Nevada
Environmental Management
Operations Activity

DOE/NV--1504

National Nuclear Security Administration

Closure Report for Corrective Action Unit 104: Area 7 Yucca Flat Atmospheric Test Sites, Nevada National Security Site, Nevada

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June 2013

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

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CLOSURE REPORT FOR CORRECTIVE ACTION UNIT 104: AREA 7 YUCCA FLAT ATMOSPHERIC TEST SITES, NEVADA NATIONAL SECURITY SITE, NEVADA

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

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CLOSURE REPORT FOR CORRECTIVE ACTION UNIT 104: AREA 7 YUCCA FLAT ATMOSPHERIC TEST SITES, NEVADA NATIONAL SECURITY SITE, NEVADA

Approved By: /s/: Tiffany A. Lantow ______________________ Date: 6/10/2013

Tiffany A. Lantow
Soils Activity Lead

Approved By: /s/: Robert F. Boehlecke ______________________ Date: 6/10/2013

Robert F. Boehlecke
Environmental Management Operations Activity Manager

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ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
BMP	best management practice
CA	Contamination Area
CAA	corrective action alternative
CADD	Corrective Action Decision Document
CAIP	Corrective Action Investigation Plan
CAP	Corrective Action Plan
CAS	Corrective Action Site
CAU	Corrective Action Unit
CR	Closure Report
CSM	conceptual site model
DOE	U.S. Department of Energy
dpm/100 cm^2	disintegration(s) per minute per 100 square centimeters
DQA	data quality assessment
DQI	data quality indicator
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
FAL	final action level
FFACO	*Federal Facility Agreement and Consent Order*
ft	foot (feet)
MDC	minimum detectable concentration
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
mi	mile(s)
MW	mixed waste
NNSA/NFO	U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NNSA/NV	U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office

ACRONYMS AND ABBREVIATIONS (continued)

NNSS	Nevada National Security Site
PSM	potential source material
QA	quality assurance
QAPP	*Industrial Sites Quality Assurance Project Plan*
QC	quality control
TCLP	Toxicity Characteristic Leaching Procedure
TED	total effective dose
TLD	thermoluminescent dosimeter
WMA	waste management area
UR	use restriction
yd^3	cubic yard(s)

EXECUTIVE SUMMARY

This Closure Report (CR) presents information supporting closure of Corrective Action Unit (CAU) 104, Area 7 Yucca Flat Atmospheric Test Sites, and provides documentation supporting the completed corrective actions and confirmation that closure objectives for CAU 104 were met. This CR complies with the requirements of the *Federal Facility Agreement and Consent Order* (FFACO) that was agreed to by the State of Nevada; the U.S. Department of Energy (DOE), Environmental Management; the U.S. Department of Defense; and DOE, Legacy Management (FFACO, 1996 as amended). CAU 104 consists of the following 15 Corrective Action Sites (CASs), located in Area 7 of the Nevada National Security Site:

- CAS 07-23-03, Atmospheric Test Site T-7C
- CAS 07-23-04, Atmospheric Test Site T7-1
- CAS 07-23-05, Atmospheric Test Site
- CAS 07-23-06, Atmospheric Test Site T7-5a
- CAS 07-23-07, Atmospheric Test Site - Dog (T-S)
- CAS 07-23-08, Atmospheric Test Site - Baker (T-S)
- CAS 07-23-09, Atmospheric Test Site - Charlie (T-S)
- CAS 07-23-10, Atmospheric Test Site - Dixie
- CAS 07-23-11, Atmospheric Test Site - Dixie
- CAS 07-23-12, Atmospheric Test Site - Charlie (Bus)
- CAS 07-23-13, Atmospheric Test Site - Baker (Buster)
- CAS 07-23-14, Atmospheric Test Site - Ruth
- CAS 07-23-15, Atmospheric Test Site T7-4
- CAS 07-23-16, Atmospheric Test Site B7-b
- CAS 07-23-17, Atmospheric Test Site - Climax

Closure activities began in October 2012 and were completed in April 2013. Activities were conducted according to the Corrective Action Decision Document/Corrective Action Plan for CAU 104 (U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office, 2012). The corrective actions included No Further Action and Clean Closure.

Closure activities generated sanitary waste, mixed waste, and recyclable material. Some wastes exceeded land disposal limits and required treatment prior to disposal. Other wastes met land disposal restrictions and were disposed in appropriate onsite landfills.

The U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office (NNSA/NFO) requests the following:

- A Notice of Completion from the Nevada Division of Environmental Protection to NNSA/NFO for closure of CAU 104
- The transfer of CAU 104 from Appendix III to Appendix IV, Closed Corrective Action Units, of the FFACO

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1.0 INTRODUCTION

This Closure Report (CR) documents closure activities for Corrective Action Unit (CAU) 104, Area 7 Yucca Flat Atmospheric Test Sites, according to the *Federal Facility Agreement and Consent Order* (FFACO) that was agreed to by the State of Nevada; the U.S. Department of Energy (DOE), Environmental Management; the U.S. Department of Defense; and DOE, Legacy Management (FFACO, 1996 as amended). CAU 104 consists of the following 15 Corrective Action Sites (CASs), located in Area 7 of the Nevada National Security Site (NNSS) (Figure 1):

- CAS 07-23-03, Atmospheric Test Site T-7C
- CAS 07-23-04, Atmospheric Test Site T7-1
- CAS 07-23-05, Atmospheric Test Site
- CAS 07-23-06, Atmospheric Test Site T7-5a
- CAS 07-23-07, Atmospheric Test Site - Dog (T-S)
- CAS 07-23-08, Atmospheric Test Site - Baker (T-S)
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- CAS 07-23-12, Atmospheric Test Site - Charlie (Bus)
- CAS 07-23-13, Atmospheric Test Site - Baker (Buster)
- CAS 07-23-14, Atmospheric Test Site - Ruth
- CAS 07-23-15, Atmospheric Test Site T7-4
- CAS 07-23-16, Atmospheric Test Site B7-b
- CAS 07-23-17, Atmospheric Test Site - Climax

1.1 PURPOSE

This CR provides justification for closure of CAU 104 without further corrective action based on implementation of corrective actions in accordance with the Corrective Action Decision Document (CADD)/Corrective Action Plan (CAP) for CAU 104 (U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office [NNSA/NSO], 2012). This CR provides a summary of completed closure activities, documentation supporting the completed corrective actions, and confirmation that the closure objectives were met.

1.2 SCOPE

The scope of closure for CAU 104 included No Further Action and Clean Closure. The following corrective actions were implemented:

- No further action was required for CASs 07-23-03, 07-23-04, 07-23-05, 07-23-06, 07-23-07, 07-23-08, 07-23-09, 07-23-10, 07-23-11, 07-23-12, 07-23-13, 07-23-14, 07-23-15, and 07-23-17.
- Clean closure was implemented for CAS 07-23-16.

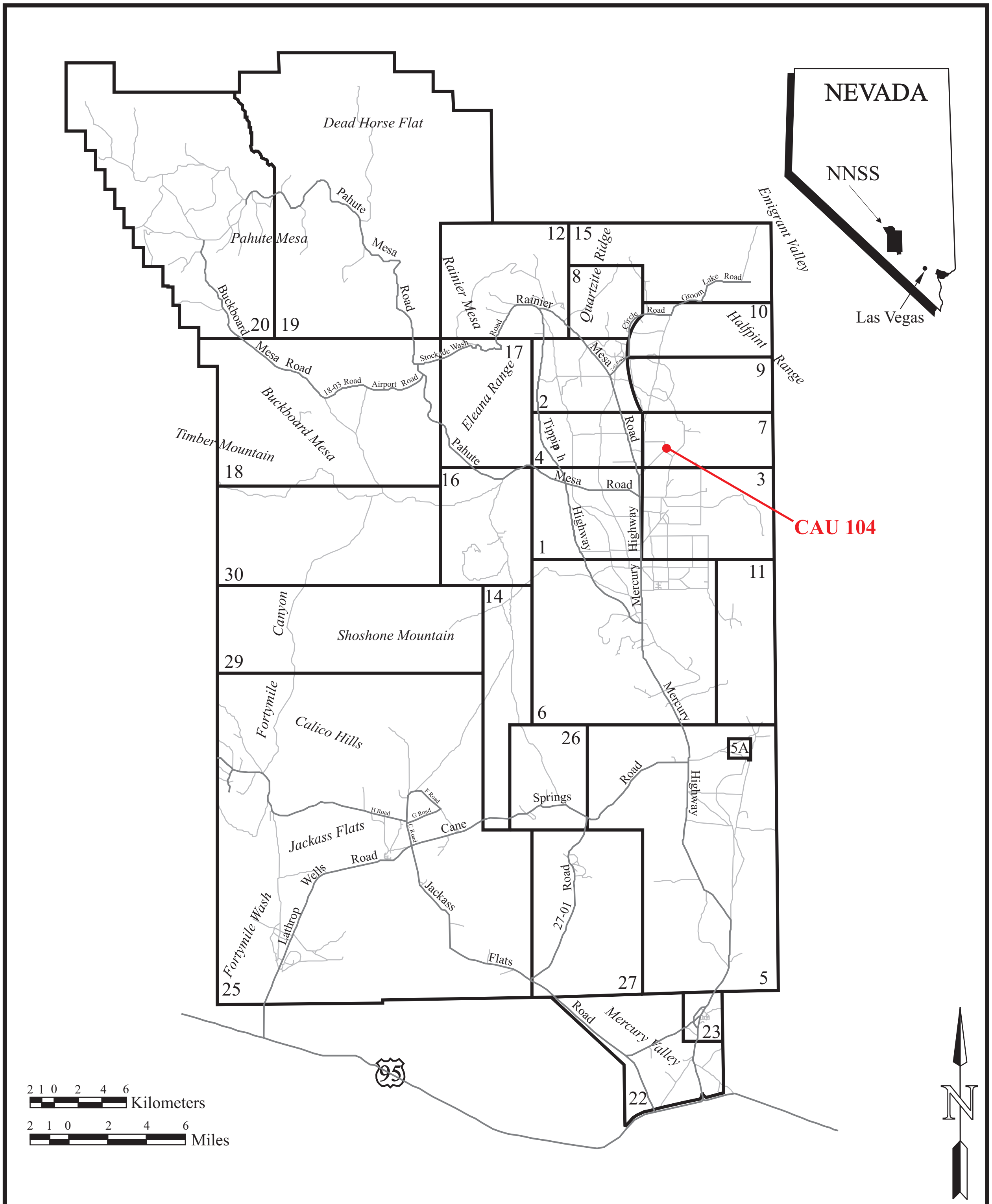

FIGURE 1. CORRECTIVE ACTION UNIT 104 SITE LOCATION MAP

1.3 CLOSURE REPORT CONTENTS

This CR includes the following sections:

- Section 1.0: Introduction
- Section 2.0: Closure Activities
- Section 3.0: Waste Disposition
- Section 4.0: Closure Verification Results
- Section 5.0: Conclusions and Recommendations
- Section 6.0: References
- Appendix A: Data Quality Objectives
- Appendix B: Sample Analytical Results
- Appendix C: Waste Disposition Documentation
- Appendix D: Site Closure Photographs
- Appendix E: Radiological Determination for Release of Lead-Sheathed Cables

1.3.1 Applicable Programmatic Plans and Documents

Closure activities were performed in accordance with the CADD/CAP for CAU 104 (NNSA/NSO, 2012).

1.3.2 Data Quality Objectives

Data Quality Objectives for the Corrective Action Investigation

Data quality objectives (DQOs) were developed for the CAU 104 field investigation and are presented in Appendix A of the Corrective Action Investigation Plan (CAIP) (NNSA/NSO, 2011). The DQO process defines the type, quality, and quantity of data needed to support the resolution of DQO decisions at an appropriate level of confidence. The corrective action investigation was performed according to these DQOs to provide the information necessary to define the nature and extent of contamination and evaluate and recommend corrective action alternatives (CAAs).

A conceptual site model (CSM) was developed using information from the physical setting, potential contaminant sources, release information, historical background information, knowledge from similar sites, and physical and chemical properties of the potentially affected media and potential contaminants. The CSM established that the CAU 104 area is inactive and/or abandoned and is classified as an Occasional Use Area, which assumes that the future use of the area includes occasional work activities and that workers will not be assigned to the area on a regular basis. A site worker under this scenario is assumed to be on site for a maximum of 80 hours per year for 5 years (NNSA/NSO, 2011).

The CAIP defined the sources of potential contamination, which include atmospheric deposition of radionuclides from nuclear testing, as well as spills, waste, infrastructure, and debris associated with testing support. The affected media were identified as surface and shallow subsurface soil. The primary release was defined as the initial atmospheric deposition of radiological contaminants from nuclear tests and the subsequent mechanical movement or covering of these contaminants. The “other release” scenario included spills or waste found at the site during the investigation or contamination that has migrated as a result of wind or water. The CAIP described four parallel berms that run to the southwest from Bunker 7-300 along the 7-01 Road for “an unknown distance.” Partially buried lead-sheathed cable debris was identified in the CAIP as being “dispersed intermittently across these berms” and was addressed under the “other release” scenario (NNSA/NSO, 2011).

The information gathered during the primary release investigation included 21 composite surface soil samples (including 1 field duplicate) collected at 5 soil plot locations, 112 surface soil grab samples (including 4 field duplicates) collected at 108 locations in a grid pattern, 41 subsurface soil grab samples (including 3 field duplicates) collected at 31 locations biased to signs of disturbance, and 165 thermoluminescent dosimeter (TLD) measurements (including 8 TLDs at background locations) to determine total effective dose (TED). These data supported the CSM as presented in the CAIP. Therefore, no revisions to the CSM were necessary. Based on the data evaluation and the proposed scenario, contamination associated with the primary release is not present at CAU 104 at levels exceeding the final action level (FAL) of 25 millirems per Occasional Use Area year (NNSA/NSO, 2012).

The information gathered during the investigation of other chemical releases, including 29 soil samples and a comprehensive visual survey in a 3.5-square-mile area in the immediate vicinity where the primary releases occurred, supports the CSM as presented in the CAIP. Therefore, no revisions to the CSM were necessary. The approximate boundary of the comprehensive visual survey is shown in Figure 2. This visual survey did not include the entire length of the 7-01 Road to determine the full extent of the berms and partially buried lead-sheathed cable debris. The visual survey ended approximately 4,000 feet (ft) southwest of the Bunker 7-300. Based on this visual survey, the CADD/CAP made the assumption that the berms extended approximately 1.8 miles (mi) from Bunker 7-300 to Mercury Highway and that the lead-sheathed cable was present in pieces scattered throughout the berms. Figure 2 depicts the assumed extent of the berms along the 7-01 Road. The partially buried lead-sheathed cable debris was assumed to be present in the berms for this entire distance and located on the surface or shallow subsurface (less than 1 ft below ground surface [bgs]) (NNSA/NSO, 2012).

Eight soil samples were collected from beneath the lead-sheathed cable debris. The sample locations are shown in Figure 2. Lead concentrations in these soil samples did not exceed the FAL of 8,356 milligrams per kilogram (mg/kg). The highest lead result for a sample collected from the soil beneath the lead-sheathed cable debris was 810 mg/kg. The CAIP requirements were shown to have been met at this CAU for other chemical releases (NNSA/NSO, 2012).

A data quality assessment (DQA) was performed to determine the degree of acceptability and usability of the reported data in the decision-making process and included an evaluation of the data quality indicators (DQIs). The results of the DQA were presented in Appendix B of the CADD/CAP. The results of the evaluation show that criteria were not met in the areas of accuracy, sensitivity, precision, and completeness. However, these deficiencies were shown to not affect the decision-making process. The DQA determined that information generated during the investigation supported the CSM assumptions, the data collected supported their intended use in the decision-making process, and DQO requirements were met. Based on the results of the DQA, the nature and extent of contamination at CAU 104 were adequately identified so that CAAs could be developed and evaluated (NNSA/NSO, 2012).

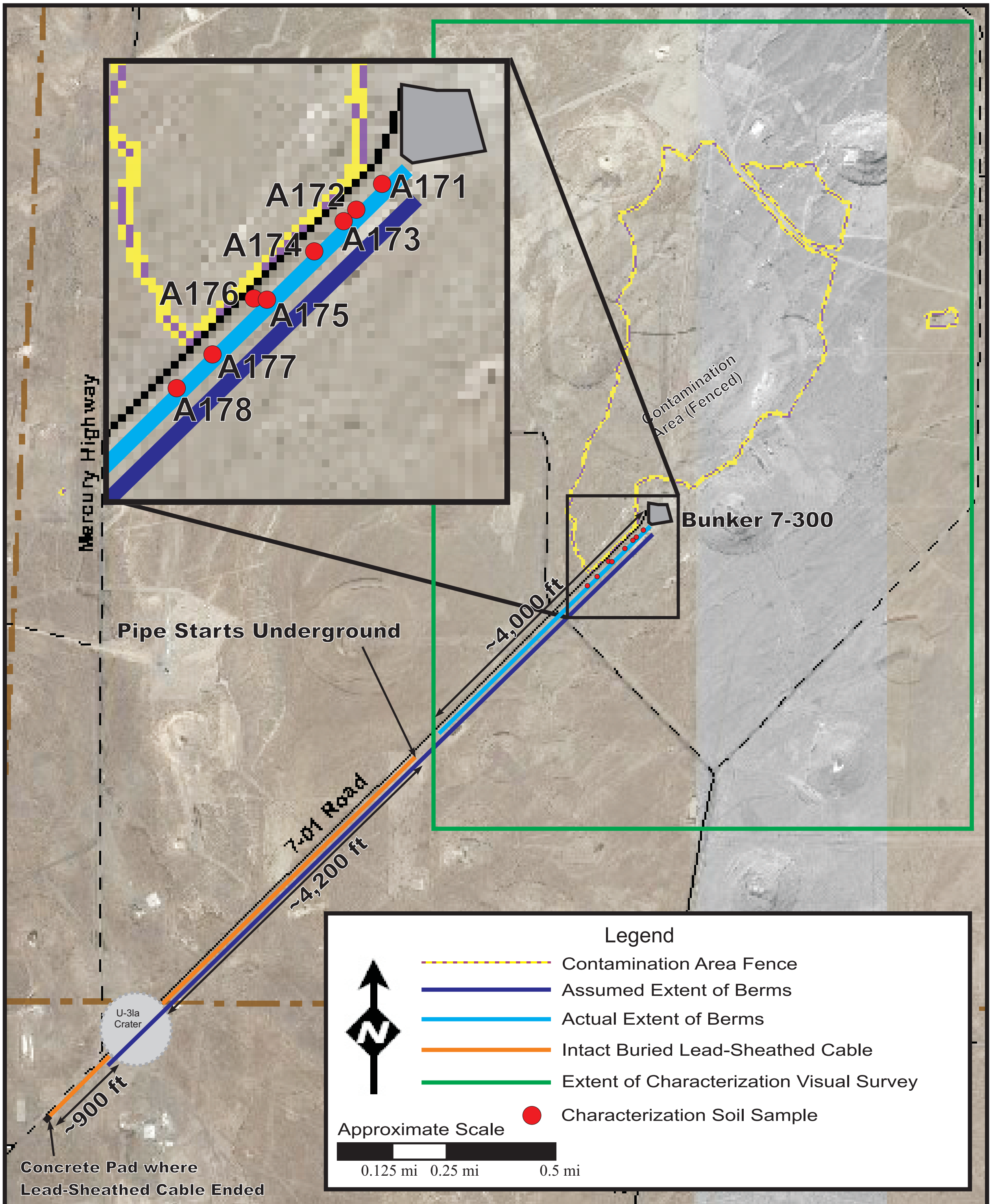

FIGURE 2. LEAD-SHEATHED CABLE INVESTIGATION ACTIVITIES

Data Quality Objectives for Lead-Sheathed Cable Removal

Additional DQOs were developed in the CADD/CAP to plan data collection activities and define performance criteria for the corrective action of removal of lead-sheathed cables. These DQOs are presented in Appendix F of the CADD/CAP and are included as Appendix A of this report. These DQOs were designed to ensure that the data collected would provide sufficient and reliable information to identify, evaluate, and technically defend recommended corrective actions. The corrective action implementation was based on these DQOs (NNSA/NSO, 2012).

The CSM developed in these DQOs included the potential release source present in the form of lead that was used to sheath cables running along the 7-01 Road between Bunker 7-300 and Mercury Highway. Since lead was not present in underlying soil at levels exceeding the FAL, the environmental problem was limited to lead in sufficient amounts that future degradation into the soil would cause an unacceptable risk to a site receptor (NNSA/NSO, 2012).

The information needed to resolve the decision statement, "Does lead remain at CAU 104?" was determined to include visual and geophysical surveys. The surveys were recommended to be performed in locations that most likely contain lead (judgmental) based on the CSM (berms along the 7-01 Road) and expanded using the biasing factors of visual identification of lead debris and geophysical surveys of anomalies beyond the berm boundaries (NNSA/NSO, 2012).

The spatial boundaries of these surveys were defined as 5 ft below original ground surface and 100 ft from the center line of the 7-01 Road between Bunker 7-300 and Mercury Highway. Potential source material (PSM) found beyond these boundaries was stated to indicate a flaw in the CSM that would potentially require re-evaluation of the CSM. The action level was established as the presence of lead debris of the equivalent amount of lead in one lead brick within a 10-square-meter area (NNSA/NSO, 2012).

The following decision rules were established:

- If the presence of lead is inconsistent with the CSM or extends beyond the spatial boundaries identified, then work will be suspended and the corrective action strategy will be reconsidered; otherwise, the decision will be to continue the corrective action.
- If the population parameter in the population of interest exceeds the corresponding action level, then additional corrective action will be implemented; otherwise, no further corrective action is needed.

The information gathered during the removal of lead-sheathed cables was inconsistent with the CSM. The CSM assumed that four parallel berms ran to the southwest along the 7-01 Road for approximately 1.8 mi from Bunker 7-300 to Mercury Highway and that discrete pieces of heavily damaged lead-sheathed cables were present intermittently throughout the berms. The lead-sheathed cable debris was assumed to be mainly visible on the surface with very little present in the shallow subsurface within the berms (less than 1 ft bgs) (NNSA/NSO, 2012).

During closure work, the berms that had been assumed to run along the 7-01 Road for 1.8 mi to Mercury Highway were found to end approximately 4,000 ft southwest of Bunker 7-300, and lead-sheathed cable debris was found to mostly be present in only one of the four berms. At a location near the end of the berms, a section of lead-sheathed cable approximately 3 ft long was found to be protruding up from the ground surface. When removal of this section of cable began, the cable was found to continue underground and to generally be intact at varying depths from approximately 2 to 7 ft bgs from this point to the edge of crater U-3la. The presence of lead extended beyond the spatial boundary of 5 ft bgs; therefore, the corrective action strategy was reconsidered. It was determined to continue removal of the buried intact lead-sheathed cable. Approximately 4,200 ft of mainly intact lead-sheathed cable was removed on the northeast side of crater U-3la. The cable was also found on the southwest side of crater U-3la and southwest of Mercury Highway and continued along the same trajectory for an additional distance of approximately 1,000 ft, where it ended at the concrete pad of a former substation.

1.3.3 Data Quality Assessment

The DQA presented in Section 4.1 describes the quality assurance (QA) and quality control (QC) procedures and the data validation process. Accurate and defensible analytical data were collected and verify that the closure objectives were met.

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2.0 CLOSURE ACTIVITIES

This section includes a description of the closure activities performed for CAU 104, deviations from the CADD/CAP, and schedule of completed field work.

2.1 DESCRIPTION OF CORRECTIVE ACTION ACTIVITIES

The following sections describe the closure activities completed for CAU 104.

2.1.1 No Further Action

No radiological or chemical contaminants are present in the soil at levels exceeding FALs at CAU 104. The following sites were closed with no further action:

- CAS 07-23-03, Atmospheric Test Site T-7C
- CAS 07-23-04, Atmospheric Test Site T7-1
- CAS 07-23-05, Atmospheric Test Site
- CAS 07-23-06, Atmospheric Test Site T7-5a
- CAS 07-23-07, Atmospheric Test Site - Dog (T-S)
- CAS 07-23-08, Atmospheric Test Site - Baker (T-S)
- CAS 07-23-09, Atmospheric Test Site - Charlie (T-S)
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- CAS 07-23-14, Atmospheric Test Site - Ruth
- CAS 07-23-15, Atmospheric Test Site T7-4
- CAS 07-23-17, Atmospheric Test Site - Climax

As a best management practice (BMP), an administrative use restriction (UR) was established for areas where an industrial use of the area (2,000 hours per year) could potentially cause a future site worker to receive a TED exceeding 25 millirems per year. This limit is based on continuous industrial use of the site and addresses exposure to industrial workers who would regularly be assigned to the work area for an entire career (250 days per year, 8 hours per day, for 25 years). Establishing an administrative UR will prevent inadvertent exposure to an unacceptable dose if a more intensive use of the site were to be considered in the future. Any proposed activity that will result in a more intensive use of the site would require additional evaluation.

As a precautionary measure, the administrative UR boundary also encompasses areas where removable contamination is present that exceeds the criterion for a Contamination Area (CA). The administrative UR also includes craters adjacent to the UR that could not be entered during the investigation. The administrative UR was established in the CADD/CAP and was recorded in accordance with the FFACO (NNSA/NSO, 2012). The administrative UR does not require postings or inspections.

The corrective actions for CAU 104 are based on the assumption that activities on the NNSS will be limited to those that are industrial in nature and that the NNSS will maintain controlled access (i.e., restrict public access and residential use). Should the future land use of the NNSS change such that these assumptions are no longer are valid, additional evaluation may be necessary.

2.1.2 Clean Closure

CAS 07-23-16, Atmospheric Test Site B7-b, was clean closed due to the presence of PSM in the form of lead-sheathed cables. Lead-sheathed cables were removed for disposal or recycling. Berms ran to the southwest from Bunker 7-300 along the 7-01 Road for approximately 4,000 ft. Discrete pieces of heavily damaged lead-sheathed cable were found in one of the berms on the south side of the 7-01 Road. Similar pieces were also found on the north side of the 7-01 Road in a few locations outside the CA fence. The berms where lead pieces were found are shown as blue lines in Figure 3. Several other berms were present that did not have pieces of lead. These are shown as purple lines in Figure 3.

Investigative trenches were dug at nine locations (labeled Trench 1–9 in Figure 3) to locate the lead-sheathed cable and to identify other buried utilities in the area. The berms were graded, the soil was ripped, and visible pieces of lead were picked up. This process was repeated until no visible pieces of lead remained. The lead pieces were staged on plastic before being packaged into three macroencapsulation boxes. The external volume of each macroencapsulation box was approximately 5 cubic yards (yd^3). The waste was treated and disposed as mixed waste (MW). Southwest of the location where the berms ended, four additional investigative trenches were dug, and no remaining small pieces of lead-sheathed cable were found. The total weight of the lead pieces that were disposed as MW is approximately 12,800 pounds.

At a location near the southwest end of the berms, at Trench 4, a section of lead-sheathed cable approximately 3 ft long was found to be protruding up from the ground surface. When removal of this section of cable began, the cable was found to be buried. The lead-sheathed cable was found to generally be intact at varying depths from approximately 2 to 7 ft below grade parallel to the road from Trench 4 to the northeast edge of crater U-3la. Approximately 4,200 ft of mainly intact lead-sheathed cable were removed from the location of Trench 4 to the northeast edge of crater U-3la. The lead-sheathed cable was observed to continue into the crater; however, due to safety concerns, the crater was not entered to continue removal of the cable.

As discussed in the CADD/CAP, lead-sheathed cables would not be removed from the crater because the risks associated with entering the crater are greater than those posed by the presence of lead. The potential exposure to the lead-sheathed cables within this crater is negligible due to an incomplete exposure pathway. Workers are not allowed to occupy this crater due to the potential for additional subsidence. Contamination can only be transported by stormwater flow towards the bottom of the crater, where it will be covered by eroding soil. Therefore, removal of the lead-sheathed cables within the crater or a UR of the crater area is not necessary to eliminate exposure of site workers to the lead contamination (NNSA/NSO, 2012).

Visible pieces of lead-sheathed cable were removed from two locations on the southwest side of crater U-3la. The approximate locations are labeled in Figure 3. The buried lead-sheathed cable was located on the southwest side of crater U-3la and continued for an additional distance of approximately 1,000 ft, where it ended at the concrete pad of a former substation. Approximately 900 ft of intact lead-sheathed cable were removed on the southwest side of crater U-3la.

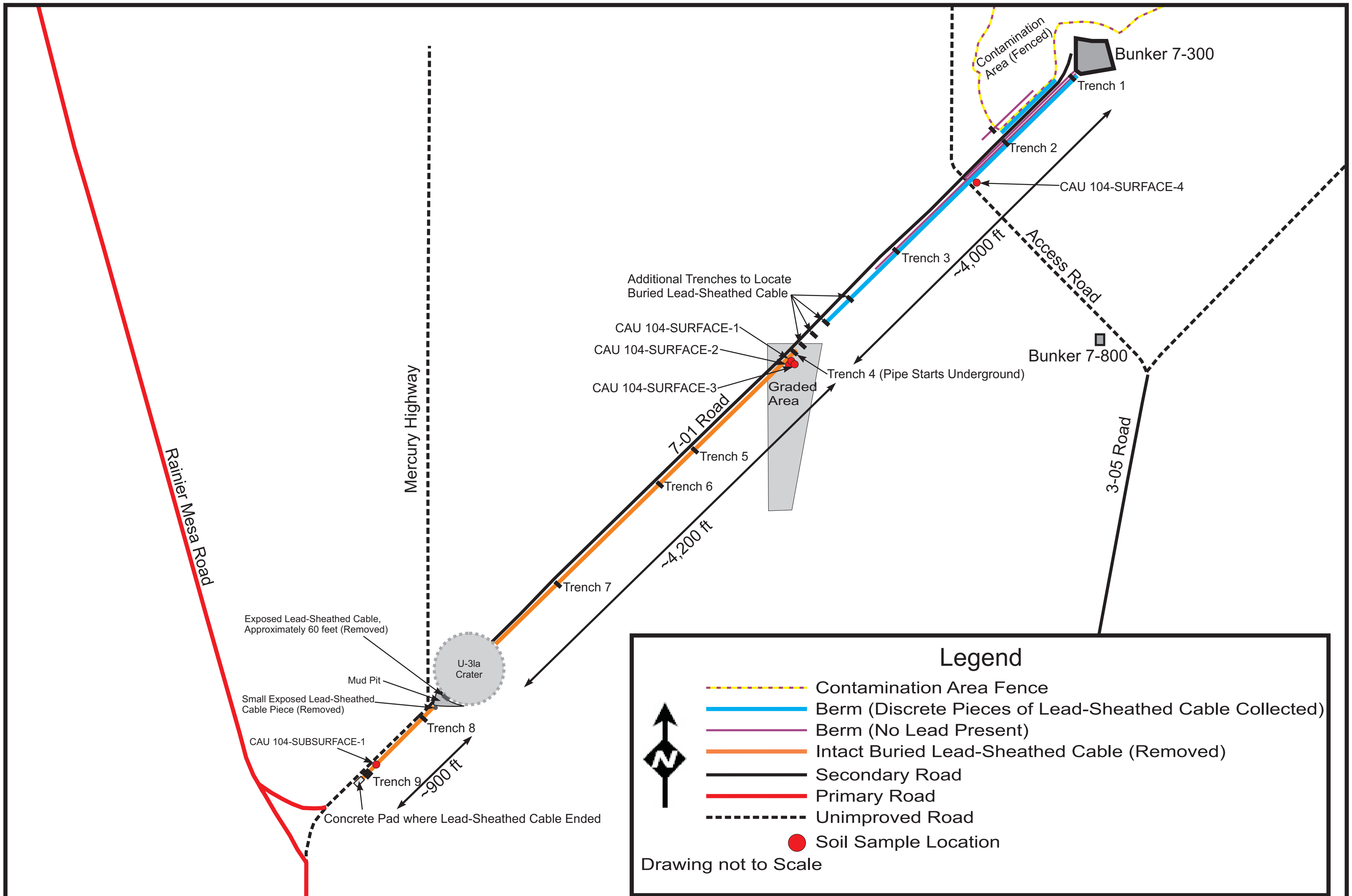

FIGURE 3. LEAD-SHEATHED CABLE REMOVAL ACTIVITIES

The lead-sheathed cable entered a horizontal steel conduit in the soil beneath the northeast side of the footing of the concrete pad of a former substation. The conduit turned 90 degrees under the pad and ran up through the concrete pad to the surface, where the lead-sheathed cable ended. A trench was excavated around the perimeter of the concrete pad, and the lead-sheathed cable was not found exiting the pad at any other point. The concrete pad was demolished to remove the remaining section of lead-sheathed cable, and this section was packaged in one of the macroencapsulation boxes with the small pieces of lead.

An evaluation of the long sections of lead-sheathed cable that were buried was performed to determine a radiological release recommendation for recycling. This evaluation is found in Appendix E of this report and includes radiological swipe and survey data for the lead-sheathed cable. The results of the surveys indicate that the lead-sheathed cables are below the NNSS allowable total residual surface contamination criteria for release of property to uncontrolled areas, as defined in Table 4-2 of the Nevada National Security Site Radiological Control Manual (Radiological Control Managers' Council, 2012). These criteria (Table 1) are consistent with the guidelines for the uncontrolled release of property under DOE Order 458.1, Change 2, "Radiation Protection of the Public and the Environment" (DOE, 2011). The highest survey results obtained from the lead-sheathed cable are recorded in Table 2. Based on both historical knowledge and survey data, as demonstrated in the evaluation in Appendix E, the lead-sheathed cable can be unconditionally released.

TABLE 1. ALLOWABLE TOTAL RESIDUAL SURFACE CONTAMINATION VALUES (IN DPM/100 CM^2)

RADIONUCLIDE	REMOVABLE	FIXED AND REMOVABLE
Alpha-Emitters	20	100
Beta/Gamma-Emitters	1,000	5,000

dpm/100 cm^2: disintegration(s) per minute per 100 square centimeters

TABLE 2. HIGHEST TOTAL RESIDUAL SURFACE CONTAMINATION VALUES OBTAINED FROM THE LEAD-SHEATHED CABLE (IN DPM/100 CM^2)

RADIONUCLIDE	REMOVABLE	FIXED AND REMOVABLE
Alpha-Emitters	3.8	26.3
Beta/Gamma-Emitters	10.3	181

dpm/100 cm^2: disintegration(s) per minute per 100 square centimeters

The long sections of lead-sheathed cable were bundled into manageable piles and placed into three lined intermodal containers. The intermodal containers were transported to Mercury and put up for auction to be recycled. The total weight of the lead-sheathed cable to be recycled is approximately 53,000 pounds.

The excavations created during removal of the buried lead-sheathed cable were backfilled and contoured to the surrounding grade. Other construction debris generated during removal of the lead-sheathed cable (e.g., non-lead-sheathed cables co-located with the lead-sheathed cable) were collected and disposed as sanitary waste at the U10c Sanitary Landfill. Approximately 10 yd^3 of construction debris were disposed.

2.2 Deviations from the Plan as Approved

The CADD/CAP for CAU 104 presented a detailed statement of work for implementation of clean closure at CAS 07-23-16. It was assumed that four parallel berms ran to the southwest along the 7-01 Road for approximately 1.8 mi from Bunker 7-300 to Mercury Highway and that discrete pieces of heavily damaged lead-sheathed cables were present intermittently throughout the berms. All lead-sheathed cable debris was assumed to be present at the surface or shallow subsurface (less than 1 ft bgs). The scope for removal included visually identifying individual pieces of lead-sheathed cable and using geophysical equipment to identify anomalies and verify removal. This process of identification and removal was to be performed along the 7-01 Road for approximately 1.8 mi between Bunker 7-300 and Mercury Highway (NNSA/NSO, 2012).

During closure work, the berms that had been assumed to run along the 7-01 Road for 1.8 mi were found to end approximately 4,000 ft southwest of Bunker 7-300. At a location near the end of the berms, the cable was found to continue underground and to generally be intact at varying depths from approximately 2 to 7 ft bgs from this point for approximately 4,200 ft to the edge of crater U-3la. The cable was also found on the southwest side of crater U-3la and southwest of Mercury Highway and continued along the same trajectory for an additional distance of approximately 1,000 ft.

Due to the actual condition of the lead-sheathed cable, the method of removal was modified from that identified in the CADD/CAP. The buried, continuous sections of lead-sheathed cable were excavated and removed, and geophysical surveys were not required to verify removal in these areas. Geophysical surveys were only performed along the berms from Bunker 7-300 to the point where the berms ended. Geophysical surveys were conducted along the section of the site where the berms were located, all detected anomalies were investigated, and lead-sheathed cable debris was removed.

2.3 Corrective Action Schedule as Completed

Closure activities began in October 2012 and were completed in April 2013.

2.4 Site Plan/Survey Plat

As-built drawings were not required for CAU 104 closure activities.

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3.0 WASTE DISPOSITION

This section describes the waste generated during closure activities and its final disposition.

3.1 WASTE MINIMIZATION

Waste minimization practices applied throughout closure activities included radiological surveys to verify acceptance of debris at the Area 9 U10c Sanitary Landfill and size reduction of debris.

3.2 WASTE MANAGEMENT

Waste was characterized and managed according to federal and state regulations, DOE orders, and company procedures. Waste management areas (WMAs) were established and identified with appropriate signs and boundaries to restrict unauthorized access. WMAs were inspected as required to ensure that containers were intact, not leaking, and not exceeding storage duration limits. Waste containers were purchased either new or reconditioned. Containers were inspected prior to use to verify that they were in good condition (e.g., no leaks, rust, or dents), lined or made of material that would not react with the waste, and met U.S. Department of Transportation requirements. Containers remained closed while stored unless waste was being added or removed. Containers were handled in such a manner that the integrity of the container was not compromised. Appropriate labels were affixed, and relevant information was marked on the containers with an indelible marker. Information was legible and clearly visible.

3.3 WASTE DISPOSAL

Waste disposition is summarized in the following sections. Waste disposition documentation is included in Appendix C of this document.

3.3.1 Sanitary Waste

Approximately 10 yd^3 of sanitary waste were generated. Sanitary waste consisted of debris generated during removal of the lead-sheathed cable (e.g., non-lead-sheathed cables co-located with the lead-sheathed cable). Debris was disposed at the U10c Sanitary Landfill.

3.3.2 Mixed Waste

MW generated during closure activities consisted of approximately 12,800 pounds of lead-sheathed cable debris packaged in three macroencapsulation boxes. The external volume of each macroencapsulation box was approximately 5 yd^3. Therefore, the total volume of MW disposed was approximately 15 yd^3. MW was transported to the Area 5 Radioactive Waste Management Site for treatment and disposal.

3.3.3 Recyclable Materials

The long sections of lead-sheathed cable that were excavated were placed into three lined intermodal containers. The intermodal containers were transported to Mercury and put up for auction to be recycled. The total weight of the lead-sheathed cable to be recycled was approximately 53,000 pounds.

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4.0 CLOSURE VERIFICATION RESULTS

Site closure was verified by visual inspection and photographic documentation of final site conditions. Photographs are included in Appendix D. Geophysical surveys were also performed along the berms from Bunker 7-300 to the point where the berms ended. Geophysical surveys were conducted along the section of the site where the berms were located, all detected anomalies were investigated, and lead-sheathed cable debris was removed. Confirmation of removal was determined by the absence of lead-sheathed cables at geophysical anomalies.

In addition, soil samples were collected as a BMP to verify that remaining soil was not impacted by lead at concentrations above the FAL. One soil sample was collected from the trench beneath the lead-sheathed cable. The sample was analyzed for total lead and for lead using the Toxicity Characteristic Leaching Procedure (TCLP) method. In addition, one soil sample was collected from the location where the small pieces of lead-sheathed cable were staged on plastic, and three soil samples were collected from the area where the long sections of cable were stored directly on the soil. These samples were also analyzed for total lead and for lead using the TCLP method. The sample locations are shown in Figure 3.

Sample results are summarized in Table 3, and the laboratory summary data reports are included in Appendix B. Total lead was not detected in the samples at concentrations above the FAL of 8,356 mg/kg.

TABLE 3. SOIL SAMPLE RESULTS

SAMPLE LOCATION	SAMPLE NUMBER	SAMPLE RESULTS	
		TOTAL LEAD (mg/kg)	TCLP LEAD (mg/L)
Trench	CAU 104-SUBSURFACE-1	26	0.000009*
Surface where the long sections of cable were stored directly on the soil	CAU 104-SURFACE-1	2,200	30
	CAU 104-SURFACE-2	410	4.8
	CAU 104-SURFACE-3	36	0.036
Surface where the small pieces of lead-sheathed cable were staged on plastic	CAU 104-SURFACE-4	820	0.49

mg/kg: milligram(s) per kilogram
mg/L: milligram(s) per liter
*Analyte was not detected above the minimum detectable concentration (MDC). Result reported is equal to the MDC.

4.1 DATA QUALITY ASSESSMENT

Accurate and defensible data were collected to verify that closure objectives were met. The DQO decision statement, “Does lead remain at CAU 104?” was satisfied by performing visual and geophysical surveys. The DQOs developed in the CADD/CAP stated that surveys should be performed in locations most likely to contain PSM (judgmental). The survey locations were to be selected based on the CSM (berms along the 7-01 Road) and expanded using the biasing factors of visual identification of lead debris and geophysical survey anomalies beyond the berm boundaries (NNSA/NSO, 2012).

The surveys were performed in locations that contained the populations of interest, as dictated by the DQOs in the CADD/CAP. Geophysical surveys were conducted along the berms, all detected anomalies were investigated, and lead-sheathed cable debris was removed. Confirmation of removal was determined by the absence of lead-sheathed cable debris at geophysical anomalies.

Analytical data results are included as Appendix B. QA/QC procedures and the data validation process were conducted according to the *Industrial Sites Quality Assurance Project Plan* (QAPP) (U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office [NNSA/NV], 2002).

Soil samples were collected with disposable sampling equipment, placed in appropriately labeled containers secured with custody seals, labeled with unique sample numbers, placed on ice, and transported under strict chain of custody. Samples were analyzed by certified contract laboratories. Analytical results were validated at the laboratory using stringent QA/QC procedures, including matrix spike/matrix spike duplicates, spiked surrogate recovery analysis, verification of analytical results, and DQI requirements.

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

No anomalies were discovered in the data that would discredit any of the sample results. Data met the required DQIs. The complete datasets, including validation reports, are maintained in the project files and are available upon request.

4.2 USE RESTRICTION

As a BMP, an administrative UR was established for the areas where an industrial use of the area (2,000 hours per year) could potentially cause a future site worker to receive a TED exceeding 25 millirems per year. This limit is based on continuous industrial use of the site and addresses exposure to industrial workers who would regularly be assigned to the work area for an entire career (250 days per year, 8 hours per day, for 25 years). Establishing an administrative UR will prevent inadvertent exposure of workers to radioactivity if a more intensive use of the site were to be considered in the future. Any proposed activity that will result in a more intensive use of the site would require additional evaluation.

As a precautionary measure, the administrative UR boundary also encompasses areas where removable contamination is present that exceeds the criterion for a CA. The administrative UR also includes craters adjacent to the UR that could not be entered during the investigation. The administrative UR was established in the CADD/CAP and was recorded in accordance with the FFACO (NNSA/NSO, 2012). The administrative UR does not require postings or inspections.

The corrective actions for CAU 104 are based on the assumption that activities on the NNSS will be limited to those that are industrial in nature and that the NNSS will maintain controlled access (i.e., restrict public access and residential use). Should the future land use of the NNSS change such that these assumptions are no longer are valid, additional evaluation may be necessary.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Closure activities began in October 2012 and were completed in April 2013 and included removal of lead-sheathed cables. Discrete pieces of lead-sheathed cable debris will be treated and disposed as MW, and the long sections of lead-sheathed cable that were excavated were put up for auction to be recycled.

5.2 Post-Closure Requirements

There are no post-closure requirements for the administrative UR at CAU 104.

5.3 Recommendations

Because closure activities for CAU 104 have been completed following the CADD/CAP for CAU 104 (NNSA/NSO, 2012) as documented in this CR, the U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office (NNSA/NFO) requests the following:

- A Notice of Completion from the Nevada Division of Environmental Protection to NNSA/NFO for closure of CAU 104
- The transfer of CAU 104 from Appendix III to Appendix IV, Closed Corrective Action Units, of the FFACO

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6.0 REFERENCES

DOE, see U.S. Department of Energy.

EPA, see U.S. Environmental Protection Agency.

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

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

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

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

Radiological Control Managers' Council, 2012. *Nevada National Security Site Radiological Control Manual*, DOE/NV/25946--801 Revision 2. March 2012. Las Vegas, NV.

U.S. Department of Energy, 2011. "Radiation Protection of the Public and the Environment," DOE Order 458.1, Change 2. Washington, D.C.

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

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office, 2011. *Corrective Action Investigation Plan for Corrective Action Unit 104: Area 7 Yucca Flat Atmospheric Test Sites, Nevada National Security Site, Nevada*. DOE/NV--1461. Las Vegas, NV.

U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office, 2012. *Corrective Action Decision Document/Corrective Action Plan for Corrective Action Unit 104: Area 7 Yucca Flat Atmospheric Test Sites, Nevada National Security Site, Nevada*. DOE/NV--1489. Las Vegas, NV.

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

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

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APPENDIX A*

DATA QUALITY OBJECTIVES

*As presented and published in the approved *Corrective Action Decision Document/Corrective Action Plan for Corrective Action Unit 104: Area 7 Yucca Flat Atmospheric Test Sites, Nevada National Security Site, Nevada*, 2012, DOE/NV--1489. Las Vegas, NV.

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F.1.0 Sampling and Analysis Plan

The DQO process described in this appendix is a seven-step strategic systematic planning method used to plan data collection activities and define performance criteria for the CAU 104, Area 7 Yucca Flat Atmospheric Test Sites, corrective action of the removal of lead-sheathed cables. DQOs are designed to ensure that the data collected will provide sufficient and reliable information to identify, evaluate, and technically defend recommended corrective actions (i.e., no further action, closure in place, or clean closure).

The CAU 104 corrective action implementation will be based on the DQOs presented in this appendix. The seven steps of the DQO process presented in Sections F.2.0 through F.8.0 were developed in accordance with *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA, 2006).

In general, the procedures used in the DQO process provide a method to establish performance or acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of a study.

F.2.0 Step 1 - State the Problem

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

F.2.1 Problem Statement

PSM in the form of lead-sheathed cables is present at CAS 07-23-16 and requires corrective action. A corrective action of clean closure will be implemented to remove the PSM. Additional information is needed to demonstrate that the PSM has been removed and no further corrective action is needed.

For CAU 104, the PSM is defined as metallic lead debris in amounts that could pose an unacceptable risk to future site receptors when the metal degrades and is released into the soil. For the purposes of this CADD/CAP, this will be defined as the amount of lead in one lead brick within a 10-m^2 area.

F.2.2 Conceptual Site Model

The CSM is used to organize and communicate information about site characteristics. It reflects the best interpretation of available information at a point in time. The CSM is a primary vehicle for communicating assumptions about release mechanisms, potential migration pathways, or specific constraints. The CSM describes the most probable scenario for current conditions at each site and defines the assumptions that are the basis for identifying appropriate sampling strategy and data collection methods. An accurate CSM is important as it serves as the basis for all subsequent inputs and decisions throughout the DQO process.

The CSM was developed for CAU 104 using information from the physical setting, contaminant sources, release information, historical background information, knowledge from similar sites, and physical and chemical properties of the potentially affected media and COPCs.

The CSM consists of the following:

- Potential contaminant releases, including media subsequently affected
- Release mechanisms (the conditions associated with the release)

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

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

Additional descriptions of CSM elements are provided in the following subsections. Figure F.1-1 depicts a graphical representation of the CSM.

F.2.2.1 Release Sources

The only potential release source specific to the implementation of corrective actions at CAU 104 is represented in the CSM as PSM present in the form of metallic lead that was used to sheath electrical cables running between Bunker 7-300 along the 7-01 Road to Mercury Highway.

F.2.2.2 Potential Contaminants

The release-specific COPCs are defined as the contaminants reasonably expected at the site that could contribute to a dose or risk exceeding FALs. Based on the nature of the releases identified in Section 2.2.1, lead is not present in adjacent soil at levels exceeding FALs. Therefore, the environmental problem is limited to metallic lead in sufficient amounts that future degradation into soil would cause an unacceptable risk to a site receptor.

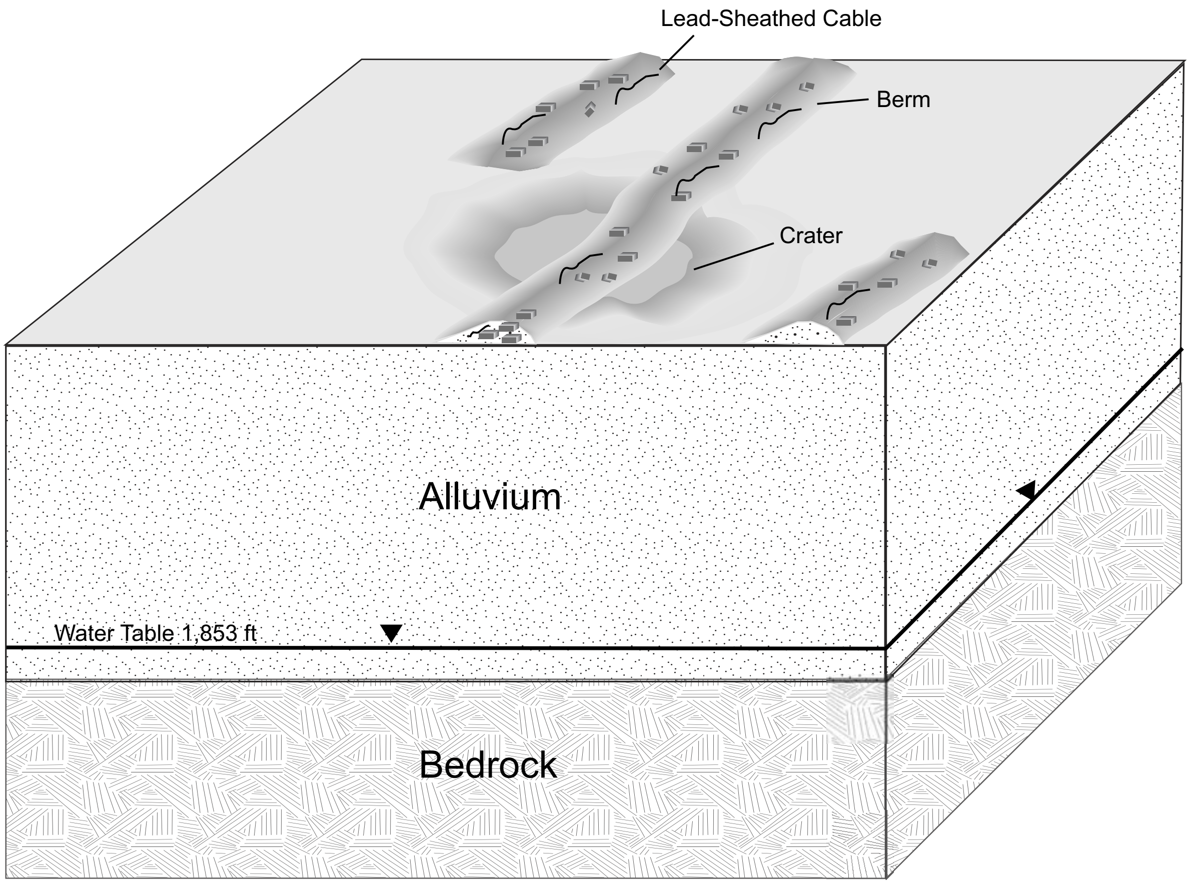

Figure F.1-1
CAU 104 CSM

F.2.2.3 Contaminant Characteristics

The characteristics of the PSM pertinent to the corrective action decision are the physical characteristics of the metallic lead. It is present as approximately 1/16-in. thick metal formed into an approximately 2.5-in. diameter cylinder surrounding a bundle of electrical cables. This cable is primarily buried under soil berms but has been disturbed in several locations where it is visible on the surface. Where the cable has been disturbed, the cable has been cut into fragments, and the lead sheathing is torn and crumpled.

Contaminant characteristics related to migration are not pertinent to the corrective action decision because the metal sheathing fragments are not subject to migration.

F.2.2.4 Site Characteristics

CAU 104 is located in Area 7 of the NNSS in Yucca Flat. The area is relatively flat, gently sloping to the southeast. The area is sparsely vegetated with native plants. The soil at CAU 104 is made up of sand to cobble-sized alluvium of various lithologies and includes large areas of disturbed and/or non-native soil. No perennial stream flow exists in the region. Ephemeral streams are present and flow in a general southwest direction toward Yucca Flat Dry Lake.

F.2.2.5 Migration Pathways and Transport Mechanisms

Migration pathways and transport mechanisms related to migration are not pertinent to the corrective action decision because the metal sheathing fragments are not subject to migration.

F.2.2.6 Exposure Scenarios

Human receptors may be exposed to lead through oral ingestion or inhalation of, or dermal contact (absorption) with soil or debris. As presented in Appendix D, the most appropriate exposure scenario for the CAU 104 CASs was conservatively established as the Occasional Use Area exposure scenario.

F.3.0 Step 2 - Identify the Goal of the Study

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

F.3.1 Decision Statements

The Decision statement is as follows: “Does lead PSM remain at CAU 104?”

F.3.2 Alternative Actions to the Decision

If the lead PSM is not detected, further corrective action is not required. If the lead PSM is detected, additional removal will be completed.

F.4.0 Step 3 - Identify Information Inputs

Step 3 of the DQO process identifies the information needed, determines sources for information, and identifies methods that will allow reliable comparisons with corrective action criteria.

F.4.1 Information Needs

To resolve the DQO decision (determine whether lead PSM is present), surveys will be collected and analyzed following these two criteria:

- Surveys must be collected in areas most likely to contain PSM (judgmental sampling).
- The method must be sufficient to identify any PSM present.

F.4.2 Sources of Information

Information to satisfy the DQO decision will be generated by performing visual and geophysical surveys.

The surveys should be from locations that most likely contain lead PSM, if present (judgmental). These survey locations will be selected based on the CSM (berms along the 7-01 Road) and expanded using the biasing factors of visual identification of lead debris and geophysical survey anomalies that are beyond the berm boundaries.

F.5.0 Step 4 - Define the Boundaries of the Study

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

F.5.1 Target Populations of Interest

The population of interest to resolve the DQO decision (determine whether lead PSM from the release is present) is the presence of lead PSM.

F.5.2 Spatial Boundaries

Spatial boundaries are the maximum lateral and vertical extent of expected contamination that can be supported by the CSM. The DQO decision spatial boundaries are as follows:

- **Vertical.** 5 ft below original ground surface
- **Lateral.** 100 ft from the center line of the 7-01 Road between Bunker 7-300 and Mercury Highway

Contamination found beyond these boundaries may indicate a flaw in the CSM and may require reevaluation of the CSM before the investigation can continue.

F.5.3 Practical Constraints

Practical constraints may be activities by other organizations at the NNSS, utilities, threatened or endangered animals and plants, unstable or steep terrain, and/or access restrictions that may affect the ability to investigate this site. The only practical constraint that has been identified specific to CAU 104 is the presence of a subsidence crater from underground testing that encompasses a portion of the 7-01 Road between Bunker 7-300 and Mercury Highway.

F.5.4 Define the Sampling Units

The scale of decision-making refers to the smallest, most appropriate area or volume for which decisions will be made. The scale of decision making in the DQO decision is any 10-m^2 area where the presence of lead PSM associated with CAU 104 will cause the determination that further corrective action is necessary.

F.6.0 Step 5 - Develop the Analytic Approach

Step 5 of the DQO process specifies appropriate population parameters for making decisions, defines action levels, and generates a decision rule.

F.6.1 Population Parameters

Population parameters are the parameters compared to action levels. For the lead PSM, the population parameter is the observation of lead debris or the identification of a geophysical anomaly.

F.6.2 Action Levels

The action level is the presence of more than the equivalent amount of lead in one lead brick of lead debris within a 10-m^2 area.

F.6.3 Decision Rules

The decision rules applicable to the DQO decision are as follows:

- If the presence of lead PSM is inconsistent with the CSM or extends beyond the spatial boundaries identified in Section F.5.2, then work will be suspended and the corrective action strategy will be reconsidered, else the decision will be to continue the corrective action.
- If the population parameter in the population of interest (defined in Step 4) exceeds the corresponding action level, then additional corrective action will be implemented, else no further corrective action is needed.

F.7.0 Step 6 - Specify Performance or Acceptance Criteria

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

F.7.1 Decision Hypotheses

The baseline condition (i.e., null hypothesis) and alternative condition for the DQO decision are as follows:

- **Baseline condition.** PSM is present.
- **Alternative condition.** PSM is not present.

Decisions and/or criteria have false negative or false positive errors associated with their determination. The impact of these decision errors and the methods that will be used to control these errors are discussed in the following subsections. In general terms, confidence in the DQO decision will be established qualitatively by the following:

- Developing a CSM (based on process knowledge).
- Testing the validity of the CSM based on corrective action results.
- Evaluating the quality of data.

F.7.2 False Negative Decision Error

The false negative decision error would mean deciding that lead PSM is not present when it actually is. The potential consequence is an increased risk to human health and environment.

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

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

- For the DQO decision, having a high degree of confidence that the survey locations selected will identify a lead PSM if present anywhere within the CAS.
- Having a high degree of confidence that geophysical method will be sufficient to detect any lead PSM present in the surveys.

To satisfy the first criterion, the DQO decision surveys must be collected in areas likely to be contaminated by the lead PSM. The CAI identified the lead PSM as having a clear pattern of distribution consisting of linear berms extending along the 7-01 Road. The areas likely to contain this PSM are along both sides of the 7-01 Road and within 20 ft of the road. The survey methods listed in Section F.4.2 will be used to further ensure that appropriate sampling locations are selected to meet these criteria. The Closure Report will present a DQA evaluation that surveys were collected from those locations that contain the populations of interest as defined in Section F.5.1.

If there are visual indications of similar berms or additional pieces of lead-sheathed cables outside the 20-ft clearance area, this area will be extended to include all identified PSM. In order to ensure all PSM debris is identified, the clearance area will be extended to include a 10-ft radius from each piece of PSM detected on the outer edge of the previously defined clearance area.

To satisfy the second criterion, the DQO decision geophysical surveys will include performance testing. Performance testing will be performed for each day geophysical surveys are conducted. The test will consist of burying a 1-ft section of lead-sheathed cable at a depth of 2 ft below original ground surface and verifying that it will produce a significant geophysical anomaly.

F.7.3 False Positive Decision Error

The false positive decision error would mean deciding that lead PSM is present when it is not, resulting in increased costs for unnecessary corrective action activities.

F.8.0 Step 7 - Develop the Plan for Obtaining Data

Step 7 of the DQO process selects and documents a design that will produce data that exceeds performance or acceptance criteria. A judgmental scheme will be implemented to select survey locations as described in Section F.7.2. Geophysical anomalies will be investigated to determine whether the presence of lead PSM is responsible for the anomaly. If so, the lead PSM will be removed and an additional geophysical survey will be conducted until geophysical survey anomalies are not present or the anomalies are explained by other debris. Visual and geophysical surveys will encompass the target population of interest defined in Section F.5.1.

F.9.0 References

EPA, see U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2002. *Guidance for Quality Assurance Project Plans*, EPA QA/G5, EPA/240/R-02/009. Washington, DC: Office of Environmental Information.

U.S. Environmental Protection Agency. 2006. *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4, EPA/240/B-06/001. Washington, DC: Office of Environmental Information.

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APPENDIX B

SAMPLE ANALYTICAL RESULTS

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Sample Results

Total LEAD

Method SW6010B

Sample Results

Lab Name: ALS Environmental -- FC
Client Name: National Security Technologies, LLC
Client Project ID: CAU 104 V3831
Work Order Number: 1302166
Reporting Basis: Dry Weight
Analyst: Mike Lundgreen

Final Volume: 100 ml
Matrix: SOIL
Result Units: MG/KG

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	Reporting Limit	MDL	Flag	Sample Aliquot
CAU104-SURFACE-1	1302166-1	2/12/2013	2/15/2013	02/15/2013	7.351	5	2200	1.6	0.47		1.036 g
CAU104-SURFACE-2	1302166-2	2/12/2013	2/15/2013	02/15/2013	8.584	10	410	3.1	0.94		1.048 g
CAU104-SURFACE-3	1302166-3	2/12/2013	2/15/2013	02/15/2013	3.325	1	36	0.3	0.089		1.041 g
CAU104-SURFACE-4	1302166-4	2/12/2013	2/15/2013	02/15/2013	3.545	10	820	3	0.91		1.021 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *it1302166-1*

TCLP LEAD

Method SW6010B

Sample Results

Lab Name: **ALS Environmental -- FC**
Client Name: National Security Technologies, LLC
Client Project ID: CAU 104 V3831
Work Order Number: 1302166 **Final Volume:** 50 g
Reporting Basis: As Received **Matrix:** LEACHATE
Analyst: Mike Lundgreen **Result Units:** MG/L

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	Reporting Limit	MDL	Flag	Sample Aliquot
CAU104-SURFACE-1	1302166-5	2/12/2013	2/19/2013	02/19/2013	N/A	1	30	0.03	0.009		5 g
CAU104-SURFACE-2	1302166-6	2/12/2013	2/19/2013	02/19/2013	N/A	1	4.8	0.03	0.009		5 g
CAU104-SURFACE-3	1302166-7	2/12/2013	2/19/2013	02/19/2013	N/A	1	0.036	0.03	0.009		5 g
CAU104-SURFACE-4	1302166-8	2/12/2013	2/19/2013	02/19/2013	N/A	1	0.49	0.03	0.009		5 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *it1302166-1*

Sample Results

TCLP LEAD

Method SW6010B

Sample Results

Lab Name: **ALS Environmental -- FC**
Client Name: National Security Technologies, LLC
Client Project ID: CAU 104 V3829
Work Order Number: 1302055
Reporting Basis: As Received
Analyst: Mike Lundgreen

Final Volume: 50 g
Matrix: LEACHATE
Result Units: MG/L

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	Reporting Limit	MDL	Flag	Sample Aliquot
CAU104-SUBSURFACE-1	1302055-2	2/4/2013	2/7/2013	02/07/2013	N/A	1	0.000009	0.03	0.000009	U	5 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *it1302055-1*

Total LEAD

Method SW6010B

Sample Results

Lab Name: ALS Environmental -- FC
Client Name: National Security Technologies, LLC
Client Project ID: CAU 104 V3829
Work Order Number: 1302055 **Final Volume:** 100 ml
Reporting Basis: Dry Weight **Matrix:** SOIL
Analyst: Mike Lundgreen **Result Units:** MG/KG

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	Reporting Limit	MDL	Flag	Sample Aliquot
CAU104-SUBSURFACE-1	1302055-1	2/4/2013	2/11/2013	02/11/2013	8.317	1	26	0.32	0.097		1.012 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *it1302055-1*

APPENDIX C

WASTE DISPOSITION DOCUMENTATION

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National Security Technologies LLC
Vision • Service • Partnership

H120-PA-13-0100

April 29, 2013

Stefan J. Duke
Waste Generator Services
National Security Technology
P.O. Box 98521
Las Vegas, NV 89193-8521

Subject: **CERTIFICATE OF DISPOSAL FOR MIXED LOW-LEVEL/NON-RAD CLASSIFIED HAZARDOUS WASTE AT THE NEVADA NATIONAL SECURITY SITE RADIOACTIVE WASTE MANAGEMENT SITE (RWMS)**

Enclosed is the courtesy certificate acknowledging disposal of shipment DPM13004 in the Mixed Waste Disposal Unit, at the Nevada National Security Site RWMS.

If you have any questions, please contact me at 702-295-2261.

/s/: Patrick M. Arnold

Patrick M. Arnold, Program Manager
Environmental Management Program

RCD:saq

Enclosure: as stated

cc w/enc.
Correspondence Control
EWO Correspondence
J. T. Carilli, NNSA/NFO
R. C. Denton, NSTec
R. G. Geisinger, NSTec
M. Libidinsky, NNSA/NFO
C. P. Moke, NSTec
K. M. Small, NNSA/NFO
K. C. Tanaka, NSTec
A. V. Tauber, NNSA/NFO
R. A. Wagner, NSTec

NSTec Form FRM-1929	**CERTIFICATE OF DISPOSAL** (MIXED LOW-LEVEL/Non-Rad Classified Hazardous)	05/09/12 Rev. 01 Page 1 of 1

National Security Technologies LLC
For U.S. Department of Energy
Waste Management
Nevada National Security Site - Zone 2
Mercury, NV 89023

EPA ID NV3890090001

This Certificate acknowledges that the following shipment(s) of manifested MIXED LOW-LEVEL/Non-Rad Classified Hazardous waste have been disposed at the Nevada National Security Site Radioactive Waste Management Site.

Shipment Number	Uniform Hazardous Waste Manifest Number	Date(s) of Disposal	Volume Ft^3 (m^3)	Disposal Process
DPM13004	000000013N20	04/25/2013	403.30 (11.42)	Landfill

This certification is provided as a courtesy to the waste generator for information purposes only.

/s/: Patrick Arnold
Signature

4/29/13
Date

Program Manager, Environmental Management Program
Title

Instructions:
Shipment Number – enter shipment number from LWIS database.
Uniform Hazardous Waste Manifest Number – enter number from UHWM provided by generator.
Date of Disposal – enter date waste was placed in disposal cell.
Volume – enter shipment volume in cubic feet and equivalent cubic meters in parenthesis.
Disposal Process – enter Landfill.

APPENDIX D

SITE CLOSURE PHOTOGRAPHS

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PHOTOGRAPH LOG

PHOTOGRAPH NUMBER	DATE	DESCRIPTION
1	10/23/2012	Section of Lead-Sheathed Cable at Trench 4 Leading Underground
2	10/24/2012	Investigative Trench
3	10/25/2012	Lead-Sheathed Cable Debris from Berm Staged on Plastic
4	10/30/2012	Removal of Lead-Sheathed Cable
5	10/31/2012	Removal of Lead-Sheathed Cable
6	11/05/2012	Removed Sections of Lead-Sheathed Cable
7	11/06/2012	Grading the Berms
8	11/07/2012	Ripping the Berms
9	11/15/2012	Removal of Lead-Sheathed Cable
10	11/19/2012	Removal of Lead-Sheathed Cable
11	11/20/2012	Removal of Lead-Sheathed Cable
12	11/21/2012	Removal of Lead-Sheathed Cable
13	11/28/2012	Removal of Lead-Sheathed Cable
14	11/28/2012	Section of Lead-Sheathed Cable on the Southwest Side of Crater U-3la
15	12/03/2012	Removal of Lead-Sheathed Cable
16	01/30/2013	Concrete Pad Where the Lead-Sheathed Cable Ended
17	01/30/2013	Lead-Sheathed Cable and Steel Conduit under the Concrete Pad
18	01/30/2013	Lead-Sheathed Cable and Steel Conduit at the Surface of the Concrete Pad
19	01/30/2013	Trenching around the Concrete Pad
20	02/05/2013	Packaging Lead-Sheathed Cable Debris from the Berms into Macroencapsulation Boxes
21	02/05/2013	Lead-Sheathed Cable Debris from the Berms in Macroencapsulation Box
22	02/06/2013	Cross Section of Lead-Sheathed Cable
23	02/11/2013	Bundling the Long Sections of Lead-Sheathed Cable
24	02/11/2013	Packaging the Long Sections of Lead-Sheathed Cable into an Intermodal Container
25	02/11/2013	Lead-Sheathed Cable in an Intermodal Container
26	03/14/2013	Demolition of the Concrete Pad Where the Lead-Sheathed Cable Ended
27	03/14/2013	Removal of the Steel Conduit and Lead-Sheathed Cable from the Concrete Pad
28	03/14/2013	Steel Conduit and Lead-Sheathed Cable
29	04/04/2013	Transport of Macroencapsulation Boxes to Area 5

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Photograph 1: Section of Lead-Sheathed Cable at Trench 4 Leading Underground, 10/23/2012

Photograph 2: Investigative Trench, 10/24/2012


Photograph 3: Lead-Sheathed Cable Debris from Berm Staged on Plastic, 10/25/2012


Photograph 4: Removal of Lead-Sheathed Cable, 10/30/2012

Photograph 5: Removal of Lead-Sheathed Cable, 10/31/2012

Photograph 6: Removed Sections of Lead-Sheathed Cable, 11/05/2012

Photograph 7: Grading the Berms, 11/06/2012

Photograph 8: Ripping the Berms, 11/07/2012

Photograph 9: Removal of Lead-Sheathed Cable, 11/15/2012

Photograph 10: Removal of Lead-Sheathed Cable, 11/19/2012

Photograph 11: Removal of Lead-Sheathed Cable, 11/20/2012

Photograph 12: Removal of Lead-Sheathed Cable, 11/21/2012

Photograph 13: Removal of Lead-Sheathed Cable, 11/28/2012

Photograph 14: Section of Lead-Sheathed Cable on the Southwest Side of Crater U-3la, 11/28/2012

Photograph 15: Removal of Lead-Sheathed Cable, 12/03/2012

Photograph 16: Concrete Pad Where the Lead-Sheathed Cable Ended, 01/30/2013

Photograph 17: Lead-Sheathed Cable and Steel Conduit under the Concrete Pad, 01/30/2013

Photograph 18: Lead-Sheathed Cable and Steel Conduit at the Surface of the Concrete Pad, 01/30/2013

Photograph 19: Trenching around the Concrete Pad, 01/30/2013

Photograph 20: Packaging Lead-Sheathed Cable Debris from the Berms into Macroencapsulation Boxes, 02/05/2013

Photograph 21: Lead-Sheathed Cable Debris from the Berms in Macroencapsulation Box, 02/05/2013

Photograph 22: Cross Section of Lead-Sheathed Cable, 02/06/2013

Photograph 23: Bundling the Long Sections of Lead-Sheathed Cable, 02/11/2013

Photograph 24: Packaging the Long Sections of Lead-Sheathed Cable into an Intermodal Container, 02/11/2013

Photograph 25: Lead-Sheathed Cable in an Intermodal Container, 02/11/2013

Photograph 26: Demolition of the Concrete Pad Where the Lead-Sheathed Cable Ended, 03/14/2013

Photograph 27: Removal of the Steel Conduit and Lead-Sheathed Cable from the Concrete Pad, 03/14/2013

Photograph 28: Steel Conduit and Lead-Sheathed Cable, 03/14/2013

Photograph 29: Transport of Macroencapsulation Boxes to Area 5, 04/04/2013

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APPENDIX E

RADIOLOGICAL DETERMINATION FOR RELEASE OF LEAD-SHEATHED CABLES

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Navarro-Intera

Radiological Determination For Release Of Items

A	User/Requestor Name: Mark Burmeister Phone #: 295-1816 Company: Navarro-Intera
B	Detailed item description (physical appearance, material composition, serial number(s), current location, history of use, etc...) Attach additional pages as necessary. Approximately 5,000 linear feet of lead sheathed cable from CAU 104. The cable was buried 2' – 6' below grade from Controlled Area at CAU 104, in Area 7. The cable is presently staged in 3 intermodal containers with container numbers 000000-3, 000000-4 & 000001-9. See attached White Paper "An Evaluation of Lead-Sheathed Cable at CAU 104", dated January 25, 2013.

		Yes	No	?
C	Has the item ever been located or used in:			
	1. a controlled area in a manner or for a duration such that Radiation Services cannot vouch for the radiological status of the item?	☒	☐	☐
	2. a Radioactive Material Area / Underground Radioactive Material Area?	☐	☒	☐
	3. a radiological area (e.g., CA, HCA, ARA, RA, HRA)?	☐	☒	☐
	4. Has the item ever been in contact with unconfined radioactive material (soil, trinity glass)?	☐	☒	☐
	5. Has the item ever been in an area that would have caused induced radioactivity?	☐	☒	☐

D

Where is the item currently located?
CAU 104

What is the final intended disposition of the item (e.g., Recycle, Burial, Public Use)? Resale to Public for re-use/recycle

Who will be receiving the item (e.g., name, organization, company)? Public via NSTec Property Mgmt.

E

Person knowledgeable of the item history: Mark Burmeister (Print Name) /s/: Mark Burmeister (Signature) 2/25/2013 (Date)

User/Requestor/Processor (if different): ______ (Print Name) ______ (Signature) ______ (Date)

I attest that, based upon best available knowledge, the above information is true and accurate.

Radiation Services Staff Use Only (complete section F or section G)

F

The item is approved for unrestricted release based upon process knowledge

RSS: N/A (Print Name) (Signature) (Date)

G

The item was surveyed according to:

☒ ~~100% survey~~ Process RSR # 130129-SL-25 ☐ Analytical Data Package Review

☐ Release Survey Plan# N/A ☐ Per Special Instructions:

Final Disposition:

☒ The item is approved for unrestricted release FRM-0121C ID# (if applicable): N/A

☐ The item is approved for conditional release to a RMA

☐ The item meets waste acceptance criteria and can be released for disposal

RSS: Jeffrey Tappen (Print Name) /s/: Jeffrey Tappen (Signature) 2/25/13 (Date)

HP (survey plan): N/A (Print Name) (Signature) (Date)

RSM (if required): N/A (Print Name) (Signature) (Date)

NOTE: RSS retain a copy of this form for the radiological release file

Navarro-Intera

RADIOLOGICAL SURVEY FORM

Project Number: SL13-160

RSR #: 130129-SL-28

Purpose of Survey: ☐ NI-026 Form Attached Post Job Survey of Lead Shielded Cable and Equip.	Survey Date	1/29/2013	RWP #		
	CAU Number	104	Location of Survey	☒ Controlled Area ☐ RMA ☐ CA ☐ HCA Area 7	
	CAS Number(s)	N/A			
	Print Name	Jeff Houghton			
	Signature	/s/: Jeff Houghton			
	Reviewed By	/s/: Jeff Tappen	Review Date	02-05-13	

Contamination Instrument				
Instrument Model	Electra			
Instrument S/N	1283			
Probe S/N	2041			
Calibration Due	8/2/2013			
Efficiency (%)	α	14.4%	β	25.3%
Background (1)	α	13.9	β	2246.0
MDC (1)	α	66.519	β	449.982

REMOVABLE Contamination Instrument (4)				
Instrument Model	Tennelec			
Instrument S/N	84165			
Probe S/N	N/A			
Calibration Due	10/18/2013			
Efficiency (%)	α	26.4%	β	41.0%
Background (1)	α	0.6	β	2.4
MDC (1)	α	15.100	β	14.500

Dose Rate Instrument	
Instrument Model	
Instrument S/N	
	N
Calibration Due	A
Background	
☐ micro-R / hr ☐ milli-R / hr ☐ Other (state)	

Survey Point	TOTAL Contamination (1)		REMOVABLE Contamination (1)(4)		Dose Rate Readings (2)	Comments / Information (3)
	Alpha	Beta / Gamma	Alpha	Beta / Gamma	(contact / 30 cm / 1 m)	
1	13.9	147	0.00	2.5		☐ Lead Shielded Cable
2	13.9	141	3.2	2.5		☐ Lead Shielded Cable
3	0.00	132	0.00	0.1		☐ Lead Shielded Cable
4	26.3	181	0.00	2.5	N	☐ Lead Shielded Cable
5	0.00	138	0.00	2.5	A	☐ Lead Shielded Cable
6	13.9	153	0.00	0.00		☐ Lead Shielded Cable
7	0.00	126	0.00	5.00		☐ Back Hoe # 71190, Bucket
8	13.9	138	0.00	2.5		☐ Shovel
			N			☐
			A			☐

(1) Units are net readings in units of dpm/100cm² unless otherwise stated in the Comments / Information block. (2) Dose rate units are as stated in the instrument information section.

(3) Check box if item was released from radiological control. (4) If the Tennelec gas-flow proportional counter was used, see the attached report for information and swipe results.

Navarro - Intera Swipes Report

Count Date: 1/29/13 17:11

Device: S5-XLB S/N: 84165 Cal. Due: 10/18/13
Batch ID: ROUTINE SWIPES - 201301291711 Batch Key: 2469

Survey # 130129-SL-28

Background (dpm)
Alpha Rate: 0.6
Beta Rate: 2.4

Efficiency (%)
Alpha: 26.4
Beta: 41.0

MDA (DPM)
Alpha: 15.1
Beta: 14.5

Sample Count Time
1.0 Minutes

Sample ID	Alpha (dpm)	Beta (dpm)	Sample Manager Comments	Comments
20130129171108-A1	-0.6	2.5		1-6 LEAD SHIELDED CABLE
20130129171409-A2	3.2	2.5		
20130129171519-A3	-0.6	0.1		
20130129171629-A4	-0.6	2.5		
20130129171749-A5	-0.6	2.5		
20130129171859-A6	-0.6	-2.4		
20130129172009-A7	-0.6	5.0		BACK HOE #91190 BUCKET
20130129172119-A8	-0.6	2.5		SHOVEL

RADIOLOGICAL SURVEY FORM

Navarro-Intera

Project Name: Soils
Project Number: SL13-160

RSR #: 121204-SL-05
Page: 1 of 2

Survey Description: (purpose)
Frisk, direct, and swipe surveys for approximately 590 feet of lead lined cable recovered approximately 6 feet below ground surface. The averge direct reading is recorded on this form, see the Tennelec printout, page 2 of 2 for swipe results.

Drawing Attached ☐ YES ☑ NO

Survey Date: Tuesday, December 04, 2012
CAU Number: 104
CAS Number(s): N/A
RWP #: N/A
Location: Area 7
N/A

Print Name: Juvencio S. Castro
Signature: /s/: Juvencio S. Castro
Reviewed By: /s/: Jeff Tappen
Date: 12-7-12

Instrument (1)				
Instrument Model	Electra			
Inst. S/N	4676			
Probe S/N	2337			
Calibration Due	1/31/2013			
Efficiency	α	13.5%	β	25.8%
BKGD: (dpm/100cm²)	α	22.2	β	1923
MDC: (dpm/100cm²)	α	81.8	β	413

Instrument (2)				
Instrument Model	Tennelec			
Inst. S/N	84165			
Probe S/N	N/A			
Calibration Due	10/18/2013			
Efficiency	α	26.4%	β	41%
BKGD: (dpm/100cm²)	α	0	β	1.9
MDC: (dpm/100cm²)	α	10.2	β	13.8

Instrument (3) : Dose Rate **OR** Tennelec	
Instrument Model	
Instrument Number	
Calibration Due	N
BKGD	A ☐ µrem/h ☐ µR/h
MDC: (dpm/100cm²)	α ____ β ____

Survey Point	Fixed + Removable Contamination: Alpha dpm/100cm²	Fixed + Removable Contamination: Beta/Gamma dpm/100cm²	Removable Contamination: Alpha dpm/100cm²	Removable Contamination: Beta/Gamma dpm/100cm²	Dose-Rate Readings (gross) (OC / 30cm / 1m)	Instrument Used	Comments/Information
	Direct Instrument Scans: ☐ Gross Readings ☑ Net Readings		☐ Large Area Swipe (LAS) ☑ Swipe; ☐ Gross Readings ☑ Net Readings				
At 300 feet	59.3	519	See page 2 of 2	See page 2 of 2	N/A	1 & 2	**Approximately at mid point of this cable.**
Last item							

N/A

Navarro - Intera Swipes Report

Count Date: 12/4/12 16:27

Device: S5-XLB S/N: 84165 Cal. Due: 10/18/13
Batch ID: ROUTINE SWIPES - 201212041627 Batch Key: 2344

Survey # 121204-SL-05

Background (dpm)		Efficiency (%)		MDA (DPM)		Sample Count Time
Alpha Rate:	0.0	Alpha:	26.4	Alpha:	10.2	1.0 Minutes
Beta Rate:	1.9	Beta:	41.0	Beta:	13.8	

Sample ID	Alpha (dpm)	Beta (dpm)	Sample Manager Comments	Comments CAU 104
20121204162741-A1	0	3.0		Lead Lined Cable Approximately 590 FT.
20121204163042-A2	0	3.0		
20121204163152-A3	0	-1.9		
20121204163302-A4	0	5.4		
20121204163422-A5	0	3.0		
20121204163532-A6	0	3.0		
20121204163642-A7	0	0.5		
20121204163752-A8	3.8	0.5		
20121204163912-A9	0	-1.9		
20121204164022-A10	0	3.0		
20121204164132-A11	0	-1.9		
20121204164242-A12	0	10.3		
20121204164402-A13	0	-1.9		
20121204164512-A14	0	0.5		
20121204164622-A15	0	0.5		
20121204164732-A16	0	5.4		
20121204164842-A17	3.8	-1.9		

An Evaluation of Lead-Sheathed Cable at CAU104

M. Burmeister & H. Anagnostopoulos

1/25/2013

Description

Approximately 1.8 miles of lead-sheathed cable is present at Corrective Action Unit (CAU) 104, located in close proximity to Corrective Action Site (CAS) 07-23-16. The cable runs intermittently within berms, on the surface, and buried (2'-6' bgs) on both sides of the 7-01 Road, between Bunker 7-300 and the Mercury Highway (Figure 1). The ~2" diameter cable is composed of three ~ ½" diameter stranded copper cables, wrapped in a fibrous insulating material, all within an outer lead sheath (Figure 2). The lead-sheathed cable passes through one crater; U-31a.

Due to a concern for the lead sheath as a potential source of lead soil contamination, approximately 5,000 feet of buried intact cable has been excavated and removed. Lead-sheathed cable was not removed from the crater area because of industrial safety risks associated with entering the cratered area. The excavation and cable removal was terminated in the vicinity of Mercury Highway, as this was determined to be the extent of the CAS 07-23-16 boundary. Additional removal may be pursued by the U.S. DOE at a future date, under a separate removal action.

During excavation of the cable, it was noted that the cable was found at various depths below the ground surface. This seems unusual, since standard trenching techniques would result in a trench at a fixed depth. It seems that the cable was laid such that it formed a perfectly straight and flat line in space, regardless of topography. This might serve as a clue to its intended function. In addition, one section of cable was accompanied by a series of three-inch diameter galvanized pipes that were driven into the ground. The pipe interiors were empty, the pipe tops were capped, and the tops generally protruded a few inches above the ground surface. The pipes formed a picket that paralleled the cable. These might also serve as a clue to function.

The lead and copper components of the cable are valuable commodities that might be recycled. A small section of the cable, near bunker 7-300, ran along the surface of the soil and was found with significant damage. Because the cable integrity was compromised and the cable cannot be reasonably assessed for potential radioactive contamination, this section was segregated. The remaining intact, buried section of cable was excavated and is presently staged for recycling as non-radioactively contaminated metals.

The cable is estimated to weigh 6.2 lbs/ft; of which 3.5 lb/ft is lead and 2.7 lbs/ft is copper.

History

To date, the presence of the cable cannot be tied to a particular test or test-series. The purpose and function of the cable has not been established, but might be surmised.

The cable construction resembles that of a "hardened" direct-buried power distribution cable, however the source of power and intended load have not been established and is not clear. The use of a paper wrap as insulation, and the absence of a thick rubber or plastic outer sheath raises doubts about its use as an electrical power conductor.

The cable construction, orientation, presence of a picket of pipes (for mounting instrumentation at the ground surface?), and proximity to many near-surface tests suggest that the cable might have been used for monitoring of low-frequency electromagnetic pulses (EMP) that could be induced in buried power distribution cables.

The presence of an outer sheath of lead seemed unusual, but further investigation indicates that this is not at all unusual for "hardened" direct-buried cables, especially for the time period in question. Research has revealed that cables intended for underground use or direct burial in earth will have heavy plastic or metal, most often lead sheaths, or may require special direct-buried construction. Also, a conductive sheath / shield, typically of copper tape or sometimes lead alloy, is used as a shield to keep electromagnetic radiation in, and also provide a path for fault and leakage currents (sheaths are earthed at one cable end). Lead sheaths are heavier and potentially more difficult to terminate than copper tape, but generally provide better earth fault capacity.

Radiological Status and Contamination Potential

A radiological control technician (RCT) was assigned to monitor cable excavation and removal activities. Routine in-process radiological surveys were performed on the cable and the excavator to verify their radiological status. No indications of the presence of radioactive material or radioactive contamination have been observed. The cable is located within a Controlled Area, but outside of any Radiological Areas.

Based upon the cable's suggested function, location underground and outside of radiological areas, and the results of in-process radiological surveys, the contamination potential (both internal and external) is remote.

Release of Scrap Metal for Recycling

A suspension on the unrestricted release of metal for recycling was issued on July 13, 2000, by the U.S. DOE. A Fact Sheet, EH-412, "Frequently asked questions on the suspension on release for recycling of metal from radiation [sic] areas," was issued by the Office of Environmental Policy and Guidance: Air, Water and Radiation Division in the same month, regarding the suspension. The suspension covers all types of metal, and applies to those that, upon release, would be melted and used to make new products. Only metals from radiological areas are affected.

The Nevada National Security Site (NNSS) received a technical assistance visit from the Office of Nuclear Materials Integration on January 25-28, 2010. The results of the visit are documented in a letter to Steven A. Mellington, dated March 16, 2010. Recommendation #1 stated (in part):

> *"The current DOE policy with regard to scrap metal management requires that such materials be encumbered from unrestricted release only if the metal is determined to be scrap while managed in a radiological area after July 13, 2000. Metal released from radiological control consistent with the requirements of DOE Order 5400.5, Radiation Protection of the Public and Environment, prior to this date is not subject to the suspension. This material may be dispositioned consistent with the requirements of the Federal Management Regulations associated with personal property management in the best interest of the government.*

With regard to managing metal with the potential for radioactive contamination, for certain items, if the metal has not been managed or stored in a radiological area as defined by 10 CFR 835, the recycling of the metal is not automatically prohibited by the suspension"...

The lead-sheathed cable has not previously been managed as a scrap metal and was not located within any defined radiological area. The material is not encumbered and is not subject to the suspension.

Recommendations

Considering the history and radiological status of the area containing the cable, the remote contamination potential of the cable, and following site inspection and consultation with the RCT, it is feasible and reasonable to consider releasing the previously buried portions of the cable from the Controlled Area, based upon process knowledge. In-process radiological surveys have also been conducted during cable removal operations, as a best management practice, and confirm the radiological classification of the cable as "clean" (e.g., not radiologically contaminated).

The lead-sheathed cable may be sent for recycling as "clean" material. This satisfies the U.S. DOE suspension on scrap metal recycling and is consistent with the guidance that was provided by the U.S. DOE Office of Nuclear Materials Integration for the NNSS.

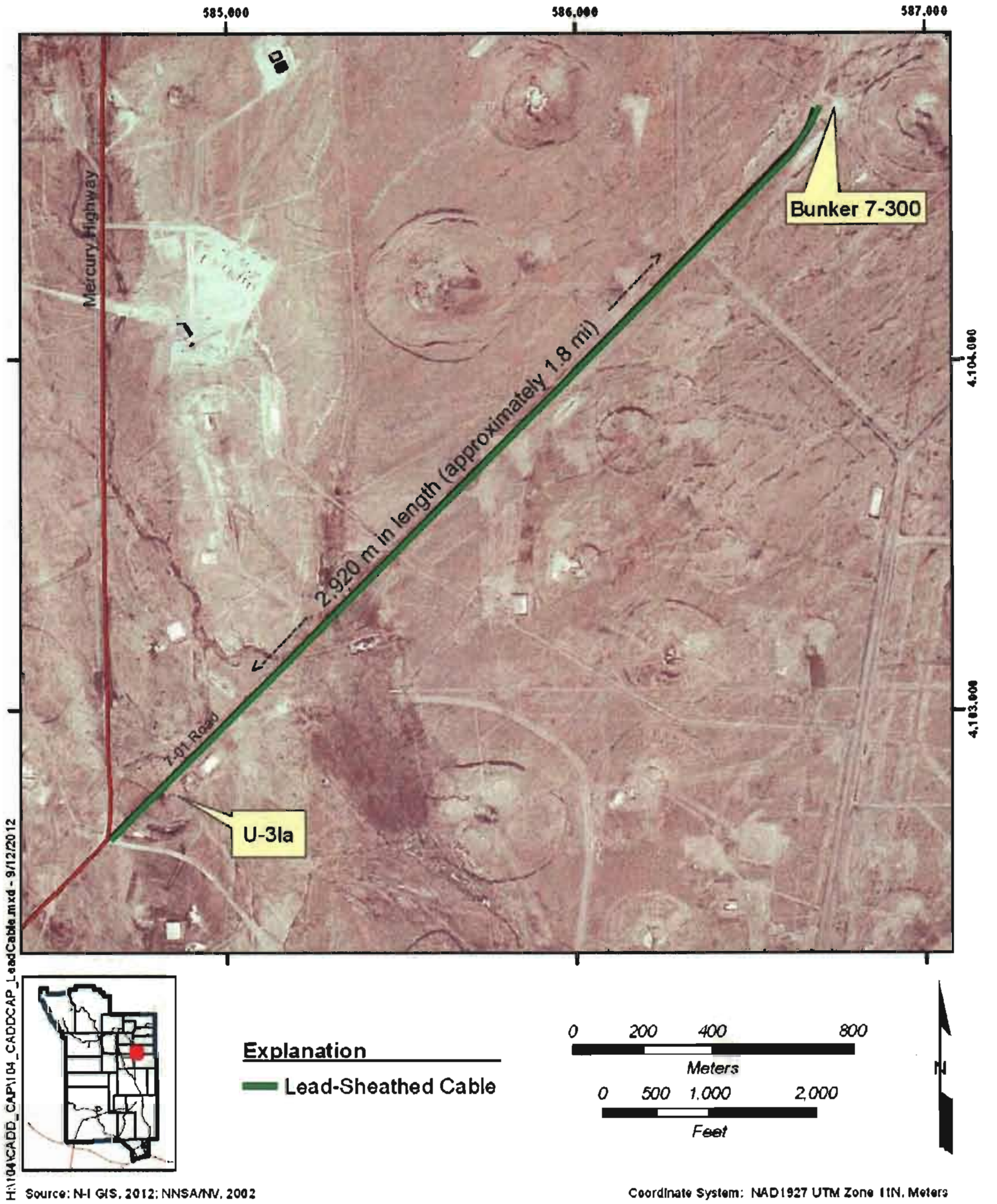

Figure 1 – Location of Lead-Sheathed Cable Removal

Figure 2 – Overview of Cable Construction

APPENDIX F

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION COMMENT RESPONSE FORM

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Document Title: CLOSURE REPORT FOR CORRECTIVE ACTION UNIT 104: AREA 7 YUCCA FLAT ATMOSPHERIC TEST SITES, NEVADA NATIONAL SECURITY SITE, NEVADA

Revision Number: 0

Responsible NNSA/NFO Activity Lead: Tiffany Lantow

Document Date: May 2013

Author: NSTec

Reviewer: Jeff MacDougall/NDEP/486-2850 ext 233

Review Criteria: Full

Comment No. / Location	Comment	Comment Response
1.	Appendix E, White Paper, Evaluation of Lead-Sheathed Cable at CAU 104, page 2, Radiological Status and Contamination Potential: In this section, it is stated that "in-process radiological surveys were performed" – provide details as to the results of these surveys (i.e., quantify, numeric) with regards to radiological background levels. Perhaps the results of the surveys performed on the cable and excavator can be quantified in relative terms with respect to background concentrations for the area. In addition, if the potential for internal and external contamination is "remote," support (quantify) this assertion using (or summarizing) survey results, as is suggested.	Background radiation levels are not regulated under 10 CFR 835. Therefore, the measured background levels are not considered in the assessment of the potential for release of materials. The likelihood that the lead-sheathed cable has levels of radioactivity in excess of NNSS Radiological Control Manual Table 4-2 levels is remote based on the results of radiological survey RSR 121204-SL-05 (NI-064, December 4, 2012) that showed removable and total levels well below Table 4-2 levels. This radiological survey form has been added to Appendix E. In addition, the following language has been included in Section 2.1.2., in the second paragraph on page 12: An evaluation of the long sections of lead-sheathed cable that were buried was performed to determine a radiological release recommendation for recycling. This evaluation is found in Appendix E of this report and includes radiological swipe and survey data for the lead-sheathed cable. The results of the surveys indicate that the lead-sheathed cables are below the NNSS allowable total residual surface contamination criteria for release of property to uncontrolled areas, as defined in Table 4-2 of the Nevada National Security Site Radiological Control Manual (Radiological Control Managers' Council, 2012). These criteria (Table 1) are consistent with the guidelines for the uncontrolled release of property under DOE Order 458.1, Change 2, "Radiation Protection of the Public and the Environment" (DOE, 2011). The highest survey results obtained from the lead-sheathed cable are recorded in Table 2. Based on both historical knowledge and survey data, as demonstrated in the evaluation in Appendix E, the lead-sheathed cable can be unconditionally released.

Table 1. Allowable Total Residual Surface Contamination Values in dpm/100 cm^2

Radionuclide	Removable	Fixed and Removable
Alpha-Emitters	20	100
Beta/Gamma-Emitters	1,000	5,000

dpm/100 cm^2: disintegration(s) per minute per 100 square centimeters

Table 2. Highest Total Residual Surface Contamination Values Obtained from the Lead-Sheathed Cable (in dpm/100 cm^2)

Radionuclide	Removable	Fixed and Removable
Alpha-Emitters	3.8	26.3
Beta/Gamma-Emitters	10.3	181

dpm/100 cm^2: disintegration(s) per minute per 100 square centimeters

Comment No. / Location	Comment	Comment Response
2.	Section 3.3.2, page 15: It is stated that 18 cubic yards of mixed waste were generated – other than lead-sheathed cable debris packaged in the three macroencapsulation boxes, was there other waste generated and packaged separately? If so specify the nature and total volume of this waste. if the total volume of mixed waste was the lead-sheathed cable debris packaged in the three macroencapsulation boxes, confirm the volume/quantities for accuracy and report the volume consistently throughout the document (in Section 2.1.2, Section 3.3.1, Section 3.3.2, Appendix C).	The total volume of the mixed waste was 15 cubic yards and only included the lead-sheathed cable debris packaged in the macroencapsulation boxes. No other mixed waste was generated during closure activities at CAU 104. The volume was corrected in the text. In addition, a portion of the second paragraph of Section 2.1.2 was re-written as follows: The lead pieces were staged on plastic before being packaged into three macroencapsulation boxes. The external volume of each macroencapsulation box was approximately 5 cubic yards (yd^3). The waste was treated and disposed as mixed waste (MW). Southwest of the location where the berms ended, four additional investigative trenches were dug, and no remaining small pieces of lead-sheathed cable were found. The total weight of the lead pieces that were disposed as MW is approximately 12,800 pounds. Section 3.3.2 was re-written as follows: MW generated during closure activities consisted of approximately 12,800 pounds of lead-sheathed cable debris packaged in three macroencapsulation boxes. The external volume of each macroencapsulation box was approximately 5 yd^3. Therefore, the total volume of MW disposed was approximately 15 yd^3. MW was transported to the Area 5 Radioactive Waste Management Site for treatment and disposal.
3.	EXECUTIVE SUMMARY, first paragraph: revise the text "…15 Corrective Action Sites located in Areas 2, 23, and 25…" to appropriately reflect Area 7 as the location of the sites.	Text revised as suggested.

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