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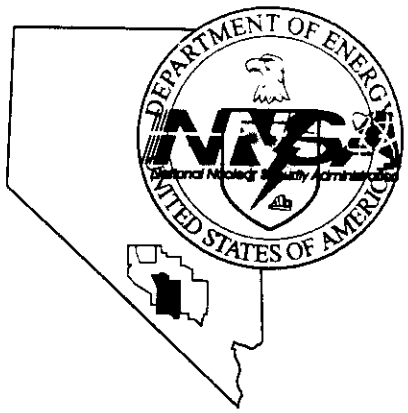

Corrective Action Plan for Corrective Action Unit 262: Area 25, Septic Systems and Underground Discharge Point, Nevada Test Site, Nevada

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Revision: 0

June 2002

Environmental Restoration
Division

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

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CORRECTIVE ACTION PLAN FOR CORRECTIVE ACTION UNIT 262: AREA 25, SEPTIC SYSTEMS AND UNDERGROUND DISCHARGE POINT, NEVADA TEST SITE, NEVADA

Prepared for:
U.S. Department of Energy
National Nuclear Security Administration
Nevada Operations Office
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Revision: 0

June 2002

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CORRECTIVE ACTION PLAN FOR CORRECTIVE ACTION UNIT 262: AREA 25, SEPTIC SYSTEMS AND UNDERGROUND DISCHARGE POINT, NEVADA TEST SITE, NEVADA

Approved by: _____ Date: 6/18/02
Janet L. Appenzeller-Wing, Project Manager
Industrial Sites Project

Approved by: _____ Date: 6/18/02
Runore C. Wycoff, Director
Environmental Restoration Division

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APPENDIX C - NEVADA DIVISION OF ENVIRONMENTAL PROTECTION DOCUMENT REVIEW SHEET

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ACRONYMS AND ABBREVIATIONS

BN	Bechtel Nevada
°C	degrees Celsius
CADD	Corrective Action Decision Document
CAP	Corrective Action Plan
CAIP	Corrective Action Investigation Plan
CAS	Corrective Action Site
CAU	Corrective Action Unit
COC	Contaminant(s) of Concern
CR	Closure Report
DOE/NV	U.S. Department of Energy, Nevada Operations Office
DQO	Data Quality Objective
DRO	Diesel Range Organics
E-MAD	Engine Maintenance, Assembly, and Disassembly
ER	Environmental Restoration
EZ	Exclusion Zone
ER	Environmental Restoration
FFACO	Federal Facility Agreement and Consent Order
FMP	Field Management Plan
ft	foot(feet)
gal	gallon(s)
HSO	Health and Safety Officer
IT	International Technology Corporation
Kg	kilogram(s)
km	kilometer(s)
L	liter(s)
LDR	Land Disposal Restrictions
LLW	Low-Level Waste
m	meter(s)
m^3	cubic meter(s)
mg/kg	milligram per kilogram
mi	mile(s)

ACRONYMS AND ABBREVIATIONS (continued)

MW	Mixed Waste
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NEPA	National Environmental Policy Act
NNSA/NV	U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office
NRDS	Nuclear Rocket Development Station
NTS	Nevada Test Site
OSHA	Occupational Safety and Health Administration
PPE	Personal protective equipment
QA	Quality Assurance
QC	Quality Control
RCT	Radiological Control Technician
R-MAD	Reactor Maintenance, Assembly, and Disassembly
REOP	Real Estate/Operations Permit
RWP	Radiological Work Permit
SSHASP	Site-Specific Health and Safety Plan
TPH	Total Petroleum Hydrocarbons
TPH-DRO	Total Petroleum Hydrocarbons as Diesel Range Organics
TSD	Treatment, Storage, and Disposal Facility
VOC	Volatile organic compound(s)
WAA	Waste Accumulation Area
yd^3	cubic yard(s)

EXECUTIVE SUMMARY

The Area 25 Septic Systems and Underground Discharge Point is identified in the Federal Facility Agreement and Consent Order of 1996 as Corrective Action Unit (CAU) 262. CAU 262 is located in Area 25 of the Nevada Test Site approximately 100 kilometers (62 miles) northwest of Las Vegas, Nevada. CAU 262 consists of nine Corrective Action Sites (CAS) including 25-02-06, 25-04-06 (Systems A & B), 25-04-07, 25-05-03, 25-05-05, 25-05-06, 25-05-08, 25-05-12, and 25-51-01.

CAU 262 is located in the vicinity of the Nuclear Rocket Development Station (NRDS). The NRDS consisted of the Engine Maintenance, Assembly, and Disassembly (E-MAD); Reactor Maintenance, Assembly, and Disassembly (R-MAD); Engine Test Stand; Test Cell A; and Test Cell C facilities. The CAU 262 CASs are specifically located in the vicinity of the E-MAD, R-MAD, and Test Cell C facilities. These facilities were used to develop and test nuclear reactors, engines, and rocket stages for the space program between 1958 and 1973. Various other projects used these facilities after 1973. The CASs are comprised of septic system distribution boxes, septic tanks, and leachfields. Process and sanitary effluents from these facilities were routed through collection systems and disposed of in subsurface leachfields. Collection systems include any piping and any septic tanks and diversion structures or distribution boxes between the edge of the source building foundation and the distribution system. Subsurface collection systems are not included in CAU 262.

CAU 262 was previously characterized by the IT Corporation, Las Vegas office. Site characterization results were presented in Appendices A and E of the Corrective Action Decision Document (CADD) for CAU 262, Area 25 Septic Systems and Underground Discharge Point (U.S. Department of Energy, Nevada Operations Office [DOE/NV], 2001). Site characterization data indicated that the contents of some septic tanks, some empty distribution boxes, and the soil within the boundaries of the leachfields exceeded clean-up criteria for organic compounds, Resource Conservation and Recovery Act metals, and radionuclides.

The Nevada Division of Environmental Protection-approved CADD (DOE/NV, 2001) specifies the following corrective actions for each CAS:

- Corrective Action Alternative 1 - No further action for CAS 25-51-01
- Corrective Action Alternative 2 - Clean closure for CASs 25-04-06, 25-04-07, 25-05-05, and 25-05-12
- Corrective Action Alternative 3 - Closure in place with administrative controls for CASs 25-02-06, 25-05-03, 25-05-06, and 25-05-08

Closure in place includes administrative controls such as use restrictions, and site postings. All use restrictions shall be detailed in the CAU 262 Closure Report.

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1.0 INTRODUCTION

This Corrective Action Plan (CAP) provides selected corrective action alternatives and proposes the closure methodology for Corrective Action Unit (CAU) 262, Area 25 Septic Systems and Underground Discharge Point. CAU 262 is identified in the Federal Facility Agreement and Consent Order (FFACO) of 1996. Remediation of CAU 262 is required under the FFACO.

CAU 262 is located in Area 25 of the Nevada Test Site (NTS), approximately 100 kilometers (km) (62 miles [mi]) northwest of Las Vegas, Nevada (Figure 1). The nine Corrective Action Sites (CASs) within CAU 262 are located in the Nuclear Rocket Development Station complex. Individual CASs are located in the vicinity of the Reactor Maintenance, Assembly, and Disassembly (R-MAD); Engine Maintenance, Assembly, and Disassembly (E-MAD); and Test Cell C compounds. CAU 262 includes the following CASs as provided in the FFACO (1996);

- CAS 25-02-06, Underground Storage Tank
- CAS 25-04-06, Septic Systems A and B
- CAS 25-04-07, Septic System
- CAS 25-05-03, Leachfield
- CAS 25-05-05, Leachfield
- CAS 25-05-06, Leachfield
- CAS 25-05-08, Radioactive Leachfield
- CAS 25-05-12, Leachfield
- CAS 25-51-01, Dry Well

Figures 2, 3, and 4 show the locations of the R-MAD, the E-MAD, and the Test Cell C CASs, respectively.

The facilities within CAU 262 supported nuclear rocket reactor engine testing. Activities associated with the program were performed between 1958 and 1973. However, several other projects used the facilities after 1973. A significant quantity of radioactive and sanitary waste was produced during routine operations. Most of the radioactive waste was managed by disposal in the posted leachfields. Sanitary wastes were disposed in sanitary leachfields. Septic tanks, present at sanitary leachfields (i.e., CAS 25-02-06, 25-04-06 [Septic Systems A and B], 25-04-07, 25-05-05, 25-05-12) allowed solids to settle out of suspension prior to entering the leachfield. Posted leachfields do not contain septic tanks.

All CASs located in CAU 262 are inactive or abandoned. However, some leachfields may still receive liquids from runoff during storm events.

Results from the 2000-2001 site characterization activities conducted by International Technology (IT) Corporation, Las Vegas Office are documented in the Corrective Action Investigation Report for Corrective Action Unit 262: Area 25 Septic Systems and Underground Discharge Point, Nevada Test Site, Nevada. This document is located in Appendix A of the Corrective Action Decision Document for CAU 262, Area 25 Septic Systems and Underground Discharge Point, Nevada Test Site, Nevada. (DOE/NV, 2001).

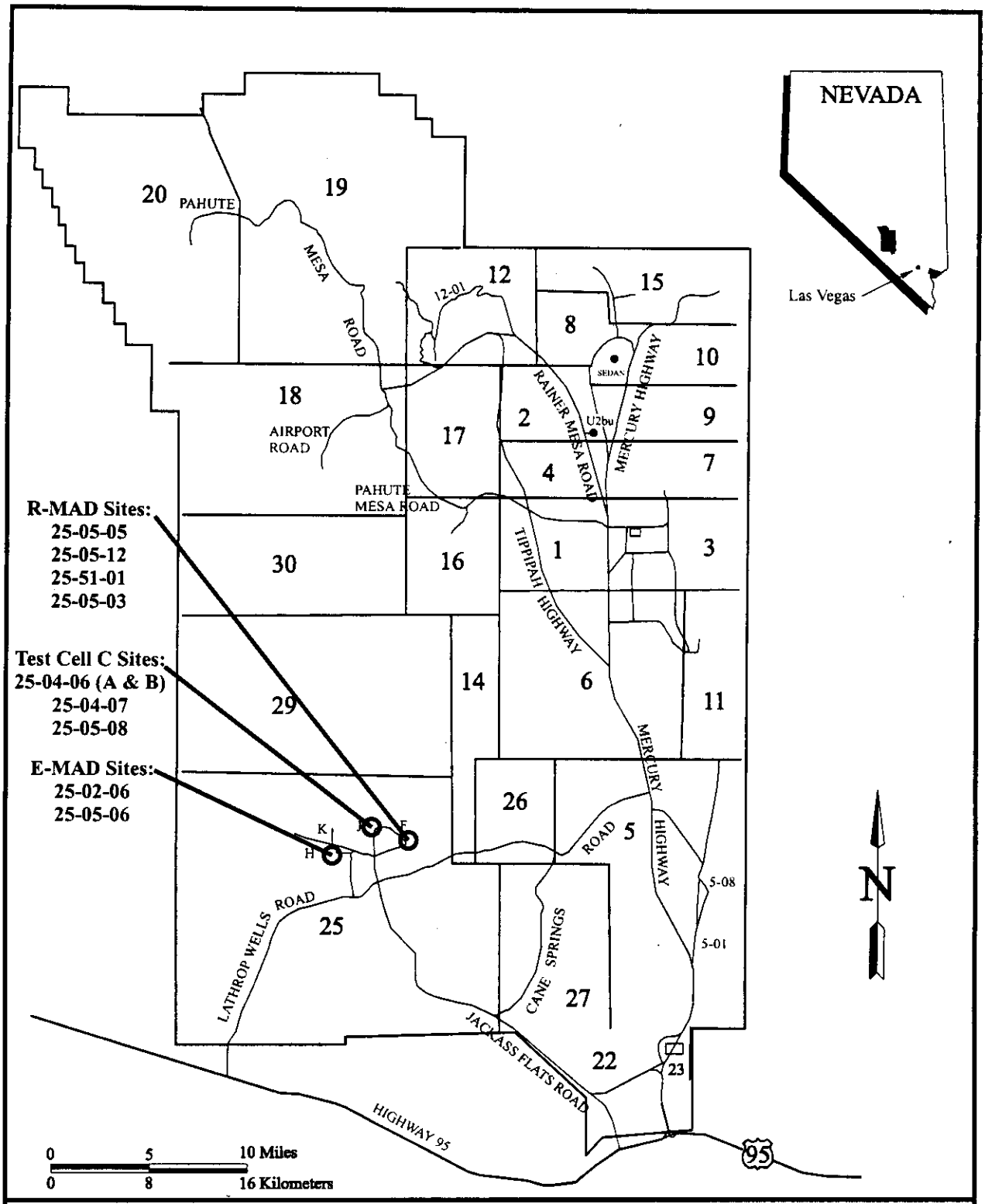

FIGURE 1
CAU 262, AREA 25 SEPTIC SYSTEMS AND UNDERGROUND DISCHARGE POINT R-MAD, E-MAD, AND TEST CELL C LOCATIONS, NEVADA TEST SITE, NEVADA

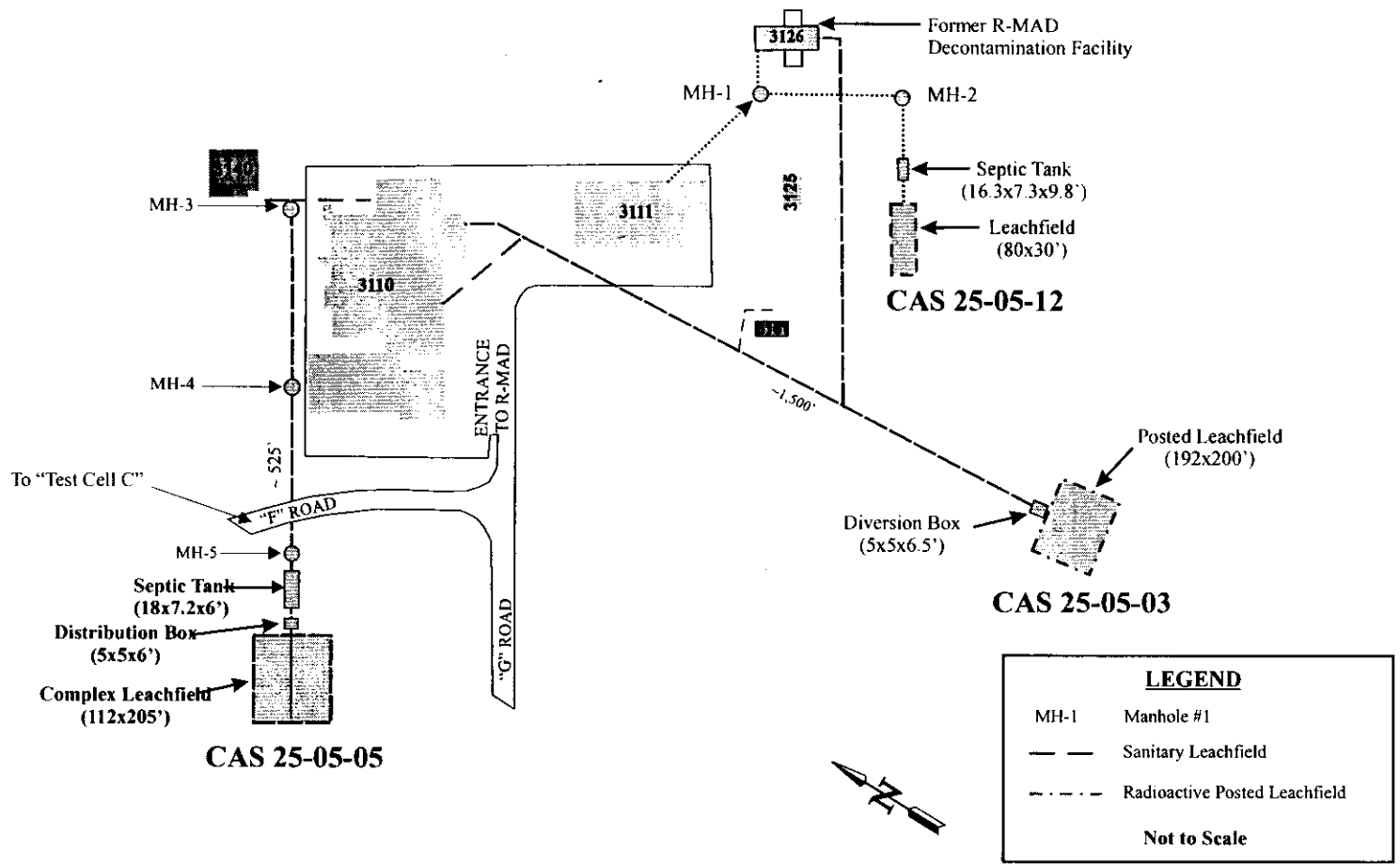

FIGURE 2
CAS 25-05-03, 25-05-05, AND 25-05-12 R-MAD LEACHFIELDS, NEVADA TEST SITE, NEVADA

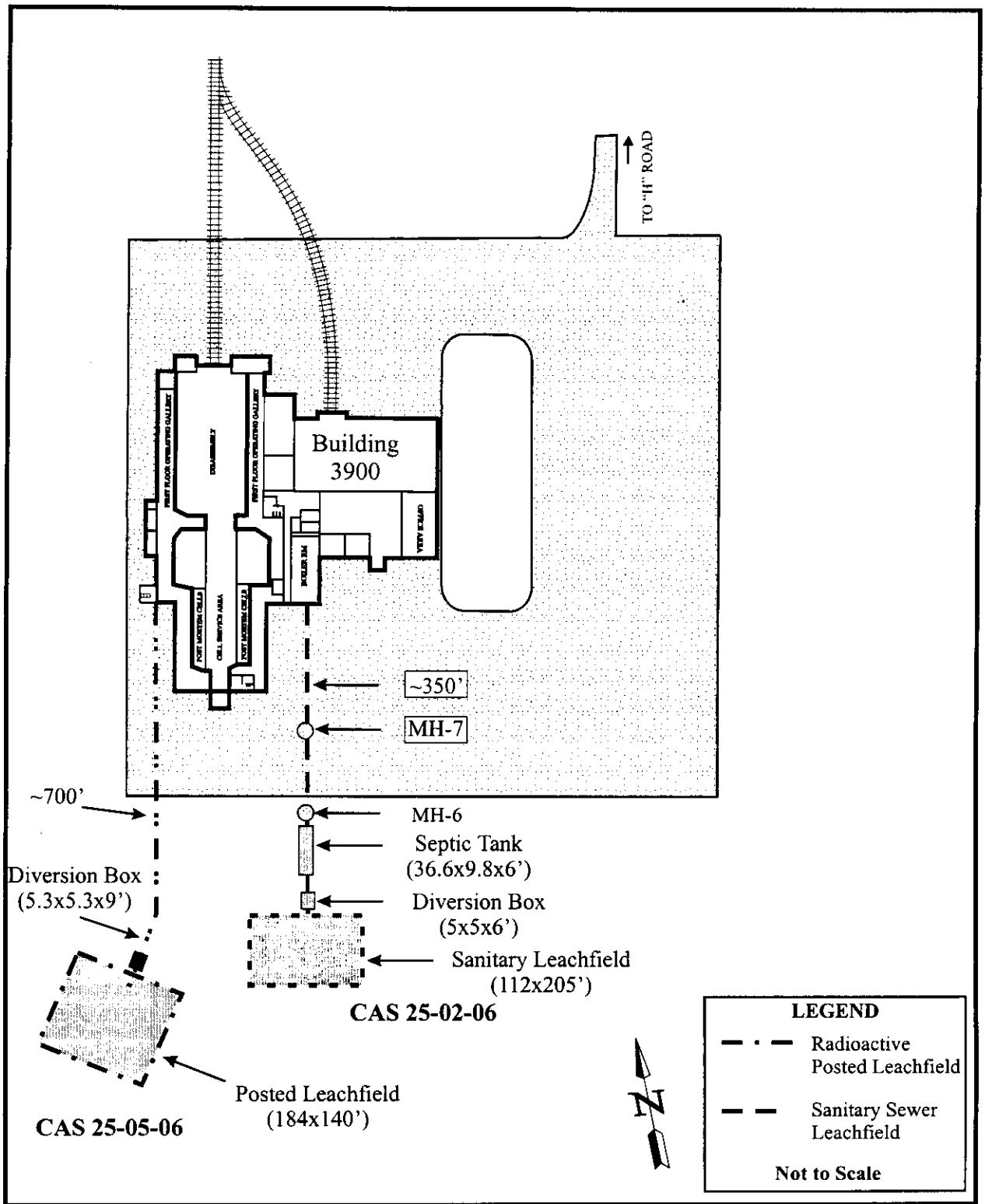

FIGURE 3
CAS 25-02-06 AND 25-05-06 E-MAD LEACHFIELDS,
NEVADA TEST SITE, NEVADA

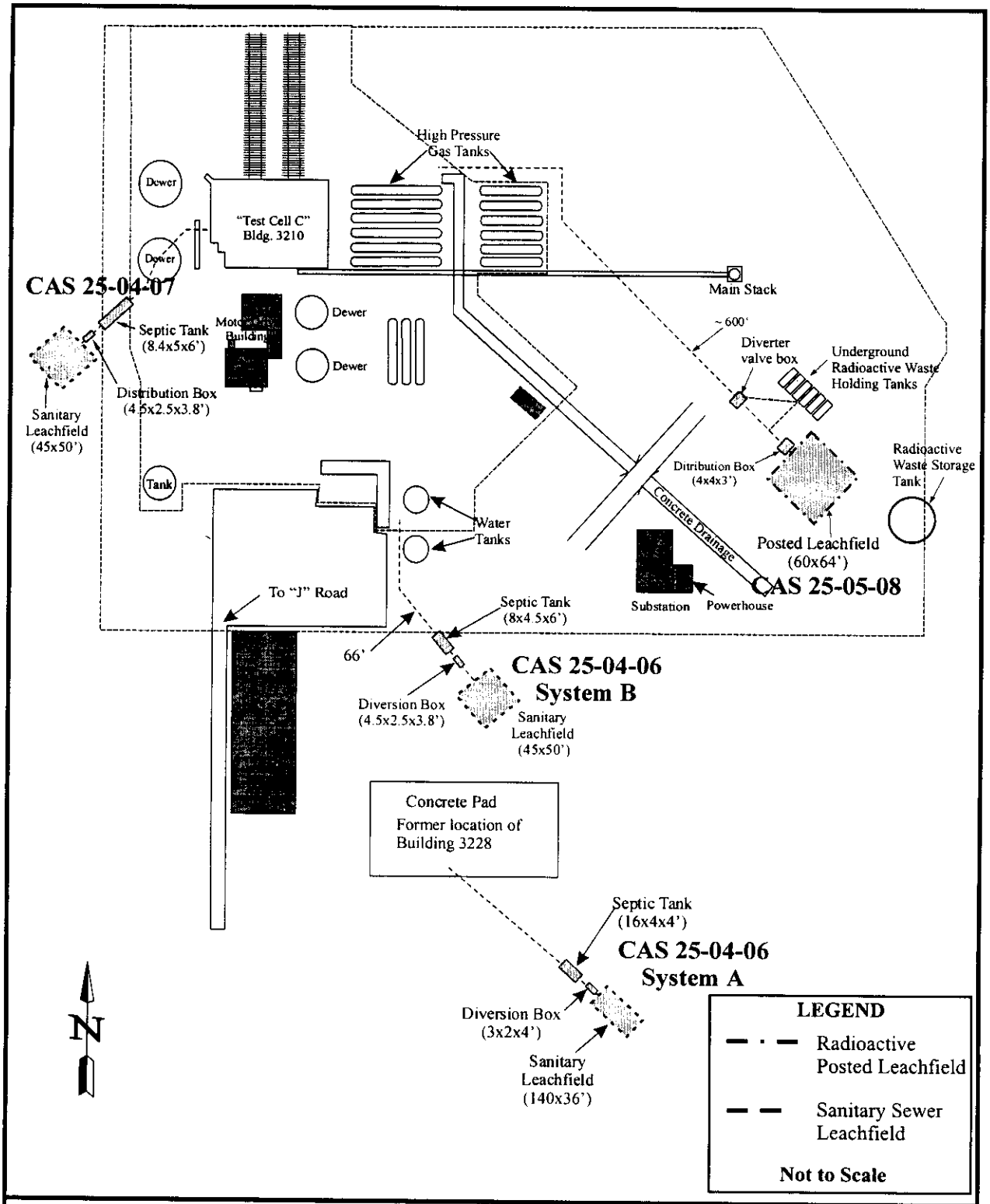

FIGURE 4
CAS 25-04-06 (A & B), 25-04-07, AND 25-05-08 TEST CELL C LEACHFIELDS, NEVADA TEST SITE, NEVADA

Table 1 summarizes the Nevada Division of Environmental Protection (NDEP) approved Corrective Action Alternatives for the CAU 262 CASs as stated in the CADD (DOE/NV, 2001).

The following sections provide a brief description of each CAS. For a complete description of each CAS, refer to the CADD (DOE/NV, 2001) and the Corrective Action Investigation Plan (CAIP) (DOE/NV, 2000a).

25-02-06; Underground Storage Tank
The system is located approximately 76 meters (m) (250 feet [ft]) south of Building 3900 at the E-MAD facility (Figure 3). The leachfield is approximately 34 m (112 ft) long by 62.5 m (205 ft) wide. The system includes a distribution box measuring 1.5 m (5 ft) long by 1.5 m (5 ft) wide by 1.8 m (6 ft) deep. The system's septic tank measures 11 m (36.6 ft) long by 1.5 m (5 ft) wide by 1.8 m (6 ft) deep. This system received sanitary effluent from Building 3900. Previous site characterization data reported in the CAU 262 Corrective Action Decision Document (CADD) (U.S. Department of Energy, Nevada Operations Office [DOE/NV], 2001) indicate that the leachfield is not impacted by any Contaminants of Concern (COCs). Characterization data (DOE/NV, 2001) indicates that the septic tank contains TPH, PCB, and sanitary waste.

25-04-06; Septic Systems A and B
Both Septic System A and B leachfields are located at the Test Cell C facility approximately 56.3 m (185 ft) southeast and northeast of Building 3228, respectively (Figure 4). Only a concrete pad marks the former location of this structure.

The Septic System A leachfield is approximately 42.6 m (140 ft) long by 10.9 m (36 ft) wide. The system includes a distribution box that measures 0.9 m (3 ft) long by 0.6 m (2 ft) wide by 1.2 m (4 ft) deep and is covered by a concrete lid. The system also includes a septic tank measuring 4.9 m (16 ft) long by 1.2 m (4 ft) wide by 1.2 m (4 ft) deep, which is accessed by two manholes. This system received sanitary effluent from Building 3228. Previous site characterization data (DOE/NV, 2001) indicate that this system contains no COCs. The septic tank contains only sanitary waste.

The Septic System B leachfield is approximately 13.7 m (45 ft) long by 15.2 m (50 ft) wide. The system is equipped with a distribution box that measures 1.3 m (4.5 ft) long by 0.7 m (2.5 ft) wide by 1.1 m (3.8 ft) deep, and is covered by a cast-iron lid. This system is equipped with a septic tank measuring 2.4 m (8 ft) long by 1.3 m (4.5 ft) wide by 1.8 m (6 ft) deep, which is accessed by one manhole. This system received sanitary effluent from Building 3220. Previous site characterization data indicate that this system is not impacted by any COCs. The septic tank contains only sanitary waste.

25-04-07; Septic System
This system is located approximately 73 m (240 ft) southwest of Building 3210 at the Test Cell C facility (Figure 4). The leachfield is approximately 13.7 m (45 ft) long by 15.2 m (50 ft) wide. The system includes a distribution box measuring 1.3 m (4.5 ft) long by 0.7 m (2.5 ft) wide by 1.1 m (3.8 ft) deep. This system is also equipped with a septic tank measuring 2.4 m (8 ft) long by 1.3 m (4.5 ft) wide by 1.8 m (6 ft) deep. This system received sanitary effluent from Building 3210. Previous site characterization data (DOE/NV, 2001) indicate that this system is not impacted by any COCs. The septic tank contains only sanitary waste.

TABLE 1 - CAU 262 AREA 25 SEPTIC SYSTEM AND UNDERGROUND DISCHARGE POINT CORRECTIVE ACTION ALTERNATIVE

CAS No.	LOCATION	CAS DESCRIPTION	CLOSURE ALTERNATIVE	COMMENTS
25-02-06	E-MAD	Underground Storage Tank	Alternative 3. Closure In Place	Liquids in tank will be solidified and new cover installed.
25-05-06	E-MAD	Leachfield	Alternative 3. Closure In Place	Grout distribution box and monitoring tubes. Construct new fence and signs.
25-04-06	Test Cell C	Septic Systems A and B	Alternative 2. Clean Closure	Remove tank contents, grout distribution boxes, backfill tanks.
25-04-07	Test Cell C	Septic System	Alternative 2. Clean Closure	Remove tank contents, grout distribution box, backfill tank.
25-05-08	Test Cell C	Radioactive Leachfield	Alternative 3. Closure In Place	Grout distribution box and monitoring tubes. Construct cover, new fence and signs.
25-05-03	R-MAD	Leachfield	Alternative 3. Closure In Place	Grout distribution box and monitoring tubes. Construct cover, new fence and signs.
25-05-05	R-MAD	Leachfield	Alternative 2. Clean Closure	Remove and solidify tank contents, grout distribution box, backfill tank.
25-05-12	R-MAD	Leachfield	Alternative 2. Clean Closure	Remove and solidify tank contents, grout distribution box, backfill tank.
25-51-01	R-MAD	Dry Well	Alternative 1. No Further Action	

25-05-03; Leachfield
This system is located at the R-MAD facility approximately 457 m (1,500 ft) south of Building 3110 (Figure 2). The leachfield is approximately 58.5 m (192 ft) long by 60.9 m (200 ft) wide. This system received radioactive effluent from Buildings 3110, 3126, and 3161. Potentially hazardous and radioactive wastes are known to have been discharged to this system. Approximately 40 monitoring tubes were originally installed in this system, many of which are no longer visible.

25-05-05; Leachfield
The system is located at the R-MAD facility approximately 91.4 m (300 ft) southwest of Building 3110 (Figure 2). The leachfield is approximately 34 m (112 ft) long by 62.4 m (205 ft) wide. The system includes a septic tank that measures 5.5 m (18 ft) long by 2.1 m (7 ft) wide by 1.8 m (6 ft) deep, with three manholes providing access to the tank. A diversion structure measuring 1.5 m (5 ft) long by 1.5 m (5 ft) wide by 1.8 m (6 ft) deep is located just down-gradient from the septic tank. This system received effluent from both Buildings 3110 and 3140. Previous site characterization data (DOE/NV, 2001) indicate that the leachfield is not impacted by any COCs, the septic tank is contains TPH and sanitary waste only. During a previous site characterization, running water was heard flowing in the system.

25-05-06; Leachfield
The system is located at the E-MAD facility approximately 190 m (625 ft) southwest of Building 3900 (Figure 3). The leachfield is approximately 56 m (184 ft) long by (140 ft) wide. The system included a distribution box measures 1.6 m (5.3 ft) long by 1.6 m (5.3 ft) wide by 2.7 m (9 ft) deep. This structure is covered by a 0.9-m (3-ft) thick concrete lid. This system received radioactive and process effluent from Building 3900. Ten monitoring tubes are present within the boundaries of the leachfield.

25-05-08; Radioactive Leachfield
The system is located 149 m (490 ft) southeast of Building 3210 at the Test Cell C facility (Figure 4). The leachfield is approximately 18.2 m (60 ft) long by 19.5 m (64 ft) wide. A distribution box measuring 1.2 m (4 ft) long by 1.2 m (4 ft) wide by 0.9 m (3 ft) deep is present. This system received radioactive effluent from Building 3210. Six monitoring tubes are present within the leachfield boundary.

25-05-12; Leachfield
The system is located 68.5 m (225 ft) southwest of Building 3126 at the R-MAD facility (Figure 2). The leachfield is approximately 24.3 m (80 ft) long by 9.1 m (30 ft) wide. The system includes a septic tank measuring approximately 4.9 m (16.3 ft) long by 2.2 m (7.2 ft) wide by 3 m (9.8 ft) deep, which is accessed by two manholes. This system received sanitary effluent from Buildings 3111 and 3126. Previous site characterization data (DOE/NV, 2001) indicate that the leachfield is not impacted by any COCs. The septic tank contains TPH and sanitary waste.

25-51-01; Dry Well
The dry well was an underground discharge point designed to received sanitary waste from Building 3125 at the R-MAD facility. It is located approximately 6 m (20 ft) north of the west corner of Building 3125.

A potential leachfield associated with the dry well is located approximately 52.5 m (175 ft) southwest of Building 3125.

1.1 PURPOSE

The purpose of this CAP is to provide the specific methods for implementing the recommended corrective action alternatives as specified in the CADD (DOE/NV, 2001). Detailed information on the site history and results of previous characterization activities is located in the CAIP (DOE/NV, 2000a) and CADD (DOE/NV, 2001).

The CAIP (DOE/NV, 2000a) described the site history, outlined a site characterization plan, and proposed Preliminary Action Levels to evaluate the need for possible site corrective actions. Site characterization activities were performed in 2000 and 2001. Site characterization results were reported in Appendix A of the CADD (DOE/NV, 2001). The CADD specified that Corrective Action Alternative 2 - Clean Closure, shall be implemented at CASs 25-04-06; 25-04-07; 25-05-05; and 25-05-12. The CADD also specified that Corrective Action Alternative 3 - Closure in Place with Administrative Controls shall be implemented at CASs 25-02-06; 25-05-03; 25-05-06; and 25-05-08. CAS 25-51-01 will be closed by Corrective Action Alternative 1 - No Further Action.

1.2 SCOPE

Specific details of the corrective actions to be performed at each CAS are presented in Section 2.0 – Detailed Statement of Work.

1.3 CORRECTIVE ACTION PLAN CONTENTS

This CAP is divided into the following sections:

- Section 1.0 - Introduction
- Section 2.0 - Detailed Statement of Work
- Section 3.0 - Schedule
- Section 4.0 - Post-Closure Monitoring Plan
- Section 5.0 - References

The appendices of this document have been modified from the approved FFACO outline. The following FFACO appendices have not been included or have been revised as indicated below:

APPENDIX B Sampling and Analysis Plan

This appendix is not included because Sampling and Analysis has been adequately addressed in Sections 2.2.1, Data Quality Objectives, and 2.4, Confirmation of Corrective Actions.

The appendices included in this document are as follows:

APPENDIX A ENGINEERING SPECIFICATIONS AND DRAWINGS

APPENDIX B PROJECT ORGANIZATION

APPENDIX C NEVADA DIVISION OF ENVIRONMENTAL PROTECTION DOCUMENT REVIEW SHEET

DISTRIBUTION LIST

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

- Federal Facility Agreement and Consent Order, 1996 as amended. Agreed to by the Nevada Division of Environmental Protection, the U.S. Department of Energy, and the U.S. Department of Defense.

- U.S. Department of Energy, Nevada Operations Office, 2000a. Corrective Action Investigation Plan for Corrective Action Unit 262: Area 25 Septic Systems and Underground Discharge Point, Nevada Test Site, Nevada, DOE/NV--629, Las Vegas, NV.

- U.S. Department of Energy, Nevada Operations Office, 2001. Corrective Action Decision Document for Corrective Action Unit 262: Area 25 Septic Systems and Underground Discharge Point, Nevada Test Site, Nevada, DOE/NV--744-REV 1, Las Vegas, NV.

2.0 DETAILED STATEMENT OF WORK

2.1 CORRECTIVE ACTIONS

The objectives of the corrective action alternatives specified in the CADD (DOE/NV, 2001) are to prevent or mitigate adverse environmental impacts due to exposure and migration of surface and subsurface waste. Corrective Action Alternative 2 - Clean Closure and Corrective Action and Alternative 3 - Closure in Place with Administrative Controls were selected as the preferred corrective action alternatives. This section specifies how the approved corrective action alternatives will be implemented at each CAS.

Sanitary septic tanks that do not contain hazardous or hydrocarbon contaminants will be closed in accordance with Nevada Administrative Code (NAC) 444.818 (NAC, 1999). This requirement specifies that contents must be removed and properly disposed, and the septic tank must be removed for proper disposal or left in place and the remaining voids backfilled with inert material. Septic tanks that contain regulated hazardous or hydrocarbon contaminants must either be closed by removing and disposing of the contents, or closing the contents in place and mitigating the remaining risk (i.e., by implementing administrative and engineering controls). If the tank is left in place, any remaining voids must be backfilled with an inert material.

Posted leachfields and distribution boxes (i.e., CASs 25-05-03, 25-05-06, 25-05-08) will be closed in place by performing the following activities:

- Cut off existing monitoring tubes at ground level and grout closed.
- Install a native soil cover over the impacted leachfield areas (no cover at 25-05-06).
- Construct diversion channels and/or berms, where necessary, to redirect run-on and run-off away from the leachfield cover.
- Install, replace, or repair fencing around the leachfield boundaries to restrict human and wild animal access into the impacted areas.
- Install new signs on the fencing surrounding the site boundaries, displaying point-of-contact information.

2.1.1 Corrective Action Alternative 2 - Clean Closure

The NDEP-approved CADD (DOE/NV, 2001) specified that the preferred corrective action alternative for the following CASs (Table 1) is Alternative - 2 Clean Closure.

2.1.1.1 25-04-06; Septic Systems A and B

Septic System A

The CADD (DOE/NV, 2001) reported that the septic tank contains approximately 2,838 liters (L) (750 gallons [gal]) of sanitary liquids and sludge. The site shall be closed by removing the contents of the tank. This will be accomplished by first mixing the liquid and sludge by using high-pressure water jets or equivalent equipment. The resulting slurry will then be pumped from the septic tank using either a mucking pump, vacuum truck, or an equivalent piece of equipment. Liquid and sludge waste generated during closure activities will be managed as sanitary waste and be disposed in the Area 23 Sewage Treatment Facility. Solid investigation derived waste

(e.g., gloves, tyvek coveralls, paper) will be disposed of as sanitary waste in an appropriate landfill on the NTS. After all of the sludge and liquids have been removed, all remaining voids will be backfilled using Type II Portland Cement or equivalent. This includes the septic tank, distribution box, influent and effluent ends of the tank, and any access points (i.e., manholes).

Septic System B

The CADD (DOE/NV, 2001) reported that the septic tank contains approximately 2,615 L (691 gal) of sanitary liquids. The site will be closed by removing the contents of the tank. Prior to removing the liquids, high-pressure water jets or equivalent equipment will be used to mix any potential sludge with the liquids. Removal will be accomplished by pumping the liquid from the septic tank using either a mucking pump, vacuum truck, or an equivalent piece of equipment. Liquid and sludge waste generated during closure activities will be managed as sanitary waste. This waste will be disposed in the Area 23 Sewage Treatment Facility. Solid investigation derived waste (e.g., gloves, tyvek coveralls, paper) will be disposed of as sanitary waste in an appropriate landfill on the NTS. After all of the liquids have been removed, all remaining voids shall be backfilled using Type II Portland Cement or equivalent. This includes the septic tank, distribution box, influent and effluent ends of the tank, and any access points (i.e., manholes).

2.1.1.2 25-04-07; Septic System

The CADD (DOE/NV, 2001) reported that the septic tank contains approximately 1,082 L (286 gal) of sanitary liquids. The site will be closed by removing the contents of the tank. To provide safer access to the septic tank, a small portion of the concrete pad that currently covers most of the tank shall be removed. Prior to removing the liquids, high-pressure water jets or equivalent equipment will be used to mix any potential sludge with the liquids. The contents of the tank shall then be removed by pumping the liquid from the tank using either a mucking pump, vacuum truck, or an equivalent piece of equipment. Waste generated during closure activities will be managed as sanitary waste and will be disposed in the Area 23 Sewage Treatment Facility. All remaining voids shall then be backfilled using Type II Portland Cement or equivalent. This includes the septic tank, distribution box, influent and effluent ends of the tank, and any access points (i.e., manholes).

2.1.1.3 25-05-05; Leachfield

The CADD (DOE/NV, 2001) reported that the effluent chamber contains approximately 46 L (122 gal) of hydrocarbon-impacted sludge that exceeds the NDEP action level of 100 milligrams per kilogram (mg/kg). The influent chamber also contains approximately 10,404 L (2,749 gal) of hydrocarbon-impacted sludge. The site will be closed by removing the contents of the tank. Prior to removing the contents, any liquids present in the tank will be mixed with the sludge using high-pressure water jets or equivalent equipment. The potential exists that the sludge may be too viscous to allow pumping. In this case, a sufficient volume of water will be added to achieve the necessary viscosity required for removing the contents of the tank. The contents of the tank will be removed using either a mucking pump, vacuum truck, or an equivalent piece of equipment. A waste characterization sample(s) will be collected and submitted for laboratory analysis of total petroleum hydrocarbons-diesel range organics (TPH-DRO), volatile organic compounds (VOCs) by the toxicity characterization leaching procedure (U.S. Environmental Protection Agency, 1996), and gross alpha/beta. Waste will then be transferred to appropriate containers and transferred to a Waste Accumulation Area (WAA). Upon receipt of analytical results, the waste will be solidified and disposed of in an appropriate on-site disposal facility.

After removal of the contents from the tank, the tank will be rinsed using a steam cleaner. The rinsate will be pumped from the tank using an appropriate pump and containerized in 208-L (55-gal) drums. A rinsate sample will then be collected and analyzed for TPH-DRO and gross alpha/beta. Upon receipt of analytical results, the rinsate will be solidified and disposed of in the appropriate on-site disposal facility. If analytical results indicate that the rinsate is above applicable action levels, the tank will be rinsed again and the rinsate analyzed for the same analytical parameters. Upon verification that the rinsate is below the action levels, all remaining voids shall then be backfilled using Type II Portland Cement or equivalent. This includes the septic tank, distribution box, influent and effluent ends of the tank, and any access points (i.e., manholes).

2.1.1.4 25-05-12; Leachfield

The CADD (DOE/NV, 2001) reported that the septic tank influent chamber contains approximately 6,370 L (1,683 gal) of hydrocarbon-impacted sludge that exceeded the NDEP TPH action level of 100 mg/kg. The effluent chamber contains approximately 6,370 L (1,683 gal) of sanitary liquid. To minimize the possibility of mixing hydrocarbon-impacted sludge with sanitary liquids during extraction, the sanitary waste shall be removed first, followed by the hydrocarbon-impacted waste. If the materials in both chambers are mixed on removal the entire waste will managed as hydrocarbon waste. Site closure will be accomplished by removing the contents of the tank. Prior to removal, the liquid and sludge will be mixed using high-pressure water jets or equivalent equipment. The potential exists that the sludge may be too viscous to be removed with standard pumps. In this case, a sufficient volume of water may be added to achieve the necessary viscosity required for pumping. A waste characterization sample(s) will be collected and submitted for laboratory analysis of TPH-DRO and gross alpha/beta. The contents of the tank will be transferred to appropriate containers using either a mucking pump, vacuum truck or equivalent piece of equipment. The containerized waste will then be transferred to a WAA. Upon receipt of analytical results, the waste will be solidified and disposed in a appropriate on-site disposal facility. After removing the contents of the tank, the tank shall be thoroughly rinsed using a steam cleaner. Rinsate shall be pumped from the tank using an appropriate pump and containerized in 208-L (55-gal) drums. A rinsate sample will be collected and analyzed for TPH-DRO. Upon receipt of analytical results, the rinsate will be solidified and disposed in the appropriate on-site disposal facility. If the rinsate is above action levels, the tank will be rinsed again and the rinsate analyzed for the parameters that exceeded the action level. Upon verification that the rinsate is below applicable action levels, all remaining voids shall then be backfilled using Type II Portland Cement or equivalent. This includes the septic tank, distribution box, influent and effluent ends of the tank, and any access points (i.e., manholes).

2.1.2 Corrective Action Alternative 3 - Closure in Place with Administrative Controls

As specified in the NDEP-approved CADD (DOE/NV, 2001), Corrective Action Alternative 3 - Closure in Place with Administrative Controls, shall be implemented at the following CASs (Table 1). Specific closure activities for each CAS are addressed in the following paragraphs. The purpose of this corrective action alternative is to prevent inadvertent contact with COCs and impacted media that exceeds free release criteria. This shall be accomplished by implementing engineering (i.e., fencing) and administrative controls (i.e., Use Restrictions) to minimize access and prevent unauthorized intrusive activities at the CASs. Site engineering construction drawings for the CASs requiring engineered covers (25-05-03 and 25-05-08) are presented in

Appendix A. Since closure activities at the following CASs are not expected to generate any waste other than used personal protective equipment (PPE) and scrap metal from monitoring tubes, COCs are not summarized as in Section 2.1.1, Alternative 2 - Clean Closure. Only the closure methodologies are addressed.

At each CAS, permanent signs shall be installed to communicate the Use Restrictions, the presence of COCs, and point-of-contact information. Signs will be permanently attached to the perimeter fence. At a minimum, these signs shall contain the following information:

- FFACO name, CAU and CAS site number (e.g., CAU 262, CAS 25-05-03), and COCs
- Use Restriction Statement prohibiting any intrusive activities (e.g., excavation, trenching, drilling) unless concurrent approval is obtained in writing from the U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office (NNSA/NV)
- Point-of-contact information

2.1.2.1 25-02-06; Underground Storage Tank

As reported in the CADD (DOE/NV, 2001), the septic tank influent chamber contains approximately 16,120 L (4,259 gal) of hydrocarbon-impacted sludge. The middle chamber contains approximately 5,162 L (1,364 gal) of sanitary liquid. The effluent chamber contains approximately 465 L (123 gal) of polychlorinated biphenyls and radioactively-impacted sludge. Closure in Place shall be accomplished by removing the existing concrete pad covering the tank using a backhoe or equivalent piece of equipment. The cover shall be radiologically surveyed by a Radiological Control Technician (RCT) and disposed in the appropriate landfill depending on the radiological screening results. The contents of the septic tank will then be solidified in place. Solidification will be accomplished by mixing Type II Portland Cement (or equivalent) with the contents of the tank. After adding the concrete to the tank, a grout pump (or equivalent) will be used to thoroughly mix any potential liquids with the sludge and cement. After achieving proper solidification, any remaining voids will be backfilled with cement. A reinforced (i.e., steel mesh) concrete pad shall be constructed over the footprint of the tank to restrict access to the subsurface. This slab is not intended to support any future structures, it shall prevent access to the colosed E-MAD Complex Leachfield septic tank only.

Any waste generated during closure activities (e.g., the former concrete pad) shall be containerized in appropriate containers, properly labeled, and staged in a WAA, if required, until disposal in an appropriate on-site disposal facility.

Administrative controls (i.e., Use Restrictions) will be implemented to mitigate any remaining risk. Use Restrictions will include long-term maintenance requirements for the concrete cover. They will also prohibit any intrusive activities into, and beneath, the surface of the site. These Use Restrictions shall be communicated by posting the appropriate signage at the site. Long-term maintenance will also be required to ensure the integrity of the concrete cover and the legibility of the signs. Specific controls and maintenance requirements shall be specified in the CAU 262 Closure Report (CR).

The combination of these protective measures will effectively prevent inadvertent intrusive activities by both humans and wildlife in addition to mobilization of any COCs.

2.1.2.2 25-05-03; Leachfield

Site closure shall be accomplished by installing a minimum 0.6-m (2-ft) thick surface cap constructed of native soil material. This cover shall be constructed over the current leachfield footprint, extending to the boundaries of the current fence line. Appendix A provides engineering construction drawings for the cover. Approximately 2,250 cubic meters (m^3) (3,000 cubic yards [yd^3]) of cover material is expected to be required. Cover material will be excavated from the R-MAD borrow pit located approximately 100 m (330 ft) north of the R-MAD compound entrance on the west side of Road F. Soil excavated from this borrow pit is known to be free of radiologic or chemical contaminants. No screening or size reduction is proposed for the cover material unless size distribution of the material is dramatically different from the existing site materials. The Site Superintendent will perform a visual inspection of the soils transported to the site to determine if the soils are similar in physical properties. Cover material shall be placed over the impacted area in successive 0.15 to 0.2-m (6 to 8-inch) lifts using a bull-dozer or equivalent. To minimize the potential spread of impacted soils and post-job equipment decontamination requirements, cover placement shall proceed from non-impacted areas (i.e., clean areas outside the leachfield boundary) towards the impacted areas. Cover material shall be wetted as needed during application to control dust and aid in proper compaction. Once the lift is placed, it will be wheel-rolled or track-compacted by successive passes with heavy construction equipment. Each lift of the constructed cover will be compacted to 90 percent of maximum density for the fill material. Compaction requirements will be verified by testing in the field by BN Materials Testing Laboratory personnel. Compaction test results will be included in the CAU 262 CR. Appendix A provides construction drawings for the cover.

The existing site fence will be replaced with a new 2.1-m (7-ft) chain link fence. Appendix A Drawing C1 provides fence construction details.

As a best management practice, the two existing washes that currently transect the impacted area (i.e., northeast and southeast corners) shall be graded, and backfilled with native soil and rip-rap rock (Appendix A, Drawing C3). The backfilled portion of the wash shall be compacted with a sheep's foot compactor, or equivalent. The remaining up-gradient sections of the wash will be modified to redirect overland flow away from the impacted area. Modification will consist of constructing a diversion channel/berm consisting of native soil and rip-rap rock. During soil placement, water will be applied to allow for proper compaction. After soil placement, the channel/berm will be compacted with a sheep's foot compactor, or equivalent to 90 percent of the maximum density as determined by field compaction testing. Compaction test results will be included in the CAU 262 CR. Appendix A, Drawing C3 provides engineering construction specifications for the diversion channel/berm.

The distribution box and monitoring tubes will be closed by cutting the tubes off at ground surface and filling them with Type II Portland Cement or equivalent. In addition, three large subsurface vaults, a 208-L (55-gal) diversion drum, and two valve boxes will be closed by backfilling with clean fill. Cut sections of the monitoring tubes will be radiologically surveyed and disposed in the appropriate on-site disposal facility.

All construction activities shall be accomplished using standard construction equipment. This equipment may consist of, but not be limited to, bulldozers, graders, front-end loaders, sheep's

foot compactors, end- and belly-dump trucks, and water trucks. Water used for dust suppression and soil conditioning will be obtained from a fill stand pipe located on the northeast side of the intersection of Jackass Flats Road and Lathrop Wells Road in Area 25.

Administrative controls (i.e., Use Restrictions) will be implemented to mitigate remaining risk. Use Restrictions will prohibit any intrusive activities into, and beneath, the surface of the site. Specific Use Restrictions shall be specified in the CR. Long-term maintenance requirements will also be required to ensure integrity of the surface cap. Access to the leachfield will be restricted by the chain-link fencing around the perimeter of the leachfield. Permanent warning signs will be attached to the fencing listing necessary point-of-contact information, as specified in Section 2.1.2. The combination of these protective measures will effectively prevent inadvertent intrusive activities by both humans and wildlife in addition to any potential mobilization of any COCs.

2.1.2.3 25-05-06; Leachfield

Site closure shall be accomplished by performing the following activities. The distribution box will be exposed by excavating and will be closed by backfilling with Type II Portland Cement or equivalent. The monitoring tubes will be closed by cutting the tubes off at ground surface and filling them with Type II Portland Cement or equivalent. Cut sections of the tubes shall be radiologically surveyed and disposed in the appropriate on-site disposal facility.

Administrative controls (i.e., Use Restrictions) will be implemented to mitigate remaining risk. Use Restrictions will include long-term maintenance requirements for the surface cap. They will also prohibit any intrusive activities into, and beneath, the surface of the site. Specific Use Restrictions shall be specified in the CR. Access to the leachfield will be restricted by installing a new 2.1-m (7-ft) chain-link fence around the perimeter of the leachfield. All material from the existing fence, wire and fence posts, that will be removed shall be radiologically surveyed and disposed in the appropriate on-site disposal facility. Permanent warning signs will be attached to the newly-installed perimeter fencing to delineate the boundary of the leachfield and list Use Restrictions and point-of-contact information, as specified in Section 2.1.2.

The combination of these protective measures will effectively prevent intrusive activities into the impacted area by both humans and wildlife in addition to any potential mobilization of any COCs.

2.1.2.4 25-05-08; Radioactive Leachfield

Site closure shall be accomplished by installing a 0.6-m (2-ft) thick surface cover constructed of native soil material. The cover will extend 4.5 m (15 ft) on the horizontal plane beyond the current boundary of the leachfield. Appendix A provides engineering construction drawings for the cover. Approximately 635 m^3 (835 yd^3) of cover material is expected to be required. Cover material shall be excavated from R-MAD borrow pit. Soil excavated from this borrow pit is known to be free of radiological or chemical contaminants. No screening or size reduction is proposed for the cover material unless size distribution of the material is dramatically different from the existing site materials. The Site Superintendent will perform a visual inspection of the soils transported to the site to determine if the soils are similar in physical properties. Cover material shall be placed over the impacted area in successive 0.15 to 0.2-m (6 to 8-inch) lifts, using a bulldozer or equivalent. To minimize the potential spread of impacted soils and post-job

equipment decontamination requirements, cover placement shall proceed from non-impacted areas (i.e., clean areas outside the boundaries of the posted leachfield) towards the impacted areas. Cover material will be wetted during application to control dust and aid in proper compaction. Once the lift is placed, it will be wheel-rolled or track-compacted by successive passes with heavy construction equipment. Each lift of the constructed cover will be compacted to 90 percent of maximum density for the fill material. Compaction requirements will be verified by testing in the field by BN Materials Testing Laboratory personnel. Compaction test results will be included in the CAU 262 CR.

The distribution box and monitoring tubes shall be closed by backfilling with Type II Portland Cement or equivalent. Prior to filling with cement, the monitoring tubes shall be cut at ground surface. Cut sections of the tubes shall be radiologically surveyed and disposed in the appropriate on-site disposal facility.

All construction activities shall be accomplished using standard construction equipment. This equipment may consist of, but not be limited to, bulldozers, graders, front-end loaders, sheep's foot compactors, end- and belly-dump trucks, and water trucks. Water used for dust suppression and soil conditioning will be obtained from a fill stand pipe located on the northeast side of the intersection of Jackass Flats Road and Lathrop Wells Road in Area 25.

Administrative controls (i.e., Use Restrictions) will be implemented to mitigate remaining risk. Use Restrictions will include long-term maintenance requirements for the surface cap. They will also prohibit any intrusive activities into, and beneath, the surface of the site. Specific Use Restrictions shall be specified in the CR. Access to the leachfield will be restricted by installing a new 2.1-m (7-ft) chain-link fence around the perimeter of the leachfield. All material from the existing fence, wire and fence posts, that will be removed shall be radiologically surveyed and disposed in the appropriate on-site disposal facility. Permanent warning signs will be attached to the newly-installed perimeter fencing to delineate the boundary of the leachfield and list Use Restrictions and point-of-contact information, as specified in Section 2.1.2.

2.2 CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL

Construction activities shall be limited to installing native soil covers over the existing footprints of two posted leachfields, the construction of diversion channel/berms, and the installation of site fencing, as discussed in Section 2.1.2. Engineering drawings for sites requiring construction activities are provided in Appendix A.

2.2.1 Data Quality Objectives

Data Quality Objectives (DQOs) were developed for CAU 262 by the IT Las Vegas office. No additional DQOs shall be developed for site closure activities. Collection of verification samples shall be collected by Bechtel Nevada (BN) Environmental Restoration personnel. Sample collection will follow BN Organization Instruction OI-2152.108, "Soil Sampling" (BN, 2000b). All samples will be managed under strict Chain of Custody procedures (BN, 2000a). After receipt of the analytical results, data packages shall be internally reviewed using Tier II Quality

Assurance (QA) and Quality Control (QC) procedures. Any data determined not to be valid will be identified in the in the CR.

2.3 WASTE MANAGEMENT

2.3.1 Waste Minimization

All work activities that will generate waste will follow the BN Waste Minimization and Pollution Prevention Program. Special care will be given to segregate the waste streams to avoid the generation of additional waste.

All wastes will be accumulated, stored, analyzed, and disposed of in accordance with applicable state and federal regulations, U.S. Department of Energy orders, U.S. Department of Transportation requirements, and BN Waste Management procedures.

To restrict access to waste, WAAs for the various waste streams will be constructed of chain-link fencing. These areas will be identified with appropriate signage. All WAAs will be inspected weekly to ensure that all containers are intact and are not leaking.

Standard 208-L (55-gal) drums will be used for smaller volumes of petroleum hydrocarbon waste, hazardous waste, mixed waste (MW), low-level waste (LLW), and investigation-derived decontamination fluids. Baker Tanks, or equivalent, will be used to store large volumes of liquid waste from septic tanks that requires characterization prior to disposal. Upon receipt of analytical results, such waste will be transferred to vacuum trucks for transport and disposal. After a waste container is filled, the package will be closed according to BN Organization Procedure OP-2151.304, "Radioactive Waste Tracking, Handling, and Management at the NTS" (BN, 2000c), if applicable. If a container is not completely filled at the end of a workday, the lid will be closed without securing the clips and tamper-indicating tape, tag, or a lock will be placed on the container. All 208-L (55-gal) drums containing free liquids will be stored on spill containment pallets.

Appropriate labels will be affixed to all waste containers and relevant information will be marked on each label with an indelible marker. The information will be legible and clearly visible for inspections. Containers will be labeled with information including:

- Radiologic tracking label, hazardous waste label, or drum identification number, as appropriate
- Waste type in container
- Waste origin
- Accumulation dates
- A "pending analysis" sticker, if sampling is required
- The words "Hazardous Waste" on containers of hazardous and mixed waste

To assure container integrity, all containers will be physically inspected prior to being shipped off-site and at the time of unloading at the disposal designation.

2.3.2 Waste Streams

Closure activities are expected to generate hydrocarbon-impacted and sanitary waste. There is also a slight potential for hazardous, MW, and LLW to be generated. PPE that becomes contaminated during closure activities shall be disposed with the appropriate waste stream associated with the site.

2.3.2.1 Sanitary Waste

Liquid sanitary waste generated during closure activities shall be disposed in the NTS Area 23 Sewage Treatment Facility. Small volumes of liquid sanitary waste will be containerized in standard 208-L (55-gal) drums. Large volumes of liquid sanitary wastes requiring analysis for waste characterization purposes will be containerized in Baker Tanks or equivalent. After proper characterization, wastes will be transported to the NTS Area 23 Sewage Treatment Facility in a vacuum truck. Solid sanitary wastes (e.g., PPE, general trash) will be managed as construction debris and disposed in the NTS Area 23 Sanitary Landfill.

2.3.2.2 Low-Level Radioactive Waste

Sites impacted by radionuclides are to be closed in place. At these sites monitoring tubes that extend above the leachfield surface will be cut off flush with the surface. This scrap metal will be radiologically screened by an RCT and disposed of appropriately depending on the survey results; possibly as LLW. If LLW is generated during closure activities, it shall be managed and disposed according to all applicable regulations. Any waste determined to be radiologically impacted will be packaged in 208-L (55-gal) drums, staged in a Radioactive Materials Area pending proper characterization. Pending receipt of an approved Waste Management profile, the waste will be disposed in the Area 5 Radioactive Waste Management Site.

2.3.2.3 Hazardous Waste

It is not anticipated that any hazardous waste will be generated during site closure activities. A remote possibility exists that waste generated during closure of septic tanks at CAS 25-05-05 may be hazardous. For this reason, all waste removed from the septic tanks during closure activities at these CASs will be characterized by sampling and analytical analysis. Upon receipt of the analytical results, the waste will be properly classified and disposed. Any waste requiring determined to be hazardous, shall be transferred to the Area 5 Hazardous Waste Storage Pad. Upon identification of a disposal path, the waste will be disposed at an appropriate permitted off-site Treatment Storage and Disposal (TSD) facility.

2.3.2.4 Hydrocarbon Waste

Hydrocarbon waste shall be characterized by sampling and analytical analysis. Upon receipt of the analytical results, the waste will be properly classified and disposed. Any waste meeting the Land Disposal Restrictions (LDRs) as specified in the landfill permit will be disposed in the Area 6 Hydrocarbon Landfill. Hydrocarbon waste not meeting the LDRs will be stored in the WAA until a disposal path is identified. The waste will then be disposed in a appropriate off-site TSD facility.

2.3.2.5 Mixed Waste

No MW is anticipated to be generated at any CASs. In the event that any MW is generated

during closure activities, it shall be managed and disposed according to all applicable BN and NNSA/NV procedures and regulations.

2.3.2.6 Decontamination Fluids

All equipment and materials used at CASs that are radiologically impacted will be radiologically surveyed prior to release from the site. Any equipment that becomes contaminated during closure activities will be decontaminated on-site. For larger pieces of equipment that cannot be decontaminated over a 208-L (55-gal) drum, a decontamination pad will be constructed by lining a bermed area large enough to hold the heavy equipment. The equipment will be driven onto the pad and steam cleaned. Rinsate will be allowed to evaporate in place. Smaller equipment and/or tools will be decontaminated with a solution of Alconox™ and water over 208-L (55-gal) drums. Rinsate will be transferred to the bermed area and allowed to evaporate. Any excess rinsate will be placed in appropriate containers and characterized. Upon receipt of analytical results, the waste will be properly classified and disposed. If a decontamination pad is constructed, the plastic liner will be radiologically surveyed, if applicable, upon completion of closure activities. The liner will be disposed in the appropriate on-site disposal facility.

2.4 CONFIRMATION OF CORRECTIVE ACTIONS

Accurate and defensible analytical data will be collected to verify that closure activities meet the project-specific requirements as outlined in this CAP. Prior to backfilling, verification samples will be collected from rinsate water to verify that COCs have been removed from all CASs containing septic systems. All samples will be collected by trained BN Environmental Restoration (ER) personnel. Immediately after collection, samples will be placed on ice and cooled to 4 degrees Celsius (39 degrees Fahrenheit). All samples will then be logged onto the Chain of Custody and transferred to the BN Analytical Services Group under strict chain-of-custody procedures (BN, 2000a). Samples will be analyzed by an approved U.S. Environmental Protection Agency laboratory. Analytical results will be validated at the laboratory using stringent QA and QC procedures. All sample data will also be internally validated by BN personnel using Tier II validation procedures.

All sample data will be documented in a field logbook at the time of sample collection. The logbook will be bound with sequentially numbered pages. Entries into the logbook will include the following information:

- Names of sampling personnel
- Dates and times of samples collected
- Sample naming convention
- Sample location map including sample name, analysis, and permanent points of reference, if applicable
- Description of sample collected
- Sample container type, volume, preservatives (if applicable)
- Special conditions observed during sample collection (e.g., stained soil)

All field notes will be recorded in black, indelible ink. Any errors will be crossed out with a single line, initialed, and dated. All samples will be labeled with a unique sample identification

number. This sample number will contain the CAS number in addition to the sample number. For example, for CAS 25-05-06, verification sample number one would be labeled 250506-V1.

One set of QA/QC samples will be collected for every 20 normal environmental samples. QA/QC samples will include blind duplicates, matrix spike/matrix spike duplicates, rinse blanks, and one trip blank for each VOC shipment. The blind duplicates will be labeled with their own

unique sample number. Analytical results will be validated by qualified BN ER personnel using Tier II validation procedures.

2.5 PERMITS, PLANNING, AND SITE PREPARATION

Prior to beginning corrective action field activities, planning documents and permits will be prepared. These documents will include a Site-Specific Health and Safety Plan (SSHASP), Field Management Plan (FMP), National Environmental Policy Act (NEPA) Checklist, NNSA/NV Real Estate/Operations Permit (REOP), Radiological Work Permits (RWP), and utility clearance and excavation permits.

2.5.1 Site-Specific Health and Safety Plan

A SSHASP (including a Preliminary Hazard Analysis and Hazard Assessment) will be prepared and a copy will be maintained on-site by the BN ER Health and Safety Officer (HSO). The SSHASP will be reviewed and signed by all workers prior to beginning work. The HSO will also maintain a material safety data sheet file for all chemicals brought to the site. The SSHASP will provide a detailed, job-specific plan covering physical and environmental hazards, protection against accidents, and exposure of workers to contamination. It will also discuss weather and air monitoring, accident reporting, and emergency procedures. Additional copies of the SSHASP will be filed in the BN ER and Environment, Safety, and Health Division offices in Mercury, Nevada.

2.5.2 Field Management Plan

A FMP will be prepared for the closure activities. The FMP will outline how the work will be performed and will include an integrated safety management plan and a detailed schedule for the project. In addition, the FMP will identify responsible parties for each aspect of the project and will indicate how decisions are to be made. Copies of the FMP will be available at the site and will be filed in the BN ER office in Mercury, Nevada.

2.5.3 National Environmental Policy Act Checklist

A NEPA Checklist will be completed prior to and after all excavation activities at the site. Excavation activities will follow all applicable federal, state, and local laws; regulations; and permits regarding protection of the environment.

2.5.4 NNSA/NV Real Estate/Operations Permit

A REOP will be obtained prior to beginning closure activities. The permit will establish the NNSA/NV as the prime authority possessing control of the site and will accomplish the following:

- Establish a sole governing organization responsible for safety.
- Identify hazards and controls associated with field operations pertinent to the site.
- Identify the hazardous materials located at the site for emergency response purposes.
- Ensure that NNSA/NV will review and approve all work conducted in association with the site.
- Identify NNSA/NV's responsibility to plan and schedule activities.
- Provided a mechanism to recover applicable infrastructure support costs.

2.5.5 Radiological Work Permit

RWPs will be prepared and approved for the purpose of informing workers of the specific PPE necessary to protect them while performing their tasks. The workers will be required to read the permits and acknowledge their understanding of the requirements before entry into the exclusion zone (EZ). The RWPs will be maintained by the Radiological Control personnel at the entrance to the site. All site workers will be required to be Radiation Worker II trained in order to perform any work on-site.

2.5.6 Utility Clearances and Excavation Permits

A utility clearance will be performed and an excavation permit will be obtained prior to beginning any excavation activities. A copy of the permit will be filed on-site throughout the duration of the project.

2.5.7 Site Control

At radiologically-impacted sites, a hotline will be established whenever a RWP is required. This control shall serve to prevent the spread of radiological contamination outside of impacted areas. Only properly trained personnel wearing appropriate PPE will be allowed to enter the exclusion zone. All equipment and materials will be radiologically surveyed by Radiological Control personnel prior to removal from the EZ.

2.5.8 Personnel Training

All personnel responsible for packaging LLW or MW will be required to read and understand BN Organization Procedure OP-2151.304, "Radioactive Waste Tracking, Handling, and Management at the NTS" (BN, 2000c).

Closure of CAU 262 is considered an Occupational Safety and Health Administration (OSHA) hazardous waste job, and as such, the occupational safety and health requirements detailed in Title 29 Code of Federal Regulations (CFR) Part 1910.120 "Hazardous Waste Operations and Emergency Response" (CFR, 1999) will apply to all personnel supporting site closure activities.

That is, all personnel will be required to have a current 40-hour OSHA certification. All personnel will be required to read and understand the SSHASP prior to working at the site. A tailgate safety briefing will be conducted every day prior to beginning work, or as the scope of work or site conditions change. In addition, all personnel will Radiation Worker II training.

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3.0 SCHEDULE

The NNSA/NV requires that all field activities shall be completed in 2003. Mobilization will occur during the fall of 2002, September to November time frame. Field work will be done in the December 2002 to February 2003 time frame. The FFACO deadline for the CR is May 30, 2003. Sufficient flexibility has been incorporated into the field schedule to allow for minor difficulties (e.g., weather, equipment failure). The NNSA/NV shall notify the NDEP of any condition or event that may impact the project schedule.

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4.0 POST-CLOSURE MONITORING PLAN

Site closure at CASs 25-02-06, 25-05-03, 25-05-06, and 25-05-08 will include use restrictions to prohibit activities into the subsurface. Future use of any land related to these CASs will be restricted from any intrusive activity unless concurrence is obtained in advance and in writing from NNSA/NV and NDEP. Such intrusive activities would alter and/or modify the proposed containment controls. The purpose of post-closure monitoring is to ensure that these Use Restrictions will be maintained. Post-closure monitoring will also be required to determine if maintenance and repairs to the signs and site fencing will be required. Proposed post-closure monitoring will consist of an annual (i.e., yearly) visual inspections at CASs 25-05-03, 25-05-06, and 25-05-08. These inspections shall begin one year after approval of the CR. Monitoring will continue for three consecutive years. If after three years, monitoring indicates that no maintenance requirements are necessary, the NNSA/NV may propose to the NDEP a change in the post-closure monitoring frequency. All observations noted on inspections shall be documented on inspection forms and submitted to the NDEP as part of a yearly Post-Closure Monitoring report. Inspections shall ensure that signs are legible, all fencing is in good condition, and that the soil covers are in good condition (e.g., no subsidence, no significant erosion, no unauthorized excavation), and that Use Restrictions are being maintained. Inspections after major storm events are recommended to ensure that diversion channels/berms and covers are in good condition. Any maintenance requirements shall be performed within 90 days of being reported to the NNSA/NV and NDEP. Any repairs or maintenance performed at these CASs shall be documented in writing at the time of repair. Specific Use Restrictions and site post-closure monitoring requirements will be specified in the CR.

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5.0 REFERENCES

Bechtel Nevada, 2000a. Organization Instruction OI-2152.100, "Sampling Chain Of Custody," Rev. 0, Las Vegas, NV.

Bechtel Nevada, 2000b. Organization Instruction OI-2152.108, "Soil Sampling," Rev. 0, Las Vegas, NV.

Bechtel Nevada, 2000c. Organization Procedure OP-2151.304, "Radioactive Waste Tracking, Handling, and Management at the NTS," Rev. 2, Las Vegas, NV.

BN, see Bechtel Nevada.

CFR, see Code of Federal Regulations.

Code of Federal Regulations. 2001. Title 29 CFR Part 1910.120, "Hazardous Waste Operations and Emergency Response." Washington, D.C.: U.S. Government Printing Office.

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

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

FFACO, see Federal Facility Agreement and Consent Order.

NAC, see Nevada Administrative Code.

Nevada Administrative Code. 1999. NAC 444.818, Limitations and site requirements. Carson City, NV.

U.S. Department of Energy, Nevada Operations Office, 2000a. Corrective Action Investigation Plan for Corrective Action Unit 262: Area 25 Septic Systems and Underground Discharge Point, Nevada Test Site, Nevada, DOE/NV--629, Las Vegas, NV.

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

U.S. Department of Energy, Nevada Operations Office, 2001. Corrective Action Decision Document for Corrective Action Unit 262: Area 25 Septic Systems and Underground Discharge Point, Nevada Test Site, Nevada, DOE/NV--744-REV 1, Las Vegas, NV.

U.S. Environmental Protection Agency. 1996. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846 CD ROM PB97-501928GEI, which contains updates for 1986, 1992, 1994, and 1996. Washington D.C.

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APPENDIX A

ENGINEERING SPECIFICATIONS AND DRAWINGS

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NATIONAL NUCLEAR SECURITY ADMINISTRATION

NEVADA OPERATIONS OFFICE

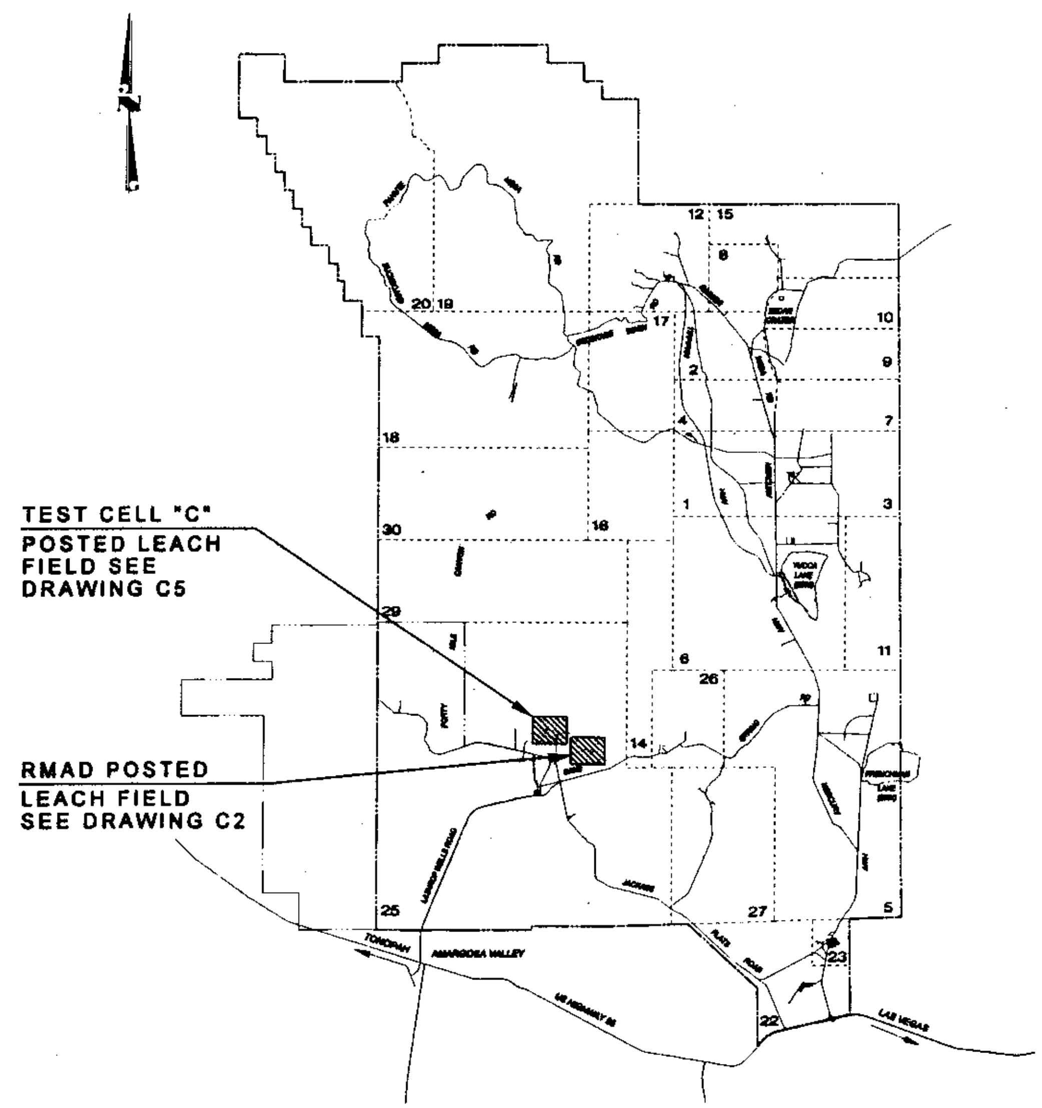
LAS VEGAS, NEVADA

CAU 262 REMEDIATION

AREA 25

DRAWING INDEX

DRAWING NUMBER		DRAWING TITLE
TITLE - COMMON		
02052-025-078-T1	REV 0	TITLE SHEET
02052-025-078-T2	REV 0	GENERAL NOTES, LEGEND & SYMBOLS
02052-025-078-T3	REV 0	ABBREVIATIONS
CIVIL - COMMON		
02052-025-078-C1	REV 0	FENCE & SIGN DETAILS
CIVIL - RMAD (CAS 25-05-03)		
02052-025-078-C2	REV 0	AREA 25 SITE AND DEMOLITION PLAN
02052-025-078-C3	REV 0	AREA 25 GRADING PLAN
02052-025-078-C4	REV 0	AREA 25 SECTIONS
CIVIL - TEST CELL "C" (CAS 25-05-08)		
02052-025-078-C5	REV 0	AREA 25 SITE AND DEMOLITION PLAN
02052-025-078-C6	REV 0	AREA 25 GRADING PLAN
02052-025-078-C7	REV 0	AREA 25 SECTIONS



NEVADA TEST SITE

NOT TO SCALE

SCOPE OF WORK

CONSTRUCT CLOSURE CAP AT RMAD POSTED LEACH FIELD AND TEST CELL "C" POSTED LEACH FIELD AFTER GROUTING DISTRIBUTION BOXES, MONITORING TUBES AND FILLING WITH SOIL EXPERIMENT BOXES. REMOVE AND DISPOSE OF EXISTING FENCING AND INSTALL NEW CHAIN LINK FENCING AND SIGNS AT BOTH SITES. RIPRAP AREAS FOR EROSION PROTECTION.

PROJECT NOTES

ALL CONSTRUCTION FEATURES, MATERIALS, TESTS AND DETAILS SHALL CONFORM TO "USDOE/NV STANDARD SPECIFICATIONS, DATED DECEMBER 1996". FOR STANDARDS REFERENCED ON THIS PROJECT, SEE THE NTS OVERHEAD POWER LINE STANDARDS.

CAUTION NOTE:

INFORMATION SHOWN ON THESE DRAWINGS MIGHT NOT REFLECT CURRENT CONDITIONS OF FACILITY OR SUBSTRUCTURE. PERSONNEL SHALL USE CAUTION WHEN PERFORMING WORK BASED ON THE EXISTING INFORMATION SHOWN ON THE DRAWINGS.

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NEVADA TEST SITE — AREA 25

CAU 262 REMEDIATION

TITLE SHEET

Bechtel Nevada

02052-025-078-T1

REV 0

STANDARD CIVIL SYMBOLS, LEGENDS AND NOTES

GENERAL NOTES

1. DO NOT SCALE DRAWINGS, NUMERICAL DIMENSIONS SHALL TAKE PRECEDENCE.
2. WHEREVER MATERIALS OR EQUIPMENT ITEMS ARE SPECIFIED BY BRAND NAME AND/OR MODEL NUMBER, ALTERNATE PRODUCTS, EQUAL IN QUALITY AND UTILITY TO THOSE SPECIFIED, MAY BE USED SUBJECT TO APPROVAL OF BN DESIGN ENGINEERING.
3. ALL OF THE CONSTRUCTION SHOWN ON THESE DRAWINGS IS NEW AND INCLUDED IN THE CONTRACT UNLESS SHOWN "EXST" OR "NIC".
4. ALL CONSTRUCTION INTERFERENCE SHALL BE REPORTED TO BN DESIGN ENGINEERING FOR RESOLUTION PRIOR TO PROCEEDING WITH THE WORK IN QUESTION.
5. LATEST EDITIONS OF REFERENCES CITED IN THESE NOTES SHALL APPLY.
6. DESERT TORTOISE SHALL BE PROTETED IN ACCORDANCE WITH EXISTING REGULATIONS AND COMPANY PROCEDURES.

CIVIL NOTES

1. BASIS FOR HORIZONTAL CONTROL: NORTH AMERICAN DATUM 1927, NEVADA STATE COORDINATE SYSTEM, CENTRAL ZONE. BASIS FOR VERTICAL CONTROL: NORTH AMERICAN VERTICAL DATUM 1929, NEVADA STATE COORDINATE SYSTEM, CENTRAL ZONE.
2. ALL EXISTING UNDERGROUND UTILITIES WITHIN THE CONSTRUCTION SITE SHALL BE LOCATED BY MEANS OF AN ELECTRONIC METAL DETECTING DEVICE AND MARKED.
3. ALL GRADE ELEVATIONS SHOWN ARE FINISH GRADES, UNLESS OTHERWISE NOTED. SUBGRADE ELEVATIONS MUST BE ESTABLISHED WHERE REQUIRED PRIOR TO FINAL GRADING.
4. ALL FILL SHALL BE COMPACTED GRANULAR MATERIAL, FREE OF TRASH, ORGANIC MATERIAL, OR ANY OTHER CONTAMINATION.
5. REMOVE LUMPED SUBGRADE SOIL AND ROCKS OVER 6 INCHES IN DIAMETER.
6. EXCAVATION SAFETY PROCEDURES SHALL BE IN ACCORDANCE WITH BN COMPANY DIRECTIVE CD-0444.021 REV 0 (EXCAVATION AND PENETRATION).
7. STOCKPILE EXCAVATED MATERIAL TO A HEIGHT NOT TO EXCEED 15 FEET.
8. TEMPORARY PERIMETER FENCING SHALL BE PLACED AROUND CONSTRUCTION SITE FOR SAFETY AND ACCESS CONTROL.
9. SUBMIT A FIELD SURVEY SHOWING DIMENSIONS, LOCATIONS, BEARINGS, AND ELEVATIONS FOR THE FINAL CONFIGURATION OF SITE AS SHOWN ON THE ENGINEERING DRAWINGS.
10. SURVEY DATA SHALL BE SUBMITTED TO ENGINEERING IN ASCII FILE FORMAT AND CONTAIN SUFFICIENT DATA POINTS TO CREATE DIGITAL TERRAIN MODELS (DTM) OF SITE TO FACILITATE AS-BUILDING OF THE PROJECT DRAWINGS.
11. ALL COVER FILL MATERIAL SHALL BE COMPACTED TO 95% OF MAXIMUM DENSITY (A MINIMUM INPLACE DENSITY OF 112 PCF), AS DETERMINED BY ASTM D1557. FILL MAY BE COMPACTED IN 12 INCH (MAXIMUM) LOOSE LIFTS. DENSITY TESTING WILL BE PERFORMED WITH THE PROBE END WITHIN 2 INCHES FROM THE BOTTOM OF THE LIFT. DENSITY TESTING WILL BE PERFORMED AT 4 RANDOM LOCATIONS PER LIFT.

DEMOLITION NOTES

1. WHERE DEMOLITION OCCURS, THE CONTRACTOR SHALL PROTECT EXISTING STRUCTURES, DOORS, ELECTRICAL SYSTEMS, AND MECHANICAL SYSTEMS FROM BEING DAMAGED. PROTECTION SHALL BE IN THE FORM OF DUST COVERS, BARRIERS, OR OTHER MEANS DEEMED APPROPRIATE.
2. ALL DEBRIS, NON-SALVAGEABLE MATERIALS, AND EXCESS SPOILAGE SHALL BE REMOVED FROM THE JOB SITE AND DISPOSED OF AT THE NEAREST APPROVED SANITARY LANDFILL. ALL SALVAGEABLE MATERIALS NOT REQUIRED FOR THIS PROJECT, AS DETERMINED BY THE USER, SHALL BE DELIVERED TO PROPERTY MANAGEMENT FOR THEIR DISPOSITION.
3. ANY WASTE MATERIAL DETERMINED BY THE ENVIRONMENTAL COMPLIANCE OFFICE OR THE INDUSTRIAL HYGIENE OFFICE TO BE HAZARDOUS SHALL BE DISPOSED OF IN ACCORDANCE WITH THEIR REQUIREMENTS.
4. ANY WASTE MATERIAL DETERMINED BY THE WASTE MANAGEMENT DEPARTMENT AND RADIOLOGICAL CONTROL ORGANIZATION TO BE RADIOLOGICALLY CONTAMINATED SHALL BE DISPOSED OF IN ACCORDANCE WITH THEIR REQUIREMENTS.
5. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS PRIOR TO DEMOLITION.
6. ALL DIMENSIONS SHOWN ARE FOR ESTIMATING PURPOSES AND AS A GUIDE TO SHOW THE EXTENTS OF DEMOLITION.
7. ALL WORK SHALL BE SCHEDULED TO PROCEED IN A MANNER AS TO CAUSE MINIMUM DISTURBANCE TO PERSONNEL AND EQUIPMENT IN AND AROUND THE SITE AND SHALL MAINTAIN SAFE WORKING CONDITIONS AT ALL TIMES.

LEGEND & SYMBOLS

SYMBOL	DESCRIPTION
N 710,000 E 700,000	NEVADA STATE COORDINATE SYSTEM
N01°30'30"E	CENTER LINE BEARING
(3535)	EXISTING CONTOUR
35	FINISH CONTOUR
(3934.00)	EXISTING SPOT ELEVATION
3935.00 FG	FINISH GRADE ELEVATION
5+00	CENTER LINE W/STATIONS
	AREA BOUNDARY LINE
	EXISTING DIRT ROAD
	EDGE OF EXISTING ASPHALT PAVING
	EDGE OF NEW ASPHALT PAVING
	EDGE EXISTING CONCRETE PAD
	EXISTING EARTH
	AGGREGATE BASE COURSE
	EXISTING FLOW LINE
	NEW FLOW LINE
1 OR A	DETAIL OR SECTION CUT TAKEN & DRAWN ON THE SAME SHEET
A / 62	SECTION IDENTIFICATION; SHEET NUMBER WHERE SECTION IS DRAWN
1 OR A DETAIL OR SECTION TITLE	DETAIL OR SECTION IDENTIFICATION; SHEET NUMBER WHERE DETAIL OR SECTION IS TAKEN: 1 / 62

SYMBOL	DESCRIPTION
	EXISTING AREA LIGHTING POLE
	EXISTING POWER POLE
	EXISTING PAVEMENT REMOVAL
	EXISTING BUILDING OR STRUCTURE
	EXISTING CULVERT
	NEW CULVERT
x	EXISTING FENCE
x	NEW FENCE
	EXISTING SURVEY MONUMENT
CUG	EXISTING COMMUNICATIONS UNDERGROUND
POH	EXISTING POWER OVERHEAD
PUG	EXISTING POWER UNDERGROUND
8" W	EXISTING WATER LINE W/SIZE
4" S	EXISTING SEWER LINE W/SIZE
	EXISTING VALVE
	EXISTING HYDRANT
	EXISTING POST INDICATOR VALVE
	TEMPORARY TRAFFIC CONTROL SIGN OR PERMANENT ROAD SIGN
	DELTA (CENTRAL ANGLE)
	BARRICADE
	NEW GUARD RAIL
	TRAFFIC CHANNELIZATION DEVICE
1 REF	ITEM CALLOUT

REFERENCES

TITLE SHEET	02052-026-078-T1

ISSUED FOR CONSTRUCTION 6/17/02

NEVADA TEST SITE
AREA 25
CAU 262 REMEDIATION

GENERAL NOTES, LEGEND & SYMBOLS

Bechtel Nevada

02052-025-078-T2

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ABBREVIATIONS

GENERAL

ABBREVIATION	ABBR
ABOVE FINISH FLOOR	AFF
ABOVE FINISH GRADE	AFG
ADMINISTRATION	ADMIN
AGGREGATE	AGGR
AIR CONDITIONING	A/C
ALTERNATE	ALT
ALUMINUM	AL
AMERICAN NATIONAL STANDARDS INSTITUTE	ANSI
AMERICAN SOCIETY FOR TESTING AND MATERIALS	ASTM
AMERICAN SOCIETY OF SANITARY ENGINEERS	ASSE
AMERICAN WATER WORKS ASSOCIATION	AWWA
ANCHOR BOLT	AB
AND	&
APPROVED	APVD
APPROXIMATE	APPROX
ARCHITECT/ENGINEER	A/E
ASBESTOS CEMENT PIPE	ACP
ASPHALT	ASPH
ASPHALT CEMENT	AC
AT	@
AUTOMATIC	AUTO
AUXILIARY	AUX
AVERAGE	AVG
BEAM	BM
BECHTEL NEVADA	BN
BELOW FINISH GRADE	BFG
BITUMINOUS	BITMUM
BLOCK	BLK
BLOCKING	BLKG
BOREHOLE	BH
BOTTOM	BOT
BRACING	BRCG
BRACKET	BRKT
BUILDING	BLDG
BURIED CABLE	BC
CAST IRON	CI
CATALOG	CAT
CAULKING	CLKG
CEILING	CLG
CEMENT	CEM
CENTER	CTR
CENTER LINE	℄
CENTER TO CENTER	C TO C
CIRCULAR	CIRC
CLEAR	CLR
CODE OF FEDERAL REGULATORS	CFR
COLUMN	COL
COMBINATION	COMB
COMMUNICATIONS	COMM/C
COMPARTMENT	COMPT
CONCRETE	CONC
CONCRETE MASONRY UNITS	CMU
CONNECTION	CONN
CONSTRUCTION	CONSTR
CONSTRUCTION JOINT	CJ
CONSTRUCTION SPECIFICATION	CON SPEC
CONTINUATION/CONTINUOUS	CONT
CONTROL JOINT	CLJ
COPPER	CU
CORNER	COR
CORPORATION	CORP
COUNTERSUNK	CTSK
COUNCIL OF AMERICAN BUILDING OFFICIALS	CABO
CUBIC FOOT	CFT
CUBIC METER	CM
CUBIC YARD	CY
DATED	DTD
DETAIL	DET
DEGREE	DEG
DEPARTMENT OF ENERGY	DOE
DIAGONAL	DIAG
DIAMETER	DIA
DIMENSION	DIM
DOUBLE	DBL
DOWN	DN
DRAWING	DWG
DUCTILE IRON	DI
EACH	EA
EAST	E
ELECTRIC/ELECTRICAL	ELEC
ELECTRIC HEATER	EH
ELECTRIC WATER COOLER	EWC
ELECTRIC WATER HEATER	EWH
ELECTRIC UNIT HEATER	EUH
ELEVATION	EL
EMERGENCY	EMER
ENCLOSURE	ENCL
ENGINEER	ENGR
ENTRANCE	ENTR
EQUAL	EQL
EQUIPMENT	EQPT
EXHAUST	EXH
EXISTING	EXST
EXPANSION	EXP
EXPANSION JOINT	EXP JT
EXPOSED	EXP
EXTERIOR	EXT
FACILITY	FACIL
FACTORY MUTUAL	FM
FEET	FT
FIBER OPTICS	FO
FIELD	FLD
FINISH	FNSH
FINISH FLOOR	FF
FINISH GRADE	FG
FIRE	F
FIRE ALARM CONTROL PANEL	FACP
FIRE HYDRANT	FHY
FIRE PROTECTION	FP
FIRST	1ST
FITTING	FTG
FIXTURE	FXTR
FLANGED	FLG
FLOOR	FL
FOOT	FT
FOOTING	FTG
FOUNDATION	FDN
FUTURE	FUT
GAGE OR GAUGE	GA
GALLONS/HOUR	GPH
GALLONS/MINUTE	GPM
GALVANIZED	GALV
GALVANIZED IRON	GALVI
GATE VALVE	GTV
GENERAL	GENL
GOVERNMENT	GOVT
GOVERNMENT FURNISHED EQUIPMENT	GFE
GRADE	GR
GRATING	GRTG
HAND RAIL	HNDRL
HAZARDOUS WASTE	HAZ W
HEATING, VENTILATING AND AIR CONDITIONING	HVAC
HEIGHT	HGT
HIGH POINT	HPT
HORIZONTAL	HORIZ
HORSEPOWER	HP
HOUR	HR
INCH	IN
INSIDE DIAMETER	ID
INSULATION	INSUL
INVERT	INV
JOINT	JT
LAVATORY	LAV
LEFT	LT
LENGTH	LG
LIGHTING	LTG
LINEAR FOOT	LF
LINEAR METER	LM
LIQUEFIED PETROLEUM GAS	LPG
LONG	LG
LOW POINT	LP
MACHINE	MACH
MAGNETIC	MAG
MAINTENANCE	MAINT
MANHOLE	MH
MANUFACTURER	MFR
MANUFACTURING	MFG
MATERIAL	MATL
MAXIMUM	MAX
MECHANICAL	MECH
MEMBRANE	MEMB
METAL	MET
METER/METRIC	M
METRIC TON	MTON
MEZZANINE	MEZZ
MILE	MI
MILIMETER	MM
MILLION GALLONS PER DAY	MGD
MINIMUM	MIN
MISCELLANEOUS	MISC
MOUNT(ING) (ED)	MT(G)(D)
NATIONAL FIRE PROTECTION ASSOCIATION	NFPA
NATIONAL PIPE THREAD	NPT
NEVADA	NV
NEVADA TEST SITE	NTS
NON RISING STEM	NRS
NOMINAL	NOM
NORMAL	NORM
NORTH	N
NOT IN CONTRACT	NICS
NOT TO SCALE	NTS
NUMBER	NO #
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION	OSHA
ON CENTER	OC
OPENING	OPNG
OPPOSITE	OPP
OUTSIDE DIAMETER	OD
OUTSIDE STEM & YOKE	OS & Y
OVERHEAD	OVHD
PAIR	PR
PAVEMENT	PVMT
PLATE	PL
POINT	PT
POLE	P
POLYVINYL CHLORIDE	PVC
POUNDS	LBS
POUNDS/SQUARE FOOT	PSF
POUND/SQUARE INCH	PSI
POWER	P
POWER POLE	PP
POWER OVERHEAD	POH
POWER UNDERGROUND	PUG
PREFABRICATED	PREFAB
PRESSURE	PRESS
PROJECT ENGINEER	PE
QUANTITY	QTY
RADIUS	RAD/R
REFERENCE	REF
REINFORCED CONCRETE BOX	RCB
REINFORCING	REINF
REQUIRED	REQD
REVISIONS/REVERSE	REV
RIGHT	R
RIGID STEEL	RS
ROAD	RD
ROOF	RF
ROOF DRAIN	RD
ROOF DRAIN OVERFLOW	RDOF
ROOM	RM
ROUGH	RGH
ROUGH OPENING	RO
ROUND	RND
SANITARY SEWER	SS
SCHEDULE	SCHED
SECOND	2ND SEC
SECTION	SECT
SHEET METAL	SH MET
SIMILAR	SIM
SOUTH/SEWER	S
SPACE	SPA
SPARE	SPR
SPECIFICATION	SPEC
SPIGOT	SP
SQUARE	SQ Ø
STANDARD	STD
STATION	STA
STEAM	ST
STEEL	STL
SUBGRADE	SG
SUBSTATION	SUBSTA
SYMMETRICAL	SYMM
TANGENT/TELEPHONE	T
THICK	THK
TEMPORARY	TEMP
TOP OF CONCRETE	TOC
TYPICAL	(TYP)
UNDERGROUND	UGND
UNDERWRITERS LABORATORIES	UL
UNFINISHED	UNFIN
UNIFORM BUILDING CODE	UBC
UNIFORM PLUMBING CODE	UPC
UNITED STATES	US
UNLESS OTHERWISE NOTED	UON
UNLESS OTHERWISE SPECIFIED	UOS
URINAL	UR
VACUUM	VAC
VENTILATOR	VENT
VERTICAL	VERT
VITRIFIED CLAY PIPE	VCP
VOLUME	VOL
WATER CLOSET	WC
WATERPROOF	WTRPRF
WEATHERPROOF	WP
WEIGHT	WT
WEST/WATER/WASTE	W
WIDTH	WD
WITH	W/
WITHOUT	W/O
YARD	YD

CIVIL

AGGREGATE	AGGR
AMERICAN SOCIETY OF CIVIL ENGINEERS	ASCE
ARC LENGTH	L
BEGIN CURVE	BC
BEGIN VERTICAL CURVE	BVC
BOTTOM OF SLOPE	BOS
CONTROL POINT	CONT PT
CORRUGATED METAL PIPE	CMP
CORRUGATED METAL PIPE ARCH	CMPA
END CURVE	EC
END VERTICAL CURVE	EVC
HIGH POINT	HI PT
HIGHWAY	HWY
LINEAR FEET	LF
LINEAR METERS	LM
STATE OF NEVADA DEPARTMENT OF TRANSPORTATION	NDOT
NORTHEAST	NE
NORTHWEST	NW
POINT OF CURVE	PC
POINT OF INTERSECTION	PI
POINT OF TANGENCY	PT
POINT OF VERTICAL CURVE	PVC
POINT OF VERTICAL INTERSECTION	PVI
POINT OF VERTICAL REVERSE CURVE	PVRC
POINT OF VERTICAL TANGENCY	PVT
SOUTHEAST	SE
SLOPE	S
SHOULDER	SHLDR
SOUTHWEST	SW
TOP OF MANHOLE	TMH
VERTICAL CURVE	VC

REFERENCES

TITLE SHEET 02052-025-078-T1

NEVADA TEST SITE — AREA 25

CAU 262 REMEDIATION

ABBREVIATIONS

Bechtel Nevada

02052-025-078-T3 REV 0

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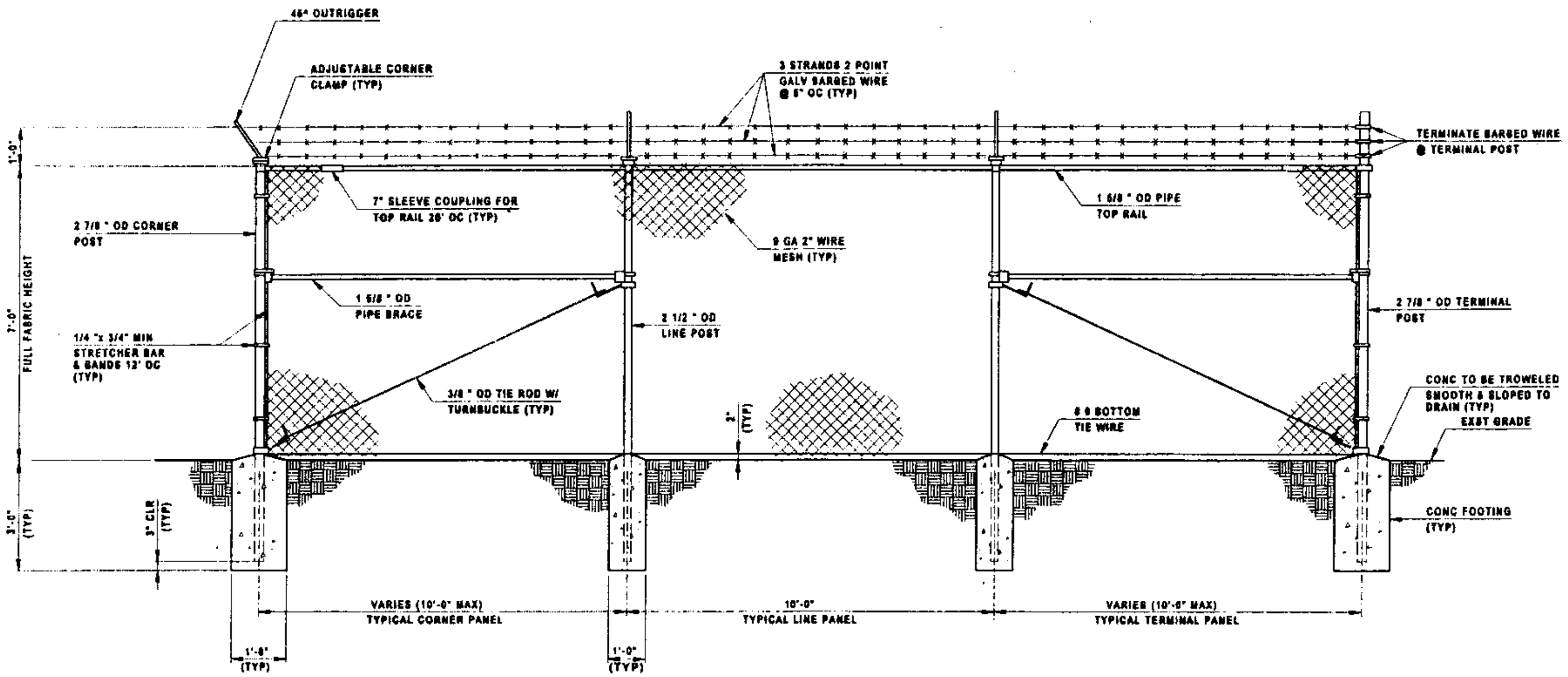
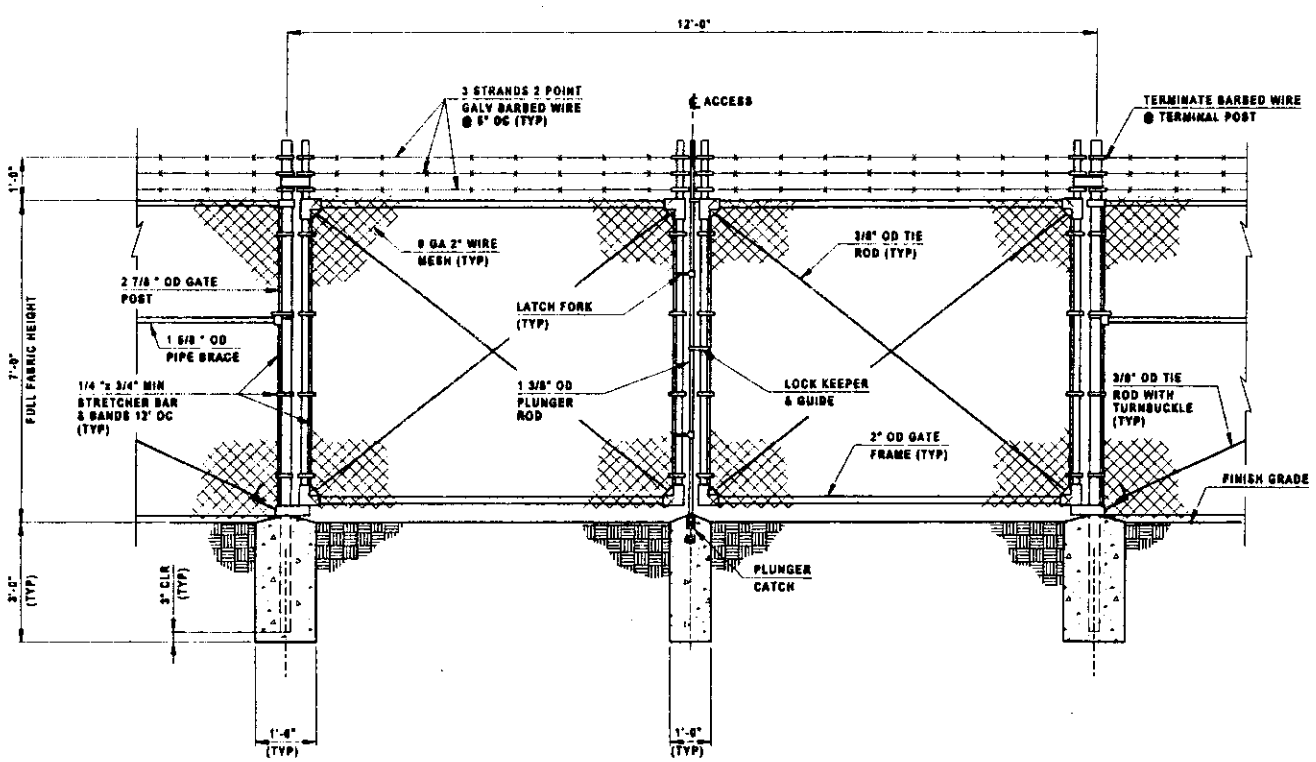


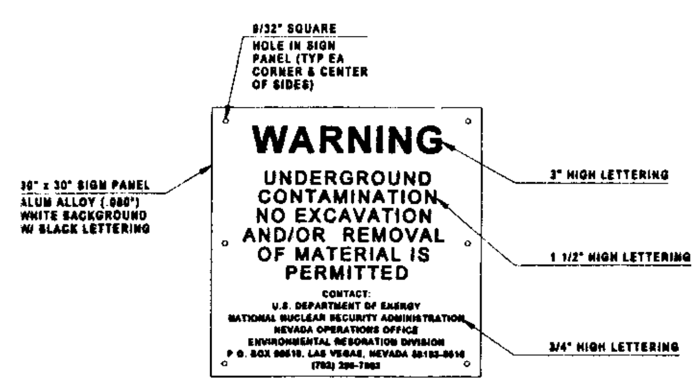
TYPICAL FENCE DETAIL (1) C3, C6

NOT TO SCALE



TYPICAL GATE DETAIL (2) C3, C6

NOT TO SCALE



TYPICAL SIGN DETAIL (3) C3, C6

NOT TO SCALE

FENCING NOTES

1. CONCRETE SHALL DEVELOPE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI IN 28 DAYS AND SHALL CONFORM TO LATEST ACI CODE.
2. FENCE SHALL EXTEND WITHIN 2 INCHES OF FIRM GROUND.
3. ALL FENCE POSTS SHALL BE SET IN CONCRETE. ALL POSTS, BRACING, AND OTHER STRUCTURAL MEMBERS SHALL BE LOCATED INSIDE THE ENCLOSED AREA.
4. 9 GAGE ALUMINUM OR 11 GAGE GALVANIZED STEEL TIE WIRES 12 INCHES OC AT POSTS AND 24 INCHES OC AT TOP RAIL AND BOTTOM TENSION WIRE.
5. FENCE MATERIALS.
   a. STEEL ITEMS, INCLUDING POSTS, TOP RAILS AND BRACE RAILS SHALL BE HOT-DIP GALVANIZED, SCHEDULE 40 PIPE. ALL STRETCHER BARS AND BANDS SHALL BE HOT-DIP GALVANIZED.
   b. IRON ITEMS, INCLUDING POST TOPS AND FITTINGS SHALL BE WROUGHT OR MALLEABLE IRON, HOT-DIP GALVANIZED.
   c. CHAIN LINK FABRIC SHALL BE 9 GAGE IN 2" MESH HOT-DIP GALVANIZED.
   d. BARBED WIRE SHALL CONSIST OF 3 STRANDS OF GALVANIZED TWISTED 12 1/2 GAGE CARBON STEEL. BARBS SHALL BE 14 GAGE GALVANIZED 2 POINT PATTERN ON APPROXIMATE 6" CENTERS
6. FENCE GROUNDING.

   USER SHALL DETERMINE IF GROUNDING OF NEW CHAIN LINK FENCING IS REQUIRED.
7. SIGN PANELS

   SIGN PANELS SHALL BE ATTACHED TO FENCE FABRIC USING HOG RINGS.

REFERENCES

TITLE SHEET	02052-025-078-T1

0 ISSUED FOR CONSTRUCTION 6/17/02

NEVADA TEST SITE — AREA 25

CAU 262 REMEDIATION

FENCE & SIGN DETAILS

Bechtel Nevada

DRAWING NUMBER 02052-025-078-C1

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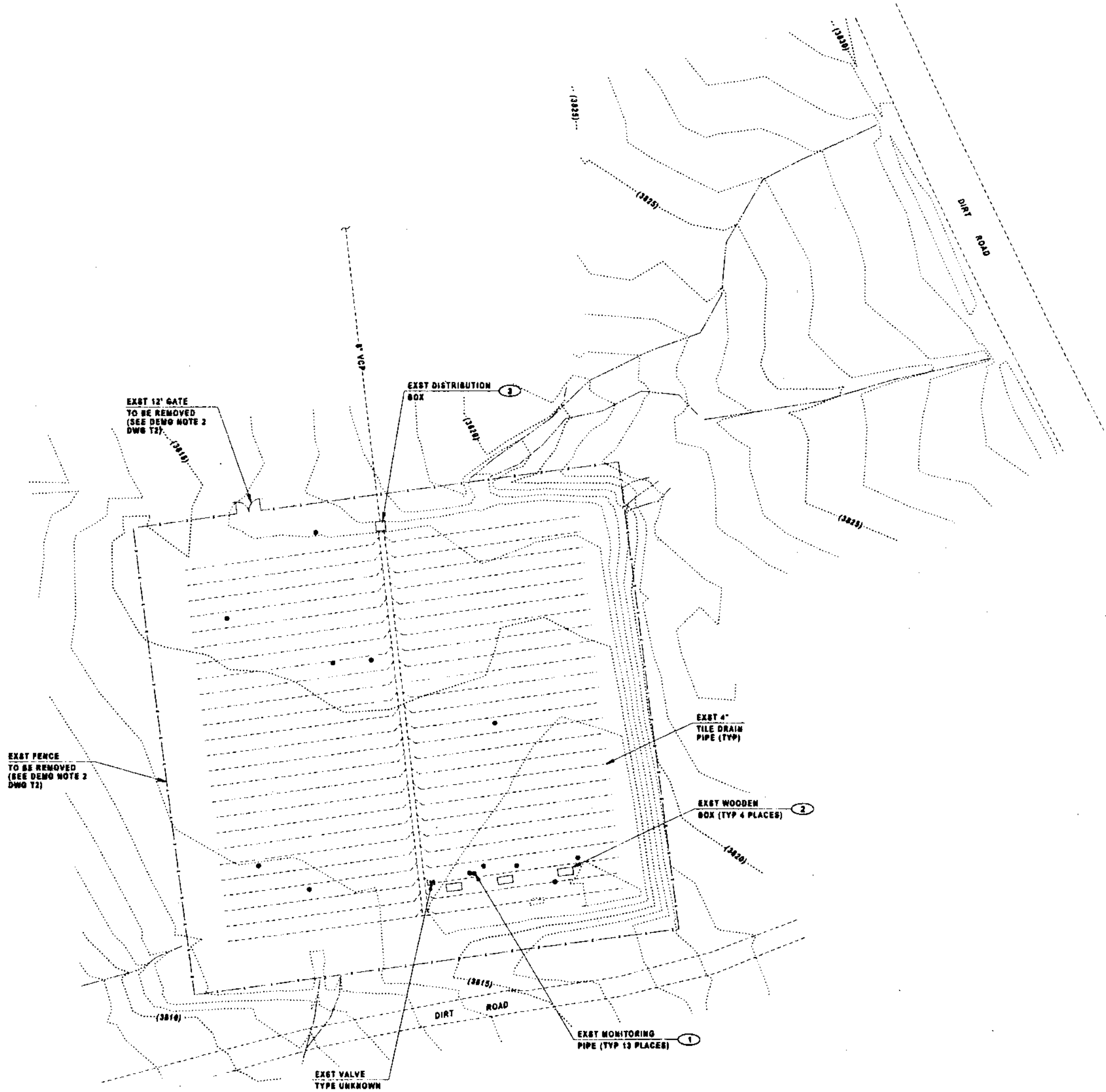
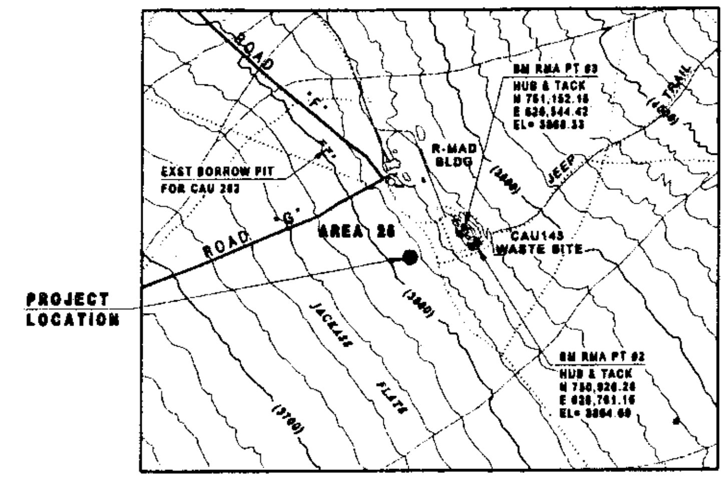


SITE AND DEMOLITION PLAN

SCALE: 1" = 30'



KEY MAP

SCALE : NTS

KEY NOTES

(1) CLEAN-CUT EXISTING STEEL NEUTRON MONITORING PIPE STUB-UP AS FOLLOWS:

(A) CUT STEEL PIPE OFF FLUSH WITH EXISTING GROUND.
(B) FILL STEEL PIPE WITH GROUT MIX DESIGN SHOWN BELOW.

HLGC (CC-A) R-1

MATERIALS	LBS/CU FT
CHEM COMP	12.00
PC, TYPE II	8.80
W-60	2.40
FLY ASH	14.78
CONC SAND A-1	81.11
PSP	0.15
RETARDER	0.77 FL OZ
WATER	22.40

NOTE: 3000 PSI AT 14 DAYS
180°F MAXIMUM
SUMP = 11 + AT 2 HRS
DENSITY = 130.8 PCF
INITIAL SET 7 HRS
FINAL SET 9 HRS

(C) THE GROUT SHALL BE PLACED INTO THE PIPE UNTIL IT OVERFLOWS INTO THE FOOTER AND FILLED TO GRADE. NO SPECIAL FINISH IS REQUIRED. LEVEL AND LET CURE.

(2) EXISTING BURIED WOODEN BOXES (TO BE FILLED W/COMPACTED SUITABLE NATIVE MATERIAL, IN PLACE, BY BN CONSTRUCTION).

(3) EXISTING DISTRIBUTION BOX TO BE GROUTED IN PLACE BY BN CONSTRUCTION W/HLGC (CC-A) R-1.

REFERENCES

02052-025-078-T1	TITLE SHEET
02052-025-078-C2	GRADING PLAN

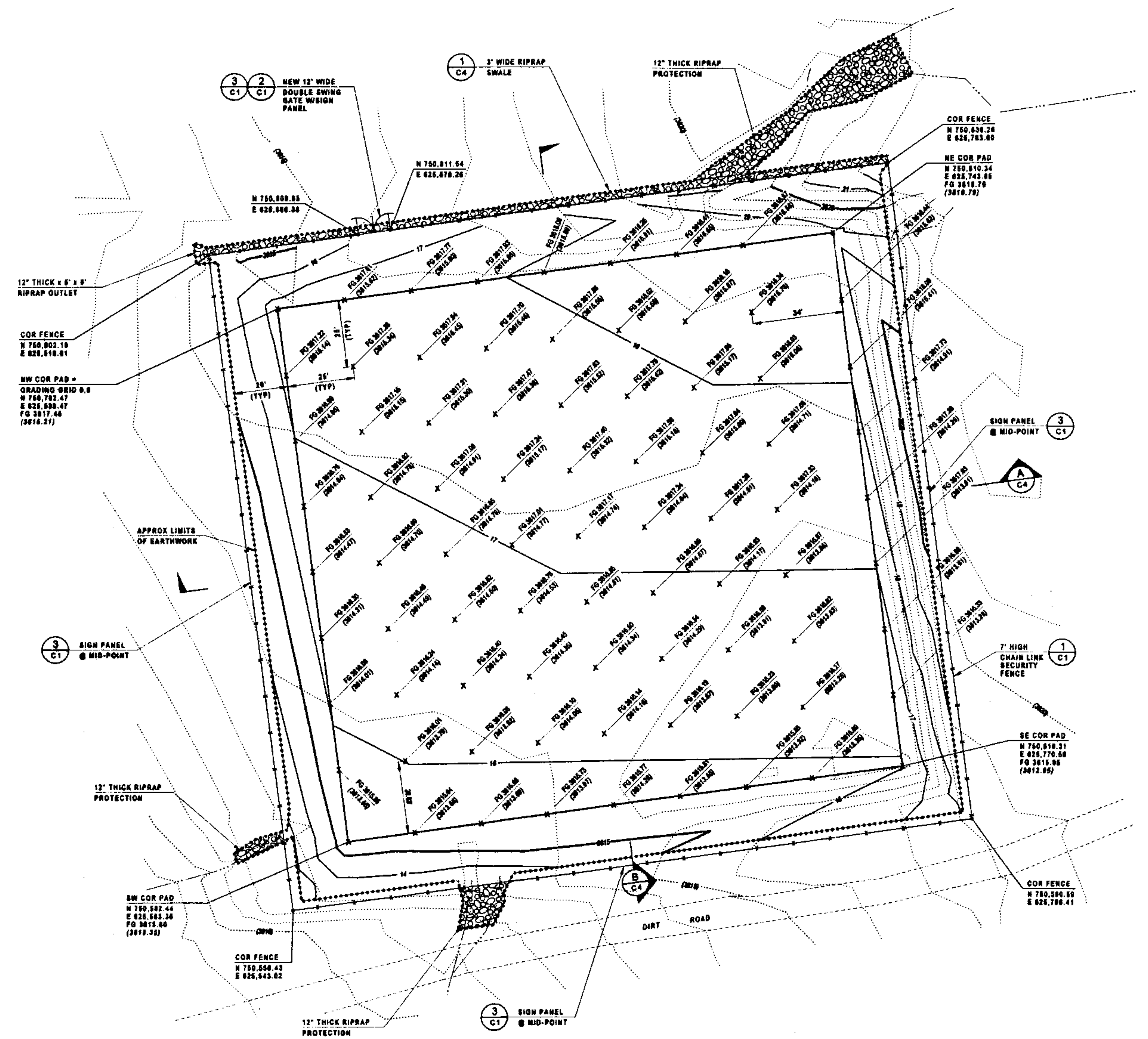
GRAPHIC SCALE
0 30 60 90 FEET
1" = 30'
(CONTOUR INTERVAL = 1 FT)

0 ISSUED FOR CONSTRUCTION 6/17/02

NEVADA TEST SITE — AREA 25
CAU 262 REMEDIATION
RMAD LEACH FIELD
CAS 25-05-03
SITE AND DEMOLITION PLAN

NNSA National Nuclear Security Administration, Nevada Operations Office
Bechtel Nevada
P.O. BOX 98521 LAS VEGAS, NV 89193-8521

02052-025-078-C2 REV 0



GRADING PLAN

SCALE : 1" = 20'

RIPRAP ROCK GRADATION		
% PASSING BY WEIGHT	SIZE	
	IN	MM
100	12	305
25-50	6	152
0-15	2	51

* ROUNDED TO THE NEAREST INCH
* WEIGHT OF SPHERICAL STONE = 110 LB/CU FT (LOOSE MATERIAL)
* WEIGHT OF FINE AGGREGATE CUSHION (0.187 INCH PARTICLE SIZE) = 90 LB/CU FT (LOOSE MATERIAL)

NOTES

1. GEOTEXTILE FILTER FABRIC SHALL BE PLACED BEFORE RIP-RAP. GEOTEXTILE SHALL BE NONWOVEN NEEDLE PUNCHED WITH AN APPARENT OPENING SIZE (AOS) OF LESS THAN OR EQUAL TO 10mm.
2. A 6" LAYER OF FINE AGGREGATE PER CLARK COUNTY AREA NEVADA UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS SECTION 706.03.03 SHALL BE PLACED ON TOP OF FILTER FABRIC TO ACT AS A CUSHION WHEN PLACING RIP-RAP.
3. CLASS 150 RIP-RAP SHALL BE HARD, DURABLE, ANGULAR IN SHAPE, FREE FROM CRACKS, HAVE A MINIMUM SPECIFIC GRAVITY OF 2.50, AND PLACED IN LAYERS FROM LARGEST TO SMALLEST DIAMETER ROCK FOR PROPER BEDDING PER NDOT SPECIFICATION 706.03.06.

ESTIMATED QUANTITIES		
DESCRIPTION	QTY	UNIT
NATIVE FILL MATERIAL	4580	CY
7' HIGH CHAIN LINK SECURITY FENCE	896	LF
12' WIDE CHAIN LINK GATE	1	EA
CLASS 150 RIPRAP	76	CY
SIGN PANEL	4	EA
FINE AGGREGATE CUSHION	38	CY

NOTES

1. NO CUT AND FILL FACTORS ARE APPLIED TO PROVIDED QUANTITIES.
2. QUANTITIES PROVIDED ARE FOR BECHTEL NEVADA ESTIMATING PURPOSES ONLY. ITEMS LISTED ARE NOT ALL INCLUSIVE.

REFERENCES

TITLE SHEET 02052-025-078-T1

NEVADA TEST SITE — AREA 25

CAU 262 REMEDIATION
RMAD LEACH FIELD
CAS 25-05-03
GRADING PLAN

0 ISSUED FOR CONSTRUCTION 6/17/02

NNSA — Bechtel Nevada

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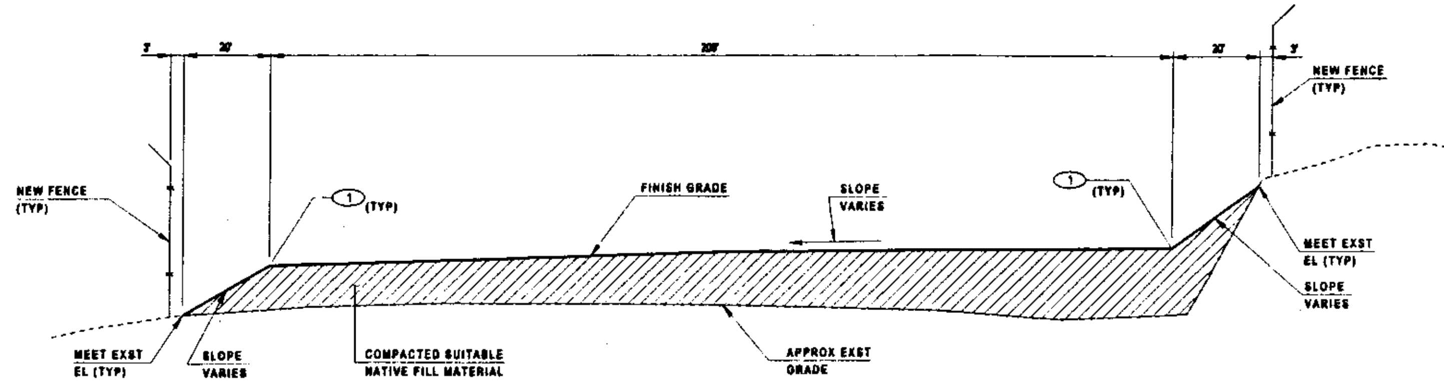
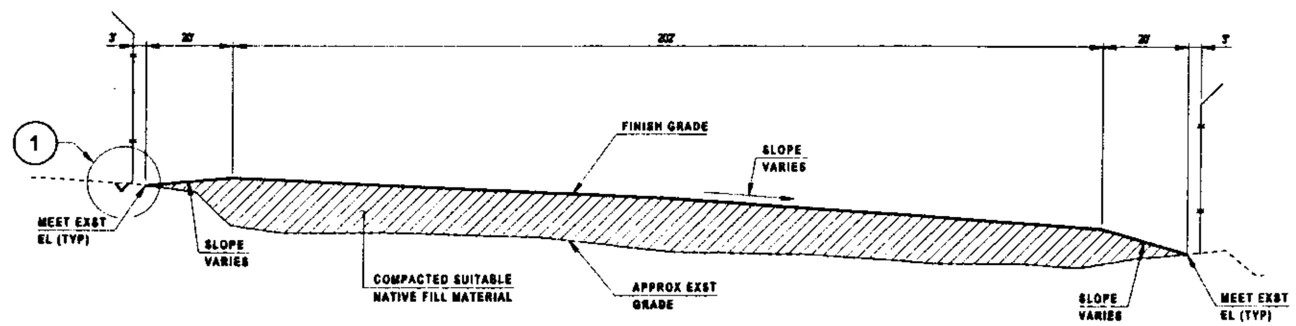


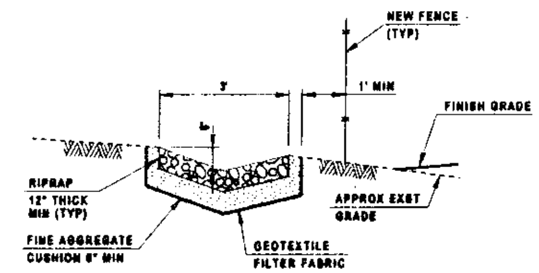
SECTION (A) C3
SCALE : HORIZ 1" = 20', VERT 1" = 4'



SECTION (B) C3
SCALE : HORZ 1" = 20', VERT 1" = 4'

KEY NOTES

1. SEE GRADING GRID FOR FINISH GRADE ELEVATIONS, DWG C3.



DETAIL (1) C3
SCALE : NOT TO SCALE

REFERENCES

TITLE SHEET 02052-025-078-T1

GRAPHIC SCALE
0 2 4 8 12 FEET
1" = 4'

GRAPHIC SCALE
0 10 20 40 60 FEET
1" = 20'

ISSUED FOR CONSTRUCTION 6/17/02

NEVADA TEST SITE — AREA 25
CAU 262 REMEDIATION
RMAD LEACH FIELD
CAS 25-05-03
SECTIONS

National Nuclear Security Administration, Nevada Operations Office
Bechtel Nevada
P.O. BOX 98521 LAS VEGAS, NV 89193-8521

DRAWING NUMBER 02052-025-078-C4
REV 0

02052.A35 N/A 9504AC31
6/13/02

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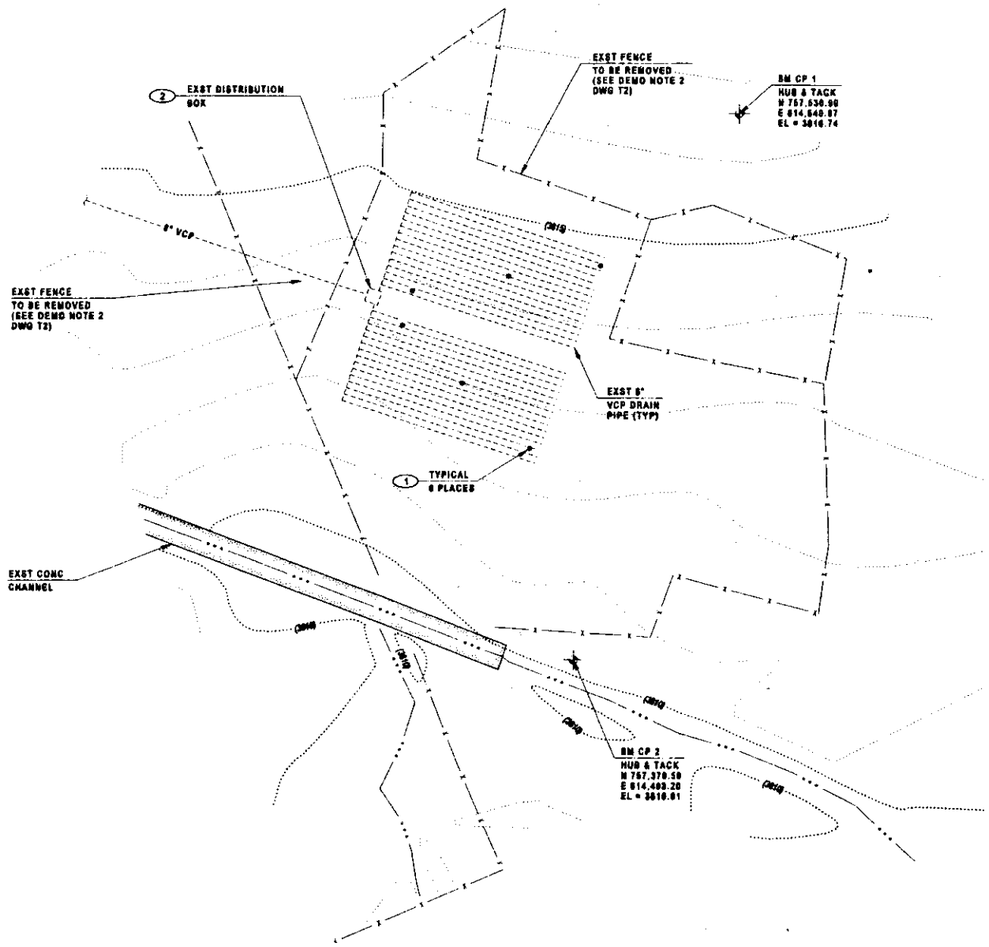
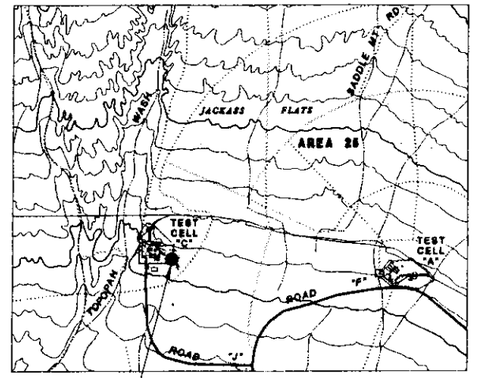


SITE AND DEMOLITION PLAN

SCALE : 1" = 30'



KEY MAP

SCALE : NTS

KEY NOTES

1. CLEAN-CUT EXISTING STEEL NEUTRON MONITORING PIPE STUB-UP AS FOLLOWS:

   (A) CUT STEEL PIPE OFF FLUSH WITH EXISTING GROUND.
   (B) FILL STEEL PIPE WITH GROUT MIX DESIGN SHOWN BELOW.

HLGC (CC-A) R-1

MATERIALS	LBS/CU FT
CHEM COMP	12.00
PC, TYPE II	8.60
W-80	2.48
FLY ASH	14.76
CONC SAND A-1	81.11
PSP	0.15
RETARDER	0.77 FL OZ
WATER	22.40

NOTE: 3000 PSI AT 14 DAYS
150°F MAXIMUM
SUMP = 11 + AT 2 HRS
DENSITY = 136.6 PCF
INITIAL SET 7 HRS
FINAL SET 9 HRS

(C) THE GROUT SHALL BE PLACED INTO THE PIPE UNTIL IT OVERFLOWS INTO THE FOOTER AND FILLED TO GRADE. NO SPECIAL FINISH IS REQUIRED. LEVEL AND LET CURE.

2. EXISTING DISTRIBUTION BOX TO BE 6ROUTED IN PLACE BY BN CONSTRUCTION WHILSC (CC-A) R-1.

REFERENCES

02052-025-078-T1	TITLE SHEET
02052-026-078-C6	GRADING PLAN

GRAPHIC SCALE
0 10 20 40 60 FEET
1" = 20'
(CONTOUR INTERVAL = 1 FT)

ISSUED FOR CONSTRUCTION 8/17/02

NEVADA TEST SITE
AREA 25
CAU 262 REMEDIATION
TEST CELL "C" LEACH FIELD
CAS 25-05-06
SITE AND DEMOLITION PLAN

Bechtel Nevada

02052-025-078-C5
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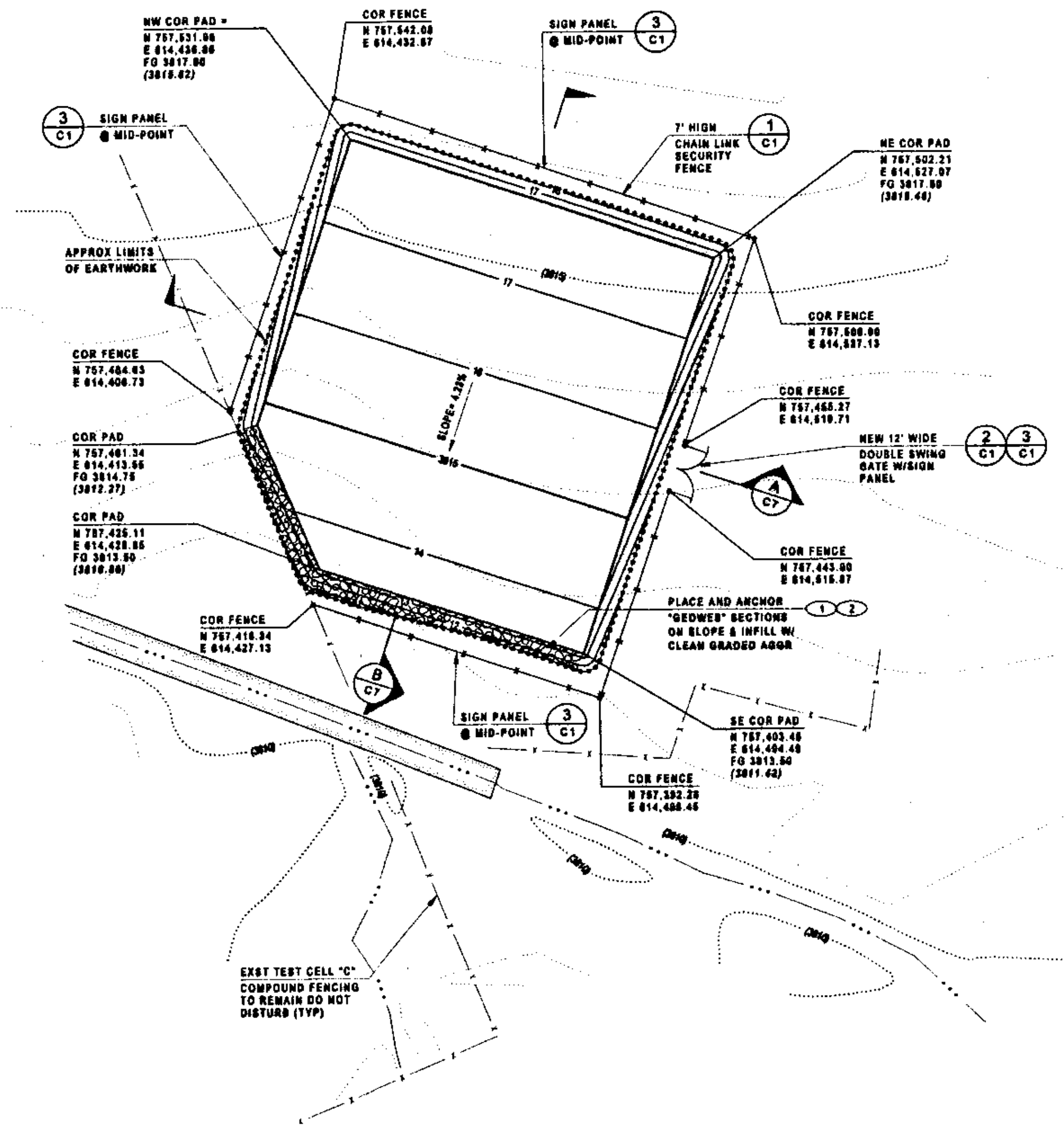


GRADING PLAN

SCALE : 1"= 20'

KEY NOTES

(1) "B" SERIES GEOWEB CELLULAR CONFINEMENT SYSTEM SHALL HAVE A CELL DEPTH OF 3" AND COME IN 20 FT x 5 FT SECTIONS AS SUPPLIED BY SOIL STABILIZATION PRODUCTS COMPANY INC. INSTALLATION SHALL BE PER MANUFACTURE'S SPECIFICATIONS AND RECOMMENDATIONS.

(2) INFILL MATERIAL SHALL BE A CLEAN GRADED AGGREGATE RANGING IN SIZE FROM 3/4 TO 2 1/2 INCHES. THE INFILL MATERIAL SHALL LEVEL WITH THE TOP OF CELLS

ESTIMATED QUANTITIES		
DESCRIPTION	QTY	UNIT
NATIVE FILL MATERIAL	635	CY
7' HIGH CHAIN LINK SECURITY FENCE	370	LF
12' WIDE CHAIN LINK GATE	1	EA
3/4" TO 2 1/2" AGGREGATE	5	CY
SIGN PANEL	4	EA
20' x 5' GEOWEB SECTION	6	EA

NOTES

1. NO CUT AND FILL FACTORS ARE APPLIED TO PROVIDED QUANTITIES.
2. QUANTITIES PROVIDED ARE FOR BECHTEL NEVADA ESTIMATING PURPOSES ONLY. ITEMS LISTED ARE NOT ALL INCLUSIVE.

REFERENCES

TITLE SHEET 02052-025-078-T1

GRAPHIC SCALE 0 10 20 40 80 FEET
1" = 20'
(CONTOUR INTERVAL = 1 FT)

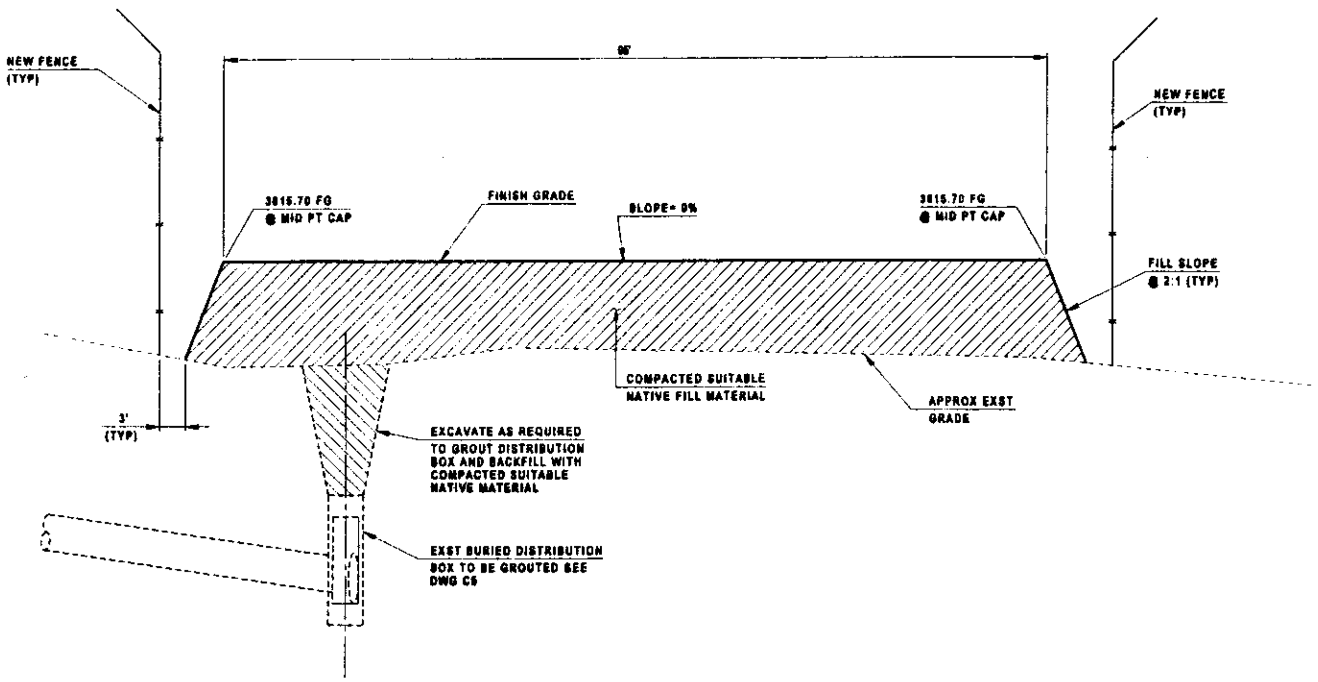
NEVADA TEST SITE — AREA 25
CAU 262 REMEDIATION
TEST CELL "C" LEACH FIELD
CAS 25-05-08
GRADING PLAN

Bechtel Nevada

0 ISSUED FOR CONSTRUCTION

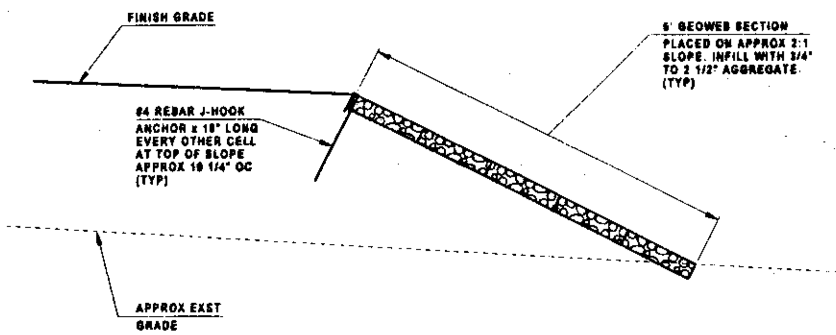
02052-025-078-C8

REV 0



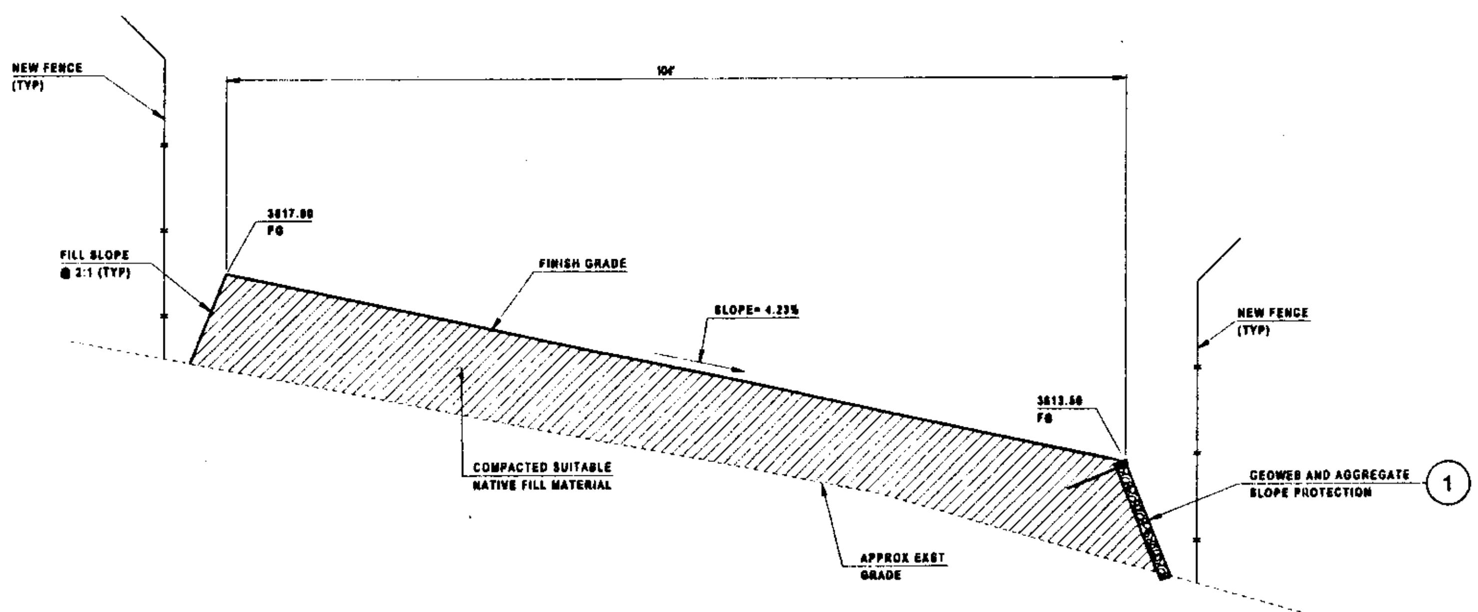
SECTION (A) C5

SCALE : HORIZ 1"= 10', VERT 1"= 2'



DETAIL (1)

NOT TO SCALE



SECTION (B) C5

SCALE : HORIZ 1"= 10', VERT 1"= 2'

REFERENCES

TITLE SHEET	02052-025-078-T1

GRAPHIC SCALE: 0 1 2 4 6 FEET — 1" = 2'

GRAPHIC SCALE: 0 10 20 30 FEET — 1" = 10'

0 — ISSUED FOR CONSTRUCTION 6/17/02

NEVADA TEST SITE — AREA 25

CAU 262 REMEDIATION

TEST CELL "C" LEACH FIELD

CAS 25-05-08

SECTIONS & DETAIL

NNSA National Nuclear Security Administration, Nevada Operations Office

Bechtel Nevada, P.O. Box 98521 Las Vegas, NV 89193-8521

Drawing number: 02052-025-078-C7 REV 0

Project: 02052.A25 — Activity code: 8B04AC31 — N/A

Dates: 6/13/02, 6/13/02, 6/13/02

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ANALYSIS / CALCULATION (A/C) COVER SHEET

Project Title: CAU 262 Remediation	Project/Tracking No.: 02052A25	Analysis/Calculation No.: CAL-C-301
Subject: Erosion and Rip-Rap Analysis		

Analysis / Calculation Status Designation: ☐ Preliminary ☒ Final ☐ Superseded

Computer Program / Title	Mainframe / PC	Program No.	Version / Release No.
Microsoft Excel	PC		1997
Flowmaster	PC		6.0
MathCadd	PC		8

Purpose:

The Purpose of this calculation is twofold. First, the erosion across the top and sides of two earthen covers will be evaluated to determine the depth of erosion over the institutional control period of 30 years due to wind and average annual precipitation. Next, upstream, natural channels, at the RMAD Leachfields, will be evaluated for rip-rap protection due to the 100 year, 6 hour storm event. The Test Cell C Leachfields are located on natural high topography and are not impacted by overland flow.

Conclusions:

The maximum calculated 30 year depth of erosion at the RMAD Leachfield is 8.8 inches. The calculated depth of soil for shielding is 12.8 inches. The total required depth of cover for the RMAD Leachfield is 21.6 inches. The minimum designed cover thickness is 24 inches. The cover as designed is adequate.

The maximum calculated 30 year depth of erosion at the Test Cell C Leachfield is 6.5 inches. The calculated depth of soil for shielding is 7.4 inches. The total required depth of cover for the Test Cell C Leachfield is 13.9 inches. The minimum designed cover thickness is 24 inches. The cover as designed is adequate.

The maximum calculated d_{50} size of rip-rap is 3.5 inches upstream of the RMAD Leachfield. The design d_{50} size of rip-rap is 6 inches. The designed rip-rap is adequate.

Record of Revisions

Revision No.	Reason for Revision	Date	Prepared	Checked	Approval
0	INITIAL ISSUE	6/18/02	Julie Ann Smith	V. K. Sahni	6/18/02

ANALYSIS / CALCULATION (A/C) SHEET

Project: CAU 262 Remediation	Analysis/Calculation No.: CAL-C-301	
Subject: Erosion and Rip-Rap Analysis		
Date 06/18/02	Prepared ~~VKF~~ JES	Checked VKS

Table of Contents

Section	Page Number
Purpose:	1
Conclusions:	1
Open Items:	3
References:	3
Assumptions:	3
Design Input:	3
Calculations:	4
Results:	6

ANALYSIS / CALCULATION (A/C) SHEET

Project: CAU 262 Remediation	Analysis/Calculation No.: CAL-C-301
Subject: Erosion and Rip-Rap Analysis	
Date 06/18/02	Prepared ~~VKF~~ JLS Checked VKS

Open Items:

There are no open items.

References:

1. U. S. Dept. of Agriculture, Guide for Predicting Soil Loss by Wind Erosion, February 1983.
2. U. S. Dept. of Commerce, NTIS Document PB 80-100381, Design and Construction of Covers for Solid Waste Landfills.
3. Clark County Regional Flood Control District (CCRFCD) *Hydrologic Criteria and Drainage Design Manual*, 1999 Edition.
4. Clark County Uniform Standard Specifications For Public Works' Construction Off-Site Improvements, June 1997.
5. French, Richard H. *Open Channel Hydraulics*.
6. R-Mad Leachfield Soil Test Results, BN MTL Report No. A480-CT-002-0008, dated April 23, 2002.
7. CAU 143 Contaminated Waste Dumps, Hydrologic/Hydraulic Analysis, A/C-00090-A25-C-189.
8. CAU 143 Contaminated Waste Dumps, Calculation, A/C-00090-A25-C-183.
9. CAU 143 Contaminated Waste Dumps, Calculation, A/C-00090-A25-C-184.
10. Soil Conservation Service, National Engineering Handbook, 1985 Edition.
11. Engineering Drawings, 02052-0250078-C3 and C6, dated 6/17/02.
12. State of Nevada Department of Transportation, Standard Specifications for Road and Bridge Construction, 1996 Edition.

Assumptions:

1) A roughness coefficient "n" value of 0.25 for no vegetation (new ditch). (Ref 5)
2) A roughness coefficient "n" value of 0.45 for rip-raped channels. (Ref 5)
3) A roughness coefficient "n" value of 0.40 for existing natural channels with vegetation (Ref 5).
4) Prevailing wind direction of SSW based on site experience.
5) Average channel geometry for upstream channels at RMAD Leachfield (pages 37-38).
6) Drainage basin delineation for RMAD Leachfield (page 37).
7) Period of institutional control for design is 30 years.
8) Rip-Rap internal angle of friction of 41 degrees (Ref 9).

Design Input:

1) Soil test results for borrow soils (Ref 6) (pages 38-40).
2) Run-off Coefficient "C" of .5 for undeveloped areas (Ref 3).
3) Local adjustment factor "K" of .5 (Ref 3).
4) Time, Intensity, Duration Curve (Ref 9) (page 24).
5) SCS Curve Number for alluvial deposits on the Nevada Test Site (Ref 7).
6) Travel Time and Time of Concentration Calculation Methods (Ref 10, Chap. 15).
7) Design storm for rip-rap sizing is the 100 year, 6 hour event.
8) Digital Terrain Model g:\dgn\02052\caddata\rmad\exstgr.dtm.
9) Digital Terrain Model g:\dgn\02052\caddata\rmad\fincap.dtm.

ANALYSIS / CALCULATION (A/C) SHEET

Project: CAU 262 Remediation	Analysis/Calculation No.: CAL-C-301	
Subject: Erosion and Rip-Rap Analysis		
Date 06/18/02	Prepared VKS	Checked VKS

Calculations:

Cover Erosion: (See Pages 7-18)

The Wind Erosion Equation (WEE) and Universal Soil Loss Equations (USLE) (Ref 1 and 2) were used to provide conservative estimates of expected depths of erosion from wind and water respectively. These equations are intended to estimate an average soil loss over an extended period.

The RMAD cover erosion is calculated for two separate conditions. The top with its shallow slope and the side slope area on the windward side with a much steeper slope. As the diagonal distance across the top of the cap is very close to the assumed wind direction of SSW, this dimension is used in the calculations (conservative). The northeast side of the cover slopes up to meet existing grade past the extents of the leachfield. Though this slope is subject to erosion, it has not been included in the calculations. Wind erosion is much greater than erosion due to precipitation over extended periods of time. Wind erosion is assumed to occur in the top third of the slope. Therefore, erosion of this slope would not occur over the leachfield, and would not impact the cover.

Water and wind erosion were combined for each condition and multiplied by their respective areas to determine the total erosion for each condition. Using 90% of maximum density from soil test results (Ref 6) (See page 40), the total depths of erosion over a 30-yr. period were determined for each condition. The larger value was added to the minimum depth required for shielding (radioactivity) to determine the minimum required cover depth.

Test Cell C cover erosion is calculated across the top of the cover only. The windward slope will be protected by a geoweb geosynthetic infilled with gravel. The slope is too steep to place rip-rap as it exceeds the internal angle of friction for rip-rap. Due to site constraints, this slope cannot be shallowed. The length across the cap was measured across the middle of the cap in the SSW direction.

By combining both water and wind erosion and multiplying by the cover area, a total erosion value was calculated. Using 90% of maximum density from soil test results (Ref 6) (See page 40), a total depth of erosion over a 30-yr. period was determined.

Rip-Rap Sizing: (See Pages 19-37)

As the Test Cell C Leachfield is located on a natural topographic high point, overland flow is not a concern. Therefore, no calculations for this facility were performed.

At the RMAD Leachfield, only upstream, natural channels were analyzed for rip-rap protection. Currently, there are 3 channels impacting the leachfield (see page 37) which discharge onto the existing leachfield. There is currently no rilling across the leachfield. The designed cover will shallow the slopes at the discharge points. This will further minimize the potential for future erosion across the cover.
Drainage basins for each natural channel were delineated using recent topographic survey information. The longest flow path was determined for each basin. Each basin was determined to consist of overland and channel flow. Reach lengths for each flow segment were measured. Beginning and end elevations for each flow segment were determined from topographic information. Basin areas were measured using CADD tools. See page 37, for the drainage basin information.

Overland and channel slopes were calculated (page 19).

Cross sections (pages 33-36) were computer generated at the approximate midpoint of each channel reach in order to compute the hydraulic properties (approximate) of each channel. This information along

ANALYSIS / CALCULATION (A/C) SHEET

Project: CAU 262 Remediation	Analysis/Calculation No.: CAL-C-301	
Subject: Erosion and Rip-Rap Analysis		
Date 06/18/02	Prepared ~~VKS~~ JAS	Checked VKS

with the calculated channel slopes was input into FlowMaster to calculate the velocity (pages 20-22) in the channels assuming bank full flow (Ref 10).

The initial (lag) time for overland flow was estimated (page 23) using the Soil Conservation Service (SCS) curve number method (Ref 10) where,

$T_i = (L^{0.8} (S+1)^{0.7})/((1900)(Y^{0.5})$ and

T_i = Overland Travel Time (Hours)
L = Reach Length (feet)
S = (1000/CN) – 10 Where CN is approximately equal to Hydrologic Soil Cover
Y = Average Watershed Land Slope (percent).

The travel time for channel flow was estimated (page 23) using the following formula (Ref 10).

$T_t = L/(3600)(V)$ where,

T_t = Travel Time (hours)
L = Reach Length (feet)
V = Flow Vellocity (feet per second).

The Time of Concentration for each basin was calculated (page 23) and is the sum of the respective initial and travel time for each basin.

The Time of Concentration was used along with the Time/Intensity/Duration curve to determine the rainfall intensity for use in the Modified Rational Formula (pages 24-25).

The Modified Rational Formula (Ref 3) was used to estimate the peak flow from each drainage basin (page 25).

Q = kcIA where,

Q = Max Rate of Runoff (cfs)
K = Local Adjustment Factor
C = Runoff Coefficient
I = Average Intensity (in/hr)
A = Basin Area (acres)

Previous FlowMaster calculations were modified to calculate the actual flow depth and velocity in each channel using the calculated peak basin flows (pages 26-31).

Velocities due to the peak flows for each channel were used to determine the minimum size of rip-rap required to prevent scour using the Tractive Stress Method (Ref 3). See page 32 for calculations.

ANALYSIS / CALCULATION (A/C) SHEET

Project: CAU 262 Remediation	Analysis/Calculation No.: CAL-C-301	
Subject: Erosion and Rip-Rap Analysis		
Date 06/18/02	Prepared ~~VKS~~ JLS	Checked

Results:

The maximum calculated 30 year depth of erosion at the RMAD Leachfield is 8.8 inches. The calculated depth of soil for shielding is 12.8 inches. The total required depth of cover for the RMAD Leachfield is 21.6 inches. The minimum designed cover thickness is 24 inches. The cover as designed is adequate.

The maximum calculated 30 year depth of erosion at the Test Cell C Leachfield is 6.5 inches. The calculated depth of soil for shielding is 7.4 inches. The total required depth of cover for the Test Cell C Leachfield is 13.9 inches. The minimum designed cover thickness is 24 inches. The cover as designed is adequate.

The maximum calculated (required) d_{50} size of rip-rap is 3.5 inches upstream of the RMAD Leachfield. The design d_{50} size of rip-rap is 6 inches. The designed rip-rap is adequate. The design d_{50} is based on the minimum class of rip-rap from reference 12, Section 706.03.05.

COVER TOP

Water Erosion

Universal Soil Loss Equation

$A := RKLSCP$ (Chapter 10, Ref 2)

Definition of Variables
- R = Runoff Erosivity Factor
- K = Erodibility Factor
- LS = Slope Length Factor
- C = Cover Factor
- P = Practice Factor

$R := 40 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$ (Ref 8)

Erodibility Factor (K) Determined by Particel Size Distribution of Surface Material
Erosion Cover Material: Native Material from Borrow Pit

% Silt/Fine Sand	%Sand	%Organics
9.5	46	0

Grain Sizes as defined in Ref. 2
Particle Size Distribution Curves Attached (pages 38-39)

$K := 0.12$ (Figure 60, Ref 2) (page 41)

Cover slope = 1.18% Slope Length = 290.6 ft

$LS := 0.267$ (Interpolated from Table 28, Ref 2) (page 43)

$C := 1$ $P := 1$

$A := R \cdot K \cdot LS \cdot C \cdot P$

$$A = 1.28 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$$

Wind Erosion

$E := f(IKCLV)$ (Ref. 1, pg 1)

Definition of Variables
- I = Erodibility Factor
- K = Ridge Roughness Factor
- C = Climatic Factor
- L = Unsheltered Distance
- V = Vegetative Cover Factor

Erodibility factor (I) is Equal to Product of Soil Erodibility Factor and Knoll Adjustment Factor (Ref 2, pg 147).

Erodibility Factor : (Figure 69, Ref 2) (page 42)
For Native Borrow Material. %Coarser than 0.84 mm = 56

Erodibility Factor= 25

Knoll Adjustment factor: (Figure 70, Ref 2) (page 42)
Windward Slope = 1.18%

Knoll Adjustment factor= 102 *use b curve

$I := 25 \cdot 1.02$ $I = 25.5$

$K := 1$ (Table 2, Ref 1)

$C := 200$ (Attached SCS Figure, page 49)

Unsheltered Distance (L) is the Longest Distance Across Cover in Prevailing Wind Direction.

Prevailing Wind Direction is NNE. (Assumed)

$L := 290.6\ ft$

$V := 0$

Wind Erosion (E) Determined by attached SCS Soil Loss Tables (pgs. 44-48) for Determined Variables.

$C = 200$ $I = 25.5$ $K = 1$ $L = 290.6\ ft$ $V = 0$

Determine Erosion (E) by Linear Interpolation of Tabular Values

For I = 21 @ L = 290.6 ft

$$L := \begin{bmatrix} 200 \\ 300 \end{bmatrix} ft \qquad E := \begin{bmatrix} 10.1 \\ 14.4 \end{bmatrix} ton \cdot acre^{-1} \cdot yr^{-1}$$

$$linterp(L, E, 290.6\ ft) = 14 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$$

For I = 38 @ L = 290.6 ft

$$L := \begin{bmatrix} 200 \\ 300 \end{bmatrix} ft \qquad E := \begin{bmatrix} 35.9 \\ 42.5 \end{bmatrix} ton \cdot acre^{-1} \cdot yr^{-1}$$

$$linterp(L, E, 290.6\ ft) = 41.88 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$$

For L = 290.6 @ I = 25.5

$$I := \begin{bmatrix} 21 \\ 38 \end{bmatrix} \qquad E := \begin{bmatrix} 14.0 \\ 41.88 \end{bmatrix} ton \cdot acre^{-1} \cdot yr^{-1}$$

$$E := linterp(I, E, 25.5)$$

$$E = 21.38 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$$

Total Erosion

$$E_{rate} := A + E$$

$$E_{rate} = 22.66 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$$

Cover Surface Area:

$$Area := 42.18\ ft^2$$

$$Area = 0.968 \cdot acre$$

$$E_{tot} := E_{rate} \cdot Area$$

$$E_{tot} = 22 \cdot ton \cdot yr^{-1}$$

Depth of Erosion

Cover Material: Native Borrow

Optimun Density = 124.9 pcf 90% Density = 112 pcf

Cover weight /ft:

$$Wt := \left(112 \frac{lb}{ft^3}\right) \cdot 42218\ ft^2$$

$$Wt = 2364.21 \cdot \frac{ton}{ft}$$

$$E_{tot} := 22.0\ ton \cdot yr^{-1}$$

$$Depth := \frac{E_{tot}}{Wt} \qquad Depth = 0.0093 \cdot \frac{ft}{yr}$$

Over 30 Years:

$$D_{30} := Depth \cdot 30\ yr$$

$$D_{30} = 0.28\ ft$$

$$D_{30} = 3.35 \cdot in$$

Erosion over 30 yr period (D_{30}) < 2ft therefore cover material satisfactory

COVER SIDE SLOPES

Water Erosion

Universal Soil Loss Equation

$A := R \cdot K \cdot LS \cdot C \cdot P$ (Chapter 10, Ref 2)

Note: For Side Slopes Only Slope Length Factor (LS) Change, all Other Factors Remain the Same

Typical Side Slope Varies - Max Slope Used is 9%

Slope Length = 30 ft (Avg.)

$LS := 0.643$ (Interpolated from Table 28, Ref 2) (page 43)

$R := 40 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$ (Ref 8)

$K := 0.12$ (Figure 60, Ref 2)

$C := 1$ $P := 1$

$A := R \cdot K \cdot LS \cdot C \cdot P$

$A = 3.09 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$

Wind Erosion

$E := f(IKCLV)$ (Ref. 1, pg 1)

Note: For Side Slopes Erodibility Factor (I) and Unsheltered Length (L) Change, all Other Factors Remain the Same

Erodibility factor (I) is Equal to Product of Soil Erodibility Factor and Knoll Adjustment Factor (Ref 2, pg 147).

Erodibility Factor : (Figure 69, Ref 2) (page 42)
For Native Borrow Material. %Coarser than 0.84 mm = 56

Erodibility Factor= 25

Knoll Adjustment factor: (Figure 70, Ref 2) (page 42)
Windward Slope = 9.0%

Knoll Adjustment factor= 325 *use b curve

$I := 25 \cdot 3.25$ $I = 81.25$

$C := 200$ (attached SCS figure, page 49)

Wind Erosion (E) Determined by attached SCS Soil Loss Tables (pages 44-48) for Determined Variables.

$C := 200$ $I = 81.25$ $K := 1$ $L := 30\ ft$ $V = 0$

Determine Erosion (E) by Linear Interpolation of Tabular Values

For I = 56 & 86 @ L = 30 ft

$$I := \begin{bmatrix} 56 \\ 86 \end{bmatrix} \qquad E := \begin{bmatrix} 27.8 \\ 62.3 \end{bmatrix} ton \cdot acre^{-1} \cdot yr^{-1}$$

$E := linterp(I, E, 81.25)$

$E = 56.84 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$

Total Erosion

$E_{rate} := A + E$

$$E_{rate} = 59.92 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$$

Cover Surface Area:

$$Area := 9095\ ft^2$$

$$Area = 0.21 \cdot acre$$

$$E_{tot} := E_{rate} \cdot Area$$

$$E_{tot} = 12.5 \cdot ton \cdot yr^{-1}$$

Depth of Erosion

Cover Material: Native Borrow

Optimun Density = 124.9 pcf 90% Density = 112 pcf

Cover weight /ft:

$$Wt := \left(112 \frac{lb}{ft^3}\right) \cdot 9095\ ft^2$$

$$Wt = 509.32 \cdot \frac{ton}{ft}$$

$$E_{tot} := 12.5\ ton \cdot yr^{-1}$$

$$Depth := \frac{E_{tot}}{Wt}$$

$$Depth = 0.0245 \cdot \frac{ft}{yr}$$

Over 30 Years:

$D_{30} := Depth \cdot 30\ yr$

$$D_{30} = 0.74\ ft$$

$$D_{30} = 8.84 \cdot in$$

Erosion over 30 yr period (D_{30}) < 2ft therefore cover material satisfactory

Maximum 30 yr erosion depth is 8.84 inches. This plus the calculated depth required for shielding of 12.8 inches, yeilds a total required depth of 21.6 inches. As this is less than the minimum 2 foot design thickness, the cover is adequate.

TEST CELL C LEACHFIELD COVER EROSION

COVER TOP

Water Erosion

Universal Soil Loss Equation

$A := RKLSCP$ (Chapter 10, Ref 2)

Definition of Variables
- R = Runoff Erosivity Factor
- K = Erodibility Factor
- LS = Slope Length Factor
- C = Cover Factor
- P = Practice Factor

$R := 40 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$

Erodibility Factor (K) Determined by Particel Size Distribution of Surface Material
Erosion Cover Material: Native Material from Borrow Pit*

% Silt/Fine Sand	%Sand	%Organics
9.5	46	0

Grain Sizes as defined in Ref. 2
Particle Size Distribution Curves Attached (page 38-39)

$K := 0.12$ (Figure 60, Ref 2) (page 41)

Cover slope = 4.23% Slope Length = 103 ft

$LS := 0.435$ (Interpolated from Table 28, Ref 2) (page 43)

$C := 1$ $P := 1$

$A := R \cdot K \cdot LS \cdot C \cdot P$

$$A = 2.09 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$$

Wind Erosion

$E := f(IKCLV)$ (Ref. 1, pg 1)

Definition of Variables
- I = Erodibility Factor
- K = Ridge Roughness Factor
- C = Climatic Factor
- L = Unsheltered Distance
- V = Vegetative Cover Factor

Erodibility factor (I) is Equal to Product of Soil Erodibility Factor and Knoll Adjustment Factor (Ref 2, pg 147).

Erodibility Factor : (Figure 69, Ref 2) (page 42)
For Native Borrow Material. %Coarser than 0.84 mm = 56

Erodibility Factor= 25

Knoll Adjustment factor: (Figure 70, Ref 2) (page 42)
Windward Slope = 4.23%

Knoll Adjustment factor= 165 *use b curve

$I := 25 \cdot 1.65$ $I = 41.25$

$K := 1$ (Table 2, Ref 1)

$C := 200$ (Attached SCS Figure, page 49)

Unsheltered Distance (L) is the Longest Distance Across Cover in Prevailing Wind Direction.

Prevailing Wind Direction is NNE. (Assumed)

$L := 103\ ft$

$V := 0$

Wind Erosion (E) Determined by attached SCS Soil Loss Tables (pgs. 44-48) for Determined Variables.

$C = 200$ $I = 41.25$ $K = 1$ $L = 103\ ft$ $V = 0$

Determine Erosion (E) by Linear Interpolation of Tabular Values

For I = 38 @ L = 103 ft

$$L := \begin{bmatrix} 100 \\ 150 \end{bmatrix} ft \qquad E := \begin{bmatrix} 25.6 \\ 31.1 \end{bmatrix} ton \cdot acre^{-1} \cdot yr^{-1}$$

$$linterp(L, E, 103\ ft) = 25.93 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$$

For I = 48 @ L = 103 ft

$$L := \begin{bmatrix} 100 \\ 150 \end{bmatrix} \text{ft} \qquad E := \begin{bmatrix} 39.4 \\ 45.8 \end{bmatrix} \text{ton}\cdot\text{acre}^{-1}\cdot\text{yr}^{-1}$$

$$\text{linterp}(L, E, 103\ \text{ft}) = 39.78\ \text{ton}\cdot\text{acre}^{-1}\cdot\text{yr}^{-1}$$

For L = 103 @ I = 41.25

$$I := \begin{bmatrix} 38 \\ 48 \end{bmatrix} \qquad E := \begin{bmatrix} 25.93 \\ 39.78 \end{bmatrix} \text{ton}\cdot\text{acre}^{-1}\cdot\text{yr}^{-1}$$

$$E := \text{linterp}(I, E, 41.25)$$

$$E = 30.43\ \text{ton}\cdot\text{acre}^{-1}\cdot\text{yr}^{-1}$$

Total Erosion

$$E_{rate} := A + E$$

$$E_{rate} = 32.52\ \text{ton}\cdot\text{acre}^{-1}\cdot\text{yr}^{-1}$$

Cover Surface Area:

$$\text{Area} := 9492\ \text{ft}^2$$

$$\text{Area} = 0.22\ \text{acre}$$

$$E_{tot} := E_{rate}\cdot\text{Area}$$

$$E_{tot} = 7.1\ \text{ton}\cdot\text{yr}^{-1}$$

Depth of Erosion

Cover Material: Native Borrow

Optimun Density = 124.9 pcf 90% Density = 112 pcf

Cover weight /ft:

$$Wt := \left(112 \frac{lb}{ft^3}\right) \cdot 9492\ ft^2$$

$$Wt = 531.55 \cdot \frac{ton}{ft}$$

$$E_{tot} := 7.1\ ton \cdot yr^{-1}$$

$$Depth := \frac{E_{tot}}{Wt} \qquad Depth = 0.0134 \cdot \frac{ft}{yr}$$

Over 30 Years:

$$D_{30} := Depth \cdot 30\ yr$$

$$D_{30} = 0.4\ ft$$

$$D_{30} = 4.81 \cdot in$$

Erosion over 30 yr period (D_{30}) < 2ft therefore cover material satisfactory

COVER SIDE SLOPES

Water Erosion

Universal Soil Loss Equation

$A := R \cdot K \cdot LS \cdot C \cdot P$ (Chapter 10, Ref 2)

Note: For Side Slopes Only Slope Length Factor (LS) Change, all Other Factors Remain the Same

Max Slope Used is 50%

Slope Length = 5 ft (Avg.)

$LS := 8.9$ (Interpolated from Table 28, Ref 2) (page 43)

$R := 40 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$ (Ref 8)

$K := 0.12$ (Figure 60, Ref 2) (page 41)

$C := 1$ $P := 1$

$$A := R \cdot K \cdot LS \cdot C \cdot P$$

$$A = 42.72 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$$

Wind Erosion

Note: The windward side is protected by geoweb, infilled with gravel. Therefore wind erosion will not have an impact on this unit.

Total Erosion

$$E_{rate} := A$$

$$E_{rate} = 42.72 \cdot ton \cdot acre^{-1} \cdot yr^{-1}$$

Cover Surface Area:

$$Area := 1590\ ft^2$$

$$Area = 0.04 \cdot acre$$

$$E_{tot} := E_{rate} \cdot Area$$

$$E_{tot} = 1.6 \cdot ton \cdot yr^{-1}$$

Depth of Erosion

Cover Material: Native Borrow

Optimun Density = 124.9 pcf 90% Density = 112 pcf

Cover weight /ft:

$$Wt := \left(112 \frac{lb}{ft^3}\right) \cdot 1590\ ft^2$$

$$Wt = 89.04 \cdot \frac{ton}{ft}$$

$$E_{tot} := 1.6\ ton \cdot yr^{-1}$$

$$Depth := \frac{E_{tot}}{Wt}$$

$$Depth = 0.018 \cdot \frac{ft}{yr}$$

Over 30 Years:

$$D_{30} := Depth \cdot 30\ yr$$

$$D_{30} = 0.54\ ft$$

$$D_{30} = 6.47 \cdot in$$

Erosion over 30 yr period (D_{30}) < 2ft therefore cover material satisfactory

Maximum 30 yr erosion depth is 6.5 inches. This plus the calculated depth required for shielding of 7.4 inches, yeilds a total required depth of 13.9 inches. As this is less than the minimum 2 foot design thickness, the cover is adequate.

Subbasin	Area (s.f.)	Area (acre)	K	C	I (in/hr)	Q (cfs)
1	238951	5.49	0.5	0.5	3.70	5.07
2	99672	2.29	0.5	0.5	4.20	2.40
3	9563	0.22	0.5	0.5	5.70	0.31

CAS 25-05-03
BASIN/ CHANNEL SLOPES

SUBBASIN 1

distance	elev	Dist. From start	Slope (ft/ft)	
0	3856	0		O/Land
878	3829	878	0.030752	
		Basin Slope	-0.031	

Channel

distance	elev	Dist. From start	Slope (ft/ft)	
0	3829	0		channel
290	3818	290	0.037931	
		Channel Slope	-0.038	

SUBBASIN 2

distance	elev	Dist. From start	Slope (ft/ft)	
0	3858	0		O/Land
700	3828	700	0.042857	
		Basin Slope	-0.043	

Channel

distance	elev	Dist. From start	Slope (ft/ft)	
0	3828	0		channel
280	3818	280	0.035714	
		Channel Slope	-0.036	

SUBBASIN 3

distance	elev	Dist. From start	Slope (ft/ft)	
0	3832	0		O/Land
269	3822	269	0.037175	
		Basin Slope	-0.037	

Channel

distance	elev	Dist. From start	Slope (ft/ft)	
0	3822	0		channel
24	3819	24	0.125	
		Channel Slope	-0.125	

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Analysis Calc. #: CAS-C-301
Prepared By: [illegible]
Checked By: [illegible]
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Worksheet
Worksheet for Triangular Channel

BN-0905 (08/99) Bechtel Nevada
Analysis Calc. #: CAL-C-301
Prepared By: JLS
Checked By: VKS
Rev.#: C Page 21 of 49

Project Description	
Worksheet	Subbasin 1 - Full Bank Flow
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.040	
Slope	0.038000	ft/ft
Depth	0.57	ft
Left Side Slope	45.00	H : V
Right Side Slope	22.00	H : V

Results		
Discharge	34.12	cfs
Flow Area	10.9	ft²
Wetted Perimeter	38.21	ft
Top Width	38.19	ft
Critical Depth	0.58	ft
Critical Slope	0.035289	ft/ft
Velocity	3.14	ft/s
Velocity Head	0.15	ft
Specific Energy	0.72	ft
Froude Number	1.04	
Flow Type	Supercritical	

Worksheet
Worksheet for Triangular Channel

Project Description	
Worksheet	Subbasin 2 - Full Bank Flow
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Discharge

SN-0905 (08/99) Bechtel Nevada
Analysis Calc. #: CAL-C-301
Prepared By: JRS
Checked By: VKS
Rev.#: 0 Page 22 of 49

Input Data		
Mannings Coefficient	0.040	
Slope	0.036000	ft/ft
Depth	0.61	ft
Left Side Slope	12.00	H : V
Right Side Slope	33.00	H : V

Results		
Discharge	26.72	cfs
Flow Area	8.4	ft²
Wetted Perimeter	27.48	ft
Top Width	27.45	ft
Critical Depth	0.61	ft
Critical Slope	0.034610	ft/ft
Velocity	3.19	ft/s
Velocity Head	0.16	ft
Specific Energy	0.77	ft
Froude Number	1.02	
Flow Type	Supercritical	

Worksheet
Worksheet for Triangular Channel

Project Description	
Worksheet	Subbasin 3 - Full Bank Flow
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Discharge

BN-0905 (08/99) Bechtel Nevada
Analysis Calc. #: CAL-C-301
Prepared By: JLS
Checked By: VKS
Rev.#: C Page 23 of 99

Input Data		
Mannings Coefficient	0.040	
Slope	0.125000	ft/ft
Depth	0.67	ft
Left Side Slope	26.00	H : V
Right Side Slope	11.00	H : V

Results		
Discharge	52.55	cfs
Flow Area	8.3	ft²
Wetted Perimeter	24.83	ft
Top Width	24.79	ft
Critical Depth	0.87	ft
Critical Slope	0.030829	ft/ft
Velocity	6.33	ft/s
Velocity Head	0.62	ft
Specific Energy	1.29	ft
Froude Number	1.93	
Flow Type	Supercritical	

CAS 25-05-03
Time of Concentration

Subbasin 1

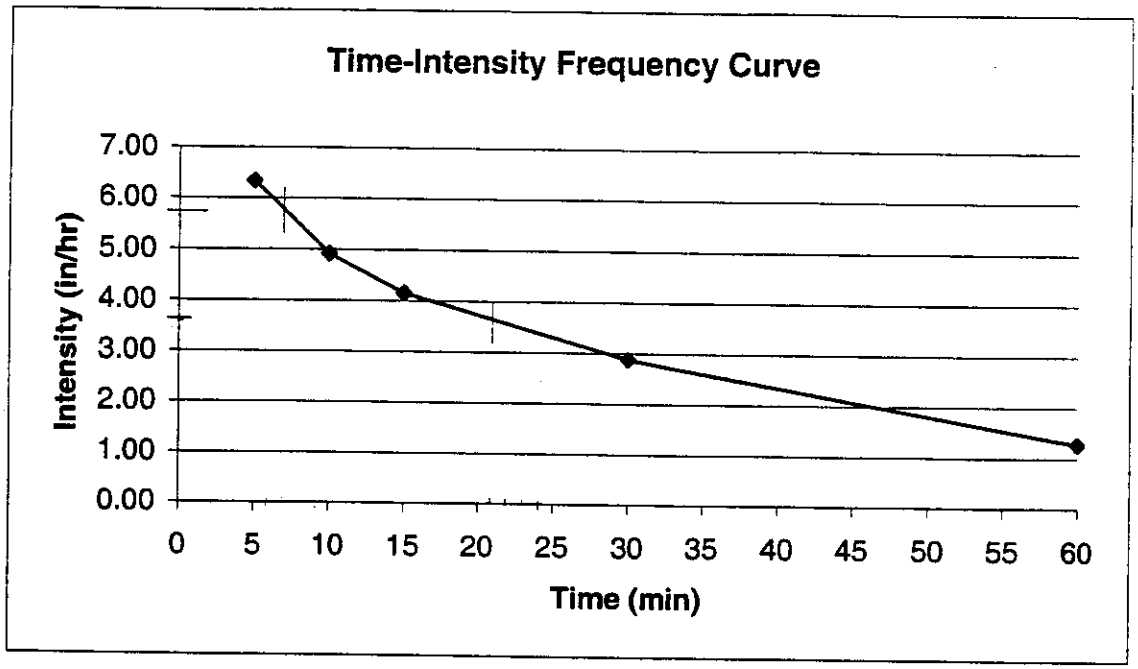
Initial Time, Ti	
CN =	55
S =	8.18
L (Basin) =	878
L (channel) =	290
S (basin) =	3.10
V (Channel) =	3.14
Ti (hr) =	0.319
Travel Time, Tt	
Tt (hr) =	0.026
Time of Conc	
Tc (hr) =	0.345
Tc (min) =	20.7
I (in/hr) =	3.7

Subbasin 2

Initial Time, Ti	
CN =	55
S =	8.18
L (Basin) =	700
L (channel) =	280
S (basin) =	4.30
V (Channel) =	3.19
Ti (hr) =	0.226
Travel Time, Tt	
Tt (hr) =	0.024
Time of Conc	
Tc (hr) =	0.251
Tc (min) =	15.0
I (in/hr) =	4.2

Subbasin 3

Initial Time, Ti	
CN =	55
S =	8.18
L (Basin) =	269
L (channel) =	24
S (basin) =	3.70
V (Channel) =	6.33
Ti (hr) =	0.114
Travel Time, Tt	
Tt (hr) =	0.001
Time of Conc	
Tc (hr) =	0.115
Tc (min) =	6.9
I (in/hr) =	5.7


Time-Intensity Frequency Curve
Intensity (in/hr)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
5
10
15
20
25
30
35
40
45
50
55
60
Time (min)

Worksheet
Worksheet for Triangular Channel

BN-0905 (08/99) Bechtel Nevada
Analysis Calc. #: CAL-C-301
Prepared By: JLS
Checked By: VKS
Rev.#: 0 Page 26 of 49

Project Description	
Worksheet	Subbasin 1 - Runoff Flow
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.040	
Slope	0.038000	ft/ft
Left Side Slope	45.00	H : V
Right Side Slope	22.00	H : V
Discharge	5.07	cfs

Results		
Depth	0.28	ft
Flow Area	2.6	ft²
Wetted Perimeter	18.69	ft
Top Width	18.68	ft
Critical Depth	0.27	ft
Critical Slope	0.045503	ft/ft
Velocity	1.95	ft/s
Velocity Head	0.06	ft
Specific Energy	0.34	ft
Froude Number	0.92	
Flow Type	Subcritical	

Worksheet
Worksheet for Triangular Channel

BN-0905 (08/99) Bechtel Nevada
Analysis Calc. #: CAL-T-301
Prepared By: JLS
Checked By: VKS
Rev.#: 0 Page 27 of 49

Project Description	
Worksheet	Subbasin 2 - Runoff Flow
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.040	
Slope	0.036000	ft/ft
Left Side Slope	12.00	H : V
Right Side Slope	33.00	H : V
Discharge	2.40	cfs

Results		
Depth	0.25	ft
Flow Area	1.4	ft²
Wetted Perimeter	11.13	ft
Top Width	11.12	ft
Critical Depth	0.23	ft
Critical Slope	0.047724	ft/ft
Velocity	1.75	ft/s
Velocity Head	0.05	ft
Specific Energy	0.29	ft
Froude Number	0.88	
Flow Type	Subcritical	

Worksheet
Worksheet for Triangular Channel

SN-0905 (08/99) **Bechtel Nevada**
Analysis Calc. #: CAL-C-301
Prepared By: JAS
Checked By: VKS
Rev.#: 0 Page 28 of 49

Project Description	
Worksheet	Subbasin 3 - Runoff Flow
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.040	
Slope	0.125000	ft/ft
Left Side Slope	26.00	H : V
Right Side Slope	11.00	H : V
Discharge	0.31	cfs

Results		
Depth	0.10	ft
Flow Area	0.2	ft²
Wetted Perimeter	3.62	ft
Top Width	3.62	ft
Critical Depth	0.11	ft
Critical Slope	0.061124	ft/ft
Velocity	1.75	ft/s
Velocity Head	0.05	ft
Specific Energy	0.15	ft
Froude Number	1.40	
Flow Type	Supercritical	

Worksheet
Worksheet for Trapezoidal Channel

BN-0905 (08/99) **Bechtel Nevada**

Analysis Calc. #: CAL-C-301
Prepared By: JLS
Checked By: VKS
Rev.#: 0 Page 29 of 49

Project Description	
Worksheet	Subbasin 1+2 - Runoff Flow
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.040	
Slope	0.037000	ft/ft
Left Side Slope	11.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	7.00	ft
Discharge	7.47	cfs

Results		
Depth	0.30	ft
Flow Area	2.7	ft²
Wetted Perimeter	11.23	ft
Top Width	11.16	ft
Critical Depth	0.30	ft
Critical Slope	0.037749	ft/ft
Velocity	2.76	ft/s
Velocity Head	0.12	ft
Specific Energy	0.42	ft
Froude Number	0.99	
Flow Type	Subcritical	

Worksheet
Worksheet for Triangular Channel

BN-0905 (08/99) Bechtel Nevada
Analysis Calc. #: CAL-C-301
Prepared By: JLS
Checked By: VKS
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Project Description	
Worksheet	North Face V-Ditch
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.025	
Slope	0.030400	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Discharge	7.47	cfs

Results		
Depth	0.71	ft
Flow Area	1.5	ft²
Wetted Perimeter	4.46	ft
Top Width	4.24	ft
Critical Depth	0.83	ft
Critical Slope	0.013117	ft/ft
Velocity	5.00	ft/s
Velocity Head	0.39	ft
Specific Energy	1.09	ft
Froude Number	1.48	
Flow Type	Supercritical	

Worksheet
Worksheet for Triangular Channel

Project Description	
Worksheet	North Face V-Ditch
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

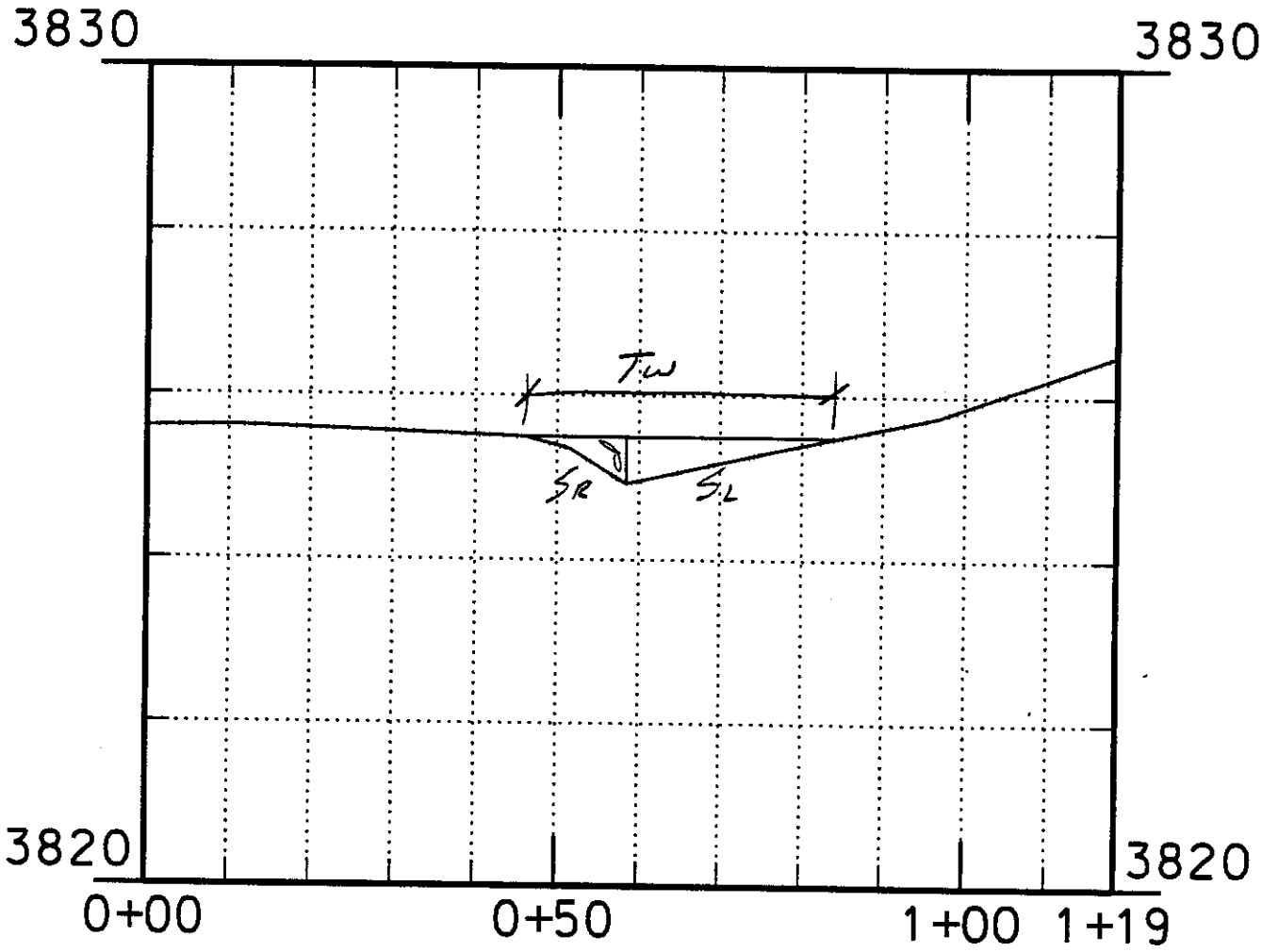
Input Data		
Mannings Coefficient	0.045	
Slope	0.030400	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Discharge	7.47	cfs

Results		
Depth	0.88	ft
Flow Area	2.3	ft²
Wetted Perimeter	5.57	ft
Top Width	5.28	ft
Critical Depth	0.83	ft
Critical Slope	0.042500	ft/ft
Velocity	3.22	ft/s
Velocity Head	0.16	ft
Specific Energy	1.04	ft
Froude Number	0.85	
Flow Type	Subcritical	

CAS 25-05-03
Rip-Rap Sizing

				Tractive Stress Method	
				d50 = 14.2 Fs Ymax (Se/K1)	
SUBBASIN 1				d50 (ft)	(in)
V (fps) =	1.95		Fs =	1.2	
S (ft/ft) =	0.038		Y max =	0.28	
Ss =	2.5		Se =	0.038	
			K1 =	1.69	
			BA =	1.30	
			AR =	41.00	
			d50 =	**0.11**	**1.29**
SUBBASIN 2				d50 (ft)	(in)
V (fps) =	1.75		Fs =	1.2	
S (ft/ft) =	0.036		Y max =	0.25	
Ss =	2.5		Se =	0.036	
			K1 =	0.55	
			BA =	4.80	
			AR =	41.00	
			d50 =	**0.28**	**3.34**
SUBBASIN 3				d50 (ft)	(in)
V (fps) =	1.75		Fs =	1.2	
S (ft/ft) =	0.125		Y max =	0.1	
Ss =	2.5		Se =	0.125	
			K1 =	2.95	
			BA =	5.20	
			AR =	41.00	
			d50 =	**0.07**	**0.87**
Subbasin 1+2 - Channel				d50 (ft)	(in)
V (fps) =	2.76		Fs =	1.2	
S (ft/ft) =	0.037		Y max =	0.3	
Ss =	2.5		Se =	0.037	
			K1 =	2.95	
			BA =	5.20	
			AR =	41.00	
			d50 =	**0.06**	**0.77**
North Face V-Ditch				d50 (ft)	(in)
V (fps) =	5		Fs =	1.2	
S (ft/ft) =	0.030		Y max =	0.71	
Ss =	2.5		Se =	0.030	
			K1 =	5.68	
			BA =	18.40	
			AR =	41.00	
			d50 =	**0.06**	**0.77**

SUBBASIN #1 CHANNEL



$T_w = 38.5'$ $S_L = 45:1$
$d = .57'$
$WP = 77'$ $S_R = 22:1$
$A = 11.0\ SF$

SUBBASIN #2 CHANNEL

BN-0905 (08/99) Bechtel Nevada
Analysis Calc. #: CAL-C-301
Prepared By: JLS
Checked By: VKS
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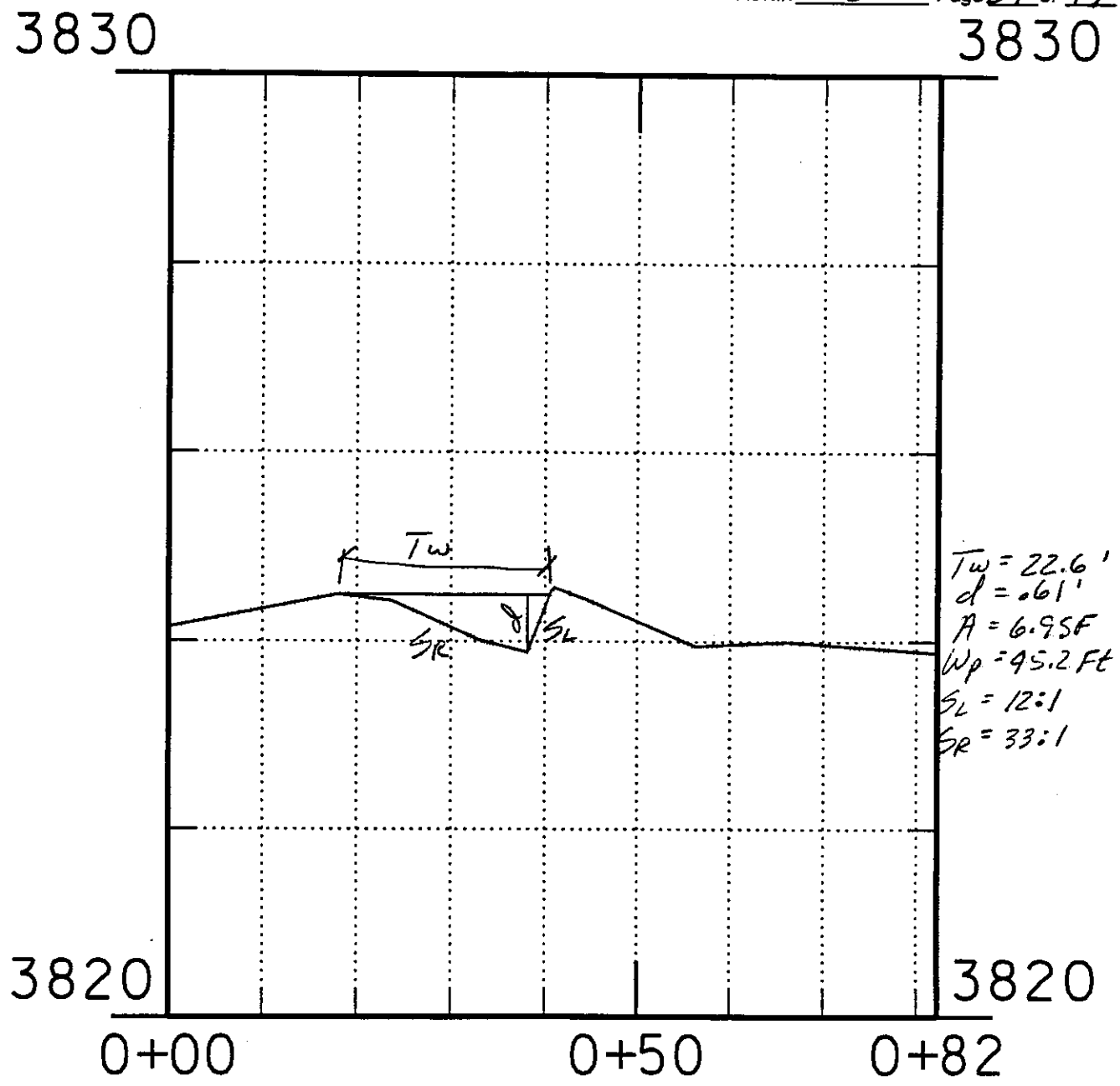

BN-0905 (08/99) Bechtel Nevada
Analysis Calc. #: CAL-C-301
Prepared By: JLS
Checked By: VKS
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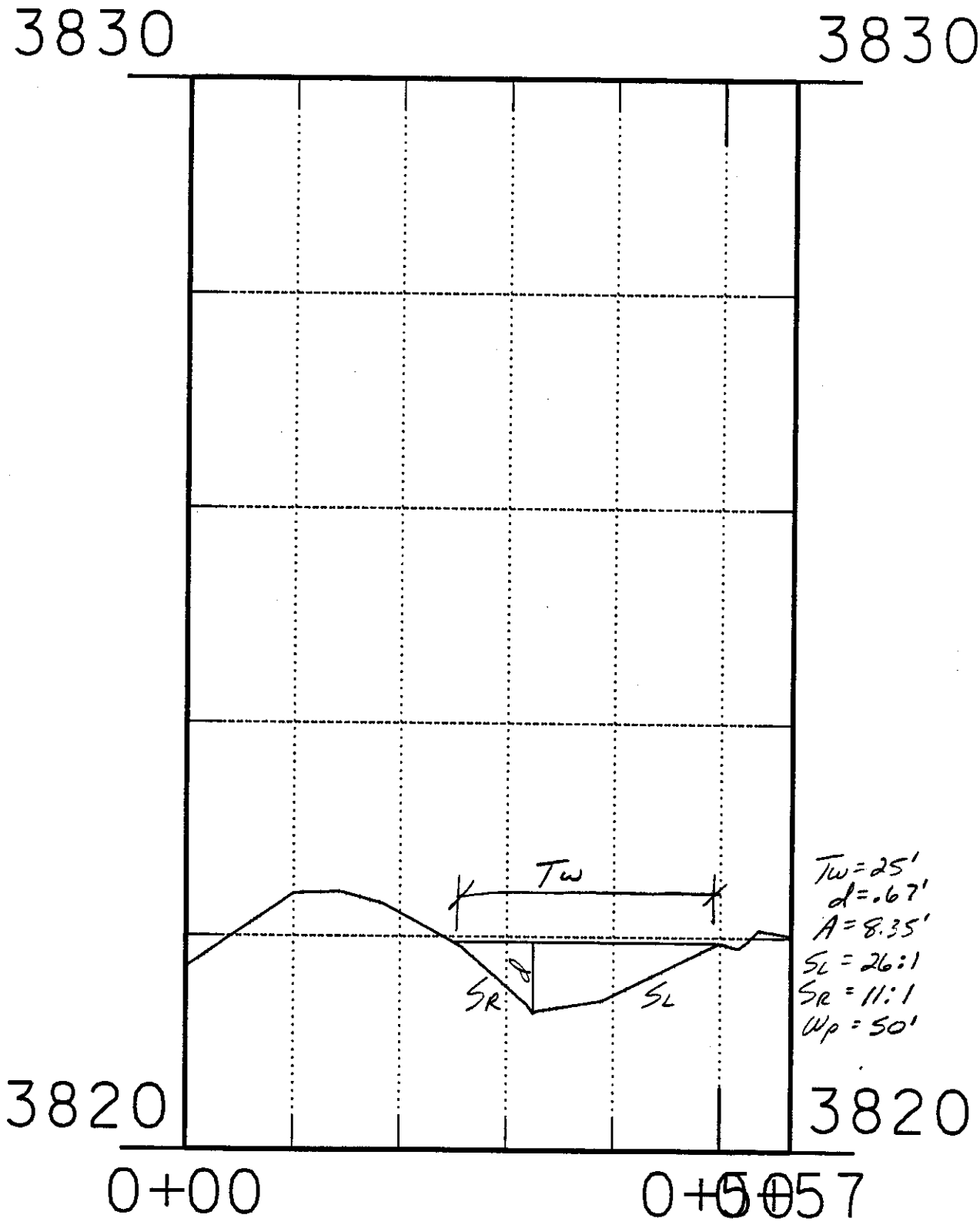
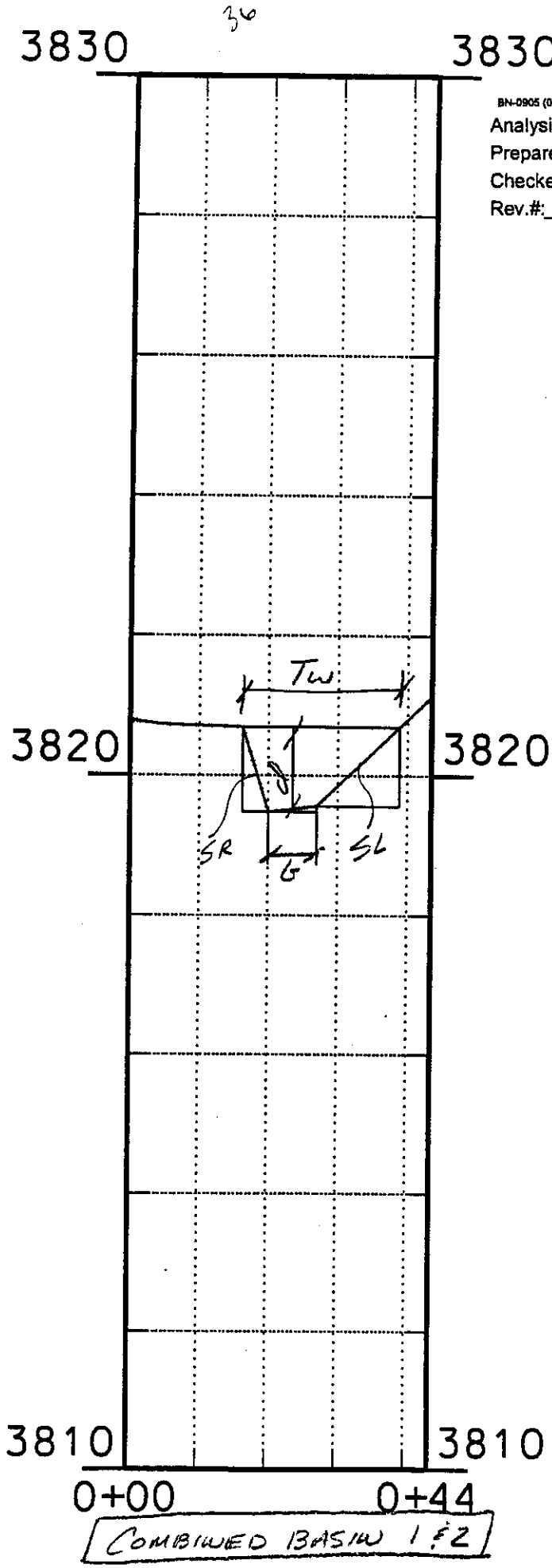
SUBBASIN #3 CHANNEL





COMBINED BASIN 1 & 2

BN-0905 (08/99) Bechtel Nevada

Analysis Calc. #: CAL-C-301

Prepared By: SKS

Checked By: VKS

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d = 1.21'
G = 7.0'
Tw = 23'
A = 17.15F
SL = 11:1
SR = 3:1

4

BN-0905 (08/99) Bechtel Nevada
Analysis Calc. # CAL-C-301
Prepared By: JLS
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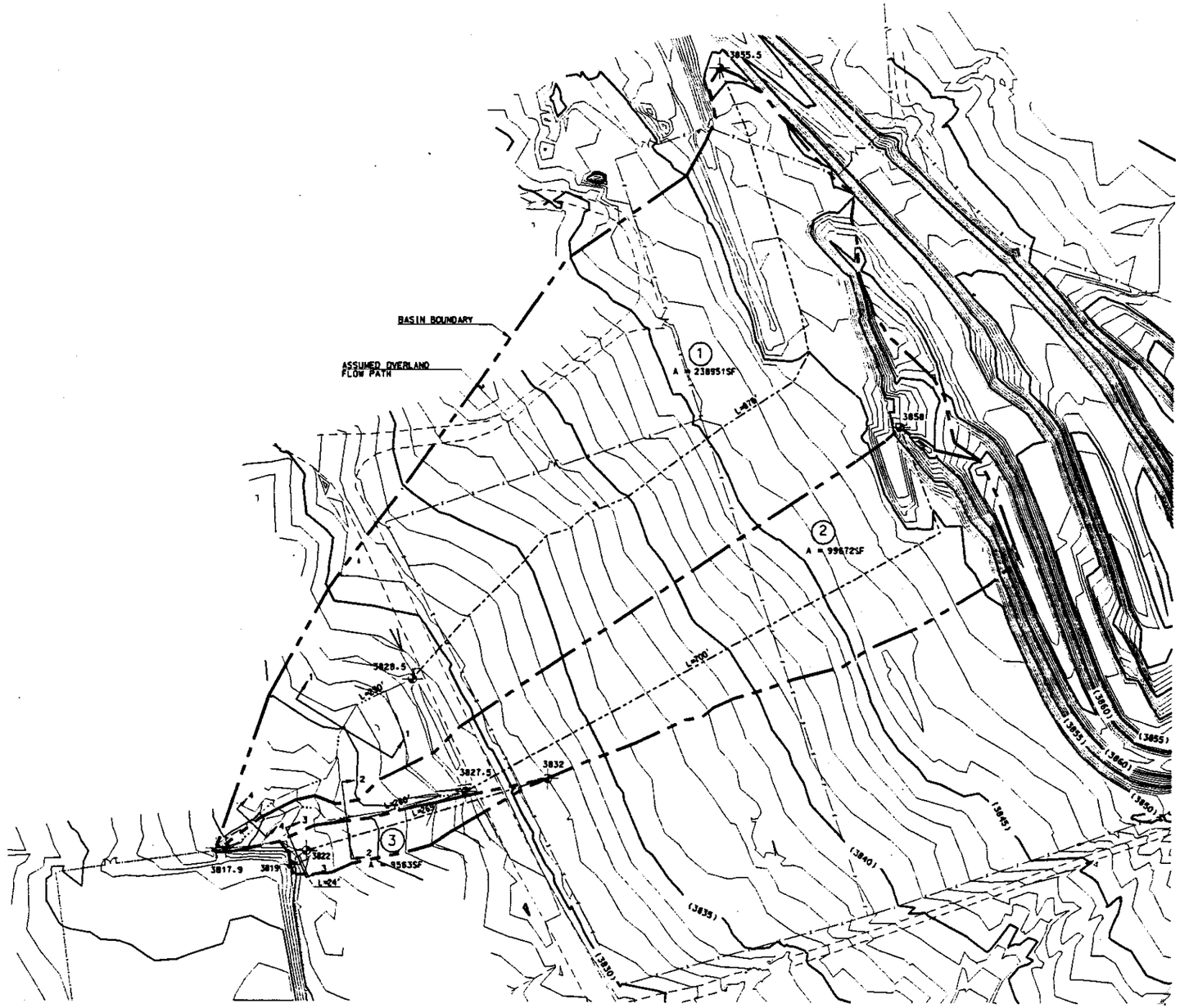


DRAINAGE BASIN PLAN
SCALE : 1" = 60'

GRAPHIC SCALE
0 30 60 120 180 FEET
1" = 60'

NEVADA TEST SITE — AREA 25
CAU 262 REMEDIATION
RMAD LEACHFIELD
CAS 25-05-03
DRAINAGE BASINS

NNSA National Nuclear Security Administration Nevada Operations Office
Bechtel Nevada P.O. BOX 98521, LAS VEGAS, NV 89193-8521

SK-02052-C1

06/17/02 04:44:02 PM g:\dgn\02052a25cad_data\rmadfcheck.dgn

06/17/02 04:44:02 PM

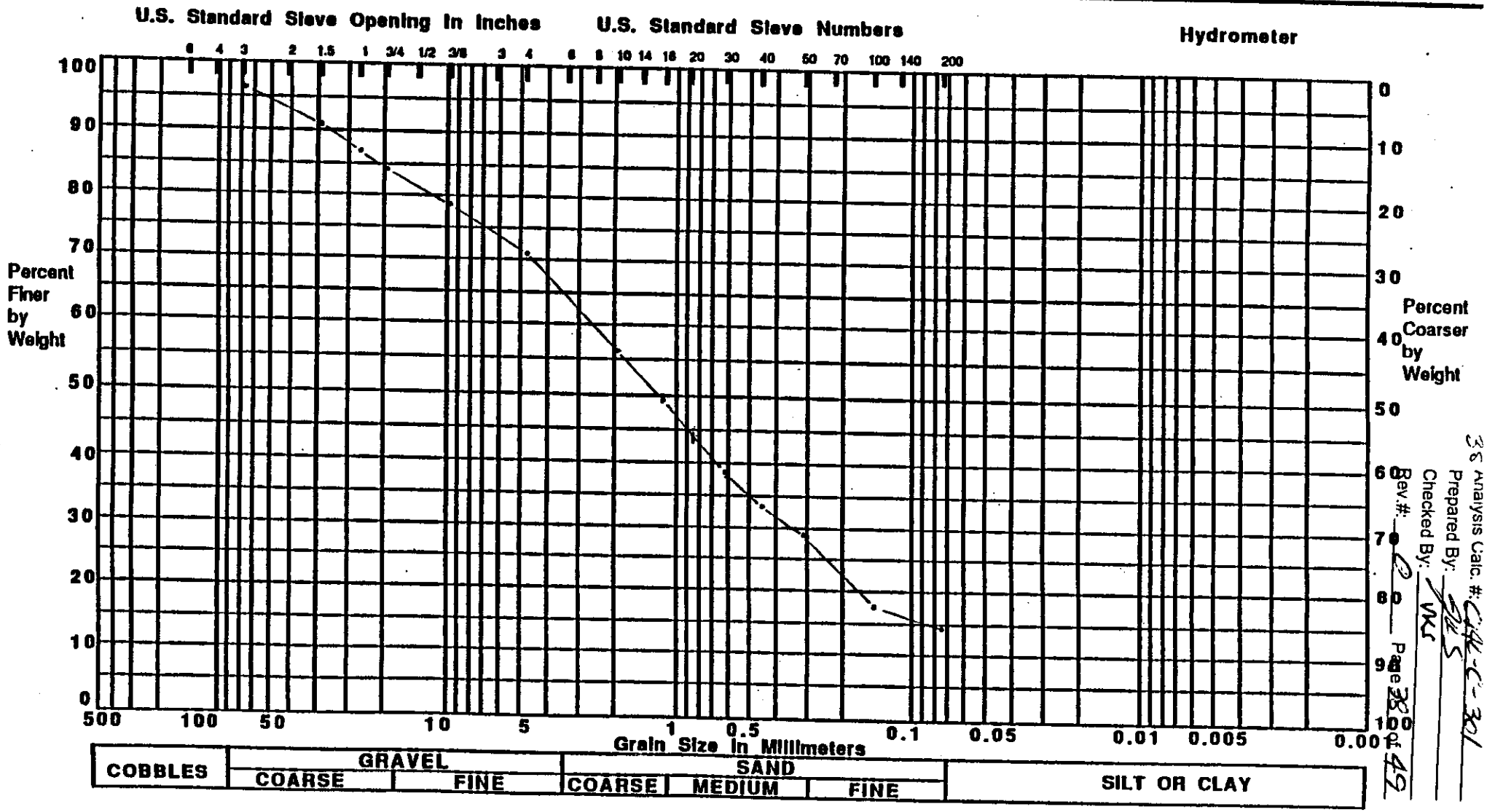
GRADATION CURVES

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

LAB NO. 870
CHARGE # 5B04AC31
DATE 04/23/2002

PROJECT: R-MAD & TEST CELL "C" & BORROW PIT LOG # N/A CLASSIFICATION: SM / SP

CHECKED BY: D. HERRINGTON DH DATE CHECKED: 4-23-02 MATERIAL R-MAD BORROW PIT

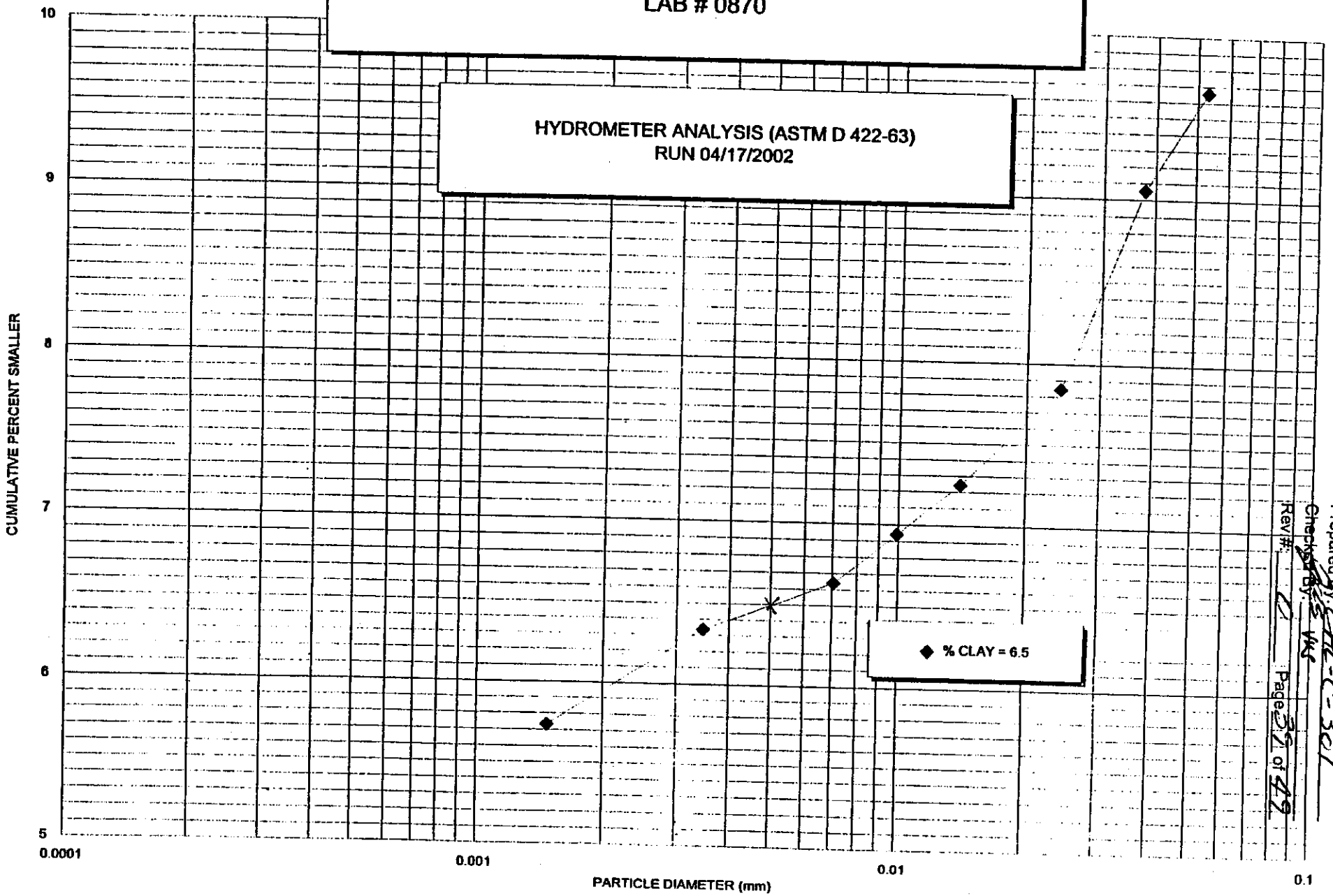


36 Analysis Calc. #: Cycle-C-301
Prepared By: RLS
Checked By: VKL
Rev.#: 0 Page 38 of 42

NO EQUIPMENT USED.

BORROW PIT
LAB # 0870

HYDROMETER ANALYSIS (ASTM D 422-63)
RUN 04/17/2002



Analysis Calc. #:
Prepared By: [illegible]
Checked By: [illegible]
Rev #: 0
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CORRECTION OF UNIT WEIGHT AND WATER CONTENT FOR SOILS CONTAINING OVERSIZE PARTICLES
ASTM D 4718-87

90

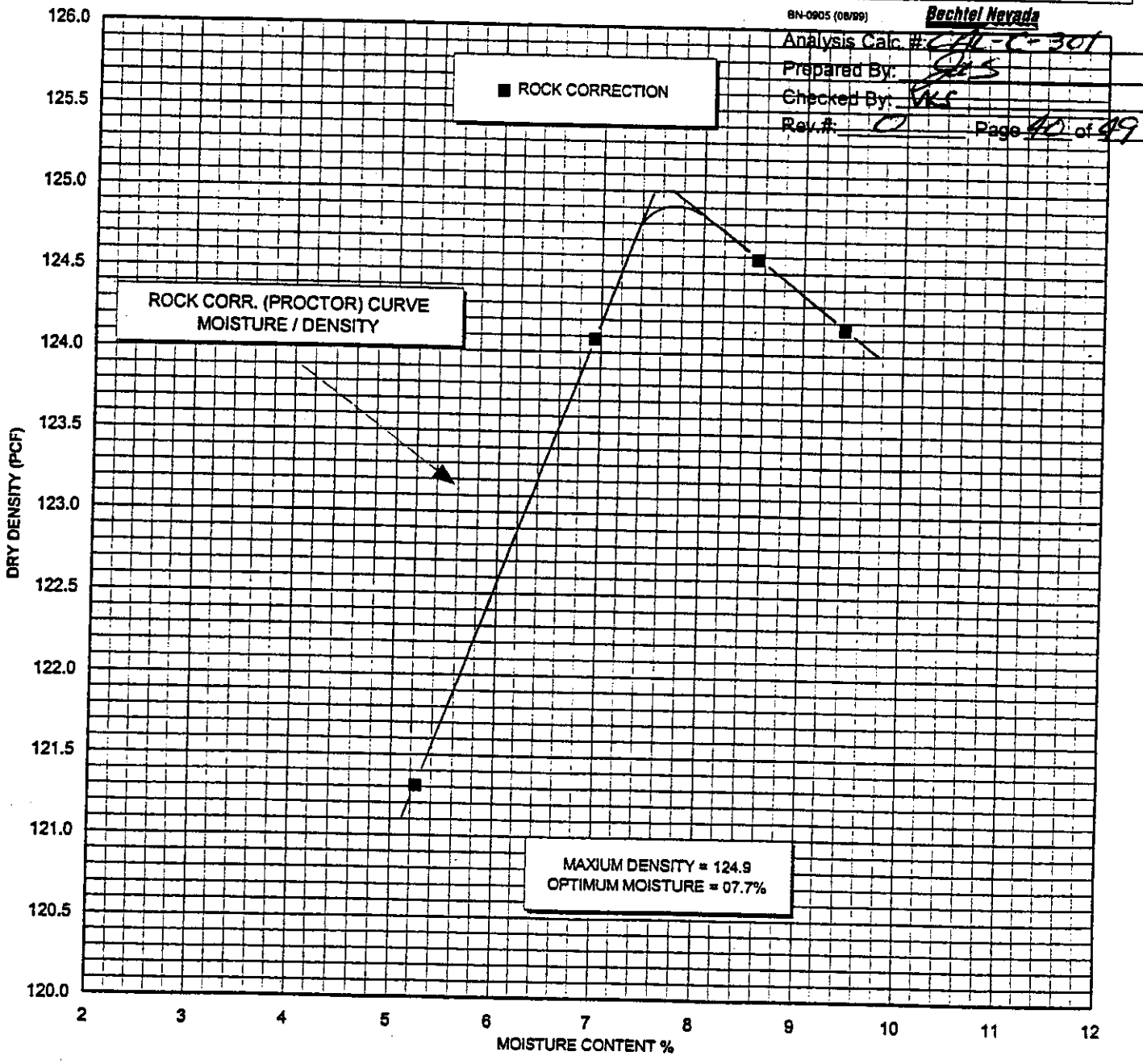
BECHTEL NEVADA
MATERIALS TESTING LABORATORY
P. O. BOX 98521
LAS VEGAS, NV 89193-8521

CHARGE # 5B04AC31
LAB # 0870
DATE 04/23/2002
RAMMER: MECH.

Project: R-MAD & TEST CELL "C"
Sampled by: D. HERRINGTON
Tested by: D. HERRINGTON
Requested by: K. CAMPBELL
Date sampled: 04/09/2002
Date tested: 04/11/2002
User/Agency BN
Material: R-MAD BORROW PIT
Checked by: V. Drumm

		1	2	3	4	5	6
1	Unit Wt. of Water: PCF	62.42	62.42	62.42	62.42	N/A	N/A
2	Percent of +3/4" size:	15.4%	15.4%	15.4%	15.4%	N/A	N/A
3	Sp. Gr. of +3/4" size:	2.42	2.42	2.42	2.42	N/A	N/A
4	% Water Content of 3/4":	N/A	N/A	N/A	N/A	N/A	N/A
5	% Water Content of Fines:	6.0%	9.9%	8.0%	10.9%	N/A	N/A
6	Dry Unit Wt. of Fines: PCF	117.1	120.7	120.2	120.3	N/A	N/A
7	% Corrected Water Content:	5.2%	8.5%	6.9%	9.4%	N/A	N/A
8	Corrected Dry Unit Wt.: PCF	121.3	124.6	124.1	124.2	N/A	N/A

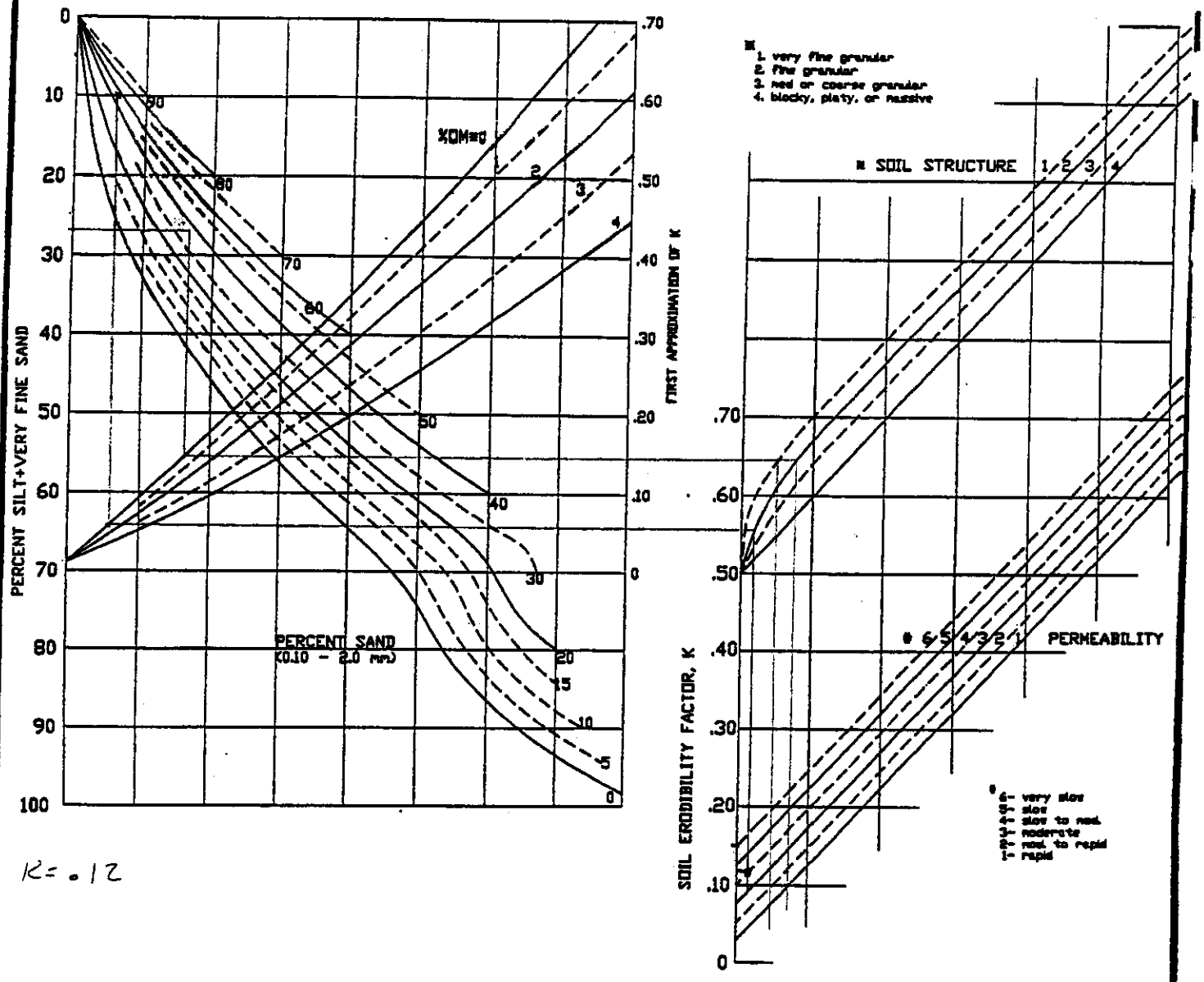
BN-0905 (08/99) Bechtel Nevada
Analysis Calc. #: CAL-C-301
Prepared By: GLS
Checked By: MKF
Rev.#: 0 Page 40 of 99



Equipment used: PM 16, #301256, Cal. date: 05/02/2001, Cal. due: 05/02/2002
Machine # 712293, # 312653, Calibration Date: 02/19/2002, Calibration Due: 02/19/2003
NO SPECIFICATIONS: INFORMATION ONLY

CC: K. COOKE BECHTEL
K. ORTEGO BECHTEL
MTL BN FILES

SOIL ERODIBILITY NOMOGRAPH USED TO DETERMINE FACTOR K (TONS/ACRE) FOR SPECIFIC TOPSOILS OR SUBSOIL HORIZONS



K = .12

BN-0905 (08/99) Bechtel Nevada

Analysis Calc. #: CAL-C-301

Prepared By: GLS

Checked By: VKS

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Revision	Date

REFERENCE: A Soil-Erodibility Nomograph for Farmland and Construction Sites, 1971

FIGURE 1303a

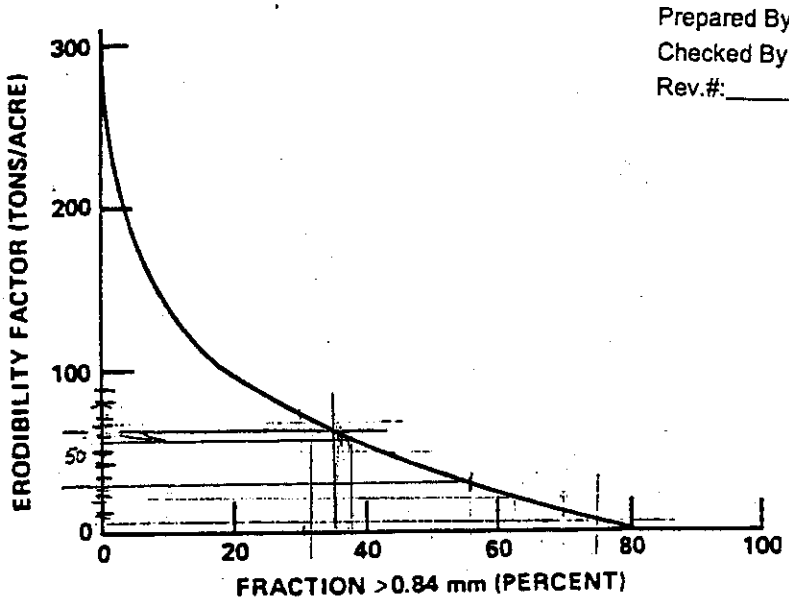

Figure 69. Wind erosion versus percent coarse fraction.[9]

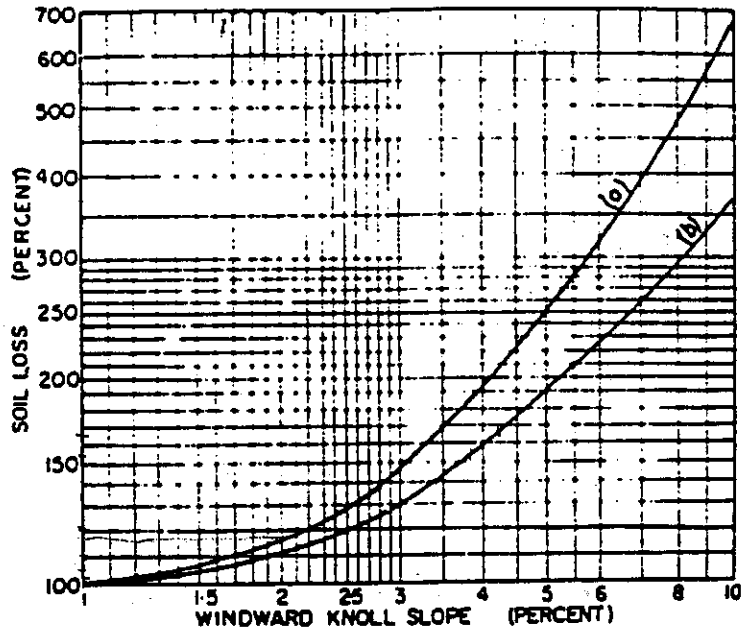

Figure 70. Knoll adjustment (a) from top of knoll and (b) from upper third of slope.[95] (Reproduced by permission of Soil Science Society of America.)

TABLE 28. VALUES OF THE FACTOR LS FOR SPECIFIC COMBINATIONS OF SLOPE LENGTH AND STEEPNESS[a]

Slope	Slope length (feet)											
%	25	50	75	100	150	200	300	400	500	600	800	1000
0.5	0.07	0.08	0.09	0.10	0.11	0.12	0.14	0.15	0.16	0.17	0.19	0.20
1	0.09	0.10	0.12	0.13	0.15	0.16	0.18	0.20	0.21	0.22	0.24	0.26
2	0.13	0.16	0.19	0.20	0.23	0.25	0.28	0.31	0.33	0.34	0.38	0.40
3	0.19	0.23	0.26	0.29	0.33	0.35	0.40	0.44	0.47	0.49	0.54	0.57
4	0.23	0.30	0.36	0.40	0.47	0.53	0.62	0.70	0.76	0.82	0.92	1.0
5	0.27	0.38	0.46	0.54	0.66	0.76	0.93	1.1	1.2	1.3	1.5	1.7
6	0.34	0.48	0.58	0.67	0.82	0.95	1.2	1.4	1.5	1.7	1.9	2.1
8	0.50	0.70	0.86	0.99	1.2	1.4	1.7	2.0	2.2	2.4	2.8	3.1
10	0.69	0.97	1.2	1.4	1.7	1.9	2.4	2.7	3.1	3.4	3.9	4.3
12	0.90	1.3	1.6	1.8	2.2	2.6	3.1	3.6	4.0	4.4	5.1	5.7
14	1.2	1.6	2.0	2.3	2.8	3.3	4.0	4.6	5.1	5.6	6.5	7.3
16	1.4	2.0	2.5	2.8	3.5	4.0	4.9	5.7	6.4	7.0	8.0	9.0
18	1.7	2.4	3.0	3.4	4.2	4.9	6.0	6.9	7.7	8.4	9.7	11.0
20	2.0	2.9	3.5	4.1	5.0	5.8	7.1	8.2	9.1	10.0	12.0	13.0
25	3.0	4.2	5.1	5.9	7.2	8.3	10.0	12.0	13.0	14.0	17.0	19.0
30	4.0	5.6	6.9	8.0	9.7	11.0	14.0	16.0	18.0	20.0	23.0	25.0
40	6.3	9.0	11.0	13.0	16.0	18.0	22.0	25.0	28.0	31.0	--	--
50	8.9	13.0	15.0	18.0	22.0	25.0	31.0	--	--	--	--	--
60	12.0	16.0	20.0	23.0	28.0	--	--	--	--	--	--	--

[a] Values given for slopes longer than 300 feet or steeper than 18% are extrapolations beyond the range of the research data and, therefore, less certain than the others.

Cover/Management Factor C

Factor C in the USLE is the ratio of soil loss from land cropped under specified conditions to that from clean-tilled, continuous fallow.[2] Therefore, C combines effects of vegetation, crop sequence, management, and agricultural (as opposed to engineering) erosion-control practices. On landfills, freshly covered and without vegetation or special erosion-reducing procedures of cover placement, C will usually be about unity. Where there is vegetative cover or significant amounts of gravel, roots, or plant residues or where cultural practices increase infiltration and reduce runoff-velocity, C is much less than unity. C ranges from about 0.60 to less than 0.01 on cropped land and, therefore, is important to planning erosion control on landfill.

A field-tested routine adaptable to landfill planning modifies C to reflect the net effect of interrelated crop and management variables and local rainfall patterns or seasons. The first-year procedure amounts to distinguishing five crop stages: cover placement (rough fallow), seedling, establishment, developing-maturing crop, and sometimes residue-stubble. Probable calendar dates for successive periods are selected. The fraction of the local

UNSHELTERED DISTANCE IN FEET	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	42.0	35.7	27.2	19.0	10.9	4.9	2.1	C.5	0.4				
8000	42.C	35.7	27.2	19.0	10.9	4.9	2.1	0.9	0.4				
6000	40.2	34.1	25.8	17.9	10.2	4.5	1.5	C.8	0.4				
4000	38.5	32.6	24.7	17.0	9.6	4.2	1.8	0.7	0.3				
3000	36.0	30.4	22.9	15.7	8.8	3.8	1.6	0.5					
2000	34.0	28.7	21.4	14.6	8.1	3.4	1.4	0.5					
1000	27.C	22.6	16.6	10.9	5.9	2.1	0.9						
800	24.6	20.5	14.9	9.7	5.1	2.C	0.7						
600	21.9	18.1	13.1	8.4	4.3	1.6	0.6						
400	17.8	14.7	10.4	6.5	3.3	1.1							
300	14.4	11.8	8.2	5.0	2.4	0.8							
200	10.1	8.2	5.5	3.2	1.5	C.3							
150	7.1	5.6	3.7	2.1	0.8								
100	4.6	3.6	2.3	1.2	0.5								
80	3.3	2.6	1.6	0.7									
60	1.8	1.3	0.7										
50	1.3	1.0	C.5										
40	1.0	0.5											
30													
20													
10													

4A

$I = 21$
$C = 200$
$K = 1.0$

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

SURFACE - K = 0.9 — C = 200 — I = 21

(L) UNSHELTERED DISTANCE IN FEET — (V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	37.8	32.0	24.1	16.6	9.4	4.1	1.7	C.6					
8000	37.6	31.9	24.0	16.5	9.3	4.0	1.7	0.6					
6000	36.1	30.5	22.9	15.7	8.8	3.8	1.6	0.5					
4000	34.6	29.2	21.9	14.9	8.3	3.5	1.5	0.5					
3000	32.4	27.3	20.3	13.7	7.6	3.1	1.3	C.4					
2000	30.2	25.4	18.8	12.6	6.9	2.8	1.1	0.4					
1000	23.3	19.4	14.0	9.1	4.8	1.8	0.7						
800	21.5	17.9	12.9	8.3	4.3	1.6	0.6						
600	18.7	15.4	11.0	6.9	3.5	1.2							
400	14.5	11.9	8.3	5.0	2.4	0.8							
300	11.9	9.6	6.6	3.9	1.8	C.4							
200	7.6	6.0	4.C	2.2	0.9								
150	4.7	3.7	2.4	1.2	0.5								
100	3.3	2.6	1.6	0.8									
80	2.0	1.6	0.8										
60	1.2	0.9	0.5										
50	0.9	C.5											
40	0.7	0.4											
30													
20													
10													

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

SURFACE - K = 0.8 — C = 200 — I = 21

(L) UNSHELTERED DISTANCE IN FEET — (V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	33.6	28.3	21.2	14.4	8.0	3.3	1.4	C.5					
8000	33.2	28.0	20.9	14.1	7.8	3.3	1.3	0.4					
6000	31.8	26.8	19.9	13.4	7.4	3.0	1.2	0.4					
4000	30.6	25.7	19.0	12.8	7.0	2.8	1.1	0.4					
3000	28.1	23.5	17.3	11.5	6.2	2.5	1.0						
2000	24.8	20.7	15.1	9.8	5.2	2.0	0.7						
1000	19.9	16.5	11.8	7.5	3.8	1.4							
800	17.9	14.7	10.5	6.6	3.3	1.1							
600	14.9	12.2	8.5	5.2	2.5	0.8							
400	11.7	9.5	6.5	3.9	1.8	0.4							
300	9.C	7.2	4.8	2.8	1.3	0.3							
200	5.C	4.0	2.5	1.4	0.5								
150	3.5	2.7	1.7	0.8									
100	2.C	1.5	C.8										
80	1.5	1.1	0.6										
60	0.8	0.4											
50	0.6	0.4											
40.	0.5	0.3											
30													
20													
10													

* NOTE: SOIL LOSS FOR VALUES WHERE 'E' IS LESS THAN 0.1 OR GREATER THAN 440.0 ARE NOT SHOWN; OTHER VALUES NOT SHOWN ARE INVALID

** NOTE: VALUES SHOWN ARE FLAT SMALL GRAIN EQUIVALENT, NOT 'V'

K=1.0

45

BN-0905 (08/99) Bechtel Nevada

Analysis Calc. #: CAL-C-301

Prepared By: JLS

Checked By: VKS

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(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

SURFACE - K = 0.5 — C = 200, I = 38

(V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

(L) UNSHELTERED DISTANCE IN FEET	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	68.4	59.3	47.0	34.9	21.7	11.3	5.6	2.7	1.6	0.5			
8000	68.4	59.3	47.0	34.9	21.7	11.3	5.6	2.7	1.6	0.5			
6000	67.1	58.2	46.0	34.1	21.1	10.9	5.4	2.6	1.6	0.5			
4000	64.3	55.7	43.8	32.3	19.9	10.2	4.9	2.4	1.4				
3000	61.5	53.1	41.7	30.9	18.6	9.4	4.5	2.2	1.3				
2000	58.4	50.3	39.3	28.6	17.3	8.4	4.1	1.9	1.1				
1000	51.6	44.2	34.2	24.5	14.5	7.0	3.2	1.4	0.8				
800	49.4	42.3	32.6	23.2	13.7	6.4	2.9	1.3	0.6				
600	45.1	38.4	29.4	20.7	12.0	5.5	2.4	1.1	0.5				
400	39.7	33.7	25.5	17.7	10.1	4.4	1.9	0.8	0.4				
300	36.1	30.5	22.9	15.7	8.8	3.8	1.6	0.5					
200	30.5	25.6	19.0	12.7	6.9	2.8	1.1	0.4					
150	26.6	22.5	16.9	9.7	5.1	2.0	0.7						
100	20.6	17.1	12.3	7.8	4.0	1.4	0.5						
80	17.7	14.6	10.3	6.5	3.2	1.1							
60	13.5	11.0	7.6	4.6	2.2	0.7							
50	11.2	9.1	6.2	3.7	1.7	0.3							
40	8.9	7.2	4.8	2.8	1.2	0.3							
30	5.8	4.6	3.0	1.6	0.6								
20	3.1	2.4	1.5	0.7									
10	0.9	0.5											

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

SURFACE - K = 0.6 — C = 200, I = 38

(V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

(L) UNSHELTERED DISTANCE IN FEET	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	60.8	52.9	41.1	30.1	18.4	9.2	4.4	2.1	1.2				
8000	60.8	52.9	41.1	30.1	18.4	9.2	4.4	2.1	1.2				
6000	59.7	51.9	40.3	29.4	17.9	8.9	4.3	2.0	1.2				
4000	57.3	49.3	38.5	27.9	16.9	8.3	3.9	1.8	1.1				
3000	55.7	48.0	37.3	27.0	16.2	7.9	3.7	1.7	1.0				
2000	52.5	45.0	34.9	25.0	14.9	7.2	3.3	1.5	0.9				
1000	45.6	38.9	29.8	21.0	12.2	5.6	2.9	1.1	0.5				
800	42.6	36.3	27.6	19.3	11.1	5.0	2.2	0.9	0.4				
600	38.4	32.6	24.6	17.0	9.6	4.2	1.8	0.7	0.3				
400	33.5	28.6	21.4	14.5	8.1	3.4	1.4	0.5					
300	30.2	25.4	18.8	12.4	6.8	2.8	1.1	0.4					
200	24.0	20.0	14.5	9.5	5.0	1.9	0.7						
150	19.9	16.4	11.8	7.5	3.8	1.4							
100	15.5	12.7	8.9	5.5	2.7	0.9							
80	13.3	10.8	7.5	4.5	2.2	0.4							
60	9.4	7.6	5.1	2.9	1.3	0.3							
50	7.3	5.8	3.8	2.2	0.9								
40	5.2	4.1	2.6	1.4	0.6								
30	3.4	2.7	1.6	0.8									
20	1.6	1.2	0.7										
10	0.6	0.4											

* NOTE: SOIL LOSS FOR VALUES WHERE 'E' IS LESS THAN 0.1 OR GREATER THAN 440.0 ARE NOT SHOWN; OTHER VALUES NOT SHOWN ARE INVALID

** NOTE: VALUES SHOWN ARE FLAT SMALL GRAIN EQUIVALENT, NOT 'V'

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

C = 200
I = 48

SURFACE - K = 1.0

(L) UNSHELTERED DISTANCE IN FEET | (V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	96.0	84.4	68.7	51.2	35.0	20.3	10.9	5.9	3.8	1.5	0.7	0.1	
8000	96.0	84.4	68.7	51.2	35.0	20.3	10.9	5.9	3.8	1.5	0.7	0.1	
6000	96.0	84.4	68.7	51.2	35.0	20.3	10.9	5.9	3.8	1.5	0.7	0.1	
4000	93.0	81.7	66.3	51.2	33.5	19.2	10.2	5.5	3.5	1.3	0.4		
3000	90.7	79.6	64.5	49.6	32.3	18.4	9.7	5.2	3.3	1.2	0.4		
2000	87.1	76.3	61.6	47.1	30.5	17.1	9.0	4.7	3.0	1.1	0.3		
1000	78.9	68.8	55.1	41.6	26.5	14.4	7.4	3.8	2.3	0.8			
800	75.5	65.8	52.5	39.4	24.9	13.4	6.8	3.4	2.1	0.7			
600	70.8	61.5	48.8	36.4	22.7	12.0	6.0	3.0	1.8	0.6			
400	64.4	55.8	43.9	32.4	19.9	10.2	5.0	2.4	1.4				
300	59.2	51.1	40.0	29.1	17.7	8.8	4.2	2.0	1.2				
200	52.2	44.8	34.7	24.9	14.8	7.1	3.3	1.5	0.8				
150	45.8	39.1	29.9	21.1	12.3	5.7	2.5	1.1	0.5				
100	39.4	33.4	25.3	17.5	10.0	4.4	1.9	0.8	0.4				
80	35.7	30.1	22.6	15.5	8.7	3.7	1.5	0.5					
60	30.1	25.2	18.7	12.5	6.8	2.8	1.1	0.4					
50	26.1	21.8	15.9	10.5	5.6	2.2	0.8						
40	23.1	19.2	13.9	9.0	4.7	1.8	0.7						
30	18.8	15.6	11.1	7.0	3.5	1.2							
20	13.1	10.7	7.4	4.4	2.1	0.4							
10	5.4	4.2	2.7	1.5	0.6								

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

C = 200
I = 48

SURFACE - K = 0.9

(L) UNSHELTERED DISTANCE IN FEET | (V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	86.4	75.7	61.8	46.7	30.2	16.9	8.8	4.7	2.9	1.1	0.3		
8000	86.4	75.7	61.8	46.7	30.2	16.9	8.8	4.7	2.9	1.1	0.3		
6000	86.4	75.7	61.8	46.7	30.2	16.9	8.8	4.7	2.9	1.1	0.3		
4000	83.2	72.8	58.5	44.9	28.6	15.8	8.2	4.3	2.7	1.0	0.3		
3000	81.0	70.8	56.8	43.1	27.5	15.1	7.8	4.0	2.5	0.9	0.3		
2000	77.2	67.3	53.8	40.5	25.7	13.9	7.1	3.6	2.2	0.7			
1000	70.1	60.8	48.2	35.9	22.4	11.8	5.8	2.9	1.7	0.6			
800	66.5	57.6	45.5	33.6	20.8	10.8	5.3	2.6	1.5	0.5			
600	61.4	53.0	41.6	30.5	18.6	9.4	4.5	2.1	1.3				
400	55.6	47.8	37.2	26.9	16.2	7.9	3.7	1.7	1.0				
300	51.5	44.2	34.2	24.5	14.5	6.9	3.2	1.4	0.8				
200	44.3	37.7	28.8	20.3	11.7	5.3	2.4	1.0	0.5				
150	38.3	32.4	24.5	16.9	9.6	4.2	1.8	0.6					
100	33.3	28.1	21.0	14.2	7.9	3.3	1.3	0.5					
80	29.7	24.9	18.4	12.3	6.7	2.7	1.1						
60	23.8	19.8	14.4	9.4	4.9	1.9	0.7						
50	21.1	17.5	12.6	8.1	4.1	1.5	0.5						
40	18.3	15.1	10.7	6.8	3.4	1.2							
30	14.5	11.8	8.2	5.0	2.4	0.8							
20	9.5	7.6	5.1	3.0	1.3	0.3							
10	3.3	2.6	1.6	0.7									

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

C = 200
I = 48

SURFACE - K = 0.8

(L) UNSHELTERED DISTANCE IN FEET | (V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	76.8	66.9	53.5	40.3	25.5	13.8	7.0	3.6	2.2	0.7			
8000	76.8	66.9	53.5	40.3	25.5	13.8	7.0	3.6	2.2	0.7			
6000	76.4	66.6	53.2	40.0	25.4	13.7	6.9	3.9	2.2	0.7			
4000	73.8	64.2	51.1	38.3	24.1	12.9	6.5	3.3	2.0	0.6			
3000	71.7	62.3	49.5	37.0	23.2	12.2	6.1	3.0	1.8	0.6			
2000	67.7	58.7	46.4	34.4	21.3	11.1	5.5	2.7	1.6	0.5			
1000	59.5	51.3	40.1	29.3	17.8	8.9	4.2	2.0	1.2				
800	57.0	49.1	38.3	27.8	16.8	8.3	3.9	1.8	1.1				
600	53.2	45.7	35.4	25.5	15.2	7.3	3.4	1.6	0.9				
400	47.4	40.5	31.1	22.1	12.9	6.0	2.7	1.2	0.5				
300	43.2	36.8	28.0	19.6	11.3	5.1	2.3	1.0	0.4				
200	36.6	30.9	23.3	16.0	9.0	3.9	1.6	0.5					
150	31.7	26.7	19.8	13.3	7.3	3.0	1.2	0.4					
100	26.4	22.1	16.2	10.6	5.7	2.2	0.8						
80	23.0	19.1	13.9	9.0	4.7	1.7	0.6						
60	18.7	15.4	11.0	6.9	3.5	1.2							
50	15.6	12.8	9.0	5.5	2.7	0.9							
40	13.3	10.8	7.5	4.5	2.2	0.4							
30	10.5	8.5	5.7	3.4	1.6	0.3							
20	5.3	4.2	2.7	1.4	0.6								
10	1.7	1.3	0.7										

* NOTE: SOIL LOSS FOR VALUES WHERE 'E' IS LESS THAN 0.1 OR GREATER THAN 440.0 ARE NOT SHOWN; OTHER VALUES NOT SHOWN ARE INVALID

** NOTE: VALUES SHOWN ARE FLAT SMALL GRAIN EQUIVALENT, NOT 'V'

47

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

C = 200
I = 56

SURFACE - K = 1.0

(L) UNSHELTERED DISTANCE IN FEET	(V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE												
	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	112.0	99.1	81.7	64.5	43.6	26.4	14.8	8.4	5.5	2.3	1.1	0.2	
8000	112.0	99.1	81.7	64.5	43.6	26.4	14.8	8.4	5.5	2.3	1.1	0.2	
6000	112.0	99.1	81.7	64.5	43.6	26.4	14.8	8.4	5.5	2.3	1.1	0.2	
4000	109.8	97.1	79.9	63.0	42.3	25.5	14.2	8.0	5.3	2.2	1.1	0.2	
3000	107.9	95.4	78.3	61.6	41.3	24.8	13.7	7.7	5.0	2.1	1.0	0.2	
2000	104.8	92.5	75.8	59.4	39.7	23.6	12.9	7.2	4.7	1.9	0.9	0.1	
1000	96.1	84.5	68.8	53.3	35.1	20.3	10.9	5.9	3.8	1.5	0.7	0.1	
800	93.0	81.7	66.3	51.2	33.5	19.2	10.2	5.5	3.5	1.3	0.4		
600	86.5	76.2	61.5	47.0	30.4	17.1	9.0	4.7	3.0	1.1	0.3		
400	80.0	69.8	56.0	42.4	27.0	14.8	7.6	3.9	2.4	0.8			
300	75.0	65.3	52.0	39.1	24.7	13.2	6.7	3.4	2.1	0.7			
200	66.7	57.8	45.7	33.8	20.9	10.8	5.3	2.6	1.5	0.5			
150	59.1	50.9	39.8	29.0	17.6	8.8	4.2	2.0	1.1				
100	53.1	45.6	35.4	25.4	15.2	7.1	3.4	1.5	0.9				
80	46.7	41.7	32.1	22.8	13.4	6.3	2.9	1.3	0.6				
60	40.8	34.7	26.3	18.3	10.5	4.7	2.0	0.9	0.4				
50	37.1	31.4	23.6	16.2	9.1	3.9	1.7	0.6					
40	33.7	28.4	21.2	14.4	8.0	3.3	1.4	0.5					
30	27.8	23.3	17.1	11.3	6.1	2.4	0.9						
20	21.0	17.4	12.5	8.0	4.1	1.5	0.5						
10	11.5	9.6	6.6	3.9	1.8	0.4							

BN-0905 (08/99) Bechtel Nevada

Analysis Calc. #: CAL-C-301

Prepared By: [signature]

Checked By: VKr

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(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

C = 200
I = 56

SURFACE - K = 0.9

(L) UNSHELTERED DISTANCE IN FEET	(V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE												
	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	100.8	88.8	72.4	56.6	37.5	22.0	12.0	6.6	4.3	1.7	0.8	0.1	
8000	100.8	88.8	72.6	56.6	37.5	22.0	12.0	6.6	4.3	1.7	0.8	0.1	
6000	100.8	88.8	72.6	56.6	37.5	22.0	12.0	6.6	4.3	1.7	0.8	0.1	
4000	98.1	86.3	70.4	54.7	36.1	21.0	11.4	6.2	4.0	1.6	0.7	0.1	
3000	95.8	84.3	68.6	53.1	34.9	20.2	10.8	5.9	3.8	1.5	0.7	0.1	
2000	92.4	81.4	65.8	50.7	33.2	19.0	10.1	5.4	3.4	1.3	0.4		
1000	83.9	73.4	59.1	45.0	29.0	16.1	8.4	4.4	2.7	1.0	0.3		
800	79.9	69.7	55.5	42.3	27.0	14.8	7.6	3.9	2.4	0.8			
600	75.1	65.4	52.2	39.2	24.7	13.3	6.7	3.4	2.1	0.7			
400	69.6	60.4	47.9	35.6	22.2	11.6	5.8	2.9	1.7	0.5			
300	64.1	55.4	43.7	32.1	19.8	10.1	4.9	2.4	1.4				
200	56.0	48.2	37.5	27.2	16.4	8.0	3.8	1.7	1.0				
150	49.7	42.6	32.9	23.4	13.8	6.5	3.0	1.3	0.6				
100	43.2	36.8	28.1	19.7	11.4	5.1	2.3	1.0	0.4				
80	39.0	33.1	25.0	17.3	9.8	4.3	1.8	0.8	0.3				
60	32.9	27.8	20.7	14.0	7.7	3.2	1.3	0.4					
50	29.7	24.9	18.4	12.3	6.7	2.7	1.1						
40	25.8	21.5	15.7	10.3	5.5	2.1	0.8						
30	21.1	17.5	12.6	8.1	4.2	1.5	0.5						
20	14.9	12.2	8.5	5.2	2.5	0.8							
10	7.4	5.9	3.9	2.2	0.9								

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

C = 200
I = 56

SURFACE - K = 0.8

(L) UNSHELTERED DISTANCE IN FEET	(V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE												
	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	89.6	78.6	63.6	48.8	31.8	18.0	9.5	5.1	3.2	1.2	0.4		
8000	89.6	78.6	63.6	48.8	31.8	18.0	9.5	5.1	3.2	1.2	0.4		
6000	89.6	78.6	63.6	48.8	31.8	18.0	9.5	5.1	3.2	1.2	0.4		
4000	86.5	75.8	61.1	46.8	30.2	16.9	8.9	4.7	2.9	1.1	0.3		
3000	84.3	73.8	59.4	45.3	29.1	16.2	8.4	4.4	2.8	1.0	0.3		
2000	80.1	69.9	56.1	42.5	27.1	14.8	7.6	3.9	2.4	0.9	0.3		
1000	73.0	63.5	50.6	37.8	23.8	12.7	6.3	3.2	1.9	0.6			
800	69.7	60.5	48.0	35.7	22.3	11.7	5.8	2.9	1.7	0.6			
600	64.6	55.9	44.0	32.5	20.0	10.2	5.0	2.4	1.4				
400	58.2	50.2	39.2	28.5	17.3	8.6	4.1	1.9	1.1				
300	54.1	46.5	36.1	26.0	15.6	7.6	3.5	1.6	0.9				
200	47.0	40.1	30.8	21.8	12.8	5.9	2.7	1.2	0.5				
150	40.5	34.4	26.1	18.1	10.4	4.6	2.0	0.8	0.4				
100	35.2	29.7	22.3	15.2	8.5	3.6	1.5	0.5					
80	31.7	26.7	19.9	13.4	7.3	3.0	1.2	0.4					
60	25.5	21.3	15.5	10.2	5.4	2.1	0.8						
50	22.7	18.8	13.6	8.8	4.6	1.7	0.6						
40	20.0	16.5	11.8	7.5	3.8	1.4	0.5						
30	15.8	12.9	9.1	5.6	2.8	0.9							
20	10.7	8.6	5.9	3.4	1.6	0.3							
10	3.9	3.1	1.9	0.9									

* NOTE: SOIL LOSS FOR VALUES WHERE 'E' IS LESS THAN 0.1 OR GREATER THAN 440.0 ARE NOT SHOWN; OTHER VALUES NOT SHOWN ARE INVALID

** NOTE: VALUES SHOWN ARE FLAT SMALL GRAIN EQUIVALENT, NOT 'V'

48

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

C = 200
I = 86

SURFACE - K = 1.0

(L) UNSHELTERED DISTANCE IN FEET | (V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

(L)	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	172.0	155.0	132.3	110.3	80.0	55.5	34.4	22.2	15.9	8.1	4.6	1.1	0.6
8000	172.0	155.0	132.3	110.3	80.0	55.5	34.4	22.2	15.9	8.1	4.6	1.1	0.6
6000	172.0	155.0	132.3	110.3	80.0	55.5	34.4	22.2	15.9	8.1	4.6	1.1	0.6
4000	172.0	155.0	132.3	110.3	80.0	55.5	34.4	22.2	15.9	8.1	4.6	1.1	0.6
3000	171.2	154.3	131.7	109.7	79.5	55.1	34.1	22.0	15.7	8.0	4.6	1.1	0.6
2000	166.9	150.2	127.9	106.2	76.7	52.7	32.4	20.7	14.8	7.4	4.2	1.0	0.6
1000	155.8	139.8	118.4	97.5	69.6	46.8	28.3	17.7	12.5	6.1	3.3	0.8	0.4
800	151.1	135.4	114.4	93.8	66.6	44.3	26.6	16.5	11.6	5.9	3.0	0.7	0.4
600	143.6	128.4	108.0	88.0	62.0	40.6	24.1	14.7	10.2	4.8	2.6	0.2	
400	133.7	119.2	99.7	80.5	56.0	35.9	20.9	12.5	8.6	3.9	2.0	0.2	
300	125.7	111.8	93.0	74.5	51.3	32.3	18.5	10.9	7.3	3.2	1.7	0.2	
200	114.3	101.2	83.6	66.2	44.8	27.4	15.3	8.8	5.8	2.4	1.2	0.2	
150	105.6	93.2	76.5	60.3	40.1	23.9	13.1	7.3	4.8	1.9	0.9	0.1	
100	97.5	85.8	70.0	54.3	35.8	20.8	11.2	6.1	3.9	1.5	0.7	0.1	
80	91.7	80.5	65.3	50.3	32.8	18.7	9.9	5.3	3.4	1.3	0.4		
60	81.4	71.1	57.1	43.3	27.7	15.2	7.9	4.1	2.5	0.9	0.3		
50	75.8	66.0	52.7	39.6	25.1	13.5	6.8	3.5	2.1	0.7			
40	70.5	61.2	48.6	36.2	22.6	11.9	5.9	2.9	1.8	0.6			
30	62.3	53.8	42.3	31.0	19.0	9.6	4.6	2.2	1.3				
20	52.9	45.4	35.2	25.3	15.1	7.3	3.4	1.5	0.9				
10	37.7	31.9	24.1	16.6	9.4	4.1	1.7	0.6					

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

C = 200
I = 86

SURFACE - K = 0.5

(L) UNSHELTERED DISTANCE IN FEET | (V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

(L)	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	154.8	138.9	117.5	96.7	68.9	46.2	27.9	17.5	12.3	5.9	3.3	0.8	0.4
8000	154.8	138.9	117.5	96.7	68.9	46.2	27.9	17.5	12.3	5.9	3.3	0.8	0.4
6000	154.8	138.9	117.5	96.7	68.9	46.2	27.9	17.5	12.3	5.9	3.3	0.8	0.4
4000	153.5	137.7	116.4	95.7	68.1	45.6	27.5	17.1	12.0	5.8	3.2	0.7	0.4
3000	151.2	135.6	114.5	93.9	66.7	44.4	26.7	16.6	11.6	5.6	3.0	0.7	0.4
2000	147.8	132.3	111.6	91.2	64.5	42.7	25.5	15.7	10.9	5.2	2.8	0.6	
1000	138.5	123.7	103.7	84.1	58.8	38.1	22.4	13.6	9.3	4.3	2.3	0.2	
800	135.0	120.4	100.8	81.5	56.7	36.5	21.3	12.8	8.8	4.0	2.1	0.2	
600	127.6	113.6	94.6	76.0	52.4	33.1	19.1	11.3	7.6	3.4	1.7	0.2	
400	118.3	105.0	86.5	69.1	47.1	29.1	16.4	9.5	6.3	2.7	1.4	0.2	
300	111.5	98.6	81.3	64.2	43.3	26.2	14.6	8.3	5.5	2.3	1.1	0.2	
200	102.7	90.6	74.1	57.9	38.5	22.8	12.4	6.9	4.5	1.8	0.9	0.1	
150	94.4	82.9	67.4	52.1	34.2	19.7	10.5	5.7	3.6	1.4	0.4		
100	85.9	75.2	60.6	46.3	29.9	16.7	8.7	4.6	2.9	1.1	0.3		
80	79.3	69.2	55.5	42.0	26.7	14.6	7.5	3.8	2.4	0.8			
60	71.5	62.2	49.4	36.9	23.1	12.2	6.1	3.0	1.8	0.6			
50	65.8	57.0	45.0	33.2	20.5	10.6	5.2	2.5	1.5	0.5			
40	59.5	51.7	40.5	29.6	18.0	9.0	4.3	2.0	1.2				
30	53.9	46.3	35.9	25.9	15.5	7.5	3.5	1.6	0.9				
20	44.4	37.9	28.9	20.3	11.8	5.4	2.4	1.0	0.5				
10	30.5	25.6	19.0	12.7	6.9	2.8	1.1	0.4					

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR — JANUARY,1981

C = 200
I = 86

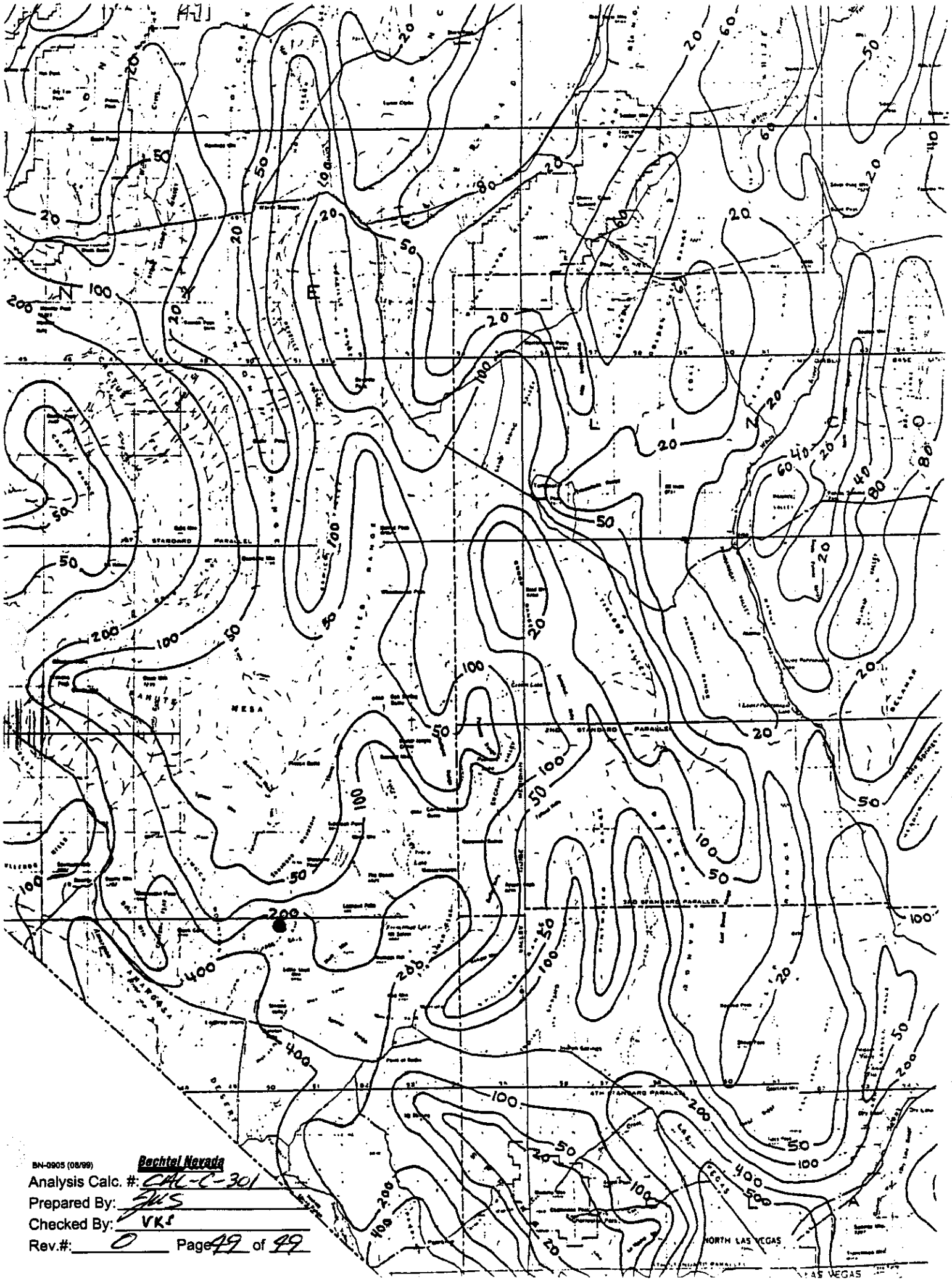
SURFACE - K = 0.2

(L) UNSHELTERED DISTANCE IN FEET | (V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

(L)	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	137.6	122.8	103.0	83.5	58.3	37.7	22.2	13.4	9.2	4.2	2.2	0.2	
8000	137.6	122.8	103.0	83.5	58.3	37.7	22.2	13.4	9.2	4.2	2.2	0.2	
6000	137.6	122.8	103.0	83.5	58.3	37.7	22.2	13.4	9.2	4.2	2.2	0.2	
4000	136.2	119.7	100.1	80.9	56.3	36.1	21.1	12.6	8.6	3.9	2.1	0.2	
3000	132.1	117.7	98.3	79.3	55.0	35.1	20.4	12.2	8.3	3.7	1.9	0.2	
2000	130.3	116.1	96.8	78.0	54.0	34.3	19.9	11.8	8.0	3.6	1.9	0.2	
1000	117.7	104.4	86.4	68.7	46.7	28.8	16.3	9.4	6.3	2.7	1.3	0.2	
800	114.9	101.8	84.0	66.6	45.1	27.6	15.5	8.9	5.9	2.5	1.2	0.2	
600	109.6	96.9	79.7	62.8	42.2	25.5	14.1	8.0	5.2	2.2	1.1	0.2	
400	103.1	91.0	74.5	58.2	38.7	22.9	12.5	7.0	4.5	1.9	0.9	0.1	
300	98.0	86.2	70.3	54.6	36.0	21.0	11.3	6.2	4.0	1.6	0.7	0.1	
200	87.8	77.0	62.7	47.6	30.9	17.4	9.1	4.8	3.0	1.1	0.4		
150	80.0	69.8	56.0	42.4	27.0	14.8	7.6	3.9	2.4	0.8			
100	73.5	64.0	50.9	38.2	24.0	12.8	6.4	3.2	2.0	0.6			
80	67.9	58.9	46.6	34.5	21.5	11.2	5.5	2.7	1.6	0.5			
60	59.2	51.1	40.0	29.1	17.7	8.8	4.2	2.0	1.2				
50	55.1	47.4	36.8	26.6	16.0	7.8	3.6	1.7	1.0				
40	50.9	43.6	33.7	24.1	14.3	6.8	3.1	1.4	0.8				
30	43.2	36.8	28.1	19.7	11.4	5.1	2.3	1.0	0.4				
20	34.8	29.4	22.0	15.0	8.4	3.5	1.5	0.5					
10	20.4	16.9	12.1	7.7	4.0	1.4	0.5						

* NOTE: SOIL LOSS FOR VALUES WHERE 'E' IS LESS THAN 0.1 OR GREATER THAN 440.0 ARE NOT SHOWN; OTHER VALUES NOT SHOWN ARE INVALID.

** NOTE: VALUES SHOWN ARE FLAT SMALL GRAIN EQUIVALENT, NOT ACTUAL.


A-1
MESA
NORTH LAS VEGAS
LAS VEGAS

APPENDIX B

PROJECT ORGANIZATION

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PROJECT ORGANIZATION

The U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office (NNSA/NV) Project Manager or Task Manager will serve as the primary point of contact for all activities conducted for this project. The NNSA/NV Project Manager is responsible for seeing that all activities conducted during the project fulfill the obligations of NNSA/NV, as described in the Federal Facility Agreement and Consent Order of 1996 (as amended) and the Nevada Division of Environmental Protection (NDEP) approved work plan. The NNSA/NV Project Manager will plan, authorize, and control project work so that activities are completed in accordance with the work plan on schedule and within budget. The NNSA/NV Project Manager will be the primary point of contact with the NDEP. The NNSA/NV points of contact for this project are as follows:

NNSA/NV Project Manager: Janet Appenzeller-Wing
Telephone Number: (702) 295-0461

NNSA/NV Task Manager: Sabine Curtis
Telephone Number: (702) 295-0542

The identification of the project Health and Safety Officer and other BN site personnel can be found in the appropriate plan (the Field Management Plan and the Site-Specific Health and Safety Plan). However, personnel are subject to change and it is suggested that the NNSA/NV Project Manager be contacted for further information.

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APPENDIX C
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION DOCUMENT REVIEW SHEET

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NEVADA ENVIRONMENTAL RESTORATION PROJECT
DOCUMENT REVIEW SHEET

1. Document Title/Number Draft Corrective Action Plan for Corrective Action Unit 262: Area 25, Septic Systems and Underground Discharge Point, Nevada Test Site, Nevada
2. Document Date May 2002
3. Revision Number 0
4. Originator/Organization Bechtel Nevada
5. Responsible NNSA/NV ERP Project Mgr. Janet Appenzeller-Wing
6. Date Comments Due May 30, 2002
7. Review Criteria Federal Facility Agreement and Consent Order
8. Reviewer/Organization/Phone No. John Wong / Nevada Division of Environmental Protection / (702) 486-2866
9. Reviewer's Signature _____

10. Comment Number/ Location	11. Type[a]	12. Comment	13. Comment Response	14. Accept
1. pg. 25, Section 4.0	M	Several of the CASs that will be closed in place received radiological and hazardous effluent: given that COCs are being left in place above regulatory levels at these sites, post-closure monitoring will be necessary for the first three years after closure. At that point, the NNSA/NV can propose a less frequent monitoring schedule. As with other sites that currently have post-closure monitoring, NDEP is not likely to agree to a complete termination of monitoring activities with in the first thirty years after closure. Modify the discussion on completion of post-closure monitoring to allow flexibility with respect to the completion of post-closure monitoring.	The text of section 4.0 has been changed to read as follows: "If after three years, monitoring indicates that no maintenance requirements are necessary, the NNSA/NV may propose to the NDEP a change in the post-closure monitoring frequency."	Yes

[a]Comment Types: M = Mandatory, S = Suggested.

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Project Manager
Environmental Restoration Division
U.S. Department of Energy
National Nuclear Security Administration
Nevada Operations Office
P.O. Box 98518 M/S 505
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Sabine Curtis — 1 (Uncontrolled)*
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