Nevada
Environmental
Restoration
Project

DOE/NV--755

Streamlined Approach for
Environmental Restoration (SAFER) Plan
For Corrective Action Unit 394:
Areas 12, 18, and 29
Spill/ Release Sites
Nevada Test Site, Nevada

Controlled Copy No.: ____
Revision No.: 0

September 2001

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**STREAMLINED APPROACH FOR ENVIRONMENTAL
RESTORATION (SAFER) PLAN
FOR CORRECTIVE ACTION UNIT 394:
AREAS 12, 18, AND 29 SPILL/RELEASE SITES
NEVADA TEST SITE, NEVADA**

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

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CORRECTIVE ACTION UNIT 394:
AREAS 12, 18, AND 29 SPILL/RELEASE SITES
NEVADA TEST SITE, NEVADA**

Approved by: _____ Date: _____

Janet Appenzeller-Wing, Project Manager
Industrial Sites Project

Approved by: _____ Date: _____

Runore C. Wycoff, Division Director
Environmental Restoration Division

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List of Acronyms and Abbreviations

AST	Aboveground storage tank
bgs	Below ground surface
CAS	Corrective Action Site
CAU	Corrective Action Unit
CFR	<i>Code of Federal Regulations</i>
COCs	Contaminant(s) of concern
COPC	Contaminant(s) of potential concern
CP	Control Point
CSM	Conceptual site model
CWMA	Controlled Waste Management Area
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DQI	Data Quality Indicators
DQO	Data Quality Objective
EC	Environmental compliance
EPA	U.S. Environmental Protection Agency
ERD	Environmental Restoration Division
FFACO	<i>Federal Facility Agreement and Consent Order</i>
FSR	Field-screening results
ft	Foot (feet)
ft ²	Square foot (feet)
HASP	Health and Safety Plan
HDPE	High-density polyethylene
HWAA	Hazardous waste accumulation area
IDW	Investigation-derived waste
in.	Inch(es)

List of Acronyms and Abbreviations (Continued)

ISMS	Integrated Safety Management System
ITLV	IT Corporation, Las Vegas
LLW	Low-level radioactive waste
mg/kg	Milligram(s) per kilogram
mi	Mile(s)
MS/MSD	Matrix spike/matrix spike duplicate
NAC	<i>Nevada Administrative Code</i>
NDEP	Nevada Division of Environmental Protection
NNSA/NV	National Nuclear Security Administration Nevada Operations Office
NTS	Nevada Test Site
NTSWAC	<i>Nevada Test Site Waste Acceptance Criteria</i>
PAL	Preliminary action level
PCB	Polychlorinated biphenyls
PID	Photoionization detector
POC	<i>Nevada Test Site Performance Objective for Certification of Nonradioactive Hazardous Waste</i>
PPE	Personal protective equipment
ppm	Part(s) per million
PRG	Preliminary remediation goal
QA	Quality assurance
QAPP	<i>Quality Assurance Project Plan</i>
QC	Quality control
RCRA	<i>Resource Conservation and Recovery Act</i>
REC	Recognizable environmental condition
RPD	Relative percent difference
RWMS	Radioactive Waste Management Site
SAA	Satellite Accumulation Area

List of Acronyms and Abbreviations (Continued)

SAFER	Streamlined Approach for Environmental Restoration
SD	Standard deviation
SSHASP	Site-specific health and safety plan
SVOC	Semivolatile organic compound(s)
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total petroleum hydrocarbon(s)
UST	Underground storage tank
VOC	Volatile organic compound
yd ³	Cubic yard(s)

Executive Summary

This Streamlined Approach for Environmental Restoration (SAFER) Plan addresses characterization and closure for Corrective Action Unit (CAU) 394, Areas 12, 18, and 29 Spill/Release Sites, identified in the *Federal Facility Agreement and Consent Order*. Corrective Action Unit 394 consists of the following six Corrective Action Sites (CASs):

- CAS 12-25-04, UST 12-16-2 Waste Oil Release
- CAS 18-25-01, Oil Spills
- CAS 18-25-02, Oil Spills
- CAS 18-25-03, Oil Spill
- CAS 18-25-04, Spill (Diesel Fuel)
- CAS 29-44-01, Fuel Spill

Corrective Action Site 29-44-01 has two environmental concerns: a potential release site associated with an aboveground storage tank and an unrelated soil stain. Therefore, this CAS has been divided into (a) and (b) sites.

This plan provides the methodology for field activities needed to gather the necessary information for closing each CAS. There is sufficient information and process knowledge from historical documentation regarding the expected nature and extent of potential contaminants to recommend closure of CAU 394 using the SAFER process.

The Data Quality Objective process developed for this CAU identified three potential closure options: (1) clean closure by remediation and verification; (2) investigation and confirmation that no contamination exists above preliminary action levels (PALs) leading to a no further action declaration; or (3) characterization of the nature and extent of contamination leading to closure in place. Individual CASs were assigned to groups based on the preferred closure option selected for the CAS as follows: Group #1 - clean closure; Group #2 - no further action; and Group #3 - closure in place. The preferred closure options were selected based on available information including contaminants of potential concern, future land use, and assumed risks. A decision flow process to outline the collection of the data necessary to achieve closure was formulated for each group.

The following text summarizes the types of activities that will complete closure of CAU 394:

- Perform site preparation activities (e.g., utilities clearances, earth moving to provide access to sample locations).
- Excavate contaminated soil at Group #1 sites and verify all contaminants have been removed. Collect environmental samples from designated target populations (e.g., locations around excavations) and submit for laboratory analyses to confirm or disprove all contaminants of concern (COCs) above PALs have been removed.
- Perform preliminary investigation at Group #2 sites to determine if contamination above PALs is present, and promote site to Group #3, if necessary. Investigation consists of site reconnaissance, documenting site observations including field screening, and collection of environmental samples from designated target populations (e.g., potentially contaminated locations) for laboratory analyses to confirm or disprove COCs above PALs are present.
- Perform site characterization activities at Group #3 sites to define the nature and extent of contamination in order to support closure in place. Collect environmental samples from bias locations to confirm or disprove presence of COCs (i.e., nature of contamination) if this data does not already exist. Collect environmental samples from designated target populations (e.g., clean soil adjacent to contaminated soil) and submit for laboratory analyses to define the extent of contamination.
- Confirm the preferred closure option is sufficient to protect human health and the environment or select alternative closure option, based on validated analytical data and professional judgement.
- Close the underground storage tank piping at CAS 12-25-04 in accordance with *Nevada Administrative Code* regulations.
- Perform housekeeping activities for debris at various CASs. Collect verification samples for any soil removal activities associated with either housekeeping and/or clean closure and submit for laboratory analyses for appropriate COCs.
- Document all completed closure activities for CAU 394 in a Closure Report.

Under the *Federal Facility Agreement and Consent Order*, the SAFER Plan will be submitted to the Nevada Division of Environmental Protection (NDEP) for approval. Field work will be conducted following approval of the plan. On completion of the field activities, a Closure Report will be prepared and submitted to the NDEP for review and approval.

1.0 Introduction

This Streamlined Approach for Environmental Restoration (SAFER) Plan addresses the actions necessary for the closure of Corrective Action Unit (CAU) 394, Areas 12, 18, and 29 Spill/Release Sites, identified in the *Federal Facility Agreement and Consent Order* (FFACO) (1996). This CAU contains six Corrective Action Sites (CASs) located within Areas 12, 18 and 29 of the Nevada Test Site (NTS) ([Figure 1-1](#)). The NTS is approximately 65 miles (mi) northwest of Las Vegas, Nevada. The six CASs that comprise CAU 394 are as follows:

- CAS 12-25-04, UST 12-16-2 Waste Oil Release
- CAS 18-25-01, Oil Spills
- CAS 18-25-02, Oil Spills
- CAS 18-25-03, Oil Spill
- CAS 18-25-04, Spill (Diesel Fuel)
- CAS 29-44-01, Fuel Spill

Corrective Action Site 29-44-01 has two distinct, recognizable environmental conditions (RECs). These distinct RECs have site elements that necessitate the creation of different conceptual site models (CSMs) and selection of preferred closure alternatives. Therefore, this CAS has been divided into (a) and (b) sites, so the individual RECs can be addressed separately (see [Section 2.0](#) for details).

1.1 SAFER Process

There is sufficient information and process knowledge about the nature and/or extent of contaminants of potential concern (COPCs) to recommend closure of CAU 394 using the SAFER process (FFACO, 1996). The objective of the SAFER process will be to document and verify the adequacy of existing information, affirm the closure decision, and to provide sufficient data to implement the corrective action, if necessary. This process uses Data Quality Objectives (DQOs) to define the type and quality of data needed to complete the investigation and the observational approach for managing uncertainty and planning decision making. The Data Quality Objective process developed for this CAU identified three potential closure options: (1) clean closure by remediation and verification; (2) investigation and confirmation that no contamination exists above preliminary action levels (PALs), leading to a no further action declaration; or (3) characterization of the nature and extent of contamination leading to closure in place. Individual CASs were assigned to groups based on the

Figure 1-1
Nevada Test Site, Nye County, NV

preferred closure option selected for the CAS as follows: Group #1 - clean closure; Group #2 - no further action; and Group #3 - closure in place. The preferred closure options were selected based on available information including contaminants of potential concern, future land use, and assumed risks (see [Section A.2.0](#)).

The SAFER concept recognizes that technical decisions may be based on incomplete but sufficient information, as well as the experience of the decision maker. Uncertainties are addressed through documented assumptions that are verified by sampling and analyses, data evaluation, on-site observations as planned activities progress, and developing any necessary contingency and monitoring plans. The remediation and closure may proceed simultaneously with site characterization as sufficient data are gathered to confirm or disprove the assumptions made in selecting the closure method. If at any time during site closure new information is developed to indicate that the closure method should be revised, the closure activities will be redirected to more appropriately protect human health and the environment.

The decision process for closure of CAU 394 is summarized in [Figure A.2-1](#) in [Appendix A](#). This decision process has three starting points, one for each potential preferred closure option. Clean closure is the preferred alternative for Group #1 CASs. These CASs will undergo remediation and confirmation sampling. No further action is the preferred alternative for Group #2 CASs. Group #2 CASs will undergo a preliminary (Phase I) investigation. If contamination is identified at Group #2 CASs, then these CASs will likely be moved into Group #3. Closure in place is the preferred alternative for Group #3 CASs. The nature and extent of potential contamination at Group #3 CASs will be characterized (Phase II investigation). Contingencies are built into the process in the event new information is developed to indicate that the selected, preferred closure option should be revised. The process ends with closure of the site and the writing of a Closure Report.

Decision points which require a consensus be reached between the U.S. Department of Energy (DOE), National Nuclear Security Administration Nevada Operations Office (NNSA/NV), and the Nevada Division of Environmental Protection (NDEP) prior to continuing are indicated in [Figure A.2-1](#) in [Appendix A](#).

1.2 Summary of Corrective Actions

The text below summarizes the types of activities that will complete closure of CAU 394. The assumptions that support these activities are documented in the [Section A.1.0](#) and [A.2.0](#) of [Appendix A](#). Additional details regarding these activities are provided in [Section 3.0](#) and [Appendix A](#):

- Perform site preparation activities (e.g., utilities clearances, earth moving to provide access to sample locations).
- Excavate contaminated soil at Group #1 sites and verify all contaminants have been removed. Collect environmental samples from designated target populations (e.g., locations around excavations) and submit for laboratory analyses to confirm or disprove that all contaminants of concern (COCs) above preliminary action levels (PALs) have been removed.
- Perform preliminary investigation at Group #2 sites to determine if contamination above PALs is present, and promote site to Group #3, if necessary. Investigation consists of site reconnaissance, documenting site observations including field screening, and collection of environmental samples from designated target populations (e.g., potentially contaminated locations) for laboratory analyses to confirm or disprove that COCs above PALs are present.
- Perform site characterization activities at Group #3 sites to define the nature and extent of contamination in order to support closure in place. Collect environmental samples from bias locations to confirm or disprove presence of COCs (i.e., nature of contamination) if this data does not already exist. Collect environmental samples from designated target populations (e.g., clean soil adjacent to contaminated soil) and submit for laboratory analyses to define the extent of contamination.
- Confirm the preferred closure option is sufficient to protect human health and the environment or select alternative closure option, based on validated analytical data and professional judgement.
- Close the underground storage tank (UST) piping at CAS 12-25-04 in accordance with *Nevada Administrative Code* (NAC) regulations.
- Perform housekeeping activities for debris at various CASs. Collect verification samples for any soil removal activities associated with either housekeeping and/or clean closure and submit for laboratory analyses for appropriate COCs.

1.3 SAFER Plan Contents

This SAFER plan has been developed to support the proposed data collection and closure activities for CAU 394. The format of this Plan is as follows:

- [Section 1.0](#) provides an introduction to this project and the SAFER process.
- [Section 2.0](#) provides site locations and descriptions.
- [Section 3.0](#) provides a detailed description of the planned field activities and closure objectives.
- [Section 4.0](#) provides information on the reports and records to be generated during the investigation and closure activities.
- [Section 5.0](#) discusses the waste management issues for the investigation and remediation.
- [Section 6.0](#) discusses the project quality assurance (QA) and quality control (QC) requirements.
- [Section 7.0](#) provides a list of project references.
- [Appendix A](#) provides the DQOs formulated for this CAU.
- [Appendix B](#) provides the Project Organization.

2.0 Unit Description

This section presents the description of the CAU including history, location, process knowledge, and closure standards.

2.1 History

Corrective Action Unit 394 (Areas 12, 18, and 29 Spill/Release Sites) consists of six CASs. Three of the CASs are located in the vicinity of the former Control Point (CP) in Area 18. In some of the historical documents, the Area 18 CP is also referred to as CP 17, 17 Camp, 18 Camp, or Pahute Mesa CP. In this document, the terms Area 18 Camp or Area 18 will be used unless information is taken from a direct quote.

The following sections provide brief operational histories and descriptions of the CASs that comprise CAU 394.

2.1.1 CAS 12-25-04, UST 12-16-2, Waste Oil Release

Corrective Action Site 12-25-04 consists of a documented release of waste oil from UST 12-16-2 at Building 12-16 in Area 12 (FFACO, 1996). Building 12-16 was used as the light duty shop (or lube shop) for Area 12 from roughly 1965 to the early to mid-1990s, when it was closed. Waste oil was accumulated and stored in UST 12-16-2 prior to disposal (REECo, 1979). The waste oil release was originally discovered in July 1992, when stained soil was noted in an excavation approximately 10 feet (ft) to the south and east of UST 12-16-2. This excavation was intended to be used for the construction of a concrete pad for an aboveground storage tank (AST) to replace UST 12-16-2 (Madsen, 1992b). The stained soil was sampled for a full suite of analysis. Only oil was found to exceed the regulatory limits (100 milligrams per kilogram [mg/kg]) (Burhoe, 1993). The release was determined to have exceeded the reporting limits for hydrocarbon spills and was reported to the State of Nevada and assigned the case number H920723D (DOE/NV, 1992b).

Underground storage tank 12-16-2 was removed from the ground on October 12, 1992. Additional staining was noted under the UST when it was removed (REECo, 1993b). Sample results indicate the soil in the area is contaminated with oil and potentially solvents (Clark, 1992). Additional sample results from sludge inside the tank indicate the oil in the tank was contaminated with solvents

(Madsen, 1992a). Both the excavation for the replacement AST and the excavation for the removal of UST 12-16-2 remain open (see [Figure 2-1](#) and [Figure 2-2](#)). The RECs at the site consist of the contaminated soil/excavations, a steel box located at the northwest corner of the UST 12-16-2 excavation, and two pipes protruding from the west side of the UST 12-16-2 excavation. As described by a former worker at Building 12-16, the steel box was used to drain used oil filters. This box may have been connected by a pipe to UST 12-16-2 (Gonzales, 2001). The two pipes protruding from the west side of the UST 12-16-2 excavation are capped and believed to be the inflow pipes to the former UST (IT, 2001).

Figure 2-1
Replacement AST Excavation (CAS 12-25-04)

2.1.2 CAS 18-25-01, Oil Spills

Corrective Action Site 18-25-01 is described as “oil spills” at the Area 18 Camp Gas Station (FFACO, 1996). This site was recorded during the original inventory of inactive and abandoned wastes sites at the NTS in 1991. The original site inventory form describes the site as follows: “copious oil spills, various sizes, located near and around the old Gas Station 17 Camp” (REECo, 1991b).

Figure 2-2
UST 12-16-2 Excavation (CAS 12-25-04)

Engineering drawings indicate the service station was in operation by 1964 or 1965. It is unknown when operations were ceased.

Current surface conditions at the site consist of areas of gravel and weathered asphalt, areas of sediment from a recent flood event (erosion of the site appears to be limited), and several concrete pads and the pump islands. It could not be determined during a site visit if there is an intact layer of asphalt at the site. Individual stains were not identifiable in available pictures or during site visits (IT, 2001).

The USTs for this gas station were originally located southwest of the service station (REECo, 1993a) and are not included in the scope of this CAS.

As described in the DQOs ([Appendix A](#)), surface stains will not be investigated because they are indistinguishable from the asphalt and would not likely have been due to releases of reportable quantities. The environmental problem that will be investigated at this CAS is larger spills of fuel or other liquids as might be expected at a service station. The service station dispensed both gasoline

and diesel, and potentially provided maintenance services for vehicles. These activities may have contributed to larger releases of oils and/or fuels in the vicinity of the fuel pumps and/or the mechanics shelter that may meet the criteria for a State of Nevada reportable release(s) (e.g., greater than 3 cubic yards [yd³] of contaminated soil [NAC, 2000d]). The investigation will focus on the subsurface manifestations of such potential releases.

2.1.3 CAS 18-25-02, Oil Spills

Corrective Action Site 18-25-02 consists of contaminated gravel and soil at the location of a former generator shack at the Area 18 Camp. This site was recorded during the original inventory of inactive and abandoned wastes sites at the NTS in 1991. The original site inventory form describes the site as follows: “large area of oil spilled on the ground inside the old generator shack (17 Camp)” (REECo, 1991b). No engineering drawings or other historical documentation could be found for this building other than those that describe it simply as a generator shack. Area wide (i.e., Area 18 Camp), as-built engineering drawings in which the location of the shack is noted are dated 1964 and 1966 (Holmes and Narver, 1964b; Stearns and Rogers, 1966). Based on these drawings, it appears the generator shack was in operation by 1964 or 1965. Based on interviews with NTS employees, operations at the Area 18 camp ceased by 1970 (McGlothlin, 2001; Rakow, 2001a). Based on notes taken during IT Corporation, Las Vegas (ITLV) field visits, the shack was demolished sometime between 1993 and 1997. The curbing for the foundation is still in place as are several concrete pads within the curbing. The remaining area inside the curbing is filled with pea gravel, some areas of which are darkly stained (see [Figure 2-3](#)). It is unknown if there is a solid concrete foundation under the pea gravel (IT, 2001).

There are three RECs at this site. The first consists of the contaminated media including the pea gravel inside the curbing, the concrete pads inside the curbing, and the curbing itself. The second is a small diameter soil stain at the mouth of a pipe protruding from the ground just to the east of the curbing. The terminus of the pipe is unknown. The third REC is electrical equipment located directly to the north of the curbing. The electrical equipment may have contributed to the presence of polychlorinated biphenyls (PCBs) in samples collected at the site (IT, 2001). Samples of the gravel collected inside the curbing in 1998 indicated chromium, arsenic, and PCBs above PALs. Several volatile organic compounds (VOCs) were also identified. Total petroleum hydrocarbon results were inconclusive (Bordelois, 1998a), likely due to matrix interference.

Figure 2-3
Foundation of Generator Shack (CAS 18-25-02)

2.1.4 CAS 18-25-03, Oil Spill

Corrective Action Site 18-25-03 consists of contaminated soil at the former location of an AST. The AST was used to store diesel fuel to run a generator(s) at the Area 18 CP (REECo, 1991b). This CAS is located approximately 10 to 20 ft north of CAS 18-25-02. This site was recorded during the original inventory of inactive and abandoned wastes sites at the NTS in 1991. The original site inventory form describes the site as follows: “oil spill approximately 6 to 8 square feet (ft²) located under the above ground fuel tank, about 300 gallon capacity, adjacent to the old generator shack” (REECo, 1991b). The tank can be seen in [Figure 2-4](#), a historic photograph taken in 1991. Although the picture is of poor quality, it does show a concrete block under the southeast leg. This block is still currently on site and can be used to accurately locate the former location of the AST. The dates of operation of this tank are assumed to be the same as those of the generator shack. The AST was removed sometime between 1991 and 1997. The current site conditions are shown in [Figure 2-5](#).

There are three RECs at this site. The first consists of the visible soil stain and debris potentially impacted by the release. The second is a set of concrete AST cradles to the east of the soil stain. These cradles appear to have held a much larger tank. This tank is not currently described in the FFACO as an independent CAS (FFACO, 1996). Based on an engineering drawing that indicates

Figure 2-4
Historical Photograph of CAS 18-25-03 Taken in 1991

Figure 2-5
Current Photograph of CAS 18-25-03 Taken in 2001

there was more than one diesel tank at the location (author unknown, 1976), it is believed this tank was also used to store diesel. There are no visible stains around the concrete tank cradles. The third REC is the electrical equipment located directly to the west of the soil stain. The electrical equipment may have contributed to the presence of PCBs in samples collected at the site. Samples of soil within the stained area indicated low levels of PCBs and VOCs were present. The results for semivolatile organic compounds (SVOCs) and TPHs were inconclusive (Bordelois, 1998b), likely due to matrix interference.

2.1.5 CAS 18-25-04, Spill (Diesel Fuel)

Corrective Action Site 18-25-04 consists of a documented diesel and oil release at the Pahute Mesa Airstrip in Area 18. This site was recorded during the original inventory of inactive and abandoned wastes sites at the NTS in June of 1991. The original site inventory form describes the site as follows: “diesel fuel leakage noted under generator. Standing liquid noted at time of visit and soil staining observed” (REECo, 1991b). Several actions were taken in the months subsequent to the original identification. The site was inspected by contractor environmental compliance (EC) personnel on July 22, 1991 (Haworth, 1991a). The release was determined to have exceeded the reporting limits for hydrocarbon spills and was reported to the State of Nevada on July 23, 1991, and assigned the case number H910723C (Hoar, 1997). The stained soil at the site was sampled on July 29, 1991. Sample results indicated high levels of both diesel and oil contamination (Haworth, 1991b). Contaminated soil was excavated and removed from the site in November 1991 (REECo, 1991a). Based on the size of the excavation, several hundred cubic yards of material was removed. A subsequent inspection by EC personnel indicated contamination was still evident at the site (REECo, 1991a; Perkins, 2001a). No additional excavation or sampling is known to have occurred. The generators and fuel tanks responsible for the release were subsequently moved from their original location on top of the hill above the airstrip parking area to the asphalt of the parking area.

The single REC at the site is soil contamination/excavation. There is also a soil pile next to the excavation (IT, 2001). Based on interviews, this soil is believed to be “clean,” noncontaminated soil segregated from the contaminated soil during excavation to limit the amount of material hauled to the landfill (Perkins, 2001b).

2.1.6 CAS 29-44-01, Fuel Spill

CAS 29-44-01 is described as a fuel spill at the Shoshone Transmitter Site in Area 29 (FFACO, 1996). The only documentation of this site was found in the *Resource Conservation and Recovery Act (RCRA) Part B Permit Application for Waste Management Activities at the NTS*. This document describes the site only as a fuel spill occurring at the Shoshone Transmitter Site (DOE/NV, 1992a). No information on the source or exact location of this release was provided in this document or any other identified document. A historical engineering drawing and a site visit identified two potential environmental problems at the Shoshone Transmitter Site. These two potential problems are discussed in the following Sections 2.1.6.1 and 2.1.6.2.

2.1.6.1 CAS 29-44-01a, Potential Former AST Location

Historical engineering drawings indicate there was an AST at the Shoshone Transmitter Station that was removed sometime prior to 1974 (Holmes & Narver, 1974). The AST is a potential source of the release. However, several long-time NTS employees, who have worked at the site, did not recall the AST ever having been at the site, or any release at the site (Rakow, 2001b; Donahoe, 2001). A site visit identified an earthen pad that appears to be in the location where the engineering drawings indicate the AST was located (Holmes & Narver, 1974). The earthen pad is shown in [Figure 2-6](#), and is located approximately 80 ft north of the transmitter station. There was no noted staining or odor evident in this area during the latest ITLV, site visit (previous visits did not target this area) (IT, 2001).

2.1.6.2 CAS 29-44-01b, Soil Stain

Site visits to the Shoshone Transmitter Station also identified a hydrocarbon soil stain approximately 4 ft in diameter in the vicinity of the transmitter station. This stain is located approximately 100 ft east of the transmitter station and is not related to the former AST location. This stain appears to be of recent origin (i.e., within the last five years) since it was first identified in 1998 and not recorded in previous site visits conducted by ITLV (IT, 2001).

2.2 Site Location and Description

The CASs within CAU 394 are located within Areas 12, 18, and 29 of the NTS (see [Figure 1-1](#)). The following sections provide additional information on site locations and a description of each CAS. The site descriptions used in association with the CAS number in the remainder of this document are

Figure 2-6
Earthen AST Pad (CAS 29-44-01a)

not necessarily the official FFACO description. The descriptions used are meant to provide information allowing the reader to associate the CAS with a location and/or type of release. Work to be performed at these sites includes excavation and removal of contaminated media and debris, soil sampling for remediation verification, investigative and characterization purposes, refilling of excavations, grading of ground surfaces, and other potential closure activities. See [Section 3.0](#) for details of planned activities.

2.2.1 CAS 12-25-04, UST 12-16-2, Waste Oil Release

Corrective Action Site 12-25-04 is located on the east side of Building 12-16 in Area 12 Camp (see [Figure 2-7](#)). Building 12-16 is located on the northeast corner of the intersection of Rainier Mesa Road and the main access road into the Area 12 Camp.

The site consists of soil contaminated by a release from UST 12-16-2 and associated piping extending to the foundation of Building 12-16.

Figure 2-7
Location and Layout of CAS 12-25-04

2.2.2 CAS 18-25-01, Area 18 Service Station

Corrective Action Site 18-25-01 is located at the former service station on the southwest corner of the intersection of Pahute Mesa Road and Road 18-B (see [Figure 2-8](#)).

The site consists of potentially contaminated soil in the vicinity of the former location of the fuel pumps and the mechanics shelter.

2.2.3 CAS 18-25-02, Area 18 Generator Shack

Corrective Action Site 18-25-02 is located outside the gate to the former Area 18 CP Security Compound. The site is located on the north side of the access road (see [Figure 2-9](#)).

The site consists of soil and debris (e.g., concrete pads) contaminated as a result of poor preventative maintenance and fueling practices within and around the generator shack. Two sources of contamination at this CAS will be investigated: (1) the area within the foundation curbing of the generator shack; and (2) the stain at the end of the pipe east of the generator shack foundation.

2.2.4 CAS 18-25-03, Area 18 Generator Shack AST

Corrective Action Site 18-2-03 is located outside the gate to the former Area 18 CP Security Compound. The site is located immediately north and adjacent to CAS 18-25-02 (see [Figure 2-9](#)).

The site consists of soil and potentially debris (e.g., concrete pads) contaminated as a result of poor preventative maintenance and fueling practices of an AST that was formerly located at the site. In addition, potential contamination from a potential second AST located east and adjacent to the primary AST will be investigated.

2.2.5 CAS 18-25-04, Pahute Mesa Airstrip

Corrective Action Site 18-25-04 is located on the hill just to the north of the tarmac at the Area 18 Airstrip (see [Figure 2-10](#)).

The site consists of potentially contaminated soil as a result of a release of diesel and oil due to poor preventative maintenance and fueling operations.

Figure 2-8
Location and Layout of CAS 18-25-01

Figure 2-9
Location and Layout of CASs 18-25-02 and 18-25-03

Figure 2-10
Location and Layout of CAS 18-25-04

2.2.6 CAS 29-44-01a, Shoshone Transmitter Station AST

Corrective Action Site 29-44-01a is located approximately 80 feet (ft) to the northwest of the current location of the Shoshone Transmitter Station in Area 29 (see [Figure 2-11](#)). This location is approximately 6,800 ft above sea level.

The site consists of potentially contaminated soil as a result of a potential release from an AST, fuel line, and generator system.

2.2.7 CAS 29-44-01b, Shoshone Transmitter Station Soil Stain

Corrective Action Site 29-44-01b is located approximately 100 ft to the northeast of the current location of the Shoshone Transmitter Station in Area 29 (see [Figure 2-11](#)).

The site consists of contaminated soil associated with a release of unknown origin. There is a stain with a diameter of approximately 4 ft at the site.

2.3 Process Knowledge

Process knowledge is the basis for the development of the CSM. The CSM describes the most probable scenario for current conditions at each site, and defines the assumptions that are the basis for the SAFER plan. The assumptions are formulated from historical information and process knowledge.

The CSM for each site is documented in the following sections. Additional information on the development of CSMs for this CAU is available in [Section A.1.0](#) of [Appendix A](#).

2.3.1 CSM Elements Common to CASs in CAU 394

Groundwater impacts from potentially migrating contaminants are not expected at any of the sites. Depth to groundwater in the vicinity of each CAS is as follows:

- Area 12 Camp (CAS 12-25-04), greater than 700 ft below ground surface (bgs) (DOE/NV, 1996a; IT, 2001).
- Area 18 Camp (CASs 18-25-01, 18-25-02, and 18-25-03), greater than 1,000 ft bgs (DOE/NV, 1996a; IT, 2001).

Figure 2-11
Location and Layout of CASs 29-44-01a and 29-44-01b

- Area 18 Airstrip (CAS 18-25-04), greater than 500 ft bgs (DOE/NV, 1996a; IT, 2001).
- Shoshone Transmitter Station (CAS 29-44-01), greater than 2,500 ft bgs (DOE/NV, 1996a; IT, 2001).

Under Alternative 3 for future land use at the NTS, Area 12 is located within the Nuclear Test Zone, and Areas 18 and 29 are located within the Reserved Zone. The Nuclear Test Zone is set aside for future underground nuclear weapons test and outdoor high explosives tests. The Reserved Zone is set aside for short duration exercises and training such as nuclear emergency response and U.S. Department of Defense land-navigation exercises and training (DOE/NV, 1998). These land-use scenarios limit future land uses to industrial activities; therefore, future residential uses are not considered. Potential exposure routes to site workers from COCs in soils and/or debris include oral ingestion, inhalation, or dermal contact (absorption) through the inadvertent disturbance of contaminated soils and/or debris.

There are other CSM elements common to the majority of the CASs. The amount of source material released is unknown for all CASs. Vertical migration of COPCs is expected to be predominant over lateral migration in the absence of any barrier. A concrete barrier may be encountered at CAS 18-25-02 and bedrock may be encountered within 10 ft or less of the surface at 18-25-04, 29-44-01a, and 29-44-01b. Soil is the impacted or potentially impacted media at all the sites. However, asphalt and/or concrete is potentially impacted at CASs 18-25-01 and 18-25-02. Radionuclides are not expected at any CAS. Hydrocarbons are the primary COPC at each CAS, and can be used to guide the investigation.

2.3.2 CSM Elements for Individual CASs

The following sections provide the relevant information and assumptions (i.e., process knowledge) used to develop the CSMs for each CAS. The process knowledge presented here and/or information from future field observations will be used to select bias sampling locations. These locations are selected based on the premise that if contamination above PALs is present at any location within the site, it will be found by sampling at the selected locations. When this logic is applied the phrase: “sampling locations were optimized by applying process knowledge,” or similar wording, will be used.

2.3.2.1 CAS 12-25-04, UST 12-16-2, Waste Oil Release

Figure A.1-1 and Figure A.1-2 in Appendix A show a generalized representation of the CSM constructed for CAS 12-25-04. The following text relates information and assumptions that were used in developing the CSM.

Based on the analytical results from samples collected from the excavation for the foundation of the replacement AST, the plume from the leaking UST appears to be limited to less than 20 ft laterally from the UST excavation. Analytical results from a sample collected in the excavation for the foundation of the replacement AST in 1991 indicated TPH was the only COC detected above PALs. The level of detection (118 mg/kg) (Dodge, 1995) indicates the sample was likely collected on the edge of the plume. The location from which this sample was collected is approximately 10 ft to the southeast of the UST excavation (Dodge, 1995). Based on the extent of lateral contamination predicted by these sample results, a portion of the contaminant plume may extend under the foundation of Building 12-16.

Continuing migration of contaminants at this site is believed to be limited as the source of the release has been removed. However, the existing excavation and overhang of the roof of Building 12-16 at the site likely diverts precipitation into the site. This may lead to increased infiltration of storm water, which in turn may lead to increased mobilization of contaminants. Runoff is not likely since the excavation would trap precipitation and the excavation is too large to have overflow.

Contaminants of potential concern were selected based on documented sample results and process knowledge. Underground storage tank 12-16-2 was used to hold waste oil prior to disposal. As such, COPCs include oil and RCRA metals. In addition, based on analytical results from samples of sludge collected from inside the tank (Madsen, 1992b), the tank appears to have been used for the disposal of chlorinated solvents, fuels such as diesel and gasoline, and possibly other wastes. Therefore, VOCs, SVOCs, TPH (full range), and PCBs will also be considered COPCs. Radionuclides were analyzed for in previous samples from both the tank and the contaminated soil (Clark, 1992; Madsen, 1992b; Burhoe, 1993). Review of the radioanalytical results (Alderson, 2001) indicated no radionuclides were identified above applicable “rad added” limits of the *Nevada Test Site Performance Objective for Certification of Nonradioactive Hazardous Waste* (POC) (BN, 1995).

Based on the appearance of chlorinated solvents in the sludge sample from the tank (Madsen, 1992b) and disposal of the sludge as listed hazardous waste (REECo, 1992), if these same chlorinated solvents are identified in waste generated at the site, that waste will be managed as listed hazardous waste.

2.3.2.2 CAS 18-25-01, Area 18 Service Station

Figure A.1-3 in Appendix A shows a generalized representation of the CSM constructed for CAS 18-25-01. The following text relates information and assumptions that were used in developing the CSM.

Current surface conditions at the site consist of weathered asphalt, gravel, and sediment. Based on site drawings, the service station area was originally paved (Holmes & Narver, 1965; AEC, 1968). There is a natural wash that is directed under Pahute Mesa Road by culverts near the southeast corner of the site. This wash appears to have flooded in recent years (within the last 3 years) and may have contributed to erosion in the southeast corner of the site. This culvert appears to have been upgraded since the flood event. This construction may also have impacted the southeast corner of the site. The remainder of the site appears not to have been impacted by erosion from this event. However, the eastern side of the site (area adjacent to Pahute Mesa Road) is covered by sediment, (gravel and dirt) likely from the same flood event.

Process knowledge was used to optimize the selection of sample locations. Two areas were chosen for sampling. The first location includes the area around the fuel pumps. The subsurface soil in this area may have been contaminated as the result of multiple operational spills occurring from overfilling vehicles. Contaminants from these spills may have reached the subsurface soil through cracks in the asphalt and/or by passing through the asphalt. Leaks in the fuel pumps themselves may also have contributed to potential contamination in the area around the fuel pumps. The second location is the area in front of the mechanics shelter. This building was likely used for vehicle maintenance. There are no floor drains evident in the concrete pad that remains. Potential spills and/or releases of fluids in this building may have drained off of the concrete pad and migrated between the concrete pad and the asphalt contaminating the underlying soil.

Continuing migration of contaminants at this location is believed to be limited because the potential source(s) have been removed and the surface is flat and not conducive to erosion (surface transport).

Contaminants of potential concern were selected based on process knowledge. No previous sampling is known to have occurred at this site. Based on knowledge of service station operations, including fueling and maintenance of vehicles, COPCs at this site include TPHs (full scan), VOCs, SVOCs, RCRA metals, and PCBs.

2.3.2.3 CAS 18-25-02, Area 18 Generator Shack

Figure A.1-4 in Appendix A shows a generalized representation of a generic CSM constructed for surface releases of petroleum hydrocarbon products to an alluvial surface and shallow subsurface. The conditions at CAS 18-25-02 are consistent with this CSM except that the release of petroleum hydrocarbons also impacted debris such as concrete pads. The following text relates information and assumptions that were used in developing the CSM.

Continuing migration of contaminants at this location is believed to be limited because the potential source(s) have been removed and the surface is flat and not conducive to erosion (surface transport). Staining appears to be confined to the gravel and soil within the area of the foundation curbing (see Figure 2-3), with the exception of a small stain (approximately 12 x 6 inches [in.]) to the east of the foundation curbing. The curbing appears to have protected the staining within the foundation from run-on and runoff. Therefore, it does not appear that surface transport of contamination has occurred at this site. It is unknown if the curbing is attached to a contiguous concrete foundation under the curbing. If so, contamination is likely confined within the foundation. However, the CSM assumes the foundation is not contiguous.

Contaminants of potential concern were selected based on documented sample results and process knowledge. The release(s) and spills that caused the staining within the foundation curbing are likely from poor preventative maintenance and fueling practices in conjunction with releases from equipment within the generator shack. Previous sample analytical results indicated the presence of chromium, arsenic, and PCBs above PALs. Several VOCs were identified below PALs. Total petroleum hydrocarbon results were inconclusive (Bordelois, 1998a), likely due to matrix interference. The COPCs for this site include TPHs (oil and diesel), VOCs, SVOCs, RCRA metals, and PCBs.

2.3.2.4 CAS 18-25-03, Area 18 Generator Shack AST

Figure A.1-4 in Appendix A shows a generalized representation of a generic CSM constructed for surface releases of petroleum hydrocarbon products to an alluvial surface and shallow subsurface. The conditions at CAS 18-25-03 are consistent with this CSM. The following text relates information and assumptions that were used in developing the CSM.

Continuing migration of contaminants at this site may be limited, because the source has been removed. However, based on the topography of the site as observed during site visits, there is a potential for surface migration of contaminants from run-on and runoff. Located to the west and north and adjacent to this site are the Area 18 CP Security Compound and a former communications yard (see Figure 2-9). Also adjacent to the site is a concrete pad for electrical equipment (potentially transformers). Surface transport of contamination from the yards and electrical pad may have contributed to the presence of PCBs in samples collected from the stained soil.

Contamination from sources outside the CAS (such as PCB contamination from the communications yard) is not part of the CSM developed for this CAS. The remediation/investigation of this CAS will not attempt to characterize PCB or other contamination outside of that associated with the visible surface stain that is CAS 18-25-03. If evidence indicates contamination is migrating from a source outside of the CAS, it will be documented and potentially entered into the FFACO as an additional CAS/CAU. In such cases, NNSA/NV and NDEP will be notified and given the opportunity to comment on, or concur with, the recommendation.

Contaminants of potential concern for CAS 18-25-02 were selected based on documented sample results and process knowledge. Staining is evident at the location where a diesel AST was formerly located. The diesel AST is considered to be the source of the stain, and therefore, diesel is the primary COPC. Due to the relative closeness of CAS 18-25-02 to 18-25-03, all COPCs considered for CAS 18-25-03 will be included as COPCs for CAS 18-25-02. Therefore, the COPCs for CAS 18-25-02 include TPHs (oil and diesel), VOCs, SVOCs, RCRA Metals, and PCBs.

2.3.2.5 CAS 18-25-04, Pahute Mesa Airstrip

Figure A.1-5 in Appendix A shows a generalized representation of the CSM constructed for CAS 18-25-04. The following text relates information and assumptions that were used in developing the CSM.

Continuing migration of contaminants at this site may be limited to infiltration of contaminants transported by precipitation. The source of the release and majority of contaminated soil have been removed. However, the existing excavation at the site likely traps precipitation and some run-on. This may lead to increased infiltration of storm water, which in turn may lead to increased mobilization of contaminants. Runoff is not likely since the excavation would trap precipitation and the excavation is too large to have overflow.

Contaminants of potential concern were selected based on documented sample results and process knowledge. The source of the release was generators and associated diesel ASTs. Samples taken prior to excavation indicated tetrachloroethene was present at low levels (0.28 mg/kg). Although the majority of contaminated soil was removed, tetrachloroethene will remain a COPC. Other COPCs for this site include TPHs (oil and diesel) and VOCs.

2.3.2.6 CAS 29-44-01a, Shoshone Transmitter Station AST

Figure A.1-6 in Appendix A shows a generalized representation of the CSM constructed for CAS 29-44-01a. The following text relates information and assumptions that were used in developing the CSM.

Continuing migration of contaminants at this site may be occurring due to continuing infiltration of precipitation and erosion. Although the source of the potential release has been removed, the location and topography of the site combine to enhance the likelihood of migration. The site is located on top of a mountain and thus receives increased precipitation. The slope of the land and shallow surface soils contribute to potential erosion at the site. Since bedrock is likely to be encountered at a very shallow depth (within 10 ft bgs), the migration of contamination along the soil/bedrock interface would also be a consideration at this site if contamination is found.

Contaminants of potential concern were selected based on process knowledge. The potential source of the release is a diesel AST, associated fuel line, and generator. The COPCs for this site are limited to TPHs (diesel and oil).

2.3.2.7 CAS 29-44-01b, Shoshone Transmitter Station Soil Stain

Figure A.1-4 in Appendix A shows a generalized representation of a generic CSM constructed for surface releases of petroleum hydrocarbon products to an alluvial surface and shallow subsurface. Although the spill appears to have occurred onto fill material and not alluvium, the conditions at CAS 29-44-01b are consistent with this CSM. The following text relates information and assumptions that were used in developing the CSM.

Continuing migration of contaminants at this location may be limited because the source(s) has been removed and the surface is flat and not conducive to erosion (surface transport).

Since no previous sampling events have been conducted and the source of the spill is unknown, a wide range of COPCs will be considered. Based on visual and odorous evidence, the spill appears to be hydrocarbon in nature. The COPCs for this site include TPHs (full scan), VOCs, SVOCs, RCRA metals, and PCBs.

2.4 Closure Standards

The proposed closure standards for CAU 394 characterization and verification samples are the action levels established in the DQO process (Appendix A). Laboratory analytical results will be compared to these action levels to guide remediation and closure efforts. The extent of contamination will be bounded when a minimum of one soil sample is below the closure standards. Clean closure will be complete when verification samples of remaining soils indicate levels below the closure standards.

Per the NAC 445A.2272 (NAC, 2000c), the action level for TPH is 100 mg/kg. If TPH levels in soil above 100 mg/kg remain at a site, the site conditions will be evaluated in accordance with the NAC 459.9973 (1) (a-k) factors to determine if any corrective action will be required (NAC, 2000e). Chemical constituents will be compared to the U.S. Environmental Protection Agency (EPA) Region IX risk-based Preliminary Remediation Goals (PRGs) for industrial soils (EPA, 1996a). If constituents are encountered that have no established PRG, a protocol similar to that of EPA Region IX (risk-based calculation) may be used in establishing an action level.

Background concentrations for RCRA metals may exceed the PAL (i.e., arsenic). A sediment sampling effort performed by the Nevada Bureau of Mines and Geology (Tingley et al., 1998) provides relevant analytical data for numerous metals, including the eight RCRA metals. Statistical analysis of this data provides background concentrations (mean plus two standard deviations) applicable to soil samples collected from the NTS for investigation of CASs (Moore, 1999). When concentrations of RCRA metals are detected above the PAL but below the background concentrations, a corrective action will not be required. Sites where RCRA metals exceed the background concentration may be evaluated on a case-by-case basis to determine if corrective actions are needed.

Radionuclides are not expected; however, PALs will be established in the event additional new information or site conditions indicate that site characterization samples should be analyzed for radionuclides. The PALs for radionuclides are isotope-specific and defined as the maximum concentration for that isotope found in environmental samples taken from an undisturbed background location in the vicinity of the NTS, as presented in McArthur and Miller (1989), Atlan-Tech (1991), and Black and Townsend (1996).

3.0 Field Activities and Closure Objectives

This section of the SAFER plan provides a description of the field activities and closure objectives for CAU 394. All sampling activities will be conducted in compliance with the *Industrial Sites Quality Assurance Project Plan* (QAPP) (DOE/NV, 1996b) and other applicable, approved procedures and instructions.

Field activities will be performed in accordance with the current version of the ITLV Health and Safety Plan (HASP) (IT, 2000) and an approved site-specific health and safety plan (SSHASP) prepared prior to the field effort. As required by the NNSA/NV Integrated Safety Management System (ISMS) (DOE/NV, 1997), these documents outline the requirements for protecting the health and safety of the workers and the public, and the procedures for protecting the environment. The ISMS program requires that site personnel take every reasonable step to reduce or eliminate the possibility of injury, illness, or accidents, and to protect the environment during all project activities.

The field activities planned for each CAS are dependent upon which of the three groups the CAS is assigned, as discussed in the DQOs (see [Section A.2.0](#) of [Appendix A](#)). The groupings are based on the preferred closure alternative which, in turn, dictates the investigation approach. Group #1 consists of CASs where remediation is the preferred closure option (i.e., CASs 18-25-02, 18-25-03, 18-25-04, and 29-44-01b). Field activities at the Group #1 sites will include excavation and verification sampling. Group #2 includes CASs where no further action is the preferred closure alternative (i.e., CASs 18-25-01 and 29-44-01a). Field activities at the Group #2 sites will include site reconnaissance and confirmation sampling (i.e., Phase I site investigation). Group #3 CASs are those where close in place is the preferred closure alternative (i.e., CAS 12-25-04). Field activities at the Group #3 sites will include sampling and analysis to define the nature and extent of contamination.

[Figure A.2-1](#) in [Appendix A](#) is a decision flow diagram which shows the path to closure for each of the three groups and indicates the decision flow path for potential contingencies as dictated by the analytical data and/or observations. The groupings of the CASs can change during the course of the investigations based on new analytical data and/or observations as they become available. For example, if contamination above PALs is found at CAS 18-25-01 (a Group #2 site where no further

action was the selected preferred alternative), then CAS 18-25-01 would be moved to Group #3 for characterization and closure in place.

The remainder of [Section 3.0](#) discusses generic activities applicable at all CASs ([Section 3.1](#), [Section 3.3](#), and [Section 3.2.3](#)), specific activities for CASs in Group #1, Group #2, and Group #3 ([Section 3.2](#), [Section 3.3.2](#), and [Section 3.3.3](#)), and aspects of the investigation/closure process applicable to all CASs ([Section 3.4](#), [Section 3.5](#), and [Section 3.6](#)).

3.1 Contaminants of Potential Concern

The specific COPCs for each site are indicated in [Table 3-1](#). As described in the DQOs (see [Appendix A](#)), if during the course of a remediation or investigation, analytical data becomes available which indicates that a specific COPC is not present at a CAS, it may be eliminated from consideration (see [Figure A.2-1](#) in [Appendix A](#)).

Table 3-1
COPCs for CASs in CAU 394

CAS	TPH (gasoline)	TPH (oil and diesel)	Total VOCs	Total SVOCs	Total RCRA Metals	PCBs
12-25-04	X	X	X	X	X	X
18-25-01	X	X	X	X	X	X
18-25-02	--	X	X	X	X	X
18-25-03	--	X	X	X	X	X
18-25-04	--	X	X	--	--	--
29-44-01a	--	X	--	--	--	--
29-44-01b	X	X	X	X	X	X

X = COPC for given CAS

-- = not a COPC for given CAS

Field screening may be used to guide several of the field activities including excavation and sample location selection. The following screening levels will be used:

- TPH - screening levels are established at 75 parts per million (ppm), using an appropriate test method
- VOC - headspace screening levels are established at 20 ppm or 2.5 times background, whichever is greater, using a photoionization detector (PID)

3.2 Remediation

Remediation of known contamination is planned for Group #1 CASs and may eventually occur at Group #2 and/or Group #3 CASs (see [Figure A.2-1](#)). Based on previous sampling and/or information obtained during site visits, contamination above PALs is anticipated at Group #1 CASs. Prior to excavation, samples will be collected from bias sample locations in order to provide information for waste management and disposal decisions. Excavation will be used to remove the contaminated soil and debris. Following excavation, verification sampling will be used to confirm that all contamination has been removed.

3.2.1 Pre-Excavation Samples

Samples will be collected from CASs 18-25-02, 18-25-03, and 29-44-01b prior to excavation activities. The main objective of this sampling will be to provide the data necessary to make accurate waste characterizations, determine disposal facilities, and determine proper packaging. The analytical results for these samples may also be used to eliminate COPCs from verification sampling (see [Figure A.2-1](#) in [Appendix A](#)).

Sampling will be conducted in accordance with the following plan. Process knowledge was used to optimize the selection of sample locations. A minimum of one location (the approximate middle of the surface soil stain) will be sampled at CASs 18-25-03 and 29-44-01b and the small stain at the end of the pipe at CAS 18-25-02. A minimum of two locations will be sampled within the generator shack foundation at CAS 18-25-02. Locations will be finalized in the field based on site observations, including visual evidence of staining. Samples will be collected from a depth of 0 to 6 in. and 12 to 18 in. bgs at each location. The 0 to 6-in. bgs sample will be representative of near-surface conditions, where COPCs which tend not to migrate (e.g., PCBs) will likely be located if present. The 12 to 18-in. bgs sample will be representative of deeper subsurface conditions where

complete volatilization of compounds may not have occurred. Manual collection techniques, such as excavation and/or hand auguring, will be used to collect the samples. If refusal is met prior to attaining the planned depth, samples will be collected as near as possible to the planned depth/location.

Each sample collected will be submitted to the laboratory for analysis of the COPCs identified in [Table 3-1](#). In addition, samples from CAS 18-25-02 will be analyzed by the toxicity characteristic leaching procedure (TCLP) for RCRA metals. Although radiological constituents are not expected, negative sample results may be necessary to meet waste acceptance criteria. Therefore, a minimum of one sample from each CAS will be submitted for gamma spectroscopy, isotopic uranium, and isotopic plutonium. Samples submitted for laboratory analysis will be analyzed according to [Table 6-2](#). If site observations and/or waste acceptance criteria dictate, additional samples may be collected for waste characterization purposes as excavation progresses.

In addition to the soil samples, samples of concrete and/or other debris may be collected for waste characterization purposes. Decisions to sample debris will be based on field conditions (e.g., staining, location of debris) and waste acceptance criteria of potential disposal locations. The analyses required for debris samples will be determined on a case by case basis. At a minimum, the stained portions of the concrete pads at CASs 18-25-02 and 18-25-03 will be sampled for characterization as potential PCB waste. All waste will be managed in accordance with [Section 5.0](#).

3.2.2 Excavation

At Group #1 CASs, manual or mechanical (e.g., backhoe) excavation techniques will be used to remove contaminated soil and debris, as necessary. Site observations including visual indications of staining, odor, and field screening will be used to guide the excavation activities. Excavations may be left open until verification sample results are available, validated, and a determination is made that all contamination has been removed. In the event a determination is made to move a Group #1 site to Group #3 for characterization (see [Figure A.2-1](#) in [Appendix A](#)), the excavation may be backfilled. Prior to the completion of field activities, all excavations will be backfilled with clean fill and contoured to match the surrounding area.

3.2.2.1 CAS 18-25-02, Area 18 Generator Shack

Excavation activities at CAS 18-25-02 will consist of removing contaminated soil and debris (e.g., concrete pads) from inside the foundation curbing. If necessary, the curbing will be removed. If a contiguous concrete foundation is attached to the curbing, it will be inspected. If staining and/or cracking is evident, the concrete will be removed.

The contaminated soil at the end of a pipe just to the east of the generator shack foundation will also be excavated.

3.2.2.2 CAS 18-25-03, Area 18 Generator Shack AST

Excavation activities at CAS 18-25-03 will consist of removing contaminated soil and debris from the area of the surface soil stain.

3.2.2.3 CAS 18-25-04, Pahute Mesa Airstrip

Previous excavation activities were conducted at CAS 18-25-04 in 1991. Therefore, no excavation activities are planned prior to the collection of verification samples.

Upon verification that contamination above PALs has been removed, the soil pile to the west of the excavation may be used to backfill the excavation. Field-screening and field observations will be used to segregate soil from the pile that may contain TPH at concentrations above PALs. Field-screening for TPH will be performed for approximately every 20 yd³ of soil moved. Soil determined to exceed the NDEP action level for TPH will be managed as hydrocarbon waste in accordance with [Section 5.0](#). The removal of all contaminated soil will be verified through the collection and laboratory analysis of soil samples.

3.2.2.4 CAS 29-44-01b, Shoshone Transmitter Station Soil Stain

Excavation activities at CAS 29-44-01b will consist of removing contaminated soil from the area of the surface soil stain.

3.2.3 Management of Excavated Soil and Associated Debris

Soil and associated debris (e.g., concrete) removed during excavation and/or sampling activities will be managed on site either by (1) containerizing and managing as waste in accordance with [Section 5.0](#), (2) placing back into the hole or excavation in the approximate location from which it

originated (soil only), or (3) berming and covering. Soil managed by berming and covering may be returned to the excavation or managed as waste, and transported off site for disposal.

Soil sample results may be applied to associated debris for the purposes of waste characterization, where the debris is not sampled directly (see [Section 3.2.1](#)). The Site Supervisor will determine if concrete or other debris needs to be sampled independently, based on field conditions and waste acceptance criteria of potential disposal locations.

3.3 Verification

Verification sampling will occur at Group #1 CASs after remediation. Verification sampling may also eventually occur at Group #2 and Group #3 CASs. However, investigative and/or characterization sampling must first occur at Group #2 and Group #3 CASs (see [Figure A.2-1](#)).

3.3.1 Verification Sampling

Following excavation activities, samples will be collected to verify all contamination has been removed. The number and location of verification samples will be determined in the field. Consistent with the *Sectorized Clean-up Work Plan for Housekeeping Category Waste Sites*, a minimum of one sample is needed for each distinct stained area where less than 3 yd³ of soil is removed (DOE/NV, 2000b). This sample will be collected from the approximate center of the bottom of the excavation. A minimum of five verification samples will be collected from any hydrocarbon release site where more than 3 yd³ of soil is removed. These samples typically will be collected from the bottom and each of the four side walls of the excavation. Sidewall samples are collected from the zone of impacted soil. The final locations and numbers of verification samples to be collected will be determined in the field based on site conditions and the professional judgement of the Site Supervisor.

Each sample collected will be submitted for laboratory analysis for the COPCs identified in [Table 3-1](#). If analytical results are above closure standards, additional soil excavation and verification sampling will be conducted until the closure criteria are met. If more than one round of excavation and verification sampling is required, COPCs may be eliminated from subsequent rounds based on validated analytical data and professional judgement of the Site Supervisor (see [Figure A.2-1](#) in [Appendix A](#)). Additional samples may be collected for waste management purposes.

The Site Supervisor will determine if verification samples need to be collected from potentially contaminated debris (e.g., concrete pads) left at the site.

The following sections provide specific information on the planned verification sampling at Group #1 CASs.

3.3.1.1 CAS 18-25-02, Area 18 Generator Shack

The location and target populations for verification sampling will depend on the condition of the generator shack foundation. If the foundation is not contiguous, verification sampling will target the concentrations of COCs in soil at locations adjacent to the excavation. If a contiguous foundation is intact under the contaminated soil and left in place, verification samples will target the concentrations of COCs in soil adjacent to this foundation. The final number and location of verification samples will be determined in the field. The proposed locations of verification samples are shown in [Figure A.3-1](#) in [Appendix A](#).

If the foundation is contiguous and it is determined that it should be left in place, a minimum of three verification samples will be collected from the concrete.

3.3.1.2 CAS 18-25-03, Area 18 Generator Shack AST

Verification sampling will target concentrations of COCs in soil adjacent to the excavation. The final number and location of verification samples will be determined in the field. The proposed locations of verification samples are shown in [Figure A.3-1](#) in [Appendix A](#).

Additional sample locations are also shown in [Figure A.3-1](#). Samples will be collected at these additional locations to verify (1) contaminant migration to CAS 18-25-03 from an upgradient source(s), (2) the full extent of contamination from CAS 18-25-03 has been removed in the downgradient direction from the soil stain, and (3) there are no other release sites in CAS 18-25-03 associated with the concrete cradles to the east of the soil stain. Sample depths will be selected in the field based on observations including field screening. If no indication of contamination is found at the additional sample locations, samples will be collected at approximately 6 and 18 in. bgs.

3.3.1.3 CAS 18-25-04, Pahute Mesa Airstrip

Verification sampling will target concentrations of COCs in soil adjacent to the excavation. The proposed locations of verification samples are shown in [Figure A.3-2](#) in [Appendix A](#). Locations for verification samples will include the approximate center of the excavation. Samples will be collected approximately every 2 ft to a minimum depth of 4 ft bgs. Additional sample locations will include points along each edge of the excavation at the approximate mid-point as indicated in [Figure A.3-2](#). Samples will be collected approximately every 5 ft to the approximate depth of the existing excavation or to bedrock, whichever is first.

3.3.1.4 CAS 29-44-01b, Shoshone Transmitter Station Soil Stain

Verification sampling will target concentrations of COCs in soil adjacent to the excavation. The locations of verification samples at CAS 29-44-01b will be determined in the field based on the amount of contaminated soil removed.

3.3.2 Field Activities for Group #2 CASs - Phase I Investigation

There are no confirmed releases to soil at Group #2 sites. However, based on process knowledge, there is a potential for contamination to be present at these CASs. Site reconnaissance and confirmation sampling will be used to determine the presence of contamination above PALs.

Site reconnaissance, including documentation of visual observations and field screening, will be used to determine if field observations indicate contamination above PALs is present. If site observations indicate contamination above PALs is likely present, the site will be promoted to Group #3 for Phase II characterization. Otherwise, confirmation samples will be collected.

The objective of confirmation sampling is to determine whether COC concentrations are present above PALs. Analytical results will be used to confirm the presence or absence of COPCs at concentrations exceeding PALs. Biasing factors to be considered when selecting the sample locations for this investigation are discussed in [Section A.4.3](#) and [Table A.4-1](#) of [Appendix A](#). The Site Supervisor will use professional judgement and process knowledge including additional biasing factors documented in the field (e.g., field-screening results) to optimize the confirmation sampling locations. Additional samples may be collected for waste management purposes.

If analytical results of confirmation samples indicate contamination above PALs is present, the site will be promoted to Group #3 for Phase II characterization. Otherwise, the site will be deemed clean and no further action will be necessary (see [Figure A.2-1](#) in [Appendix A](#)).

Each sample collected will be submitted for laboratory analysis for the COPCs identified in [Table 3-1](#).

3.3.2.1 CAS 18-25-01, Area 18 Service Station

Site reconnaissance at CAS 18-25-01 will consist of using either drilling or direct-push techniques to observe subsurface soil conditions at the locations, shown in [Figure A.4-1](#) in [Appendix A](#).

Observations will be recorded continuously to a minimum depth of 6 ft. Field screening will be recorded at approximately 2-ft intervals to a minimum depth of 6 ft. The first interval will be at either 2 ft bgs or 2 ft below the asphalt/soil interface, if asphalt exists at the location. The purpose of the field screening is to identify biasing factors for selection of confirmation sample locations and additional negative data. Therefore, if contamination is evident, field screening does not need to occur every 2 ft and will only be used as needed. Material overlaying asphalt will not be investigated.

Confirmation sampling at CAS 18-25-01 will target COPCs in soils underneath the asphalt near the pump islands and on the east side of the concrete foundation of the former mechanics shelter.

Concentrations of contaminants that can be associated with the asphalt are not part of the target population. In order to differentiate between contaminants associated with the asphalt and those due to potential releases, a minimum of three samples of the asphalt will be collected for comparison to soil samples.

Confirmation sampling will consist of using either drilling or direct-push techniques to collect subsurface soil samples at the locations shown in [Figure A.4-1](#) in [Appendix A](#). Information gathered during the site reconnaissance will be used to determine the final sample collection locations. In the absence of additional biasing information, a minimum of one sample will be collected from each location, at a depth of 4 ft. The depth will be measured either from the surface or 4 ft below the asphalt/soil interface, if asphalt exists at the location.

3.3.2.2 CAS 29-44-01a, Shoshone Transmitter Station AST

Site reconnaissance at CAS 29-44-01a will consist of using either direct-push or manual techniques to observe surface and subsurface soil conditions at the locations, shown in [Figure A.4-2](#) in [Appendix A](#). Observations including TPH field screening will be recorded at depths of 6 and 12 in. bgs.

Confirmation sampling at CAS 29-44-01a will target concentrations of diesel and oil within the surface and shallow subsurface soil adjacent to the former locations of the system components (e.g., AST, fuel line, and generator). Confirmation sampling will consist of using either direct-push techniques or manual techniques to collect soil samples at the locations, shown in [Figure A.4-2](#) in [Appendix A](#). Information gathered during the site reconnaissance will be used to determine the final sample collection locations. In the absence of additional biasing information, a minimum of two samples will be collected from each sample location. These samples will be collected at approximate depths of 6 and 12 in. bgs.

3.3.3 Field Activities for Group #3 CASs - Phase II Investigation

Group #3 sites consist of CASs where COCs above PALs have been confirmed by analytical data (e.g., CAS 12-25-04), or CASs from Group #2 where COCs are determined to likely exceed PALs based on site observations (e.g., excessive staining or positive field-screening results). Currently, Group #3 consists only of CAS 12-25-04. However, any of the CASs in Group #1 or Group #2 could be promoted to Group #3 (see [Figure A.2-1](#)) based on contingency planning, as detailed in the DQOs ([Appendix A](#)). Analytical results from this phase will be used to determine the nature and extent of contamination that exceeds PALs and to provide information to support the preferred closure alternative, closure in place.

The nature of contamination will be determined based on the results of samples collected from bias locations. The objective of bias sampling is to determine whether COC concentrations are present above PALs. Analytical results will be used to confirm the presence or absence of COPCs, and whether the concentrations exceed PALs. Process knowledge will be used to optimize the selection of bias sample locations. Final locations will be determined by the Site Supervisor based on the culmination of biasing data generated throughout the investigation including information gathered

during initial activities for Group #1 and Group #2 sites. Additional samples may be collected for waste management purposes.

Extent of contamination is the area of contiguous contamination with COC concentrations above PALs. Lateral and vertical extent of contamination will be bounded by analytical results that indicate concentrations of COCs below PALs. If any of the step-out analytical results indicate COCs above PALs, additional step-out locations will be sampled until COC concentrations below PALs have been achieved. If results indicate the extent of contamination extends beyond the spatial boundaries listed in [Table A.3-3](#), [Table A.4-3](#), and [Table A.5-3](#) and/or an increasing trend in contaminant concentrations, the conceptual model has failed and the investigation may need to be rescoped.

A minimum of one “clean” sample collected below the zone of contamination is needed to establish vertical extent.

A minimum, one “clean” sample from each step-out location is needed to establish lateral extent. Step-out sampling will target concentrations of COPCs adjacent to the documented environmental concern (e.g., soil stain, excavation, or fuel pumps) at each site. Step-out locations designed to establish lateral extent are typically arranged in a triangular pattern extending horizontally from the source of contamination. If field observations (e.g., field screening) indicate contamination is still present at a step-out location, a sample may not be collected but rather a location further from the source will be sampled.

Each sample collected will be submitted for laboratory analysis for the COPCs identified in [Table 3-1](#), unless previous data indicates specific COPCs are no longer a concern.

3.3.3.1 CAS 12-25-04, UST 12-16-2, Waste Oil Release

The nature of contamination will be determined by the results of bias samples collected at the locations shown in [Figure A.5-1](#) in [Appendix A](#). The samples will be collected using either direct-push or drilling techniques. A minimum of one sample from the contaminated zone will be collected from each of the specified locations. The interval to be sampled will be determined in the field based on field screening and/or site observations. Each sample collected will be submitted for laboratory analysis for the COPCs identified in [Table 3-1](#).

Step-out samples will be collected using either direct-push or drilling techniques at the approximate locations, shown in [Figure A.5-1](#) in [Appendix A](#). Due to the foundation for Building 12-16, step-out sampling west of the release will not be done. The extent of contamination in this direction will be estimated based on the analytical results and the extent of contamination in the other directions (e.g., distance from contamination source).

Site preparation activities will include some earth moving in order to access the bias sample locations which are currently within the excavation created by the removal of UST 12-16-2. The excavation may be backfilled prior to sampling or the east wall of the excavation may be opened to allow access so that direct-push and/or drilling equipment can safely operate. Any soil removed during site preparation activities will be placed either in the excavation at the conclusion of site activities and/or managed as IDW in accordance with [Section 5.0](#).

3.3.3.2 Other CASs Promoted from Group #1 or Group #2

If sites from Group #1 or Group #2 are promoted to Group #3, analytical data from bias sample locations will likely have already been collected. If not, or additional data is deemed necessary, process knowledge will be used to optimize the selection of sampling locations. These locations will be chosen based on information documented in [Section 2.1](#), and [Section 2.3](#); and/or additional information (e.g., site observations and/or analytical results) obtained during the excavation/verification sampling activities described for Group #1 CASs (see [Section 3.2](#)) and the reconnaissance/confirmation sampling activities described for Group #2 CASs (see [Section 3.3.2](#)).

Data collected during the excavation/verification sampling activities at Group #1 CASs or the reconnaissance/confirmation sampling activities at Group #2 CASs will be used to the extent possible to limit the COPCs identified in [Table 3-1](#).

If sites from Group #1 or Group #2 are promoted to Group #3, step-out sampling will be used to bound the contamination. Step-out locations will be determined in the field based on data collected from the initial investigations and/or site observations. Cultural features such as concrete pads and topographical features such as steep slopes (CAS 29-44-01a) may limit the step-out locations. If step-out sample locations are not accessible, the extent of contamination may be estimated based on data from other locations and distance from the source.

3.4 Data Quality Objectives

The DQOs are qualitative and quantitative statements that specify the quality of the data required to support potential closure alternatives for CAU 394. The DQOs were developed to clearly define the purposes for which environmental data will be used and to design a data collection program that will satisfy these purposes. The formulation of a CSM aids the development of DQOs for the site.

Details of the DQO process are presented in [Appendix A](#). During the DQO discussions for this CAU, the informational inputs or data needs to resolve problem statements and decision statements were documented. Criteria for data collection and analysis were defined and agreed upon, and the appropriate QA/QC required for particular data collection activities were assigned. The analytical methods and reporting limits prescribed through the DQO process, as well as the data quality indicators (DQI) for laboratory analysis, such as precision and accuracy requirements, are provided in more detail in [Section 6.0](#) of this SAFER plan. At the end of the investigation, resulting laboratory data will be evaluated to confirm or refute the conceptual model and determine if the DQOs were met by using the DQIs of precision, accuracy, representativeness, completeness, and comparability. Other DQIs may be used, such as sensitivity.

3.5 Closure

The following activities, at a minimum, have been identified for closure of the site:

- All completed activities in support of the closure of CAU 394 will be documented in a Closure Report (CR).

Group #1 CASs

- Material to be remediated will be removed and disposed of IDW, and verification samples will be collected in the remaining soil. Verification analytical results will be documented in the CR.
- Excavations will be backfilled with clean fill.

Group #2 CASs

- Sufficient data will be collected and analyzed to confirm contamination above PALs does not exist.

- Housekeeping waste will be removed and photodocumented and, if required, soil verification sampling will be conducted for appropriate COCs.

Group #3 CASs

- Sufficient data will be collected and analyzed to determine the nature and extent of contamination so that the appropriate corrective action alternative may be selected and implemented.
- If closure in place is the preferred corrective action alternative, a risk assessment will be completed and/or appropriate use restrictions will be implemented. These actions will be documented in the CR.
- If clean closure is the preferred corrective action alternative, the material to be remediated will be removed and disposed of IDW, and verification samples will be collected in the remaining soil. Verification analytical results will be documented in the CR.
- Pipes protruding into the excavation at CAS 12-25-04 will be cut off even with the foundation of Building 12-16 and grouted.
- Housekeeping waste will be removed and photodocumented and, if required, soil verification sampling will be conducted for appropriate COCs.

3.6 Duration

After submittal of the Final SAFER plan for CAU 394 to NDEP (FFACO milestone deadline of September 28, 2001), further activities will be delayed until after the winter months. Due to the locations of some of the CASs (e.g., 29-44-01). Once activities are resumed for CAU 394 (approximately March 1, 2001), the following is a tentative schedule of activities (in calendar days):

- Day 0: Preparation for field investigation will begin.
- Day 60: The field investigation, including sampling, will commence. Samples will be shipped to meet applicable holding times.
- Day 150: The field investigation will be completed. Laboratory analytical data will be submitted.
- Day 215: The quality-assured, analytical data will be available for NDEP review.

4.0 Reports and Records Availability

A daily report will be prepared summarizing all field activities conducted that day. The report will include the project accomplishments, problems encountered, and personnel and equipment utilized. The report will be submitted to the DOE NNSA/NV Environmental Restoration Division (ERD) Task Manager for submittal to NDEP.

Upon completion of the field activities, a closure report will be prepared to include the following:

- Introduction (Purpose and Scope)
- Closure Activities (Description of Field Activities)
- Waste Disposition
- Conclusions (Data Quality Assessment)

This document is available in the DOE public reading rooms located in Las Vegas and Carson City, Nevada, or by contacting the ERD Project Manager. The NDEP maintains the official Administrative Record for all activities conducted under the auspices of the FFACO.

5.0 Waste Management

Management of remediation waste and investigation-derived waste (IDW) will be based on regulatory requirements, approved NDEP guidance field observations, process knowledge, and the analytical results of the CAU 394 samples. Decontamination activities will be performed according to approved procedures specified in the contractor field sampling instructions and, as appropriate, for the COPCs identified for this CAU.

Investigation-derived waste (i.e., newly generated waste such as nonreusable sampling equipment, PPE, and rinsate) is considered potentially contaminated waste only by virtue of contact with potentially contaminated media. Therefore, sampling and analysis of the IDW, separate from analyses of site investigation samples, may not be necessary. However, if associated investigation samples are found to contain COCs above regulatory levels, rinsate samples may be taken to support waste management activities. The data generated as a result of the site investigation, along with process knowledge, will be used whenever possible to assign the appropriate waste type (e.g., nonhazardous, hazardous, low-level radioactive waste [LLW], or mixed) to the IDW.

Waste will be managed and disposed of in accordance with DOE Orders, U.S. Department of Transportation (DOT) regulations, RCRA regulations, State of Nevada requirements, and agreements and permits between DOE and NDEP.

No process knowledge has been identified to indicate the release or disposal of any listed hazardous waste at sites other than CAS 12-25-04. Therefore, if contaminants are identified at sites other than CAS 12-25-04, they will be considered characteristic rather than listed wastes. Waste generated at CAS 12-25-04, and known or suspected of containing the contaminants tetrachloroethene and 1,1,1-trichloroethane, will be managed as listed hazardous waste.

5.1 Waste Minimization

Corrective action investigation activities have been planned to minimize IDW generation. To minimize the amount of rinsate generated, contact with potentially contaminated media will be minimized, only equipment that has come into contact with potentially contaminated media will be decontaminated; dry decontamination will be utilized first, and decontamination activities will only

use the volume of water necessary to decontaminate equipment and personnel. Reusable equipment (such as booties, high-density polyethylene (HDPE) sheeting, and metal spoons) will be utilized and decontaminated for future use, whenever possible. The use of disposable equipment will be eliminated, where feasible. Any IDW generated, such as disposable sampling equipment, decontamination rinsate, and PPE will be segregated to the greatest extent possible to minimize the generation of hazardous, radioactive, and/or mixed waste. IDW may also be decontaminated to facilitate sanitary disposal, if possible.

5.2 Potential Waste Streams

[Table 5-1](#) lists the potential waste streams that may be generated during field activities. Included in [Table 5-1](#) is an estimate of the waste to be generated and an explanation of the planned characterization method for each waste stream. Methods of characterization may be changed based on a review of analytical data and information gathered in the field. Waste will be traceable to its source and individual samples; this information will be recorded in the waste management logbook. Waste will be managed in accordance with its waste type as described in [Section 5.4](#).

5.3 Management of Remediation and Investigation-Derived Waste

Waste will be generated by both remediation and site investigation at CAU 394 CASs during the activities described in this document. Remediation waste will be generated during the excavation activities planned at Group #1 CASs, and may also be generated if the contingency for clean closure is implemented for any of the Group #2 or Group #3 CASs. Investigation-derived waste will be generated during the investigation and characterization activities planned for Group #2 and Group #3 CASs, and also during the initial waste characterization sample collection activities described in [Section 3.2.1](#) for Group #1 CASs.

5.3.1 Management of Remediation Waste

Remediation waste will be characterized and managed in accordance with the specified waste type as described in [Section 5.4](#). Generally, remediation waste will be characterized prior to generation. Once a waste stream is characterized, a disposal location will be selected. The waste will be packaged based on the waste acceptance criteria specified by the disposal location, transportation requirements, and logistics. Prior to transportation and disposal, soil and debris may be staged in piles. All piles will be bermed and covered with plastic.

**Table 5-1
Potential Waste Streams**

Waste Stream	CAS	Estimated Volume	Characterization Plan
Potentially contaminated soil and associated debris (e.g., concrete, wood, metal) from excavation and/or sample activities	18-25-02	530 yd ³	Direct sampling prior to excavation. Additional direct sampling, as needed. Additional sampling as determined by waste acceptance criteria or Site Supervisor.
	18-25-03	390 yd ³	
	29-44-01b	3 yd ³	
	12-25-04 18-25-01 18-25-04 29-44-01a	None	Waste stream is not anticipated at other CASs. Soil removed during sampling will be returned to its approximate original location. If generated, the soil/debris waste stream will be characterized by correlation with associated site/waste characterization analytical data and/or direct sampling.
Debris and associated trace amounts of soil from potential housekeeping-type cleanup	All CASs	Unknown	Direct sampling and process knowledge
PPE; disposable sampling equipment; plastic	All CASs	Less than 110 gallons per CAS	Correlation with associated site/waste characterization analytical data, visual observation (i.e, staining), and process knowledge
Decontamination rinsate	All CASs	Less than 165 gallons per CAS	Correlation with associated site/waste characterization analytical data and/or direct sampling
TPH field-screening residues	All CASs	Less than 10 gallons per CAS	Correlation with associated site/waste characterization analytical data and/or direct sampling and knowledge of ingredients

5.3.2 Management of Investigation-Derived Waste

The IDW generated will be managed as potentially hazardous waste until laboratory results have been reviewed and waste characterization is completed. Waste pending analysis will be managed as potentially radioactive waste only at the Area 18 sites. Waste acceptance criteria for potential disposal locations and the POC (BN, 1995) dictate that certain waste be sampled for radiological constituents. This includes any waste generated in a controlled waste management area (CWMA). The only site located within a CWMA is CAS 18-25-04 (Pahute Mesa Airstrip). Once characterized, waste will be managed in accordance with the specified waste type as described in [Section 5.4](#).

In addition to the analytical data collected for site investigation/characterization, data may be required to characterize IDW from Group #2 and Group #3 sites. Additional data may consist of additional samples and/or analyses. Each of the CASs has been reviewed to ensure that sufficient analyses to support IDW disposal have been planned. The additional analysis are shown in [Table 5-2](#). The

additional samples/analyses will support waste classification to meet the waste acceptance criteria of potential disposal locations. Samples submitted for laboratory analysis will be analyzed according to [Table 6-2](#). Rinsate generated during the investigation may be analyzed for any or all COPCs, based on site characterization analytical data.

Table 5-2
Additional Analyses for Waste Characterization

CAS	TCLP VOCs	TCLP RCRA Metals	Isotopic Plutonium	Isotopic Uranium	Gamma Spectroscopy
12-25-04, UST 12-16-2 Waste Oil Release	--	Bias sample locations as described in Section 3.3.3.1 ^a	--	--	--
18-25-01, Area 18 Service Station	Bias sample locations as described in Section 3.3.2.1 ^a		10 percent of sample locations ^b		
18-25-02, Area 18 Generator Shack	--	WM sample location as described in Section 3.2.1 and 10 percent of additional sample locations ^b			
18-25-03, Area 18 Generator Shack AST	--	--	WM sample location as described in Section 3.2.1 and 10 percent of additional sample locations ^b		
18-25-04, Pahute Mesa Airstrip	--	--	10 percent of sample locations ^b		
29-44-01a, Shoshone Transmitter Station AST	--	--	--	--	--
29-44-01b, Shoshone Transmitter Station Soil Stain	--	--	WM sample location as described in Section 3.2.1 and 10 percent of additional sample locations ^b		

-- = No samples planned to be analyzed for these analysis

^aNot all bias sample locations need to be analyzed by TCLP; final amounts will be determined by the Site Supervisor.

^bSample locations will be determined in the field at the discretion of the Site Supervisor.

5.4 Management of Specified Waste Types

The following sections describe the management techniques for the different waste types. Applicable waste management regulations and requirements are listed in [Table 5-3](#).

5.4.1 Nonhazardous Waste (Solid/Sanitary)

Sanitary waste includes waste not directly associated with sampling activities such as plastic, food, and paper products. Sanitary waste may also include non-contaminated PPE cleared by visual

**Table 5-3
Waste Management Regulations and Requirements**

Waste Type	Federal Regulation	Additional Requirements
Nonhazardous (solid/sanitary)	NA	NRS 444.440 - 444.620 ^a NAC 444.570 - 444.7499 ^b Landfill Permit ^c
Hydrocarbon	NA	NAC 445A.2272 ^d Landfill Permit ^{c,e}
Hazardous	RCRA	NRS 459.400 - 459.600 ^f NAC 444.850 - 444.8746 ^g POC ^h
Low-Level Radioactive	NA	DOE Orders and NTSWAC ⁱ
Mixed	RCRA	NTSWAC ⁱ POC ^h
PCB	TSCA	Landfill Permit ^{c,e}

^aNevada Revised Statutes (NRS, 1999a)

^bNevada Administrative Code (NAC, 2000a)

^cArea 9, U10c Crater

^dNevada Administrative Code (NAC, 2000c)

^eArea 6, Hydrocarbon Landfill

^fNevada Revised Statutes (NRS, 1999b)

^gNevada Administrative Code (NAC, 2000b)

^hPerformance Objective for the Certification of Nonradioactive Hazardous Waste (BN, 1995)

ⁱNevada Test Site Waste Acceptance Criteria, Rev. 3 (DOE/NV, 2000a)

NA = Not Applicable

PCB = Polychlorinated biphenyls

TSCA = Toxic Substance Control Act

inspection and/or screening. This waste will be contained in plastic bags and transported to an approved solid waste management unit.

5.4.2 Hydrocarbon Waste

The action level for soil contaminated with hydrocarbons is 100 mg/kg in the State of Nevada (NAC, 2000c). Soils and associated IDW with TPH levels above 100 mg/kg, provided other regulated constituents are below regulatory limits shall be managed as hydrocarbon waste and disposed of in accordance with all applicable regulations.

5.4.3 Hazardous Waste

Suspected hazardous waste will be managed in accordance with RCRA and State of Nevada hazardous waste management regulations, interpreted as follows. Suspected hazardous waste will be placed in containers that meet DOT specifications in accordance with 49 *Code of Federal Regulations* (CFR), Part 100-180 (CFR, 2000d). Container markings and field records will allow wastes to be traceable back to the source. Additionally, waste may be directly sampled for characterization purposes. The type of container used will be appropriate for the particular waste in storage, as specified in 40 CFR 265.172 (CFR 2000a). No incompatible waste is expected to be generated; however, if incompatible waste is encountered in the field, it will be managed in accordance with 40 CFR 265.177 (CFR, 2000b).

Hazardous waste will be characterized in accordance with the requirements of 40 CFR 261 (CFR, 2000c). Characterization will be based on analytical data, field-screening results (FSRs), process knowledge, or a combination thereof. Containerized wastes pending characterization will be identified with "Pending Analysis" markings until their regulatory status can be determined. Depending on the nature and amount of waste generated, waste management control areas may be established, such as a Satellite Accumulation Area (SAA) or Hazardous Waste Accumulation Area (HWAA).

Waste determined to be hazardous will be transported to the Area 5 Hazardous Waste Storage Unit or shipped directly to a licensed Treatment Storage and Disposal Facility within fifteen days from the completion of its characterization. If transportation cannot be completed within 15 days, a schedule indicating the shipment date will be provided to NDEP. Characterization is deemed complete once all data relating to the IDW has been validated, reviewed, and a waste characterization report finalized. When shipped off site, hazardous waste will be transported by a licensed hazardous waste hauler and accompanied by a Uniform Hazardous Waste Manifest in accordance with DOT shipping requirements. A copy of the manifest will be provided to the NDEP in accordance with State of Nevada regulatory requirements.

At a minimum, hazardous waste generated during this investigation will comply with the POC (BN, 1995).

5.4.4 Low-Level Radioactive Waste

Low-level radioactive wastes are not expected to be generated. However, any LLW generated will be managed and characterized in accordance with DOE Orders and the requirements of the *Nevada Test Site Waste Acceptance Criteria* (NTSWAC) (DOE/NV, 2000a) and the ITLV Waste Certification Program Plan. Characterization will be based on analytical data, FSRs, process knowledge, or a combination thereof. Potentially contaminated IDW, such as PPE, will be placed in clear plastic bags marked with the date and the associated sample locations and/or sample numbers. The plastic bags and any other LLW, such as containerized soil, will be placed in marked packages meeting DOT specifications and locked or fitted with tamper-indicating devices. The waste will be staged at a designated HWAA/Radioactive Controlled Area or a HWAA/Radioactive Materials Area pending disposal in accordance with NTSWAC requirements (DOE/NV, 2000a). Drums will be marked “Radioactive Material Pending Analysis” until a final waste determination can be made.

Rinsate from decontamination activities may be analyzed to determine final disposition. Gross alpha and gross beta analysis may be performed on rinsate samples, and the results will be used to determine final disposition. Additionally, the soil characterization results may be applied to the rinsate as part of the determination of final disposition. If rinsate is categorized as LLW, it will be solidified prior to NTSWAC certification activities and disposed of at a NTS Radioactive Waste Management Site (RWMS). Other disposal alternatives not requiring solidification may be available after the waste is generated and specific characteristics of the waste are known.

Any waste to be disposed of in LLW landfills at the NTS will be characterized in accordance with the requirements of the NTSWAC and the contractor-specific waste certification program plan and implementing procedures.

5.4.5 Mixed Waste

Mixed waste is a combination of hazardous and radioactive waste. If generated, this waste will be managed in accordance with RCRA (CFR, 2000c) and NAC regulations (NAC, 2000b), as well as DOE requirements for radioactive waste. Where there is a conflict in regulations or requirements, the most stringent shall apply. For example, the accumulation time limit and weekly inspections per RCRA regulations will be applied to mixed waste even though it is not required for radioactive waste.

Conversely, while RCRA does not require documented traceability, the NTSWAC for LLW does; therefore, traceability shall be documented.

In general, mixed waste will be managed in the same manner as hazardous waste with added mandatory radioactive waste management program requirements. Suspected mixed waste will be managed in accordance with applicable regulations, requirements, and ITLV standard practices. Containers will be marked with the words "Waste Pending Analysis," pending characterization. However, once a mixed waste determination is made, mixed waste shall be transported to the NTS transuranic waste storage pad for storage pending treatment or disposal. Mixed waste with hazardous waste constituents meeting land disposal restrictions may be disposed of at the Area 5 RWMS. Mixed waste not meeting land disposal restrictions will require development of a treatment plan under the requirements of the Mutual Consent Order between DOE and the State of Nevada (NRS, 1999b).

5.4.6 PCB Waste

The storage and disposal of PCBs are regulated by the *Toxic Substance Control Act Regulations* (CFR, 2000e). Previous sample results and process knowledge indicate one or more sites may contain PCBs. Samples will be analyzed for PCBs at sites where PCBs are a COPC. Process knowledge and sample analytical results will be used to make a determination as to whether remediation waste and/or IDW will be managed as PCB waste.

Remediation wastes and IDW will be managed based on as found levels of PCBs. Wastes in which concentrations of PCBs are known to occur based on laboratory analytical results at levels greater than 50 ppm will be managed and disposed of as PCB waste. Remediation waste which has not been sampled but is suspected of containing PCBs will also be managed as PCB waste.

Waste identified as PCB waste will be stored and managed in accordance with applicable regulations for the management and disposal of PCB waste.

6.0 Quality Assurance/Quality Control

The overall objective of the closure activities described in this SAFER plan is to collect accurate and defensible data to support the selection and implementation of a closure alternative for each CAS in CAU 394. The following two sections 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 SAFER plan or required by the results of the DQO process (see [Appendix A](#)), this investigation will adhere to the Industrial Sites QAPP (DOE/NV, 1996b).

6.1 Quality Control Field 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 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 during the DQO process, include:

- Trip blanks (1 per sample cooler containing VOC environmental samples)
- Equipment blanks (1 per sampling event for each type of decontamination procedure)
- Source blanks (1 per lot of source material that contacts sampled media)
- Field duplicates (1 per 20 environmental samples or 1 per CAS if less than 20 collected)
- Field blanks (1 per 20 environmental samples or 1 per CAS if less than 20 collected)
- Matrix spike/matrix spike duplicate (MS/MSD) (1 per 20 environmental samples or 1 per CAS per matrix if less than 20 collected)

Additional QC samples may be submitted based on site conditions at the discretion of the Site Supervisor. Field quality control samples shall be analyzed using the same analytical procedures implemented for environmental samples. The results of the QC sample analyses will be included in the analytical report. Additional details regarding field QC samples are available in the Industrial Sites QAPP (DOE/NV, 1996b).

6.2 Laboratory/Analytical Quality Assurance

Criteria for remediation and verification (Group #1), Phase I - investigation (Group #2), and Phase II - characterization (as stated in the DQOs [[Appendix A](#)]) require laboratory analysis be conducted for samples used in decision making to provide a quantitative measurement of any COCs present. Rigorous QA/QC will be implemented for all laboratory samples and includes documentation, data verification, and validation of analytical results, and meeting the requirements of data quality indicators as they relate to laboratory analysis.

Data verification and validation will be performed in accordance with the Industrial Sites QAPP (DOE/NV, 1996b) and this SAFER plan. All laboratory data from samples collected and analyzed will be evaluated for data quality according to *EPA Functional Guidelines* (EPA, 1994a and 1999). The data will be reviewed to ensure that all critical samples were appropriately collected and analyzed, and the results passed data validation criteria. Validated data, whether estimated (i.e., J-qualified) or not, will be assessed to determine if they meet the DQOs of the investigation and the performance criteria for the Data Quality Indicators (DQIs). The results of this assessment will be documented in the closure report. If the DQOs were not met, corrective actions will be evaluated, selected, and implemented (e.g., refine conceptual site model or resample to fill data gaps).

Data quality indicators are qualitative and quantitative statements that specify the data requirements for a project and include precision, accuracy, representativeness, completeness, and comparability. In addition, sensitivity has been included as a DQI for laboratory analysis. The performance criteria for each indicator has been selected based on the intended use of the data, current field and analytical procedures, and instrumentation. Precision and accuracy goals have been standardized for both organic and inorganic analytes for analytical laboratories under the EPA Contract Laboratory Program (CLP) (EPA, 1988a, 1988b, 1991, 1994b, and 1994c). Laboratory quality control samples used to measure precision and accuracy of analytical procedures shall be analyzed using the same analytical procedures implemented for environmental samples. Additional details regarding DQIs and laboratory QC samples are available in the Industrial Sites QAPP (DOE/NV, 1996b).

[Table 6-1](#) provides the established performance criteria for each of the DQIs and the impacts to the decision if the criteria are not met. The Industrial Sites QAPP (DOE/NV, 1996b) documents the actions to be taken to correct conditions that adversely affect data quality both in the field and the

Table 6-1
Laboratory/Analytical Data Quality Indicators

Data Quality Indicator	Performance Criteria	Impact on Decision if Performance Criteria Not Met
Precision	Variations between duplicates (field and lab) and original sample should not exceed analytical method-specific criteria listed in Table 6-2 .	Estimated data within sample delivery group (SDG) will be evaluated for its usability. If data determined not usable, then data will not be used in decision, and the data set will be evaluated for completeness.
Accuracy	Laboratory control sample results and matrix spike results should be within analytical method-specific criteria listed in Table 6-2 .	Estimated data within SDG will be evaluated for its usability. If estimated data is biased high or conservative, the data may be used in decision. If estimated data is biased low and below the decision threshold, the data may not be used in decision, and the data set will be evaluated for completeness.
Sensitivity	Detection limits of laboratory instruments must be less than action level for COC.	Cannot determine if COCs are present at levels of concern, thereby investigation objectives cannot be met, and the data set will be evaluated for completeness.
Verification (Group #1) Completeness	100% of samples submitted to laboratory 100% of requested analyses conducted 100% of critical analytes to be valid ^a 80% of noncritical analytes to be valid	Cannot make decision on whether COCs are present above PALs with high confidence.
Phase I - Investigation (Group #2) Completeness	100% of samples submitted to laboratory 100% of requested analyses conducted 100% of critical analytes to be valid ^a 80% of noncritical analytes to be valid	Cannot make decision on whether COCs are present above PALs with high confidence.
Phase II - Characterization (Group #3) Completeness	100% of samples submitted to laboratory 100% of requested analyses conducted 100% of critical analytes to be valid ^a 80% of noncritical analytes to be valid	Decision of whether or not extent of contamination has been bounded cannot be determined.
Clean Closure Completeness	100% of samples submitted to laboratory 100% of requested analyses conducted 100% of critical analytes to be valid ^a 80% of noncritical analytes to be valid	Decision of whether or not COCs above PALs remain in soil cannot be determined.
Comparability	Equivalent samples analyzed using same analytical methods; the same units of measurement and detection limits must be used for like analyses.	Inability to use data compiled in previous phases.
Representativeness	Correct analytical method performed for appropriate COPC; valid data reflects appropriate target population.	Cannot identify COC or estimate concentration of COC; therefore, cannot make decision(s) on target population.

^aCritical analytes are those analytes most likely present in the target population at concentrations of concern and have been identified through previous analytical results, historical documentation, and process knowledge. Critical analytes are listed below for each CAS; included in the parentheses is the stage of investigation/remediation in which the CAS will start. Critical analytes for CASS moved from one group to another based on analytical results will be determined by those results.
CAS 12-25-04 (Phase II - characterization): TPH (full scan), 1,1,1 - trichloroethane, tetrachloroethene, and PCBs
CAS 18-25-01 (Phase I - investigation): TPH (full scan), benzene, lead
CAS 18-25-02 (remediation and verification): TPH (diesel and oil), PCBs, arsenic, chromium, and anthracene
CAS 18-25-03 (remediation and verification): TPH (diesel and oil), and PCBs
CAS 18-25-04 (verification): TPH (diesel and oil) and PCBs
CAS 29-44-01a (Phase I - investigation): TPH (diesel and oil) and PCBs
CAS 29-44-01b (verification): TPH (diesel and oil) and PCBs

laboratory. Any deficiencies noted during the investigation that renders the data quality unacceptable will be documented in the closure report. [Table 6-2](#) provides the analytical requirements for COPCs for the Industrial Sites Project.

Table 6-2
Laboratory Chemical, Toxicity Characteristic Leaching Procedure, and
Radiochemistry Analytical Requirements for Industrial Sites
(Page 1 of 4)

Parameter or Analyte	Medium or Matrix	Analytical Method	Minimum Reporting Limit	RCRA Hazardous Waste Regulatory Limit	Relative Percent Difference (RPD) ^a	Percent Recovery (%R) ^b
ORGANICS						
Total Volatile Organic Compounds (VOCs)	Water	8260B ^c	Analyte-specific estimated quantitation limits ^d	Not Applicable (NA)	14°	61-145°
	Soil				24°	59-172°
Toxicity Characteristic Leaching Procedure (TCLP) VOCs						
Benzene	Aqueous	1311/8260B ^c	0.050 mg/L ^d	0.5 mg/L ^f	14°	61-145°
Carbon Tetrachloride			0.050 mg/L ^d	0.5 mg/L ^f		
Chlorobenzene			0.050 mg/L ^d	100 mg/L ^f		
Chloroform			0.050 mg/L ^d	6 mg/L ^f		
1,2-Dichloroethane			0.050 mg/L ^d	0.5 mg/L ^f		
1,1-Dichloroethene			0.050 mg/L ^d	0.7 mg/L ^f		
Methyl Ethyl Ketone			0.050 mg/L ^d	200 mg/L ^f		
Tetrachloroethene			0.050 mg/L ^d	0.7 mg/L ^f		
Trichloroethene			0.050 mg/L ^d	0.5 mg/L ^f		
Vinyl Chloride			0.050 mg/L ^d	0.2 mg/L ^f		
Total Semivolatile Organic Compounds (SVOCs)	Water	8270C ^c	Analyte-specific estimated quantitation limits ^d	NA	50°	9-127°
	Soil				50°	11-142°
TCLP SVOCs						
o-Cresol	Aqueous	1311/8270C ^c	0.10 mg/L ^d	200 mg/L ^f	50° 50°	9-127°
m-Cresol			0.10 mg/L ^d	200 mg/L ^f		
p-Cresol			0.10 mg/L ^d	200 mg/L ^f		
Cresol (total)			0.30 mg/L ^d	200 mg/L ^f		
1,4-Dichloro-benzene			0.10 mg/L ^d	7.5 mg/L ^f		
2,4-Dinitrotoluene			0.10 mg/L ^d	0.13 mg/L ^f		
Hexachloro-benzene			0.10 mg/L ^d	0.13 mg/L ^f		
Hexachloro-butadiene			0.10 mg/L ^d	0.5 mg/L ^f		
Hexachloro-ethane			0.10 mg/L ^d	3 mg/L ^f		
Nitrobenzene			0.10 mg/L ^d	2 mg/L ^f		
Pentachloro-phenol			0.50 mg/L ^d	100 mg/L ^f		
Pyridine			0.10 mg/L ^d	5 mg/L ^f		
2,4,5-Trichloro-phenol			0.10 mg/L ^d	400 mg/L ^f		
2,4,6-Trichloro-phenol			0.10 mg/L ^d	2 mg/L ^f		

Table 6-2
Laboratory Chemical, Toxicity Characteristic Leaching Procedure, and
Radiochemistry Analytical Requirements for Industrial Sites
(Page 2 of 4)

Parameter or Analyte	Medium or Matrix	Analytical Method	Minimum Reporting Limit	RCRA Hazardous Waste Regulatory Limit	Relative Percent Different (RPD) ^a	Percent Recovery (%R) ^b
TCLP SVOCs						
Total Pesticides	Water	8081A ^c	Analyte-specific Contract Required Quantitation Limits (CRQL) ^e	NA	27°	38-131°
	Soil				50°	23-139°
TCLP Pesticides						
Chlordane	Aqueous	1311/8081A ^c	0.0005 mg/L ^e	0.03 mg/L ^f	27°	38-131°
Endrin			0.001 mg/L ^e	0.02 mg/L ^f		
Heptachlor			0.0005 mg/L ^e	0.008 mg/L ^f		
Heptachlor Epoxide			0.0005 mg/L ^e	0.008 mg/L ^f		
gamma-BHC (Lindane)			0.0005 mg/L ^e	0.4 mg/L ^f		
Methoxychlor			0.005 mg/L ^e	10 mg/L ^f		
Toxaphene			0.05 mg/L ^e	0.5 mg/L ^f		
Polychlorinated Biphenyls (PCBs)	Water	8082 ^c	Analyte-specific (CRQL) ^e	NA	Lab-specific ^g	Lab-specific ^g
	Soil					
Total Herbicides	Water	8151A ^c	1.3 µg/L ^c	NA	Lab-specific ^g	Lab-specific ^g
	Soil		66 µg/kg ^c			
TCLP Herbicides						
2,4-D	Aqueous	1311/8151A ^c	0.002 mg/L ^d	10 mg/L ^f	Lab-specific ^g	Lab-specific ^g
2,4,5-TP			0.00075 mg/L ^d	1 mg/L ^f		
Total Petroleum Hydrocarbons (TPH)	Water Gasoline	8015B modified ^c	0.1 mg/L ^h	NA	Lab-specific ^g	Lab-specific ^g
	Soil Gasoline		0.5 mg/kg ^h			
	Water Diesel		0.5 mg/L ^h			
	Soil Diesel		25 mg/kg ^h			
Explosives	Water	8330 ^c	14 µg/L ^c	NA	Lab-specific ^g	Lab-specific ^g
	Soil		2.2 mg/kg ^c			
Polychlorinated Dioxins and Furans	Water	8280A/8290 ^c	0.05 µg/L ^c	NA	Lab-specific ^g	Lab-specific ^g
	Soil		5 µg/kg ^c			
INORGANICS						
Total Resource Conservation and Recovery Act (RCRA) Metals						
Arsenic	Water	6010B ^c	10 µg/L ^{h,i}	N/A	20 ^j	75-125 ⁱ
	Soil	6010B ^c	1 mg/kg ^{h,j}			
Barium	Water	6010B ^c	200 µg/L ^{h,i}			
	Soil	6010B ^c	20 mg/kg ^{h,i}			

Table 6-2
Laboratory Chemical, Toxicity Characteristic Leaching Procedure, and
Radiochemistry Analytical Requirements for Industrial Sites
(Page 3 of 4)

Parameter or Analyte	Medium or Matrix	Analytical Method	Minimum Reporting Limit	RCRA Hazardous Waste Regulatory Limit	Relative Percent Different (RPD) ^a	Percent Recovery (%R) ^b
INORGANICS						
Total Resource Conservation and Recovery Act (RCRA) Metals						
Cadmium	Water	6010B ^c	5 µg/L ^{h,j}	NA	20 ⁱ	75-125 ⁱ
	Soil	6010B ^c	0.5 mg/kg ^{h,i}			
Chromium	Water	6010B ^c	10 µg/L ^{h,i}			
	Soil	6010B ^c	1 mg/kg ^{h,j}			
Lead	Water	6010B ^c	3 µg/L ^{h,j}			
	Soil	6010B ^c	0.3 mg/kg ^{h,j}			
Mercury	Water	7470A ^c	0.2 µg/L ^{h,i}			
	Soil	7471A ^c	0.1 mg/kg ^{h,i}			
Selenium	Water	6010B ^c	5 µg/L ^{h,j}			
	Soil	6010B ^c	0.5 mg/kg ^{h,i}			
Silver	Water	6010B ^c	10 µg/L ^{h,i}			
	Soil	6010B ^c	1 mg/kg ^{h,j}			
Arsenic	Aqueous	1311/6010B ^c 1311/7470A ^c	0.10 mg/L ^{h,j}	5 mg/L ⁱ	20 ⁱ	75-125 ⁱ
Barium			2 mg/L ^{h,i}	100 mg/L ⁱ		
Cadmium			0.05 mg/L ^{h,j}	1 mg/L ⁱ		
Chromium			0.10 mg/L ^{h,j}	5 mg/L ⁱ		
Lead			0.03 mg/L ^{h,j}	5 mg/L ⁱ		
Mercury			0.002 mg/L ^{h,i}	0.2 mg/L ⁱ		
Selenium			0.05 mg/L ^{h,j}	1 mg/L ⁱ		
Silver			0.10 mg/L ^{h,j}	5 mg/L ⁱ		
Cyanide	Water	9010B ^c	0.01 mg/L ⁱ	NA	20 ⁱ	75-125 ⁱ
	Soil		1.0 mg/kg ⁱ			
Sulfide	Water	9030B/9034 ^c	0.4 mg/L ^c	NA	Lab-specific ^g	Lab-specific ^g
	Soil or Sediment		10 mg/kg ^h			
pH/Corrosivity	Water	9040B ^c	NA	see 40 CFR 261 ^f	Lab-specific ^g	Lab-specific ^g
	Soil	9045C ^c		see 40 CFR 261 ^f		
Ignitability	Water	1010 ^c	NA	Flash Point <140° F ⁱ	NA	NA
	Soil	1030 ^c		see 40 CFR 261 ^f		

Table 6-2
Laboratory Chemical, Toxicity Characteristic Leaching Procedure, and
Radiochemistry Analytical Requirements for Industrial Sites
(Page 4 of 4)

Parameter or Analyte	Medium or Matrix	Analytical Method	Minimum Reporting Limit	RCRA Hazardous Waste Regulatory Limit	Relative Percent Different (RPD) ^a	Percent Recovery (%R) ^b
RADIOCHEMISTRY						
Gamma-emitting Radionuclides ⁱ	Water	EPA 901.1 ^k	10 pCi/L (Cs-137) ^m	NA	20	Laboratory Control Sample Recovery 80-120
	Soil	HASL-300 ^j	0.5 pCi/g (Cs-137) ^m		35	
Isotopic Plutonium ⁱ	Water	HAL-300 ^j	0.1 pCi/L	NA	20	
	Soil	ASTM C1001-90 ⁿ	0.05 pCi/g		35	
Isotopic Uranium ⁱ	Water	HASL-300 ^j ASTM D3972-97 ⁿ	0.2 pCi/L	NA	20	
	Soil	HASL-300 ^j ASTM E1000-90 ⁿ	0.1 pCi/g		35	
Strontium - 90 ⁱ	Water	ASTM D5811-95 ⁿ	1.0 pCi/L	NA	20	
	Soil	HASL-300 ^j	0.5 pCi/g		35	
Americium - 241 ⁱ	Water	HASL-300 ^j	0.1 pCi/L	NA	20	
	Soil	HASL-300 ^j	0.05 pCi/g ^l	NA	35	
Tritium ⁱ	Water	EPA 906.0 ^k	400	NA	20	Laboratory Control Sample Recovery 80-120%
	Soil (Sludge)	PAI 754/704 ^o	1 pCi/g		20	Matrix Spike Recovery 61-140%

^a RPD is used to Calculate Precision

Precision is estimated from the relative percent difference of the concentrations measured for the matrix spike and matrix spike duplicate or of laboratory, or field duplicates of unspiked samples. It is calculated by: $RPD = 100 \times \{([C_1 - C_2]) / [(C_1 + C_2) / 2]\}$, where C_1 = Concentration of the analyte in the first sample aliquot, C_2 = Concentration of the analyte in the second sample aliquot.

^b %R is used to Calculate Accuracy

Accuracy is assessed from the recovery of analytes spiked into a blank or sample matrix of interest, or from the recovery of surrogate compounds spiked into each sample. The recovery of each spiked analyte is calculated by: $\%R = 100 \times (C_s - C_u / C_n)$, where C_s = Concentration of the analyte in the spiked sample, C_u = Concentration of the analyte in the unspiked sample, C_n = Concentration increase that should result from spiking the sample

^c U.S. Environmental Protection Agency (EPA) Test Methods for Evaluating Solid Waste, 3rd Edition, Parts 1-4, SW-846 CD ROM Washington, DC (EPA, 1996b)

^d Estimated Quantitation Limit as given in SW-846 (EPA, 1996b)

^e EPA Contract Laboratory Program Statement of Work for Organic Analysis (EPA, 1988b; 1991; and 1994c)

^f Title 40 Code of Federal Regulations Part 261 "Identification and Listing of Hazardous Waste" (CFR, 2000)

^g In-House Generated RPD and %R Performance Criteria

It is necessary for laboratories to develop in-house performance criteria and compare them to those in the methods. The laboratory begins by analyzing 15-20 samples of each matrix and calculating the mean %R for each analyte. The standard deviation (SD) of each %R is then calculated, and the warning and control limits for each analyte are established at ± 2 SD and ± 3 SD from the mean, respectively. If the warning limit is exceeded during the analysis of any sample delivery group (SDG), the laboratory institutes corrective action to bring the analytical system back into control. If the control limit is exceeded, the sample results for that SDG are considered unacceptable. These limits are reviewed after every quarter and are updated when necessary. The laboratory tracks trends in both performance and control limits by the use of control charts. The laboratory's compliance with these requirements is confirmed as part of an annual laboratory audit. Similar procedures are followed in order to generate acceptance criteria for precision measurements

^h *Industrial Sites Quality Assurance Project Plan* (DOE/NV, 1996a)

ⁱ EPA Contract Laboratory Program Statement of Work for Inorganic Analysis (EPA, 1988a; 1994b; and 1995)

^j Isotopic minimum detectable concentrations are defined during the DQO process and specified in the CAIP as applicable

^k *Prescribed Procedures for Measurements of Radioactivity in Drinking Water*, EPA-600/4-80-032 (EPA, 1980)

^l *Manual of Environmental Measurements Laboratory Procedures*, HASL-300 (DOE, 1997)

^m Since each gamma emitter has a unique detection limit, the measurement sensitivity will be specified relative to Cs-137.

ⁿ American Society for Testing and Materials

^o Laboratory specific method (PAI, 1999)

Definitions:

µg/kg = Microgram(s) per kilogram

mg/kg = Milligram(s) per kilogram

pCi/L = Picocurie(s) per liter

mg/L = Milligram(s) per liter

pCi/g = Picocurie(s) per gram

µg/L = Microgram(s) per liter

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Appendix A

Data Quality Objectives Worksheets

A.1.0 DQO Overview

There is sufficient information and process knowledge about the nature and/or extent of contamination at the six CASs in CAU 394 to propose an appropriate corrective action and implement closure of CAU 394 using the SAFER process. This approach uses the DQO process to define the type and quality of data needed to complete investigation and the observational approach for managing uncertainty and planning decision making. The objective of the SAFER process will be to document and verify the adequacy of existing information; to affirm the decision for either clean closure, closure in place, or no further action; and to provide sufficient data to implement the corrective action (FFACO, 1996).

The CAU 394 investigation will be based on the DQOs developed by representatives of NNSA/NV and NDEP. The DQO process is a strategic planning approach based on the scientific method that is used to prepare for a site investigation/characterization data collection activity. The DQO process is designed to ensure that the data collected will provide sufficient and reliable information to identify, evaluate, and technically defend the chosen corrective action, if necessary.

A.1.1 DQO Planning Team

The DQO planning team for the FFACO-required DQO Kick-Off Meeting consists of representatives from ITLV, NNSA/NV, Bechtel Nevada, and NDEP. [Table A.1-1](#) lists the representatives from each organization in attendance for the June 28, 2001, meeting. The primary decision makers include representatives from NNSA/NV and NDEP. Decision makers will receive notifications as work progresses and when critical decision points are reached within the SAFER process.

A.1.2 Background

The June 28, 2001, DQO meeting provided brief descriptions of each CAS to acquaint the planning team with the environmental problems identified at CAU 394 (copies of the presentation are available in project files [IT, 2001]). Background data for each CAS is provided in [Section 2.0](#) of the SAFER plan. Existing references that were reviewed and are the primary source for the background information are provided in [Section A.6.0](#).

**Table A.1-1
DQO Meeting Participants**

Participant	Affiliation
Robert Boehlecke	ITLV
Kevin Campbell	BN
Greg Doyle	BN
Sabine Curtis	NNSA/NV
Boyd Imai	ITLV
R. Lynn Kidman	ITLV
Sylvan Hersh	ITLV
Jeanne Wightman	ITLV
Jeff Johnson	ITLV
Mike McKinnon	NDEP

ITLV - IT Corporation, Las Vegas Office

BN - Bechtel Nevada

NNSA/NV - National Nuclear Security Administration Nevada Operations Office

NDEP - Nevada Division of Environmental Protection

Six CASs comprise CAU 394, Areas 12, 18, and 29 Spill/Release Sites. One CAS is in Area 12, four CASs are in Area 18, and one CAS is in Area 29. The six CASs are:

- CAS 12-25-04, UST 12-16-2 Waste Oil Release
- CAS 18-25-01, Oil Spills
- CAS 18-25-02, Oil Spills
- CAS 18-25-03, Oil Spill
- CAS 18-25-04, Spill (Diesel Fuel)
- CAS 29-44-01, Fuel Spill

In addition, CAS 29-44-01 has two distinct RECs. These distinct RECs have site elements that necessitate the creation of different CSMs and potentially different closure options. Therefore, this CAS has been divided into (a) and (b) sites, so that the individual RECs can be addressed separately.

A seventh CAS, 12-25-05, was recently transferred from CAU 394 to CAU 5000 and will not be addressed by this document (Liebendorfer, 2001).

A.1.3 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 appropriate sampling strategy and data collection methods. An accurate conceptual site model is important as it serves as the basis for all subsequent inputs and decisions throughout the DQO process. The basis for developing the CSMs was process knowledge and historical records.

The CSM constructed for CAS 18-25-01 does not focus on the potential environmental problem originally documented and described for this site. The original documentation states there are “copious oil spills, various sizes, located near and around the old Gas Station 17 Camp,” (REECo, 1991b). The original site photo is of poor quality and does not provide any additional information. Based on engineering drawings and a site visit it appears the service station was paved with asphalt. Therefore, it is assumed that the original site documentation was describing oil stains on asphalt as are common on any road or parking area. This will not be investigated. The area was formerly used as a service station which dispensed gasoline and diesel and potentially provided maintenance services for vehicles. These activities may have contributed to a large release of oils and/or fuels that may have contaminated a significant amount of the subsurface in the vicinity of the fuel pumps and/or the mechanics shelter. This is the potential environmental problem that will be investigated.

If during investigation/characterization activities additional elements are identified that are outside the scope of the CSMs as presented, the situation will be reviewed and a recommendation will be made as to how best to proceed. For example, if PCBs are found to be wide spread at CAS 18-25-03, and the presence of the PCBs is determined to not be associated with the soil stain that is documented as the CAS (e.g., the use of PCB laden oil in dust suppression in neighboring yards), then the PCB contamination will be documented and potentially entered into the FFACO as an additional CAS/CAU. In such cases, NNSA/NV and NDEP will be notified and given the opportunity to comment on, or concur with the recommendation.

Several conceptual site model elements common to CAU 394 are listed below:

- Radiological COPCs are not expected.

- Hydrocarbons are the primary COPC and can be used to guide the investigation.
- Currently only waste containing tetrachloroethene or 1,1,1-trichloroethane generated at CAS 12-25-04 (waste oil UST) will be managed as listed waste. All other waste will be considered nonhazardous unless it is shown to have a hazardous waste characteristic.
- In the absence of a barrier, vertical migration will predominate over lateral migration. A barrier may be present at CAS 18-25-02 and bedrock may be present within several feet of the surface at CASs 18-25-04, 29-44-01a, and 29-44-01b.
- Future land use scenarios limit use to various nonresidential uses as indicated in [Table A.1-2](#) (DOE/NV, 1998).

Table A.1-2
Future Land Use Designations for NTS Areas Containing CAU 394 Sites

NTS Area	Designated Future Land Use
12	Nuclear and High Explosives Testing - This area is designated within the Nuclear Test Zone for additional underground nuclear weapons tests and outdoor high explosives tests. This zone includes compatible defense and nondefense research, development, and testing activities.
18 and 29	Reserved - This area includes land and facilities that provide widespread flexible support for diverse short-term testing and experimentation. The reserved zone is also used for short duration exercises and training such as nuclear emergency response and Federal Radiological Monitoring and Assessment Center training and U.S. Department of Defense land-navigation exercises and training.

- Exposure scenarios are limited by the future land use scenarios to site workers who may be exposed to COCs through oral ingestion, inhalation, or dermal contact (absorption) of soils and/or debris (e.g., asphalt, concrete) due to inadvertent disturbance of contaminated soils and/or debris.

[Table A.1-3](#) provides information on additional CSM elements for each CAS.

A.1.3.1 CSM for CASs 12-25-04

[Figure A.1-1](#) shows a representation of historical site conditions at CAS 12-25-04 prior to excavation.

[Figure A.1-2](#) shows a generalized representation of the CSM constructed for current site conditions at CAS 12-25-04. The following text provides information unique to CAS 12-25-04.

- The COPCs, if present, are associated with the release of: (1) waste oil, and (2) products intentionally or unintentionally mixed with the waste oil (e.g., solvents, gasoline).

Table A.1-3
Conceptual Site Model
Description of Elements for Each CAS in CAU 394
(Page 1 of 2)

CSM Element	Description of CSM element for each CAS						
CAS Identifier	12-25-04	18-25-01	18-25-02	18-25-03	18-25-04	29-44-01a	29-44-01b
CAS Description	Waste oil UST release	Releases at the A18 Service Station	Release from generator equipment	Release from diesel AST	Release from ASTs and generators	Potential release from diesel generator	Soil stain
Source of Release	Leak from waste oil UST	Various operational spills	Poor preventative maintenance and refueling				Unknown
Potentially Affected Media	Soil	Soil and asphalt/concrete	Soil and concrete	Soil	Soil	Soil	Soil
Actions Taken	The source of the release has been removed. In addition, the contaminated soil has been removed at 18-25-04 (REECO, 1991a).						
Amount Released	Unknown						
Potentially Released Material	Hydrocarbons Solvents	Hydrocarbons Solvents	Hydrocarbons Solvents	Hydrocarbons	Hydrocarbons Solvents	Diesel	Hydrocarbon
Chemical COPCs	TPH (full scan) VOCs SVOCs RCRA Metals PCBs	TPH (full scan) VOCs SVOCs RCRA Metals PCBs	TPH (oil & diesel) VOCs SVOCs RCRA Metals PCBs		TPH (oil & diesel) VOCs	TPH (diesel)	TPH (full scan) VOCs SVOCs RCRA Metal PCBs
COPCs Detected Above PALs (mg/kg)	Oil - 5,140 ^a	No data available	Aroclor 1260 - 1.3 Arsenic - 31.6 Chromium - 693 ^b	None ^b	No data available after removal of soil ^c	No data available	

Table A.1-3
Conceptual Site Model
Description of Elements for Each CAS in CAU 394
(Page 2 of 2)

CSM Element	Description of CSM element for each CAS						
CAS Identifier	12-25-04	18-25-01	18-25-02	18-25-03	18-25-04	29-44-01a	29-44-01b
On-Going Surface Transport Likely	No, contaminants released below the surface; excavation not likely to disperse contamination	No, the area is generally flat	No, the majority of the site is bounded by an approximately 4 in. high curb	Possible, the site slopes generally to the south	No, excavation not likely to disperse contamination	Likely, the pad is set like a step in a slope	No, the area is generally flat
Subsurface Migration Mechanism(s)	In all cases the source has been removed; therefore, the only driving force for migration is precipitation and infiltration. In general, evaporation rates are higher than precipitation; however, two of the sites (CASs 12-25-04 and 18-25-04) have excavations which may collect precipitation and runoff thus contributing to on going migration.						
Preferential Pathways	None identified						
Groundwater	Groundwater impacts are not expected. The depth to ground water at these sites varies but is estimated at between 500 to 2,500 ft bgs (Frizzell & Shulters, 1990; DRI, 1996; USGS, 1981; DOE/NV, 1996a).						
Approximate Extent of Visible Contamination	Contamination not visible at surface		Approximately 24 x 18 ft	Approximately 5 ft in diameter	Contamination not visible at surface		Approximately 4 ft in diameter
Estimated Extent of Lateral Contamination	50 X 50 ft Based on available analytical results	Unknown	34 X 28 ft based on edge of foundation plus 10 ft	15-ft radius from center of stain based on stain and 10 ft buffer	Unknown, dimensions of existing excavation are 60 X 55 ft	Unknown	3-ft radius based on size of stain
Estimated Depth of Contamination (assume no barrier)	15 ft	Unknown	15 ft	15 ft	Unknown	Unknown	3 ft
Estimated Volume of Contaminated Soil	1,400 yd ³	Unknown	530 yd ³	390 yd ³	Unknown	Unknown	3 yd ³

^aSample was collected from a trench approximately 10 ft south of the main UST excavation (Clark, 1992).

^bResults for these samples were incomplete due to matrix effects (Bordelois, 1998a and b).

^cPrior to removal of the contaminated soil samples indicated diesel at 17,000 mg/kg and oil at 14,000 mg/kg (Clark, 1991a).

Figure A.1-1
Conceptual Site Model for Historic Conditions
at CAS 12-25-04

Figure A.1-2
Conceptual Site Model for Current Conditions
at CAS 12-25-04

A soil sample was collected directly under the south end of the tank after it was removed from the ground. This sample was analyzed for a full suite of analyses. Results indicated 3,300 mg/kg of oil and 0.18 mg/kg of tetrachloroethene. Other compounds detected included toluene, xylenes, and poly-aromatic hydrocarbon compounds which were likely present due to the petroleum hydrocarbons. Only TPH was detected above PALs (Clark, 1992; Alderson, 2001).

A second sample collected approximately 10 ft to the south of the UST excavation and at a depth of approximately 6 ft bgs was analyzed for TPH (oil). Results for this sample indicated a concentration of 5,140 mg/kg of oil.

- Subsurface soils are the affected media. Uncontaminated soil, asphalt, and/or concrete overlay the contaminated soils except at the excavations.
- The excavations and other site features (e.g., Building 12-16 roof overhang) at CAS 12-25-04 may have contributed to the capture of runoff and increased the potential for infiltration. The increase soil moisture may also have contributed to increased natural attenuation of the remaining contamination.

A.1.3.2 CSM for 18-25-01

Figure A.1-3 shows a generalized CSM constructed for current conditions at CAS 18-25-01. The following text provides information unique to CAS 18-25-01.

- The COPCs, if present, are associated with the release of: (1) petroleum hydrocarbons, (2) contaminants within the makeup of the petroleum hydrocarbons (e.g., PCBs in oil or leaded gasoline), and/or (3) unknown products or wastes spilled onto the land surface (e.g., cleaners or solvents used during preventative maintenance).
- Contamination, if present, is most likely to be found in areas where process knowledge indicates releases were likely to occur. These locations include the area around the pump islands where vehicles were parked and diesel and gasoline were dispensed, and the area around the mechanics shelter where fluids may have drained during vehicle maintenance.
- Subsurface soils are the affected media within the CAS. It is assumed there is a layer of asphalt over most of the site. This layer of asphalt was likely thin (less than 4 in. thick) and is now highly weathered and cracked. Contaminated soil may be present under the asphalt.
- Contamination associated exclusively with the asphalt (substances that are part of the makeup of the asphalt) may be present in the soil. Contamination present as a result of the asphalt will not be investigated or considered in closure options.
- Some areas of the site have been disturbed by recent (within the past 5 years) flood event(s) and construction activities (emplacement of new culverts). These activities have contributed

Figure A.1-3
Conceptual Site Model for CAS 18-25-01

to a layer of sediment on the east side of the site and may have removed the original asphalt and soil from the southeast corner of the site.

A.1.3.3 CSM for 18-25-02

Figure A.1-4 shows a generalized CSM constructed for surface releases with limited potential for surface migration. This generalized model applies to the current conditions at CAS 18-25-02. The following text provides information unique to CAS 18-25-02.

- The COPCs, if present, are associated with the release of: (1) petroleum hydrocarbons, (2) contaminants within the makeup of the petroleum hydrocarbons (e.g., PCBs in oil), and/or (3) unknown products or wastes spilled at the site (e.g., cleaners or solvents used during preventative maintenance).

Two soil samples were collected in 1997 from visibly stained areas. These samples were analyzed for a full suite of analyses including PCBs. Results indicated Aroclor-1260 (1.3 mg/kg), chromium (693 mg/kg), and arsenic (31.6 mg/kg) were detected above PALs. However, nondetects for many of the SVOCs and TPH (diesel and waste oil) were estimated (Bordelois, 1998a) due to high detection limits.

- Surface and subsurface soils and concrete are the affected media within the CAS.
- The foundation curbing of the generator shack prevents run-on and runoff. The primary CSM assumes the curbing is not part of a contiguous layer of concrete under the contaminated gravel. As a contingency the alternate CSM accounts for this possibility.
- This site is located adjacent to a former communications yard and electrical equipment. There is a potential for widespread PCB contamination in the general area due to use of PCB laden oil used in dust suppression.

A.1.3.4 CSM for 18-25-03

Figure A.1-4 shows a generalized CSM constructed for surface releases with limited potential for surface migration. This generalized model applies to the current conditions at CAS 18-25-03. The following text provides information unique to CAS 18-25-03.

- The COPCs, if present, are associated with the release of: (1) petroleum hydrocarbons, (2) contaminants within the makeup of the petroleum hydrocarbons (e.g., PCBs in oil), and/or (3) unknown products or wastes spilled at the site (e.g., cleaners or solvents used during preventative maintenance).

One sample and a duplicate were collected from the visibly stained area. The samples were analyzed for a full suite of analyses including PCBs. Results indicated no contaminants were

Figure A.1-4
Generic Conceptual Site Model for CAU 394 Surface Releases

detected above PALS. However, nondetects for many of the SVOCs and TPH (diesel and waste oil) were estimated due to various reasons (Bordelois, 1998b).

- The area slopes generally to the south potentially contributing to surface transport of contamination.
- This site is located adjacent to a former communications yard and electrical equipment. There is a potential for widespread PCB contamination in the general area due to use of PCB laden oil used in dust suppression. This scenario is not part of the CSM.

A.1.3.5 CSM for 18-25-04

Figure A.1-5 shows a generalized CSM constructed for current conditions at CAS 18-25-04. The following text provides information unique to CAS 18-25-04.

- The COPCs, if present, are associated with the release of: (1) petroleum hydrocarbons, (2) contaminants within the makeup of the petroleum hydrocarbons (e.g., PCBs in oil), and/or (3) unknown products or wastes spilled at the site (e.g., cleaners or solvents used during preventative maintenance).

A sample collected from the visibly stained area prior to excavation was analyzed for VOCs, TCLP Metals, and TPH (diesel and waste oil). Results indicated diesel (17,000 mg/kg) and waste oil (14,000 mg/kg) were detected above PALs. No other contaminants were detected above PALs (Clark, 1991a and b).

- The majority of the contaminated soil was removed during excavation activities in 1991 (REECo, 1991a).
- The open excavation may have contributed to water collection and increased infiltration of COPCs. The increase soil moisture may also have contributed to increased natural attenuation of the remaining contamination.

A.1.3.6 CSM for 29-44-01a

Figure A.1-6 shows a generalized CSM constructed for current conditions at CAS 29-44-01a. The following text provides information unique to CAS 29-44-01a.

- The COPCs, if present, are associated with the release of diesel from an AST/generator system onto the land surface.
- Knowledge of the layout of the site leads to the assumption there is a potential for surface transport of COPCs. The potential release site is located on a slope. It is assumed the soils at this site are thin due the location of the site (top of a mountain) and the degree of slope. The potential contamination release mechanisms indicates two potential CSMs.

Figure A.1-5
Conceptual Site Model for CAS 18-25-04

Figure A.1-6
Conceptual Site Model for CAS 29-44-01a

- One possible release scenario is a slow leak from the tank or other system components or a series of minor releases (e.g., allowing small amounts of condensate to drain to the ground as preventative maintenance). This release scenario would indicate a lower likelihood of surface transport and a smaller area of contamination.
- The second possible release scenario is a single mass release or series of mass releases such as for the purposes of emptying the tank. This release scenario would indicate a high likelihood of surface transport and a larger area of contamination. This scenario is not accounted for in the CSM in [Figure A.1-6](#).
- Precipitation, runoff, and erosion are likely to have provided additional driving forces for physical transport of potential contamination on the surface and near surface.
- The length of time since the potential release (approximately 30 years) and location of the release may have contributed to natural attenuation of the potential contamination.

A.1.3.7 CSM for CAS 29-44-01b

[Figure A.1-4](#) shows a generalized CSM constructed for surface releases with limited potential for surface migration. This generalized model applies to the current conditions at CAS 29-44-01b. The source of the stain is not known; however, the COPCs, if present, are likely associated with the release of: (1) petroleum hydrocarbons, and/or (2) contaminants within the makeup of the petroleum hydrocarbons (e.g., PCBs in oil). Based on the size of the surface stain (approximately 4 to 6 ft in diameter) the spill appears to be small. The area surrounding the stain is generally flat and thus would indicate there is little opportunity for surface transport of contaminants.

A.2.0 Site Groupings

As a basis for establishing the DQOs, process knowledge was assessed and preferred closure alternatives were established for each CAS. The preferred closure alternatives as indicated in [Table A.2-1](#), were chosen based on consideration of such factors as location, future land use, COPCs, and assumed potential risk to receptors. The sites have been divided into three groups based on the preferred closure alternative and knowledge of the site. The sequence of principle study questions for each group are shown in [Figure A.2-1](#). Also shown in [Figure A.2-1](#) are contingencies for alternative closure options.

Table A.2-1
Site Groupings and Preferred Closure Alternatives

Group	Preferred Closure Alternative	CAS	Supporting Information and Assumptions
Group #1 (Release documented)	Clean closure	18-25-02	Area 18 is designated as a Reserved Zone open for training and experimentation (DOE/NV, 1998). Area 18 Base Camp is a potential location for commercial users of the NTS. Contamination includes PCBs.
		18-25-03	
		29-44-01b	Area of contamination is small and is assumed to be removable by hand.
		18-25-04	Remediation has previously taken place at the site; however, verification samples were not collected. Samples will be collected to confirm remediation is complete. If sampling indicates contamination above PALs is still present, a determination will be made to proceed with clean closure or move to Group #3 for closure in place.
Group #2 (Unknown if release occurred)	No further action	29-44-01a	Contamination if present is hydrocarbon which poses minimal risk. Site is extremely remote and chance of future receptors minimal. Removal of potential contamination likely to cause damage to environment based on location. Natural attenuation likely in process. Removal would be resource intensive and potentially hazardous to workers due to site and road conditions.
		18-25-01	Contamination, if present, is under asphalt and concrete. Potential contamination is likely mostly petroleum hydrocarbons which pose minimal risk.
Group #3 (Release documented)	Close in place	12-25-04	Contamination is likely under asphalt and concrete. Area 12 is designated as a Nuclear and High Explosives Testing Zone (DOE/NV, 1998). Contamination is mostly petroleum hydrocarbons which pose minimal risk.

Figure A.2-1
Data Quality Objectives Flow Diagram for CAU 394

A.3.0 Seven Step DQO Process for Group 1 CASs

This section discusses the seven step DQO process for Group #1 CASs. Included in Group #1 are CASs 18-25-02, 18-25-03, and 29-44-01b, where contamination is known to exist and will be removed by excavation. Also included in Group #1 is CAS 18-25-04 where contaminated soil was previously remediated; however, verification samples were not collected. Clean closure is the preferred closure option for these CASs.

A.3.1 Step 1, State the Problem

The problem statement below is based on the assumption that remediation has already occurred or will occur.

Remediation may not remove all contamination exceeding PALs. Remaining contamination may pose a threat to human health and the environment.

A.3.2 Step 2, Identify the Decisions

The following decisions to be resolved are arranged sequentially and may be iterative.

- (1) Confirm that verification samples indicate excavation has removed all contamination above PALs.
- (2) Determine if a stopping point has been reached (may occur during excavation, prior to collection of verification samples during the iterative process).
- (3) Determine if further remediation is reasonable, if verification samples indicate contamination above PALs remains.
- (4) Determine if COPCs can be eliminated from subsequent verification sampling, if further remediation is planned.

Analytical sample data may be collected prior to excavation in order to provide data for waste management and/or health and safety decisions. This data, if generated, will be evaluated to

determine if it can be used in any of the decisions. Details on waste management/characterization activities including potential pre-excavation samples will be provided in the SAFER plan.

A.3.2.1 Alternative Actions to the Decisions

The following alternative actions are arranged sequentially and may be iterative.

- (1) If no COPCs exceed PALs, stop investigation and close site (no further action). If COPCs exceed PALs, determine if stopping point has been reached and if additional excavation is reasonable.
- (2) If a stopping point has not been reached, determine if further excavation is reasonable. If a stopping point has been reached, notify NNSA/NV and NDEP and reevaluate the closure/characterization strategy.
- (3) If further excavation is reasonable, conduct excavation and collect verification samples. If further excavation is not reasonable, follow DQO process for characterizing the site for closure in place as described in [Section A.5.0](#).
- (4) If further excavation is planned and COPCs can be eliminated, do not analyze future samples for those COPCs. If COPCs can not be eliminated, continue analyzing for them.

A.3.3 Step 3, Identify Inputs to the Decision

In order to resolve the first decision as stated above, sample data must be collected and analyzed following two criteria: (1) samples must be collected in areas most likely to be contaminated, and (2) the analyses must be sufficient to detect any contamination present within those samples. Biasing factors to support the sample collection activities and meet the first criterion include: documented process knowledge on source and location of release, field observations made during remediation, and judgement of the site supervisor. Biasing factors to meet the second criteria include documented process knowledge on the source of the release, historical sample results and potentially new samples collected prior to remediation activities.

[Table A.4-1](#) lists the information inputs, the source of information for each input, and the proposed methods to collect the new data. The last column addresses the appropriate QA/QC type required for a particular data collection activity and is determined by the intended use of the data in decision

Table A.3-1
Identified Information/Data Needs to Resolve Decisions for Group #1 CASs
(Page 1 of 4)

Information/Data Needs	Source of Information/Data	Proposed collection methods	Data Type ^a
<p>Information needs to meet Criteria #1 for Decision #1: Biasing factors in choosing sample locations:</p> <p>(1) Source and location of releases</p> <p>(2) Field observations of surface and subsurface soil conditions</p>	<p>(1) Process knowledge and site observations as documented in the CSM indicate the source and location of each release.</p> <p>CAS 18-25-02: Hydrocarbon release occurred inside a generator shack. The release appears to be confined inside the foundation curbing. Analytical results indicate arsenic, chromium, and PCBs exceed PALs. Results for TPH were inconclusive (Bordelois, 1998a).</p> <p>CAS 18-25-03: Release is documented as originating from diesel AST (REECo, 1991b). In general, previous analytical results were inconclusive; however, no metals exceeded PALs (Bordelois, 1998b).</p> <p>CAS 18-25-04: Release documented as originating from ASTs and generators (Haworth, 1991). Previous analytical results indicate release was oil and diesel (Clark, 1991a and b). Release was excavated in 1991 (REECo, 1991c); however, no confirmation samples were collected.</p> <p>CAS 29-44-01: Release appears to be hydrocarbon in origin (IT, 2001).</p>	<p>Information is documented in CSM, additional information gained during the remediation and subsequent verification sampling will be added to the CSM as necessary.</p>	Qualitative
	<p>(2) Data Need: Document field observations on subsurface conditions including presence of staining and odor and/or results of field-screening. Determine if the generator shack has a contiguous foundation.</p>	<p>Document field observations during remediation. The observations will be documented in the field and will be used to determine when and where verification samples will be collected.</p>	Qualitative Semiquantitative

Table A.3-1
Identified Information/Data Needs to Resolve Decisions for Group #1 CASS
(Page 2 of 4)

Information/Data Needs	Source of Information/Data	Proposed collection methods	Data Type ^a
Continued Criteria #1, for Decision #1: If contamination is present, it will be sampled.	<p>The culmination of all the biasing data collected/documented as indicated above will aid in determining the areas most likely to be contaminated after excavation.</p> <p>Data Need: Collect verification samples from potentially affected media in area most likely contaminated and submit for laboratory analysis.</p>	<p>Appropriate sampling techniques (e.g., hand auger, drilling/direct-push, excavation) will be used to collect soil samples at biased locations as indicated below. Final locations and/or additional sample locations will be chosen in the field based on site conditions and professional judgement. Consistent with the <i>Sectorized Clean-up Work Plan For Housekeeping Category Waste Sites</i> a minimum of one sample will be collected from any excavation where less than 3 yd³ of material is removed (DOE/NV, 2000). At locations where greater than 3 yd³ of material is removed, a minimum of five samples will be collected. One from the bottom of the excavation and one from the approximate middle of each of the four walls of the excavation. Additional site-specific considerations are detailed below.</p> <p>CAS 18-25-02: If foundation is found to be contiguous (e.g., curbing has an attached bottom), sample locations will include the interval of soil even with the base of the foundation on all four sides outside of the curbing. If foundation is found not to be contiguous (i.e., only the curbing), sample locations will include bottom and four side walls of the excavation.</p> <p>CAS 18-25-03: Additional locations will include locations to determine if: (1) contamination was/is migrating to the CAS from another source (e.g., electrical equipment pad or communications yard), (2) surface contamination has migrated downhill from the stain, and (3) there were release points associated with the secondary AST.</p> <p>CAS 18-25-04: Locations will include the bottom of the existing excavation to a minimum depth of 4 ft and along all four sides of the excavation at the approximate mid-point of the side to a minimum depth equal to the current bottom of the excavation or refusal due to bedrock.</p> <p>CAS 29-44-01b: No additional considerations.</p>	Quantitative

Table A.3-1
Identified Information/Data Needs to Resolve Decisions for Group #1 CASs
(Page 3 of 4)

Information/Data Needs	Source of Information/Data	Proposed collection methods	Data Type ^a
<p>Information needs to meet Criteria #2 for Decision #1: If contamination is present it will be detected.</p> <p>Types of analyses</p>	<p>Results of historical samples and process knowledge indicate the following COPCs:</p> <p>CASs 18-25-02 and 18-25-03: TPH (oil and diesel), VOCs, SVOCs, RCRA Metals, and PCBs</p> <p>CAS 18-25-04: TPH (oil and diesel) and VOCs</p> <p>CAS 29-44-01b: TPH (full scan), VOCs, SVOCs, RCRA Metals, and PCBs</p> <p>Data Need: Potential pre-excavation samples</p>	<p>Existing data documented in site background and CSM.</p> <p>All samples collected will be analyzed using the appropriate analytical method provided in Table 6-2 in Section 6.0 of the SAFER plan. Reviewed analytical results will be used to determine if COPCs exceed PALs.</p>	<p>Qualitative Quantitative</p>
<p>Information needs for Decision #2: Stopping points</p> <p>Analytical data and/or field observations.</p>	<p>Data Need: Sample analytical data and site observations</p>	<p>Sample analytical data and site observations will be collected/documented as indicated above.</p> <p>Professional judgement and consideration of the results of sample analysis and field observations will be used to determine if a stopping point has been reached. A stopping point will have been reached if data indicate a major flaw in the CSM.</p>	<p>Qualitative Quantitative</p>
<p>Information needs for Decision #3: Additional excavation</p> <p>Analytical data and/or field observations.</p>	<p>Data Need: Sample analytical data and site observations</p>	<p>Sample analytical data and site observations will be collected/documented as indicated above.</p> <p>Professional judgement and consideration of the results of sample analysis and field observations will be used to determine if additional remediation is reasonable or is technically infeasible. Considerations will include logistical constraints and physical constraints (e.g., depth of contamination, location of underground utilities, and available technology).</p>	<p>Qualitative Quantitative</p>

Table A.3-1
Identified Information/Data Needs to Resolve Decisions for Group #1 CAsS
(Page 4 of 4)

Information/Data Needs	Source of Information/Data	Proposed collection methods	Data Type ^a
Information needs for Decision #4: eliminate COPCs Analytical data and field observations	Data Need: Reviewed laboratory analytical results and field observations.	Sample analytical data and site observations will be collected/documented as indicated above. Professional judgement and consideration of the results of sample analysis and field observations will be used to determine if COPCs can be eliminated from further sampling. A COPC may be eliminated from further sampling if analytical results indicate concentrations less than the PAL and site observations indicate additional samples will be collected at a location at which higher concentrations would not be expected based on distance/direction from the source.	Qualitative Quantitative
Waste management requirements	Data Need: Collect samples for waste characterization as necessary.	Sample analytical data and field observations will be collected/documented as indicated above.	Qualitative Quantitative
Housekeeping activities	The types and amount of debris for removal is generally known through visual observations.	Remove debris and photo document.	Qualitative
Global Positioning Satellite (GPS) coordinates	Data Need: Collect GPS measurements for sample locations as well as physical boundaries.	GPS measurements will be collected in accordance with standard procedures in a manner capable of achieving horizontal accuracy of less than 10 centimeters.	Quantitative

^a **Quantitative** data measures the quantity or amount of a characteristic or component within the population of interest. These data require the highest level of QA/QC in collection and measurement systems because the intended use of the data is to resolve primary decisions (i.e., rejecting or accepting the null hypothesis) and/or verifying closure standards have been met.

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

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

making. Other information addresses needs identified which are not directly related to the principle study questions are also listed in [Table A.4-1](#) and include collection of data to make appropriate waste management decisions, document housekeeping activities, and document sample collection points.

A.3.3.1 Determine the Basis for the Preliminary Action Levels

Laboratory analytical results will be compared to the following PALs to evaluate if COPCs are present and require further investigation:

- EPA Region IX risk-based Preliminary Remediation Goals for industrial soils (EPA, 1996).
- TPH concentrations above the TPH limit of 100 ppm per the NAC 445A.2272 (NAC, 2000).
- Background concentrations for RCRA metals will be evaluated when natural background exceeds the PAL (i.e., arsenic). Background is considered the mean plus two times the standard deviation of the mean (Moore, 1998) based on data published in *Mineral and Energy Resource Assessment of the Nellis Air Force Range* (NBMG, 1998).
- For COPCs without established PRGs, the same protocol as EPA Region IX will be used in establishing an action level, otherwise choose an established PRG from another region.

A.3.3.2 Potential Sampling Techniques and Appropriate Analytical Methods

Samples will be collected at biased sampling locations by hand excavation, backhoe excavation, or drilling/direct-push techniques from locations determined by the criteria discussed in [Table A.3-1](#). Samples will be analyzed for the COPCs as indicated in [Table A.3-1](#). Sample collection and handling activities will follow standard procedures.

[Table 6-2](#) in [Section 6.0](#) of the SAFER plan provides the analytical methods and laboratory requirements (i.e., detection limits, precision, and accuracy requirements). Specific analyses required for the disposal of IDW are identified in [Section 5.0](#) of the SAFER plan. Unless otherwise required by the results of this DQO and stated in the SAFER plan, this investigation will adhere to the Industrial Sites QAPP (DOE/NV, 1996).

A.3.4 Step 4, Define the Boundaries of the Study

The purpose of this step is to define the target population of interest and specify the spatial and temporal features of the population that are pertinent for decision making.

A.3.4.1 Define the Target Population

The target population for each CAS is defined in [Table A.3-2](#).

**Table A.3-2
Target Populations for CASs in Group #1**

CAS	Target Population
18-25-02	Concentrations of COCs in soil collected from locations adjacent to the excavation(s) and/or adjacent to the concrete foundation. If the concrete foundation is contiguous and it is determined that it should be left in place, then concentrations of COCs in the remaining concrete will be included as a target population.
18-25-03	Concentrations of COCs in soil collected from locations adjacent to the excavation
18-25-04	Concentrations of COCs in soil collected from locations adjacent to the excavation
29-44-01b	Concentrations of COCs in soil collected from locations adjacent to the excavation

A.3.4.2 Determine the Spatial and Temporal Boundaries

The spatial boundaries that apply to each CAS in Group #1 are defined in [Table A.3-3](#). The dimensions given for the spatial boundaries are purposely not the same as those used for estimates on the volume of contaminated material given in [Table A.1-3](#). The spatial boundaries include a realistic horizontal buffer zone for the extent of contamination and for purposes of comparing site conditions to the CSM. For purposes of waste/soil staging, the buffer zone defining the CAS will be extended to 100 ft. Each CAS is considered geographically independent. However, it is possible that contamination at CASs 18-25-02 and CAS 18-25-03 may overlap.

**Table A.3-3
Spatial Boundaries Identified for Group #1 CASs**

CAS	Spatial Boundary
18-25-02	The generator shack foundation plus 20 ft buffer to a vertical depth of 50 ft
18-25-03	The former location of the AST plus 20 ft buffer to a vertical depth of 50 ft
18-25-04	Excavations and soil pile boundaries plus 20 ft buffer to a vertical depth of 50 ft bgs
29-44-01b	The existing stain and 20 ft buffer to a vertical depth of 10 ft

Temporal boundaries are those time constraints set up by weather conditions and project schedules set in the baseline. Weather conditions in Area 18 and 29 are an important temporal constraint and require that investigation activities are not scheduled during winter months. There are no time constraints on collecting samples as environmental conditions at all sites will not significantly change in the near future, and conditions would have stabilized over the last 10 to 25 years since last used. Current schedules for submitting the SAFER plan are August 12, 2001 for the Draft SAFER plan and September 28, 2001 for the Final SAFER plan. Field work is currently scheduled to begin in FY 2002.

A.3.4.3 Identify Practical Constraints

Nevada Test Site-controlled activities may affect ability to characterize these sites. [Table A.3-4](#) indicates other practical constraints that may be encountered at each CAS.

**Table A.3-4
Practical Constraints Identified for CASs Within Group #1**

CAS	Underground Utilities Likely to be Encountered	Topography Likely to Effect Planned Activities	Concrete or Asphalt Covers Potentially Contaminated Soil	Site is in Remote Area	Structures (e.g., fences, building) Likely to Effect Planned Activities	Area Subject to Access Restrictions
18-25-02	Yes	No	Yes ^a	Yes	Yes	Yes
18-25-03	Yes	No	No	Yes	Yes	Yes
18-25-04	No	Yes	No	Yes	No	Yes
29-44-01b	No	No	No	Yes	No	Yes

^aConcrete pads inside the generator shack and foundation curbing may cover contaminated soil. It is planned to remove all stained or potentially contaminated concrete.

A.3.4.4 Define the Scale of Decision Making

The scale of decision making is defined as the CAS.

A.3.5 Step 5, Develop a Decision Rule

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

A.3.5.1 Specify the Population Parameter

Since the sampling design is biased towards likely locations of contamination, the population parameter will be the maximum observed concentration of each COC within each sample location.

A.3.5.2 Choose an Action Level

Action levels were defined in Step 3 ([Section A.3.3](#)).

A.3.5.3 Measurement and Analysis Methods

This step was previously addressed in Step 3 ([Section A.3.3.2](#)). The measurement and analysis methods given in [Table 6-2](#) in [Section 6.0](#) of the SAFER plan are capable of performing over the expected range of values, and that the detection limit of the measurement method to be used is less than the action limit for each COC.

A.3.5.4 Decision Rule

The following decision rules are arranged in sequential order.

- (1) If laboratory data indicates all COCs are below PALs within a CAS, then further excavation is unnecessary. If laboratory data indicates any COCs exceed PALs within a CAS, then determine if a stopping point has been reached.
- (2) If a stopping point has been reached, then notify NNSA/NV and NDEP and reevaluate the remediation/characterization strategy. If a stopping point has not been reached, then determine if further excavation is reasonable.
- (3) If further excavation is reasonable (assuming COCs exceed PALs), then continue excavation and verification activities. If further excavation is not reasonable, then follow DQO process for characterizing the location for closure in place as described in [Section A.5.0](#).
- (4) If laboratory data indicates COCs are below PALs at a CAS (assuming further remediation is necessary and reasonable), then those COCs do not need to be analyzed for in verification samples after additional excavation. If laboratory data indicates COCs exceed PALs at a CAS, then those COCs must be analyzed for in verification samples after additional excavation.

A.3.6 Step 6, Specify the Tolerable Limits on Decision Errors

The sampling approach for verification samples at Group #1 sites relies upon biased samples; therefore, statistical analysis is not appropriate. Only laboratory analytical results (quantitative data) will be used to determine if COCs are present above PALs.

The baseline condition (i.e., null hypothesis) and alternative condition for Group #1 sites is:

- Baseline condition - COCs will be present above PALs after remediation
- Alternative condition - COCs will not be present above PALs after remediation

A.3.6.1 False Rejection Decision Error

The false rejection or alpha error would mean accepting that COCs are not present above PALs when they really are, increasing risk to human health and environment.

The false rejection decision error is controlled by meeting the following two criteria: (1) having a high confidence that the sample locations selected will identify COCs if present within the CAS and (2) having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples. To satisfy that the first criteria is met, locations for verification samples will be chosen as described in [Table A.3-1](#). Following established quality assurance procedures during sample collection, handling, and analysis, as well as during the evaluation of results protects against false negatives.

A.3.6.2 False Acceptance Decision Error

The false acceptance error or beta error would mean accepting that COCs are above PALs when they are not, resulting in increased costs for unneeded excavation and/or characterization.

The false acceptance decision error is controlled by protecting against false positive analytical results. False positive results are typically attributed to laboratory errors and sampling/handling errors. Quality assurance/quality control samples (e.g., field blanks, trip blanks, laboratory control samples, and method blanks) should minimize the risk of a false positive analytical result. Other factors are following established procedures for decontamination of sampling equipment to avoid cross contamination and using clean sample containers

A.3.6.3 Quality Assurance/Quality Control

Quality control samples will be collected as required by established procedures. The required QC samples include:

- Trip blanks (1 per sample cooler containing VOC environmental samples)
- Equipment blanks (1 per sampling event for each type of decontamination procedure)
- Source blanks (1 per batch of equipment or supplies [e.g., direct-push liners or decontamination water])
- Field duplicates (minimum of 1 per 20 environmental samples or 1 per sampling location)
- Field blanks (minimum of 1 per 20 environmental samples or 1 per sampling location)
- MS/MSD (minimum of 1 per 20 environmental samples or 1 per sampling location)

Additional QC samples may be submitted based on site conditions.

Data quality indicators of precision, accuracy, comparability, completeness and representativeness are defined in the Industrial Sites QAPP (DOE/NV, 1996). Site specific data quality indicators are discussed in more detail in [Section 6.0](#) of the SAFER plan.

A.3.7 Step 7, Optimize the Design for Obtaining Data

Data collection activities will focus on verification sampling after remediation. However, samples may be obtained from the stained soil prior to remediation to aid in making waste management and/or health and safety decisions. If these sample are collected the results may be used to limit COPCs as described in [Section A.3.2](#) (see [Figure A.2-1](#)).

Environmental soil samples may be field screened to guide remediation activities, to assist in waste management decisions, and to provide health and safety information. The field-screening level for TPH when utilized to determine if further excavation needs to occur is 75 ppm, using an appropriate field test method.

Upon the completion of excavation activities, verification samples will be collected from the excavation. Consistent with the Sector Clean-up Work Plan For Housekeeping Category Waste Sites, a minimum of one sample will be collected from any excavation where less than 3 yd³ of

material is removed (DOE/NV, 2000). At locations where greater than 3 yd³ of material is removed, a minimum of five samples will be collected (i.e., one from the bottom of the excavation and one from the approximate middle of each of the four walls of the excavation). Additional site-specific considerations are detailed in the sections below. Additional samples may be collected for waste characterization and disposal purposes.

Excavations may remain open while awaiting sample results. Upon completion of remediation activities all excavations will be backfilled with clean fill.

A.3.7.1 CAS 18-25-02

The location of verification samples is dependent upon field observations concerning the concrete foundation of the generator shack. If the foundation is found to be contiguous (i.e., the curbing is attached to a concrete bottom that spans all of the foundation) all soil/gravel and stained concrete pads from inside the foundation will be removed and the foundation will be inspected for cracks and/or staining. A decision will be made to remove the concrete foundation or leave in place. If the concrete foundation is left in place a minimum of three samples will be collected from the concrete to characterize potential PCB contamination. If the foundation is there and it is determined it will be left in place, a minimum of four verification samples will be collected from the interval of soil even with the base of the foundation on all four sides. If the foundation is found not to be contiguous or it is determined it will be removed, all contaminated soil/gravel and stained concrete will be removed and a minimum of five verification samples will be collected. See [Figure A.3-1](#).

Verification sample(s) will also be collected after excavation of the small stain to the east of the generator shack foundation.

A.3.7.2 CAS 18-25-03

In addition to the verification samples collected from the excavation, the following locations will be sampled (See [Figure A.3-1](#)):

- Locations to the west and north of the stain to determine if contamination was/is migrating into CAS 18-25-03 from either the electrical equipment pad to the west or the communications yard to the north.

Figure A.3-1
Proposed Sample Locations at CASs 18-25-02 and 18-25-03

- A location down slope of the excavation to determine if surface contamination has migrated down slope from the stain.
- A minimum of three locations around the perimeter of the former location of a secondary AST to determine if there were release points associated with that tank.

Step out sampling to define contamination originating outside of the CAS will not be conducted beyond the fence on the north and west sides of the CAS. In this scenario, NNSA/NV and NDEP will be notified.

A.3.7.3 CAS 18-25-04

Locations for verification samples will include the approximate center of the excavation. Samples will be collected approximately every 2 ft to a minimum depth of 4 ft bgs. Additional sample locations will include points along each edge of the excavation at the approximate mid-point as indicated in [Figure A.3-2](#). Samples will be collected approximately every 5 ft to the approximate depth of the existing excavation or to bedrock whichever is first.

Upon verification that contamination above PALs has been removed, the soil pile to the west of the excavation will be used to backfill the excavation. Field-screening and field observations will be used to segregate any soil that may contain TPH at concentrations above PALs. Field-screening for TPH will be performed for approximately every 20 cubic yards of soil moved. The field-screening level for TPH for this purpose will be 75 ppm, using an appropriate field test method.

A.3.7.4 CAS 29-44-01b

There are no site-specific considerations.

Figure A.3-2
Proposed Sample Locations at CAS 18-25-04

A.4.0 Seven Step DQO Process for Group 2 CASs

This section discusses the seven step DQO process for Group 2 CASs 18-25-01 and 29-44-01a, where it is unknown if a release occurred. These sites will undergo a preliminary investigation (i.e., Phase I) to determine if contamination is present above PALs. The preferred closure option for Group #2 sites is no further action assuming no contamination above PALs is found. If contamination above PALs is identified, the sites will be moved to Group #3 for characterization.

A.4.1 Step 1, State the Problem

It is unknown if there were releases at CASs 18-25-01 and 29-44-01a or if there is contamination above PALs at these sites.

A.4.2 Step 2, Identify the Decision

The following decisions to be resolved are arranged sequentially.

(1) Determine if field observations indicate COPCs are likely above PALs (e.g., is gross contamination obvious).

(2) Determine if sample analytical data indicates COPCs are present above PALs.

A.4.2.1 Alternative Actions to the Decision

The following alternative actions are arranged sequentially.

(1) If field observations indicate COPCs are likely above PALs, characterize the site in accordance with Group #3 DQOs (see [Section A.5.0](#)). If field observations do not indicate TPH is likely above PALs, collect confirmation samples at locations as indicated by biasing factors.

(2) If laboratory samples indicate no COPCs exceed PALs, further investigation of the CAS is not required. If samples indicate contamination above PALs, characterize the site in accordance with Group #3 DQOs (see [Section A.5.0](#)).

A.4.3 Step 3, Identify Inputs to the Decisions

In order to resolve Decision #1, an investigation will be initiated to determine if field observations indicate contamination is above PALs and/or identify additional biasing factors that may influence location of confirmation sampling. Examples of such field observations may include presence of hydrocarbon odor or staining or positive results for TPH field-screening methods. This investigation (i.e., screening) must be conducted in areas most likely to be contaminated. Historical records, interviews, and process knowledge indicate the source of the potential release, location of the system components that may have contributed to the potential release, and COPCs that are expected if a release occurred.

In order to resolve Decision #2, sample data must be collected and analyzed following two criteria: (1) samples must be collected in areas most likely to be contaminated, and (2) the analyses must be sufficient to detect any contamination present within those samples. A combination of the historical information and additional biasing data collected during the screening investigation will provide needed information on the location of the potential release. Biasing factors to meet the second criterion include documented process knowledge on the source of the potential release.

[Table A.4-1](#) lists the information inputs, the source of information for each input, and the proposed methods to collect the new data. The last column addresses the appropriate QA/QC type required for a particular data collection activity and is determined by the intended use of the resulting data in decision making. Other information addresses needs identified which are not directly related to the principle study questions are also listed in [Table A.4-1](#) and include collection of data to make appropriate waste management decisions and document sample collection points.

A.4.3.1 Determine the Basis for Preliminary Action Levels

Laboratory analytical results will be compared to the PALs as indicated in [Section A.3.3.1](#) to evaluate if COPCs are present and require further investigation.

A.4.3.2 Potential Sampling Techniques and Applicable Analytical Methods

Samples will be collected at biased sampling locations by hand excavation, backhoe excavation, or drilling/direct-push techniques from locations determined by the criteria discussed in [Table A.4-1](#)

Table A.4-1
Identified Information/Data Needs to Resolve Decisions for Group #2 CASS
(Page 1 of 2)

Information/Data Needs	Source of Information/Data	Proposed collection methods	Data Type
<p>Information needs for Decisions #1: Biasing factors in choosing investigation (i.e., screening) locations</p> <p>(1) Source and location of potential releases</p> <p>(2) Utilities and other access problems</p>	<p>(1) Current location or historical location of system components are documented in the CSMs. These locations are based on engineering drawings and site observations. Current field observations are limited due to asphalt, concrete, and/or soil cover at CAS 18-25-01. There are no known confirmed release points.</p> <p>CAS 18-25-01: There is no specific identified source of a release. Likely sources include releases from pumps during fueling and fluids drained from vehicles during maintenance. The likely location of a release is around the pump islands and the mechanics shelter.</p> <p>CAS 29-44-01a: There is no specific identified source of a release. The only identified sources of fuel at the transmitter stations is the potential AST and generator that were there prior to 1972. The likely location of a release is around the former location of the AST, fuel line, and generator.</p> <p>Data Need: Document field observations including TPH field screening, topography, and subsurface soil conditions (e.g., staining, and odor).</p>	<p>At a minimum, the locations indicated below will be investigated. Additional locations may be added based on site conditions and the professional judgement of the Site Supervisor.</p> <p>CAS 18-25-01: Drilling/direct-push holes at the following locations to a minimum depth of 6 ft bgs</p> <ul style="list-style-type: none"> - Two locations (adjacent to predicted location of pumps) on either side of each pump islands, approximately 5 ft from pump islands. Total of 8 locations - Every 10 ft along front edge of mechanics shelter 5 ft from edge of concrete. <p>CAS 29-44-01a: Using hand excavation methods at the following locations in order to observe soil conditions to a depth of 6 inches.</p> <ul style="list-style-type: none"> - Center and middle of all four sides of AST pad - Minimum of two locations along fuel line - Center and middle of all four sides of radio pad <p>Professional judgement will be used to determine if sufficient field observational data exist to promote sites to Group #3 for a Phase-II (characterization). Considerations may include appearance of visible staining and/or positive field screening results.</p>	Qualitative Semi-Quantitative
	<p>(2) Asphalt and concrete cover the area of concern for CAS 18-25-01. Underground utilities are expected at CAS 18-25-01 and may exist at CAS 29-44-01a. Potential sampling locations at CAS 29-44-01a are located on a slope that may not be accessible to sampling technology.</p> <p>Data Need: Document utilities and access restrictions in relation to potential sampling areas.</p>	<p>Complete checklist to document locations of underground and above ground utilities prior to intrusive work. Determine if an alternate sampling technique can access sampling locations.</p>	Qualitative

Table A.4-1
Identified Information/Data Needs to Resolve Decisions for Group #2 CASS
(Page 2 of 2)

Information/Data Needs	Source of Information/Data	Proposed collection methods	Data Type
<p>Information needs to meet Criteria #1 for Decision #2:</p> <p>If contamination is present, it will be sampled</p>	<p>(1) The culmination of all the biasing data collected/documented above will aid in determining the areas most likely to be contaminated.</p> <p>Data Need: Collect confirmation samples from potentially affected media in area most likely contaminated and submit for laboratory analysis.</p>	<p>Appropriate sampling techniques (e.g., hand excavation, backhoe excavation, drilling/direct-push) will be used to collect soil samples at biased locations. Locations will be determined by application of professional judgement and considerations of all biasing factors as discussed above. In the event no additional biasing factors are identified during the field investigation, the minimum samples to be collected are indicated below:</p> <p>CAS 18-25-01: - One at each location indicated for field investigation</p> <p>CAS 29-44-01a: - Middle of both short ends of the AST pad (most likely place for drain valve) - Approximate location of both ends of fuel line</p>	Quantitative
<p>Information needs to meet Criteria #2 for Decision #2:</p> <p>If contamination is present it will be detected. Types of analyses</p>	<p>Process knowledge, historical records, and interviews indicate the COPCs expected to be present if a release occurred.</p> <p>CAS 18-25-01: TPH (full scan), VOCs, SVOCs, RCRA Metals, and PCBs</p> <p>CAS 29-44-01a: Diesel</p>	<p>All samples collected will be analyzed for all COPCs using the appropriate analytical method provided in Table 6-2 in Section 6.0 of the SAFER plan. Reviewed analytical results will be used to determine if COPCs exceed PALs.</p>	Quantitative
Waste management requirements	Waste will be characterized based on process knowledge, field observations, and results of analytical samples.	Sample analytical data and field observations will be collected/documented as indicated above.	Qualitative/ Semiquantitative Quantitative
Global Positioning Satellite (GPS) coordinates	Data Need: Collect GPS measurements for all sample and screening locations as well as cultural/topographical features.	GPS measurements will be collected in accordance with standard procedures in a manner capable of achieving horizontal accuracy of less than 10 centimeters.	Quantitative

^aSee foot note ^a for [Table A.3-1](#).

Samples will be analyzed for the COPCs as indicated in [Table A.4-1](#). Sample collection and handling activities will follow standard procedures.

[Table 6-2](#) in [Section 6.0](#) of the SAFER plan provides the analytical methods and laboratory requirements (e.g., detection limits, precision, and accuracy requirements). Specific analyses required for the disposal of IDW are identified in [Section 5.0](#) of the SAFER plan. Unless otherwise required by the results of this DQO and stated in the SAFER plan, this investigation will adhere to the Industrial Sites QAPP (DOE/NV, 1996).

A.4.4 Step 4, Define the Boundaries of the Study

The purpose of this step is to define the target population of interest and specify the spatial and temporal features of the population that are pertinent for decision making.

A.4.4.1 Define the Target Population

The target population for each CAS is defined in [Table A.4-2](#).

Table A.4-2
Target Populations for CASs in Group #2

CAS	Target Population
18-25-01	Concentrations of COPCs in soils underneath the asphalt near the pump islands and in front of the concrete pad (east side) for the mechanics shelter. Concentrations of COPCs that can be associated with the asphalt are not part of the target population.
29-44-01a	Concentrations of diesel/oil within the surface and subsurface soils to 12 inches bgs in locations adjacent to the former locations of the system components (e.g., diesel AST).

A.4.4.2 Determine the Spatial and Temporal Boundaries

The spatial boundaries that apply to each CAS in Group #2 are defined in [Table A.4-3](#). The dimensions given for the spatial boundaries are purposely not the same as those used for estimates on the volume of contaminated material given in [Table A.1-3](#). The spatial boundaries include a realistic horizontal buffer zone for the extent of contamination and for purposes of comparing site conditions to the CSM. For purposes of waste/soil staging the buffer zone defining the CAS will be extended to 100 ft for CAS 29-44-01a. Each CAS is considered geographically independent. The spatial boundaries include a wide buffer zone so as to provide an area for equipment and waste staging.

Table A.4-3
Spatial Boundaries Identified for CASs Within CAU 394

CAS	Spatial Boundary
18-25-01	The service station area and 20 ft buffer to a vertical depth of 50 ft
29-44-01a	Former locations of system components plus 30 ft buffer to a depth of 50 ft

Weather conditions in Areas 18 and 29 are an important temporal constraint and require that investigation activities are not scheduled during winter months. There are no time constraints on collecting samples as environmental conditions at these sites will not significantly change in near future, and conditions would have stabilized over the last 10 to 25 years since last used. Current schedules for submitting the SAFER plan are July 12, 2001 for the Draft SAFER plan and September 28, 2001, for the Final SAFER plan. Field work is currently scheduled to begin in FY 2002.

A.4.4.3 Identify Practical Constraints

Nevada Test Site-controlled activities may affect ability to characterize these sites. Corrective action site 29-44-01a is extremely remote and only reachable by a very steep and winding dirt road.

Table A.4-4 indicates other practical constraints that may be encountered at each CAS.

Table A.4-4
Practical Constraints Identified for CASs Within Group #2

CAS	Underground Utilities Likely to be Encountered	Topography Likely to Effect Planned Activities	Concrete or Asphalt Covers Potentially Contaminated Soil	Site is in Remote Area	Structures (e.g., fences, building) Likely to Effect Planned Activities	Area Subject to Access Restriction
18-25-01	Yes	No	Yes ^a	Yes	No	Yes
29-44-01a	Possible	Yes	No	Yes	No	Yes

^aAsphalt or concrete may cause practical constraints at this site because of the physical barrier they may impose to sampling potentially contaminated soil. In addition, the presence of asphalt may cause additional problems because it may pose problems in discerning if concentrations of TPH detected are due to releases or due to the presence of asphalt.

A.4.4.4 Define the Scale of Decision Making

The scale of decision making is defined as the CAS.

A.4.5 Step 5, Develop a Decision Rule

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

A.4.5.1 Specify the Population Parameter

The population parameter is the observed concentration of COCs within each sample.

A.4.5.2 Choose an Action Level

Action levels were defined in Step 3 ([Section A.4.3](#)).

A.4.5.3 Measurement and Analysis Methods

This step was previously addressed in Step 3 ([Section A.4.3.2](#)). The measurement and analysis methods given in [Table 6-2](#) in [Section 6.0](#) of the SAFER plan are capable of performing over the expected range of values, and that the detection limit of the measurement method to be used is less than the action limit for each COC.

A.4.5.4 Decision Rule

The following decision rules are arranged in sequential order.

(1) If field observations indicate COCs are likely above PALs at a CAS, then characterize the CAS in accordance with Group #3 DQOs (see [Section A.5.0](#)). If field observations do not indicate COCs are likely above PALs at a CAS, then collect confirmation samples at locations as indicated by biasing factors.

(2) If laboratory analysis does not indicate contamination above PALs at a CAS, then close site (no further action). If laboratory analysis indicates contamination above PALs at a CAS, then characterize the CAS in accordance with Group #3 DQOs (see [Section A.5.0](#)).

A.4.6 Step 6, Specify the Tolerable Limits on Decision Errors

The sampling approach for the investigation of Group #2 sites relies upon biased samples; therefore, statistical analysis is not appropriate. Only laboratory analytical results (quantitative data) will be used to determine if COCs are present above PALs.

The baseline condition (i.e., null hypothesis) and alternative condition for the initial study question for Group #2 sites are:

- Baseline condition - COCs are present above PALs
- Alternative condition - COCs are not present above PALs

A.4.6.1 False Rejection Decision Error

The false rejection or alpha error would mean accepting that COCs are not present above PALs when they really are, increasing risk to human health and environment.

The false rejection decision error is controlled by meeting the following two criteria: (1) having a high confidence that the sample locations selected will identify COCs if present within the CAS, and (2) having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples. To satisfy that the first criteria is met, samples will be collected in areas that are likely to be contaminated by considering the biasing factors. To satisfy that the second criteria is met, samples will be analyzed for the suspected COCs.

Following established quality assurance procedures during sample collection, handling, and analysis, as well as during the evaluation of results protects against false negatives.

A.4.6.2 False Acceptance Decision Error

The false acceptance error or beta error would mean accepting that COCs are above PALs when they are not, resulting in increased costs for unneeded characterization.

The false acceptance decision error is controlled by protecting against false positive analytical results. False positive results are typically attributed to laboratory errors and sampling/handling errors. Quality assurance/quality control samples (e.g., field blanks, trip blanks, laboratory control samples, and method blanks) should minimize the risk of a false positive analytical result. Other factors are following established procedures for decontamination of sampling equipment to avoid cross contamination and using clean sample containers

A.4.6.3 Quality Assurance/Quality Control

A discussion of QA/QC is provided in [Section A.3.6.3](#).

A.4.7 Step 7, Optimize the Design for Obtaining Data

The objective of the investigation of Group #2 CASs is to verify contamination exceeding PALs does/does not exist at these sites. In order to accomplish this, an initial investigation will be performed to determine if contamination is obvious based on field observations. Field indicators of contamination may include evidence of staining and/or positive TPH field-screening results. If contamination is obvious, a site characterization will be conducted in accordance with the DQOs discussed in [Section A.5.0](#). If contamination is not immediately obvious based on site observations, then confirmation samples will be collected based on the biasing factors as indicated in [Table A.4-1](#). Laboratory analytical results will be used to confirm the absence/presence of COCs. If COCs are not identified above PALs, further investigation is not necessary. If COCs are identified above PALs, site characterization will be conducted in accordance with the DQOs discussed in [Section A.5.0](#).

Hand sampling and/or drilling/direct push will be the primary investigation techniques. Field investigation and collection of confirmation samples will be completed as indicated below in the site specific sections. Sample locations will be finalized in the field based on observations, field screening results, and the professional judgement of the site supervisor. Additional samples may be collected for waste characterization and disposal purposes.

Environmental soil samples may be field screened to guide sample collection activities, to assist in waste management decisions, and to provide health and safety information. The field-screening level for TPH when utilized to determine if a confirmation sample needs to be collected at a specific spot is 75 ppm, using an appropriate field test method.

A.4.7.1 CAS 18-25-01

Site investigation activities at CAS 18-25-01 will include making field observations (e.g., screening) and soil sampling. The locations of the fuel pumps and mechanics shelter are documented on engineering drawings and are visible in the field. Site preparation activities may include the removal of asphalt and/or concrete to access sampling locations. Drilling/direct-push techniques will likely be used to expose soil to a minimum depth of 6 ft bgs at the locations indicated in [Figure A.4-1](#). At a minimum, the locations indicated in [Figure A.4-1](#) will be screened for evidence of contamination such as staining and/or positive TPH field-screening results. If no evidence of a release is indicated in the field, then at a minimum confirmation samples will be collected from the locations indicated in

[Figure A.4-1](#) at a depth of 4 ft bgs. The depth of 4 ft bgs was chosen because at this depth interference from the overlaying asphalt is not likely to be a factor; however, if a State of Nevada reportable hydrocarbon spill (i.e., greater than 3 cubic yards of contaminated material) occurred at the location it is likely to have reached this depth based on factors documented in the CSM.

A.4.7.2 CAS 29-44-01a, Potential Diesel Fuel Release at Shoshone Transmitter

Site investigation activities will include making field observations and soil sampling. The former location and configuration of the AST, associated piping, and generator are documented on engineering drawings. Hand excavation techniques will likely be used to expose soil to a minimum of 6 in. bgs at the screening locations indicated in [Figure A.4-2](#). At a minimum the locations indicated in [Figure A.4-2](#) will be screened for evidence of contamination such as staining and/or positive TPH field-screening results. If no evidence of a release is indicated in the field, then at a minimum confirmation samples will be collected from the locations indicated in [Figure A.4-2](#).

Figure A.4-1
Investigation and Potential Sample Locations at CAS 18-25-01

Figure A.4-2
Investigation and Potential Sample Locations at CAS 29-44-01a

A.5.0 Seven Step DQO Process for Group 3 CASs

This section discusses the seven step DQO process for Group #3 CASs, where contamination is known to exist and the preferred closure option is close in place. These sites must be characterized (i.e., Phase II) to provide data to support the closure option. At a minimum Group #3 consists of CAS 12-25-04. Other sites from Groups #1 and #2 may be added to this group based on the outcome of the remediation or investigation as described in [Section A.3.0](#) and [Section A.4.0](#).

A.5.1 Step 1, State the Problem

The full nature and/or extent of contamination at these sites is unknown. Contamination at these sites may present a risk to human health and the environment. Data is needed to support the final determination of a closure alternative and close the site.

Based on historical documentation (e.g., previous sample results), field observations (i.e., visible staining), and process knowledge, hazardous constituents may exceed PALs at Group #3 CASs. As a contingency, this section will be written to include Group #1 and Group #2 CASs.

A.5.2 Step 2, Identify the Decisions

The following decisions to be resolved are arranged sequentially.

- (1) Determine if contamination exists above PALs (e.g., nature of contamination).
- (2) Determine the extent of contamination equal to or above PALs.
- (3) Determine if a stopping point has been reached, if the extent has not been defined.
- (4) Determine if COPCs can be eliminated, if additional sampling is planned.
- (5) Determine the final closure alternative.

A.5.2.1 Alternative Actions to the Decisions

The following alternative actions are arranged sequentially and may be iterative.

- (1) If no COPCs exceed PALs, stop investigation and close site (no further action). If COPCs exceed PALs, define extent of contamination.
- (2) If the extent (vertical and lateral) of contamination above PALs has been bounded, no further characterization is necessary. If the extent of contamination above PALs has not been bounded, continue to collect required data (e.g., step-out sampling).
- (3) If a stopping point has not been reached, continue to collect required data. If a stopping point has been reached, notify NNSA/NV and NDEP and reevaluate the characterization strategy.
- (4) If during the initial investigation of Group #1 and/or Group #2 CASs or during on-going characterization of Group #3 CASs data indicates COPCs can be eliminated, do not analyze future samples for those COPCs. If COPCs can not be eliminated, continue analyzing for them.
- (5) If close in place is the preferred closure alternative, complete risk assessment and/or determine appropriate use restriction. If clean closure is the preferred alternative, remediate and collect verification sample(s) in accordance with the DQOs outlined in [Section A.3.0](#).

A.5.3 Step 3, Identify the Inputs to the Decisions

Historical records, interviews, field observations, and process knowledge indicate the source, general location, and types of potential COCs that are expected at CAU 394. New data collected as discussed in [Section A.3.0](#) and [Section A.4.0](#) will provide additional information on CASs in Groups #1 and #2 in the event characterization of these sites is necessary. Previous sampling efforts have provided some data; however, this information is either limited, inconclusive, or nonrepresentative of current conditions to accurately determine the nature and/or extent of contamination.

In order to resolve the decisions stated above, new sample data must be collected and analyzed. For Decision #1 data must be collected following two criteria: (1) samples must be collected in areas most likely to be contaminated, and (2) the analyses must be sufficient to detect any contamination present within those samples. Biasing factors to support the sample collection activities and meet the first criterion include: configuration of the system in question (e.g., location of tanks and associated piping, location of concrete pads), process knowledge, and field observations including field-screening methods.

[Table A.5-1](#) lists the information inputs, the source of information for each input, and the proposed methods to collect the new data. The last column addresses the appropriate QA/QC type required for a particular data collection activity and is determined by the intended use of the resulting data in decision making. Other information addresses needs identified which are not directly related to the principle study questions are also listed in [Table A.5-1](#) and include collection of data to make appropriate waste management decisions, document housekeeping activities, and document sample collection points.

A.5.3.1 Determine the Basis for Preliminary Action Levels

Laboratory analytical results will be compared to the PALs as indicated in [Section A.3.3.1](#) to evaluate if COPCs are present at levels that may pose an unacceptable risk to human health and/or the environment and require a corrective action.

A.5.3.2 Potential Sampling Techniques and Appropriate Analytical Methods

Samples will be collected by hand excavation, backhoe excavation, or drilling/direct-push techniques from locations determined by the criteria discussed in [Table A.5-1](#). Samples will be analyzed for the COPCs as indicated in [Table A.5-1](#). Sample collection and handling activities will follow standard procedures.

[Table 6-2](#) in [Section 6.0](#) of the SAFER plan provides the analytical methods and laboratory requirements (i.e., detection limits, precision, and accuracy requirements). Specific analyses required for the disposal of IDW are identified in [Section 5.0](#) of the SAFER plan. Unless otherwise required by the results of this DQO and stated in the SAFER plan, this investigation will adhere to the Industrial Sites QAPP (DOE/NV, 1996).

A.5.4 Step 4, Define the Boundaries of the Study

The following sections define the target populations, spatial boundaries and temporal boundaries for CASs within CAU 394.

Table A.5-1
Identified Information/Data Needs to Resolve Decisions for Group #3 CASs
(Page 1 of 4)

Information/Data Needs	Source of Information/Data	Proposed collection methods	Data Type ^a
<p>Information needs to meet Criteria #1 for Decision #1: If contamination is present it will be sampled.</p> <p>(1) Source and location of releases</p> <p>(2) Analytical data and field observations from investigations of Groups #1 and #2 CASs</p> <p>(3) Field-screening results</p> <p>(4) Field observations of surface and soil conditions</p> <p>(5) Utilities and other access problems</p>	<p>(1) Historical records, process knowledge as documented in the site background and CSM.</p> <p>CAS 12-25-04: The source of the release is UST 12-16-2 which was used to store waste oil. The location is identified in the field by the open excavation left after the removal of the UST.</p> <p>All other CASs: The source and location is documented in Section A.3.0 and Section A.4.0.</p>	<p>Information is documented in CSM, additional information gained during activities discussed in Section A.3.0 and Section A.4.0 will be added to the CSM as necessary.</p>	Qualitative
	<p>(2) Data Need: Data from investigations as described in Section A.3.0 and Section A.4.0 will provide information on the nature of those releases.</p>	<p>Data collected/documentated as discussed in Section A.3.0 and Section A.4.0 will be used to update the CSMs for Group #1 and #2 CASs as necessary.</p>	Qualitative Semiquantitative Quantitative
	<p>(3) Data Need: Collect field-screening results for TPH and/or VOCs on soil in potential sampling areas.</p>	<p>Areas near proposed sample collection points will be field-screened to help guide the selection of most appropriate sample to submit to laboratory.</p>	Semiquantitative
	<p>(4) Current field observations may be limited due to barriers (e.g., asphalt) or clean media (i.e., soil) covers over contaminated or potentially contaminated soil media.</p> <p>Data Need: Document field observations on surface and subsurface conditions for staining, odor, presence of pipes, etc.</p>	<p>Conduct field observations during sample collection. The observations will be documented in the field and may be used in selecting biased sample locations</p>	Qualitative
	<p>(5) Asphalt and concrete cover potential sampling locations at several CASs including CAS 12-25-04. Underground utilities are expected in Area 12 Camp and Area 18 Camp.</p> <p>Data Need: Document all utilities and access restrictions in relation to potential sampling areas.</p>	<p>Complete checklist to document locations of underground and above ground utilities prior to intrusive work. Determine if alternate sampling techniques can access sampling location; if not, then determine alternate sampling location.</p>	Qualitative

Table A.5-1
Identified Information/Data Needs to Resolve Decisions for Group #3 CASS
(Page 2 of 4)

Information/Data Needs	Source of Information/Data	Proposed collection methods	Data Type ^a
Continued Criteria #1 for Decision #1: If contamination is present, it will be sampled.	The culmination of all the biasing data collected/documented above will aid in determining the areas most likely to be contaminated. Data Need: Collect samples from potentially affected media in area most likely contaminated and submit for laboratory analysis.	Appropriate sampling techniques (e.g., hand auger, drilling/direct push, excavation) will be used to collect soil samples at biased locations. CAS 12-25-04: Locations include excavation for UST 12-16-2 and under steel box. All other CASSs: Locations for bias samples are described in Section A.3.0 and Section A.4.0 . Additional bias samples may be collected as dictated by the results of the investigation activities described in Section A.3.0 and Section A.4.0 .	Quantitative
Information needs to meet Criteria #2 for Decision #1: If contamination is present it will be detected: Types of analyses	Historical records, interviews and previous sample results indicate the COPCs expected to be present. CAS 12-25-04: TPH (full scan), VOCs, SVOCs, RCRA Metals, and PCBs. All other CASSs: COPCs are documented in Section A.3.0 and Section A.4.0 . Adjustments to the COPC list may be made based on the results of the investigation activities discussed in Section A.3.0 and Section A.4.0 .	Existing data are documented in site background and CSM. All new samples collected will be analyzed using the appropriate analytical method provided in Table 6-2 in Section 6.0 of the SAFER plan. Reviewed analytical results will be used to determine if COPCs exceed PALs.	Quantitative
Decision #2: Extent of contamination	Data Need: Collect samples for laboratory analysis at sample locations both vertically and laterally to bound contamination above PALs	Collect samples for laboratory analysis at locations tentatively identified in sample design and/or as determined in the field based on field observations. Reviewed analytical results will be used to determine if COPCs exceed PALs. A minimum of one "clean" sample below any interval in which COCs exceed PALs is needed to define vertical extent. A minimum of one "clean" sample is needed to define horizontal extent at step-out locations where no COCs are detected above PALs.	Quantitative

Table A.5-1
Identified Information/Data Needs to Resolve Decisions for Group #3 CASS
(Page 3 of 4)

Information/Data Needs	Source of Information/Data	Proposed collection methods	Data Type ^a
Information needs for Decision #3: Stopping points Analytical data and/or field observations.	A stopping point has been reached if sample analytical data and/or site observations indicate a major flaw in the CSM such as an unrecognized source of contamination, migration pathway, or excessive contamination. Data Need: Sample analytical data and site observations.	Sample analytical data and site observations will be collected/documented as indicated above. Professional judgement and consideration of the results of sample analysis and field observations will be used to determine if a stopping point has been reached. A stopping point may have been reached if data indicate a major flaw in the CSM.	Qualitative Quantitative
Information needs for Decision #4: Eliminate COPCs if possible Analytical data and field observations	Data Need: Reviewed laboratory analytical results and field observations.	Sample analytical data and site observations will be collected/documented as indicated above. Professional judgement and consideration of the results of sample analysis and field observations will be used to determine if COPCs can be eliminated from further sampling. A COPC may be eliminated from further sampling if analytical results indicate concentrations less than the PAL and site observations indicate additional samples will be collected/documented at a location at which higher concentrations would not be expected based on distance/direction from the source.	Qualitative Quantitative
Information needs for Decision #5: Select closure alternative Analytical data and/or field observations	As discussed in Section A.2.0 a preferred closure option has been selected. Data Need: Additional inputs to this decision will include new laboratory data and field observations.	Sample analytical data and field observations will be collected/documented as indicated above. Determination of the closure option will be based on professional judgement and consideration of the results of sample analysis and field observations. Considerations include COCs, concentrations of COCs, exposure pathways, and risk to receptors.	Qualitative Quantitative
Waste management requirements	Waste will be characterized based on process knowledge, field observations, and results of analytical samples.	Sample analytical data and field observations will be collected/documented as indicated above.	Qualitative/ Semiquantitative Quantitative
Housekeeping activities	The types and amount of debris for removal is generally known through visual observations.	Remove debris and photo document.	Qualitative

Table A.5-1
Identified Information/Data Needs to Resolve Decisions for Group #3 CASs
(Page 4 of 4)

Information/Data Needs	Source of Information/Data	Proposed collection methods	Data Type ^a
Global Positioning Satellite (GPS) coordinates	Data Need: Collect GPS measurements for all sample and screening locations as well as physical boundaries.	GPS measurements will be collected in accordance with standard procedures in a manner capable of achieving horizontal accuracy of less than 10 centimeters.	Quantitative

^aSee foot note ^a for [Table A.3-1](#)

A.5.4.1 Define the Target Population

The target population for each CAS is defined in [Table A.5-2](#).

**Table A.5-2
Target Populations for CASs in Group #3**

CAS	Target Population
12-25-04	Concentrations of COPCs in soils adjacent to the former location of UST 12-16-2
18-25-01	Concentrations of COPCs in soils underneath the asphalt adjacent to the pump islands and the pad for the mechanics shelter
18-25-02	Concentrations of COPCs in soils adjacent to the documented soil stain inside the generator shack foundation
18-25-03	Concentrations of COPCs in soils adjacent to the documented soil stain near the former location of the generator shack AST
18-25-04	Concentrations of COPCs in soil adjacent to the existing excavation
29-44-01a	Concentrations of diesel within the surface and subsurface soils adjacent to the former locations of the system components (e.g., AST)
29-44-01b	Concentrations of COPCs in soil adjacent to the documented soil stain

A.5.4.2 Determine the Spatial and Temporal Boundaries

The spatial boundaries that apply to each CAS 12-25-04 are defined in [Table A.5-3](#). The dimensions given for the spatial boundaries are purposely not the same as those used for estimates on the volume of contaminated material given in [Table A.1-3](#). The spatial boundaries include a realistic buffer zone for the extent of contamination and for purposes of comparing site conditions to the CSM. For purposes of waste/soil staging the horizontal buffer zone defining the CAS will be extended to 100 ft. The spatial boundaries for CASs in Groups #1 and #2 are defined in [Section A.3.0](#) and [Section A.4.0](#), respectively. Each CAS is considered geographically independent. The spatial boundaries include a wide buffer zone so as to provide an area for equipment and waste staging.

**Table A.5-3
Spatial Boundaries Identified for CASs in Group #3**

CAS	Spatial Boundary
12-25-04	Excavations boundaries and 30 ft buffer to a vertical depth of 50 ft

Weather conditions in Areas 18 and 29 are an important temporal constraint and require that investigation activities are not scheduled during winter months. There are no time constraints on

collecting samples as environmental conditions at all sites will not significantly change in the near future, and conditions would have stabilized over the last 10 to 25 years since last used. Current schedules for submitting the SAFER plan are July 12, 2001 for the Draft SAFER plan and September 28, 2001 for the Final SAFER plan. Field work is currently scheduled to begin in FY 2002.

A.5.4.3 Identify Practical Constraints

Nevada Test Site-controlled activities may affect ability to characterize these sites. The other practical constraints that apply to each CAS in Group 3 are defined in [Table A.5-4](#). The practical constraints for CASs in Groups #1 and #2 are detailed in [Section A.3.0](#) and [Section A.4.0](#), respectively.

**Table A.5-4
Practical Constraints Identified for CASs in Group #3**

CAS	Underground Utilities Likely to be Encountered	Topography Likely to Effect Planned Activities	Concrete or Asphalt Covers Potentially Contaminated Soil	Site is in Remote Area	Structures (e.g., fences, building) Likely to Effect Planned Activities	Area Subject to Access Restriction
12-25-04	Yes	No	Yes ^a	No	Yes	No

^aAsphalt or concrete may cause practical constraints at this site because of the physical barrier they may impose to sampling potentially contaminated soil. In addition, the presence of asphalt may cause additional problems because it may pose problems in discerning if concentrations of TPH detected are due to releases or due to the presence of asphalt.

A.5.4.4 Define the Scale of Decision Making

The scale of decision making is defined as the CAS.

A.5.5 Step 5, Develop a Decision Rule

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

A.5.5.1 Specify the Population Parameter

The population parameter will be the concentration of COCs in each sample.

A.5.5.2 Choose an Action Level

Action levels were defined in Step 3 ([Section A.5.3.1](#)).

A.5.5.3 Measurement and Analysis Methods

This step was previously addressed in Step 3 ([Section A.5.3.2](#)). The measurement and analysis methods given in [Table 6-2](#) in [Section 6.0](#) of the SAFER plan are capable of performing over the expected range of values, and the detection limit of the measurement method to be used is less than the action limit for each COPC.

A.5.5.4 Decision Rule

The following alternative actions are arranged sequentially.

- (1) If laboratory data indicates all COPCs are below PALs at a CAS, then stop characterization and close site (no further action). If laboratory data indicates any COPCs exceed PALs, then define extent of contamination.
- (2) If COPCs do not exceed PALs in the target population (bounding samples) at a CAS, then contamination has been bounded and further step out sampling is not required. If COCs exceed PALs in the target population (bounding samples) at a CAS, then the contamination has not been bounded and additional step out sampling is required.
- (3) If a stopping point has been reached, then notify NNSA/NV and NDEP and reevaluate the characterization strategy. If a stopping point has not been reached, then continue characterization.
- (4) If laboratory data indicates COCs are below PALs at a CAS (assuming further sampling is necessary), then those COCs do not need to be analyzed for at step out locations. If laboratory data indicates COCs exceed PALs at a CAS, then those COCs must be analyzed for at step out locations.
- (5) If close in place is the preferred closure alternative, then complete risk assessment and/or determine appropriate use restriction. If clean closure is the preferred alternative, then remediate and collect verification sample(s) in accordance with the DQOs outlined in [Section A.3.0](#).

A.5.6 Step 6, Specify Tolerable Limits on Decision Errors

The sampling approach for the investigation of Group #3 sites relies upon biased samples; therefore, statistical analysis is not appropriate. Only laboratory analytical results (quantitative data) will be used to determine if COCs are present above PALs. The baseline condition and alternative condition are:

- Baseline condition - The extent of COC concentrations above PALs has not been bounded by step out sampling.
- Alternative condition - The extent of COC concentrations above PALs has been bounded by step out sampling.

A.5.6.1 False Rejection Decision Error

The false rejection or alpha error would mean deciding that the extent of contamination above PALs has been bounded by step out sampling when they have not. This decision error would result in an increased risk to human health by not determining the full extent of contamination; thereby, implementing an inappropriate corrective action at the site that would not adequately protect against exposure to future receptors.

Data collection activities will be designed to minimize the chances of making a false rejection (alpha) decision error. The characterization CAU 394 sites is based on biased sampling and will be conducted under several basic assumptions regarding the area of contamination. The first is that contaminated areas will be sampled as discussed in [Section A.5.3](#) (e.g., the CSM is correct and the source and location of contamination is known through historical records, process knowledge, etc.). The second is that the concentrations of COCs decreases away from the area of contamination. The criteria for bounding the extent of contamination greater than PALs requires that one “clean” laboratory analytical sample is collected.

Following established QA/QC practices and standard procedures for data collection help minimize false negative analytical results.

A.5.6.2 False Acceptance Decision Error

The false acceptance or beta error would mean deciding that the extent of contamination above PALs has not been bounded when it really has. The consequence of this decision error would result in an

unnecessary increase in the utilization of resources in implementing additional sample collection and/or an inappropriate corrective action.

The false acceptance decision error is controlled by protecting against false positive results. False positive results are typically attributed to laboratory errors and sampling/handling errors. Quality assurance/quality control samples (e.g., field blanks, trip blanks, laboratory control samples, and method blanks) should minimize the risk of a false positive analytical result. Other factors are following established procedures for decontamination of sampling equipment to avoid cross contamination and using clean sample containers.

A.5.6.3 Quality Assurance/Quality Control

A discussion of QA/QC is provided in [Section A.3.6.3](#).

A.5.7 Step 7, Optimize the Design for Obtaining Data

The objective of the investigation of Group #3 CASs is to define the nature and extent of contamination in order to support a closure alternative. In order to determine the nature of contamination, bias sampling will be conducted at locations likely to contain contamination. Biased sampling is appropriate for these sites because there is adequate process knowledge and historical evidence to indicate that contamination would have accumulated in biased locations. In addition, for sites originally grouped in Group #1 or Group #2, the excavation and/or preliminary investigation activities described in [Section A.3.0](#) and [Section A.4.0](#) will likely provide the bias sample data prior to promotion to Group #3. At a minimum, those investigations will provide additional biasing information for selection of the bias sample locations, if needed.

Environmental soil samples may be field screened to guide sample collection activities, to assist in waste management decisions, and to provide health and safety information. The field-screening level for TPH when utilized to determine if contamination is present above PALs is 75 ppm, using an appropriate field test method.

A generic sampling strategy has been developed that will ensure that the lateral and vertical extent of contamination has been adequately located, identified, and quantified. In general, sampling at each CAS will follow this strategy unless otherwise indicated in the CAS specific sections. Information and data collected during the activities described in [Section A.3.0](#) for Group #1 and [Section A.4.0](#) for

Group #2 sites may be used to provide the needed data (i.e., if samples already collected provide the data as described additional samples will not be required).

The generic sampling strategy will consist of two parts. The first will be to sample at biased locations most likely to contain the heaviest contamination. This will likely already have been completed for sites that started in Group #1 or Group #2. A minimum of two samples will be collected at each sample location where biasing factors indicate contamination. One sample will be collected from an interval where contamination is evident based on field observations and or field-screening, and one sample will be collected as a “clean” sample to demonstrate the vertical extent of contamination has been defined. The location of the clean sample will be chosen by the results of field observations and application of professional judgement. In most cases the location of the clean sample will be determined by attaining two intervals below field-screening levels.

The second part of the sampling strategy will be to define the lateral extent of contamination through the collection of samples at step out locations. In order to bound the contamination, a minimum of one “clean” laboratory analytical sample is needed from a minimum of three step-out locations. Generally, the three step-out locations are oriented in a triangular pattern around the contamination. The locations will be finalized in the field based on site conditions and professional judgement. If field observations and/or field screening indicate contamination is still present at a step-out location a sample may not be collected at that location and a location further out will be sampled.

Site preparation activities will include identification of underground utilities at all CASs. The locations of these utilities may influence the selection of sample collection points.

A.5.7.1 CAS 12-25-04, UST 12-16-2, Waste Oil Release

Site investigation activities will include collection of environmental soil samples to define the nature and extent of contamination remaining at the site and closure of any underground piping that remains at the conclusion of the characterization activities. The steel oil filter drain box will be investigated to determine if any waste sludges and/or liquids remain in it, or in associated piping. Any such waste identified will be sampled and disposed of accordingly. The steel box and associated piping will be removed and disposed of accordingly. The remaining piping originally used to fill the tank will be cut off even with the building foundation and grouted.

Site preparation activities may include soil excavation to access sampling locations.

At a minimum, the locations indicated in [Figure A.5-1](#) will be sampled. Step-out locations are also tentatively identified in [Figure A.5-1](#). These locations may be adjusted and/or additional location may be added, as necessary to define the extent of contamination.

Step-out locations may not be accessible in all directions. Building 12-16 is located directly adjacent to the west of the excavation for UST 12-16-2. It is likely that contamination extends under the concrete pad of Building 12-16. The extent of contamination in this direction will be estimated based on the results of laboratory analysis and the extent of contamination to the north, east, and south of the excavation (e.g., distance from contamination source).

A.5.7.2 CAS 18-25-01, Area 18 Service Station

Depending on the outcome of the site investigation activities described in [Section A.4.0](#), additional investigation activities may not be necessary. If contamination is identified during the investigation/confirmation activities described in [Section A.4.0](#), then the CAS will be characterized as described in this section. If contamination is not identified during the activities described in [Section A.4.0](#), then the investigation at this CAS will cease.

Site preparation activities may include the removal of asphalt, concrete, and/or clean soil to access sampling locations.

Bias samples will be collected during Phase-I investigation activities as described in [Section A.4.0](#). Step-out locations will be sampled, as necessary, to define the extent of contamination. Step-out locations may not be accessible in all directions. Two concrete pads are located on the site. It is possible that contamination, if identified, may extend under these pads. The extent of contamination under the pads may be estimated.

A.5.7.3 CAS 18-25-02, Area 18 Generator Shack

Depending on the outcome of the site investigation activities described in [Section A.3.0](#), additional investigation activities may not be necessary. If contamination remains after the remediation/verification activities described in [Section A.3.0](#), the CAS will be characterized as

Figure A.5-1
Proposed Sample Locations at CAS 12-25-04

described in this section. If contamination is not identified during the activities described in [Section A.3.0](#), then the investigation at this CAS will cease.

Site preparation activities may include the removal an/or addition of soil so that equipment can access sampling locations.

Bias samples will be collected during excavation/verification sampling activities as described in [Section A.3.0](#). Step-out locations will be sampled, as necessary, to define the extent of contamination. Step-out locations may not be accessible in all directions. There is a sewer line to the south of the CAS, a chain link fence to the north and west of the CAS, and concrete pads within the CAS.

Sampling of the concrete pads and or curbing will not be necessary. The concrete will be assumed to be contaminated with whatever COCs are found in the soil within the curbing.

A.5.7.4 CAS 18-25-03, Area 18 Generator Shack AST

Depending on the outcome of the site investigation activities described in [Section A.3.0](#), additional investigation activities may not be necessary. If contamination remains after the remediation/verification activities described in [Section A.3.0](#), the CAS will be characterized as described in this section. If contamination is not identified during the activities described in [Section A.3.0](#), then the investigation at this CAS will cease.

Site preparation activities may include the removal an/or addition of soil so that equipment can access sampling locations.

Bias samples will be collected during excavation/verification sampling activities as described in [Section A.3.0](#). Step-out locations will be sampled, as necessary, to define the extent of contamination. Step-out locations may not be accessible in all directions. There is a sewer line to the south of the CAS, a chain-link fence to the north and west of the CAS, and concrete pads within the CAS and to the south of the CAS. The extent of contamination in this direction may be estimated.

A.5.7.5 CAS 18-25-04, Pahute Mesa Airstrip

Depending on the outcome of the site investigation activities described in [Section A.3.0](#), additional investigation activities may not be necessary. If contamination remains after the remediation/confirmation activities described in [Section A.3.0](#), the CAS will be characterized as described in this section. If contamination is not identified during the activities described in [Section A.3.0](#), then the investigation at this CAS will cease.

Site preparation activities may include the removal an/or addition of soil so that equipment can access sampling locations.

Bias samples will be collected during excavation/verification sampling activities as described in [Section A.3.0](#). Step-out locations will be sampled, as necessary, to define the extent of contamination. Step-out locations may not be accessible in all directions. There is an asphalt pad approximately 20 ft to the south of the existing excavation. The extent of contamination in this direction may be estimated.

A.5.7.6 CAS 29-44-01a, Shoshone Transmitter Potential Diesel Fuel Release

Depending on the outcome of the site investigation activities described in [Section A.4.0](#), additional investigation activities may not be necessary. If contamination is identified during the investigation activities described in [Section A.4.0](#), then the CAS will be characterized as described in this section. If contamination is not identified during the activities described in [Section A.4.0](#), then the investigation at this CAS will cease.

Bias samples will be collected during Phase-I investigation activities as described in [Section A.4.0](#). Step-out locations will be sampled, as necessary, to define the extent of contamination. Step-out locations may not be accessible in all directions. The site is located on a slope. If contamination is found to extend down the slope, manual sampling methods will be the only potential sampling method viable. The necessity of continued sampling on the slope will be weighed against the health and safety of the work crews. The extent of contamination in this direction may be estimated.

A.5.7.7 CAS 29-44-01b, Shoshone Transmitter Hydrocarbon Stain

Depending on the outcome of the site investigation activities described in [Section A.3.0](#), additional investigation activities may not be necessary. If contamination remains after the remediation/

confirmation activities described in [Section A.3.0](#), the CAS will be characterized as described in this section. If contamination is not identified during the activities described in [Section A.3.0](#), then the investigation at this CAS will cease.

Bias samples will be collected during excavation/verification sampling activities as described in [Section A.3.0](#). Step-out locations will be sampled, as necessary, to define the extent of contamination.

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Appendix B

Project Organization

B.1.0 Project Organization

The NNSA/NV Industrial Sites Project Manager is Janet Appenzeller-Wing and her telephone number is (702) 295-0461. The NNSA/NV Industrial Sites Task Manager is Sabine Curtis and her telephone number is (702) 295-0542.

The names of the project Health and Safety Officer and the Quality Assurance Officer can be found in the appropriate NNSA/NV plan. However, personnel are subject to change, and it is suggested that the NNSA/NV Industrial Sites Project Manager be contacted for further information. The NNSA/NV Task Manager will be identified in the FFACO Biweekly Activity Report prior to the start of field activities.

Appendix C

Response to NDEP Comments

NEVADA ENVIRONMENTAL RESTORATION PROJECT DOCUMENT REVIEW SHEET

1. Document Title/Number: Draft Streamlined Approach for Environmental Restoration (SAFER) Plan for Corrective Action Unit 394: Areas 12, 18, and 19 Spill/Release Sites, Nevada Test Site, Nevada			2. Document Date: August 2001	
3. Revision Number: 0			4. Originator/Organization: IT Corporation	
5. Responsible DOE/NV ERP Subproject Mgr.: Janet Appenzeller-Wing			6. Date Comments Due: September 7, 2001	
7. Review Criteria: Full				
8. Reviewer/Organization/Phone No.: NDEP			9. Reviewer's Signature:	
10. Comment Number/ Location	11. Type*	12. Comment	13. Comment Response	14. Accept
1)		NDEP reviewed the Draft Streamlined Approach for Environmental Restoration (SAFER) Plan for Corrective Action Unit 394: Areas 12, 18, and 29 Spill/Release Sites and had no comments to this document.		

^a Comment Types: M = Mandatory, S = Suggested.

Return Document Review Sheets to DOE/NV Environmental Restoration Division, Attn: QAC, M/S 505.

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Paul J. Liebendorfer
State of Nevada
Bureau of Federal Facilities
Division of Environmental Protection
333 W. Nye Lane, Room 138
Carson City, NV 89706-0851

2 (Controlled)*

Supervisor, Las Vegas Office
State of Nevada
Bureau of Federal Facilities
Division of Environmental Protection
555 E. Washington, Suite 4300
Las Vegas, NV 89101

1 (Controlled)*

Sabrina Lawrence
Environmental Restoration Division
U.S. Department of Energy
National Nuclear Security Administration
Nevada Operations Office
P.O. Box 98518, M/S 505
Las Vegas, NV 89193-8518

1 (Controlled)*

Janet Appenzeller-Wing
Environmental Restoration Division
U.S. Department of Energy
National Nuclear Security Administration
Nevada Operations Office
P.O. Box 98518, M/S 505
Las Vegas, NV 89193-8518

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Copies

Sabine Curtis
Environmental Restoration Division
U.S. Department of Energy
National Nuclear Security Administration
Nevada Operations Office
P.O. Box 98518, M/S 505
Las Vegas, NV 89193-8518

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Wayne Johnson
Bechtel Nevada
P.O. Box 98521, M/S NTS306
Las Vegas, NV 89193-8521

1 (Uncontrolled)*

Allison Urbon
Bechtel Nevada
P.O. Box 98521, M/S NTS306
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