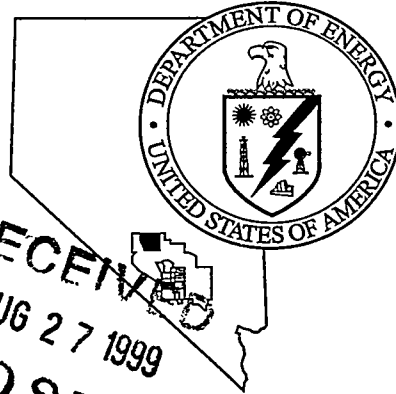


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Closure Report for
Corrective Action Unit 426:
Cactus Spring Waste Trenches,
Tonopah Test Range, Nevada

Controlled Copy No.:
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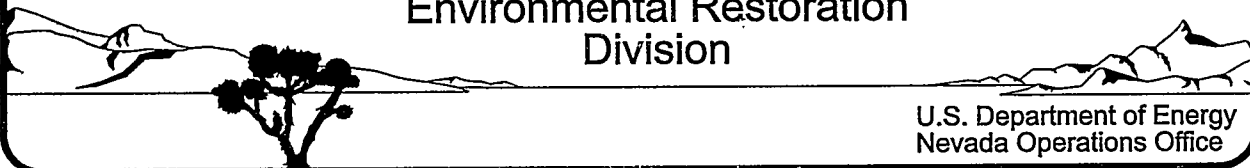
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August 1998

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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.: _____

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**

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TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS	iii
EXECUTIVE SUMMARY	v
1.0 INTRODUCTION	1
1.1 Purpose	4
1.2 Scope	5
1.3 Closure Report Contents	5
2.0 CLOSURE ACTIVITIES	7
2.1 Description of Corrective Action Activities	7
2.1.1 Site Preparation	7
2.1.2 Engineered Cover Construction	7
2.1.3 Installation of Fence And Signs	10
2.1.4 Vegetative Cover	10
2.2 Deviations From Corrective Action Plan As Approved	10
2.3 Corrective Action Schedule As Completed	11
2.4 Site Plan/Survey Plat	11
3.0 WASTE DISPOSITION	13
4.0 CLOSURE VERIFICATION RESULTS	14
4.1 Compaction Results	14
4.2 Use Restrictions	16
5.0 POST-CLOSURE MONITORING PLAN	17
5.1 Post-Closure Monitoring	17
5.2 Annual Reporting	18
5.3 Duration	18
6.0 CONCLUSIONS AND RECOMMENDATIONS	19
6.1 Conclusions	19
6.2 Recommendations	19
7.0 REFERENCES	20

TABLE OF CONTENTS (continued)

FIGURES

FIGURE 1 - LOCATION OF CACTUS SPRING WASTE TRENCHES	2
FIGURE 2 - SITE MAP FOR CACTUS SPRING WASTE TRENCHES	3
FIGURE 3 - ENGINEERED COVER FILL HORIZONS	9
FIGURE 4 - CORRECTIVE ACTION SCHEDULE AS COMPLETED	12

TABLES

TABLE 1 - SEED MIX FOR REVEGETATION	11
TABLE 2 - COMPACTION TEST RESULTS	15

APPENDICES

APPENDIX A - AS-BUILT ENGINEERING DRAWINGS	
APPENDIX B - USE RESTRICTION DOCUMENTATION	
APPENDIX C - GEOTECHNICAL TEST RESULTS	
APPENDIX D - POST CLOSURE MONITORING CHECKLIST	

ACRONYMS AND ABBREVIATIONS

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

EXECUTIVE SUMMARY

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.

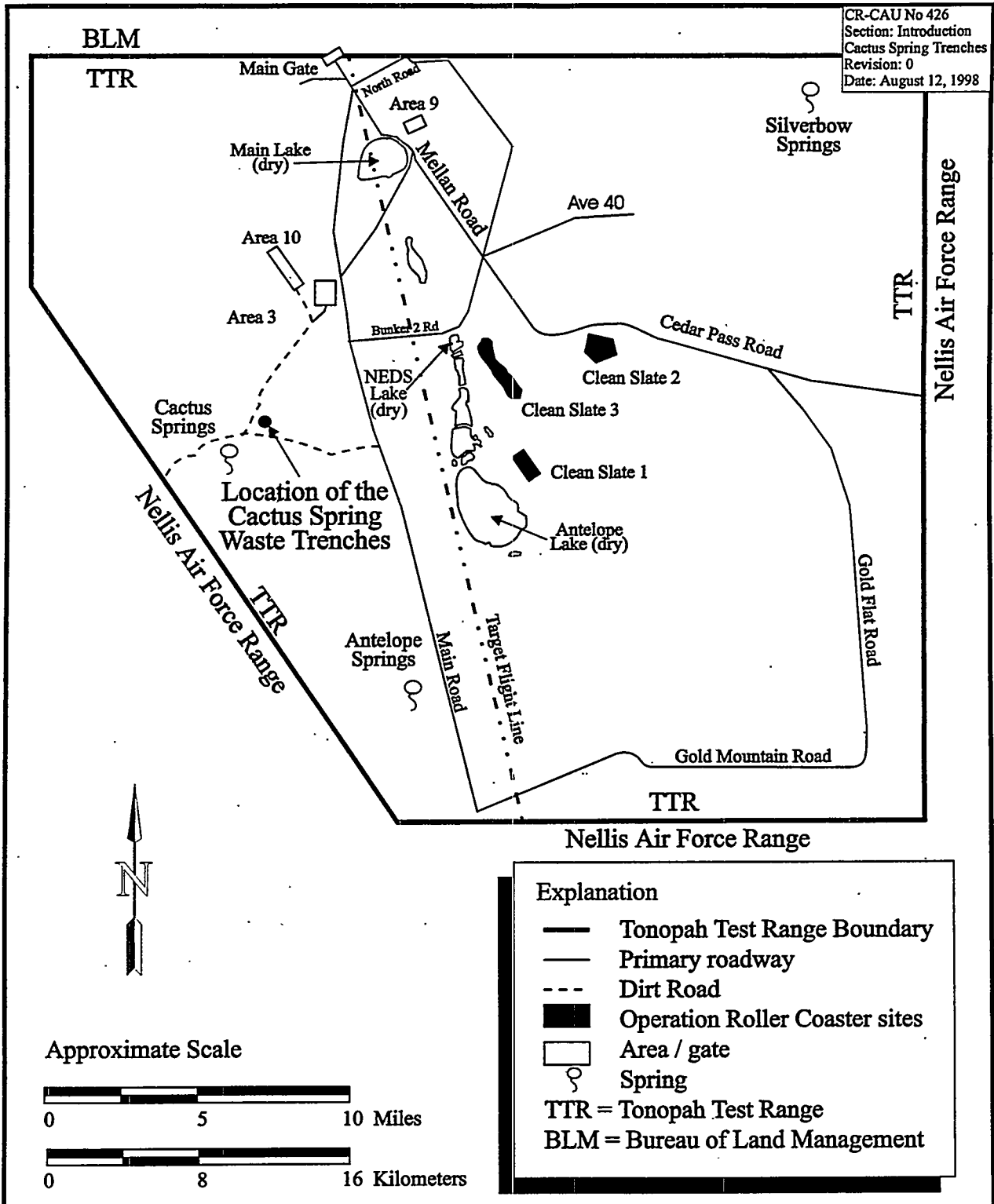
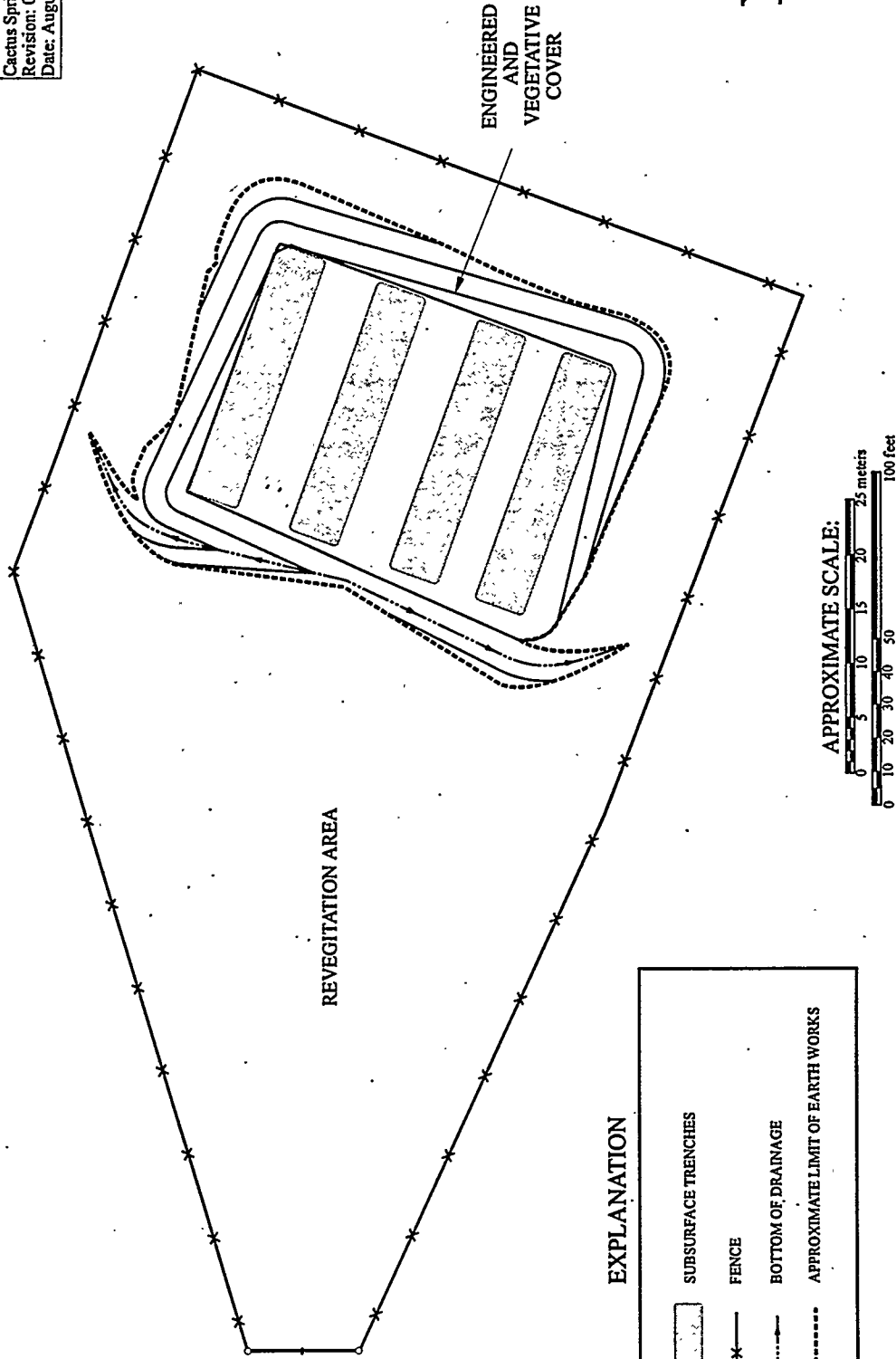


Figure 1
Location of Cactus Spring Waste Trenches.





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



ENGINEERED
 AND
 VEGETATIVE
 COVER

REVEGETATION AREA

EXPLANATION

-  SUBSURFACE TRENCHES
-  FENCE
-  BOTTOM OF DRAINAGE
-  APPROXIMATE LIMIT OF EARTH WORKS

APPROXIMATE SCALE:



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 5.9×10^{-4} centimeters/second (cm/sec) (2.3×10^{-4} inches/second [in/sec]) to 2.5×10^{-8} cm/sec (9.8×10^{-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.

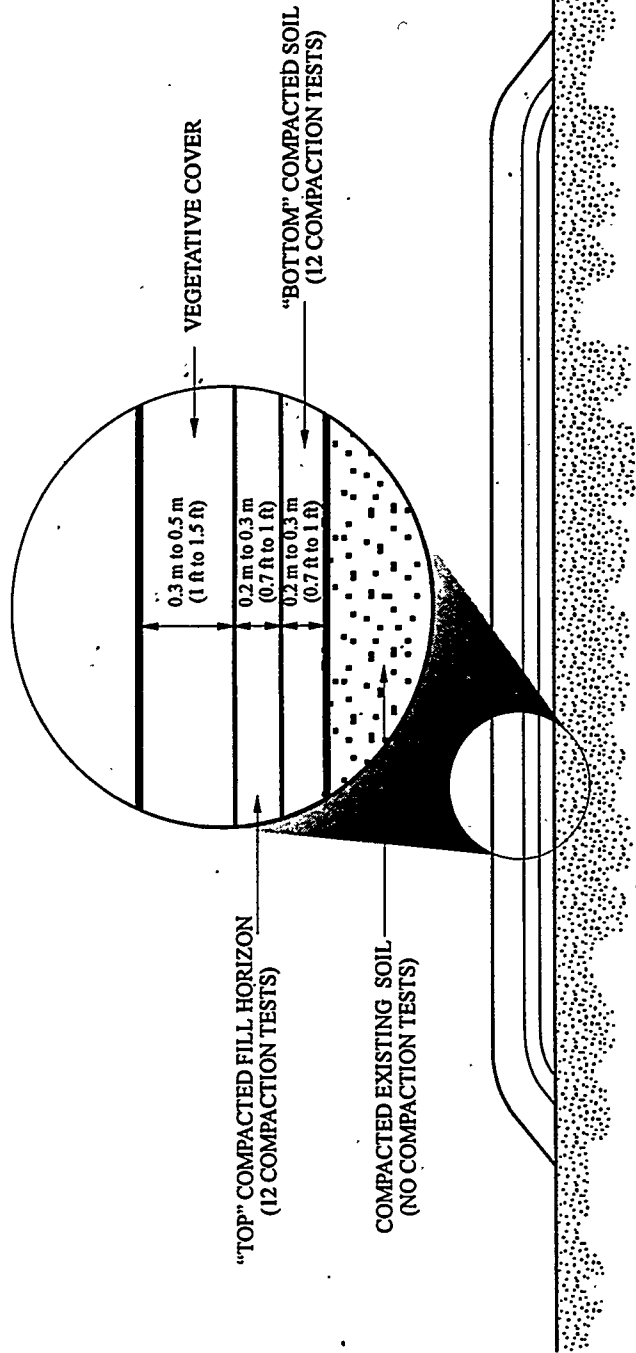
Diversion channels were constructed by excavating the existing soil to channel precipitation runoff away from the site and limit precipitation run-on to the engineered cover area (Appendix A).

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).



GENERALIZED CROSS SECTION

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 Squirreltail	<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																																																								
				AUG 10	AUG 11	AUG 12	AUG 13	AUG 14	AUG 15	AUG 16	SEP 1	SEP 2	SEP 3	SEP 4	SEP 5	SEP 6	SEP 7	SEP 8	SEP 9	SEP 10	SEP 11	SEP 12	SEP 13	SEP 14	SEP 15	SEP 16	SEP 17	SEP 18	SEP 19	SEP 20	SEP 21	SEP 22	SEP 23	SEP 24	SEP 25	SEP 26	SEP 27	SEP 28	SEP 29	SEP 30	OCT 1	OCT 2	OCT 3	OCT 4	OCT 5	OCT 6	OCT 7	OCT 8	OCT 9	OCT 10	OCT 11	OCT 12	OCT 13	OCT 14	OCT 15	OCT 16	OCT 17	OCT 18	OCT 19	OCT 20	OCT 21	OCT 22	OCT 23	OCT 24	OCT 25	OCT 26	OCT 27
Cactus Spring Waste Trenches Closure																																																																			
CAU 426																																																																			
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: 28OCT97
 Data Date: 30OCT97
 Run Date: 30AUG98

CSWT
 Early Bar
 Program Bar
 Critical Activity

Sheet 1 of 1

Figure 4
Corrective Action Schedule
As Completed

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

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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 m³ [5 cubic feet (ft³)]). 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

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/m³ (123.0 lb/ft³). 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 ¹	LAB NUMBER	COMPACTED FILL HORIZON ²	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

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

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 DEPARTMENT OF ENERGY

NEVADA OPERATIONAL
TONOPAHA TEST SITE

CACTUS SPRING WASTE TRENCH

CLOSURE AREA

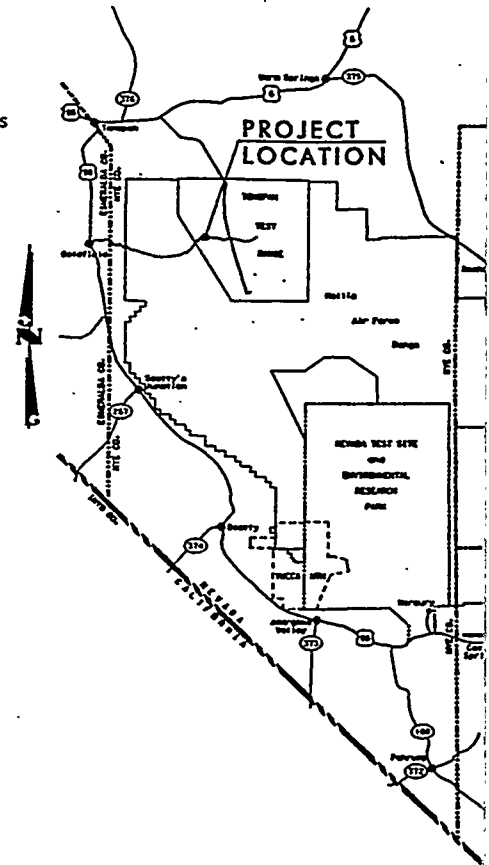
INDEX

DRAWING NUMBER	DRAWING TITLE	STANDARD NUMBER	DESCRIPTION
JS-052-133-T2 REV 1	TITLE SHEET	STD T1	STANDARDS INDEX GENERAL NOTES, DRAFTING SYMBOLS & ANSI STANDARDS
CIVIL			
JS-052-133-C4 REV 1	VICINITY MAP	STD C100	NOTES, LEGEND & SYMBOLS ABBREVIATIONS
JS-052-133-C5 REV 1	SITE & GRADING PLAN	STD C101	
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
NOT TO SCALE

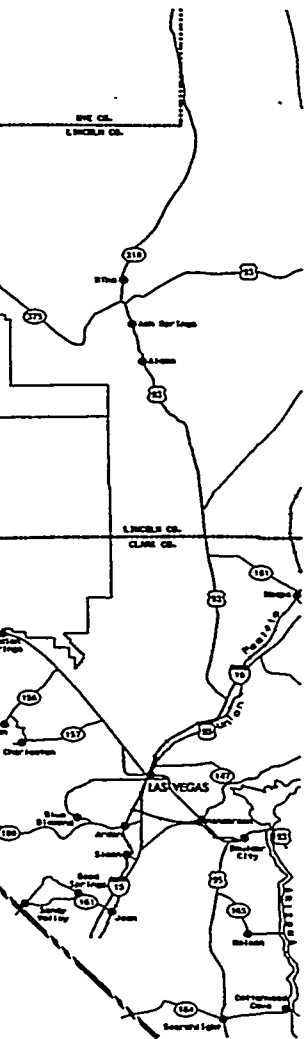
DEPARTMENT OF ENERGY

OPERATIONS OFFICE
 TONOPAH RANGE, NEVADA

CACTUS SPRING WASTES TRENCHES CAU 426

CLOSURE

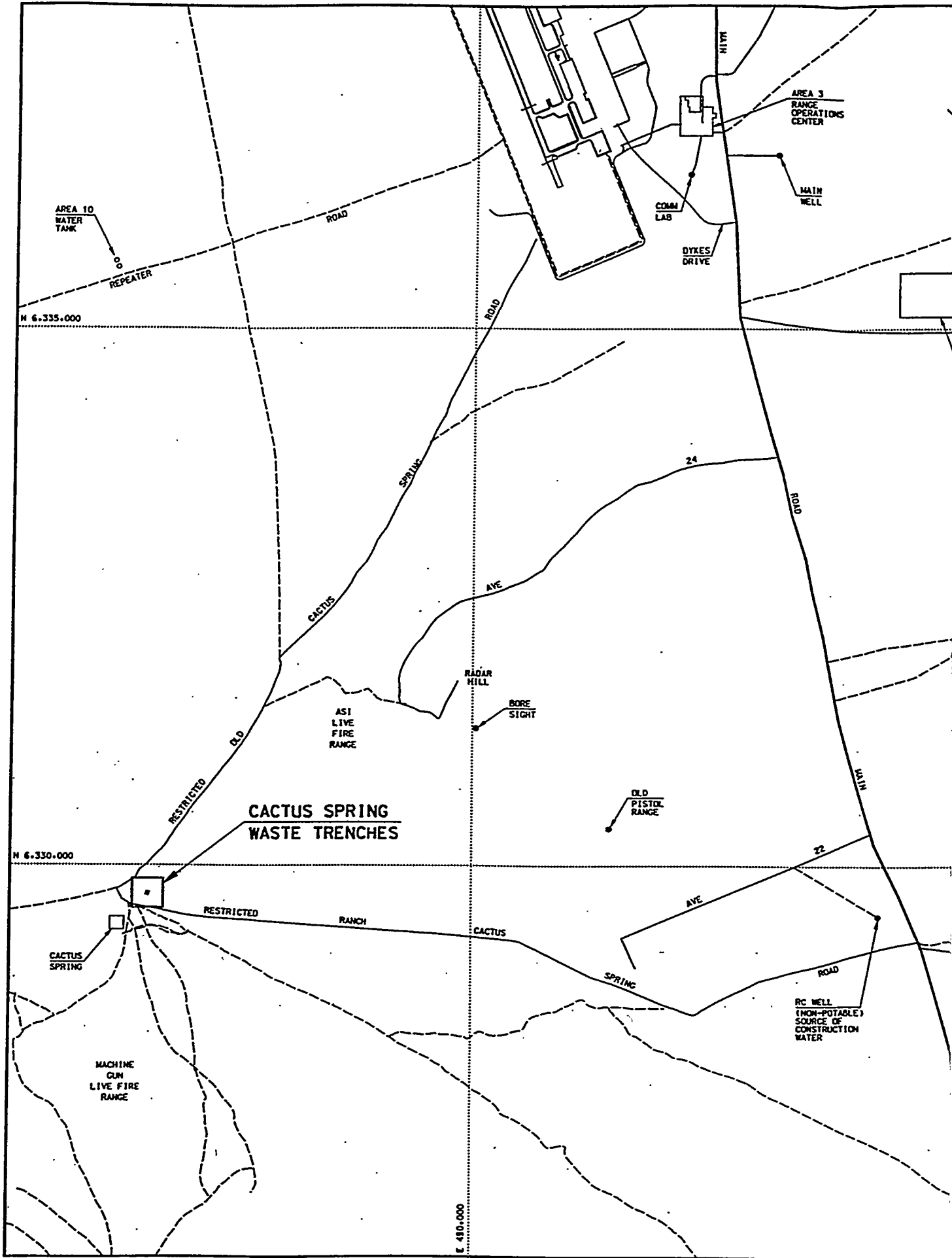
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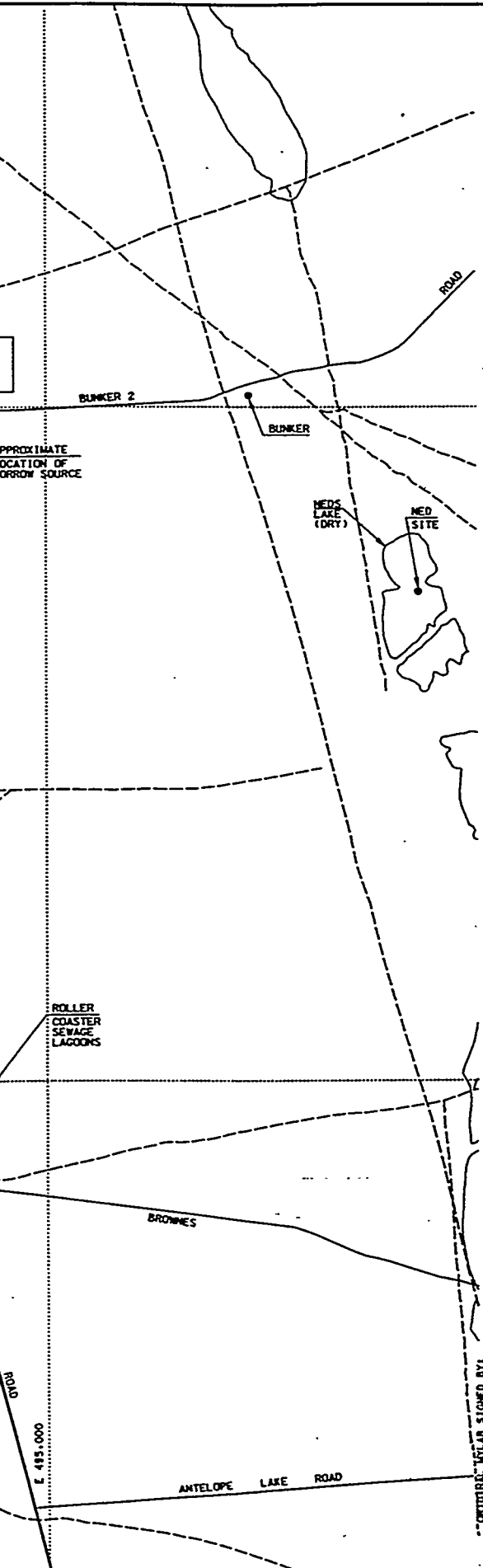


ORIGINAL AS-BUILT SIGNED BY:	AS-BUILT			
	<i>Bechtel Nevada</i> <i>Kevin Cable</i> <i>7-21-98</i>			
UNLESS NOTED BY MARKED CHANGES, ALL DIMENSIONS, NOTES, REFERENCES AND CONSTRUCTION FEATURES ARE CORRECTED, AND WERE CONSTRUCTED AS SHOWN ON THIS DRAWING.				

ORIGINAL INKAR SIGNED BY:

AS-BUILT PER SURVEY			
NO	DATE	REVISIONS	
U.S. DEPARTMENT OF ENERGY			
NEVADA OPERATIONS OFFICE		LAS VEGAS, NEVADA	
DESIGNED BY	AREA	TONOPAH TEST RANGE AREA 52	
FILE	FILE	CACTUS SPRING WASTES TRENCHES CAU 426	
CHECKED BY	DATE	CLOSURE	
JAS	DLH	TITLE SHEET	
SAFETY	QA		
KRK			
SUBMITTED BY	DATE	APPROVED BY	
KEN SCHECHTER	DAVID MADSEN	KEVIN CABLE	09/03/97
Bechtel Nevada		P.A. NO. N/A	
P.O. BOX 90521 LAS VEGAS, NV 89193-0521		ACTIVITY CODE C4PR100E	
		PROJECT NO. 37056TTR	
		SHEET 1 OF 1	





GENERAL NOTES:

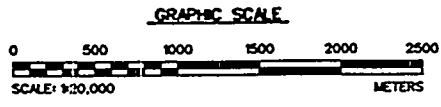
1. CAP OVER EACH TRENCH (4) SHALL BE CONSTRUCTED OF BORROW MATERIAL PLACED IN 8" LIFTS AND COMPACTED TO 80% OF MAXIMUM DENSITY PER ASTM D1557.
2. REVEGETATION SHALL BE PERFORMED IN ACCORDANCE WITH RECOMMENDATIONS CONTAINED IN THE TONOPAH TEST RANGE CLOSURE SITES REVEGETATION PLAN, BECHTEL NEVADA, MAY 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.

ORIGINAL AS-BUILT SIGNED BY

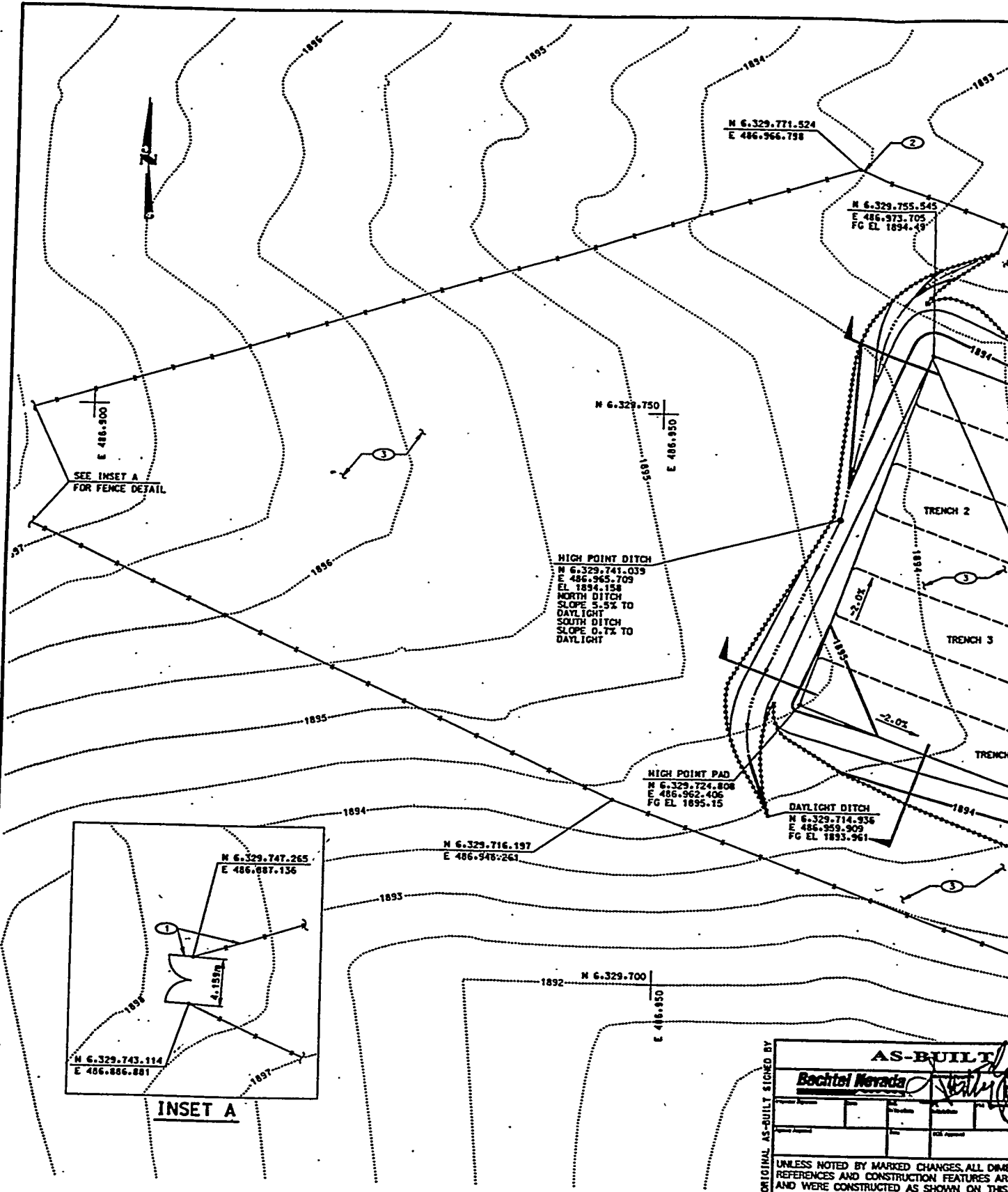
AS-BUILT

Bechtel Nevada *[Signature]* 7/21/98

UNLESS NOTED BY MARKED CHANGES, ALL DIMENSIONS, NOTES, REFERENCES AND CONSTRUCTION FEATURES ARE CORRECTED, AND WERE CONSTRUCTED AS SHOWN ON THIS DRAWING.



AS-BUILT PER SURVEY		REVISIONS	
NO	DATE		
U.S. DEPARTMENT OF ENERGY			
NEVADA OPERATIONS OFFICE		LAS VEGAS, NEVADA	
DESIGNED BY FIE		TONOPAH TEST RANGE AREA 52	
CHECKED BY JAS		CACTUS SPRING WASTE TRENCHES CAU 426	
SAFETY BY KJK		CLOSURE VICINITY MAP	
SUBMITTED TO/CHIEF ENGINEER KEN SCHECHTER		APPROVAL BLOCK	
DESIGNED BY DAVID MADSEN		DEPT OF ENERGY PROJ ENGR KEVIN CABLE	
DATE 02/03/97		DATE	
Bechtel Nevada		DRAWING NUMBER JS-052-133-C4	
P.O. BOX 7036 NORTH LAS VEGAS, NV 89036		REVISION 1	



ORIGINAL AS-BUILT SIGNED BY

AS-BUILT

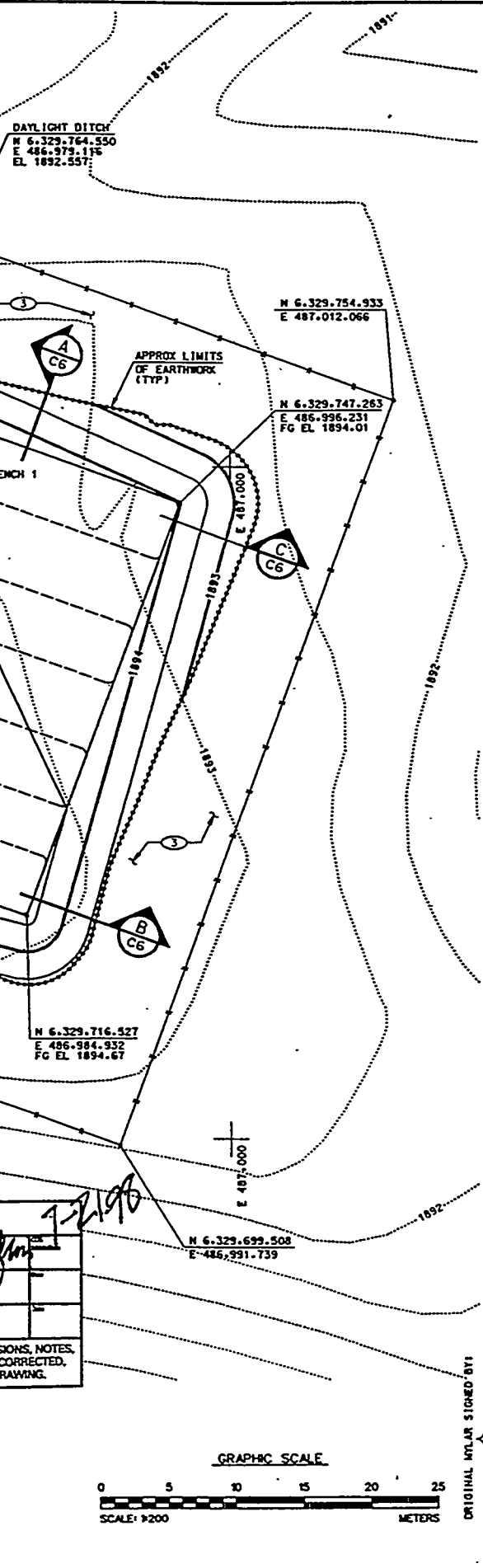
Bochtel Nevada

Prepared	Checked	Reviewed

UNLESS NOTED BY MARKED CHANGES, ALL DATA REFERENCES AND CONSTRUCTION FEATURES ARE AND WERE CONSTRUCTED AS SHOWN ON THIS

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 426 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 ³
EMBANKMENT	921.53	METER ³
BORROW	887.72	METER ³

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

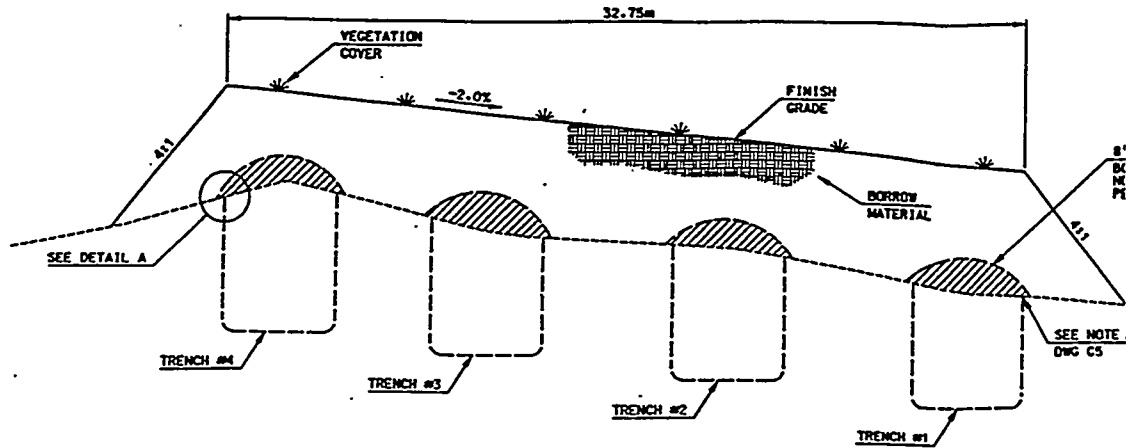
REFERENCES

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

7-21-96
 REVISIONS, NOTES, CORRECTED DRAWING.

ORIGINAL NOTAR SIGNED BY:

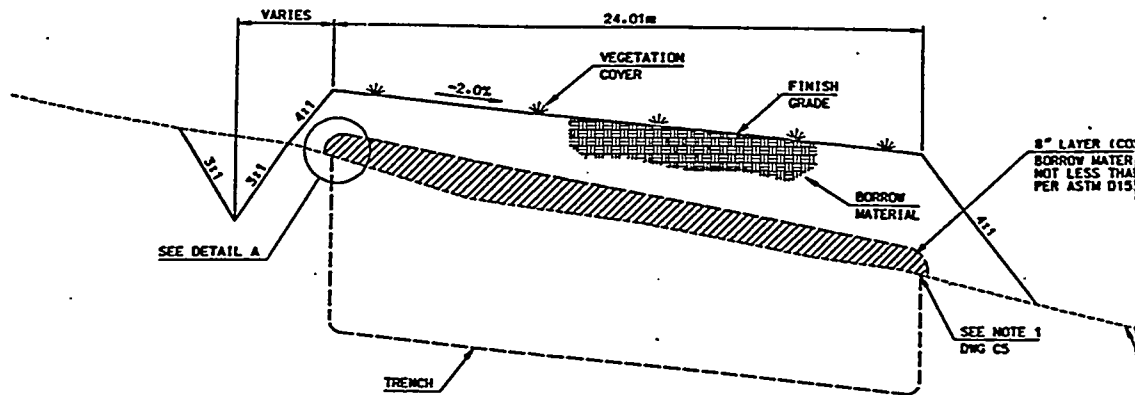
AS-BUILT PER SURVEY		REVISIONS	
U.S. DEPARTMENT OF ENERGY			
NEVADA OPERATIONS OFFICE		LAS VEGAS, NEVADA	
TONOPAH TEST RANGE AREA 52			
CACTUS SPRING WASTE TRENCHES CAU 426			
CLOSURE			
SITE & GRADING PLAN			
SUBMITTED TO/CHIEF ENGINEER	USER	APPROVAL BLOCK	
KEN SCHECHTER	DAVID MADSEN	DEPT OF ENERGY PROJ ENGR	DATE
BECHTEL NEVADA		KEVIN CABLE	02/03/97
Bechtel Nevada		DRAWING NUMBER	
P.O. BOX 3536 NORTH LAS VEGAS, NV 89103		JS-052-133-C5	
ACTIVITY CODE CAP8100E		REVISION 1	
PROJ. NO. 97096TTR		SHEET 1	



SECTION

NOT TO SCALE

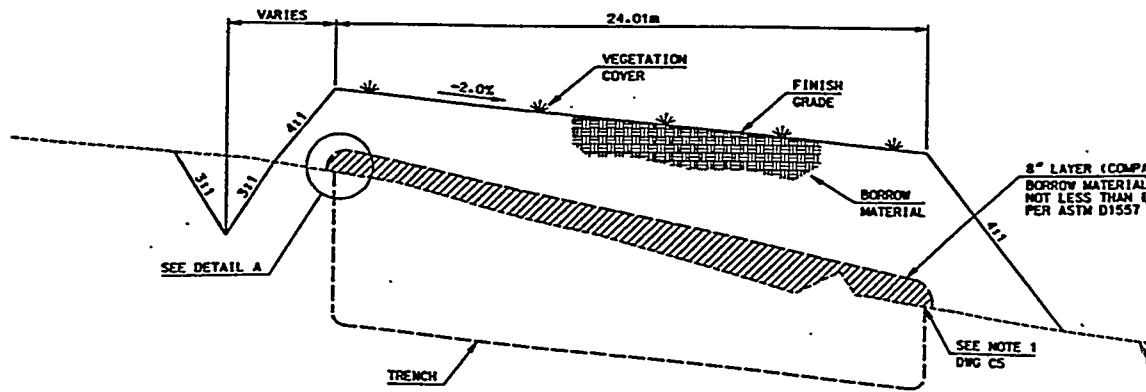
(A) CS



SECTION

NOT TO SCALE

(B) CS

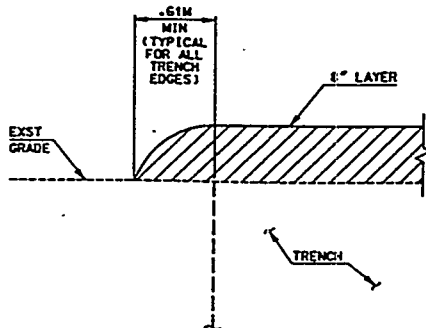


SECTION

NOT TO SCALE

(C) CS

LAYER (COMPACTED THICKNESS)
 OF MATERIAL COMPACTED TO
 LESS THAN 80% OF MAX DENSITY
 ASTM D1557 (TYP)



DETAIL

NOT TO SCALE

(A)

CTED THICKNESS)
 COMPACTED TO
 80% OF MAX DENSITY

AS-BUILT

Bochtel Nevada

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 JS-052-133-T2
 SITE & GRADING PLAN JS-052-133-C5

ED THICKNESS)
 COMPACTED TO
 80% OF MAX DENSITY

NO		DATE	REVISIONS	REV	DATE	BY
<p align="center">U.S. DEPARTMENT OF ENERGY</p> <p align="center">NEVADA OPERATIONS OFFICE LAS VEGAS, NEVADA</p> <p align="center">TONOPAH TEST RANGE AREA 52</p> <p align="center">CACTUS SPRING WASTE TRENCHES CAU 426</p> <p align="center">CLOSURE SECTIONS</p>						
DESIGNED FIE	CHECKED JAS	DATE 01/11	ENGINEER OLH	APPROVAL BLOCK DEPT OF ENERGY PROJ ENGR KEVIN CABLE	DATE 02/03/97	
SUBMITTED (PE/CHIEF ENGINEER) USER KEN SCHECHTER DAVID MADSEN BECHTEL NEVADA			P.L. NO. N/A ACTIVITY CODE C4PB100E PROJ. NO. 970961TR			DRAWING NUMBER JS-052-133-C6 SHEET OF REVISION 1

ORIGINAL NOTAR SIGNED BY:

APPROX EXST GRADE

APPENDIX B

USE RESTRICTION DOCUMENTATION

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

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

A handwritten signature in cursive script that reads "Michael F. Fukey".

MICHAEL F. FUKEY, Colonel, USAF

cc:
HQA WC 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: Kevin Cabbie Date: 8/4/98

Attachments: Survey Map

NOTES

1. ALL TRENCHES SHALL BE INSTALLED ACCORDING TO THE SPECIFICATIONS AND NOTES ON THE TRENCHING SHEETS. THE EXISTING GRADE SHALL BE MAINTAINED TO THE MAXIMUM EXTENT POSSIBLE.

KEY NOTES

- ⊙ ALL TRENCHES SHALL BE INSTALLED ACCORDING TO THE SPECIFICATIONS AND NOTES ON THE TRENCHING SHEETS.
- ⊙ ALL TRENCHES SHALL BE INSTALLED ACCORDING TO THE SPECIFICATIONS AND NOTES ON THE TRENCHING SHEETS.
- ⊙ ALL TRENCHES SHALL BE INSTALLED ACCORDING TO THE SPECIFICATIONS AND NOTES ON THE TRENCHING SHEETS.

LEGEND

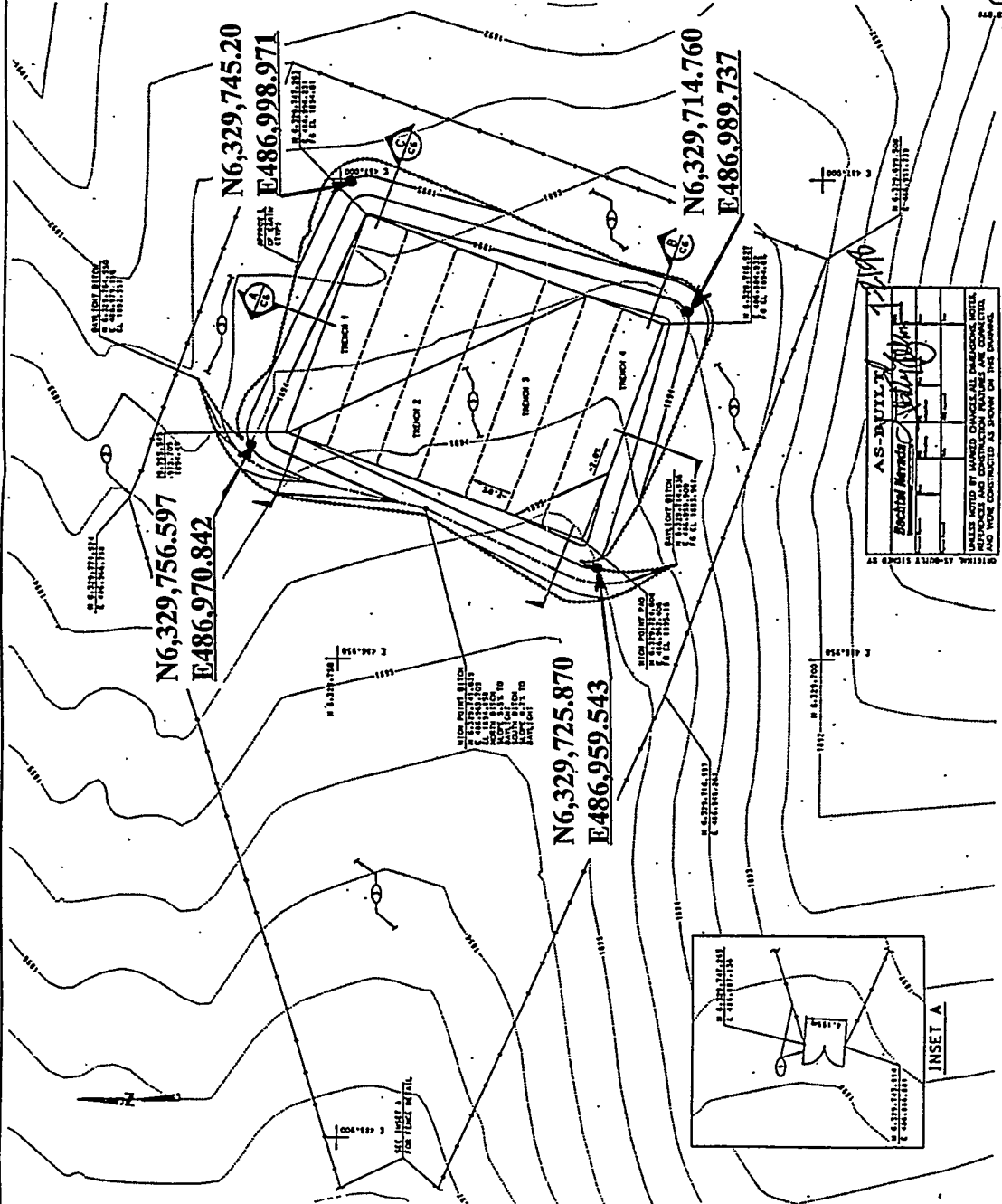
⊙ APPROXIMATE PERIMETER OF WASTE TRENCH

ESTIMATED QUANTITIES	
DESCRIPTION	QUANTITY
Excavation	22,111
Backfill	10,178
Gravel	10,178

REFERENCES

U.S. DEPARTMENT OF ENERGY
 YUKON-PACIFIC TEST RANGE AREA 52
 CACTUS SPRING WASTE TRENCHES CAU 426
 CLOSURE

U.S. DEPARTMENT OF ENERGY	
YUKON-PACIFIC TEST RANGE AREA 52	
CACTUS SPRING WASTE TRENCHES CAU 426	
CLOSURE	
SITE & GRADING PLAN	
DATE	10/15/83
BY	AS-BUILT PER SHEET
SCALE	AS SHOWN
PROJECT NO.	JS-052-133-C5
DESIGNED BY	AS-BUILT PER SHEET
CHECKED BY	AS-BUILT PER SHEET
APPROVED BY	AS-BUILT PER SHEET



SITE & GRADING PLAN

GRAPHIC SCALE - 1:1 METERS

AS-BUILT PER SHEET

APPENDIX C

GEOTECHNICAL TEST RESULTS

NOV 19 97

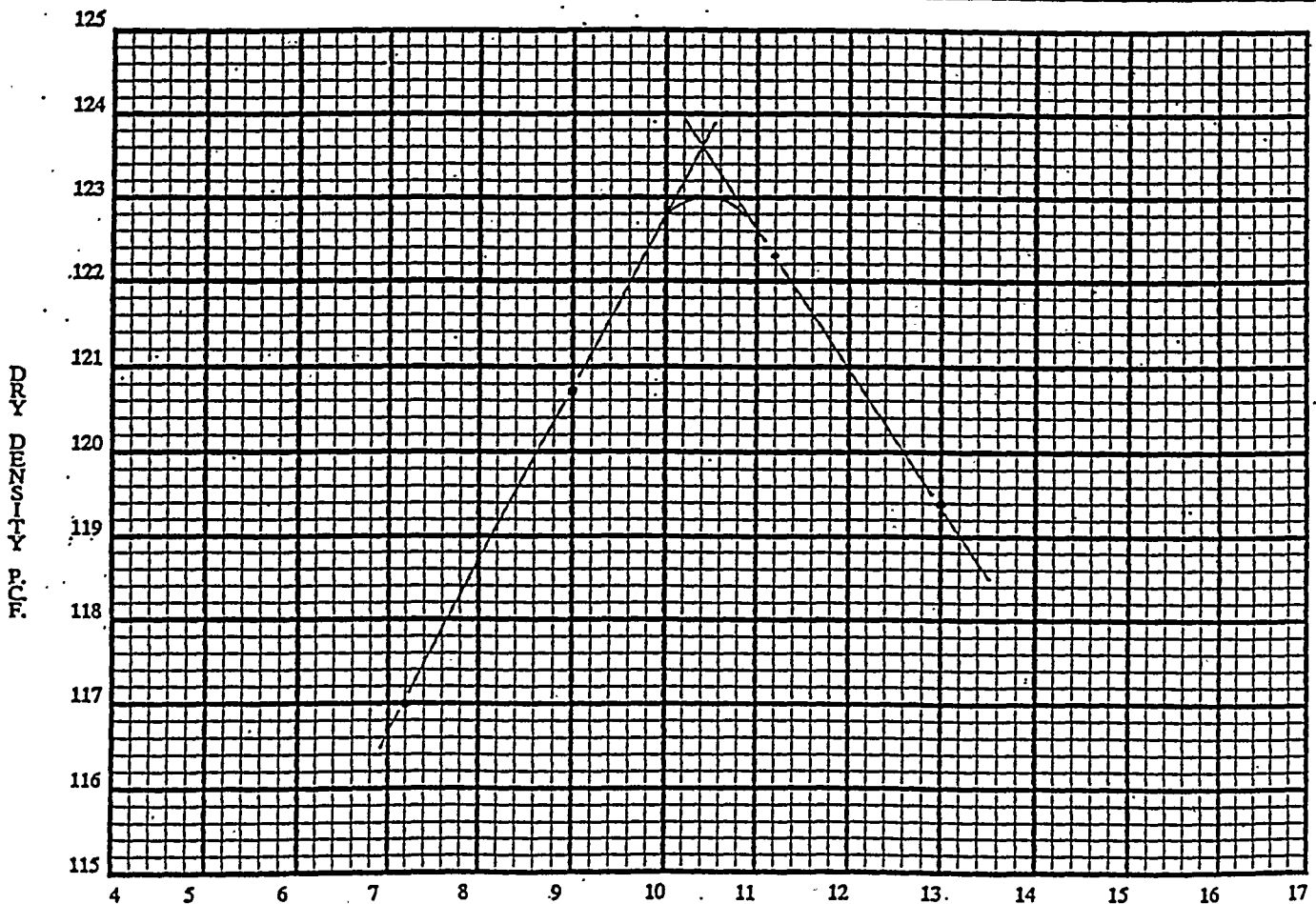
PROCTOR TEST
ASTM D 1557-91
METHOD C

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

CHARGE # CARB10DE
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: TTR SANDIA BORROW PIT
Tested by: D. HERRINGTON Date tested: 08/13/97 Checked by: *R.D. Johnson*

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



MAX. DENSITY = $\frac{123.0}{10.4}$ PCF
OPT. MOISTURE = $\frac{123.0}{10.4}$ %

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: *R.D. Johnson* Date checked: 8-19-97

LABORATORY TEST REQUIRED

- Sieve Analysis (ASTM C-136-98)
- (ASTM C-117-95)
- (ASTM D-422-90)
- (ASTM D-1140-92)
- Moisture Content (ASTM C-566-93)
- (ASTM D-2216-92)
- Unit Weight (ASTM C-29-91)
- 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

	Native	Oversize	Proctor
Wet Weight + Tare	4051.8	N/A	N/A
Dry Weight + Tare	3806.6	N/A	N/A
Water	245.2	N/A	N/A
Tare	936.8	N/A	N/A
Dry Weight	2869.8	N/A	N/A
Moisture %	8.5%	N/A	N/A

UNIT WEIGHT

	Loose	Rodded
Container Size (ft^3)	0.0997506	0.0997506
Total Weight (lb)		
Tare Weight (lb)		
Material Weight (lb)		
Unit Weight (P.C.F.)	N/A	N/A
Percent Porosity	N/A	N/A

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

REMARKS: MED BROWN SILTY SAND WITH SOME GRAVEL.

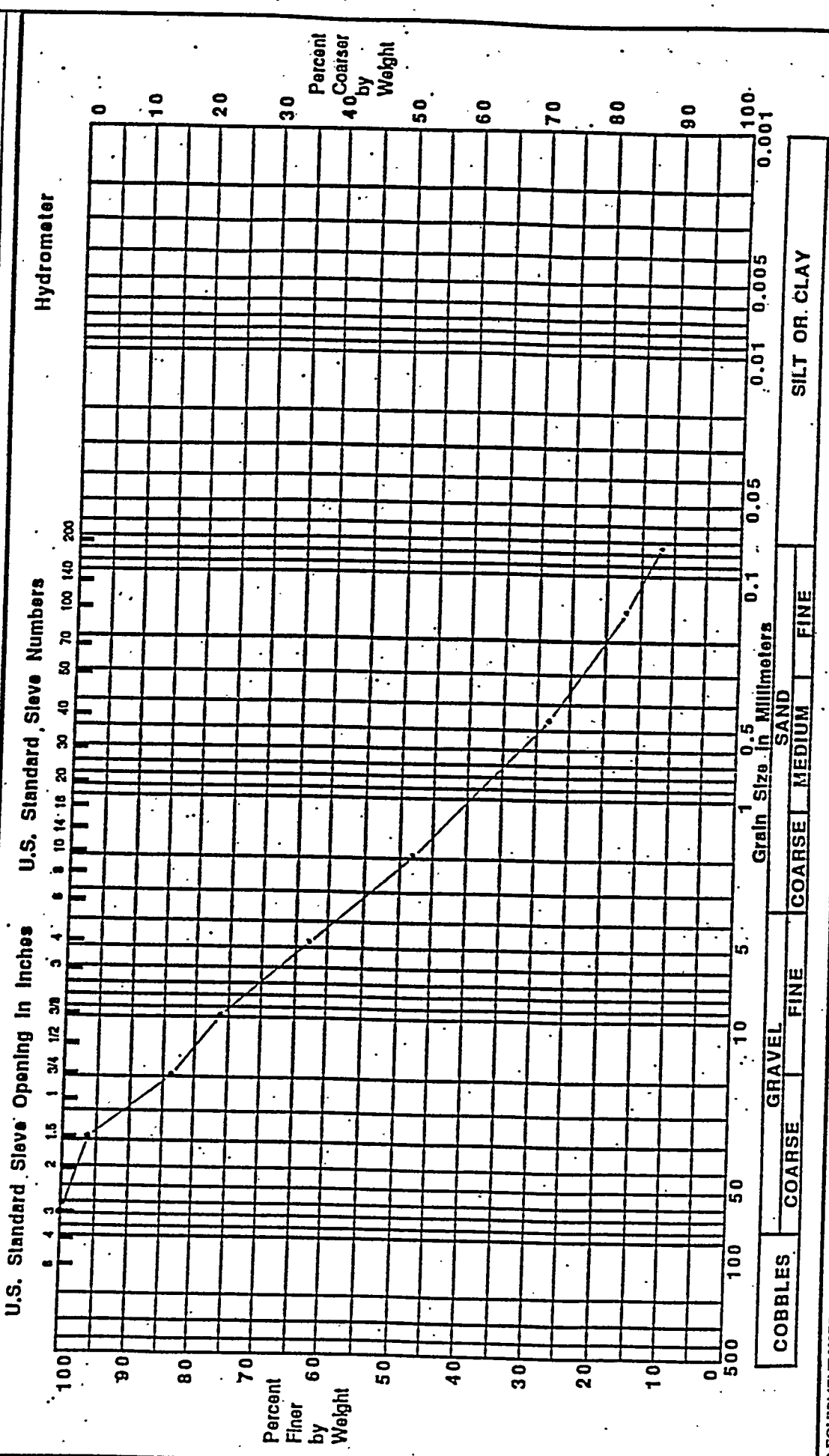
cc: E. MITCHELL BECHTEL
D. MADSEN BECHTEL
MTL BECHTEL FILES

Bechtel Nevada
MATERIALS TESTING LABORATORY
 P.O. BOX 08521
 LAS VEGAS, NV 89193-8521

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

GRADATION CURVES

PROJECT: ROLLER COASTER SEWAGE LAGOON
 CLASSIFICATION: SM
 CHECKED BY: D. HERRINGTON *D. H.* LOG # N/A
 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 # <u>C4RB10DE</u>
			DATE TYPED <u>09/22/97</u>
			PAGE <u>1</u> OF <u>2</u>

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 *D. Johnson*

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	8" Placed	8" Placed	8" Placed	8" Placed	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	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>

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	BEGTEL NEVADA MATERIALS TESTING LABORATORY P. O. BOX 98521, M/S NTS-188 LAS VEGAS, NV 89193-8521	CHARGE #: <u>C4RB10DE</u> DATE TYPED <u>09/22/97</u> PAGE <u>2</u> OF <u>2</u>
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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 *R.D. Johnson*

Information 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	8" Placed	8" Placed	8" Placed	8" Placed	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	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>

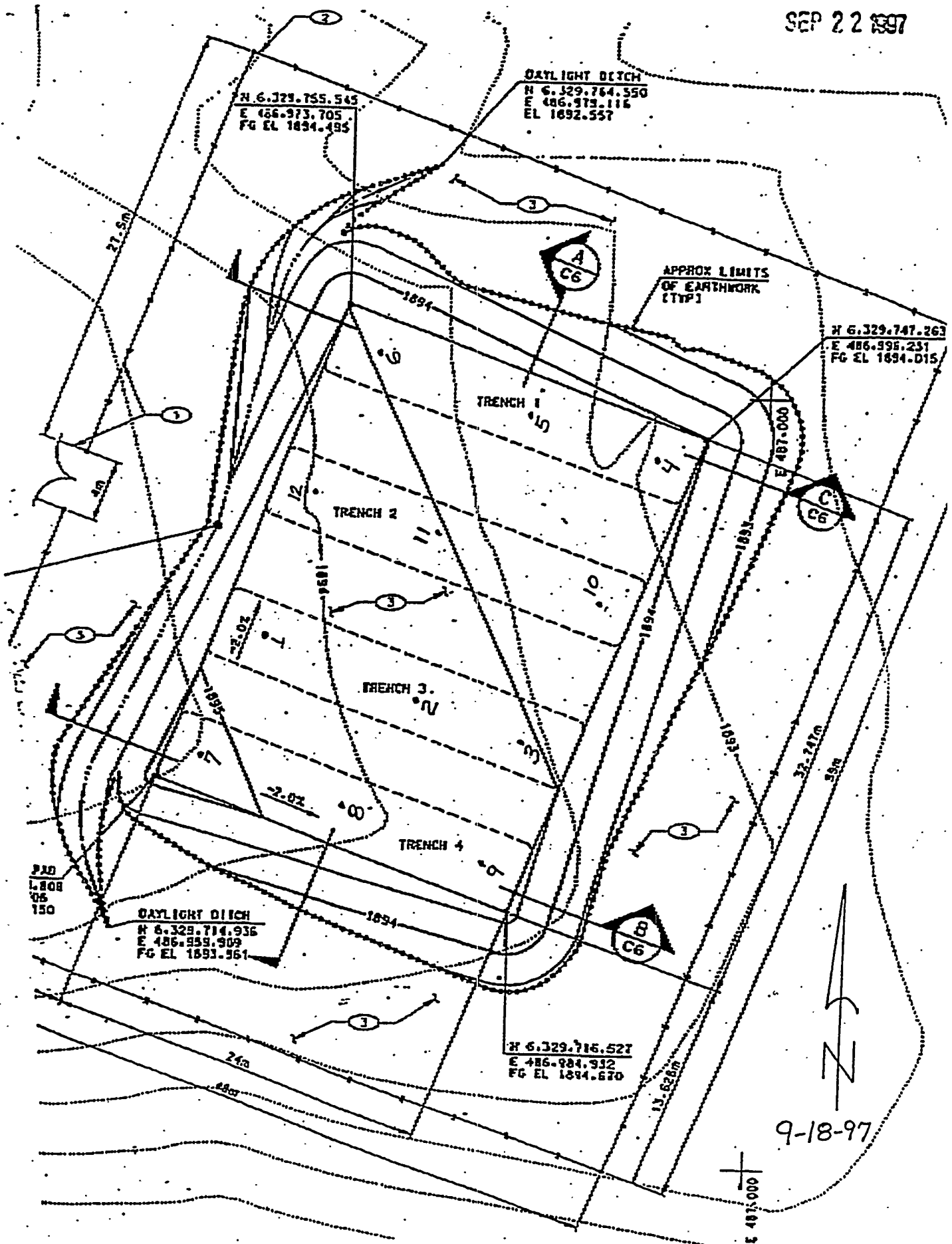
Gauge No 23205 DATE OF STANDARDIZATION 09/18/97 VALUE OF M 632
 STANDARDIZATION D 3007

PLOT PLAN

SEE ATTACHED PLOT PLAN FOR TEST LOCATIONS

REMARKS: NONE CC: E. MITCHELL BECHTEL
D. MADSEN
MTL BECHTEL FILES

SEP 22 1997



N 6.329.755.545
 E 486.973.705
 FG EL 1894.495

DAYLIGHT DITCH
 N 6.329.764.550
 E 486.979.116
 EL 1892.557

N 6.329.747.263
 E 486.996.231
 FG EL 1894.015

DAYLIGHT DITCH
 N 6.329.714.936
 E 486.959.309
 FG EL 1893.561

N 6.329.716.527
 E 486.984.932
 FG EL 1894.670

PAD
 L 808
 05
 150

9-18-97

000.000
 E 487.000

SEP 22 1997

NUCLEAR DENSITY ASTM D2922-91 CAMPBELL MC-2/MC-3	BECHTEL NEVADA MATERIALS TESTING LABORATORY P. O. BOX 98521, M/S NTS-188 LAS VEGAS, NV 89193-8521		CHARGE #: C4RB10DE
			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 09/19/97 Checked by *A.D. Johnson*

Information transmitted to D. FINNEY By D. HERRINGTON How VERBAL Date 09/19/97

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 23205 DATE OF STANDARDIZATION 09/19/97 VALUE OF M 632
 STANDARDIZATION D 3007

PLOT PLAN

SEE ATTACHED PLOT PLAN FOR TEST LOCATIONS

REMARKS: NONE

CC: E. MITCHELL BECHTEL
D. MADSEN 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 #: <u>C4RB10DE</u>
			DATE TYPED <u>09/22/97</u>
			PAGE <u>2</u> OF <u>2</u>

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 09/19/97 Checked by *R.D. Johnson*

Information transmitted to D. FINNEY By D. HERRINGTON How VERBAL Date 09/19/97

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	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>	<i>WITHIN</i>

GAUGE NO 23205 DATE OF STANDARDIZATION 09/19/97 VALUE OF M 632

STANDARDIZATION D 3007

PLOT PLAN

SEE ATTACHED PLOT PLAN FOR TEST LOCATIONS

REMARKS: NONE

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

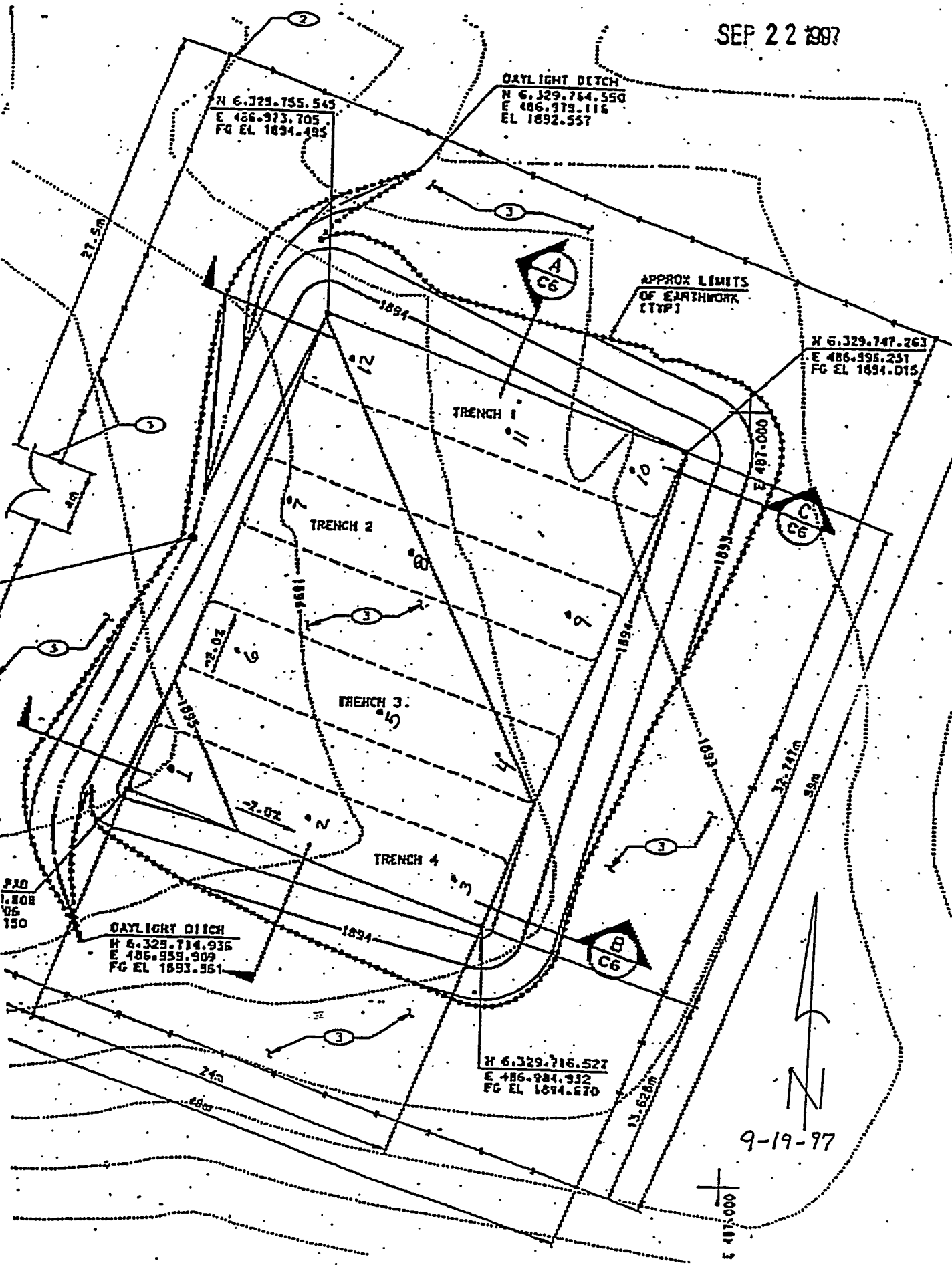
SEP 22 1997

DAYLIGHT DITCH
N 6.329.764.550
E 486.373.116
EL 1892.557

N 6.329.755.545
E 486.973.705
FG EL 1894.485

N 6.329.747.263
E 486.396.231
FG EL 1894.015

APPROX LIMITS
OF EARTHWORK
(TYP)



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):	

A. GENERAL INSTRUCTIONS

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.
3. 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.
4. 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.
5. 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.
6. 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.

B. PREPARATION (To be completed prior to site visit)	YES	NO	EXPLANATION
1. Site as-built plans and site base map reviewed.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
2. Previous inspection reports reviewed.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
a. Were anomalies or trends detected on previous inspections?	<input type="checkbox"/>	<input type="checkbox"/>	
b. Was maintenance performed?	<input type="checkbox"/>	<input type="checkbox"/>	
3. Site maintenance and repair records reviewed.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
a. Has site repair resulted in a change from as-built conditions?	<input type="checkbox"/>	<input type="checkbox"/>	
b. Are revised as-builts available that reflect repair changes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

C. SITE INSPECTION (To be completed during inspection)	YES	NO	EXPLANATION
1. Adjacent off-site features within watershed areas.			
a. Have there been any changes in use of adjacent area?	<input type="checkbox"/>	<input type="checkbox"/>	
b. Are there any new roads or trails?	<input type="checkbox"/>	<input type="checkbox"/>	
c. Has there been a change in the position of nearby washes?	<input type="checkbox"/>	<input type="checkbox"/>	
d. Has there been lateral excursion or erosion/deposition of nearby washes?	<input type="checkbox"/>	<input type="checkbox"/>	
e. Are there new drainage channels?	<input type="checkbox"/>	<input type="checkbox"/>	
f. Change in surrounding vegetation?	<input type="checkbox"/>	<input type="checkbox"/>	
2. Security fence, signs.			
a. Displacement of fences, site markers, boundary markers, or monuments?	<input type="checkbox"/>	<input type="checkbox"/>	
b. Have any signs been damaged or removed? (Number of signs replaced: _____)	<input type="checkbox"/>	<input type="checkbox"/>	
c. Were gates locked?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

CACTUS SPRING WASTE TRENCHES, POST-CLOSURE MONITORING CHECKLIST

3. Waste Unit cover.

YES NO EXPLANATION

- 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?

YES	NO	EXPLANATION

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?

YES	NO	EXPLANATION

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)

YES	NO	EXPLANATION

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?

YES	NO	EXPLANATION

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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