Nevada
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Project

DOE/NV--1385

National Nuclear Security Administration

Corrective Action Decision Document/Closure Report for Corrective Action Unit 560: Septic Systems Nevada Test Site, Nevada

Controlled Copy No.: ___
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Environmental Restoration
Project

U.S. Department of Energy
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CORRECTIVE ACTION DECISION DOCUMENT/ CLOSURE REPORT FOR CORRECTIVE ACTION UNIT 560: SEPTIC SYSTEMS NEVADA TEST SITE, NEVADA

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

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CORRECTIVE ACTION DECISION DOCUMENT/CLOSURE REPORT FOR CORRECTIVE ACTION UNIT 560: SEPTIC SYSTEMS NEVADA TEST SITE, NEVADA

Approved by: /s/ Kevin J. Cabble Date: 04/08/2010

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List of Acronyms and Abbreviations

Ac	Actinium
ACM	Asbestos-containing material
ACP	Asbestos-containing pipe
Am	Americium
ASTM	American Society for Testing and Materials
bgs	Below ground surface
Bi	Bismuth
BMP	Best management practice
°C	Degrees Celsius
CAA	Corrective action alternative
CADD	Corrective action decision document
CAI	Corrective action investigation
CAIP	Corrective action investigation plan
CAS	Corrective action site
CAU	Corrective action unit
CD	Certificate of disposal
CFR	*Code of Federal Regulations*
CLP	Contract Laboratory Program
COC	Contaminant of concern
COPC	Contaminant of potential concern
CP	Control Point
CR	Closure report
Cs	Cesium
CSM	Conceptual site model
DOE	U.S. Department of Energy
DQA	Data quality assessment
DQI	Data quality indicator

List of Acronyms and Abbreviations *(Continued)*

DQO	Data quality objective
DRO	Diesel-range organics
EML	Environmental Measurements Laboratory
EPA	U.S. Environmental Protection Agency
Eu	Europium
FADL	Field activity daily log
FAL	Final action level
FD	Field duplicate
FFACO	*Federal Facility Agreement and Consent Order*
FSL	Field-screening level
FSR	Field-screening result
ft	Foot
ft^3	Cubic foot
gal	Gallon
GPS	Global Positioning System
HASL	Health and Safety Laboratory
ID	Identification
IDW	Investigation-derived waste
in.	Inch
kg	Kilogram
lb	Pound
LCS	Laboratory control sample
LVF	Load verification form
MDC	Minimum detectable concentration
mg/kg	Milligrams per kilogram
mrem/yr	Millirem per year
MS	Matrix spike

List of Acronyms and Abbreviations (Continued)

MSD	Matrix spike duplicate
N/A	Not applicable
NA	Not available
NAC	*Nevada Administrative Code*
NAD	North American Datum
NBMG	Nevada Bureau of Mines and Geology
NCRP	National Council on Radiation Protection
ND	Nondetect
NDEP	Nevada Division of Environmental Protection
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NNES	Navarro Nevada Environmental Services, LLC
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NTS	Nevada Test Site
NTTR	Nevada Test and Training Range
PAL	Preliminary action level
Pb	Lead
PB	Preparation blank
pCi/g	Picocuries per gram
PCB	Polychlorinated biphenyl
POC	Performance objective criteria
PPE	Personal protective equipment
PRG	Preliminary remediation goal
PSM	Potential source material
Pu	Plutonium
PVC	Polyvinyl chloride
QA	Quality assurance

List of Acronyms and Abbreviations *(Continued)*

QAPP	Quality Assurance Project Plan
QC	Quality control
RBSL	Risk-based screening level
RBCA	Risk-based corrective action
RCRA	*Resource Conservation and Recovery Act*
ROTC	Record of Technical Change
RPD	Relative percent difference
SCL	Sample collection log
SDG	Sample delivery group
SNJV	Stoller-Navarro Joint Venture
SSTL	Site-specific target level
SVOC	Semivolatile organic compound
TC	Toxicity characteristic
TCLP	Toxicity characteristic leaching procedure
Th	Thorium
Tl	Thallium
TPH	Total petroleum hydrocarbons
TSCA	*Toxic Substances Control Act*
TSDF	Treatment, storage, and disposal facility
UR	Use restriction
UTM	Universal Transverse Mercator
VOC	Volatile organic compound
VCP	Vitrified clay pipe
yd	Yard
yd^3	Cubic yard
%R	Percent recovery

Executive Summary

This Corrective Action Decision Document (CADD)/Closure Report (CR) has been prepared for Corrective Action Unit (CAU) 560, Septic Systems, at the Nevada Test Site, Nevada, in accordance with the *Federal Facility Agreement and Consent Order* (FFACO). Corrective Action Unit 560 comprises seven corrective action sites (CASs):

- 03-51-01, Leach Pit
- 06-04-02, Septic Tank
- 06-05-03, Leach Pit
- 06-05-04, Leach Bed
- 06-59-03, Building CP-400 Septic System
- 06-59-04, Office Trailer Complex Sewage Pond
- 06-59-05, Control Point Septic System

The purpose of this CADD/CR is to provide justification and documentation supporting the recommendation for closure of CAU 560 with no further corrective action. To achieve this, corrective action investigation (CAI) activities were performed from October 7, 2008, through February 24, 2010, as set forth in the *Corrective Action Investigation Plan for Corrective Action Unit 560: Septic Systems, Nevada Test Site, Nevada*, and Record of Technical Change No. 1. The purpose of the CAI was to fulfill the following data needs as defined during the data quality objective (DQO) process:

- Determine whether contaminants of concern (COCs) are present.
- If COCs are present, determine their nature and extent.
- Provide sufficient information and data to complete appropriate corrective actions.

The CAU 560 dataset from the investigation results was evaluated based on the data quality indicator parameters. This evaluation demonstrated the quality and acceptability of the dataset for use in fulfilling the DQO data needs.

Analytes detected during the CAI were evaluated against final action levels (FALs) established in this document. The following contaminants were determined to be present at concentrations exceeding their corresponding FALs:

- No contamination exceeding the FALs was identified at CASs 03-51-01, 06-04-02, and 06-59-04.

- The soil at the base of the leach pit chamber at CAS 06-05-03 contains arsenic above the FAL of 23 milligrams per kilogram (mg/kg) and polychlorinated biphenyl (PCBs) above the FAL of 0.74 mg/kg, confined vertically from a depth of approximately 5 to 20 feet (ft) below ground surface. The contamination is confined laterally to the walls of the leach pit chamber and leach rock. The contamination present at CAS 06-05-03 within the leach pit was not feasible to remove.

- The surface and subsurface soils within and surrounding the septic system at CAS 06-05-04 contained PCB concentrations above the FAL of 0.74 mg/kg. The lateral and vertical extent of COCs was determined for this CAS. Contaminated soils were removed up to within 18 ft of the building. The remaining contamination is confined to subsurface soils adjacent to and beneath Building CP-162 and was not feasible to remove.

- The solid materials within the septic tank and soils immediately surrounding the inlet end of the tank at CAS 06-59-03 contained benzo(a)pyrene above the FAL of 0.21 mg/kg. The soils, tank contents, and tank were removed. Materials remaining at this CAS do not contain contamination exceeding FALs.

- The solids contained within the septic tank and inlet pipe at CAS 06-59-05 contained the following contaminants above their respective FALs: PCBs, arsenic, lead, benzo(a)pyrene, and pesticides. The tank and inlet pipe contents were removed. Materials remaining at this CAS do not contain contamination exceeding FALs.

Therefore, the U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office (NNSA/NSO) provides the following corrective action recommendations:

- No further action for CASs 03-51-01, 06-04-02, and 06-59-04, as no contaminants of potential concern were present that exceed FALs.

- Closure in place for CAS 06-05-03 under a corrective action with a use restriction (UR) for remaining PCB- and arsenic-impacted potential source material (PSM). The UR form and map have been filed in the NNSA/NSO Facility Information Management System, the FFACO database, and NNSA/NSO CAU/CAS files.

- Closure in place for CAS 06-05-04 under a corrective action with a UR for remaining PCBs in soil adjacent to and beneath Building CP-162. The UR form and map have been filed in the NNSA/NSO Facility Information Management System, the FFACO database, and NNSA/NSO CAU/CAS files.

- No further action for CAS 06-59-03, as the COC of benzo(a)pyrene in soil and PSM have been removed.

- No further action for CAS 06-59-05, as the COCs in PSM within the septic tank and inlet piping have been removed and the tank was filled with concrete.

1.0 Introduction

This Corrective Action Decision Document (CADD)/Closure Report (CR) presents information supporting closure of Corrective Action Unit (CAU) 560, Septic Systems, Nevada Test Site (NTS), Nevada. The corrective actions were implemented in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) that was agreed to by the State of Nevada; U.S. Department of Energy (DOE), Environmental Management; U.S. Department of Defense; and DOE, Legacy Management (FFACO, 1996; as amended February 2008). The NTS is approximately 65 miles northwest of Las Vegas, Nevada (Figure 1-1).

Corrective Action Unit 560 comprises the seven corrective action sites (CASs) that are shown on Figure 1-2 and listed below:

- 03-51-01, Leach Pit
- 06-04-02, Septic Tank
- 06-05-03, Leach Pit
- 06-05-04, Leach Bed
- 06-59-03, Building CP-400 Septic System
- 06-59-04, Office Trailer Complex Sewage Pond
- 06-59-05, Control Point Septic System

A detailed discussion of the history of this CAU is presented in the *Corrective Action Investigation Plan* (CAIP) *for Corrective Action Unit 560: Septic Systems, Nevada Test Site, Nevada* (NNSA/NSO, 2008). This document provides or references the specific information necessary to support closure of this CAU.

1.1 Purpose

This CADD/CR provides justification why no further corrective action is necessary, how and why use restrictions (URs) have been applied, and the technical rationale for implemented closure activities. This justification is based on the corrective actions implemented and the results of investigative activities that were conducted in accordance with the CAIP (NNSA/NSO, 2008).

Corrective Action Unit 560, Septic Systems consists of seven inactive sites located in the eastern portion of Area 3 and the central portion of Area 6, at or near the Control Point (CP)-6 Complex. The

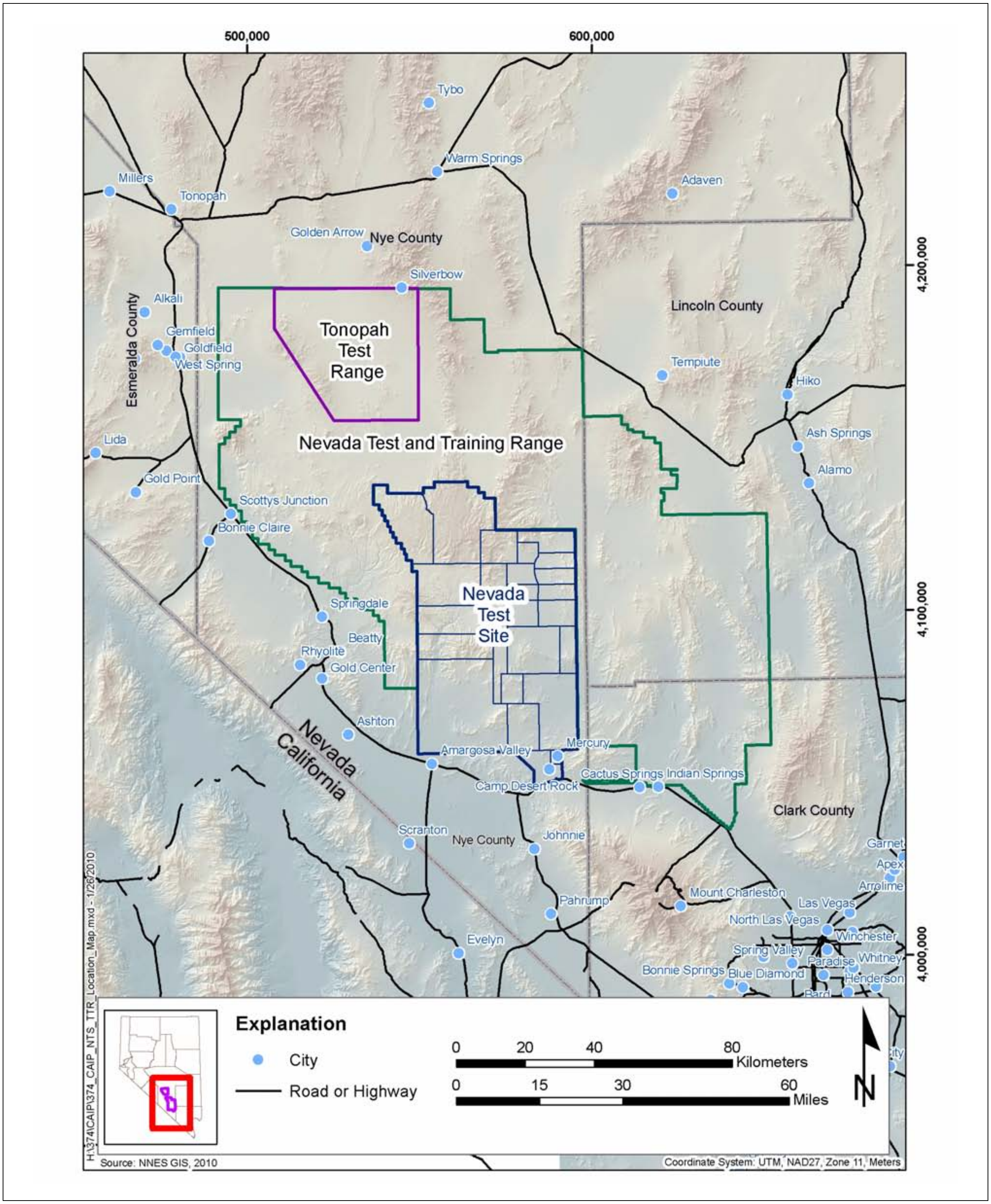

Figure 1-1
Nevada Test Site

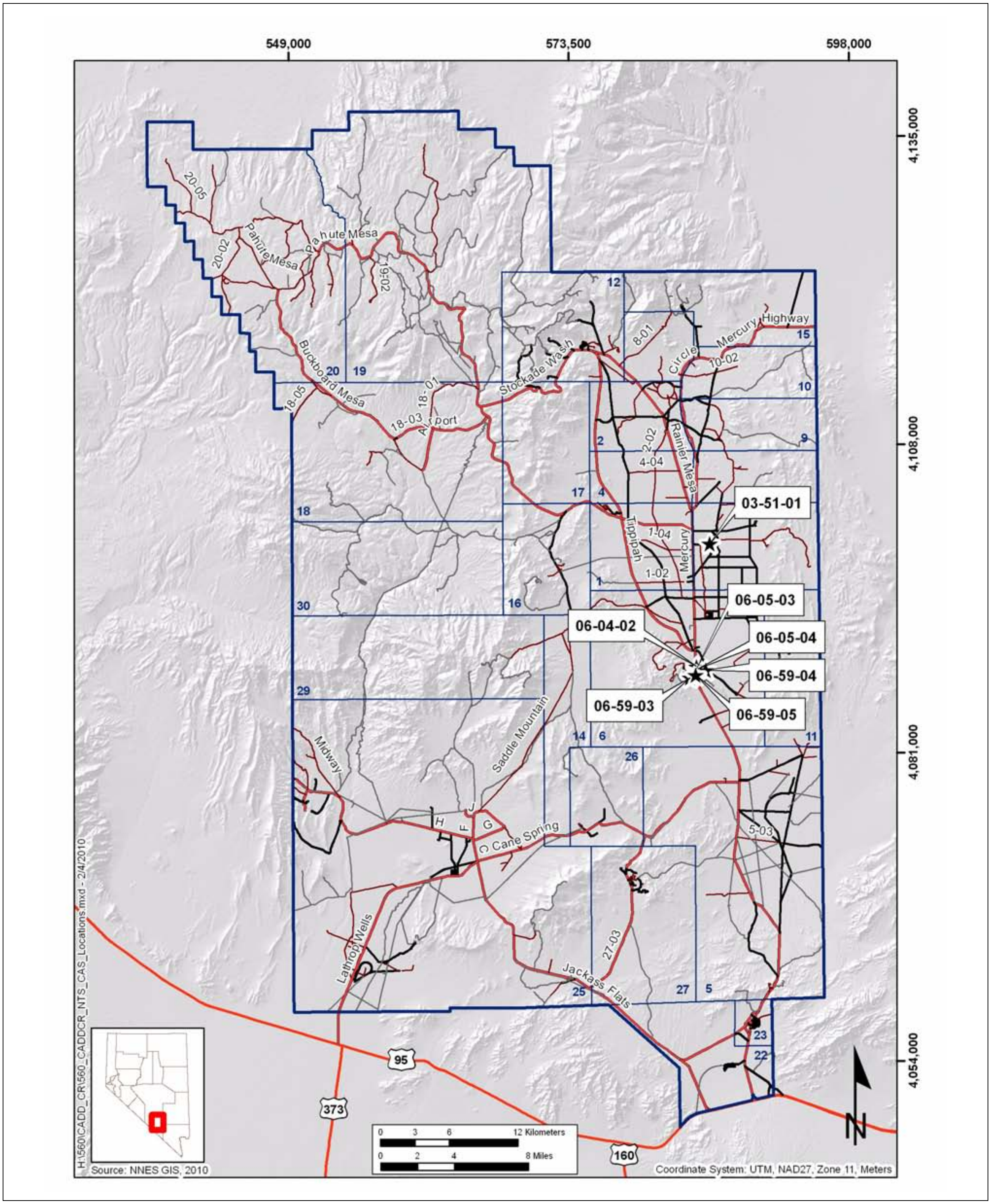

Figure 1-2
Corrective Action Unit 560, CAS Location Map

seven CAU 560 sites consist of leach pits and leach beds, septic tanks, septic system components, and a sewage pond. One CAS is located in Area 3 near Building 3C-5, Special Measurements Facility, at the former Area 3 Camp. Building 3C-5 was demolished in March 1999 as part of the Area 3 Camp closure. The remaining six CASs are located in Area 6 at the CP-6 Complex. The CP-6 Complex consists of currently standing buildings and historical buildings dating back to as early as 1953 (Building CP-400, which was built in 1953 and demolished in June 2003, is associated with CAS 06-59-03). Portions of the CP-6 Complex are still active and were considered during corrective actions.

Corrective Action Site 03-51-01 consists of a steel leach pit chamber and underground piping associated with the former Building 3C-5, Special Measurements Facility. The piping begins approximately 3 feet (ft) from a cut in the concrete pad that was once the foundation of Building 3C-5, and runs north approximately 9 ft to the edge of the leach pit chamber. The 3-ft pipe section was removed before the corrective action investigation (CAI).

Corrective Action Site 06-04-02 consists of a steel leach pit chamber and subsurface piping associated with support/administrative trailers of the CP-6 Complex. All of these trailers were removed by 1985.

Corrective Action Site 06-05-03 consists of a concrete leach pit chamber, an abandoned steel septic tank, and subsurface piping associated with Building CP-160, Site Maintenance Facility, a currently active structure.

Corrective Action Site 06-05-04 consists of a leach bed, distribution box, an abandoned concrete septic tank, and subsurface piping associated with Building CP-162, a currently active structure.

Corrective Action Site 06-59-03 consists of a corroded steel septic tank, former dry well and filter box locations, and surface and subsurface piping associated with Building CP-400, built in 1953 and demolished in June 2003.

Corrective Action Site 06-59-04 consists of a covered sewage pond associated with the Area 6 Office Trailer Complex. The sewage pond measures approximately 60 by 60 ft and was previously connected to the Office Trailer Complex by approximately 200 ft of piping that had been removed before the CAI.

Corrective Action Site 06-59-05 consists of a concrete septic tank, tile field, and associated piping. The septic system was originally identified as servicing several buildings within the CP-6 Complex.

1.2 Scope

The scope of this CADD/CR is to justify that no further corrective action is required at CAU 560, Septic Systems. This document provides the results of an investigation to determine any contamination present at each CAS in concentrations exceeding the final action levels (FALs). Where contamination exceeding the FALs was found, corrective actions were implemented to remove this contamination (at CASs where removal was practical) or prevent future access to the contamination through a UR (at one CAS where removal was not practical). The activities conducted during the field investigation to accomplish this scope included the following:

- Field screening all soil samples collected
- Conducting video-mole surveys of accessible subsurface features
- Collecting environmental samples for laboratory analysis
- Collecting step-out samples to define the lateral and vertical extent of the contamination
- Collecting waste samples to determine the potential to generate contaminants of concern (COCs) if released to the environment
- Collecting waste samples to determine the proper disposal of wastes
- Collecting quality control (QC) samples
- Implementing best management practices (BMPs)

1.3 CADD/CR Contents

This CADD/CR is divided into the following sections and appendices:

Section 1.0 – Introduction: Summarizes the purpose, scope, and contents of this CADD/CR.

Section 2.0 – Corrective Action Investigation Summary: Summarizes the investigation field activities, the results of the investigation, the need for corrective action, and a summary of the results of the data quality objective (DQO) assessment.

Section 3.0 – Recommendation: States why no further corrective action is required.

Section 4.0 – References: Provides a list of all referenced documents used in the preparation of this CADD/CR.

Appendix A – *Corrective Action Investigation Results:* Provides a description of the project objectives, field investigation and sampling activities, investigation results, waste management, and quality assurance (QA). Sections A.3.0 through A.9.0 provide specific information regarding field activities, sampling methods, and laboratory analytical results from the investigation.

Appendix B – *Data Assessment*: Provides a data quality assessment (DQA) that reconciles DQO assumptions and requirements to the CAI results.

Appendix C – *Risk Assessment*: Presents an evaluation of risk associated with the establishment of FALs.

Appendix D – *Closure Activity Summary*: Provides details on the completed closure activities and includes the required verification activities and supporting documentation.

Appendix E – *Sample Location Coordinates:* Provides CAI sample locations coordinates.

Appendix F – *Corrective Action Alternative* (CAA) *Evaluation:* Provides information on the evaluation of CAAs for CASs containing COCs.

Appendix G – *Nevada Division of Environmental Protection* (NDEP) *Comment Responses:* Contains NDEP comments on the draft version of this document.

1.3.1 Applicable Programmatic Plans and Documents

Investigation activities were performed in accordance with the following documents:

- CAIP for CAU 560, Septic Systems (NNSA/NSO, 2008)
- Record of Technical Change (ROTC) No. 1 for the CAIP for CAU 560, Septic Systems
- *Industrial Sites Quality Assurance Project Plan* (QAPP) (NNSA/NV, 2002)
- FFACO (1996, as amended February 2008)

1.3.2 Data Quality Assessment Summary

The DQA is presented in Appendix B and includes an evaluation of the data quality indicators (DQIs) to determine the degree of acceptability and usability of the reported data in the decision-making process. The DQO process ensures that the right type, quality, and quantity of data will be available to support the resolution of those decisions at an appropriate level of confidence. Using both the DQO and DQA processes help to ensure that DQO decisions are sound and defensible.

The DQA process as presented in Appendix B is composed of the following steps:

- Step 1: Review DQOs and Sampling Design
- Step 2: Conduct a Preliminary Data Review
- Step 3: Select the Test
- Step 4: Verify the Assumptions
- Step 5: Draw Conclusions from the Data

Sample locations that support the presence and/or extent of contamination at each CAS are shown in Appendix A. Based on the results of the DQA presented in Appendix B, the nature and extent of COCs at CAU 560 have been adequately identified to implement corrective actions. The DQA also determined that information generated during the investigation support the conceptual site model (CSM) assumptions and the data collected met the DQOs and support their intended use in the decision-making process.

2.0 Corrective Action Investigation Summary

The following sections summarize the investigation activities and investigation results, and justify why no further corrective action is needed at CAU 560. Detailed CAI activities and results for individual CAU 560 CASs are presented in Appendix A.

2.1 Investigation Activities

Corrective action investigation activities were performed as set forth in the CAU 560 CAIP (NNSA/NSO, 2008) from October 7, 2008, through February 24, 2010. The purpose of the CAU 560 CAI was to address the decision statements in the project-specific DQOs by:

- Determining whether COCs are present in the soils associated with CAU 560.
- Determining the lateral and vertical extent of identified COCs.
- Ensuring adequate data have been collected to close the sites under NDEP, *Resource Conservation and Recovery Act* (RCRA) (CFR, 2009a), *Toxic Substances Control Act* (TSCA) (CFR, 2009b), and DOE requirements.

The scope of the CAI included the following activities:

- Field screening soil samples for total alpha and beta/gamma radiation.
- Collecting environmental samples for laboratory analyses to determine the presence of COCs and to define the vertical and lateral extent of COCs, if present.
- Collecting QC samples for laboratory analyses to ensure that the data generated from the analysis of investigation samples meet the requirements of the DQIs.
- Collecting solid waste samples from septic system components to identify whether the waste contained in these structures are potential sources of environmental contamination and to support waste disposal activities.
- Conducting radiological swipe surveys on asbestos-containing material (ACM) for waste disposal purposes.

A judgmental sampling scheme was implemented to select sample locations and evaluate analytical results, as outlined in the CAU 560 CAIP (NNSA/NSO, 2008). Judgmental sampling allows the methodical selection of sample locations that target the populations of interest (defined in the DQOs) rather than non-selective random locations.

For the judgmental sampling scheme, individual sample results (rather than average concentrations) are used to compare to FALs. Therefore, statistical methods to generate site characteristics (averages) are not necessary. If good prior information is available on the target site of interest, then the sampling may be designed to collect samples only from areas known to have the highest concentration levels on the target site. If the observed concentrations from these samples are below the action level, then a decision can be made that the site contains safe levels of the contaminant without the samples being truly representative of the entire area (EPA, 2006).

The judgmental sampling design was used to confirm the existence of contamination at specific locations and provide information (such as extent of contamination) about specific areas of the site.

Confidence in judgmental sampling scheme decisions was established qualitatively by validation of the CSM and justification that sampling locations are the most likely locations to contain a COC, if a COC exists.

Waste characterization activities were conducted to gather sufficient information and data to support waste disposal decisions. Information regarding waste characterization is presented in Appendix A.

Closure activities were conducted to implement corrective actions and/or BMPs at six of the seven CASs. Information and details regarding specific closure activities are presented in Appendix D.

The following sections describe specific CAI activities conducted at each CAS. Additional information regarding the CAI is presented in Appendix A.

2.1.1 Leach Pit (CAS 03-51-01)

The following sections summarize the field activities conducted at this CAS.

2.1.1.1 Visual Inspections

Two features associated with the sewer system were visually identified using backhoe excavation. These features consisted of a steel-constructed leach pit and associated subsurface piping. The building pad drain appeared plugged. Inspection of the 2-inch (in.) diameter steel sewer pipe identified a 3-ft portion of the pipe had been removed between the building pad drain and intact sewer pipe. The remaining 9-ft section of piping was intact and extended directly through the leach pit cover and contained no sediments. The leach pit measured approximately 4 ft in diameter with a removable lid. The interior of the leach pit was accessed by partially removing the pit cover and inspected for content. Hand auger attempts and visual inspection identified no wastes within the leach pit casing. There were no visible signs of structural failure identified during the inspection except for the 3-ft portion of removed pipe.

During excavation of the sewer line, an additional steel water line was identified adjacent to the leach pit that continued northward in the direction of a geophysical anomaly identified by an earlier geophysical survey. Because the presence of the water line was consistent with the linear anomaly north of the leach pit location and no outlet pipe from the leach pit was identified, the geophysical anomaly was not investigated as part of the septic system.

A walkover was conducted in the area north of the building pad to identify additional surface sample locations based on biasing factors (i.e., staining). No additional biased sample locations were identified. However, one additional biased sample was identified at the location of the 3-ft missing section of pipe at the building pad.

2.1.1.2 Video Surveys

Video surveys were not conducted on the septic system piping because the sewer pipe diameter was smaller than the video-mole diameter, thereby making the pipe inaccessible.

2.1.1.3 Field Screening

Investigation samples were field screened for alpha and beta/gamma radiation using handheld radiological survey instruments. The field-screening results (FSRs) were compared to field-screening levels (FSLs) to guide subsequent sampling decisions. All radiological FSRs were below FSLs.

2.1.1.4 Sample Collection

A total of three characterization samples were collected from three locations during CAI activities at CAS 03-51-01. Samples were collected using grab sampling or from a decontaminated backhoe bucket for sampling depths greater than 4 ft below ground surface (bgs). The sample identification (ID) numbers, locations, types, and analyses are listed in Table A.3-1. The sample locations are shown on Figure A.3-1.

Environmental soil samples were collected from beneath the inlet pipe to the leach pit (location A02); and at the base of the leach pit (location A03) to verify the integrity of the components and determine whether there have been any releases of contaminants exceeding FAL concentrations from the leach pit and associated piping to the surrounding soil. One additional biased sample was collected beneath the missing 3-ft inlet pipe section adjacent to the building pad drain (location A01). Decision II samples were not collected at this CAS, as no contaminants of potential concern (COPCs) exceeded FALs.

2.1.1.5 Conceptual Site Model Validation

A CSM was developed to represent the release mechanisms and potential migration pathways for contaminant releases at CAU 560 CASs. The CSM and associated discussion for this CAS are provided in the CAIP (NNSA/NSO, 2008).

The migration pathway and release mechanism information gathered during the CAI was consistent with the CSM, and all information gathered during the CAI supports and validates the CSM as presented in the CAU 560 CAIP (NNSA/NSO, 2008).

2.1.2 Septic Tank (CAS 06-04-02)

The following sections summarize the field activities conducted at this CAS.

2.1.2.1 Visual Inspections

Several features associated with the sewer system were visually identified within the CAS by a combination of hand and backhoe excavation as well as a site walkdown. During the site walkdown, three vitrified clay pipe (VCP) stickups or cleanouts were identified slightly above the ground surface (see Figure A.4-1). No other septic system components were identified on the surface. Hand excavation of cleanouts #1 and #2 confirmed subsurface VCP was present between 1 and 2 ft bgs and trends northward toward the leach pit.

An area of three t-posts marking the approximate location of the septic tank or leach pit was excavated by backhoe and identified the steel cover of a leach pit approximately 0.5 ft bgs. The configuration of the leach pit was identified through further excavation to a depth of 15 ft. The leach pit casing is constructed of steel measuring approximately 6 ft in diameter. The leach pit casing has a removable steel lid containing a 10-in. diameter open vent hole. Inspections on the outside of the casing and surrounding soil indicate the integrity of the casing was intact and not leaking (no staining was apparent). The interior of the leach pit was visually inspected through the open vent hole and identified dry debris present at the base of the pit. Inlet pipes were identified on both the south and west sides at 2.5 to 3 ft bgs. During excavation, the western inlet pipe was breached for video-survey purposes. The western inlet pipe was excavated westward approximately 14 ft from the leach pit where a fourth cleanout and y-connector were confirmed and shows the VCP trending to the southwest.

A walkover was conducted in the area to identify additional surface sample locations based on biasing factors (i.e., staining). Numerous pieces of debris such as electrical cable, wood, and metal are scattered on the surface and shallow subsurface through out the CAS boundary. However, no biasing factors such as stains were identified on the surface.

2.1.2.2 Video Surveys

Video surveys were conducted on the septic system piping to the extent possible to verify the presence and extent of piping identified on engineering drawings, and to identify any breaches, breaks, or residual material in the piping that might require additional biased sampling. Approximately 295 ft of piping leading to and from the leach pit was video surveyed at CAS 06-04-02. No breaches or residual material were identified in the existing piping. Therefore, no additional biased sample locations were identified based on video-survey results. All piping that was breached during the video survey was grouted once the survey was completed. Details of the video surveys are presented in Appendix A.

2.1.2.3 Field Screening

Soil samples were screened in the field for alpha and beta/gamma radiation. The radiological FSRs were compared to FSLs to guide subsequent sampling decisions. All radiological FSRs were below FSLs.

2.1.2.4 Sample Collection

A total of five characterization samples, including a potential source material (PSM) sample, were collected from four locations during investigation activities at CAS 06-04-02. Samples were collected by grab sampling, using a hand auger, or from a decontaminated backhoe bucket for sampling depths greater than 4 ft bgs. The sample ID numbers, locations, types, and analyses are listed in Table A.4-1. The sample locations are shown on Figure A.4-1.

Decision I environmental sampling activities included the collection of subsurface soil samples surrounding the septic system components at this CAS. A total of four soil samples were collected at the leach pit to determine whether there has been a release from the septic system. Samples 560B002 and 560B003 were collected directly beneath both the southern (B02) and western (B03) inlet pipes, respectively. Two samples from soil surrounding the base of the leach pit (location B04) were collected at depths of 12.5 and 15 ft bgs. One solid sample (560B001) was collected within the interior of the leach pit at a depth of 11 ft bgs (location B01) for PSM determination. Decision II samples were not collected at this CAS, as no COPCs exceeded FALs.

2.1.2.5 Conceptual Site Model Validation

A CSM was developed to represent the release mechanisms and potential migration pathways for contaminant releases at CAU 560 CASs. The CSM and associated discussion for this CAS are provided in the CAIP (NNSA/NSO, 2008).

The migration pathway and release mechanism information gathered during the CAI was consistent with the CSM, and all information gathered during the CAI supports and validates the CSM as presented in the CAU 560 CAIP (NNSA/NSO, 2008).

2.1.3 Leach Pit (CAS 06-05-03)

The following sections summarize the field activities conducted at this CAS.

2.1.3.1 Visual Inspections

Upon a site walkdown inspection, visible features of the system above ground were the leach pit vent pipe and riser pipe. No biasing factors were identified on the ground surface in the areas of the leach pit and suspected septic tank; therefore, no additional biased sample locations were identified.

Backhoe excavation was used to expose and inspect the top of the leach pit, the inlet pipe, and base of the leach pit. The leach pit cover was exposed at a depth of 4 ft bgs and confirmed one 3-in. vent pipe and one 10-in. riser pipe from the cover to ground surface. The exposed VCP inlet pipe was intact with no apparent leaks. No outlet pipe was identified from the leach pit. The leach pit casing is 4 ft in diameter, constructed of concrete with weep holes, and has a removable lid. The concrete casing is surrounded by approximately 3 to 4 ft of leach rock, starting at a depth around 7 ft bgs. No staining was visible within the surrounding leach rock, and the concrete was structurally intact. Due to undermining of the leach rock and utility line restrictions, the base of the leach pit was not accessible by backhoe excavation.

Hand excavation was initially conducted at the southeast corner of Building CP-160 to determine whether the septic tank was removed or abandoned in place. Excavation was limited due to unknown and active utility line restrictions. After three potholes were completed, the eastern top edge of the steel septic tank was identified at a depth of 3 ft bgs and approximately 6 ft east of the building. Guided backhoe excavation exposed portions of the southern and eastern sides and base of the tank. The tank lid and outlet pipe had been removed; the tank was backfilled with soil and appeared intact with no soil staining visible.

The visual inspections of the leach pit and septic tank did not result in additional sample collection.

2.1.3.2 Video Surveys

A video survey was conducted through the 10-in. diameter leach pit riser pipe to view the inside of the leach pit chamber. Observations from the survey showed the access pipe extended about 3 ft into an open chamber. Materials on the bottom of the pit were solid and dry. Inactive piping on the remainder of the septic systems components was either removed or inaccessible. Details of the video surveys are presented in Appendix A. No additional samples were identified based on the video-survey results.

2.1.3.3 Field Screening

Soil samples were screened in the field for alpha and beta/gamma radiation. The radiological FSRs were compared to FSLs to guide subsequent sampling decisions. All radiological FSRs were below FSLs.

2.1.3.4 Sample Collection

A total of 12 characterization samples were collected from seven locations during CAI activities at CAS 06-05-03. Samples were collected using a hand auger, or from a decontaminated backhoe bucket or drill cores for sampling depths greater than 4 ft bgs. The sample ID numbers, locations, types, and analyses are listed in Table A.5-1. The sample locations are shown on Figure A.5-1.

Environmental samples collected at the leach pit included one sample (560C001) taken directly below the inlet pipe (location C01) at a depth of 4.5 ft bgs, and one solid sample (560C002) collected from the floor of the leach pit (location C02) at a depth of 14.5 ft bgs for PSM determination. While accessing the outside base of the leach pit, it was determined to be inaccessible by backhoe due to proximity to Building CP-162 foundation and active utility lines. Therefore, one soil sample 4 ft away from the leach pit casing (560C003 at location C03) was collected at a depth of 8.5 ft bgs (5 ft below the leach pit lid). To meet CAI objectives, samples 560C005 and 560C006 were collected from native soil beneath the base of the leach pit (16.5 ft and 19.5 ft bgs, respectively) by drilling a soil boring directly through the leach pit casing at location C02. The septic tank adjacent to Building CP-160 had been abandoned and backfilled. One sample was collected at the base of the abandoned septic tank (location C04); however, the remaining parts of the tank (inlet end pipe and base) were inaccessible by excavation due to the proximity of unknown and active utility lines as well as the Building CP-160 foundation.

To vertically bound COCs identified in the leach pit PSM sample, three step-out borings were drilled in three directions from the leach pit (locations C05, C06, and C07) for the purpose of collecting Decision II samples. The Decision II samples were collected at depths of 14.5 ft (depth of PSM) and 19.5 ft bgs to bound COCs identified in the leach pit PSM sample both laterally and vertically.

2.1.3.5 Conceptual Site Model Validation

A CSM was developed to represent the release mechanisms and potential migration pathways for contaminant releases at CAU 560 CASs. The CSM and associated discussion for this CAS are provided in the CAIP (NNSA/NSO, 2008).

The migration pathway and release mechanism information gathered during the CAI was consistent with the CSM, and all information gathered during the CAI supports and validates the CSM as presented in the CAU 560 CAIP (NNSA/NSO, 2008).

2.1.4 Leach Bed (CAS 06-05-04)

The following sections summarize the field activities conducted at this CAS.

2.1.4.1 Visual Inspections

A walkover was conducted within the CAS boundary before intrusive activities to identify additional surface sample locations based on biasing factors (i.e., staining). No additional biased sample locations were identified. The only septic system component visible on the surface is the manhole cover of the distribution box. The fence line surrounding the leach bed was partially removed for sampling access and inspection of the leach bed.

The manhole cover was removed to inspect the interior of distribution box and provide access for the video survey and sampling. Inspection confirmed the presence of one inlet pipe, three outlet pipes, and dry soil materials at the base of the feature. Each outlet pipe and the inlet pipe were exposed by a combination of hand and backhoe excavation for sample access and inspection. The pipes were determined to be intact asbestos-containing pipe (ACP) with no apparent leaks (i.e., no stains).

The distal end of the leach bed was exposed by backhoe excavation for inspection and sampling. Visual inspection confirmed three leach lines exist within the leach bed with a distance of only 3 ft between each line. The configuration of the lines at the distal end differs from that shown in the CAIP. (See Figure A.6-1, which shows the three leach lines connected together by plastic fittings so the system is contained and effluent released only through designed leach holes in each line.) Leach rock below the leach lines was visibly stained bluish-green. The proximal end of the leach bed was excavated by backhoe to expose the lines for inspection and sampling. Inspection of the proximal end identified the transition point of each outlet pipe to a perforated leach line where distinct bluish-green to blackish-green staining was visible within the leach rock directly underlying the leach lines. A combination of undermining leach rock and the narrow distance between leach lines prevented the backhoe from exposing the middle leach line for sampling purposes.

Excavation conducted in the suspected location of the abandoned septic tank confirmed the septic tank is present and abandoned in place. The tank is located about 4 ft bgs and 9 ft west of the distribution box. The lid of the tank had been removed during abandonment, and the interior of the tank was backfilled with soil. The outlet pipe from the tank was present just above the exposed eastern edge of the tank and was encased in grout. Inspection of the western edge of the tank showed the inlet pipe had been previously cut and a 4-ft section of pipe removed. The cut end of the inlet pipe was exposed for sampling and inspection purposes. No soil staining was visible at either the tank inlet or outlet pipes. The base of both the eastern and western ends of the septic tank was exposed for sampling, and the tank appeared intact with no apparent leaks.

The visual inspections of the septic tank components did not result in additional sample collection.

2.1.4.2 Video Surveys

A video survey was conducted on each of the three distribution box outlet pipes, via access through the distribution box, in the direction of the leach bed. The survey showed little to no residual material within the leach lines and no breaches were identified. Therefore, no additional samples were necessary.

2.1.4.3 Field Screening

Soil samples were screened in the field for alpha and beta/gamma radiation. The radiological FSRs were compared to FSLs to guide subsequent sampling decisions. All radiological FSRs were below FSLs.

2.1.4.4 Sample Collection

A total of 265 characterization samples (including 6 field duplicates [FDs]) were collected from more than 150 locations during CAI at CAS 06-05-04. Samples were collected by grab sampling, or from a decontaminated backhoe bucket or drill cores for sampling depths greater than 4 ft bgs. The sample ID numbers, locations, types, and analyses are listed in Table A.6-1. The sample locations for the septic system characterization are shown in Figure A.6-1. The sample locations defining the extent of COCs and the soil-removal area are shown in Figure A.6-2.

Environmental samples were collected from the soil surrounding the distribution box and septic tank components as well as the proximal and distal ends of the leach bed lines (locations D01 through D13) to address potential releases from the septic system. Location D17 was drilled inside the septic tank to confirm all backfill was soil and to determine whether any PSM was left in place during abandonment. Samples were collected from the soil at the outside base of the septic tank (locations D4 and D5); directly below the septic tank inlet and outlet pipe (locations D02 and D03), the distribution box inlet pipe and three outlet pipes (locations D07 through D09). One sample was collected of soil located within the distribution box (location D01). Samples were collected at the native soil interface directly below the distal ends of the leach bed lines where bluish-green staining was noted in the leach rock (locations D10 and D11). Because the distal ends were interconnected, only two samples were collected by taking soil from the center between the three lines where leach holes were present. Samples were collected at the native soil interface and 1 ft below the interface directly below the proximal ends of the leach bed lines where bluish-green staining was noted in the leach rock (locations D12 and D13). Due to the narrow distance and undermining leach rock, samples were collected at the southern and northern leach lines only.

To laterally bound the subsurface polychlorinated biphenyl (PCB) contamination within and adjacent to the septic system, samples were collected at locations D14 through D16 and D18 through D20.

The lateral extent of subsurface contamination (i.e., 6 ft bgs) related to the septic system was bounded for releases by these locations (see Figure A.6-1). However, analytical results from locations D15, D16, and D18 showed PCB contamination in surface samples (0 to 0.5 ft bgs). Another 161 samples (locations DQ00 through DQ87 and DL01 through DL10) were collected to determine the nature and extent of PCB contamination, and to confirm assumptions in the revised CSM regarding other potential sources of PCB releases. Figure A.6-2 shows the locations used to define the lateral extent of PCB contamination, and bounds the areas where a partial soil-removal action was implemented.

During and after soil-removal actions, additional samples (locations DV01 through DV41, DL11 through DL13, and DVC01 through DVC20) were collected and analyzed for PCBs to confirm whether concentrations in the remaining soil were below action levels. Appendix D presents details of the closure activities conducted at this CAS.

2.1.4.5 Conceptual Site Model Validation

A CSM was developed to represent the release mechanisms and potential migration pathways for contaminant releases at CAU 560 CASs. The CSM and associated discussion for this CAS are provided in the CAIP and ROTC No. 1 (NNSA/NSO, 2008).

The migration pathway and release mechanism information gathered during the CAI was consistent with the CSM, and all information gathered during the CAI supports and validates the CSM as presented in the CAU 560 CAIP and ROTC No. 1 (NNSA/NSO, 2008).

2.1.5 Building CP-400 Septic System (CAS 06-59-03)

The following sections summarize the field activities conducted at this CAS.

2.1.5.1 Visual Inspections

Features associated with the sewer system observed from the surface consisted of a steel-constructed septic tank that had partially caved in and associated aboveground piping along the east-facing slope. The eastern chamber of the tank had collapsed, and a hole remained into the western chamber where dry tank materials were observed. A building pad drain was visible but inaccessible to the video mole and appeared plugged. Backhoe excavation exposed three separate drain lines associated with the septic system. All lines were intact; however, because the 2-in. dry well line was located only 6 to 12 in. bgs and directly above the sewer line, it was breached during the excavation. No residual materials were inside the pipe. Further excavation by backhoe exposed the septic tank inlet and outlet pipes and northern side of the tank for inspection and sampling. The entire tank is rusted and corroded, resulting in significant deterioration of structural integrity of the tank.

Exposure of the filter box line confirmed the absence of the filter box feature on the southern slope. The VCP ended at the slope, was open, and contained no residual materials. The dry well aboveground piping was investigated by hand excavating where the piping enters the soil mound present at the base of the slope to aid in locating the dry well feature. Stained soil was encountered within the soil mound adjacent to the pipe, which ended and was capped within the mound. Additional hand excavation did not encounter the dry well feature; therefore, it is assumed the dry well was never installed or had been removed in the past. (See Figure A.7-1 for the locations and configuration of the components identified for the Building CP-400 septic system.)

Additional biased samples were identified within the stained soil mound and adjacent to the rusted tank, where breaches were visible.

2.1.5.2 Video Surveys

Video surveys were not conducted on the septic system inlet piping because the integrity and configuration of the sewer lines, dry well line, and filter box lines were visible when exposed through excavation. Video survey was not feasible on the outlet pipe and aboveground dry well piping and, therefore, was not conducted.

2.1.5.3 Field Screening

Soil samples were screened in the field for alpha and beta/gamma radiation. The radiological FSRs were compared to FSLs to guide subsequent sampling decisions. All radiological FSRs were below FSLs.

2.1.5.4 Sample Collection

A total of 17 characterization samples were collected from 11 locations during CAI activities at CAS 06-59-03. Samples were collected by hand grab sample, a decontaminated backhoe bucket for sampling depths greater than 4 ft bgs, or drill core. The sample ID numbers, locations, types, and analyses are listed in Table A.7-1. The sample locations are shown on Figure A.7-1.

Sample 560E001 was collected from materials in the western, partially intact chamber of the septic tank for PSM determination (location E01). Excavation confirmed the filter box system is no longer present; however, the VCP connecting the building to the former filter box was present, so one sample (560E003) was collected from the surface interval (0 to 0.5 ft bgs) where the filter box VCP ends on the southern slope (location E03) to determine whether there have been any releases. Samples were collected directly below the two inlet pipes (location E02), the outlet pipe (location E04), and from soil near the base of the septic tank. The two samples near the base of the tank were located at the center chamber wall and eastern tank end (locations E05 and E06) where breaches were visible. Two biased locations were identified while exposing the dry well aboveground piping within the soil mound at the base of the slope (locations E07 and E08). One sample was collected in soil above the dry well piping based on green stains observed near the middle of the mound (location E07). The second biased location (E08) within the soil mound was at the capped end of the dry well piping, which also contained green staining.

Decision II samples were collected at this CAS to bound the benzo(a)pyrene concentrations that exceeded FALs. Three step-out locations (E09, E10, and E11) were drilled to collect subsurface samples at depths of 2, 3.5, and 5 ft bgs to bound COCs identified in soil near the inlet pipe and PSM inside the western chamber of the tank.

Three verification samples were collected at locations EV01, EV02, and EV03 during closure activities. Site photographs showing the sampled area are presented in Appendix D and additional details are presented in Sections A.7.3 and D.1.5.

2.1.5.5 Conceptual Site Model Validation

A CSM was developed to represent the release mechanisms and potential migration pathways for contaminant releases at CAU 560 CASs. The CSM and associated discussion for this CAS are provided in the CAIP (NNSA/NSO, 2008).

The migration pathway and release mechanism information gathered during the CAI was consistent with the CSM, and all information gathered during the CAI supports and validates the CSM as presented in the CAU 560 CAIP (NNSA/NSO, 2008).

2.1.6 Office Trailer Complex Sewage Pond (CAS 06-59-04)

The following sections summarize the field activities conducted at this CAS.

2.1.6.1 Visual Inspections

No septic system features other than the sewage pond were identified during the investigation. Exploratory trenches in three locations (one within the sewage pond) confirmed the absence/removal of the abandoned subsurface piping leading to the sewage pond. No liner was identified within the sewage pond.

A walkover was conducted on the surface of the sewage pond to identify the lowest surface point to collect a biased surface sample in accordance with the CAIP (NNSA/NSO, 2008). No additional biased sample locations were identified.

2.1.6.2 Video Surveys

Video surveys were not conducted at this CAS, as subsurface piping had been removed.

2.1.6.3 Field Screening

Soil samples were screened in the field for alpha and beta/gamma radiation. The radiological FSRs were compared to FSLs to guide subsequent sampling decisions. All radiological FSRs were below FSLs.

2.1.6.4 Sample Collection

A total of four characterization samples were collected from two locations during CAI activities at CAS 06-59-04. Samples were collected from a decontaminated backhoe bucket for sampling depths greater than 4 ft bgs. The sample ID numbers, locations, types, and analyses are listed in Table A.8-1. The sample locations are shown on Figure A.8-1.

As stipulated in the CAIP (NNSA/NSO, 2008), the lowest spot on the surface of the sewage pond was selected as a biased sample location (F01) where one soil sample was collected of the material covering the pond. Subsurface soils at location F01 were exposed via backhoe excavation to identify features of the sewage pond and collect samples in a similar location where the outlet pipe may have existed. One sample (560F002) was collected at the interface of backfill material and sewage pond materials at a depth of 8.5 ft bgs. Staining was visible within the sewage pond materials. One sample (560F003) was collected at the interface of the pond material and native soil interface at a depth of 10 ft bgs. During the exploratory trenching to confirm the absence of subsurface piping, a confirmation sample (560F004) was collected in native soil at location F02. Decision II samples were not collected at this CAS, as no COPCs exceeded FALs.

2.1.6.5 Conceptual Site Model Validation

A CSM was developed to represent the release mechanisms and potential migration pathways for contaminant releases at CAU 560 CASs. The CSM and associated discussion for this CAS are provided in the CAIP (NNSA/NSO, 2008).

The migration pathway and release mechanism information gathered during the CAI was consistent with the CSM, and all information gathered during the CAI supports and validates the CSM as presented in the CAU 560 CAIP (NNSA/NSO, 2008).

2.1.7 Control Point Septic System (CAS 06-59-05)

The following sections summarize the field activities conducted at this CAS.

2.1.7.1 Visual Inspections

The septic tank is visible at the ground surface where three lids provide access to the three chambers of the septic tank. Each chamber also contains one vent pipe. The lids were lifted and the interior of the tank inspected. Each chamber contained dry solid materials, and observations confirmed that the size and configuration of each chamber are consistent with engineering drawings. Based on the dimensions of each chamber and the depth measured to solid tank materials, a volume of PSM was calculated at 4 cubic yards (yd^3).

The presence of the inlet and outlet pipes was identified visually from inside the tank, and structural integrity of the tank appeared intact. Visual observations inside the active distribution box confirmed that the one abandoned pipe to the septic tank was grouted shut inside the box. Hand excavation exposed the distribution box outlet pipe, the tank inlet and outlet pipes, and vent pipe. All features were intact with no apparent leaks. The western and eastern ends and the north side of the tank were exposed through backhoe excavation for inspection and sampling. The tank showed no signs of leaks or breaches. The inlet pipe, initially exposed by hand, was breached by the backhoe during exposure of the tank base. After a sample was collected, the inlet pipe breach was grouted before the excavation was backfilled.

The septic tank outlet pipe connecting to the tile field was excavated by backhoe to expose the proximal ends of the leach lines and confirm the tile field configuration. Visual inspection confirmed three leach lines connect to both the north and south sides of the outlet pipe at approximately 2.5 ft bgs with an approximate 2-ft-thick bed of leach rock underlying the leach lines. Each set of north-south lines is slightly offset by about 1 ft from one another. The first set of leach lines is located 13 ft east of the tank with 13 ft between each set of leach lines. The distal ends of each line were exposed for inspection and sampling. Each distal end was capped, and the length of each leach line from the outlet pipe junction to the distal end averaged 105 ft. Little to no residual material was present within the leach lines and outlet pipe. Because the outlet pipe appears intact and open at the tank, the outlet pipe was breached just east of the tank and grouted a few inches from the location where the first set of leach lines occurs. (See Figure A.9-1 for the locations of septic system components.)

The visual inspections of the septic tank components did not result in additional sample collection.

2.1.7.2 Video Surveys

A video survey was conducted on the septic system piping by accessing the tank inlet pipe through the breach (location G01) created by the backhoe. The survey indicated no other breaches or tie-ins, and little to no residual material between the tank and distribution box. The survey also confirmed the inlet pipe had been grouted at the active distribution box. Another video survey was conducted on the outlet pipe between the tank and exposed truncation of the pipe east of the leach field lines. The survey confirmed little to no residual material within the main outlet pipe, and all six leach line tie-ins were visible with no other breaches identified. Therefore, no additional samples were identified.

2.1.7.3 Field Screening

Soil samples were screened in the field for alpha and beta/gamma radiation. The radiological FSRs were compared to FSLs to guide subsequent sampling decisions. All radiological FSRs were below FSLs.

2.1.7.4 Sample Collection

A total of 25 characterization samples (including 2 FDs) were collected from 22 locations during CAI activities at CAS 06-59-05. Samples were collected by hand or from a decontaminated backhoe bucket for sampling depths greater than 4 ft bgs. The sample ID numbers, locations, types, and analyses are listed in Table A.9-1. The sample locations are shown on Figure A.9-1.

Environmental samples were collected from the soil surrounding the septic tank to determine whether releases may be present from breaches or leaks from the tank. Samples were collected directly below the inlet pipe (location G02), the outlet pipe and vent pipe (location G01), at the connection between the septic tank inlet pipe and the manhole/distribution box (location G09), and from the soil at the base of the septic tank (locations G03 and G10). The sample depths ranged from 0.5 to 8.5 ft bgs, and all sample locations are shown on Figure A.9-1. Environmental samples were collected from beneath the proximal and distal ends of each of the six leach field lines to determine whether contaminants migrated to native soil for a total of 12 soil samples (locations G11 through G22). With the exception of the breached inlet pipe, no other biasing factors were identified during the inspection and sampling event; therefore, no additional biased samples were collected.

A total of four solid samples were collected within the septic tank and inlet pipe. Three of the solid samples (560G001 through G003) were collected from the interior base of each of the three septic tank chambers at locations G06 through G08 for PSM determination. Sample 560G007 was a solid sample collected from inside the inlet pipe breach at location G03 for PSM determination.

Decision II samples were not collected at this CAS, as no COPCs in soil surrounding the septic system components exceeded FALs. The COCs identified in the PSM are considered bound by the tank and inlet pipe in which they were contained.

2.1.7.5 Conceptual Site Model Validation

A CSM was developed to represent the release mechanisms and potential migration pathways for contaminant releases at CAU 560 CASs. The CSM and associated discussion for this CAS are provided in the CAIP (NNSA/NSO, 2008).

The migration pathway and release mechanism information gathered during the CAI was consistent with the CSM, and all information gathered during the CAI supports and validates the CSM as presented in the CAU 560 CAIP (NNSA/NSO, 2008).

2.2 Results

The data summary provided in Section 2.2.1 defines the COPCs that exceeded the FALs (i.e., COCs) within the CAU 560 CASs and the extent of any identified COCs. Section 2.2.2 summarizes the assessment made in Appendix B, which demonstrates that the investigation results satisfy the DQO data requirements.

2.2.1 Summary of Analytical Data

Chemical and radiological results for soils and wastes in disposal features (i.e., tanks or leach pits) from samples collected at each of the CASs are summarized in Sections 2.2.1.1 through 2.2.1.7. Environmental samples are evaluated against FALs to determine the presence of COCs and the extent of COC contamination, if present. Wastes in tanks and leach pits are evaluated against PSM criteria to determine whether a release of the tank contents to the surrounding environmental media could cause the presence of a COC in the environmental media.

The preliminary action levels (PALs) for the CAU 560 CAI were determined during the DQO process and are discussed in Section 3.3 of the CAU 560 CAIP (NNSA/NSO, 2008). The FALs used for determining the presence of COCs and for evaluating the need for corrective action are defined in Section 2.3. Details about the methods used during this CAI and a comparison of environmental sample results to the FALs are presented in Appendix A.

2.2.1.1 Leach Pit (CAS 03-51-01)

All soil concentrations of the reported constituents were compared to and were less than PALs. The maximum concentration of each detected contaminant at this CAS is listed in Table 2-1, and sample locations are shown in Figure A.3-1.

Table 2-1
Maximum Concentration of Detected Contaminants for CAS 03-51-01, Leach Pit
(Page 1 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Ac-228	2.02	560A003	11.0 - 12.0	A03	5	pCi/g
Aroclor 1254	0.58 (J)	560A001	0.0 - 1.0	A01	0.74	mg/kg
Aroclor 1260	0.11 (J)	560A001	0.0 - 1.0	A01	0.74	mg/kg
Arsenic	6.3	560A003	11.0 - 12.0	A03	23	mg/kg
Barium	150	560A003	11.0 - 12.0	A03	67,000	mg/kg
Beryllium	0.67	560A003	11.0 - 12.0	A03	1,900	mg/kg
Bis(2-ethylhexyl)phthalate	0.17 (J)	560A001	0.0 - 1.0	A01	120	mg/kg
Butyl benzyl phthalate	0.16 (J)	560A001	0.0 - 1.0	A01	100,000	mg/kg
Cadmium	0.63	560A001	0.0 - 1.0	A01	450	mg/kg
Cs-137	1.29	560A001	0.0 - 1.0	A01	12.2	pCi/g
Chlordane	0.022 (J)	560A001	0.0 - 1.0	A01	6.5	mg/kg
Chromium	30 (J)	560A001	0.0 - 1.0	A01	450	mg/kg
Di-n-octyl phthalate	0.36	560A001	0.0 - 1.0	A01	25,000	mg/kg
DRO	2.1 (J)	560A001	0.0 - 1.0	A01	N/A[a]	mg/kg
Eu-152	0.324 (J)	560A001	0.0 - 1.0	A01	5.67	pCi/g
Heptachlor epoxide	0.013 (J)	560A001	0.0 - 1.0	A01	0.19	mg/kg
Lead	21	560A001	0.0 - 1.0	A01	800	mg/kg

Table 2-1
Maximum Concentration of Detected Contaminants for CAS 03-51-01, Leach Pit
(Page 2 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Pb-212	2.13 (J)	560A003	11.0 - 12.0	A03	5	pCi/g
Pb-214	1.17	560A003	11.0 - 12.0	A03	5	pCi/g
Mercury	0.014	560A001	0.0 - 1.0	A01	310	mg/kg
Silver	2.3	560A001	0.0 - 1.0	A01	5,100	mg/kg
Tl-208	0.654	560A002	1.0 - 2.0	A02	5	pCi/g
Th-234	2.47 (J)	560A002	1.0 - 2.0	A02	105	pCi/g

[a]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

Ac = Actinium
DRO = Diesel-range organics
Cs = Cesium
Eu = Europium
mg/kg = Milligrams per kilogram
N/A = Not applicable
Pb = Lead
pCi/g = Picocuries per gram
Th = Thorium
Tl = Thallium

J = Estimated value

2.2.1.2 Septic Tank (CAS 06-04-02)

All soil concentrations of the reported constituents were compared to and were less than PALs. The maximum concentration of each detected contaminant at this CAS is listed in Table 2-2, and sample locations are shown in Figure A.4-1.

Table 2-2
Maximum Concentration of Detected Contaminants for CAS 06-04-02, Septic Tank
(Page 1 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
4,4'-DDD	0.003 (J)	560B002	3.0 - 3.5	B02	10	mg/kg
Ac-228	0.88	560B002	3.0 - 3.5	B02	5	pCi/g
Arsenic	5.3	560B004	12.5 - 13.0	B04	23	mg/kg
Barium	120	560B003	2.0 - 2.5	B03	67,000	mg/kg
Beryllium	0.58	560B003	2.0 - 2.5	B03	1,900	mg/kg
Bis(2-ethylhexyl)phthalate	0.1 (J)	560B002	3.0 - 3.5	B02	120	mg/kg
Chromium	6.6	560B003	2.0 - 2.5	B03	450	mg/kg

Table 2-2
Maximum Concentration of Detected Contaminants for CAS 06-04-02, Septic Tank
(Page 2 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Delta-BHC	0.0015 (J)	560B004	12.5 - 13.0	B04	0.36	mg/kg
DRO	8	560B005	15.0 - 15.5	B04	N/A[a]	mg/kg
Lead	13	560B003	2.0 - 2.5	B03	800	mg/kg
Pb-212	1.07 (J)	560B002	3.0 - 3.5	B02	5	pCi/g
Pb-214	0.79	560B002	3.0 - 3.5	B02	5	pCi/g
Mercury	0.032 (J-)	560B002	3.0 - 3.5	B02	310	mg/kg
Silver	4	560B005	15.0 - 15.5	B04	5,100	mg/kg
Tl-208	0.299	560B004	12.5 - 13.0	B04	5	pCi/g

[a]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value
J- = The result is an estimated quantity, but the result may be biased low.

The solid contents of the leach pit were sampled to determine whether this material posed a threat of the introduction of COCs if released to the environment surrounding the leach pit (i.e., could serve as PSM). The concentrations from sample 560B001 were compared to and were less than PSM criteria; therefore, the leach pit does not contain PSM. The maximum concentration of each detected contaminant in the PSM sample is listed in Table 2-3. The leach pit sample results were also used for waste handling and disposal option determination.

2.2.1.3 Leach Pit (CAS 06-05-03)

All soil concentrations of the reported constituents were compared to and were less than PALs.

Decision II samples were collected to evaluate and delineate whether the PSM containing COCs (arsenic and PCBs) migrated outside the leach pit chamber. The analytical results were below the respective FALs and defined the extent of contamination. The maximum concentration of each detected contaminant for Decision I and II samples at this CAS is listed in Table 2-4, and sample locations are shown in Figure A.5-1.

Table 2-3
Maximum PSM Results for CAS 06-04-02, Septic Tank

Sample Location	Sample Number	Sample Matrix	Parameter	Result	PSM Criteria[a]	Units
B01	560B001	Solid	DRO	18	N/A[b]	mg/kg
			Aroclor 1260	0.024 (J)	0.74	
			Arsenic	4.6	23	
			Barium	78	67,000	
			Beryllium	0.54	1,900	
			Cadmium	0.87	450	
			Chromium	46	450	
			Lead	33	800	
			Mercury	0.094	310	
			Silver	51	5,100	
			4,4'-DDE	0.0046 (J)	7	
			4,4'-DDT	0.007 (J)	7	
			Pb-212	0.44 (J)	5	pCi/g
			Pb-214	0.5 (J)	5	

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)
[b]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value

Table 2-4
Maximum Concentration of Detected Contaminants for CAS 06-05-03, Leach Pit
(Page 1 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
4,4'-DDD	0.0014 (J)	560C003	8.5 - 9.0	C03	10	mg/kg
Ac-228	0.8	560C001	4.5 - 5.0	C01	5	pCi/g
Aroclor 1260	0.15	560C001	4.5 - 5.0	C01	0.74	mg/kg
Aroclor 1268	0.33	560C001	4.5 - 5.0	C01	0.74	mg/kg
Arsenic	6.3	560C004	8.0 - 8.5	C04	23	mg/kg
Barium	120	560C004	8.0 - 8.5	C04	67,000	mg/kg
Barium	120	560C001	4.5 - 5.0	C01	67,000	mg/kg

Table 2-4
Maximum Concentration of Detected Contaminants for CAS 06-05-03, Leach Pit
(Page 2 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Beryllium	1.1 (J)	560C009	14.5 - 15.0	C06	1,900	mg/kg
Bis(2-ethylhexyl)phthalate	0.088 (J)	560C003	8.5 - 9.0	C03	120	mg/kg
Cadmium	0.099	560C004	8.0 - 8.5	C04	450	mg/kg
Chlordane	0.12	560C004	8.0 - 8.5	C04	6.5	mg/kg
Chromium	12	560C011	14.5 - 15.0	C07	450	mg/kg
Delta-BHC	0.0017 (J)	560C003	8.5 - 9.0	C03	0.36	mg/kg
Dieldrin	0.00087 (J)	560C004	8.0 - 8.5	C04	0.11	mg/kg
DRO	12	560C005	16.5 -17.5	C02	N/A[a]	mg/kg
Endosulfan sulfate	0.0014 (J)	560C004	8.0 - 8.5	C04	3,700	mg/kg
Lead	12	560C001	4.5 - 5.0	C01	800	mg/kg
Pb-212	0.91 (J)	560C003	8.5 - 9.0	C03	5	pCi/g
Pb-214	0.68	560C004	8.0 - 8.5	C04	5	pCi/g
Mercury	0.28	560C003	8.5 - 9.0	C03	310	mg/kg
Silver	0.18 (J-)	560C006	19.5 - 20.0	C02	5,100	mg/kg
Tl-208	0.33	560C003	8.5 - 9.0	C03	5	pCi/g

[a]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value
J- = The result is an estimated quantity, but the result may be biased low.

The solid contents of the leach pit were sampled to determine whether this material posed a threat of the introduction of COCs if released to the environment surrounding the leach pit (i.e., could serve as PSM). One solid sample (560C002) indicated PCBs and arsenic are present above PALs. Concentrations of PCBs and arsenic were above their respective FALs; therefore, the leach pit contains PSM. The maximum concentration of each detected contaminant in the PSM sample is listed in Table 2-5.

Table 2-5
Maximum PSM Results for CAS 06-05-03, Leach Pit

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Criteria[a]	Units
C02	560C002	Solid	DRO	1,100	N/A[b]	mg/kg
			Acetone	0.015 (J)	54,000	
			Arsenic	**57**	23	
			Barium	220	67,000	
			Beryllium	0.71	1,900	
			Cadmium	12	450	
			Chromium	110	450	
			Lead	330	800	
			Mercury	9.9	310	
			Silver	4.2	5,100	
			Bis(2-ethylhexyl)phthalate	16	120	
			Fluoranthene	0.62 (J)	22,000	
			Methylene chloride	0.0026 (J)	21	
			Phenanthrene	0.36 (J)	100,000	
			Pyrene	0.37 (J)	29,000	
			4,4'-DDE	0.096 (J)	7	
			Beta-BHC	0.0052 (J)	1.3	
			Heptachlor epoxide	0.032 (J)	0.19	
			Aroclor 1016	**0.56 (J)**	0.74	
			Aroclor 1254	**1.3 (J)**		
			Aroclor 1260	**0.76 (J)**		
			Pb-214	0.65	5	pCi/g
			Th-234	9.7	105	

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)
[b]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value

Bold indicates the value is equal to or exceeds the PSM criteria.

2.2.1.4 Leach Bed (CAS 06-05-04)

With the exception of PCBs, all concentrations of the reported constituents were compared to and were less than PALs.

From the 262 samples collected during the characterization and soil-removal phases, 75 samples exceeded the PAL (0.74 mg/kg) for total PCBs (Aroclor 1254, 1260, and 1268 combined) with concentrations above PALs ranging from 0.76 to 210 mg/kg. Because the FALs for these constituents were established as the PALs, they are considered to be COCs. The maximum concentration of each detected contaminant for all characterization samples collected at this CAS is listed in Table 2-6.

Table 2-6
Maximum Concentration of Detected Contaminants for CAS 06-05-04, Leach Bed
(Page 1 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
4,4'-DDE	0.007 (J)	560D008	3.5 - 4.0	D08	7	mg/kg
Ac-228	0.86	560D026	8.5 - 9.5	D17	5	pCi/g
Aroclor 1242	0.0562 (J)	560DE09	0.5 - 0.7	DQ81	0.74	mg/kg
Aroclor 1254	0.17 (J)	560DE09	0.5 - 0.7	DQ81	0.74	mg/kg
Aroclor 1260	**180 (J)**	560DQ44	0.0 - 0.25	DQ44	0.74	mg/kg
Aroclor 1268	**170 (J)**	560DQ66	0.0 - 0.25	DQ66	0.74	mg/kg
Arsenic	9.1	560D001	3.5 - 4.0	D01	23	mg/kg
Barium	120	560D026	8.5 - 9.5	D17	67,000	mg/kg
Beryllium	0.53	560D007	3.5 - 4.0	D07	1,900	mg/kg
Bis(2-ethylhexyl)phthalate	21	560D001	3.5 - 4.0	D01	120	mg/kg
Cadmium	0.63	560D001	3.5 - 4.0	D01	450	mg/kg
Chlordane	0.032	560D002	8.5 - 9.0	D02	6.5	mg/kg
Chromium	77	560D001	3.5 - 4.0	D01	450	mg/kg
Delta-BHC	0.0038 (J)	560D007	3.5 - 4.0	D07	0.36	mg/kg
Di-n-octyl phthalate	0.49 (J)	560D001	3.5 - 4.0	D01	25,000	mg/kg
DRO	85	560D001	3.5 - 4.0	D01	N/A[a]	mg/kg
Eu-154	0.62	560D012	6.0 - 6.5	D12	5.4	pCi/g
Lead	50	560D001	3.5 - 4.0	D01	800	mg/kg
Pb-212	0.97	560D002	8.5 - 9.0	D02	5	pCi/g

Table 2-6
Maximum Concentration of Detected Contaminants for CAS 06-05-04, Leach Bed
(Page 2 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Pb-214	0.78 (J)	560D005	5.0 - 5.5	D05	5	pCi/g
Mercury	2.2	560D015	6.0 - 6.5	D13	310	mg/kg
Selenium	0.59	560D005	5.0 - 5.5	D05	5,100	mg/kg
Silver	73	560D026	8.5 - 9.5	D17	5,100	mg/kg
Tl-208	0.317	560D026	8.5 - 9.5	D17	5	pCi/g
Total xylenes	0.005 (J)	560D009	3.5 - 4.0	D09	420	mg/kg

[a]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value

Bold indicates the value is equal to or exceeds the FAL.

The lateral extent of PCB contamination was defined through Decision II samples, and a soil-removal action was implemented at this CAS as part of the closure activities to address the PCB contamination within the Area 6 yard. Table A.6-6 presents the sample locations, sample depths, and PCB concentrations (including nondetects) of materials remaining at this CAS after soil-removal actions were completed. The remaining PCB concentrations above FALs shown in Table A.6-6 are limited to the area of the UR being implemented under a corrective action at this CAS, while all other sample results in Table A.6-6 demonstrate PCBs above FALs have been adequately removed. Table A.6-7 presents the sample locations, sample depths, and PCB concentrations (including nondetects) of materials that were subsequently removed during closure activities and properly disposed.

2.2.1.5 Building CP-400 Septic System (CAS 06-59-03)

With the exception of benzo(a)pyrene and total petroleum hydrocarbons (TPH)-DRO, all soil concentrations of the reported constituents were compared to and were less than PALs. One sample (560E002) collected at location E02 beneath the inlet pipe exceeded the FAL for benzo(a)pyrene at a depth of 2.5 ft bgs. Total petroleum hydrocarbons-DRO was detected in sample 560E003 at the former filter box location above the PAL of 100 mg/kg. The TPH-DRO was moved on to a Tier 2 evaluation, and FALs were established for the hazardous constituents of TPH-DRO. The Tier 2 evaluation determined that none of the individual hazardous constituents of TPH-DRO were detected above their respective PALs. Therefore, TPH-DRO is not considered a COC. (See Figure A.7-1 for the sample locations collected at this CAS.)

Decision II soil samples collected from three step-out borings (E09, E10, and E11) were analyzed for benzo(a)pyrene. All three samples were below the respective FAL for benzo(a)pyrene and, therefore, defined the extent of contamination. The maximum concentration of each detected contaminant for Decision I and II samples at this CAS is listed in Table 2-7.

Table 2-7
Maximum Concentration of Detected Contaminants for CAS 06-59-03, Building CP-400 Septic System
(Page 1 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
2,4-Dinitrotoluene	0.31 (J)	560E017	5.0 - 5.5	E11	1,200	mg/kg
4,4'-DDD	0.017 (J)	560E003	1.0 - 1.5	E03	10	mg/kg
4,4'-DDE	0.0097 (J)	560E003	1.0 - 1.5	E03	7	mg/kg
4,4'-DDT	0.066 (J)	560E004	3.5 - 4.0	E04	7	mg/kg
Ac-228	1.95	560E003	1.0 - 1.5	E03	5	pCi/g
Am-241	0.228 (J)	560E008	3.0 - 3.5	E08	12.7	pCi/g
Anthracene	0.16 (J)	560E002	2.0 - 2.5	E02	100,000	mg/kg
Aroclor 1260	0.028	560E004	3.5 - 4.0	E04	0.74	mg/kg
Arsenic	6.2	560E003	1.0 - 1.5	E03	23	mg/kg
Barium	130	560E005	4.0 - 4.5	E05	67,000	mg/kg
Benz(a)anthracene	0.95	560E002	2.0 - 2.5	E02	2.1	mg/kg
Benzo(a)pyrene	**0.92**	560E002	2.0 - 2.5	E02	0.21	mg/kg
Benzo(b)fluoranthene	1.3	560E002	2.0 - 2.5	E02	2.1	mg/kg
Benzo(ghi)perylene	0.36	560E002	2.0 - 2.5	E02	29,000	mg/kg
Benzo(k)fluoranthene	0.45	560E002	2.0 - 2.5	E02	21	mg/kg
Beryllium	0.99	560E008	3.0 - 3.5	E08	1,900	mg/kg
Bis(2-ethylhexyl)phthalate	0.89 (J)	560E003	1.0 - 1.5	E03	120	mg/kg
Cadmium	1.3	560E007	2.5 - 3.0	E07	450	mg/kg
Carbazole	0.15 (J)	560E002	2.0 - 2.5	E02	86	mg/kg
Cs-137	0.142	560E008	3.0 - 3.5	E08	12.2	pCi/g

Table 2-7
Maximum Concentration of Detected Contaminants for CAS 06-59-03, Building CP-400 Septic System
(Page 2 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Chlordane	0.1 (J)	560E003	1.0 - 1.5	E03	6.5	mg/kg
Chromium	80 (J)	560E003	1.0 - 1.5	E03	450	mg/kg
Chrysene	0.94	560E002	2.0 - 2.5	E02	210	mg/kg
Dibenzo(ah)anthracene	0.12 (J)	560E002	2.0 - 2.5	E02	0.21	mg/kg
Dieldrin	0.01 (J)	560E003	1.0 - 1.5	E03	0.11	mg/kg
DRO	380	560E003	1.0 - 1.5	E03	N/A[a]	mg/kg
Endosulfan sulfate	0.0058 (J)	560E002	2.0 - 2.5	E02	3,700	mg/kg
Fluoranthene	1.8	560E002	2.0 - 2.5	E02	22,000	mg/kg
Indeno(1,2,3-cd)pyrene	0.39	560E002	2.0 - 2.5	E02	2.1	mg/kg
Lead	80	560E002	2.0 - 2.5	E02	800	mg/kg
Pb-212	2.01 (J)	560E005	4.0 - 4.5	E05	5	pCi/g
Pb-214	1.21 (J)	560E005	4.0 - 4.5	E05	5	pCi/g
Mercury	0.0082	560E007	2.5 - 3.0	E07	310	mg/kg
Phenanthrene	0.88	560E002	2.0 - 2.5	E02	100,000	mg/kg
Pyrene	1.6	560E002	2.0 - 2.5	E02	29,000	mg/kg
Silver	210	560E007	2.5 - 3.0	E07	5,100	mg/kg
Tl-208	0.626	560E005	4.0 - 4.5	E05	5	pCi/g
Th-234	2.69 (J)	560E003	1.0 - 1.5	E03	105	pCi/g

[a]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value

Bold indicates the value is equal to or exceeds the FAL.

A total of three verification samples (560EV01 through EV03) were collected following the excavation and removal of COC-impacted soil and PSM. The analytical results for these verification samples were below the FAL.

The solid contents of the septic tank western chamber were sampled (560E001) to determine whether this material posed a threat of the introduction of COCs if released to the environment surrounding the leach pit (i.e., could serve as PSM). Septic tank content sampling of the solid materials indicated benzo(a)pyrene present above PSM criteria; therefore, the septic tank contents are considered PSM. The maximum concentration of each detected contaminant in the PSM sample is listed in Table 2-8.

Table 2-8
Maximum PSM Results for CAS 06-59-03, Building CP-400 Septic System
(Page 1 of 2)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Criteria[a]	Units
E01	560E001	Solid	DRO	400	N/A[b]	mg/kg
			Arsenic	7.3	23	
			Barium	120	67,000	
			Beryllium	0.62	1,900	
			Cadmium	3.6	450	
			Chromium	11	450	
			Lead	40	800	
			Mercury	0.6	310	
			Selenium	1.7 (J+)	5,100	
			Silver	250	5,100	
			1,4-Dichlorobenzene	0.016	7.9	
			Benzo(a)anthracene	0.38 (J)	2.1	
			Benzo(a)pyrene	**0.47 (J)**	0.21	
			Benzo(b)fluoranthene	0.64 (J)	2.1	
			Benzo(g,h,i)perylene	0.35 (J)	29,000	
			Benzo(k)fluoranthene	0.33 (J)	21	
			Chrysene	0.45 (J)	210	
			Fluoranthene	0.49 (J)	22,000	

Table 2-8
Maximum PSM Results for CAS 06-59-03, Building CP-400 Septic System
(Page 2 of 2)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Criteria[a]	Units
E01	560E001	Solid	Indeno(1,2,3,3-cd)pyrene	0.2 (J)	2.1	mg/kg
			Phenanthrene	0.16 (J)	100,000	
			Pyrene	0.55 (J)	29,000	
			Pb-212	1.75	5	pCi/g
			Tl-208	0.5	5	
			4,4'-DDE	0.052 (J)	7	mg/kg
			4,4'-DDT	0.0096 (J)		
			Chlordane	0.47 (J)	6.5	
			Heptachlor epoxide	0.0027 (J)	0.19	

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)
[b]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value
J+ = The result is an estimated quantity, but the result may be biased high.

Bold indicates the value is equal to or exceeds the PSM criteria.

2.2.1.6 Office Trailer Complex Sewage Pond (CAS 06-59-04)

All soil concentrations of the reported constituents were compared to and were less than PALs. The maximum concentration of each detected contaminant at this CAS is listed in Table 2-9, and sample locations are shown in Figure A.8-1.

Table 2-9
Maximum Concentration of Detected Contaminants for CAS 06-59-04, Office Trailer Complex Sewage Pond
(Page 1 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
4,4'-DDD	0.004	560F002	8.5 - 9.0	F01	10	mg/kg
Ac-228	2.32	560F001	0.0 - 0.5	F01	5	pCi/g
Aroclor 1254	0.17	560F002	8.5 - 9.0	F01	0.74	mg/kg
Arsenic	5.5	560F002	8.5 - 9.0	F01	23	mg/kg

Table 2-9
Maximum Concentration of Detected Contaminants for CAS 06-59-04, Office Trailer Complex Sewage Pond
(Page 2 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Barium	150	560F002	8.5 - 9.0	F01	67,000	mg/kg
Beryllium	0.99	560F001	0.0 - 0.5	F01	1,900	mg/kg
Beta-BHC	0.0012 (J)	560F002	8.5 - 9.0	F01	1.3	mg/kg
Bis(2-ethylhexyl)phthalate	0.089 (J)	560F002	8.5 - 9.0	F01	120	mg/kg
Cadmium	0.44	560F002	8.5 - 9.0	F01	450	mg/kg
Chromium	9	560F001	0.0 - 0.5	F01	450	mg/kg
Delta-BHC	0.00073 (J)	560F003	10.0 - 10.5	F01	0.36	mg/kg
Dieldrin	0.0014 (J)	560F002	8.5 - 9.0	F01	0.11	mg/kg
DRO	25	560F002	8.5 - 9.0	F01	N/A[a]	mg/kg
Heptachlor epoxide	0.011 (J)	560F002	8.5 - 9.0	F01	0.19	mg/kg
Lead	16	560F002	8.5 - 9.0	F01	800	mg/kg
Pb-212	2.35 (J)	560F001	0.0 - 0.5	F01	5	pCi/g
Pb-214	1.22 (J)	560F002	8.5 - 9.0	F01	5	pCi/g
Mercury	1.6	560F002	8.5 - 9.0	F01	310	mg/kg
Silver	0.2	560F002	8.5 - 9.0	F01	5,100	mg/kg
Tl-208	0.73	560F001	0.0 - 0.5	F01	5	pCi/g
Th-234	2.74 (J)	560F002	8.5 - 9.0	F01	105	pCi/g

[a]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value

2.2.1.7 Control Point Septic System (CAS 06-59-05)

All soil concentrations of the reported constituents for Decision I sampling around the septic tank components were compared to and were less than PALs. The maximum concentration of each detected contaminant at this CAS is listed in Table 2-10, and sample locations are shown in Figure A.9-1.

Table 2-10
Maximum Concentration of Detected Contaminants for CAS 06-59-05, Control Point Septic System
(Page 1 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
4,4'-DDD	0.028(J)	560G015	4.5 - 5.0	G13	10	mg/kg
4,4'-DDE	0.0072 (J)	560G022	4.0 - 4.5	G19	7	mg/kg
4,4'-DDT	0.025 (J)	560G024	3.5 - 4.0	G21	7	mg/kg
Ac-228	1.21	560G011	6.5 - 7.0	G01	5	pCi/g
Alpha-BHC	0.00039 (J)	560G014	3.5 - 4.0	G12	0.36	mg/kg
Aroclor 1254	0.059 (J)	560G009	8.0 - 8.5	G05	0.74	mg/kg
Aroclor 1260	0.097	560G015	4.5 - 5.0	G13	0.74	mg/kg
Arsenic	21	560G025	3.0 - 3.5	G22	23	mg/kg
Barium	130	560G011	6.5 - 7.0	G01	67,000	mg/kg
Beryllium	0.69	560G004	0.5 - 1.0	G01	1,900	mg/kg
Bis(2-ethylhexyl)phthalate	0.35 (J)	560G005	0.5 - 1.0	G01	120	mg/kg
Cadmium	1	560G024	3.5 - 4.0	G21	450	mg/kg
Cs-137	0.232	560G005	0.5 - 1.0	G01	12.2	pCi/g
Chlordane	0.4	560G005	0.5 - 1.0	G01	6.5	mg/kg
Chromium	9.1 (J)	560G024	3.5 - 4.0	G21	450	mg/kg
Delta-BHC	0.0011 (J)	560G019	4.0 - 4.5	G17	0.36	mg/kg
Dieldrin	0.0019 (J)	560G004	0.5 - 1.0	G01	0.11	mg/kg
DRO	6.1	560G012	6.5 - 7.0	G10	N/A[a]	mg/kg
Endosulfan I	0.00037 (J)	560G009	8.0 - 8.5	G05	3,700	mg/kg
Endosulfan sulfate	0.0011 (J)	560G019	4.0 - 4.5	G17	3,700	mg/kg
Endrin	0.0016 (J)	560G005	0.5 - 1.0	G01	180	mg/kg
Gamma-BHC	0.0012 (J)	560G004	0.5 - 1.0	G01	1.7	mg/kg
Heptachlor epoxide	0.0043 (J)	560G012	6.5 - 7.0	G10	0.19	mg/kg
Lead	67 (J)	560G006	2.5 - 3.5	G02	800	mg/kg
Pb-212	1.18 (J)	560G005	0.5 - 1.0	G01	5	pCi/g
Pb-214	0.84 (J)	560G005	0.5 - 1.0	G01	5	pCi/g
Mercury	0.059	560G004	0.5 - 1.0	G01	310	mg/kg
Silver	100	560G015	4.5 - 5.0	G13	5,100	mg/kg

Table 2-10
Maximum Concentration of Detected Contaminants for CAS 06-59-05, Control Point Septic System
(Page 2 of 2)

Contaminant	Maximum Result	Sample Number	Depth (ft bgs)	Location	FAL	Units
Silver	100	560G022	4.0 - 4.5	G19	5,100	mg/kg
Tl-208	0.41	560G008	8.0 - 8.5	G04	5	pCi/g
Th-234	1.53	560G022	4.0 - 4.5	G19	105	pCi/g

[a]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value

Septic tank content sampling of the wastes in each of three chambers as well as the waste contained within the inlet pipe indicated pesticides, semivolatile organic compounds (SVOCs), PCBs, and RCRA metals present above PSM criteria. Based on analytical results above PSM criteria for benzo(a)pyrene, arsenic, lead, PCBs, dieldrin, chlordane, and heptachlor epoxide, the contents of both the septic tank and inlet pipe are considered PSM. The maximum concentration of each detected contaminant in the PSM samples is listed in Table 2-11. All PSM was removed through a corrective action.

Table 2-11
Maximum PSM Results for CAS 06-59-05, Control Point Septic System
(Page 1 of 3)

Sample Location	Sample Number	Sample Matrix	Parameter	Results	Criteria[a]	Units
G07	560G002	Solid	DRO	2,300	N/A[b]	mg/kg
G06	560G001	Solid	Arsenic	**30**	23	mg/kg
G07	560G002	Solid	Barium	560	67,000	mg/kg
G07	560G002	Solid	Cadmium	46	450	mg/kg
G07	560G002	Solid	Chromium	170 (J)	450	mg/kg
G03	560G007	Solid	Lead	**2,000 (J)**	800	mg/kg
G03	560G007	Solid	Mercury	130	310	mg/kg
G07	560G002	Solid	Selenium	9	5,100	mg/kg
G06	560G001	Solid	Silver	370	5,100	mg/kg
G07	560G002	Solid	Acetone	0.026	54,000	mg/kg

Table 2-11
Maximum PSM Results for CAS 06-59-05, Control Point Septic System
(Page 2 of 3)

Sample Location	Sample Number	Sample Matrix	Parameter	Results	Criteria[a]	Units
G08	560G003	Solid	Carbon disulfide	0.0028	720	mg/kg
G03	560G007	Solid	Tetrachloroethylene	0.022	1.3	mg/kg
G03	560G007	Solid	1,1,1-Trichloroethene	0.013	1,200	mg/kg
G03	560G007	Solid	1,4-Dichlorobenzene	0.016	7.9	mg/kg
G07	560G002	Solid	Benzo(a)anthracene	0.6 (J)	2.1	mg/kg
G07	560G002	Solid	Benzo(a)pyrene	**0.62 (J)**	0.21	mg/kg
G07	560G002	Solid	Benzo(b)fluoranthene	0.75 (J)	2.1	mg/kg
G08	560G003	Solid	Benzo(ghi)perylene	0.87 (J)	29,000	mg/kg
G03	560G007	Solid	Bis(2-ethylhexyl)phathalate	9.3 (J)	120	mg/kg
G07	560G002	Solid	Butyl benzyl phthalate	2.6 (J)	100,000	mg/kg
G03	560G007	Solid	Chrysene	0.36 (J)	210	mg/kg
G08	560G003	Solid	Di-n-butyl phthalate	0.5 (J)	62,000	mg/kg
G07	560G002	Solid	Fluoranthene	1.2 (J)	22,000	mg/kg
G07	560G002	Solid	Indeno(1,2,3-cd)pyrene	0.7 (J)	2.1	mg/kg
G03	560G007	Solid	Phenanthrene	0.91 (J)	100,000	mg/kg
G07	560G002	Solid	Pyrene	2 (J)	29,000	mg/kg
G07	560G002	Solid	Aroclor 1260	**5.3 (J)**	0.74	mg/kg
G03	560G007	Solid	Ac-228	0.68	5	pCi/g
G03	560G007	Solid	Am-241	0.92 (J)	12.7	pCi/g
G06	560G001	Solid	Cs-137	2.12	12.2	pCi/g
G03	560G007	Solid	Pb-212	0.75 (J)	5	pCi/g
G03	560G007	Solid	Pb-214	0.34 (J)	5	pCi/g
G07	560G002	Solid	Th-234	4.5 (J)	105	pCi/g
G03	560G007	Solid	Pu-238	0.97	13	pCi/g
G03	560G007	Solid	Pu-239/240	6.1	12.7	pCi/g
G07	560G002	Solid	4,4’-DDD	2 (J)	10	mg/kg
G07	560G002	Solid	4,4’-DDE	0.96 (J)	7	mg/kg
G03	560G007	Solid	4,4’-DDT	0.62 (J)	7	mg/kg

Table 2-11
Maximum PSM Results for CAS 06-59-05, Control Point Septic System
(Page 3 of 3)

Sample Location	Sample Number	Sample Matrix	Parameter	Results	Criteria[a]	Units
G07	560G002	Solid	Chlordane	**6.6 (J)**	6.5	mg/kg
G07	560G002	Solid	Dieldrin	**1.2 (J)**	0.11	mg/kg
G07	560G002	Solid	Heptachlor epoxide	**0.24 (J)**	0.19	mg/kg

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)
[b]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

Am = Americium
Pu = Plutonium

J = Estimated value

Bold indicates the value is equal to or exceeds the PSM criteria.

2.2.2 Data Assessment Summary

The DQA is presented in Appendix B and includes an evaluation of the DQIs to determine the degree of acceptability and usability of the reported data in the decision-making process. The DQO process ensures that the right type, quality, and quantity of data will be available to support the resolution of those decisions at an appropriate level of confidence. Using both the DQO and DQA processes help to ensure that the DQO decisions are sound and defensible. The DQA process is composed of the following steps:

- Step 1: Review DQOs and Sampling Design.
- Step 2: Conduct a Preliminary Data Review.
- Step 3: Select the Test.
- Step 4: Verify the Assumptions.
- Step 5: Draw Conclusions from the Data.

Sample locations that support the presence and/or extent of contamination at each CAS are shown in Appendix A. Based on the results of the DQA presented in Appendix B, the DQO requirements have been met. The DQA also determined that information generated during the investigation support the revised CSM assumptions and the data collected support their intended use in the decision-making process.

2.3 Justification for No Further Action

No further corrective action is justified based on an evaluation of risk to ensure protection of the public and the environment in accordance with *Nevada Administrative Code* (NAC) 445A (NAC, 2006a), feasibility, and cost effectiveness. The decision that no further corrective action is needed was determined from DQO decision statements based on a comparison of the analyte concentrations detected in CAI soil samples to the FALs defined in Section 2.3.1.

No further corrective action is required at CASs 03-51-01, 06-04-02, and 06-59-04, as no COCs were identified in sample results. Appendix C presents the justification for no further action based on risk.

Total petroleum hydrocarbons-DRO greater than the PAL has been identified in several CASs. Because the individual hazardous constituents of TPH-DRO reported in the volatile organic compound (VOC) and SVOC results did not exceed PALs, TPH-DRO is not considered a COC at any CAS. Appendix C presents the justification for no further action based on risk.

All PSM and COC-impacted soils at CASs 06-59-03 and 06-59-05 were removed during the corrective action activities of clean closure discussed in Appendix D and final verification sample results did not exceed FALs.

As part of a closure in place corrective action for CAS 06-05-04, a UR has been implemented. More than 2,000 yd^3 of COC-impacted soil was removed during closure activities; however, analytical results from an area sampled near Building CP-162 indicate PCBs remain in soil adjacent to and beneath Building CP-162. The UR shall prevent unauthorized intrusive activities from the surface to a depth of 5.5 ft bgs below Building CP-162 and extending 32 ft east and 13 ft south of the building. Hazardous materials associated with the UR include PCBs. An annual post-closure inspection is associated with the UR to certify that postings are in place, intact, and readable. Signage has been placed to designate the restricted area. The UR is included in Attachment D-1 of Appendix D.

As part of a closure in place corrective action for CAS 06-05-03, a UR has been implemented. The UR shall prevent unauthorized intrusive activities from 5 to 20 ft bgs in a 10-ft radius extending out from the post in the center of the grouted leach pit. Hazardous materials associated with the UR include arsenic and PCBs. An annual post-closure inspection is associated with the UR to certify that postings are in place, intact, and readable. Signage and metal markers have been placed to designate the restricted area. The UR is included in Appendix D.

Best management practices were implemented at several of the CASs. Appendix D provides additional detail on the BMP activities performed at CAU 560 CASs.

2.3.1 Final Action Levels

The CAU 560 FALs are risk-based cleanup goals that, if met, will ensure that each release site will not pose an unacceptable risk to human health and the environment and that conditions at each site are in compliance with all applicable laws and regulations. The risk-based corrective action (RBCA) process used to establish FALs is described in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006). This process conforms with NAC Section 445A.227, which lists the requirements for sites with soil contamination (NAC, 2006b). For the evaluation of corrective actions, NAC Section 445A.22705 (NAC, 2006c) requires the use of American Society for Testing and Materials (ASTM) Method E1739 (ASTM, 1995) to "conduct an evaluation of the site, based on the risk it poses to public health and the environment, to determine the necessary remediation standards (i.e., FALs) or to establish that corrective action is not necessary."

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

- Tier 1 evaluation - Sample results from source areas (highest concentrations) are compared to action levels based on generic (non-site-specific) conditions (i.e., the PALs established in the CAIP [NNSA/NSO, 2008]). The FALs may then be established as the Tier 1 action levels, or the FALs may be calculated using a Tier 2 evaluation.

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

- Tier 3 evaluation - Conducted by calculating Tier 3 SSTLs on the basis of more sophisticated risk analyses using methodologies described in Method E1739 that consider site-, pathway-, and receptor-specific parameters.

A Tier 1 evaluation was conducted for all COPCs to determine whether contaminant levels satisfy the criteria for a quick regulatory closure or warrant a more site-specific assessment. This was accomplished by comparing individual source area contaminant concentration results to the Tier 1 action levels (the PALs established in the CAIP [NNSA/NSO, 2008]).

Constituents detected at CAU 560 for which PALs were not established were:

- Endosulfan I
- Endosulfan sulfate
- Phenanthrene

The PALs for these constituents were established as the PALs of the surrogate constituents listed in Table 2-12.

Table 2-12
Surrogate Chemical PALs

Chemical	Surrogate Chemical	Rationale
Endosulfan I	Endosulfan	Endosulfan I is an isomer of endosulfan. These chemicals have the same chemical weight and the same molecules. The melting points of endosulfan and endosulfan I are 106 degrees Celsius (°C) and 108°C, respectively.
Endosulfan sulfate	Endosulfan	Endosulfan and its primary metabolite, endosulfan sulfate, exhibit similar toxicities and are both believed to be responsible for the toxicity observed in animals. The use of endosulfan as a surrogate for endosulfan sulfate could lead to an overestimation of the risk posed by endosulfan sulfate because the other primary metabolite (endosulfan diol) could be mainly responsible for the toxicity instead of endosulfan sulfate.
Phenanthrene	Anthracene	The surrogate is based on structural similarity. The difference between the two chemicals is the position of the benzene rings. Under the same conditions, these chemicals react similarly. Phenanthrene is more polar and, therefore, more reactive than anthracene.

The constituents detected at the CAU 560 CASs that exceeded Tier 1 action levels were:

- PCBs at CASs 06-05-03, 06-05-04, and 06-59-05
- Benzo(a)pyrene at CAS 06-59-03 and 06-59-05
- TPH-DRO at CASs 06-05-03, 06-59-03, and 06-59-05
- Arsenic at CASs 06-05-03 and 06-59-05
- Lead at CAS 06-59-05
- Dieldrin at CAS 06-59-05
- Heptachlor expoxide at CAS 06-59-05
- Chlordane at CAS 06-59-05

Tier 1 action levels were established as the FALs for all COPCs except for TPH-DRO. Only TPH-DRO was passed on to a Tier 2 evaluation. The Tier 2 evaluation of TPH-DRO consisted of evaluating the hazardous constituents of TPH to the FALs. Because the individual hazardous constituents of TPH-DRO are reported and evaluated in the VOC and SVOC results as potential COCs, TPH-DRO is not considered a COC. Additional details of the Tier 2 evaluation for TPH-DRO are provided in Appendix D.

3.0 Recommendation

No further corrective action is required at CAU 560 based on the implementation of corrective actions at each CAU 560 CAS. Corrective actions were evaluated based on technical merits focusing on performance, reliability, feasibility, and safety. The following corrective actions were implemented for CAU 560:

- No further action for CASs 03-51-01, 06-04-02, and 06-59-04, as no COPCs were present that exceed FALs.
- Closure in place for CAS 06-05-03 under a corrective action with a UR for remaining PCB- and arsenic-impacted PSM. The UR form and map has been filed in the DOE, National Nuclear Security Administration Nevada Site Office (NNSA/NSO) Facility Information Management System, the FFACO database, and NNSA/NSO CAU/CAS files.
- Closure in place for CAS 06-05-04 under a corrective action with a UR for remaining PCB-impacted soil. The UR form and map has been filed in the NNSA/NSO Facility Information Management System, the FFACO database, and NNSA/NSO CAU/CAS files.
- No further action for CAS 06-59-03, as the COC of benzo(a)pyrene in soil and PSM have been removed.
- No further action for CAS 06-59-05, as the COCs in PSM within the septic tank and inlet piping have been removed and the tank was filled with concrete.

The following BMPs were also conducted:

- Removed and disposed of the leach pit casing, cover, and connecting piping; backfilled and re-graded at CAS 03-51-01.
- Removed and disposed of the leach pit casing and lid; backfilled and re-graded; and disposed of housekeeping surface debris at CAS 06-04-02.

The NNSA/NSO requests that NDEP issue a Notice of Completion for this CAU and approval to move the CAU from Appendix III to Appendix IV of the FFACO.

4.0 References

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Appendix A

Corrective Action Investigation Results

A.1.0 Introduction

This appendix presents the CAI activities and analytical results for CAU 560. Corrective Action Unit 560 is located in Areas 3 and 6 of the NTS (Figure 1-1) and comprises the seven CASs listed below:

- 03-51-01, Leach Pit
- 06-04-02, Septic Tank
- 06-05-03, Leach Pit
- 06-05-04, Leach Bed
- 06-59-03, Building CP-400 Septic System
- 06-59-04, Office Trailer Complex Sewage Pond
- 06-59-05, Control Point Septic System

Corrective Action Site 03-51-01 is located in Area 3 of the NTS and consists of a leach pit and associated subsurface piping that serviced the former Building 3C-5, Special Measurements Facility, and soil surrounding the features. The septic system received waste water from a sink drain and was designed to release effluent to subsurface soil through the leach pit disposal feature. Building 3C-5 was demolished by 1999, leaving only the concrete building pad and numerous floor tiles on the pad and surrounding areas. The portions of the facility investigated are shown in Figure A.3-1 and consisted of soil sample collection at septic system components (i.e., inlet pipe, base of leach pit). Additionally, for worker protection, floor tiles containing asbestos were removed from the building pad and surrounds before intrusive activities began.

Corrective Action Site 06-04-02 is located in Area 6 of the NTS and consists of a leach pit, associated subsurface piping, and soil surrounding these features. The CAS was originally identified as a septic tank associated with support/administrative trailers of the CP-6 Complex; however, visual inspection during the investigation identified a leach pit, not a septic tank, as the disposal feature. The septic system was designed to route effluent from trailer drains to the subsurface soil through the leach pit disposal feature. All of the trailers were removed by 1985. The portions of the facility investigated are shown in Figure A.4-1 and consisted of soil sample collection at septic system components (i.e., inlet pipes, base of leach pit).

Corrective Action Site 06-05-03 is located in Area 6 of the NTS and consists of a leach pit, a septic tank, inactive, subsurface piping, and soil surrounding these features. The abandoned septic system serviced Building CP-160, Site Maintenance Facility, a currently active structure. The septic system received wastes from restroom facilities, sinks, and floor drains and was designed to release effluent to subsurface soil through the leach pit disposal feature. The portions of the facility investigated are shown in Figure A.5-1 and consisted of soil sample collection at components of the inactive portions of the septic system (i.e., inlet pipe, base of pit).

Corrective Action Sites 06-05-04 is located in Area 6 of the NTS and consists of a leach bed, distribution box, a septic tank, associated subsurface piping, and soil surrounding these features. The abandoned septic system serviced Building CP-162, a currently active structure, and received wastes from a water curtain, floor drains, sinks, and restroom facilities. The portions of the facility investigated are shown in Figure A.6-1 and consisted of soil sample collection at septic system components (i.e., inlet and outlet pipes, base of tank).

Corrective Action Site 06-59-03 is located in Area 6 of the NTS and consists of a septic tank, a dry well, a filter box, and associated surface and subsurface piping, and soil surrounding these features. The septic system serviced Building CP-400, built in 1953 and demolished in June 2003, and received wastes from a sink, water closet, darkroom sink, and floor drains and was designed to release effluent to subsurface soil through the former filter box and dry well disposal features. The portions of the facility investigated are shown in Figure A.7-1 and consisted of soil sample collection at septic system components (i.e., septic tank contents, inlet pipe).

Corrective Action Site 06-59-04 is located in Area 6 of the NTS and consists of a covered sewage pond and subsurface piping associated with the Area 6 Office Trailer Complex. The sewage pond was previously connected to the Office Trailer Complex by approximately 200 ft of piping that has since been removed as determined through visual inspections. The portions of the facility investigated are shown in Figure A.8-1 and consisted of soil sample collection within the pond.

Corrective Action Site 06-59-05 is located in Area 6 of the NTS and consists of a septic tank, a tile field, and subsurface piping connected to the septic tank and tile field, as well as soil surrounding these features. The septic system was originally identified as servicing several buildings within the CP-6 Complex. The septic system was designed to release effluent to subsurface soil through the tile field disposal feature. The portions of the facility investigated are shown in Figure A.9-1 and consisted of soil sample collection of septic systems components (i.e., base of tank, leach lines).

Additional information regarding the history of each site, planning, and the scope of the investigation is presented in the CAU 560 CAIP (NNSA/NSO, 2008).

A.1.1 Project Objectives

The primary objective of the investigation is to provide sufficient information to validate the assumptions used to select the corrective actions and to verify that closure objectives were met for each CAS in CAU 560. This objective was achieved by determining the presence of COCs and the vertical and lateral extent of the COCs, if present.

The selection of soil, waste characterization, and/or verification sample locations was based on site conditions, and the strategy developed during the DQO process as presented in the CAU 560 CAIP (NNSA/NSO, 2008). The sampling strategy implemented a judgmental sampling approach at all seven CASs.

A.1.2 Contents

This appendix contains information and data in sufficient detail to justify that no further corrective action is required at CAU 560. The contents of this appendix are as follows:

- Section A.1.0 describes the investigation background, objectives, and content.
- Section A.2.0 provides an investigation overview.
- Sections A.3.0 through A.9.0 provide CAS-specific information regarding the field activities, sampling methods, and laboratory analytical results from investigation sampling.
- Section A.10.0 summarizes waste management activities.
- Section A.11.0 discusses the QA and QC processes followed and results of the QA/QC activities.
- Section A.12.0 is a summary of the investigation results.
- Section A.13.0 lists the cited references.

The complete field documentation and laboratory data — including field activity daily logs (FADLs), sample collection logs (SCLs), analysis request/chain-of-custody forms, soil sample descriptions, laboratory certificates of analyses, analytical results, and surveillance results — are retained in project files as hard copy files or electronic media.

A.2.0 Investigation Overview

Field investigation and sampling activities for the CAU 560 CAI were conducted from October 7, 2008, through February 24, 2010. Table A.2-1 lists the CAI activities that were conducted at each of the CASs.

Table A.2-1
CAI Activities Conducted at Each CAS
To Meet CAIP Requirements for CAU 560

CAI Activities	CAS						
	03-51-01	06-04-02	06-05-03	06-05-04	06-59-03	06-59-04	06-59-05
Inspected and verified the CAS components identified in the CAIP.	X	X	X	X	X	X	X
Performed site walkovers to identify biased sampling locations.	X	X	X	X	X	X	X
Collected biased soil samples for laboratory analysis.	X	X	X	X	X	X	X
Field screened samples for alpha and beta/gamma radiation using a hand-held survey instrument.	X	X	X	X	X	X	X
Conducted video surveys using a video-mole survey instrument to verify the features of a component, and identify pipe contents or breaches in the associated piping.	--	X	X	X	--	--	X
Collected soil samples from step-out sample locations (Decision II) based on the outer boundary sample locations where COCs were detected in Decision I soil samples.	--	--	X	X	X	--	--
Collected solid samples from the contents of septic system components for waste characterization to support disposal recommendations and determine whether the waste could be a potential source of contamination for the environment (i.e., soil).	--	X	X	X	X	--	X
Conducted analysis for total fecal coliform bacteria for the protection of workers and offsite laboratory personnel.	--	X	X	--	X	--	X
Submitted select samples for offsite laboratory analysis.	X	X	X	X	X	X	X
Collected GPS coordinates for sample locations and points of interest.	--	X	X	X	X	X	X

GPS = Global Positioning System

-- = Not applicable

The investigation and sampling program was managed in accordance with the requirements set forth in the CAU 560 CAIP (NNSA/NSO, 2008). Samples were collected and documented as prescribed in the CAU 560 CAIP and ROTC No. 1 (NNSA/NSO, 2008). Quality control samples (e.g., field blanks, equipment rinsate blanks, trip blanks, and duplicate samples) were collected as required by the *Industrial Sites Quality Assurance Project Plan* (QAPP) (NNSA/NV, 2002a) and the CAU 560 CAIP (NNSA/NSO, 2008).

Weather conditions at the site varied to include sun (high to moderate temperatures), average rainfall, intermittent cloudiness, and light to strong winds. No weather delays were encountered during the investigation.

The CASs were investigated by sampling potential contaminant sources, and surface and subsurface soils. Surface soil samples were collected by hand excavation. Subsurface soil samples were collected using hand augering, a backhoe, or rotosonic drilling. The soil samples were field screened at all locations for alpha and beta/gamma radiation. The results were compared against screening levels to guide in the CAS-specific investigations. Samples of septic system components (e.g., septic tank contents) were collected to support both environmental and waste characterization using plastic scoops and hand augers.

Except as noted in the following CAS-specific sections, CAU 560 Decision I sampling locations were accessible, and sampling activities at planned locations were not restricted. Decision II step-out sample locations were accessible and remained within anticipated spatial boundaries except where otherwise noted.

Sections A.2.1 through A.2.4 provide the investigation methodology and laboratory analytical information.

A.2.1 Sample Locations

Investigation locations selected for sampling were based on interpretation of existing engineering drawings, aerial and land photographs, interviews with former and current site employees, information obtained during site visits, and site conditions as provided in the CAU 560 CAIP (NNSA/NSO, 2008). Sampling points for each site were selected based on the approach provided in the CAIP. The planned biased sample locations are discussed in text and represented on figures in the CAIP. Actual environmental sample locations are shown on the figures included in Sections A.3.0 through A.9.0. Some locations were modified slightly from planned positions due to field conditions and observations. In some cases, laboratory analytical results determined the need for step-out sampling locations. Decision II sample locations were staked where appropriate and labeled. The majority of sample locations were surveyed with a GPS instrument. For those locations not surveyed, the locations were measured in the field and then digitized using Geographic Informations Systems tools. A Trimble Pathfinder ProXRSTM GPS instrument was used for determining the sample location coordinates as well as CAS points of interest. Appendix E presents these data in a tabular format.

A.2.2 Investigation Activities

The investigation activities performed at CAU 560 were based on field investigation activities discussed in the CAU 560 CAIP and ROTC No. 1 (NNSA/NSO, 2008). The technical approach consisted of the activities listed in Table A.2-1. The investigation strategy allowed the nature and extent of contamination associated with each CAS to be established. The following sections describe the specific investigation activities that took place at CAU 560.

A.2.2.1 Geophysical Surveys

Prior surveys conducted at CASs 03-51-01, 06-05-03, and 06-05-04 were reviewed to determine potential locations and/or components of disposal features and the septic system.

A.2.2.2 Field Screening

Field-screening activities for alpha and beta/gamma radiation were performed as specified in the CAU 560 CAIP (NNSA/NSO, 2008). Site-specific FSLs for alpha and beta/gamma radiation were defined as the mean background activity level plus two times the standard deviation of readings from 10 background locations selected near each CAS. The radiation FSLs are instrument-specific and were established for each instrument and CAS before use.

Alpha and beta/gamma radiation screening was performed at each CAS using an NE Technology Electra fitted with a DP6 dual-alpha and beta/gamma radiation scintillation probe.

The CAS-specific sections of this document identify the CASs where field screening was conducted and how the FSLs were used to aid in the selection of samples to be submitted for analysis. Field-screening results are recorded on SCLs that are retained in project files.

A.2.2.3 Piping, Septic Tank, and Leach Pit Inspections

Piping, septic tank/leach pit, and system component inspections of surface (distribution boxes, riser pipes, access hatches, and tie-ins) and subsurface (riser pipe connections, septic tank inlet and outlet pipes, possible breach areas in piping) features were conducted using a video survey, or by exposing the component and performing a visual inspection where feasible. Notes in the FADLs and field maps provide documentation of the integrity of the individual components. The following provides details of investigation techniques that were used to verify the integrity of the pipe, tank or pit, and system components.

The septic systems at CASs 06-05-03 (Leach Pit), 06-05-04 (Leach Bed), 06-59-03 (Building CP-400 Septic System), and 06-59-05 (Control Point Septic System) had septic tanks. Corrective Action Sites 03-51-01 (Leach Pit), 06-04-02 (Septic Tank), and 06-05-03 (Leach Pit) had leach pits. None of the septic tanks nor leach pits had liquid, and none of the solid levels approached the inlet or outlet piping for the tank or leach pit. The steps described below were used to inspect and sample septic tanks, leach pits, and the distribution box:

- The interior of the septic tank and/or leach pit was visually inspected to note items such as chambers present, condition of the tank or pit interior, and condition of the contents; estimate the amount of contents; and provide access for measurement of the phases.
- Samples were collected of the contents within the septic tanks, leach pits, and distribution box where present. Solid samples were the only phase present in all structures. All septic tank samples and one leach pit sample were field lab screened for fecal coliform. Results of the fecal coliform screenings were all negative and are maintained in the project records.
- Samples were collected from below the inlet and outlet of each septic tank, leach pit, and distribution box where identified (e.g., leach pits had no outlet pipes).
- Integrity of the septic tanks were evaluated by excavating to the base of each tank and identifying potential releases from the tank(s). Integrity and configuration of the leach pits were evaluated by excavating to the base of each pit. Integrity and configuration of the

CAS 06-05-04 and CAS 06-59-05 distribution boxes were evaluated by removing the manhole cover and evaluating the base near the inlet and outlet pipe. Visual observations were recorded in the FADL and on the SCLs.

Video-mole surveys were conducted at CASs 06-04-02, 06-05-04, and 06-59-05 using a video camera on septic system surface or subsurface components (i.e., cleanouts, piping) to identify residual material, breaches, or unknown tie-ins. No breaches in the piping were identified during the video-mole survey; however, during excavation of piping at CAS 03-51-01, a breach was identified in subsurface piping. One sample was collected beneath the breached section at this CAS. Additional breaches were inadvertently created at CASs 06-59-05 and 06-04-02 during exposure of piping. Residual material within the breached pipe was adequate for sampling at CAS 06-59-05. Residual material (e.g., pebbles, twigs) identified in the piping by the video-mole surveys was not sampled due to inadequate material and volume. Sections of piping that were breached to gain access for the video mole or during excavation were grouted.

A.2.2.4 Surface and Subsurface Soil Sampling

Soil samples were collected using “scoop and trowel” (surface hand-grab sampling), hand auger, backhoe, and/or drill core methods. All samples were surveyed for alpha and beta/gamma radiation before the start of sampling. Labeled sample containers were filled according to the following sequence: VOCs sample containers were filled with soil directly from the sample location and/or backhoe bucket. Additional soil was transferred into disposable aluminum tin pans, homogenized, and field screened for alpha and beta/gamma radiation. All remaining sample containers were then filled.

Surface soil samples were collected at biased locations from 0 to 0.5 ft bgs as determined in the field based on the presence of biasing factors focused on determining extent of identified contamination. Subsurface soil samples were collected from the soil horizon at the base of septic system components (i.e., tanks, boxes, piping) to evaluate the structural integrity of the components and/or from biased locations and depths to bound COCs identified during Decision I sampling.

A.2.2.5 Waste Characterization Sampling

Characterization of CAS-specific components and waste was performed to support recommendations for disposal of these items and determine whether the waste in question at these CASs could be acting as a source of potential soil contamination. Investigation methods included visual inspection, radiological surveys, and direct sampling of the contents of septic system components. Waste characterization activities were intended to gather adequate information and data about the CAS to support decisions regarding the disposal of materials located within each CAS.

Samples were analyzed in accordance with the CAU 560 CAIP (NNSA/NSO, 2008). The specific analyses for each CAS are listed in CAS-specific sections, and the analytical results are compared to the federal limits for hazardous waste, NDEP hydrocarbon action limit, landfill acceptance criteria, and the limits in the NTS performance objective criteria (POC) (BN, 1995). The POC limits have been established for NTS hazardous waste generators to ensure that all hazardous waste being shipped offsite contains no “added radioactivity.”

Specific waste characterization sampling and analysis was conducted on the following potential waste streams:

- Radiological swipe samples collected from asbestos floor tiles removed from CAS 03-51-01 and ACP collected from CASs 06-05-03, 06-05-04 and 06-59-05.
- Solids and soil in septic tanks, leach pits, and pieces of piping associated with septic system components at CASs 06-04-02, 06-05-03, 06-05-04, 06-59-03, and 06-59-05.
- Liquid samples of rinsate generated from decontamination activities.

A.2.3 Laboratory Analytical Information

Radiological and chemical analyses were performed by Paragon Analytics, Inc., and ALS (formerly known as Paragon Analytics, Inc.) of Fort Collins, Colorado; and General Engineering Laboratory of Charleston, South Carolina. The analytical suites and laboratory analytical methods used to analyze investigation samples are listed in Table A.2-2. Analytical results are reported in this appendix if they were detected above the minimum detectable concentrations (MDCs). The complete laboratory data packages are available in the project files.

Table A.2-2
Laboratory Analyses and Methods, CAU 560 Investigation Samples[a]

Analysis	Analytical Method[b]
VOCs	Aqueous/Non-aqueous - EPA SW-846[c] 8260
TCLP VOCs	EPA SW-846[c] 1311/8260
SVOCs	Aqueous/Non-aqueous - EPA SW-846[c] 8270
TCLP SVOC	EPA SW-846[c] 1311/8270
PCBs	Aqueous/Non-aqueous - EPA SW-846[c] 8082
TPH-DRO	Aqueous/Non-aqueous - EPA SW-846[c] 8015 Modified
Pesticides	Aqueous/Non-aqueous - EPA SW-846[c] 8081
TCLP Pesticides	EPA SW-846[c] 1311/8081
Metals	Aqueous - EPA SW-846[c] 6010/7470 Non-aqueous - EPA SW-846[c] 6010/7471
TCLP Metals	EPA SW-846[c] 1311/6010/7470
Gamma Spectroscopy	Aqueous - EPA 901.1[d] Non-aqueous - DOE EML HASL-300[e], Ga-01-R
Gross Alpha/Beta	Aqueous - EPA 900.0[d] Non-aqueous - SM 7110 B[f] Modified
Tritium	Aqueous - EPA 906.0[d] Non-aqueous[b]

[a]Investigation samples include both environmental and waste characterization samples and associated QC samples.
[b]The most current EPA, DOE, ASTM, NIOSH, or equivalent accepted analytical method may be used, including Laboratory Standard Operating Procedures approved by SNJV/NNES in accordance with industry standards and the SNJV/NNES Statement of Work requirements.
[c]*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA, 2008).
[d]*Prescribed Procedures for Measurement of Radioactivity in Drinking Water,* (EPA, 1980).
[e]*The Procedures Manual of the Environmental Measurements Laboratory* (DOE, 1997).
[f]*Standard Methods for the Examination of Water and Wastewater* (Clesceri, et al., 1998).

Note: The term “modified” indicates modifications of approved methods. All modifications have been approved by the SNJV/NNES Analytical Services Department.

EML = Environmental Measurements Laboratory
EPA = U.S. Environmental Protection Agency
HASL = Health and Safety Laboratory
NIOSH = National Institute for Occupational Safety and Health
NNES = Navarro Nevada Environmental Services, LLC
SNJV = Stoller-Navarro Joint Venture
TCLP = Toxicity Characteristic Leaching Procedure

Validated analytical data for CAU 560 investigation samples have been compiled and evaluated to confirm the presence of contamination and define the extent of contamination, if present. The analytical results for each CAS are presented in Sections A.3.0 through A.9.0.

The analytical parameters are CAS-specific and were selected through the application of site process knowledge according to the DQOs. Samples collected during step-out sampling were only analyzed for the COPCs that exceeded FALs in the original samples.

A.2.4 Comparison to Action Levels

A COC is defined as any contaminant present in environmental media exceeding a FAL. A COC may also be defined as a contaminant that, in combination with other like contaminants, is determined to jointly pose an unacceptable risk based on a multiple constituent analysis (NNSA/NSO, 2006). Multiple constituent analyses are presented in Appendix C.

If COCs are present, corrective action must be considered for the CAS. The FALs for the CAU 560 investigation are defined for each CAS in Appendix C. Results that are equal to or greater than FALs are identified by bold text in the CAS-specific results tables (Sections A.3.0 through A.9.0).

The presence of a COC would require a corrective action. A corrective action may also be necessary if there is a potential for wastes that are present at a site (i.e., PSM) to release COCs into site environmental media.

To evaluate PSM for the potential to result in the introduction of a COC to the surrounding environmental media, the following conservative assumptions and criteria were established:

- Any physical waste containment would fail at some point, and the contents would be released to the surrounding media.
- The resulting concentration of contaminants in the surrounding media would be equal to the concentration of contaminants in the waste.
- Any liquid waste containing a contaminant exceeding the RCRA toxicity characteristic concentration would cause a COC to be present in the surrounding media if the liquid was released.
- Any non-liquid waste containing a contaminant exceeding an equivalent FAL concentration would cause a COC to be present in the surrounding media.

A.3.0 CAS 03-51-01, Leach Pit, Investigation Results

Corrective Action Site 03-51-01 is located in Area 3 adjacent to the former Building 3C-5 pad. The CAS consists of a septic system that serviced the former building. Septic system components identified in the CAIP for investigation included the subsurface piping and leach pit. Before intrusive activities, asbestos-containing floor tiles were removed from the building pad and surrounding soils as a health and safety precaution to site workers. Additional detail is provided in the CAIP (NNSA/NSO, 2008).

A.3.1 CAIP Activities

A total of three characterization samples were collected during investigation activities at CAS 03-51-01. The sample IDs, locations, types, and analyses are listed in Table A.3-1. The specific CAI activities conducted to satisfy the CAIP requirements at this CAS are described in the following sections.

Table A.3-1
Samples Collected at CAS 03-51-01, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
A01	560A001	0.0 - 1.0	Soil	Environmental	X	X	X	X	X	X	X
A02	560A002	1.0 - 2.0	Soil	Environmental	X	X	X	X	X	X	X
A03	560A003	11.0 - 12.0	Soil	Environmental	X	X	X	X	X	X	X
N/A	560A301	N/A	Water	Trip Blank	--	--	--	--	--	--	X
N/A	560A302	N/A	Water	Equipment Rinsate	X	X	X	X	X	X	X

-- = Not required

A.3.1.1 Visual Inspections

Two features associated with the sewer system were visually identified using backhoe excavation. These features consisted of a steel-constructed leach pit and associated subsurface piping. The building pad drain appeared plugged. Inspection of the 2-in. diameter steel sewer pipe identified a 3-ft portion of the pipe had been removed between the building pad drain and intact sewer pipe. The remaining 9-ft section of piping was intact and extended directly through the leach pit cover and contained no sediments. The leach pit measured approximately 4 ft in diameter with a removable lid. The interior of the leach pit was accessed by partially removing the pit cover and inspected for content. Hand auger attempts and visual inspection identified no wastes within the leach pit casing. There were no visible signs of structural failure identified during the inspection except for the 3-ft portion of removed pipe. Figure A.3-1 shows the locations of septic system components identified in relation to the Building 3C-5 building pad.

During excavation of the sewer line, an additional steel water line was identified adjacent to the leach pit that continued northward in the direction of a geophysical anomaly identified by an earlier geophysical survey. Because the presence of the water line was consistent with the linear anomaly north of the leach pit location and no outlet pipe from the leach pit was identified, the geophysical anomaly was not investigated as part of the septic system.

A walkover was conducted in the area north of the building pad to identify additional surface sample locations based on biasing factors (i.e., staining). No additional biased sample locations were identified. However, one additional biased sample was identified at the location of the 3-ft missing section of pipe at the building pad.

A.3.1.2 Video Surveys

Video surveys were not conducted on the septic system piping because the sewer pipe diameter was smaller than the video-mole diameter.

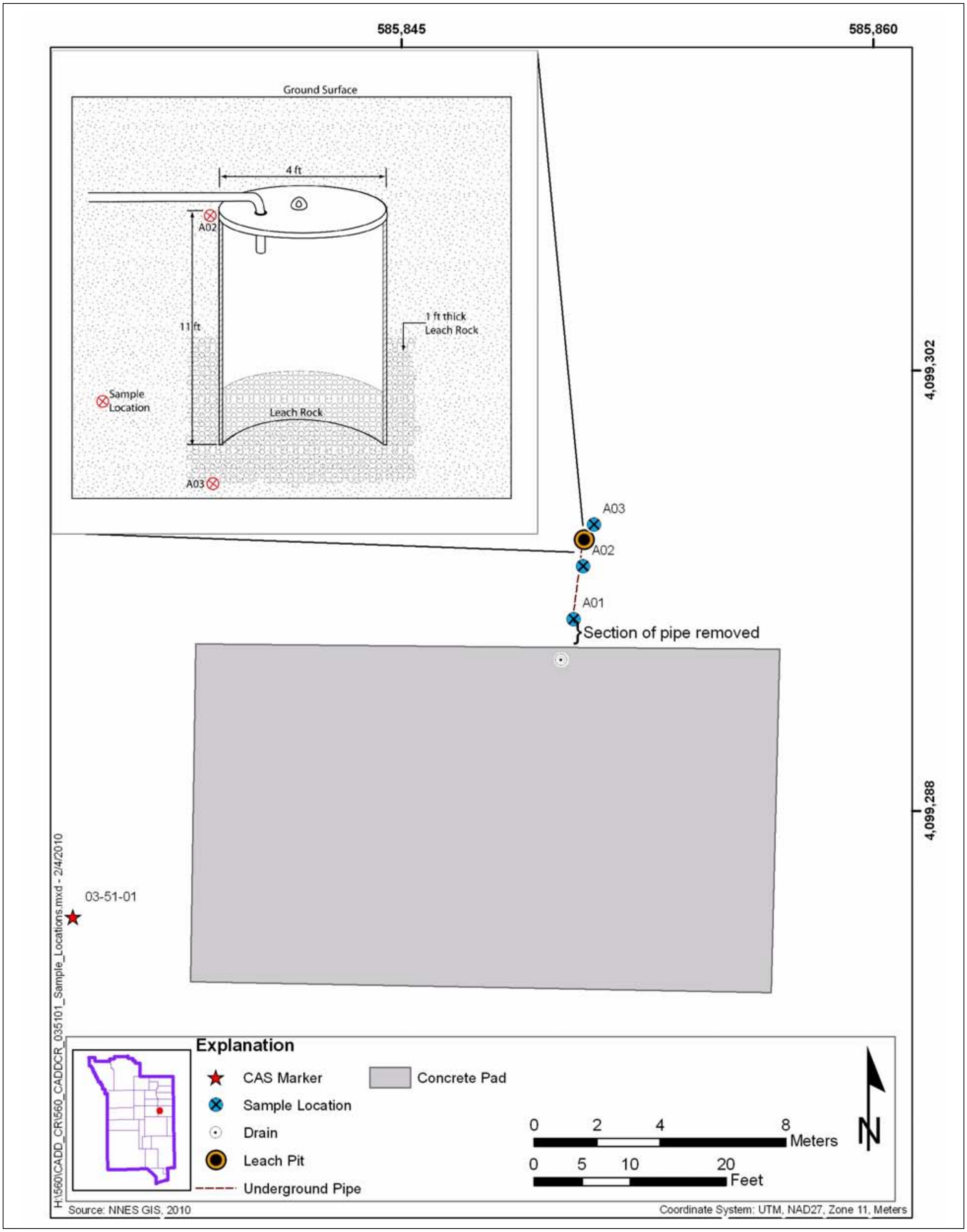

Figure A.3-1
Site Map and Sample Locations at CAS 03-51-01, Leach Pit

A.3.1.3 Field Screening

Investigation samples were field screened for alpha and beta/gamma radiation. The FSRs were compared to FSLs to guide subsequent sampling decisions where appropriate. None of the samples collected at CAS 03-51-01 exceeded alpha or beta/gamma radiation FSLs.

A.3.1.4 Sample Collection

Decision I environmental sampling activities included the collection of subsurface soil samples surrounding the septic system components (Figure A.3-1) at this CAS. One biased environmental sample (560A001) was collected from the soil beneath the removed section of subsurface piping between the building pad and intact sewer pipe at location A01. Sample 560A002 at location A02 was collected from directly below the inlet pipe into the leach pit at a depth of 1 to 2 ft bgs. One sample was collected at the native soil interface at the base of the leach pit (location A03) to determine whether there have been any releases outside the leach pit casing. No outlet pipe was present; therefore, no additional soil samples were required. The sample depths ranged from 0 to 11 ft bgs, and all sample locations are shown on Figure A.3-1.

Decision II samples were not collected at this CAS, as no COPCs exceeded FALs.

A.3.1.5 Deviations

Investigation samples were collected as outlined in the CAU 560 CAIP (NNSA/NSO, 2008) with no deviations and submitted for laboratory analysis.

A.3.2 Investigation Results

The following sections provide analytical results from the samples collected to complete investigation activities as outlined in the CAIP (NNSA/NSO, 2008). Investigation samples were analyzed for the CAIP-specified COPCs, which included VOCs, SVOCs, TPH-DRO, RCRA metals, beryllium, pesticides, PCBs, and gamma-emitting radionuclides. The analytical parameters and laboratory methods used to analyze the investigation samples are listed in Table A.2-2. Table A.3-1 lists the sample-specific analytical suite for CAS 03-51-01.

Analytical results from the soil samples with concentrations exceeding MDCs are summarized in the following sections. An evaluation was conducted on all contaminants detected above MDCs by comparing individual concentration or activity results against the FALs. Establishment of the FALs is presented in Appendix C.

A.3.2.1 Volatile Organic Compounds

None of the analytical results for VOCs in soil samples collected at this CAS was detected above MDCs. The FALs were established at the PAL concentrations.

A.3.2.2 Semivolatile Organic Compounds

Analytical results for SVOCs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.3-2. No SVOCs were detected at concentrations exceeding the respective PALs. The FALs were established at the PAL concentrations.

Table A.3-2
Sample Results for Total SVOCs Detected above MDCs
at CAS 03-51-01, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)		
			Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Di-n-octyl phthalate
FALs[a]			120	100,000	25,000
A01	560A001	0.0 - 1.0	0.17 (J)	0.16 (J)	0.36
A02	560A002	1.0 - 2.0	0.13 (J)	--	--

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

A.3.2.3 Total Petroleum Hydrocarbons

Analytical results for TPH-DRO in soil samples collected at this CAS that were detected above MDCs are presented in Table A.3-3. No samples exceeded the PAL of 100 mg/kg for TPH-DRO. No FAL was established for TPH-DRO. Instead, FALs were established for the individual hazardous constituents of TPH-DRO and are reported in the VOC and SVOC sections.

Table A.3-3
Sample Results for TPH-DRO Detected above MDCs
at CAS 03-51-01, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			DRO
PALs[a]			100
A01	560A001	0.0 - 1.0	2.1 (J)

[a]Based on “Contamination of Soil: Establishment of Action Levels” (NAC, 2006).

J = Estimated value

A.3.2.4 RCRA Metals and Beryllium

Analytical results for RCRA metals and beryllium in soil samples collected at this CAS that were detected above MDCs are presented in Table A.3-4. No metals were detected at concentrations exceeding their PALs. The FALs were established at the PAL concentrations.

A.3.2.5 Polychlorinated Biphenyls

Analytical results for PCBs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.3-5. No PCBs were detected at concentrations exceeding the PAL. The FAL was established at the PAL concentration.

A.3.2.6 Pesticides

Analytical results for pesticides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.3-6. No pesticides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

Table A.3-4
Sample Results for Metals Detected above MDCs at CAS 03-51-01, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)							
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Silver
FALs			**23[a]**	**67,000[b]**	**1,900[b]**	**450[b]**	**450[b]**	**800[b]**	**310[b]**	**5,100[b]**
A01	560A001	0.0 - 1.0	3.4	150	0.57	0.63	30 (J)	21	0.014	2.3
A02	560A002	1.0 - 2.0	3.4	140	0.6	0.18	5.6 (J)	11	0.0021 (J-)	--
A03	560A003	11.0 - 12.0	6.3	150	0.67	0.12	4.9 (J)	10	0.0018 (J-)	--

[a]Based on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the NBMG throughout the NTS and NTTR (NBMG, 1998; Moore, 1999).
[b]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

NBMG = Nevada Bureau of Mines and Geology
NTTR = Nevada Test and Training Range

J = Estimated value
J- = The result is an estimated quantity, but the result may be biased low.
-- = Not detected above MDCs.

Table A.3-5
Sample Results for PCBs Detected above MDCs at CAS 03-51-01, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)		Total Aroclor (1254, 1260, 1268)
			Aroclor 1254	Aroclor 1260	
FALs[a]			**0.74**	**0.74**	
A01	560A001	0.0 - 1.0	0.58 (J)	0.11(J)	0.69
A02	560A002	1.0 - 2.0	0.035 (J)	--	0.035

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

Table A.3-6
Sample Results for Pesticides Detected above MDCs at CAS 03-51-01, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)	
			Chlordane	Heptachlor Epoxide
FALs[a]			6.5	0.19
A01	560A001	0.0 - 1.0	0.022 (J)	0.013 (J)
A02	560A002	1.0 - 2.0	--	0.00058 (J)

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

A.3.2.7 Gamma-Emitting Radionuclides

Analytical results for gamma-emitting radionuclides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.3-7. No radionuclides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

Table A.3-7
Sample Results for Gamma-Emitting Radionuclides Detected above MDCs at CAS 03-51-01, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (pCi/g)						
			Ac-228	Cs-137	Eu-152	Pb-212	Pb-214	Tl-208	Th-234
FALs			5[a]	12.2[b]	5.7[b]	5[a]	5[a]	5[a]	105[b]
A01	560A001	0.0 - 1.0	1.75	1.29	0.324 (J)	1.92 (J)	1.11	0.574	2.25 (J)
A02	560A002	1.0 - 2.0	1.99	0.213	--	2.01 (J)	1.02	0.654	2.47 (J)
A03	560A003	11.0 - 12.0	2.02	--	--	2.13 (J)	1.17	0.63	1.99 (J)

[a]Taken from the general guidelines for residual concentration of Ac-228, Bi-213, Pb-212, Pb-214, Tl-208, and Th-232, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993).
[b]Taken from the construction, commercial, industrial land-use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 25-mrem/yr dose.

Bi = Bismuth
mrem/yr = Millirem per year
NCRP = National Council on Radiation Protection and Measurements
J = Estimated value
-- = Not detected above MDCs.

A.3.3 Nature and Extent of Contamination

Based on the analytical results for soil samples collected within CAS 03-51-01, there were no identified COCs. Therefore, the nature and extent of contamination has been satisfied.

A.3.4 Revised Conceptual Site Model

The CAIP requirements were met at this CAS, and no revisions were necessary to the CSM.

A.4.0 CAS 06-04-02, Septic Tank, Investigation Results

Corrective Action Site 06-04-02 is located in the CP-6 Complex north of Building CP-160. The CAS consists of a septic system that serviced the former support/administrative trailer complex. The components identified for investigation include a leach pit, two inlet pipes, and subsurface piping. Additional detail regarding this CAS is provided in the CAIP (NNSA/NSO, 2008).

A.4.1 CAIP Activities

A total of five characterization samples, including a PSM sample, were collected during investigation activities at CAS 06-04-02. The sample IDs, locations, types, and analyses are listed in Table A.4-1. The specific CAI activities conducted to satisfy the CAIP requirements at this CAS are described in the following sections.

A.4.1.1 Visual Inspections

Several features associated with the sewer system were visually identified within the CAS by a combination of hand and backhoe excavation as well as a site walkdown. During the site walkdown, three VCP stickups or cleanouts were identified slightly above the ground surface (Figure A.4-1). No other septic system components were identified on the surface. Hand excavation of cleanouts #1 and #2 confirmed subsurface VCP was present between 1 and 2 ft bgs and trends northward toward the leach pit.

An area of three t-posts marking the approximate location of the septic tank or leach pit was excavated by backhoe and identified the steel cover of a leach pit approximately 0.5 ft bgs. The configuration of the leach pit was identified through further excavation to a depth of 15 ft. The leach pit casing is constructed of steel measuring approximately 6 ft in diameter. The leach pit casing has a removable steel lid containing a 10-in. diameter open vent hole and measured approximately 15 ft deep. Inspections on the outside of the casing and surrounding soil indicate the integrity of the casing was intact and not leaking (no staining was apparent). The interior of the leach pit was visually inspected through the open vent hole and identified dry debris present at the base of the pit. Inlet pipes were identified on both the south and west sides at 2.5 to 3 ft bgs. During excavation, the western inlet pipe was breached for video-survey purposes. The western inlet pipe was excavated

Table A.4-1
Samples Collected at CAS 06-04-02, Septic Tank

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	TCLP Metals	TCLP Pesticides	TCLP SVOCs	TCLP VOC	VOC
B01	560B001	11.0 - 11.5	Solid	PSM	X	X	X	X	X	X	X	X	X	X	X
B02	560B002	3.0 - 3.5	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
B03	560B003	2.0 - 2.5	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
B04	560B004	12.5 - 13.0	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
	560B005	15.0 - 15.5	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
N/A	560B301	N/A	Water	Trip Blank	--	--	--	--	--	--	--	--	--	--	X

-- = Not required

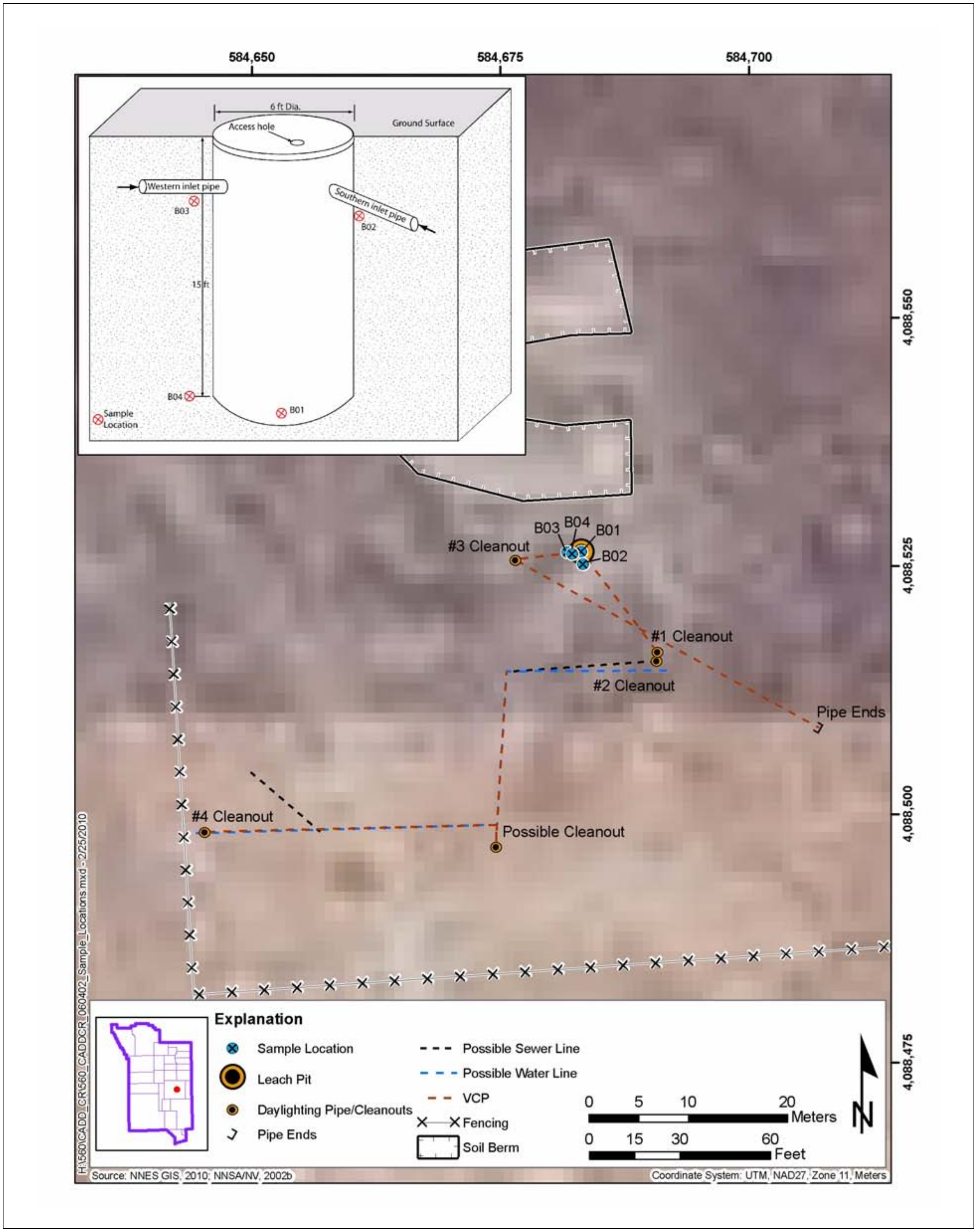

Figure A.4-1
Site Map and Sample Locations at CAS 06-04-02, Septic Tank

westward approximately 14 ft from the leach pit where a fourth cleanout and y-connector were confirmed and shows the VCP trending to the southwest. Figure A.4-1 shows the locations of septic system components identified.

During excavation of the VCP, an additional copper metal water line, not associated with the septic system, was identified near cleanout #1 and trends north.

A walkover was conducted in the area to identify additional surface sample locations based on biasing factors (i.e., staining). Numerous pieces of debris such as electrical cable, wood, and metal are scattered on the surface and shallow subsurface through out the CAS boundary. However, no biasing factors such as stains were identified on the surface.

A.4.1.2 Video Surveys

The interior of the leach pit casing was inspected with a video-mole camera by accessing a 10-in. diameter portal present in the lid. The video survey indicated only solid material was present at the base of the pit. One additional inlet pipe was identified on the western side of the pit casing. Video surveys were conducted on approximately 295 ft of septic system piping by accessing three daylighting stickup/cleanouts and through one breach made at the western inlet pipe. Video surveys indicated no residual waste within the pipes and identified no breaches within the surveyed pipe. Based on length and direction of the video-mole device, the survey was able to confirm and/or clarify the piping layout for a large portion of the underground piping as shown in Figure A.4-1.

A.4.1.3 Field Screening

Investigation samples were field screened for alpha and beta/gamma radiation. The FSRs were compared to FSLs to guide subsequent sampling decisions where appropriate. None of the samples collected at CAS 06-04-02 exceeded alpha or beta/gamma radiation FSLs.

A.4.1.4 Sample Collection

Decision I environmental sampling activities included the collection of subsurface soil samples surrounding the septic system components (Figure A.4-1) at this CAS. A total of four soil samples were collected at the leach pit to determine whether there has been a release from the septic system.

Samples 560B002 and 560B003 were collected directly beneath both the southern and western inlet pipes, respectively. Two samples from soil surrounding the base of the leach pit (location B04) were collected at depths of 12.5 and 15 ft bgs. One waste sample (560B001) was collected within the interior of the leach pit at a depth of 11 ft bgs (location B01) for PSM determination.

Decision II samples were not collected at this CAS, as no COPCs exceeded FALs.

A.4.1.5 Deviations

Investigation samples were collected for the presence of a leach pit as opposed to a septic tank as outlined in the CAU 560 CAIP (NNSA/NSO, 2008) with no deviations and submitted for laboratory analysis.

A.4.2 Investigation Results

The following sections provide analytical results from the samples collected to complete investigation activities as outlined in the CAIP (NNSA/NSO, 2008). Investigation samples were analyzed for the CAIP-specified COPCs, which included VOCs, SVOCs, TPH-DRO, RCRA metals, beryllium, pesticides, PCBs, and gamma-emitting radionuclides. The analytical parameters and laboratory methods used to analyze the investigation samples are listed in Table A.2-2. Table A.4-1 lists the sample-specific analytical suite for CAS 06-04-02. The waste characterization analytical results for TCLP VOCs, TCLP SVOCs, TCLP metals, and TCLP pesticides are discussed in Section A.10.0.

Analytical results from the soil samples with concentrations exceeding MDCs are summarized in the following sections. An evaluation was conducted on all contaminants detected above MDCs by comparing individual concentration or activity results against the FALs. Establishment of the FALs is presented in Appendix C.

A.4.2.1 Volatile Organic Compounds

None of the analytical results for VOCs in soil samples collected at this CAS was detected above MDCs. The FALs were established at the PAL concentrations.

A.4.2.2 Semivolatile Organic Compounds

Analytical results for SVOCs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.4-2. No SVOCs were detected at concentrations exceeding the respective PALs. The FALs were established at the PAL concentrations.

Table A.4-2
Sample Results for Total SVOCs Detected above MDCs
at CAS 06-04-02, Septic Tank

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			Bis(2-ethylhexyl)phthalate
FALs[a]			120
B02	560B002	3.0 - 3.5	0.1 (J)

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value

A.4.2.3 Total Petroleum Hydrocarbons

Analytical results for TPH-DRO in soil samples collected at this CAS that were detected above MDCs are presented in Table A.4-3. No samples exceeded the PAL of 100 mg/kg for TPH-DRO. No FAL was established for TPH-DRO. Instead, FALs were established for the individual hazardous constituents of TPH-DRO and are reported in the VOC and SVOC sections.

Table A.4-3
Sample Results for TPH-DRO Detected above MDCs
at CAS 06-04-02, Septic Tank

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			DRO
PALs[a]			100
B04	560B004	12.5 - 13.0	7.8
	560B005	15.0 - 15.5	8

[a]Based on “Contamination of Soil: Establishment of Action Levels” (NAC, 2006).

A.4.2.4 RCRA Metals and Beryllium

Analytical results for RCRA metals and beryllium in soil samples collected at this CAS that were detected above MDCs are presented in Table A.4-4. No metals were detected at concentrations exceeding their PALs. The FALs were established at the PAL concentrations.

Table A.4-4
Sample Results for Metals Detected above MDCs
at CAS 06-04-02, Septic Tank

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)						
			Arsenic	Barium	Beryllium	Chromium	Lead	Mercury	Silver
FALs			23[a]	67,000[b]	1,900[b]	450[b]	800[b]	310[b]	5,100[b]
B02	560B002	3.0 - 3.5	4	98	0.57	6.2	13	0.032 (J-)	3
B03	560B003	2.0 - 2.5	4.7	120	0.58	6.6	13	0.019 (J-)	--
B04	560B004	12.5 - 13.0	5.3	89	0.54	5.1	11	0.015 (J-)	3.4
	560B005	15.0 - 15.5	5.1	93	--	4.9	9.2	0.013 (J-)	4

[a]Based on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the NBMG throughout the NTS and NTTR (NBMG, 1998; Moore, 1999).
[b]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J- = The result is an estimated quantity, but the result may be biased low.
-- = Not detected above MDCs.

A.4.2.5 Polychlorinated Biphenyls

None of the analytical results for PCBs in soil samples collected at this CAS was detected above MDCs. The FAL was established at the PAL concentration.

A.4.2.6 Pesticides

Analytical results for pesticides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.4-5. No pesticides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

Table A.4-5
Sample Results for Pesticides Detected above MDCs
at CAS 06-04-02, Septic Tank

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)	
			4,4'-DDD	Delta-BHC
FALs[a]			10	0.36
B02	560B002	3.0 - 3.5	0.003 (J)	--
B04	560B004	12.5 - 13.0	--	0.0015 (J)
	560B005	15.0 - 15.5	--	0.0015 (J)

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

A.4.2.7 Gamma-Emitting Radionuclides

Analytical results for gamma-emitting radionuclides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.4-6. No radionuclides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

Table A.4-6
Sample Results for Gamma-Emitting Radionuclides Detected above MDCs
at CAS 06-04-02, Septic Tank

Sample Location	Sample Number	Depth (ft bgs)	COPCs (pCi/g)			
			Ac-228	Pb-212	Pb-214	Tl-208
FALs[a]			5	5	5	5
B02	560B002	3.0 - 3.5	0.88	1.07 (J)	0.79	0.288
B03	560B003	2.0 - 2.5	0.82	0.86	0.66 (J)	0.266
B04	560B004	12.5 - 13.0	0.85	0.85	0.566 (J)	0.299
	560B005	15.0 - 15.5	0.76	0.96 (J)	0.75	--

[a]Taken from the general guidelines for residual concentration of Ac-228, Bi-213, Pb-212, Pb-214, Tl-208, and Th-232, as found in Chapter IV of DOE Order 5400.5, Change 2, “Radiation Protection of the Public and Environment.” (DOE, 1993).

J = Estimated value
-- = Not detected above MDCs.

A.4.2.8 Potential Source Material

For the leach pit, it was determined that solid materials were present at the base of the leach pit. One solid sample was collected to determine whether the contents were PSM and the data could be used to determine proper disposal methods. Laboratory analysis determined that results for TPH-DRO, metals, and PCBs were detected above MDCs. The analytical results are presented in Table A.4-7. Based on the sample results, the contents of the septic tank are not considered PSM.

Table A.4-7
Potential Source Material Results Detected above MDCs
at CAS 06-04-02, Septic Tank

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Criteria[a]	Units
B01	560B001	Solid	TPH-DRO	18	N/A[b]	mg/kg
			Aroclor 1260	0.024 (J)	0.74	
			Arsenic	4.6	23	
			Barium	78	67,000	
			Beryllium	0.54	1,900	
			Cadmium	0.87	450	
			Chromium	46	450	
			Lead	33	800	
			Mercury	0.094	310	
			Silver	51	5,100	
			4,4'-DDE	0.0046 (J)	7	
			4,4'-DDT	0.007 (J)	7	
			Pb-212	0.44 (J)	5	pCi/g
			Pb-214	0.5 (J)	5	

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)
[b]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value

A.4.3 Nature and Extent of Contamination

Based on the analytical results for soil samples collected within CAS 06-04-02, there were no identified COCs. Therefore, the nature and extent of contamination has been satisfied.

A.4.4 Revised Conceptual Site Model

The CAIP requirements were met at this CAS, and no revisions were necessary to the CSM.

A.5.0 CAS 06-05-03, Leach Pit, Investigation Results

Corrective Action Site 06-05-03 is located in Area 6 adjacent to Building CP-160, Site Maintenance Facility, a currently active structure. The CAS consisted of a septic system that serviced Building CP-160. Several components were identified in the CAIP for investigation, including the septic system components (i.e., inlet pipe), septic tank, and leach pit. Additional detail is provided in the CAIP (NNSA/NSO, 2008).

A.5.1 CAIP Activities

A total of 12 characterization samples were collected during investigation activities at CAS 06-05-03. The sample IDs, locations, types, and analyses are listed in Table A.5-1. The specific CAI activities conducted to satisfy the CAIP requirements at this CAS are described in the following sections.

A.5.1.1 Visual Inspections

Upon a site walkdown inspection, visible features of the system were the leach pit vent pipe and riser pipe extending from the ground surface. No biasing factors were identified on the ground surface in the areas of the leach pit and suspected septic tank; therefore, no additional biased sample locations were identified.

Backhoe excavation was used to expose and inspect the top of the leach pit, the inlet pipe, and base of the leach pit. The leach pit cover was exposed at a depth of 4 ft bgs and confirmed one 3-in. vent pipe and one 10-in. riser pipe from the cover to ground surface. The exposed VCP inlet pipe was intact with no apparent leaks. No outlet pipe was identified from the leach pit. The leach pit casing is 4 ft in diameter, constructed of concrete with weep holes, and has a removable lid. The concrete casing is surrounded by approximately 3 to 4 ft of leach rock starting at a depth around 7 to 9 ft bgs. No staining was visible within the surrounding leach rock. Due to undermining of the leach rock and utility line restrictions, the base of the leach pit was not accessible by backhoe excavation.

Hand excavation was initially conducted at the southeast corner of Building CP-160 to determine whether the septic tank was removed or abandoned in place. Excavation was limited due to unknown and active utility line restrictions. After three potholes were completed, the eastern top edge of the

Table A.5-1
Samples Collected at CAS 06-05-03, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	TCLP Metals	TCLP Pesticides	TCLP SVOCs	TCLP VOCs	VOCs
C01	560C001	4.5 - 5.0	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
C02	560C002	14.5 - 15.0	Solid	PSM	X	X	X	X	X	X	X	X	X	X	X
	560C005	16.5 - 17.5	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
	560C006	19.5 - 20.0	Soil	Environmental	--	--	X	X	--	--	--	--	--	--	--
C03	560C003	8.5 - 9.0	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
C04	560C004	8.0 - 8.5	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
C05	560C007	14.5 - 15.0	Soil	Environmental	--	--	X	X	--	--	--	--	--	--	--
	560C008	19.5 - 20.0	Soil	Environmental	--	--	X	X	--	--	--	--	--	--	--
C06	560C009	14.5 - 15.0	Soil	Environmental	--	--	X	X	--	--	--	--	--	--	--
	560C010	19.5 - 20.0	Soil	Environmental	--	--	X	X	--	--	--	--	--	--	--
C07	560C011	14.5 - 15.0	Soil	Environmental	--	--	X	X	--	--	--	--	--	--	--
	560C012	19.5 - 20.0	Soil	Environmental	--	--	X	X	--	--	--	--	--	--	--
N/A	560C301	N/A	Water	Trip Blank	--	--	--	--	--	--	--	--	--	--	X

-- = Not required

steel septic tank was identified at a depth of 3 ft bgs and approximately 6 ft east of the building. Guided backhoe excavation exposed portions of the southern and eastern sides and base of the tank. The tank lid and outlet pipe had been removed, backfilled with soil, and appeared intact with no soil staining visible.

A.5.1.2 Video Surveys

A video survey was conducted through the 10-in. diameter leach pit riser pipe to view the inside of the leach pit chamber. Observations from the survey showed the access pipe extended about 3 ft into an open chamber. Materials on the bottom of the pit were solid and dry. Inactive piping on the remainder of the septic systems components was either removed or inaccessible.

A.5.1.3 Field Screening

Investigation samples were field screened for alpha and beta/gamma radiation. The FSRs were compared to FSLs to guide subsequent sampling decisions where appropriate. None of the samples collected at CAS 06-05-03 exceeded alpha or beta/gamma radiation FSLs.

A.5.1.4 Sample Collection

Decision I environmental sampling activities included the collection of four subsurface soil samples surrounding the septic system components and one PSM sample (Figure A.5-1) through a combination of backhoe excavation, hand auger, and drilling at this CAS.

Environmental samples collected at the leach pit included one sample taken directly below the inlet pipe (560C001) at a depth of 4.5 ft bgs, and one solid sample collected from the floor of the leach pit (560C002) at a depth of 14.5 ft bgs for PSM determination. While accessing the outside base of the leach pit, it was determined to be inaccessible by backhoe due to proximity to Building CP-162 foundation and active utility lines. Therefore, one soil sample 4 ft away from the leach pit casing (560C003 at location C03) was collected at a depth of 8.5 ft bgs (5 ft below the leach pit lid). To meet CAI objectives, samples 560C005 and 560C006 were collected from native soil beneath the base of the leach pit (16.5 ft and 19.5 ft bgs, respectively) by drilling a soil boring directly through the leach pit casing at location C02.

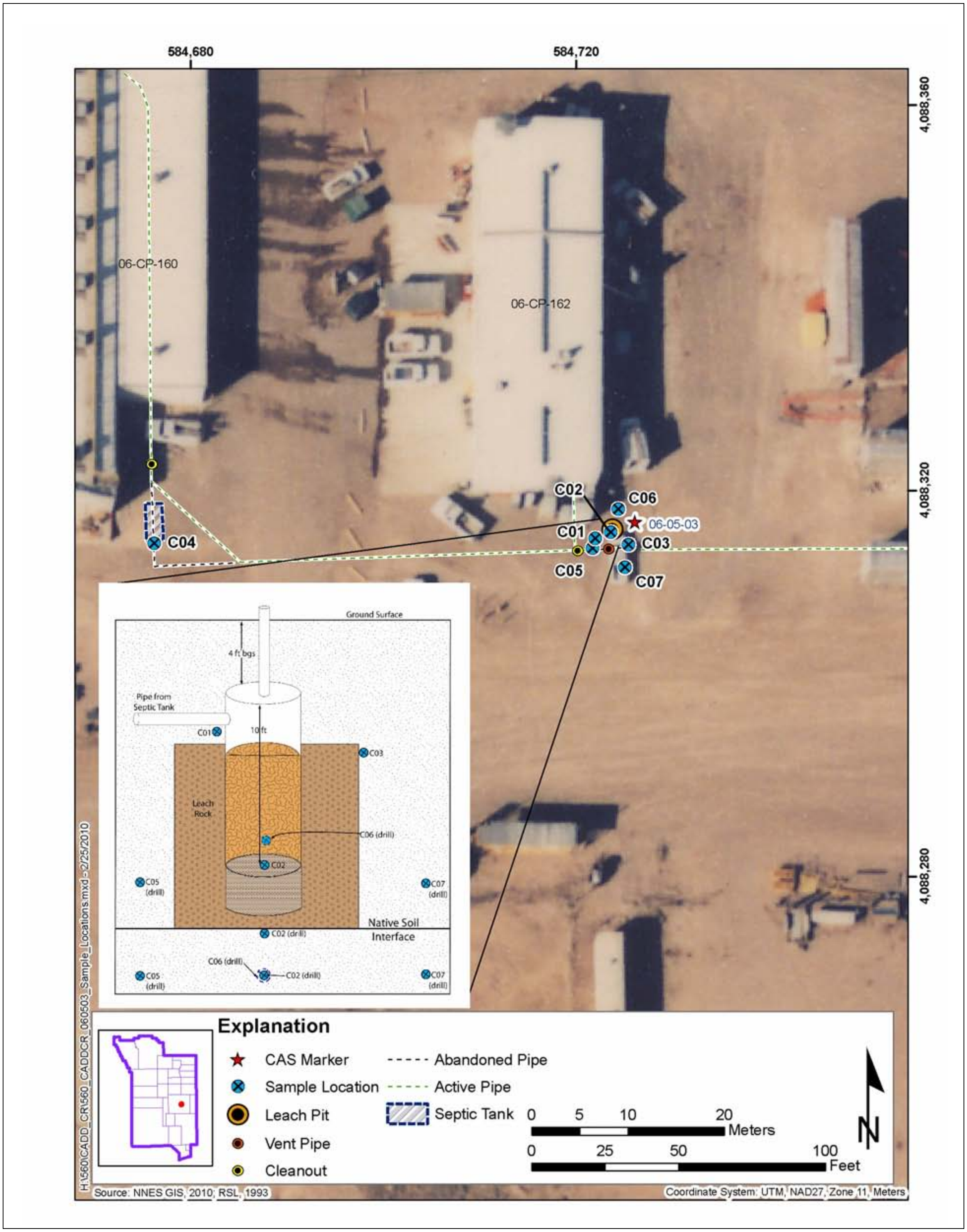

Figure A.5-1
Site Map and Sample Locations at CAS 06-05-03, Leach Pit

To vertically bound COCs identified in the leach pit PSM, three step-out borings were drilled in three directions from the leach pit (locations C05, C06, and C07) for the purpose of collecting Decision II samples. The Decision II samples were collected at depths of 14.5 ft (depth of PSM) and 19.5 ft bgs, and analyzed for PCBs and metals (including beryllium) to verify that PSM identified in the leach pit has not resulted in COCs in the surrounding soil.

A.5.1.5 Deviations

Investigation samples were collected as outlined in the CAU 560 CAIP (NNSA/NSO, 2008) with no deviations and submitted for laboratory analysis.

A.5.2 Investigation Results

The following sections provide analytical results from the samples collected to complete investigation activities as outlined in the CAIP (NNSA/NSO, 2008). Investigation samples were analyzed for the CAIP-specified COPCs, which included VOCs, SVOCs, TPH-DRO, RCRA metals, beryllium, pesticides, PCBs, and gamma-emitting radionuclides. The analytical parameters and laboratory methods used to analyze the investigation samples are listed in Table A.2-2. Table A.5-1 lists the sample-specific analytical suite for CAS 06-05-03. Waste characterization analytical results for TCLP VOCs, TCLP SVOCs, TCLP metals, and TCLP pesticides are discussed in Section A.10.0. Decision II samples were analyzed for RCRA metals, beryllium, and PCBs only.

Analytical results from the soil samples with concentrations exceeding MDCs are summarized in the following sections. An evaluation was conducted on all contaminants detected above MDCs by comparing individual concentration or activity results against the FALs. Establishment of the FALs is presented in Appendix C.

A.5.2.1 Volatile Organic Compounds

None of the analytical results for VOCs in soil samples collected at this CAS was detected above MDCs. The FALs were established at the PAL concentrations.

A.5.2.2 Semivolatile Organic Compounds

Analytical results for SVOCs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.5-2. No SVOCs were detected at concentrations exceeding the respective PALs. The FALs were established at the PAL concentrations.

Table A.5-2
Sample Results for Total SVOCs Detected above MDCs at CAS 06-05-03, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			Bis(2-ethylhexyl)phthalate
FALs[a]			**120**
C03	560C003	8.5 - 9.0	0.088 (J)

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value

A.5.2.3 Total Petroleum Hydrocarbons

Analytical results for TPH-DRO in soil samples collected at this CAS that were detected above MDCs are presented in Table A.5-3. No samples exceeded the PAL of 100 mg/kg for TPH-DRO. No FAL was established for TPH-DRO. Instead, FALs were established for the individual hazardous constituents of TPH-DRO and are reported in the VOC and SVOC sections.

Table A.5-3
Sample Results for TPH-DRO Detected above MDCs at CAS 06-05-03, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			DRO
PALs[a]			**100**
C02	560C005	16.5 - 17.5	12
C03	560C003	8.5 - 9.0	3.6 (J)

[a]Based on “Contamination of Soil: Establishment of Action Levels” (NAC, 2006).

J = Estimated value

A.5.2.4 RCRA Metals and Beryllium

Analytical results for RCRA metals and beryllium in soil samples collected at this CAS that were detected above MDCs are presented in Table A.5-4. No metals were detected at concentrations exceeding their PALs. The FALs were established at the PAL concentrations.

Table A.5-4
Sample Results for Metals Detected above MDCs
at CAS 06-05-03, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)							
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Silver
FALs			23[a]	67,000[b]	1,900[b]	450[b]	450[b]	800[b]	310[b]	5,100[b]
C01	560C001	4.5 - 5.0	4	120	--	--	5.3	12	0.22	--
C02	560C005	16.5 - 17.5	3.6	59	--	0.094	3.9	5.6	0.045	0.17 (J-)
	560C006	19.5 - 20.0	4.8	63	--	0.088	2.8	4.2	0.019	0.18 (J-)
C03	560C003	8.5 - 9.0	4.7	98	0.58	--	5.8	12	0.28	--
C04	560C004	8.0 - 8.5	6.3	120	0.74	0.099	5.6 (J)	12 (J)	0.041	--
C05	560C007	14.5 - 15.0	4.1	60	--	0.061	2.5	4.4	0.022	--
	560C008	19.5 - 20.0	3.8	87	--	0.095	3.8	6.2	0.049	--
C06	560C009	14.5 - 15.0	5.3	110	1.1 (J)	--	6.5	9	0.009	--
	560C010	19.5 - 20.0	4.9	79	--	--	4.1	5.2	0.019	--
C07	560C011	14.5 - 15.0	4.2	68	--	--	12	5.8	0.027	0.12 (J-)
	560C012	19.5 - 20.0	4.8	71	0.54 (J)	0.064	3.4	6.5	0.019	--

[a]Based on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the NBMG throughout the NTS and NTTR (NBMG, 1998; Moore, 1999).
[b]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
J- = The result is an estimated quantity, but the result may be biased low.
-- = Not detected above MDCs.

A.5.2.5 Polychlorinated Biphenyls

Analytical results for PCBs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.5-5. The PCBs were not detected at concentrations exceeding the PAL. The FAL was established at the PAL concentration.

Table A.5-5
Sample Results for PCBs Detected above MDCs
at CAS 06-05-03, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)		Total Aroclor (1254, 1260, 1268)
			Aroclor 1260	Aroclor 1268	
FALs[a]			0.74	0.74	
C01	560C001	4.5 - 5.0	0.15	0.33	0.48
C03	560C003	8.5 - 9.0	0.02 (J)	--	0.02
C05	560C008	19.5 - 20.0	0.055	--	0.055
C07	560C011	14.5 - 15.0	0.022 (J)	--	0.022

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

A.5.2.6 Pesticides

Analytical results for pesticides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.5-6. No pesticides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

A.5.2.7 Gamma-Emitting Radionuclides

Analytical results for gamma-emitting radionuclides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.5-7. No radionuclides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

Table A.5-6
Sample Results for Pesticides Detected above MDCs at CAS 06-05-03, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				
			4,4'-DDD	Chlordane	Delta-BHC	Dieldrin	Endosulfan Sulfate
FALs[a]			10	6.5	0.36	0.11	3,700
C03	560C003	8.5 - 9.0	0.0014 (J)	--	0.0017 (J)	--	--
C04	560C004	8.0 - 8.5	--	0.12	--	0.00087 (J)	0.0014 (J)

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

Table A.5-7
Sample Results for Gamma-Emitting Radionuclides Detected above MDCs at CAS 06-05-03, Leach Pit

Sample Location	Sample Number	Depth (ft bgs)	COPCs (pCi/g)			
			Ac-228	Pb-212	Pb-214	Tl-208
FALs[a]			5	5	5	5
C01	560C001	4.5 - 5.0	0.8	0.71	0.55 (J)	0.243
C02	560C005	16.5 - 17.5	0.71	0.89 (J)	0.58 (J)	0.271
C03	560C003	8.5 - 9.0	0.64	0.91 (J)	0.62 (J)	0.33
C04	560C004	8.0 - 8.5	--	0.87 (J)	0.68 (J)	0.32

[a]Taken from the general guidelines for residual concentration of Ac-228, Bi-213, Pb-212, Pb-214, Tl-208, and Th-232, as found in Chapter IV of DOE Order 5400.5, Change 2, “Radiation Protection of the Public and Environment.” (DOE, 1993).

J = Estimated value
-- = Not detected above MDCs.

A.5.2.8 Potential Source Material

For the leach pit, it was determined that wastes were present at the base of the leach pit. One solid sample was collected by hand auger to determine whether the wastes were PSM and the data could be used to determine proper disposal methods. Laboratory analysis determined that results for VOCs, TPH-DRO, SVOCs, metals, pesticides, PCBs, and gamma-emitting radionuclides were detected above MDCs. The analytical results are presented in Table A.5-8. The sample results exceeded the PSM criteria for arsenic and PCBs. Although TPH-DRO was present in the solid samples, it is not considered a potential source of COC contamination because the hazardous constituents of TPH-DRO were all below their respective criteria. Based on the sample results, the contents of the leach pit are considered PSM.

A.5.3 Nature and Extent of Contamination

Analytical results for the solid sample collected from the floor of the leach pit indicate the leach pit contains PSM with PCBs and arsenic as COCs. Based on the analytical results for Decision II soil samples collected below the base of the leach pit and the three step-out locations within CAS 06-05-03, no COCs were identified outside the leach pit. Therefore, the nature and extent of contamination has been satisfied.

A.5.4 Revised Conceptual Site Model

The CAIP requirements were met at this CAS, and no revisions were necessary to the CSM.

Table A.5-8
Potential Source Material Results Detected above MDCs at CAS 06-05-03, Leach Pit

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Criteria[a]	Units
C02	560C002	Solid	DRO	1,100	N/A[b]	mg/kg
			Arsenic	**57**	23	
			Barium	220	67,000	
			Beryllium	0.71	1,900	
			Cadmium	12	450	
			Chromium	110	450	
			Lead	330	800	
			Mercury	9.9	310	
			Silver	4.2	5,100	
			Acetone	0.015 (J)	54,000	
			Methylene chloride	0.0026 (J)	21	
			Bis(2-ethylhexyl)phthalate	16	120	
			Fluoranthene	0.62 (J)	22,000	
			Phenanthrene	0.36 (J)	100,000	
			Pyrene	0.37 (J)	29,000	
			4,4'-DDE	0.096 (J)	7	
			Beta-BHC	0.0052 (J)	NA	
			Heptachlor epoxide	0.032 (J)	0.19	
			Aroclor 1254	**1.3 (J)**	0.74	
			Aroclor 1260	**0.76 (J)**	0.74	
			Aroclor 1016	0.56 (J)	0.74	
			Pb-214	0.65 (J)	5	pCi/g
			Th-234	9.7	105	

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)
[b]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value
NA = Not available

Bold indicates the value is equal to or exceeds the PSM criteria.

A.6.0 CAS 06-05-04, Leach Bed, Investigation Results

Corrective Action Site 06-05-04 is located in Area 6 near Building CP-160, Site Maintenance Facility, a currently active structure. The CAS consisted of a septic system that serviced the former building. Several components were identified in the CAIP for investigation, including the septic system components (i.e., distribution box) and leach bed. Additional detail is provided in the CAIP (NNSA/NSO, 2008).

A.6.1 CAIP Activities

A total of 265 characterization samples (including 6 FDs) were collected during investigation activities at CAS 06-05-04. The sample IDs, locations, types, and analyses are listed in Table A.6-1. The specific CAI activities conducted to satisfy the CAIP requirements at this CAS are described in the following sections.

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
(Page 1 of 13)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
D01	560D001	3.5 - 4.0	Soil	Environmental	X	X	X	X	X	X	X
D02	560D002	8.5 - 9.0	Soil	Environmental	X	X	X	X	X	X	X
D03	560D003	3.5 - 4.0	Soil	Environmental	X	X	X	X	X	X	X
D04	560D004	9.5 - 10.0	Soil	Environmental	X	X	X	X	X	X	X
D05	560D005	5.0 - 5.5	Soil	Environmental	X	X	X	X	X	X	X
D06	560D006	3.5 - 4.0	Soil	Environmental	X	X	X	X	X	X	X
D07	560D007	3.5 - 4.0	Soil	Environmental	X	X	X	X	X	X	X
D08	560D008	3.5 - 4.0	Soil	Environmental	X	X	X	X	X	X	X
D09	560D009	3.5 - 4.0	Soil	Environmental	X	X	X	X	X	X	X

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
(Page 2 of 13)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
D10	560D010	5.5 - 6.0	Soil	Environmental	X	X	X	X	X	X	X
D11	560D011	5.5 - 6.0	Soil	Environmental	X	X	X	X	X	X	X
D12	560D012	6.0 - 6.5	Soil	Environmental	X	X	X	X	X	X	X
	560D013	6.0 - 6.5	Soil	FD of #560D012	X	X	X	X	X	X	X
	560D014	7.5 - 8.0	Soil	Environmental	X	X	X	X	X	X	X
D13	560D015	6.0 - 6.5	Soil	Environmental	X	X	X	X	X	X	X
	560D016	7.5 - 8.0	Soil	Environmental	X	X	X	X	X	X	X
D14	560D017	8.5 - 9.0	Soil	Environmental	--	--	--	X	--	--	--
	560D018	12.5 - 13.0	Soil	Environmental	--	--	--	X	--	--	--
D15	560D019	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
	560D020	5.5 - 6.0	Soil	Environmental	--	--	--	X	--	--	--
	560D021	9.0 - 9.5	Soil	Environmental	--	--	--	X	--	--	--
D16	560D022	6.0 - 6.5	Soil	Environmental	--	--	--	X	--	--	--
	560D023	7.5 - 8.0	Soil	Environmental	--	--	--	X	--	--	--
	560D024	12.5 - 13.0	Soil	Environmental	--	--	--	X	--	--	--
	560D025	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
D17	560D026	8.5 - 9.5	Soil	Environmental	X	X	X	X	X	X	X
D18	560D027	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
	560D028	5.5 - 6.0	Soil	Environmental	--	--	--	X	--	--	--
	560D029	9.0 - 9.5	Soil	Environmental	--	--	--	X	--	--	--
D19	560D030	9.0 - 9.5	Soil	Environmental	--	--	--	X	--	--	--
	560D031	12.0 - 12.5	Soil	Environmental	--	--	--	X	--	--	--

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
(Page 3 of 13)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
D20	560D032	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
	560D033	5.5 - 6.0	Soil	Environmental	--	--	--	X	--	--	--
	560D034	9.0 - 9.5	Soil	Environmental	--	--	--	X	--	--	--
DL01	560DL01	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL02	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL03	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL04	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
DL02	560DL05	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL06	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL07	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL08	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
DL03	560DL09	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL10	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL11	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL12	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
DL04	560DL13	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL14	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL15	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL16	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
DL05	560DL17	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL18	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL19	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL20	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
(Page 4 of 13)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
DL06	560DL21	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL22	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL23	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL24	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DL07	560DL25	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL26	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL27	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL28	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DL08	560DL29	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL30	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL31	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL32	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DL09	560DL33	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL34	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL35	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL36	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
	560DL41	5.5 - 5.7	Soil	Environmental	--	--	--	X	--	--	--
DL10	560DL37	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DL11	560DL38	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
DL12	560DL39	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
DL13	560DL40	4.5 -4.7	Soil	Environmental	--	--	--	X	--	--	--
DQ00	560DQ01	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ01	560DQ02	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ02	560DQ03	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
(Page 5 of 13)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
DQ03	560DQ04	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ04	560DQ12	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ05	560DQ10	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ06	560DQ09	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ07	560DQ05	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ08	560DQ06	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ09	560DQ07	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ10	560DQ11	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ11	560DQ08	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ12	560DQ27	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ13	560DQ14	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ14	560DQ23	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ15	560DQ24	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
	560DQ42	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
	560DQ53	1.3 - 1.5	Soil	Environmental	--	--	--	X	--	--	--
DQ16	560DQ25	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ17	560DQ26	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ18	560DQ13	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ19	560DQ15	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ20	560DQ22	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ21	560DQ20	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ22	560DQ21	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ23	560DQ16	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
(Page 6 of 13)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
DQ24	560DQ17	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
	560DQ18	0.0 - 0.5	Soil	FD of #560DQ17	--	--	--	X	--	--	--
DQ25	560DQ19	0.0 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ28	560DQ28	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ70	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ29	560DQ29	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ71	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ30	560DQ32	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ72	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ31	560DQ34	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ73	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ32	560DQ36	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ74	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ33	560DQ31	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ75	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ34	560DQ37	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ54	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
	560DD93	1.3 - 1.5	Soil	Environmental	--	--	--	X	--	--	--
DQ35	560DQ39	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ76	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ36	560DQ40	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ77	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ37	560DQ41	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
(Page 7 of 13)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
DQ38	560DQ38	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ79	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
	560DD91	1.3 - 1.5	Soil	Environmental	--	--	--	X	--	--	--
DQ39	560DQ35	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ78	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ40	560DQ30	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ80	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ41	560DQ33	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
DQ43	560DQ43	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ57	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
	560DQ58	0.5 - 0.7	Soil	FD of #560DQ57	--	--	--	X	--	--	--
DQ44	560DQ44	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ56	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
	560DQ59	1.3 - 1.5	Soil	Environmental	--	--	--	X	--	--	--
DQ45	560DQ45	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ55	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ46	560DQ46	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ81	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
	560DD92	1.3 - 1.5	Soil	Environmental	--	--	--	X	--	--	--
	560DE12	2.0 - 2.2	Soil	Environmental	--	--	--	X	--	--	--
DQ47	560DQ47	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
DQ48	560DQ48	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
DQ49	560DQ49	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
(Page 8 of 13)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
DQ50	560DQ50	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DD89	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ51	560DQ51	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ82	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ52	560DQ52	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ83	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ60	560DQ60	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ84	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ61	560DQ61	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
DQ62	560DQ62	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
DQ63	560DQ63	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
DQ64	560DQ64	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DD87	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ65	560DQ65	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DD88	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ66	560DQ66	0.0 -0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DD86	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
	560DD94	1.3 - 1.5	Soil	Environmental	--	--	--	X	--	--	--
DQ67	560DQ67	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DQ68	0.0 - 0.25	Soil	FD of #560DQ67	--	--	--	X	--	--	--
DQ70	560DD70	0.3 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
DQ71	560DD71	0.0 - 0.3	Soil	Environmental	--	--	--	X	--	--	--

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
DQ72	560DD72	0.0 - 0.3	Soil	Environmental	--	--	--	X	--	--	--
	560DD82	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
	560DD83	0.5 - 0.7	Soil	FD of #560DD82	--	--	--	X	--	--	--
DQ73	560DD73	0.0 - 0.3	Soil	Environmental	--	--	--	X	--	--	--
	560DD84	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ74	560DD74	0.0 - 0.3	Soil	Environmental	--	--	--	X	--	--	--
	560DD85	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ75	560DD75	0.0 - 0.3	Soil	Environmental	--	--	--	X	--	--	--
DQ76	560DD76	0.0 - 0.3	Soil	Environmental	--	--	--	X	--	--	--
	560DD90	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ77	560DD77	0.3 - 0.5	Soil	Environmental	--	--	--	X	--	--	--
	560DE10	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ78	560DD78	0.0 - 0.3	Soil	Environmental	--	--	--	X	--	--	--
	560DE11	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ79	560DD79	0.0 - 0.3	Soil	Environmental	--	--	--	X	--	--	--
	560DE08	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ80	560DD80	0.0 - 0.3	Soil	Environmental	--	--	--	X	--	--	--
	560DE07	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ81	560DD81	0.0 - 0.3	Soil	Environmental	--	--	--	X	--	--	--
	560DE09	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ82	560DE01	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DE13	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ83	560DE02	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
DQ84	560DE03	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DE14	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ85	560DE04	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
DQ86	560DE05	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
	560DE06	0.0 - 0.25	Soil	FD of #560DE05	--	--	--	X	--	--	--
	560DE16	0.5 - 0.7	Soil	Environmental	--	--	--	X	--	--	--
DQ87	560DE15	0.0 - 0.25	Soil	Environmental	--	--	--	X	--	--	--
DV001	560DV001	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV002	560DV002	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV003	560DV003	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV004	560DV004	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV005	560DV005	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV006	560DV006	7.5 - 7.7	Soil	Environmental	--	--	--	X	--	--	--
DV007	560DV007	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV008	560DV008	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV009	560DV009	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV010	560DV010	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV011	560DV011	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV012	560DV012	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV013	560DV013	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV014	560DV014	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV015	560DV015	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV016	560DV016	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV017	560DV017	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
DV018	560DV018	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV019	560DV019	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV020	560DV020	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV021	560DV021	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV022	560DV022	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV023	560DV023	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV024	560DV024	1.5 - 1.7	Soil	Environmental	--	--	--	X	--	--	--
DV025	560DV025	6.0 - 6.2	Soil	Environmental	--	--	--	X	--	--	--
DV26	560DV026	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DV27	560DV027	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DV28	560DV028	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DV29	560DV029	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DV30	560DV030	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DV31	560DV031	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DV32	560DV032	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DV033	560DV033	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
DV034	560DV034	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
DV035	560DV035	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
DV036	560DV036	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
DV037	560DV037	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
DV038	560DV038	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DV039	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
	560DV040	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
DV039	560DV044	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DV045	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
	560DV048	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
DV040	560DV046	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
DV041	560DV041	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
	560DV042	3.5 - 3.7	Soil	Environmental	--	--	--	X	--	--	--
	560DV043	4.5 - 4.7	Soil	Environmental	--	--	--	X	--	--	--
	560DV047	5.5 - 5.7	Soil	Environmental	--	--	--	X	--	--	--
DVC01	560DVC01	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC02	560DVC02	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC03	560DVC03	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC04	560DVC04	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC05	560DVC05	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC06	560DVC06	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC07	560DVC07	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC08	560DVC08	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC09	560DVC09	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC10	560DVC10	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC11	560DVC11	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC12	560DVC12	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC13	560DVC13	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC14	560DVC14	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC15	560DVC15	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC16	560DVC16	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--

Table A.6-1
Samples Collected at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
DVC17	560DVC17	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC18	560DVC18	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC19	560DVC19	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DVC20	560DVC20	2.5 - 2.7	Soil	Environmental	--	--	--	X	--	--	--
DZ01	560DZ01	0.0 - 0.25	Soil	Environmental	--	--	--	X	X	--	--
DZ02	560DZ02	0.0 - 0.25	Soil	Environmental	--	--	--	X	X	--	--
DZ03	560DZ03	0.0 - 0.25	Soil	Environmental	--	--	--	X	X	--	--
DZ04	560DZ04	0.0 - 0.25	Soil	Environmental	--	--	--	X	X	--	--
DZ05	560DZ05	0.0 - 0.25	Soil	Environmental	--	--	--	X	X	--	--
DZ06	560DZ06	0.0 - 0.25	Soil	Environmental	--	--	--	X	X	--	--
N/A	560D301	N/A	Water	Trip Blank	--	--	--	--	--	--	X
N/A	560D302	N/A	Water	Field Blank	X	X	X	X	X	X	X
N/A	560D303	N/A	Water	Trip Blank	--	--	--	--	--	--	X
N/A	560D304	N/A	Water	Trip Blank	--	--	--	--	--	--	X
N/A	560D305	N/A	Water	Trip Blank	--	--	--	--	--	--	X
N/A	560D306	N/A	Water	Source Material QC	X	X	X	X	X	X	X
N/A	560D307	N/A	Water	Equipment Rinsate	X	X	X	X	X	X	X
N/A	560D308	N/A	Water	Equipment Rinsate	--	--	--	X	--	--	--
N/A	560D309	N/A	Water	Trip Blank	--	--	--	--	--	--	X
N/A	560D310	N/A	Water	Trip Blank	--	--	--	--	--	--	X
N/A	560H302	N/A	Water	Trip Blank	--	--	--	--	--	--	X
N/A	560H303	N/A	Water	Trip Blank	--	--	--	--	--	--	X

-- = Not required

A.6.1.1 Visual Inspections

A walkover was conducted within the CAS boundary before intrusive activities to identify additional surface sample locations based on biasing factors (i.e., staining). No additional biased sample locations were identified. The only septic system component visible on the surface is the manhole cover of the distribution box. The fence line surrounding the leach bed was partially removed for sampling access and inspection of the leach bed.

The manhole cover was removed to inspect the interior of the distribution box and provide access for the video survey and sampling. Inspection confirmed the presence of one inlet pipe, three outlet pipes, and dry soil materials at the base of the feature. Each outlet pipe and the inlet pipe were exposed by a combination of hand and backhoe excavation for sample access and inspection. The pipes were determined to be intact ACP with no apparent leaks (i.e., no stains).

The distal end of the leach bed was exposed by backhoe excavation for inspection and sampling. Visual inspection confirmed three leach lines exist within the leach bed with a distance of only 3 ft between each line. The configuration of the lines at the distal end differs from that shown in the CAIP (NNSA/NSO, 2008). Figure A.6-1 shows the three leach lines connected together by plastic fittings so the system is contained and effluent released only through designed perforations. Leach rock below the leach lines was visibly stained bluish-green. The proximal end of the leach bed was excavated by backhoe to expose the lines for inspection and sampling. Inspection of the proximal end identified the transition point of each outlet pipe to a perforated leach line where distinct bluish-green to blackish-green staining was visible within the leach rock directly underlying the leach lines. A combination of undermining leach rock and the narrow distance between leach lines prevented the backhoe from exposing the middle leach line for sampling purposes.

Backhoe excavation conducted in the suspected location of the abandoned septic tank confirmed the septic tank is present and abandoned in place. The tank is located about 4 ft bgs and 9 ft west of the distribution box. The lid of the tank had been removed during abandonment, and the interior of the tank was backfilled with soil. The outlet pipe from the tank was present just above the exposed eastern edge of the tank and was encased in grout. Inspection of the western edge of the tank showed the inlet pipe had been previously cut and a 4-ft section of pipe removed. The cut end of the inlet pipe was exposed for sampling and inspection purposes, then grouted before the excavation was

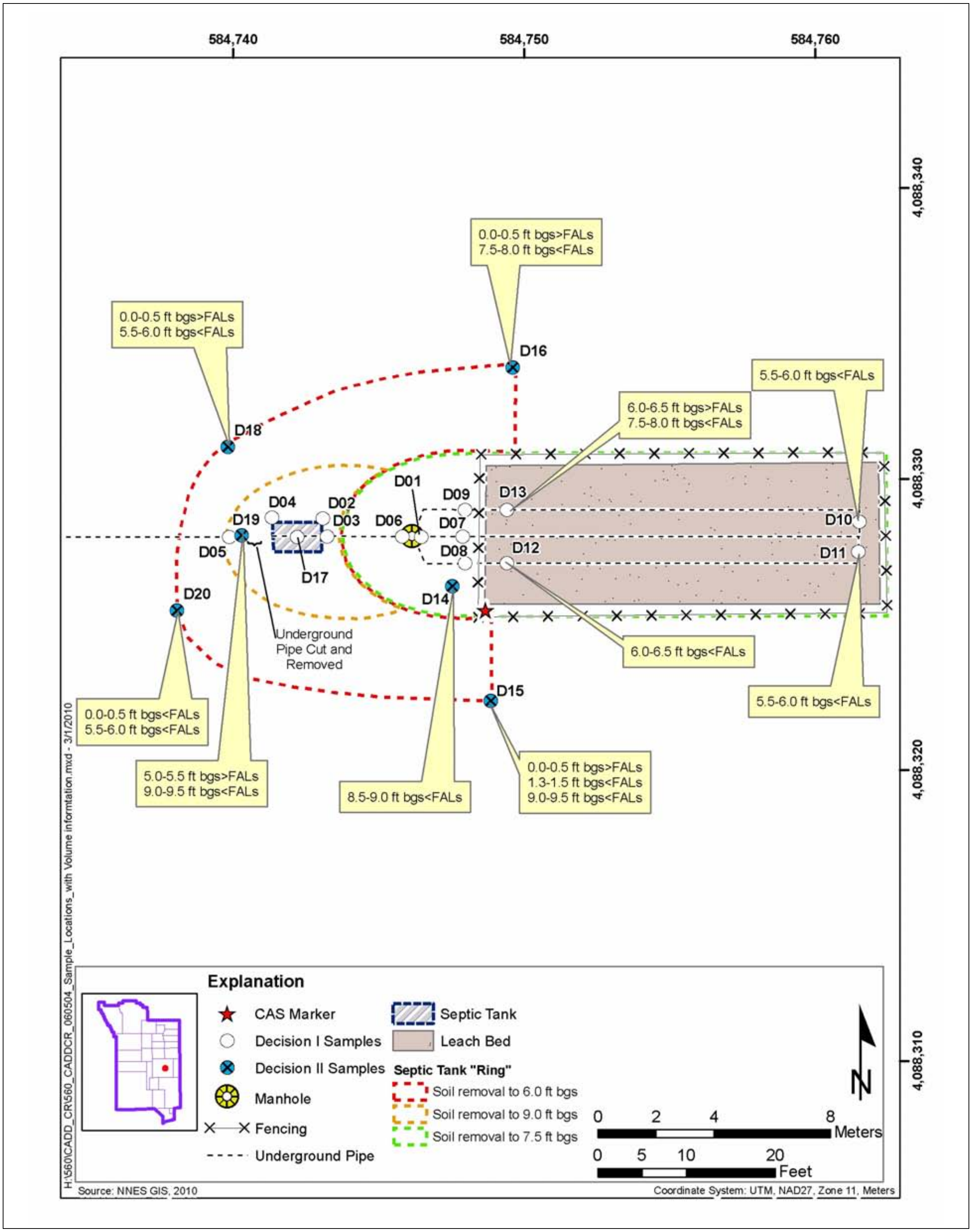

Figure A.6-1
Site Map and Sample Locations at CAS 06-05-04, Leach Bed

backfilled. No soil staining was visible at either the tank inlet or outlet pipes. The base of both the eastern and western ends of the septic tank was exposed for sampling, and the tank appeared intact with no apparent leaks.

A.6.1.2 Video Surveys

A video survey was conducted on each of the three distribution box outlet pipes, via access through the distribution box, in the direction of the leach bed. The survey showed little to no residual wastes within the leach lines, and no breaches were identified.

A.6.1.3 Field Screening

Investigation samples were field screened for alpha and beta/gamma radiation. The FSRs were compared to FSLs to guide subsequent sampling decisions where appropriate. None of the samples collected at CAS 06-05-04 exceeded alpha or beta/gamma radiation FSLs.

A.6.1.4 Sample Collection

Environmental samples were collected from the soil surrounding the distribution box and septic tank components as well as the proximal and distal ends of the leach bed lines (locations D01 through D13) to address potential releases from the septic system. Location D17 was drilled inside the septic tank to confirm all backfill was soil and to determine whether any PSM was left in place during abandonment. Samples were collected from the soil at the outside base of the septic tank (locations D4 and D5); directly below the septic tank inlet and outlet pipe (locations D02 and D03), the distribution box inlet pipe and three outlet pipes (locations D07 through D09). One sample was collected of soil located within the distribution box (location D01). Samples were collected at the native soil interface directly below the distal ends of the leach bed lines where bluish-green staining was noted in the leach rock (locations D10 and D11). Because the distal ends were interconnected, only two samples were collected by taking soil from the center between the three lines where leach holes were present. Samples were collected at the native soil interface and 1 ft below the interface directly below the proximal ends of the leach bed lines where bluish-green staining was noted in the leach rock (locations D12 and D13). Due to the narrow distance and undermining leach rock, samples were collected at the southern and northern leach lines only.

To laterally bound the subsurface PCB contamination within and adjacent to the septic system, samples were collected at locations D14 through D16 and D18 through D20. The lateral extent of subsurface contamination (i.e., 6 ft bgs) related to the septic system was bounded for releases by these locations (Figure A.6-1). However, analytical results from locations D15, D16, and D18 showed PCB contamination in surface samples (0 to 0.5 ft bgs). Another 161 samples (locations DQ00 through DQ87 and DL01 through DL10) were collected to determine the nature and extent of PCB contamination and confirm assumptions in the revised CSM regarding other potential sources of PCB releases. Figure A.6-2 shows the locations used to define the lateral extent of PCB contamination and bounds the areas where a soil-removal action was implemented to address PCB contamination.

During and after soil-removal actions, additional samples (locations DV001 through DV041, DL11 through DL13, and DVC01 through DVC20) were collected and analyzed for PCBs to confirm if concentrations in the remaining soil were below action levels. Appendix D presents details of the closure activities conducted at this CAS.

A.6.1.5 Deviations

Except where noted below, investigation samples were collected as outlined in the CAU 560 CAIP (NNSA/NSO, 2008) and submitted for laboratory analysis. A deviation in sampling the proximal end of the leach bed was made because the narrow width (3 ft) between the leach lines, in combination with a thick bed of undermining leach rock, prevented the backhoe from accessing the native soil interface on the proximal end. However, observations of the leach rock material and nature of contamination within the leach bed confirmed that the outside leach lines were representative of the center leach line.

A.6.2 Investigation Results

The following sections provide analytical results from the samples collected to complete investigation activities as outlined in the CAIP (NNSA/NSO, 2008). Investigation samples were analyzed for the CAIP-specified COPCs, which included VOCs, SVOCs, TPH-DRO, RCRA metals, beryllium, pesticides, PCBs, and gamma-emitting radionuclides. The analytical parameters and laboratory methods used to analyze the investigation samples are listed in Table A.2-2. Table A.6-1 lists the sample-specific analytical suite for CAS 06-05-04.

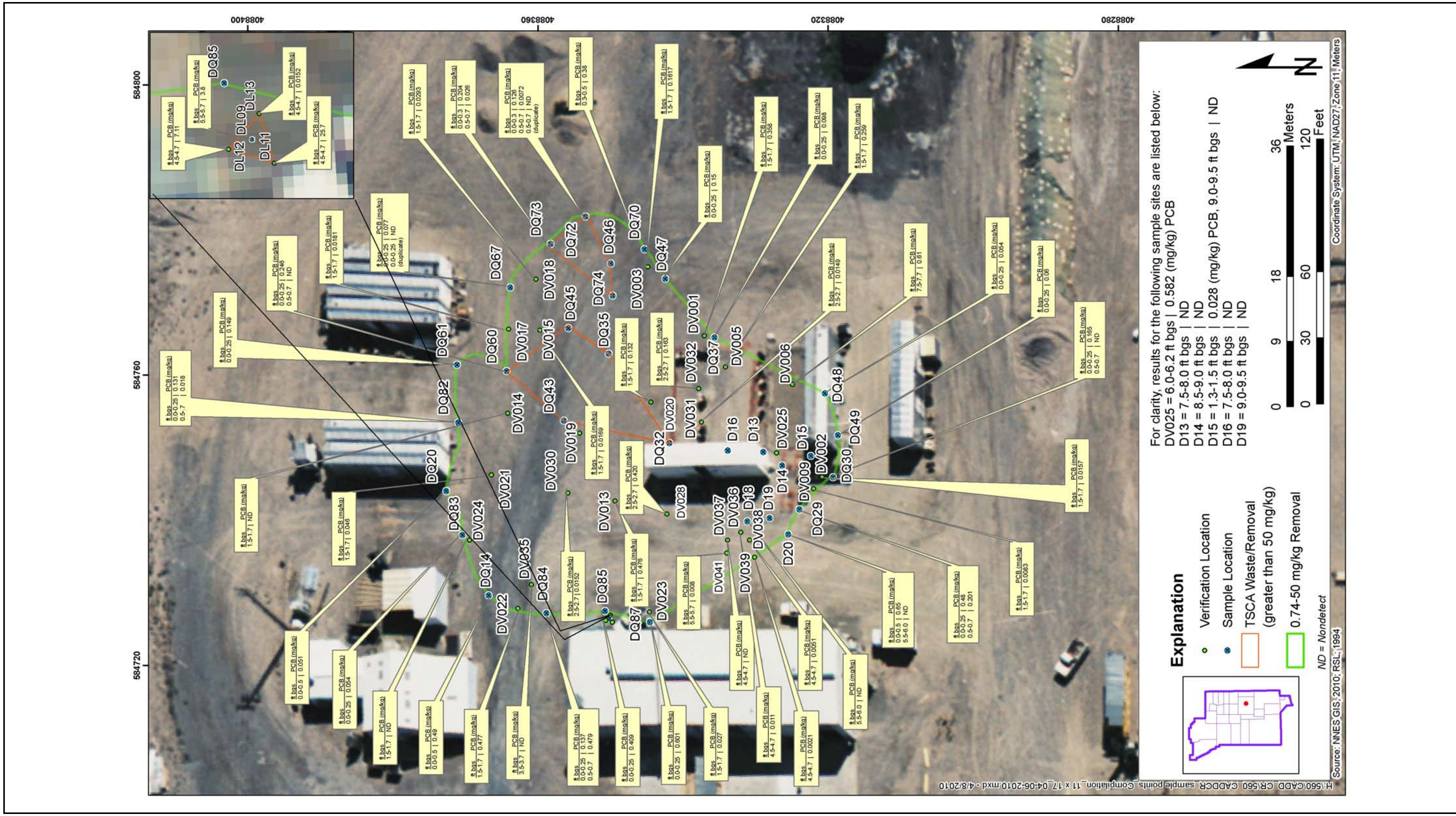

Figure A.6-2
Decision II PCB Extent and Removal Areas CAS 06-05-04, Leach Bed

Analytical results from the soil samples with concentrations exceeding MDCs are summarized in the following sections. An evaluation was conducted on all contaminants detected above MDCs by comparing individual concentration or activity results against the FALs. Establishment of the FALs is presented in Appendix C.

A.6.2.1 Volatile Organic Compounds

Analytical results for VOCs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.6-2. No VOCs were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

Table A.6-2
Sample Results for Total VOCs Detected above MDCs
at CAS 06-05-04, Leach Bed

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			Total Xylenes
FALs[a]			420
D09	560D009	3.5 - 4.0	0.005 (J)

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value

A.6.2.2 Semivolatile Organic Compounds

Analytical results for SVOCs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.6-3. No SVOCs were detected at concentrations exceeding the respective PALs. The FALs were established at the PAL concentrations.

A.6.2.3 Total Petroleum Hydrocarbons

Analytical results for TPH-DRO in soil samples collected at this CAS that were detected above MDCs are presented in Table A.6-4. No samples exceeded the PAL of 100 mg/kg for TPH-DRO. No FAL was established for TPH-DRO. Instead, FALs were established for the individual hazardous constituents of TPH-DRO and are reported in the VOC and SVOC sections.

Table A.6-3
Sample Results for Total SVOCs Detected above MDCs at CAS 06-05-04, Leach Bed

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)	
			Bis(2-ethylhexyl)phthalate	**Di-n-octyl phthalate**
FALs[a]			**120**	**25,000**
D01	560D001	3.5 - 4.0	21	0.49 (J)
D10	560D010	5.5 - 6.0	2.1	--
D11	560D011	5.5 - 6.0	0.39 (J)	--
D12	560D012	6.0 - 6.5	0.43	--
	560D013	6.0 - 6.5	0.35 (J)	--
D13	560D015	6.0 - 6.5	0.86	--
	560D016	7.5 - 8.0	4.8	--
D17	560D026	8.5 - 9.5	0.092 (J)	--

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

Table A.6-4
Sample Results for TPH-DRO Detected above MDCs at CAS 06-05-04, Leach Bed

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			DRO
PALs[a]			**100**
D01	560D001	3.5 - 4.0	85
D05	560D005	5.0 - 5.5	4.1 (J)
D10	560D010	5.5 - 6.0	28
D11	560D011	5.5 - 6.0	2.9 (J)
D12	560D013	6.0 - 6.5	2.7 (J)
	560D014	7.5 - 8.0	8
D13	560D015	6.0 - 6.5	8.4
	560D016	7.5 - 8.0	6.6
D17	560D026	8.5 - 9.5	13

[a]Based on “Contamination of Soil: Establishment of Action Levels” (NAC, 2006).

J = Estimated value

A.6.2.4 RCRA Metals and Beryllium

Analytical results for RCRA metals and beryllium in soil samples collected at this CAS that were detected above MDCs are presented in Table A.6-5. No metals were detected at concentrations exceeding their PALs. The FALs were established at the PAL concentrations.

Table A.6-5
Sample Results for Metals Detected above MDCs at CAS 06-05-04, Leach Bed
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)								
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
FALs			23[a]	67,000[b]	1,900[b]	450[b]	450[b]	800[b]	310[b]	5,100[b]	5,100[b]
D01	560D001	3.5 - 4.0	9.1	110	--	0.63	77	50	1	--	--
D02	560D002	8.5 - 9.0	4.5	78	--	0.074	3.9	6.9	0.022 (J-)	--	--
D03	560D003	3.5 - 4.0	5	52	--	0.074	3.3	4.8	--	--	--
D04	560D004	9.5 - 10.0	5.9	84	--	0.072	3.5	6.4	0.029 (J-)	--	--
D05	560D005	5.0 - 5.5	4.2	91	--	0.11	5.3	13	0.027 (J-)	0.59	--
D06	560D006	3.5 - 4.0	5.4	86	--	0.06	4.1	7.1	--	--	--
D07	560D007	3.5 - 4.0	4.4	93	0.53	0.082	4.6	7.7	0.034 (J-)	--	--
D08	560D008	3.5 - 4.0	4.2	94	--	--	5.6 (J)	10	0.22	--	--
D09	560D009	3.5 - 4.0	5	95	--	--	5.4 (J)	8.1	0.034 (J-)	--	--
D10	560D010	5.5 - 6.0	2.5	110	--	--	21 (J)	27	0.53	--	--
D11	560D011	5.5 - 6.0	3.6	95	--	--	7.4 (J)	10	0.13	--	--
D12	560D012	6.0 - 6.5	3	90	--	--	6.7 (J)	19	0.84	--	--
	560D013	6.0 - 6.5	3	89	--	--	6.7 (J)	19	0.86	--	--
	560D014	7.5 - 8.0	3.5	100	--	--	3.7 (J)	5.3	0.039	--	--
D13	560D015	6.0 - 6.5	2.9	68	--	--	12	37	2.2	--	--
	560D016	7.5 - 8.0	3.9	75	--	--	4.9	31	0.56	--	--

Table A.6-5
Sample Results for Metals Detected above MDCs at CAS 06-05-04, Leach Bed
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)								
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
FALs			23[a]	67,000[b]	1,900[b]	450[b]	450[b]	800[b]	310[b]	5,100[b]	5,100[b]
D17	560D026	8.5 - 9.5	4.3	120	--	0.083	7.7	8.8	0.063	--	73

[a]Based on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the NBMG throughout the NTS and NTTR (NBMG, 1998; Moore, 1999).
[b]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
J- = The result is an estimated quantity, but the result may be biased low.
-- = Not detected above MDCs.

A.6.2.5 Polychlorinated Biphenyls

Tables A.6-6 and A.6-7 provide analytical results (including nondetect concentrations) for all of the soil characterization samples collected at CAS 06-05-04. Of the 262 samples collected during the characterization and soil-removal phases, 75 samples exceeded the PAL (0.74 mg/kg) for total PCBs (Aroclor 1254, 1260, and 1268 combined) with concentrations above PALs ranging from 0.76 to 210 mg/kg. The FALs were established at the PAL concentrations; therefore, PCBs are considered a COC at this CAS.

The lateral extent of PCB contamination was defined through Decision II samples, and a soil-removal action was implemented at this CAS as part of the closure activities to address the PCB contamination within the Area 6 yard. Table A.6-6 presents the sample locations, sample depths, and PCB concentrations (including nondetects) of materials remaining at this CAS after soil-removal actions were completed. The remaining PCB concentrations above FALs shown in Table A.6-6 are limited to the area of the UR being implemented under a corrective action at this CAS, while all other sample results in Table A.6-6 demonstrate PCBs above FALs have been adequately removed. Table A.6-7 presents the sample locations, sample depths, and PCB concentrations (including nondetects) of materials that were subsequently removed during closure activities and properly disposed.

Table A.6-6
Sample Results for PCBs Detected above MDCs in Soils Remaining at CAS 06-05-04, Leach Bed
(Page 1 of 11)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
D04	560D004	9.5 - 10.0	--	--	0.12	0.3	0.42
D12	560D014	7.5 - 8.0	--	--	--	--	--
D13	560D016	7.5 - 8.0	--	--	--	--	--
D14	560D017	8.5 - 9.0	--	--	0.024 (J)	--	0.024
	560D018	12.5 - 13.0	--	--	--	--	--
D15	560D021	9.0 - 9.5	--	--	0.021 (J)	--	0.021
D16	560D022	6.0 - 6.5	--	--	--	--	--
	560D023	7.5 - 8.0	--	--	--	--	--
	560D024	12.5 - 13.0	--	--	--	--	--
D18	560D029	9.0 - 9.5	--	--	--	--	--
D19	560D030	9.0 - 9.5	--	--	0.067	--	0.067
	560D031	12.0 - 12.5	--	--	--	--	--
D20	560D034	9.0 - 9.5	--	--	--	--	--

Table A.6-6
Sample Results for PCBs Detected above MDCs in Soils Remaining at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
DL01	560DL01	2.5 - 2.7	--	--	0.427 (J)	0.421	**0.848**
	560DL02	1.5 - 1.7	--	0.102	0.138	0.075	0.315
	560DL03	4.5 - 4.7	--	--	--	--	--
	560DL04	3.5 - 3.7	--	--	--	--	--
DL02	560DL05	1.5 - 1.7	--	--	0.504	0.494	**0.998**
	560DL06	2.5 - 2.7	--	--	**2.14 (J)**	**2.21 (J)**	**4.35**
	560DL07	3.5 - 3.7	--	--	**2.89 (J)**	**3.24 (J)**	**6.13**
	560DL08	4.5 - 4.7	--	--	0.0586	0.0554	0.114
DL03	560DL09	1.5 - 1.7	--	--	0.277 (J)	0.277 (J)	0.554
	560DL10	2.5 - 2.7	--	--	0.002 (J)	--	0.002
	560DL11	3.5 - 3.7	--	--	--	--	--
	560DL12	4.5 - 4.7	--	--	--	--	--

Table A.6-6
Sample Results for PCBs Detected above MDCs in Soils Remaining at CAS 06-05-04, Leach Bed
(Page 3 of 11)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
DL04	560DL13	1.5 - 1.7	--	--	0.0351	0.0335	0.0686
	560DL14	2.5 - 2.7	--	--	0.0276	0.0252	0.0528
	560DL15	3.5 - 3.7	--	--	**0.813 (J)**	**0.805 (J)**	**1.618**
	560DL16	4.5 - 4.7	--	--	--	--	--
DL05	560DL17	4.5 - 4.7	--	--	--	--	--
	560DL18	3.5 - 3.7	--	--	--	--	--
	560DL19	2.5 - 2.7	--	--	0.0059	0.0055	0.0114
	560DL20	1.5 - 1.7	--	--	0.238	0.250	0.488
DL06	560DL21	4.5 - 4.7	--	--	0.0061	0.0058	0.0119
	560DL22	3.5 - 3.7	--	--	**1.35 (J)**	**1.51 (J)**	**2.86**
	560DL23	2.5 - 2.7	--	--	0.004	0.0059 (J)	0.0099
	560DL24	1.5 - 1.7	--	--	0.0076	0.0077	0.0153

Table A.6-6
Sample Results for PCBs Detected above MDCs in Soils Remaining at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
DL07	560DL25	4.5 - 4.7	--	--	0.0063	0.0050	0.0113
	560DL26	3.5 - 3.7	--	--	0.0035 (J)	0.0028 (J)	0.0063
	560DL27	2.5 - 2.7	--	--	**0.940 (J)**	**0.942 (J)**	**1.882**
	560DL28	1.5 - 1.7	--	--	0.565 (J)	0.596 (J)	**1.191**
DL08	560DL29	4.5 - 4.7	--	--	**0.930 (J)**	**0.926 (J)**	**1.856**
	560DL30	3.5 - 3.7	--	--	0.168	0.174	0.342
	560DL31	2.5 - 2.7	--	--	0.021	0.0232	0.0442
	560DL32	1.5 - 1.7	--	--	0.0078	0.0087	0.0165
DL09	560DL41	5.5 - 5.7	--	--	**1.93 (J)**	**1.87 (J)**	**3.8**
DL10	560DL37	2.5 - 2.7	--	--	--	--	--
DL11	560DL38	4.5 - 4.7	--	--	**12.6 (J)**	**13.1 (J)**	**25.7**
DL12	560DL39	4.5 - 4.7	--	--	**3.62 (J)**	**3.49 (J)**	**7.11**
DL13	560DL40	4.5 - 4.7	--	--	0.0078	0.0074	0.0152
DQ00	560DQ01	0.0 - 0.5	--	--	0.098	--	0.098
DQ01	560DQ02	0.0 - 0.5	--	--	0.02	--	0.02

Table A.6-6
Sample Results for PCBs Detected above MDCs in Soils Remaining at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			0.74	0.74	0.74	0.74	
DQ02	560DQ03	0.0 - 0.5	--	--	--	--	--
DQ03	560DQ04	0.0 - 0.5	--	--	0.14	--	0.14
DQ04	560DQ12	0.0 - 0.5	--	--	0.084	--	0.084
DQ05	560DQ10	0.0 - 0.5	--	--	0.037	--	0.037
DQ06	560DQ09	0.0 - 0.5	--	--	0.055	--	0.055
DQ07	560DQ05	0.0 - 0.5	--	--	--	--	--
DQ08	560DQ06	0.0 - 0.5	--	--	--	--	--
DQ09	560DQ07	0.0 - 0.5	--	--	0.0083 (J)	--	0.0083
DQ10	560DQ11	0.0 - 0.5	--	--	--	--	--
DQ11	560DQ08	0.0 - 0.5	--	--	0.024 (J)	--	0.024
DQ12	560DQ27	0.0 - 0.5	--	--	0.19	--	0.19
DQ13	560DQ14	0.0 - 0.5	--	--	0.023 (J)	--	0.023
DQ14	560DQ23	0.0 - 0.5	--	--	0.49	--	0.49
DQ16	560DQ25	0.0 - 0.5	--	--	0.032 (J)	--	0.032
DQ17	560DQ26	0.0 - 0.5	--	--	0.1	--	0.1

Table A.6-6
Sample Results for PCBs Detected above MDCs in Soils Remaining at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			0.74	0.74	0.74	0.74	
DQ18	560DQ13	0.0 - 0.5	--	--	0.021	--	0.021
DQ19	560DQ15	0.0 - 0.5	--	--	0.021	--	0.021
DQ20	560DQ22	0.0 - 0.5	--	--	0.051	--	0.051
DQ21	560DQ20	0.0 - 0.5	--	--	0.075	--	0.075
DQ22	560DQ21	0.0 - 0.5	--	--	0.024	--	0.024
DQ23	560DQ16	0.0 - 0.5	--	--	--	--	--
DQ24	560DQ17	0.0 - 0.5	--	--	0.022	--	0.022
	560DQ18	0.0 - 0.5	--	--	0.025	--	0.025
DQ25	560DQ19	0.0 - 0.5	--	--	0.023 (J)	--	0.023
DQ29	560DQ29	0.0 - 0.25	--	--	0.24 (J)	0.24 (J)	0.48
	560DQ71	0.5 - 0.7	--	--	0.041 (J)	0.16	0.201
DQ30	560DQ32	0.0 - 0.25	--	--	0.078	0.087	0.165
	560DQ72	0.5 - 0.7	--	--	--	--	--
DQ37	560DQ41	0.0 - 0.25	--	--	0.05 (J)	0.048 (J)	0.098
DQ47	560DQ47	0.0 - 0.25	--	--	0.15	--	0.15

Table A.6-6
Sample Results for PCBs Detected above MDCs in Soils Remaining at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			0.74	0.74	0.74	0.74	
DQ48	560DQ48	0.0 - 0.25	--	--	0.054 (J)	--	0.054
DQ49	560DQ49	0.0 - 0.25	--	--	0.06 (J)	--	0.06
DQ60	560DQ60	0.0 - 0.25	--	--	0.016 (J)	0.23 (J)	0.246
	560DQ84	0.5 - 0.7	--	--	--	--	--
DQ61	560DQ61	0.0 - 0.25	--	--	0.0095 (J)	0.14	0.1495
DQ67	560DQ67	0.0 - 0.25	--	--	0.011 (J)	0.066	0.077
	560DQ68	0.0 - 0.25	--	--	--	0.024	0.024
DQ70	560DD70	0.3 - 0.5	--	--	0.232	0.148	0.38
DQ72	560DD72	0.0 - 0.3	--	--	0.0738	0.0521	0.1259
	560DD82	0.5 - 0.7	--	--	0.0029 (J)	0.0043	0.0072
	560DD83	0.5 - 0.7	--	--	0.0076	0.0101	0.0177
DQ73	560DD73	0.0 - 0.3	--	--	0.12	0.0836 (J)	0.2036
	560DD84	0.5 - 0.7	--	--	0.0117	0.0142	0.0259
DQ74	560DD85	0.5 - 0.7	--	--	0.167	0.114	0.281

Table A.6-6
Sample Results for PCBs Detected above MDCs in Soils Remaining at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			0.74	0.74	0.74	0.74	
DQ82	560DE01	0.0 - 0.25	--	--	0.0681	0.0629 (J)	0.131
	560DE13	0.5 - 0.7	--	--	0.01 (J)	0.0081	0.0181
DQ83	560DE02	0.0 - 0.25	--	--	0.0291	0.0249 (J)	0.054
DQ84	560DE03	0.0 - 0.25	--	--	0.0708	0.066 (J)	0.1368
	560DE14	0.5 - 0.7	--	--	0.276 (J)	0.203	0.479
DQ85	560DE04	0.0 - 0.25	--	--	0.214	0.195 (J)	0.409
DQ87	560DE15	0.0 - 0.25	--	--	0.344 (J)	0.257	0.601
DV001	560DV001	1.5 - 1.7	--	--	0.174	0.184	0.358
DV002	560DV002	1.5 - 1.7	--	--	0.0081	0.0076	0.0157
DV003	560DV003	1.5 - 1.7	--	--	0.0882	0.0735	0.1617
DV005	560DV005	1.5 - 1.7	--	--	0.141	0.118	0.259
DV006	560DV006	7.5 - 7.7	--	--	0.331	0.279	0.61
DV009	560DV009	1.5 - 1.7	--	--	0.0043	0.004	0.0083
DV013	560DV013	1.5 - 1.7	--	--	0.256	0.22	0.476
DV014	560DV014	1.5 - 1.7	--	--	--	--	--

Table A.6-6
Sample Results for PCBs Detected above MDCs in Soils Remaining at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			0.74	0.74	0.74	0.74	
DV015	560DV015	1.5 - 1.7	--	--	0.009	0.0079	0.0169
DV017	560DV017	1.5 - 1.7	--	--	0.0091	0.009	0.0181
DV018	560DV018	1.5 - 1.7	--	--	0.0159	0.0134	0.0293
DV019	560DV019	1.5 - 1.7	--	--	0.0339	0.0301	0.064
DV020	560DV020	1.5 - 1.7	--	--	0.0729	0.0588	0.1317
DV021	560DV021	1.5 - 1.7	--	--	0.0241	0.0219	0.046
DV023	560DV023	1.5 - 1.7	--	--	0.0133	0.0137	0.027
DV024	560DV024	1.5 - 1.7	--	--	--	--	--
DV025	560DV025	6.0 - 6.2	--	--	0.33 (J)	0.252 (J)	0.582
DV28	560DV028	2.5 - 2.7	--	--	0.218	0.202	0.420
DV30	560DV030	2.5 - 2.7	--	--	0.0061	0.0091 (J)	0.0152
DV31	560DV031	2.5 - 2.7	--	--	0.0077	0.0072	0.0149
DV32	560DV032	2.5 - 2.7	--	--	0.0081	0.0082	0.163
DV035	560DV035	3.5 - 3.7	--	--	--	--	--
DV036	560DV036	4.5 - 4.7	--	--	0.0061	0.005	0.0111

Table A.6-6
Sample Results for PCBs Detected above MDCs in Soils Remaining at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			0.74	0.74	0.74	0.74	
DV037	560DV037	4.5 - 4.7	--	--	--	--	--
DV038	560DV040	4.5 - 4.7	--	--	0.0024 (J)	0.0027 (J)	0.0051
DV039	560DV044	2.5 - 2.7	--	--	0.0033 (J)	0.0044	0.0077
	560DV048	4.5 - 4.7	--	--	0.0021 (J)	--	0.0021
DV041	560DV047	5.5 - 5.7	--	--	0.0043	0.0035 (J)	0.0078
DVC01	560DVC01	2.5 - 2.7	--	--	0.0162	0.0163	0.0325
DVC02	560DVC02	2.5 - 2.7	--	--	0.0032 (J)	0.0029 (J)	0.0061
DVC03	560DVC03	2.5 - 2.7	--	--	0.0046	0.0059	0.0105
DVC04	560DVC04	2.5 - 2.7	--	--	0.0026 (J)	0.0033 (J)	0.0059
DVC05	560DVC05	2.5 - 2.7	--	--	0.010	0.0098	0.0198
DVC06	560DVC06	2.5 - 2.7	--	--	0.0129	0.013	0.0259
DVC07	560DVC07	2.5 - 2.7	--	--	0.0095	0.0095	0.019
DVC08	560DVC08	2.5 - 2.7	--	--	0.0057	0.0066	0.0123
DVC09	560DVC09	2.5 - 2.7	--	--	0.0399	0.0442	0.0841
DVC10	560DVC10	2.5 - 2.7	--	--	0.0096	0.0106	0.0202

Table A.6-6
Sample Results for PCBs Detected above MDCs in Soils Remaining at CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	Total (Aroclor 1254, 1260 & 1268)
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
DVC11	560DVC11	2.5 - 2.7	--	--	0.0338	0.0354	0.0692
DVC12	560DVC12	2.5 - 2.7	--	--	0.0158	0.0156	0.0314
DVC13	560DVC13	2.5 - 2.7	--	--	0.0305	0.0377	0.0682
DVC14	560DVC14	2.5 - 2.7	--	--	0.034	0.0331	0.0671
DVC15	560DVC15	2.5 - 2.7	--	--	--	--	--
DVC16	560DVC16	2.5 - 2.7	--	--	--	--	--
DVC17	560DVC17	2.5 - 2.7	--	--	0.0016 (J)	--	0.0016
DVC18	560DVC18	2.5 - 2.7	--	--	0.0025	0.0030	0.0055
DVC19	560DVC19	2.5 - 2.7	--	--	--	--	--
DVC20	560DVC20	2.5 - 2.7	--	--	--	--	--

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

Table A.6-7
Sample Results for PCBs Detected above MDCs in Soils Removed from CAS 06-05-04, Leach Bed
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Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
D01	560D001	3.5 - 4.0	--	--	0.15 (J)	0.51 (J)	0.66
D02	560D002	8.5 - 9.0	--	--	0.18 (J)	0.34 (J)	0.52
D03	560D003	3.5 - 4.0	--	--	--	0.021	0.021
D05	560D005	5.0 - 5.5	--	--	**1.7 (J)**	**3.8 (J)**	**5.5**
D06	560D006	3.5 - 4.0	--	--	--	0.014 (J)	0.014
D07	560D007	3.5 - 4.0	--	--	0.22 (J)	0.47 (J)	0.69
D08	560D008	3.5 - 4.0	--	--	0.22	0.54	**0.76**
D09	560D009	3.5 - 4.0	--	--	0.19	0.37	0.56
D10	560D010	5.5 - 6.0	--	--	0.017 (J)	--	0.017
D11	560D011	5.5 - 6.0	--	--	--	--	--
D12	560D012	6.0 - 6.5	--	--	--	--	--
	560D013	6.0 - 6.5	--	--	--	--	--
D13	560D015	6.0 - 6.5	--	--	0.63 (J)	**1.3 (J)**	**1.93**
D15	560D019	0.0 - 0.5	--	--	**0.78 (J)**	--	**0.78**
	560D020	5.5 - 6.0	--	--	--	--	--

Table A.6-7
Sample Results for PCBs Detected above MDCs in Soils Removed from CAS 06-05-04, Leach Bed
(Page 2 of 9)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			0.74	0.74	0.74	0.74	
D16	560D025	0.0 - 0.5	--	--	**1.1 (J)**	--	**1.1**
D17	560D026	8.5 - 9.5	--	--	**1.1 (J)**	--	**1.1**
D18	560D027	0.0 - 0.5	--	--	**0.96 (J)**	--	**0.96**
	560D028	5.5 - 6.0	--	--	--	--	--
D20	560D032	0 - 0.5	--	--	0.63 (J)	--	0.63
	560D033	5.5 - 6.0	--	--	--	--	--
DL09	560DL33	4.5 - 4.7	--	--	**25.8 (J)**	**27 (J)**	**52.8**
	560DL34	3.5 - 3.7	--	--	0.0461	0.047	0.0931
	560DL35	2.5 - 2.7	--	--	0.0197	0.021	0.0407
	560DL36	1.5 - 1.7	--	--	0.0373	0.0363	0.0736
DQ15	560DQ24	0.0 - 0.5	--	--	**1.5 (J)**	--	**1.5**
	560DQ42	0.5 - 1.0	--	--	**1.2 (J)**	**1.1 (J)**	**2.3**
	560DQ53	1.3 - 1.5	--	--	0.028 (J)	--	0.028
DQ28	560DQ28	0.0 - 0.25	--	--	0.66 (J)	0.65 (J)	**1.31**
	560DQ70	0.5 - 0.7	--	--	0.34 (J)	**1.1 (J)**	**1.44**

Table A.6-7
Sample Results for PCBs Detected above MDCs in Soils Removed from CAS 06-05-04, Leach Bed
(Page 3 of 9)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
DQ31	560DQ34	0.0 - 0.25	--	--	**0.76 (J)**	**0.74 (J)**	**1.5**
	560DQ73	0.5 - 0.7	--	--	--	0.038	0.038
DQ32	560DQ36	0.0 - 0.25	--	--	0.36	0.33	0.69
	560DQ74	0.5 - 0.7	--	--	0.44 (J)	**1.3 (J)**	**1.74**
DQ33	560DQ31	0.0 - 0.25	--	--	**1.6 (J)**	**2.2 (J)**	**3.8**
	560DQ75	0.5 - 0.7	--	--	0.036	0.13	0.166
DQ34	560DD93	1.3 - 1.5	--	--	**4.67 (J)**	**4.16 (J)**	**8.83**
	560DQ37	0.0 - 0.25	--	--	**2.1 (J)**	**1.7 (J)**	**3.8**
	560DQ54	0.5 - 0.7	--	--	**9.2 (J)**	**37 (J)**	**46.2**
DQ35	560DQ39	0.0 - 0.25	--	--	**0.79 (J)**	0.7 (J)	**1.49**
	560DQ76	0.5 - 0.7	--	--	**2.1 (J)**	**6.8 (J)**	**8.9**
DQ36	560DQ40	0.0 - 0.25	--	--	**0.8 (J)**	**0.81 (J)**	**1.61**
	560DQ77	0.5 - 0.7	--	--	--	0.011 (J)	0.011

Table A.6-7
Sample Results for PCBs Detected above MDCs in Soils Removed from CAS 06-05-04, Leach Bed
(Page 4 of 9)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
DQ38	560DD91	1.3 - 1.5	--	--	**2.9 (J)**	**2.61 (J)**	**5.51**
	560DQ38	0.0 - 0.25	--	--	**2.1 (J)**	**1.8 (J)**	**3.9**
	560DQ79	0.5 - 0.7	--	--	**3.5 (J)**	**9.6 (J)**	**13.1**
DQ39	560DQ35	0.0 - 0.25	--	--	**0.97 (J)**	**0.92 (J)**	**1.89**
	560DQ78	0.5 - 0.7	--	--	0.14 (J)	0.47	0.61
DQ40	560DQ30	0.0 - 0.25	--	--	0.66 (J)	**0.75 (J)**	**1.41**
	560DQ80	0.5 - 0.7	--	--	0.66 (J)	**2.2 (J)**	**2.86**
DQ41	560DQ33	0.0 - 0.25	--	--	**0.86 (J)**	**0.76 (J)**	**1.62**
DQ43	560DQ43	0.0 - 0.25	--	--	**2.2 (J)**	--	**2.2**
	560DQ57	0.5 - 0.7	--	--	0.016 (J)	0.13	0.146
	560DQ58	0.5 - 0.7	--	--	0.02 (J)	0.086	0.106
DQ44	560DQ44	0.0 - 0.25	--	--	**180 (J)**	--	**180**
	560DQ56	0.5 - 0.7	--	--	--	0.57 (J)	0.57
	560DQ59	1.3 - 1.5	--	--	0.45 (J)	**1.4 (J)**	**1.85**

Table A.6-7
Sample Results for PCBs Detected above MDCs in Soils Removed from CAS 06-05-04, Leach Bed
(Page 5 of 9)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
DQ45	560DQ45	0.0 - 0.25	--	--	**4.6 (J)**	--	**4.6**
	560DQ55	0.5 - 0.7	--	--	0.28 (J)	**0.95 (J)**	**1.23**
DQ46	560DD92	1.3 - 1.5	--	--	**1.47 (J)**	**1.44 (J)**	**2.91**
	560DE12	2.0 - 2.2	--	--	0.0179	0.0138 (J)	0.0317
	560DQ46	0.0 - 0.25	--	--	**1.3 (J)**	--	**1.3**
	560DQ81	0.5 - 0.7	--	--	0.3 (J)	0.62 (J)	**0.92**
DQ50	560DD89	0.5 - 0.7	--	--	**1.45 (J)**	**1.31 (J)**	**2.76**
	560DQ50	0.0 - 0.25	--	--	0.55 (J)	--	0.55
DQ51	560DQ51	0.0 - 0.25	--	--	**0.96**	--	**0.96**
	560DQ82	0.5 - 0.7	--	--	0.49 (J)	**1.7 (J)**	**2.19**
DQ52	560DQ52	0.0 - 0.25	--	--	**1.2 (J)**	--	**1.2**
	560DQ83	0.5 - 0.7	--	--	0.033 (J)	0.12	0.153
DQ62	560DQ62	0.0 - 0.25	--	--	0.53 (J)	**0.99 (J)**	**1.52**
DQ63	560DQ63	0.0 - 0.25	--	--	0.37 (J)	**2.1 (J)**	**2.47**

Table A.6-7
Sample Results for PCBs Detected above MDCs in Soils Removed from CAS 06-05-04, Leach Bed
(Page 6 of 9)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
DQ64	560DD87	0.5 - 0.7	--	--	**2.06 (J)**	**1.74 (J)**	**3.8**
	560DQ64	0.0 - 0.25	--	--	0.16 (J)	0.7 (J)	**0.86**
DQ65	560DD88	0.5 - 0.7	--	--	0.327	0.286	0.613
	560DQ65	0.0 - 0.25	--	--	0.32 (J)	**0.96 (J)**	**1.28**
DQ66	560DD86	0.5 - 0.7	--	--	**1.21 (J)**	**0.937 (J)**	**2.147**
	560DD94	1.3 - 1.5	--	--	0.0527	0.0459	0.0986
	560DQ66	0.0 - 0.25	--	--	**40 (J)**	**170 (J)**	**210**
DQ71	560DD71	0.0 - 0.3	--	--	0.0346	0.0243 (J)	0.0589
DQ74	560DD74	0.3 - 0.5	--	--	0.566	0.312 (J)	**0.878**
DQ75	560DD75	0.3 - 0.5	--	--	0.443	0.27 (J)	**0.713**
DQ76	560DD76	0.0 - 0.3	--	--	**3.06 (J)**	**1.91 (J)**	**4.97**
	560DD90	0.5 - 0.7	--	--	0.281 (J)	0.221	0.502
DQ77	560DD77	0.3 - 0.5	--	--	0.49	0.289 (J)	**0.779**
	560DE10	0.5 - 0.7	--	--	0.0347	0.0309 (J)	0.0656

Table A.6-7
Sample Results for PCBs Detected above MDCs in Soils Removed from CAS 06-05-04, Leach Bed
(Page 7 of 9)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
DQ78	560DD78	0.0 - 0.3	--	--	**1**	0.617 (J)	**1.617**
	560DE11	0.5 - 0.7	--	--	**1.45 (J)**	**1.86 (J)**	**3.31**
DQ79	560DD79	0.0 - 0.3	--	--	0.452	0.4	**0.852**
	560DE08	0.5 - 0.7	--	--	0.316 (J)	0.268 (J)	0.584
DQ80	560DD80	0.0 - 0.3	--	--	**1.29 (J)**	**1.05 (J)**	**2.34**
	560DE07	0.5 - 0.7	--	--	0.318 (J)	0.269 (J)	0.587
DQ81	560DD81	0.0 - 0.3	--	--	**0.825 (J)**	0.724 (J)	**1.549**
	560DE09	0.5 - 0.7	0.0562 (J)	0.17 (J)	0.509 (J)	0.452 (J)	**1.131**
DQ86	560DE05	0.0 - 0.25	--	--	0.505 (J)	0.464 (J)	**0.969**
	560DE06	0.0 - 0.25	--	--	0.454 (J)	0.413 (J)	**0.867**
	560DE16	0.5 - 0.7	--	--	0.179 (J)	0.122	0.301
DV004	560DV004	1.5 - 1.7	--	--	**7.04 (J)**	**5.73 (J)**	**12.77**
DV007	560DV007	1.5 - 1.7	--	--	**2.04 (J)**	**2.3 (J)**	**4.34**
DV008	560DV008	1.5 - 1.7	--	--	**2.69 (J)**	**2.12 (J)**	**4.81**
DV010	560DV010	1.5 - 1.7	--	--	**0.922 (J)**	**0.765 (J)**	**1.687**

Table A.6-7
Sample Results for PCBs Detected above MDCs in Soils Removed from CAS 06-05-04, Leach Bed
(Page 8 of 9)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			0.74	0.74	0.74	0.74	
DV011	560DV011	1.5 - 1.7	--	--	**4.55 (J)**	**3.57 (J)**	**8.12**
DV012	560DV012	1.5 - 1.7	--	--	0.637 (J)	0.546 (J)	**1.183**
DV016	560DV016	1.5 - 1.7	--	--	**0.786 (J)**	**0.714 (J)**	**1.5**
DV022	560DV022	1.5 - 1.7	--	--	0.254	0.223	0.477
DV26	560DV026	2.5 - 2.7	--	--	**18.20 (J)**	**17.7 (J)**	**35.90**
DV27	560DV027	2.5 - 2.7	--	--	**4.85 (J)**	**4.86 (J)**	**9.71**
DV29	560DV029	2.5 - 2.7	--	--	**19.5 (J)**	**18.2 (J)**	**37.7**
DV033	560DV033	3.5 - 3.7	--	--	**6.04 (J)**	**5.88 (J)**	**11.92**
DV034	560DV034	3.5 - 3.7	--	--	**1.51 (J)**	**1.27 (J)**	**2.78**
DV038	560DV038	2.5 - 2.7	--	--	**1.38 (J)**	**1.38 (J)**	**2.76**
	560DV039	3.5 - 3.7	--	--	**8.32 (J)**	**8.25 (J)**	**16.57**
DV039	560DV045	3.5 - 3.7	--	--	**9.72 (J)**	**10.5 (J)**	**20.22**
DV040	560DV046	4.5 - 4.7	--	--	**3.54 (J)**	**3.37 (J)**	**6.91**

Table A.6-7
Sample Results for PCBs Detected above MDCs in Soils Removed from CAS 06-05-04, Leach Bed
(Page 9 of 9)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
DV041	560DV041	2.5 - 2.7	--	--	0.0088	0.0086	0.0174
	560DV042	3.5 - 3.7	--	--	0.0587	0.0597	0.1184
	560DV043	4.5 - 4.7	--	--	0.64 (J)	0.66 (J)	**1.3**

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

Bold indicates the value is equal to or exceeds the FAL.

A.6.2.6 Pesticides

Analytical results for pesticides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.6-8. No pesticides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

Table A.6-8
Sample Results for Pesticides Detected above MDCs
at CAS 06-05-04, Leach Bed

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)		
			4,4'-DDE	Chlordane	Delta-BHC
FALs[a]			7	6.5	0.36
D02	560D002	8.5 - 9.0	--	0.032	--
D07	560D007	3.5 - 4.0	--	--	0.0038 (J)
D08	560D008	3.5 - 4.0	0.007 (J)	--	--
D09	560D009	3.5 - 4.0	--	--	0.0035 (J)

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

A.6.2.7 Gamma-Emitting Radionuclides

Analytical results for gamma-emitting radionuclides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.6-9. No radionuclides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

A.6.3 Nature and Extent of Contamination

Based on the analytical results for soil samples collected within CAS 06-05-04, the only COC identified was PCBs. Analytical results from Decision II soil samples determined the extent of PCB contamination identified in soils within and surrounding septic system components and in the Area 6 yard. The Decision II samples provided the boundaries for a soil-removal action implemented as part of the closure in place corrective action. Combining the results from sample locations remaining after the soil removal with the results from subsequent sampling during and after the soil-removal action

Table A.6-9
Sample Results for Gamma-Emitting Radionuclides Detected above MDCs at CAS 06-05-04, Leach Bed

Sample Location	Sample Number	Depth (ft bgs)	COPCs (pCi/g)				
			Ac-228	Eu-154	Pb-212	Pb-214	Tl-208
FALs			5[a]	5.4[b]	5[a]	5[a]	5[a]
D01	560D001	3.5 - 4.0	--	--	0.72	--	--
D02	560D002	8.5 - 9.0	--	--	0.97	--	--
D03	560D003	3.5 - 4.0	--	--	0.65 (J)	--	--
D04	560D004	9.5 - 10.0	--	--	0.42	0.45 (J)	0.21
D05	560D005	5.0 - 5.5	--	--	--	0.78 (J)	--
D06	560D006	3.5 - 4.0	--	--	0.65	--	--
D07	560D007	3.5 - 4.0	--	--	0.63	--	--
D08	560D008	3.5 - 4.0	0.62	--	0.701	0.514 (J)	0.232
D09	560D009	3.5 - 4.0	0.69	--	0.75	0.53 (J)	0.281
D10	560D010	5.5 - 6.0	0.47	--	0.566 (J)	0.39 (J)	0.171
D11	560D011	5.5 - 6.0	0.56	--	0.78 (J)	0.45 (J)	0.227
D12	560D012	6.0 - 6.5	--	0.62	0.6 (J)	0.4 (J)	--
	560D013	6.0 - 6.5	--	--	0.69 (J)	0.52 (J)	--
	560D014	7.5 - 8.0	--	--	0.5 (J)	0.43 (J)	--
D13	560D015	6.0 - 6.5	--	--	0.65 (J)	0.41 (J)	0.194
	560D016	7.5 - 8.0	--	--	0.69 (J)	0.51 (J)	--
D17	560D026	8.5 - 9.5	0.86	--	0.96 (J)	0.7 (J)	0.317

[a]Taken from the general guidelines for residual concentration of Ac-228, Bi-213, Pb-212, Pb-214, Tl-208, and Th-232, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993).
[b]Taken from the construction, commercial, industrial land-use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 25-mrem/yr dose.

J = Estimated value
-- = Not detected above MDCs.

(Table A.6-6), it is shown that no PCBs exceeding the FAL remain in the soil-removal areas. These same combined results also define the extent of remaining PCB contamination in soils adjacent to and beneath Building CP-162. The area of PCB concentrations exceeding the FAL is included in the UR applied to this CAS. Therefore, the nature and extent of contamination has been satisfied.

A.6.4 Revised Conceptual Site Model

Subsurface soils impacted by PCB contamination are located predominantly in disturbed areas where the distribution box and septic tank components were installed and the septic tank later abandoned. The only portion of the leach bed with elevated PCBs is the northwestern corner. Additional surface and subsurface soils impacted by PCB contamination extend beyond the immediate area of the CAS components and into the Area 6 yard. Decision II step-out locations delineated the vertical and lateral extent of subsurface PCB-impacted soil. Information gathered during the CAI supports the revised CSM as presented in the CAU 560 CAIP and ROTC No. 1 (NNSA/NSO, 2008). Therefore, no further revision is necessary.

A.7.0 CAS 06-59-03, Building CP-400 Septic System, Investigation Results

Corrective Action Site 06-59-03 is located in Area 6 at the former CP-400 building. The CAS consisted of a septic system that serviced the former building. Several components were identified in the CAIP for investigation, including the septic system components (i.e., septic tank), former filter box location, and the dry well drain line. Additional detail of the CAS history is provided in the CAIP (NNSA/NSO, 2008).

A.7.1 CAIP Activities

A total of 17 characterization samples were collected during investigation activities at CAS 06-59-03. The sample IDs, locations, types, and analyses are listed in Table A.7-1. The specific CAI activities conducted to satisfy the CAIP requirements at this CAS are described in the following sections.

A.7.1.1 Visual Inspections

Features associated with the sewer system observed from the surface consisted of a steel-constructed septic tank that had partially caved in and associated aboveground piping along the east-facing slope. The eastern chamber of the tank had collapsed, and a hole remained into the western chamber where dry tank materials were observed. A building pad drain was visible but inaccessible to the video mole and appeared plugged. Excavation using a backhoe exposed three separate drain lines associated with the septic system. The three lines consist of a 6-in. diameter VCP from the building to the former filter box location, a 2-in. diameter steel dry well drain line from the building to the septic tank, and a 4-in. steel sewer line from the building to the septic tank. The dry well drain line entered the western chamber of the septic tank as opposed to bypassing the tank as shown in engineering drawings. All lines were intact; however, because the 2-in. dry well line was located only 6 to 12 in. bgs and directly above the sewer line, it was breached during the excavation. No residual wastes were inside the pipe. Further excavation by backhoe exposed the septic tank inlet and outlet pipes and northern side of the tank for inspection and sampling. The entire tank is rusted and corroded, resulting in significant deterioration of structural integrity of the tank.

Table A.7-1
Samples Collected at CAS 06-59-03, Building CP-400 Septic System
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	TCLP Metals	TCLP Pesticides	TCLP SVOCs	TCLP VOCs	VOCs
E01	560E001	5.0 - 5.5	Solid	PSM	X	X	X	X	X	X	X	X	X	X	X
E02	560E002	2.0 - 2.5	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
E03	560E003	1.0 - 1.5	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
E04	560E004	3.5 - 4.0	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
E05	560E005	4.0 - 4.5	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
E06	560E006	4.0 - 4.5	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
E07	560E007	2.5 - 3.0	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
E08	560E008	3.0 - 3.5	Soil	Environmental	X	X	X	X	X	X	--	--	--	--	X
E09	560E009	2.0 - 2.5	Soil	Environmental	--	--	--	--	--	X	--	--	--	--	--
	560E010	3.5 - 4.0	Soil	Environmental	--	--	--	--	--	X	--	--	--	--	--
	560E011	5.0 - 5.5	Soil	Environmental	--	--	--	--	--	X	--	--	--	--	--
E10	560E012	2.0 - 2.5	Soil	Environmental	--	--	--	--	--	X	--	--	--	--	--
	560E013	3.5 - 4.0	Soil	Environmental	--	--	--	--	--	X	--	--	--	--	--
	560E014	5.0 - 5.5	Soil	Environmental	--	--	--	--	--	X	--	--	--	--	--

Table A.7-1
Samples Collected at CAS 06-59-03, Building CP-400 Septic System
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	TCLP Metals	TCLP Pesticides	TCLP SVOCs	TCLP VOCs	VOCs
E11	560E015	2.5 - 3.0	Soil	Environmental	--	--	--	--	--	X	--	--	--	--	--
	560E016	3.5 - 4.0	Soil	Environmental	--	--	--	--	--	X	--	--	--	--	--
	560E017	5.0 - 5.5	Soil	Environmental	--	--	--	--	--	X	--	--	--	--	--
EV01	560EV01	3.5 - 3.7	Soil	Verification	--	--	--	--	--	X	--	--	--	--	--
EV02	560EV02	3.5 - 3.7	Soil	Verification	--	--	--	--	--	X	--	--	--	--	--
EV03	560EV03	3.5 - 3.7	Soil	Verification	--	--	--	--	--	X	--	--	--	--	--
N/A	560E301	NA	Water	Trip Blank	--	--	--	--	--	--	--	--	--	--	X
N/A	560E302	NA	Water	Trip Blank	--	--	--	--	--	--	--	--	--	--	X
N/A	560E303	NA	Water	Trip Blank	--	--	--	--	--	--	--	--	--	--	X

-- = Not required

Exposure of the filter box line confirmed the absence of the filter box feature on the southern slope. The VCP ended at the slope, was open, and contained no residual materials. The dry well aboveground piping was investigated by hand excavating where the piping enters the soil mound present at the base of the slope to aid in locating the dry well feature. Stained soil was encountered within the soil mound adjacent to the pipe, which ended and was capped within the mound. Additional hand excavation did not encounter the dry well feature; therefore, it is assumed the dry well was never installed or had been removed. Figure A.7-1 shows the locations and configuration of the components identified for the Building CP-400 septic system.

A walkover was conducted around the septic tank, former filter box area, and dry well area to identify additional surface sample locations based on biasing factors (i.e., staining). No additional biased sample locations were identified.

A.7.1.2 Video Surveys

Video surveys were not conducted on the septic system inlet piping because the integrity and configuration of the sewer lines, dry well line, and filter box lines were visible when exposed through excavation. Video survey was not feasible on the outlet pipe and aboveground dry well piping and, therefore, was not conducted.

A.7.1.3 Field Screening

Investigation samples were field screened for alpha and beta/gamma radiation. The FSRs were compared to FSLs to guide subsequent sampling decisions where appropriate. None of the samples collected at CAS 06-59-03 exceeded alpha or beta/gamma radiation FSLs.

A.7.1.4 Sample Collection

Decision I environmental sampling activities included the collection of surface and subsurface soil samples surrounding the septic system components at this CAS, including the former locations of the filter box and dry well.

Sample 560E001 was collected from materials in the western, uncollapsed chamber of the septic tank for PSM determination. Excavation confirmed the filter box system is no longer present; however,

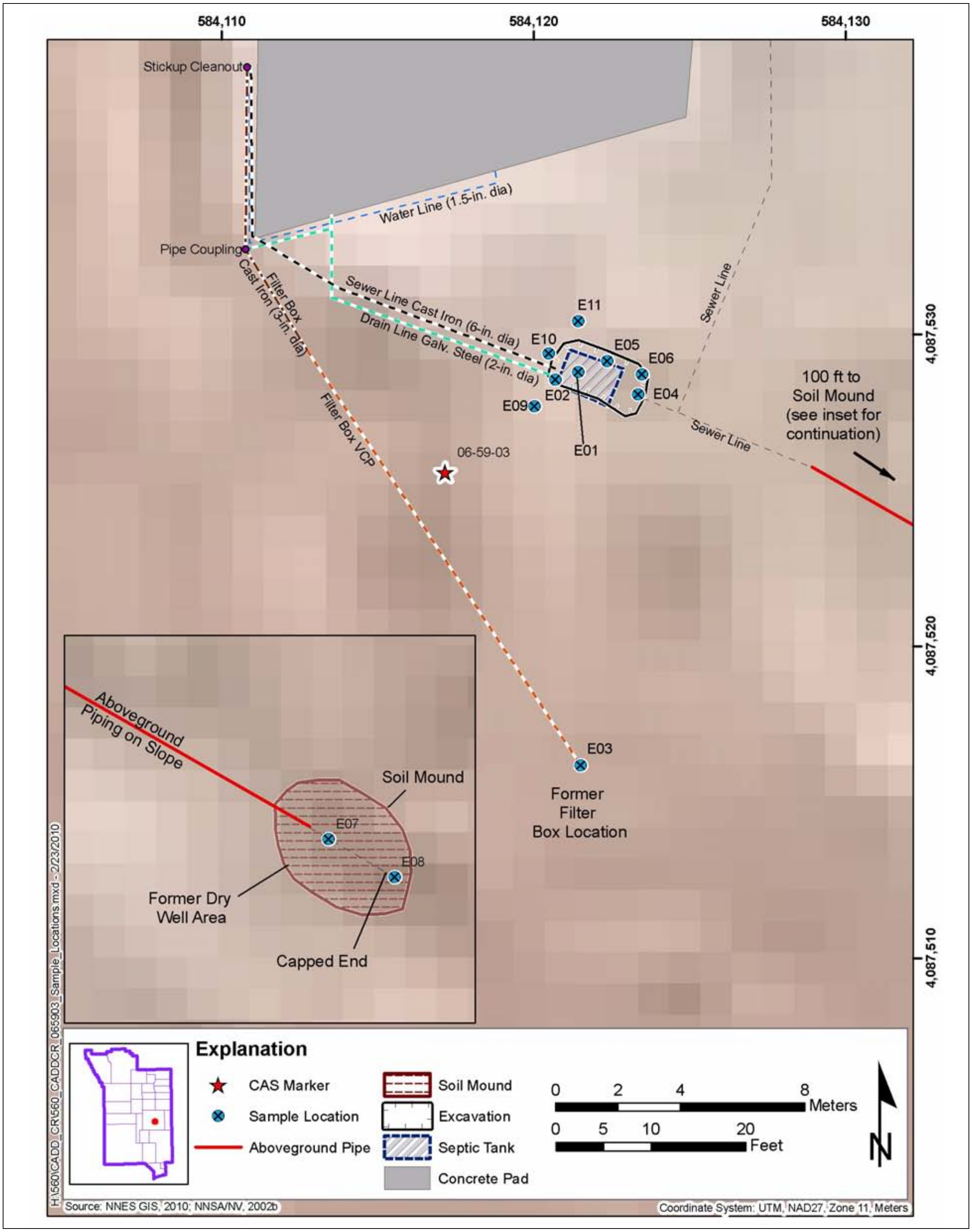

Figure A.7-1
Site Map and Sample Locations at CAS 06-59-03, Building CP-400 Septic System

the VCP connecting the building to the former filter box was present so one sample (560E003) was collected from the interval (1 to 1.5 ft bgs) where the filter box VCP ends on the southern slope (location E03) to determine whether there have been any releases. Samples were collected directly below the two inlet pipes (location E02), the outlet pipe (location E04), and from soil near the base of the septic tank. The two samples near the base of the tank were located at the center chamber wall and eastern tank end (locations E05 and E06) where breaches were visible. Two biased locations were identified while exposing the dry well aboveground piping within the soil mound at the base of the slope. One sample was collected in soil above the dry well piping based on green stains observed near the middle of the mound (location E07). The second biased location (E08) within the soil mound was at the capped end of the dry well piping, which also contained green staining.

Decision II samples were collected at this CAS to bound SVOCs that exceeded FALs. Three step-out locations (E09, E10, and E11) were drilled approximately 5 ft from the inlet end of the tank to collect subsurface samples at depths of 2, 3.5, and 5 ft bgs to bound COCs identified in soil near the inlet pipe and PSM inside the western chamber of the tank.

Three verification samples were collected at locations EV01, EV02, and EV03 during closure activities at a depth of 3.7 ft bgs. The locations are presented in Figure A.7-1, and additional details are presented in Section D.1.5.

A.7.1.5 Deviations

Except where noted below, investigation samples were collected as outlined in the CAU 560 CAIP (NNSA/NSO, 2008) and submitted for laboratory analysis. A deviation was required during the collection of soil samples at the base of the tank to confirm the structural integrity. The tank is embedded into bedrock, which prohibited the backhoe from excavating to the bottom of the tank. However, because the integrity of the tank was visibly breached in multiple locations due to corrosion, two biased samples (locations E05 and E06) were collected along the north side of the tank approximately 1.5 ft above the base, in areas where the tank could have released effluent to the surrounding soils.

A.7.2 Investigation Results

The following sections provide analytical results from the samples collected to complete investigation activities as outlined in the CAIP (NNSA/NSO, 2008). Investigation samples were analyzed for the CAIP-specified COPCs, which included VOCs, SVOCs, TPH-DRO, RCRA metals, beryllium, pesticides, PCBs, and gamma-emitting radionuclides. The analytical parameters and laboratory methods used to analyze the investigation samples are listed in Table A.2-2. Table A.7-1 lists the sample-specific analytical suite for CAS 06-59-03. The waste characterization analytical results for TCLP VOCs, TCLP SVOCs, TCLP metals, and TCLP pesticides are discussed in Section A.10.0.

Analytical results from the soil samples with concentrations exceeding MDCs are summarized in the following sections. An evaluation was conducted on all contaminants detected above MDCs by comparing individual concentration or activity results against the FALs. Establishment of the FALs is presented in Appendix C.

A.7.2.1 Volatile Organic Compounds

None of the analytical results for VOCs in soil samples collected at this CAS was detected above MDCs. The FALs were established at the PAL concentrations.

A.7.2.2 Semivolatile Organic Compounds

Analytical results for SVOCs in soil samples collected before and after soil-removal actions, that were detected above MDCs are presented in Table A.7-2. Benzo(a)pyrene was detected at concentrations exceeding the PAL. The FALs were established at the PAL concentrations; therefore, benzo(a)pyrene is considered a COC. A soil-removal action was implemented to remove contaminated soil and PSM at locations E01 and E02, and Table A.7-2 (see lower section – Results after Soil Removal) shows no benzo(a)pyrene remains at this CAS based on samples collected after the corrective action.

After soil-removal actions at this CAS, verification samples 560EV01 through EV03 were collected. Only one sample (560EV03) had a detection for benzo(a)pyrene above the MDC at a concentration of

Table A.7-2
Sample Results for Total SVOCs Detected above MDCs at CAS 06-59-03, Building CP-400 Septic System

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)														
			2,4-Dinitrotoluene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate	Carbazole	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene
FALs[a]			1,200	100,000	2.1	0.21	2.1	29,000	21	120	86	210	0.21	22,000	2.1	100,000	29,000
Results before Soil Removal																	
E02	560E002	2.0 - 2.5	--	0.16 (J)	0.95	**0.92**	1.3	0.36	0.45	0.086 (J)	0.15 (J)	0.94	0.12 (J)	1.8	0.39	0.88	1.6
E03	560E003	1.0 - 1.5	--	--	--	--	--	--	--	0.89 (J)	--	--	--	--	--	--	--
E06	560E006	4.0 - 4.5	--	--	--	--	--	--	--	0.088 (J)	--	--	--	--	--	--	--
E10	560E012	2.0 - 2.5	0.1 (J)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
E11	560E015	2.5 - 3.0	0.074 (J)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	560E016	3.5 - 4.0	0.072 (J)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	560E017	5.0 - 5.5	0.31 (J)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Results after Soil Removal																	
EV03	560EV03	3.5 - 3.7	--	--	--	0.119	--	--	--	--	--	--	--	--	--	--	--

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

Bold indicates the value is equal to or exceeds the FAL.

0.119, which is below the FAL. Additional details regarding verification sampling and soil-removal actions are presented in Appendix D.

A.7.2.3 Total Petroleum Hydrocarbons

Analytical results for TPH-DRO in soil samples collected at this CAS that were detected above MDCs are presented in Table A.7-3. One soil sample collected at the former filter box location (location E03, sample 560E003) exceeded the PAL of 100 mg/kg for TPH-DRO. No FAL was established for TPH-DRO. Instead, FALs were established for the individual hazardous constituents of TPH-DRO and are reported in the VOC and SVOC sections.

Table A.7-3
Sample Results for TPH-DRO Detected above MDCs at CAS 06-59-03, Building CP-400 Septic System

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			DRO
PALs[a]			100
E02	560E002	2.0 - 2.5	11
E03	560E003	1.0 - 1.5	**380**
E04	560E004	3.5 - 4.0	7.8
E05	560E005	4.0 - 4.5	32
E06	560E006	4.0 - 4.5	3.4 (J)

[a]Based on “Contamination of Soil: Establishment of Action Levels” (NAC, 2006).

J = Estimated value

Bold indicates the value is equal to or exceeds the PAL.

A.7.2.4 RCRA Metals and Beryllium

Analytical results for RCRA metals and beryllium in soil samples collected at this CAS that were detected above MDCs are presented in Table A.7-4. No metals were detected at concentrations exceeding their PALs. The FALs were established at the PAL concentrations.

Table A.7-4
Sample Results for Metals Detected above MDCs
at CAS 06-59-03, Building CP-400 Septic System

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)							
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Silver
FALs			23[a]	67,000[b]	1,900[b]	450[b]	450[b]	800[b]	310[b]	5,100[b]
E02	560E002	2.0 - 2.5	5.3	98	0.75	0.36	6.1 (J)	80	0.0014 (J-)	0.74
E03	560E003	1.0 - 1.5	6.2	82	0.8	1	80 (J)	40	0.0019 (J-)	180
E04	560E004	3.5 - 4.0	6	94	0.68	1.2	9.5 (J)	45	0.0035	29
E05	560E005	4.0 - 4.5	4.1	130	0.58	0.59	5.2 (J)	9.7	0.0015 (J-)	72
E06	560E006	4.0 - 4.5	5.1	120	0.63	0.96	9.3 (J)	16	0.0015 (J-)	73
E07	560E007	2.5 - 3.0	4.9	87	0.92	1.3	17 (J)	12	0.0082	210
E08	560E008	3.0 - 3.5	2	83	0.99	0.85	14 (J)	12	0.0041	93

[a]Based on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the NBMG throughout the NTS and NTTR (NBMG, 1998; Moore, 1999).
[b]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
J- = The result is an estimated quantity, but the result may be biased low.

A.7.2.5 Polychlorinated Biphenyls

Analytical results for PCBs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.7-5. No PCBs were detected at concentrations exceeding the PAL. The FAL was established at the PAL concentration.

A.7.2.6 Pesticides

Analytical results for pesticides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.7-6. No pesticides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

Table A.7-5
Sample Results for PCBs Detected above MDCs at CAS 06-59-03, Building CP-400 Septic Systems

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			Aroclor 1260
FALs[a]			0.74
E02	560E002	2.0 - 2.5	0.0091 (J)
E03	560E003	1.0 - 1.5	0.0088 (J)
E04	560E004	3.5 - 4.0	0.028

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value

Table A.7-6
Sample Results for Pesticides Detected above MDCs at CAS 06-59-03, Building CP-400 Septic System

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)					
			4,4'-DDD	4,4'-DDE	4,4'-DDT	Chlordane	Dieldrin	Endosulfan Sulfate
FALs[a]			10	7	7	6.5	0.11	3,700
E02	560E002	2.0 - 2.5	0.0048 (J)	--	0.0089 (J)	0.066 (J)	--	0.0058 (J)
E03	560E003	1.0 - 1.5	0.017 (J)	0.0097 (J)	0.055 (J)	0.1 (J)	0.01 (J)	0.0042 (J)
E04	560E004	3.5 - 4.0	0.0056 (J)	0.0086 (J)	0.066 (J)	0.059 (J)	--	0.0045 (J)
E05	560E005	4.0 - 4.5	0.0025 (J)	--	0.0075 (J)	--	--	--
E06	560E006	4.0 - 4.5	0.0028 (J)	0.0054 (J)	0.011	0.033 (J)	--	--
E07	560E007	2.5 - 3.0	0.01 (J)	0.0072 (J)	0.0044	0.034	0.0062	--
E08	560E008	3.0 - 3.5	0.0049 (J)	0.0038 (J)	0.00095 (J)	0.015 (J)	0.0014 (J)	--

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

A.7.2.7 Gamma-Emitting Radionuclides

Analytical results for gamma-emitting radionuclides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.7-7. No radionuclides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

Table A.7-7
Sample Results for Gamma-Emitting Radionuclides Detected above MDCs at CAS 06-59-03, Building CP-400 Septic System

Sample Location	Sample Number	Depth (ft bgs)	COPCs (pCi/g)						
			Ac-228	Am-241	Cs-137	Pb-212	Pb-214	Tl-208	Th-234
FALs			5[a]	12.7[b]	12.2[b]	5[a]	5[a]	5[a]	105[b]
E02	560E002	2.0 - 2.5	1.34	--	--	1.57	1.02 (J)	0.482	--
E03	560E003	1.0 - 1.5	1.95	--	--	1.99 (J)	1.14 (J)	0.592	2.69 (J)
E04	560E004	3.5 - 4.0	1.65	--	--	1.69 (J)	1.11 (J)	0.563	1.96 (J)
E05	560E005	4.0 - 4.5	1.89	--	--	2.01 (J)	1.21 (J)	0.626	2.21 (J)
E06	560E006	4.0 - 4.5	1.7	--	--	1.63 (J)	1.08 (J)	0.547	2.41 (J)
E07	560E007	2.5 - 3.0	1.27	--	0.117	1.3 (J)	0.75 (J)	0.442	1.32 (J)
E08	560E008	3.0 - 3.5	1.3	0.228 (J)	0.142	1.47 (J)	0.92 (J)	0.507	1.82 (J)

[a]Taken from the general guidelines for residual concentration of Ac-228, Bi-213, Pb-212, Pb-214, Tl-208, and Th-232, as found in Chapter IV of DOE Order 5400.5, Change 2, “Radiation Protection of the Public and Environment.” (DOE, 1993).
[b]Taken from the construction, commercial, industrial land-use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 25-mrem/yr dose.

J = Estimated value
-- = Not detected above MDCs.

A.7.2.8 Potential Source Material

Inspection of the western inlet chamber of the septic tank determined that wastes were present within the tank on the bottom. A sample was collected to determine whether the contents were PSM. The analytical results are presented in Table A.7-8. Laboratory analysis determined that results for VOCs, TPH-DRO, SVOCs, metals, pesticides, and gamma-emitting radionuclides were detected above MDCs. The sample exceeded PSM criteria for benzo(a)pyrene. Based on the analytical results

Table A.7-8
Potential Source Material Results Detected above MDCs
at CAS 06-59-03, Building CP-400 Septic System (Removed during Corrective Action)
(Page 1 of 2)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Criteria[a]	Units
E01	560E001	Solid	DRO	400	N/A[b]	mg/kg
			Arsenic	7.3	23	
			Barium	120	67,000	
			Beryllium	0.62	1,900	
			Cadmium	3.6	450	
			Chromium	11	450	
			Lead	40	800	
			Mercury	0.6	310	
			Selenium	1.7 (J+)	5,100	
			Silver	250	5,100	
			1,4-Dichlorobenzene	0.016	7.9	
			Benzo(a)anthracene	0.38 (J)	2.1	
			Benzo(a)pyrene	**0.47 (J)**	0.21	
			Benzo(b)fluoranthene	0.64 (J)	2.1	
			Benzo(g,h,i)perylene	0.35 (J)	29,000	
			Benzo(k)fluoranthene	0.33 (J)	21	
			Chrysene	0.45 (J)	210	
			Fluoranthene	0.49 (J)	22,000	
			Indeno(1,2,3,3-cd)pyrene	0.2 (J)	2.1	
			Phenanthrene	0.16 (J)	100,000	
			Pyrene	0.55 (J)	29,000	
			Pb-212	1.75	5	pCi/g
			Tl-208	0.5	5	

Table A.7-8
Potential Source Material Results Detected above MDCs
at CAS 06-59-03, Building CP-400 Septic System (Removed during Corrective Action)
(Page 2 of 2)

Sample Location	Sample Number	Sample Matrix	Parameter	Result	Criteria[a]	Units
E01	560E001	Solid	4,4'-DDE	0.052 (J)	7	mg/kg
			4,4'-DDT	0.0096 (J)		
			Chlordane	0.47 (J)	6.5	
			Heptachlor epoxide	0.0027 (J)	0.19	

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)
[b]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

J = Estimated value
J+ = The result is an estimated quantity, but the result may be biased high.

Bold indicates the value is equal to or exceeds the PSM criteria.

for benzo(a)pyrene, the contents of the septic tank are considered PSM. Materials from which all samples were collected were removed as part of the corrective action.

A.7.3 Nature and Extent of Contamination

Based on the analytical results for the septic tank solid sample (PSM) and soil collected at the inlet pipe, benzo(a)pyrene was identified as a COC. The corrective action implemented at this CAS included the removal of benzo(a)pyrene-impacted PSM and soil at locations E01 and E02. As shown in Table A.7-2 (see lower section – Results after Soil Removal), no benzo(a)pyrene remains at CAS 06-59-03 at concentrations exceeding the FAL.

A.7.4 Revised Conceptual Site Model

The CAIP requirements were met at this CAS, and no revisions were necessary to the CSM.

A.8.0 CAS 06-59-04, Office Trailer Complex Sewage Pond, Investigation Results

Corrective Action Site 06-59-04 is located in Area 6. The CAS consists of a sewage pond and surrounding soil potentially impacted by septic system effluent releases. Subsurface piping was initially identified in the CAIP as part of the septic system; however, visual inspection confirmed the piping had been removed during abandonment. Additional detail is provided in the CAIP (NNSA/NSO, 2008).

A.8.1 CAIP Activities

A total of four characterization samples were collected during investigation activities at CAS 06-59-04. The sample IDs, locations, types, and analyses are listed in Table A.8-1. The specific CAI activities conducted to satisfy the CAIP requirements at this CAS are described in the following sections.

Table A.8-1
Samples Collected at CAS 06-59-04, Office Trailer Complex Sewage Pond

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Metals	PCBs	Pesticides	SVOCs	VOCs
F01	560F001	0.0 - 0.5	Soil	Environmental	X	X	X	X	X	X	X
	560F002	8.5 - 9.0	Soil	Environmental	X	X	X	X	X	X	X
	560F003	10.0 - 10.5	Soil	Environmental	X	X	X	X	X	X	X
F02	560F004	4.5 - 5.0	Soil	Environmental	X	X	X	X	X	X	X
N/A	560F301	N/A	Water	Trip Blank	--	--	--	--	--	--	X
N/A	560F302	N/A	Water	Field Blank	X	X	X	X	X	X	X
N/A	560F303	N/A	Water	Trip Blank	--	--	--	--	--	--	X

-- = Not required

A.8.1.1 Visual Inspections

No septic system features other than the sewage pond were identified during the investigation. Exploratory trenches in three locations (one within the sewage pond) confirmed the absence/removal of the abandoned subsurface piping leading to the sewage pond. No liner was identified within the sewage pond.

A walkover was conducted on the surface of the sewage pond to identify the lowest surface point to collect a biased surface sample in accordance with the CAIP. No additional biased sample locations were identified.

A.8.1.2 Video Surveys

Video surveys were not conducted at this CAS, as there was no piping identified.

A.8.1.3 Field Screening

Investigation samples were field screened for alpha and beta/gamma radiation. The FSRs were compared to FSLs to guide subsequent sampling decisions where appropriate. None of the samples collected at CAS 06-59-04 exceeded alpha or beta/gamma radiation FSLs.

A.8.1.4 Sample Collection

Decision I environmental sampling activities included the collection of surface and subsurface soil samples within the sewage pond and one confirmation sample within an exploratory trench excavated to confirm the absence of the subsurface piping (Figure A.8-1).

Per the CAIP, the lowest spot on the surface of the sewage pond was selected as a biased sample location (F01) where one soil sample was collected of the material covering the pond (560F001). Subsurface soils at location F01 were exposed via backhoe excavation to identify features of the sewage pond and collect samples in a similar location where the outlet pipe may have existed. One sample (560F002) was collected at the interface of backfill material and sewage pond materials at a depth of 8.5 ft bgs. Staining was visible within the sewage pond materials. One sample (560F003) was collected at the interface of the pond material and native soil interface at a depth of 10 ft bgs. During the exploratory trenching to confirm the absence of subsurface piping, a confirmation sample

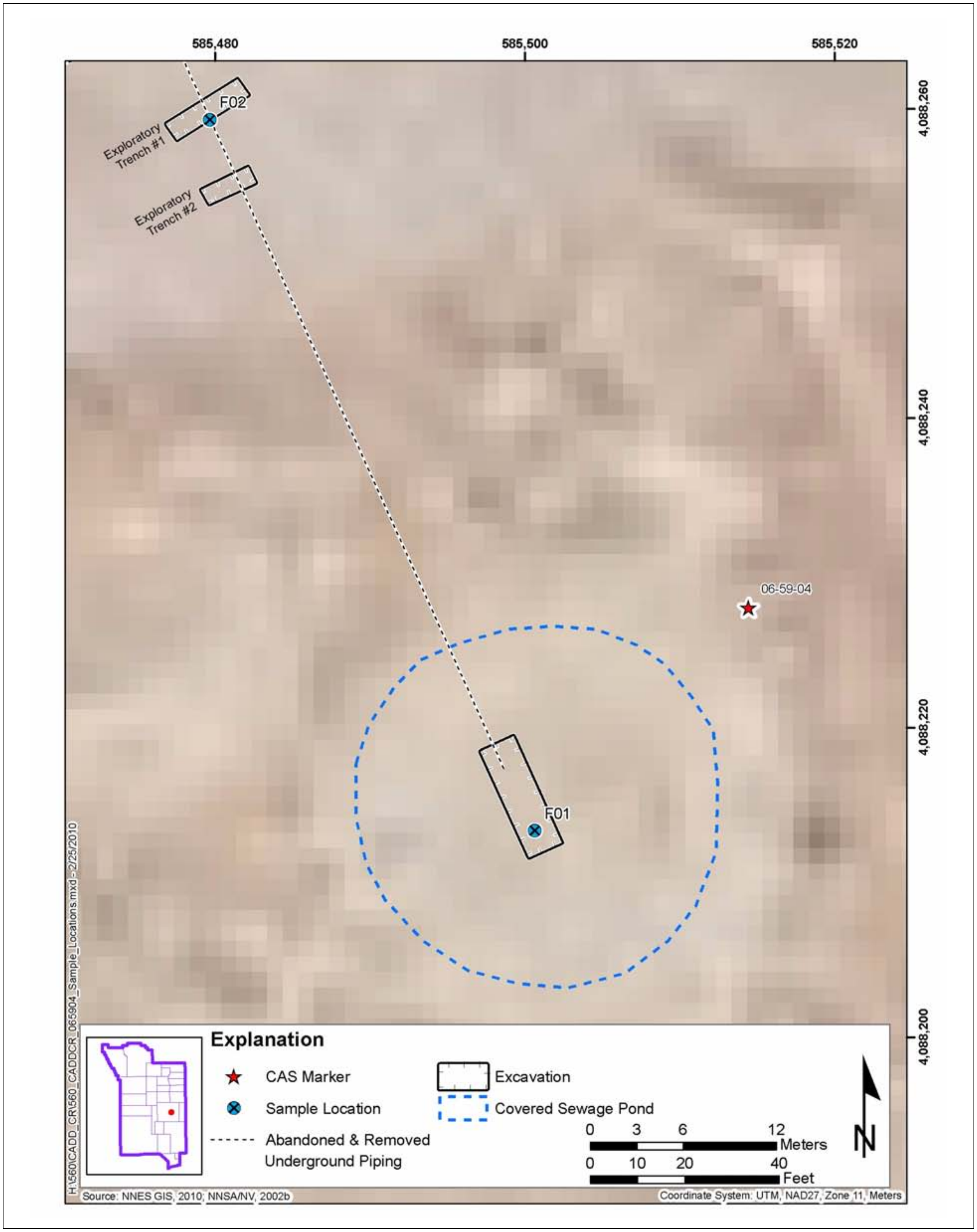

Figure A.8-1
Site Map and Sample Locations at CAS 06-59-04, Office Trailer Complex Sewage Pond

(560F004) was collected in native soil at location F02. All sample locations are shown on Figure A.8-1.

Decision II samples were not collected at this CAS, as no COPCs exceeded FALs.

A.8.1.5 Deviations

Investigation samples were collected as outlined in the CAU 560 CAIP (NNSA/NSO, 2008) with no deviations and submitted for laboratory analysis.

A.8.2 Investigation Results

The following sections provide analytical results from the samples collected to complete investigation activities as outlined in the CAIP (NNSA/NSO, 2008). Investigation samples were analyzed for the CAIP-specified COPCs, which included VOCs, SVOCs, TPH-DRO, RCRA metals, beryllium, pesticides, PCBs, and gamma-emitting radionuclides. The analytical parameters and laboratory methods used to analyze the investigation samples are listed in Table A.2-2. Table A.8-1 lists the sample-specific analytical suite for CAS 06-59-04.

Analytical results from the soil samples with concentrations exceeding MDCs are summarized in the following sections. An evaluation was conducted on all contaminants detected above MDCs by comparing individual concentration or activity results against the FALs. Establishment of the FALs is presented in Appendix C.

A.8.2.1 Volatile Organic Compounds

None of the analytical results for VOCs in soil samples collected at this CAS was detected above MDCs. The FALs were established at the PAL concentrations.

A.8.2.2 Semivolatile Organic Compounds

Analytical results for SVOCs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.8-2. No SVOCs were detected at concentrations exceeding the respective PALs. The FALs were established at the PAL concentrations.

Table A.8-2
Sample Results for Total SVOCs Detected above MDCs
at CAS 06-59-04, Office Trailer Complex Sewage Pond

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			Bis(2-ethylhexyl)phthalate
FALs[a]			120
F01	560F002	8.5 - 9.0	0.089 (J)

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value

A.8.2.3 Total Petroleum Hydrocarbons

Analytical results for TPH-DRO in soil samples collected at this CAS that were detected above MDCs are presented in Table A.8-3. No samples exceeded the PAL of 100 mg/kg for TPH-DRO. No FAL was established for TPH-DRO. Instead, FALs were established for the individual hazardous constituents of TPH-DRO and are reported in the VOC and SVOC sections.

Table A.8-3
Sample Results for TPH-DRO Detected above MDCs
at CAS 06-59-04, Office Trailer Complex Sewage Pond

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			DRO
PALs[a]			100
F01	560F002	8.5 - 9.0	25

[a]Based on “Contamination of Soil: Establishment of Action Levels” (NAC, 2006).

A.8.2.4 RCRA Metals and Beryllium

Analytical results for RCRA metals and beryllium in soil samples collected at this CAS that were detected above MDCs are presented in Table A.8-4. No metals were detected at concentrations exceeding their PALs. The FALs were established at the PAL concentrations.

Table A.8-4
Sample Results for Metals Detected above MDCs
at CAS 06-59-04, Office Trailer Complex Sewage Pond

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)							
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Silver
FALs			**23[a]**	**67,000[b]**	**1,900[b]**	**450[b]**	**450[b]**	**800[b]**	**310[b]**	**5,100[b]**
F01	560F001	0.0 - 0.5	4.4	130	0.99	0.24	9	12	0.0092 (J-)	--
	560F002	8.5 - 9.0	5.5	150	0.73	0.44	7.9	16	1.6	0.2
	560F003	10.0 - 10.5	5.3	130	0.75	0.18	6.6	8.9	0.033 (J-)	--
F02	560F004	4.5 - 5.0	4.4	120	0.63	0.064	4.4 (J)	6.5 (J)	0.025	--

[a]Based on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the NBMG throughout the NTS and NTTR (NBMG, 1998; Moore, 1999).
[b]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
J- = The result is an estimated quantity, but the result may be biased low.
-- = Not detected above MDCs.

A.8.2.5 Polychlorinated Biphenyls

Analytical results for PCBs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.8-5. No PCBs were detected at concentrations exceeding the PAL. The FAL was established at the PAL concentration.

Table A.8-5
Sample Results for PCBs Detected above MDCs
at CAS 06-59-04, Office Trailer Complex Sewage Pond

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			Aroclor 1254
FALs[a]			**0.74**
F01	560F002	8.5 - 9.0	0.17

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

A.8.2.6 Pesticides

Analytical results for pesticides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.8-6. No pesticides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

Table A.8-6
Sample Results for Pesticides Detected above MDCs
at CAS 06-59-04, Office Trailer Complex Sewage Pond

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				
			4,4'-DDD	Beta-BHC	Delta-BHC	Dieldrin	Heptachlor Epoxide
FALs[a]			10	1.3	0.36	0.11	0.19
F01	560F002	8.5 - 9.0	0.004	0.0012 (J)	--	0.0014 (J)	0.011 (J)
	560F003	10.0 - 10.5	--	--	0.00073 (J)	--	--

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

A.8.2.7 Gamma-Emitting Radionuclides

Analytical results for gamma-emitting radionuclides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.8-7. No radionuclides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

A.8.3 Nature and Extent of Contamination

Based on the analytical results for soil samples collected within CAS 06-59-04, there were no identified COCs. Therefore, the nature and extent of contamination has been satisfied.

A.8.4 Revised Conceptual Site Model

The CAIP requirements were met at this CAS, and no revisions were necessary to the CSM.

Table A.8-7
Sample Results for Gamma-Emitting Radionuclides Detected above MDCs at CAS 06-59-04, Office Trailer Complex Sewage Pond

Sample Location	Sample Number	Depth (ft bgs)	COPCs (pCi/g)				
			Ac-228	Pb-212	Pb-214	Tl-208	Th-234
FALs			5[a]	5[a]	5[a]	5[a]	105[b]
F01	560F001	0.0 - 0.5	2.32	2.35 (J)	1.21 (J)	0.73	2.52 (J)
	560F002	8.5 - 9.0	2.05	2.1 (J)	1.22 (J)	0.626	2.74 (J)
	560F003	10.0 - 10.5	1.69	1.7 (J)	0.93 (J)	0.519	2.49 (J)
F02	560F004	4.5 - 5.0	1.06	1.18 (J)	0.67 (J)	0.39	--

[a]Taken from the general guidelines for residual concentration of Ac-228, Bi-213, Pb-212, Pb-214, Tl-208, and Th-232, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993).
[b]Taken from the construction, commercial, industrial land-use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 25-mrem/yr dose.

J = Estimated value
-- = Not detected above MDCs.

A.9.0 CAS 06-59-05, Control Point Septic System, Investigation Results

Corrective Action Site 06-59-05 is located in Area 6 east of the CP-6 Complex. The CAS consists of a septic system and surrounding soils located about 160 ft east of Mercury Highway that formerly serviced several buildings within the CP-6 Complex. The septic system components identified for investigation include a septic tank, tile field, subsurface piping connecting a distribution box, septic tank, and tile field. Additional detail regarding this CAS is provided in the CAIP (NNSA/NSO, 2008).

A.9.1 CAIP Activities

A total of 25 characterization samples were collected during investigation activities at CAS 06-59-05. The sample IDs, locations, types, and analyses are listed in Table A.9-1. The specific CAI activities conducted to satisfy the CAIP requirements at this CAS are described in the following sections.

A.9.1.1 Visual Inspections

The septic tank is visible at the ground surface where three lids provide access to the three chambers of the septic tank. Each chamber also contains one vent pipe. The lids were lifted and the interior of the tank inspected. Each chamber contained dry waste, and observations confirmed that the size and configuration of each chamber are consistent with engineering drawings. Based on the dimensions of each chamber and the depth measured to solid tank materials, a volume of waste was calculated at 1 yd^3.

The presence of the inlet and outlet pipes was identified visually from inside the tank, and structural integrity of the tank appeared intact. Visual observations inside the active distribution box confirmed that the one abandoned pipe to the septic tank was grouted shut inside the box. Hand excavation exposed the distribution box outlet pipe, the tank inlet pipe, outlet pipe, and vent pipe. All features were intact with no apparent leaks. The western and eastern ends and the north side of the tank were exposed through backhoe excavation for inspection and sampling. The tank showed no signs of leaks or breaches. The inlet pipe, initially exposed by hand, was breached by the backhoe during exposure

Table A.9-1
Samples Collected at CAS 06-59-05, Control Point Septic System
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Isotopic Plutonium	Metals	PCBs	Pesticides	SVOCs	TCLP Metals	TCLP Pesticides	TCLP SVOCs	TCLP VOCs	VOCs
G01	560G004	0.5 - 1.0	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
	560G005	0.5 - 1.0	Soil	FD of 560G004	X	X	--	X	X	X	X	--	--	--	--	X
	560G011	6.5 - 7.0	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G02	560G006	2.5 - 3.5	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G03	560G007	2.5 - 3.0	Solid	PSM	X	X	X	X	X	X	X	X	X	X	X	X
G04	560G008	8.0 - 8.5	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G05	560G009	8.0 - 8.5	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G06	560G001	4.0 - 4.5	Solid	PSM	X	X	--	X	X	X	X	X	X	X	X	X
G07	560G002	6.5 - 7.0	Solid	PSM	X	X	--	X	X	X	X	X	X	X	X	X
G08	560G003	6.5 - 7.0	Solid	PSM	X	X	--	X	X	X	X	X	X	X	X	X
G09	560G010	2.0 - 2.5	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G10	560G012	6.5 - 7.0	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G11	560G013	4.5 - 5.0	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G12	560G014	3.5 - 4.0	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G13	560G015	4.5 - 5.0	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G14	560G016	4.5 - 5.0	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G15	560G017	4.5 - 5.0	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X

Table A.9-1
Samples Collected at CAS 06-59-05, Control Point Septic System
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Purpose	DRO	Gamma Spectroscopy	Isotopic Plutonium	Metals	PCBs	Pesticides	SVOCs	TCLP Metals	TCLP Pesticides	TCLP SVOCs	TCLP VOCs	VOCs
G16	560G018	4.5 - 5.0	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G17	560G019	4.0 - 4.5	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G18	560G020	4.0 - 4.5	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
	560G021	4.0 - 4.5	Soil	FD of 560G020	X	X	--	X	X	X	X	--	--	--	--	X
G19	560G022	4.0 - 4.5	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G20	560G023	3.5 - 4.0	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G21	560G024	3.5 - 4.0	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
G22	560G025	3.0 - 3.5	Soil	Environmental	X	X	--	X	X	X	X	--	--	--	--	X
N/A	560G301	N/A	Water	Trip Blank	--	--	--	--	--	--	--	--	--	--	--	X
N/A	560G302	N/A	Water	Trip Blank	--	--	--	--	--	--	--	--	--	--	--	X
N/A	560G303	N/A	Water	Trip Blank	--	--	--	--	--	--	--	--	--	--	--	X

-- = Not required

of the tank base. After a sample was collected, the inlet pipe breach was grouted before the excavation was backfilled.

The septic tank outlet pipe connecting to the tile field was excavated by backhoe to expose the proximal ends of the leach lines and confirm the tile field configuration. Visual inspection confirmed three leach lines connect to both the north and south sides of the outlet pipe at approximately 2.5 ft bgs with an approximate 2-ft-thick bed of leach rock underlying the leach lines. Each set of north-south lines are slightly offset by about 1 ft from one another. The first set of leach lines is located 13 ft east of the tank with 13 ft between each set of leach lines. The distal ends of each line were exposed for inspection and sampling. Each distal end was capped, and the length of each leach line from the outlet pipe junction to the distal end averaged 105 ft. Little to no residual material was present within the leach lines and outlet pipe. Because the outlet pipe appears intact and open at the tank, the outlet pipe was breached just east of the tank and grouted a few inches from the location where the first set of leach lines occurs. Figure A.9-1 shows the locations of septic system components.

A walkover was conducted in the area of the tank and tile field to identify additional surface sample locations based on biasing factors (i.e., staining). No additional biased sample locations were identified.

A.9.1.2 Video Surveys

A video survey was conducted on the septic system piping by accessing the tank inlet pipe through the breach (location G01) created by the backhoe. The survey indicated no other breaches or tie-ins, and little to no residual material between the tank and distribution box. The survey also confirmed the inlet pipe had been grouted at the active distribution box. Another video survey was conducted on the outlet pipe between the tank and exposed truncation of the pipe east of the leach field lines. The survey confirmed little to no residual material within the main outlet pipe, and all six leach line tie-ins were visible with no other breaches identified.

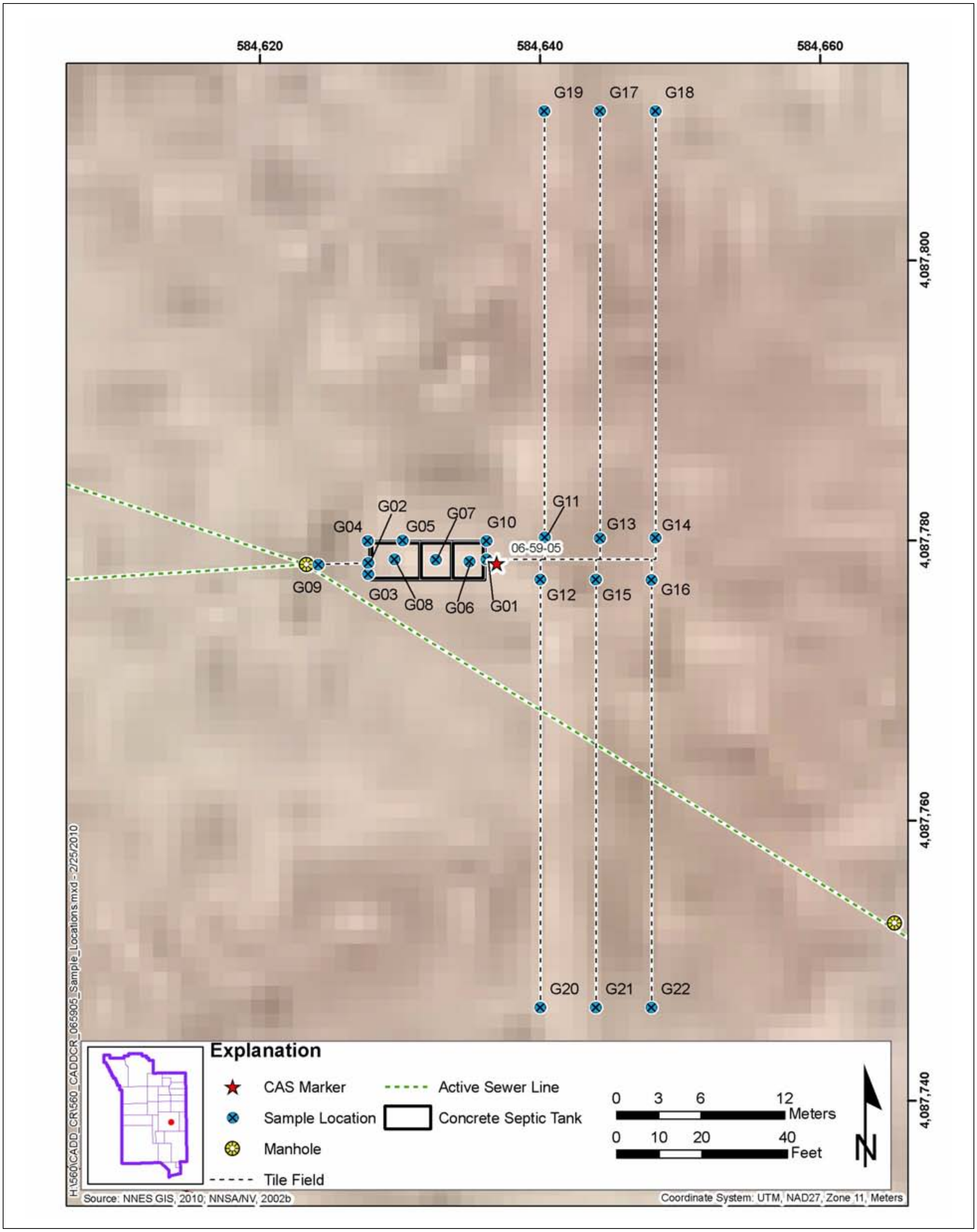

Figure A.9-1
Site Map and Sample Locations at CAS 06-59-05, Control Point Septic System

A.9.1.3 Field Screening

Investigation samples were field screened for alpha and beta/gamma radiation. The FSRs were compared to FSLs to guide subsequent sampling decisions where appropriate. None of the samples collected at CAS 06-59-05 exceeded alpha or beta/gamma radiation FSLs.

A.9.1.4 Sample Collection

Decision I environmental sampling activities included the collection of 25 subsurface soil samples surrounding the septic system components at this CAS and four solid samples collected within the tank and inlet pipe. Three of the solid samples were collected from the interior base of each of the three septic tank chambers (560G001 through G003) for PSM determination. Sample 560G007 was a solid sample collected from inside the inlet pipe breach at location G03 for PSM determination.

Environmental samples were collected from the soil surrounding the septic tank to determine whether releases may be present from breaches or leaks from the tank. Samples were collected directly below the inlet pipe (location G02), the outlet pipe and vent pipe (location G01), at the connection between the septic tank inlet pipe and the manhole/distribution box (location G09), and from the soil at the base of the septic tank (locations G03 and G10). The sample depths ranged from 0.5 to 8.5 ft bgs, and all sample locations are shown on Figure A.9-1. Environmental samples were collected from beneath the proximal and distal ends of each of the six leach field lines to determine whether contaminants migrated to native soil for a total of 12 soil samples (locations G11 through G22). With the exception of the breached inlet pipe, other biasing factors were not identified during the inspection and sampling event; therefore, no additional biased samples were collected.

Decision II samples were not collected at this CAS, as no COPCs in soil surrounding the septic system components exceeded FALs. The PSM identified in the tank and piping are considered contained by the structures.

A.9.1.5 Deviations

Investigation samples were collected as outlined in the CAU 560 CAIP (NNSA/NSO, 2008) with no deviations and submitted for laboratory analysis.

A.9.2 Investigation Results

The following sections provide analytical results from the samples collected to complete investigation activities as outlined in the CAIP (NNSA/NSO, 2008). Investigation samples were analyzed for the CAIP-specified COPCs, which included VOCs, SVOCs, TPH-DRO, RCRA metals, beryllium, pesticides, PCBs, and gamma-emitting radionuclides. The analytical parameters and laboratory methods used to analyze the investigation samples are listed in Table A.2-2. Table A.9-1 lists the sample-specific analytical suite for CAS 06-59-05. The waste characterization analytical results for TCLP VOCs, TCLP SVOCs, TCLP metals, and TCLP pesticides are discussed in Section A.10.0.

Analytical results from the soil samples with concentrations exceeding MDCs are summarized in the following sections. An evaluation was conducted on all contaminants detected above MDCs by comparing individual concentration or activity results against the FALs. Establishment of the FALs is presented in Appendix C.

A.9.2.1 Volatile Organic Compounds

None of the analytical results for VOCs in soil samples collected at this CAS was detected above MDCs. The FALs were established at the PAL concentrations.

A.9.2.2 Semivolatile Organic Compounds

Analytical results for SVOCs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.9-2. No SVOCs were detected at concentrations exceeding the respective PALs. The FALs were established at the PAL concentrations.

A.9.2.3 Total Petroleum Hydrocarbons

Analytical results for TPH-DRO in soil samples collected at this CAS that were detected above MDCs are presented in Table A.9-3. No samples exceeded the PAL of 100 mg/kg for TPH-DRO. No FAL was established for TPH-DRO. Instead, FALs were established for the individual hazardous constituents of TPH-DRO and are reported in the VOC and SVOC sections.

Table A.9-2
Sample Results for Total SVOCs Detected above MDCs
at CAS 06-59-05, Control Point Septic System

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			Bis(2-ethylhexyl)phthalate
FALs[a]			120
G01	560G005	0.5 - 1.0	0.35 (J)

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value

Table A.9-3
Sample Results for TPH-DRO Detected above MDCs
at CAS 06-59-05, Control Point Septic System

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			DRO
PALs[a]			100
G01	560G004	0.5 - 1.0	3.2 (J)
	560G005	0.5 - 1.0	2.5 (J)
G10	560G012	6.5 - 7.0	6.1

[a]Based on “Contamination of Soil: Establishment of Action Levels” (NAC, 2006).

J = Estimated value

A.9.2.4 RCRA Metals and Beryllium

Analytical results for RCRA metals and beryllium in soil samples collected at this CAS that were detected above MDCs are presented in Table A.9-4. No metals were detected at concentrations exceeding their PALs. The FALs were established at the PAL concentrations.

A.9.2.5 Polychlorinated Biphenyls

Analytical results for PCBs in soil samples collected at this CAS that were detected above MDCs are presented in Table A.9-5. No PCBs were detected at concentrations exceeding the PAL. The FAL was established at the PAL concentration.

Table A.9-4
Sample Results for Metals Detected above MDCs at CAS 06-59-05, Control Point Septic System
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)							
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Silver
FALs			23[a]	67,000[b]	1,900[b]	450[b]	450[b]	800[b]	310[b]	5,100[b]
G01	560G004	0.5 - 1.0	6.8	120	0.69	0.18	7.5 (J)	12 (J)	0.059	--
	560G005	0.5 - 1.0	4	110	0.62	0.16	6.4 (J)	11 (J)	0.055	--
	560G011	6.5 - 7.0	4.4	130	0.6	0.15	7.2 (J)	8.6	0.0019	--
G02	560G006	2.5 - 3.5	5.4	94	--	0.08	5.4 (J)	67 (J)	0.027	--
G04	560G008	8.0 - 8.5	5.8	110	0.64	0.051	4.9 (J)	7.4 (J)	0.025	0.83 (J-)
G05	560G009	8.0 - 8.5	6.1	85	--	0.089	5.3 (J)	6.5 (J)	0.032	7.2
G09	560G010	2.0 - 2.5	5.3	110	0.56	0.081 (J-)	5.6 (J)	7.2 (J)	0.035	--
G10	560G012	6.5 - 7.0	4.4	87	--	0.2	5.4 (J)	7.6	0.0005	17
G11	560G013	4.5 - 5.0	3.4	76	--	0.19	5.4 (J)	7.2	0.0057	20
G12	560G014	3.5 - 4.0	4.5	90	--	0.18	5.4 (J)	8.4	0.0057	26
G13	560G015	4.5 - 5.0	3.2	100	--	0.41	8.4 (J)	12	0.0098	100
G14	560G016	4.5 - 5.0	3.6	73	--	0.15	5.4 (J)	7.7	0.019	23
G15	560G017	4.5 - 5.0	6.8	73	--	0.13	5 (J)	7.9	0.0023 (J-)	7.6
G16	560G018	4.5 - 5.0	4.6	69	--	0.17	3.6 (J)	5.5	0.0035	3.2
G17	560G019	4.0 - 4.5	4.3	82	--	0.17	4.7 (J)	5.7	0.0036	7.5
G18	560G020	4.0 - 4.5	4.5	71	0.52	0.12	4.8 (J)	6.8	0.0054	17
	560G021	4.0 - 4.5	3.6	72	0.56	0.09	4.8 (J)	6.4	0.005	16
G19	560G022	4.0 - 4.5	3.9	83	0.54	0.81	8 (J)	11	0.036	100

Table A.9-4
Sample Results for Metals Detected above MDCs at CAS 06-59-05, Control Point Septic System
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)							
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Silver
FALs			23[a]	67,000[b]	1,900[b]	450[b]	450[b]	800[b]	310[b]	5,100[b]
G20	560G023	3.5 - 4.0	4	96	--	0.19	5 (J)	5.9	0.0057	10
G21	560G024	3.5 - 4.0	4.5	100	0.61	1	9.1 (J)	11	0.021	88
G22	560G025	3.0 - 3.5	21	110	0.57	0.14	5.6 (J)	7.4	0.0054	2.8

[a]Based on the background concentrations for metals. Background is considered the mean plus two times the standard deviation for sediment samples collected by the NBMG throughout the NTS and NTTR (NBMG, 1998; Moore, 1999).
[b]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
J- = The result is an estimated quantity, but the result may be biased low.
-- = Not detected above MDCs.

Table A.9-5
Sample Results for PCBs Detected above MDCs
at CAS 06-59-05, Control Point Septic System

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)		Total Aroclor (1254, 1260, 1268)
			Aroclor 1254	Aroclor 1260	
FALs[a]			0.74	0.74	
G05	560G009	8.0 - 8.5	0.059 (J)	--	0.059
G11	560G013	4.5 - 5.0	--	0.017 (J)	0.017
G12	560G014	3.5 - 4.0	--	0.03	0.03
G13	560G015	4.5 - 5.0	--	0.097	0.097
G19	560G022	4.0 - 4.5	--	0.053	0.053
G21	560G024	3.5 - 4.0	--	0.056	0.056

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

A.9.2.6 Pesticides

Analytical results for pesticides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.9-6. No pesticides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

A.9.2.7 Gamma-Emitting Radionuclides

Analytical results for gamma-emitting radionuclides in soil samples collected at this CAS that were detected above MDCs are presented in Table A.9-7. No radionuclides were detected at concentrations exceeding their respective PALs. The FALs were established at the PAL concentrations.

A.9.2.8 Potential Source Material

For each of the three septic tank chambers, it was determined that wastes were present at the base of each chamber. One sample was collected from each tank, as well as from the interior of the breached inlet pipe, to determine whether the contents were PSM. Laboratory analysis determined that results for VOCs, TPH-DRO, metals, SVOCs, PCBs, pesticides, and gamma-emitting radionuclides were

Table A.9-6
Sample Results for Pesticides Detected above MDCs at CAS 06-59-05, Control Point Septic System
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)											
			4,4'-DDD	4,4'-DDE	4,4'-DDT	Alpha-BHC	Chlordane	Delta-BHC	Dieldrin	Endosulfan I	Endosulfan Sulfate	Endrin	Heptachlor Epoxide	Gamma-BHC
FALs[a]			10	7	7	0.36	6.5	0.36	0.11	3,700	3,700	180	0.19	1.7
G01	560G004	0.5 - 1.0	--	--	0.0062	--	0.33	--	0.0019 (J)	--	--	--	--	0.0012 (J)
	560G005	0.5 - 1.0	--	--	0.0059	--	0.4	--	0.0017 (J)	--	--	0.0016 (J)	--	--
	560G011	6.5 - 7.0	--	--	0.00067 (J)	--	--	--	--	--	--	--	--	0.00022 (J)
G02	560G006	2.5 - 3.5	0.0017 (J)	--	0.0013 (J)	--	--	--	0.001(J)	--	--	--	--	--
G04	560G008	8.0 - 8.5	--	--	0.00068 (J)	--	--	--	--	--	0.00061 (J)	--	--	--
G05	560G009	8.0 - 8.5	--	--	--	--	--	--	--	0.00037 (J)	--	--	0.0025 (J)	--
G09	560G010	2.0 - 2.5	--	--	0.0019	--	0.029	--	0.0013 (J)	--	--	--	--	0.0009 (J)
G10	560G012	6.5 - 7.0	0.016 (J)	0.0063 (J)	0.0061 (J)	--	0.044 (J)	--	--	--	--	--	0.0043 (J)	--
G11	560G013	4.5 - 5.0	0.0023 (J)	0.0016 (J)	0.002 (J)	0.00035 (J)	0.0086 (J)	--	--	--	--	--	0.00072 (J)	0.00053 (J)
G12	560G014	3.5 - 4.0	0.0051 (J)	0.0029 (J)	0.0021 (J)	0.00039 (J)	0.021 (J)	--	--	--	--	--	0.0014 (J)	0.0009 (J)
G13	560G015	4.5 - 5.0	0.028 (J)	0.0058 (J)	0.0039 (J)	--	0.055 (J)	--	--	--	--	--	0.0035 (J)	--
G14	560G016	4.5 - 5.0	0.0018 (J)	0.0013 (J)	0.0012 (J)	--	0.012 (J)	--	--	--	--	--	0.00048 (J)	--
G15	560G017	4.5 - 5.0	0.0024 (J)	0.0017 (J)	0.00075 (J)	--	0.012 (J)	--	--	--	--	--	0.00078 (J)	0.0004 (J)
G16	560G018	4.5 - 5.0	--	--	--	--	0.0036 (J)	--	--	--	--	--	--	0.00024 (J)
G17	560G019	4.0 - 4.5	0.0016 (J)	0.00052 (J)	0.0028	--	0.0048 (J)	0.0011 (J)	--	--	0.0011 (J)	--	--	--
G18	560G020	4.0 - 4.5	0.0043	0.0019 (J)	0.0047 (J)	--	0.014 (J)	--	--	--	--	--	0.00074 (J)	--
	560G021	4.0 - 4.5	0.0055 (J)	0.0019 (J)	0.0045 (J)	0.00033 (J)	0.013 (J)	--	--	--	--	--	0.0014 (J)	--

Table A.9-6
Sample Results for Pesticides Detected above MDCs at CAS 06-59-05, Control Point Septic System
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)											
			4,4'-DDD	4,4'-DDE	4,4'-DDT	Alpha-BHC	Chlordane	Delta-BHC	Dieldrin	Endosulfan I	Endosulfan Sulfate	Endrin	Heptachlor Epoxide	Gamma-BHC
FALs[a]			10	7	7	0.36	6.5	0.36	0.11	3,700	3,700	180	0.19	1.7
G19	560G022	4.0 - 4.5	0.013 (J)	0.0072 (J)	0.018	--	0.062 (J)	--	--	--	--	--	0.0025 (J)	--
G20	560G023	3.5 - 4.0	0.0064 (J)	0.0021 (J)	0.0027 (J)	--	0.011 (J)	--	--	--	--	--	--	--
G21	560G024	3.5 - 4.0	0.012 (J)	0.0062 (J)	0.025 (J)	--	0.059 (J)	--	--	--	--	--	0.003 (J)	--
G22	560G025	3.0 - 3.5	0.00068 (J)	0.0012 (J)	0.0018 (J)	--	--	--	0.00053 (J)	--	--	--	--	--

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

Table A.9-7
Sample Results for Gamma-Emitting Radionuclides Detected above MDCs at CAS 06-59-05, Control Point Septic System

Sample Location	Sample Number	Depth (ft bgs)	COPCs (pCi/g)					
			Ac-228	Cs-137	Pb-212	Pb-214	Tl-208	Th-234
FALs			5[a]	12.2[b]	5[a]	5[a]	5[a]	105[b]
G01	560G004	0.5 - 1.0	0.93	0.198	1.06 (J)	0.77 (J)	0.331	--
	560G005	0.5 - 1.0	1.13	0.232	1.18 (J)	0.84 (J)	0.359	--
	560G011	6.5 - 7.0	1.21	--	1.04 (J)	0.79 (J)	0.357	--
G02	560G006	2.5 - 3.5	0.85	--	0.85	0.631 (J)	0.243	1.47
G04	560G008	8.0 - 8.5	1.17	--	1.12 (J)	0.62 (J)	0.41	--
G05	560G009	8.0 - 8.5	0.75	--	0.89	0.69 (J)	0.225	--
G09	560G010	2.0 - 2.5	1.16	--	0.92	0.63 (J)	0.28	--
G10	560G012	6.5 - 7.0	0.82	--	0.85 (J)	0.71 (J)	0.317	--
G11	560G013	4.5 - 5.0	0.77	--	0.87	0.643 (J)	0.256	1.33
G12	560G014	3.5 - 4.0	0.82	--	0.81 (J)	0.588 (J)	0.236	--
G13	560G015	4.5 - 5.0	0.96	--	0.94 (J)	0.77 (J)	0.301	--
G14	560G016	4.5 - 5.0	0.79	--	0.81	0.61 (J)	0.273	--
G15	560G017	4.5 - 5.0	0.69	--	0.85	0.69 (J)	0.296	--
G16	560G018	4.5 - 5.0	0.64	--	0.72	0.58 (J)	0.23	--
G17	560G019	4.0 - 4.5	0.75	--	0.82 (J)	0.57 (J)	0.253	--
G18	560G020	4.0 - 4.5	0.71	--	0.74 (J)	0.531 (J)	0.247	--
	560G021	4.0 - 4.5	0.65	--	0.79 (J)	0.561 (J)	0.287	--
G19	560G022	4.0 - 4.5	0.64	--	0.76	0.633 (J)	0.224	1.53
G20	560G023	3.5 - 4.0	0.65	--	0.79 (J)	0.547 (J)	0.244	--
G21	560G024	3.5 - 4.0	1.03	--	1.13 (J)	0.69 (J)	0.353	--
G22	560G025	3.0 - 3.5	0.9	--	0.91 (J)	0.581 (J)	0.3	1.23 (J)

[a]Taken from the general guidelines for residual concentration of Ac-228, Bi-213, Pb-212, Pb-214, Tl-208, and Th-232, as found in Chapter IV of DOE Order 5400.5, Change 2, "Radiation Protection of the Public and Environment." (DOE, 1993).
[b]Taken from the construction, commercial, industrial land-use scenario in Table 2.1 of the NCRP Report No. 129, *Recommended Screening Limits for Contaminated Surface Soil and Review Factors Relevant to Site-Specific Studies* (NCRP, 1999). The values provided in this source document were scaled to a 25-mrem/yr dose.

J = Estimated value
-- = Not detected above MDCs.

detected above MDCs. The analytical results are presented in Tables A.9-8 through A.9-14. Based on analytical results above FALs for benzo(a)pyrene, arsenic, lead, PCBs, and pesticides (specifically dieldrin, chlordane, and heptachlor epoxide), the contents of both the septic tank and inlet pipe are considered PSM. Materials from which all samples were collected were removed as part of the corrective action.

Table A.9-8
Potential Source Material Results for VOCs Detected above MDCs at CAS 06-59-05, Control Point Septic System (Removed during Corrective Action)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				
			1,1,1-Trichloroethane	1,4-Dichlorobenzene	Acetone	Carbon Disulfide	Tetrachloroethene
PSM Criteria[a]			**1,200**	**7.9**	**54,000**	**720**	**1.3**
G03	560G007	2.5 - 3.0	0.013	0.016	0.015 (J)	--	0.022
G07	560G002	6.5 - 7.0	--	--	0.026	--	--
G08	560G003	6.5 - 7.0	--	--	--	0.0028 (J)	--

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)

J = Estimated value
-- = Not detected above MDCs.

A.9.3 Nature and Extent of Contamination

Based on the analytical results for samples collected within CAS 06-59-05, COCs were identified in the solid materials collected within the septic tank and inlet pipe. No COCs were identified in soil surrounding the septic system components. Therefore, the nature and extent of contamination has been satisfied.

A.9.4 Revised Conceptual Site Model

The CAIP requirements were met at this CAS, and no revisions were necessary to the CSM.

Table A.9-9
Potential Source Material Results for TPH-DRO Detected above MDCs at CAS 06-59-05, Control Point Septic System (Removed during Corrective Action)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			DRO
PSM Criteria[a]			N/A[b]
G03	560G007	2.5 - 3.0	1,000
G06	560G001	4.0 - 4.5	1,300
G07	560G002	6.5 - 7.0	2,300
G08	560G003	6.5 - 7.0	2,200

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)
[b]FALs were established for the individual hazardous constituents of diesel; see Appendix C for details.

Table A.9-10
Potential Source Material Results for Metals Detected above MDCs at CAS 06-59-05, Control Point Septic System (Removed during Corrective Action)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)							
			Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
PSM Criteria[a]			23	67,000	450	450	800	310	5,100	5,100
G03	560G007	2.5 - 3.0	4.3	410	19	71 (J)	**2,000 (J)**	130	--	230
G06	560G001	4.0 - 4.5	**30**	530	38	140 (J)	250 (J)	120	--	370
G07	560G002	6.5 - 7.0	19	560	46	170 (J)	250 (J)	45	9	330
G08	560G003	6.5 - 7.0	8.3	510	20	87 (J)	260 (J)	48	3.1	290

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)

J = Estimated value
-- = Not detected above MDCs.

Bold indicates the value is equal to or exceeds the PSM criteria.

Table A.9-11
Potential Source Material for Total SVOCs Detected above MDCs at CAS 06-59-05, Control Point Septic System (Removed during Corrective Action)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)											
			Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Bis(2-ethylhexyl)phthalate	Butyl benzyl phthalate	Chrysene	Di-n-butyl phthalate	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene
PSM Criteria[a]			**2.1**	**0.21**	**2.1**	**29,000**	**120**	**100,000**	**210**	**62,000**	**22,000**	**2.1**	**100,000**	**29,000**
G03	560G007	2.5 - 3.0	--	--	0.57 (J)	0.4 (J)	9.3 (J)	2.4 (J)	0.36 (J)	--	0.56 (J)	--	0.91 (J)	0.78 (J)
G06	560G001	4.0 - 4.5	--	--	0.69 (J)	0.72 (J)	3 (J)	--	--	--	--	0.57 (J)	--	--
G07	560G002	6.5 - 7.0	0.6 (J)	**0.62 (J)**	0.75 (J)	0.81 (J)	4.3 (J)	2.6 (J)	--	--	1.2 (J)	0.7 (J)	--	2 (J)
G08	560G003	6.5 - 7.0	--	**0.31 (J)**	0.4 (J)	0.87 (J)	3 (J)	1 (J)	0.34 (J)	0.5 (J)	0.31 (J)	0.6 (J)	0.37 (J)	0.81 (J)

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)

J = Estimated value
-- = Not detected above MDCs.

Bold indicates the value is equal to or exceeds the PSM criteria.

Table A.9-12
Potential Source Material Results for PCBs Detected above MDCs at CAS 06-59-05, Control Point Septic System (Removed during Corrective Action)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)
			Aroclor 1260
PSM Criteria[a]			0.74
G03	560G007	2.5 - 3.0	**2.9 (J)**
G06	560G001	4.0 - 4.5	**4.5 (J)**
G07	560G002	6.5 - 7.0	**5.3 (J)**
G08	560G003	6.5 - 7.0	**4 (J)**

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)

J = Estimated value

Bold indicates the value is equal to or exceeds the PSM criteria.

Table A.9-13
Potential Source Material Results for Pesticides Detected above MDCs at CAS 06-59-05, Control Point Septic System (Removed during Corrective Action)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)					
			4,4'-DDD	4,4'-DDE	4,4'-DDT	Chlordane	Dieldrin	Heptachlor Epoxide
PSM Criteria[a]			10	7	7	6.5	0.11	0.19
G03	560G007	2.5 - 3.0	0.93 (J)	0.32 (J)	0.62 (J)	2.9 (J)	**0.18 (J)**	0.071 (J)
G06	560G001	4.0 - 4.5	0.44 (J)	0.91 (J)	--	6.1 (J)	**0.39 (J)**	**0.2 (J)**
G07	560G002	6.5 - 7.0	2 (J)	0.96 (J)	--	**6.6 (J)**	**1.2 (J)**	**0.24 (J)**
G08	560G003	6.5 - 7.0	0.17 (J)	0.1 (J)	--	1.2 (J)	**0.17 (J)**	0.071 (J)

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)

J = Estimated value
-- = Not detected above MDCs.

Bold indicates the value is equal to or exceeds the PSM criteria.

Table A.9-14
Potential Source Material Results for Gamma-Emitting Radionuclides Detected above MDCs at CAS 06-59-05, Control Point Septic System (Removed during Corrective Action)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (pCi/g)					
			Ac-228	Am-241	Cs-137	Pb-212	Pb-214	Th-234
PSM Criteria[a]			**5**	**12.7**	**12.2**	**5**	**5**	**105**
G03	560G007	2.5 - 3.0	0.68	0.92 (J)	0.61	0.75 (J)	0.34 (J)	--
G06	560G001	4.0 - 4.5	--	--	2.12	--	--	--
G07	560G002	6.5 - 7.0	--	--	1.84	--	--	4.5 (J)

[a]CAU 560 CAIP, Section A.4.1 (NNSA/NSO, 2008)

J = Estimated value
-- = Not detected above MDCs.

A.10.0 Waste Management

Wastes generated during the CAI were characterized based on the results of associated soil samples, direct samples of the waste, and/or process knowledge. The characterization and disposition of the waste was based on federal and state regulations, permit limitations, and acceptance criteria. The types, volumes, and disposal of the wastes are addressed in the following subsections. Section A.10.1 addresses investigation-derived waste (IDW), and Section A.10.2 addresses wastes generated as part of the BMP and clean closure activities at the CAU 560 CASs. Results from TCLP analyses conducted on samples collected for potential waste decisions are presented in Section A.10.3.
Due to the large quantity of load verification forms and shipping manifests generated during the CAI, copies of the forms are not included in this report. However, copies are available in the CAU 560 project file.

A.10.1 Investigation-Derived Waste

The IDW generated during daily field activities for CAU 560 included disposable personal protective equipment (PPE); disposable sampling equipment; plastic sheeting, and empty sample jars. The IDW, which are collected daily, is field screened as generated to comply with the radiological release limits of Table 4-2 of the NTS Radiological Control Manual (NNSA/NSO, 2009). The wastes are visually inspected as generated and packaged for evidence of staining or other evidence of hazardous/chemical contamination. The IDW streams for CAU 560 met all of the release criteria and were characterized as sanitary industrial waste based on process knowledge, site environmental samples, and radiological surveys of the waste. The waste was bagged, marked, and placed in a roll-off container at Building 23-153 for disposition at the NTS Area 9 U10C Industrial Landfill.

In addition to the IDW mentioned above, four additional waste streams were generated during CAI field activities at CAU 560 and included:

- Four 55-gallon (gal) drums of decontamination rinsate from CASs 06-05-03 and 06-05-04. Rinsate was solidified before disposal.
- Fourteen drums of ACM (floor tiles and pipe) from CASs 03-51-01, 06-05-03, and 06-05-04. Radiological swipe surveys were conducted on the ACM and results for all swipe collection surveys identified no elevated radiological count rates.

- One 5-gal drum of fecal coliform test kit waste from CASs 06-04-02, 06-59-03, and 06-59-05.
- One 5-gal drum of hydrocarbon rags from CAS 06-05-03.

The waste characterization and disposition information (e.g., quantity, waste type, disposal facility) of these four waste streams are shown in Table A.10-1. Copies of all waste load verification forms are available in the CAU 560 project file.

A.10.2 CAU 560 Closure Waste

This section describes the wastes generated at CAU 560 as a result of corrective action activities and BMP activities at specific CASs. These waste streams are characterized based on process knowledge, radiological screening, associated soil/solid samples, and/or direct samples of the waste. Table A.10-1 presents the volumes, waste characterization, and disposition pathways of these waste streams and are based on current federal and state regulations, permit limitations, and acceptance criteria. The following sections provide a brief description of the activities performed that generated the specific waste streams.

A.10.2.1 Best Management Practices Waste

Several BMPs were implemented at CAU 560 regardless of whether a CAS required a corrective action due to contamination. The primary BMP consisted of the removal of non-contaminated septic tank components, leach pit casings and lids, and connecting piping at CASs 03-51-01, 06-04-02, and 06-05-03. Surface debris was also removed from CAS 06-04-02 as a BMP. The following provides a brief general description of the wastes generated as a result of BMP activities at each of the CASs:

- CAS 03-51-01: The carbon-steel leach pit casing approximately 11 ft long and 4 ft in diameter along with the casing lid and approximately 9 ft of carbon-steel connecting piping were removed from the subsurface.
- CAS 06-04-02: The steel leach pit casing approximately 15 ft long and 6 ft in diameter along with the casing lid were removed from the subsurface.
- CAS 06-05-03: To provide access to the leach pit chamber for closure activities, the 5-ft-diameter concrete leach pit chamber lid and pipe stickups were removed and disposed.

Table A.10-1
Waste Summary Table
(Page 1 of 3)

CAS	Waste Items	Waste Characterization				Waste Disposition			
		Hazardous	Hydrocarbon	Regulated PCBs	Radioactive	Disposal Facility	Waste Volume	Disposal Date	Disposal Document[a]
03-51-01	Friable Asbestos	No	No	No	No	Area 23 Landfill	2,322 lb	08/20/2009	LVF
	Bulk Debris – Concrete, Plastic, Metal	No	No	No	No	Area 9 U10C	9,867 lb[b]	11/12/2009	LVF
06-04-02	Solidified Field-Screening Rinsate	No	No	No	No	Area 9 U10C	0.9 gal[b]	12/29/2009	LVF
	Bulk Debris – Concrete, Plastic, Metal	No	No	No	No	Area 9 U10C	9,867 lb[b]	11/12/2009	LVF
06-05-03	Solidified Rinsate	No	No	No	No	Area 9 U10C	933 lb[b]	08/18/2009	LVF
	Debris – Oily Rags	No	Yes	No	No	Area 9 U10C	5 gal	12/29/2009	LVF
	Friable Asbestos	No	No	No	No	Area 23 Landfill	178 lb	08/20/2009	LVF
	Bulk Debris – Concrete, Plastic, Metal	No	No	No	No	Area 9 U10C	9,867 lb[b]	11/12/2009	LVF

Table A.10-1
Waste Summary Table
(Page 2 of 3)

CAS	Waste Items	Waste Characterization				Waste Disposition			
		Hazardous	Hydrocarbon	Regulated PCBs	Radioactive	Disposal Facility	Waste Volume	Disposal Date	Disposal Document[a]
06-05-04	Bulk Soil TSCA Regulated	No	No	Yes	No	Offsite TSDF Clean Harbors	425,714 kg	01/21/2010 – 02/11/2010	Manifest CD
						Offsite TSDF U.S. Ecology	3,440 kg	04/08/2010	Manifest CD
	Bulk Soil <TSCA Levels	No	No	No	No	Area 9 U10C	3,772,858 lb	12/08/2009 – 02/23/2010	LVF
	Solidified Rinsate	No	No	No	No	Area 9 U10C	934 lb	08/18/2009	LVF
	Bulk Debris – Nonfriable Asbestos	No	No	No	No	Area 9 U10C	200 lb	12/17/2009	LVF
	Bulk Debris – Concrete, Plastic, Metal	No	No	No	No	Area 9 U10C	70,000 lb	12/08/2009	LVF
06-59-03	Solidified Field-Screening Rinsate	No	No	No	No	Area 9 U10C	0.9 gal[b]	12/29/2009	LVF
	Bulk Debris – Concrete, Soil, Plastic, Metal	No	No	No	No	Area 9 U10C	12,990 lb	11/24/2009	LVF
	Solidified Rinsate	No	No	No	No	Area 9 U10C	933 lb[b]	08/18/2009	LVF
06-59-04	No Waste Generated at this CAS Location								

Table A.10-1
Waste Summary Table
(Page 3 of 3)

CAS	Waste Items	Waste Characterization				Waste Disposition			
		Hazardous	Hydrocarbon	Regulated PCBs	Radioactive	Disposal Facility	Waste Volume	Disposal Date	Disposal Document[a]
06-59-05	Lead, Debris	Yes	No	No	No	Area 5 RCRA Permitted Storage Unit (Pending)	10 gal	04/08/2010	Manifest CD
	Solidified Field-Screening Rinsate	No	No	No	No	Area 9 U10C	0.9 gal[b]	12/29/2009	LVF
	Bulk Debris – Concrete, Soil, Plastic, Metal	No	No	No	No	Area 9 U10C	12,990 lb	11/24/2009	LVF

[a]Copies of waste disposal documents are located in project files.
[b]Waste shipped using same shipping document; total weight divided by 3 was used for individual CAS disposal weight.

CD = Certificate of disposal
kg = Kilogram
lb = Pound
LVF = Load verification form
TSDF = Treatment, storage, and disposal facility

A.10.2.2 Corrective Action Waste

This section describe the wastes that were generated from clean closure alternatives and disposed at the NTS Area 9 U10C Industrial Landfill or shipped offsite to the Clean Harbors Grassy Mountain Facility near Knolls, Utah. Table A.10-1 provides details on the types of waste generated, final disposition, and shipment information. Due to the large number of load verification forms and waste manifests generated for CAU 560 waste disposal activities, the forms are not included in this report. Copies of all waste load verification forms are available in the CAU 560 project file.

A.10.2.2.1 CAS 06-05-04, Leach Bed

A soil-removal action was implemented at this CAS as part of the closure in place corrective action to remove all components of the septic system as well as PCB-impacted soil. About 70,000 lb of bulk debris waste was generated by removing septic system components that included the concrete septic tank, concrete distribution box, tank piping, and leach bed piping. The PCB-impacted soil with concentrations above the FAL but below the TSCA-regulated level (CFR, 2009b) was removed by excavation in pre-determined lifts, loaded into bulk containers, and disposed in the NTS Area 9 U10C Industrial Landfill. The PCB-impacted soil with concentrations above the TSCA-regulated level (CFR, 2009b) of 50 mg/kg was excavated in lifts, loaded into 25-yd^3 intermodal containers, and shipped offsite for disposal at the Clean Harbors Grassy Mountain Facility near Knolls, Utah. Table A.10-1 provides the details on the volume of PCB-impacted soil disposed. Copies of all waste load verification forms and shipping manifests are available in the CAU 560 project file. Excavation and additional soil removal of 3 yards (yd) of PCB-impacted soil exceeding 50 mg/kg (CFR, 2009b) resulted in an additional shipment offsite to the US Ecology Facility near Beatty, Nevada, on April 8, 2010.

A.10.2.2.2 CAS 06-59-03, CP-400 Septic System

A clean closure was implemented at this CAS to remove the corroded septic tank, its contents, and surrounding soil contaminated with benzo(a)pyrene. Approximately 1 yd^3 of PSM and approximately 5 yd^3 of soil and overburden rock were removed for disposal. The remains of the septic tank and section of inlet pipe were removed and disposed. All waste shipped from this CAS was disposed at the NTS Area 9 U10C Industrial Landfill. Copies of all waste load verification forms are available in the CAU 560 project file.

A.10.2.2.3 CAS 06-59-05, Control Point Septic System

A clean closure was implemented at this CAS to remove approximately 1 yd^3 of PSM within the septic tank, inlet pipe, and outlet connecting piping assembly for disposal. The components of the septic tank and piping that were removed or breached to provide access to the PSM were also disposed and included the metal lids, vent pipes, the connecting pipe assembly at the outlet end, and about 4 ft of inlet piping between the tank and distribution box. Additionally, the pipe fittings (i.e., joints) of the septic tank piping were determined to contain lead; therefore, these pipe joints were removed and segregated as a separate hazardous waste stream and shipped to the NTS Area 5 Storage Facility pending offsite treatment and disposal. All other waste shipped from this CAS was disposed at the NTS Area 9 U10C Industrial Landfill. Copies of all waste load verification forms are available in the CAU 560 project file.

A.10.3 Toxicity Characteristic Leaching Procedure Results

To assist in potential waste decisions, solid samples of residual materials were collected from septic systems at four of the seven CASs and submitted for TCLP analyses. The analytical results for all analytes detected from these samples are shown in Table A.10-2. One soil sample (560H503) was collected from the residual material within the distribution box at CAS 06-05-04 and submitted for TCLP analyses for waste characterization purposes; however, no analytes were detected. Complete results (including nondetect results) for all samples are maintained in project files.

Table A.10-2
TCLP Results Detected in CAU 560 PSM

Sample Location	Sample Number	Depth (ft bgs)	Matrix	Parameter	Result	Criteria[a] (TC Levels)	Units
CAS 06-04-02							
B01	560B001	11.0 - 11.5	Solid	Lead	0.033	5.0	mg/L
				Cadmium	0.0059	1.0	mg/L
				Selenium	0.049 (J-)	1.0	mg/L
CAS 06-05-03							
C02	560C002	14.5 - 15.0	Solid	Cadmium	0.089	1.0	mg/L
CAS 06-59-03							
E01	560E001	5.0 - 5.5	Solid	Silver	0.0078	5.0	mg/L
CAS 06-59-05							
G03	560G007	2.5 - 3.0	Solid	Lead	1.9	5.0	mg/L
				Cadmium	0.29	1.0	mg/L
				Mercury	0.0002	0.2	mg/L
				Heptachlor epoxide	0.00016 (J)	0.008	mg/L
				Gamma-BHC	0.00011 (J)	0.066	mg/L
G06	560G001	4.0 - 4.5	Solid	Cadmium	0.1	1.0	mg/L
G07	560G002	6.5 - 7.0	Solid	Cadmium	0.15	1.0	mg/L
				Selenium	0.058	1.0	mg/L
G08	560G003	6.5 - 7.0	Solid	Mercury	0.00011	0.2	mg/L
				2,4-Dinitrotoluene	0.11	0.13	mg/L

[a]Based on Title 40 CFR Part 261, “Identification and Listing of Hazardous Waste” (CFR, 2009a).

CFR = *Code of Federal Regulations*
TC = Toxicity characteristic

J = Estimated value
J- = The result is an estimated quantity, but the result may be biased low.

A.11.0 Quality Assurance

This section contains a summary of QA/QC measures implemented during the sampling and analysis activities conducted in support of the CAU 560 CAI. The following sections discuss the data validation process, QC samples, and nonconformances. A detailed evaluation of the DQIs is presented in Appendix B.

Laboratory analyses were conducted for samples used in the decision-making process to provide a quantitative measurement of any COPCs present. Rigorous QA/QC was implemented for all laboratory samples including documentation, verification and validation of analytical results, and affirmation of DQI requirements related to laboratory analysis. Detailed information regarding the QA program is contained in the Industrial Sites QAPP (NNSA/NV, 2002a).

A.11.1 Data Validation

Data validation was performed in accordance with the Industrial Sites QAPP and approved protocols and procedures. All laboratory data from samples collected and analyzed for CAU 560 were evaluated for data quality in a tiered process described in Sections A.11.1.1 through A.11.1.3. Data were reviewed to ensure that samples were appropriately processed and analyzed, and the results were evaluated using validation criteria. Documentation of the data qualifications resulting from these reviews is retained in project files as a hard copy and electronic media.

One hundred percent of the data analyzed as part of this investigation were subjected to Tier I and Tier II evaluations. A Tier III evaluation was performed on approximately 5 percent of the data analyzed.

A.11.1.1 Tier I Evaluation

Tier I evaluation for chemical and radiochemical analysis examines, but is not limited to:

- Sample count/type consistent with chain of custody.
- Analysis count/type consistent with chain of custody.
- Correct sample matrix.
- Significant problems stated in cover letter or case narrative.
- Completeness of certificates of analysis.

- Completeness of Contract Laboratory Program (CLP) or CLP-like packages.
- Completeness of signatures, dates, and times on chain of custody.
- Condition-upon-receipt variance form included.
- Requested analyses performed on all samples.
- Date received/analyzed given for each sample.
- Correct concentration units indicated.
- Electronic data transfer supplied.
- Results reported for field and laboratory QC samples.
- Whether or not the deliverable met the overall objectives of the project.

A.11.1.2 Tier II Evaluation

Tier II evaluation for chemical analysis examines, but is not limited to:

- Correct detection limits achieved.
- Sample date, preparation date, and analysis date for each sample.
- Holding time criteria met.
- Quality control batch association for each sample.
- Cooler temperature upon receipt.
- Sample pH for aqueous samples, as required.
- Detection limits properly adjusted for dilution, as required.
- Blank contamination evaluated and applied to sample results/qualifiers.
- Matrix spike (MS)/matrix spike duplicate (MSD) percent recoveries (%R) and relative percent difference (RPDs) evaluated and qualifiers applied to laboratory results, as necessary.
- Field duplicate RPDs evaluated using professional judgment and qualifiers applied to laboratory results, as necessary.
- Laboratory duplicate RPDs evaluated and qualifiers applied to laboratory results, as necessary.
- Surrogate %R evaluated and qualifiers applied to laboratory results, as necessary.
- Laboratory control sample (LCS) %R evaluated and qualifiers applied to laboratory results, as necessary.

- Initial and continuing calibration evaluated and qualifiers applied to laboratory results, as necessary.
- Internal standard evaluation.
- Mass spectrometer tuning criteria.
- Organic compound quantitation.
- Inductively coupled plasma interference check sample evaluation.
- Graphite furnace atomic absorption QC.
- Inductively coupled plasma serial dilution effects.
- Recalculation of 10 percent of laboratory results from raw data.

Tier II evaluation for radiochemical analysis examines, but is not limited to:

- Correct detection limits achieved.
- Blank contamination evaluated and, if significant, qualifiers are applied to sample results.
- Certificate of Analysis consistent with data package documentation.
- Quality control sample results (duplicates, LCSs, laboratory blanks) evaluated and used to determine laboratory result qualifiers.
- Sample results, uncertainty, and MDC evaluated.
- Detector system calibrated with National Institute of Standards and Technology (NIST)-traceable sources.
- Calibration sources preparation was documented, demonstrating proper preparation and appropriateness for sample matrix, emission energies, and concentrations.
- Detector system response to daily or weekly background and calibration checks for peak energy, peak centroid, peak full-width half-maximum, and peak efficiency, depending on the detection system.
- Tracers NIST-traceable, appropriate for the analysis performed, and recoveries that met QC requirements.

- Documentation of all QC sample preparation complete and properly performed.
- Spectra lines, photon emissions, particle energies, peak areas, and background peak areas support the identified radionuclide and its concentration.

A.11.1.3 Tier III Evaluation

The Tier III review is an independent examination of the Tier II evaluation. A Tier III review of 5 percent of the sample analytical data was performed by TLI Solutions of Lakewood, Colorado. Tier II and Tier III results were compared and where differences are noted, data were reviewed and changes were made accordingly. This review included the following additional evaluations:

- Review:
  - Case narrative, chain of custody, and sample receipt forms
  - Lab qualifiers (applied appropriately)
  - Method of analyses performed as dictated by the chain of custody
  - Raw data, including chromatograms, instrument printouts, preparation logs, and analytical logs
  - Manual integrations to determine whether the response is appropriate
  - Data package for completeness
- Determine sample results qualifiers through the evaluation of (but not limited to):
  - Tracers and QC sample results (e.g., duplicates, LCSs, blanks, MSs) evaluated and used to determine sample results qualifiers
  - Sample preservation, sample preparation/extraction and run logs, sample storage, and holding time
  - Instrument and detector tuning
  - Initial and continuing calibrations
  - Calibration verification (initial, continuing, second source)
  - Retention times

- Second column and/or second detector confirmation
- Mass spectra interpretation
- Interference check samples and serial dilutions
- Post digestion spikes and method of standard additions
- Breakdown evaluations

- Perform calculation checks of:
  - At least one analyte per QC sample and its recovery
  - At least one analyte per initial calibration curve, continuing calibration verification, and second source recovery
  - At least one analyte per sample that contains positive results (hits); radiochemical results only require calculation checks on activity concentrations (not error)
- Verify that target compound detects identified in the raw data are reported on the results form.
- Document any anomalies for the laboratory to clarify or rectify. The contractor should be notified of any anomalies.

A.11.2 Field QC Samples

Field QC samples consisted of trip blanks, equipment rinsate blanks, field blanks, source blank, MS/MSDs, and FDs collected and submitted for analysis by the laboratory analytical methods shown in Table A.2-2. The QC samples were assigned individual sample numbers and sent to the laboratory "blind." Additional samples were selected by the laboratory to be analyzed as laboratory duplicates.

Field blanks, source blanks, and equipment rinsates were analyzed for the applicable parameters listed in Table A.2-2 and trip blanks were analyzed for VOCs only.

During the CAI, FDs were sent as blind samples to the laboratory to be analyzed for the investigation parameters listed in Table A.2-2. For these samples, the duplicate results precision (i.e., RPDs between the environmental sample results and their corresponding FD sample results) were evaluated.

A.11.2.1 Laboratory QC Samples

Analysis of QC preparation blanks (PBs) was performed on each sample delivery group (SDG) for inorganics. Analysis for surrogate spikes and method blanks was performed on each SDG for organics. Initial and continuing calibration and LCSs were performed for each SDG. The results of these analyses were used to qualify associated environmental sample results. Documentation of data qualifications resulting from the application of these guidelines is retained in project files as both hard copy and electronic media.

The laboratory included a PB, LCS, and a laboratory duplicate sample with each batch of field samples analyzed for radionuclides.

A.11.3 Field Nonconformances

Three field nonconformances were identified for the CAI. The dry decontamination process was determined to be inadequate between sample locations D11 to D12 where staining was visible in the sample. There was no apparent adverse affect on the sample results based on comparison of analytical results between the two locations and other locations with similar conditions (D12 and D13). Ten samples were received by the laboratory out of temperature due to insufficient ice in the shipped cooler. Sample results were estimated. Samples shipped on July 16, 2009, had incorrect sample numbers, which were corrected on the chain of custody. This nonconformance did not affect sample results.

A.11.4 Laboratory Nonconformances

Laboratory nonconformances are generally due to inconsistencies in the analytical instrumentation operation, sample preparations, extractions, missed holding times, and fluctuations in internal standard and calibration results. Fifteen nonconformances were issued by the laboratories that may or may not have resulted in qualifying data. These laboratory nonconformances have been accounted for and resolved during the data qualification process.

A.12.0 Summary

Organic and inorganic contaminants detected in environmental samples and samples of waste contained in septic tanks and leach pits during the CAI were evaluated against FALs and PSM criteria to determine the nature and extent of COCs for CAU 560. Assessment of the data generated from investigation activities indicates the FALs were exceeded for PCBs at CAS 06-05-04 and benzo(a)pyrene at CAS 06-59-03. Potential source material was found in septic system components to include PCBs and arsenic at CAS 06-05-03; benzo(a)pyrene at CAS 06-59-03; and PCBs, lead, arsenic, and pesticides at CAS 06-59-05. The following summarizes the results for each CAS.

CAS 03-51-01, Leach Pit

Based on the observations made and the analytical results of the environmental samples collected at this CAS, no contamination has been released to the soil at this CAS. Therefore, based on the results of the CAA determination (see Appendix F), the corrective action of no further action was implemented at this CAS. However, as a BMP, the leach pit casing, lid, and connecting piping were removed for disposal, and the leach pit void filled with native soil and re-graded.

CAS 06-04-02, Septic Tank

A leach pit was identified at this CAS instead of a septic tank. Based on observations made and the analytical results of environmental samples and solids within the leach pit, no contamination has been released to the soil at this CAS, and no PSM is present. Therefore, based on the results of the CAA determination (see Appendix F), the corrective action of no further action was implemented at this CAS. However, as a BMP, the leach pit casing, lid, connecting piping as well as surrounding surface debris were removed for disposal. The leach pit void was filled with native soil and re-graded.

CAS 06-05-03, Leach Pit

Based on observations made and analytical results of the PSM solid samples collected at this CAS, PSM is present in the leach pit. The PSM contains PCBs and arsenic above PSM criteria. Based on observations made and analytical results of the environmental samples collected at this CAS, no contamination has been released to the soils at the septic tank or the leach pit. Based on results of CAA determination (see Appendix F) and the presence of leach pit PSM, a corrective action of closure in place with a UR was implemented. To mitigate potential migration of COCs from the PSM in the leach pit, the chamber lid and pipe stickups were removed at a depth of 5 ft bgs for leach pit access, and the chamber was filled with concrete. The leach pit chamber lid and piping were disposed and backfilled with native materials, and the area was re-graded.

CAS 06-05-04, Leach Bed

Based on observations made and analytical results of the environmental samples collected at this CAS, PCB contamination was identified in surface and subsurface samples in the distribution box, backfill material within the abandoned septic tank, leach bed materials, and soils in the immediate vicinity of the septic system components. Additional PCB contamination not associated to septic system release points was identified in soils north and west of the CAS components in the Area 6 yard. Based on the presence of a COC and results of the CAA evaluation (see Appendix F), the corrective action of closure in place with a UR following a soil-removal action was implemented. Approximately 1,700 yd^3 of PCB-impacted soil at concentrations from 0.74 mg/kg (the FAL) to 50 mg/kg was excavated and removed for disposal to the NTS Area 9 U10C Industrial Landfill. Approximately 400 yd^3 of PCB-impacted soil at concentrations exceeding the TSCA-regulated level of 50 mg/kg (CFR, 2009b) was excavated and removed for disposal to an offsite treatment facility. Based on the analytical results of remaining samples, no further corrective action is expected. A closure in place with a UR has been implemented for PCB contamination that remains near and extends under Building CP-162. All other identified areas with PCB contamination at concentrations greater than the FAL and greater than the TSCA-regulated level of 50 mg/kg were removed. All components of the septic system were also removed for disposal and the area backfilled and re-graded.

CAS 06-59-03, Building CP-400 Septic System

Based on observations made and analytical results of the environmental samples collected at this CAS, benzo(a)pyrene was identified as a COC in both soil and PSM at the inlet end of the septic tank. The lateral and vertical extent of contamination was limited to 15 ft and 5 ft, respectively, from the western chamber and inlet pipe connection. Based on the presence of a COC and results of the CAA evaluation (see Appendix F), the corrective action of clean closure was implemented. A total volume of 6 yd^3 of contaminated soil and PSM was removed for disposal as well as the remains of the rusted septic tank and connecting piping. Based on the results of verification samples collected at this CAS, no further corrective action is required because the benzo(a)pyrene contamination at concentrations greater than the FAL was removed.

CAS 06-59-04, Office Trailer Complex Sewage Pond

Based on the observations made and the analytical results of the environmental samples collected at this CAS, no contamination has been released to the soil at this CAS. Therefore, based on the results of the CAA determination (see Appendix F), the corrective action of no further action was implemented at this CAS.

CAS 06-59-05, Control Point Septic System

Based on observations made and environmental samples collected at this CAS, no contamination has been released to the soil surrounding the septic system components of this CAS. Based on analytical results of dry sludge collected within the septic tank chambers and the inlet pipe, PSM containing PCBs (Aroclor 1260), lead, arsenic, benzo(a)pyrene, dieldrin, heptachlor epoxide, and chlordane above PSM criteria is present at this CAS. Based on the presence of PSM and results of the CAA evaluation (see Appendix F), the corrective action of clean closure was implemented. The PSM present inside each septic tank chamber, the inlet pipe, and the connecting piping assembly at the outlet end was removed and disposed. The septic tank was then filled with concrete; therefore, no further corrective action is required. As a BMP, the steel covers, aboveground vent pipes, inlet pipe, and outlet piping assembly were also removed for disposal.

A.13.0 References

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Appendix B

Data Assessment

B.1.0 Data Assessment

The DQA process is the scientific evaluation of the actual CAI results to determine whether the DQO criteria established in the CAU 560 CAIP (NNSA/NSO, 2008) were met and whether DQO decisions can be resolved at the desired level of confidence. The DQO process ensures that the right type, quality, and quantity of data will be available to support the resolution of those decisions at an appropriate level of confidence. Using both the DQO and DQA processes help to ensure that DQO decisions are sound and defensible.

The DQA involves five steps that begin with a review of the DQOs and end with an answer to the DQO decisions. The five steps are briefly summarized as follows:

Step 1: Review DQOs and Sampling Design – Review the DQO Process to provide context for analyzing the data. State the primary statistical hypotheses; confirm the limits on decision errors for committing false negative (Type I) or false positive (Type II) decision errors; and review any special features, potential problems, or deviations to the sampling design.

Step 2: Conduct a Preliminary Data Review – Perform a preliminary data review by reviewing QA reports and inspecting the data both numerically and graphically, validating and verifying the data to ensure that the measurement systems performed in accordance with the criteria specified, and using the validated dataset to determine whether the quality of the data is satisfactory.

Step 3: Select the Test – Select the test based on the population of interest, population parameter, and hypotheses. Identify the key underlying assumptions that could cause a change in one of the DQO decisions.

Step 4: Verify the Assumptions – Perform tests of assumptions. If data are missing or are censored, determine the impact on DQO decision error.

Step 5: Draw Conclusions from the Data – Perform the calculations required for the test.

B.1.1 Review DQOs and Sampling Design

This section contains a review of the DQO process presented in Appendix A of the CAU 560 CAIP (NNSA/NSO, 2008). The DQO decisions are presented with the DQO provisions to limit false negative or false positive decision errors. Special features, potential problems, or any deviations to the sampling design are also presented.

B.1.1.1 Decision I

The Decision I statement as presented in the CAU 560 CAIP: "Is any COC present in environmental media within the CAS?" (NNSA/NSO, 2008).

Decision I Rules:

- If the population parameter of any COPC in a target population exceeds the FAL for that COPC, then that COPC is identified as a COC.
- If a COC is detected, then the Decision II statement must be resolved.
- If COCs are not identified, then the CAI is complete.

B.1.1.1.1 DQO Provisions To Limit False Negative Decision Error

A false negative decision error (where consequences are more severe) was controlled by meeting the following criteria:

1. Having a high degree of confidence that locations selected will identify COCs if present anywhere within the CAS.
2. Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples.
3. Having a high degree of confidence that the dataset is of sufficient quality and completeness.

Criterion 1:

The following methods [stipulated in the CAU 560 DQOs (NNSA/NSO, 2008)] were used in selecting sample locations.

1. Selection of sampling locations associated with FSRs was accomplished by analyzing samples for alpha and beta/gamma-emitting radionuclides using a hand-held NE Technology Electra.

2. Selection of locations identified during geophysical surveys that had results indicating surface or subsurface materials existed, and were not consistent with the natural surroundings (e.g., the sewage pond) was accomplished by conducting visual inspections.

3. Selection of sampling locations associated with breaches in piping was accomplished by performing a video survey of the pipes and/or visual field observations of exposed piping.

4. Selection of sampling locations associated with a release of effluent to the surrounding soils from piping connection and tie-in locations was accomplished by conducting visual inspections of the pipes for corrosion or disconnects and observations of surface and/or subsurface soil for presence of staining.

5. Selection of sampling locations associated with a release of effluent to the surrounding soils from breaches in the structural integrity of septic tanks, distribution boxes, the filter box, the dry well, and leach pit features was accomplished by conducting visual inspections.

6. Selection of sampling locations associated with discoloration, textural discontinuities, disturbance of native soils and other indicators of potential contamination was accomplished by visual observations of excavated soils.

7. Selection of sampling locations associated with professional judgment based on acceptable knowledge was accomplished by:

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

<u>Criterion 2:</u>

All samples were analyzed using the analytical methods listed in Tables 3-4 and 3-5 of the CAU 560 CAIP and for the chemical and radiological parameters listed in Section A.3.2.2 of the CAIP (NNSA/NSO, 2008). Table B.1-1 provides a reconciliation of samples analyzed to the planned analytical program.

Samples were submitted for all of the analytical methods specified in the analytical program specified in Section 3.4 of the CAU 560 CAIP (NNSA/NSO, 2008).

Table B.1-1
CAU 560 Analyses Performed

CAS	Total VOCs	Total SVOCs	PCBs	Metals	TPH-DRO	Pesticides	Gamma Spectroscopy	Beryllium	TCLP VOC	TCLP SVOC	TCLP Metals	TCLP Pesticides
03-51-01	RS	RS	RS	RS	RS	RS	RS	RS	NR	NR	NR	NR
06-04-02	RS	RS	RS	RS	RS	RS	RS	RS	S	S	S	S
06-05-03	RS	RS	RS	RS	RS	RS	RS	RS	S	S	S	S
06-05-04	RS	RS	RS	RS	RS	RS	RS	RS	NR	NR	NR	NR
06-59-03	RS	RS	RS	RS	RS	RS	RS	RS	S	S	S	S
06-59-04	RS	RS	RS	RS	RS	RS	RS	RS	NR	NR	NR	NR
06-59-05	RS	RS	RS	RS	RS	RS	RS	RS	S	S	S	S

NR = Not required
R = Required but not submitted
RS = Required and submitted
S = Not required but submitted

Sample results were assessed against the acceptance criterion for the DQI of sensitivity as defined in the Industrial Sites QAPP (NNSA/NV, 2002). The sensitivity acceptance criterion defined in the CAU 560 CAIP is that analytical detection limits will be less than the corresponding action level (NNSA/NSO, 2008). This criterion was not achieved for the analytical results listed in Table B.1-2. Results not meeting the sensitivity acceptance criterion will not be used in making DQO decisions and will therefore be considered as rejected data. The impact on DQO decisions is addressed in the assessment of completeness.

Table B.1-2
Analytes Failing Sensitivity Criteria

Sample Number	Analyte	CAS	MDC (µg/kg)	FAL (µg/kg)
560G012	Benzo(a)pyrene	06-59-05	210	210
	Dibenzo(a,h)anthracene		210	210

Criterion 3:

To satisfy the third criterion, the entire dataset, as well as individual sample results, were assessed against the acceptance criteria for the DQIs of precision, accuracy, representativeness, completeness, and comparability, as defined in the Industrial Sites QAPP (NNSA/NV, 2002). The DQI acceptance criteria are presented in Table 6-1 of the CAU 560 CAIP (NNSA/NSO, 2008). As presented in Tables B.1-2 and B.1-3, these criteria were met for each of the DQIs.

Table B.1-3
Accuracy Measurements
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Contaminant	Number of Measurements Qualified	Number of Measurements Performed	Percent within Criteria
Alpha-BHC	1	60	98.3
Endosulfan sulfate	1	60	98.3
Lindane	1	60	98.3
Trichloroethene	1	60	98.3
Chlorobenzene	2	60	96.7
Aroclor 1221	2	214	99.1
Aroclor 1232	2	214	99.1
Aroclor 1248	2	214	99.1
Aroclor 1016	2	214	99.1
Aroclor 1242	3	214	98.6
Aroclor 1254	3	214	98.6
Aroclor 1260	22	214	89.7
Aroclor 1268	20	214	90.7
4,4’-DDE	3	60	95
Delta-BHC	3	60	95
4,4’-DDT	4	60	93.3
Chlordane	4	60	93.3
Heptachlor epoxide	4	60	93.3
4,4’-DDD	6	60	90
Lead	8	67	88.1

Table B.1-3
Accuracy Measurements
(Page 2 of 2)

Contaminant	Number of Measurements Qualified	Number of Measurements Performed	Percent within Criteria
Alpha-chlordane	8	60	86.7
Gamma-chlordane	8	60	86.7

Precision

Precision was evaluated as described in Section 6.2 of the CAU 560 CAIP (NNSA/NSO, 2008). There were no data qualified for precision; therefore, 100 percent of this DQI was achieved, exceeding the CAIP acceptance criterion of 80 percent.

Accuracy

Accuracy was evaluated as described in Section 6.2 of the CAU 560 CAIP (NNSA/NSO, 2008). Table B.1-3 provides the chemical accuracy analysis results for all constituents qualified for accuracy. There were no radiological data qualified for accuracy. Accuracy rates are above the CAIP criterion of 80 percent; therefore, the dataset is determined to be acceptable for the DQI of accuracy.

Representativeness

The DQO process as identified in Appendix A of the CAU 560 CAIP (NNSA/NSO, 2008) was used to address sampling and analytical requirements for CAU 560. During this process, appropriate locations were selected that enabled the samples collected to be representative of the population parameters identified in the DQO (the most likely locations to contain contamination and locations that bound COCs). The sampling locations identified in the Criterion 1 discussion meet this criterion. Therefore, the analytical data acquired during the CAU 560 CAI are considered representative of the population parameters.

Completeness

The CAU 560 CAIP (NNSA/NSO, 2008) defines acceptable criteria for completeness to be that the dataset is sufficiently complete to be able to make the DQO decisions. This is initially evaluated as 80 percent of CAS-specific non-critical analytes identified in the CAIP having valid results and

100 percent of critical analytes (including Decision II samples) having valid results. Critical analytes for CAU 560 are identified as the hazardous constituents of TPH-DRO for CASs 06-05-03 and 06-05-04, and silver at CAS 06-59-03.

Rejected data (either qualified as rejected or data that failed the criterion of sensitivity) were not used in the resolution of DQO decisions and are not counted toward meeting the completeness acceptance criterion. Rejected data are presented in Table B.1-2 as those analytes not meeting the sensitivity criteria. Due to matrix interferences, one sample was diluted and/or prepared at reduced volume, resulting in raised detection limits for benzo(a)pyrene and dibenzo(ah)anthracene that exceeded the FALs. All other critical analytes in the remaining soil samples for CAS 06-59-05 passed sensitivity criteria and were reported as nondetects; therefore, there is sufficient information to reasonably conclude that these two constituents are not present within soils this CAS. All other data for critical analytes were within the acceptable criteria. Therefore, the dataset is determined to be acceptable for the DQI of completeness.

Comparability

Field sampling, as described in the CAU 560 CAIP (NNSA/NSO, 2008), was performed and documented in accordance with approved procedures that are comparable to standard industry practices. Approved analytical methods and procedures per DOE were used to analyze, report, and validate the data. These are comparable to other methods used not only in industry and government practices, but most importantly are comparable to other investigations conducted for the NTS. Therefore, project datasets are considered comparable to other datasets generated using these same standardized DOE procedures, thereby meeting DQO requirements.

Also, standard, approved field and analytical methods ensured that data were appropriate for comparison to the investigation action levels specified in the CAIP.

B.1.1.1.2 DQO Provisions To Limit False Positive Decision Error

The false positive decision error was controlled by assessing the potential for false positive analytical results. Quality assurance/QC samples such as field blanks, trip blanks, LCSs, and method blanks were used to determine whether a false positive analytical result may have occurred. This provision is evaluated during the validation process, and appropriate qualifications are applied to the data.

Proper decontamination of sampling equipment and the use of certified clean sampling equipment and containers also minimized the potential for cross contamination that could lead to a false positive analytical result.

B.1.1.2 Decision II

Decision II as presented in the CAU 560 CAIP: “If a COC is present, is sufficient information available to evaluate appropriate CAAs?” (NNSA/NSO, 2008). Sufficient information is defined to include:

- Identifying the volume of media containing any COC bounded by analytical sample results in lateral and vertical directions.
- The information needed to determine potential remedial waste types.
- The information needed to evaluate the feasibility of remediation alternatives (i.e., bioassessment if natural attenuation or biodegradation is considered, and geotechnical data if construction or evaluation of barriers is considered).

<u>Decision II Rules:</u>

- If the observed concentration of any COC in a Decision II sample exceeds the FALs, then additional samples will be collected to complete the determination of the extent.
- If observed COC concentrations in a sample from all bounding directions are less than the FALs, then the decision will be that the extent of contamination has been defined in the lateral and/or vertical direction.
- If wastes are to be generated as part of a corrective action, samples will be collected to sufficiently characterize the potential wastes.

Population Parameters – The population parameters for Decision II data will be the observed concentration of each unbounded COC in any sample or the observed concentration of each sample used to characterize the potential waste streams.

B.1.1.2.1 DQO Provisions To Limit False Negative Decision Error

A false negative decision error (where consequences are more severe) is controlled by meeting the following criteria:

1. Having a high degree of confidence that the sample locations selected will identify the extent of the COCs.
2. Having a high degree of confidence that analyses conducted will be sufficient to detect any COCs present in the samples at an acceptable level of sensitivity.
3. Having a high degree of confidence that the dataset is of sufficient quality and completeness.
4. Having a high degree of confidence that the potential waste streams are characterized.

Criterion 1:

In general, soil sample results demonstrated that the vertical and lateral extent of COCs were defined. Areas within three CASs (06-05-03, 06-05-04, and 06-59-03) were identified as requiring further delineation of COCs based on Decision I sample results. The sample locations and concentrations for the contaminants driving the extent of contamination are shown in Figures A.5-1, A.6-1, and A.7-1 for those CASs requiring Decision II sample collection.

For the COCs identified within the interior of the leach pit at CAS 06-05-03 (arsenic and PCBs), Decision II sampling consisted of drilling three step-out borings and collecting samples approximately 6 ft laterally from location C02 (center of leach pit casing). The vertical and lateral extent was defined at this location for the COC based on these step-out locations. Figure A.5-1 shows the sample locations and concentrations.

The surface and subsurface soils at CAS 06-05-04 reveal PCBs at concentrations exceeding the FAL and TSCA-regulated level (CFR, 2009b). Decision II samples were collected to define the vertical and lateral extent of PCB contamination near the septic system components and into the Area 6 yard. Figure A.6-2 shows the Decision II sample locations and PCB concentrations defining the extent of PCB-impacted soil.

For the COCs identified at CAS 06-59-03 (benzo(a)pyrene), Decision II sampling consisted of drilling three step-out borings at locations E09, E10, and E11 and collecting samples approximately

5 ft laterally from location E02 (western end of septic tank). The vertical and lateral extent was defined at this location for the COC based on these step-out locations. Figure A.7-1 shows the sample locations and concentrations.

Soil sample results demonstrated that the vertical and lateral extent of arsenic, benzo(a)pyrene, and/or PCBs above the FAL was defined. The lateral extent of the COCs are defined by the soil samples collected laterally at similar depth intervals where contamination was identified. The vertical extent of the COCs are defined by the soil samples collected at various subsurface depths.

Criterion 2:

All samples were analyzed for the COCs present at the corresponding CAS:

- CAS 06-05-03 - PCBs and arsenic
- CAS 06-05-04 - PCBs
- CAS 06-59-03 - Benzo(a)pyrene
- CAS 06-59-05 - Lead, arsenic, benzo(a)pyrene, PCBs and pesticides (dieldrin, chlordane, heptachlor epoxide)

The second criterion for extent (sensitivity) was accomplished for all analyses as demonstrated in Tables B.1-2 and B.1-3.

Criterion 3:

To satisfy the third criterion for extent, the entire dataset, as well as individual sample results, were assessed against the DQIs of precision, accuracy, comparability, completeness, and representativeness, as defined in the Industrial Sites QAPP (NNSA/NV, 2002). The DQI discussion is presented under Criterion 3 for Decision I.

B.1.1.2.2 DQO Provisions To Limit False Positive Decision Error

The false positive decision error was controlled by assessing the potential for false positive analytical results. Quality assurance/QC samples such as field blanks, trip blanks, LCSs, and method blanks were used to determine whether a false positive analytical result may have occurred. This provision is evaluated during the validation process, and appropriate qualifications are applied to the data.

Proper decontamination of sampling equipment and the use of certified clean sampling equipment and containers also minimized the potential for cross contamination that could lead to a false positive analytical result.

B.1.1.3 Sampling Design

The CAU 560 CAIP (NNSA/NSO, 2008) made the following commitments for sampling:

1. Judgmental sampling will be conducted at each CAS of CAU 560.

   Result: All sample locations were selected as the most likely to contain contaminants (e.g., low point of the sewage pond, beneath leach bed distribution lines at the leach-rock/native soil interface). Samples were collected and analyzed for the appropriate COPCs.

2. Where practical, sampling activities at CASs with piping will consist of video-mole survey of abandoned piping adjacent to a feature in the CAS to identify breaches or residual material.

   Result: Where practical and accessible, piping was video surveyed. The accessible piping at each CAS — except 03-51-01, 06-05-03, and 06-59-03 — was video surveyed. Corrective Action Site 06-05-03 piping was mostly converted to the active sewer system and was not accessible, and the majority of the CAS 03-51-01 inactive piping could be investigated without video surveying. The piping diameter at CAS 06-59-03 was smaller than the video mole but was easily accessible during visual inspection. No residual material was identified in any lines, except for the septic tank inlet pipe at CAS 06-59-05, which contained material and was sampled.

3. Septic tanks, former trailer location tie-ins, distribution boxes, the CAS 06-59-03 filter box and dry well, and leach pits will be excavated, as appropriate, to verify component integrity and identify any breaches in inlet and outlet piping.

   Result: These components received visual inspections at each CAS to verify integrity. None of these components showed evidence of breaching or disconnects except for three specific locations at which soil samples were collected to investigate potential impacts to the surrounding soils. These locations were the degraded septic tank at CAS 06-59-03, the inlet connection to the CAS 03-51-01 leach pit where the piping was absent, and the inlet connection to the CAS 06-05-04 septic tank where a section of piping had been removed. Corrective Action Site 06-59-03 did not contain a filter box or a dry well, but samples were collected at representative locations selected to investigate potential impacts to the soils. At CAS 06-59-04, all piping had been removed before the CAI.

4. Decision I activities will consist of locating components and collecting soil samples beneath and/or adjacent to collection and distribution systems to identify releases of contaminants.

   Result: All collection and distribution system components at each CAS, except CASs 06-05-03 and 06-59-03, were investigated by excavation, and soil samples were collected as stipulated in the CAIP adjacent to and from beneath the required components. At CAS 06-59-03, the filter box and dry well were not present; however, samples were collected at representative locations selected to investigate potential impacts to the soils. At CAS 06-05-03, the septic tank was not fully accessible for sampling due to active utilities and the building foundation, so sample collection was not feasible at the inlet pipe or base of the tank at the inlet end; the outlet pipe had been removed and backfilled before the CAI. Therefore, only one sample was collected at the base of the tank near the outlet end where the tank was accessible. At CAS 03-51-01, the geophysical anomaly near the leach pit was not an outlet pipe; therefore, no samples were required.

5. Activities will include visual inspections of the inside of septic tanks, within leach pits, inside the CAS 06-59-03 filter box and dry well, and within the CAS 06-59-04 sewage pond. Samples will then be collected to characterize the waste or contents for potential disposal.

   Result: Visual inspections and approximate measurements of interiors were made and documented in FADLs for each of the listed CASs. Residual materials were not present in the CAS 03-51-01 leach pit, 06-05-04 septic tank, and 06-59-04 sewage pond. The remaining CASs had residual component material that was sampled, except for the CAS 06-05-03 septic tank, which had been backfilled with fill material. The filter box and dry well at CAS 06-59-03 were no longer present, so inspections were not feasible.

B.1.2 Conduct a Preliminary Data Review

A preliminary data review was conducted by reviewing QA reports and inspecting the data. The contract analytical laboratories generate a QA nonconformance report when data quality does not meet contractual requirements. Data were validated and verified to ensure that the measurement systems performed in accordance with the criteria specified. The validated dataset quality was found to be satisfactory.

B.1.3 Select the Test and Identify Key Assumptions

The test for making DQO Decision I was the comparison of the maximum analyte result from each CAS to the corresponding FAL. The test for making DQO Decision II was the comparison of all COC analyte results from each bounding sample to the corresponding FALs.

The key assumptions that could impact a DQO decision are listed in Table B.1-4.

Table B.1-4
Key Assumptions

Exposure Scenario	Site workers are only exposed to COCs through oral ingestion, inhalation, external exposure to radiation, or dermal contact (by absorption) of COCs absorbed onto the soils. Exposure to contamination is limited to industrial site workers, construction/remediation workers, and military personnel conducting training.
Affected Media	Surface soil, shallow subsurface soil, and potentially perched (shallow) groundwater. Deep groundwater contamination is not a concern. Contaminants migrating to regional aquifers are not considered.
Location of Contamination/Release Points	The area of contamination is contiguous. The extent of COC concentration decreases away from the area of contamination.
Transport Mechanisms	Surface transport may occur as a result of a spill or storm water runoff. Surface transport beyond shallow substrate is not a concern.
Preferential Pathways	None.
Lateral and Vertical Extent of Contamination	Subsurface contamination, if present, is contiguous and decreases with distance and depth from the source. Surface contamination may occur laterally as a result of a spill or storm water runoff.
Groundwater Impacts	None.
Future Land Use	Nonresidential.
Other DQO Assumptions	Contamination may be present in the soils adjacent to a feature due to runoff or intended use (e.g., decontamination pad).

B.1.4 Verify the Assumptions

The results of the CAI support the key assumptions identified in the CAU 560 DQOs and Table B.1-4.

All data collected during the CAI supported CSMs with the exceptions noted in this section. These exceptions did not invalidate the CSMs presented in the CAU 560 CAIP (NNSA/NSO, 2008), nor did they necessitate revisions to the CSMs.

B.1.4.1 Other DQO Commitments

No other DQO commitments were made in the CAU 560 CAIP (NNSA/NSO, 2008).

B.1.5 Draw Conclusions from the Data

This section resolves the two DQO decisions for each of the CAU 560 CASs.

B.1.5.1 Decision Rules for Decision I

Decision Rule: If the concentration of any COPC in a target population exceeds the FAL for that COPC during the initial CAI, then that COPC is identified as a COC and Decision II sampling will be conducted.

Result: The following COCs were identified in the following CASs and require either Decision II sampling to define extent and/or corrective action to remove PSM.

- PCBs at CASs 06-05-03, 06-05-04, and 06-59-05
- Benzo(a)pyrene at CAS 06-59-03 and 06-59-05
- TPH-DRO at CASs 06-05-03, 06-59-03, and 06-59-05
- Arsenic at CASs 06-05-03 and 06-59-05
- Lead at CAS 06-59-05
- Dieldrin at CAS 06-59-05
- Heptachlor expoxide at CAS 06-59-05
- Chlordane at CAS 06-59-05

Decision Rule: If all COPC concentrations are less than the corresponding FALs, then the decision will be no further action.

Result: No COCs were identified in soil or waste samples collected from CASs 03-51-01, 06-04-02, and 06-59-04. No further action was identified as the corrective action for these CASs.

B.1.5.2 Decision Rules for Decision II

Decision Rule: If the observed concentration of any COC in a Decision II sample exceeds the FALs, then additional samples will be collected to complete the determination of the extent.

Result: Samples to define extent in soil were collected from CASs 06-05-03, 06-05-04, and 06-59-03. No COCs were identified in soils at CAS 06-59-05 so Decision II samples were not required; however, COCs were identified in septic tank PSM.

Decision Rule: If all observed COC population parameters are less than the FALs, then the decision will be that the extent of contamination has been defined in the lateral and/or vertical direction.

Result: The vertical and lateral extent of contamination at CASs 06-05-03, 06-05-04, and 06-59-03 were defined. The extent of COC plumes is displayed in Figures A.5-1, A.6-2, and A.7-1, respectively.

B.2.0 References

CFR, see *Code of Federal Regulations*.

Code of Federal Regulations. 2009. Title 40 CFR Part 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce and Prohibitions." Washington, DC: U.S. Government Printing Office.

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

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

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

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office. 2008. *Corrective Action Investigation Plan for Corrective Action Unit 560: Septic Systems, Nevada Test Site, Nevada*, Rev. 0, DOE/NV--1272. Las Vegas, NV.

Appendix C

Risk Assessment

C.1.0 Risk Assessment

The RBCA process used to establish FALs is described in the *Industrial Sites Project Establishment of Final Action Levels* (NNSA/NSO, 2006). This process conforms with NAC Section 445A.227 (NAC, 2006a), which lists the requirements for sites with soil contamination. For the evaluation of corrective actions, NAC Section 445A.22705 (NAC, 2006b) requires the use of ASTM Method E1739 (ASTM, 1995) to "conduct an evaluation of the site, based on the risk it poses to public health and the environment, to determine the necessary remediation standards (i.e., FALs) or to establish that corrective action is not necessary."

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

- The tank/pit containment would fail at some point, and the contents would be released to the surrounding media.
- The resulting concentration of contaminants in the surrounding media would be equal to the concentration of contaminants in the tank/pit waste.
- Any liquid contaminant in the septic tanks exceeding the RCRA toxicity characteristic concentration can result in a COC's introduction to the surrounding media.

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

This section contains documentation of the RBCA process used to establish FALs described in the Industrial Sites Project Establishment of FALs (NNSA/NSO, 2006). This process defines three tiers (or levels) to establish FALs used to evaluate DQO decisions:

- Tier 1 – Sample results from source areas (highest concentrations) compared to risk-based screening levels (RBSLs) (i.e., PALs) based on generic (non-site-specific) conditions.

- Tier 2 – Sample results from exposure points compared to SSTLs calculated using site-specific inputs and Tier 1 formulas.

- Tier 3 – Sample results from exposure points compared to SSTLs and points of compliance calculated using chemical fate/transport and probabilistic modeling.

The risk-based corrective action decision process stipulated in the Industrial Sites Project Establishment of FALs (NNSA/NSO, 2006) is summarized in Figure C.1-1.

C.1.1 A. Scenario

Corrective Action Unit 560, Septic Systems, comprises the following seven inactive CASs within Areas 3 and 6 of the NTS:

- 03-51-01, Leach Pit
- 06-04-02, Septic Tank
- 06-05-03, Leach Pit
- 06-05-04, Leach Bed
- 06-59-03, Building CP-400 Septic System
- 06-59-04, Office Trailer Complex Sewage Pond
- 06-59-05, Control Point Septic System

The seven CASs are located in the eastern portion of Area 3 and the central portion of Area 6, at or near the CP-6 Complex. The CASs consist of leach pits and leach beds, septic tanks, septic system components, and a sewage pond. One CAS is located near Building 3C-5, Special Measurements Facility, at the former Area 3 Camp. Building 3C-5 was demolished in March 1999 as part of the Area 3 Camp closure. The remaining six CASs are located at the CP-6 Complex. The CP-6 Complex consists of currently standing buildings and historical buildings dating back to as early as 1953 (Building CP-400, which was built in 1953 and demolished in June 2003, is associated with CAS 06-59-03). Portions of the CP-6 Complex are still active and were considered during corrective actions.

The Area 3 CAS 03-51-01 consists of a steel leach pit chamber and underground piping associated with the former Building 3C-5, Special Measurements Facility. The piping begins approximately 3 ft from a cut in the concrete pad that was once the foundation of Building 3C-5, and runs north approximately 9 ft to the edge of the leach pit chamber. The 3-ft pipe section was removed before the CAI.

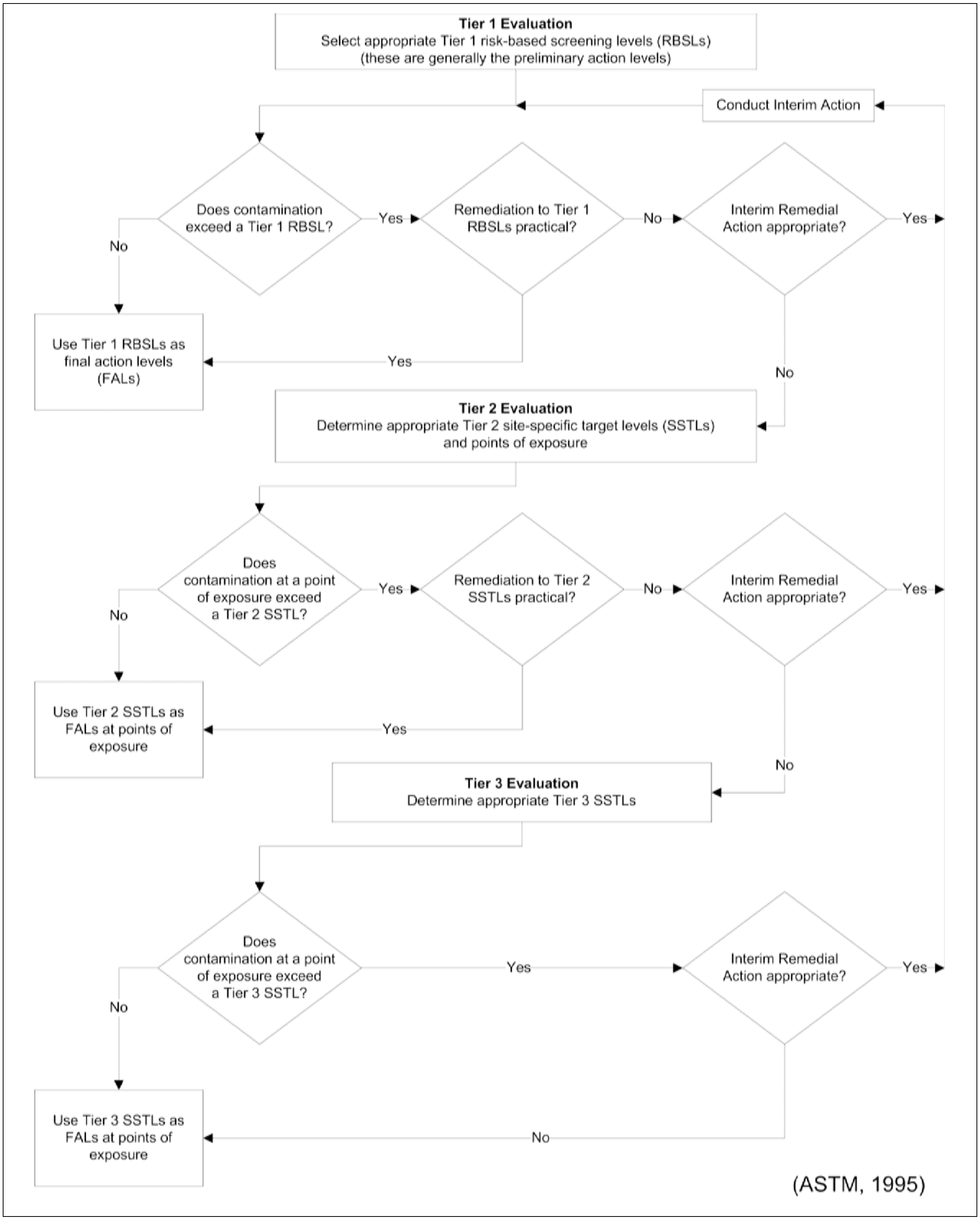

Figure C.1-1
Risk-Based Corrective Action Decision Process

Corrective Action Site 06-04-02 consists of a steel leach pit chamber and subsurface piping associated with support/administrative trailers of the CP-6 Complex. All of these trailers were removed by 1985.

Corrective Action Site 06-05-03 consists of a concrete leach pit chamber, an abandoned steel septic tank, and subsurface piping associated with Building CP-160, Site Maintenance Facility, a currently active structure. Portions of the original subsurface piping were converted for use in the active sewer system.

Corrective Action Site 06-05-04 consists of a leach bed, distribution box, abandoned concrete septic tank, and subsurface piping associated with Building CP-162, a currently active structure. An unknown PCB release not associated with the septic system that impacted nearby surface and subsurface soils was identified during the investigation.

Corrective Action Site 06-59-03 consists of a corroded steel septic tank, former dry well and filter box locations, and surface and subsurface piping associated with Building CP-400, built in 1953 and demolished in June 2003.

Corrective Action Site 06-59-04 consists of a covered sewage pond associated with the Area 6 Office Trailer Complex. The sewage pond measures approximately 60 by 60 ft and was previously connected to the Office Trailer Complex by approximately 200 ft of piping that had been removed before the CAI.

Corrective Action Site 06-59-05 consists of a concrete septic tank, tile field, and associated piping. The septic system was originally identified as servicing several buildings within the CP-6 Complex. This system was abandoned when a newer active system was installed using the same distribution box.

C.1.2 B. Site Assessment

The CAI at CASs 03-51-01 (Leach Pit), 06-04-02 (Septic Tank), 06-05-03 (Leach Pit), 06-05-04 (Leach Bed), 06-59-03 (Building CP-400 Septic System), 06-59-04 (Office Trailer Complex Sewage Pond), and 06-59-05 (Control Point Septic System) involved visual inspections through video survey and/or excavation and soil sampling adjacent to and/or beneath structural components identified as potential sources for contaminant releases. The CAI results indicate residual materials are present in the leach pits and septic tanks; however, the structural integrity of system components (e.g., tanks, piping) at each of these CASs are intact, either closed or covered by soil, and are not releasing contaminants to the surrounding environment.

The CAI at CAS 03-51-01 (Leach Pit) involved visual inspection through excavation and soil sampling adjacent to and/or beneath structural components identified in the CAIP as potential sources for contaminant releases (NNSA/NSO, 2008). The CAI results indicate no residual materials are present within the interior of the leach pit, and the structural integrity of the effluent collection/distribution system components (e.g., leach pit, piping) is intact, not open to the surface, and not releasing contaminants to the surrounding environment. No COCs were identified at this CAS. The source, release point, and nature and extent of the COCs are consistent with the septic system CSM presented in the CAIP.

The CAI at CAS 06-04-02 (Septic Tank) involved visual inspection through video survey and excavation and soil sampling adjacent to and/or beneath structural components identified in the CAIP as potential sources for contaminant releases (NNSA/NSO, 2008). The CAI results indicate no residual materials are present within the interior of the leach pit, and the structural integrity of the effluent collection/distribution system components (e.g., leach pit, piping) is intact, not open to the surface, and not releasing contaminants to the surrounding environment. No COCs were identified at this CAS. The source, release point, and nature and extent of the COCs are consistent with the septic system CSM presented in the CAIP.

The CAI at CAS 06-05-03 (Leach Pit) involved visual inspection through video survey and/or excavation and soil sampling adjacent to and/or beneath structural components identified in the CAIP as potential sources for contaminant releases (NNSA/NSO, 2008). The CAI results indicate residual materials are present within the interior of the leach pit; however, the structural integrity of the effluent collection/distribution system components (e.g., leach pit, piping) is intact, not open to the surface, and not releasing contaminants to the surrounding environment. Arsenic and PCBs were identified as COCs in solid material and soils within the leach pit chamber. The COCs are limited to the interior of the leach pit and contiguous with the source release point of inlet pipe effluent. The source, release point, and nature and extent of the COCs are consistent with the septic system CSM presented in the CAIP.

The CAI at CAS 06-05-04 (Leach Bed) involved visual inspections through video survey and excavation and soil sampling adjacent to and/or beneath structural components identified in the CAIP as potential sources for contaminant releases (NNSA/NSO, 2008). The CAI results indicate the structural integrity of the piping from the septic tank outlet to the leach bed is intact with no breaches and no residual materials, and is not releasing contaminants to the surrounding environment. The CAI results of the surface and subsurface soil surrounding the distribution box and the abandoned septic tank indicate PCBs are present as COCs. The lateral and vertical extent of COCs is not contiguous with the source release point of the leach bed and is not limited to areas surrounding the system components. The highest concentrations of PCB-impacted soil are found nearly 90 ft north of the leach bed. The source, release point, and nature and extent of the COCs were not consistent with the leach bed CSM presented in the CAIP; therefore, the CSM was revised to address the potential for a spill or historical dust-suppression activities containing PCB-laden materials.

The CAI at CAS 06-59-03 (Building CP-400 Septic System) involved visual inspection through excavation and soil sampling adjacent to and/or beneath structural components identified in the CAIP as potential sources for contaminant releases (NNSA/NSO, 2008). The CAI results indicate residual materials are present within the interior of the septic tank, and the structural integrity of the effluent collection/distribution system components (e.g., leach pit, piping) is not intact; however, the components are not open to the surface. The CAI indicates the rusted septic tank and the breached inlet pipe were releasing contaminants to the surrounding environment. Benzo(a)pyrene was identified as COCs in solid material and soils within and surrounding the septic tank western chamber. The COCs are limited to the interior of the septic tank and in shallow subsurface soils contiguous with the source release point of inlet pipe effluent. The source, release point, and nature and extent of the COCs are consistent with the septic system CSM presented in the CAIP.

The CAI at CAS 06-59-04 (Office Trailer Complex Sewage Pond) involved visual inspection through excavation and soil sampling adjacent to and/or beneath structural components identified in the CAIP as potential sources for contaminant releases (NNSA/NSO, 2008). The CAI results indicate no residual materials are present within the interior of the sewage pond and the pond effluent materials are not open to the surface, and not releasing contaminants to the surrounding environment. The subsurface piping originally terminating with the pond was removed before the CAI. No COCs were identified at this CAS. The source, release point, and nature and extent of the COCs are consistent with the septic system CSM presented in the CAIP.

The CAI at CAS 06-59-05 (Control Point Septic System) involved visual inspection through video survey and/or excavation and soil sampling adjacent to and/or beneath structural components identified in the CAIP as potential sources for contaminant releases (NNSA/NSO, 2008). The CAI results indicate residual materials are present within the interior of the leach pit; however, the structural integrity of the effluent collection/distribution system components (e.g., leach pit, piping) is intact, not open to the surface, and not releasing contaminants to the surrounding environment. Arsenic, lead, benzo(a)pyrene, dieldrin, chlordane, heptachlor epoxide, and PCBs were identified as COCs in solid material within each of the three septic tank chambers and solid material within the inlet pipe. The COCs are limited to the interior of the septic tank and inlet pipe and are contiguous with the source release point of inlet pipe effluent. The source, release point, and nature and extent of the COCs are consistent with the septic system CSM presented in the CAIP.

The maximum concentration of contaminant identified at each CAS, and their corresponding PALs are presented in Table C.1-1.

C.1.3 C. Site Classification and Initial Response Action

The four major site classifications listed in Table 3 of the ASTM Standard are: (1) immediate threat to human health, safety, and the environment; (2) short-term (0 to 2 years) threat to human health, safety, and the environment; (3) long-term (greater than 2 years) threat to human health, safety, or the environment; and (4) no demonstrated long-term threats.

Based on the CAI, none of the CASs presents an immediate threat to human health, safety, and the environment; therefore, no interim response actions are necessary at these sites. Based on this information, three of the CASs (03-51-01, 06-04-02, and 06-59-04) are determined to be Classification 4 sites as defined by ASTM Method E1739 and pose no demonstrated near- or long-term threats. At CASs 06-05-03, 06-05-04, 06-59-03 and 06-59-05, COCs were identified that

Table C.1-1
Maximum Reported Value for Tier I Comparison
(Page 1 of 3)

Parameter	PAL	Units	Maximum Result						
			03-51-01	**06-04-02**	**06-05-03**	**06-05-04**	**06-59-03**	**06-59-04**	**06-59-05**
2,4-Dinitrotoluene	1,200	mg/kg	--	--	--	--	0.31 (J)	--	--
4,4’-DDD	10	mg/kg	--	0.003 (J)	0.0014 (J)	--	0.017 (J)	0.004	2
4,4’-DDE	7	mg/kg	--	0.0046 (J)	0.096 (J)	0.007 (J)	0.052 (J)	--	0.96 (J)
4,4’-DDT	7	mg/kg	--	0.007 (J)	--	--	0.066 (J)	--	0.62 (J)
Ac-228	5	pCi/g	2.02	0.88	0.8	0.86	1.95	2.32	1.21
Alpha-BHC	0.36	mg/kg	--	--	--	--	--	--	0.00039 (J)
Am-241	12.7	mg/kg	--	--	--	--	0.228 (J)	--	0.92
Anthracene	100,000	mg/kg	--	--	--	--	0.16 (J)	--	--
Aroclor 1016	0.74	--	--	--	0.56 (J)	--	--	--	--
Aroclor 1242	0.74	mg/kg	--	--	--	0.0562 (J)	--	--	--
Aroclor 1254	0.74	mg/kg	0.58 (J)	--	**1.3 (J)**	0.17 (J)	--	0.17	0.059 (J)
Aroclor 1260	0.74	mg/kg	0.11 (J)	0.024 (J)	**0.76 (J)**	**180 (J)**	0.028		**5.3**
Aroclor 1268	0.74	mg/kg	--	--	0.33	**170 (J)**	--	--	--
Arsenic	23	mg/kg	6.3	5.3	**57**	9.1	7.3	5.5	**30**
Barium	67,000	mg/kg	150	120	220	220	130	150	560
Benzo(a)anthracene	2.1	mg/kg	--	--	--	--	0.95	--	0.6 (J)
Benzo(a)pyrene	0.21	mg/kg	--	--	--	--	**0.92**	--	**0.62 (J)**
Benzo(b)fluoranthene	2.1	mg/kg	--	--	--	--	1.3	--	0.75 (J)
Benzo(ghi)perylene	29,000	mg/kg	--	--	--	--	0.36	--	0.87 (J)
Benzo(k)fluoranthene	21	mg/kg	--	--	--	--	0.45	--	--

Table C.1-1
Maximum Reported Value for Tier I Comparison
(Page 2 of 3)

Parameter	PAL	Units	Maximum Result						
			03-51-01	06-04-02	06-05-03	06-05-04	06-59-03	06-59-04	06-59-05
Beryllium	1,900	mg/kg	0.67	0.58	1.1 (J)	0.53	0.99	0.99	0.69
Beta-BHC	1.3	mg/kg	--	--	0.0052 (J)	--	--	0.0012 (J)	--
Bis(2-ethylhexyl)phthalate	120	mg/kg	0.17 (J)	0.1 (J)	16	21	0.89 (J)	0.089 (J)	9.3 (J)
Butyl benzyl phthalate	100,000	mg/kg	0.16 (J)	--	--	--	--	--	2.6 (J)
Cadmium	450	mg/kg	0.63	--	12	0.63	3.6	0.44	46
Carbazole	86	mg/kg	--	--	--	--	0.15 (J)	--	--
Cs-137	12.2	pCi/g	1.29	--	--		0.142	--	2.12
Chlordane	6.5	mg/kg	0.022 (J)	--	0.12	0.032	0.47 (J)	--	**6.6**
Chromium	450	mg/kg	30 (J)	46	110	77	80 (J)	9	170
Chrysene	210	mg/kg	--	--	--	--	0.94	--	0.36 (J)
1,4-Dichlorobenzene	7.9	mg/kg	--	--	--	--	0.016	--	--
Delta-BHC	0.36	mg/kg	--	0.0015 (J)	0.0017 (J)	0.0038 (J)	--	0.00073 (J)	0.0011 (J)
Dibenzo(ah)anthracene	0.21	mg/kg	--	--	--	--	0.12 (J)	--	--
Di-n-octyl phthalate	25,000	mg/kg	0.36	--	--	0.49 (J)	--	--	--
Dieldrin	0.11	mg/kg	--	--	0.00087 (J)	--	0.01 (J)	0.0014 (J)	**1.2 (J)**
DRO	100	mg/kg	2.1 (J)	18	**1,100**	85	**400**	25	**2,300**
Endosulfan I	3,700	mg/kg	--	--	--	--	--	--	0.00037 (J)
Endosulfan sulfate	3,700	mg/kg	--	--	0.0014 (J)	--	0.0058 (J)	--	0.0011 (J)
Endrin	180	mg/kg	--	--	--	--	--	--	0.0016 (J)
Eu-152	5.67	pCi/g	0.324 (J)	--	--	--	--	--	--

Table C.1-1
Maximum Reported Value for Tier I Comparison
(Page 3 of 3)

Parameter	PAL	Units	Maximum Result						
			03-51-01	06-04-02	06-05-03	06-05-04	06-59-03	06-59-04	06-59-05
Eu-154	5.4	mg/kg	--	--	--	0.62	--	--	--
Fluoranthene	22,000	mg/kg	--	--	0.62 (J)	--	1.8	--	1.2
Gamma-BHC	1.7	mg/kg	--	--	--	--	--	--	0.0012 (J)
Heptachlor epoxide	0.19	mg/kg	0.013 (J)	--	0.032 (J)	--	0.0027 (J)	0.011 (J)	**0.24 (J)**
Indeno(1,2,3-cd)pyrene	2.1	mg/kg	--	--	--	--	0.39	--	0.7 (J)
Lead	800	mg/kg	21	33	330	50	80	16	**2,000 (J)**
Pb-212	5	pCi/g	2.13 (J)	1.07 (J)	0.91 (J)	0.97	2.01 (J)	2.35 (J)	1.18 (J)
Pb-214	5	pCi/g	1.17 (J)	0.79	0.68 (J)	0.78 (J)	1.21 (J)	1.22 (J)	0.84 (J)
Mercury	310	mg/kg	0.014	0.094	9.9	2.2	0.6	1.6	130
Phenanthrene	100,000	mg/kg	--	--	0.36 (J)	--	0.88	--	0.91
Pyrene	29,000	mg/kg	--	--	0.37 (J)	--	1.6	--	2
Selenium	5,100	mg/kg	--	--	--	0.59	1.7 (J+)	--	9
Silver	5,100	mg/kg	2.3	51	4.2	73	250	0.2	370
Tl-208	5	pCi/g	0.654	0.299	0.33	0.317	0.626	0.73	0.41
Th-234	105	pCi/g	2.47 (J)	--	9.7	--	2.69 (J)	2.74 (J)	4.5
Total xylenes	420	mg/kg	--	--	--	0.005 (J)	--	--	--

J = Estimated value
J+ = The result is an estimated quantity, but the result may be biased high.

Bold indicates the value is equal to or exceeds the PAL.

may pose long-term threats to human health, safety, or the environment and have been determined to be Classification 3 sites as defined by ASTM Method E1739 (ASTM, 1995).

C.1.4 D. Development of Tier 1 Lookup Table of RBSLs

Tier 1 action levels have been defined as the PALs established during the DQO process. The PALs are a tabulation of chemical-specific (but not site-specific) screening levels based on the type of media (soil) and potential exposure scenarios (industrial). These are very conservative estimates of risk, are preliminary in nature, and are used as action levels for site screening purposes. Although the PALs are not intended to be used as FALs, a FAL may be defined as the Tier 1 action level (i.e., PAL) value if individual contaminant analytical results are below the corresponding Tier 1 action level value. The FAL may also be established as the Tier 1 action level value if individual contaminant analytical results exceed the corresponding Tier 1 action level value and implementing a corrective action based on the FAL is practical. The PALs are defined as:

- Region 9 Risk-Based PRGs for Industrial Soils (EPA, 2004).
- Background concentrations for RCRA metals will be evaluated when natural background exceeds the PAL, as is often the case with arsenic. Background is considered the mean plus two times the standard deviation of the mean based on data published in Mineral and Energy Resource Assessment of the Nellis Air Force Range (NBMG, 1998; Moore, 1999).
- TPH concentrations above the action level of 100 mg/kg per NAC 445A.2272 (NAC, 2006a).
- The PALs for radioactive contaminants are based on the NCRP Report No. 129 recommended screening limits for construction, commercial, industrial land-use scenarios (NCRP, 1999) scaled to 25-mrem/yr-dose constraint (Appenzeller-Wing, 2004) and the generic guidelines for residual concentration of radionuclides in DOE Order 5400.5 (DOE, 1993).
- For COPCs without established PRGs, a protocol similar to EPA Region 9 will be used to establish an action level; otherwise, an established PRG from another EPA region may be chosen.

The PALs were developed based on an industrial scenario. Because the CAU 560 CASs in Areas 3 and 6 are not assigned work stations and are considered to be in remote or occasional use areas, the use of industrial reuse based PALs is conservative. The Tier 1 lookup table is defined as the PAL concentrations or activities as defined in the CAIP (NNSA/NSO, 2008).

C.1.5 E. Exposure Pathway Evaluation

The DQOs stated that site workers would only be exposed to COCs through oral ingestion, inhalation, or dermal contact (absorption) due to exposure to potentially contaminated media (i.e., soil) at the CASs. The results of the CAI showed that all COCs identified at CASs within CAU 560, except for CAS 06-05-04, are localized near the release point and have not migrated more than 15 ft vertically or laterally. At CAS 06-05-04, the COCs identified are widespread in surface soils but limited to less than 12 ft vertically near the septic system components where PCB-impacted soil was mixed during installation and/or abandonment activities. Because COCs were primarily identified in the solid materials at the bottom of leach pits and/or septic tanks and limited soils near the release points, the only potential exposure pathways would be through worker contact with the contaminated soil. The limited migration demonstrated by the analytical results, elapsed time since the suspected release, and depth to groundwater supports the selection and evaluation of only surface and shallow subsurface contact as the complete exposure pathways. Groundwater is not considered to be a significant exposure pathway.

C.1.6 F. Comparison of Site Conditions with Tier 1 RBSLs

All analytical results from CAU 560 samples were less than corresponding Tier 1 action levels (i.e., PALs) except for those listed in Table C.1-2.

Table C.1-2
Contaminants of Potential Concern Detected above PALs

CAS	TPH-DRO	Aroclor 1260	Aroclor 1254	Aroclor 1268	Aroclor 1016	Arsenic	Lead	Benzo(a)pyrene	Dieldrin	Chlordane	Heptachlor epoxide
06-05-03	x	x	x	--	x	x	--	--	--	--	--
06-05-04	--	x	--	x	--	--	--	--	--	--	--
06-59-03	x	--	--	--	--	--	--	x	--	--	--
06-59-05	x	x	--	--	--	x	x	x	x	x	x

C.1.7 G. Evaluation of Tier 1 Results

It was determined by NNSA/NSO that for all contaminants except TPH-DRO, remediation to the Tier 1 RBSL is practical. Therefore, the FALs for these contaminants were established as the Tier 1 RBSLs, and a corrective action is required for all the contaminants listed in Table C.1-2 except for TPH-DRO. A Tier 2 SSTL will be evaluated for TPH-DRO that will apply to all CASs.

C.1.8 H. Tier 1 Remedial Action Evaluation

TPH-DRO Evaluation

The TPH-DRO was not practical or technically feasible to remediate to Tier 1 action levels due to the widespread and discontinuous nature of contamination at the various CASs (e.g., isolated locations under leachfield rock or within PSM). Therefore, no actions to remediate any of the sites to Tier 1 action levels for TPH-DRO are proposed, and TPH-DRO was moved to a Tier 2 evaluation.

PCB Evaluation

Corrective action was implemented for the PCB contamination at CASs 06-05-03, 06-05-04, and 06-59-05 to remediate the sites to Tier 1 action levels.

Arsenic and Lead Evaluation

Corrective action was implemented for the arsenic and lead contamination at CASs 06-05-03 and 06-59-05 to remediate the sites to Tier 1 action levels.

Pesticide Evaluation

Corrective action was implemented for the dieldrin, chlordane, and heptachlor epoxide contamination at CAS 06-59-05 to remediate the site to Tier 1 action levels.

Benzo(a)pyrene Evaluation

Corrective action was implemented for the benzo(a)pyrene contamination in soils and PSM at CASs 06-59-03 and 06-59-05 to remediate the sites to Tier 1 action levels.

C.1.9 I. Tier 2 Evaluation

No additional data were needed to complete a Tier 2 evaluation.

C.1.10 J. Development of Tier 2 SSTLs

Evaluation of TPH-DRO SSTLs

Method E1739 stipulates that risk evaluations for TPH-DRO contamination be calculated and evaluated based on the risk posed by the potentially hazardous constituents of diesel. Section 6.4.3 ("Use of Total Petroleum Hydrocarbon Measurements") of ASTM Method E1739 states: "TPHs should not be used for risk assessment because the general measure of TPH provides insufficient information about the amounts of individual chemical(s) of concern present" (see also Sections X1.5.4 and X1.42 of Method E1739 in ASTM, 1995). Therefore, the individual potentially hazardous constituents in diesel were compared to corresponding Tier 2 SSTLs to evaluate the need for corrective action at each individual CAS at CAU 560. The Tier 2 SSTLs for the hazardous constituents of diesel were conservatively established as the PALs. These SSTLs and the maximum reported level for each diesel constituent per CAS are presented in Table C.1-3.

Table C.1-3
Tier 2 SSTLs and CAU 560 Results for Hazardous Constituents of Diesel
(Page 1 of 2)

Common Name	SSTL (mg/kg)	Maximum Reported Value (mg/kg)						
		03-51-01	06-04-02	06-05-03	06-05-04	06-59-03	06-59-04	06-59-05
1,3,5-Trimethylbenzene	70	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	190	ND	ND	ND	ND	ND	ND	ND
Benz(a)anthracene	2.1	ND	ND	ND	ND	0.95	ND	0.6 (J)
Benzene	1.4	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.2	ND	ND	ND	ND	**0.92 (J)**	ND	**0.62 (J)**
Ethylbenzene	400	ND	ND	ND	ND	ND	ND	ND
Naphthalene	190	ND	ND	ND	ND	ND	ND	ND
Toluene	520	ND	ND	ND	ND	ND	ND	ND
Xylenes	420	ND	ND	0.005 (J)	0.005 (J)	ND	ND	ND
n-Butylbenzene	240	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	240	ND	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	21	ND	ND	ND	ND	0.45	ND	ND
Benzo(b)fluoranthene	2.1	ND	ND	ND	ND	1.3	ND	0.75 (J)
Fluorene	26,000	ND	ND	ND	ND	ND	ND	ND

Table C.1-3
Tier 2 SSTLs and CAU 560 Results for Hazardous Constituents of Diesel
(Page 2 of 2)

Common Name	SSTL (mg/kg)	Maximum Reported Value (mg/kg)						
		03-51-01	06-04-02	06-05-03	06-05-04	06-59-03	06-59-04	06-59-05
Phenanthrene	100,000	ND	ND	0.36	ND	0.88	ND	0.91 (J)
Fluoranthene	22,000	ND	ND	0.62 (J)	ND	1.8	ND	1.2 (J)
Pyrene	29,000	ND	ND	0.37	ND	1.6	ND	2 (J)
Chrysene	210	ND	ND	ND	ND	0.94	ND	0.36 (J)
Anthracene	100,000	ND	ND	ND	ND	0.16 (J)	ND	ND
Benzo(g,h,i)perylene	29,000	ND	ND	ND	ND	0.36	ND	0.87 (J)

ND = Nondetect

Bold indicates the value is equal to or exceeds the PAL.

C.1.11 K. Comparison of Site Conditions with Tier 2 SSTLs

The Tier 2 action levels are typically compared to individual sample results from reasonable points of exposure (as opposed to the source areas as is done in Tier 1) on a point-by-point basis. Points of exposure are defined as those locations or areas at which an individual or population may come in contact with a COC originating from a CAS. For CAU 560, the Tier 2 action levels were compared to maximum contaminant concentrations from each sample location.

As shown in Table C.1-3, benzo(a)pyrene exceeds the Tier 2 SSTL at CASs 06-59-03 and 06-59-05. All of the hazardous constituents of TPH-DRO were included in the Tier 1 evaluation, and the corresponding FALs were established as the Tier 1 RBSL (i.e., PAL). Therefore, a Tier 2 SSTL is not needed for TPH-DRO. However, a corrective action is required for benzo(a)pyrene at CASs 06-59-03 and 06-59-05 as described in Section C.1.7.

C.1.12 L. Tier 2 Remedial Action Evaluation

Based on the Tier 2 evaluation of the TPH-DRO hazardous constituents, only benzo(a)pyrene at CASs 06-59-03 and 06-59-05 poses an unacceptable risk to human health and the environment. Remedial actions at these CASs for this contaminant were addressed in the Tier 1 Remedial Action Evaluation (Section C.1.8).

C.2.0 Recommendations

As shown in Table C.2-1, no COCs or PSM were identified from the analysis of CAU 560 samples at CASs 03-51-01, 06-04-02, and 06-59-04. The corrective action of no further action was selected for these CASs. The COCs and PSM identified at the remaining CASs requires corrective actions that were implemented during the CAI.

Table C.2-1
Corrective Action Recommendations

CAS	COCs	PSM	Corrective Action	BMPs
03-51-01	None	N/A	No further action	Removed leach pit casing
06-04-02	None	N/A	No further action	Removed leach pit casing and surface debris
06-05-03	None	Arsenic, PCBs	Closure in place	Removed leach pit lid and vent pipes
06-05-04	PCBs	N/A	Closure in place	Removed septic system components
06-59-03	Benzo(a)pyrene	Benzo(a)pyrene	Clean closure	Removed septic tank and connecting piping
06-59-04	None	N/A	No further action	None
06-59-05	None	Pesticides, arsenic, lead, benzo(a)pyrene, and PCBs	Clean closure	Removed metal tank lids, riser pipes

The CAI identified arsenic and PCBs (Aroclor 1254 and 1260) in leach pit contents above the corresponding FAL (Tier 1 RBSLs) at CAS 06-05-03. These constituents are identified as PSM at this CAS, and warrants corrective action. A corrective action of closure in place with a UR was implemented and will be protective of human health, safety, and the environment. The UR is included in Appendix D. Additionally, the leach pit chamber lid and vent pipes were removed and disposed as a BMP, and the leach pit was filled with concrete.

As PCBs were identified in soils above the corresponding FAL (Tier 1 RBSLs) at CAS 06-05-04, Leach Bed, it was determined that PCBs (total combined Aroclor 1254, 1260, and 1268) are COCs, and contamination at this CAS warrants corrective action. A corrective action of closure in place with a UR and soil-removing action were implemented and will be protective of human health, safety, and the environment. Additionally, all septic system components were removed and disposed as a BMP.

As benzo(a)pyrene was identified in soils and PSM above the corresponding FAL (Tier 1 RBSLs) at CAS 06-59-03, Building CP-400 Septic System, it was determined that benzo(a)pyrene is a COC, and contamination at this CAS warrants corrective action. A corrective action of clean closure was implemented and will be protective of human health, safety, and the environment. Additionally, the septic tank and associated piping were removed and disposed as a BMP.

The CAI identified lead, arsenic, benzo(a)pyrene, Aroclor 1260, dieldrin, chlordane, heptachlor epoxide above their corresponding FALs in septic tank contents at CAS 06-59-05. These constituents are identified as PSM at this CAS and warrant corrective action. A corrective action of clean closure was implemented and will be protective of human health, safety, and the environment. Additionally, all septic tank lids, vent pipes, the outlet end piping assembly, and a portion of the inlet pipe were removed and disposed as a BMP, and the tank was filled with concrete.

C.3.0 References

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Appendix D

Closure Activity Summary

D.1.0 Closure Activity Summary

The following sections document CAU 560 closure activities and BMP measures conducted from November 7, 2009, through February 24, 2010. Corrective actions and BMPs were completed at the following CASs:

- 06-05-03, Leach Pit
- 06-05-04, Leach Bed
- 06-59-03, Building CP-400 Septic System
- 06-59-05, Control Point Septic System

Only BMPs were completed at the following CASs:

- 03-51-01, Leach Pit
- 06-04-02, Septic Tank

There were no closure activities at CAS 06-59-04; therefore, this CAS is not discussed in this appendix. The following sections provide the supporting documentation (e.g., photos and verification samples) to verify the completion of closure activities at CAU 560. Details regarding waste characterization, waste volumes, and final disposition are presented in Section A.10.0. Load verification forms and manifests are not included in this report due to the large quantity generated for this project; however, copies are available for review in the CAU 560 project file.

D.1.1 CAS 03-51-01 Closure Activities

As a BMP, approximately 9 ft of subsurface steel piping and the 4-by-11-ft steel leach pit casing were excavated and removed. The void was backfilled with spoils and additional fill material, and the site was contoured to original grade. The waste debris was staged for screening and shipping at CAS 06-04-02; combined with other sanitary waste debris from CASs 06-04-02 and 06-05-03; and disposed at the NTS Area 9 U10C Industrial Landfill on November 12, 2009. Figure D.1-1 documents BMP activities conducted at this CAS.

Figure D.1-1
CAS 03-51-01: BMP Activities during and after Leach Pit Casing Removal

D.1.2 CAS 06-04-02 Closure Activities

As a BMP, the 6-by-15-ft leach pit casing was removed by excavation. Subsurface piping associated with the septic system was not removed; however, during the CAI, all aboveground cleanouts and/or breaches were grouted. The void was backfilled with spoils and additional fill material, and then the site was contoured to original grade. As an additional BMP, surface debris not associated with the septic system such as wire, construction debris, and concrete rubble was removed from the site for disposal. The waste debris was staged for screening and shipping; combined with other sanitary waste debris from CASs 03-51-01 and 06-05-03; and disposed at the NTS Area 9 U10C Industrial Landfill on November 12, 2009. Figures D.1-2 through D.1-4 document BMP activities conducted at this CAS.

Figure D.1-2
CAS 06-04-02: BMP Activities before, during, and after Leach Pit Casing Removal

Figure D.1-3
CAS 06-04-02: Surface Debris before BMP of Removal and Disposal

Figure D.1-4
CAS 06-04-02: Surface Debris Staged for BMP of Removal and Disposal

D.1.3 CAS 06-05-03 Closure Activities

A corrective action of closure in place with a UR has been implemented for CAS 06-05-03 as it was not feasible to clean close this CAS (i.e., remove PSM present within leach pit) due to the proximity of Building CP-162 and nearby active sewer lines. A UR has been applied to subsurface disturbances between 5 to 20 ft bgs surrounding the concrete-filled leach pit chamber to reduce potential exposure to site personnel working in the area. Attachment D-1 of this appendix provides details of the UR and a figure of the UR boundary. The use-restricted subsurface area for this CAS has been identified with a single posting and sign established within the center of the leach pit chamber, and metal markers designate the four corners of the UR. Annual post-closure inspections will be conducted to ensure postings are in place, intact, and readable.

Closure activities conducted at this CAS to support the closure in place corrective action and implementation of the UR included removing clean overburden material to access the leach pit chamber at a depth of 5 ft bgs, and removing the concrete lid and two steel pipes. Once the leach pit chamber was accessed, the entire chamber was grouted with cement to reduce potential exposure to PSM and reduce the potential for migration of contaminants to underlying soils. After the leach pit chamber was grouted, the original overburden material was returned as backfill and the site contoured to original grade. The concrete lid and steel pipes were staged and screened as waste at CAS 06-04-02; combined with other sanitary waste debris from CASs 06-04-02 and 03-51-01; and disposed at the NTS Area 9 U10C Industrial Landfill on November 12, 2009. Figures D.1-5 and D.1-6 document closure activities conducted at this CAS.

Figure D.1-5
CAS 06-05-03: Accessing and Removing Leach Pit Chamber Lid and Riser Pipes

Figure D.1-6
CAS 06-05-03: Grouting of Leach Pit Chamber and Emplacement of UR Post

D.1.4 CAS 06-05-04 Closure Activities

As part of the closure in place corrective action, soil-removal activities were implemented at CAS 06-05-04 to address the widespread PCB soil contamination by reducing the area of PCB-impacted soil. The source or sources for this contamination is unknown and was evaluated based on the "as found" concentrations. Primary removal actions were performed on the septic system components and two subpopulations of PCB-contaminated soil. This section provides details on the removal actions and, where applicable, verification sampling to confirm contaminated soil was removed to below action levels.

All components of the septic tank and leach bed system were removed for disposal, including the fencing and posts surrounding the leach bed. Specific activities conducted include the following:

- Exposed the intact leach bed piping by hand and backhoe excavation, and removed all piping. Approximately 20 ft of ACP was removed, wrapped into five small packages with plastic, and segregated from other waste streams. The remaining polyvinyl chloride (PVC) piping was staged for disposal with other bulk debris.

- Excavated and removed the concrete septic tank, distribution box, and connected piping and staged for disposal.

- Loaded and shipped 70,000 lb of bulk debris (metal posts, the distribution box and lid, leach bed fencing, concrete debris, PVC piping) as industrial waste to the NTS Area 9 U10C Industrial Landfill on December 8, 2009.

- Loaded 200 lb of ACM (piping) and shipped to the NTS Area 9 U10C Industrial Landfill on December 17, 2009.

To address the soil removal of PCB-contaminated soil, two subpopulations of contaminated soils were delineated for excavation and removal. This first subpopulation consisted of surface and subsurface soils contaminated with total PCB concentrations above the FAL of 0.74 mg/kg but less than the TSCA-regulated limit of 50 mg/kg (CFR, 2009). The excavated area representing the first subpopulation is outlined with the green perimeter on Figure A.6-2. During excavation, these soils were stockpiled for disposal. A total of 75 bulk shipments of soil waste (3,772,858 lb, or approximately 1,700 yd^3) were loaded and shipped to the NTS Area 9 U10C Industrial Landfill (between December 8, 2009, and February 23, 2010).

Specific activities associated with the removal of the first PCB subpopulation (i.e., PCB concentrations less than 50 mg/kg) are described below in the general order they were performed:

- Excavated the remaining leach bed materials (soil and leach rocks) to 7.5 ft bgs and stockpiled for shipping.
- Excavated and removed soils within the septic tank "ring" composed of sample locations D15, D16, D18, D20 (perimeter points) to 6 ft bgs (Figure A.6-1).
- Excavated and removed subsurface soils to 9 ft bgs within the septic tank "ring" in the area underlying and surrounding the septic tank (Figure A.6-1).
- Removed a 1.5-ft soil lift in areas surrounding the septic system, primarily northward, where Decision II sample results delineated the lateral extent. Two areas were left intact and isolated that contained soil with concentrations greater than 50 mg/kg (orange perimeter in Figure A.6-2).
- Collected verification samples for PCB analysis from points pre-generated in 30-by-30-ft grids (locations DV001 through DV025) across the excavation area at a depth of 1.5 ft bgs for DV001 through DV005 and DV007 through DV024, and respective depths of 7.5 ft bgs for DV006 and 6 ft bgs for DV025.
- Based on seven verification sample results (at locations DV004, DV007 and DV008, DV010 through DV012, and DV016) exceeding the FAL, removed another 1-ft lift of soil to a depth of 2.5 ft bgs in the respective grids that failed and collected a second round of verification samples at locations DV26 through DV32.
- Based on three of the verification samples at locations DV26, DV27, and DV29 exceeding the FAL, an additional 150 yd of soil was removed from 2.5 to 3.5 ft bgs and verification samples collected at locations DV033 through DV035.
- Based on verification samples exceeding the FALs at locations DV033 and DV034, removed additional soil to a depth of 4.5 ft bgs, and verification samples were collected at locations DV036 and DV037 at 4.5 ft bgs.
- Established locations DV038 through DV041 and collected samples at each location at depths of 2.5, 3.5, and 4.5 ft bgs to verify lateral extent to 4.5 ft bgs and supplement characterization data.
- Based on analytical results for locations DV038 through DV041, further soil removal was suspended due to the proximity to Building CP-162. Locations DL01 through DL13 were sampled to provide additional characterization of soil adjacent to Building CP-162.

- Based on analytical results from locations DL01 through DL13, a UR has been implemented under a closure in place corrective action to address PCB concentrations exceeding the FAL that remain in subsurface soils adjacent to and beneath Building CP-162.

The final verification results representing the remaining materials at this CAS with PCB concentrations below the action levels and that demonstrate PCBs above FALs have been adequately removed from the soil-removal areas are presented in Figure A.6-2 and Table A.6-6. An additional thirteen locations (DL01 through DL13) were sampled near the eastern side of Building CP-162 to characterize potential PCB contamination in building foundation soils. The results of these samples indicate PCB concentrations remain above FALs at all locations except DL03 and DL05; therefore, a UR has been implemented for PCB contamination adjacent to and beneath Building CP-162. The UR has been implemented because further excavation is not feasible under the building. Attachment D-1 of this appendix provides details of the UR and a figure of the UR boundary. The UR boundaries surrounding Building CP-162 are 34 ft east and 13 ft south.

Sampling Approach for TSCA-Regulated Verification Sampling

The second subpopulation of PCB-contaminated soils consisted of surface and shallow subsurface soils contaminated with total PCB concentrations exceeding the TSCA-regulated limit of 50 mg/kg (CFR, 2009). Regulatory requirements for verification sampling conducted during self-implemented cleanup are specifically defined. The two areas are outlined with the orange perimeter on Figure A.6-2. During excavation, these soils were loaded directly into intermodal containers. A total of 28 intermodals of TSCA-regulated waste (941,320 lb or approximately 400 yd^3) were prepared and shipped offsite to the Clean Harbors Grassy Mountain Facility near Knolls, Utah, for treatment and disposal between January 21 and February 11, 2010. Excavation and additional soil removal of 3 yd of PCB-impacted soil exceeding 50 mg/kg (TSCA regulated) (CFR, 2009) resulted in an additional shipment offsite to the US Ecology Facility near Beatty, Nevada, on April 8, 2010.

Specific activities associated with the removal of the second PCB subpopulation (TSCA regulated) consisted of removing a 2.5-ft soil lift within the two designated areas. In addition to requiring offsite disposal, the verification sampling conducted in these areas followed a specific protocol as outlined in 40 CFR 761.280 to 289 for soil contamination greater than 50 mg/kg (TSCA regulated) (CFR, 2009). The compositing method described in 40 CFR 761.289(b)(i) for multiple point sources and unknown sources of contamination was used to demonstrate compliance with regulations. A total of

20 composite verification samples (560DVC01 through 560DVC20) were collected at a depth of 2.5 ft bgs following the sampling approach described below and analyzed for PCBs. These verification sample locations are shown in Figure D.1-7, and analytical results are presented in Table D.1-1 as well as Table A.6-6. The 20 composite verification results support closure of this CAS with regards to the second PCB subpopulation.

The sampling grids established for each of the two remediated areas that required verification sampling were laid out in two-dimensional sections as follows (Figure D.1-7):

- Used a square-based grid system to overlay the entire area to be sampled. The grid axes were oriented on a magnetic north-south line centered in the area, and an east-west axis perpendicular to the magnetic north-south axis also centered in the area. The intersecting node is the point of origin.
- Marked out a series of sampling points 1.5 meters apart oriented to the grid axes. The sampling points were at the locations where the grid lines intersect (nodes). The sampling points proceeded in every direction to the extent sufficient to result in a two-dimensional grid completely overlaying the sampling area.
- Collected a sample at each node that falls within the remediated area. Analyzed all samples according to the compositing scheme provided below. Samples outside of the previously contaminated area were not taken, as this dilutes the analytical results.

The sample size and procedure for collecting a sample were as follows:

- At each selected sampling location for bulk PCB remediation waste or porous surfaces, collect at least 20 milliliters of waste (or a portion of sufficient weight for the chemical analyst to measure the concentration of PCBs and still have sufficient analytical detection sensitivity to reproducibly measure PCBs at the levels designated in 40 CFR 761.61(a)(4) [CFR, 2009]).
- A core sampler having a 2-in. diameter barrel was used to collect a representative soil sample at each node to a depth of 3 in. Each of the individual grab samples was placed in a stainless-steel tray and mixed thoroughly to make the composite sample.

Compositing of the samples is an activity that is authorized by regulation. Compositing of up to but no more than nine samples is allowed. Under this compositing scheme, a maximum of nine samples were composited for each type of bulk PCB remediation waste (i.e., soil). The maximum dimensions of the area enclosing a nine grid point composite is two grid intervals bounded by three collinear grid points (3 meters, or approximately 10 ft long). All samples in the composite were taken at the same depth, and composite sample areas and individually analyzed samples completely overlaid the cleanup site. Figures D.1-8 through D.1-11 document closure activities conducted at this CAS.

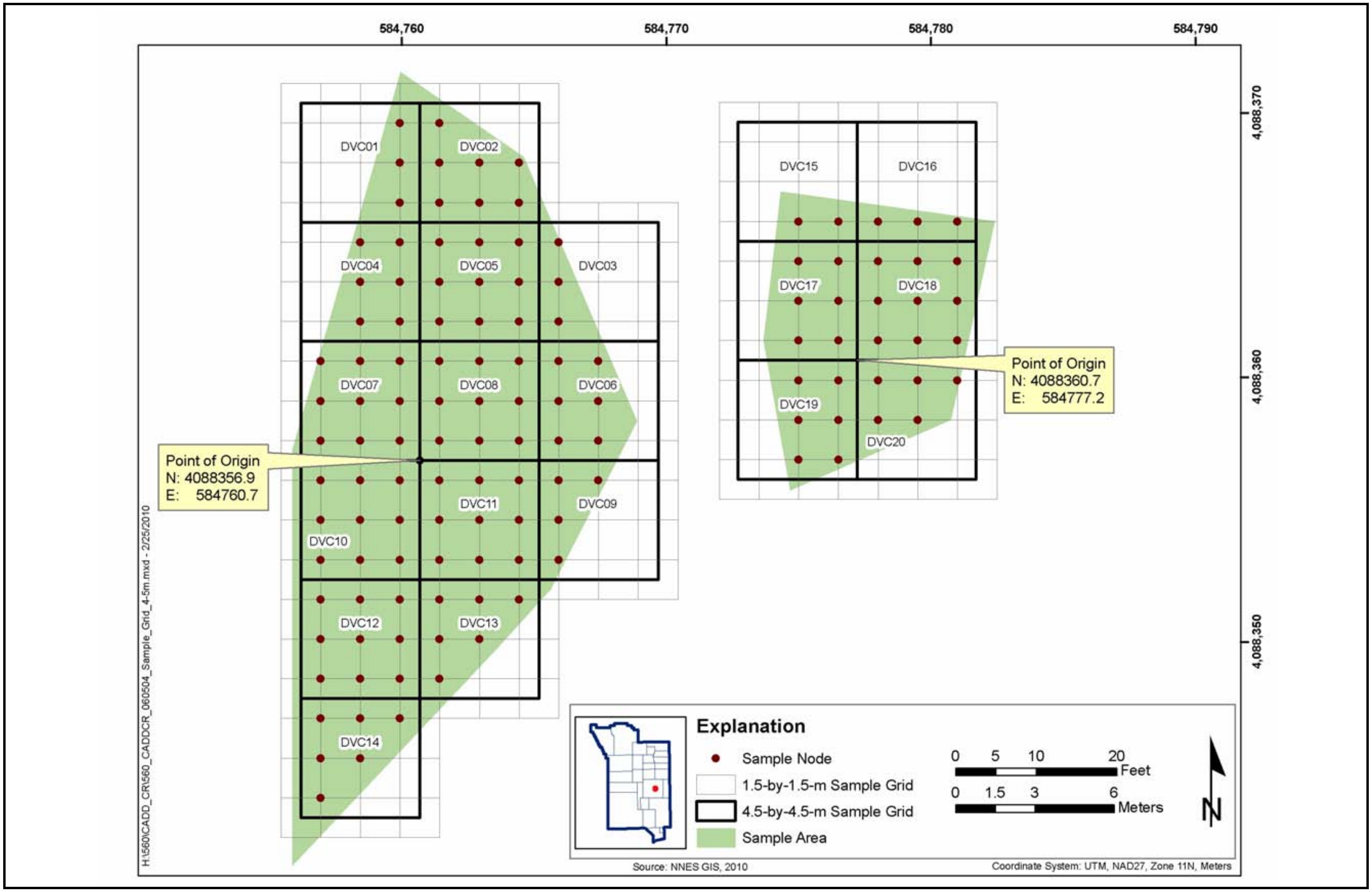


Figure D.1-7
TSCA-Level Verification Sample Locations at CAS 06-05-04, Leach Bed

Table D.1-1
Verification Results for Second Subpopulation of PCBs at CAS 06-05-04, Leach Bed
(Page 1 of 2)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			0.74	0.74	0.74	0.74	
DVC01	560DVC01	2.5 - 2.7	--	--	0.0162	0.0163	0.0325
DVC02	560DVC02	2.5 - 2.7	--	--	0.0032 (J)	0.0029 (J)	0.0061
DVC03	560DVC03	2.5 - 2.7	--	--	0.0046	0.0059	0.0105
DVC04	560DVC04	2.5 - 2.7	--	--	0.0026 (J)	0.0033 (J)	0.0059
DVC05	560DVC05	2.5 - 2.7	--	--	0.010	0.0098	0.0198
DVC06	560DVC06	2.5 - 2.7	--	--	0.0129	0.013	0.0259
DVC07	560DVC07	2.5 - 2.7	--	--	0.0095	0.0095	0.019
DVC08	560DVC08	2.5 - 2.7	--	--	0.0057	0.0066	0.0123
DVC09	560DVC09	2.5 - 2.7	--	--	0.0399	0.0442	0.0841
DVC10	560DVC10	2.5 - 2.7	--	--	0.0096	0.0106	0.0202
DVC11	560DVC11	2.5 - 2.7	--	--	0.0338	0.0354	0.0692
DVC12	560DVC12	2.5 - 2.7	--	--	0.0158	0.0156	0.0314
DVC13	560DVC13	2.5 - 2.7	--	--	0.0305	0.0377	0.0682
DVC14	560DVC14	2.5 - 2.7	--	--	0.034	0.0331	0.0671
DVC15	560DVC15	2.5 - 2.7	--	--	--	--	--
DVC16	560DVC16	2.5 - 2.7	--	--	--	--	--

Table D.1-1
Verification Results for Second Subpopulation of PCBs at CAS 06-05-04, Leach Bed
(Page 2 of 2)

Sample Location	Sample Number	Depth (ft bgs)	COPCs (mg/kg)				Total (Aroclor 1254, 1260 & 1268)
			Aroclor 1242	Aroclor 1254	Aroclor 1260	Aroclor 1268	
FALs[a]			**0.74**	**0.74**	**0.74**	**0.74**	
DVC17	560DVC17	2.5 - 2.7	--	--	0.0016 (J)	--	0.0016
DVC18	560DVC18	2.5 - 2.7	--	--	0.0025 (J)	0.0030 (J)	0.0055
DVC19	560DVC19	2.5 - 2.7	--	--	--	--	--
DVC20	560DVC20	2.5 - 2.7	--	--	--	--	--

[a]Based on *Region 9 Preliminary Remediation Goals (PRGs)* (EPA, 2004).

J = Estimated value
-- = Not detected above MDCs.

Figure D.1-8
CAS 06-05-04: Before, during, and after Removal of Leach Bed Materials

Figure D.1-9
CAS 06-05-04: Top: Post-Removal View of Non-TSCA Soil Area;
Bottom: Non-TSCA Soil Waste Loading for Disposal

Figure D.1-10
CAS 06-05-04: Top: Larger TSCA-Level Soil Area before Removal; Bottom: Larger TSCA-Level Soil Area after Removal of 2.5-ft Soil Lift with Verification Sample Grids Plotted

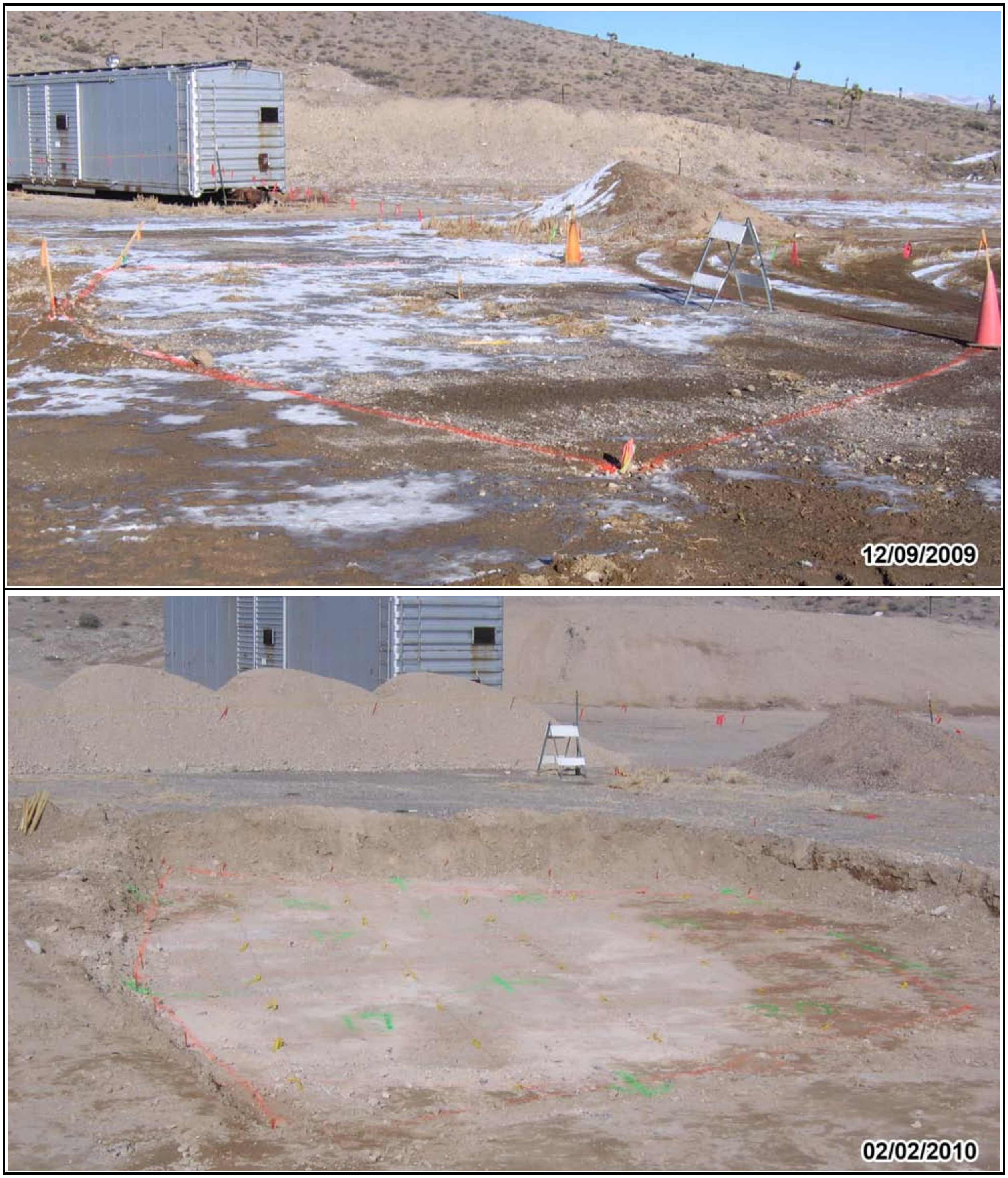


Figure D.1-11
CAS 06-05-04: Top: Smaller TSCA-Level Soil Area before Removal; Bottom: Smaller TSCA-Level Soil Area after Removal of 2.5-ft Soil Lift with Verification Sample Grids Plotted

D.1.5 CAS 06-59-03 Closure Activities

A corrective action of clean closure for this site consisted of removing soil and PSM contaminated with benzo(a)pyrene. As a BMP, the remains of the corroded septic tank were also removed from the site. Closure activities were initiated by removing 1.5 ft of overburden from a 12-by-18-ft area to expose the septic tank. Once exposed, the tank and its contents (i.e., PSM) were removed and staged on plastic sheeting for waste shipping. Approximately 1 yd^3 of PSM was removed from the tank. Approximately 5 yd^3 of benzo(a)pyrene-contaminated soil was removed from the area surrounding the inlet end of the tank by excavating a wedge of soil approximately 2 by 10 by 11 ft and 3.5 ft deep. Following removal of the soil, three verification samples were collected (560EV01, 560EV02, and 560EV03) and analyzed for benzo(a)pyrene only. The analytical results of the verification samples detected above MDCs are presented in Table A.7-2 and support the closure of this CAS.

The excavated and removed tank debris and the COC-impacted soil was characterized as sanitary waste; combined with bulk debris and soil waste from CAS 06-59-05; and disposed at the NTS Area 9 U10C Industrial Landfill on November 24, 2009. Figures D.1-12 through D.1-14 document closure activities conducted at this CAS.

Figure D.1-12
CAS 06-59-03: Excavation of Septic Tank in Process and Stockpiled Soil, PSM, and Tank Debris before Disposal

Figure D.1-13
CAS 06-59-03: Verification Sample Locations EV01, EV02, and EV03

Figure D.1-14
CAS 06-59-03: Site Conditions after Waste Removal, Backfilling, and Re-contouring

D.1.6 CAS 06-59-05 Closure Activities

A corrective action of clean closure for this site consisted of removing contaminated PSM from the three septic tank chambers and inlet pipe and as a BMP removed aboveground tank features (i.e., vent pipes). To accomplish the clean closure, the septic tank was accessed by removing manhole covers to each chamber. The piping at the outlet and inlet of the tank was exposed through hand and backhoe excavation. The following activities were completed during closure activities:

- Video-moled the outlet end piping assembly, and visually verified the piping to be free of sludge. The entire outlet end piping assembly was removed and grouted at the tank wall (Figure D.1-15).
- Excavated and removed the inlet pipe and PSM. The inlet pipe was grouted near the distribution box after verifying it was empty (Figure D.1-16).
- Removed two tank vent pipes sticking above ground. During removal of these vent pipes as well as the inlet/outlet pipes, it was discovered that the gasket material used to seal the pipe unions contained lead. The lead gasket material was separated from the cast-iron piping and managed as a separate waste stream (Figure D.1-17).
- Backfilled the inlet and outlet ends to grade and flush with the top of septic tank.
- Removed, via vacuum and hand scooping, approximately 6 cubic feet (ft^3) of sludge from outlet end chamber; approximately 5 ft^3 of sludge from the middle chamber; and approximately 9 ft^3 of sludge from the inlet chamber (Figure D.1-18).
- Visually inspected each chamber after PSM removal and verified the tank was empty.
- Grouted the empty septic tank with six loads of cement (approximately 50 yd^3), and finished/troweled the surface flush over former manholes and vent pipe openings (Figure D.1-19).

No biasing factors (i.e., stained soil, odors) were observed, and no spillage occurred during closure or removal activities. The integrity of the septic tank components was uncompromised before excavation/removal of the features. The soil sample results from the CAI do not show contamination in concentrations above the FALs in the native soils beneath and surrounding the tank features; therefore, the analytical results of the CAI soil samples were used as verification in support that closure has been completed for this CAS.

Figure D.1-15
CAS 06-59-05: Removal of the Outlet End Piping Assembly

Figure D.1-16
CAS 06-59-05: Removal of the Inlet End Piping and PSM

Figure D.1-17
CAS 06-59-05: Top: Piping Debris Staged for Disposal after the Lead-Containing Joint Seals Were Separated;
Bottom: Septic Tank Sludge and Metal Lids Being Loaded for Disposal

Figure D.1-18
CAS 06-59-05: Removal of COC-Impacted Sludge from the Septic Tank

Bulk debris generated by removing inlet piping, outlet piping assembly, vent pipes, and PSM from the tank was characterized as sanitary, industrial waste; combined with bulk debris and soil waste from CAS 06-59-03; and disposed at the NTS Area 9 U10C Industrial Landfill on November 24, 2009. The pipe unions identified as containing lead were characterized as hazardous waste and shipped at the NTS Area 5 RCRA-permitted Storage Facility pending offsite treatment and disposal in April 2010.

Figure D.1-19
CAS 06-59-05: Septic Tank during and after Grouting

D.2.0 References

CFR, see *Code of Federal Regulations*.

Code of Federal Regulations. 2009. Title 40 CFR Part 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce and Prohibitions." Washington, DC: U.S. Government Printing Office.

EPA, see U.S. Environmental Protection Agency.

NNES GIS, see Navarro Nevada Environmental Services Geographic Information Systems.

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

Navarro Nevada Environmental Services Geographic Information Systems. 2010. ESRI ArcGIS Software.

RSL, see Remote Sensing Laboratory.

Remote Sensing Laboratory. 1993. Aerial Photograph "7366-042," 5 March. Las Vegas, NV: EG&G Energy Measurements, Inc.

U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2002. *Nevada Test Site Orthophoto Site Atlas*, DOE/NV/11718--604. Aerial photos acquired Summer 1998. Prepared by Bechtel Nevada. Las Vegas, NV.

U.S. Environmental Protection Agency. 2004. *Region 9 Preliminary Remediation Goals*. As accessed at http://www.epa.gov/region09/waste/sfund/prg/index.html on 30 November 2007. Prepared by S.J. Smucker. San Francisco, CA.

Attachment D-1

Use Restrictions

(6 Pages)

CAU Use Restriction Information

CAU Number/Description: CAU 560, Septic Systems

Applicable CAS Number/Description: CAS 06-05-03, Leach Pit

Contact (Federal Sub-Project Director/Sub-Project): Kevin Cabble Industrial Sites - DP

Physical Description:

Surveyed Area (UTM, Zone 11, NAD 27, meters):
North corner: N = 4088319.7; E = 584723.1
East corner: N = 4088317.4; E = 584725.7
South corner: N = 4088313.9; E = 584723.1
West corner: N = 4088317.4; E = 584719.7
Center post: N = 4088316.7; E = 584722.4

Depth: 5 feet to 20 feet below ground surface

Survey Method (GPS, etc): GPS on center post and four corners

Basis for UR:

Summary Statement: The FFACO UR was implemented as part of a closure in place corrective action to restrict site activities that may expose workers to site contamination. This standard UR is for subsurface disturbances between a depth of 5 feet to 20 feet. Chemical contamination was identified in materials located at the base of the leach pit chamber at a depth of 14.5 feet below ground surface. Contaminants are limited to soils within the leach pit chamber and have not migrated outside the chamber. Site contaminants identified during the corrective action investigation are arsenic and PCBs (Aroclor 1254 and1260). The maximum detected concentrations of the site contaminants are presented in the table below.

Contaminants Table:

Maximum Concentration of Contaminants for CAU 560 CAS 06-05-03, Leach Pit			
Constituent	**Maximum Concentration**	**Action Level**	**Units**
Arsenic	30	23	mg/kg
Aroclor 1254	1.3	0.74	mg/kg
Aroclor 1260	0.76	0.74	mg/kg

Site Controls: Post a warning sign in the center of the CAS 06-05-03 UR (located in the center of the leach pit chamber) and place metal markers on the ground surface marking the four corners of the UR (no fencing).

UR Maintenance Requirements:

Description: See the CAU 560 CADD/CR for additional information on the condition of the site. This UR must be entered into the DOE/NV Facility Information Management System (FIMS) and the FFACO databases.

Inspection/Maintenance Frequency: Annual visual inspections to ensure the sign and metal markers are in place and readable, and no evidence of subsurface intrusion between 5 feet and 20 feet.

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

Comments: The contaminated Potential Source Material is located at the base of the leach pit chamber. The leach pit is a 5-foot diameter concrete chamber with approximately 2 to 3 feet of leach rock surrounding the outside wall. The removal of the leach pit chamber and the PSM contained within was not feasible due to depth of the PSM and configuration of the leach pit; the proximity of an active sewer line to the leach pit; and the proximity of the Building CP-162 foundation. To further limit potential exposure and future migration of contaminants away from the leach pit, the chamber was filled with concrete from 14.5 feet below ground surface to a depth of 5 feet below ground surface (top of chamber).

Submitted By: /s/ Kevin J. Cabble **Date:** 04/08/2010

Note: Effective upon acceptance of closure documents by NDEP.

CAU 560, Septic Systems, CAS 06-05-03, UR Boundary

CAU Use Restriction Information

CAU Number/Description: CAU 560, Septic Systems

Applicable CAS Number/Description: CAS 06-05-04, Leach Bed

Contact (Federal Sub-Project Director/Sub-Project): Kevin Cabble Industrial Sites - DP

Physical Description:

Surveyed Area (UTM, Zone 11, NAD 27, meters):
Southeast corner: N = 4088315.3; E = 584731.1
Southwest corner: N = 4088314.9; E = 584708.0
Northwest corner: N = 4088354.8; E = 584708.0
Northeast corner: N = 4088354.8; E = 584730.1

Depth: Surface to 5.5 feet below ground surface;

Survey Method (GPS, etc): GPS SW, SE, and NW, NE corner; GIS digitized

Basis for UR:

Summary Statement: The FFACO UR was implemented as part of a closure in place corrective action to restrict site activities that may expose workers to site contamination. This standard UR is for surface and subsurface disturbances from 0.0 feet to 5.5 feet. Chemical contamination was identified in soils located east of Building CP-162. Based on the trend of contamination identified, contaminants are presumed to extend beneath Building CP-162 into the foundation soils. Site contaminants identified during the corrective action investigation are PCBs (Aroclor 1254, 1260, and1268). The maximum detected concentrations of the site contaminants (including total PCBs which combine aroclors 1254, 1260, and 1268) are presented in the table below.

Contaminants Table:

Maximum Concentration of Contaminants for CAU 560 CAS 06-05-04, Leach Bed and CAS 06-05-03, Leach Pit			
Constituent	**Maximum Concentration**	**Action Level**	**Units**
Total PBCs	6.13	0.74	mg/kg
Aroclor 1254	0.907	0.74	mg/kg
Aroclor 1260	12.6	0.74	mg/kg
Aroclor 1268	13.1	0.74	mg/kg

Site Controls: Post a warning sign on west side of Bldg CP-162 within 10 feet of main entrance/egress; post warning signs at the four corners of the UR boundary (no fencing).

UR Maintenance Requirements:

Description: See the CAU 560 CADD/CR for additional information on the condition of the site. This UR must be entered into the DOE/NV Facility Information Management System (FIMS) and the FFACO databases.

Inspection/Maintenance Frequency: Annual visual inspections to ensure signs are in place and readable, no evidence of surface intrusion is visible for soils associated with the UR.

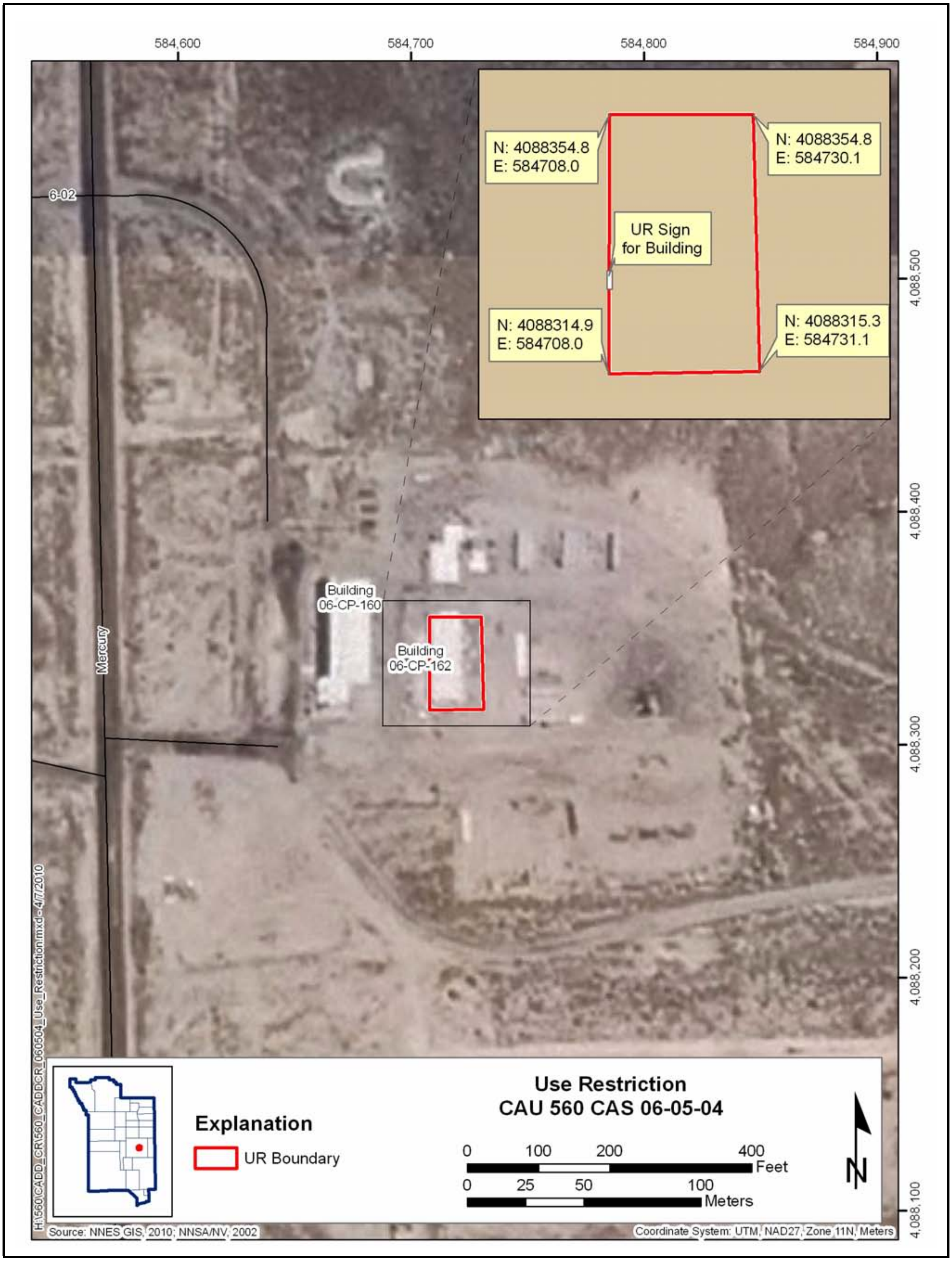
Note: Effective upon acceptance of closure documents by NDEP.

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

Comments: The PCB contamination, based on sample results collected adjacent to Building CP-162, indicate PCB-impacted soil remains between 1.5 feet and 5.5 feet on the east side of the building and extends beneath the building. Removal of the PCB-contaminated soil was not feasible due to the proximity of the Building CP-162 foundation and active utility lines. PCB contamination is not contiguous across the UR, varies in depths, and varies in concentrations from non-detect to the maximum concentration show above.

Submitted By: /s/ Kevin J. Cabble **Date:** 04/08/2010

Note: Effective upon acceptance of closure documents by NDEP.



CAU 560, Septic Systems, CAS 06-05-04, UR Boundary

Appendix E

Sample Location Coordinates

E.1.0 Sample Location Coordinates

Sample location coordinates were collected during the CAI using a Trimble GPS, Model TSCI. These coordinates identify the field sampling locations (e.g., latitude, longitude, elevation) at CAU 560.

Sample locations and pertinent locations of interest are shown on Figures A.3-1 through A.9-1. The corresponding coordinates for the CAU 560 sample locations are listed in Table E.1-1.

Table E.1-1
Sample Location Coordinates and Locations of Interest for CAU 560
(Page 1 of 8)

Northing[a]	Easting[a]	Sample Location
03-51-01, Leach Pit		
4099294.2	585850.5	A01
4099295.8	585850.7	A02
4099297.2	585851.1	A03
06-04-02, Septic Tank		
4088526.5	584681.7	B01
4088526.3	584682.2	B02
4088526.5	584683.1	B03
4088525.2	584683.3	B04
06-05-03, Leach Pit		
4088315.2	584722.0	C01
4088315.9	584723.5	C02
4088314.6	584725.3	C03
4088314.3	584675.3	C04
4088313.7	584721.7	C05
4088318.2	584724.1	C06
4088312.0	584724.8	C07

Table E.1-1
Sample Location Coordinates and Locations of Interest for CAU 560
(Page 2 of 8)

Northing[a]	Easting[a]	Sample Location
06-05-04, Leach Bed		
4088238.1	584746.5	D01
4088328.8	584743.1	D02
4088328.1	584743.2	D03
4088328.7	584741.3	D04
4088328.0	584739.8	D05
4088328.1	584745.8	D06
4088328.1	584747.8	D07
4088327.1	584748.0	D08
4088329.0	584748.1	D09
4088328.5	584761.5	D10
4088327.6	584761.4	D11
4088327.1	584749.4	D12
4088328.9	584749.3	D13
4088326.4	584747.5	D14
4088322.4	584748.9	D15
4088333.9	584749.6	D16
4088328.1	584742.2	D17
4088331.2	584739.8	D18
4088328.1	584740.3	D19
4088325.5	584738.0	D20
4088315.9	584728.6	DL01
4088341.6	584725.6	DL02
4088316.1	584734.0	DL03
4088322.9	584728.6	DL04
4088323.1	584733.8	DL05
4088327.8	584728.1	DL06
4088327.9	584733.7	DL07
4088334.0	584728.0	DL08

Table E.1-1
Sample Location Coordinates and Locations of Interest for CAU 560
(Page 3 of 8)

Northing[a]	Easting[a]	Sample Location
06-05-04, Leach Bed (continued)		
4088350.2	584726.4	DL09
4088313.4	584728.6	DL10
4088349.8	584725.9	DL11
4088350.6	584726.2	DL12
4088350.0	584726.9	DL13
Not collected	Not collected	DQ00
4088260.7	584772.8	DQ01
4088271.6	584786.0	DQ02
4088247.3	584820.3	DQ03
4088296.2	584680.7	DQ04
4088293.9	584698.4	DQ05
4088299.4	584731.8	DQ06
4088279.8	584769.0	DQ07
4088293.7	584809.0	DQ08
4088299.9	584809.7	DQ09
4088309.2	584794.1	DQ11
4088329.7	584812.2	DQ12
4088370.4	584689.8	DQ13
4088366.8	584729.6	DQ14
4088346.0	584759.1	DQ15
4088346.1	584801.0	DQ16
4088351.5	584828.1	DQ17
4088375.2	584679.1	DQ18
4088392.5	584693.8	DQ19
4088376.4	584741.6	DQ20
4088395.3	584773.1	DQ21
4088391.3	584802.5	DQ22
4088422.5	584701.8	DQ23

Table E.1-1
Sample Location Coordinates and Locations of Interest for CAU 560
(Page 4 of 8)

Northing[a]	Easting[a]	Sample Location
06-05-04, Leach Bed (continued)		
4088424.7	584733.6	DQ24
4088425.2	584759.9	DQ25
4088333.8	584738.7	DQ28
4088324.0	584741.5	DQ29
4088319.3	584745.9	DQ30
4088323.3	584752.4	DQ31
4088341.9	584750.6	DQ32
4088332.8	584745.7	DQ33
4088346.8	584753.8	DQ34
4088350.2	584762.9	DQ35
4088343.1	584767.6	DQ36
4088335.6	584765.2	DQ37
4088351.2	584757.4	DQ38
4088338.3	584742.5	DQ40
4088331.3	584748.3	DQ41
4088356.4	584753.7	DQ43
4088356.9	584760.7	DQ44
4088355.8	584766.5	DQ45
4088349.7	584770.9	DQ46
4088342.4	584773.2	DQ47
4088320.4	584757.4	DQ48
4088318.6	584751.7	DQ49
4088334.7	584734.5	DQ50
4088341.5	584738.2	DQ51
4088345.0	584742.3	DQ52
4088364.3	584760.5	DQ60
4088371.1	584761.4	DQ61
4088364.2	584750.7	DQ62

Table E.1-1
Sample Location Coordinates and Locations of Interest for CAU 560
(Page 5 of 8)

Northing[a]	Easting[a]	Sample Location
06-05-04, Leach Bed (continued)		
4088351.5	584739.8	DQ63
4088359.9	584737.7	DQ64
4088344.6	584732.9	DQ65
4088353.6	584778.2	DQ66
4088363.8	584772.1	DQ67
4088345.3	584777.3	DQ70
4088363.6	584781.2	DQ71
4088353.4	584781.8	DQ72
4088358.2	584778.1	DQ73
4088350.0	584775.4	DQ74
4088354.2	584787.5	DQ75
4088355.7	584770.4	DQ76
4088366.2	584739.0	DQ77
4088368.4	584753.7	DQ78
4088350.7	584731.7	DQ79
4088344.6	584729.7	DQ80
4088357.3	584731.5	DQ81
4088371.0	584753.4	DQ82
4088370.4	584738.0	DQ83
4088358.8	584727.2	DQ84
4088350.7	584727.5	DQ85
4088344.4	584727.0	DQ86
4088344.6	584725.9	DQ87
4088337.0	584765.4	DV001
4088320.8	584745.9	DV002
4088344.8	584774.9	DV003
4088339.9	584763.3	DV004
4088334.1	584761.1	DV005

Table E.1-1
Sample Location Coordinates and Locations of Interest for CAU 560
(Page 6 of 8)

Northing[a]	Easting[a]	Sample Location
06-05-04, Leach Bed (continued)		
4088324.9	584758.7	DV006
4088336.2	584733.4	DV007
4088333.6	584741.2	DV008
4088322.0	584744.3	DV009
4088338.8	584746.5	DV010
4088339.3	584739.2	DV011
4088359.8	584740.6	DV012
4088349.4	584742.6	DV013
4088364.2	584754.7	DV014
4088359.7	584766.1	DV015
4088357.9	584730.4	DV016
4088364.0	584766.3	DV017
4088360.2	584773.2	DV018
4088354.2	584752.0	DV019
4088344.4	584756.2	DV020
4088366.4	584746.3	DV021
4088362.7	584727.9	DV022
4088344.6	584727.3	DV023
4088369.4	584737.2	DV024
4088327.1	584749.3	DV025
4088332.7	584737.1	DV026
4088340.9	584732.6	DV027
4088342.2	584740.9	DV028
4088355.6	584734.2	DV029
4088355.8	584743.7	DV030
4088337.5	584753.5	DV031
4088337.9	584758.1	DV032
4088341.7	584734.7	DV033

Table E.1-1
Sample Location Coordinates and Locations of Interest for CAU 560
(Page 7 of 8)

Northing[a]	Easting[a]	Sample Location
06-05-04, Leach Bed (continued)		
4088329.4	584738.1	DV034
4088360.9	584731.1	DV035
4088332.0	584738.3	DV036
4088333.9	584737.2	DV037
4088330.8	584737.2	DV038
4088330.1	584734.9	DV039
4088333.9	584733.2	DV040
4088334.0	584735.5	DV041
06-59-03, Building CP-400 Septic System		
4087528.9	584121.4	E01
4087528.6	584120.7	E02
4087516.3	584121.5	E03
4087528.2	584123.4	E04
4087529.2	584122.2	E05
4087528.7	584123.5	E06
4087512.0	584152.8	E07
4087510.8	584155.0	E08
4087527.8	584120.0	E09
4087529.4	584120.4	E10
4087530.5	584121.4	E11
06-59-04, Office Trailer Complex Sewage Pond		
4088213.4	585500.6	F01
4088259.5	585479.6	F02

Table E.1-1
Sample Location Coordinates and Locations of Interest for CAU 560
(Page 8 of 8)

Northing[a]	Easting[a]	Sample Location
06-59-05, Control Point Septic System		
4087778.8	584636.1	G01
4087778.6	584627.6	G02
4087777.5	584627.7	G03
4087780.1	584627.6	G04
4087780.1	584630.0	G05
4087778.6	584634.7	G06
4087778.8	584632.5	G07
4087778.7	584629.7	G08
4087778.5	584624.1	G09
4087780.2	584635.9	G10
4087780.4	584640.1	G11
4087777.5	584640.0	G12
4087780.3	584644.4	G13
4087780.4	584648.1	G14
4087777.3	584644.0	G15
4087777.2	584648.0	G16
4087810.8	584644.3	G17
4087810.8	584648.3	G18
4087810.7	584640.3	G19
4087746.6	584640.0	G20
4087746.7	584643.8	G21
4087746.6	584648.1	G22

[a]Universal Transverse Mercator (UTM) Zone 11, North American Datum (NAD) 1927 (U.S. Western)

Appendix F

Corrective Action Alternative Evaluation

F.1.0 Corrective Action Alternative Evaluation

This appendix provides information on the CAA evaluation conducted for CAU 560. The evaluation of CAAs was the basis for determining the final corrective action implemented at each of the seven CASs in CAU 560. The need for corrective action at any CAS was based on the presence of COCs.

The screening criteria used to evaluate and select the preferred CAAs are presented in Section F.1.1. The CAAs considered for evaluation are identified in Section F.1.2 and evaluated for their ability to ensure protection of the public and the environment in accordance with NAC 445A (NAC, 2006b), feasibility, and cost effectiveness.

F.1.1 Screening Criteria

The screening criteria used to evaluate and select the preferred CAAs are identified in the *Guidance on RCRA Corrective Action Decision Documents: The Statement of Bases, Final Decision and Response to Comments* (EPA, 1991) and the *Final RCRA Corrective Action Plan* (EPA, 1994).

Corrective action alternatives are evaluated based on four general corrective action standards and five remedy selection decision factors. All CAAs must meet the four general standards to be selected for evaluation using the remedy selection decision factors.

The general corrective action standards are as follows:

- Protection of human health and the environment
- Compliance with media cleanup standards
- Control the source(s) of the release
- Comply with applicable federal, state, and local standards for waste management

The remedy selection decision factors are as follows:

- Short-term reliability and effectiveness
- Reduction of toxicity, mobility, and/or volume
- Long-term reliability and effectiveness
- Feasibility
- Cost

F.1.1.1 Corrective Action Standards

The following text describes the corrective action standards used to evaluate the CAAs.

Protection of Human Health and the Environment

Protection of human health and the environment is a general mandate of the RCRA statute (EPA, 1994). This mandate requires that the corrective action include any necessary protective measures. These measures may or may not be directly related to media cleanup, source control, or management of wastes. The CAAs are evaluated for the ability to be protective of human health and the environment through an evaluation of risk as presented in Appendix C.

Compliance with Media Cleanup Standards

The CAAs are evaluated for the ability to meet the proposed media cleanup standards. The media cleanup standards are the FALs defined in Section 2.3.1 and Appendix C.

Control the Source(s) of the Release

The CAAs are evaluated for the ability to stop further environmental degradation by controlling or eliminating additional releases that may pose a threat to human health and the environment. Unless source control measures are taken, efforts to clean up releases may be ineffective or, at best, will essentially involve a perpetual cleanup. Therefore, each CAA must provide effective source control to ensure the long-term effectiveness and protectiveness of the corrective action.

Comply with Applicable Federal, State, and Local Standards for Waste Management

The CAAs are evaluated for the ability to be conducted in accordance with applicable federal and state regulations (e.g., 40 CFR 260 to 282, “Hazardous Waste Management” [CFR, 2008a]; 40 CFR 761 “Polychlorinated Biphenyls,” [CFR, 2008b]; and NAC 444.842 to 98, “Management of Hazardous Waste” [NAC, 2006a]).

F.1.1.2 Remedy Selection Decision Factors

The following text describes the remedy selection decision factors used to evaluate the CAAs.

Short-Term Reliability and Effectiveness

Each CAA must be evaluated with respect to its effects on human health and the environment during implementation of the selected corrective action. The following factors will be addressed for each alternative:

- Protection of the community from potential risks associated with implementation, such as fugitive dusts, transportation of hazardous materials, and explosion
- Protection of workers during implementation
- Environmental impacts that may result from implementation
- The amount of time until the corrective action objectives are achieved

Reduction of Toxicity, Mobility, and/or Volume

Each CAA must be evaluated for its ability to reduce the toxicity, mobility, and/or volume of the contaminated media. Reduction in toxicity, mobility, and/or volume refers to changes in one or more characteristics of the contaminated media by the use of corrective measures that decrease the inherent threats associated with that media.

Long-Term Reliability and Effectiveness

Each CAA must be evaluated in terms of risk remaining at the CAU after the CAA has been implemented. The primary focus of this evaluation is on the extent and effectiveness of the control that may be required to manage the risk posed by treatment of residuals and/or untreated wastes.

Feasibility

The feasibility criterion addresses the technical and administrative feasibility of implementing a CAA and the availability of services and materials needed during implementation. Each CAA must be evaluated for the following criteria:

- Construction and Operation – Refers to the feasibility of implementing a CAA given the existing set of waste and site-specific conditions.
- Administrative Feasibility – Refers to the administrative activities needed to implement the CAA (e.g., permits, URs, public acceptance, rights of way, offsite approval).

- Availability of Services and Materials – Refers to the availability of adequate offsite and onsite treatment, storage capacity, disposal services, necessary technical services and materials, and prospective technologies for each CAA.

Cost

Costs for each alternative are estimated for comparison purposes only. The cost estimate for each CAA includes both capital, and operation and maintenance costs, as applicable, and are provided in CAU 560 project files. The following is a brief description of each component:

- Capital Costs – These include direct costs that may consist of materials, labor, construction materials, equipment purchase and rental, excavation and backfilling, sampling and analysis, waste disposal, demobilization, and health and safety measures. Indirect costs are separate and not included in the estimates.

- Operation and Maintenance – These costs are separate and include labor, training, sampling and analysis, maintenance materials, utilities, and health and safety measures. These costs are not included in the estimates.

F.1.2 Development of Corrective Action Alternatives

This section identifies and briefly describes the viable corrective action technologies and the CAAs considered for CAU 560. Based on the review of existing data, future use, and current operations at the NTS, the following alternatives have been developed for consideration at CAU 560:

- Alternative 1 – No further action
- Alternative 2 – Clean closure
- Alternative 3 – Closure in place with administrative controls

F.1.2.1 Alternative 1 – No Further Action

Under the no further action alternative, no corrective action activities will be implemented. This alternative is a baseline case with which to compare and assess the other CAAs and their ability to meet the corrective action standards.

F.1.2.2 Alternative 2 – Clean Closure

For contaminated surface and subsurface soil, Alternative 2 includes excavating and disposing of all impacted soil and debris containing COCs. A visual inspection will be conducted to ensure that surface debris has been removed before the completion of the corrective action. Verification soil samples will also be collected and analyzed for the presence of COCs once the known volume of contaminated soil is removed. This alternative includes removing and disposing all PSM identified within septic tanks or leach pits.

Any contaminated material that is removed will be disposed of at an appropriate disposal facility. All excavated areas will be returned to surface conditions compatible with the intended future use of the site. Overburden soil (as feasible), along with additional clean fill, will be used to backfill excavations after removal of the contaminated soil. Clean borrow soil may be removed from a nearby location for placement in the excavation, as necessary. This alternative includes filling tanks or leach pits with inert material or removal in accordance with NAC 444.818 (NAC, 2006a).

F.1.2.3 Alternative 3 – Closure in Place with Administrative Controls

For contaminated surface and subsurface soil, Alternative 3 includes the administrative activities and costs associated with URs for CASs where contamination is present at levels that exceed the FALs. Administrative controls will restrict inadvertent contact with contaminated media by prohibiting any activity that would cause significant exposure of site occupants to the identified COCs.

F.1.3 Evaluation and Comparison of Alternatives

Each CAA presented in Section F.1.2 were evaluated based on the general corrective action standards described in Section F.1.1. These evaluations are presented in Tables F.1-1 through F.1-4. Any CAA that does not meet the general corrective action standards were removed from consideration.

The remaining CAAs were further evaluated based on the remedy selection decision factors described in Section F.1.1. These evaluations are presented in Tables F.1-5 through F.1-8. For each remedy selection decision factor, the CAAs are ranked relative to one another. The CAA with the least desirable impact on the remedy selection decision factor will be given a ranking of 1. The CAAs with increasingly desirable impacts on the remedy selection decision factor will receive increasing rank numbers. The CAAs that will have an equal impact on the remedy selection decision factor will receive an equal ranking number. The scoring listed in this table represents the sum of the remedy selection decision factor rankings for each CAA. The scoring does not include the BMPs because the BMPs will be performed regardless of the CAA selected.

Table F.1-1
Evaluation of General Corrective Action Standards for CAS 06-05-03 (Leach Pit)

CAA 1, No Further Action		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	No	COCs are present at concentrations that exceed the FAL (Tier I).
Compliance with Media Cleanup Standards	No	COCs are present at concentrations that exceed the FAL (Tier I).
Control the Source(s) of the Release	Yes	Septage from Building CP-160 has been discontinued, and remaining leach pit contents will be covered with back fill or removed.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	This alternative will not generate waste.
CAA 2, Clean Closure		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	Yes	Contamination exceeding the risk-based action levels will be removed.
Compliance with Media Cleanup Standards	Yes	Contamination exceeding the risk-based action levels will be removed.
Control the Source(s) of the Release	Yes	Septage from Building CP-160 has been discontinued, and remaining leach pit contents will be covered with backfill or removed.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	Excavated waste can be managed in compliance with all standards.
CAA 3, Closure in Place with Administrative Controls		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	Yes	Use restrictions will be implemented to protect site workers from contamination exceeding the risk-based action levels.
Compliance with Media Cleanup Standards	Yes	Although COCs will not be removed, site workers will not be exposed to COCs.
Control the Source(s) of the Release	Yes	Septage from Building CP-160 has been discontinued, and remaining leach pit contents will be covered with backfill or removed.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	This alternative will not generate waste.

Table F.1-2
Evaluation of General Corrective Action Standards for CAS 06-05-04 (Leach Bed)

CAA 1, No Further Action		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	No	COCs are present at concentrations that exceed the FAL (Tier I).
Compliance with Media Cleanup Standards	No	COCs are present at concentrations that exceed the FAL (Tier I).
Control the Source(s) of the Release	No	Contaminated material exists in surface and subsurface soils due to past maintenance activities (likely dust control application of oil containing PCBs) in the general yard area.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	This alternative will not generate waste.
CAA 2, Clean Closure		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	Yes	Contamination exceeding the risk-based action levels will be removed.
Compliance with Media Cleanup Standards	Yes	Contamination exceeding the risk-based action levels will be removed.
Control the Source(s) of the Release	Yes	Surface soil throughout the entire yard and the identified PCB contamination within part of the septic system footprint would be removed.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	Excavated waste can be managed in compliance with all standards.
CAA 3, Closure in Place with Administrative Controls		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	Yes	Use restrictions will be implemented to protect site workers from contamination exceeding the risk-based action levels.
Compliance with Media Cleanup Standards	Yes	Although COCs will not be removed, site workers will not be exposed to COCs.
Control the Source(s) of the Release	Yes	Septage from Building CP-162 has been discontinued that may have resulted in contamination in the leach bed area. Also, activities that could result in contact with contaminated material in the surface and subsurface soils in the general yard area would be limited.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	This alternative will not generate waste.

Table F.1-3
Evaluation of General Corrective Action Standards for CAS 06-59-03 (Building CP-400 Septic System)

CAA 1, No Further Action		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	No	COCs are present at concentrations that exceed the FAL (Tier I).
Compliance with Media Cleanup Standards	No	COCs are present at concentrations that exceed the FAL (Tier I).
Control the Source(s) of the Release	No	Septage input from Building CP-400 has been discontinued; however, COCs remain in the septic tank and soil at the inlet end of the septic tank.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	This alternative will not generate waste.
CAA 2, Clean Closure		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	Yes	Contamination exceeding the risk-based action levels will be removed.
Compliance with Media Cleanup Standards	Yes	Contamination exceeding the risk-based action levels will be removed.
Control the Source(s) of the Release	Yes	Septage input from Building CP-400 has been discontinued. Also, remaining tank contents and soil at the inlet end of the septic tank will be removed.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	Excavated waste can be managed in compliance with all standards.
CAA 3, Closure in Place with Administrative Controls		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	Yes	Use restrictions will be implemented to protect site workers from contamination exceeding the risk-based action levels.
Compliance with Media Cleanup Standards	Yes	Although COCs will not be removed, site workers will not be exposed to COCs.
Control the Source(s) of the Release	Yes	Septage input from Building CP-400 has been discontinued. The existing contamination in tank and inlet area resides on bedrock, which should act as an effective confining layer. The UR would restrict intrusive activities preventing access to the contamination.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	This alternative will not generate waste.

Table F.1-4
Evaluation of General Corrective Action Standards for CAS 06-59-05 (Control Point Septic System)

Standard	Comply?	Explanation
CAA 1, No Further Action		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	No	Potential source material is present; septic tank contents exceed FALs (Tier I).
Compliance with Media Cleanup Standards	No	Potential source material is present; septic tank contents exceed FALs (Tier I).
Control the Source(s) of the Release	No	If material were released from the septic tank, it would have the potential to impact the surrounding media.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	This alternative will not generate waste.
CAA 2, Clean Closure		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	Yes	Potential source material (material from all three chambers and inlet pipe that exceeded FALs) will be removed.
Compliance with Media Cleanup Standards	Yes	Potential source material (material from all three chambers and inlet pipe that exceeded FALs) will be removed.
Control the Source(s) of the Release	Yes	Potential source material (material from all three chambers and inlet pipe that exceeded FALs) will be removed.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	Removed waste can be managed in compliance with all standards.
CAA 3, Closure in Place with Administrative Controls		
Standard	Comply?	Explanation
Protection of Human Health and the Environment	Yes	Stabilization of the septic tank PSM and a UR, will be implemented to protect site workers from contamination.
Compliance with Media Cleanup Standards	Yes	Although the PSM will not be removed, site workers will not be exposed.
Control the Source(s) of the Release	Yes	The PSM will be stabilized.
Comply with Applicable Federal, State, and Local Standards for Waste Management	Yes	This alternative will not generate waste.

Table F.1-5
Evaluation of Remedy Selection Decision Factors for CAS 06-05-03 (Leach Pit)

CAA 1, No Further Action		
Factor	Rank	Explanation
Not evaluated, as this CAA did not meet the General Corrective Action Standards		
CAA 2, Clean Closure		
Standard	Rank	Explanation
Short-Term Reliability and Effectiveness	1	This alternative is reliable and effective, but involves increased short-term exposure of site workers to COCs.
Reduction of Toxicity, Mobility, and/or Volume	2	This alternative will result in a decrease of toxicity and mobility, but will generate moderate waste volumes.
Long-Term Reliability and Effectiveness	2	This alternative is reliable and effective at protecting human health and the environment because removal of contaminated media will prevent future exposure of site workers to COCs.
Feasibility	1	This alternative is the most complicated of the CAAs.
Cost	1	The excavation and waste disposal costs for this alternative are higher than the other CAAs.
Score	7	
CAA 3, Closure in Place with Administrative Controls		
Standard	Rank	Explanation
Short-Term Reliability and Effectiveness	2	This alternative is reliable and effective in providing increased protection of human health by preventing contact with COCs.
Reduction of Toxicity, Mobility, and/or Volume	1	This alternative will not reduce toxicity or mobility of the COCs that are present, but will not generate excavation waste volumes.
Long-Term Reliability and Effectiveness	1	This alternative is reliable in the long term with ongoing maintenance. It is effective in providing increased protection of human health by preventing contact with COCs.
Feasibility	2	This alternative is easily implemented but requires maintenance.
Cost	2	The installation and ongoing maintenance costs for this alternative are lower than the other CAAs.
Score	8	

Table F.1-6
Evaluation of Remedy Selection Decision Factors
for CAS 06-05-04 (Leach Bed)

CAA 1, No Further Action		
Factor	Rank	Explanation
Not evaluated, as this CAA did not meet the General Corrective Action Standards		
CAA 2, Clean Closure		
Standard	Rank	Explanation
Short-Term Reliability and Effectiveness	1	This alternative is reliable and effective, but involves increased short-term exposure of site workers to COCs.
Reduction of Toxicity, Mobility, and/or Volume	2	This alternative will result in a decrease of toxicity and mobility, but will generate moderate waste volumes.
Long-Term Reliability and Effectiveness	2	This alternative is reliable and effective at protecting human health and the environment because removal of contaminated media will prevent future exposure of site workers to COCs.
Feasibility	1	This alternative is the most complicated of the CAAs.
Cost	1	The excavation and waste disposal costs for this alternative are higher than the other CAAs.
Score	7	
CAA 3, Closure in Place with Administrative Controls		
Standard	Rank	Explanation
Short-Term Reliability and Effectiveness	2	This alternative is reliable and effective in providing increased protection of human health by preventing contact with COCs.
Reduction of Toxicity, Mobility, and/or Volume	1	This alternative will not reduce toxicity or mobility of the COCs that are present, but will not generate excavation waste volumes.
Long-Term Reliability and Effectiveness	1	This alternative is reliable in the long term with ongoing maintenance. It is effective in providing increased protection of human health by preventing contact with COCs.
Feasibility	2	This alternative is easily implemented but requires maintenance.
Cost	2	The installation and ongoing maintenance costs for this alternative are lower than the other CAAs.
Score	8	

Table F.1-7
Evaluation of Remedy Selection Decision Factors
for CAS 06-59-03 (Building CP-400 Septic System)

CAA 1, No Further Action		
Factor	Rank	Explanation
Not evaluated, as this CAA did not meet the General Corrective Action Standards		
CAA 2, Clean Closure		
Standard	Rank	Explanation
Short-Term Reliability and Effectiveness	1	This alternative is reliable and effective, but involves increased short-term exposure of site workers to COCs.
Reduction of Toxicity, Mobility, and/or Volume	2	This alternative will result in a decrease of toxicity and mobility, but will generate moderate waste volumes.
Long-Term Reliability and Effectiveness	2	This alternative is reliable and effective at protecting human health and the environment because removal of contaminated media will prevent future exposure of site workers to COCs.
Feasibility	1	This alternative is the most complicated of the CAAs.
Cost	1	The excavation and waste disposal costs for this alternative are higher than the other CAAs.
Score	7	
CAA 3, Closure in Place with Administrative Controls		
Standard	Rank	Explanation
Short-Term Reliability and Effectiveness	2	This alternative is reliable and effective in providing increased protection of human health by preventing contact with COCs.
Reduction of Toxicity, Mobility, and/or Volume	1	This alternative will not reduce toxicity or mobility of the COCs that are present, but will not generate excavation waste volumes.
Long-Term Reliability and Effectiveness	1	This alternative is reliable in the long term with ongoing maintenance. It is effective in providing increased protection of human health by preventing contact with COCs.
Feasibility	2	This alternative is easily implemented but requires maintenance.
Cost	2	The installation and ongoing maintenance costs for this alternative are lower than the other CAAs.
Score	8	

Table F.1-8
Evaluation of Remedy Selection Decision Factors for CAS 06-59-05 (Control Point Septic System)

CAA 1, No Further Action		
Factor	Rank	Explanation
Not evaluated, as this CAA did not meet the General Corrective Action Standards		
CAA 2, Clean Closure		
Standard	Rank	Explanation
Short-Term Reliability and Effectiveness	1	This alternative is reliable and effective, but involves increased short-term exposure of site workers to PSM.
Reduction of Toxicity, Mobility, and/or Volume	2	This alternative will result in a decrease of toxicity and mobility, but will generate moderate waste volumes.
Long-Term Reliability and Effectiveness	2	This alternative is reliable and effective at protecting human health and the environment because removal of contaminated media will prevent future exposure of site workers to the PSM.
Feasibility	1	This alternative is the most complicated of the CAAs.
Cost	1	The excavation and waste disposal costs for this alternative are higher than the other CAAs.
Score	7	
CAA 3, Closure in Place with Administrative Controls		
Standard	Rank	Explanation
Short-Term Reliability and Effectiveness	2	This alternative is reliable and effective in providing increased protection of human health by preventing contact with the PSM.
Reduction of Toxicity, Mobility, and/or Volume	1	This alternative will not reduce toxicity or mobility of the COCs that are present, but will not generate excavation waste volumes.
Long-Term Reliability and Effectiveness	1	This alternative is reliable in the long term with ongoing maintenance. It is effective in providing increased protection of human health by preventing contact with the PSM.
Feasibility	2	This alternative can be implemented but requires maintenance.
Cost	2	The installation and ongoing maintenance costs for this alternative are lower than the other CAAs.
Score	8	

The CAAs were not evaluated for CASs 03-51-01, 06-04-02, and 06-59-04 because COCs were not detected at these sites. However, BMPs were implemented at CASs 03-51-01 and 06-04-02 to remove CAS features (i.e., leach pits), backfill the area, and re-contour the surface as described in Appendix D. The CAAs were evaluated for CAS 06-05-03, 06-05-04, 06-59-03, and 06-59-05 as COCs were detected at these CASs.

F.1.4 Recommended Alternatives

Based on the screening criteria and CAA evaluations shown in Tables F.1-1 through F.1-8, the following CAAs were recommended and implemented at CAU 560. Details on the actual closure activities conducted at each CAS, including BMPs, are provided in Appendix D.

Alternative 1, no further action, is the preferred and implemented corrective action for CASs 03-51-01, Leach Pit; 06-04-02, Septic Tank; and 06-59-04, Office Trailer Complex Sewage Pond. Selection of this CAA is consistent with past practices for CASs that do not contain COCs.

Alternative 2, clean closure, is the preferred and implemented corrective action for CASs 06-59-03, Building CP-400 Septic System; and 06-59-05, Control Point Septic System. Although not the highest-scoring CAA, selection of this CAA is consistent with past practices for CASs that contain COCs where the removal of contaminated media is feasible, cost-effective, safely completed, and where future activity may not be limited.

Alternative 3, closure in place with administrative controls, was the highest-scoring CAA and is selected as the preferred corrective action for CASs 06-05-03 and 06-05-04. Selection of this CAA is consistent with past practices for CASs that contain COCs where the removal of contaminated media is not feasible, the alternative is cost-effective, the selected alternative can be safely completed, and at CASs where limited future activity is expected or can be implemented.

F.2.0 References

CFR, see *Code of Federal Regulations*.

Code of Federal Regulations. 2008a. Title 40 CFR Parts 260 to 282, "Hazardous Waste Management." Washington, DC: U.S. Government Printing Office.

Code of Federal Regulations. 2008b. Title 40 CFR Part 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce and Prohibitions." Washington, DC: U.S. Government Printing Office.

EPA, see U.S. Environmental Protection Agency.

NAC, see *Nevada Administrative Code*.

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Appendix G

Nevada Division of Environmental Protection Comment Responses

(2 Pages)

ndep
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administrator

March 23, 2010

Robert F. Boehlecke
Federal Project Director
Environmental Restoration Project
National Nuclear Security Administration
Nevada Site Office
P. O. Box 98518
Las Vegas, NV 89193-8518

RE: Review of the draft Corrective Action Decision Document /Closure Report (CADD/CR) Corrective Action Unit (CAU) 560: Septic Systems, Nevada Test Site, Nevada, Revision 0, March 2010
Federal Facility Agreement and Consent Order

Dear Mr. Boehlecke:

The Nevada Division of Environmental Protection, Bureau of Federal Facilities (NDEP) staff has received and reviewed the draft Corrective Action Decision Document/Closure Report (CADD/CR) for Corrective Action Unit (CAU) 560: Septic Systems. NDEP's review of this document did not indicate any deficiencies.

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

Sincerely,

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

JJM/TZ:*tz*

ACTION
INFO AMEM
NSO/MGR ✓
COR-
File Code

cc: K. J. Cabble, ERP, NNSA/NSO, Las Vegas, NV
E.F. DiSanza, WMP, NNSA/NSO
FFACO Group, PSG, NNSA/NSO, Las Vegas, NV
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