

# FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (FFACO)

## RECORD OF TECHNICAL CHANGE (ROTC)

**Corrective Action Unit (CAU) Number:** 426

**CAU Description:** Cactus Spring Waste Trenches (TTR)

**CAU Owner:** Industrial Sites - Environmental Restoration (ER)

**ROTC No.** DOE/NV/11718-226-ROTC 1 **Page** 1 **of** 9

**Document Type** Closure Report (CR) **Date** 11/19/2019

The following technical changes (including justification) are requested by:

Tiffany Gamero

Requestor Name

Long-Term Monitoring Activity Lead

Requestor Title

### Description of Change:

1. This ROTC replaces the Use Restriction (UR) information listed in the documentation for CAU 426.

UR forms have been updated to list all UR requirements, including but not limited to: post-closure site controls (signs, fencing, etc.), inspection and maintenance requirements, and Geographic Information Systems (GIS) coordinate information. The UR requirements and form(s) included in this ROTC represent the current corrective action requirements for each Corrective Action Site (CAS) in this CAU and supersede information concerning corrective action and post-closure requirements in existing documentation.

2. UR boundary coordinate values changed due to conversion from North American Datum (NAD) 83 State Plane Central (m) to NAD 1983 for CAS RG-08-001-RGCS.

### Justification:

1. Some changes in the UR requirements from those found in closure documents have been subsequently modified in letters, memos, and inspection reports. This has resulted in difficulty in determining current post-closure requirements. A review of the post-closure requirements for this CAU has been conducted to ensure that all requirements have been identified and documented on the new UR form. The new UR form was developed to be inclusive of all requirements for long-term monitoring and standardize information contained in the URs consistent with current protocols.
2. UR boundary coordinates need to be in one standardized coordinate system.

**FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (FFACO)**  
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**Document Type** Closure Report (CR) **Date** 11/19/2019

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**Schedule Impacts:**

No impacts to schedule.

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**ROTC applies to the following document(s):**

- U.S. Department of Energy, Nevada Operations Office. 1998. Closure Report for Corrective Action Unit 426: Cactus Spring Waste Trenches, Tonopah Test Range, Nevada, Rev. 0, DOE/NV/11718-226. Las Vegas, NV.

**FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (FFACO)**  
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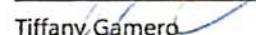
ROTC No. DOE/NV/11718-226-ROTC 1 Page 3 of 9

Document Type Closure Report (CR) Date 11/19/2019

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**Approvals:**

/s/ Tiffany Gamero

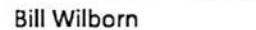


Date 12/5/2019

Activity Lead

Environmental Management (EM) Nevada Program

/s/ Wilhelm R. Wilborn



Date 12/9/19

Deputy Program Manager, Operations

Environmental Management (EM) Nevada Program

/s/ Mark McLane



Date 12/18/19

Christine Andres

Chief, Bureau of Federal Facilities

Nevada Division of Environmental Protection (NDEP)

# U.S. Department of Energy, Environmental Management Nevada Program

## Use Restriction Information

### General Information

Use Restriction (UR) Type(s):	FFACO Only
Corrective Action Unit (CAU) Number & Description:	426 - Cactus Spring Waste Trenches (TTR)
Corrective Action Site (CAS) Number & Description:	RG-08-001-RGCS - Waste Trenches
CAU/CAS Owner:	Industrial Sites - ER
Note:	N/A

### Section I. Federal Facility Agreement and Consent Order (FFACO) UR

#### Basis for FFACO UR

**Summary Statement:** This FFACO UR is established to protect workers from inadvertent exposure to radiological and chemical contaminants that were released at this site. Radiological and chemical contaminants are assumed to be present that exceed action levels.

#### FFACO UR Physical Description

##### Surveyed Area (UTM, Zone 11, NAD 83, meters):

UR Boundary	UR Point <sup>1</sup>	Easting <sup>2</sup>	Northing <sup>2</sup>
FFACO Boundary	1	516,370	4,174,941
	2	516,339	4,174,952
	3	516,351	4,174,983
	4	516,379	4,174,972
	5	516,370	4,174,941

<sup>1</sup>UR Points are listed clockwise beginning at the southernmost point. If multiple points share the southernmost Northing coordinate, the easternmost point is listed as Point 1.

<sup>2</sup>UR coordinate values presented herein were transformed from the North American Datum of 1983 State Plane Nevada Central (meters), and rounded to the nearest meter; resultant coordinates may not reflect the original precision of values contained within the source GIS data set.

**Boundary Applies to:** Subsurface

<b>Starting Depth:</b>	1	<b>Ending Depth:</b>	5
<b>Depth Unit:</b>	Meters		
<b>Survey Source:</b>	GPS		

# U.S. Department of Energy, Environmental Management Nevada Program

## Use Restriction Information

### FFACO UR Requirements

#### Site Controls:

This FFACO UR is recorded as described in **Section IV. Recordation Requirements** to restrict activities within the area by the coordinates listed above and depicted in the attached figure without prior notification of NDEP unless the activities are conducted under the provisions of 10 CFR, Part 835, Occupational Radiation Protection and 10 CFR, Part 851, Worker Safety and Health Program.

Control	Criteria
N/A	N/A

**Inspection Frequency:** N/A

#### Additional Considerations:

Consideration	Criteria
None	None

**Requirements Comments:** Surface is uncontaminated.

## Section II. Administrative UR

*An Administrative UR is not identified for this site.*

## Section III. Supporting Documentation

### UR Source Document(s)

ROTC 1 for CAU 426 CR (DOE/NV/11718-226), dated 11/12/2019.

MacDougall, J., Nevada Division of Environmental Protection, Bureau of Federal Facilities. 2011. Letter to R.F. Boehlecke (NNSA/NSO) titled Acceptance of the Post Closure Inspection Report for 2010, Tonopah Test Range, Nevada, Federal Facility Agreement and Consent Order, 8 April. Las Vegas, NV.

MacDougall, J., Nevada Division of Environmental Protection, Bureau of Federal Facilities. 2010. Letter to R.F. Boehlecke (NNSA/NSO) titled Acceptance of the Post Closure Inspection Report for 2009, Tonopah Test Range, Nevada, Federal Facility Agreement and Consent Order, 15 July. Las Vegas, NV.

U.S. Department of Energy, Nevada Operations Office. 1998. Closure Report for Corrective Action Unit 426: Cactus Spring Waste Trenches, Tonopah Test Range, Nevada, Rev. 0, DOE/NV/11718-226. Las Vegas, NV.

# U.S. Department of Energy, Environmental Management Nevada Program

## Use Restriction Information

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### Attachments

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- FFACO UR Boundary Map (UTM, Zone 11, NAD 83 meters)
- Supplemental Information Figure (UTM, Zone 11, NAD 83 meters)

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## Section IV. Recordation Requirements

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### Recordation:

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The above UR(s) are recorded in the:

- FFACO Database
- NNSA M&O Contractor GIS
- USAF (Nellis Air Force Base Range Operations) GIS
- EM Nevada Program CAU/CAS Files

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## Section V. EM Nevada Program Approval

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/s/ Tiffany Gamero

Tiffany Gamero

Activity Lead

EM Nevada Program

Date:

12/5/2019

516,320

516,360

4,175,000

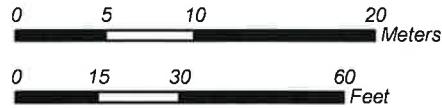


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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**CAU 426, CAS RG-08-001-RGCS**  
**Waste Trenches**  
**FFACO UR Boundary**

Explanation	
	FFACO UR
	Trail

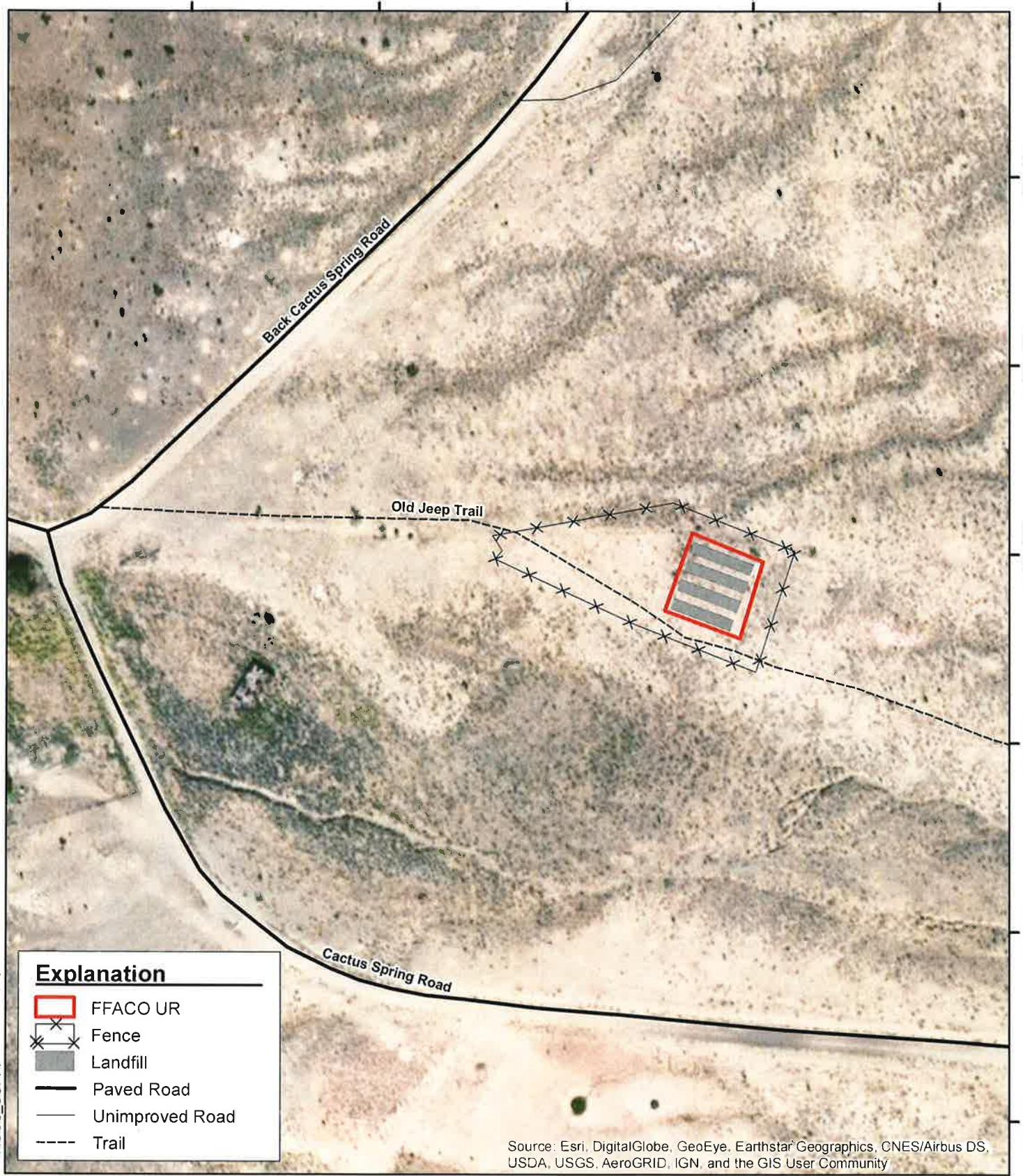


Source: Navarro GIS, 2019

Coordinate System: NAD 1983 UTM Zone 11N, Meter

## **Supplemental Information Figure**

The attached supplemental information figure(s) are included to capture site feature information that was available in previous iterations of this Use Restriction (UR) to prevent loss of that information.

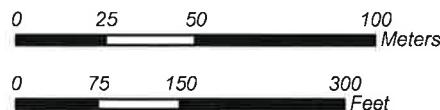


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Source: Navarro GIS, 2019

**CAU 426, CAS RG-08-001-RGCS  
Waste Trenches  
Supplemental Information  
General Location of Site Features**



NOTE: Size and location of features are approximated  
Coordinate System: NAD 1983 UTM Zone 11N, Meter

# RECORD OF TECHNICAL CHANGE

Technical Change No: 01	Project/Job No: CAU 426	Date: June 13, 2000																																							
Project/Job Name: Cactus Spring Waste Trenches (CAU 426)																																									
Closure Report Title: Closure Report for Corrective Action Unit 426, Cactus Spring Waste Trenches, Tonopah Test Range, Nevada	Document Date: 8/14/98																																								
The following Work Plan technical changes are requested by:																																									
Printed Name: David D. Madsen	Title: Task Manager	Signature: /s/ David Madsen																																							
Technical Change (list specific page/section/paragraph as appropriate):																																									
<p><b>SECTION 2.2 DEVIATIONS FROM CORRECTIVE ACTION PLAN AS APPROVED</b></p> <p>Change from "No deviations from the approved CAP (DOE, 1997b) occurred." to "The species in the seed mixture were changed to more closely reflect the species present in the Cactus Spring area. Budsage (<i>Artemisia spinescens</i>) and Fluff Grass (<i>Erioneuron pulchellum</i>) were not used in the seed mixture. Black sagebrush (<i>Artemisia nova</i>), Douglas Rabbitbrush (<i>Chrysostamnus viscidiflorus</i>), Rubber Rabbitbrush (<i>Ericameria nauseosus</i>), Greasewood (<i>Sarcobatus vermiculatus</i>), and Nevada Jointfir (<i>Ephedra nevadensis</i>) were added to the seed mixture."</p>																																									
Replace Table 1 with the following table:																																									
<p><b>TABLE 1 - SEED MIX FOR REVEGETATION</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">COMMON NAME</th> <th style="width: 33%;">SCIENTIFIC NAME</th> <th style="width: 34%;">QUANTITY IN MIX kg/ha (lbs/ac)</th> </tr> </thead> <tbody> <tr> <td>Black sagebrush</td> <td><i>Artemisia nova</i></td> <td>0.45 (0.4)</td> </tr> <tr> <td>Fourwing saltbrush</td> <td><i>Atriplex canescens</i> var. <i>Canescens</i></td> <td>2.8 (2.5)</td> </tr> <tr> <td>Shadscale saltbrush</td> <td><i>Atriplex confertfolia</i></td> <td>5.6 (5.0)</td> </tr> <tr> <td>Nevada jointfir</td> <td><i>Ephedra nevadensis</i></td> <td>6.5 (5.8)</td> </tr> <tr> <td>Rubber rabbitbrush</td> <td><i>Ericameria nauseosus</i></td> <td>0.22 (0.2)</td> </tr> <tr> <td>Douglas rabbitbrush</td> <td><i>Chrysostamnus viscidiflorus</i></td> <td>1.9 (1.7)</td> </tr> <tr> <td>Winterfat</td> <td><i>Kraschenin-nikovia lanata</i> (<i>Ceratoides</i>)</td> <td>2.8 (2.5)</td> </tr> <tr> <td>Greasewood</td> <td><i>Sarcobatus vermiculatus</i></td> <td>9.3 (8.3)</td> </tr> <tr> <td>Indian ricegrass</td> <td><i>Achnatherum hymenoides</i> (<i>Oryzopsis</i>)</td> <td>1.9 (1.7)</td> </tr> <tr> <td>Bottlebrush squirreltail</td> <td><i>Elymus elymoides</i> ssp. <i>elymoides</i> (<i>Sitanion</i>)</td> <td>0.9 (0.8)</td> </tr> <tr> <td>Galleta grass</td> <td><i>Pleuraphis jamesii</i> (<i>Hilaria</i>)</td> <td>2.2 (2.0)</td> </tr> <tr> <td>Apricot globemallow</td> <td><i>Sphaeralcea ambigua</i> ssp. <i>ambigua</i></td> <td>0.11 (0.1)</td> </tr> </tbody> </table>			COMMON NAME	SCIENTIFIC NAME	QUANTITY IN MIX kg/ha (lbs/ac)	Black sagebrush	<i>Artemisia nova</i>	0.45 (0.4)	Fourwing saltbrush	<i>Atriplex canescens</i> var. <i>Canescens</i>	2.8 (2.5)	Shadscale saltbrush	<i>Atriplex confertfolia</i>	5.6 (5.0)	Nevada jointfir	<i>Ephedra nevadensis</i>	6.5 (5.8)	Rubber rabbitbrush	<i>Ericameria nauseosus</i>	0.22 (0.2)	Douglas rabbitbrush	<i>Chrysostamnus viscidiflorus</i>	1.9 (1.7)	Winterfat	<i>Kraschenin-nikovia lanata</i> ( <i>Ceratoides</i> )	2.8 (2.5)	Greasewood	<i>Sarcobatus vermiculatus</i>	9.3 (8.3)	Indian ricegrass	<i>Achnatherum hymenoides</i> ( <i>Oryzopsis</i> )	1.9 (1.7)	Bottlebrush squirreltail	<i>Elymus elymoides</i> ssp. <i>elymoides</i> ( <i>Sitanion</i> )	0.9 (0.8)	Galleta grass	<i>Pleuraphis jamesii</i> ( <i>Hilaria</i> )	2.2 (2.0)	Apricot globemallow	<i>Sphaeralcea ambigua</i> ssp. <i>ambigua</i>	0.11 (0.1)
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**Justification (list specific reasons for change and the effects on project schedule/costs/personnel):**

The Closure Report for Corrective Action Unit 426, Cactus Spring Waste Trenches, Tonopah Test Range, Nevada, report number DOE/NV/11718--226 was submitted to the Nevada Division of Environmental Protection (NDEP) on August 14, 1998. Permeability results of soils adjacent to the engineered cover and a request for closure of CAU 404 were transmitted to the NDEP on April 29, 1999. The Closure Report (CR) was approved by the NDEP on May 13, 1999.

The seed mixture reported in the CR (Table 1) was determined to be different from the seed mixture planted at the site in October 1997. The seed mixture was changed by revegetation personnel to more closely reflect the species present in the Cactus Spring area.

There are no impacts to project schedule/cost/personnel.

Will other project documents be affected? **NO** **Specify:**

**APPROVALS:**

BN Program Manager:	Printed Name: <u>Ken Ortega</u>	Signature: <u>J</u> /s/ Signature on File	Date: <u>6/13/00</u>
BN Project Manager:	Printed Name: <u>Wayne Johnson</u>	Signature: <u>J</u> /s/ Signature on File	Date: <u>6/13/00</u>
BN Project Engineer <u>Group Manager</u> :	Printed Name: <u>Steve Nacht</u>	Signature: <u>J</u> /s/ Steve Nacht	Date: <u>6/13/00</u>
BN Task Manager:	Printed Name: <u>DAVE MADSEN</u>	Signature: <u>J</u> /s/ David Madsen	Date: <u>6/13/00</u>

**CONCURRENCES:**

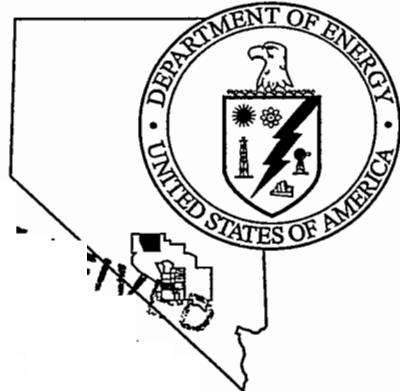
DOE/NV Project Manager:	Printed Name: <u>Janet Aggenrether</u> <u>Kevin Cabble</u> <u>EC</u>	Signature: <u>J</u> /s/ Kevin Cabble for	Date: <u>7-27-00</u>
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**EFFECTIVE DATE OF FIELD CHANGE:**

Verbal Approval Provided to:	Printed Name: Not Applicable	Title:	Date:
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Nevada  
Environmental  
Restoration  
Project

DOE/NV/11718-226  
UC-702



Closure Report for  
Corrective Action Unit 426:  
Cactus Spring Waste Trenches,  
Tonopah Test Range, Nevada

Controlled Copy No.:  
Revision No.: 0

**UNCONTROLLED**

August 1998

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Environmental Restoration  
Division

U.S. Department of Energy  
Nevada Operations Office

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**CLOSURE REPORT FOR  
CORRECTIVE ACTION UNIT 426:  
CACTUS SPRING WASTE TRENCHES  
TONOPAH TEST RANGE, NEVADA**

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

**Controlled Copy No.: UNCONTROLLED**

**Revision: 0**

**Prepared by  
Bechtel Nevada  
Environmental Restoration Program**

**August 1998**

**CLOSURE REPORT FOR  
CORRECTIVE ACTION UNIT 426:  
CACTUS SPRING WASTE TRENCHES  
TONOPAH TEST RANGE, NEVADA**

Approved by: /s/ Janet Appenzeller-Wing  
Janet L. Appenzeller-Wing, Project Manager  
Industrial Sites Subproject

Date: 8/11/98

Approved by: /s/ Robert M. Bangerter, Jr.  
Runore C. Wycoff, Project Manager  
Nevada Environmental Restoration Project

Date: 8/11/98

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APPENDIX D - POST CLOSURE MONITORING CHECKLIST

## ACRONYMS AND ABBREVIATIONS

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CADD	Corrective Action Decision Document
CAIP	Corrective Action Investigation Plan
CAS	Corrective Action Site
CAP	Corrective Action Plan
CAU	Corrective Action Unit
cm	centimeter
cm/sec	centimeters/second
COCs	Constituents of Concern
CR	Closure Report
DOE	U.S. Department of Energy
DOE/NV	U.S. Department of Energy, Nevada Operations Office
EPA	U.S. Environmental Protection Agency
FFACO	Federal Facilities Agreement and Compliance Order
ft	feet
ft <sup>3</sup>	cubic feet
in	inch
in/sec	inches/second
km	kilometer
kg/ha	kilograms/hectar
lbs/ac	pounds/acre

## **ACRONYMS AND ABBREVIATIONS (continued)**

m	meter
m <sup>3</sup>	cubic meter
mi	mile
NDEP	Nevada Division of Environmental Protection
PRG	Preliminary Remediation Goal
TTR	Tonopah Test Range
USAF	United States Air Force
yd <sup>3</sup>	cubic yard

## **EXECUTIVE SUMMARY**

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This Closure Report provides the documentation for closure of the Cactus Spring Waste Trenches Corrective Action Unit (CAU) 426. The site is located on the Tonopah Test Range, approximately 225 kilometers (140 miles) northwest of Las Vegas, Nevada..

CAU 426 consists of one Corrective Action Site (CAS) which is comprised of four waste trenches (CAS Number RG-23-001-RGCS). The trenches were excavated to receive solid waste generated in support of Operation Roller Coaster, primarily the Double Tracks Test in 1963, and were subsequently backfilled. The Double Tracks Test involved the use of live animals to assess the biological hazards associated with the non-nuclear detonation of plutonium-bearing devices (i.e., inhalation uptake of plutonium aerosol) (DOE, 1996).

The remedial alternative proposed in the Corrective Action Decision Document (CADD) for the site was "Capping" (DOE, 1997a). The Nevada Division of Environmental Protection (NDEP)-approved Corrective Action Plan (CAP) proposed the "Capping" methodology (DOE, 1997b). The closure activities were completed in accordance with the approved CAP and consisted of constructing an engineered cover in the area of the trenches, constructing/planting a vegetative cover, installing a perimeter fence and signs, implementing restrictions on future use, and preparing a Post-Closure Monitoring Plan.

Since closure activities for CAU 426 have been completed in accordance with the Nevada Division of Environmental Protection-approved CAP (DOE, 1997b) as documented in this Closure Report, the U.S. Department of Energy, Nevada Operations Office (DOE/NV) requests:

- CAU 426 be moved from Appendix III to Appendix IV of the Federal Facility Agreement and Consent Order.
- NDEP provide a Notice of Completion to the DOE/NV.

## **1.0 INTRODUCTION**

The U.S. Department of Energy, Nevada Operations Office (DOE/NV) operates the Nevada Test Site and entered into a trilateral agreement with the state of Nevada and the U.S. Defense Special Weapons Agency. The trilateral agreement, the Federal Facilities Agreement and Consent Order (FFACO), provides a framework for identifying, characterizing, remediating, and closing DOE/NV environmental sites in Nevada (NDEP, 1996). Corrective Action Units (CAUs) have been identified in the FFACO at the Tonopah Test Range (TTR) which is currently operated by the DOE/Albuquerque Operations Office and U.S. Air Force (USAF).

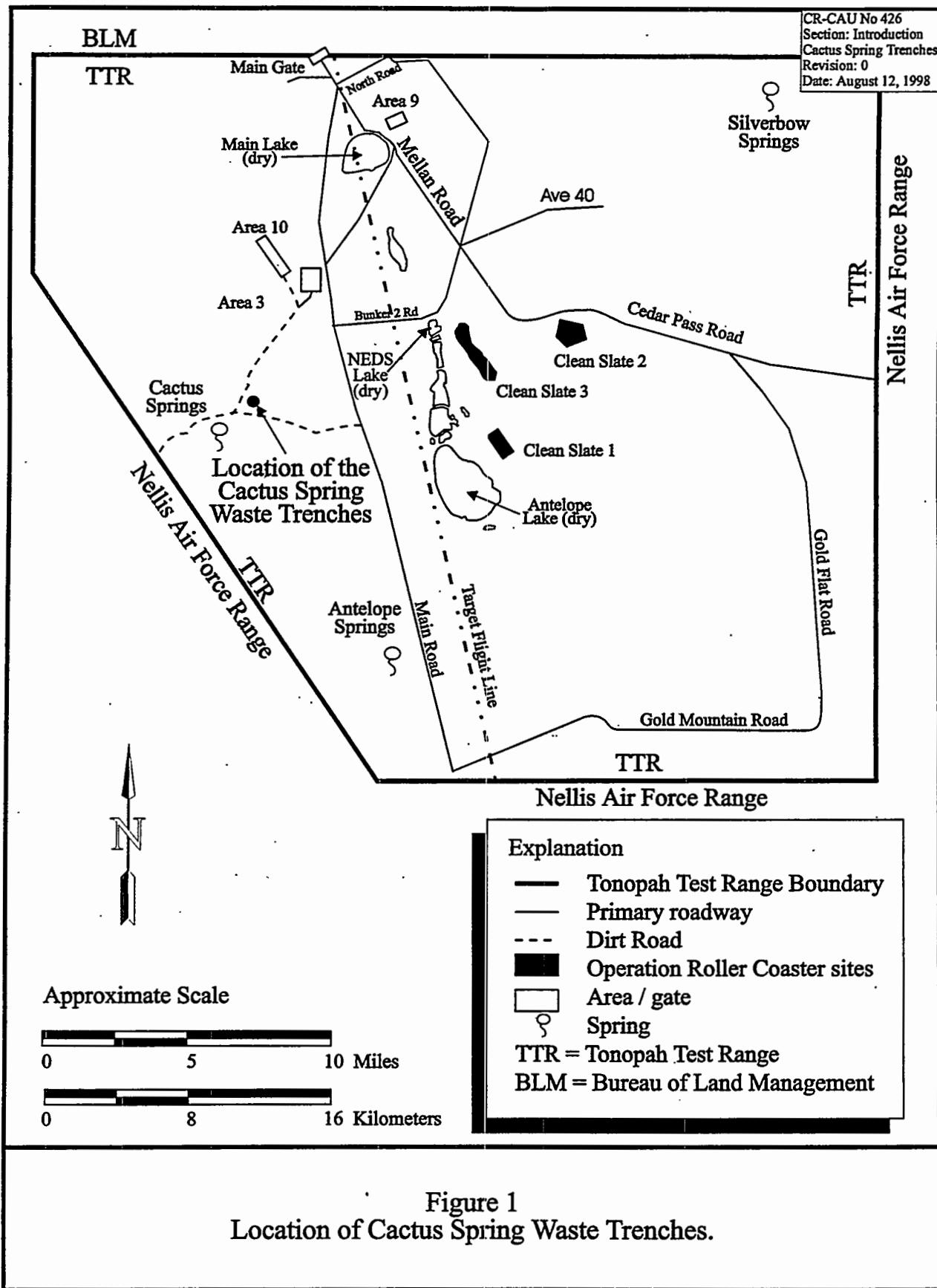
This Closure Report (CR) provides documentation for the closure of the Cactus Spring Waste Trenches Corrective Action Unit (CAU) 426. The site is located on the TTR, approximately 225 kilometers (km) (140 miles [mi]) northwest of Las Vegas, Nevada. See Figure 1 for the site location.

CAU 426 consists of one Corrective Action Site (CAS) comprised of four waste trenches (CAS Number RG-23-001-RGCS). The trenches were excavated to receive solid waste generated in support of Operation Roller Coaster, primarily the Double Tracks Test in 1963. The Double Tracks Test involved the use of live animals to assess the biological hazards associated with the non-nuclear detonation of plutonium-bearing devices (i.e., inhalation uptake of plutonium aerosol) (DOE, 1996). The trenches were subsequently backfilled. Each trench is approximately 36 meters (m) (118.1 feet [ft]) long by 3 m to 5 m (9.8 ft to 16.4 ft) wide by 3 m to 4.5 m (9.8 ft to 14.8 ft) deep. A site map is provided as Figure 2.

Detailed information of the site history and results of the investigation activities can be found in the Corrective Action Investigation Plan (CAIP) (DOE, 1996), and the Corrective Action Decision Document (CADD) (DOE, 1997a).

Site investigation results indicated the following:

- Small quantities of sanitary waste were observed in the drill cores collected from the trenches. The waste materials included wood, glass, metal, animal bone fragments, and paint chips. The waste was predominantly found from 0.9 m (3 ft) to 2.1 m (7 ft) below the surface.
- No visual or radiological evidence was observed indicative of disposal of the animal shrouds in the trenches.



CR-CAU No 426  
Section: Introduction  
Cactus Spring Trenches  
Revision: 0  
Date: August 12, 1998

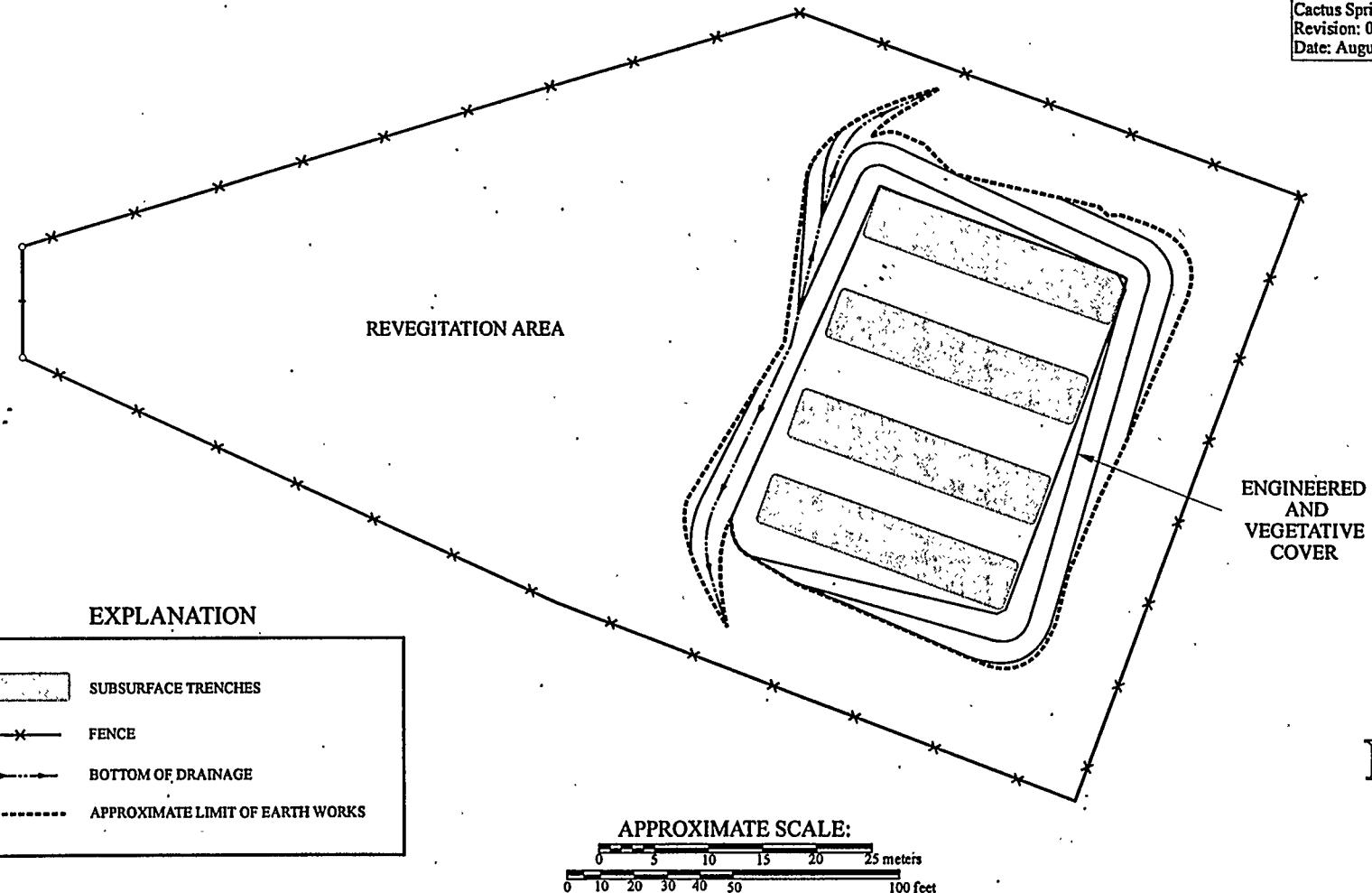


FIGURE 2  
SITE MAP FOR CACTUS SPRING WASTE TRENCHES

- No concentrations of constituents of concern (COCs) were detected above U.S. Environmental Protection Agency (EPA) Region IX Preliminary Remediation Goals (PRGs) (EPA, 1996). Most of the detected COCs were estimated values associated with laboratory contamination or were naturally occurring. One soil sample collected for Total Petroleum Hydrocarbon analysis (as diesel) with a result of 5,300 milligrams per kilogram (mg/kg) was assessed to be a spurious data point.
- The alluvial/fill material comprising the trench cover and the native material below the trenches have relatively low hydraulic conductivities ranging from  $5.9 \times 10^{-4}$  centimeters/second (cm/sec) ( $2.3 \times 10^{-4}$  inches/second [in/sec]) to  $2.5 \times 10^{-8}$  cm/sec ( $9.8 \times 10^{-9}$  in/sec).

Remedial alternatives were proposed in the CADD based upon the results of the investigation activities. The proposed remedial alternatives were "No Action, Access Restrictions, Excavation and Capping, and Capping". The Nevada Division of Environmental Protection (NDEP) approved-CADD identified "Capping" as the selected remedial alternative. The "Capping" alternative was proposed to consist of the construction of a vegetative, engineered cover, installation of a fence, and restrictions on future use (DOE, 1997a).

DOE/NV expedited the closure schedule in Fiscal Year 1997 and proposed the closure methodology for the selected remedial alternative to the NDEP in a Draft Corrective Action Plan (CAP) in August, 1997. Based upon an expedited review by and comments received from the NDEP for the Draft CAP (NDEP, 1997a), DOE/NV implemented the field closure activities between September 17, 1997 and October 30, 1997. The Final CAP (DOE, 1997b) was transmitted to the NDEP on September 16, 1997. The NDEP provided an expedited review of the Final CAP and approved the proposed activities on September 29, 1997 (NDEP, 1997b).

## 1.1 PURPOSE

The purpose of this CR is to:

- Document the closure activities and provide the information collected as proposed in the CAP (DOE, 1997b).
- Obtain a Notice of Completion from the NDEP.
- Recommend the movement of CAU 426 from Appendix III to Appendix IV of the FFACO.

## 1.2 SCOPE

The following is the scope of the closure actions implemented for CAU 426:

- Install an engineered cover over the trenches.
- Plant native shallow rooted plants/grasses on the engineered cover.
- Install a fence with signs on the perimeter of the site.
- Coordinate closure of the site with the USAF because of the location of the site and use restrictions.
- Provide documentation (this report) of remedial activities and a Post-Closure Monitoring Plan.

## 1.3 CLOSURE REPORT CONTENTS

This CR is divided into the following sections:

- Section 1.0 - Introduction: Site background, purpose, scope, and report contents
- Section 2.0 - Closure Activities: Corrective action activities; deviations from the CAP as approved, corrective action schedule as completed, and site plan
- Section 3.0 - Waste Disposition
- Section 4.0 - Closure Verification Results
- Section 5.0 - Post-Closure Monitoring Plan
- Section 6.0 - Conclusions and Recommendations
- Section 7.0 - References
- Appendix A - Engineering Drawings
- Appendix B - Use Restriction Documentation
- Appendix C - Geotechnical Test Results
- Appendix D - Post-Closure Monitoring Checklist

This report was developed using information and guidance from the following documents:

- Corrective Action Investigation Plan: Cactus Spring Waste Trenches, Revision 0, DOE, 1996.
- Corrective Action Decision Document For the Cactus Spring Trenches, Revision 1, July 1997, DOE, 1997a.
- Corrective Action Plan For CAU No. 426: Cactus Spring Waste Trenches, Tonopah Test Range, DOE, 1997b.
- Nevada Environmental Restoration Project, Health and Safety Plan, Revision 2, DOE, 1996.
- Nevada Environmental Restoration Project, Industrial Sites, Quality Assurance Project Plan, Nevada Test Site, Revision 1, DOE, 1996.
- Nevada Environmental Restoration Project, Project Management Plan, Revision 0, DOE, 1994.
- Tonopah Test Range Closure Sites Revegetation Plan, DOE, 1997.

## **2.0 CLOSURE ACTIVITIES**

---

This section of the CR details the specific activities involved in the closure of the Cactus Spring Waste Trenches CAU 426 (CAS Number RG-23-001-RGCS). This section also includes the rationale for deviations from the approved CAP (DOE, 1997b) and a detailed schedule of site activities as completed.

### **2.1 DESCRIPTION OF CORRECTIVE ACTION ACTIVITIES**

#### **2.1.1 Site Preparation**

Prior to the start of field closure activities, a soil sample was collected for geotechnical testing from the borrow pit located approximately 9 km (5.5 mi) northeast of the site (see Engineering Drawings in Appendix A for the location of the borrow pit). The soil sample was collected to determine the maximum density (ASTM, 1997a [modified proctor test]) for compaction testing in the area of the trenches.

Soils from the site and borrow pit were observed by the site geologist to be a silty sand with gravel. Sieve analysis (ASTM, 1997b) of the sample collected from the borrow pit confirmed the borrow pit soil to be a silty sand with gravel. Geotechnical test results are discussed in Section 4.0. Since the borrow and site soil were similar, size reduction of the borrow material was not required for the vegetative covers.

Prior to placement of soil in the area of the trenches for construction of the engineered cover, water was applied to the site with the water truck for dust control and compaction purposes. Additionally, the engineered cover area was compacted with repeated passes using the water truck to provide a base for compaction. Minor depressions (up to approximately 10 centimeters (cm) [4 inches (in)]) were observed in the areas of the trenches after compaction activities with the water truck.

#### **2.1.2 Engineered Cover Construction**

Belly dump trucks were used to transport the soil to the site from the borrow pit. Approximately 840 cubic meters ( $m^3$ ) (1,100 cubic yards [ $yd^3$ ]) of soil were transported to the site for area grading, backfilling of the minor depressions in the areas of the trenches, and construction of engineered/vegetative cover. Water for dust suppression and construction activities was obtained from the Roller Coaster Well located approximately 7 km (4.3 mi) east of the site (see Engineering Drawings in Appendix A for the location of the well). Water was introduced to and mixed with the soil at the borrow pit as dust control. Approximately 272,520 liters (72,000

gallons) of water was used for soil preparation and dust suppression activities at the site and on the access road to the site.

Diversion channels were constructed by excavating the existing soil to channel precipitation runoff away from the site and limit precipitation run-on to the engineered cover area (Appendix A).

Compaction of the soil at the site was conducted using a grader and traffic from the belly dump trucks. The soil fill was placed in approximately 0.2 m (8 in) lifts over the entire cover area and compacted to minimize subsidence and decrease the permeability of the backfill relative to the native, undisturbed soils as required in the CAP (DOE, 1997b). Fill was placed at the site in the following three horizons (see Figure 3):

- “Bottom” compacted fill horizon: the compacted soil horizon between the compacted soil base (existing site soil) and “top” compacted fill horizon. The “bottom” compacted fill horizon ranged from 0.2 m to 0.3 m (0.7 ft to 1 ft) in thickness and consists of approximately two compacted 0.2 m (8 in) lifts of loose soil.
- “Top” compacted fill horizon: the compacted fill horizon between the “bottom” compacted fill horizon and the vegetative cover. The “top” compacted fill horizon ranged from 0.2 m to 0.3 m (0.7 ft to 1 ft) and consists of approximately two compacted 0.2 m (8 in) lifts of loose soil.
- Vegetative cover: the fill horizon above the “top” compacted fill horizon prepared for the planting of native shallow rooted plants/grasses.

Field density (compaction) tests (ASTM, 1995c [nuclear density tests]) were conducted in the “bottom” and “top” compacted fill horizons after compaction activities were completed. Compaction results are discussed in Section 4.1.

After compaction results were determined to exceed the minimum requirement of 80 percent of the maximum density in the “bottom” compacted fill horizon, additional fill was placed and compacted. The additional fill was placed on the cover area in approximate 0.2 m (8 in) lifts and compacted. Up to two compacted lifts of soil were required to complete the “top” compacted fill horizon. The top of the compacted area of the engineered cover is approximately 0.3 m to 0.5 m [1.0 ft to 1.5 ft] below the final grade of the vegetative cover. After compaction results were determined to exceed the minimum requirement of 80 percent of the maximum density in the “top” compacted fill horizon, additional fill was placed for the construction of the vegetative cover (see Section 2.1.4 for discussion regarding construction of the vegetative cover).

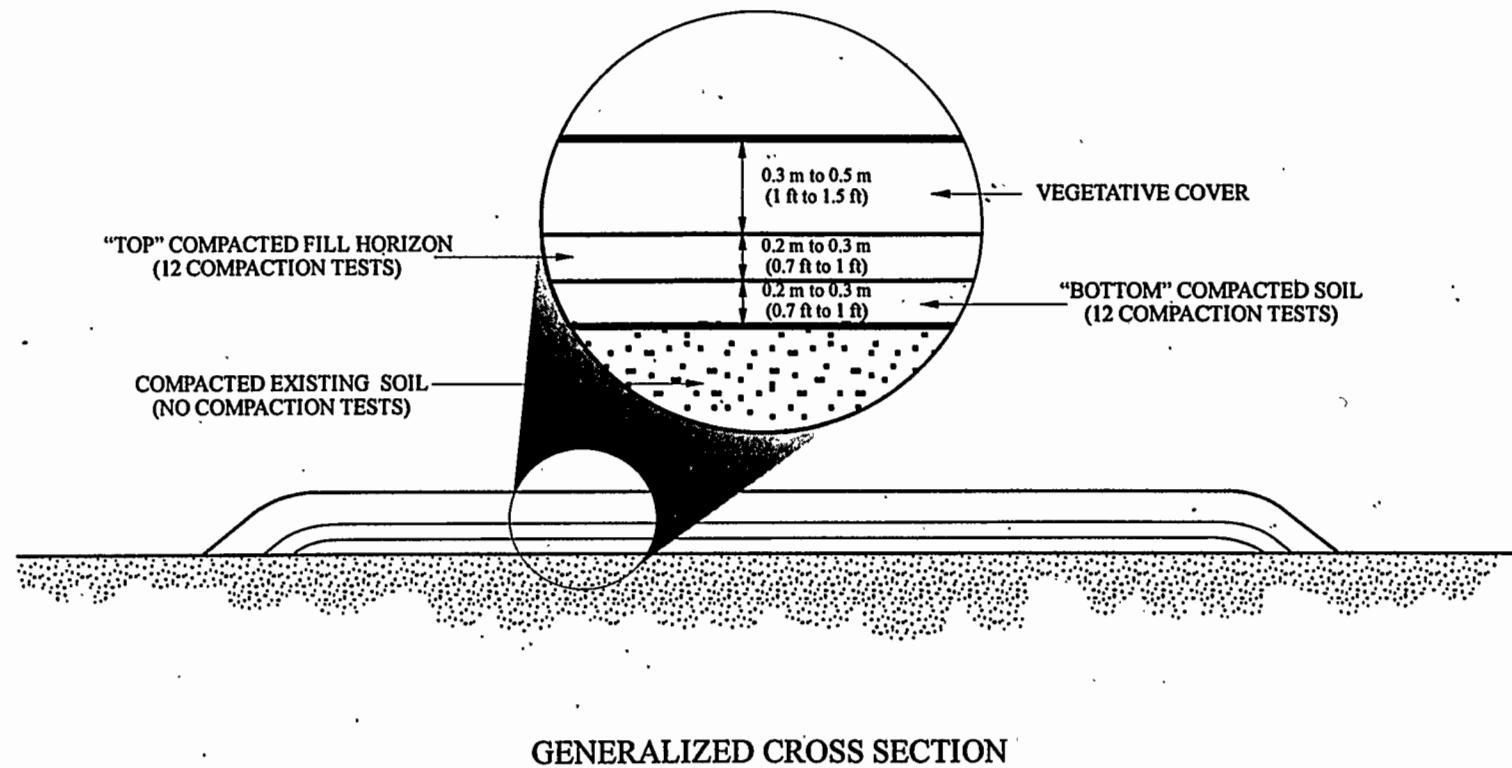


FIGURE 3  
ENGINEERED COVER FILL HORIZONS

### **2.1.3 Installation of Fence and Signs**

To allow native plant species to establish and develop and to inhibit unauthorized excavation into the cover, a three-strand barbed wire fence with a woven wire mesh (2.5 cm [1 in] weave) base was installed at the perimeter of the site. The woven wire mesh is approximately 0.6 m (2 ft) tall. The location of the fence can be found in Appendix A. Signs were posted near the corners and center area of each side of the fence indicating "Vegetation Area, No Excavation."

### **2.1.4 Vegetative Cover**

After the density tests were conducted in the "top" compacted fill horizon (0.3 m to 0.5 m [1.0 ft to 1.5 ft] below the final grade), the soil for the vegetative cover was placed and moderately compacted. Compaction tests were not proposed or required in the vegetative cover since the area would be ripped and disked prior to planting.

Surface preparation for planting consisted of ripping the cover areas and area within the fence with a grader to an approximate depth of 0.4 m (1.3 ft) and harrowing with a spring-tooth harrow. The schedule of vegetative cover construction and planting activities can be found in Figure 4.

Polyacrylamide gel was applied at the same time as seeding at an approximate rate of 22 kilograms per hectare (kg/ha) (20 pounds per acre [lbs/ac]) to assist in the retention of soil moisture for seed germination and plant development. The seed mixture (Table 1) was planted in October to ensure dormancy breaking requirements would be met, and that the seed would be in the ground prior to the winter precipitation. After the seeds were planted, straw was broadcast on the site at an approximate rate of 4,500 kg/ha (4,000 lbs/ac) with a straw blower. The straw was subsequently punched into the soil with a tractor-drawn disk crimper. The straw is used as a mulch to add organic matter to the soil and is a barrier to reduce wind and water erosion.

## **2.2 DEVIATIONS FROM CORRECTIVE ACTION PLAN AS APPROVED**

No deviations from the approved CAP (DOE, 1997b) occurred.

**TABLE 1 - SEED MIX FOR REVEGETATION**

COMMON NAME	SCIENTIFIC NAME	QUANTITY IN MIX kg/ha (lbs/ac)
Budsage	<i>Artemisia spinescens</i>	0.5 (0.4)
Shadscale	<i>Atriplex confertifolia</i>	17.2 (15.4)
Winterfat	<i>Ceratoides lanata</i>	14.8 (13.2)
Fourwing Saltbush	<i>Atriplex canescens</i>	3.1 (2.8)
Galleta	<i>Hilaria jamesii</i>	7.4 (6.6)
Indian Ricegrass	<i>Oryzopsis hymenoides</i>	4.9 (4.4)
Bottlebrush Squirretail	<i>Sitanion hystrix</i>	3.5 (3.1)
Desert Globemallow	<i>Sphaeralcea ambigua</i>	0.4 (0.3)

## **2.3 CORRECTIVE ACTION SCHEDULE AS COMPLETED**

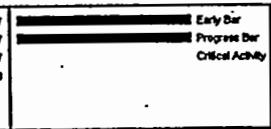
The corrective action activities were completed in a timely manner. A detailed schedule of the project activities as completed can be found in Figure 4.

## **2.4 SITE PLAN/SURVEY PLAT**

Figure 1 provides the location of CAU 426, and Figure 2 is the site map. As-Built engineering drawings can be found in Appendix A.

Activity ID	Activity Description	Actual Start	Actual Finish	FY97				FY98						
				11	18	25	1	8	15	22	29			
<b>Cactus Spring Waste Trenches Closure</b>														
<b>CAU 426</b>														
1	Collect geotech sample and test	11AUG97	14AUG97											
2	Mobilize to site (construction)	17SEP97	17SEP97						■					
3	Compact trench area	17SEP97	17SEP97						■					
4	Construct engineered cover	17SEP97	19SEP97						■					
5	Construct fence	17SEP97	24SEP97						■					
6	Prepare vegetative cover for disking & planting	19SEP97	24SEP97						■					
7	Demobilize from site (construction)	20SEP97	27SEP97						■					
8	Survey for "as-built" drawings	24SEP97	24SEP97						■					
9	Disk & plant revegetation (includes mobe/demobe)	23OCT97	30OCT97								■			

Project Start	25AUG97
Project Finish	29OCT97
Date Due	30OCT97
Run Date	30APR98



CSNT

Figure 4  
Corrective Action Schedule  
As Completed

Sheet 1 of 1

CAP - CAU No. 426  
Section: Closure Activities  
Cactus Spring Trenches  
Revision: 0  
Date: August 12, 1998

## **3.0 WASTE DISPOSITION**

A small volume of construction debris was generated at the site from the fencing activities. The construction debris consisted of paper, plastic, wire, and wood (less than 0.1 m<sup>3</sup> [5 cubic feet (ft<sup>3</sup>)]). The construction debris was disposed in the TTR USAF landfill by Kirk-Myer, Inc. Services.

Decontamination and personnel protective equipment wastes were not generated since closure activities did not expose or contact any of the trench contents.

## 4.0 CLOSURE VERIFICATION RESULTS

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### 4.1 COMPACTION RESULTS

One maximum density test (ASTM, 1997a) and sieve analysis (ASTM, 1997b) was conducted on a sample collected from the borrow pit. The borrow pit sample was collected for the closure activities conducted this site and at CAU 404 (TTR Roller Coaster Sewage Lagoons and North Disposal Trench). The maximum density of the borrow pit soil was 1,970 kg/m<sup>3</sup> (123.0 lb/ft<sup>3</sup>). The maximum density was used to determine the percent compaction from the field density tests (ASTM, 1997c [nuclear density testing]). Geotechnical test results can be found in Appendix C.

Through observations by the site geologist and sieve analysis, the borrow pit and site soil were determined to be a silty sand with gravel. Since the soils were similar, size reduction was not required for the soil used for the vegetative cover.

The compaction requirement for the engineered cover was a minimum of 80 percent of the maximum density (DOE, 1997b). Construction activities for the engineered cover and vegetative cover are described in Sections 2.1.2 and 2.1.4, respectively. Compaction test results are summarized in Table 2 and presented in Appendix C. The compaction test locations can also be found in Appendix C. The following discussion provides information regarding the field density tests for the compacted fill horizons of the engineered cover (refer to Figure 3 for the relative locations of the fill horizons).

Three density tests were conducted in the area of each trench in the "bottom" compacted fill horizon for a total of twelve tests as proposed in the CAP (DOE, 1997b). Since the compacted thickness of the "bottom" compacted fill horizon varied between approximately 0.2 m to 0.3 m (8 in to 12 in), 20 cm (8 in) deep field density tests were conducted to reduce the potential of interference from the underlying native site soils. The compaction results in the "bottom" compacted fill horizon exceeded the 80 percent requirement and ranged from 89.8 to 96.9 percent compaction.

After compaction testing the "bottom" compacted fill horizon, additional fill was placed and compacted that comprised the "top" compacted fill horizon. The additional fill was placed on the cover area in approximate 0.2 m (8 in) lifts and compacted. Up to two compacted lifts were required to complete the "top" compacted fill horizon. For the discussion regarding the engineered cover construction activities see Section 2.1.2.

A total of twelve field density tests (three 30 cm [12 in] tests in each trench area) were conducted in the "top" compacted fill horizon. Selection of the 30 cm (12 in) test depth was based upon the compacted thickness of the "top" compacted fill horizon (ranged from approximately 0.2 m to 0.3 m (0.7 ft to 12 in) depending upon the fill and grade requirements of the cover area). The

TABLE 2 - COMPACTION TEST RESULTS

TEST LOCATION <sup>1</sup>	LAB NUMBER	COMPACTED FILL HORIZON <sup>2</sup>	TEST DEPTH	PERCENT COMPACTION
1	869	Bottom	20 cm (8 in)	89.8
2	870	Bottom	20 cm (8 in)	90.5
3	871	Bottom	20 cm (8 in)	95.9
4	872	Bottom	20 cm (8 in)	92.6
5	873	Bottom	20 cm (8 in)	96.9
6	874	Bottom	20 cm (8 in)	95.9
7	875	Bottom	20 cm (8 in)	94.8
8	876	Bottom	20 cm (8 in)	95.1
9	877	Bottom	20 cm (8 in)	92.8
10	878	Bottom	20 cm (8 in)	93.1
11	879	Bottom	20 cm (8 in)	94.3
12	880	Bottom	20 cm (8 in)	95.7
1	881	Top	30 cm (12 in)	97.4
2	882	Top	30 cm (12 in)	93.1
3	883	Top	30 cm (12 in)	93.7
4	884	Top	30 cm (12 in)	95.1
5	885	Top	30 cm (12 in)	94.7
6	886	Top	30 cm (12 in)	93.3
7	887	Top	30 cm (12 in)	96.0
8	888	Top	30 cm (12 in)	95.2
9	889	Top	30 cm (12 in)	95.2
10	890	Top	30 cm (12 in)	94.0
11	891	Top	30 cm (12 in)	93.6
12	892	Top	30 cm (12 in)	94.1

Notes: 1 - Test Locations can be found in Appendix C.

2 - See Section 2.1.2 for a discussion regarding the fill horizons of the engineered cover.

compaction results exceeded the 80 percent requirement and ranged from 93.1 to 97.4 percent compaction. Field densities were not conducted in the vegetative cover since the area was to be ripped and disked prior to planting.

As-built surveying of the surface of the vegetative cover areas was completed and indicated that the covers were constructed as proposed in the approved CAP (DOE, 1997b).

## **4.2 USE RESTRICTIONS**

Closure activities conducted at the site were coordinated with and acknowledged by the USAF (see Appendix B for USAF acknowledgment letter and CAU Use Restriction Form).

The Use Restriction Form was transmitted to the USAF on August 6, 1998 for recordation. After recordation, the USAF will provide the DOE/NV and NDEP with a confirmation of the recordation.

The future use of any land related to this CAU, as described in Appendix B, is restricted from any DOE or USAF activity that may alter or modify the containment control as identified in this CR or other documentation for this CAU unless appropriate concurrence is obtained in advance.

## **5.0 POST-CLOSURE MONITORING PLAN**

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Post-closure monitoring of the covers is intended to determine:

- If maintenance and repairs to the perimeter fence are required.
- If remedial action is necessary to establish a vegetative cover.
- If maintenance and repairs to the engineered cover is required.
- When cessation to post-closure monitoring can be proposed.

### **5.1 POST-CLOSURE MONITORING**

The monitoring will consist of biannual (twice per year) visual inspections of:

- The cover for condition (subsidence, significant erosion, unauthorized excavation, etc.) and plant development.
- The fence and signs to determine if repairs are required.

Additional, nonscheduled inspections may be required after severe weather events such as heavy rainfall, flash flooding, and high winds. Any identified maintenance and repair requirements will be remedied within 90 days of discovery and documented in writing at the time of repair.

Additional revegetation work would be conducted during the next revegetation window (October to February).

Intrusion into or sampling of the trench contents is not proposed during the post-closure monitoring period.

Monitoring of the vegetative cover will be conducted during the first, third, and fifth year after revegetation. Monitoring during the first year will determine if germination of seeded plant species has occurred. By the third year, plant establishment will be evaluated. By the fifth year, long-term survival can be predicted. Concurrently, wildlife use of the site will be evaluated with the objective of determining if burrowing animals have moved onto the site and to what depth they might be expected to penetrate the cover. The erosion condition of the soil will be evaluated using a qualitative erosion condition classification developed by the U.S. Bureau of Land Management. Information gathered will be compared to natural conditions and will be used in assessing whether or not remedial action is necessary so that a viable vegetative cover is established.

## 5.2 ANNUAL REPORTING

An annual report will be prepared that will provide the observations and describe modifications and/or repairs made to the cover and cover area. The annual report will be prepared following the second inspection of each year that post-closure monitoring is conducted. The annual reports will include the following information:

- Discussion of observations.
- Inspection checklist (see Appendix D for example inspection form) and maintenance record.
- Conclusions and recommendations.

A copy of each annual report will be submitted to the NDEP.

## 5.3 DURATION

The biannual inspections will be performed for five years after the planting of the vegetative covers, and will be documented on inspection forms.

Completion of post-closure monitoring of CAU 426 may be proposed after two consecutive years of visual inspections have not indicated the need to revegetate or provide maintenance to the vegetative covers. Completion of post-closure monitoring may be proposed within five years after the original revegetation of the site and include the removal of the fence since the plants will have attained a maturity to not be significantly affected by the grazing of wild horses.

## **6.0 CONCLUSIONS AND RECOMMENDATIONS**

---

### **6.1 CONCLUSIONS**

The following conclusions are made based upon the completed site closure activities and information provided in this report:

- An engineered cover was constructed over the area of the trenches.
- Compaction results exceeded the minimum requirement of 80 percent of the maximum density.
- The vegetative cover and area within the fence was planted with seeds from native shallow rooted plants/grasses.
- A fence with signs was installed on the perimeter of the site to allow the plants/grasses to establish and prevent unauthorized excavation into the engineered cover.
- Closure activities have been coordinated with the USAF.
- The Use Restriction Form was transmitted to the USAF on August 6, 1998 for recordation. After recordation, the USAF will provide the DOE/NV and NDEP with a confirmation of the recordation.
- The field closure activities conducted at the site were completed in accordance to the approved CAP (DOE, 1997b).

### **6.2 RECOMMENDATIONS**

The DOE/NV provides the following recommendations since the proposed closure activities were completed at the site:

- A Notice of Completion be provided by the NDEP to DOE/NV for the closure of CAU 426 (Cactus Spring Trenches [CAS Number RG-23-001-RGCS]).
- CAU 426 be moved from Appendix III to Appendix IV of the FFACO.

DOE\NV will continue to perform post-closure monitoring of the site as indicated in Section 5.0 of this CR.

## 7.0 REFERENCES

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### American Society for Testing and Materials, see ASTM

ASTM, 1997a. Method D 1557-91: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort, 1997 Annual Book of ASTM Standards, Volume 04.08, Soil and Rock (I): D 420 - D 4914.

ASTM, 1997b. Method D 422-90: Standard Test Method for Particle-Size Analysis of Soils, and Method D 1140-92: Standard Test Method for Amount of Material in Soils Finer Than the No. 200 Sieve, 1997 Annual Book of ASTM Standards, Volume 04.08, Soil and Rock (I): D 420 - D 4914.

ASTM, 1997c. Method D 2922-96: Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth), 1997 Annual Book of ASTM Standards, Volume 04.08, Soil and Rock (I): D 420 - D 4914.

### U.S. Department of Energy, see DOE

DOE, 1996. Corrective Action Investigation Plan: Cactus Spring Waste Trenches, Rev. 0, May 1996, DOE/NV-429.

DOE, 1997a. Corrective Action Decision Document For the Cactus Spring Waste Trenches, Rev. 1, July 1997, DOE/NV-474 UC-700.

DOE, 1997b. Corrective Action Plan for Corrective Action Unit 426, Cactus Spring Waste Trenches, Tonopah Test Range, September 1997, DOE/NV-11718-153 UC-702.

### U.S. Environmental Protection Agency, see EPA

EPA, 1996. Region IX Preliminary Remediation Goals (PRGs), San Francisco, CA.

### Nevada Division of Environmental Protection, see NDEP

NDEP, 1996. The State of Nevada Department of Conservation and Natural Resources, Division of Environmental Protection and the U. S. Department of Energy and the U. S. Department of Defense Federal Facility Compliance Order And Agreement.

NDEP, 1997a. Letter from Karen K. Beckley to Stephen A. Mellington, RE: Corrective Action Plan for CAU No. 426, Cactus Spring Waste Trenches, Tonopah Test Range (DRAFT), August 1997, August 21, 1997.

NDEP, 1997b. Letter from Paul J. Liebendorfer to Stephen A. Mellington, RE: Corrective Action Plan for Corrective Action Unit 426, Cactus Spring Waste Trenches, TTR, September 29, 1997.

## **APPENDIX A**

### **AS-BUILT ENGINEERING DRAWINGS**

UNITED STATES DEPA  
NEVADA OPERA  
TONOPAH TEST  
CACTUS SPRING WAST  
CLOS  
ARE A

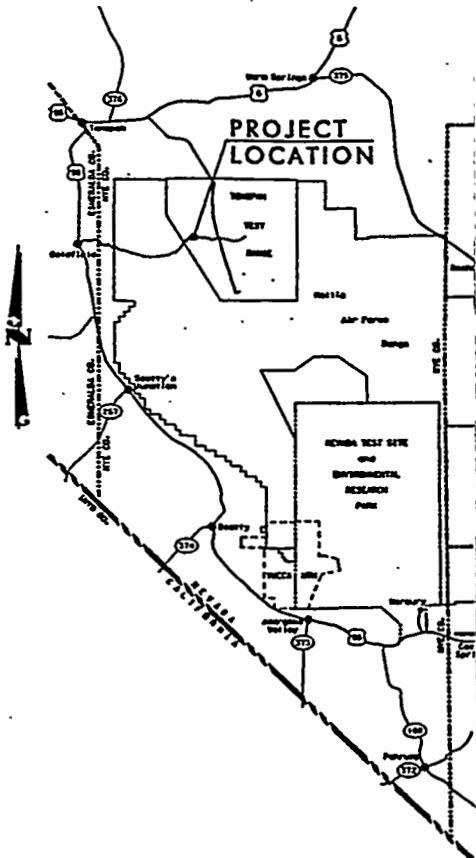
## INDEX

DRAWING NUMBER	DRAWING TITLE	STANDARD NUMBER	DESCRIPTION
<b>TITLE</b>			
JS-052-133-T2 REV 1	TITLE SHEET	STD T1	STANDARDS INDEX GENERAL NOTES, DRAFTING SYMBOLS & ANSI STANDARD
<b>CIVIL</b>			
JS-052-133-C4 REV 1	VICINITY MAP	STD C100	NOTES, LEGEND & SYMBOLS
JS-052-133-CS REV 1	SITE & GRADING PLAN	STD C101	ABBREVIATIONS
JS-052-133-C6 REV 1	SECTIONS		

## **SCOPE OF WORK**

THIS PROJECT SHALL CONSIST OF PLACING NATIVE FILL TO CLOSE THE CACTUS SPRING WASTE TRENCHES. WORK WILL ALSO INCLUDE REVEGETATION OF THE SITE.

WORK SHALL BE PERFORMED IN ACCORDANCE WITH DOE/NV STD SPECIFICATIONS DATED DECEMBER 1994.



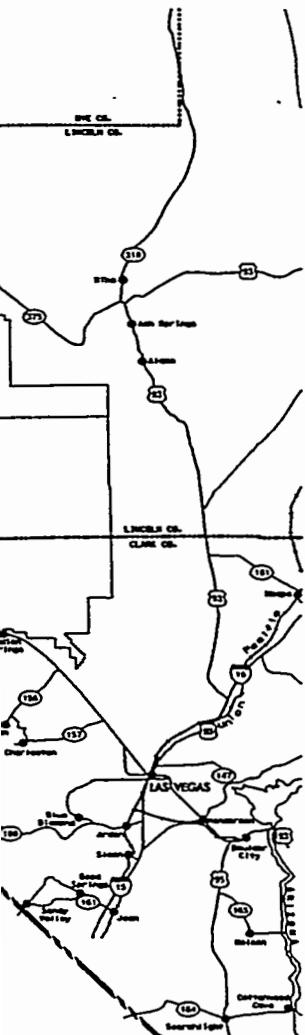
LOCATION

# DEPARTMENT OF ENERGY

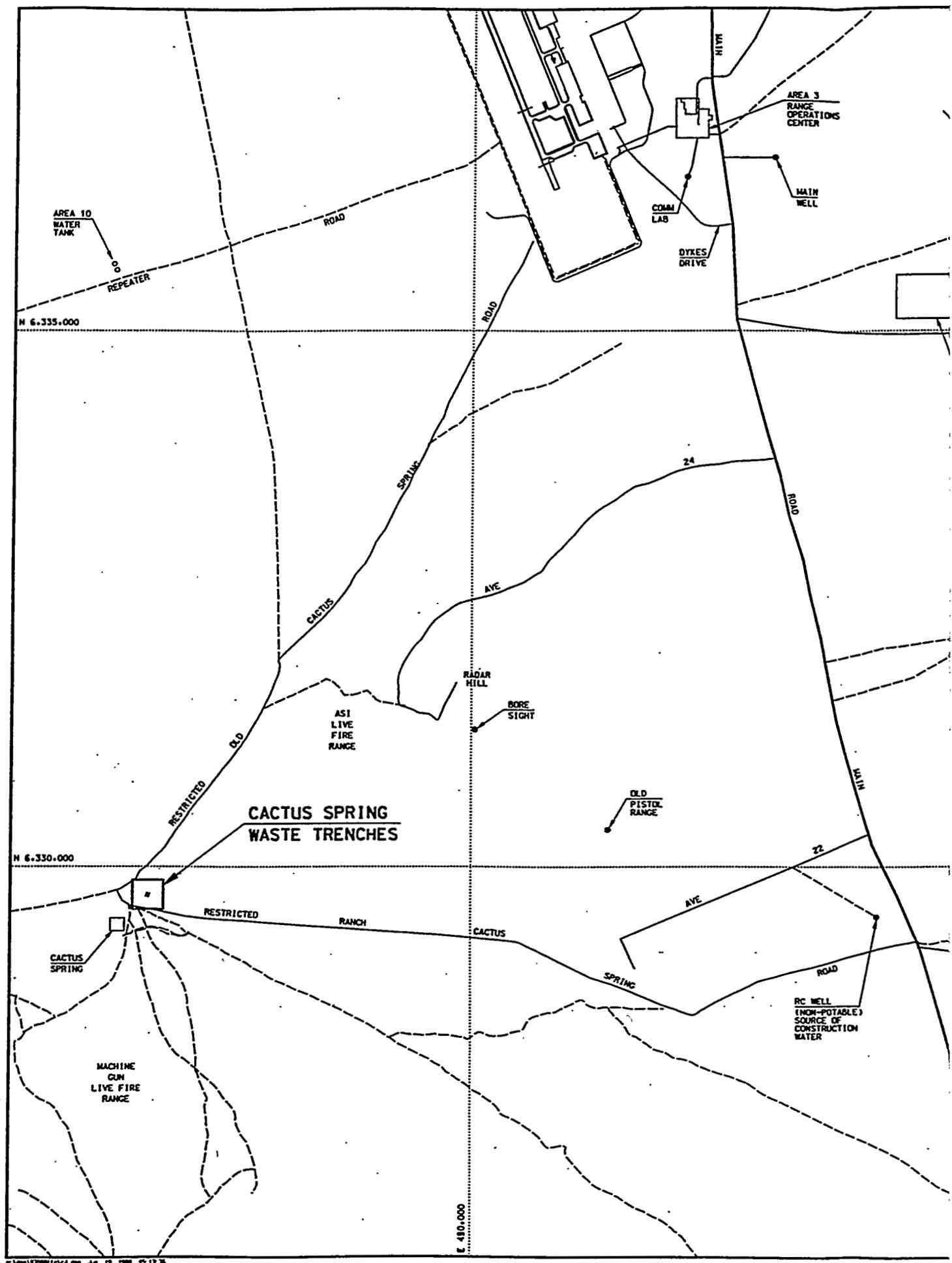
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RANGE, NEVADA

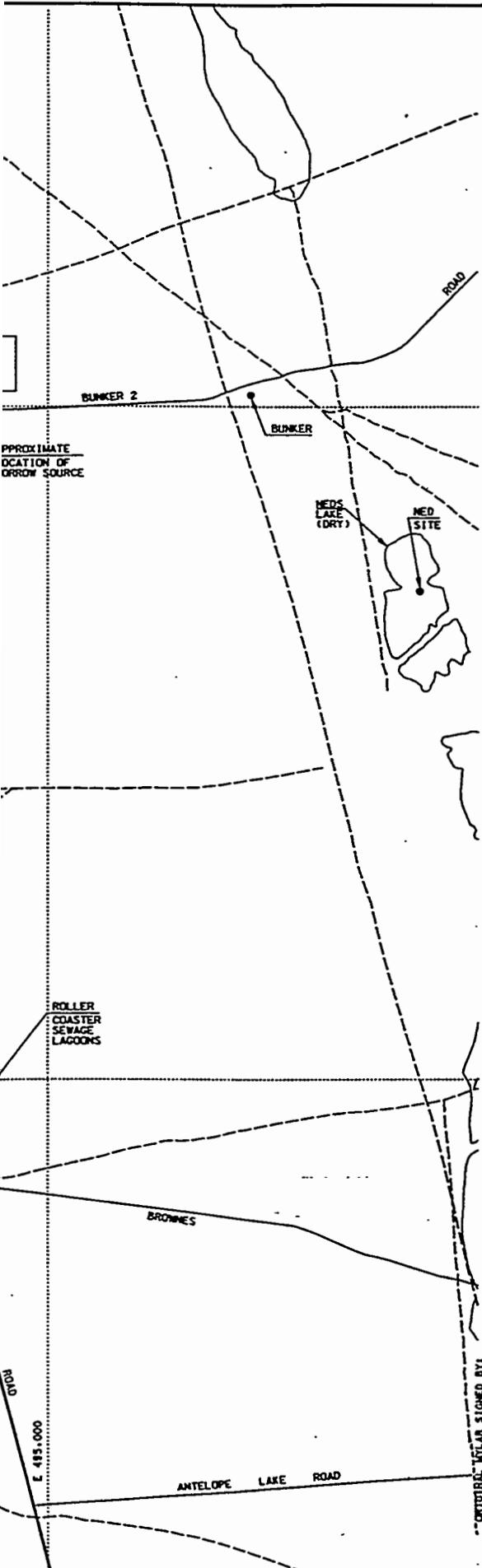
E TRENCHES CAU 426  
URE

5 2



1	NEVADA		AS-BUILT PER SURVEY								
	NO	DATE	REVISIONS				1	2	3	4	5
<b>U.S. DEPARTMENT OF ENERGY</b> <b>NEVADA OPERATIONS OFFICE</b> <b>TONOPAH TEST RANGE — AREA 52</b> <b>CACTUS SPRING WASTE TRENCHES CAU 426</b> <b>CLOSURE</b> <b>TITLE SHEET</b>											
DELIVER TO: DSNM FIE FIE SCHEDULE: DSNM JAS OLH SAFETY: OL KRK		LAS VEGAS, NEVADA									
SUBMITTED (PRINTED OR STAMPED): <b>KEN SCHECHTER</b> <b>DAVID MADSEN</b> APPROVAL BLOCK DATE: <b>09/03/97</b> KEVIN CABLE											
APPROVAL BLOCK DATE: <b>09/03/97</b> KEVIN CABLE											
P. O. BOX: <b>98521</b> N/A ACTIVITY CODE: <b>C4P86T00E</b> PROJ. ID: <b>97056TTR</b> BLDG. NUMBER: <b>JS-052-133-T2</b> REVISION: <b>1</b>											
<b>Bechtel Nevada</b> P.O. BOX 98521 LAS VEGAS, NV 89193-9521											



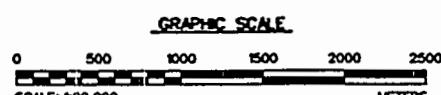


#### GENERAL NOTES:

1. CAP OVER EACH TRENCH (4) SHALL BE CONSTRUCTED OF BORROW MATERIAL PLACED IN 8" LISTS AND COMPAKTED TO 80% OF MAXIMUM DENSITY PER ASTM D1557.
2. REVEGETATION SHALL BE PERFORMED IN ACCORDANCE WITH RECOMMENDATIONS CONTAINED IN THE TONOPAH TEST RANGE CLOSURE SITES REVEGETATION PLAN, BECHTEL NEVADA, MAY 1997. SEED MIX REQUIRES MODIFICATION TO INCLUDE ONLY PLANTS AND GRASSES WITH ROOT DEPTHS TO MAXIMUM OF 3 FEET.
3. ALL MEASURED VALUES TO BE BASED ON THE NORTH AMERICAN DATUM OF 1983, NEVADA STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, METERS.

7/19/97

AS-BUILT	
Bechtel Nevada	
Original As-Built	Approved
Surveyor	Perf.
Supervisor	Perf.
UNLESS NOTED BY MARKED CHANGES, ALL DIMENSIONS, NOTES, REFERENCES AND CONSTRUCTION FEATURES ARE CORRECTED, AND WERE CONSTRUCTED AS SHOWN ON THIS DRAWING.	



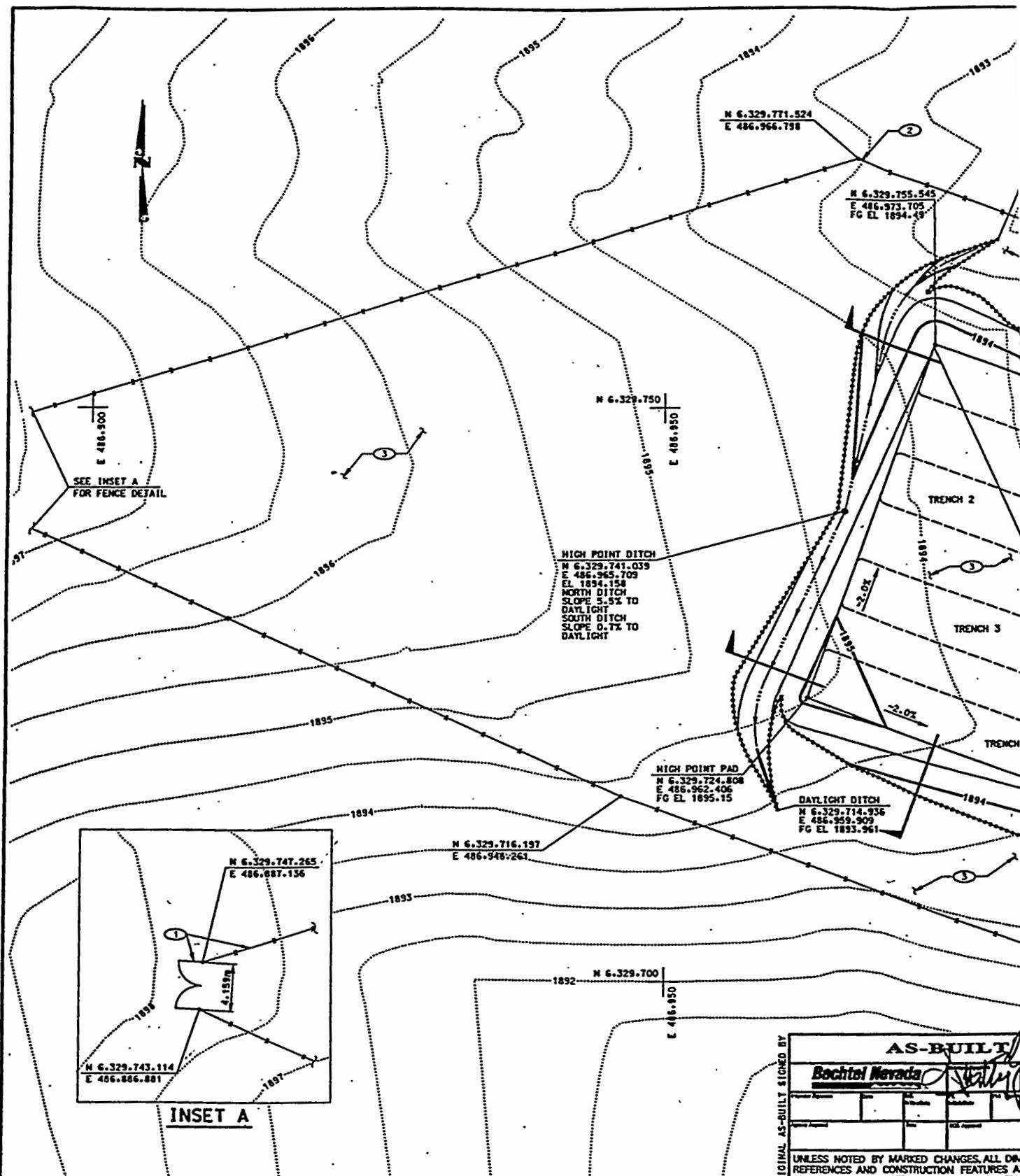
U.S. DEPARTMENT OF ENERGY

NEVADA OPERATIONS OFFICE LAS VEGAS, NEVADA

DESIGNED BY: FIE	AS-BUILT BY: FIE	REVISIONS: 1000 1010 1020 1030 1040 1050 1060
CHECKED BY: JAS	ORIGIN: OLH	
SUPERVISED BY: KRN	DATE: 09/03/97	
SUBMITTED (PC/CHIEF ENGINEER) BY: KEVIN CABLE		
BECHTEL NEVADA		
TONOPAH TEST RANGE AREA 52		
CACTUS SPRING WASTE TRENCHES CAU 426		
CLOSURE		
VICINITY MAP		
APPROVAL BLOCK		DATE: 09/03/97
DEPT OF ENERGY PROF ENGR: KEVIN CABLE		
DRAWING NUMBER: JS-052-133-C4		
P.O. NO: N/A		
FILE NUMBER: C4P91005		
PRINTED BY: 070967TR		
SHEET: 1		REVISION: 1

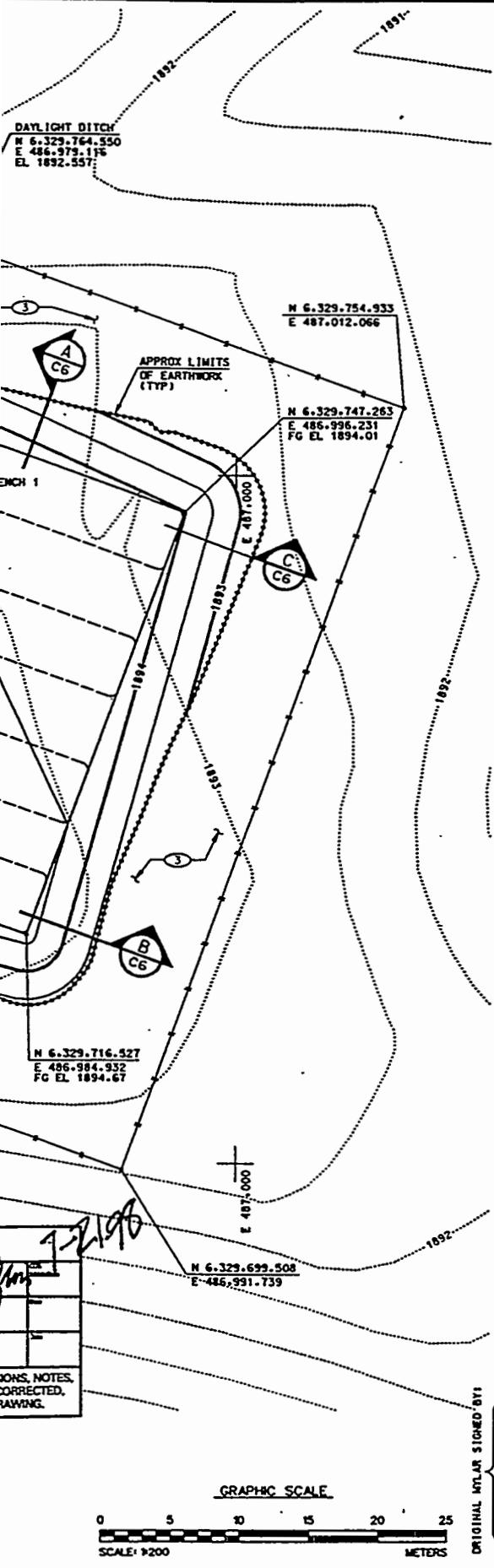
**Bechtel Nevada**

P.O. BOX 2504 NORTH LAS VEGAS, NV 89104



**SITE & GRADING PLAN**

SCALE 1:200  
CONTOUR INTERVAL = .5 METERS



## NOTES

1. CONSTRUCTION QUALITY ASSURANCE SHALL BE PERFORMED IN ACCORDANCE WITH SECTIONS 2.1 AND 2.2 OF THE CORRECTIVE ACTION PLAN DOCUMENT FOR THE CACTUS SPRING WASTE TRENCHES, CAU 420, REV 0, TONOPAH TEST RANGE.

## KEY NOTES

- 1 A THREE STRAND, BARBED WIRE FENCE SHALL BE INSTALLED AROUND THE TRENCHES. PROVIDE A 4 METER DOUBLE SWING VEHICLE ACCESS GATE AS SHOWN. SIGNS INDICATING REVEGETATION AREAS ARE TO BE MOUNTED ON NEW FENCE.
- 2 WARNING SIGNS AGAINST EXCAVATION ARE TO BE INSTALLED ON THE CORNERS OF THE BARBED WIRE FENCING.
- 3 ENTIRE AREA WITHIN NEW FENCING SHALL BE REVEGETATED.

## LEGEND

APPROXIMATE PERIMETER OF WASTE TRENCH

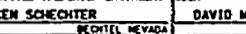
### ESTIMATED QUANTITIES

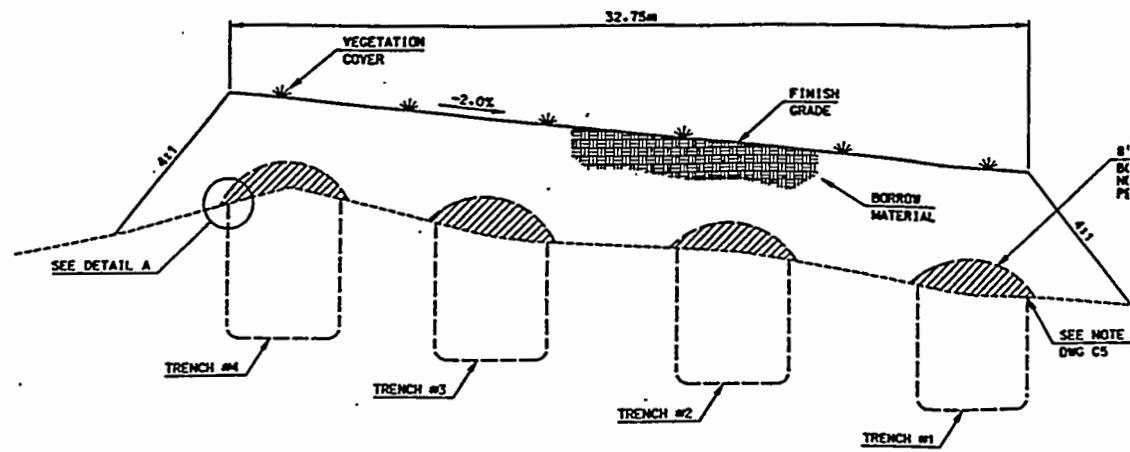
DESCRIPTION	QUANTITY	UNIT
EXCAVATION	33.81	METER <sup>3</sup>
EMBANKMENT	921.53	METER <sup>3</sup>
BORROW	687.72	METER <sup>3</sup>

NO CUT AND FILL FACTORS APPLIED. QUANTITIES SHOWN ARE FOR ESTIMATING PURPOSES ONLY. PAYMENT SHALL BE MADE BY ACTUAL INSTALLED QUANTITIES.

## REFERENCES

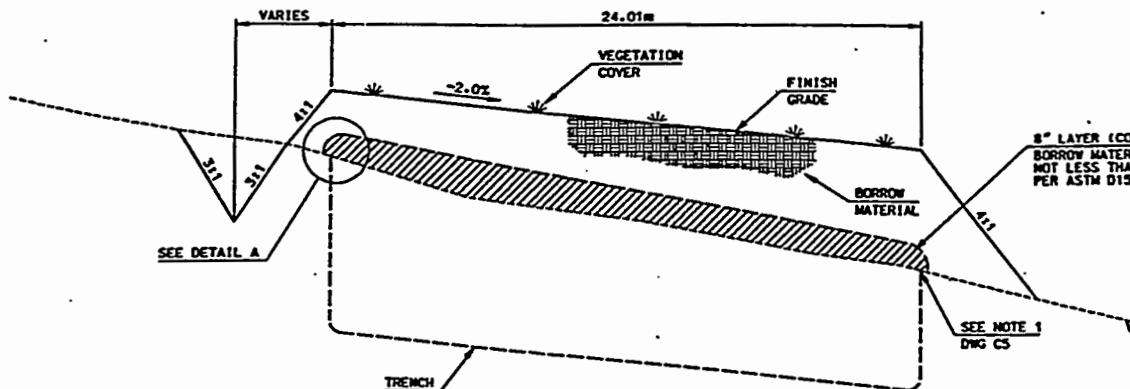
**TITLE SHEET** **JS-052-133-T2**  
**VICINITY MAP** **JS-052-133-C4**  
**SECTIONS** **JS-052-133-C6**

AS-BUILT PER SURVEY		REVISIONS	
NO	DATE	REVISIONS	
<b>U.S. DEPARTMENT OF ENERGY</b> <b>NEVADA OPERATIONS OFFICE</b>			
TONOPAH TEST RANGE		AREA 52	
<b>CACTUS SPRING WASTE TRENCHES CAU 426</b> <b>CLOSURE</b> <b>SITE &amp; GRADING PLAN</b>			
SUBMITTED BY: BECHTEL NEVADA		APPROVAL BLOCK	
KEN SCHECHTER		DEPT. OF ENERGY PROJ. ENGR.	
BECHTEL, NEVADA		KEVIN CABBLE	
		DATE	
		03/03/97	
 P.O. BOX 3936 NORTH LAS VEGAS, NV 89036		ACTIVITY CODE: CAPB100E FILE NO.: B7095TTR SHEET: 1 OF 1 REVISION: 1	
<b>JS-052-133-C5</b>			



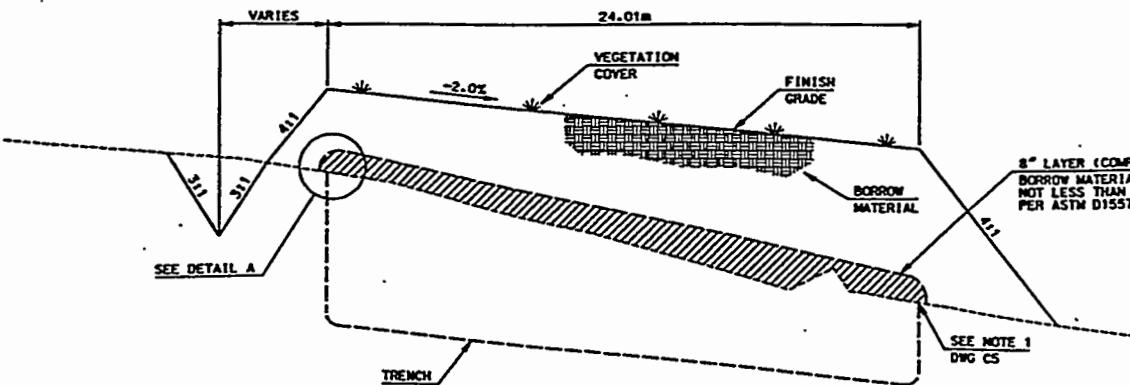
**SECTION**  
NOT TO SCALE

(A) CS



**SECTION**  
NOT TO SCALE

(B) CS

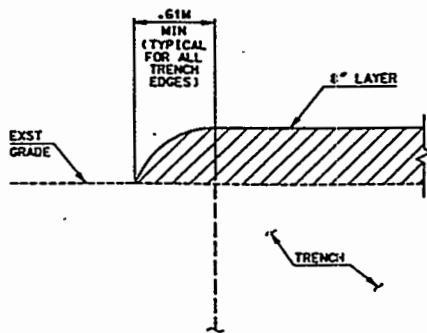


**SECTION**  
NOT TO SCALE

(C) CS

YER (COMPACTED THICKNESS)  
MATERIAL COMPACTED TO  
LESS THAN 80% OF MAX DENSITY  
STM D1557 (TYP)

APPROX EXST  
GRADE



## DETAIL

NOT TO SCALE

A

CTED THICKNESS)  
COMPACTED TO  
0% OF MAX DENSITY

APPROX EXST  
GRADE

12/98

AS-BUILT					
Bechtel Nevada					
NO	DATE	REVISIONS	1	2	3
UNLESS NOTED BY MARKED CHANGES, ALL DIMENSIONS, NOTES, REFERENCES AND CONSTRUCTION FEATURES ARE CORRECTED, AND WERE CONSTRUCTED AS SHOWN ON THIS DRAWING.					

## REFERENCES

TITLE SHEET  
SITE & GRADING PLAN

JS-052-133-T2  
JS-052-133-C5

THICKNESS)  
IMPACTED TO  
OF MAX DENSITY

APPROX EXST  
GRADE

ORIGINAL MYLAR SIGNED BY:

NO	DATE	REVISIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
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## **APPENDIX B**

## **USE RESTRICTION DOCUMENTATION**

## **USAF ACKNOWLEDGMENT LETTER**



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 99TH AIR BASE WING (ACC)  
NELLIS AIR FORCE BASE, NEVADA

JUL 15 1998

Colonel Michael F. Fukey  
Director, Environmental Management  
4349 Duffer Dr., Ste. 1601  
Nellis AFB NV 89191-7007

Ms. Runore C. Wycoff,  
Director, Environmental Restoration Division  
DOE Nevada Operations Office  
P.O. Box 98518  
Las Vegas NV 89193-8518

**ACKNOWLEDGEMENT OF CORRECTIVE ACTION UNIT (CAU) 426**

Nellis Air Force Base (Nellis) has reviewed the U. S. Department of Energy's (DOE) Corrective Action Decision Document for Corrective Action Unit (CAU) 426. Nellis has the right to use this land for military purposes under Public Law 99-606, as amended, and Public Land Order 7131.

Nellis can only impose restrictions on its use of the land while under its control. For the above referenced site, these self-imposed restrictions by Nellis on its use of this section of NAFR (hereafter "use restrictions") will be placed in the Geographic Information System (GIS) for NAFR. The Range Management Office (RMO) at Nellis will administer use restrictions to ensure that there are institutional controls on users of the NAFR, ensuring that they are aware of these restrictions located in the GIS, which should assist the DOE in working with the state regulators on Corrective Active Units. If RMO determines that a proposed mission use would not comport with existing use restrictions or that there is a proposed transfer/relinquishment of all or part of the NAFR, it will notify DOE of the proposed transfer/relinquishment. Then DOE must contact the regulators or transferee/returnee to address and resolve cleanup issues associated with the proposed use or transfer/relinquishment.

If RMO needs to modify its use restrictions thereby causing additional cleanup requirements to meet the proposed land-use scenarios, then DOE will clean the restricted land up to the level to meet the proposed land-use scenarios in an expeditious manner so that RMO may amend the use restrictions.

Also, Nellis and DOE are negotiating a Memorandum of Understanding that will address DOE's future obligations to clean up any of its contaminated areas.

Please contact me at 652-6828 if you have any questions.

Sincerely

/s/ Michael Fukey

**MICHAEL F. FUKEY, Colonel, USAF**

cc:

HQAWC RMO/RML  
HQ AWFC/JAV

## **CAU USE RESTRICTION FORM**

## CAU Use Restriction Information

CAU Number/Description: CAU 426 Cactus Spring Waste Trenches, Tonopah Test Range

Nevada

Applicable CAS Numbers/Descriptions: CAS RG-23-001-RGCS (Waste Trenches)

Contact (organization/project): DOE/NV Industrial Sites Project Manager

Surveyed Area (UTMs): N6.329.756.597 E486.970.842; N6.329.745.20 E486.998.971;

N6.329.725.870 E486.959.543; N6.329.714.760 E486.989.737

Survey Date 10/23/97 Survey Method (GPS, etc.) GPS Datum NAD 83

### Use Restrictions

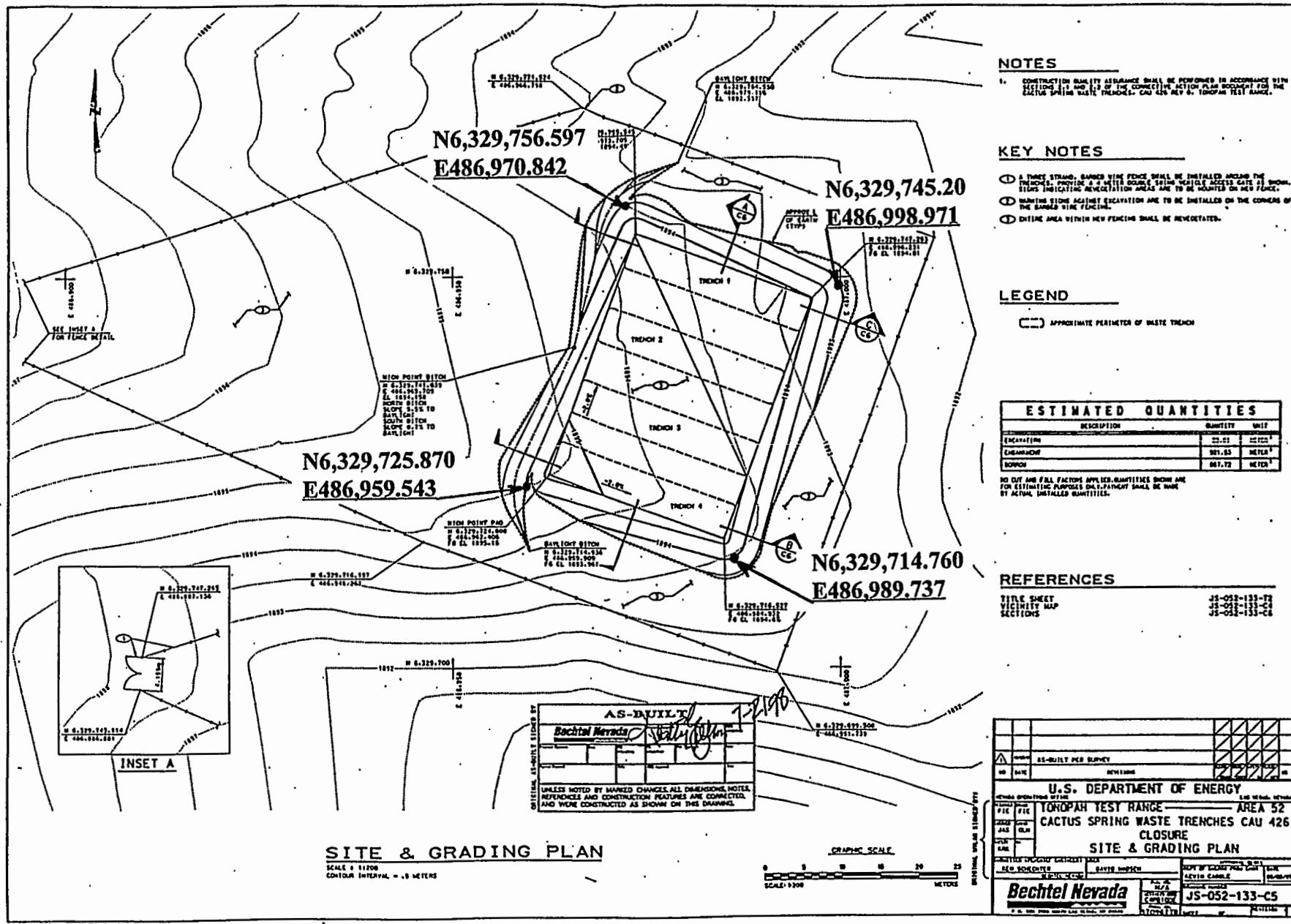
The future use of any land related to this Corrective Action Unit (CAU), as described by the above surveyed location, is restricted from any DOE or Air Force activity that may alter or modify the containment control as approved by the state and identified in the CAU Closure Report or other CAU documentation unless appropriate concurrence is obtained in advance.

Comments: See the Closure Report for additional information on the condition of the site(s) and any monitoring and/or inspection requirements.

Submitted By: /s/ Kevin Cabble

Date: 8/4/98

Attachments: Survey Map



## **APPENDIX C**

## **GEOTECHNICAL TEST RESULTS**

PROCTOR TEST

ASTM D.1557-91

METHOD C

**BECHTEL NEVADA**  
MATERIALS TESTING LABORATORY  
P. O. BOX 98521  
LAS VEGAS, NV 89193-8521

CHARGE # C4RB10DE

LAB # 0781

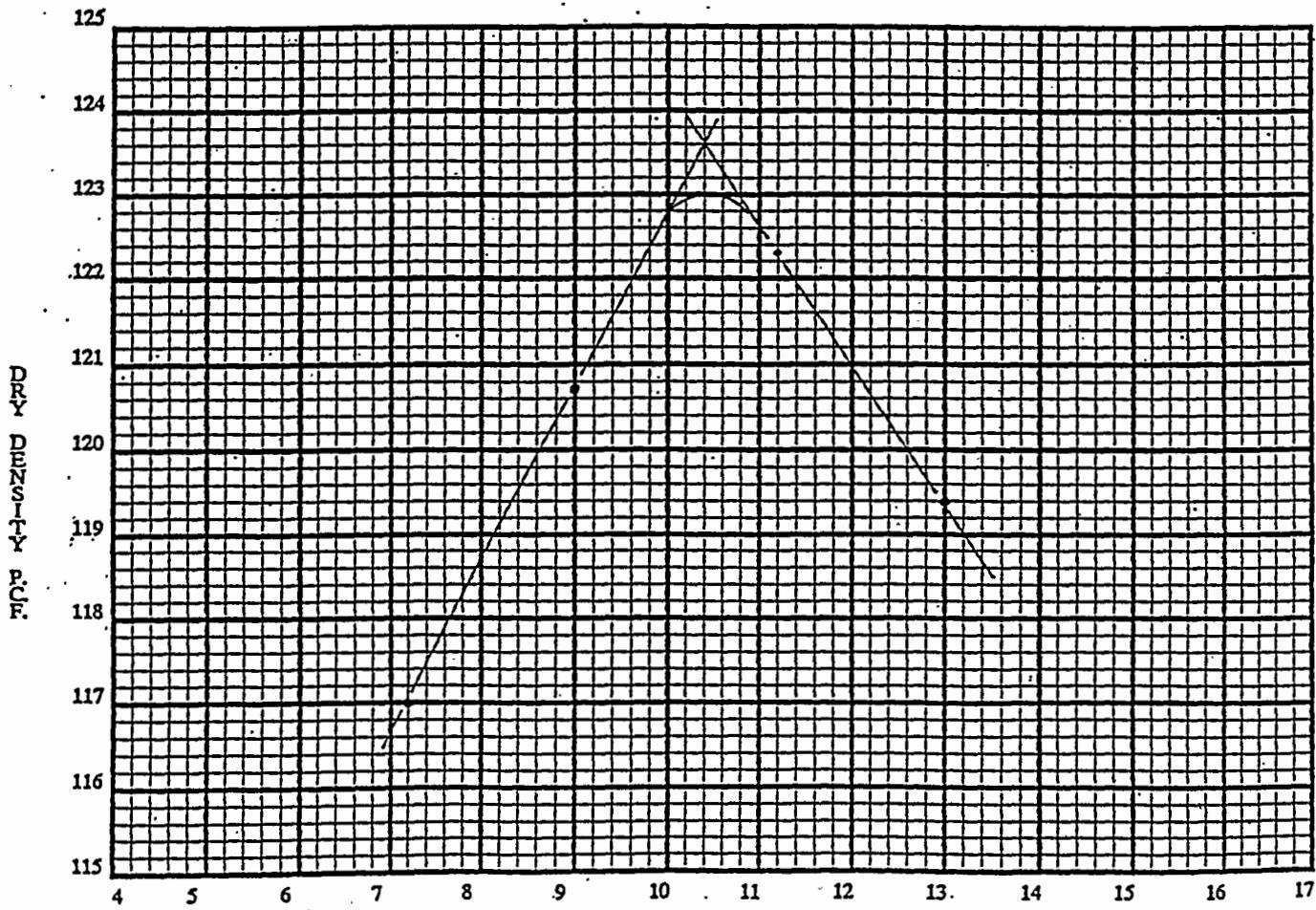
DATE 08/14/97

Project: ROLLER COASTER SEWAGE LAGOON Requested by: D. MADSEN User/Agency: BECHTEL

Sampled by: D. MADSEN Date sampled: 08/11/97 Material: TIR SANDIA BORROW PIT

Tested by: D. HERRINGTON Date tested: 08/13/97 Checked by: /s/ Signature on file

TRIAL		1	2	3	4	5	6
1	Wt. mold + wet soil	7322.9	7468.9	7433.2	7109.0	N/A	N/A
2	Wt. mold	2845.6	2845.6	2845.6	2845.6	N/A	N/A
3	Wt. wet soil	4477.3	4623.3	4587.6	4263.4	N/A	N/A
4	Wet Density, PCF	131.6	135.9	134.9	125.3	N/A	N/A
5	Moisture Tare #	A	B	C	D	N/A	N/A
6	Wt. wet soil + tare	1368.1	1428.2	1431.9	1554.5	N/A	N/A
7	Wt. dry soil + tare	1256.2	1286.5	1269.4	1451.8	N/A	N/A
8	Wt. moisture	111.9	141.7	162.5	102.7	N/A	N/A
9	Wt. tare	16.7	16.7	16.8	16.7	N/A	N/A
10	Wt. dry soil	1239.5	1269.8	1252.6	1435.1	N/A	N/A
11	% Moisture	9.0	11.2	13.0	7.2	N/A	N/A
12	Dry Density, PCF	120.7	122.3	119.4	117.0	N/A	N/A



NO SPECIFICATIONS: INFORMATION ONLY

Equipment used: PM 16, PTL W1256. Cal. date: 06/05/97, Cal. due: 06/05/98

CC: E. MITCHELL BECHTEL  
D. MADSEN BECHTEL  
MTL BECHTEL FILES



**Bechtel Nevada**  
**MATERIALS TESTING LABORATORY**  
**P. O. BOX 98521**  
**LAS VEGAS, NV 89193-8521**

**Request/ Test Report:**

Requested by: D. MADSEN

Charge #: C4RB10DE

User/Agency: BECHTEL

Log #: N/A

MTL Lab #: 0781

Project: ROLLER COASTER SEWAGE LAGOON

Material: TTR SANDIA BORROW PIT

Sampled by: D. MADSEN

Date Sampled: 08/11/97

Tested By: D. HERRINGTON

Date tested: 08/14/97

Checked by: /s/ Signature on file

Date checked: 8-19-97

**LABORATORY TEST REQUIRED**

Sieve Analysis  
 (ASTM C-136-93)  
 (ASTM C-117-95)  
 X (ASTM D-422-90)  
 X (ASTM D-1140-92)  
 Moisture Content  
 (ASTM C-566-93)  
 X (ASTM D-2218-92)

Unit Weight  
 (ASTM C-29-91)

X Soil Classification  
 Percent Porosity

Specific Gravity  
 (ASTM C-127-88/128-93)  
 (ASTM D-584-92)

Other (as noted)

SIEVE ANALYSIS				
U.S. Standard Sieve #	Cumulative Wt Retained	% Retained	% Passing	Spec % Passing
3	0.0	0%	100%	N/A
1 1/2	112.5	4%	96%	N/A
3/4	457.4	16%	84%	N/A
3/8	699.3	24%	76%	N/A
4	1073.3	37%	63%	N/A
10	1502.7	52%	48%	N/A
40	2064.4	72%	28%	N/A
100	2371.2	83%	17%	N/A
200	2523.6	87.9%	12.1%	N/A

Soil Class: SM

Sample Wt (g): DRY = 2869.8      WET = N/A

**MOISTURE CONTENT**

Wet Weight + Tare  
 Dry Weight + Tare  
 Water  
 Tare  
 Dry Weight  
 Moisture %

Native	Oversize	Proctor
4051.8	N/A	N/A
3806.6	N/A	N/A
245.2	N/A	N/A
936.8	N/A	N/A
2869.8	N/A	N/A
8.5%	N/A	N/A

**UNIT WEIGHT**

Loose	Rodded
0.0997506	0.0997506

Oversize Specific Gravity: N/A

Specific Gravity: N/A

EQUIPMENT USED: PM 16, PTL #1256, Calibration Date: 06/05/97

Calibration Due: 06/05/98

Sieve 3"	<u>PTL # Y3221</u>	<u>Cal. Date: 02/06/97</u>	<u>Cal. Due: 02/06/98</u>
Sieve 1 1/2"	<u>PTL # Y303278</u>	<u>Cal. Date: 05/23/97</u>	<u>Cal. Due: 05/23/98</u>
Sieve 3/4"	<u>PTL # Y303276</u>	<u>Cal. Date: 03/17/97</u>	<u>Cal. Due: 03/17/98</u>
Sieve 3/8	<u>PTL # Y302106</u>	<u>Cal. Date: 03/17/97</u>	<u>Cal. Due: 03/17/98</u>
Sieve # 4	<u>PTL # Y302043</u>	<u>Cal. Date: 03/13/97</u>	<u>Cal. Due: 03/13/98</u>
Sieve # 10	<u>PTL # Y310018</u>	<u>Cal. Date: 05/22/97</u>	<u>Cal. Due: 05/22/98</u>
Sieve # 40	<u>PTL # Y310013</u>	<u>Cal. Date: 05/22/97</u>	<u>Cal. Due: 05/22/98</u>
Sieve # 100	<u>PTL # Y10035</u>	<u>Cal. Date: 05/07/97</u>	<u>Cal. Due: 05/07/98</u>
Sieve # 200	<u>PTL # Y310033</u>	<u>Cal. Date: 05/07/97</u>	<u>Cal. Due: 05/07/98</u>

REMARKS: MED BROWN SILTY SAND WITH  
 SOME GRAVEL

cc: E. MITCHELL BECHTEL  
D. MADSEN BECHTEL  
 MTL BECHTEL FILES

## GRADATION CURVES

*Bechtel Nevada*  
**MATERIALS TESTING LABORATORY**  
 P. O. BOX 98521  
 LAS VEGAS, NV 89193-8521

LAB NO. 0781  
 CHARGE # C4RB10DE  
 DATE 08/14/97

PROJECT: ROLLER COASTER SEWAGE LAGOON

LOG #

N/A

CLASSIFICATION: SM

CHECKED BY: D. HERRINGTON

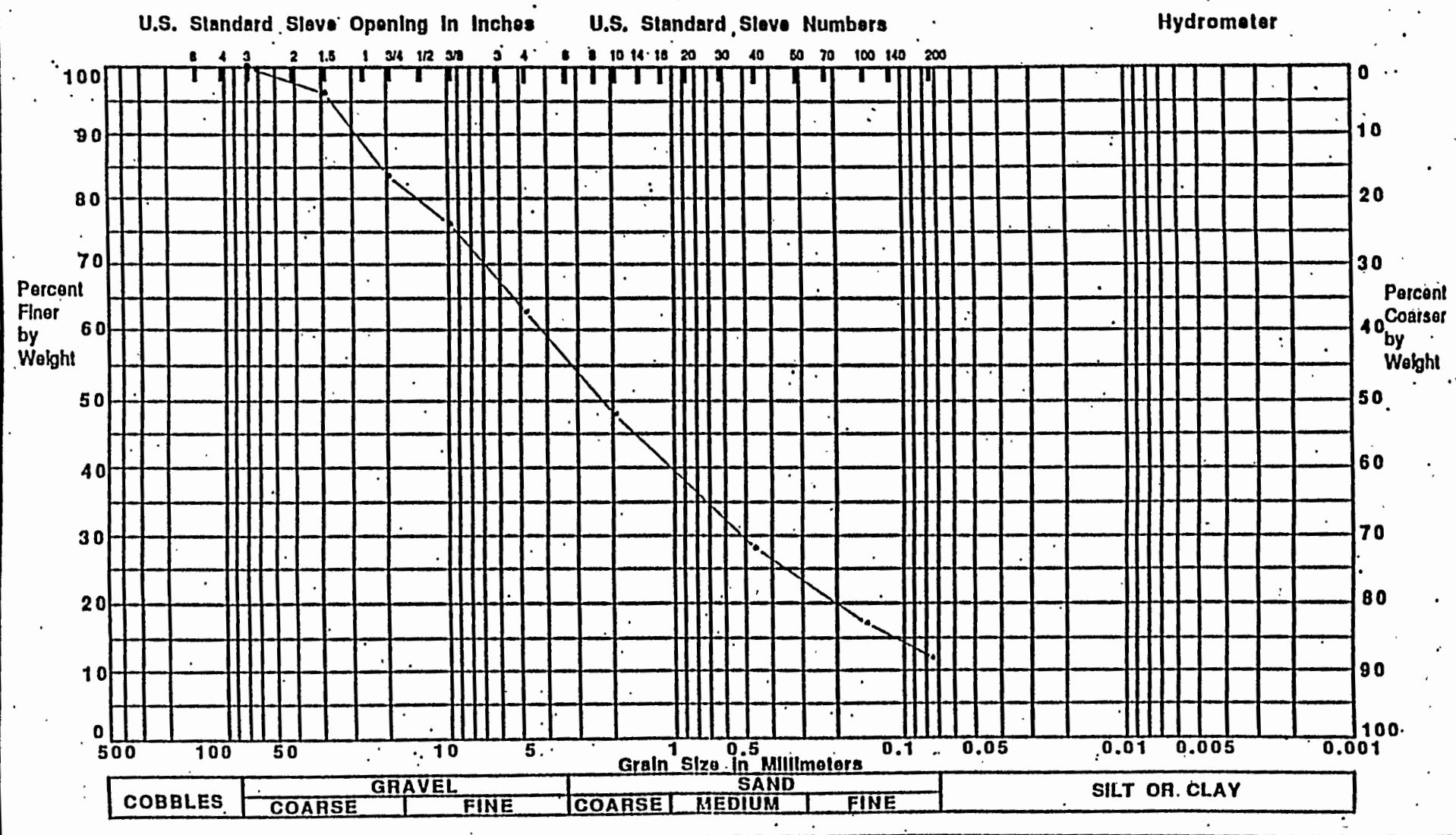
*D. H.*

DATE CHECKED:

8-19-97

MATERIAL

TTR SANDIA BORROW PIT



NO EQUIPMENT USED.

CC: E. MITCHELL      BECHTEL  
 D. MADSEN      BECHTEL  
 MTL BECHTEL FILES



SEP 22 1997

NUCLEAR DENSITY ASTM D2922-91 CAMPBELL MC-2/MC-3	BECHTEL NEVADA MATERIALS TESTING LABORATORY P. O. BOX 98521, M/S NTS188 LAS VEGAS, NV 89193-8521	CHARGE #: CARB10DE DATE TYPED: 09/22/97 PAGE: 1 OF 2
--	---	--

Requested by D. MADSEN User/Agency BECHTEL Material SANDIA BORROW PIT

Project CACTUS SPRING Location of Tests TRENCH COVER

Tested by D. HERRINGTON Date Tested 09/18/97 Checked by /s/ Signature on file

Information transmitted to D. FINNEY By D. HERRINGTON How VERBAL Date 09/18/97

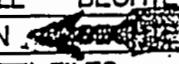
LABORATORY NO	869	870	871	872	873	874
TEST LOCATION	1	2	3	4	5	6
DEPTH OF PROBE	8"	8"	8"	8"	8"	8"
DEPTH OF TESTS	8" Placed					
DRY DENSITY-PCF	110.4	111.3	117.9	113.9	119.2	118.0
MOISTURE %	8.4	6.7	8.2	7.4	7.3	7.2
MAX DENSITY PCF	123.0	123.0	123.0	123.0	123.0	123.0
OPTIMUM MOISTURE %	10.4	10.4	10.4	10.4	10.4	10.4
PERCENT COMPACTION	89.8	90.5	95.9	92.6	96.9	95.9
REQUIRED COMPACTION %	80.0	80.0	80.0	80.0	80.0	80.0
IN / OUT of SPECIFICATION	WITHIN	WITHIN	WITHIN	WITHIN	WITHIN	WITHIN

GAUGE NO 23205 DATE OF STANDARDIZATION 09/18/97 VALUE OF M 632  
STANDARDIZATION D 3007

## PLOT PLAN

SEE ATTACHED PLOT PLAN FOR TEST LOCATIONS

REMARKS: NONE

CC: E. MITCHELL BECHTEL  
D. MADSEN   
 MTL BECHTEL FILES

SEP '22 1997

## NUCLEAR DENSITY

ASTM D2922-91

CAMPBELL MC-2/MC-3

BECHTEL NEVADA  
MATERIALS TESTING LABORATORY  
P. O. BOX 98521, M/S NTS168  
LAS VEGAS, NV 89193-8521CHARGE #: CARB10DE  
DATE TYPED: 09/22/97  
PAGE: 2 OF 2Requested by D. MADSEN User/Agency BECHTEL Material SANDIA BORROW PITProject CACTUS SPRING Location of Tests TRENCH COVERTested by D. HERRINGTON Date Tested 09/18/97 Checked by /s/ Signature on fileInformation transmitted to D. FINNEY By D. HERRINGTON How VERBAL Date 09/18/97

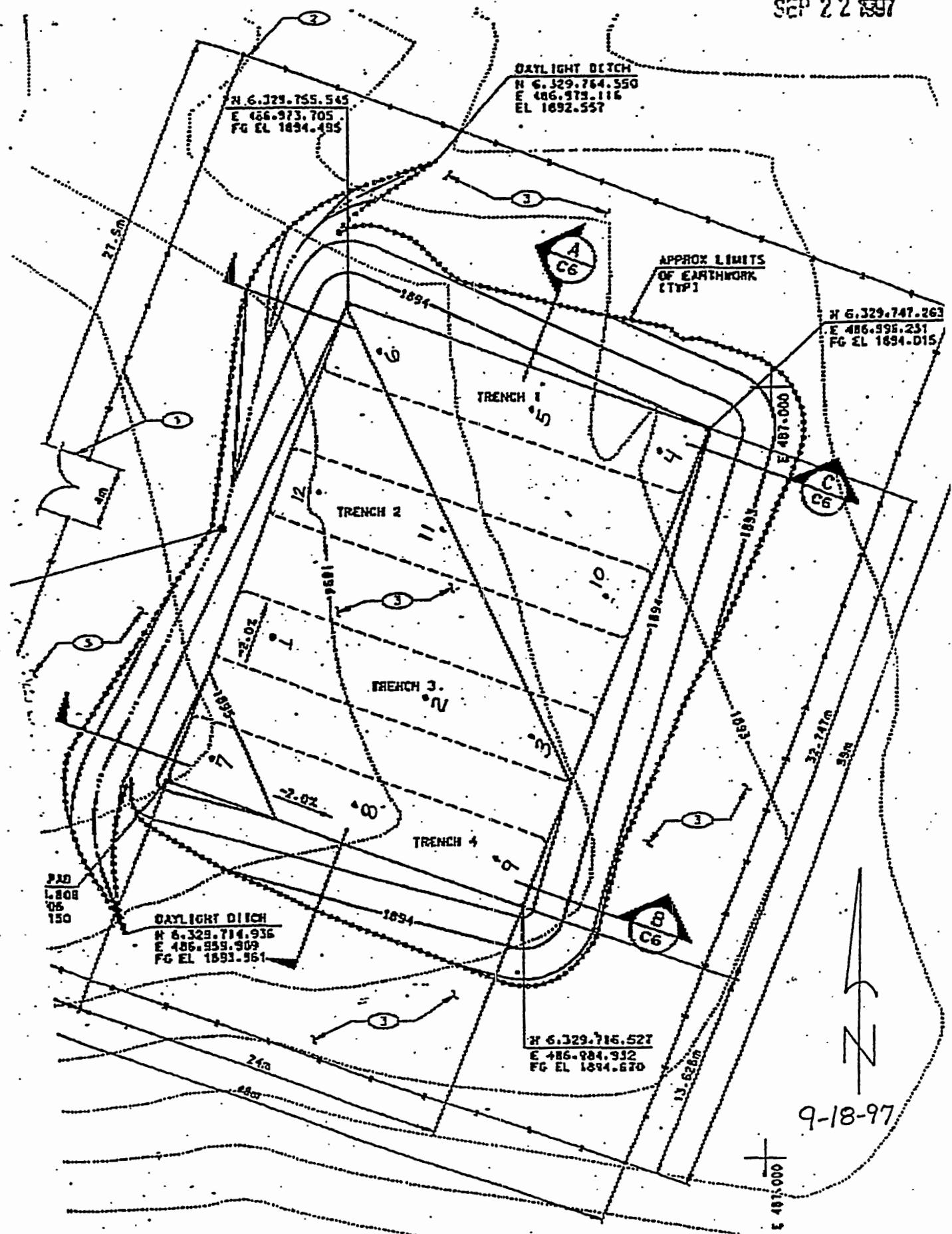
LABORATORY NO	875	876	877	878	879	880
TEST LOCATION	7	8	9	10	11	12
DEPTH OF PROBE	8"	8"	8"	8"	8"	8"
DEPTH OF TESTS	8" Placed					
DRY DENSITY-PCF	116.6	117.0	114.2	114.5	116.0	117.7
MOISTURE %	7.9	8.1	8.1	8.7	8.3	8.1
MAX DENSITY PCF	123.0	123.0	123.0	123.0	123.0	123.0
OPTIMUM MOISTURE %	10.4	10.4	10.4	10.4	10.4	10.4
PERCENT COMPACTION	94.8	95.1	92.8	93.1	94.3	95.7
REQUIRED COMPACTION %	80.0	80.0	80.0	80.0	80.0	80.0
IN / OUT of SPECIFICATION	WITHIN	WITHIN	WITHIN	WITHIN	WITHIN	WITHIN

GAUGE NO	<u>23205</u>	DATE OF STANDARDIZATION	<u>09/18/97</u>	VALUE OF M	<u>632</u>
				STANDARDIZATION D	<u>3007</u>

## PLOT PLAN

SEE ATTACHED PLOT PLAN FOR TEST LOCATIONS

REMARKS: NONECC: E. MITCHELL BECHTEL  
D. MADSEN ~~RECEIVED~~  
MTL BECHTEL FILES



SEP 22 1997

NUCLEAR DENSITY ASTM D2922-91 CAMPBELL MC-2/MC-3	BECHTEL NEVADA MATERIALS TESTING LABORATORY P. O. BOX 98521, M/S NTS183 LAS VEGAS, NV 89193-8521	CHARGE #: C4RB10DE DATE TYPED: 09/22/97 PAGE: 1 OF 2
--	---	--

Requested by <u>D. MADSEN</u>	User/Agency <u>BECHTEL</u>	Material <u>SANDIA BORROW PIT</u>
-------------------------------	----------------------------	-----------------------------------

Project <u>CACTUS SPRING</u>	Location of Tests <u>TRENCH COVER</u>
------------------------------	---------------------------------------

Tested by <u>D. HERRINGTON</u>	Date Tested <u>09/19/97</u>	Checked by <u>/s/ Signature on file</u>
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Information transmitted to <u>D. FINNEY</u>	By <u>D. HERRINGTON</u>	How <u>VERBAL</u>	Date <u>09/19/97</u>
---	-------------------------	-------------------	----------------------

LABORATORY NO	881	882	883	884	885	886
TEST LOCATION	1	2	3	4	5	6
DEPTH OF PROBE	12"	12"	12"	12"	12"	12"
DEPTH OF TESTS	-1'	-1'	-1'	-1'	-1'	-1'
DRY DENSITY-PCF	119.8	114.5	115.2	117.0	116.5	114.8
MOISTURE %	6.5	8.6	7.3	8.4	8.2	7.3
MAX DENSITY PCF	123.0	123.0	123.0	123.0	123.0	123.0
OPTIMUM MOISTURE %	10.4	10.4	10.4	10.4	10.4	10.4
PERCENT COMPACTION	97.4	93.1	93.7	95.1	94.7	93.3
REQUIRED COMPACTION %	80.0	80.0	80.0	80.0	80.0	80.0
IN / OUT of SPECIFICATION	WITHIN	WITHIN	WITHIN	WITHIN	WITHIN	WITHIN

GAUGE NO <u>23205</u>	DATE OF STANDARDIZATION <u>09/19/97</u>	VALUE OF M <u>632</u>
		STANDARDIZATION D <u>3007</u>

#### PLOT PLAN

SEE ATTACHED PLOT PLAN FOR TEST LOCATIONS

REMARKS: NONE

CC: E. MITCHELL BECHTEL  
D. MADSEN BECHTEL  
MTL BECHTEL FILES

SEP 22 1997

NUCLEAR DENSITY ASTM D2922-91 CAMPBELL MC-2/MC-3	BECHTEL NEVADA MATERIALS TESTING LABORATORY P. O. BOX 98521, M/S NTS188 LAS VEGAS, NV 89193-8521	CHARGE #: C4RB10DE DATE TYPED: 09/22/97 PAGE: 2 OF 2
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Requested by <u>D. MADSEN</u>	User/Agency <u>BECHTEL</u>	Material <u>SANDIA BORROW PIT</u>				
Project <u>CACTUS SPRING</u>	Location of Tests	TRENCH COVER				
Tested by <u>D. HERRINGTON</u>	Date Tested <u>09/19/97</u>	Checked by <u>/s/ Signature on file</u>				
Information transmitted to <u>D. FINNEY</u>	By <u>D. HERRINGTON</u>	How <u>VERBAL</u>	Date <u>09/19/97</u>			
LABORATORY NO	887	888	889	890	891	892
TEST LOCATION	7	8	9	10	11	12
DEPTH OF PROBE	12"	12"	12"	12"	12"	12"
DEPTH OF TESTS	-1'	-1'	-1'	-1'	-1'	-1'
DRY DENSITY-PCF	118.1	117.1	117.1	115.6	115.1	115.8
MOISTURE %	6.9	7.1	6.1	6.7	6.8	7.0
MAX DENSITY PCF	123.0	123.0	123.0	123.0	123.0	123.0
OPTIMUM MOISTURE %	10.4	10.4	10.4	10.4	10.4	10.4
PERCENT COMPACTION	96.0	95.2	95.2	94.0	93.6	94.1
REQUIRED COMPACTION %	80.0	80.0	80.0	80.0	80.0	80.0
IN / OUT of SPECIFICATION	WITHIN	WITHIN	WITHIN	WITHIN	WITHIN	WITHIN

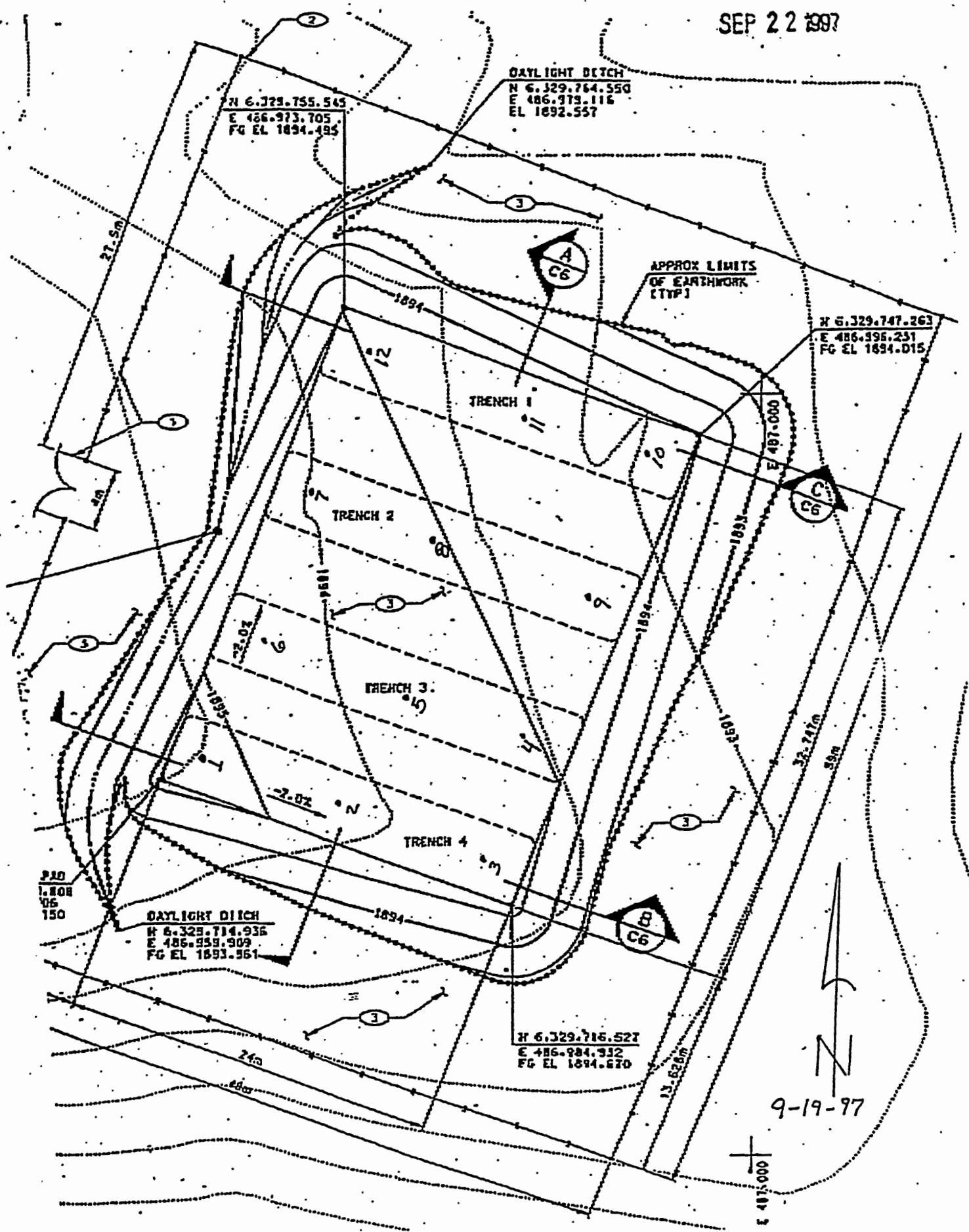
GAUGE NO <u>23205</u>	DATE OF STANDARDIZATION <u>09/19/97</u>	VALUE OF M <u>632</u>
		STANDARDIZATION D <u>3007</u>

## PLOT PLAN

SEE ATTACHED PLOT PLAN FOR TEST LOCATIONS

REMARKS: NONECC: E. MITCHELL BECHTEL  
D. MADSEN ~~BECHTEL~~  
MTL BECHTEL FILES

SEP 22 1997



## **APPENDIX D**

### **POST-CLOSURE MONITORING CHECKLIST**

## CACTUS SPRING WASTE TRENCHES, POST-CLOSURE MONITORING CHECKLIST

Date of Last Inspection:	Reason for Last Inspection:			
Responsible Agency:	Project Manager:			
Inspection Date:				
Inspector (name, title, organization):				
Assistant Inspector (name, title, organization):				
<b>A. GENERAL INSTRUCTIONS</b> <ol style="list-style-type: none"> <li>1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.</li> <li>2. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.</li> <li>3. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.</li> <li>4. A standard set of color 35mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.</li> <li>5. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.</li> </ol>				
<b>B. PREPARATION (To be completed prior to site visit)</b>		<b>YES</b>	<b>NO</b>	<b>EXPLANATION</b>
1. Site as-built plans and site base map reviewed.				
2. Previous inspection reports reviewed.				
a. Were anomalies or trends detected on previous inspections?				
b. Was maintenance performed?				
3. Site maintenance and repair records reviewed.				
a. Has site repair resulted in a change from as-built conditions?				
b. Are revised as-builts available that reflect repair changes?				
<b>C. SITE INSPECTION (To be completed during inspection)</b>		<b>YES</b>	<b>NO</b>	<b>EXPLANATION</b>
1. Adjacent off-site features within watershed areas.				
a. Have there been any changes in use of adjacent area?				
b. Are there any new roads or trails?				
c. Has there been a change in the position of nearby washes?				
d. Has there been lateral excursion or erosion/deposition of nearby washes?				
e. Are there new drainage channels?				
f. Change in surrounding vegetation?				
2. Security fence, signs.				
a. Displacement of fences, site markers, boundary markers, or monuments?				
b. Have any signs been damaged or removed? (Number of signs replaced: _____)				
c. Were gates locked?				

### CACTUS SPRING WASTE TRENCHES, POST-CLOSURE MONITORING CHECKLIST

	YES	NO	EXPLANATION
3. Waste Unit cover.			
a. Is there evidence of settling?			
b. Is there cracking?			
c. Is there evidence of erosion around the cap (wind or water)?			
d. Is there evidence of animal burrowing?			
e. Have the site markers been disturbed by man or natural processes?			
f. Do natural processes threaten to integrity of any cover or site marker?			
g. Other?			
4. Vegetative cover.			
a. Is perimeter fence or mesh fencing damaged?			
b. Is there evidence of horses or rabbits on site?			
c. Is organic mulch adequate to prevent erosion?			
d. Are weedy annual plants present? If yes, are they a problem?			
e. Are seeded plant species found on site?			
f. Is there evidence of plant mortality?			
5. Photo Documentation			
a. Has a photo log been prepared?			
c. Number of photos exposed ( )			
D. FIELD CONCLUSIONS			
1. Is there an imminent hazard to the integrity of the unit? (Immediate report required)			
Person/Agency to whom report made:			
2. Are more frequent inspections required?			
3. Are existing maintenance/repair actions satisfactory?			
4. Is other maintenance/repair necessary?			
5. Is current status/condition of vegetative cover satisfactory?			
6. Rationale for field conclusions:			
E. CERTIFICATION			
I have conducted an inspection of the Cactus Spring Waste Trenches, CAU 426, at the TTR in accordance with the Post-Closure Monitoring Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.			
Chief Inspector's Signature:	Printed Name:		
Title:	Date:		

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