

**CLOSURE PLAN FOR CORRECTIVE ACTION
UNIT 109: U-2BU SUBSIDENCE CRATER,
NEVADA TEST SITE, NEVADA**

Controlled Copy No.:__

Revision 0

March 1999

**Prepared for the U.S. Department of Energy
Nevada Operations Office
under Contract No. DE-AC08-96NV11718**

THIS PAGE INTENTIONALLY LEFT BLANK

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

ERRATA SHEET

The fourth sentence in the third paragraph on page A-2 of the Closure Plan for Corrective Action Unit 109: U-2bu Subsidence Crater, Nevada Test Site, Nevada erroneously states that drinking water well UE-16d is located southeast of the U-2bu subsidence crater. The sentence should state that the water well is located southwest of the U-2bu subsidence crater.

**CLOSURE PLAN FOR CORRECTIVE ACTION
UNIT 109: U-2BU SUBSIDENCE CRATER,
NEVADA TEST SITE, NEVADA**

Approved By: *Janet L. Appenzeller-Wing*
Janet L. Appenzeller-Wing, Project Manager
Industrial Sites Project

Date: *3/12/99*

Approved By: *Robert M. Wycoff Jr.*
Runore C. Wycoff, Division Director
Environmental Restoration Project

Date: *3/12/99*

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

FIGURES	vii
TABLES	vii
ACRONYMS AND ABBREVIATIONS	ix
EXECUTIVE SUMMARY	xi
1.0 INTRODUCTION	1
1.1 PURPOSE	4
1.2 SCOPE	5
1.3 CLOSURE PLAN CONTENTS	5
2.0 DETAILED STATEMENT OF WORK	7
2.1 CLOSURE APPROACH	7
2.1.1 Preplanning and Site Preparation	7
2.1.1.1 Site-Specific Health and Safety Plan/Job Hazard Analysis	7
2.1.1.2 Field Management Plan	7
2.1.1.3 National Environmental Policy Act Documentation	8
2.1.1.4 Pre-Excavation Activity Geoprobe® Sampling	8
2.1.1.5 Site Preparation	10
2.1.2 Field Activities	10
2.1.2.1 Excavation of the Lead-Impacted Soil	10
2.1.2.2 Decontamination of Equipment	11
2.1.2.3 Construction of Berm	11
2.1.2.4 Site Restoration	12
2.2 CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL	12
2.3 WASTE MANAGEMENT	12
2.3.1 Container Management	16
2.3.2 Site Control	17
2.3.3 Preparedness and Prevention	17
2.3.4 Contingency Plan	17
2.3.5 Personnel Training	18
2.3.6 Inspections	18
2.3.7 Waste Minimization	18
2.4 CLEAN-UP VERIFICATION	18
2.4.1 Verification Sampling	18
2.4.2 Quality Control Samples	19

TABLE OF CONTENTS (Continued)

2.5 PERMITS	21
2.5.1 Radiological Work Permit	21
2.5.2 Excavating and Trenching Permit	21
2.6 CLOSURE CERTIFICATION	21
3.0 SCHEDULE	23
3.1 PROJECT SCHEDULE	23
3.2 FIELD WORK CLOSURE SCHEDULE	23
4.0 POST-CLOSURE PLAN	25
4.1 INSPECTIONS	25
4.2 MONITORING	25
4.3 MAINTENANCE AND REPAIR	25
5.0 REFERENCES	27

APPENDICES

Appendix A: "A Through K" Evaluation

Appendix B: Contingency Plan

Appendix C: Photographs of the U-2bu Subsidence Crater

Appendix D: Project Organization

Distribution List

TABLE OF CONTENTS (Continued)

FIGURES

Figure 1 - Location of the U-2bu Subsidence Crater, Area 2, Nevada Test Site	2
Figure 2 - Location of Site Characterization Samples at the U-2bu Subsidence Crater	3
Figure 3 - Proposed Site Layout Plan for the U-2bu Subsidence Crater Field Work	9

TABLES

Table 1 - Management of Various Waste Types to Be Produced at the U-2bu Subsidence Crater	13
Table 2 - U-2bu Subsidence Crater Verification Sampling Parameters	20
Table 3 - Project Schedule for U-2bu Subsidence Crater Corrective Action	24

THIS PAGE INTENTIONALLY LEFT BLANK

ACRONYMS AND ABBREVIATIONS

BN	Bechtel Nevada
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DOE/NV	U.S. Department of Energy, Nevada Operations Office
EPA	U.S. Environmental Protection Agency
FFACO	Federal Facility Agreement and Consent Order
ft	foot
JHA	Job Hazard Analysis
LDR	Land Disposal Restrictions
m	meter
mg/kg	milligram per kilogram
mg/L	milligram per liter
mL	milliliter
mm	millimeter
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NTS	Nevada Test Site
NTSWAC	Nevada Test Site Waste Acceptance Criteria
PEER	PEER Consultants
PPE	Personal Protective Equipment

ACRONYMS AND ABBREVIATIONS (Continued)

RCRA	Resource Conservation and Recovery Act
REEC Co	Reynolds Electrical and Engineering Co., Inc.
RWP	Radiological Work Permit
SSHASP	Site-Specific Health and Safety Plan
TCLP	Toxicity Characteristic Leachate Procedure
TPH	Total Petroleum Hydrocarbon

EXECUTIVE SUMMARY

The U-2bu subsidence crater, Corrective Action Unit 109, will be closed in accordance with the Resource Conservation and Recovery Act, the Nevada Division of Environmental Protection operational permit, and the Federal Facility Agreement and Consent Order. The U-2bu subsidence crater is located in Area 2 of the Nevada Test Site. It was created in 1971 by an underground nuclear test with the name Miniata. The crater has a diameter of 288 meters (944 feet) and an approximate depth of 35 meters (115 feet).

The subsidence crater was used as a land disposal unit for radioactive and hazardous waste from 1973 to 1988. Site disposal history is supported by memorandums, letters, and personnel who worked at the Nevada Test Site at the time of active disposal. Waste disposal into the crater was officially discontinued in March 1989.

Based on the results of the analyses reported in the site characterization report, the only constituents of concern in the U-2bu subsidence crater include leachable lead and total petroleum hydrocarbons. Leachable lead was detected at a concentration of 5.7 milligrams per liter at the top of the crater. This concentration exceeds the Title 40 Code of Federal Regulations 261.24 level of 5.0 milligrams per liter and, therefore, will require removal. Low levels of petroleum hydrocarbons in the diesel range were found in samples at the bottom of the crater. Maximum results were 190 milligrams per kilogram. Information is provided in this Closure Plan for the Nevada Division Environmental Protection to determine if corrective action is required under Nevada Administrative Code 445A.227, or if concentrations detected are acceptable for closure in place based on minimal risk.

Closure activities will include the excavation and disposal of impacted soil from the top of the crater. The soil is anticipated to be disposed of as mixed waste due to the presence of both radioactive and Resource Conservation and Recovery Act hazardous constituents. In addition, metal debris in the vicinity of the impacted soil will be surveyed to determine if it has been impacted by any radiological constituents. All waste will be disposed of in accordance with the proper regulations.

Upon completion of excavation, verification samples will be collected to show that the leachable lead has been removed to concentrations below the regulatory action level. After sample results show that the lead has been removed, the excavated area will be backfilled and a soil flood diversion berm will be constructed as a best management practice. An independent registered professional engineer will certify the site was closed following the approved Closure Plan. Post-closure care is not warranted for this site because closure activities will involve removal of the Resource Conservation and Recovery Act constituents of concern.

THIS PAGE INTENTIONALLY LEFT BLANK

1.0 INTRODUCTION

The U-2bu subsidence crater is an historic disposal unit located in Area 2 of the Nevada Test Site (NTS) (Figure 1). The Federal Facility Agreement and Consent Order (FFACO) lists the U-2bu subsidence crater as Corrective Action Unit 109 and Corrective Action Site 02-08-01 (FFACO, 1996). Remediation of the U-2bu subsidence crater is required under the Resource Conservation and Recovery Act (RCRA) operational permit, which is the Permit for a Hazardous Waste Facility, Permit Number NEV HW009 (Nevada Division of Environmental Protection [NDEP], 1995), and the FFACO (FFACO, 1996).

The U-2bu subsidence crater was created in 1971 by an underground nuclear test with the name Miniata. The crater has a diameter of 288 meters (m) (944 feet [ft]) and an approximate depth of 35 m (115 ft) (Figure 2).

The subsidence crater was used as a land disposal unit for radioactive and hazardous waste from 1973 to 1988. The site disposal history is supported by memorandums, letters, and personnel who worked at the NTS at the time of active disposal. Wastes included radioactive-impacted drilling mud that also contained chromium and possibly lead. Drilling mud was collected in a vacuum truck, transported to U-2bu, and dumped into the crater from the northern rim. The vacuum trucks were rinsed with water, which was also disposed in the crater. NTS personnel report that drilling mud from the Baneberry test cleanup and the Area 9 Integrated Test Series, including the Avens-Cream test, were disposed in U-2bu. The total volume of drilling mud and associated rinsate disposed at U-2bu is unknown.

In addition to the drilling mud, 13,000 to 19,000 liters (3,500 to 5,000 gallons) of wastewater and sludge from the Area 6 Decontamination Facility sumps were disposed in U-2bu in November 1988. The wastewater contained solvents and mixed fission products. This was the last waste disposed into U-2bu. Previous disposal of mixed hazardous and radioactive waste from the Decontamination Facility into the crater is undocumented, although personnel working at the facility at the time have stated that previous disposal activities of waste from the Decontamination Facility did take place into U-2bu. The volumes of waste disposed are unknown, however, the waste stream was likely similar to the wastewater and sludge disposed in November 1988. According to a Reynolds Electrical and Engineering Co., Inc. (REECo) memorandum, waste disposal into the crater was officially discontinued in March 1989.

Disposal of waste into the crater has resulted in the development of an erosion gully on the northeast side of the crater running from the top of the crater to an artificial alluvial fan that has formed at the bottom. Historical aerial photographs of the U-2bu subsidence crater show that the fan has grown over the years in association with the disposal of waste. The areal extent of the fan is currently 800 square meters (8,600 square feet) (U.S. Department of Energy [DOE], 1998b).

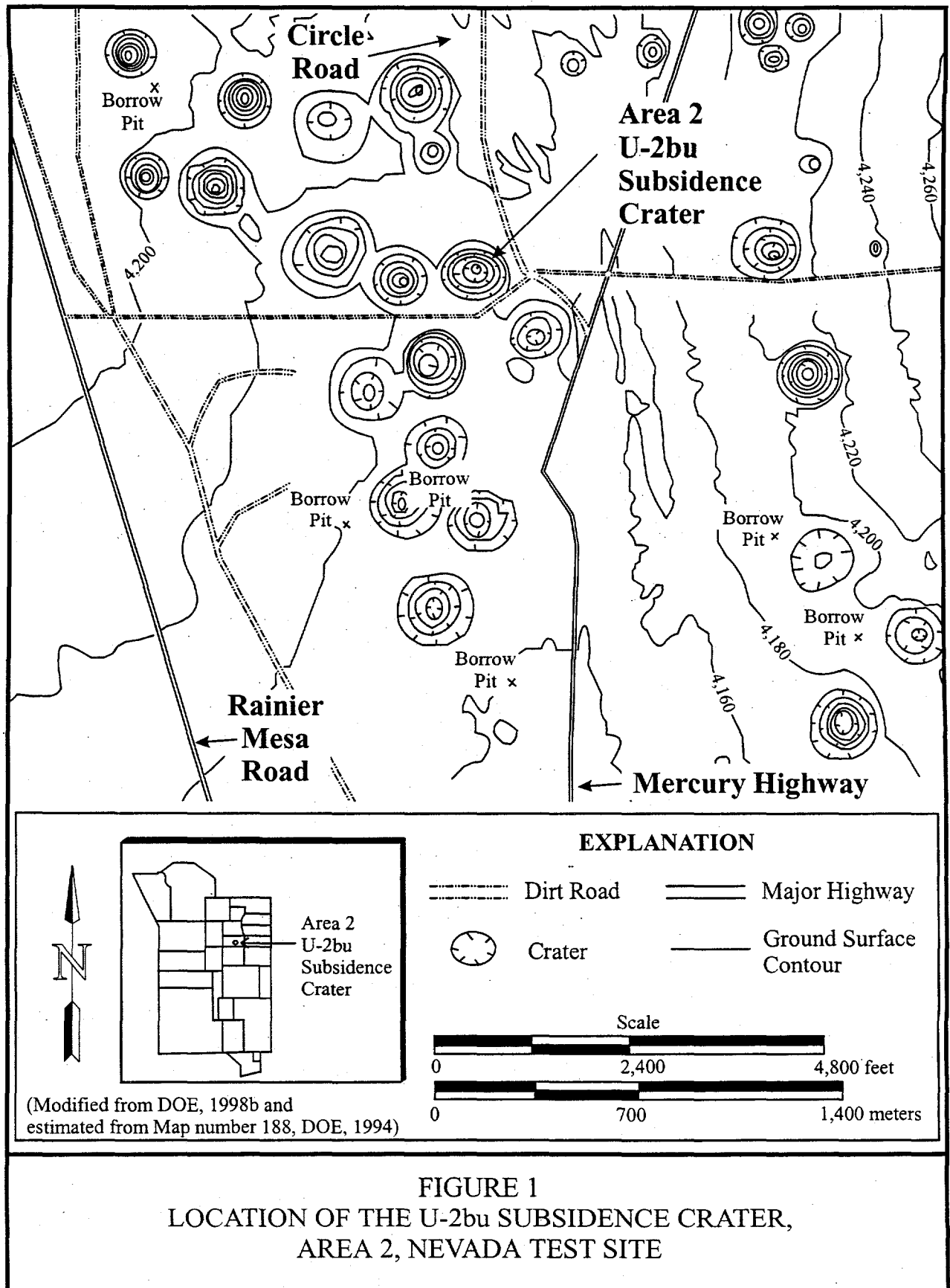
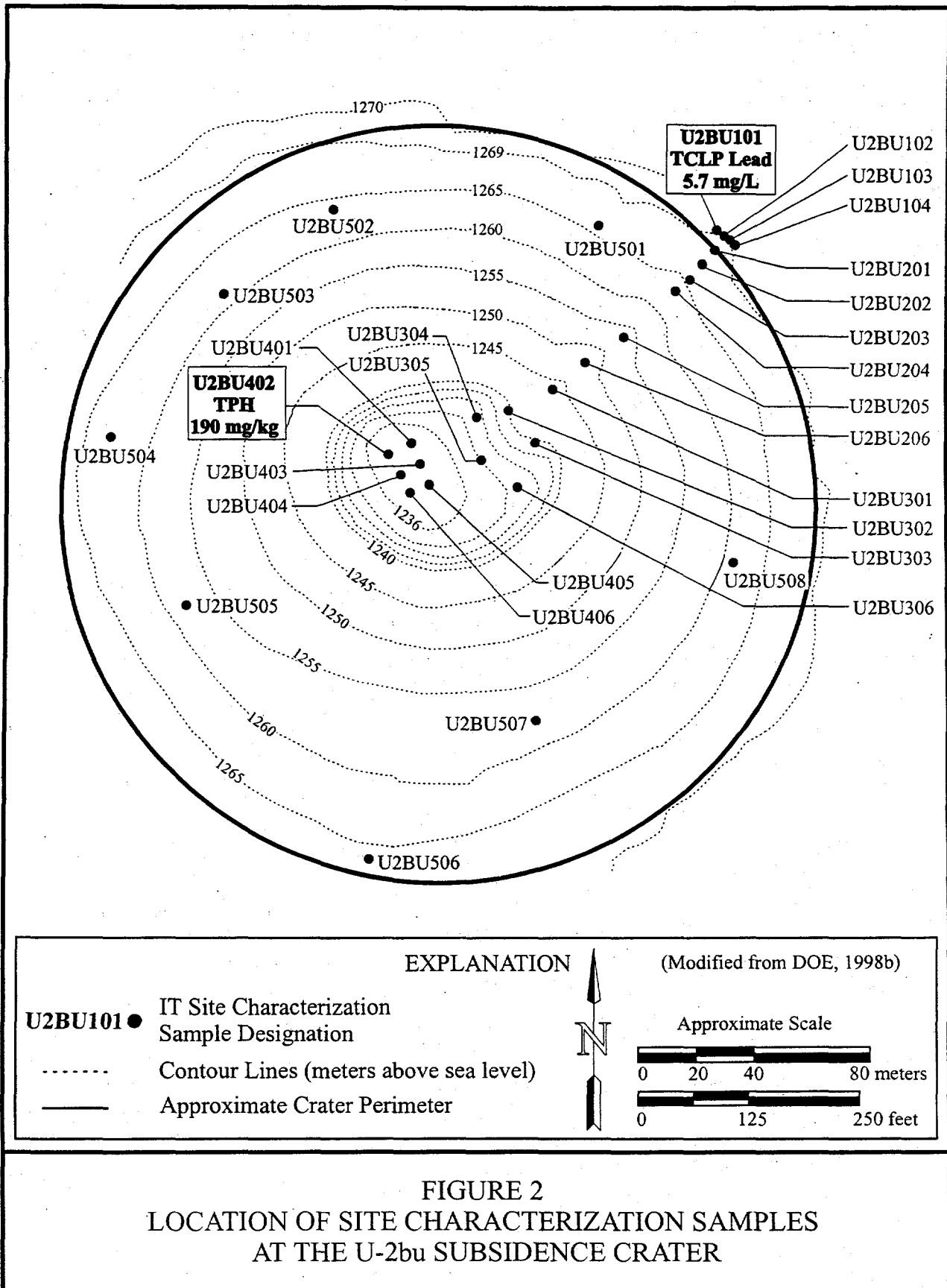


FIGURE 1
 LOCATION OF THE U-2bu SUBSIDENCE CRATER,
 AREA 2, NEVADA TEST SITE



1.1 PURPOSE

The purpose of this Closure Plan is to provide the strategy to close the CAU 109. The only previous characterization activities at U-2bu were conducted in April 1998 and involved the collection of surface and subsurface soil sampling from the north crater rim, the crater bottom, sides, gully, and artificial alluvial fan (DOE, 1998b) (Figure 2).

Soil samples were analyzed for the following:

- Total petroleum hydrocarbons (TPH) in both the gasoline and diesel range
- Toxicity Characteristic Leachate Procedure (TCLP) metals
- Total and TCLP volatile organic compounds and semivolatile organic compounds
- Polychlorinated biphenyls
- Gamma scan and gross alpha/beta

Based on the results of these analyses reported in the site characterization report (DOE, 1998b), the only constituents of concern in the U-2bu subsidence crater include TCLP (leachable) lead and petroleum hydrocarbons. All other potential constituents of concern were below the U.S. Environmental Protection Agency (EPA) Region IX Preliminary Remediation Goals (EPA, 1996a), and the RCRA toxicity characteristics levels established in Title 40 Code of Federal Regulations (CFR) 261.24 (EPA, 1996c). As part of the Data Quality Objective process, and later in the approved Characterization Report (DOE, 1998b), the radiological constituents were not considered constituents of concern at this site. Radiological constituents are only a concern for waste disposal purposes.

Leachable lead was detected at a concentration of 5.7 milligrams per liter (mg/L) at the top of the crater, just above the erosion gully. This concentration exceeds the Title 40 CFR 261.24 (EPA, 1996c) TCLP level of 5.0 mg/L for lead and, therefore, requires removal. Once the lead is removed, the RCRA closure requirements for the site will be met per § 270.1(c)(5 & 6) (EPA, 1996h).

Total petroleum hydrocarbons in the diesel range were found in one sample and its duplicate at the bottom of the crater at a maximum concentration of 190 milligrams per kilogram (mg/kg). This result exceeds the 100 mg/kg action level established in the Nevada Administrative Code (NAC) 445A.227 (NAC, 1996a). However, because the unit is located in a remote, arid environment with a deep water table, and the hydrocarbon is present in low levels that are isolated in the bottom of the crater, this portion of the site should be considered for administrative closure. Detailed information is provided in Appendix A in the "A through K" assessment of risk (NAC, 1996b) that shows that the level of petroleum hydrocarbons present in the U-2bu subsidence crater does not pose a risk to human health and the environment.

1.2 SCOPE

The scope of work for this project consists of the following activities:

- Preplanning and site preparation, including the preparation of all plans and permits, and mobilization of equipment to the site.
- Excavation of the lead impacted soil near the top of the crater.
- Collection of soil samples to verify that lead has been removed to approved levels.
- Decontamination of equipment used to excavate the soil.
- Backfilling the excavated areas.
- Constructing a soil berm as a best management practice to prevent preferential run-on into the erosion gully.
- Removal of the current posting and chain link fencing and restoration of the crater fencing and radiological postings.
- Disposal of excavated materials following applicable federal, state, and DOE regulations in accordance with Section 2.3 of this Closure Plan.

The characterization, handling, shipping, and certification of the impacted soil and other waste will be conducted according to the waste profile developed under the requirements of the Nevada Test Site Waste Acceptance Criteria (NTSWAC) (DOE, 1996a) and the Bechtel Nevada Waste Certification Program Plan for Radioactive Waste Storage or Disposal (Bechtel Nevada [BN], 1996a) as appropriate. Waste control and certification activities will be subject to a U.S. Department of Energy, Nevada Operations Office (DOE/NV) Radioactive Waste Acceptance Program approval process.

1.3 CLOSURE PLAN CONTENTS

This document is divided into the following sections in accordance with the approved FFACO Closure Plan outline:

- Section 1.0 - Introduction
- Section 2.0 - Detailed Statement of Work

- Section 3.0 - Schedule
- Section 4.0 - Post-Closure Plan
- Section 5.0 - References

2.0 DETAILED STATEMENT OF WORK

2.1 CLOSURE APPROACH

This section describes the closure methodology for the U-2bu subsidence crater. Closure will be accomplished following the conditions of Title 40 CFR § 270.1 (EPA, 1996h).

2.1.1 Preplanning and Site Preparation

Prior to beginning closure activities, several planning and preparation activities must be accomplished. These activities include document, plan, and site preparation, as well as delineation of the lead-impacted soil that will require excavation.

2.1.1.1 Site-Specific Health and Safety Plan/Job Hazard Analysis

A Site-Specific Health and Safety Plan (SSHASP) and Job Hazard Analysis (JHA) has been prepared and approved. A copy of the document will be kept on-file in the BN Environmental Restoration and the BN Environmental, Safety, and Health Division offices in Mercury, Nevada. The original document will be kept by the site supervisor at the work site. The SSHASP and JHA will be available on-site for review and signature by all workers prior to beginning work at the site. The SSHASP provides a detailed, job-specific plan covering protection against accidents or exposure of workers to contamination. It also discuss weather/air monitoring, accident reporting, emergency procedures, and physical and environmental hazards. The work will also be performed in accordance with the DOE/NV Environmental Restoration Project Health and Safety Plan (DOE, 1998c) and the BN Environmental, Safety, Security, and Health Manual. In addition, the project specific material safety data sheets will be maintained by the Health and Safety Officer and be available on-site. A Contingency Plan has also been prepared that addresses emergency response situations. A copy of the Contingency Plan is provided in Appendix B.

2.1.1.2 Field Management Plan

A Field Management Plan will be prepared for the closure activities. The plan will outline how the work will be accomplished and provide a detailed schedule for the project. In addition, it will identify the responsible parties for each aspect of the project and determine how decisions will be made. A copy of the Field Management Plan will be placed on file at the BN Environmental Restoration Office in Mercury, Nevada, and a copy will also be available at the project field site.

2.1.1.3 National Environmental Policy Act Documentation

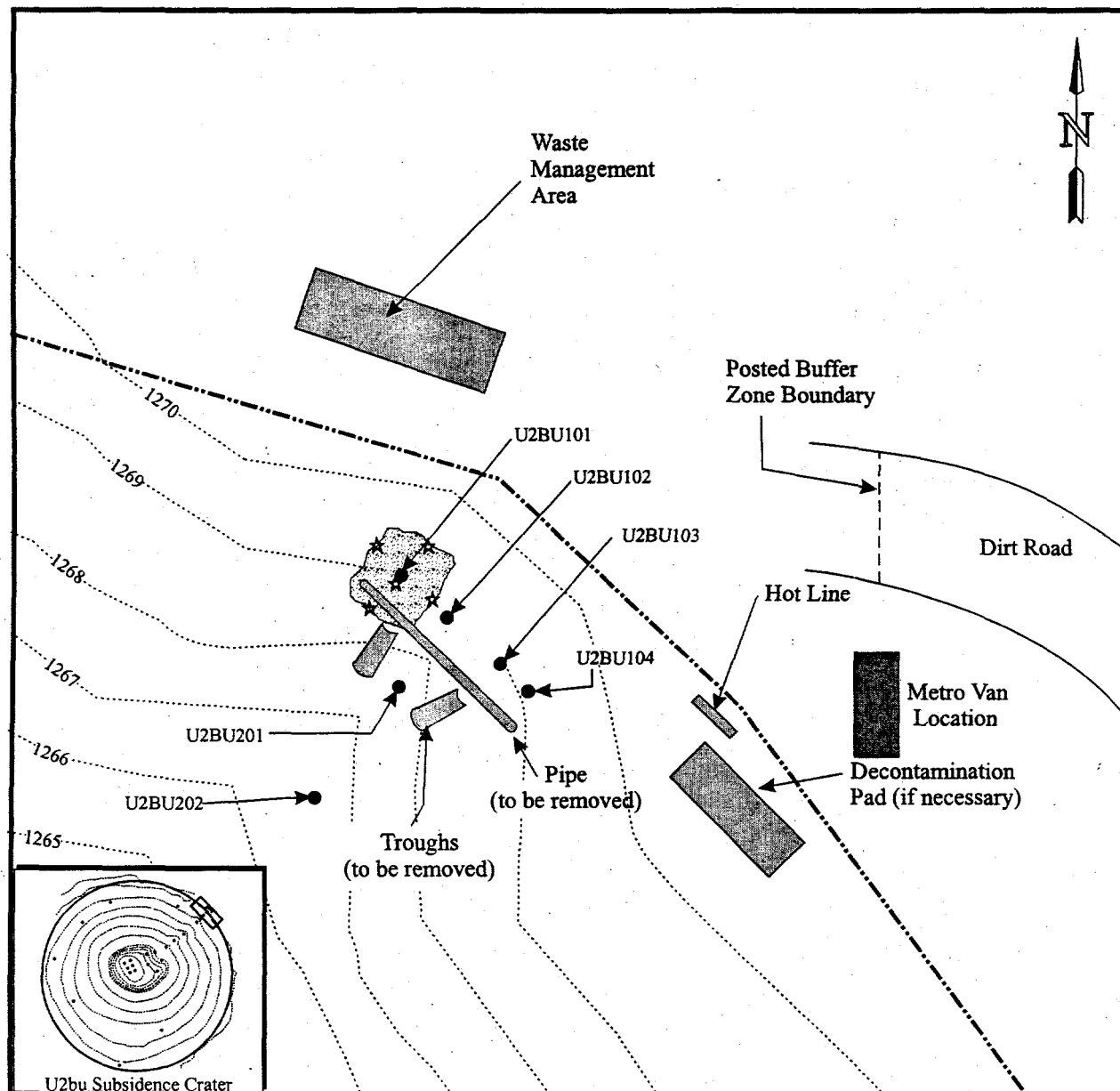
A National Environmental Policy Act checklist has been completed. A biologic survey was performed to report on the condition of existing trees, shrubs, grassed areas, and wildlife immediately adjacent to the area which may be affected by construction activities, equipment and material storage areas, and access routes. Based on the findings of this survey, the excavation activities at the U-2bu subsidence crater will not affect any biological resources. Closure activities at the site will follow all applicable federal, state, and local laws, regulations, and permits for protection of the environment.

2.1.1.4 Pre-Excavation Activity Geoprobe® Sampling

Site characterization indicated that leachable lead was found in Sample U2BU101 (Figure 2) at a depth of 1.2 m (4 ft). In February, soil samples were collected from five locations around site characterization sample U2BU101. The locations of these samples are provided in Figure 3. The samples will be used to more accurately outline the expected boundaries of impacted soil and potentially limit the size of the closure excavation. Limiting the size of the excavation will minimize the amount of waste to be generated and disposed during closure.

The samples were collected using a Geoprobe® by pushing a 1.2-m (4-ft) by 38-millimeter (mm) (1.5-inch) core barrel to a maximum depth of 3 m (10 ft) below site grade. Soil samples were collected from the intervals of 0-0.3 m, 1.2-1.5 m, 1.8-2.1 m, and 2.7-3 m (0-1 ft, 4-5 ft, 6-7 ft, and 9-10 ft). Samples are being analyzed using EPA Method, SW-846 1311/6010/7470 for TCLP metals (EPA, 1996i). To determine if the waste will be disposed as mixed waste, soil samples are also being analyzed for radiological constituents to ascertain if the levels are above the Nevada Test Site Performance Objective for Certification of Nonradioactive Hazardous Waste (REECo, 1995). If Americium is identified from the Gamma Scan, then isotopic analysis for Plutonium will be completed. Quality control samples were collected in accordance with the Nevada Environmental Restoration Project, Industrial Sites, Quality Assurance Project Plan (DOE, 1996b) such that one duplicate and one equipment blank were collected for the sampling activity.

Soil samples were also collected from the borrow pit located adjacent to the U-2bu subsidence crater. Due to the historical use of the land for weapons testing and related activities in this part of the NTS, these samples will serve to determine if the soil in the borrow pit is clean and can be used for backfill material. Unlike the Geoprobe® samples, these samples were collected using a stainless steel scoop from the upper 0-0.15 m (0-0.5 ft) and are only being analyzed for radiological constituents.



EXPLANATION

- | | | | |
|-----------|--|---|--------------------------|
| | Contour Line (meters above sea level) | ☆ | Geoprobe Sample Location |
| - - - - - | Exclusion Zone Boundary
(Rope and Chain Link Fence) | | |
| U2BU101 ● | Characterization Sample | | |
| | Proposed Excavation | | |
-
- | | |
|---------------------|------------------|
| Scale (approximate) | |
| | 0 5 10 15 meters |
| | 0 25 50 feet |

FIGURE 3
 PROPOSED SITE LAYOUT PLAN FOR THE
 U-2bu SUBSIDENCE CRATER FIELD WORK

2.1.1.5 Site Preparation

Site preparation involves regrading and improving the road leading to the crater, mobilization of equipment to the site, designation of the exclusion zone, contamination reduction zone, decontamination area, and waste management area. A proposed site layout is provided as Figure 3. This proposed layout is to be used for planning purposes only and may change depending on conditions at the time field work begins. A piece of steel piping approximately 9 m (30 ft) long and two steel troughs used in the discharge of waste into the crater will be removed from the top of the crater. This debris will be surveyed and swiped for radiological analysis and managed in accordance with Section 2.3 of this Closure Plan.

2.1.2 Field Activities

2.1.2.1 Excavation of the Lead-Impacted Soil

Until analytical results confirm the area of soil impacted by lead, the volumes of soil to be excavated are unknown. The area to be excavated will be delineated by the results of the Geoprobe® sampling of the impacted area. Based on the current knowledge of the site, the excavation will be a minimum of 1.5 m (5 ft) deep and 3 m (10 ft) long. Data is insufficient to determine the width of the excavation at this time. In addition, the actual depth and length of the excavation may increase after Geoprobe® sampling better delineates the impacted area.

During excavation, the soil and excavated area will be examined visually for stains or discoloration that may be the result of the waste discharged into the crater. The excavation will also be surveyed periodically with a hand-held Electra to identify any radiologically impacted soil as a possible indicator of associated lead. Any areas identified as impacted will be removed.

Based on process knowledge, the soil is expected to be radioactive. If the analytical results from the Geoprobe® sampling confirm this assumption, all excavated soil will be managed as a mixed radiological and hazardous waste. Impacted soil will be placed into B-25 boxes following BN Procedure L-E10.308.WWC, "Radioactive Waste Tracking, Handling, and Management at the NTS," (BN, 1998a) and stored temporarily in a waste management area to await disposal in accordance with Section 2.3 of this Closure Plan. The leachable lead levels in the waste will be evaluated to determine if the waste meets the Land Disposal Restrictions (LDRs). If the leachable lead levels are above the LDRs, the waste will be sent to an off-site contracted treatment facility where it will be treated to meet the LDRs. The treated waste will then be returned to the NTS for disposal.

Verification sampling will be done after all impacted soil is believed to have been removed. Sampling will be conducted in accordance with Section 2.4 of this Closure Plan. Collected samples will be analyzed for TCLP metals, because lead is the only constituent of concern for this site. The excavation will remain open until the results of verification samples show that

clean-up levels have been met and no additional excavation is required. Berms will be placed on the upgradient side of the excavation to prevent flooding of the excavation by run-off.

2.1.2.2 Decontamination of Equipment

All equipment and materials used on-site will be surveyed for radiological constituents using hand-held Electras and swipe samples prior to release from the site. Geoprobe® sampling equipment will be decontaminated between samples. The decontamination rinsate that is collected will be placed in a 208-L (55-gallon) drum. Any equipment that becomes contaminated during the excavation process will be decontaminated on-site. For larger pieces of equipment that cannot be decontaminated over a 208-L (55-gallon) drum, a decontamination pad will be established by lining a bermed area large enough to hold a piece of heavy equipment. The equipment will be driven onto the pad and steam cleaned. Hand-held equipment will be cleaned with a solution of Alconox™ and water, and rinsed with clean water. Rinsate will be held in the bermed area and allowed to evaporate unless it is in excess of what the bermed area can hold. Excess rinsate will be pumped into drums. Any remaining rinsate at the time of final site housekeeping will be placed in containers and disposed of following Section 2.3 of this Closure Plan. The plastic liner will be placed in containers as compactable waste and disposed of in accordance with Section 2.3.

2.1.2.3 Construction of Berm

A soil berm will be constructed upgradient of the erosion gully that drains into the crater. This berm will divert run-on away from the erosion gully, which provides preferential drainage into the crater. This gully formed as a result of the disposal practices at the crater and is not aligned with the natural drainage around the crater. In addition, a borrow pit that is approximately 150 m (500 ft) long, 60 m (200 ft) wide, and a maximum of 4.5 m (15 ft) deep, is located approximately 20 m (70 ft) north of crater. This borrow pit intersects the natural drainage of U-2bu capturing any run-on leading toward the crater. The berm is being constructed as a best management practice and is not a regulatory requirement for closure of the site. Based on the information provided in the "A through K" assessment of risk (Appendix A) and historical photographs of the crater (Appendix C), the collapse zone below the crater is not a preferential pathway for hydrocarbon migration. As a result, the levels of petroleum hydrocarbon in the crater and their potential to migrate to the groundwater will not be impacted by run-on into the crater. Therefore, the berm will not require engineering drawings or quality control. The berm will be approximately 1 m (3 ft) in height and will be constructed of clean soil taken from a nearby borrow pit.

2.1.2.4 Site Restoration

After confirmatory sampling indicates that the lead-impacted soils have been removed, the excavated area will be refilled with clean fill material to return the site to its original grade. Low areas formed by the preferential drainage formed by historical disposal practices will be filled to mound above the surrounding grade in order to redirect water run on. All chain-link fencing will be removed and the existing three-strand wire fencing that is necessary around all subsidence craters at the NTS will be repaired and restored where it is missing around the crater.

2.2 CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL

Construction activities primarily consist of excavation and earth moving. As a result, no construction quality assurance/quality control specifications are required.

2.3 WASTE MANAGEMENT

Waste from the closure will be managed following Table 1. Potential waste types include low-level radioactive waste, hazardous waste, mixed waste, and non-hazardous (sanitary) waste. All waste types that are generated will be managed in a manner that complies with all state and federal regulations, DOE orders, BN procedures, and the RCRA Operational Permit. Non-hazardous waste will be handled in accordance with DOE Standard Operating Procedure ERD-05-210, "Management and Minimization of Nonhazardous Waste at the Nevada Test Site for the Nevada Environmental Restoration Project" (DOE, 1994a). If the waste is determined to be hazardous waste, it will be handled in accordance with DOE Standard Operating Procedure ERD-05-211, "Management and Minimization of Hazardous Waste at the Nevada Test Site for the Nevada Environmental Restoration Project" (DOE, 1994b). All low-level radioactive waste and mixed waste containers will be packaged, managed, tracked, and stored according to BN Procedure L-E10.308.WWC, "Radioactive Waste Tracking, Handling, and Management at the NTS" (BN, 1998a). If necessary, a Waste Profile and Material Evaluation Form will be prepared in accordance with the NTSWAC (DOE, 1996a) and BN Procedure L-E10.302.P, "Radioactive Waste Evaluation," (BN, 1996b) based on previous site characterization results.

The only confirmed hazardous constituent of concern is leachable lead, therefore, the waste will be managed as hazardous waste (D008). Process knowledge regarding the waste disposed at the U-2bu subsidence crater indicates that radiological constituents are probably present at the site. Therefore, the samples collected by the Geoprobe® will also be analyzed for radioisotopes for waste characterization purposes. If the soil is found to contain added radioactivity above the Performance Objective Criteria for certification of nonradioactive waste (REECo, 1995), the waste will be managed and disposed of as a mixed waste.

TABLE 1— MANAGEMENT OF VARIOUS WASTE TYPES TO BE PRODUCED AT THE U-2BU SUBSIDENCE CRATER

MEDIA	WASTE TYPE	DECISION
Impacted Soil and Metal Debris	Low-Level Radioactive Waste	Low level waste will be managed in accordance with the BN Procedure L-E10.308.WWC, "Radioactive Waste Tracking, Handling, and Management at the NTS" (BN, 1998a). Waste will be placed into containers, labeled, and placed in the designated waste management area. If necessary, absorbent will be added. Appropriate paperwork (Package Inventory, Waste Traveler, Packaging Certification, Radioactive Material Shipping Exception Record or Radioactive Material Shipping Record, Waste Shipment Checklist, and Certification Statement) will be completed prior to shipment for disposal.
	RCRA-Regulated Hazardous Waste	Waste will be managed in accordance with the DOE Standard Operating Procedure ERD-05-211, "Management and Minimization of Hazardous Waste at the Nevada Test Site for the Nevada Environmental Restoration Project" (1994b). Waste will be placed into containers, labeled, and placed in the designated waste management area where it will be inspected weekly until the time of disposal.
	Mixed waste	Waste will be managed in accordance with BN Procedure L-E10.308.WWC, "Radioactive Waste Tracking, Handling, and Management at the NTS" (BN, 1998a). Waste will be placed into containers, labeled, and placed in the designated waste management area where it will be inspected weekly until the time of disposal. If necessary, absorbent will be added. If the waste does not meet the LDRs, it will be shipped to an off-site treatment facility for treatment prior to disposal at the NTS. Appropriate paperwork (Package Inventory, Waste Traveler, Packaging Certification, Radioactive Material Shipping Exception Record or Radioactive Material Shipping Record, Waste Shipment Checklist, Certification Statement, and NTS Onsite Waste Transport Manifest) will be completed prior to shipment for treatment or disposal.
	Levels Less Than Regulated Limits	The soil will be returned to excavation and used as backfill material.

TABLE 1 (Cont.)— MANAGEMENT OF VARIOUS WASTE TYPES TO BE PRODUCED AT U-2BU SUBSIDENCE CRATER

MEDIA	WASTE TYPE	DECISION
Decontamination Rinsate and Liner	Low-Level Radioactive Waste	Waste will be managed in accordance with the BN Procedure L-E10.308.WWC, "Radioactive Waste Tracking, Handling, and Management at the NTS" (BN, 1998a). Waste will be solidified using Aqua-Set® or an equivalent approved solidification agent, placed into containers, labeled, and placed in the designated waste management area. Appropriate paperwork (Package Inventory, Waste Traveller, Packaging Certification, Radioactive Material Shipping Exception Record or Radioactive Material Shipping Record, Waste Shipment Checklist, and Certification Statement) will be completed prior to shipment for disposal.
	RCRA-Regulated Hazardous Waste	Waste will be managed in accordance with the DOE Standard Operating Procedure ERD-05-211, "Management and Minimization of Hazardous Waste at the Nevada Test Site for the Nevada Environmental Restoration Project" (DOE, 1994b). Waste will be solidified, placed into containers, labeled, and placed in the designated waste management area where it will be inspected weekly until the time of disposal.
	Mixed Waste	Waste will be managed in accordance with BN Procedure L-E10.308.WWC, "Radioactive Waste Tracking, Handling, and Management at the NTS" (BN, 1998a). Waste will be solidified, placed into containers, labeled, and placed in the designated waste management area where it will be inspected weekly until the time of disposal. Appropriate paperwork (Package Inventory, Waste Traveller, Packaging Certification, Radioactive Material Shipping Exception Record or Radioactive Material Shipping Record, Waste Shipment Checklist, Certification Statement, and NTS Onsite Waste Transport Manifest) will be completed prior to shipment for disposal.
	Levels Less Than Regulated Limits	Waste will be allowed to evaporate or solidified, if necessary, and subsequently transported to the Area 9, U10C Landfill for disposal.

TABLE 1 (Cont.)— MANAGEMENT OF VARIOUS WASTE TYPES TO BE PRODUCED AT U-2BU SUBSIDENCE CRATER

MEDIA	WASTE TYPE	DECISION
Personal Protective Equipment (PPE) and Sampling Equipment	Low-Level Radioactive Waste (Based on Field-Screening Background Levels)	Waste will be managed in accordance with the BN Procedure L-E10.308.WWC, "Radioactive Waste Tracking, Handling, and Management at the NTS" (BN, 1998a). PPE generated in association with a hotline will also be managed in accordance with BN Procedure L-A14.107.H, "General Radiological Control Technician Field Instructions" (BN, 1998b). PPE will be placed in the containers of soil to occupy any void space in the container.
	RCRA-Regulated Hazardous	Waste will be managed in accordance with the DOE Standard Operating Procedure ERD-05-211, "Management and Minimization of Hazardous Waste at the Nevada Test Site for the Nevada Environmental Restoration Project" (DOE, 1994b). Waste will be placed into containers, labeled, and placed in the designated waste management area where it will be inspected weekly until the time of disposal.
	Mixed Waste	Waste will be managed in accordance with BN Procedure L-E10.308.WWC, "Radioactive Waste Tracking, Handling, and Management at the NTS" (BN, 1998a). PPE will be placed in the containers of soil to occupy any void space in the container.
	Levels Less Than Field-Screening Background Levels	Waste will be managed as sanitary waste and transported to the Area 9, U10C Landfill for disposal.

2.3.1 Container Management

All containers will be handled following Title 40 CFR § 262.34 (EPA, 1996d) and Subpart I of Title 40 CFR § 265 (EPA, 1996f) which specifies the use and management of containers. All containers will be in good condition (no significant rust or dents) and will only be filled 7/8 of the maximum capacity of the container. If the container begins to leak, the contents will be transferred to a container that is in good condition. The containers will be lined or made of a material that will not react with the waste. The containers will always be closed while stored unless waste is added or removed and will be handled in such a manner that will not jeopardize the integrity of the container. All drums and containers will be locked before the end of each workday.

The B-25 boxes to be used during this project will be filled to meet their weight capacity, which is anticipated to be 3,600 kilograms (8,000 pounds). When the boxes have almost reached their weight capacity, compactable waste will be placed in the B-25 boxes to fill any existing void spaces. After a box has been filled, the waste package will be closed according to BN Procedure L-E10.308.WWC, "Radioactive Waste Tracking, Handling, and Management at the NTS" (BN, 1998a). If a box is not completely filled to capacity at the end of a workday, the lid will be closed without securing the clips and tamper-resistant tape will be placed on the box. A secondary containment system will only be required if the containers hold free liquid or are unprotected from contact with accumulated liquid. Because the majority of the waste produced during this project is anticipated to be soil and debris, secondary containment will not be required. If, however, free liquid is placed into containers, such as the decontamination water, it will be placed on spill containment pallets.

Appropriate labels and relevant information will be marked on each container with an indelible marker and be legible and clearly visible for inspections. Pertinent data may 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 (i.e., it must be marked "Hazardous Waste").
- Location waste was derived from.
- Date accumulation begins/ends.
- "Awaiting Analysis" sticker after sampling has been completed, if sampling is required.

2.3.2 Site Control

A fenced hazardous waste storage area will be established outside of the work area to store material that could potentially be RCRA-regulated, low-level radioactive waste, or mixed waste. This will consist primarily of the B-25 containers. Figure 3 shows the planned location for the waste management area. This location may change as field conditions dictate.

2.3.3 Preparedness and Prevention

Under Title 40 CFR § 265, Subpart C (EPA, 1996f), all hazardous waste facilities must be maintained and operated in a manner that minimizes the possibility of fire, explosion, or any unplanned event. Hazards posed by the waste stored at the facility do not require a specific kind of equipment; however, fire extinguishers will be available in all vehicles on-site. Two-way radios will be available in field vehicles or as hand-held types.

Aisle space between containers must be sufficient to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of the facility in the event of an emergency.

NTS Emergency Response Teams, Fire Department, and the Nye County Sheriff's office will be provided a map with a summary of site information. Mercury Medical will be informed of the type of injury or illness that could result from fires, explosions, or releases at the facility. The work site is a remote location in Area 2 of the NTS. The closest emergency services support is located in Area 6, approximately 22 kilometers (14 miles) south of the site.

2.3.4 Contingency Plan

As required under Title 40 CFR § 265, Subpart D (EPA, 1996f), a contingency plan must be designed to minimize hazards to human health or the environment in the event of fire, explosion, or any unplanned or non-sudden release of hazardous waste constituents. The provisions of the plan must be carried out immediately after such an event and provide actions that facility personnel must take. A copy of the contingency plan is provided in Appendix B.

A copy of the contingency plan and all revisions will be maintained at the facility and provided to the NTS Fire Department, Medical Facilities, and Emergency Response Teams. There must be at least one employee either on the facility premises or on call at all time. This person must have the authority to commit the resources needed to carry out the contingency plan. The emergency coordinator must have thorough knowledge of all aspects of the contingency plan, all operations and activities at the facility, the location and characteristics of the waste handled, the location of the record within the facility, and the facility layout.

2.3.5 Personnel Training

Training for all personnel working at a hazardous waste facility is required as part of Title 40 CFR § 265, Subpart B (EPA, 1996f). The program may be classroom instruction or on-the-job training. On-the-job training must be designed so that personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, equipment, and systems. All personnel responsible for packing low-level or mixed radioactive waste will be required to read and understand BN Procedure L-E10.308.WWC, "Radioactive Waste Tracking, Handling, and Management at the NTS" (1998a). The operators of the facility must maintain the training records at the facility until closure has been completed.

Title 29 CFR § 1910.120 (EPA, 1996b) details the occupational safety and health requirements that will be followed for personnel supporting excavation activities. All personnel will be required to read and understand the SSHASP prior to working at the site. A tailgate safety briefing will be conducted every morning and as needed as activities or circumstances change. In addition, all personnel will require 40-hour Occupational Safety and Health Administration and Radiation Worker II training.

2.3.6 Inspections

An inspection of the areas in which the containers are stored will be conducted at least weekly. The purpose is to identify leaking or deteriorating containers due to corrosion or other factors. Unusual circumstances must be reported immediately so that corrective measures can be taken. Completed inspection forms will be maintained in the project file.

2.3.7 Waste Minimization

For the duration of the project, site workers will adhere to the principles of the BN Waste Minimization and Pollution Prevention Program. Care will be taken to segregate waste from nonwaste materials if at all possible and avoid cross contamination.

2.4 CLEAN-UP VERIFICATION

2.4.1 Verification Sampling

Verification sampling is required at the site. A verification program is designed to support the field decision that any remaining constituents of concern are less than remediation standards and provide the regulator with confidence that sufficient samples have been collected to verify that the site has been remediated. For the U-2bu subsidence crater, the Site Characterization Report (DOE, 1998b) indicated that leachable lead is the only RCRA constituent of concern above remediation standards and that, although present, radioactive constituents are not a constituent of

concern at this site. Therefore, the verification samples will only be analyzed for TCLP metals. The petroleum hydrocarbon in the bottom of the crater is addressed in the information provided in Appendix A supporting an Administrative Closure of the petroleum hydrocarbon impacted portion of the crater. A summary of the type and number of samples to be collected and the analyses to be performed is provided in Table 2. A two-week analytical turnaround time will be requested for all samples.

Samples will be collected from the sidewalls and floor a minimum of every 1.5 m (5 ft) along the length of the excavation. Both sidewall and bottom samples will be collected from below the depth of detectable leachable lead. Because the excavation will be deeper than 1.2 m (4 ft), no one will be allowed into the excavation. Therefore, the excavation equipment will scrape the wall or floor, the samples will then be collected as grab samples from the bucket of the excavation equipment and placed in the proper containers (Table 2). All samples will be labeled with a unique sample number and handled under strict chain-of-custody procedures. Verification samples will be analyzed using the analytical methods shown in Table 2.

Samples will be numbered using the following nomenclature:

U2BUSW-N5E

Where:

- U2BU is the site location
- SW is a sidewall sample (BOT will be used for excavation floor samples)
- N is the compass direction of the sidewall (or relative position of excavation floor samples)
- 5 is the depth of sample in feet
- E is the relative position of the sidewall sample if more than one sample is collected from the same depth but a different location on the same sidewall

2.4.2 Quality Control Samples

One quality control sample (blind replicate) will be collected for every 20 samples collected. Each blind replicate will be labeled with its own distinct sample number so that the laboratory will not be able to readily identify it as a quality control sample. An equipment decontamination blank will also be collected for each sampling event. The data packages provided by the laboratory will be validated and any laboratory method blanks will be evaluated by qualified personnel.

TABLE 2— U-2BU SUBSIDENCE CRATER VERIFICATION SAMPLING PARAMETERS

PARAMETER	NUMBER OF SAMPLES	NUMBER OF QUALITY CONTROL SAMPLES	SAMPLE TOTAL	ANALYTICAL METHOD	SAMPLE CONTAINER
Excavated Area					
TCLP Metals	To Be Determined	1 Blind Replicate and 1 Equipment Blank for every 20 samples	To Be Determined	SW-846, EPA Method 1311/6010/7470 (EPA, 1996i)	1 - 250 mL glass jar
Metal Debris					
Alpha/Beta Gamma	50	N/A	50	1-minute count 20-minute count	42.5-mm diameter filter paper circle
Geoprobe® Samples					
TCLP Metals	20	1 Blind Replicate, 1 Equipment Blank	22	SW-846, EPA Method 1311/6010/7470 (EPA, 1996i)	500-mL nalgene® bottle*
Radioactive Constituents: Gamma Scan, Isotopic Plutonium**	20	1 Blind Replicate 1 Equipment Blank	22	L-E10.602.PC (BN, 1996d) L-E10.601.PL (BN, 1996c)	500-mL nalgene® bottle*

N/A- Not applicable

* Due to the limited sample recovery of the Geoprobe®, both TCLP metals and radioactive constituents will be run from one, 500-milliliter (mL) sample.

** Samples will be analyzed for isotopic plutonium only if the gamma scan indicates an elevated detection of Americium.

2.5 PERMITS

Required permits for this project include a Radiological Work Permit (RWP) and an Excavation and Trenching Permit.

2.5.1 Radiological Work Permit

An RWP has been prepared and approved to inform workers of the specific personnel protective equipment necessary to protect them while performing their tasks. The workers will be required to read the permit and acknowledge their understanding of the requirements before entry into the exclusion zone. The RWP will be maintained by the radiological control personnel at the access station. All site workers will be required to be Radiation Worker II-certified.

2.5.2 Excavating and Trenching Permit

An approved Excavating and Trenching Permit will be obtained prior to any excavation. The permit contains a justification for the trenching operation and a checklist of pertinent organizations who must inspect the site so that the trenching will not impact utilities. A copy of this permit will be kept at the project site by the site supervisor.

2.6 CLOSURE CERTIFICATION

Closure will be verified through appropriate observations and documentation of closure activities. A closure report detailing the closure activities will be prepared and submitted by DOE/NV by certified mail or other means of verifiable delivery to the NDEP. The report will contain:

- Information regarding the volume of impacted material removed from the various components of the unit.
- The disposal history of the impacted soil and other wastes generated during the clean closure of the unit.
- The methodology used and results of verification sampling of the unit.

- Photographs of closure activities.
- Figures identifying excavation and sample areas.

Included in the closure report will be certification by an Independent, Registered Professional Engineer, and an authorized representative of DOE/NV that the unit has been closed following this plan. The NDEP has waived the Title 40 CFR § 265.115 (EPA, 1996g) requirement that the certification and closure report be submitted to the NDEP within 60 days of the completion of closure activities. The closure certification and closure report will be delivered by the date specified in Section 3.0.

3.0 SCHEDULE

3.1 PROJECT SCHEDULE

A project schedule for the U-2bu subsidence crater closure is provided in Table 3. The schedule will require modifications if conditions exist that are outside the assumptions on which the schedule is developed. The DOE will keep the NDEP apprised of any conditions that may impact the project schedule. In the event that the project schedule requires modifications, the DOE will consult with NDEP personnel prior to initiating any changes.

3.2 FIELD WORK CLOSURE SCHEDULE

The schedule for closure field work for the unit can be found in Table 3. In general, planned field work consists of the following:

- Geoprobe® Sampling February 1999
- Preparation for Construction Field Work April 1999
- Excavation Activities May-June 1999
- Management and Disposal of Waste May-September 1999
- Verification Sampling June 1999
- Final Site Restoration July 1999

Field work will be done in the most efficient manner possible. All verification and waste characterization samples will be submitted for a three-week analytical turnaround. Sufficient flexibility has been placed in the project schedule to account for minor difficulties (weather, equipment breakdown, etc.). The schedule may require modification if conditions exist that are outside the assumptions on which the schedule was developed.

24

4.0 POST-CLOSURE PLAN

Closure of the U-2bu subsidence crater is governed by the RCRA Operational Permit (NDEP, 1995) and the FFACO (1996). This document meets the RCRA Operational Permit requirement for submittal of a Closure Plan to NDEP for approval. The closure of the U-2bu subsidence crater is subject to the conditions of Title 40 CFR § 270.1. Under the conditions of Title 40 CFR § 270.1(c)(5) and (6) (EPA, 1996h), no post-closure permit is required if it is demonstrated that the closure meets the requirements of Title 40 CFR § 264.228, Title 40 CFR § 264.280(e) (EPA, 1996e), or Title 40 CFR § 264.258 (EPA, 1996e), respectively. The level of post-closure care will be determined by demonstration of closure equivalency under Title 40 CFR § 270.1(c)(5) and (6) (EPA, 1996h). The closure of the U-2bu subsidence crater is expected to meet these requirements and no post-closure care will be required.

4.1 INSPECTIONS

During this closure, the RCRA constituents of concern (leachable lead) will be removed to concentrations below the regulatory action level. In addition, the "A through K" assessment of risk (Appendix A) provides support that conditions at the CAU will not adversely impact human health and the environment. Therefore, inspections will not be required following closure. The land restrictions will be limited to safety restrictions and postings required for all subsidence craters at the NTS.

4.2 MONITORING

Based on the "A through K" assessment of risk (Appendix A), the petroleum hydrocarbons identified in the crater bottom will not impact the groundwater beneath the CAU or any nearby drinking water well. Therefore, post-closure monitoring is not required.

4.3 MAINTENANCE AND REPAIR

The only construction planned as part of the closure of the U-2bu subsidence crater is the soil berm to reduce run-on into the crater. This berm is only being constructed as a best management practice and, as a result, maintenance or repairs will not be necessary at the site following closure.

THIS PAGE INTENTIONALLY LEFT BLANK

5.0 REFERENCES

BN, see Bechtel Nevada.

Bechtel Nevada, 1996a, Waste Certification Program Plan for Radioactive Waste Storage or Disposal at the Nevada Test Site, B-A20/96.03, Revision 1, Las Vegas, NV.

Bechtel Nevada, 1996b, "Radioactive Waste Evaluation," L-E10.302.P, Las Vegas, NV.

Bechtel Nevada, 1996c, "Detection of Plutonium in Air, Water, and Soil," L-E10.601.PL, Las Vegas, NV.

Bechtel Nevada, 1996d, "Gamma Ray Spectrometry Operations," L-E10.602.PC, Las Vegas, NV.

Bechtel Nevada, 1998a, "Radioactive Waste Tracking, Handling, and Management at the NTS," L-E10.308.WWC, Las Vegas, NV.

Bechtel Nevada, 1998b, "General Radiological Control Technician Field Instructions" L-A14.107.H, Revision 1, Las Vegas, NV.

DOE, see U.S. Department of Energy.

EPA, see U.S. Environmental Protection Agency.

Federal Facilities Agreement and Consent Order (FFACO) of 1996. Prepared by Nevada Division of Environmental Protection, U.S. Department of Energy, and U.S. Department of Defense.

NAC, see Nevada Administrative Code.

NDEP, see Nevada Division of Environmental Protection.

Nevada Administrative Code, 1996a, NAC 445A, Corrective Action, Carson City, NV.

Nevada Administrative Code, 1996b, NAC 459.9974, Disposal and Evaluation of Contaminated Soil, Carson City, NV.

Nevada Division of Environmental Protection, 1995, Permit For a Hazardous Waste Facility, Permit Number NEV HW009.

REEC Co, see Reynolds Electrical and Engineering Co., Inc.

Reynolds Electrical and Engineering Co., Inc., 1995, Nevada Test Site Performance Objective for Certification of Nonradioactive Hazardous Waste, Mercury, NV.

U.S. Department of Energy, Nevada Operations Office, 1989, Offsite Radiation Exposure Review Project, Phase II Soils Programs, Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office, 1994a, Standard Operating Procedure, "Management and Minimization of Nonhazardous Waste at the Nevada Test Site for the Nevada Environmental Restoration Project," ERD-05-210, September 30, 1994, Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office, Standard Operating Procedure, 1994b, "Management and Minimization of Hazardous Waste at the Nevada Test Site for the Nevada Environmental Restoration Project," ERD-05-211, September 30, 1994, Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office, 1994c, Nevada Test Site Grid Map, EG&G Remote Sensing Laboratory, Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office, 1996a, Nevada Test Site Waste Acceptance Criteria, Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office, 1996b, Nevada Environmental Restoration Project, Industrial Sites, Quality Assurance Project Plan, Nevada Test Site, Nevada, Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office, 1996, Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada, DOE/EIS 0243, Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office, 1998a, RCRA Part A Permit Characterization Plan for the U-2bu Subsidence Crater, Revision 0, DOE/NV--499, Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office, 1998b, Characterization Report for Corrective Action Unit 109: Area 2 U-2bu Crater, Nevada Test Site, Nevada, Revision 1, DOE/NV--517, Las Vegas, NV.

- U.S. Department of Energy, Nevada Operations Office, 1998c, Nevada Environmental Restoration Project, Health and Safety Plan, Revision 3, Las Vegas, NV.
- U.S. Environmental Protection Agency, 1996a, Region IX Preliminary Remediation Goals (PRGs), San Francisco, CA.
- U.S. Environmental Protection Agency, 1996b, Title 29 Code of Federal Regulations 1910.120, "Hazardous Waste Operations and Emergency Response," Washington, D.C.
- U.S. Environmental Protection Agency, 1996c, Title 40 Code of Federal Regulations 261.24, "Toxicity Characteristic," Washington, D.C.
- U.S. Environmental Protection Agency, 1996d, Title 40 Code of Federal Regulations 262.34, "Accumulation Time," Washington, D.C.
- U.S. Environmental Protection Agency, 1996e, Title 40 Code of Federal Regulations 264.228, 264.258, 264.280, "Closure and Post-Closure Care," Washington, D.C.
- U.S. Environmental Protection Agency, 1996f, Title 40 Code of Federal Regulations 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Washington, D.C.
- U.S. Environmental Protection Agency, 1996g, Title 40 Code of Federal Regulations 265.115, "Certification of Closure," Washington, D.C.
- U.S. Environmental Protection Agency, 1996h, Title 40 Code of Federal Regulations 270.1, "EPA Administered Permit Programs: The Hazardous Waste Permit Program, Subpart A - General Information," Washington, D.C.
- U.S. Environmental Protection Agency, 1996i, Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), Third Edition, Washington, D.C.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A

“A THROUGH K” EVALUATION

THIS PAGE INTENTIONALLY LEFT BLANK

"A THROUGH K" EVALUATION

One of the state regulatory requirement affecting the closure of the U-2bu subsidence crater is the requirement of NAC 445A.227 (NAC, 1996), Contamination of Soil: Order by Director for Corrective Action: Factors to be Considered in Determining Whether Corrective Action is Required, referred to as "A through K." The following provides the NDEP with information to determine if corrective action is required.

Depth of groundwater (A): Depth to groundwater at the site is estimated to be at 597 m (1,960 ft) below ground surface. The estimated depth is based on the regional potentiometric surface map provided in the DOE Environmental Impact Statement (DOE, 1996).

The test that formed the U-2bu subsidence crater was detonated below the groundwater level. However, the collapse zone that formed below the crater is not considered a preferential pathway for transport of petroleum hydrocarbons to the groundwater. This determination is based on the extensive studies of the subsidence craters in the Area 3 Radioactive Waste Management Area, which is located in Yucca Flat approximately 8 km (5 mi) south of the U-2bu subsidence crater. In particular, the collapse zone of the U-3bh subsidence crater was studied by drilling from the crater floor directly into the collapse zone to a depth below natural ground surface of 150 m (492 ft). The collapse zone under U-3at, U-3ax and U-3bl were also studied by drilling angle holes under the craters and into the collapse zone. Samples were collected and analyzed for both physical and hydraulic properties (Schmeltzer et al., 1996; DOE1998b).

These studies concluded that the physical and hydraulic properties of the collapse zone below the crater are undifferentiated from those of the undisturbed alluvium (Schmeltzer et al., 1996; DOE1998b). Comparison of the properties of the collapse zone and the undisturbed alluvium suggests that the collapse zone is neither more nor less homogeneous than the native alluvium. In addition, as part of the core descriptions, geologists described visual indications of moisture content, particle size distribution, lithology, sorting, grain shape, and any anomalies including indications of preferential pathways. No visual evidence of preferential pathways for water was observed in the cores.

Historical aerial photographs of the U-2bu subsidence crater from the late 1970's and early 1980's show varying degrees of ponding in the crater. Visual observations of the crater bottom indicate that is ringed by trees and large shrubs and contains mud desiccation cracks, which indicates that ponding has occurred and abnormal drainage pathways are not present under the crater. Photographs showing ponding and vegetation growth are included in Appendix C. According to the studies (Schmeltzer et al., 1996; DOE1998b), infiltration and ponding in the craters has lead to a zone of higher water content in the collapse zone of the craters than background. However, the depth of the zone varies depending on past precipitation events and the size of the catchment area for a particular crater. For the U-3bh crater, this zone extended to a depth of approximately 80 m (263 ft). However, data from the characterization of U-3bh show effects of evaporation

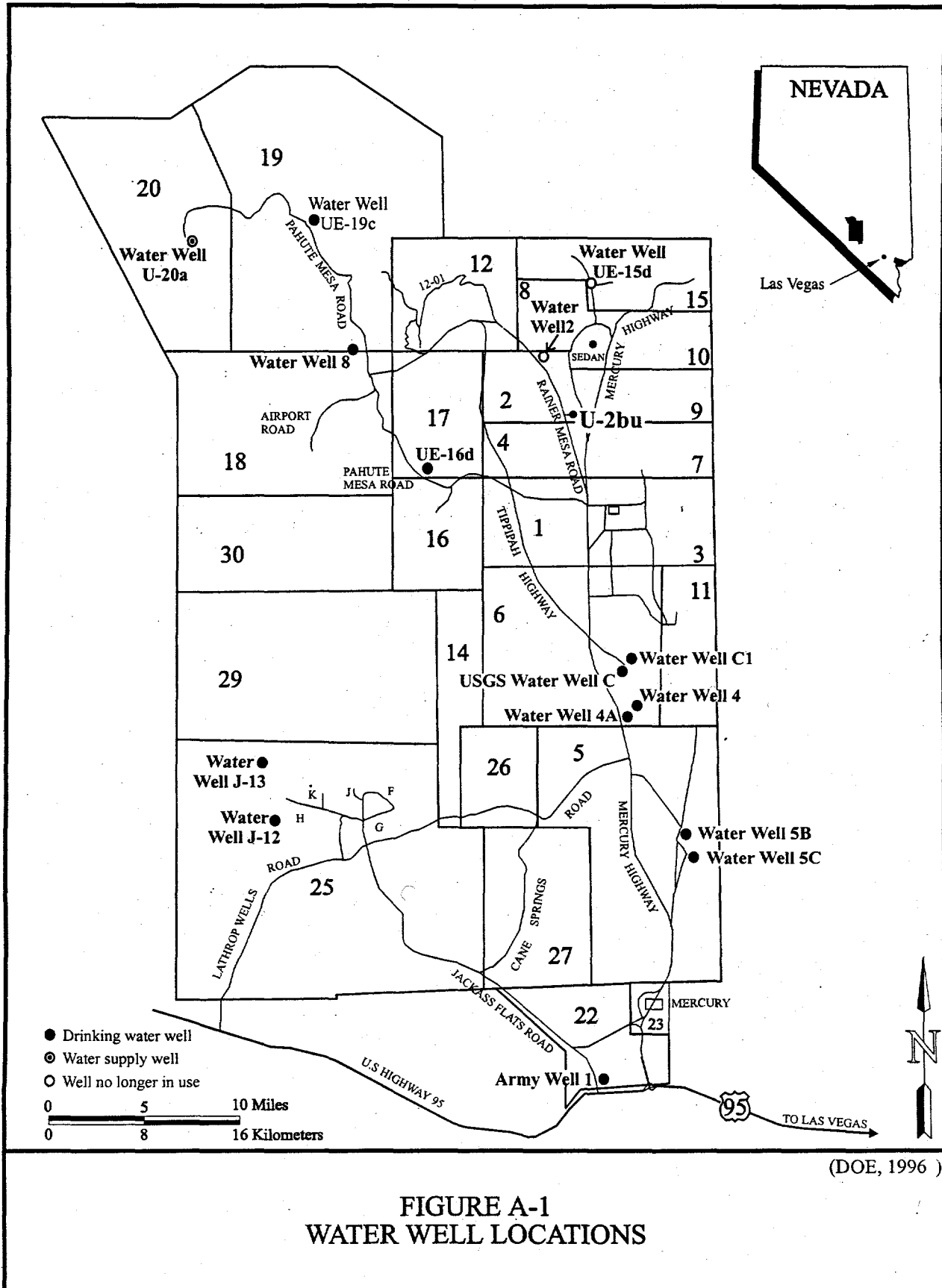
extending as deep as 45 m (148 ft). In addition, the vadose zone below 80 m (263 ft) at U-3bh showed no influence from the presence of the crater. Below this depth, conditions are the same as those for native alluvium.

Comparison of mean and standard deviations for physical and hydraulic properties of the collapse zone demonstrates that these properties have not been altered by the nuclear test. These results indicated that the collapse zone is not a preferential pathway and there is no indication of enhanced permeability.

Distance to irrigation or drinking water wells (B): The nearest water supply is located at Well 2, approximately 4.8 km (3 mi) north of the site. This well is inactive. The static water level in 1984 was measured at 736 m (2,416 ft) below ground surface (Raytheon Services Nevada, 1986). The nearest active well is UE-16d, which is located approximately 16 km (10 mi) southeast of the site (DOE, 1996). The locations of all water wells at the NTS are shown in Figure A-1.

Type of soil (C): Geotechnical results from soils at the bottom of the U-2bu subsidence crater collected during the characterization of the site consisted of 91 percent silt and clay with 9 percent sand content (DOE, 1998a). These site characterization samples were not intended to characterize the collapse zone. However, they representative the material that was disposed in the crater and the finer material that has washed down with run-on. Given the similar geologic and hydrologic settings throughout Yucca Flat, the soils from the U-3bh collapse zone are considered similar to those of U-2bu. Soils from the U-3bh collapse zone were found to contain approximately 61 to 95 percent sand, with an average of 81 percent (DOE, 1998b). The silt and clay fractions were less than 30 and 10 percent respectively. These fractions are typical of a loamy sand to sandy loam texture, which is also typical of undisturbed alluvium in Yucca Flat. Whereas particle size fractions are similar to undisturbed samples, on average, the silt fraction in the collapse zone is 3 percent higher than the mean for the undisturbed samples. This increase is possibly due to sediment deposition in the bottom of the crater. Dry bulk densities ranged from 1,230 to 1,830 kilograms per cubic meter, with no obvious trend with depth. These values are within the range of bulk densities commonly observed for undisturbed alluvium on the NTS (DOE, 1998b). These values are also in the range of the soils collected from the gully and sides of the U-2bu subsidence crater (DOE, 1998a).

Annual precipitation (D): Annual rainfall in the site vicinity over a three-year period (February 1960 to August 1964) is tabulated in the report, Daily, Seasonal, and Annual Precipitation at the Nevada Test Site, Nevada, (Desert Research Institute [DRI], 1986). The data was collected from Station 353, which is located near the Area 2 Base Camp and had a recorded average annual precipitation of 10.9 cm (4.31 in) for the time period measured (DRI, 1986). Long-term



precipitation records are available from Meteorological Station BJY, located in Area 3, which has been recording data for over 30 years. The data from this station indicates that the average rainfall for the time period 1960 through 1998 was 16.5 cm (6.5 in). The maximum rainfall of 37.36 cm (14.71 in) occurred in 1998 and the minimum of 3.89 cm (1.53 in) occurred in 1964. Precipitation data is provided in Figure A-2 and Table A-1.

Type of regulated substance released (E): Petroleum hydrocarbon in the diesel range was identified in a soil sample and duplicate soil sample from the bottom of the crater at a maximum level of 190 mg/kg (DOE, 1998a).

Extent of contamination (F): The extent of contamination is limited to the bottom of the U-2bu subsidence crater. The lateral extent of the contamination is limited by clean samples collected to the north, northwest, and west of the impacted sample location. These clean sample locations are between 8 m and 11 m (25 ft and 36 ft) from impacted area.

Present and potential land use (G): The impacted soil is located in the bottom of a subsidence crater at the NTS. The boundaries of the NTS are secured. Entrance into the bottom of the subsidence craters at the NTS is restricted. There is no potential land use scenario for the U-2bu subsidence crater.

Preferred routes of migration/exposure pathways of concern (H): The impacted soil is located in the bottom of a crater, therefore, surface migration is not a concern. The most likely route of migration would be vertically. However, the great depth to groundwater, low amount of annual precipitation, large amount of evaporation, natural attenuation of hydrocarbons in soil, and low petroleum hydrocarbon concentrations, it is unlikely that hydrocarbons will reach groundwater.

In addition, the lack of preferential pathways, as discussed in "Depth to Groundwater (A)," greatly reduces the chance that hydrocarbons will reach groundwater. Surface flow into the crater would have a minimal impact on the potential of hydrocarbons to reach the groundwater (DOE, 1998b). A borrow pit approximately 150 m (500 ft) long, 60 m (200 ft) wide, and 4.5 m (15 ft) deep, is located approximately 20 m (70 ft) north of crater. This borrow pit intersects the natural drainage and captures any run-on from natural drainage leading toward the crater. In addition, a soil berm will be constructed upgradient of the erosion gully that drains into the crater. This berm will divert run-on away from the erosion gully, which provides preferential drainage into the crater.

The site does not have an immediate inhalation or contact exposure pathway because entrance into the craters at the NTS is not allowed without permission from the National Laboratory responsible for the test and the DOE Site Use and Development Board. In addition, the impacted soil at the bottom of the U-2bu subsidence crater is located approximately 35 m (115 ft) below the top of the crater, which is the nearest personnel could be to the impacted area.

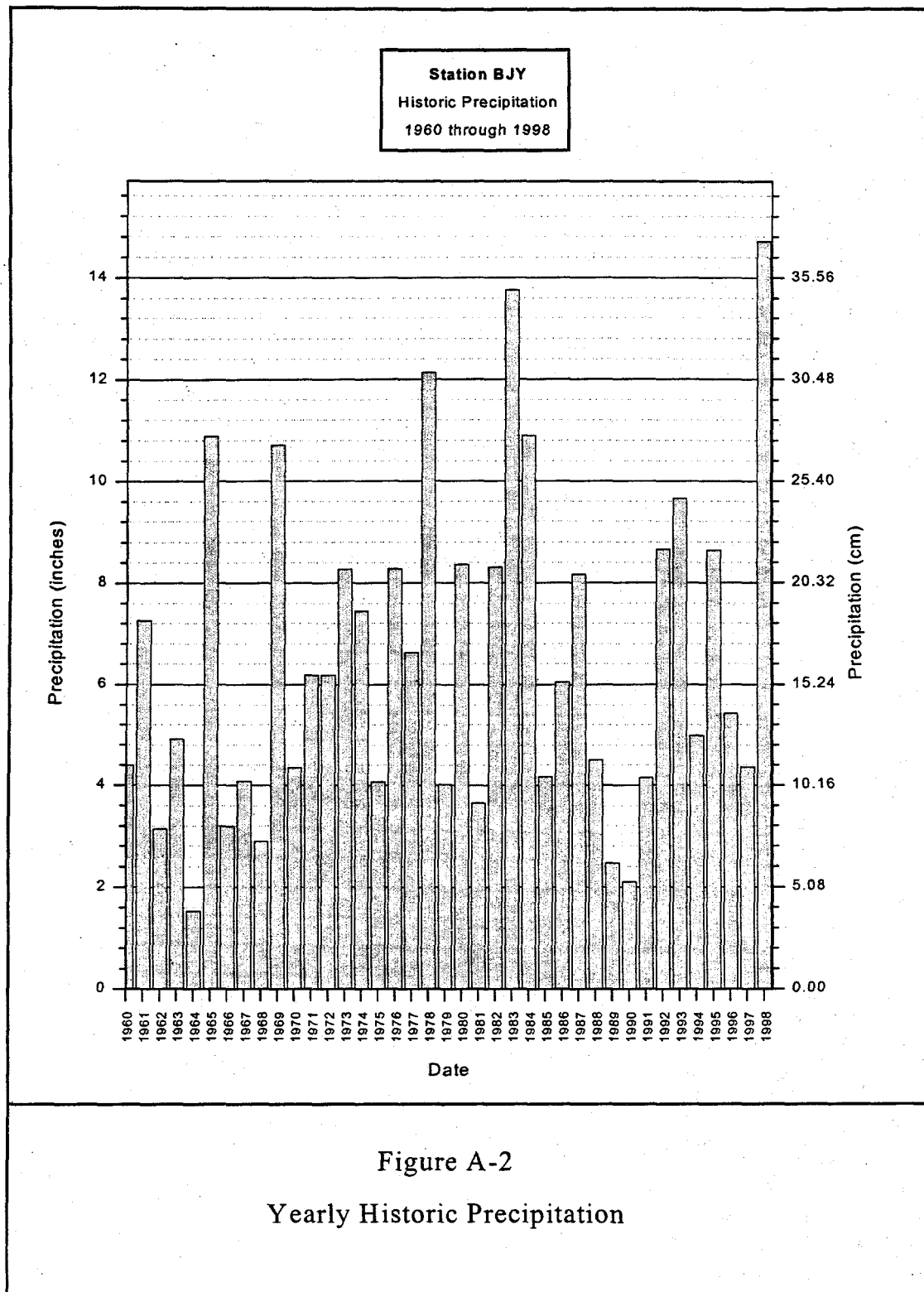


TABLE A-1- BJY PRECIPITATION RECORDS

BJY PRECIP	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEARLY AVERAGE
1960	*****	0.15	0.28	0.18	0.02	0.42	0.02	0.01	0.97	0.87	1.48	0	4.40
1961	0.38	0	0.53	0.38	0.29	0.02	0.94	2.64	0	0.17	0.86	1.05	7.26
1962	0.11	1.22	0.18	0.02	0.08	0.11	0.45	0	0.52	0.16	0.01	0.29	3.15
1963	0.04	0.46	0.38	0.15	0.46	0.64	0.01	0.43	1.89	0.12	0.32	0.02	4.92
1964	0	0	0.06	0.2	0.17	0.09	0.64	0.18	0	0.04	0.15	0	1.53
1965	0.27	0.03	0.49	2.4	0.25	0.14	1.54	0.82	0.02	0.11	2.37	2.45	10.89
1966	0.16	0.09	0.01	0	0	0	0.94	0.62	0.21	0	0.01	1.16	3.20
1967	0.51	0.22	0.06	0.63	0.23	0.12	0.68	0.25	0.41	0	0.58	0.39	4.08
1968	0.01	1.16	0.16	0.15	0	0.25	0.66	0.24	0	0.15	0.11	0.01	2.90
1969	3.41	3.17	0.55	0.19	0.07	0.78	0.72	0.03	1.21	0.24	0.33	0.02	10.72
1970	0.08	0.8	0.41	0.28	0	0.09	0.09	1.2	0.02	0	1.29	0.09	4.35
1971	0	0.33	0.02	0.41	1.69	0	0.39	0.67	0.05	0.01	0.01	2.61	6.19
1972	0	0	0	0.01	0.08	1.22	0.02	0.69	0.82	1.49	1.85	0.01	6.19
1973	1.11	2.06	3.58	0.21	0.2	0.14	0	0.05	0.01	0.37	0.32	0.22	8.27
1974	2.29	0	0.66	0.03	0	0	1.1	0.4	0	1.36	0.04	1.57	7.45
1975	0.05	0.1	1.36	0.61	0.82	0	0.08	0.05	0.21	0.75	0.02	0.02	4.07
1976	0	3.1	0.23	0.47	0.38	0	0.74	0	1.6	1.41	0	0.35	8.28
1977	1.06	0	0.04	0	2.02	0.41	0.07	2.38	0	0.07	0.1	0.48	6.63
1978	2.44	3.42	2.83	0.49	0.05	0	0.48	0	0.68	0.3	0.88	0.56	12.13
1979	1.08	0.44	0.98	0	0.08	0.01	0.76	0.4	0.02	0	0	0.25	4.02
1980	2.6	1.75	1.92	0.4	0.23	0.15	0.77	0.13	0.37	0	0	0.04	8.36
1981	0.32	0.06	1.46	0.42	0.15	0	0	0.1	0.46	0.23	0.45	0	3.65
1982	0.61	0.16	2.22	0.42	0.61	0.08	0.44	1.08	1.02	0.1	1.22	0.35	8.31
1983	1.72	0.58	2.75	0.48	0.36	0	0	4.93	0.99	0.06	0.71	1.18	13.76
1984	0	0.1	0	0.02	0	0.75	3.42	3.04	0.03	0.21	0.9	2.43	10.90
1985	0.88	0.15	0.21	0.01	0.19	0.36	0.84	0	0.09	0.21	1.09	0.14	4.17
1986	1.28	0.51	1.1	0.16	0.1	0.02	0.55	0.33	0.02	0.46	0.59	0.93	6.05
1987	1.25	0.3	0.37	0.64	1.56	0.27	1.41	0	0	0.87	0.86	0.64	8.17
1988	1.3	0.27	0.02	1.31	0.29	0.13	0.06	0.73	0.01	0	0.15	0.23	4.50
1989	0.27	0.48	0.02	0	0.96	0.15	0	0.55	0	0.05	0	0	2.48
1990	0.52	0.13	0.22	0.2	0.12	0	0.36	0.29	0.15	0	0.07	0.05	2.11
1991	0.12	0.76	1.08	0.01	0.19	0.1	0.06	0.31	0.34	0.26	0	0.92	4.15
1992	0.42	1.53	1.86	0	1.36	0.2	0.41	0	0	0.81	0	2.07	8.66
1993	3.44	3.36	0.7	0	0	0.36	0	0.41	0.04	0.39	0.49	0.47	9.66
1994	0.36	0.69	0.71	0.26	0.39	0	0.15	0.13	0.08	0.02	0.57	1.63	4.99
1995	3.09	1.25	2.55	0.56	0.71	0.16	0.13	0.16	0	0.03	0	0	8.64
1996	0.11	0.38	0.21	0	0.26	0.33	0.36	0.05	0	0.67	2.48	0.58	5.43
1997	1	0.09	0	0	0.06	0.55	0.15	0.12	1.34	0	0.44	0.61	4.36
1998	0.43	5.68	1.67	0.66	0.56	2.16	1.42	0.81	0.61	0.59	0.11	0.01	14.71
Average	0.86	0.90	0.82	0.32	0.38	0.26	0.53	0.62	0.36	0.32	0.53	0.61	6.50

Location of structures or impediments (I): There are no structures within the immediate vicinity of the U-2bu subsidence crater. Other impediments include the remote location of the subsidence crater and the presence of impacted soil only in the bottom of the subsidence crater.

Potential for hazard related to fire, vapor, or explosion (J): The potential for fire, vapor ignition, or explosion at the site as a result of the release is extremely low. The impacted soil is below ground surface, at the bottom of the subsidence crater, and consists of weathered diesel. Field screening performed at the time of site characterization indicated that levels of volatile organic compounds are very low and do not exist in concentrations to support combustion.

Other factors specific to the site (K): The following are additional factors specific to the site that should be considered in the evaluation for closure:

- The U-2bu subsidence crater was closed to disposal in March 1989. Therefore, no additional petroleum hydrocarbons will be disposed in the crater and the concentrations will decrease over time due to natural degradation.
- The impacted soil is located in the bottom of the U-2bu subsidence crater and access is restricted into all craters on the NTS. In addition, boundaries of the NTS are secured. The likelihood that the site will be used for future private use is very low.
- Based on the results of the Characterization Report (DOE, 1998a), no other constituents of concern were identified above regulatory limits in the area impacted with petroleum hydrocarbons and the concentrations of diesel were very low (190 mg/kg).
- The presence of low levels of petroleum hydrocarbons within a crater created from the detonation of a nuclear device presents minimal concerns to the environment (i.e., soil and ground water) in contrast to the radioactive constituents still present in the subsurface as a result of the nuclear testing.

REFERENCES

DOE, see U.S. Department of Energy

DRI, see Desert Research Institute

Desert Research Institute, 1986, Daily, Seasonal, and Annual Precipitation at the Nevada Test Site, Nevada, Las Vegas, NV

NAC, see Nevada Administrative Code

Nevada Administrative Code, 1996a, NAC 445A, Corrective Action, Carson City, NV.

Schmeltzer, J.S., Barker, L.E., and Blout, D.O., 1996, Site Characterization Data from the U3ax/b1 Exploratory Borehole at the Nevada Test Site, DOE/NV/11718-003, Las Vegas, NV.

Raytheon Services Nevada, 1986, Nevada Site Development Plan, Part I, Las Vegas, NV

U.S. Department of Energy, Nevada Operations Office, 1996, Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada, DOE/EIS 0243, Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office, 1998a, Characterization Report for Corrective Action Unit 109: Area 2 U-2bu Crater, Nevada Test Site, Nevada, Revision 1, DOE/NV-517, Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office, 1998b, Hydrogeologic Characterization of the Unsaturated Zone at the Area 3 Radioactive Waste Management Site, DOE/NV/11718-210, Las Vegas, NV.

APPENDIX B

CONTINGENCY PLAN

THIS PAGE INTENTIONALLY LEFT BLANK

AREA 2
U-2BU SUBSIDENCE CRATER
CONTINGENCY PLAN AND EMERGENCY
PROCEDURES

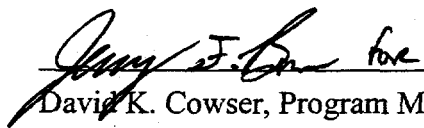
March 1999

Prepared for
U. S. Department of Energy
Nevada Operations Office
Environmental Restoration Division

THIS PAGE INTENTIONALLY LEFT BLANK

APPROVALS

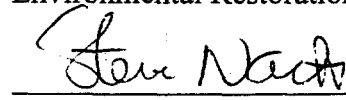
Approved By:



David K. Cowser, Program Manager
Environmental Restoration

3/15/99

Date

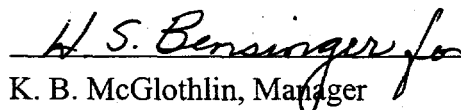


Steve J. Nacht, Project Manager
Environmental Restoration

3/9/99

Date

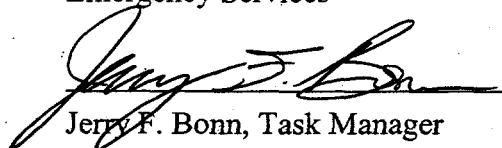
Concurred By:



K. B. McGlothlin, Manager
Emergency Services

3/9/99

Date

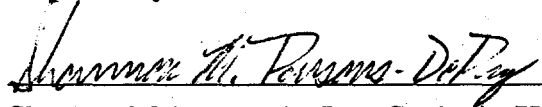


Jerry F. Bonn, Task Manager
Environmental Restoration

3/9/99

Date

Prepared By:



Shannon M. Parsons-DePry, Geologist/Hydrogeologist
Environmental Restoration

3/9/99

Date

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

FIGURES	B-vi
TABLE	B-vi
ACRONYMS AND ABBREVIATIONS	B-vii
1.0 INTRODUCTION	B-1
1.1 PURPOSE	B-1
1.2 SCOPE	B-1
1.3 FACILITY DESCRIPTION	B-1
1.3.1 Site Location	B-1
1.3.2 Site Description	B-3
1.3.3 Topography	B-3
1.3.4 Climate	B-4
2.0 WASTE DESCRIPTIONS AND ASSOCIATED HAZARDS	B-5
2.1 CHEMICAL HAZARDS	B-5
2.1.1 RCRA-Regulated Constituents	B-5
2.1.2 Radiological Constituents	B-5
2.2 PHYSICAL HAZARDS	B-6
2.2.1 RCRA-Regulated Constituents	B-6
2.2.2 Radiological Constituents	B-6
2.2.3 Other Physical Hazards	B-6
3.0 EMERGENCY NOTIFICATION PROCEDURES	B-7
3.1 DESIGNATION OF EMERGENCY COORDINATOR	B-7
3.2 RESPONSIBILITIES	B-9
3.3 NOTIFICATION	B-10
3.4 RESPONSE PROCEDURES	B-10
3.5 EVACUATION PLAN	B-11
3.6 EMERGENCY DECONTAMINATION AND FIRST AID	B-11
3.7 CLEAN-UP	B-13
4.0 EMERGENCY SERVICES	B-14
4.1 ON-SITE CONDITION OF EMERGENCY SERVICES	B-14
4.2 MEDICAL SERVICES	B-14
4.3 FIRE PROTECTION AND EMERGENCY MEDICAL SERVICES	B-14

TABLE OF CONTENTS (Continued)

5.0 EMERGENCY EQUIPMENT	B-15
6.0 REFERENCES	B-16

FIGURES

Figure 1 - Location of U-2bu Subsidence Crater	B-2
Figure 2 - Emergency/Contingency Plan Notice	B-8
Figure 3 - Injury/Illness/Incident Report	B-12

TABLE

Table 1 - List of Available Equipment and Location	B-15
--	------

ACRONYMS AND ABBREVIATIONS

BN	Bechtel Nevada
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
EC	Emergency Coordinator
EMP	Emergency Management Plan
ER	Environmental Restoration
mg/L	milligrams per liter
NTS	Nevada Test Site
PPE	Personal Protective Equipment
RCRA	Resource Conservation and Recovery Act

THIS PAGE INTENTIONALLY LEFT BLANK

1.0 INTRODUCTION

1.1 PURPOSE

This document satisfies the requirements for a contingency plan and emergency procedures required by the federal hazardous waste regulations defined in the Resource Conservation and Recovery Act (RCRA). These requirements are prescribed by:

- Title 40 Code of Federal Regulations (CFR) Part 265, Subparts C and D (EPA, 1996a)
- Title 40 CFR 262.34 (EPA, 1996b)
- Title 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (EPA, 1996c)
- Bechtel Nevada (BN) Emergency Management Plan (EMP) (BN, 1998)

This plan discusses the actions that the BN Environmental Restoration (ER) and other Nevada Test Site (NTS) personnel will take in response to fires, explosions, or unplanned sudden or non-sudden releases of hazardous waste or hazardous waste constituents to the air, soil, or surface water at the U-2bu subsidence crater during closure activities.

1.2 SCOPE

This Plan covers a variety of emergencies at the U-2bu subsidence crater. This document applies to all personnel assigned to the U-2bu subsidence crater project activities.

1.3 FACILITY DESCRIPTION

1.3.1 Site Location

The U-2bu subsidence crater is an historic land disposal unit located in Area 2 of the NTS (Figure 1). It was created in 1971 by an underground nuclear test with the name Miniata.

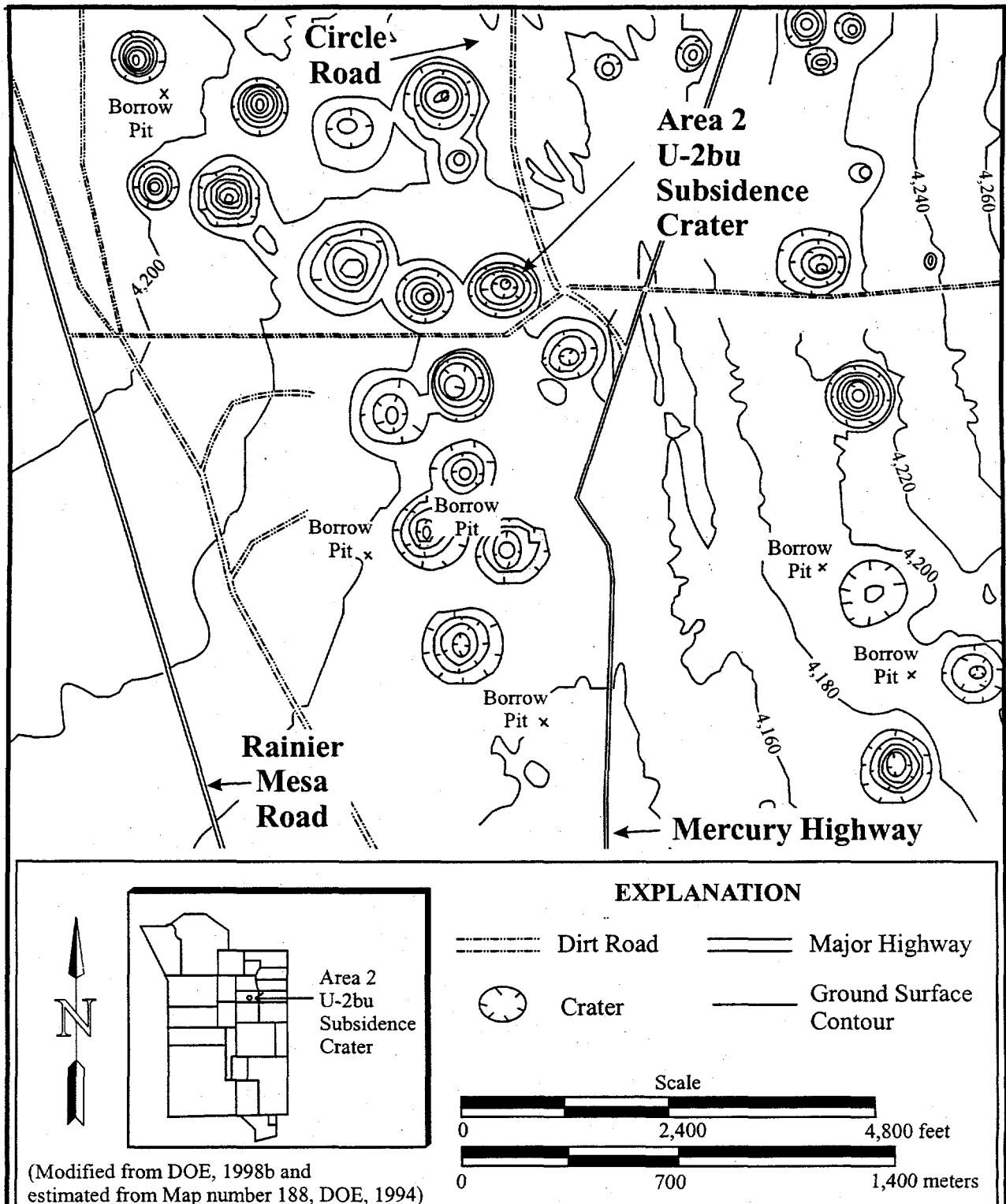


FIGURE 1
 LOCATION OF THE U-2bu SUBSIDENCE CRATER,
 AREA 2, NEVADA TEST SITE

1.3.2 Site Description

The subsidence crater was used as a land disposal unit for radioactive and hazardous waste from 1973 to 1988. The site disposal history is supported by memorandums, letters, and personnel who worked at the NTS at the time of active disposal. Wastes included radioactive drilling mud that also contained chromium and possibly lead. Drilling mud was collected in a vacuum truck, transported to U-2bu and dumped into the crater from the northern rim. The vacuum trucks were rinsed with water, which was also disposed in the crater. Nevada Test Site personnel report that drilling mud from the Baneberry test cleanup and the Area 9 Integrated Test Series, including the Avens-Cream test, were disposed in U-2bu. The total volume of drilling mud and associated rinsate disposed at U-2bu is unknown.

In addition to the drilling mud, 13,250 to 18,925 liters (3,500 to 5,000 gallons) of wastewater and sludge from the Area 6 Decontamination Facility sumps was disposed in U-2bu in November 1988. The wastewater contained solvents and mixed fission products. This was the last disposal of waste into U-2bu. Previous disposal of mixed hazardous and radioactive waste from the Decontamination Facility into the crater is undocumented, although personnel working at the facility at the time have stated that previous disposal activities of waste from the Decontamination Facility did take place in U-2bu. The volumes of waste disposed are unknown, however, the waste stream was likely similar to the wastewater and sludge disposed in November 1988. Waste disposal into the crater was officially discontinued in March 1989.

Disposal of waste into the crater has resulted in the development of an erosion gully on the northeast side of the crater running from the top of the crater to an artificial alluvial fan that has formed at the bottom. Historical aerial photographs of the U-2bu subsidence crater show that the fan has grown over the years in association with the disposal of waste. The areal extent of the fan is currently 800 square meters (8,600 square feet) (Department of Energy [DOE], 1998).

1.3.3 Topography

The NTS is located in the Great Basin of the Basin and Range province. The U-2bu subsidence crater is located in Area 2 of the NTS. The topography and soils in Area 2 are typical of the NTS alluvial basins. The soil is dense, silty sand, which contains gravel and scattered boulders and common layers of caliche. Area 2 is located in Yucca Flat, which is a topographically closed basin that drains into Yucca Lake, a playa at the lowest portion of the basin. The topography of Area 2 has been greatly altered by the numerous underground nuclear detonation that took place in Yucca Flat.

1.3.4 Climate

Lower elevations of the NTS receive approximately 15 centimeters (6 inches) of precipitation annually. Annual wind patterns are characterized by strong winds in the spring. The daily cycle is generally light winds at night, increasing winds from morning to afternoon and declining wind speed in the evening. Average monthly wind speed vary from 4 meters per second (13 feet per second) in April to 2.7 meters per second (9 feet per second) in November (Desert Research Institute, 1986). The temperatures at the NTS varies from average highs over 40° C (100° F) in the summer and average lows in the 0° C (30° F) in the winter.

2.0 WASTE DESCRIPTIONS AND ASSOCIATED HAZARDS

The U-2bu subsidence crater contains materials that present chemical and physical hazards. Potential routes of entry could include inhalation, ingestion, absorption, and injection. The specific hazards associated with the site are described in the following sections.

2.1 CHEMICAL HAZARDS

The following is a generalization of the hazards associated with the various chemical classes that may possibly be encountered at the U-2bu subsidence crater. Although analytical data indicates the presence of these chemical classes in the soil, it should be noted that they were detected in small concentrations, as discussed below.

2.1.1 RCRA-Regulated Constituents

It is possible that RCRA-regulated hazardous constituents may be found at the site. Leachable lead was detected at a maximum concentration of 5.7 milligrams per liter (mg/L), in the soil samples collected during site characterization (DOE, 1998). This concentration exceeds the regulatory action level of 5.0 mg/L. Although from a human health consideration, the levels are relatively low. Lead may be harmful or fatal if inhaled, ingested, or absorbed through the skin. Contact can cause abdominal pain and spasms, nausea, vomiting, headaches. Acute poisoning can lead to muscle weakness, "lead line" on gums, metallic taste, loss of appetite, insomnia, dizziness and shock, coma, and death in extreme cases. Target organs include the gum tissue, central nervous system, kidneys, blood, and reproductive systems.

2.1.2 Radiological Constituents

The main ionizing radiological constituents of concern are alpha particles. Alpha particles do not present an external hazard because they are easily stopped by the dead layer of skin on the body. However, alpha particles do present an internal hazard if inhaled or injected, and less of a hazard if ingested. Once inside the body, they tend to concentrate in the lungs, liver, and bones where they are in close contact with body tissue and can deposit large amounts of energy in a small volume of body tissue.

2.2 PHYSICAL HAZARDS

The following is a generalization of the physical hazards associated with the various chemical classes that may possibly be encountered at the U-2bu subsidence crater.

2.2.1 RCRA-Regulated Constituents

The RCRA-regulated constituents themselves do not present any kind of physical hazard. All physical hazards will be associated with the removal and containerizing of the waste soil.

2.2.2 Radiological Constituents

The radiological constituents themselves do not present any kind of physical hazard. All physical hazards will be associated with the removal and containerizing of the waste soil.

2.2.3 Other Physical Hazards

Other physical hazards present at the U-2bu subsidence crater associated with container-handling, heavy equipment operations, working on a sloped embankment, and working outdoors. These may include potential back injury, vehicle accidents, slip, trip, and fall accidents, heat and cold stress. Physical hazards are discussed in BN safety procedures and the Site-Specific Health and Safety Plan.

3.0 EMERGENCY NOTIFICATION PROCEDURES

The reporting and notification procedure outlined in BN Safety Procedure M-A11-007, Accidents/Incident Notifying, Investigating, and Reporting will be followed in the event of an accident, injury or other incident. Expedient reporting and notification will be made for, but not limited to, personnel injury or fatality, toxic material release, fire, or explosion. Figure 2 shows the Emergency/Contingency Plan notice that will be posted at the site. Information includes a list of the telephone numbers, emergency response procedures, waste description, etc.

3.1 DESIGNATION OF EMERGENCY COORDINATOR

The Emergency Coordinator (EC) system consists of one primary EC, one secondary EC, and one alternate EC. The ECs are onsite or on call at all times. In the event of an emergency, the primary EC should be contacted; if not available, the secondary EC should be contacted. If neither of these are available, the alternate should be contacted. The individual who is available first becomes the EC for the situation. Actual home addresses and phone numbers for ECs will be provided in the document used in the field. The ECs appointed by the Environmental Restoration Program Manager are as follows:

Primary Emergency Coordinator

Steve J. Nacht

Address: To be provided in field document

Work: (702) 295-7234

Pager: (702) 794-5692

Home: To be provided in field document

Net 3 #762

Secondary Emergency Coordinator

Jerry F. Bonn

Address: To be provided in field document

Work: (702) 295-7341

Pager: (702) 794-6325

Home: To be provided in field document

Net 3 #763; Net 15 #813

EMERGENCY/CONTINGENCY PLAN

COMPANY: Bechtel Nevada
ADDRESS: Mercury, Nevada
LOCATION OF FACILITY: Nevada Test Site, Area 2

PRIMARY EMERGENCY COORDINATOR

Steve J. Nacht
Address: To be provided in field document

Work: (702) 295-7234
Pager: (702) 794-5692
Home: To be provided in field document
Net 3 #762

SECONDARY EMERGENCY COORDINATOR

Jerry F. Bonn
Address: To be provided in field document

Work: (702) 295-7341
Pager: (702) 794-6325
Home: To be provided in field document
Net 3 #763; Net 15 #813

ALTERNATE EMERGENCY COORDINATOR

Shannon Parsons-DePry
Address: To be provided in field document

Work: (702) 295- 0645
Pager: (702) 794-5848
Home: To be provided in field document
Net 15#824

DESCRIPTION OF WASTE HANDLED

Possible radioactive constituents and metals contained in soil and decontamination water. Wastes are contained in B-25 boxes.

EMERGENCY RESPONSE CONTACTS

All emergency response teams can be contacted through the 900 Net Coordinator:
"MAYDAY, MAYDAY, MAYDAY" OR "911"

PRIMARY HOSPITAL:
Area 6 295-3490

SECONDARY HOSPITAL:
Area 23 295-1702

EMERGENCY MANAGEMENT OFFICE:
Area 23 295-1962

EMERGENCY CONTACT CENTER (24 hour contact numbers):
295-1381

FIGURE 2
EMERGENCY/CONTINGENCY PLAN NOTICE

Alternate Emergency Coordinator

Shannon Parsons-DePry
Address: To be provided in field document

Work: (702) 295-0645
Pager: (702) 794-5848
Home: to be provided in field document
Net 15: #824

3.2 RESPONSIBILITIES

The ECs have the authority to commit the necessary resources to implement this plan. Personnel resources will be applied consistent with the requirements of Title 29, CFR § 1910.120 (EPA, 1996c). The ECs will remain thoroughly familiar with the following:

- All aspects of this Plan.
- All operations and activities under control at the U-2bu subsidence crater.
- The locations and characteristics of the wastes handled.
- The locations of all the records.
- The U-2bu subsidence crater layout.

In the event of an emergency, the EC will be responsible for the following:

- Stopping all operations, where applicable.
- Implementing this Plan.
- Contacting the 900 Radio Net Coordinator through the MAYDAY/911 system and making notification of the emergency.
- Notifying all pertinent personnel of the emergency.
- Acting as the incident coordinator.
- Attempting to stop, slow, or dike the discharge, if it can be done safely with the materials at hand.
- Providing the technical expertise necessary so that all responders are fully informed of the potential hazards.

- Attempting to stop, slow, or dike the discharge, if it can be done safely with the materials at hand.
- Providing the technical expertise necessary so that all responders are fully informed of the potential hazards.

The secondary EC will also be responsible for preparing, posting, and maintaining an emergency information sheet that provides the emergency response information such as telephone number for emergency response teams. The secondary EC is also responsible for personnel evacuation. In the event the secondary EC is not available the alternate EC will conduct these duties.

3.3 NOTIFICATION

The first person who becomes aware of an emergency at the U-2bu subsidence crater shall immediately notify the proper authorities. Initial notification should be to their supervisor. If the emergency involves only a release of hazardous materials, the supervisor shall contact the EC who will initiate the necessary notification.

When the nature of the emergency is a fire, explosion, or involves personnel injury, the supervisor shall immediately notify the 900 Net Coordinator via the MAYDAY/911 system. The 900 Net Coordinator shall notify the Fire Protection Services Section and/or medical personnel, as required. The supervisor shall contact the EC.

If the first person to become aware of an emergency is not an ER employee and there are no ER personnel in the area, that person should follow the notification instructions posted at the designated field office.

3.4 RESPONSE PROCEDURES

There are two general classifications of incidents that could occur at the U-2bu subsidence crater; fire and/or explosions and a spill of potentially hazardous materials. The initial response will be to protect human health and safety, and then the environment. The following actions will be taken:

- Work in the area will cease immediately.

- For fire: Contact the NTS Fire Protection and Emergency Medical Services by using the Net MAYDAY/911 system. In the case of a small, controllable fire, an ABC-type fire extinguisher can be used. If fire extinguisher is used, still contact NTS Fire Protection and Emergency Medical Services for follow-up requirements.
- For spill: Attempt to stop, slow, or dike the discharge without compromising health and safety.
- Notify the EC who will obtain additional emergency response assistance as required. Evacuate area. Verify that all personnel are out of area.
- Remove injured persons and administer first aid as required.
- Shut down operating equipment as practical.
- Complete appropriate documentation (Figure 3).

3.5 EVACUATION PLAN

Notification for personnel to evacuate the area will be received by an emergency signal. The EC will be in possession of a blow-horn or similar device that will signal all workers to leave the area and gather in the designated assembly area. Evacuation notification will be discussed in the tailgate safety briefings. All radio nets will be kept clear and be used to transmit emergency information only. The EC will be accountable for all personnel. The assembly area for evacuated personnel will be at the field office. If cover must be taken, personnel will be instructed to enter the field trailer or field vehicles.

3.6 EMERGENCY DECONTAMINATION AND FIRST AID

If a worker is contaminated with a chemical substance, direct the worker to proceed at once to the temporary decontamination pad and drench the worker with copious amounts of water. Pay particular attention to the victim's eyes and face. Do not remove Personal Protective Equipment (PPE) until all contamination has been thoroughly rinsed off. Contact the Occupational Medicine Department for assistance and advice. Move the victim to fresh air.

		<h2 style="margin: 0;">INJURY/ILLNESS/INCIDENT REPORT</h2>			
<p>The supervisor completes this report immediately after being notified of any work-related accident or incident (injury, illness, vehicle accident, property damage, or near-miss incident) and forwards it to the assigned Safety Representative or the Occupational Safety Department within two working days. Be specific. Provide enough data that anyone reading the report, who is not familiar with the incident, can understand what happened. For near-miss incidents complete Parts I and IV. For accidents, injuries, or illnesses, complete the applicable blocks in Parts I, II, III and IV. (Instructions are listed on the back of the last copy.)</p>					
PART I					
1. Company:	2. Org./Dept. No.:	3. Date of Occurrence	4. Time (Military)	5. Location	6. Date Reported
7. Employee Name:		Social Security No.:	Job Classification:	Age:	<input type="checkbox"/> Male <input type="checkbox"/> Female
8. Job Being Done at Time of Incident		9. Experience on This Job or This Equipment (Months) <input type="checkbox"/> Under 3 <input type="checkbox"/> 3 to 12 <input type="checkbox"/> Over 12 10. Length of Present Employment (Months) <input type="checkbox"/> Under 3 <input type="checkbox"/> 3 to 12 <input type="checkbox"/> Over 12			
PART II - INJURY/ILLNESS					
11. Body Part(s) Involved		<input type="checkbox"/> Left <input type="checkbox"/> Right	12. Nature of Injury/Illness		13. Object/Equip./Substance Indicating Injury
PART III - VEHICLE OR PROPERTY DAMAGE					
14. Description of Vehicle/Equipment		15. Vehicle/Property No.:	16. Nature of Damage		
17. Activity in Progress at Time of Incident		18. Estimated Repair/Replacement Cost		19. Seat Belts Used <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
PART IV - DESCRIPTION OF EVENTS, ANALYSIS OF CAUSES, AND ACTIONS TO PREVENT RECURRENCE <small>(<input type="checkbox"/> Mark if additional sheets are attached to accomplish adequate detail.)</small>					
20. Describe clearly how the accident/incident occurred:					
21. What acts, failures to act and/or conditions contributed most directly to this accident/incident?					
22. What root causes, basic or fundamental reasons, caused the existence of these failures, acts and/or conditions?					
23. What action has or will be taken to prevent recurrence?					Implementation Date(s):
24. Preventable <input type="checkbox"/> Yes <input type="checkbox"/> No		25. Witnesses			
		1. _____			
		2. _____			
		3. _____			
26. Investigating Supervisor:		Phone:	Signature:		Date:
27. Reviewing Safety Representative:		Phone:	Signature:		Date:
28. Manager:		Phone:	Signature:		Date:

FIGURE 3. INJURY/ILLNESS/INCIDENT REPORT

3.7 CLEAN-UP

Clean-up of potential hazardous waste will be conducted by personnel having the appropriate training and PPE as determined by the EC. Clean-up will meet all current applicable standards and regulations.

4.0 EMERGENCY SERVICES

4.1 ON-SITE CONDITION OF EMERGENCY SERVICES

No coordination agreement with off-site organizations has been made because services are available onsite to respond to all credible emergencies. These services include the NTS Fire Protection and Emergency Medical Services, medical services, laboratory services, and radiological services and Industrial Hygiene services. These services are linked to the communications systems and have the capability to respond to emergencies involving hazardous, radioactive, or mixed waste constituents.

4.2 MEDICAL SERVICES

Emergency services are provided in Mercury 24 hours a day, seven days a week, by physicians, registered nurses, and/or paramedical personnel. Emergency services are also provided in Area 6 during normal working hours by paramedical personnel. All nurses and physicians are licensed by the state of Nevada paramedical qualifications, which meet or exceed U. S. Department of Transportation Highway Safety Program requirements for emergency medical services.

4.3 FIRE PROTECTION AND EMERGENCY MEDICAL SERVICES

The NTS Fire Station located in Mercury serves the NTS 24 hours a day, seven days a week. The NTS Fire Station located in Area 6 serves the NTS during normal working hours. It is located approximately 22 kilometers (14 miles) from the work site and will be the primary response team. The NTS Fire Protection and Emergency Medical Services responds to spills, explosions, fires, and non-fire emergencies involving cleanup.

5.0 EMERGENCY EQUIPMENT

Emergency equipment includes equipment for fire control, emergency communications, spill control and cleanup, personnel protection, and first aid. The on-site emergency equipment is inspected monthly to ensure there is adequate inventory and that it is in good working order. Extra PPE, respiratory equipment, and environmental monitoring equipment are available. A list of the available equipment and the location(s) can be found in Table 1.

TABLE 1— LIST OF AVAILABLE EQUIPMENT AND LOCATION.

EQUIPMENT	LOCATION
Fire Extinguishers (20 lb. ABC)	Each Vehicle, Office
First Aid Kits	Each Vehicle, Office
Eye Wash Station	Hotline
<u>PPE:</u> Tyvek Nitrile Gloves Rubber Boots Rain Suits Emergency Respirators Face Shield Safety Glasses	Office or Designated Field Vehicle
Portable Net 15 Radios with charger	Office and Site Supervisor Vehicle
<u>Spill Response Materials:</u> Horn 55-gallon drums Spill Kit Absorbent Pads	Office or Designated Field Vehicle
<u>Miscellaneous:</u> Garbage Bags Buckets Brushes Soap Kimwipes Plastic Sandbags Duct Tape	Office or Designated Field Vehicle

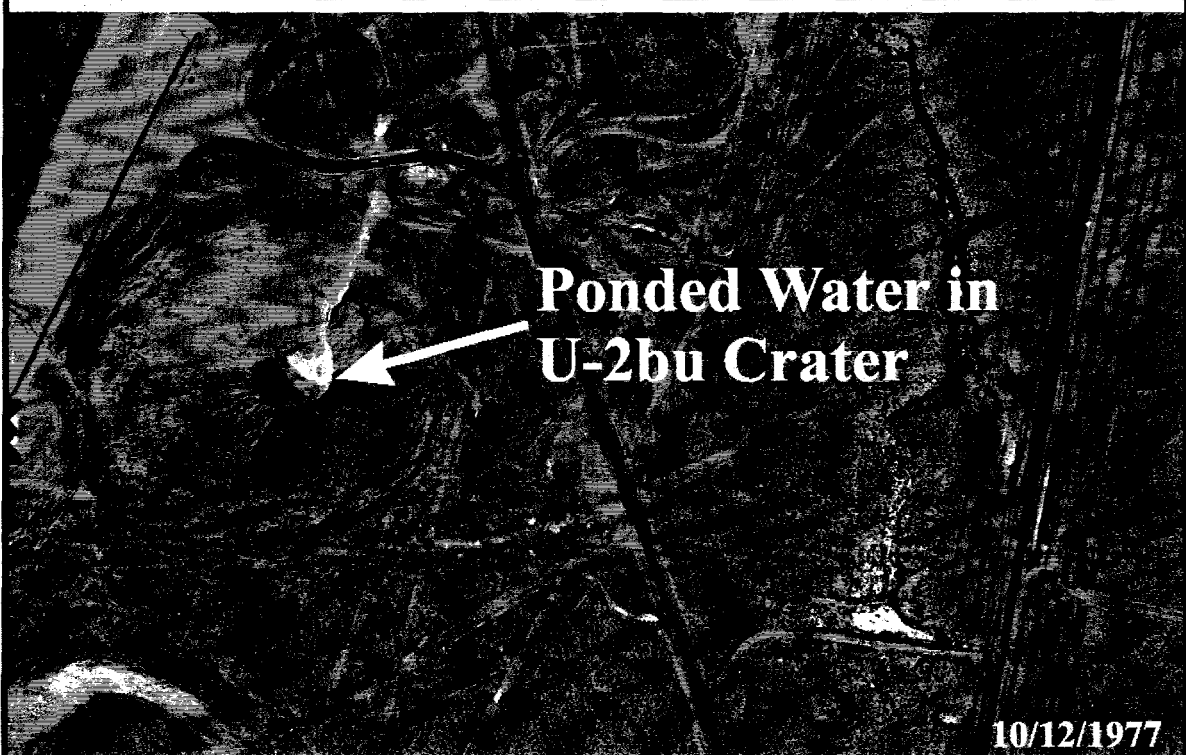
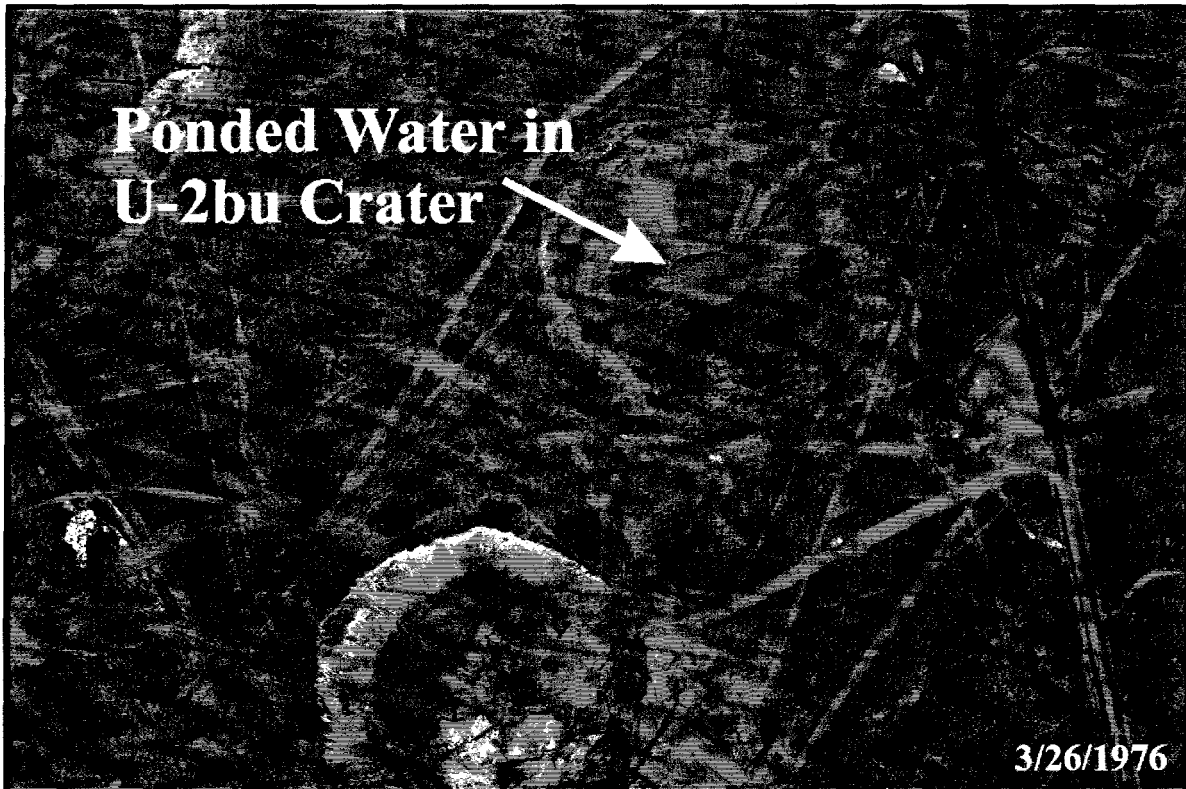
6.0 REFERENCES

- Bechtel Nevada, 1996, Accident/Incident Notifying, Investigating, and Reporting, M-A11-007, Las Vegas, Nevada.
- Bechtel Nevada, 1998, Bechtel Nevada Emergency Management Plan, Revision 0, B-2120/98.01, Las Vegas, NV.
- Desert Research Institute, 1986, Daily, Seasonal, and Annual Precipitation at the Nevada Test Site, Nevada, Las Vegas, NV
- U.S. Department of Energy, Nevada Operations Office, 1998, Characterization Report for Corrective Action Unit 109: Area 2 U-2bu Crater, Nevada Test Site, Nevada, Revision 1, DOE/NV--517, Las Vegas, NV.
- U.S. Environmental Protection Agency, 1996a, 40 Code of Federal Regulations 265, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Washington, DC.
- U.S. Environmental Protection Agency, 1996b, 40 Code of Federal Regulations 262.34, Accumulation Time, Washington, DC.
- U.S. Environmental Protection Agency, 1996c, 29 Code of Federal Regulations 1910.120, Hazardous Waste Operations and Emergency Response, Washington, DC.

APPENDIX C

PHOTOGRAPHS OF U-2BU SUBSIDENCE CRATER

PAGE INTENTIONALLY LEFT BLANK



**FIGURE C-1
HISTORICAL PONDING OF U-2BU CRATER**

THIS PAGE INTENTIONALLY LEFT BLANK

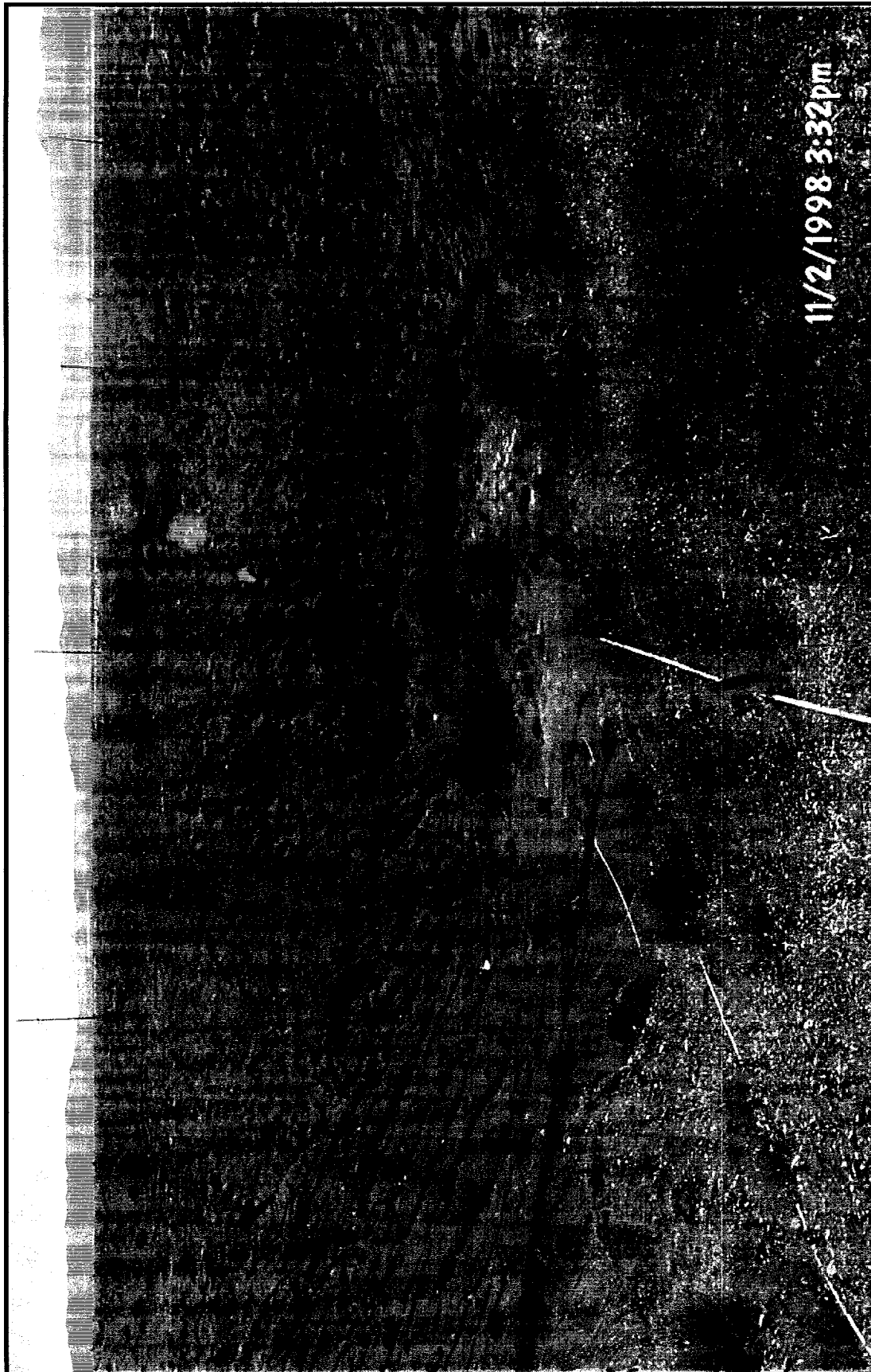


FIGURE C-2
VEGETATION GROWTH AT U-2BU CRATER

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D

PROJECT ORGANIZATION

THIS PAGE INTENTIONALLY LEFT BLANK

The following are the DOE/NV project contacts:

Runore C. Wycoff
Division Director
Environmental Restoration Division
U.S. Department of Energy, Nevada Operations Office
P.O. Box 98518
Las Vegas, NV 89193-8518
(702) 295-0250

Janet L. Appenzeller-Wing
Project Manager
Industrial Sites Project
U.S. Department of Energy, Nevada Operations Office
P.O. Box 98518
Las Vegas, NV 89193-8518
(702) 295-0461

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

THIS PAGE INTENTIONALLY LEFT BLANK

DISTRIBUTION LIST

THIS PAGE INTENTIONALLY LEFT BLANK

DISTRIBUTION LIST

*Provide copy of initial distribution of Revision 0; remainder of list gets Revision 0 if approved without changes. The entire list receives Revision 1, if issued.

Nevada Department of Environmental Protection

Paul Liebendorfer
Bureau of Federal Facilities
Division of Environmental Protection
333 W. Nye Lane, Room 13B
Carson City, NV 89706-0866

2 (Controlled)*

Mike McKinnon, Las Vegas Office
Bureau of Federal Facilities
Division of Environmental Protection
555 E. Washington, Suite 4300
Las Vegas, NV 89010

1 (Controlled)*

U.S. Department of Energy

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

1 (Uncontrolled)*

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

1 (Uncontrolled)*

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

1 (Controlled)*

DOE Public Reading Facility
P.O. Box 98521 M/S NLV040
Las Vegas, NV 89193-8521

1 (Controlled)

DISTRIBUTION LIST (Continued)

DOE/Nevada Operations Office
Technical Information Resource Center
P.O. Box 98521 M/S 505
Las Vegas, NV 89193-8521

1 (Uncontrolled)

U.S. Department of Energy
Office of Scientific and Technical Information
175 Oak Ridge Turnpike
P.O. Box 62
Oak Ridge, TN 37831

2 (Uncontrolled)

Bechtel Nevada
Correspondence Control
Bechtel Nevada
P.O. Box 98521 M/S NLV008
Las Vegas, NV 89193-8521

1 (Uncontrolled)*

Environmental Management Correspondence Control
Bechtel Nevada
P.O. Box 98521 M/S NLV080
Las Vegas, NV 89193-8521

1 (Uncontrolled)*

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

1 (Uncontrolled)*

Janet Cowley
Bechtel Nevada
P.O. Box 98521 M/S NTS110
Las Vegas, NV 89193-8521

1 (Uncontrolled)

David Cowser
Bechtel Nevada
P.O. Box 98521 M/S NLV082
Las Vegas, NV 89193-8521

1 (Uncontrolled)*

Ann Heidema
Bechtel Nevada
P.O. Box 98521 M/S NLV022
Las Vegas, NV 89193-8521

1 (Uncontrolled)

DISTRIBUTION LIST (Continued)

Rick Remington Bechtel Nevada P.O. Box 98521 M/S NTS405 Las Vegas, NV 89193-8521	1 (Uncontrolled)
Patrick Matthews Bechtel Nevada P.O. Box 98521 M/S NLV180 Las Vegas, NV 89193-852	1 (Uncontrolled)
Kenneth McGlothlin Bechtel Nevada P.O. Box 98521 M/S NTS330 Las Vegas, NV 89193-8521	1 (Uncontrolled)
Steve Nacht Bechtel Nevada P.O. Box 98521 M/S NTS306 Las Vegas, NV 89193-8521	1 (Uncontrolled)*
Shannon Parsons-DePry Bechtel Nevada P.O. Box 98521 M/S NTS306 Las Vegas, NV 89193-8521	1 (Uncontrolled)*
Phil Ralphs Bechtel Nevada P.O. Box 98521 M/S NTS330 Las Vegas, NV 89193-8521	1 (Uncontrolled)
<u>IT Corporation</u> Kenneth Beach IT Corporation P.O. Box 93838 Las Vegas, NV 89193	1 (Uncontrolled)*
Rosa Silver IT Corporation P.O. Box 93838 Las Vegas, NV 89193	2 (Controlled)

DISTRIBUTION LIST (Continued)

PEER Consultants

Dean Nelson

1 (Uncontrolled)

PEER Consultants

575 Oak Ridge Turnpike

Oak Ridge, TN 37830

Gary Hudak

1 (Uncontrolled)

PEER Consultants

P.O. Box 98521 M/S NLV082

Las Vegas, NV 89193-8521