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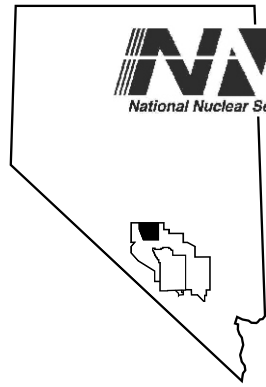

Streamlined Approach for Environmental Restoration Plan For Corrective Action Unit 489: WWII UXO Sites (TTR), Tonopah Test Range, Nevada

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STREAMLINED APPROACH FOR ENVIRONMENTAL RESTORATION PLAN FOR CORRECTIVE ACTION UNIT 489: WWII UXO SITES (TTR), TONOPAH TEST RANGE, NEVADA

U.S. Department of Energy

National Nuclear Security Administration

Nevada Site Office

Under Contract No. DE-AC08-96NV11718

Controlled Copy No.____

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STREAMLINED APPROACH FOR ENVIRONMENTAL RESTORATION PLAN FOR CORRECTIVE ACTION UNIT 489: WWII UXO SITES (TTR), TONOPAH TEST RANGE, NEVADA

Approved By: ___SIGNATURE APPROVED___________ Date: ___5/23/2005__
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TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS vii
EXECUTIVE SUMMARY ix
1.0 INTRODUCTION 1
1.1 SAFER PROCESS 1
1.2 SUMMARY OF PROPOSED CORRECTIVE ACTIONS 1
1.3 HOLD / DECISION POINTS 3
1.4 SAFER WORK PLAN CONTENTS 3
2.0 UNIT DESCRIPTION 5
2.1 SITE LOCATIONS AND DESCRIPTIONS 5
2.1.1 CAS RG-55-001-RGMN, WWII Ordnance Site 5
2.1.2 CAS RG-55-002-RGHS, WWII Ordnance Site 5
2.1.3 CAS RG-55-002-RG36, WWII Ordnance Site 5
2.2 HISTORY AND PROCESS KNOWLEDGE 6
2.3 CHARACTERIZATION DATA 6
3.0 DATA QUALITY OBJECTIVES 7
3.1 SUMMARY OF DQO ANALYSIS 7
3.1.1 State the Problem (Step 1) 7
3.1.2 Identify the Decision (Step 2) 12
3.1.3 Identify the Inputs to the Decision (Step 3) 13
3.1.4 Define the Study Boundaries (Step 4) 17
3.1.5 Develop a Decision Rule (Step 5) 18
3.1.6 Specify Tolerable Limits on Decision Errors (Step 6) 18
3.1.7 Optimize the Design (Step 7) 20
3.2 RESULTS OF THE DQO ANALYSIS 21
3.2.1 Action Level Determination and Basis 21
3.2.2 Hypothesis Test 21
3.2.3 Statistical Model 21
3.2.4 Design Description/Option 21
3.2.5 Conceptual Site Model 21
4.0 FIELD ACTIVITIES AND CLOSURE OBJECTIVES 23
4.1 CONTAMINANTS OF POTENTIAL CONCERN 23
4.2 REMEDIATION 23
4.3 VERIFICATION 24
4.4 CLOSURE 24
4.5 DURATION 25
5.0 REPORTS AND RECORDS AVAILABILITY 27
6.0 INVESTIGATION/REMEDIATION WASTE MANAGEMENT 29
6.1 WASTE MINIMIZATION 29
6.2 POTENTIAL WASTE STREAMS 29

TABLE OF CONTENTS (continued)

6.2.1 Non-Hazardous Waste 29
6.2.2 Low-Level Radioactive Waste 30
6.2.3 Hazardous Waste 30
6.2.4 Hydrocarbon Waste 30
7.0 QUALITY ASSURANCE/QUALITY CONTROL 31
7.1 SAMPLE COLLECTION ACTIVITIES 31
7.2 APPLICABLE LABORATORY/ANALYTICAL DATA QUALITY INDICATORS 31
8.0 REFERENCES 33

FIGURES

FIGURE 1. CAU 489, WWII UXO SITES (TTR), SITE LOCATION MAP 2
FIGURE 2. CAU 489 PRIMARY CONCEPTUAL SITE MODEL 10
FIGURE 3. CAU 489 ALTERNATE CONCEPTUAL SITE MODEL 11
FIGURE 4. CAU 489 CLOSURE DECISION PROCESS 14

TABLES

TABLE 1. CAU 489 COORDINATE LOCATIONS 5
TABLE 2. CAU 489 CONTAMINANTS OF POTENTIAL CONCERN 16
TABLE 3. SAMPLE ANALYSIS REQUIREMENTS 20
TABLE 4. LABORATORY/ANALYTICAL DATA QUALITY INDICATORS 32

APPENDICES

APPENDIX A.1 - PROJECT ORGANIZATION
LIBRARY DISTRIBUTION LIST

ACRONYMS AND ABBREVIATIONS

BN	Bechtel Nevada
CAS	Corrective Action Site
CAU	Corrective Action Unit
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CR	Closure Report
Cs-137	Cesium-137
CSM	Conceptual Site Model
DOE	U.S. Department of Energy
DOE/NV	U.S. Department of Energy, Nevada Operations Office
DQI	Data Quality Indicator
DQO	Data Quality Objective
EPA	U.S. Environmental Protection Agency
FFACO	Federal Facility Agreement and Consent Order
ft	foot (feet)
IT	International Technology Corporation
lb	pound(s)
m	meter(s)
mg/kg	milligram(s) per kilogram
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NTS	Nevada Test Site
NV/YMP	Nevada Yucca Mountain Project
OI	Organization Instruction
PPE	Personal Protective Equipment
PRG	Preliminary Remediation Goal
Pu-239/240	Plutonium 239/240
QA	Quality Assurance
QC	Quality Control

ACRONYMS AND ABBREVIATIONS (continued)

RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
ROTC	Record of Technical Change
RPD	Relative Percent Difference
SAFER	Streamlined Approach for Environmental Restoration
SSHASP	Site Specific Health and Safety Plan
TPH	Total Petroleum Hydrocarbons
TTR	Tonopah Test Range
UXO	Unexploded Ordnance
WWII	World War II

EXECUTIVE SUMMARY

This Streamlined Approach for Environmental Restoration Plan provides the details for the closure of Corrective Action Unit (CAU) 489: WWII UXO Sites (TTR). CAU 489 is located at the Tonopah Test Range (TTR) and is currently listed in Appendix III of the Federal Facility Agreement and Consent Order of 1996.

The area currently designated as TTR was used for practice target bombing during the 1940s by the U.S. Army Air Corps. Practice bombs consisted of sand-filled casings and spotting charges. There are approximately 20 World War II (WWII) practice targets located within the present boundaries of TTR. At some unknown time (1950s to early 1970s) an effort was made to collect the used practice bombs and stage the debris at three locations. These three locations constitute the three Corrective Action Sites (CASs) included in CAU 489:

- CAS RG-55-001-RGMN, WWII Ordnance Site (located near Mellan)
- CAS RG-55-002-RGHS, WWII Ordnance Site (located near H-Site Road)
- CAS RG-55-003-RG36, WWII Ordnance Site (located near Gate 36-E)

Based on process knowledge, historical data, aerial photography, personnel interviews, site visits, and the results of data quality objectives (Section 3.0), clean closure will be implemented at the three CASs in CAU 489. Field activities are planned to confirm the existing site information and assess the previously completed cleanup activities at the 20 WWII practice targets.

CAU 489 closure activities will consist of removal of the practice ordnance debris piles at the three CASs and collection of verification samples from the underlying soil. Any soil containing contaminants at concentrations above the action levels will be excavated and shipped to an appropriate disposal facility. In addition, the 20 previous WWII practice targets will be inspected to confirm the removal of practice ordnance debris.

Based on existing information and process knowledge, contaminants of potential concern at CAU 489 include phosphorus contained in the spotting charges, trace metals (e.g., lead, chromium) from the paint on the practice bombs, and residual explosive material that may have been released from spotting charges that may not have functioned during testing. In addition, at CAS RG-55-001-RGMN, there is evidence of a possible recent diesel fuel release from a military vehicle that was staged onsite. None of these contaminants are expected to present at concentrations above the action levels; however, this will be determined by verification sample results.

The corrective action investigation and closure activities have been planned to include data collection and hold points throughout the process. Hold points are designed to allow decision makers to review the existing data and decide which of the available options are most suitable. Hold points include the review of radiological and analytical data and field observations.

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1.0 INTRODUCTION

This Streamlined Approach for Environmental Restoration (SAFER) Plan details the activities planned for the closure of Corrective Action Unit (CAU) 489: WWII UXO Sites (TTR). CAU 489 is located at the Tonopah Test Range (TTR) and is currently listed in Appendix III of the Federal Facility Agreement and Consent Order (FFACO, 1996).

The area currently designated as TTR was used for practice target bombing during the 1940s by the U.S. Army Air Corps. Practice bombs consisted of sand-filled casings and spotting charges. There are approximately 20 World War II (WWII) practice targets located at TTR. At some unknown time (1950s to early 1970s) an effort was made to collect the used practice bombs and stage the debris at three locations. These three locations (Figure 1) constitute the three Corrective Action Sites (CASs) included in CAU 489:

- CAS RG-55-001-RGMN, WWII Ordnance Site (located near Mellan)
- CAS RG-55-002-RGHS, WWII Ordnance Site (located near H-Site Road)
- CAS RG-55-003-RG36, WWII Ordnance Site (located near Gate 36-E)

1.1 SAFER PROCESS

CAUs that may be closed using the SAFER process have conceptual corrective actions that are clearly identified. Consequently, corrective action alternatives can be chosen prior to the completion of a corrective action investigation, given anticipated investigation results.

The SAFER process combines elements of the data quality objectives (DQOs) process and the observational approach to help plan and conduct corrective actions. DQOs are used to identify a problem and define the type and quality of data needed to complete the investigation phase of the process. The purpose of the investigation phase in the SAFER process is to verify the adequacy of existing information to implement the corrective action. The observational approach provides a framework for managing uncertainty and planning decision-making.

1.2 SUMMARY OF PROPOSED CORRECTIVE ACTIONS

Based on the results of the preliminary assessment completed by International Technology Corporation (IT), process knowledge, and the DQOs (Section 3.0), closure of CAU 489 will be accomplished by clean closure of the three CASs. CAU 489 closure activities will consist of removal of the practice ordnance debris piles at the three CASs. No contaminants of concern (COCs) are expected to be present at concentrations above the action levels; however, several contaminants of potential concern (COPCs) have been identified (Section 3.1.3.2), and verification soil samples will be collected from the soil beneath the debris piles to verify whether these potential contaminants are above the action levels. If COCs are present, all soil containing COCs above action levels will be excavated and disposed at an appropriate disposal facility. The 20 previous WWII practice targets will be inspected to confirm the removal of practice ordnance debris.

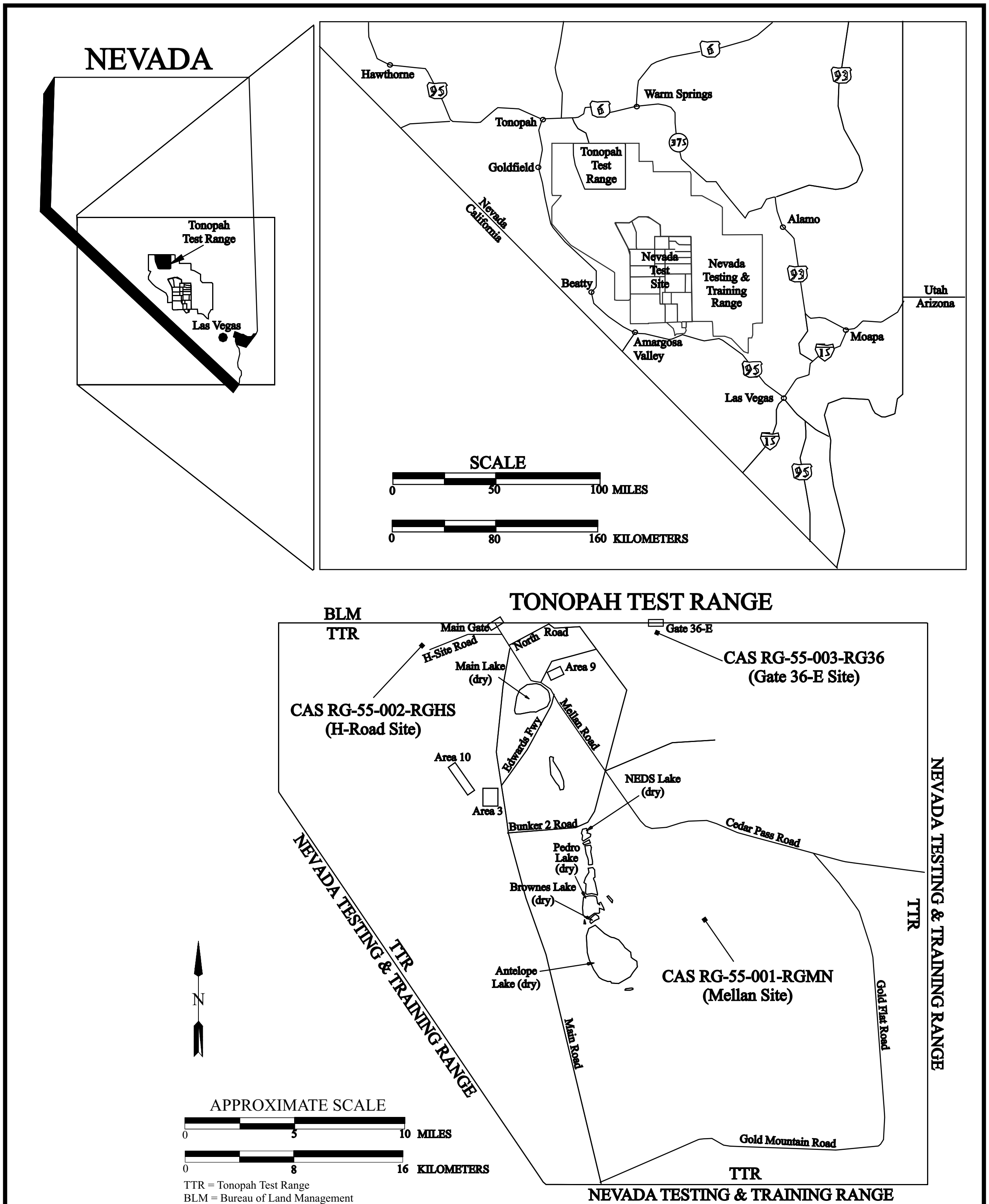

FIGURE 1
CAU 489, WWII UXO SITES (TTR), SITE LOCATION MAP

1.3 HOLD / DECISION POINTS

During closure activities, certain conditions affecting the project schedule and budget may require decisions prior to continuing work. The primary hold/decision point during the CAU 489 SAFER process will occur when the results of soil sampling and laboratory analysis are reviewed with the U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office (NNSA/NSO) and/or the Nevada Division of Environmental Protection (NDEP) to confirm the closure approach. Debris will be checked for explosive hazards by properly trained ordnance disposal specialists. If practice ordnance debris is found at the previous target locations, it will be reported to the NNSA/NSO and/or the NDEP, and a path forward will be discussed. Throughout the investigation/closure process, radiological field screening data will be collected, evaluated, and presented to the NNSA/NSO and/or the NDEP for review and input.

In addition to the previously discussed hold/decision points, work may be temporarily suspended until the issue can be satisfactorily resolved if any of the following unexpected conditions occur:

- Conditions outside the scope of work are encountered, including unexploded ordnance.
- Radiological screening yields results which require an upgrade in procedures.
- Elevated levels of COCs are found that were not originally identified as being present.
- Unsafe conditions or work practices not originally documented in the Site Specific Health and Safety Plan (SSHASP) and posing a threat to personnel, equipment, or the environment are encountered.
- Other technical factors are encountered that require the preparation of a Record of Technical Change (ROTC) to the approved SAFER Plan.

If any of these conditions occur, work will stop and the NNSA/NSO and/or the NDEP will be notified. Work will continue when a resolution has been agreed upon and a ROTC form, if required, has been approved by the NNSA/NSO and the NDEP.

1.4 SAFER WORK PLAN CONTENTS

This SAFER Work Plan has been developed to support the closure of CAU 489 according to the required FFACO format, and includes the following:

- Section 1.0: Introduction
- Section 2.0: Unit Description
- Section 3.0: Data Quality Objectives
- Section 4.0: Field Activities and Closure Objectives
- Section 5.0: Reports and Records Availability
- Section 6.0: Investigation/Remediation Waste Management
- Section 7.0: Quality Assurance / Quality Control
- Section 8.0: References
- Appendix A.1: Project Organization

This SAFER Plan was developed using guidance provided by the following documents:

- FFACO (FFACO, 1996)
- Section 445A.2272 of Nevada Administrative Code (NAC) (NAC, 2002)

- Industrial Sites Quality Assurance Project Plan (NNSA/NV, 2002)
- U.S. Environmental Protection Agency (EPA), Region IX Preliminary Remediation Goals (PRGs) (EPA, 2002)
- Nevada Yucca Mountain Project (NV/YMP) Radiological Control Manual (U.S. Department of Energy, Nevada Operations Office [DOE/NV], 2000)

2.0 UNIT DESCRIPTION

CAU 489, WWII UXO Sites (TTR), is located on the TTR. The area currently designated as TTR was used for practice target bombing during the 1940s. Practice ordnance consisted of sand-filled casings and spotting charges. There are approximately 20 WWII practice targets distributed throughout the current boundary of TTR. These practice targets are circular grids several hundred yards in diameter that have been physically cut into the ground surface for practice bomb drops. At some unknown time (1950s to early 1970s) an effort was made to collect the used practice bomb debris and stage it at three locations. These three locations constitute the three CASs included in CAU 489 (Figure 1).

The CASs in CAU 489 have the following coordinate locations:

TABLE 1. CAU 489 CAS COORDINATE LOCATIONS

CAS	EASTING (m)	NORTHING (m)
RG-55-001-RGMN	535,853	4,173,780
RG-55-002-RGHS	516,468	4,190,389
RG-55-003-RG36	532,761	4,191,492

Datum based on the North American Datum of 1927, Universal Transverse Mercator, Zone 11

2.1 SITE LOCATIONS AND DESCRIPTIONS

2.1.1 CAS RG-55-001-RGMN, WWII Ordnance Site

CAS RG-55-001-RGMN, WWII Ordnance Site, is located at TTR in the Cactus Flat area between the Mellan Airstrip and the historic town of Mellan. The Cactus Flat is an alluvial-filled basin bordered by two mountain ranges: the Cactus Range to the west, and the Kawich Range to the east. Low hills are located to the south. Based on field records, the site consists of an aboveground pile of debris and spent spotting charges from the remains of 100-pound (lb) sand-filled, used practice ordnance. Other debris includes rocket motors and venturi, aluminum parts, and rusty empty gas cans. The approximate size of the Mellan Site debris pile is 23 to 30 meters (m) (75 to 100 feet [ft]) in diameter and 0.9 to 2 m (3 to 6 ft) in height (IT, 1998).

2.1.2 CAS RG-55-002-RGHS, WWII Ordnance Site

CAS RG-55-002-RGHS, WWII Ordnance Site, is located at H-Site Road, northwest of the Main Gate of TTR. Based on field records, the pile consists almost entirely of debris and spent spotting charges from the remains of 100-lb sand-filled, used practice ordnance. A minor amount of non-hazardous construction debris is also present. The approximate size of the H-Site debris pile is 6 to 16 m (20 to 52 ft) in diameter and 1.5 m to 2.5 m (5 to 8 ft) in height (IT, 1998).

2.1.3 CAS RG-55-002-RG36, WWII Ordnance Site

CAS RG-55-003-RG36, WWII Ordnance Site, is located at Gate 36-E, northeast of the Main Gate of TTR. Based on field records, there are two similar debris piles at this CAS which consist almost entirely of debris and spent spotting charges from the remains of 100-lb sand-filled, used practice ordnance. The approximate size of the Gate 36-E Site debris piles is 9 to 12 m (30 to 40 ft) in diameter and 2 to 3 m (6 to 10 ft) in height (IT, 1998).

2.2 HISTORY AND PROCESS KNOWLEDGE

The IT Preliminary Assessment Team compiled information about CAU 489 from interviews of personnel, review of historical records, and logs of field activities. Historical information about the sites is limited. The debris at all three CASs is from used practice ordnance that was used during the 1940s. The main body of each practice bomb was originally approximately 260 centimeters (40 inches) long and made of thin sheet metal with a box-fin fitted to the tail assembly. They were filled with sand and had a spotting charge in the tail that was designed to ignite on impact to emit a smoke cloud. This cloud was used to score the accuracy of the bomb drop (IT, 1998).

2.3 CHARACTERIZATION DATA

The debris at all three CASs is from the remains of used practice ordnance that originally had a spotting charge in the tail with a type of explosive similar to gun powder that ignited phosphorus to emit a smoke cloud. During a preliminary assessment site visit, an ordnance expert speculated that some of the spotting charges might not have functioned during testing, and those that remain intact could present an explosive hazard if they are mishandled (IT, 1998). Therefore, qualified ordnance disposal personnel will be involved with the corrective action taken at the sites to evaluate the debris for explosive hazards.

Soil samples have been collected from various locations at TTR and analyzed for radiological and non-radiological parameters. No soil samples have been collected from under the debris piles in CAU 489; however, two samples were collected near CAS RG-55-001-RGMN in 1994 and 1996. The samples indicated that all constituents were well below action levels, and no COPCs were identified based on these sample results. No previous sampling has been done at or near CAS RG-55-002-RGHS or CAS RG-55-002-RG36 (IT, 1998).

Recent photographs showing military vehicles parked on top of the debris pile at CAS RG-55-001-RGMN indicate a possible diesel fuel release. There is no analytical data to support this; however, total petroleum hydrocarbons (TPH) will be considered a COPC for this CAS only.

The clean-closure standards for the purposes of closure verification for this SAFER Plan are:

- EPA Region IX risk-based PRGs for industrial soils (EPA, 2002)
- Nevada state action level for TPH in soil (100 milligrams per kilogram [mg/kg]) as stated in the NAC Section 445A.2272 (NAC, 2002)
- Table 4-2 of the NV/YMP Radiological Control Manual for free-release criteria of radiological contamination (DOE/NV, 2000)

3.0 DATA QUALITY OBJECTIVES

DQOs are qualitative and quantitative statements that specify the quality of the data required to support potential closure alternatives for CAU 489. The DQOs were developed to clearly define the purposes for which environmental data will be used and to design a data collection program that will satisfy these purposes. The formulation of a conceptual site model (CSM) is an aid to the development of DQOs for this site.

During DQO discussions for CAU 489, data needed to resolve problem statements and decision statements were identified. Criteria for data collection and analysis were defined and agreed upon, and the appropriate quality assurance (QA) / quality control (QC) required for particular data collection activities were assigned. The analytical methods and reporting limits prescribed through the DQO process, and the data quality indicators (DQIs) for laboratory analysis, are provided in more detail in Section 7.0 of this SAFER plan.

The information presented in this worksheet is based on historical data generated from preliminary assessment activities for CAU 489 at TTR. DQO worksheets follow the EPA DQO guidance outline (EPA, 2000). The steps systematically build on the data acquired during preliminary assessment work and background research. Copies of the preliminary assessment work are retained in the project files.

3.1 SUMMARY OF DQO ANALYSIS

3.1.1 State the Problem (Step 1)

Concisely describe the problem to be studied. Review prior studies and existing information to gain a sufficient understanding to define the problem.

The general location, nature, and extent of the CAU 489 CASs is understood; however, additional information is needed to verify that the existing information is adequate, confirm the existence of contamination and/or waste, and/or verify previously completed cleanup activities. In order to properly close these sites, it must be determined if there is sufficient information to close this site under the SAFER process.

3.1.1.1 CAS-Specific Information

CAU 489, WWII UXO Sites (TTR), is located at TTR. The area currently designated as TTR was used for practice target bombing during the 1940s by the U.S. Army Air Corps. Practice ordnance consisted of sand-filled casings and spotting charges. There are approximately 20 WWII practice targets located at TTR. At some unknown time (1950s to early 1970s) an effort was made to collect the used practice ordnance debris and stage it at three locations. These three locations constitute the three CASs included in CAU 489:

- CAS RG-55-001-RGMN, WWII Ordnance Site (located near Mellan)
- CAS RG-55-002-RGHS, WWII Ordnance Site (located near H-Site Road)
- CAS RG-55-003-RG36, WWII Ordnance Site (located near Gate 36-E)

The following sections describe the three CASs included in CAU 489 and the information used to derive the CSMs.

CAS RG-55-001-RGMN, WWII Ordnance Site

CAS RG-55-001-RGMN, WWII Ordnance Site, is located in the Cactus Flat area between the Mellan Airstrip and the historic town of Mellan, at TTR. Based on field records, the site consists of an aboveground pile of debris and spent spotting charges from the remains of 100-lb sand-filled, used practice ordnance. Other debris includes rocket motors and venturi, aluminum parts, and rusty and empty gas cans. The approximate size of the Mellan Site debris pile is 23 to 30 m (75 to 100 ft) in diameter and 0.9 to 2 m (3 to 6 ft) in height (IT, 1998).

Soil samples obtained in 1994 and 1996 near the ordnance pile indicated that all constituents were well below action levels, and no COPCs were identified based on these sample results. The debris is from the remains of used practice bombs that were originally filled with sand and had a spotting charge in the tail that had a type of explosive similar to gun powder that ignited phosphorus to emit a smoke cloud. During a preliminary assessment site visit, an ordnance expert speculated that some of the spotting charges might not have functioned during testing, and those that remain intact could present an explosive hazard if they are mishandled (IT, 1998). Therefore, qualified ordnance disposal personnel will be involved with the corrective action taken at this site to evaluate the debris for explosive hazards.

CAS RG-55-002-RGHS, WWII Ordnance Site

CAS RG-55-002-RGHS, WWII Ordnance Site, is located at H-Site Road, west of the Main Gate of TTR. Based on field records of its external appearance, the pile consists almost entirely of debris and spent spotting charges from the remains of 100-lb sand-filled, used practice ordnance. A minor amount of non-hazardous construction debris is also present. The approximate size of the H-Site debris pile is 6 to 16 m (20 to 52 ft) in diameter and 1.5 m to 2.5 m (5 to 8 ft) in height (IT, 1998).

No previous sampling has been done at this site. The debris is from the remains of used practice bombs that were originally filled with sand and had a spotting charge in the tail that had a type of explosive similar to gun powder that ignited phosphorus to emit a smoke cloud. During a preliminary assessment site visit, an ordnance expert speculated that some of the spotting charges might not have functioned during testing, and those that remain intact could present an explosive hazard if they are mishandled (IT, 1998). Therefore, qualified ordnance disposal personnel will be involved with the corrective action taken at this site to evaluate the debris for explosive hazards.

CAS RG-55-003-RG36, WWII Ordnance Site

CAS RG-55-003-RG36, WWII Ordnance Site, is located at Gate 36-E, east of the Main Gate, in the upper northeastern portion of TTR, Nevada. Based on field records, the CAS consists of two similar debris piles consisting almost entirely of debris and spent spotting charges from the remains of 100-lb sand-filled, used practice ordnance. The approximate size of the site is 9 to 12 m (30 to 40 ft) in diameter and 2 to 3 m (6 to 10 ft) in height (IT, 1998).

No previous sampling has been done at this site. The debris is from the remains of used practice bombs that were originally filled with sand and had a spotting charge in the tail that had a type of explosive similar to gun powder that ignited phosphorus to emit a smoke cloud. During a preliminary assessment site visit, an ordnance expert speculated that some of the spotting charges might not have functioned during testing, and those that remain intact could present an explosive hazard if they are mishandled (IT, 1998). Therefore, qualified ordnance disposal personnel will be involved with the corrective action taken at this site to evaluate the debris for explosive hazards.

3.1.1.2 Develop/Refine the Conceptual Site Model

The primary and alternate CSMs are based on information derived from site process knowledge, historical background information, site analysis, and personnel interviews associated with the debris sites. The primary CSM is presented in Figure 2, and the alternate CSM is presented in Figure 3.

Primary Conceptual Site Model for CAU 489, WWII UXO Sites (TTR)

The primary CSM (Figure 2) is considered the most probable scenario for current conditions at the three CASs that comprise CAU 489. The proposed activities are based on the assumption that there are no COCs above the action levels and no elevated levels of radiation present within the debris piles or in the underlying soil above free-release criteria, as specified in Table 4-2 of the NV/YMP Radiological Control Manual.

Soil samples near CAS RG-55-001-RGMN (Mellan Site) were analyzed in 1994 and 1996 and indicated concentrations of total uranium, Cs-137, chromium, and Pu-239/240 above background levels. The concentrations of these constituents were well below action levels, however, and they will not be considered COPCs for this site. No previous sampling information is available for the debris piles at Gate 36-E or H-Site Road. At CAS RG-55-001-RGMN (Mellan Site), process knowledge and photographs indicate recent diesel fuel releases from military activities. There is no analytical data to support this.

The used practice bombs, which were originally filled with sand, had a spotting charge in the tail with a type of explosive similar to gun powder that ignited phosphorus, which was designed to ignite on impact and emit a smoke cloud to score the accuracy of the bomb drop. Some of the spotting charges may not have functioned, and could present an explosive hazard if mishandled. The primary CSM assumes that some of the spotting charges did not function, and qualified ordnance disposal personnel will be onsite during debris removal to evaluate potential explosive hazards.

The primary CSM also assumes that the debris has been completely removed from the 20 WWII practice target locations. The aerial bombing targets have been identified through a review of aerial photography and topographic maps.

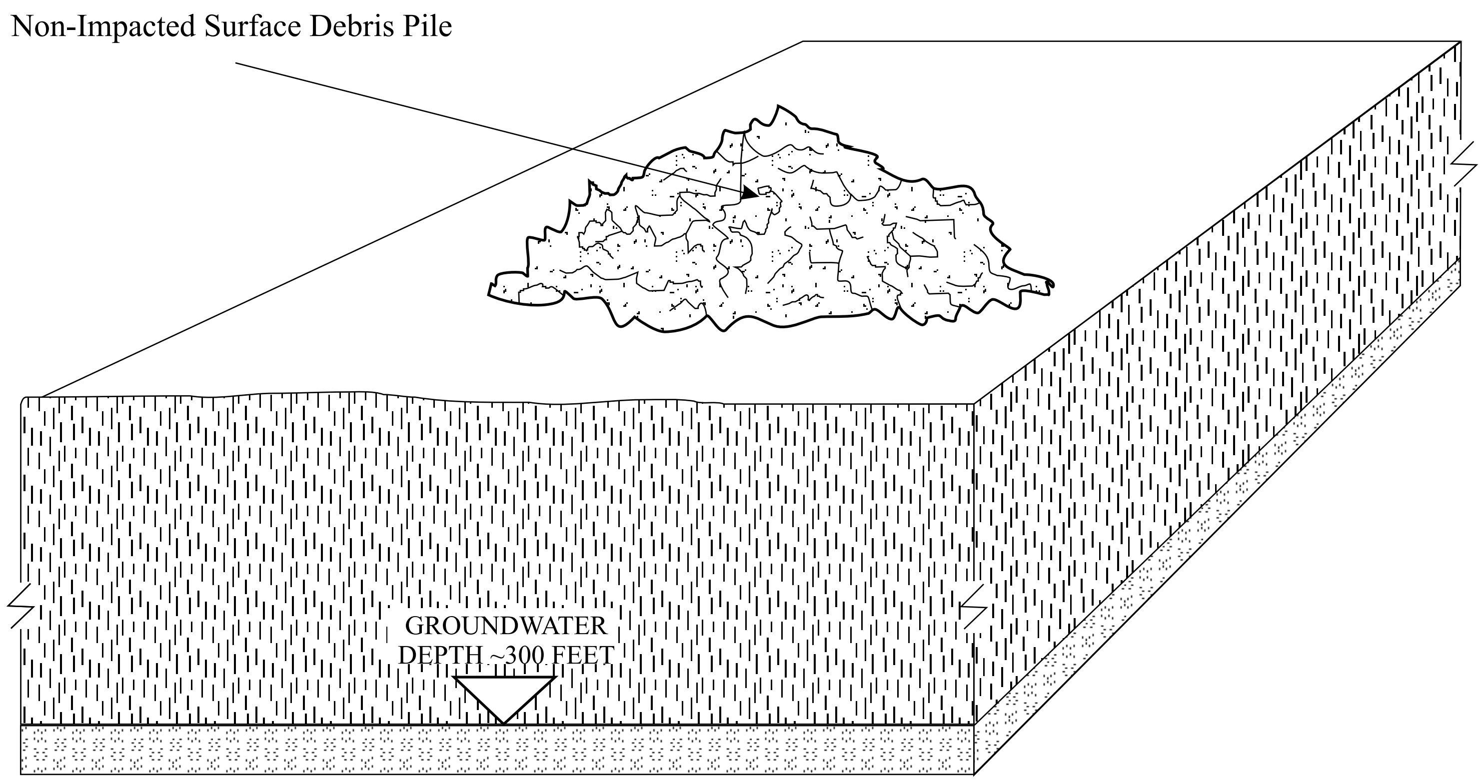

FIGURE 2
CAU 489 PRIMARY CONCEPTUAL SITE MODEL

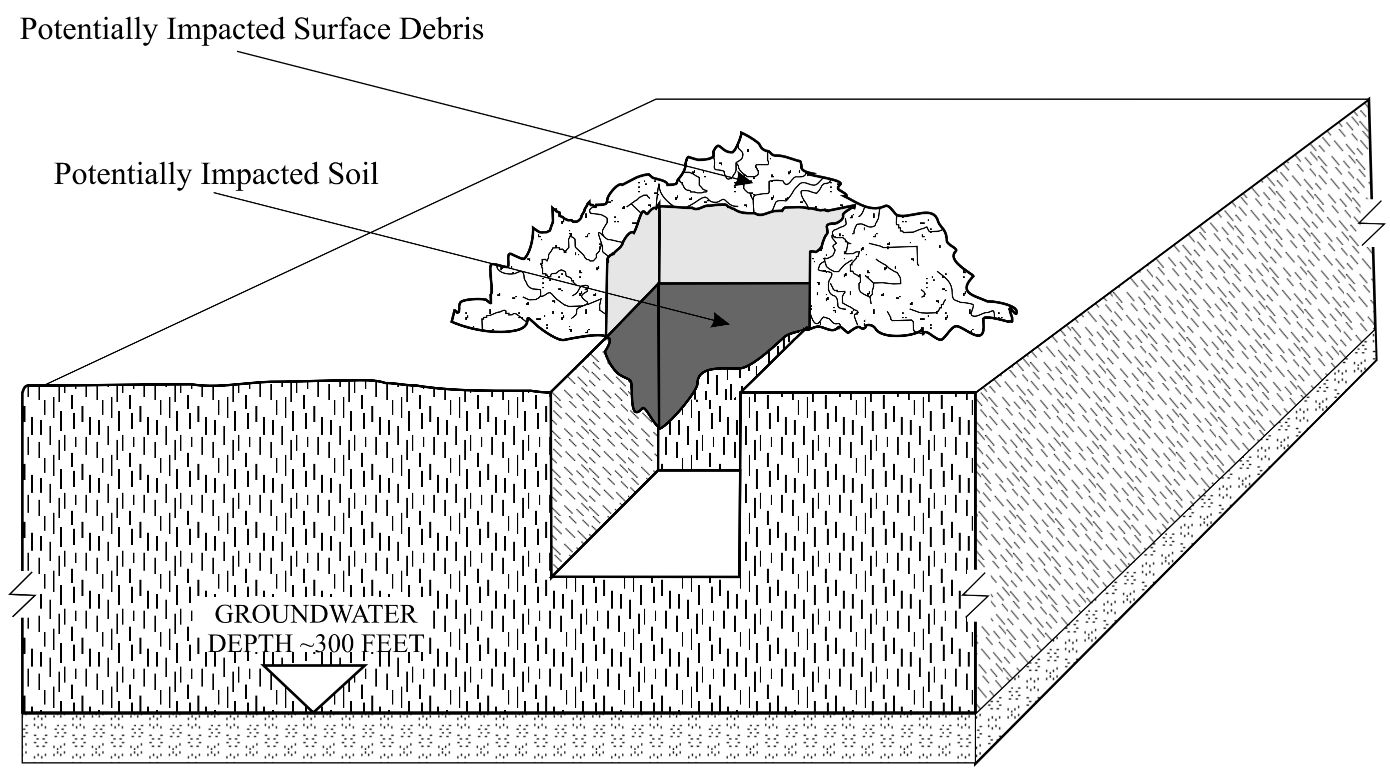

FIGURE 3
CAU 489 ALTERNATE CONCEPTUAL SITE MODEL

Alternate Conceptual Site Model

The conditions under the alternate CSM are considered less likely than the conditions outlined in the primary CSM. No information has been identified that suggests conditions outside the primary CSM are present. The alternate CSM for CAU 489 is similar to the primary model with one or more of the following exceptions:

- Conditions outside the scope of work are encountered.
- Staining and/or laboratory analytical results of verification samples indicate the presence of COCs on any debris or in soil beneath the piles.
- Radiological screening yields results in excess of the free-release criteria, as specified in the NV/YMP Radiological Controls Manual (DOE/NV, 2000).
- Debris and/or practice bombs are still present at one or more of the original 20 WWII practice target locations.

Potential Hold Points

During closure activities, certain conditions affecting the project schedule and budget may require decisions prior to continuing work. The primary hold/decision point during the CAU 489 SAFER process will occur when results of soil sampling and laboratory analysis are reviewed with the NNSA/NSO and/or the NDEP to confirm the cleanup and/or closure approach. Any live spotting charges found inside practice bombs will be removed by properly trained ordnance disposal specialists and segregated for disposal at the discretion of the ordnance disposal specialist. If inspection of the WWII practice target locations indicates that further cleanup activities are necessary, a path forward will be decided with the NNSA/NSO and/or the NDEP. Throughout the investigation/closure process, radiological field screening data will be collected, evaluated, and presented to the NNSA/NSO for review and input.

In addition to the previously discussed hold/decision points, work may be temporarily suspended until the issue can be satisfactorily resolved if any of the following unexpected conditions occur:

- Conditions outside the scope of work are encountered, including unexploded ordnance.
- Radiological screening yields results which require an upgrade in procedures to continue work.
- Elevated levels of contaminants are found that were not originally identified as being present at the sites.
- Unexpected conditions including waste and/or contamination are encountered.
- Unsafe conditions or work practices not originally documented in the SSHASP and posing a threat to personnel, equipment, or the environment are encountered.
- Other technical factors are encountered that require the preparation of a ROTC to the approved SAFER Plan.

3.1.2 Identify the Decision (Step 2)

Select the appropriate decision for the current phase of the site assessment process. Development of this decision is based on the currently available process knowledge, historical data and documentation, aerial photography (historical and recent), personnel interviews, and site visits. The most probable closure decisions are identified below.

If soil sample analysis results do not indicate the presence of COCs and no elevated levels of radioactivity are identified during closure activities, the site can be clean closed by removal of the debris piles. If any conditions outside of the scope of work are observed, the work will stop until an appropriate change of scope is identified and approved.

Removal of the debris will be conducted by manual and/or mechanical means, and the debris will be inspected for radiological and explosive hazards. Radiological surveys will be performed by a radiological control technician (RCT), and debris will be checked for live spotting charges. Any debris determined to be radiologically contaminated will be segregated and managed at the direction of the RCT. Any live spotting charges found inside practice bombs will be removed by properly trained ordnance disposal specialists and segregated for disposal at the discretion of the ordnance disposal specialist. Any non-hazardous debris, including the bomb remains that have been determined to be inert and free of hazards, will be disposed of as scrap metal in an appropriate landfill or released to a recycling yard.

After the debris piles have been removed, soil samples will be collected to verify that no COCs are present. If staining or other indications of COCs are detected, biased soil samples will be collected from the stained soil or from soil directly beneath visibly impacted debris. Otherwise, random soil sample locations will be determined using the algorithms contained in the Visual Sampling Plan™ software. After soil sample analysis, any soil containing COCs above the action levels will be excavated and disposed at an appropriate landfill. Excavations will be backfilled with clean soil from an approved borrow source.

If radiation is detected within the debris piles or in the soil beneath the piles above free-release criteria, as specified in Table 4-2 of the NV/YMP Radiological Control Manual, work will be halted in the immediate area, and a RCT will determine the extent and source of the radioactivity (DOE/NV, 2000). Any radioactive material will be handled according to the direction of the RCT, and work can continue in other areas that have been determined to be free of radiation.

The 20 WWII practice targets at various locations on TTR will then be inspected to confirm that no practice bombs or debris is present. If ordnance debris is found at these locations, the NNSA/NSO will decide what cleanup activities will be performed. In addition, the NNSA/NSO will be notified in the case that more debris than expected is encountered, and they will determine if the unexpected debris will be removed or not.

3.1.3 Identify the Inputs to the Decision (Step 3)

This step identifies the information needed and sources of information, the basis for establishing action levels, and sampling and analysis methods that can meet the data requirements. The CAU 489 corrective action decision process is outlined in Figure 4.

3.1.3.1 Information Required to Resolve the Decision

In order to confirm the CSM and the nature and extent of contamination, data must be collected and analyzed using the following three criteria:

1. Data will be collected in areas containing impacted debris and/or contamination.
2. Samples will be collected from areas most likely to be contaminated.
3. The data and analytical suite selected will be adequate to detect COCs.

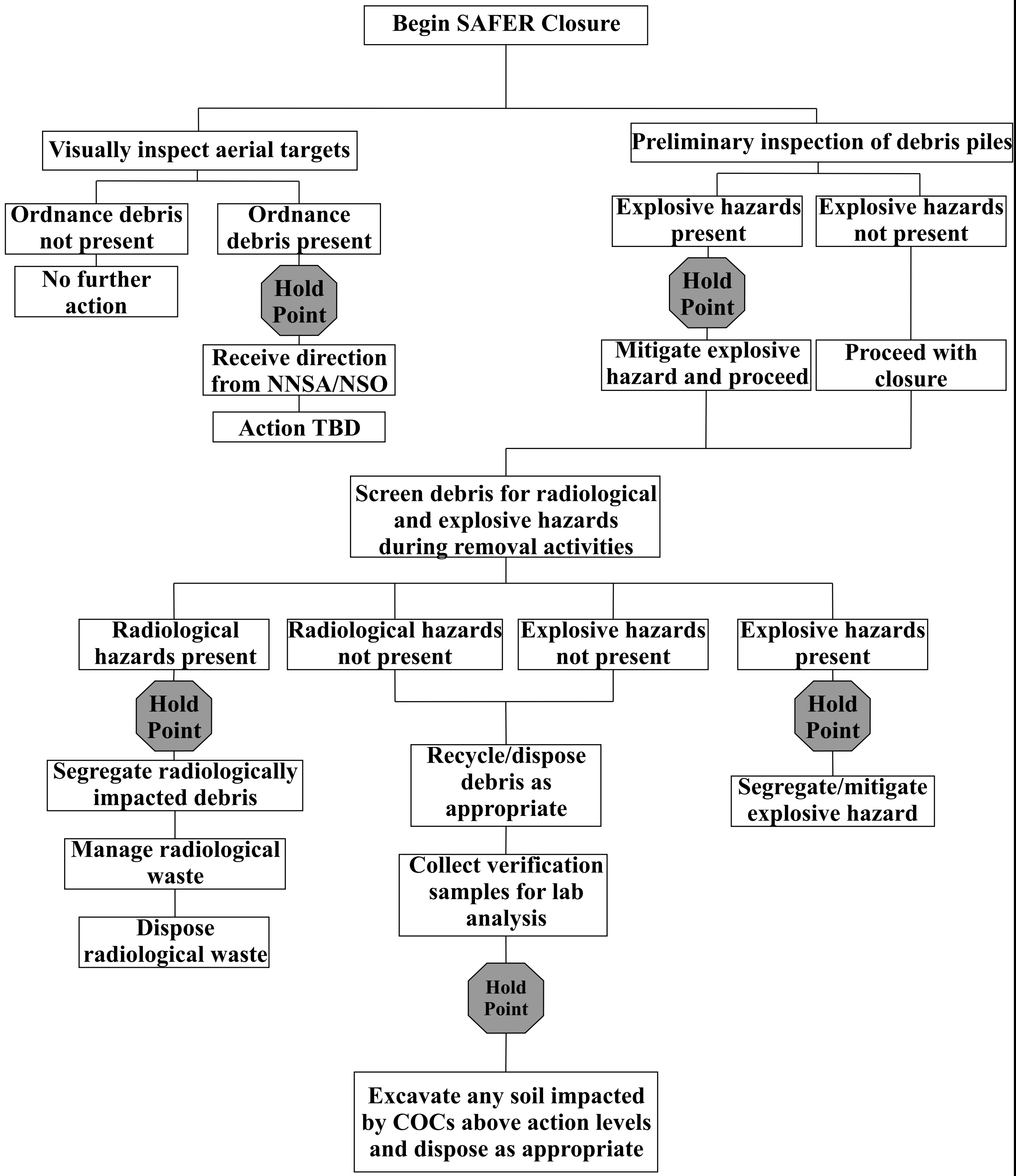

FIGURE 4
CAU 489 CLOSURE DECISION PROCESS

There are no COCs identified or expected at CAU 489; however, several COPCs have been identified based on process knowledge and site observations (see Section 3.1.3.2), and verification samples will be collected to evaluate if COCs are present. Samples will be collected based on radiological surveys, field observations, field screening results, process knowledge on source and location of release, and/or professional judgment. If possible, biased samples will be collected based on these criteria. If no biasing factors are present, random samples will be collected using the algorithms contained in the Visual Sample Plan™ software to determine the locations.

General information that applies to each CAS includes the U.S. EPA Region IX PRGs (EPA, 2002) for industrial soils, the NAC 445A.2272 for the action level for petroleum hydrocarbons (NAC, 2002), and Table 4-2 of the NV/YMP Radiological Control Manual for free-release criteria of radiological contamination (DOE/NV, 2000).

Quantitative Data

Quantitative data measure the quantity or amount of a characteristic or component within the population of interest. These data require the highest level of QA/QC in collection and measurement systems because the intended use of the data is to resolve primary decisions and/or to verify that closure standards have been met. Laboratory analytical data are generally considered quantitative.

Semiquantitative Data

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

Qualitative Data

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

Hold Points

Hold points will be incorporated into the investigation and closure activities for CAU 489. Hold points are designed to allow decision makers to review the existing data and decide which of the available options are most suitable. Hold points include the reviews of radiological data, laboratory analytical data, and field observations. The major hold points for this project have been identified and are discussed in Section 3.1.1.2.

3.1.3.2 Contaminants of Potential Concern and Affected Media

COPCs at CAU 489 include the phosphorus contained in the spotting charges, residual explosive material that may have been released from spotting charges that may not have functioned during testing, and trace metals (e.g., lead, chromium) from the paint on the practice bombs. At CAS RG-55-001-RGMN (Mellan Site), there is evidence of a possible recent diesel fuel release from a military vehicle that was staged onsite. The COPCs for CAU 489 are summarized in Table 2.

Potentially affected media include the soil beneath the debris piles. Soil samples will be collected after the debris has been removed to identify any COCs that may be present.

TABLE 2. CAU 489 CONTAMINANTS OF POTENTIAL CONCERN

CAS	CAS Description	Contaminants of Potential Concern				Potentially Contaminated Media
		Explosives	RCRA Metals	Phosphorus	TPH	
RG-55-001-RGMN	WWII Ordnance Site (Mellan)	X	X	X	X	Soil beneath debris piles
RG-55-002-RGHS	WWII Ordnance Site (H-Site)	X	X	X		Soil beneath debris piles
RG-55-003-RG36	WWII Ordnance Site (Gate 36-E)	X	X	X		Soil beneath debris piles

RCRA: Resource Conservation and Recovery Act
TPH: Total Petroleum Hydrocarbons

3.1.3.3 Potential Sampling Approaches and Appropriate Analytical Methods

The sampling techniques and analytical methods identified below will be used to resolve the decision rules and confirm the nature and extent of contamination at each CAS.

Radiological Field Screening

Field screening activities will be conducted for alpha and beta/gamma radiation. A handheld radiological survey instrument or method will be used, based on the possibility that radiologically contaminated soil or debris may be present. A RCT will be onsite during cleanup activities and will systematically screen the debris before it is removed from the site to verify that levels of radiation do not exceed free-release criteria. These field screening techniques will provide semiquantitative data that can be used to guide verification sampling and waste management activities.

Soil Sampling

Soil samples will be collected from the ground surface after the debris piles have been removed. Soil samples will be collected using manual or mechanical methods. Sample collection and handling activities will only be conducted in accordance with approved procedures. If possible, biased samples will be collected. If no biasing factors are present, random samples will be collected using the algorithms contained in the Visual Sample Plan™ software to determine the locations.

Field Observations

There is not expected to be any form of contamination at CAU 489. For safety purposes, constant visual inspection will be used to detect contamination during removal activities. Also, a certified ordnance disposal technician will be onsite to screen the debris for potential explosion hazards.

3.1.4 Define the Study Boundaries (Step 4)

The purpose of this step is to define the target population of interest, specify the spatial features and time constraints of that population pertinent for decision making, determine practical constraints on data collection, and define the scale of decision making relevant to target populations.

3.1.4.1 Geographic Area

CAU 489 has been defined on the basis of the historical data collected during previous investigations. The spatial boundaries of the three sites include the discrete locations of the debris piles, which are on the ground surface. The debris pile at CAS RG-55-001-RGMN (Mellan Site) is approximately 23 to 30 m (75 to 100 ft) in diameter and 0.9 to 2 m (3 to 6 ft) in height. The debris pile CAS RG-55-002-RGHS (H-Site) is approximately 6 to 16 m (20 to 52 ft) in diameter and 1.5 m to 2.5 m (5 to 8 ft) in height. The debris piles at CAS RG-55-003-RG36 (Gate 36-E Site) are approximately 9 to 12 m (30 to 40 ft) in diameter and 2 to 3 m (6 to 10 ft) in height (IT, 1998).

3.1.4.2 Population of Interest

The population of interest is the debris piles and is well defined. The debris has been placed on the ground surface and is defined as the metal debris piles themselves as well as any contaminated soil directly beneath the piles.

3.1.4.3 Time Constraints

The study data should be relevant with the length of time allowed for by the SAFER process under the FFACO agreement (FFACO, 1996). Field activities are scheduled to begin after approval of the final SAFER Plan. Data will be collected at times that meet the security and safety constraints of TTR and at times when weather conditions allow adequate site access and safe working conditions.

The final SAFER Plan is due to the NNSA/NSO by July 14, 2005. The FFACO deadline for the SAFER Plan is August 30, 2005. Fieldwork is tentatively scheduled to begin during Fiscal Year 2006.

3.1.4.4 Practical Constraints on Data Collection

- Approval of the SAFER Plan and the DQO process by the NNSA/NSO and the NDEP
- Equipment access and mobility at TTR
- Weather conditions that may impact fieldwork activities

- Health and safety of workers
- Operational/security issues at TTR
- Waste disposal/recycling issues
- Unforeseen conditions including unexploded ordnance, radiological levels above the free-release criteria, and other unsafe working conditions
- TTR site operations and/or closure

3.1.5 Develop a Decision Rule (Step 5)

Define the parameter of interest, specify the action level, and describe the logical basis for choosing among alternative actions. This step integrates outputs from the previous steps, with the inputs developed in this step into a decision rule ("If…, then…") statement. This decision rule describes the conditions under which possible alternative actions would be chosen.

3.1.5.1 Action Levels for the Decision

The sites will be clean closed through the removal of debris at each of the three CASs. Debris will be checked for live spotting charges, screened for radiological contamination, and disposed of or recycled. Soil samples will then be collected to verify that no COCs are present, and radiological surveys will be conducted to confirm the absence of radiological contamination in the soil. The action level is 100 mg/kg for TPH based on NAC 445A.2272 (NAC, 2002). All other action levels are based on the EPA Region IX PRGs for industrial soils (EPA, 2002). Table 4-2 of the NV/YMP Radiological Control Manual specifies the free-release criteria for radiological contamination (DOE/NV, 2000).

3.1.5.2 Decision Rule

The parameter of interest for CAU 489 is the presence or absence of COCs or radiological contamination in the soil beneath the debris piles.

Decision I

If no contamination is present in the soil beneath the debris piles above action levels at a CAS, then the removal of the debris piles will be sufficient to clean close the CAS.

Decision II

After removal of the debris piles, if contamination is present in the soil beneath the debris piles above action levels, and it is technically feasible to remove the contamination at a CAS, the CAS will be clean closed by excavating the contaminated soil and disposing of it at an appropriate landfill.

Decision III

After removal of the debris piles, if contamination is present in the soil beneath the debris piles above action levels, and it is not technically feasible to remove the contamination at a CAS, the soil contamination will be closed in place and use restrictions implemented.

3.1.6 Specify Tolerable Limits on Decision Errors (Step 6)

Define the decision makers' tolerable decision error rates based on a consideration of the consequences of making an incorrect decision.

3.1.6.1 Decision Errors

Only valid data generated from the radiological surveys and laboratory analytical results will be used to determine if contamination is present. The null hypothesis is that contamination is present in the soil beneath the debris piles.

False Negative (Rejection of the Null Hypothesis)

This decision error would occur if contamination is determined not to be present above the action levels when it actually is, increasing risk to human health and the environment.

False Positive (Acceptance of the Null Hypothesis)

This decision error would occur if contamination is determined to be present above the action levels when it actually is not, resulting in increased costs for unneeded remediation.

3.1.6.2 Measurement Error

Random and systematic measurement errors can be introduced in the measurement process during physical sample collection, sample handling, sample preparation, sample analysis, and data reduction. Errors introduced during sample collection and handling are minimized by developing a sampling and analysis plan. This SAFER Plan acts as the sampling and analysis plan for CAU 489. Bechtel Nevada (BN) Environmental Restoration sampling plans are compliant with approved operations instructions for sample collection, field documentation, and equipment decontamination. As samples are collected, each sample is identified with a unique number, and a custody seal is placed on the container. A “Services Request & Chain of Custody Record” form is filled out and maintained. Sample preparation and analysis errors are minimized by using an EPA-approved analytical method. Additionally, QC samples are added to maintain the following:

Accuracy

Accuracy is the closeness of a measurement to the mean of a set of results. Accuracy is a measure of the bias of the measurement system, and indicators are based on the percent recoveries of the laboratory analytical control spikes, surrogate spikes, or matrix spikes.

Comparability

Comparability is a qualitative judgement which expresses the confidence with which one set can be compared to another. Items used to determine comparability include the analytical method and reporting units.

Completeness

The indicator for completeness is the amount of valid data obtained from a measurement system compared to the amount that was expected and needed to be obtained to meet the project data goals.

Precision

Precision represents the repeatability of the analytical system. Indicators for this measurement are based on the relative percent difference (RPD) between field duplicates, laboratory splits, or laboratory replicate analysis. Precision is usually expressed as the RPD or standard deviation.

Representativeness

Representativeness is qualitative judgement which refers to a sample or group of samples that reflect the characteristics of the media at the sampling point. It also includes how well the sampling point represents the actual parameter variations which are under study.

3.1.7 Optimize the Design (Step 7)

Outline a sampling design, specifying the operational details of the sampling plan which fall within the project's constraints.

3.1.7.1 Sampling and Analysis Design

Material removed from the site will be screened for radioactivity. The work area will be continuously visually inspected for staining indicating the presence of COPCs and/or areas of environmental impact. Verification samples will be collected from the soil beneath the debris piles, and radiological surveys of the sites will be performed. If biasing factors are observed during closure activities (i.e., soil staining), soil samples will be collected from these locations. Additional samples will be collected from random locations. Assumptions about the COPC concentrations and distribution will be used to calculate the number of verification samples needed to allow a confidence level of 95 percent. The verification sampling analytical results will be statistically analyzed to determine if a sufficient number of samples was collected to characterize the site and yield the needed confidence level. Additional samples may be collected if the statistical analysis indicates that the initial assumptions concerning COPC concentrations and/or distribution were invalid. Initial COPC concentration assumptions and the results of statistical analysis of the analytical data will be evaluated using the algorithms contained in the Visual Sample Plan™ software. This software will also be used to determine the appropriate locations for random sample collection. Data may be presented to the NNSA/NSO to evaluate if data gaps require additional sampling and laboratory analysis.

3.1.7.2 Operational Details and Theoretical Assumptions

Although contamination is not expected, soil samples will be collected from beneath the debris piles after the debris has been completely removed. The samples will be analyzed for explosives, phosphorus, and Resource Conservation and Recovery Act (RCRA) metals. In addition, samples from CAS RG-55-001-RGMN will be analyzed for TPH. Any visible staining which could indicate the presence of COCs, as well as radiological survey results, will determine the location, if any, of biased soil samples. Otherwise, random soil samples will be collected from the underlying soil using the Visual Sample Plan™ computer algorithm to determine their locations. The analyses that will be performed are summarized in Table 3.

TABLE 3. SAMPLE ANALYSIS REQUIREMENTS

Parameter	Analytical Method	CAS
Explosives	8330[a]	All CASs
Phosphorus	6010B[a]	All CASs
RCRA Metals	6010B[a]	All CASs
TPH	8015B Modified[a]	Only CAS RG-55-001-RGMN (Mellan Site)

[a]EPA Test Methods for Evaluating Solid Waste, 3rd Edition, Parts 1-4, SW-846

3.2 RESULTS OF THE DQO ANALYSIS

3.2.1 Action Level Determination and Basis

Based on site process knowledge, historical background information, site visits, preliminary assessment activities, and personnel interviews, no contamination is expected at CAU 489. The site will be clean closed by removing the debris piles from each CAS. Debris will be checked for live spotting charges, screened for radiological contamination, and disposed of or recycled as appropriate. Soil samples will then be collected for laboratory analysis to verify that no COCs are present. The action level is 100 mg/kg for TPH based on NAC 445A.2272 (NAC, 2002). All other action levels are based on the EPA Region IX PRGs for industrial soils (EPA, 2002). Table 4-2 of the NV/YMP Radiological Control Manual specifies the free-release criteria for radiological contamination (DOE/NV, 2000).

3.2.2 Hypothesis Test

Only valid data from radiological surveys and laboratory analytical results will be used to determine if contamination is present. The null hypothesis is that contamination is present in the soil beneath the debris piles. The two types of decision errors are false negative (rejection) and false positive (acceptance). A false negative decision error would occur if contamination is determined not to be present above the action levels when it actually is, increasing risk to human health and the environment. A false positive decision error would occur if contamination is determined to be present above the action levels when it actually is not, resulting in increased costs for unneeded remediation.

3.2.3 Statistical Model

A statistical model does not strictly apply to CAU 489; however, the statistical assumption is that COPCs are limited to the bounds of the soil beneath the debris piles and may be evident based on biasing factors such as soil staining. These assumptions will be validated by the collection and laboratory analysis of soil samples.

3.2.4 Design Description/Option

Biased and/or random soil samples will be collected from beneath each debris pile after the debris has been completely removed. The samples will be analyzed for explosives, phosphorus, and RCRA metals. In addition, samples from CAS RG-55-001-RGMN will be analyzed for TPH. Visible stains, if any, as well as radiological survey results will determine the location of biased soil samples. Otherwise, random soil samples will be collected from the underlying soil.

3.2.5 Conceptual Site Model

The primary and alternate CSMs are presented in detail in Section 3.1.1.2. Figures 2 and 3, respectively, illustrate the primary and alternate CSMs.

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4.0 FIELD ACTIVITIES AND CLOSURE OBJECTIVES

This section provides a description of and the rationale for characterization, waste removal, closure verification, site restoration, and waste disposal. The SAFER process is discussed in detail in the following subsections.

Prior to beginning the corrective action investigation and site closure fieldwork, the following activities will be completed:

- Visual inspection of the testing locations and debris piles
- Preparation of National Environmental Policy Act documentation
- Preparation of a SSHASP
- Preparation of an NNSA/NSO Real Estate/Operations Permit

4.1 CONTAMINANTS OF POTENTIAL CONCERN

The COPCs for each CAS, based on site process knowledge and historical information, are listed in Table 2. COPCs at CAU 489 include the phosphorus contained in the spotting charges, trace metals (e.g., lead, chromium) from the paint on the practice bomb debris, and residual explosive material that may have been released from spotting charges that may not have functioned during testing. At CAS RG-55-001-RGMN (Mellan Site), there is evidence of a possible recent diesel fuel release from a military vehicle that was staged onsite. None of these contaminants are expected to present at concentrations above the action levels; however, this will be determined by verification sample results.

Potentially affected media include the soil beneath the debris piles. Verification samples will be collected from the soil after the debris has been removed to identify any COCs that may be present.

4.2 REMEDIATION

Based on the currently available process knowledge, historical data and documentation, aerial photography (historical and recent), personnel interviews, and site visits, no COCs are expected to be present at concentrations above the action levels at CAU 489. The site will be clean closed by removing all debris. The closure decision process is outlined in a flow chart in Figure 4.

The debris will be removed by manual or mechanical means and inspected for radiological and explosive hazards. Radiological surveys will be performed by a RCT, and debris will be checked for live spotting charges. Any debris determined to be radiologically contaminated will be segregated and managed at the direction of the RCT. Any live spotting charges found inside practice bombs will be removed by properly trained ordnance disposal specialists and segregated for disposal at the discretion of the ordnance disposal specialist. Any non-hazardous debris, including the bomb remains that have been determined to be inert and free of hazards, will be disposed of as scrap metal in an appropriate landfill or released to a recycling yard.

If any conditions outside the scope of work are observed, the work will stop until an appropriate change of scope is identified and approved.

After the debris piles have been removed, soil samples will be collected to determine if COCs are present at concentrations above the action levels. If staining or other indications of COCs are detected, biased soil samples will be collected from the stained soil or soil directly beneath visibly impacted debris. Otherwise, random soil samples, determined by the algorithms contained in the Visual Sample Plan™ software, will be collected from the underlying soil. After soil sample analysis, any soil containing COCs above the action levels will be excavated and disposed at an appropriate landfill. Excavations will be backfilled with clean soil from an approved borrow source.

If radiation is detected within the debris piles or in the soil beneath the piles above free-release criteria, as specified in Table 4-2 of the NV/YMP Radiological Control Manual, work will be halted in the immediate area, and a RCT will determine the extent and source of the radioactivity (DOE/NV, 2000). Any radioactive material will be handled according to the direction of the RCT, and work can continue in other areas that have been determined to be free of radiation.

The 20 WWII practice targets at various locations on TTR will be inspected to confirm that no practice bombs or debris is present. If ordnance debris is found at these locations, the NNSA/NSO will decide what cleanup activities will be performed. In addition, the NNSA/NSO will be notified in the case that more debris than expected is encountered, and they will determine if the unexpected debris will be removed or not.

4.3 VERIFICATION

The sampling techniques and analytical methods identified below will be used to verify closure and confirm the nature and extent of contamination at each CAS.

Radiological Field Screening

A handheld radiological survey instrument will be used to evaluate the sites for the presence of radiological contaminated debris and/or soil. A RCT will be onsite during cleanup activities and will systematically screen the debris before it is removed from the site to verify that levels of radiation do not exceed free-release criteria specified in Table 4-2 of the NV/YMP Radiological Control Manual for free-release criteria (DOE/NV, 2000).

Soil Sampling

Soil samples will be collected from beneath each debris pile for laboratory analysis to verify clean closure after the debris piles have been removed. Verification sampling locations will include biased and random locations. Analytical results will be compared to the action levels specified in the U.S. EPA Region IX PRGs (EPA, 2002) for industrial soils and the NAC 445A.2272 for petroleum hydrocarbons (NAC, 2002). Sample analysis parameters are summarized in Table 3.

4.4 CLOSURE

The specific activities required to close each CAS in CAU 489 are detailed in Section 4.2 of this document. Hold points and conditions that are outside the assumptions of this plan may impact the requirements for closure. Although no COCs are expected in the soil at concentrations above the action levels, soil samples will be collected to confirm this assumption, and soil removal activities are included in this SAFER plan as a contingency in the case that COCs are discovered. In general, the proposed activities for closure of CAU 489 include the following:

- Removal of the debris piles and screening for radiation and unexploded ordnance before disposal or recycling
- Verification sampling and radiation screening of underlying soil, and review of analytical data to confirm closure
- If analytical data results indicate the presence of COCs at concentrations above the action levels, removal of contaminated soil and backfilling of excavations
- Inspection of 20 former WWII practice target locations to confirm previous cleanup activities
- Preparation of a Closure Report (CR)

4.5 DURATION

The schedule will require modifications if conditions exist that are outside the assumptions on which the schedule was developed. Flexibility has been placed in the project schedule to account for minor difficulties (e.g., weather, equipment breakdowns, personnel availability, TTR operations, and security constraints). The NNSA/NSO will keep the NDEP informed of any conditions that may impact the project schedule. The following represents the preliminary proposed schedule duration for the field activities at CAU 489. The amount of days is contingent upon a variety of factors including site conditions, subcontractor availability, depth of contamination, and extent of ordnance surveillance activities.

- Site remediation activities including practice bomb removal/inspection and removal of contaminated soil, if needed. The CASs will be cleaned up in series, and the expected duration for each CAS is:
  - CAS RG-55-001-RGMN (Mellan Site): approximately 14 days
  - CAS RG-55-002-RGHS (H-Site Road): approximately 8 days
  - CAS RG-55-003-RG36 (Gate 36-E Site): approximately 14 days
- Verification sampling involves collecting soil samples from beneath the piles to show no COCs remain. Expected duration is approximately four days for all the CASs.
- Site restoration activities include backfilling all excavations, compacting the soil, and returning the site to its former elevation. Expected duration for this activity is approximately eight days for all the CASs.

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5.0 REPORTS AND RECORDS AVAILABILITY

A daily report will be prepared when field activities are being conducted. The report will summarize the daily activities, site visitors, health and safety issues, and any other relevant issues or problems. This report will be provided to the NNSA/NSO Task Manager.

Upon completion of closure activities, a CR will be prepared and will include the following sections and subsections:

- Introduction (Purpose and Scope)
- Closure Activities (Description of Corrective Action Activities, Deviation from the SAFER Plan as approved, Corrective Action Schedule as Completed, and Site Plan/Survey Plat)
- Waste Disposition
- Closure Verification Results (Data Quality Assessment and Use Restrictions)
- Conclusions and Recommendations
- References
- Supporting Documentation (Analytical Results for Verification Samples, Summary of Geophysical/Radiological Survey Results, Waste Disposition Documentation, and Modifications to the SAFER Plan)

The final CR will be submitted to the NNSA/NSO and the NDEP for review and approval. This SAFER Work Plan and the subsequent CR will be available in the NNSA/NSO Public Reading Facilities in Las Vegas, Nevada, and Carson City, Nevada, or by contacting the NNSA/NSO Project Manager. The NDEP maintains the official Administrative Record for all activities conducted under the auspices of the FFACO.

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6.0 INVESTIGATION/REMEDIATION WASTE MANAGEMENT

Waste from CAU 489 will be managed in accordance with all state and federal regulations, U.S. Department of Energy (DOE) orders, and BN procedures. Potential waste types include non-hazardous construction debris, low-level radioactive waste, hazardous waste, and TPH waste.

During this project 208-liter (55-gallon) drums (or other approved containers such as rolloffs) may be used. All containers must be in good condition. The containers must always be closed while stored, unless waste is being added or removed. They must be handled in such a manner that will not jeopardize the integrity of the container. Containers will not be filled above their specified weight capacity. After a container has been filled, the container will be locked. If a container is not completely filled to capacity at the end of workday, it will be locked and tamper-resistant tape will be placed over the container's hinge. Additional precautions include not filling the drums more than 7/8 full, and not mixing waste types (e.g., personal protective equipment [PPE] and decontamination water).

Appropriate labels and relevant information will be marked on each container with an indelible marker. The label marking must be legible and clearly visible for inspections. Pertinent data will be written on duct tape or a blank adhesive label that is applied to the side of the container. The following information will be included:

- Waste-tracking label
- Type of waste in the container (e.g., "Hazardous Waste")
- Location from which waste was derived
- Date(s) that accumulation begins/ends
- If sampling is required, an "Awaiting Analysis" sticker after sampling has been completed

6.1 WASTE MINIMIZATION

Waste generation will be minimized for the duration of the project by site workers adhering to the principles of the BN Waste Minimization and Pollution Prevention Program. Workers will take care to segregate waste from non-waste materials when possible and to avoid cross-contamination of waste streams.

6.2 POTENTIAL WASTE STREAMS

The potential waste streams generated by closure of the CASs in CAU 489 include non-hazardous construction debris, low-level radioactive waste, hazardous waste, and TPH waste.

6.2.1 Non-Hazardous Waste

Non-hazardous waste will be generated during closure of CAU 489, and will consist of ordnance debris that has been determined to be inert and free of hazards. Additionally, used PPE may be generated during closure activities. This type of debris will be recycled when possible. Non-recyclable materials may be disposed of in the TTR Sanitary Landfill.

6.2.2 Low-Level Radioactive Waste

Depending on field screening and soil sampling results, radiologically contaminated soil or debris may be present. Any soil or debris that is impacted above the levels specified in Table 4-2 of the NV/YMP Radiological Control Manual will be removed and packaged as low-level radioactive waste and shipped to the Nevada Test Site (NTS) for disposal.

6.2.3 Hazardous Waste

If sample results indicate that hazardous constituents are present in the soil above the respective PRG, the contaminated soil will be removed, packaged appropriately, and shipped to an appropriate offsite disposal facility.

6.2.4 Hydrocarbon Waste

If sample results indicate that TPH is present in the soil above the Nevada state action level for TPH as stated in the NAC, the contaminated soil will be removed and stored in a waste management area until disposal at the NTS Hydrocarbon Landfill or other appropriately permitted facility.

7.0 QUALITY ASSURANCE/QUALITY CONTROL

For the closure activities described in this plan, the overall objective is to collect accurate and defensible data to support the selection of and implementation of closure alternatives for the CASs in CAU 489. The following sections discuss the collection of required QC samples in the field and QA requirements for laboratory/analytical data to achieve closure.

7.1 SAMPLE COLLECTION ACTIVITIES

All samples will be collected in accordance with established procedures (BN, 2000a and 2000b) and the Industrial Sites Quality Assurance Project Plan (NNSA/NV, 2002). Field QC samples will be collected and analyzed to aid in determining the validity of sample results. The number of required QC samples depends on the type and number of environmental samples collected. The minimum number of QC samples to be collected and analyzed for this investigation is:

- Field duplicates (1 per 20 environmental samples, or 1 if less than 20 are collected)
- Field blanks (1 per batch of samples)
- Matrix spike/matrix spike duplicates (1 per 20 environmental samples, or 1 if less than 20 are collected)

Additional QC samples may be collected, based on site conditions, at the discretion of the Technical Lead. Field QC samples will be analyzed using the same analytical procedures used for environmental samples. The results of the QC sample analysis will be included in the CR.

7.2 APPLICABLE LABORATORY/ANALYTICAL DATA QUALITY INDICATORS

DQOs are qualitative and quantitative statements that specify the quality of the data required to support closure of a site. The DQOs for the CAU 489 investigation were defined using the Seven Step DQO Process developed by the EPA (EPA, 2000). Three CSMs for the CAU 489 CASs were defined during the DQO process. The DQO process is presented in detail in Section 3.0 of this document.

Clean closure of CAU 489 will require the collection and analysis of verification soil samples for explosives, phosphorus, RCRA metals, and TPH. All laboratory data generated during closure activities will be reviewed by project personnel to ensure the data are usable and complete, according to the CAU 489 DQOs. In addition, as specified in the Industrial Sites Quality Assurance Project Plan (NNSA/NV, 2002), the final data packages will be validated using applicable BN Organization Instructions (OIs). These include OI-2154.459 (BN, 2003) for validating inorganic chemical data. OI-2154.459 is based on the EPA Functional Guidelines (EPA, 1994). More details on the proposed number and location of the verification samples are given in Section 4.3 of this plan.

DQIs are qualitative and quantitative statements that specify the data requirements of a project, and include precision, accuracy, representativeness, completeness, and comparability. In addition, sensitivity has been included as a DQI for laboratory analysis. The performance criteria for each indicator have been selected on the basis of the intended use of the data, current field and analytical procedures, and instrumentation. For analytical laboratories under the EPA

Contract Laboratory Program, precision and accuracy goals have been standardized for both organic and inorganic analytes. Laboratory QC samples used to measure the precision and accuracy of analytical procedures will be analyzed using the same analytical procedures used for environmental samples.

Table 4 provides established performance criteria for each of the DQIs and the impacts to the decision if the criteria are not met. Any deficiencies noted during the investigation that render the data quality unacceptable will be documented in the CR.

TABLE 4. LABORATORY/ANALYTICAL DATA QUALITY INDICATORS

DQI	PERFORMANCE CRITERIA	IMPACT ON DECISION IF PERFORMANCE CRITERIA NOT MET
Precision	Variations between duplicates (field and lab) and original sample should not exceed analytical method-specific criteria.	Estimated data within sample delivery group (SDG) will be evaluated for their usability. If data are determined to be unusable, data shall not be used in decision, and completeness will be assessed.
Accuracy	Laboratory control sample results and matrix spike results should be within analytical method-specific criteria.	Estimated data within SDG will be evaluated for its usability. If estimated data are biased low and below the decision threshold, the data shall not be used in decision and completeness criteria will be assessed.
Sensitivity	Detection limits of laboratory instruments must be less than action level for COCs.	Cannot determine if COCs are present at levels of concern, thereby investigation objectives cannot be met.
Completeness	100% of samples must be submitted to the laboratory, 100% of the requested analyses must be performed, 100% of critical analytes must be determined to be valid [a], and 80% of non-critical analytes must be determined to be valid.	1) Decision of whether extent of contamination has been bounded cannot be determined. Impacts to decisions will be assessed. 2) Decision of whether COC above action levels remain in soil cannot be determined. Impacts to decisions will be assessed.
Comparability	Equivalent samples analyzed using same analytical methods, same units of measurement, and detection limits must be used for like analyses.	Inability to use data collected.
Representativeness	Correct analytical method performed for appropriate COCs: valid data reflects appropriate target population.	Cannot identify COCs or estimate concentration of COCs; therefore, cannot make decision(s) on target population.

[a]Critical analytes are those analytes most likely present in the target population, which have been identified through process knowledge of similar sites and historical documentation.

8.0 REFERENCES

BN, see Bechtel Nevada.

Bechtel Nevada. 2000a. "Sampling Chain of Custody," Organization Instruction OI-2152.100. Las Vegas, Nevada.

Bechtel Nevada. 2000b. "Soil Sampling", Organization Instruction OI-2152.108. Las Vegas, Nevada.

Bechtel Nevada. 2003. "Inorganic Data Verification and Validation, Revision 1", OI-2154.459. Las Vegas, Nevada.

DOE/NV, see U.S. Department of Energy, Nevada Operations Office.

EPA, see U.S. Environmental Protection Agency.

FFACO, see Federal Facility Agreement and Consent Order.

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

IT, see International Technology Corporation.

International Technology Corporation. 1998. Preliminary Assessment for CAU No. 489 World War II Ordnance Site. Nevada Test Site, Project Files. Las Vegas, NV.

NAC, see Nevada Administrative Code.

Nevada Administrative Code. 2002. NAC 445A.2272, Contamination of Soil: Establishment of Action Levels. Carson City, Nevada.

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. DOE/NV--372, REV 3. Las Vegas, Nevada.

U.S. Department of Energy, Nevada Operation Office. 2000. NV/YMP Radiological Control Manual, Revision 4. DOE/NV/11718--079. Las Vegas, NV.

U.S. Environmental Protection Agency. 1994. Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses, EPA/540/R-94/083. Washington, DC.

U.S. Environmental Protection Agency. 2000. Guidance for Data Quality Objectives Process, EPA AQ/G-4, EPA/600/R-96/055. Washington D.C.

U.S. Environmental Protection Agency. 2002. Region IX Preliminary Remediation Goals (PRGs). San Francisco, CA.

APPENDIX A.1

PROJECT ORGANIZATION

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PROJECT ORGANIZATION

The U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office (NNSA/NSO) Project Manager is Janet Appenzeller-Wing, and her telephone number is (702) 295-0461**.**

The identification of the project Health and Safety Officer and the Quality Assurance Officer can be found in both the Field Management Plan and the Site-Specific Health and Safety Plan. However, personnel are subject to change, and it is suggested that the appropriate NNSA/NSO Project Manager be contacted for further information. The Task Manager will be identified in the FFACO Monthly Activity Report prior to the start of field activities.

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