plan will be prepared and approved before the field effort. As required by the DOE Integrated Safety Management System (ISMS) (DOE/NV, 1997), this document outlines the requirements for protecting the health and safety of the workers and the public. The ISMS program requires that site personnel will reduce or eliminate the possibility of injury, illness, or accidents, and to protect the environment during all project activities. The following safety issues will be taken into consideration when evaluating the hazards and associated control procedures for field activities:

- Potential hazards to site personnel and the public include, but are not limited to: radionuclides, chemicals (e.g., heavy metals, volatile organic compounds [VOCs], semivolatile organic compounds [SVOCs], and petroleum hydrocarbons), adverse and rapidly changing weather, remote location, and motor vehicle and heavy equipment operations.
- Proper training of all site personnel to recognize and mitigate the anticipated hazards.
- Work controls to reduce or eliminate the hazards including engineering controls, substitution of less hazardous materials, and use of appropriate personal protective equipment (PPE).
- Occupational exposure monitoring to prevent overexposure to hazards such as radionuclides, chemicals, and physical agents (e.g., heat, cold, and high wind).
- Emergency and contingency planning to include medical care and evacuation, decontamination, spill control measures, and appropriate notification of project management. The same principles apply to emergency communications.
- If presumed asbestos-containing material is identified (CFR, 2007c; NAC, 2007a), it will be inspected and/or samples collected by trained personnel.

4.4 Site Restoration

After completion of the CAI and waste management activities, the following actions will be implemented before closure of the site Real Estate/Operations Permit:

- Removal of all equipment, wastes, debris, and materials associated with the CAI.
- Removal of all signage and fencing (unless part of a corrective action).
- Grading of site to pre-investigation condition (unless changed condition is necessary under a corrective action).
- Site will be inspected and certified that restoration activities have been completed.

5.0 Waste Management

Management of IDW will be based on regulatory requirements, field observations, process knowledge, and laboratory results from CAU 557 investigation samples.

Disposable sampling equipment, PPE, and rinsate are considered potentially contaminated waste only by virtue of contact with potentially contaminated media (e.g., soil) or potentially contaminated debris (e.g., construction materials). Therefore, sampling and analysis of IDW, separate from analyses of site investigation samples, may not be necessary for all IDW. However, if associated investigation samples are found to contain contaminants above regulatory levels, conservative estimates of total waste contaminant concentrations may be made based on the mass of the waste, the amount of contaminated media contained in the waste, and the maximum concentration of contamination found in the media. Direct samples of IDW may also be taken to support waste characterization.

Sanitary, hazardous, radioactive, and/or mixed waste, if generated, will be managed and disposed of in accordance with applicable DOE orders, U.S. Department of Transportation (DOT) regulations, state and federal waste regulations, and agreements and permits between DOE and NDEP.

5.1 Waste Minimization

Investigation activities are planned to minimize IDW generation. This will be accomplished by incorporating the use of process knowledge, visual examination, and/or radiological survey and swipe results. When possible, disturbed media (such as soil removed during trenching) or debris will be returned to its original location. Contained media (e.g., soil managed as waste) as well as other IDW will be segregated to the greatest extent possible to minimize generation of hazardous, radioactive, or mixed waste. Hazardous material used at the sites will be controlled in order to limit unnecessary generation of hazardous or mixed waste. Administrative controls, including decontamination procedures, recycle/reuse, and waste characterization strategies, will minimize waste generated during investigations.

5.2 Potential Waste Streams

Waste generated during the investigation activities include the following potential waste streams:

- Personal protective equipment and disposable sampling equipment (e.g., plastic, paper, sample containers, aluminum foil, spoons, bowls).
- Decontamination rinsate.
- Environmental media (e.g., soil).
- Surface debris in investigation area (e.g., construction debris, scrap, lead brick).
- Field-screening waste (e.g., spent solvent, disposable sampling equipment, and/or PPE contaminated by field-screening activities).

5.3 Investigation-Derived Waste Management

The onsite management and ultimate disposition of IDW will be determined based on a determination of the waste type (e.g., sanitary, low-level, hazardous, hydrocarbon, mixed), or the combination of waste types. A determination of the waste type will be guided by several factors, including, but not limited to: the analytical results of samples either directly or indirectly associated with the waste, historical site knowledge, waste generation process knowledge, field observations, field-monitoring/screening results, and/or radiological survey/swipe results.

Guidance from the *NV/YMP Radiological Control Manual* (NNSA/NSO, 2004) shall be used to determine whether such materials may be declared nonradioactive. Onsite IDW management requirements by waste type are detailed in the following sections. Applicable waste management regulations and requirements are listed in Table 5-1.

Table 5-1
Waste Management Regulations and Requirements

Waste Type	Federal Regulation	Additional Requirements
Solid (nonhazardous)	N/A	NRS[a] 444.440 - 444.620 NAC[b] 444.570 - 444.7499 NTS Landfill Permit SW13-097-04[c], Rev. 5 NTS Landfill Permit SW13-097-03[d], Rev. 7
Liquid/Rinsate (nonhazardous)	N/A	Water Pollution Control General Permit, GNEV93001, Rev. iv[e]
Hazardous	RCRA[f] 40 CFR 260-282	NRS[a] 459.400 - 459.600 NAC[b] 444.850 - 444.8746 POC[g]
Low-Level Radioactive	N/A	DOE Orders and NTSWAC[h]
Mixed	RCRA[f] 40 CFR 260-282	NTSWAC[h] POC[g]
Hydrocarbon	N/A	NTS Landfill Permit SW13-097-02[i], Rev. 7 NAC[b] 445A.2272
Polychlorinated Biphenyls	TSCA[j] 40 CFR 761	NRS[a] 459.400 - 459.600 NAC[b] 444.940 - 444.9555
Asbestos	TSCA[j] 40 CFR 763	NRS[a] 618.750 - 618.840 NAC[b] 444.965 - 444.976

[a]*Nevada Revised Statutes* (NRS, 2007a, b, or c)
[b]*Nevada Administrative Code* (NAC, 2007a and d)
[c]Area 23 Class II Solid Waste Disposal Site (NDEP, 2006a)
[d]Area 9 Class III Solid Waste Disposal Site (NDEP, 2006c)
[e]Nevada Test Site Sewage Lagoons (NDEP, 2005)
[f]*Resource Conservation and Recovery Act* (CFR, 2007a)
[g]*Nevada Test Site Performance Objective for the Certification of Nonradioactive Hazardous Waste* (BN, 1995)
[h]*Nevada Test Site Waste Acceptance Criteria,* Rev. 6-02 (NNSA/NSO, 2006b)
[i]Area 6 Class III Solid Waste Disposal Site for hydrocarbon waste (NDEP, 2006b)
[j]*Toxic Substance Control Act* (CFR, 2007b and c)

CFR = *Code of Federal Regulations*
DOE = U.S. Department of Energy
N/A = Not applicable
NAC = *Nevada Administrative Code*
NDEP = Nevada Division of Environmental Protection
NRS = *Nevada Revised Statutes*
NTS = Nevada Test Site
NTSWAC = *Nevada Test Site Waste Acceptance Criteria*
POC = Performance Objective for the Certification of Nonradioactive Hazardous Waste
RCRA = *Resource Conservation and Recovery Act*
TSCA = *Toxic Substances Control Act*

5.3.1 Sanitary Waste

Sanitary IDW generated at each CAS will be collected, managed, and disposed of in accordance with the sanitary waste management regulations and the permits for operation of the NTS U10c Industrial Waste Landfill.

Office trash and lunch waste will be placed in the dumpster to be transported to the sanitary landfill for disposal. Industrial IDW generated at each CAS will be placed in a roll-off box located in Mercury, or other approved roll-off box, for ultimate disposal in the U10c Industrial Waste Landfill.

5.3.2 Low-Level Radioactive Waste

Radiological swipe surveys and/or direct-scan surveys may be conducted on reusable sampling equipment and the PPE and disposable sampling equipment waste streams exiting a radiologically controlled area (RCA). This allows for the immediate segregation of radioactive waste from waste that may be unrestricted regarding radiological release. Removable contamination limits, as defined in the current version of the *NV/YMP Radiological Control Manual* (NNSA/NSO, 2004) will be used to determine whether such waste may be declared unrestricted regarding radiological release versus being declared radioactive waste. Direct sampling of the waste may be conducted to aid in determining whether a particular waste unit (e.g., drum of soil) contains low-level radioactive waste, as necessary. Waste that is determined to be below the release values, either by direct radiological survey/swipe results or through process knowledge, will not be managed as potential radioactive waste but managed in accordance with any other applicable sections of this document. Wastes with values in excess of release criteria will be managed as potential radioactive waste and be managed in accordance with this section and any other applicable sections of this document.

Low-level radioactive waste, if generated, will be managed in accordance with the contractor-specific waste certification program plan, DOE orders, and the requirements of the current version of the *Nevada Test Site Waste Acceptance Criteria* (NTSWAC). Potential radioactive waste drums containing soil, PPE, disposable sampling equipment, and/or rinsate may be staged and managed at a designated radioactive material area (RMA) or RCA when full or at the end of an investigation phase.

5.3.3 Hazardous Waste

The CAU will have waste accumulation areas established according to the needs of the project. Satellite accumulation areas and HWAAs will be managed consistent with the requirements of federal and state regulations (see Table 5-1). The HWAAs will be properly controlled for access, and will be equipped with spill kits, appropriate spill containment, and wastes will be placed in DOT-compliant containers. All containerized hazardous waste will be handled, inspected, and managed in accordance with the hazardous waste regulations. These provisions include managing the waste in containers compatible with the waste type, and segregating incompatible waste types so that in the event of a spill, leak, or release, incompatible wastes shall not contact one another. The HWAAs will be covered under a site-specific emergency response and contingency action plan until such time that the waste is determined to be nonhazardous or all containers of hazardous waste have been removed from the storage area. Hazardous waste will be managed, characterized, and disposed of in accordance with federal requirements. *Resource Conservation and Recovery Act* “listed” waste has not been identified at CAU 557.

5.3.4 Hydrocarbon Waste

Hydrocarbon soil waste containing more than 100 mg/kg of TPH will be managed on site in a drum or other appropriate container until fully characterized. Hydrocarbon waste may be disposed of at a designated hydrocarbon landfill, an appropriate hydrocarbon waste management facility (e.g., recycling facility), or other method in accordance with the State of Nevada regulations (see Table 5-1).

5.3.5 Mixed Low-Level Waste

Mixed waste, if generated, shall be managed and dispositioned according to the requirements of RCRA or subject to agreements between NNSA/NSO and the State of Nevada, as well as DOE requirements for radioactive waste. Mixed waste which does not meet NTSWAC will require development of a treatment and disposal plan under the requirements of the Mutual Consent Agreement between DOE and the State of Nevada (NDEP, 1995).

5.3.6 Polychlorinated Biphenyls

The management of PCBs is governed by the *Toxic Substances Control Act* and implementing regulation. Polychlorinated biphenyl contamination may be found as a sole contaminant or in combination with any of the types of waste discussed in this document. For example, PCBs may be a co-contaminant in soil that contains a RCRA "characteristic" waste (PCB/hazardous waste), or in soil that contains radioactive wastes (PCB/radioactive waste), or even in mixed waste (PCB/radioactive/hazardous waste). If regulated PCB waste is generated, it will be managed according to federal and State of Nevada requirements, guidance, and agreements with the NNSA/NSO (see Table 5-1).

5.4 Management of Specific Waste Streams

5.4.1 Personal Protective Equipment

Personal protective equipment and disposable sampling equipment will be visually inspected for stains, discoloration, and gross contamination as the waste is generated, and also evaluated for radiological contamination. Staining and/discoloration will be assumed to be the result of contact with potentially contaminated media such as soil, sludge, or liquid. Gross contamination is the visible contamination of an item (e.g., clumps of soil/sludge on a sampling spoon or free liquid smeared on a glove). While gross contamination can often be removed through decontamination methods, removal of gross contamination from small items, such as gloves or booties is not typically conducted. Investigation-derived waste that is grossly contaminated will be segregated and managed as potentially "characteristic" hazardous waste. This segregated population of waste will either: (1) be assigned the characterization of the soil/sludge that was sampled, (2) be sampled directly, or (3) undergo further evaluation using associated soil/sludge sample results to determine how much soil/sludge would need to be present in the waste to exceed regulatory levels. Waste that is determined to be hazardous will be entered into an approved waste management system, where it will be managed and dispositioned according to RCRA requirements or subject to agreements between NNSA/NSO and the State of Nevada (see Table 5-1). The PPE and equipment that is not visibly stained, discolored, or grossly contaminated, and is within the radiological free-release criteria, will be managed as nonhazardous sanitary waste.

5.4.2 Management of Decontamination Rinsate

Rinsate waste may be generated from the decontamination of field sampling equipment, and may be managed as RCRA-hazardous or nonhazardous, depending on process knowledge and associated analytical data. Depending on the radiological characterization of the rinsate waste, nonhazardous rinsate may be managed for disposal at the point of generation in accordance with an approved NNSA/NSO Fluid Management Plan, or disposed of elsewhere in accordance with waste acceptance criteria of the receiving facility. Hazardous and/or radioactive rinsate wastes will be managed and disposed of in accordance with federal and state regulations, and the waste acceptance criteria of the appropriate waste disposal facility.

Wet or dry decontamination may be performed over the sampling site, and in such cases, decontamination rinsate waste may be generated. If it is generated, it will be containerized, characterized, and managed as noted above. When onsite equipment decontamination is performed, it will be done in such a manner as to introduce no new contaminants to the sampling site, or to cause existing contaminants to migrate from the site.

5.4.3 Management of Soil

This waste stream consists of soil removed for disposal during soil sampling, excavation, and/or drilling. This waste stream will be characterized based on laboratory analytical results from representative locations. If the soil is determined to potentially contain COCs, the material will be either managed on site or containerized for transportation to an appropriate disposal site.

Onsite management of the waste soil will be allowed only if it is managed within an area of concern and it is appropriate to defer the management of the waste until the final remediation of the site. If this option is chosen, the waste soil shall be protected from run-on and runoff using appropriate protective measures based on the type of contaminant(s) (e.g., covered with plastic and bermed).

Management of soil waste for disposal consists of placing the waste in containers, labeling the containers, temporarily storing the containers until shipped, and shipping the waste to a disposal site. The containers, labels, management of stored waste, transport to the disposal site, and disposal shall be appropriate for the type of waste (e.g., hazardous, hydrocarbon, mixed).

Note that soil placed back into a borehole, or excavation in the same approximate location from which it originated, is not considered to be a waste.

5.4.4 Management of Debris

This waste stream can vary depending on site conditions. Debris that requires removal must be characterized for proper management and disposition. Historical site knowledge, knowledge of the waste generation process, field observations, field-monitoring/screening results, radiological survey/swipe results and/or the analytical results of samples either directly or indirectly associated with the waste may be used to characterized the debris. Debris will be visually inspected for stains, discoloration, and gross contamination. Debris may be deemed reusable, recyclable, sanitary waste, hazardous waste, PCB waste, or low-level waste. Waste that is not sanitary will be entered into an approved waste management system, where it will be managed and dispositioned according to federal and state requirements, and agreements between NNSA/NSO and the State of Nevada. Debris may be left as is, managed on site by berming and covering next to the excavation, by placement in a container(s), or left on the footprint of the CAS and its disposition deferred until implementation of corrective action at the site.

5.4.5 Field-Screening Waste

The use of field test kits and/or instruments may result in the generation of small quantities of hazardous wastes. If hazardous waste is produced by field screening, it will be segregated from other IDW and managed in accordance with the hazardous waste regulations (CFR, 2007a). For sites where field-screening samples contain radioactivity above background levels, field-screening methods that have the potential to generate hazardous waste will not be used, thus avoiding the potential to generate mixed waste. In the event a mixed waste is generated, the waste will be managed in accordance with Section 5.3.5.

6.0 Quality Assurance/Quality Control

The overall objective of the characterization activities described in this CAIP is to collect accurate and defensible data to support the selection and implementation of a closure alternative for each CAU 557 CAS. Sections 6.1 and 6.2 discuss the collection of required QC samples in the field and QA requirements for laboratory/analytical data to achieve closure. Unless otherwise stated in this CAIP, or required by the results of the DQO process (see Appendix A), this investigation will adhere to the Industrial Sites QAPP (NNSA/NV, 2002a).

6.1 Quality Control Sampling Activities

Field QC samples will be collected in accordance with established procedures. Field QC samples are collected and analyzed to aid in determining the validity of environmental sample results. The number of required QC samples depends on the types and number of environmental samples collected. The minimum frequency of collecting and analyzing QC samples for this investigation, as determined in the DQO process, include:

- Trip blanks (1 per sample cooler containing VOC environmental samples)
- Equipment rinsate blanks (1 per sampling event for each type of decontamination procedure)
- Source blanks (1 per lot of uncharacterized source material that contacts sampled media)
- Field duplicates (minimum of 1 per matrix per 20 environmental samples; if less than 20 samples collected, then 1 per CAS per matrix)
- Field blanks (may be 1 per 20 environmental samples, 1 per day, or 1 per CAS, depending on site conditions and agreement of DQO participants)
- Laboratory QC samples (minimum of 1 per 20 environmental samples; if less than 20 samples collected, then 1 per CAS per matrix)

Additional QC samples may be submitted based on site conditions at the discretion of the Task Manager or Site Supervisor. Field QC samples shall be analyzed using the same analytical procedures implemented for associated environmental samples. Additional details regarding field QC samples are available in the Industrial Sites QAPP (NNSA/NV, 2002a).

6.2 Laboratory/Analytical Quality Assurance

Criteria for the investigation, as stated in the DQOs (Appendix A) and except where noted, require laboratory analytical quality data be used for making critical decisions. Rigorous QA/QC will be implemented for all laboratory samples including documentation, data verification and validation of analytical results, and an assessment of DQIs as they relate to laboratory analysis.

6.2.1 Data Validation

Data verification and validation will be performed in accordance with the Industrial Sites QAPP (NNSA/NV, 2002a), except where otherwise stipulated in this CAIP. All chemical and radiological laboratory data from samples that are collected and analyzed will be evaluated for data quality according to company-specific procedures. The data will be reviewed to ensure that all suspected samples were appropriately collected, analyzed, and the results passed data validation criteria. Validated data, including estimated data (i.e., J-qualified), will be assessed to determine whether they meet the DQO requirements of the investigation and the performance criteria for the DQIs. The results of this assessment will be documented in the Corrective Action Decision Document. If the DQOs were not met, corrective actions will be evaluated, selected, and implemented (e.g., refine CSM or resample to fill data gaps).

6.2.2 Data Quality Indicators

The DQIs are qualitative and quantitative descriptors used in interpreting the degree of acceptability or utility of data. Data quality indicators are used to evaluate the entire measurement system and laboratory measurement processes (i.e., analytical method performance) as well as to evaluate individual analytical results (i.e., parameter performance). The quality and usability of data used to make DQO decisions will be assessed based on the following DQIs:

- Precision
- Accuracy/bias
- Representativeness
- Comparability
- Completeness
- Sensitivity

Table 6-1 provides the established analytical method/measurement system performance criteria for each of the DQIs and the potential impacts to the decision if the criteria are not met. The following subsections discuss each of the DQIs that will be used to assess the quality of laboratory data. Due to changes in analytical methodology and changes in analytical laboratory contracts, criteria for precision and accuracy in Tables 3-4 and 3-5 that vary from corresponding information in the Industrial Sites QAPP will supersede the QAPP (NNSA/NV, 2002a).

Table 6-1
Laboratory and Analytical Performance Criteria for CAU 557 Data Quality Indicators

Data Quality Indicator	Performance Metric	Potential Impact on Decision If Performance Metric Not Met
Precision	At least 80% of the sample results for each measured constituent are not qualified for precision based on the criteria for each analytical method-specific and laboratory-specific criteria presented in Section 6.2.3.	If the performance metric is not met, the affected analytical results from each affected CAS will be assessed to determine whether there is sufficient confidence in analytical results to use the data in making DQO decisions.
Accuracy	At least 80% of the sample results for each measured constituent are not qualified for accuracy based on the method-specific and laboratory-specific criteria presented in Section 6.2.4.	If the performance metric is not met, the affected analytical results from each affected CAS will be assessed to determine whether there is sufficient confidence in analytical results to use the data in making DQO decisions.
Sensitivity	Minimum detectable concentrations are less than or equal to respective FALs.	Cannot determine whether COCs are present or migrating at levels of concern.
Comparability	Sampling, handling, preparation, analysis, reporting, and data validation are performed using standard methods and procedures.	Inability to combine data with data obtained from other sources and/or inability to compare data to regulatory action levels.
Representativeness	Samples contain constituent(s) at concentration(s) present in the environmental media from which they were collected.	Analytical results will not represent true site conditions. Inability to make appropriate DQO decisions.
Completeness	80% of the CAS-specific COPCs have valid results. 100% of CAS-specific targeted contaminants have valid results.	Cannot support/defend decision on whether COCs are present.
Extent Completeness	100% of COCs used to define extent have valid results.	Extent of contamination cannot be accurately determined.
Clean Closure Completeness	100% of targeted contaminants have valid results.	Cannot determine whether COCs remain in soil.

COC = Contaminant of concern
COPC = Contaminant of potential concern
DQO = Data quality objective
FAL = Final action level

6.2.3 Precision

Precision is a measure of the repeatability of the analysis process from sample collection through analysis results that is used to assess the variability between two equal samples.

Determinations of precision will be made for field duplicate samples and laboratory duplicate samples. Field duplicate samples will be collected simultaneously with samples from the same source under similar conditions in separate containers. The duplicate sample will be treated independently of the original sample in order to assess field impacts and laboratory performance on precision through a comparison of results. Laboratory precision is evaluated as part of the required laboratory internal QC program to assess performance of analytical procedures. The laboratory sample duplicates are an aliquot, or subset, of a field sample generated in the laboratory. They are not a separate sample but a split, or portion, of an existing sample. Typically, laboratory duplicate QC samples may include matrix spike duplicate (MSD) and laboratory control sample (LCS) duplicate samples for organic, inorganic, and radiological analyses.

Precision is a quantitative measure used to assess overall analytical method and field-sampling performance as well as to assess the need to “flag” (qualify) individual parameter results when corresponding QC sample results are not within established control limits.

The criteria used for the assessment of inorganic chemical precision when both results are greater than or equal to 5x reporting limit (RL) is 20 percent and 35 percent for aqueous and soil samples, respectively. When either result is less than 5x RL, a control limit of ±1x RL and ±2x RL for aqueous and soil samples, respectively, is applied to the absolute difference.

The criteria used for the assessment of organic chemical precision is based on professional judgment using laboratory derived control limits.

The criteria used for the assessment of radiological precision when both results are greater than or equal to 5x MDC is 20 percent and 35 percent for aqueous and soil samples, respectively. When either result is less than 5x MDC, the normalized difference (ND) should be between -2 and +2 for aqueous and soil samples. The parameters to be used for assessment of precision for duplicates are listed in Table 3-5.

Any values outside the specified criteria do not necessarily result in the qualification of analytical data. It is only one factor in making an overall judgment about the quality of the reported analytical results. The performance metric for assessing the DQI of precision on DQO decisions (see Table 6-1) is that at least 80 percent of sample results for each measured contaminant are not qualified due to duplicates exceeding the criteria. If this performance is not met, an assessment of the investigation report will be conducted and documented regarding the impacts to DQO decisions specific to affected contaminants and CASs.

6.2.4 Accuracy

Accuracy is a measure of the closeness of an individual measurement to the true value. It is used to assess the performance of laboratory measurement processes.

Accuracy is determined by analyzing a reference material of known parameter concentration or by reanalyzing a sample to which a material of known concentration or amount of parameter has been added (spiked). Accuracy will be evaluated based on results from three types of spiked samples: matrix spike (MS), LCS, and surrogates (organics). The LCS sample is analyzed with the field samples using the same sample preparation, reagents, and analytical methods employed for the samples. One LCS will be prepared with each batch of samples for analysis by a specific measurement.

The criteria used for the assessment of inorganic chemical accuracy are 75 to 125 percent for MS recoveries and 80 to 120 percent for LCS recoveries. For organic chemical accuracy, MS and LCS laboratory-specific percent recovery criteria developed and generated in-house by the laboratory according to approved laboratory procedures are applied. The criteria used for the assessment of radiochemical accuracy are 80 to 120 percent for LCS and MS recoveries.

Any values outside the specified criteria do not necessarily result in the qualification of analytical data. It is only one factor in making an overall judgment about the quality of the reported analytical results. Factors beyond laboratory control, such as sample matrix effects, can cause the measured values to be outside of the established criteria. Therefore, the entire sampling and analytical process may be evaluated when determining the usability of the affected data.

The performance metric for assessing the DQI of accuracy on DQO decisions (see Table 6-1) is that at least 80 percent of the sample results for each measured contaminant are not qualified for accuracy. If this performance is not met, an assessment will be conducted in the investigation report on the impacts to DQO decisions specific to affected contaminants and CASs.

6.2.5 Representativeness

Representativeness is the degree to which sample characteristics accurately and precisely represent a characteristics of a population or an environmental condition (EPA, 2002). Representativeness is assured by a carefully developing the sampling strategy during the DQO process such that false negative and false positive decision errors are minimized. The criteria listed in DQO Step 6, Specify Performance or Acceptance Criteria, are:

- For Decision I judgmental sampling, having a high degree of confidence that the sample locations selected will identify COCs if present anywhere within the CAS.
- Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.
- For Decision II, having a high degree of confidence that the sample locations selected will identify the extent of COCs.

These are qualitative measures that will be used to assess measurement system performance for representativeness. The assessment of this qualitative criterion will be presented in the investigation report.

6.2.6 Completeness

Completeness is defined as generating sufficient data of the appropriate quality to satisfy the data needs identified in the DQOs. For judgmental sampling, completeness will be evaluated using both a quantitative measure and a qualitative assessment. The quantitative measurement to be used to evaluate completeness is presented in Table 6-1 and is based on the percentage of measurements made that are judged to be valid.

For the judgmental sampling approach, the completeness goal for targeted contaminants and the remaining COPCs is 100 and 80 percent, respectively. If this goal is not achieved, the dataset will be assessed for potential impacts on making DQO decisions.

The qualitative assessment of completeness is an evaluation of the sufficiency of information available to make DQO decisions. This assessment will be based on meeting the data needs identified in the DQOs and will be presented in the investigation report. Additional samples shall be collected if it is determined that the number of samples do not meet completeness criteria.

6.2.7 Comparability

Comparability is a qualitative parameter expressing the confidence with which one dataset can be compared to another (EPA, 2002). The criteria for the evaluation of comparability will be that all sampling, handling, preparation, analysis, reporting, and data validation were performed and documented in accordance with approved procedures that are in conformance with standard industry practices. Analytical methods and procedures approved by DOE will be used to analyze, report, and validate the data. These methods and procedures are in conformance with applicable methods used in industry and government practices. An evaluation of comparability will be presented in the investigation report.

6.2.8 Sensitivity

Sensitivity is the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest (EPA, 2002). The evaluation criteria for this parameter will be that measurement sensitivity (detection limits) will be 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. This assessment will be presented in the investigation report.

7.0 Duration and Records Availability

7.1 Duration

Table 7-1 is a tentative duration of activities (in calendar days) for CAI activities.

Table 7-1
Corrective Action Investigation Activity Durations

Duration (days)	Activity
22	Fieldwork Preparation and Mobilization
14	Sampling
90	Data Assessment
180	Waste Management

7.2 Records Availability

Historical information and documents referenced in this plan are retained in the NNSA/NSO project files in Las Vegas, Nevada, and can be obtained through written request to the NNSA/NSO Federal Sub-Project Director. This document is available in the DOE public reading rooms located in Las Vegas and Carson City, Nevada, or by contacting the DOE Federal Sub-Project Director. The NDEP maintains the official Administrative Record for all activities conducted under the auspices of the FFACO.

8.0 References

ARL/SORD, see Air Resources Laboratory/Special Operations and Research Division.

ASTM, see American Society for Testing and Materials.

Air Resources Laboratory/Special Operations and Research Division. 2008. *NTS Climatological Rain Gauge Data.* As accessed at http://www.sord.nv.doe/home_climate_rain.htm on 10 April.

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Appendix A

Data Quality Objectives

A.1.0 Introduction

The DQO process described in this appendix is a seven-step strategic systematic planning method used to plan data collection activities and define performance criteria for the CAU 557, Spills and Tank Sites, 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 557 is insufficient to evaluate and select preferred corrective actions; therefore, a CAI will be conducted.

The CAU 557 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, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of a study.
- Criteria that 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 of the data.

- 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 and 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 557 are located in Areas 1, 3, 6, and 25 of the NTS (Figure A.2-1):

- 01-25-02, Fuel Spill
- 03-02-02, Area 3 Subdock UST
- 06-99-10, Tar Spills
- 25-25-18, Train Maintenance Bldg 3901 Spill Site

The following sections (Sections A.2.1 through A.2.3) provide a description, physical setting and operational history, release information, and previous investigation results for each CAU 557 CAS. 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 01-25-02, Fuel Spill

Corrective Action Site 01-25-02 consists of a release of diesel oil contaminants to soil located at the Area 1 Shaker Plant. The Shaker Plant is located approximately 0.5 mi west of the intersection of Tippipah Highway and Pahute Mesa Road in Area 1. Figure A.9-1 shows a site layout of the CAS.

The spill area is located in the vicinity of the Shaker Plant machinery and was identified in 1993 during the excavation for a new concrete pad. The pad was planned for the support of an aboveground storage tank (AST) used to store fuel. Upon initial excavation for the pad, soil staining and an hydrocarbon odor were present. The stained area was sampled and excavated to approximately 15 ft bgs. Sample results from soil collected at the bottom excavation depth showed that TPH was still present. The excavation was backfilled with clean fill and currently appears as a low spot with dried cracks at the ground surface. The soil in this area appears lighter in color than the surrounding area.

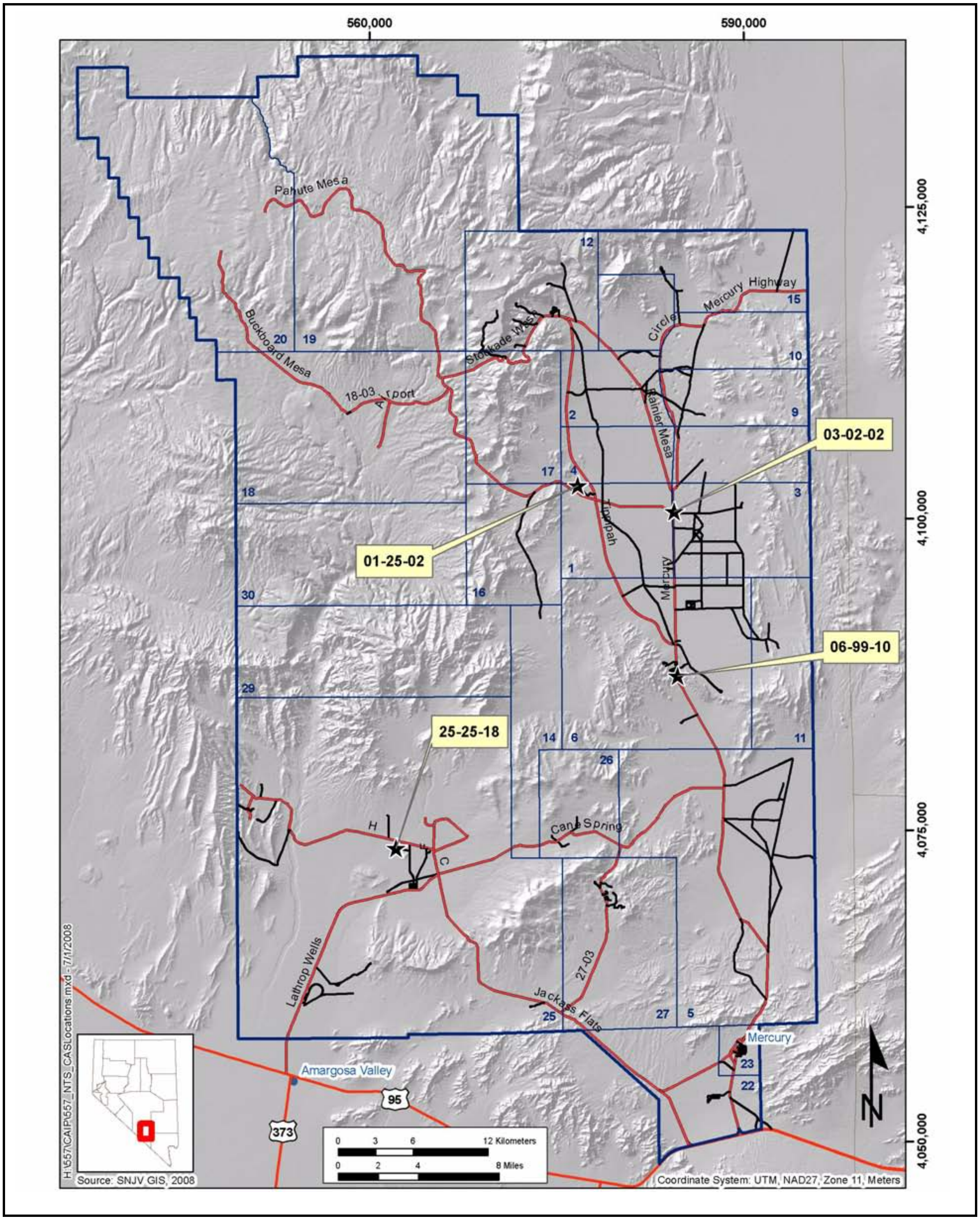

Figure A.2-1
Corrective Action Unit 557, CAS Location Map

Physical Setting and Operational History **–** Corrective Action Site 01-25-02 is located at the northwest region of Area 1 in the Yucca Flat hydrographic region. The Batch Plant portion of the Shaker Plant functioned as a screening facility for recovered desert soil and rock obtained from a nearby mine. The Batch Plant was active from 1965 until 1985. The remaining Shaker Plant remains active.

Corrective Action Site 01-25-02 is located in the northwest region of Area 1 in the Yucca Flat hydrographic region. Annual average precipitation measured in this area is 6.35 in. at the rain station BJY, which is located approximately 4.7 mi east of CAS 01-25-02 near the intersection of Rainier Mesa Road and Mercury Highway (ARL/SORD, 2008). The CAS is located within the Aqueduct Mesa Drainage Basin, which drains south to Yucca Lake. The nearest well, UE-16d (Eleana Water Well), is located approximately 1.5 mi west of CAS 01-25-02. The depth to groundwater in Well UE-17a, measured in November 2007, is 623 ft bgs (USGS and DOE, 2008). This well is located approximately 1.3 mi northwest of CAS 01-25-02. The thickness of alluvium in the Area 1 Shaker Plant is unknown; however, USGS Well ER 3-2, located approximately 6 mi southeast, penetrated approximately 2,631 ft of alluvium (DOE/NV, 1995). The soil in the spill area that has been excavated is imported fill and ranges in texture from silt to gravel. The portion of the spill that remained after the initial excavation is likely in native material.

Release Information **–** The actual source of the fuel spill and the extent of the soil contamination is unknown. Historical information speculated that the fuel spill may have come from a fuel truck that tipped over in the area and created a large spill (or possibly from an upgradient leaking AST and associated piping). The spill was not reported at the time of the release; however, a spill-notification report was filed with the Nevada Division of Emergency Management (NDEM) in November 1993, when it was identified (Case Number H931124D) (REECo, 1994a). During two separate events, the spill was excavated over an area of 30 square feet to an approximate depth of 15 ft bgs; however, a hydrocarbon odor and visual evidence of petroleum hydrocarbons were still present at the base of the excavation. The excavated hydrocarbon-contaminated soil removed from the site was disposed in the Area 6 hydrocarbon landfill (Boehlecke, 2007). The excavation was backfilled with clean fill, and no further information was identified regarding conclusions or actions taken on the fuel spill.

***Previous Investigation Results* –** The stained soil resulting from the fuel spill was sampled at two different depths on two separate dates. The initial sampling effort was conducted in November 1993 after approximately 6 to 8 yd^3 of soil had been removed and stockpiled. Analytical results showed that TPH-DRO was present in the soil at a concentration of 3,560 mg/kg (diesel was present at a concentration of 1,530 mg/kg and motor oil was present at a concentration of 2,030 mg/kg) (REECo, 1994b). In January 1994, the stained soil was further excavated to a depth of approximately 15 ft bgs and additional samples were collected. Analytical results of this second sampling effort show that TPH contamination still existed at the bottom of the excavation at a concentration of 1,740 mg/kg (REECo, 1994b). Analytical results did not detect radionuclides, PCBs, RCRA metals, base neutrals, or volatiles at levels above regulatory action limits. The soil removed from the first and second sampling effort was disposed at the Hydrocarbon Landfill in Area 6 of the NTS (REECo, 1994c).

A.2.2 Corrective Action Site 03-02-02, Area 3 Subdock UST

Corrective Action Site 03-02-02 consists of potential soil contamination from releases from a possible UST and associated features. The CAS is located within the former Area 3 Subdock of the NTS, which is just northeast of the intersection of Mercury Highway and the 03-03 Road. A site layout of the CAS is shown in Figure A.9-2.

The main feature at this CAS has been categorized by FFACO as a UST. This structure may actually be a catch basin with a sump and separator, disposal well, or possibly an injection well. There is very limited information about this CAS. The structure was not identified on engineering drawings or in historical documentation, therefore, the actual intended purpose for it is unknown. Portions of the structure are visible because the soil surrounding the feature has subsided and 2-ft voids can be seen on the outsides of the feature. The portion of the structure that is visible is constructed of 5-ft-diameter steel casing. The main feature extends to an unknown depth. The top of the feature is capped with a steel lid that is set on top of the steel casing and is currently buried under approximately 8 in. of soil. It was noted during a geophysical survey that several smaller features are present in the immediate vicinity (Weston, 2006). These features could be shallow subsurface piping connecting to what may be another chamber of the feature or a separate feature altogether (e.g., another UST, distribution box, or overflow tank).

Physical Setting and Operational History **–** The Area 3 subdock was in operation from the 1970s through 1985, at which time it was relocated to Area 1. The Area 3 subdock was used for degreasing, cleaning, and repairing worn drill bits as well as realigning bent drill rods. This area is an inactive and abandoned site and all former buildings have been removed. The area was regraded and vegetation is returning slowly. There is scattered wood debris in the vicinity of CAS 03-02-02; however, it is not considered to be associated with the CAS.

The CAS is located in the northwest region of Area 3 in the Yucca Flat hydrographic region. The average annual precipitation at station BJY, which is located near the intersection of Rainier Mesa Road and Mercury Highway, is 6.35 in. (ARL/SORD, 2008). The CAS is located within the Aqueduct Mesa drainage basin which drains south to Yucca Lake. The nearest well, Water Well A (WW-A), is located approximately 1.2 mi southeast of CAS 03-02-02. The depth to groundwater, as measured at WW-A in December 2007, is approximately 1,600 ft bgs (USGS and DOE, 2008). The thickness of alluvium at this CAS is unknown; however, USGS Well ER 3-2, which is also located approximately 1.2 mi southeast of CAS 03-02-02, penetrated approximately 2,631 ft of alluvium (DOE/NV, 1995). The soil surrounding the CAS appears to be native and ranges in texture from silt to gravel.

Release Information **–** There is no documentation indicating the use of the feature or if there were any releases from the feature and/or associated structures. It may have been used to collect effluent generated during steam-cleaning activities conducted to support past Area 3 Subdock operations; however, it is unknown if there were any releases from the feature or breaches of the structure or its associated features.

Previous Investigation Results **–** A geophysical survey was conducted at CAS 03-02-02 as part of the preliminary assessment of this site (Weston, 2006). The results of the survey identified several subsurface anomalies present at the site. The largest anomaly is approximately 21 by 21 ft and corresponds with the feature location. A second anomaly (approximately 10 by 15 ft) was identified just northeast of the feature and is believed to be an associated subsurface feature (e.g., another tank, distribution box, or overflow tank). The depth of this anomaly was not noted in the geophysical survey results. However, three linear anomalies indicate the presence of potential shallow piping and/or underground utility lines (i.e., 1 to 2 ft bgs) which may be connections between the primary and the second feature.

A.2.3 Corrective Action Site 06-99-10, Tar Spills

Corrective Action Site 06-99-10 consists of a release of potential contaminants to surface soils that are located near the Area 6 Control Point (CP). The CAS is located approximately 500 ft south of Building CP-72 along Mercury Highway. Figure A.9-3 shows a site layout of the CAS.

The two tar spills in CAS 06-99-10 are located on the side of a small hill. The larger spill measures approximately 20 by 15 ft while the smaller spill measured approximately 5 by 2 ft. The thickness varies between less than and inch to several inches. Native material has been absorbed into the two spills making it difficult to distinguish from the surrounding soil. The tar is solid and appears to have been dumped or poured down the hill.

Physical Setting and Operational History – Corrective Action Site 06-99-10 is located approximately 500 ft south of the CP-72 Building in Area 6. The spills are not believed to be associated with activities at CP-72. The tar may have been dumped from road paving operation. It is unknown when the spills occurred at this location.

Corrective Action Site 06-99-10 is located in central Area 6 in the Yucca Flat Hydrographic Region. The average annual precipitation at station BJY, located near the intersection of Rainier Mesa Road and Mercury Highway, is 6.35 in. (ARL/SORD, 2008). The CAS is located within the West Yucca Lake drainage basin which drains east to Yucca Lake. The nearest well, ER-6-2, is located approximately 2.5 mi northwest of CAS 06-99-10. The depth to groundwater, as measured at Well ER-6-2 in December 2007, is 1,782 ft bgs (USGS and DOE, 2008). The thickness of alluvium at this CAS is unknown; however, Well ER-6-2 penetrated approximately 101 ft of alluvium (DOE/NV, 1995). The soil surrounding the spills appears to be native and ranges in texture from silt to gravel.

Release Information – There is no documentation discussing the release or intended use of the tar material. It is unknown how long the tar has been at this location.

Previous Investigation Results – No previous investigations have been identified for this CAS.

A.2.4 Corrective Action Site 25-25-18, Train Maintenance Bldg 3901 Spill Site

Corrective Action Site 25-25-18 consists of a release of contaminants associated with hydrocarbon spills in Area 25 adjacent to the north end of Bldg 3901 (ETSM Building), which is located within the E-MAD Facility. Figure A.9-4 shows a site layout of CAS 25-25-18.

The various hydrocarbon spills impact a combined surface area of 65 by 100 ft. The vertical extent of the staining and potential contamination is unknown. A set of railroad tracks leading directly into the ETSM Building bisect the spill. However, the stains are slightly darker than the surrounding soil and appear to have been partially covered with a thin layer of gravel.

Physical Setting and Operational History **–** Corrective Action Site 25-25-18 is located at the E-MAD facility in Area 25. The ETSM Building (Bldg 3901) was constructed in 1965 and was used until circa 1985 for the maintenance of trains and equipment associated with nuclear testing. It is believed that the spill(s) are a result of hydrocarbon-containing liquid that was released just outside the North Bay of the ETSM Building during train maintenance activities that took place when the building was active. The stains appear in aerial photographs as early as 1976 and remain visible today.

Corrective Action Site 25-25-18 is located in central Area 25 in the Jackass Flats Hydrographic Region. The average annual precipitation at station Jackass Flats (4JA), which located in the central portion of Area 25, is 5.75 in. (ARL/SORD, 2008). The CAS is located within the Jackass Flats drainage basin which drains southwest off of the NTS. The nearest well, J-11 Water Well, is located approximately 1.72 mi southwest of CAS 25-25-18. The depth to groundwater is 1,040 ft bgs, as measured at the J-11 Water Well in February 2008 (USGS and DOE, 2008). The thickness of alluvium at this CAS is unknown; however, the J-11 Water Well encountered volcanic rock at approximately 425 ft bgs. The soil at the site appears to be native and ranges in texture from silt to pebbles.

Release Information **–** The actual source of the spill and the extent of the soil contamination is unknown. It is assumed that the spill, or spills, were a result of train maintenance activities during the active life of the facility. The trains were diesel powered, so it is possible that there were leaks from trains sitting on the tracks. The stained area is present in an aerial photograph dated 1976 but becomes less obvious in older aerials photographs. There are no spill reports or documentation discussing the stained area.

Previous Investigation Results **–** No previous analytical results have been identified for this CAS; however, a hydrocarbon AST removal was performed at the northwest corner of the ETSM Building as part of CAU 127, CAS 25-01-06. The CAU 127 was located adjacent to the CAS 25-25-18 spill on the west side of the railroad tracks. Analytical results from the CAU 127 soil sampling showed TPH-DRO to be present in the soil surrounding the AST; however, it is not believed to have impacted the soil at CAS 25-25-18 (NNSA/NSO, 2004).

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 557 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 557."

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 April 3, 2008, for the DQO meeting. The decision-makers are the NDEP and NNSA/NSO representatives.

A.3.2 Conceptual Site Model

A CSM is used to organize and communicate site characteristic information. It reflects the best interpretation of available information at any point in time. The CSM is a 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 are the basis for all subsequent inputs and decisions throughout the DQO process.

The CSM developed for CAU 557 uses 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 as well as the COPCs.

The CAU 557 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 CAU 557 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 the CAU 557 CSM.

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 surface and subsurface components (i.e., disposal hole, injection well, dry well, catch basin and associated underground piping) of the CSM. The CSM accounts for potential releases resulting from overflow of system components that are present at the ground surface (e.g., structure openings) and surface spills, as well as from releases from structures into surrounding subsurface soils. Any contaminants migrating from the CASs, 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. Concentrations are expected to decrease with horizontal and vertical distance from the source.

Table A.3-1
Conceptual Site Model
Description of Elements for Each CAU 557 CAS
(Page 1 of 2)

CAS Identifier	01-25-02	03-02-02	06-99-10	25-25-18
CAS Description	**Fuel Spill**	**Area 3 Subdock UST**	**Tar Spills**	**Train Maintenance Bldg 3901 Spill Site**
Site Status	Inactive, however, adjacent to active site(s)	Inactive and abandoned	Inactive abandoned	Inactive, however, adjacent to active site(s)
Exposure Scenario	Occasional Use Areas		Industrial Use Area	
Sources of Potential Soil Contamination	Surface spill	Leaking subsurface features	Surface spill(s)	Surface spills
Location of Contamination/ Release Point	At present spill location	At pipe connections to subsurface features and/or at breached pipe or subsurface feature	At present spill location(s)	At present spill location(s)
Amount Released	Unknown			
Affected Media	Shallow Subsurface Soil	Shallow Subsurface soil	Surface and near-surface soils	Surface and shallow subsurface soil
Potential Contaminants	TPH-DRO	Unknown	TPH-DRO, VOCs, SVOCs, PCBs	TPH-DRO, PCBs, SVOCs, VOCs
Transport Mechanisms	Percolation of precipitation through subsurface media serves as the major driving force for migration of contaminants.	Leaks from subsurface features	Surface water runoff may provide for the transportation of some contaminants within the footprint of the CAS.	Surface water runoff may provide for the transportation of some contaminants within the footprint of the CAS. Surface liquid released over time. Percolation of precipitation through subsurface media serves as the major driving force for migration of contaminants.

Table A.3-1
Conceptual Site Model
Description of Elements for Each CAU 557 CAS
(Page 2 of 2)

CAS Identifier	01-25-02	03-02-02	06-99-10	25-25-18
CAS Description	**Fuel Spill**	**Area 3 Subdock UST**	**Tar Spills**	**Train Maintenance Bldg 3901 Spill Site**
Migration Pathways	Vertical transport expected to dominate over lateral transport due to small surface gradients.			Lateral transport expected to dominate over vertical transport due to moderate- to high-surface gradient(s).
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.			
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.			

COC = Contaminant of concern
COPC = Contaminant of potential concern
DRO = Diesel-range organics
PCB = Polychlorinated biphenyl
SVOC = Semivolatile organic compound
TPH = Total petroleum hydrocarbons
UST = Underground storage tank
VOC = Volatile organic compound

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 557 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 557 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

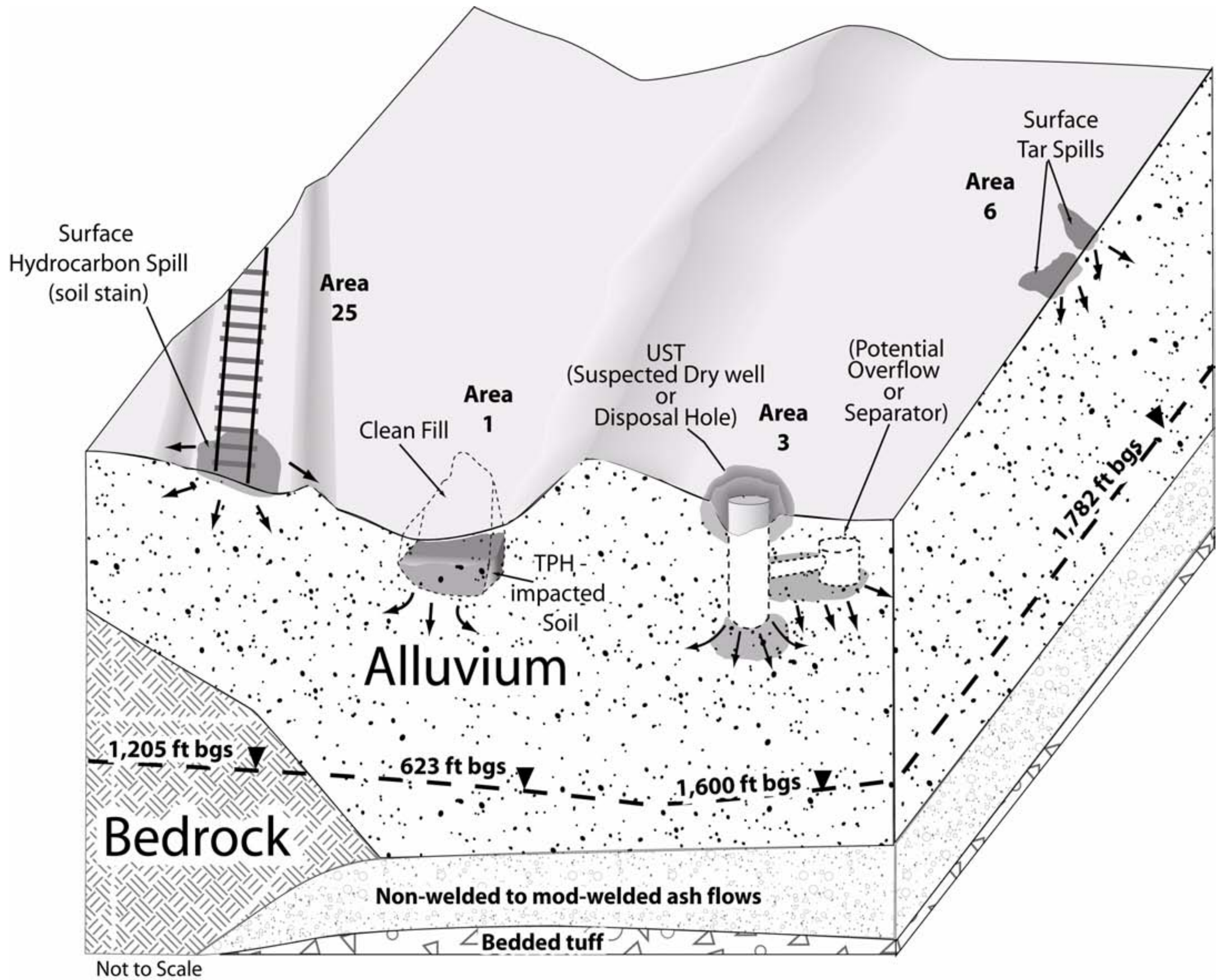

Figure A.3-1
Conceptual Site Model for CAU 557, Spills and Tank Sites

Table A.3-2
Analytical Program for CAU 557[a]

Analyses	CAS 01-25-02	CAS 03-02-02	CAS 06-99-10	CAS 25-25-18
Organic COPCs				
Total Petroleum Hydrocarbons-Diesel-Range Organics	X	X	X	X
Polychlorinated Biphenyls	--	X	X	X[b]
Semivolatile Organic Compounds	X	X	X	X
Volatile Organic Compounds	X	X	X	X
Pesticides	--	--	--	X[c]
Inorganic COPCs				
Total RCRA Metals	--	X	--	X
Beryllium	--	--	--	X[d]
Radionuclide COPCs				
Gamma Spectroscopy	--	X	--	X
Isotopic Uranium	--	X	--	X
Isotopic Plutonium	--	X	--	X
Strontium-90	--	X	--	X

[a]The COPCs are the constituents reported from the analyses listed.
[b]Sampling locations for PCBs selected based on proximity to Building 3901.
[c]Sampling locations for pesticides selected based on proximity to Building 3901. If results show total pesticides above PALs, then additional analysis for TCLP pesticides may be performed.
[d]Sampling locations for beryllium selected based on proximity to Building 3901.

COPC = Contaminant of potential concern
PAL = Preliminary action level
PCB = Polychlorinated biphenyl
RCRA = *Resource Conservation and Recovery Act*
TCLP = Toxicity Characteristic Leaching Procedure

X = Required analysis
-- = Initial analysis not required

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 6.2.6). Targeted contaminants for each CAU 557 CAS are identified in Table A.3-3. If any COPC is detected during the CAI at concentrations exceeding the PALs, then the COPC will be considered a targeted contaminant and subject to the more stringent completeness criteria.

Table A.3-3
Targeted Contaminants for CAU 557

CAS	Chemical Targeted Contaminant(s)	Radiological Targeted Contaminant(s)
01-25-02	TPH-DRO; VOC and SVOC (hazardous constituents of diesel only)	--
03-02-02	--	--
06-99-10	TPH-DRO, SVOCs, VOCs (hazardous constituents of diesel only)	--
25-25-18	TPH-DRO; and VOC and SVOC (hazardous constituents of diesel only)	--

DRO = Diesel-range organics
SVOC = Semivolatile organic compound
TPH = Total petroleum hydrocarbons
VOC = Volatile organic compound
-- = No targeted contaminants 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 include the lateral migration of potential contaminants across surface soils/sediments and vertical migration of potential contaminants through subsurface soils. At

CASs 01-25-02, 03-02-02, and 25-25-18, infiltration and percolation of precipitation could serve as a driving force for downward migration of contaminants. Observations at CAS 01-25-02 have noted that after heavy periods of rainfall, 2- to 4-in. of water pools at the former excavation location. At CAS 03-02-02, 1 to 2 ft of soil subsidence has occurred around the casing perimeter.

Due, however, to high potential evapotranspiration at the NTS, annual potential evapotranspiration at the Area 3 Radiological Waste Management Site has been estimated at 6.62 in. (Shott et al., 1997). Limited annual precipitation for this region has been estimated at 6.62 in. (ARL/SORD, 2008), and percolation of infiltrated precipitation at the NTS does not provide a significant mechanism for vertical migration of contaminants to groundwater (DOE/NV, 1992).

At CAS 06-99-10, the spill material has low solubility and high density, thus lateral and vertical migration is expected to be limited. In addition, contaminants, if detected, are expected to be found relatively close to the release point. At CAS 25-25-18, the spill is located on top of an unpaved driveway that slopes relatively steeply to the west-southwest away from the railroad tracks leading to Building 3901 and toward a second set of railroad tracks. In addition, the spill material has a slightly high solubility and relatively low density thus vertical migration of contaminants are expected to be greater than for similar contaminates spilled on flat land surfaces at the NTS. In addition, it is generally dry at CAS 25-25-18, but it is subject to infrequent, potentially intense, stormwater flows and the contaminants are subject to much higher transport potential than contaminants released to other surface areas. These stormwater flow 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 (i.e., at the bottom of the slope).

A.3.2.6 Exposure Scenarios

The exposure of workers and visitors to site contaminants is dependent upon activities of the exposed individuals at each contaminated site. Human receptors may be exposed to COPCs through oral ingestion, inhalation, dermal contact (absorption) of contaminated soil or debris due to inadvertent disturbance of these materials, or through irradiation by radioactive materials. The receptors and exposure points for these sites are based on NTS future land use (DOE/NV, 1998). The land-use and exposure scenarios for the CAU 557 CASs are listed in Table A.3-4.

Table A.3-4
Land-Use and Exposure Scenarios[a]

CAS	Record of Decision Land-Use Zone	Exposure Scenario
01-25-02 and 03-02-02	**Nuclear and High Explosives Test** 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.	**Occasional Use Area** Addresses exposure to industrial workers who are not assigned to the area as a regular worksite but may occasionally use the site. Assumes this is an outdoor area that is not regularly visited but may occasionally be used for short-term activities, such as use by military personnel conducting training exercises. Worker is assumed to be on site for an equivalent of 80 hours (or 10 days) per year, for 5 years. The indoor time is zero because there are no buildings on the site that can be used by workers for shelter and comfort.
06-99-10	**Defense Industrial Zone** This area is designated for stockpile management of weapons, including production, assembly disassembly or modification, staging, repair, retrofit, and surveillance. Permanent facilities are used for stockpile stewardship operations involving equipment and activities such as radiography, lasers, material processing, and pulsed power.	**Industrial Use Area** Addresses exposure to industrial workers who are exposed daily to contaminants in soil during an average workday. Assumes this is an assigned work area for worker who will be on the site for an entire career (225 days per year, 10 hours per day for 25 years). Active powered buildings with toilets are present at the site for the shelter and comfort of the worker.
25-25-18	**Research Test and Experiment Zone** This area is designated for small-scale research and development projects and demonstrations; pilot projects; outdoor tests; and experiments for the development, quality assurance, or reliability of material and equipment under controlled conditions. This zone includes compatible defense and nondefense research, development, and testing projects and activities.	

[a]*Nevada Test Site Resource Management Plan* (DOE/NV, 1998)

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.
- The information needed to determine potential remediation waste types.
- The information needed to evaluate the feasibility of remediation alternatives (e.g., bioassessment if natural attenuation or biodegradation is considered, and geotechnical data if construction or evaluation of barriers is considered).

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 subsurface structure contents to result in the introduction of a COC to the surrounding environmental media, the following conservative assumptions were made:

- That the structure containment would fail at some point and the contents would be released to the surrounding media.
- That the resulting concentration of contaminants in the surrounding media would be equal to the concentration of contaminants that were present in the structure.

- That any liquid contaminant in the subsurface structures exceeding the RCRA toxicity characteristic concentration can result in introduction of a COC to the surrounding media.

Liquid(s) with contaminant concentrations exceeding an equivalent toxicity characteristic action level would be considered a PSM and would require a corrective action. Solids with contaminant concentrations exceeding an equivalent FAL would be considered a PSM 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

In this section, the actions that may be taken to solve the problem are identified depending on the possible outcomes of the investigation.

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 these two criteria:

- Samples must be collected in areas most likely to contain a COC (judgmental sampling).
- The analytical suite selected must be sufficient to identify any COCs present in the samples to determine the site contaminant(s) characteristic(s).

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 determine potential remediation waste types.
- Samples of waste present in containment must provide sufficient RCRA toxicity information to determine whether they are considered to be PSM.
- Appropriate samples must be submitted to evaluate the feasibility of remediation alternatives (e.g., bioassessment if natural attenuation or biodegradation is considered, and geotechnical data if construction or evaluation of barriers is considered).
- 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, drilling, 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 557 CASs must ensure that the data collected are sufficient for selection of the corrective action alternatives (EPA, 2002). Due to the presence and significance of biasing factors at the CAU 557 CASs, the objective for judgmental sampling has been met for the CAI at these CASs. The samples collected from each site are to be collected from locations that most likely contain a COC, if present, or from locations that properly represent any contamination at the CAS. These sample locations, therefore, can be selected by means of biasing factors (e.g., a stain likely containing a spilled substance), because the information available to develop judgmental sampling is sufficient for the CAU 557 CASs.

Decision I sample locations at CASs 01-25-02, 03-02-02, 06-99-10, and 25-25-18 will be determined based on 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. Samples of the contents of the feature at CAS 03-02-02 will define the potential for the contents to contribute COCs to the surrounding media. Analytical suites for Decision I samples will include all COPCs identified in Table A.3-2.

Field-screening techniques may be used at CASs 01-25-02 and 25-25-18 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 557:

- ***Volatile organic compounds*** – Because VOCs are a common concern at the NTS, and have not been ruled out as a COPC based on process knowledge, a VOC detection instrument may be used to conduct VOC field screening at CASs 01-25-02 and 25-25-18.

- ***Walkover surface-area radiological surveys*** – To detect locations of elevated radioactivity, a radiological survey instrument was used over approximately 100 percent of CASs 03-02-02 and 25-25-18 as part of the preliminary assessment for this CAU.

- ***Alpha and beta/gamma radiation*** – A radiological survey instrument will be used at the CAS(s).

- ***Gamma-emitting radionuclides*** **–** A radiological dose rate measurement instrument may be used at any CAU 557 CASs.

Biasing factors may 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 may also be considered in selecting locations for analytical samples at CAU 557:

- Documented process knowledge for 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 such as 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.

- Preselected areas based on process knowledge of the site: Locations for which evidence such as historical photographs, experience from previous investigations, or interviewee’s 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 on the results of previous field investigations.

- Experience and data from investigations of similar sites.

- Visual indicators such as discoloration, textural discontinuities, disturbance of native soils, or any other indication of potential contamination.
- Odor.
- Other biasing factors: Factors not defined previously 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 Section 3.0 (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. 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 one of a set of locations bounding contamination in lateral and vertical directions.
- 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 557 CASs are summarized in Table A.6-2.

Table A.6-1
Spatial Boundaries of CAU 557 CASs

Corrective Action Site	Spatial Boundaries
01-25-02	The lateral limit is 50 feet (ft) from the edges of the excavation and the vertical limit is 200 ft below the existing excavation.
03-02-02	The lateral limit is 50 ft from the edge of all of the CAS components and the vertical limit is 300 ft below the system components.
06-99-10	The lateral limit is 50 ft from the edges of the spills or up to the edge of a wash. The vertical limit is 10 ft beyond visibly stained soil.
25-25-18	The lateral limit is 50 ft from the edges of the spill site and the vertical limit is 100 ft below ground surface.

Table A.6-2
Practical Constraints for the CAU 557 Field Investigation

Corrective Action Site	Practical Constraints
01-25-02	Weather (i.e., high winds, rain, lightning, extreme heat), activities taking place in the Area 1 Shaker Plant, underground utilities (e.g., piping associated with refueling operations), loose and unconsolidated terrain, and the depth of the existing excavation.
03-02-02	Weather (i.e., high winds, rain, lightning, extreme heat), underground utilities, located near a highly active road, caving around some of the structures, and loose and unconsolidated terrain.
06-99-10	Weather (i.e., high winds, rain, lightning, extreme heat), underground utilities, CAS is located near a restricted facility, and within the habitat range of the desert tortoise[a] that has loose and unconsolidated terrain.
25-25-18	Weather (i.e., high winds, rain, lightning, extreme heat), underground utilities, railroad tracks traveling through the affected area, a building foundation is adjacent to the spill site, site is located within the “Controlled Area” posted E-MAD Facility, steep berms surrounding the train tracks, and loose and unconsolidated terrain.

[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).

E-MAD = Engine Maintenance, Assembly, and Disassembly

A.6.4 Define the Sampling Units

The scale of decision-making in Decision I is defined as the CAS. Any COC 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 that 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 the 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 (NAC, 2007a). For the evaluation of corrective actions, NAC Section 445A.22705 (NAC, 2007b) recommends the use of ASTM Method E 1739-95 (ASTM, 1995) 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."

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

- Tier 1 evaluation – 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 evaluation – 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. The 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 evaluation – 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 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 mg/kg as listed in NAC 445A.2272 (NAC, 2007c).

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 Underground Test Area Project limit of 400,000 picocuries per liter for discharge of water containing tritium (NNSA/NV, 2002b).

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 of 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 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 to 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 and concurrence of CSMs (based on process knowledge) by stakeholder participants during the DQO process;

- Validity testing of CSMs based on investigation results; and

- Evaluation of the data quality 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.

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 CSM 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 of this document. 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 20 environmental samples; if less than 20 samples collected, then 1 per CAS per matrix)
- Laboratory QC samples (minimum of 1 per matrix per 20 environmental samples; if less than 20 samples collected, then 1 per CAS per matrix)

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 QC 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 lot of uncharacterized source material that contacts sampled media)
- Field blanks (minimum of 1 per CAS, 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. A judgmental sampling scheme will be implemented to select sample locations and evaluate analytical results for CAU 557. Sections A.9.1 through A.9.2 contain general information about collecting Decision I and Decision II samples under a judgmental sampling design, while the subsequent sections provide CAS-specific sampling activities, including planned sample locations.

As discussed in Section A.2.0, radiological soil contamination at these sites originating from nuclear testing is specifically excluded from this investigation. If such contamination exists, it will be addressed by the Soils Project.

A.9.1 Decision I Sampling

A judgmental sampling design will be implemented for all CAU 557 CASs. Because individual sample results, rather than an average concentration, will be used to compare to FALs at the CASs undergoing judgmental sampling, 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 Site Supervisor based on biasing factors to a depth where the biasing factors are no longer present. The Site Supervisor 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 these 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 Site Supervisor, as warranted by site conditions

A.9.3 Corrective Action Site 01-25-02, Fuel Spill

Corrective action site 01-25-02 is a historical spill in which the affected soil was partially removed and disposed and the resulting excavation was backfilled with soil. The planned investigation consists of drilling one boring in the middle of the former excavation to a depth where the greatest concentration of contaminants are expected to be found, based on previous investigation results (REECo, 1994b). This depth is expected to be encountered at approximately 15 ft bgs. After reaching approximately 12 ft bgs, soil will be screened for remaining hydrocarbon VOCs using biasing factors (i.e., VOC screening, staining and odor). A soil sample from the screening interval exhibiting the greatest biasing factors will be collected and sent to an offsite laboratory for the analyses listed on Table A.3-2. Additional soil intervals will be screened in the native soil to verify that the contamination decreases with depth. A soil sample from the screening interval exhibiting the least amount of biasing factors will be sent to an offsite laboratory for the analyses listed on

Table A.3-2. The lateral extent of the spill has been previously established at the bottom of the former excavation sidewalls (30 by 30 ft by approximately 15 ft bgs). If contamination increases with depth, a second boring may be drilled at least 5 ft past the edge of the former excavation in the downgradient direction to re-establish the lateral extent. Samples of the soil exhibiting the least amount of biasing factors from this second boring will be collected and sent to the offsite laboratory for the analyses listed on Table A.3-2.

The planned sampling location(s) at CAS 01-25-02 are shown on Figure A.9-1.

A.9.4 Corrective Action Site 03-02-02, Area 3 Subdock UST

Corrective action Site 03-02-02 is listed as a UST in the FFACO; however, based on geophysical survey results, the anomalies identified are not consistent with a typical UST (Weston, 2006). There are several features, which show as anomalies on the geophysical survey map. The largest anomaly (Anomaly #1) is approximately 21 by 21 ft and is identified at the location of the visible cylindrical feature just above the ground surface. An additional anomaly (Anomaly #2), measures 10 by 15 ft and was detected just northeast of Anomaly #1. In addition, signature responses were detected that indicate a possible shallow connection between the two anomalies. Also, three linear anomalies were detected that may be additional connections to the previously discussed features, or may possibly be underground utilities still present in the subdock area. Because the structure(s) is not typical or known, the sampling approach for this CAS will be followed using the terms defined in Sections A.9.1 and A.9.2.

The following approach is planned for sampling at CAS 03-02-02:

- Excavate soil around and beneath Anomalies #1 and #2 to identify the configuration(s) of and possible use(s) for, the subsurface structure(s). Inspect areas of potential releases and collect soil sample(s) at areas exhibiting the greatest biasing factors. Continue inspection of soil at 2-ft intervals until biasing factors are no longer present. Collect bounding sample(s).

- Examine associated subsurface piping; if breaches are identified, sample soil directly below breach at areas exhibiting the greatest biasing factors. Continue inspection of soil at 2-ft intervals until biasing factors are no longer present. Collect bounding sample(s).

The samples will be sent to the off-site laboratory for the analyses listed on Table A.3-2. The planned sampling locations at CAS 03-02-02 are shown on Figure A.9-2.

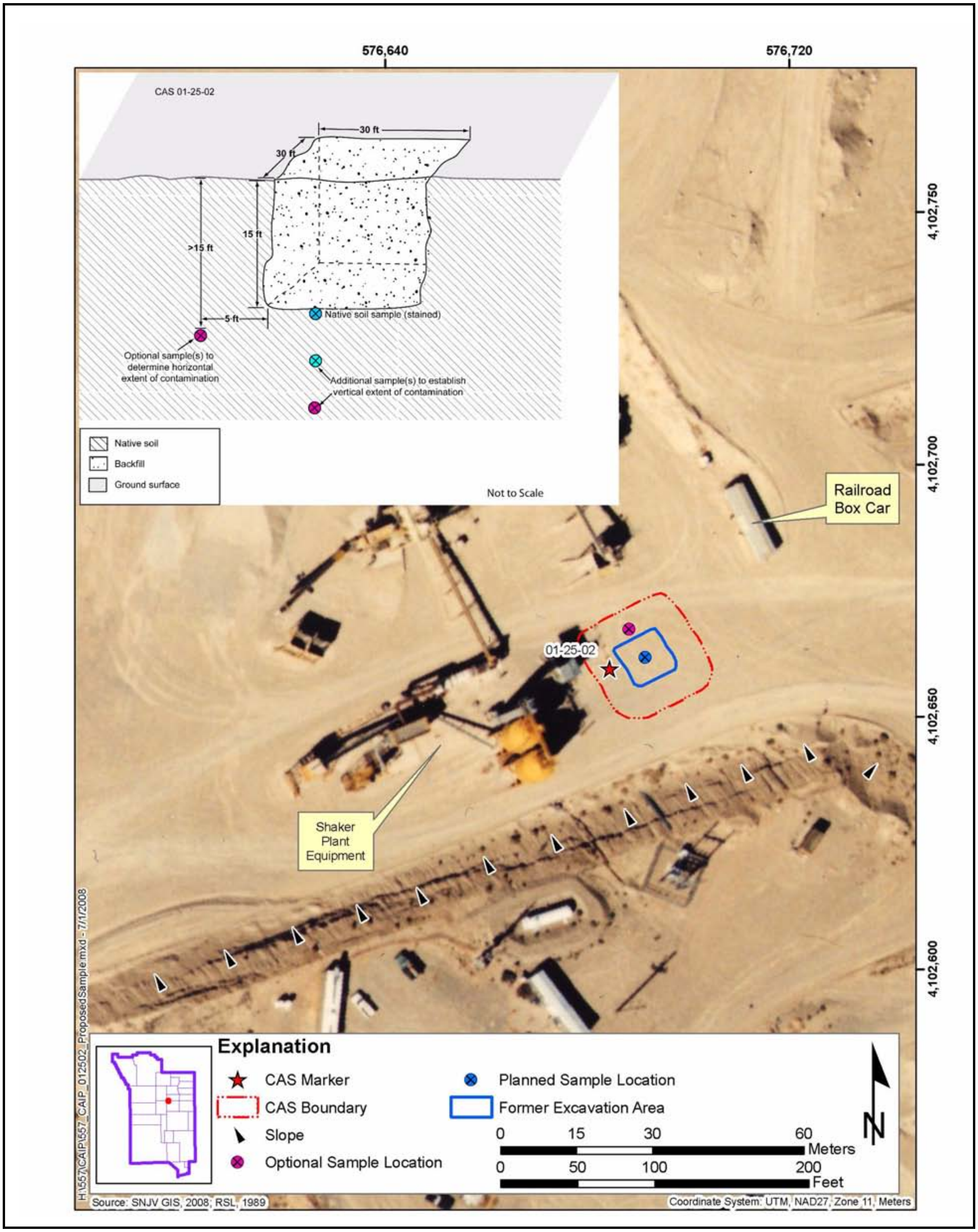

Figure A.9-1
Planned Sample Locations at CAS 01-25-02, Fuel Spill

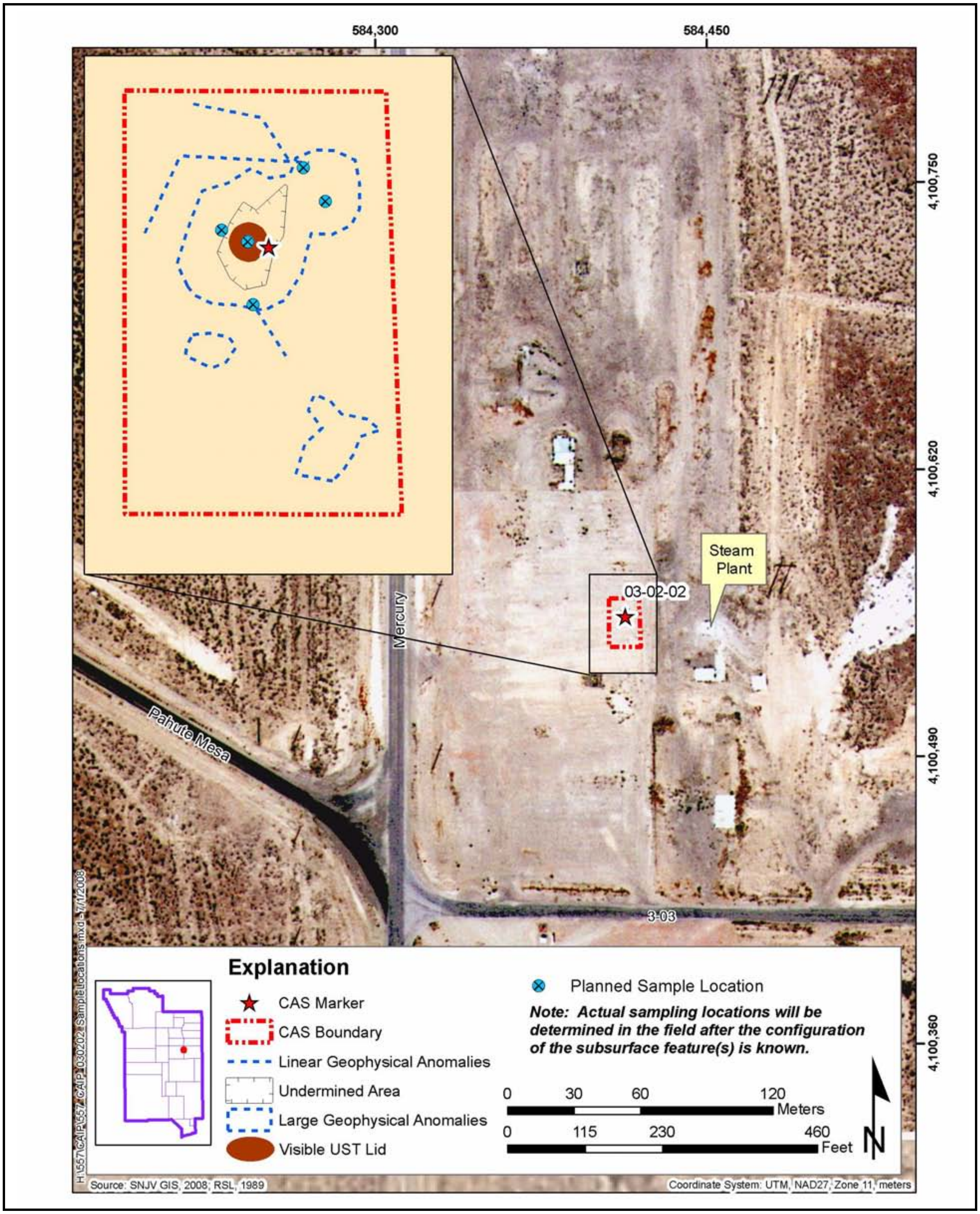

Figure A.9-2
Planned Sample Locations at CAS 03-02-02, Area 3 Subdock UST

A.9.5 Corrective Action Site 06-99-10, Tar Spills

Decision I sampling activities at CAS 06-99-10 will consist of collecting one surface soil sample from a location just beneath the bottom of each hardened tar spill(s). These samples will be analyzed for the parameters shown on Table A.3-2. In addition, two samples of the tar spill(s) will be collected and analyzed for the parameters shown on Table A.3-2 for the purpose of determining if the material is a PSM. If a COC is detected in the soil underlying the tar spill(s), Decision II soil sampling will be conducted to bound the material. These samples will be analyzed only for the COCs detected during the Decision I sampling.

Figure A.9-3 shows the planned sampling locations at CAS 06-99-10.

A.9.6 Corrective Action Site 25-25-18, Train Maintenance Bldg 3901 Spill Site

The Decision I sampling approach at CAS 25-25-18 will be based on a typical CSM for a surface spill. One sample each will be collected based on the greatest biasing factors (visual observations, odor, and FSRs) from the two stained soil areas (located on either side of the railroad tracks) to determined the highest concentration of potential hydrocarbon contamination. In addition, samples will be collected from locations just beneath and outside each of the two stained soil areas (based on biasing factors) to determine the vertical and lateral extent of contamination. All samples will be analyzed for the parameters identified on Table A.3-2.

Figure A.9-4 shows the planned sampling locations at CAS 25-25-18.

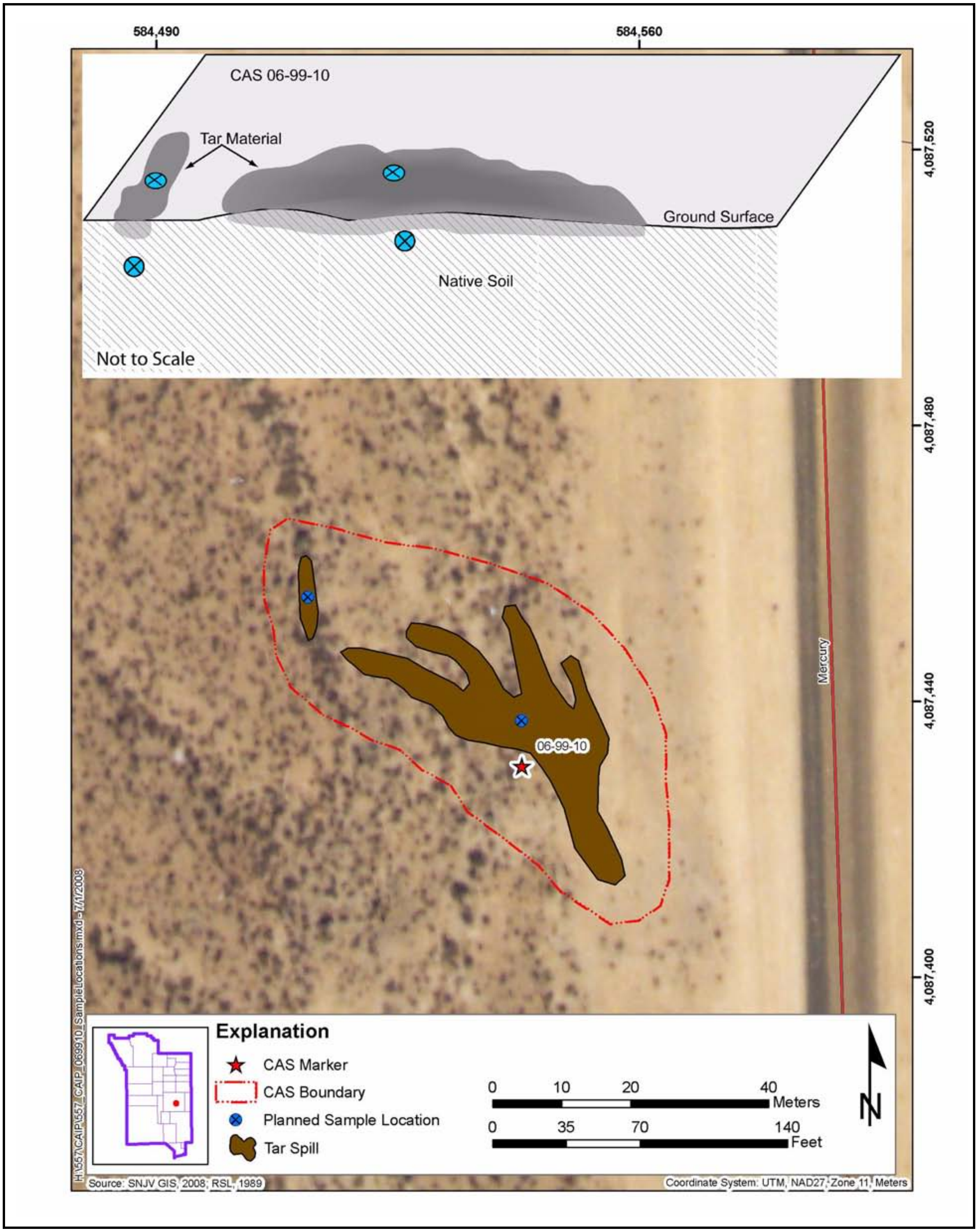

Figure A.9-3
Planned Sample Locations at CAS 06-99-10, Tar Spills

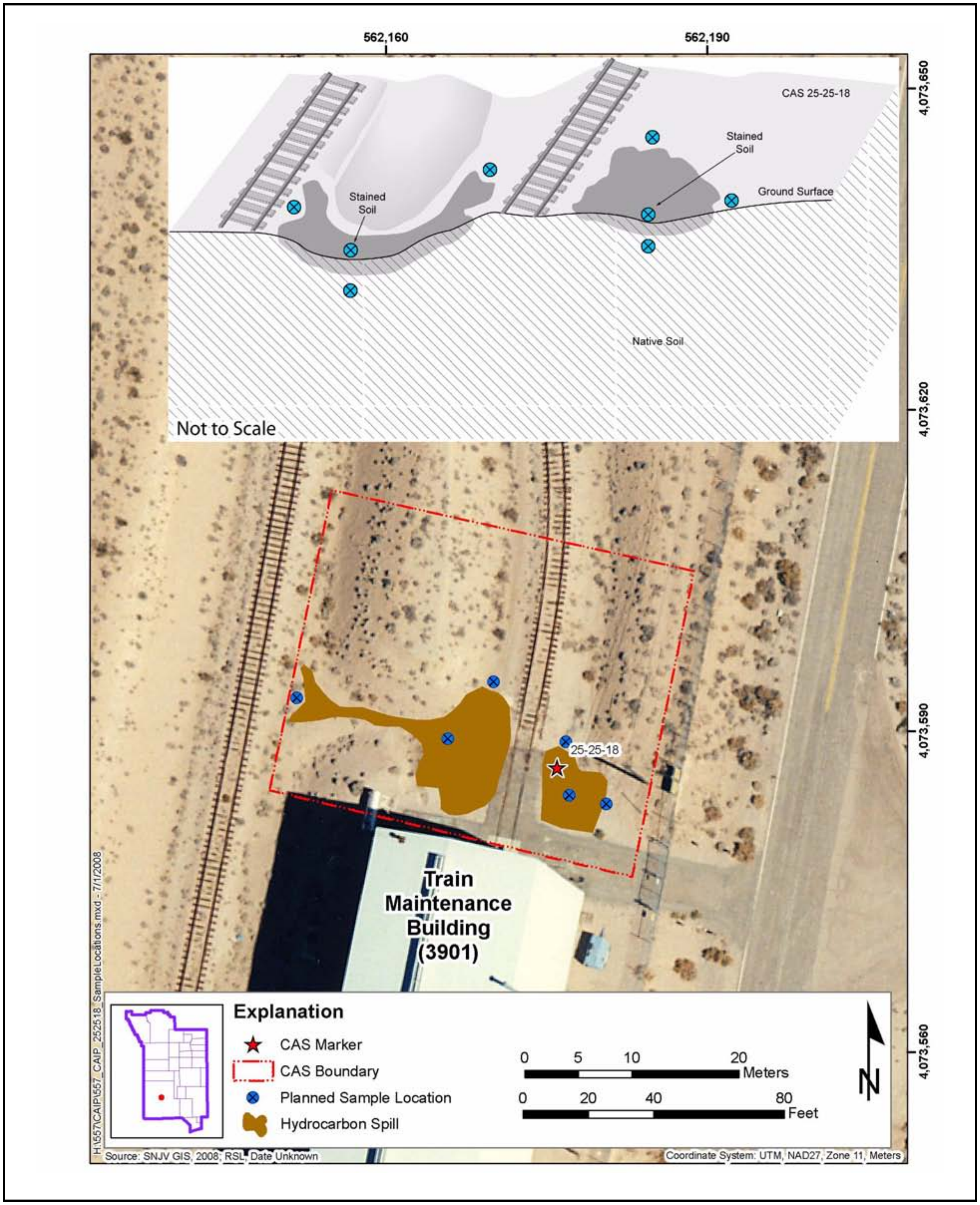

Figure A.9-4
Planned Sample Locations at CAS 25-25-18, Train Maintenance Bldg 3901 Spill Site

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Appendix B

Project Organization

B.1.0 Project Organization

The NNSA/NSO Federal Sub-Project Manager is Kevin Cabble. He can be contacted at (702) 295-5000. The NNSA/NSO Task Manager is Tiffany Lantow. She can be contacted at (702) 295-7645.

The identification of the project Health and Safety Officer and the Quality Assurance Officer can be found in the appropriate plan. However, personnel are subject to change and it is suggested that the DOE Federal Sub-Project Manager be contacted for further information. The Task Manager will be identified in the FFACO Monthly Activity Report before the start of field activities.

Appendix C

Nevada Division of Environmental Protection Comment Responses

(1 Page)

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations
Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administi

ERD.080528.0002

May 22, 2008

John B. Jones
Acting Federal Project Director
Environmental Restoration Project
National Nuclear Security Administration
Nevada Site Office
P. O. Box 98518
Las Vegas, NV 89193-8518

RE: Review of the draft Corrective Action Investigation Plan (CAIP) Corrective Action Unit (CAU) 557: Spills and Tank Sites *Federal Facility Agreement and Consent Order*

Dear Mr. Jones,

The Nevada Division of Environmental Protection, Bureau of Federal Facilities (NDEP) staff has received and reviewed the draft Corrective Action Investigation Plan (CAIP) for Corrective Action Unit (CAU) 557: Spills and Tank Sites. NDEP's review of this document did not indicate any deficiencies.

Address any questions regarding this matter to either Ted Zaferatos at (702) 486-2850, ext. 234, or me at (702) 486-2850, ext. 233.

Sincerely,

Jeff MacDougall, Ph.D.
Supervisor
Bureau of Federal Facilities

TZ

ACTION	
INFO	AMEM
NSO/MGR	✓
AMBCM	
AMEM	✓
AMNS	
AMSO	
AMSS	
COR-RAI-	
File Code	

cc: E.F. DiSanza, WMP, NNSA/NSO
FFACO Group, PSG, NNSA/NSO, Las Vegas, NV
Jeffrey Fraher, DTRA/CXTS, Kirtland AFB, NM
Wayne Griffin, SNJV, Las Vegas, NV
N.Y. Carson, SNJV, Las Vegas, NV
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