Nevada
Environmental
Restoration
Project

DOE/NV--733

Closure Report for
Corrective Action Unit 110:
Areas 3 RWMS
U-3ax/bl Disposal Unit
Nevada Test Site, Nevada

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Revision: 1

August 2001

Environmental Restoration
Division

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**CLOSURE REPORT FOR
CORRECTIVE ACTION UNIT 110:
AREA 3 RWMS U-3ax/bl DISPOSAL SITE
NEVADA TEST SITE, NEVADA**

**Prepared for the
U. S. Department of Energy
National Nuclear Security Administration
Nevada Operations Office
Work Performed Under Contract No. DE-AC08-96NV11718**

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CORRECTIVE ACTION UNIT 110:
AREA 3 RWMS U-3ax/bl DISPOSAL SITE
NEVADA TEST SITE, NEVADA**

Revision 1

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ACRONYMS AND ABBREVIATIONS

ac	Acre
CAU	Corrective Action Unit
cm	centimeter
CP	Closure Plan
CR	Closure Report
DCN	Design Change Notice
DOE	U.S. Department of Energy
DOE/NV	U.S. Department of Energy, Nevada Operations Office
DQO	Data Quality Objective
EPA	U. S. Environmental Protection Agency
FFACO	Federal Facility Agreement and Consent Order
ft	feet/foot
ft ³	cubic feet
ha	hectare
in	inch
kg	Kilograms
lb	Pound

ACRONYMS AND ABBREVIATIONS (CONTINUED)

m	meter
m ³	cubic meters
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NTS	Nevada Test Site
PVC	Polyvinyl Chloride
QAP	Quality Assurance Plan
RCRA	Resource Conservation and Recovery Act
RWMS	Radioactive Waste Management Site
TDR	Time-Domain Reflectometry
yd ³	cubic yards
yr	year

EXECUTIVE SUMMARY

The Area 3 U-3ax/bl Disposal Unit, Corrective Action Unit (CAU) 110, which consists of one Corrective Action Site 03-23-04, was closed in accordance with the reissued (November 2000) Resource Conservation and Recovery Act (RCRA) Part B operational permit NEV HW009 (NDEP, 2000) and the Federal Facility Agreement and Consent Order (Nevada Division of Environmental Protection [NDEP] et al., 1996). The U-3ax/bl is a historic disposal unit within the Area 3 Radioactive Waste Management Site located on the Nevada Test Site (NTS). The unit, which was formed by excavating the area between two subsidence craters (U-3ax and U-3bl), was operationally closed in 1987. The U-3ax/bl disposal unit was closed under the RCRA, as a hazardous waste landfill.

Existing records indicate that, from July 1968 to December 1987, U-3ax/bl received 2.3×10^5 cubic meters (8.12×10^6 cubic feet) of waste. NTS nuclear device testing generated approximately 95 percent of the total waste volume disposed of in U-3ax/bl; 80 percent of the total volume was generated from the Waste Consolidation Project (Elletson and Johnjack, 1995).

Area 3 is located in Yucca Flat, within the northeast quadrant of the NTS. The Yucca Flat watershed is a structurally closed basin encompassing an area of approximately 780 square kilometers (300 square miles). The structural geomorphology of Yucca Flat is typical of the Basin and Range Physiographic Province. Yucca Flat lies in one of the most arid regions of the country. Water balance calculations for Area 3 indicate that it is continuously in a state of moisture deficit.

The U-3ax/bl Disposal Unit was closed in place by installing a RCRA equivalent cover. Following cover construction, a fence was installed around the cover to prevent accidental damage to the cover.

Closure of CAU 110 was completed using a NDEP approved Closure Plan, Revision 0, dated August 2000 (U.S. Department of Energy, Nevada Operations Office [DOE/NV], 2000). The closure plan was based on the recommendations presented in the characterization report (DOE/NV, 1999). The Area 3 U-3ax/bl Disposal Unit, CAU 110, was closed in the following manner:

- The Area 3 U-3ax/bl Waste Disposal Unit was closed in place by installing a monolayer vegetative cover. Following cover construction, a fence was constructed around the cover to prevent accidental damage to the cover.

Closure activities were certified by an independent registered professional engineer. Post-closure monitoring will consist of site inspections to determine the condition of the engineered cover and cover performance monitoring using Time-Domain Reflectometry arrays to monitor moisture migration in the cover. Any identified maintenance and repair requirements will be remedied within 60 working days of discovery and documented in writing at the time of repair. Results of all inspections/repairs for a given year will be addressed in a single report submitted annually to the NDEP. Soil moisture will be monitored within the cover for a period of at least two years prior to establishing performance criteria for NDEP regulatory purposes.

1.0 INTRODUCTION

This Closure Report (CR) has been prepared for the Area 3 Radioactive Waste Management Site (RWMS) U-3ax/bl Disposal Unit Corrective Action Unit (CAU) 110 in accordance with the reissued (November 2000) Resource Conservation and Recovery Act (RCRA) Part B operational permit NEV HW009 (Nevada Division of Environmental Protection [NDEP], 2000) and the Federal Facility and Consent Order (FFACO) (NDEP et al., 1996). CAU 110 consists of one Corrective Action Site 03-23-04, described as the U-3ax/bl Subsidence Crater. Certifications of closure are located in Appendix A.

The U-3ax/bl is a historic disposal unit within the Area 3 RWMS located on the Nevada Test Site (NTS) (Figure 1). The unit, which was formed by excavating the area between two subsidence craters (U-3ax and U-3bl), was operationally closed in 1987. The U-3ax/bl disposal unit was closed under the RCRA, as a hazardous waste landfill (Figure 2).

Existing records indicate that, from July 1968 to December 1987, U-3ax/bl received 2.3×10^5 cubic meters (m^3) (8.12×10^6 cubic feet [ft^3]) of waste. NTS atmospheric nuclear device testing generated approximately 95 percent of the total waste volume disposed of in U-3ax/bl; 80 percent of the total volume was generated from the Waste Consolidation Project (Elletson and Johnejack, 1995).

Area 3 is located in Yucca Flat, within the northeast quadrant of the NTS. The Yucca Flat watershed is a structurally closed basin encompassing an area of approximately 780 square kilometers (300 square miles). The structural geomorphology of Yucca Flat is typical of the Basin and Range Physiographic Province. Yucca Flat lies in one of the most arid regions of the country. Water balance calculations for Area 3 indicate that it is normally in a state of moisture deficit (U.S. Department of Energy, Nevada Operations Office [DOE/NV], 1999).

1.1 PURPOSE

The Area 3 RWMS U-3ax/bl Disposal Unit was identified as a historic RCRA site in the RCRA Part B Permit issued by NDEP Permit Number NEV HW009 (NDEP, 1995). This permit specifies that the unit be closed under Title 40 Code of Federal Regulations 265 (U. S. Environmental Protection Agency [EPA], 1996b) closure requirements for interim status facilities. Additionally, closure requirements, include U. S. Department of Energy (DOE) Order 5820.2A (DOE, 1988) and DOE Order 435.1. A Closure Plan (CP) (DOE/NV, 2000) was

FIGURE 1
 CAU 110 SITE LOCATION MAP

FIGURE - 2
CAU 110 SITE VICINITY MAP

developed for the U-3ax/bl Disposal Unit to address all of the above requirements. The purpose of this CR is to document that the closure of the Area 3 RWMS U-3ax/bl Disposal Unit complied with all of the CP closure requirements.

1.2 SCOPE

The recommended closure strategy for the Area 3 RWMS U-3ax/bl Disposal Unit was closure in place with a RCRA equivalent cover. The approved closure strategy consisted of the following activities:

- Preplanning and site preparation.
- Closure of 11 polyvinyl chloride (PVC) monitoring wells located around the perimeter of U-3ax/bl. The CP identified only nine monitoring wells, two additional wells were located and closed during the closure field activities. Closure was accomplished by removing the PVC piping to a depth of 0.3 meters (m) (1.0 foot [ft]) below existing grade. The remainder of the pipe was filled with grout, and a 0.3-m (1-ft) concrete cap was installed over the monitoring well.
- Installation of four time-domain reflectometry (TDR) monitoring instrumentation nests in the cover to monitor cover performance.
- Construction of a monolayer cover by adding an additional 0.3 m (1 ft) of fill on top of the operational cover.
- Seeding the monolayer cover with native shallow rooting vegetation.
- Installation of a irrigation system over the entire cover to augment natural rainfall and promote vegetation growth.
- Installation of a fence and signs around the cover to prevent animals from eating the native vegetation and keep unauthorized personnel from performing intrusive activities on the monolayer vegetative cover.
- Post-closure cover monitoring has been started. Cover performance monitoring will be performed for a two-year period prior to negotiating post-closure criteria with the NDEP.

However, the Permit will be modified by NDEP to reflect post-closure inspections and subsidence survey requirements.

1.3 CR CONTENTS

This CR is divided into the following sections:

Section 1.0 - Introduction
Section 2.0 - Closure Activities
Section 3.0 - Waste Disposition
Section 4.0 - Closure Verification
Section 5.0 - Conclusions and Recommendations
Section 6.0 - References

The appendices of this document have been modified from the approved March 2001 FFACO outline. The following FFACO outline appendices have either not been included or revised as indicated below:

- Data Quality Objectives (DQOs) as developed in the Corrective Action Decision Document - DQOs were not developed for the closure of the Area 3 U-3ax/bl Disposal Unit. The monolayer cover was constructed to the criteria specified in the Construction Quality Assurance Plan.
- Confirmation Sampling Test Results - The U-3ax/bl Disposal Unit was closed by installation of a monolayer vegetative cover. Verification samples were not required.
- Waste Disposition Documentation - Hazardous or radiological waste was not generated during the closure activities. All waste was surveyed and disposed in the Area 3 Radiological Waste Management Area dumpster. The waste in the dumpster is disposed within the Area 23 landfill on a weekly basis.
- Modifications to the Post-Closure Plan - Modifications have not been proposed to the post-closure monitoring plan.

The following documents were used to develop this closure report:

- Characterization Report for Corrective Action Unit 110: Area 3 U-3ax/bl Disposal Unit, Nevada Test Site, Nevada, Rev. 0, DOE/NV-580; November 1999 (DOE/NV, 1999).

- Closure Plan for Corrective Action Unit 110: Area 3 RWMS U-3ax/bl Disposal Unit, Nevada Test Site, Nevada; Rev. 0, DOE/NV-647, August 2000 (DOE/NV, 2000).

No DQOs were developed for the construction of the Area 3 U-3ax/bl Disposal Unit cover. The landfill cover construction activities were controlled by the construction drawings in the Construction Quality Assurance Plan located in Appendix A-1 of the CP (DOE/NV, 2000).

2.0 CLOSURE ACTIVITIES

This section of the CR details the specific activities involved in the closure of CAU 110.

2.1 DESCRIPTION OF CORRECTIVE ACTION ACTIVITIES

Closure of CAU 110 was completed using the approved Closure Plan for Corrective Action Unit 110: Area 3 RWMS U-3ax/bl Disposal Unit, Nevada Test Site, Nevada, Revision 0, dated August 2000 (DOE/NV, 2000). The CP was based on the recommendations in the Characterization Report for Corrective Action Unit 110: U-3ax/bl Disposal Unit, Nevada Test Site, Nevada (DOE/NV, 1999). The characterization report was developed from a number of characterization studies performed for the DOE/NV Waste Management Division. Before the closure activities began, the following prefield activities were completed:

- Preparation of National Environmental Policy Act documentation.
- Preparation of the Site-Specific Health and Safety Plan.
- Preparation of the Field Management Plan.

The following is the scope of the closure actions implemented for CAU 110. Hold and check points identified in the Closure Plan Construction Quality Assurance Plan (DOE/NV, 2000) were approved in the field and a copy of the completed form is provided in Appendix B.

2.1.1 Installation of Time-Domain Reflectometry Instrumentation Nests

The following activities were required to install the post-closure monitoring cover performance instrumentation. TDR instruments are used to calculate the moisture content of the soil at a specific location. By installing TDR probes at a number of depths, a moisture profile can be developed. This vertical moisture profile can be used to verify that cover design is effectively removing moisture from the vegetative cover. The TDR installation field activities were conducted between October 29, 2000 through November 7, 2000:

- Based on the operational cover geotechnical analysis (DOE/NV, 2000), a backfill compaction standard of 80 percent was established. The compaction standard was developed for a number of different compaction techniques (Appendix C). A test pit located

just outside of the cover was used to determine the number of passes, using different equipment, required to achieve the required 80 percent compaction. Performance standards were established for the following compaction techniques: foot tamping, backhoe wheel rolling, and mechanical thumping.

- Four 0.6-m (2-ft) deep trenches were excavated across the cover (Figure 3) to bury the TDR cables. The trenches were angled so that two sets of "V" trenches were formed. The center of the "V" was located just outside of the monolayer cover. The cabling from the two TDR nests were wired into a data logger located on a instrument panel found at the point of each "V". To protect the cabling from moisture, the cabling was run through a sealed 7.62 centimeter (cm) (3 inch [in]) diameter flexible PVC conduit.
- The four trenches were backfilled and wheel-rolled according to the performance standard developed to achieve the specified 80 percent compaction.
- Four TDR nests were excavated (Figure 3). Each nest was excavated to a depth of 1.8-m (6-ft) below ground surface. The excavation followed the benching requirements specified in the Design Change Notice (DCN) number: DCN 01/10-449. A total of eight TDR instruments was installed in each nest. Each TDR instrument was staggered within the excavation to prevent any preferential pathways for moisture to enter the monitoring system. The bottom TDR instrument was installed by hand excavating 0.3-m (1-ft) into the operational cover. The soil on top of all TDR instruments was compacted by using the foot-tamping performance standard. Areas of the excavation not directly over a TDR instrument were compacted using the mechanical thumper compaction standard. The top TDR instrument was placed on the ground surface. An additional 0.3-m (1-ft) of soil was placed on top of the TDR instrument and compacted to 80 percent using the foot-tamping performance standard. A diagram of a TDR monitoring nest is provided as Figure 4.
- The two data loggers are connected to a wireless signaling system which connect to a land based telephone line located in the Area 3 RWMS office building. This system allow off-site downloading of TDR data, which reduces monitoring costs.
- TDR soil moisture calibration curves (Appendix I) were developed for the U-3ax/bl by using cover soil compacted to 80 percent. The soil surrounding the TDR probe is moistened to a known moisture content. The reading is recorded and the experiment is repeated using different soil moisture percentages until a calibration curve is developed. Direct TDR

FIGURE 3
PLAN VIEW OF TDR NESTS AND TRENCHES

FIGURE 4
 TDR INSTALLATION DIAGRAM

measurements from the TDR nests are then compared to the calibration curve and a soil moisture percentage is estimated. Additional information on the post-closure monitoring program is provided in Section 5.1 of this CR.

2.1.2 Installation of Monolayer Cover

This section outlines the activities required to construct the monolayer cover. An 2.5-m to 3-m (8-ft to 10-ft) operational cover was constructed over the U-3ax/bl waste unit in 1987. Subsidence and hydrologic modeling (DOE/NV, 2000) determined that only an additional 0.3 m (1 ft) of soil was required to meet the monolayer cover performance criteria. The monolayer cover installation field activities were conducted between October 30, 2000 through December 7, 2000. Specific construction details are provided below.

- Native soil was obtained from the Area 3 borrow pit located approximately 5 kilometers (3 miles) southwest of the Area 3 RWMS. Geotechnical tests of the borrow pit soil confirmed that it was similar to the material used in constructing the operational cover in 1987.
- Bull dozers and front-end loaders were used to stockpile borrow material. On average four belly dump trucks were used to transport the borrow material to the U-3ax/bl cover. Each belly dump truck transported approximately 14.2 m³ (18 cubic yards [yd³]) of borrow material.
- Due to surface contamination radiological posting requirements and to minimize/eliminate the requirement to decontaminate equipment, belly dump trucks were restricted to areas of the cover that had imported borrow material spread on the surface. A front-end loader, dozer, and grader were used to push the borrow material onto the U-3ax/bl cover. This operation was conducted in a manner that prevented any equipment coming in contact with the original operational cover surface. Approximately 11, 571 m³ (15,125 yd³) of borrow material was transported to and placed on to the operational cover.
- Survey grade stakes were installed to direct cover grading operations across the 3 hectares (ha) (7.5 acre [ac]) monolayer cover. After the final grade was established across the monolayer cover, a final elevation survey was conducted to "as-built" the monolayer cover.

- Seven subsidence monuments were installed across the monolayer cover. The locations of the subsidence monuments are provided in Figure 3. Each monument was surveyed and location and elevation information engraved on a brass plate attached to the center of each monument.

2.1.3 Planting Native Vegetation

To enhance the moisture removal capabilities of the monolayer cover, a mixture of shallow rooting native plants were identified for the U-3ax/bl monolayer cover. The native plants will intercept committed precipitation before it can reach the waste unit. The planting field activities were conducted between November 28, 2000 through December 6, 2000. Specific construction details are provided below.

- The monolayer cover surface was disked to a depth of 0.3 m (1 ft) to provide an ideal soil condition for the establishment of the selected native species seeds.
- Seeding was accomplished at a broadcast-seeding rate of 22.79 kilograms (kg) per ha (20.33 pounds [lb] per ac) of pure live seed. Seeds were planted using a tractor-drawn seed drill. A drag chain was used to cover the planted seeds. A list of the species and relative abundance is provided in Appendix D.
- Straw mulch was applied over the seeded cover to protect the seeds from erosion and to increase soil moisture content in the upper 15-cm (6-in) of the cover. The straw was applied at a rate of 4,484 kg/ha (4,000 lb/ac) using a straw blower. The mulch is held in place by crimping the ends of the straw into the cover using a tractor-drawn disk crimper.
- In order to establish the seeds that were installed in the monolayer cover, the natural precipitation required augmentation. The Area 3 RWMS receives on average 17 cm per year (yr) (6.69 in/yr); optimal revegetation requires 25 cm/yr (9.84 in/yr) of rainfall. A sprinkling irrigation system was installed across the monolayer cover. The irrigation system is fed from a Baker tank that is filled by water trucks on an "as needed" basis. The goal of the irrigation program is to augment natural precipitation and keep the upper 15 cm (6 in) of the monolayer cover moist. Irrigation activities are scheduled on an "as needed" basis from January 2001 through June 2001.
- After the vegetation has become established, the irrigation system will be removed from the site. Irrigation activities are scheduled to be completed by June 30, 2001.

2.1.4 Closure of PVC Monitoring Wells

Nine PVC monitoring wells were identified in the CP, however eleven PVC monitoring wells were installed along the slope of the U-3bl portion of the U-3ax/bl waste disposal unit. It is thought that these PVC monitoring wells were installed to provide waste cell water content information through neutron logging. During the U-3ax/bl landfill operations and installation of the operational cover, the majority of these PVC wells were crushed within 6 m (20 ft) of the ground surface. Since these PVC monitoring wells could not be used for any post-closure monitoring purposes, they were closed following Nevada Administrative Code (NAC) 534.421, Plugging: Wells for Purposes Other Than Water Wells. The well closure activities were conducted between November 28, 2000 through December 6, 2000. Closure activities consisted of the following:

- A 0.3-m (1-ft) long by 0.3-m (1-ft) wide by 20-cm (8-in) deep hole was hand dug around each PVC monitoring well.
- A hand saw was used to cut the exposed PVC piping flush with the bottom of the excavated surface.
- A neat cement grout was used to fill the PVC monitoring well from the base or crushed end to the ground surface. The neat cement grout was allowed to set and additional material was placed into the monitoring well if any settling occurred.
- A 0.3-m (1-ft) long by 0.3-m (1-ft) wide by 20-cm (8-in) high cement grout plug was poured to cover the top of the closed monitoring well. This plug blocks any potential preferential pathway for runoff to migrate into the U-3ax/bl waste unit.

2.1.5 Installation of Monolayer Cover Fence

To prevent indiscriminate access of personnel or animals to the monolayer vegetative cover, a fence was installed around the cover. A single entry gate was installed near the northwest corner of the cover (Figure 3). Site access information and identification signs are installed on the fencing to meet hazard notification requirements. The fence construction activities were conducted between December 7, 2000 through January 25, 2001. Detailed fencing construction details are provided below.

- Fence posts were driven into the ground in 1.5-m (5-ft) intervals around the cover. Each fence post was driven approximately 0.56-m (22-in) into the ground with approximately 1.2-m (4-ft) of fence post exposed.
- Four smooth strand wire lengths were attached between the fence posts around the monolayer vegetative cover. The lengths of smooth wire were installed as close to equal distant apart as possible.
- A grader was used to excavate an approximately 0.3-m (1-ft) v-shaped trench of soil from the base of the fence. This excavation was required for the installation of chicken wire mesh around the exterior of the monolayer vegetative cover. The chicken wire mesh is required to keep animals from borrowing under the fence and destroying the vegetation.
- After the chicken wire mesh has been installed, the grader was used to replace the 0.3-m (1-ft) of soil that was removed.
- Warning signs were installed on the fence every 61-m (200-ft) along the exterior of the U-3ax/bl monolayer vegetative cover.

2.2 DEVIATIONS FROM CP AS APPROVED

Two DCNs and an E-mail were requested and approved during construction of the monolayer vegetative cover. Each change was associated with the Construction Quality Assurance Plan (QAP) located in Appendix A-1 of the Closure Plan (DOE/NV, 2000). Each change is discussed separately below and are found in Appendix E. In addition to the engineering DCNs and e-mail, two additional PVC monitoring wells were discovered and closed per Section 2.1.4.

2.2.1 DCN No. 01/10-448

This DCN was required to support the excavation of the TDR installation nests. The Construction QAP drawing JS-003-00004-C3 required that the construction crew use portable shoring to support the side walls of the excavation. The drawings did not allow the use of benching techniques to stabilize the sides of the excavation. No shoring was available so the Construction QAP drawing was modified to allow for benching on both sides of the excavation.

2.2.2 DCN No. 01/10-449

This DCN clarified how the compaction performance standard would be established. The size of the test pit was reduced from 1-m (3-ft) by 4.9-m (16-ft) to 1-m (3-ft) by 1.8-m (6-ft). Reducing the size of the test pit did not affect the compaction performance standard accuracy or methodology. Reducing the size of the test pit provided the same results while reducing the time and resources required to obtain the compaction performance standard data.

2.2.3 November 11, 2000 E-mail

The Bechtel Nevada design engineer assigned to the U-3ax/bl Disposal Unit closure project, authorized a deviation from the Construction QAP in an November 11, 2000 E-mail. The E-mail was to be followed with a DCN formalizing this change. This DCN was not issued during the construction phase of the project. In lieu of a DCN, the "as constructed" survey data were evaluated against the authorization requirements of the E-mail and these changes were incorporated into the final "as built" engineering drawings. The e-mail authorized reducing the size of the final fence perimeter. The final fence location was reduced to the perimeter of the old radiological delineation fence line. The Construction QAP drawing JS-003-00004-C2 fence perimeter was larger than is required to address radiological or safety concerns. By reducing the perimeter of the fence line to the original radiological control perimeter, the amount of acreage requiring post-closure inspection/maintenance was significantly reduced.

In addition to reducing the fence perimeter, the location of the access gate was relocated from the south side of the cover to the west side. The gate location was moved to provide easier access into the U-3ax/bl monolayer vegetative cover from the Area 3 RWMS office area.

2.2.4 PVC Monitoring Well Closure

Two additional PVC monitoring wells were discovered hidden in low areas filled with tumble weeds. These monitoring wells were similar in construction to the nine previously identified PVC monitoring wells. These newly identified wells were closed in the same manner and time frame as the nine PVC monitoring wells identified in the CP.

2.3 CAU 110 CLOSURE ACTIVITIES SCHEDULE

The completed closure field activities schedule can be found in Figure 5. Activities such as post-

closure monitoring and irrigation of the vegetative cover are ongoing and are not included in the schedule.

2.4 CAU 110 FINAL SURVEY "AS BUILT" DIAGRAMS

The final engineering "as built" drawings for the CAU 110 Area 3 U-3ax/bl Disposal Unit are provided in Appendix F of this report. The information included in Appendix C (compaction performance standard geotechnical data) and Appendix E (engineering DCNs) along with final survey data were used to complete the final engineering "as built" drawings provided in Appendix F.

FIGURE - 5
CLOSURE FIELD SCHEDULE

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3.0 WASTE DISPOSITION

Waste generated from CAU 110 closure activities consisted of non-radiologically impacted personal protective equipment and sanitary trash. All waste was surveyed to verify that it met release criteria. Once verified, the waste was bagged and disposed of in the Area 3 RWMS dumpster. The waste in the dumpster is disposed within the Area 23 landfill on a weekly basis.

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Section: Waste Disposition
Revision: 1
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4.0 CLOSURE VERIFICATION

The U-3ax/bl Disposal Unit was closed by constructing an engineered cover. Closure verification consisted of the completion of the CAU 110 Remediation, U-3ax/bl Disposal Unit Closure Approval Matrix and Checklist located in Appendix B. Guidance for the cover construction and verification was provided in the approved Construction QAP (Appendices A-1, DOE/NV, 2000).

4.1 DATA QUALITY ASSESSMENT

The closure of the Area 3 U-3ax/bl Disposal Unit did not require the development of DQOs. Following EPA guidance for landfill closures, a Construction QAP was developed (EPA, 1991). The Construction QAP included a CAU 110 U-3ax/bl Disposal Unit Closure Approval Matrix and Checklist (Appendix B) which verified that all of the quality assurance check and hold points were verified in the field prior to progressing to the next closure task.

4.2 LAND-USE RESTRICTIONS

The Area 3 U-3ax/bl Disposal Unit has been closed in accordance with the approved closure plan (DOE/NV, 2000). This landfill has been fenced and posted with signs reading "Subsurface Radiologic Contamination". The future use of any land related to the U-3ax/bl Disposal Unit is restricted from any activity that may alter or modify the containment control as approved by the state of Nevada and identified in this document or any other CAU 110 documentation unless appropriate concurrence from the NDEP is obtained in advance.

The specific location and monitoring requirements for the Area 3 U-3ax/bl site was recorded on the CAU Use Restriction Information Form. The information on the completed form is added into the DOE/NV Facility Information Management System and the Central Data Repository. The original CAU Land Use Restriction Form was filed within the U-3ax/bl Disposal Unit project file. A copy of the CAU Use Restriction Information is included in Appendix G of this report. The post-closure monitoring requirements for CAU 110 are outlined in Section 5.1.

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5.0 CONCLUSIONS AND RECOMMENDATIONS

Closure of the Area 3 U-3ax/bl Disposal Unit was accomplished by completing the following tasks:

- Closure of eleven PVC monitoring wells located around the perimeter of U-3ax/bl. The CP identified only nine monitoring wells, two additional wells were located and closed during the closure field activities. Closure was accomplished by removing the PVC piping to a depth of 0.3-m (1-ft) below existing grade. The remainder of the pipe was filled with grout and a 0.3-m (1-ft) concrete cap installed over the monitoring well.
- Installation of four TDR cover monitoring instrumentation nests to monitor cover performance.
- Construction of a monolayer cover by adding an additional 0.3-m (1-ft) of fill on top of the operational cover.
- Seeding the monolayer cover with native shallow rooting vegetation.
- Installation of a irrigation system over the entire cover to augment natural rainfall and promote vegetation growth.
- Installation of a fence and signs around the cover to prevent animals from eating the native vegetation and keep unauthorized personnel from performing intrusive activities on the monolayer vegetative cover.

5.1 POST-CLOSURE MONITORING REQUIREMENTS

The components of the Area 3 U-3ax/bl Disposal Unit post-closure monitoring plan are provided below.

5.1.1 Inspections

Inspections will be done on a quarterly basis. Inspections will consist of visual observations to check that the cover is intact. Each site inspection will be documented on a site inspection form.

The post-closure inspection will consist of the following elements:

- A detailed inspection of the cover fencing. The perimeter of the fencing will be walked by the inspector and the condition of the fencing and chicken wire, warning signs, and entrance gate and lock will be documented every six months.
- The condition of the seven survey subsidence markers will be inspected every six months. In addition, on an biannual basis, all seven survey markers will be resurveyed to determine if the cover has subsided.
- During each inspection, any changes in the condition of the cover or fenced area will be documented. Specific changes noted on the current condition of the cover include, but are not limited to, trash/debris within the fenced compound, animal burrows/nesting activity, or erosion of the cover.
- Cracks or settling imperfections (<15 cm [6 in] deep) on the cover will be documented and will be scheduled for repair on an annual basis. Larger disruptions of the cover (animal burrows or erosion) will be immediately evaluated and repaired within 90 days.
- All repair work should preserve the original cover "as built" design. If the cover repair requires modification of the cover design, DOE/NV will present a formal design modification request to the NDEP prior to making the design modification.

5.1.2 Cover Monitoring

The U-3ax/bl Disposal Unit cover is designed to limit infiltration into the disposal unit. Waste cover performance will be monitored using TDR soil water content sensors buried at various depths within the waste cover to provide water content profile data. Soil water content profile data will demonstrate whether the cover is performing as expected.

TDR probes have been buried in the cover at depths of 0.3 to 2.4 m (1 to 8 ft), one probe every 0.3 m (1 ft). TDR probes are installed at a distance of 36.5 m (120 ft) from the edge of the cover. A profile of eight probes (a stack) was repeated at four locations across the cover (Figure 4). Moisture content data from the TDR moisture probes will be stored on a datalogger. The datalogger can be programmed to collect data at any frequency of interest; however, the recommended data collection frequency is once per day. The recommended frequency of remote data download and data analysis is once per week.

5.1.3 Compliance Criteria

The U-3ax/bl Disposal Unit cover boundary is defined by the fence installed around the cover. The fence encloses the approximately 3-ha (7.5-ac) site. The point of compliance is the depth of the deepest TDR soil moisture probe. Compliance will be set based on soil moisture content; however, the specific criteria will not be established until the cover has had sufficient time to reach equilibrium. The cover will be irrigated, as needed, to supplement rainfall for the first year in order to aid in establishing vegetation. Once the moisture content within the cover reaches equilibrium, soil moisture trigger values will be agreed upon with the NDEP.

The following have been established for the post-closure monitoring program:

- 1) Notify the NDEP of noncompliance within 14 days of determining that the cover is not operating according to the established compliance criteria.
- 2) Non-critical (cracks or settling imperfections equal to or less than 15 cm [6 in] deep on the cover) maintenance activities will be compiled during the fiscal year and addressed in the following fiscal year. The NDEP will be provided with the list of non-critical cover maintenance requirements each August.
- 3) Cracks or settling imperfections greater than 15 cm (6 in) deep which extend 1.0 m (3 ft) or more on the cover (through animal burrows, erosion, or subsidence) will be evaluated and repaired within 60 days of detection.
- 4) On an twice a year basis, all seven survey markers located on the cover will be resurveyed to determine if the cover has subsided.

After NDEP notification of noncompliance, a work plan will be submitted to the NDEP within 90 days outlining the proposed remediation/investigation plan. All corrective actions will be documented in an annual post-closure monitoring report and a copy submitted to the NDEP.

5.1.4 Maintenance and Repair

The post-closure inspection will be done, at a minimum, once every three months. All inspection and maintenance activities conducted during the year will be documented and submitted to the NDEP. The annual letter report will be provided on or before August 31st of each year of the post-closure inspection period. The post-closure inspection period duration is proposed to be

five years. After five years of post-closure monitoring, the permittee may submit a request to NDEP to reevaluate the monitoring program and/or schedule. The annual letter report will include the following information:

- Brief narrative and pictures from post-closure inspection activities.
- U-3ax/bl Disposal Unit cover inspection logs.
- Moisture content profiles through the previous year.
- Maintenance and repair documentation (if any).
- Specific recommendations for non-standard maintenance or changes in post-closure monitoring.

All closure and post-closure monitoring documentation will be retained in project files and is available upon request.

5.2 RECOMMENDATIONS

Based upon the completion of site activities, it is requested that a notice of completion be provided by the NDEP for CAU 110. Upon closure approval, CAU 110 will be promoted from Appendix III to Appendix IV of the FFACO, "Closed Corrective Action Units."

6.0 REFERENCES

- Bechtel Nevada, 2000. Site Specific Health and Safety Plan for Closure Activities at Corrective Action Unit 110: Area 3 RWMS U-3ax/bl Disposal Unit, October 2000, Las Vegas, NV.
- DOE, see U.S. Department of Energy.
- DOE/NV, see U.S. Department of Energy, Nevada Operations Office.
- Elletson, L. W., and K. R. Johnejack, 1995. Waste Inventory Report for the U-3ax/bl Disposal Unit at the Nevada Test Site. Reynolds Electrical & Engineering Co., Inc. DOE/NV/11432-193.
- EPA, see U.S. Environmental Protection Agency.
- NAC, see Nevada Administrative Code.
- NDEP, see Nevada Division of Environmental Protection.
- Nevada Administrative Code, 534.421, Plugging: Wells for Purposes Other Than Water Wells.
- Nevada Division of Environmental Protection, November 2000. Permit For a Hazardous Waste Facility, Permit Number NEV HW009; Section VII.B.7.
- Nevada Division of Environmental Protection, U.S. Department of Energy, and U.S. Department of Defense, April 1996. Federal Facilities Agreement and Consent Order (FFACO) of 1996.
- U.S. Department of Energy, 1988. "Radioactive Waste Management," DOE Order 5820.2A, U.S. Department of Energy, Washington, D.C.
- U.S. Department of Energy, Nevada Operations Office, 1999. Characterization Report for Corrective Action Unit 110: Area 3 U-3ax/bl Disposal Unit, Nevada Test Site, Nevada, DOE/NV--580, November 1999, Las Vegas, NV.

6.0 REFERENCES (Continued)

- U.S. Department of Energy, Nevada Operations Office, 2000. Closure Plan for Corrective Action Unit 110: Area 3 RWMS U-3ax/bl Disposal Unit, Nevada Test Site, Nevada, DOE/NV-647, August 2000, Las Vegas, NV.
- U.S. Department of Energy, Nevada Operations Office, 2000. Field Management Plan for Corrective Action Unit 110: Area 3 U-3ax/bl Disposal Unit, Nevada Test Site, Nevada, October 2000, Las Vegas, NV.
- U.S. Environmental Protection Agency, 1991. Design and Construction of RCRA/CERCLA Final Covers, EPA/625/4-91/025, Washington, D.C.
- U.S. Environmental Protection Agency, 1996a. 40 Code of Federal Regulations 265.310, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities Closure and Post Closure Care, Washington, D.C.
- U.S. Environmental Protection Agency, 1996b. 40 Code of Federal Regulations 265.90, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities Ground Water Monitoring, Washington, D.C.

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APPENDIX A
CERTIFICATION OF CLOSURE

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**CERTIFICATION OF CLOSURE BY THE
NATIONAL NUCLEAR SECURITY ADMINISTRATION
NEVADA OPERATIONS OFFICE**

I certify under penalty of law that the Area 3 U-3ax/bl Disposal Unit, Corrective Action Unit 110, located in Area 3 at the Nevada Test Site has been closed in accordance with the approved Closure Plan for CAU No. 110: Area 3 RWMS U-3ax/bl Disposal Unit, Nevada Test Site dated August 2000 and the Permit for a Hazardous Waste Management Facility Number NEV HW009, United States Department of Energy, Nevada Operations Office, Nevada Test Site, dated November 2000. All measures required in the Closure Plan and applicable Resource Conservation and Recover Act 42 U.S.C. 6901-6991i and Title 40 CFR 260-268 have been fully implemented and that, to the best of my knowledge, no violations exist.

Kathleen A. Carlson, Manager
NNSA Nevada Operations Office

Date

National Nuclear Security Administration
Nevada Operations Office
P.O. Box 98518
Las Vegas, NV 89193-8518

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CERTIFICATION OF CLOSURE BY THE INDEPENDENT PROFESSIONAL ENGINEER

I, Dean D. Nelson, a registered Professional Engineer, hereby state that I have reviewed the Closure Plan for the Closure of the Area 3 U-3ax/bl Disposal Unit, Corrective Action Unit 110, located in Area 3 at the Nevada Test site and am familiar with the rules and regulations of Title 40 §CFR 265.90 and §265.310 pertaining to the closure of this Corrective Action Unit has been performed with the exception of that stated in Section 2.2, in accordance with the approved Closure Plan for CAU No. 110 Area 3 U-3ax/bl Disposal Unit, Nevada Test Site dated August 2000 and the Permit for a Hazardous Waste Management Facility Number NEV HW009, United States Department of Energy, Nevada Operations Office, Nevada Test Site, dated November 2000.

Dean D. Nelson
Nevada Professional Engineer (Civil)
License Number 12733

June 21, 2001
Date

PEER Consultants, P.C.
2439 Losee Road, Suite 1C
North Las Vegas, Nevada 89109

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APPENDIX B

APPROVAL MATRIX AND CHECKLIST

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CAU 110 U-3AX/BL DISPOSAL UNIT CLOSURE APPROVAL MATRIX AND CHECKLIST

MATRIX: Use for further definition of quality responsibilities and for identification of relevant procedures.

NOTE: BN organizations, in accordance with the *Quality Management Process Description document PD-0001.002*, will provide the necessary controls during construction to verify that all design-specified hold points outlined in this plan are complied with prior to proceeding with subsequent process steps. Independent hold-point monitoring/data review will be conducted by the Independent Professional Engineer/CQA Officer representative.

ITEM - CAU 110 U-3AX/BL DISPOSAL UNIT CLOSURE	I ENG/TM GM/TL	II CONST/ OTHERS	III SUB- CONTR	IV MTL/ SRVY	V CQA HP*	VI CHECKLIST INITIAL/DATE
1.0 GENERAL INSPECTIONS/OBSERVATIONS						
General Project Support/Readiness Review	ENG	CONST		SRVY	CP	KBC 10/15/00
Lift/ Layer Thickness	TL	CONTR		TL	CP	KBC completed 11/16/00
As-built Topographic Survey	ENG			SRVY	HP	Revised by J. Sorola on 12/12/00 KBC
2.0 TIME-DOMAIN REFLECTOMETRY (TDR) INSTALLATION						
Qualification of Field Soil Performance Specifications Refer to CQA Plan - Table 3.1 Inspection Schedule	ENG	CONTR		TL	HP	Verbal by J. Sorola on 11/02/00 KBC
Excavation - See Drawing C-1	ENG	CONTR		SRVY/TL	HP	Verbal Approval by J. Sorola 11/02/00 KBC

CONSTR = BN Construction Superintendent; CQA = Construction Quality Assurance; ENG = BN Engineering; TM = BN ER Task Manager; HP = Hold Point; PE/CQA = Independent Professional Engineer/Construction Quality Assurance Officer (PEER Consultants); MTL = BN Materials Test Laboratory; SRVY = BN Survey; SUB-CONTR = BN Subcontractor; TL = BN ER Technical Lead; GM = BN ER Group Manager; CP = Check Point; * See Table 3.1 of the Construction Quality Assurance Plan

ITEM - CAU 110 U-3AX/BL DISPOSAL UNIT CLOSURE	I ENG/TM GM/TL	II CONST/ OTHERS	III SUB- CONTR	IV MTL/ SRVY	V CQA HP*	VI CHECKLIST INITIAL/DATE
TDR Installation (Equipment & Wiring) by Others Per Manufacturer Instructions	TL	OTHERS			CP	TDR Poles placed/checked by 11/16/00 KBC
Back filling/Compaction per Performance Specification	ENG	CONTR		SRVY/TL	HP	Verbal approval by J. Sorola 11/02/00 KBC
As-built trench & TDR installation (location/depth)	ENG			SRVY/TL	HP	Verbal approval by J. Sorola 11/02/00 KBC
3.0 NATIVE FILL LAYER PLACEMENT COVER						
Borrow mat'l meets requirements of specification 02223	TL	CONTR			CP	KBC 10/31/00 Soil from Area 3 borrow pit.
Placement & grade check	TL	CONTR			CP	KBC 11/16/00
As-built Topographic Survey	ENG			SRVY/TL	HP	Approved by J. Sorola 12/13/00
4.0 MONUMENTS, FENCING, & SIGN PLACEMENT						
Monuments and brass survey plates pins	ENG	CONTR		SRVY/TL	CP	Monuments placed 11/17/00 Pins stamped 12/13/00 KBC
Fence Installation	TL	CONTR		SRVY/TL	CP	Completed on 1/24/01 KBC
Sign Installation	TL	CONTR		SRVY/TL	CP	Completed on 1/24/01 KBC
As built fence corners, monuments, & signs by Survey	ENG			SRVY/TL	HP	Fencing 12/10/00 Monuments 12/13/00 KBC

CONSTR = BN Construction Superintendent; CQA = Construction Quality Assurance; ENG = BN Engineering; TM = BN ER Task Manager; HP = Hold Point;
 PE/CQA = Independent Professional Engineer/Construction Quality Assurance Officer (PEER Consultants); MTL = BN Materials Test Laboratory; SRVY = BN
 Survey; SUB-CONTR = BN Subcontractor; TL = BN ER Technical Lead; GM = BN ER Group Manager; CP = Check Point; * See Table 3.1 of the Construction
 Quality Assurance Plan

ITEM - CAU 110 U-3AX/BL DISPOSAL UNIT CLOSURE		I ENG/TM GM/TL	II CONST/ OTHERS	III SUB- CONTR	IV MTL/ SRVY	V CQA HP*	VI CHECKLIST INITIAL/DATE
5.0 VEGETATIVE COVER PREPARATION, PLANTING, & IRRIGATION SYSTEM							
Prepare Cover surface for seeding		TL	CONTR			HP	Completed 12/10/00 KBC
Cover seeding		TL	CONTR			CP	Completed 12/7/00 KBC
Irrigation System installed		TL	CONTR			CP	Completed KBC 11/11/01
6.0 PVC MONITORING WELL CLOSURE							
Prepare PVC Monitoring Wells for Closure		TL	CONTR			CP	Completed 11/9/00 KBC
Grout PVC wells and build concrete pad		TL	CONTR			CP	Completed 11/22/00 KBC
7.0 U-3ax/bl DISPOSAL UNIT COVER CONSTRUCTION COMPLETION							
Site walk down inspection tour		ENG/TM/GP	CONTR			HP	Completed 11/25/01
Site tour/documentation and PE review/acceptance		ENG/TM/GM/ PE	CONTR			HP	Completed 11/25/01 KBC

CONSTR = BN Construction Superintendent; CQA = Construction Quality Assurance; ENG = BN Engineering; TM = BN ER Task Manager; HP = Hold Point; PE/CQA = Independent Professional Engineer/Construction Quality Assurance Officer (PEER Consultants); MTL = BN Materials Test Laboratory; SRVY = BN Survey; SUB-CONTR = BN Subcontractor; TL = BN ER Technical Lead; GM = BN ER Group Manager; CP = Check Point; * See Table 3.1 of the Construction Quality Assurance Plan

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APPENDIX C

TESTING/INSPECTION REPORTS

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NOV 01 2000

NUCLEAR DENSITY
ASTM D2922-96
CAMPBELL MC-2/MC-3
TROXLER

BECHTEL NEVADA
MATERIALS TESTING LABORATORY
P.O. BOX 98521, M/S NTS188
LAS VEGAS, NV 89193-8521

CHARGE # C7K99D1
DATE TYPED 11/01/2000
PAGE 1 OF 1

Requested by K. CAMPBELL User/Agency BECHTEL Material PROCTOR, LAB # 0262, TP21 (11/09/00)
Project U3 AX/BL Location of Tests TEST PIT
Tested by J. Denny Date Tested 10/31/2000 Checked by Dale H.

LABORATORY NO	139	140	141	142	143	144
DEPTH OF PROBE	10"	10"	10"	12"	12"	12"
DEPTH OF TESTS (LIFT #)	1	1	1	2	2	2
TEST #	1	2	3	4	5	6
DRY DENSITY-PCF	90.1	93.9	91.1	94.5	93.4	91.9
MOISTURE %	8.4	7.6	8.5	7.6	7.0	7.5
PERCENT COMPACTION	79.1	82.4	80.0	83.0	82.0	80.7
MAX DENSITY PCF	113.9	113.9	113.9	113.9	113.9	113.9
OPTIMUM MOISTURE %	12.9	12.9	12.9	12.9	12.9	12.9
REQUIRED COMPACTION %	80.0	80.0	80.0	80.0	80.0	80.0
IN / OUT of SPECIFICATION	OUT	IN	IN	IN	IN	IN

GAUGE NO 23205 DATE OF STANDARDIZATION 10/31/2000 VALUE OF M 631
STANDARDIZATION D 2814

PLOT PLAN

X X X
1 & 4 2 & 5 3 & 6

REMARKS: TEST PIT WAS APPROXIMATELY 6'X3' BY 3' DEEP. 1st LIFT
PLACED WAS ABOUT 10" AND THE 2ND ABOUT 12" THICK.
RETEST OF TEST #1 WAS NOT NEEDED BY K. CAMPBELL.

CC: J. SOROLA BECHTEL
G. HUDAK PEER
J. SMITH BECHTEL
D. MADSEN BECHTEL
K. CAMPBELL BECHTEL
MTL BECHTEL FILES

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APPENDIX D VEGETATION SPECIES LIST

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Number of acres:	7.31
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Genus	Species	Common Name	Total PLS lbs	PLS lbs/acre	Total bulk lbs of seed	Bulk lbs/acre
<i>Artemisia</i>	<i>spinescens</i>	Budsage	0.80	0.11	6.27	0.86
<i>Atriplex</i>	<i>canescens</i>	Four-wing Saltbush	Deleted from mix per UNLV recommendation			
<i>Atriplex</i>	<i>confertifolia</i>	Shadscale	32.00	4.38	101.42	13.87
<i>Ceratoides</i>	<i>lanata</i>	Winterfat	36.00	4.92	65.06	8.90
<i>Ericameria</i>	<i>nauseosa</i>	Rubber Rabbitbrush	11.20	1.53	100.83	13.79
<i>Elymus</i>	<i>elymoides</i>	Squirreltail	7.44	1.02	9.73	1.33
<i>Ephedra</i>	<i>nevadensis</i>	Nevada Ephedra	21.60	2.95	39.93	5.46
<i>Eriogonum</i>	<i>fasciculatum</i>	Buckwheat	2.40	0.33	30.15	4.12
<i>Grayia</i>	<i>spinosa</i>	Spiny Hopsage	4.00	0.55	7.75	1.06
<i>Hymenoclea</i>	<i>salsola</i>	Cheesebush	16.00	2.19	26.03	3.56
<i>Lycium</i>	<i>andersonii</i>	Desert Thorn	1.60	0.22	2.61	0.36
<i>Oryzopsis</i>	<i>hymenoides</i>	Indian Ricegrass	24.80	3.39	26.16	3.58
<i>Sphaeralcea</i>	<i>ambigua</i>	Globe Mallow	4.80	0.66	6.18	0.85
TOTALS			162.64	22.25	422.12	57.75

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APPENDIX E

DEVIATIONS FROM CONSTRUCTION QAP

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☒ Design Drawing☐ Design SpecificationDate Initiated: 10/31/00Document No.: JS-003-00004-C3Revision No.: 0Title: SECTIONSDescription of Change:
MODIFIED SECTION CEngineering Tracking No. 00004.A03

Prepared By:

Julia A. Sarda

Date:

10/31/00

Checked By:

[Signature]

Date:

10/31/00

APPROVALS

Project Engineer:

[Signature]

Date:

10/31/00

Other BN Organizations: (PA, ESS&H, etc.)

Date:

Date:

Date:

Date:

Date:

Date:

Date:

Document No.: JS-003-00004-C3

Revision No.: 0

Title: SECTIONS

Description of Change:
MODIFIED SECTION D

Engineering Tracking No. 00004.A03

SECTION

SCALE: 1/8\"/>

ⓓ

☐ Design Drawing☒ Design SpecificationDate Initiated: 10/31/2000Document No.: SP-00004A03-C0007Revision No.: 0Title: Construction Specifications for U3ax/bl RCRA Equivalent Closure**Description of Change:****SECTION 02222, PART 3, PARAGRAPH 3.03.D.2.c:**

REPLACE Minimum area to be tested shall be 3 feet (914 mm) by 16 feet (4.88 m). **WITH** Minimum area to be tested shall be 3 feet (914 mm) by 6 feet (1.83 m).

Prepared by:

Date:

Checked by:

Date:

APPROVALS

Project Engineer:

Date:

Other BN Organizations: (PA, ESS&H, etc.)

Date:

Date:

Date:

Date:

Date:

Date:

Date:

From: Julie Sorola
To: ENVIRON.MERC-DORMB.CampbeK
Date: 11/9/00 9:15am
Subject: Re: Ax/bl fence engineering tech change request and TDR data -Reply

Kevin,

The proposed fence reconfiguration is acceptable. A DCN will be issued that will delete the requirement to reinstall the existing rad fence after construction of the cover and move the new fence to the approximate location of the existing rad fence. Per our conversation, the new fence will be signed as a radiation contamination area in addition to the required RCRA postings.

Please supply information on the new postings for inclusion in the asbuilt package i.e., spacing, size, color, wording, etc. I know these postings are standard for the NTS, but we do not have that information in engineering.

CC: HUDAKGG, ENVIRON.MERC-DORMB.MADSEND, ENVIRON.MERC...

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APPENDIX F
“AS-BUILT” DRAWINGS FOR
AREA 3 U-3AX/BL COVER

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NEVADA OPERATIONS OFFICE
LAS VEGAS, NEVADA

AREA 3

DRAWING NUMBER	DRAWING TITLE	STANDARD NUMBER	DESCRIPTION
----------------	---------------	-----------------	-------------

1
2

CONSTRUCT 7.8 ACRES COVER THAT CLOSED THE INACTIVE USARV DISPOSAL UNIT IN 1982 ACCORDANCE WITH THE RESIDUE CONSERVATION AND RECOVERY ACT (RCRA). THE COVER WAS CONSTRUCTED USING NATIVE MATERIALS.

ALL CONSTRUCTION FEATURES, MATERIALS, TESTS AND DETAILS CONFORM TO THE PROJECT SPECIFICATIONS AND THE APPROVED CONSTRUCTION QUALITY ASSURANCE PLAN (CQAP). FOR DETAILS OR STANDARDS REFERENCED ON THIS PROJECT, SEE THE DESIGN DRAWING STANDARDS.

ALL DESIGN DIMENSIONS ARE SHOWN ENGLISH AND METRIC. NOMINAL CUSTOMARY ENGLISH CALCULATIONS ARE MAINTAINED. METRIC CALCULATIONS ARE USED WHERE NO ENGLISH CALCULATIONS EXIST OR WHERE VENDOR SUPPLIED ITEMS ARE METRIC BY DESIGN.

LOCATION MAP

U3dx/b1 VICINITY MAP
NOT TO SCALE

[illegible][illegible]

ALL METRIC DIMENSIONS AND NOTATIONS ARE SHOWN BELOW THE DIMENSION LINE OR IN PARENTHESES.

1. DETAIL 2 - SHOWS CONTINGUED DIMENSIONS FOR

想 必 天 下

100

NOT TO SCALE

4. STAND-ALONE STATE IN

- ## REFERENCE NOTES

- ## REFERENCES

8100 00-0000

UNIT 7B: MEAL

©

Q

100

ORIGINAL NOTARY SIGNED BY:

[illegible]

DETAILS

NEVADA TEST SITE ————— AREA 03
RADIOACTIVE WASTE MANAGEMENT SITE
CALL 110 113 OR 61 RCRA EQUIVALENT CLOSURE

U.S. DEPARTMENT OF ENERGY
NUCLEAR OPERATIONS OFFICE
1010 MCRAE, NEVADA
Bechtel Nevada

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
---	---	---	---	---	---	---	---	---	----	 	-----

ALL METRIC DIMENSIONS AND NOTATIONS ARE SHOWN BELOW THE DIMENSION LINE OR IN PARENTHESES.

① NATIVE MATERIAL FILL WAS PLACED IN MINIMUM 6" TO MAXIMUM 12" COMPACTED LIFTS.

REFERENCES

 

U.S. DEPARTMENT OF ENERGY Nevada Test Site CAU 110 U304/D1 RCRA EQUIVALENT CLOSURE		AREA 03 RADIOACTIVE WASTE MANAGEMENT SITE NEVADA TEST SITE		SECTIONS 00000-401 00000-402 00000-403 00000-404 00000-405 00000-406 00000-407 00000-408 00000-409 00000-410 00000-411 00000-412 00000-413 00000-414 00000-415 00000-416 00000-417 00000-418 00000-419 00000-420 00000-421 00000-422 00000-423 00000-424 00000-425 00000-426 00000-427 00000-428 00000-429 00000-430 00000-431 00000-432 00000-433 00000-434 00000-435 00000-436 00000-437 00000-438 00000-439 00000-440 00000-441 00000-442 00000-443 00000-444 00000-445 00000-446 00000-447 00000-448 00000-449 00000-450 00000-451 00000-452 00000-453 00000-454 00000-455 00000-456 00000-457 00000-458 00000-459 00000-460 00000-461 00000-462 00000-463 00000-464 00000-465 00000-466 00000-467 00000-468 00000-469 00000-470 00000-471 00000-472 00000-473 00000-474 00000-475 00000-476 00000-477 00000-478 00000-479 00000-480 00000-481 00000-482 00000-483 00000-484 00000-485 00000-486 00000-487 00000-488 00000-489 00000-490 00000-491 00000-492 00000-493 00000-494 00000-495 00000-496 00000-497 00000-498 00000-499 00000-500	
 

ALL METRIC DIMENSIONS AND NOTATIONS ARE SHOWN BELOW THE DIMENSION LINE OR IN PARENTHESES.

WHOLE NUMBERS INDICATE MILES
DECIMAL NUMBERS SHOWN TO TWO (2) PLACES INDICATE METERS
DECIMAL NUMBERS SHOWN TO THREE (3) PLACES INDICATE KILOMETERS

GENERAL NOTES

1. NATIVE MATERIAL SOILS WERE OBTAINED FROM THE AREA 3 GORROW PIT LOCATED 1-5 MILES (2.41 KM) SOUTH OF THE PMS.
2. ALL SIDE SLOPES OF THE CLOSURE CAP ARE A MAXIMUM OF 10:1.

REFERENCES

TITLE SHEET
SECTIONS
DETAILS

ORIGINAL PLANS SIGNED BY

AS-BUILT

UNLESS NOTED BY MARKED CHANGES, ALL DIMENSIONS, NOTES, DIMENSIONS AND CONSTRUCTION FEATURES ARE CORRECTED. AND, WHERE CONSTRUCTION IS SHOWN ON THIS DRAWING.

CRATER
130h/at

GRADING PLAN

Items 1' - 19'

GRAPHIC SCALE

CO.

CONTINUOUS INTERVAL = 1 FT

EVADA TEST SITE
AREA 03
RADIOACTIVE WASTE MANAGEMENT SITE
CAU 110 USOX/DI RCRA EQUIVALENT CLOSURE
GRADING PLAN

JS-003-00004-C2

 

Closure Report - CAU 110
Section: Appendix G
Revision: 1
Date: August 6, 2001

APPENDIX G

LAND-USE RESTRICTIONS

Closure Report - CAU 110
Section: Appendix G
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Date: August 6, 2001

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FOR INFORMATION ONLY - NOT FOR CONSTRUCTION

Note: Datum information is in World Geodetic System (WGS), 1984

DUAL ENGLISH/METRIC DRAWING

Closure Report - CAU 110
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APPENDIX G

LAND-USE RESTRICTIONS

Closure Report - CAU 110
Section: Appendix G
Revision: 1
Date: August 6, 2001

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CAU Use Restriction Information

CAU Number/Description: CAU 110: Area 3 WMD U-3ax/bl Crater

Applicable CAS Numbers/Descriptions: CAS 03-23-04: U-3ax/bl Subsidence Crater

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

Surveyed Area (UTM coordinates; Zone 11, NAD 27): The site is defined by the following
NAD 27 coordinates: Gatepost: 13,452,458.93 N; 1,924,573.54 E Southern end of cover:
13,452,059.38 N; 1,925,447.12 E- Northeast side:13,452,601.21 N; 1,924,918.18 E -
13,452,578.35 N; 1,925,092.17 E - 13,452,347.30 N; 1,925,415.20 E - 13,452,236.09 N;
1,925,474.25 and Southwest side: 13,452,247.57 N; 1,924,620.24 E - 13,451,942.82 N;
1,925,192.82 E - 13,451,964.20 N; 1,925,336.12

Survey Date: January 24, 2001 Survey Method (GPS, etc.): Transit Survey

Site Monitoring Requirements: Visual inspections, subsidence monitoring, & TDR analysis

Required Frequency (quarterly, annually?): Varies, check Closure Plan for activity specific frequency

If Monitoring Has Started, Indicate Last Completion Date: N/A

Use Restrictions

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

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

Submitted By: Jane L. Jorgensen-Wing Date: 6/6/01

cc with copy of survey map:
CAU Files (2 copies)

Closure Report - CAU 110
Section: Appendix G
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Date: August 6, 2001

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Closure Report - CAU 110
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APPENDIX H

PHOTOGRAPHS AND FIELD NOTES

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Revision: 1
Date: August 6, 2001

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Thick Probe Placement Preparation

11/7/2000 12:40

TDR Probe Installation/Compaction

11/7/2000 12:45

An aerial photograph of a large, deep borrow pit. The pit's walls are steep and show distinct horizontal layers of soil or rock. At the bottom of the pit, several pieces of heavy construction equipment are visible. In the center-right, a large excavator with a long boom is positioned. To its left, there are two large trucks or haulers. Further down and to the left, another piece of machinery, possibly a bulldozer or a smaller excavator, is visible. The overall scene depicts a major earthmoving or construction project.

Area 3 Borrow Pit – Material Loading Area

11/8/2000 14:31

U-3ax/bl Cover Construction – Laying Material

11/7/2000 10:18

U-3ax/bl Cover Construction – Establishing Grade

11/7/2000 10:15

Applying Straw to Protect Seeded U-3ax/bi Cover

12/5/2000 09:20

Work continued from Page N/A

Monday 10/23/00

Weather: Cold 50's overcast intermittent rains.

Safety: Tailgate briefing given on site.

Topic: Scope of work: Fencing work, Mobilization of equipment to site
slip/trip/fall, Working around heavy equip.
PPE, Bio hazard.

Personnel: Site Supervisor Chuck Womack

Tech Lead Kevin Campbell

H.P. Craig Lyons

Laborers Joe Jablonski, Victor Ramirez

ER tech Mike Floyd

Rad Tech Mike Van Dillen, Tim Baker

Electricians Jim Rainey, Gary Gardner, Rubin Cuaron

Operators Paul Robinson, Danny Ellis

Safety Genie Cook

Equipment: BN/ER Metro Van, back hoe, DA for borrow pit in route

Wiremen arrived on site for tailgate. Rubin Cuaron no medical clearance, no training, sample

1000 Laborers working on fence access and security.

- One laborer V. Ramirez arrived on site without and training or health records on file. Good training & medical on Ramirez. All current.

Laborers have fencing & gate up.

Moved metro van into position just inside support zone.

1420 Conduit delivered. Operator to off load conduit in route. Conduit will be placed near southern gate inside support zone.

430 - No excavation will be done today due to rain. Operators depart site. All personnel except site sup, 2 laborers gone for day.

Work continued to Page N/A

SIGNATURE

DATE

10/23/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Tuesday 10/24/00

BOOK NO.

Weather: Overcast, slight showers, cool 60's.

Safety: Tailgate given prior to start of work. Topics included:

Scope of work, slipping/fall, cold stress, emergency contacts/procedures, working around heavy equipment.

5

- Caltrans posting signs - "Bechtel Construction", 43-4-312/61"

around location

Support Zone

- Electricians, ASTD folks (Dan Keitt, Lloyd Dastel), BNER (Mike Flynn, Dudley Emar) laying out conduit and stringing TOR probe cabling.

- Meter van setup, hot line established.

Paul Robinson preparing to mark off extent of cover inside EZ. Drawing # C3 shows cover edge is 50 ft inside existing fence line. After lunch cover edges will be staked and excavation of conduit trench and TOR probe pits will begin.

5

1300 Joe, Paul R., Danny E. dressed out cut in EZ trenching conduit trench, and marking/staking cover edge. Conduit trench is ^{18 inches} 2 ft 7 ft deep. 2 in. of bedding sand, 4 in conduit, covered with native fill.Blade and West Accumulation Trailer were delivered $\approx$ 0900 am.Completed excavating westernmost conduit trench and $\approx$ 1/3 of second western trench. Assembled 2 conduits with cable.

Fast line

SIGNATURE

DATE

10/24/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Weather: Overcast Sunshine coming through

Safety: Weather incliment weather. hazards, Level D PPE in support zone, level c in EZ, slip/trip/fall hazards, working around heavy equipment, noise hazard

Activities

- P. Robinson continuing to stake cover boundaries

- Continuing to excavate TOR trenches

- Delivered farm equipment - tractor, disk harrow, ~~at~~ seed drill delivered ^{stayed} up road off

- Electricians attended Tailgate briefing then back to Area 6 for work in shop

- Laborers polishing area.

Visitors

~~Personnel~~

Herk Bensinger

Bob Rommel

John Davey

- 10 yd of sand delivered to site.

1500 Water truck delivered to site. Slight leak went to see mechanic working on farm equipment.

- Perimeter of cover staked out. Grade stakes being placed on cover

- 3 TOR conduit trenches complete. 4th trench 50ft left to dig.

- All 4 ^{TOR} probe and conduit systems have been weatherized using electrical tape & weatherizing rubber tape.

1600 Workers screened out of CA.

Bobby Dolans 9L dozer + ^{tractor} water pull conditioning clean fill material at borrow pit. Watering ASTD area.

3 operators 1 site sup 2 Teamsters

2 laborers 1 tech lead 1 IH

3 RCTs 1 SH&SO 2 BNER tech

Last Line

Work continued to Page _____

SIGNATURE

[Signature]

DATE

10/25/00

CLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Thursday 10/26/00

BOOK NO.

Weather: Cool 60's, overcast with partial sun, rain showers predicted

Safety: Tailgate briefing topics include

Scope of work, weather - if rain work stops, hazards working around heavy equip.
slip/trip/fall hazards, dust control in CA using water truck & hose.

5 Visitors:

Rich Smith - RSL cameraman

2 - teamsters (sand, fuel)

John Kit - performing construction audit

Dennis Finney

- Continuing to place grade stake on cover

Bob Rommel

- Continue to dig TDR conduit trenches. Will place bedding sand $\approx$ 2 in in trenches.

- Water truck on site for dust control. Water truck leaking slowly.

- Continuing to work/condition soil in borrow pit.

- Off loaded a few bails of straw and 1" conduit/tubing for ASD work.

Panel truck staged down the access road towards Mercury Hwy
with farm equipment. next to ASD area.

Ordered another 10 yds³ of sand to trenches.

1330 Sand delivered and dumped.

1400 Fuel truck arrived to fuel backhoe, and water pump at borrow pit

Water truck went to borrow pit to dump load for soil conditioning.

1430 Still placing sand in TDR conduit trenches.

1440 Delivered 880 Front End Loader.

500 Depart Site for Area 23

Foot line

SIGNATURE

Ken Campbell

DATE

10/26/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Monday 10/30/00

Weather: Rain intermittent showers, cool 60's

Safety: Tailgate briefing given on site.

Scope of work, cold stress,

Visitors: Fuel person

Dennis Finney

5 ~~DOE~~ Fred Penrod (DOE)

1 DB

Borrow Pit: 100 ft x 400 ft 4 pieces of equipment # D9, 1 loader, 1 water pull.

Preparing soil for cover.

1300 Brought a ^{load (500)} of soil up from borrow pit for developing compaction performance specification

Preparing area in ASTD for excavation.

Discussions to clarify CRAT reqs. on TOR trench design and probe placement specifications

5 1330 Fred Penrod of DOE arrived on site. He was briefed on the SSHASP, tech change to the SSHASP and Tailgate briefing.

1340 J. Large arrived on site with water tanker for dust suppression during excavation.

1410 Begin excavation of ASTD trench for legimeters using 980 loader.
3 people in EZ - 1 operator, 1 grade checker, 1 laborerEquipment:1 D9, 1 Blade, 1 tanker truck, 1 water, 1 metro van, 1 waste accumulation trailer
1 D8, 1 980 loader, 1 water pullPersonnel

3 RCT 1 Tech Lead 2 laborer

1 Site Sup 1 I.H 1 teamster

1 SH&SO 3 operators

SCIENTIFIC BIRDY PRODUCTIONS CHICAGO 60685 Made in USA

Work continued to Page N/A

SIGNATURE

K. B. Cuyll

DATE

10/30/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Tuesday 10/31/00

BOOK NO.

Weather: Clear, high clouds, cold!

Safety: Scope of work, cold stress, slip trip fall

Sta # C9YTD00N ASD.

5 - Phone conversation w/ Julie Sorola regarding DCN to Drawing C3 and
 Page 02222-3 section 3.03 D.2.C. dimension to ^{of test pad/pit to} 3' x 6' x 3' deep. Julie will fax copy

- John of DCN later this morning. Also all ^{side} slopes of TDR pits will be
 sloped 2:1 with a bench at 5 ft deep.

Discussions w/ P Robinson want modification to TOR pit design

Front & Back of Pit 2:1 slope to depth of 4 ft. Side vertical to 4 ft.

Bench at 4 ft deep. Bench is 5 ft wide.

3 ft deeper in trench.

2 Electricians & 1 laborer D. Leivitt placing ^{conducts} TOR cables in trenches on cover
 2 operators on cover

2 laborers, 2 operators, teamster supporting ASD excavation,
 0830 Excavation of ASD trench

~~0830~~ 0830. Excavated a 3 ft x 6 ft x 3 ft deep pit on cover just north of cover south gate. ^{= 80 ft}

Pit to be used to determine performance specification for

1 foot lifts will be placed in 6 inch layers then compacted. Once 1 ft compacted will take

100 First ~~6" passes/stamps by foot~~ } 1 ft compacted 79.1, 82.5, 80.0 ^{3 compaction readings}

Second ~~6" passes/stamps~~

① 1 11 inch lift 6 passes compacted to = 6 inches

Compaction results 79.1, 82.5, 80.0%

② 2-7 inch lifts placed each stamped 4 passes compacted to 6 inches.

compaction results 80.0 83 82% ⇒ This is our compaction performance spec

soil very dry may add a small amount of water

SIGNATURE

DATE

10/31/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

66

TITLE

U-30x16L

Closure Activities

PROJECT NO.

BOOK NO.

Work continued from Page 65

ASTD PersonnelCAU 110 Personnel

2 operators

2 laborer

1 recorder

1 RCT

1 JAH

2 electrician until 1200

2 BNER tech

1 Dan Levitt

1 Operator

1 Laborer

1 MFL

2 RCT

After noon

All on CAU 110

Copy of email from D. Madsen to Sorolla received regarding DCN for compaction test pad and design of TOR pits.

C00444-21

Issue: According to Excavation & Penetration we must perform an atmosphere reading prior to allowing workers in an excavation deeper than 5 ft. Don't have monitoring equip on hand. J. Vincelli went to CP-50 for multigass meter and train.

Visitors: Tommy Gomez

Placing TOR probes is on hold.

Dennis Finney

Jeff Smith

Kathy Tharin

12:30 Because of dust being produced in ASTD excavation and SE direction of winds ~~have~~ decided to halt ASTD work to concentrate on TOR work. Will backfill conduit trenches and once we have a atmosphere reading measurement will place TOR probes

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page _____

SIGNATURE

DATE

10/31/0

DATE

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

Work continued from Page 66 Tuesday 10/31/00

BOOK NO.

- Spoke with Vic Dunn & John Davey about issue of making an atmospheric measurement according to CD0444.21 & CD0444.24; for an excavation deeper than 5 ft. Both agreed that Jeff Vincalli is qualified to make these measurements. For each TDR probe pit an O_2 , LEL, toxicity measurement will be made prior to allowing workers into pits. Once measurements are documented on Ith survey forms workers will be allowed in pit.
- Backfilling with soil and sand TDR conduit trenches.
- 1400 Jeff Vincalli ^{returned} ~~arrived~~ from CP with multigas meter and performed Ith measurements of (PHDS)
- 30 Second water tanker, front end loader (982) delivered
- Trenches will be inspected by certified Competent Person daily. A signed Trench Daily Inspection Report will be in project files. The competent person on site who will do all trench inspections is Paul Robinson.
- In addition, whenever excavations are open and deeper than 5 ft. an industrial hygiene surveillance will be made of the trench atmosphere O_2 , LEL, toxicity will be determined. Jeff Vincalli ^{on site} will make all atmospheric measurements. When J. Vincalli is not on site and atmospheric measurements must be made Caria Cook will make readings.

Fast Lane

SIGNATURE

DATE

10/31/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

weather: Clear, cool low 60's calm. Predicted winds for afternoon.

Safety: Scope of work - Place TOR probes, Rad Survey, backfill conduit runs, Begin hauling/placing clean fill on ax/bl cover.

5 Visitors: Pat Thomas, Wayne Hedges - Fuelers

Bob Rommel, Steve Nacht, Paul Brown

Dave Madison, Wayne Johnson, Terrel Nelson, Dennis Gustafson

Jack Mahan

0745 Tailgate given. Work will be on Ax/bl today no ASD work.

10 Crew: 1 supervisor 3 RCTs BNER Tech 2

1 SH&SO 3 laborers ASD Tech 2

1 HP 4 Operators

1 Tech lead 4 Teamsters

0830 Crew dressing out to place TOR probes.

0900 First load of dirt from borrow pit delivered to cover. Clean fill being placed at fence line and being pushed onto cover using D8 dozer

0930 Fuelers arrive to refuel equipment.

10 Craig Lyons and RCT performing Rad survey of ax/bl cover.

1100 Advancing clean fill onto Ax/bl cover

1230 2 Electricians arrived on site to place 90° bends on the ends of the TOR cable conduits. Also will place metal tape above conduit for future underground location

25 1300 BNER management visitors depart site.

1300 Second Tailgate briefing given to emphasize that workers were not to move onto or off of the clean fill being advanced into the EZ (CA) and vice versa.

SIGNATURE

DATE

11/1/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Tuesday 10/31 morning

3 breaks in West A at 120 ft.

conduit breaks mended with tape and glue.

Conduit is bedded in ≈ 2 inches of clean sand, covered completely with clean sand, and then covered with excavated soil. Detection tape is placed in trench at approximately 1 ft by pairs to cover.

1330 ordered 10 yd³ of clean sand to complete burial of East B and East A conduits. Sand delivered and placed off edge of clean cover fill ≈ 1400

1440 Excavating the West B TOR probe pit.

Continue to expand cover with clean fill

1450 Rich Smith arrived on site to take video

1519 Bob Rommel arrived to ask several questions regarding CRAP specs regarding survey support. Survey was scheduled for Monday 11/5/00 to construct TOR trenches.

Will request a ROTC for Section 01050 Part 2 2.01 B 2.

SIGNATURE

Thomas Campbell

DATE

11/01/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page 69

1548 Dug up a curb of 3 ft' 1 1/2 inch diameter steel. Excavated from ~5 1/2 feet deep. Notified Craig. Pit is ready for installation. Uncovered pipe while sloping the rear edge of pit. Pipe will be salvaged in am.

5 - Covered about 100 ft x 110 ft of Axl/bk with clean fill.

West A TDR probe pit - Depth before 1 ft cover placed on ^{existing} Axl/bk surface

Depth feet bgs	Probe #
7 ft	116
6 ft	115
5 ft	114
4 ft	113
3 ft	112
2 ft	111
1 ft	110
surface	109

TDR probes installed by L. Desotell, M. Floyd, J. Dixon, D. Emer

Last time

SIGNATURE

DATE

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Thursday 11/2/00

BOOK NO.

Weather: Clear, cool 50's-60's, winds ~40 mph out of the NW

Safety: Tailgate given at job site, Topira

Scope of work - bury 2nd set of TDR probes, backfill East A and East B trenches, expand cover

Cold/Weather

Slip/trip/fall

Visitors: Fred Penrod DOE,

0830 Began hauling soil from borrow pit to cover

- SHSSO performed atmospheric monitoring in TDR probe trench West B.

0 - P. Robinson did trench inspection of West B TDR probe pit

- RCT dressed out and did a rad survey of the piece of scrap rebar 3/4" dug up yesterday while sloping the rear side of the West B probe pit.

- Backfilling East A and East B trenches with clean sand.

140 - Rich Smith on site taking video shots

Once rad survey clears TDR West B probe pit, M. Floyd, J Dixon will place the first 2 deepest probes by hand in West B.

030 Long conversations with Greg Hudak and Dave Maden provided some clarification on the COAP and my responsibilities. Several errors/inconsistencies in procedures/specifications were pointed out. Hudak will talk to Julie Soroka regarding HP Hold Point release of TDR probe as-built. Hudak requested a sketch of TDR probe post installation.

100 Electricians placed detection tape above conduits. Conduit trenches East A, East B being backfilled.

00 Mechanics arrive to work on replacing large loader ripping teeth

130 Final TDR probe buried in West B probe pit.

Continuing to expand

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page 72

SIGNATURE

DATE

11/02/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page 71 Thursday 11/2/00

1 site sup 5 operators (1 left 6 teamsters
 1 SVISO 3 laborers
 1 HP 3 RCFS
 1 Tech lead 4 BNER tech
 2 Electricians 1 ASTD tech
 (until noon)
 1 video (half day)
 in borrow pit

Fuel line on dozer broke around 10 am. Mechanic repaired line by noon. About 1 cup of fuel was spilled. Non-reportable spill.

Rec survey of piece of rebar showed nothing about background.

SIGNATURE

DATE

11/2/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A

BOOK NO.

Monday 11/6/00

Weather: Clear, cool light winds from the north. Winds are supposed to increase later this morning/afternoon.

Safety: Tailgate briefing given prior to start of work.

Scope of work + survey trench & grade stakes, excavate TDR probe pit(s), place TDR probes, continue work on cover.

- Surveyors (2 of them) showed up and were briefed. Both are on bioassay and so work doesn't need to stop while one of them is in the EZ.

0930 Mechanic (K. Parker) completed fitting 988 loader with new cutting teeth.

2 Tractors arrive to fuel equipment. (Pat Thomas Wayne Hedges) refueled Blud, DA d
P. Robinson excavating TDR pits on Ax/ld.

0946 Watering ASD soil pit to control dust. Winds increasing and kicking up dust.

0947 Catherine Costenada from analytical services called and confirmed that she has bioassay samples for John Mchen and a Plutonium sample for Michael Mergen. Mike turned in gamma & Americium sample today; they are in my possession and will be submitted to the lab today.

10:30 Completed excavating East B TDR pit working on East A pit

11:00 Survey completed shooting grade stakes. Beginning survey of TDR trenches.

3 belly dumps coming bringing soil from borrow pit.

12:00 Both East A and East B TDR probes excavated.

SIGNATURE

DATE

11/6/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page 73 Monday 11/6/00

12:30 SH&SO in CA(EZ) performing atmospheric monitoring of TOR probe pits
Atmospheric monitoring showed normal ambient conditions

12:40 Competent person (P. Robinson) performed trench inspections on both East A
and East B TOR probe pits.

1300 Excavation of East A pit uncovered a small piece of flat stock metal
metal source severely embedded in wall of pit. RCT being sent in to survey
3" x 8" piece exposed.

1330 TOR pit of East B is to far out on cover - ^{near of excavation will} ~~Excavate~~
be backfilled and trench end expanded/enlarged to accomodate probes.

1520 East A at ≈ 5 ft lgs a piece of 4" x 3" stainless steel uncovered $\rightarrow$ clean survey

1545 East B $\frac{1}{2}$ - $\frac{3}{4}$ cello ≈ 3 ft lgs $\frac{1}{2}$ piece of barbed wire ≈ 2 ft $\rightarrow$ clean survey

East B one break $\rightarrow$ glued and taped.

East A two breaks $\rightarrow$ glued and taped.

Visitors: Jerel Nelson

Dillard Vincent

Tom Lenard

Just

Jim

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page _____

SIGNATURE

John Campbell

DATE

11/6/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Tuesday 11/7/00

BOOK NO.

Weather: Clear cold 50's very windy

Safety: Tailgate topics: Scope of work - continue cover construction, instal TOR probes

Cold! Stay warm, take breaks when needed

Slip trip, fall hazard.

5

Visitors: Jeff Smith

Garry Hudak

Feb Jerald Nelson

Zateratos

Terd Zateratos - NDEP (10 a.m. - 11 a.m.)

Rick Smith - RSL/video

10

Sabine Curtis

Janet Appenzeller - wing

DOE
09:30

0800 Moving loads of soil onto cover

Working on TOR probe placement in East B pit.

5 1040 Completed installing TOR probes in East B.

SH&SO went in to do atmospheric monitoring of East A TOR probe pit.

Conversation with J. Smith & G. Hudak regarding CDAP checklist. Will make notes on when CP/HP are released and how the release was made/documented.

0

Have 3 belly dumps running 2 @ 20-22 yd³/load + 1 @ 17 yd³Large belly dumps carrying @ 20-22 yd³/load.

11:10 DOE representatives depart site.

11:30 Jeff Smith departs site.

1400 Completed installing TOR probes in East A TOR probe pit!!

1430 71 belly dump loads of soil placed on cover. @ @ 22 yd³/load.

Jared / June

Work continued to Page N/A

SIGNATURE

DATE

11/7/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Wednesday 11/8/00

Weather: Clear, cool 60's, calm no winds at 0900.

Safety: Scope of work - excavate by hand 2x2x1 ft area around the 11 abandoned PVC monitoring wells, continue cover construction,

• slip trip/fall hazards

• Hazards for working around heavy equipment

• Be aware of the distinction between the CA(EZ) and clean cover → do not move from one to the other while on cover area.

• Cold stress hazards

• High wind hazards

0830 Continuing to construct a/b/c cover.

0830 Hand excavating an area 2x2x1 ft around the abandoned PVC monitoring wells. Preparing for grouting abandoned wells.

1500 Air brakes on block locked up. Mechanic called. Will replace an air line on 11/9 a.m.

110 belly loads placed on cover @ $\approx 22 \text{ yd}^3$ each.
Approximately 45% of cover completePVC pipes cut off at $\approx 1"$ below ground surface. We are ready to grout abandoned wellsRequested tech changes to location of finished fence line & grout specifications
Provided TOP probe partitioning data to Sonola, Huelsh

Just Line

SIGNATURE

DATE

11/8/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Thursday 11/9/20

BOOK NO.

Weather: Overcast, cold 50's, calm. Afternoon: light snow showers.

Safety: Continue cover construction

Hazard: working around heavy equipment, wear orange vests

visitors: 2-fuelers

- 5 - 2 laborer (Joe Jablonski, Morris Guici) and 3 operators (P. Robinson, R. Cruise, Gary Norberg) attending defensive driving course until 1200.

820 Mechanic on site working on air line on blade.

0 Moving dirt from borrow pit to cover. Taser placing dirt.

920 Telephone call from J. Savola approved proposed change to fence line.
She will issue a DCA. We have approval to construct the new red fence
within ± 5 ft of the existing fence.

5

1300 2 laborers & 3 operators returned from training.

1310 Concrete vault and associated concrete parts for ASTD arrived on site.
4 pipe filters arrive to off load vault.

0 1330 C Lyons & 3rd PCT arrive on site

14:43 HTHSG (CC)-1 ^{grout} mix design Harry Tutthill 5.5176 by ³ premixed

500- Snow falling hard now. still no accumulation

5

SIGNATURE

DATE

11/9/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Weather: Clear, ~~cool~~ cool 50's, calm

Safety: Use extra caution when working around the heavy equipment.

Sun glare in the afternoon blinding operators. So teamsters need to exercise caution when working on cover in afternoon.

Visitors: G. Hudak, R. Smith, Stu Rankinson

continuing to construct A/L cover.

Continuing to excavate ASTD.

- Tremi Grant abandoned wells

- Monuments ordered/cast

ASTD Crews

2 operators

2 laborers

1 teamster

2 PCTs $\approx$ 7 hrs each

- Called ^{Lhrstorker} Charles ~~Wendroff~~ regarding collecting EPerm samples from existing fence line. Left message. Charles returned call, will collect EPerm on Monday.

- Because of the shallow gradient of PVC wells G. Huddler agreed w/ G. Womack to use a cement slurry to close PVC wells, cement cap.

- Scheduled survey crew for Monday 11/20. They will top cover, locate PVC wells, work on ASTD trench.

- 3 belly dumps, one end dump hauling material for cover

1536 Spoke w/ George Brenck regarding pipes/well discovered at north west area of Ax.

He said to speak w/ Herman Terry @ 5-6593

1600 Scheduled J. Denny MTL for ASTD compaction testing on Thursday 11/16

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page N/A

SIGNATURE

K. Campbell

DATE

11/14/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

TITLE

CAU 110 closure Activities

PROJECT NO.

79

BOOK NO.

Work continued from Page N/A Wednesday 11/15/00

Weather: Clear, cool 50s, calm

Safety: Tailgate given prior to beginning work.

New company policy on on-the-job injury covered/discussed during briefing PY-0444.m1

Hearing protection will be required when working around water truck.

5

Visitors: Dave Krantzvitch - Iron worker GF } Determined the # of turn points needed for
Jesus Monje - Iron worker } view fence line: on site until 8:30
Bob Rome

- Continuing to place cover material on A1/b1

- Continuing to excavate ASTD trench - neatening up side slopes

A steel roller will be delivered to the site later today for compacting the bottom of the ASTD trench.

NTE (John Denny) scheduled for 3:10 a.m. 11/16 to perform compaction testing on ASTD trench and area directly over seven TOR probes at 1 ft. bgs.

1110 Steel wheel roller delivered for compacting base of ASTD trench

ASTD Personnel

2 operators

1 laborer

2 RCTs @ 7 hr each

1 tech person

1 teamster

Received first copy of grant and cap requirements for abandoned PVC monitoring wells from G. Hudak. Received verbal approval from J. Sorola via G. Hudak for approval. Copy submitted to Bloomer of BN Engineering.

SIGNATURE

DATE

11/15/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Thursday 11/16/00

Weather: Clear, cool & light breeze from the NW

Safety: Tailgate given prior to start of work: Scope of work, equipment hazards, cold work conditions

Visitors: Duane Pickett, John Doney

- Continue to construct axle cover; cover nearly complete

- Compacting ASTD trench using steel wheel roller.

- Will construct a test pad to develop compaction performance specs for 80% by foot, 90% and 95% using ^{gas powered} tamper.

0940 Fuel truck on site 2 technicians

Mechanics on site working on belly dump that broke down yesterday.

- Load of sand for ASTD dumped @ 10:00. Part dumped inside ASTD CR, ^{part} outside.
John Doney on site from MTL to do ASTD compaction testing.

* Having trouble meeting compaction spec for ASTD pit bottom of 95%. Two approaches (1) Ask engineers to relax compaction spec to 90% (2) collect a sample from pit for a proctor. G. Lyons will let us collect a small sample for γ -scan analysis. IT has a γ -scan instrument at E-E-Med. Have paged Rich Deshler (4-5687, 5-1090) regarding ~~the machinery~~ analyzing sample.

1330 J. Soroka called J. Dixon and approved a 90% compaction spec for the bottom of the ASTD pit. We have collected a soil sample from the ASTD for γ -analysis by IT. IT has agreed to run 20 minute γ -scan and provide us the results. If cleared by HP C. Lyons will submit soil samples from ASTD pit for proctor ^{determination} analysis.

1345 Corrugated Metal Pipe, ³ of them, 10 ft diameter delivered to site and off loaded.

SIGNATURE

DATE

11/16/00

Work continued from Page 80 Thursday 11/16/00

BOOK NO.

According to one hand here at Area 3 RWMS the two pipes discovered at the NW edge of the oil/tc area ~~might~~ connect to an underground tank. This tank ~~was~~ was possibly used to dispose of waste liquids. Was given a name to check with - Norm Landry.

5

1410 Gary Nordby (OE) was dispatched with ASTD soil samples for Area 25 E-Mad and X-analysis. Sample bottles ^{2x500ml} were screened by RCT's and taken for analysis.

* RCT's going to work Friday performing surface scan of ASTD downgrading.

441 J. Sorola called and approved change of 95% to 90% for compaction for ASTD trench bottom.

1510 2 more CMP sections and scaffolding arrive on site and are off loaded.

1610 Bob Cat arrived on site, 3 yd.

1615 Graig Lyons called and after reviewing X-spec sample results cleared proctor samples for delivery to MTL. Samples transported to the MTL by me with green tag and copy of RCT rad swipe results.

~~Last Line~~

SIGNATURE

DATE

11/16/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Monday 11/27/00

Weather: High overcast, cool 60's, calm.

Safety: Work on pouring the bottoms of ASD lysimeters,
Working around heavy equipment.

5 08:30 SH & SO performed atmospheric survey of lysimeter atmo.

No abnormal atmospheric readings. Survey documented on

"Confined Space Entry Air Monitoring Survey" form. Multimeter (PHD 5) due
for monthly calibration10 08:55 P. Robinson performed daily trench inspection form of ASD lysimeter
facility. Nothing abnormal

08:00 Blowers (2) were delivered to site to provide ventilation in cans.

15 09:00 Waiting on BA Engineering release of Hold Point of As/bk cover survey
data to rip cover to prepare for planting.

09:00 Iron workers placing drain pipe/slotted pipe sections in lysimeters

09:00 Waiting on concrete for lysimeter and As/bk fence post pour.

09:50 Cement arrives on site

10:10 Placing cement in first lysimeter via buckets

20 10:30 Gary Hudak called to give a heads up that there may be a high spot
on the As/bk cover. Also to point out that cover side slopes
are shown at 10:1 on drawing.

Continuing to pour concrete in lysimeters

25 11:14 G. Hudak called back said J. Sorolla has no problem w/ cover elevations.
Verbal release of Engineering Hold Point will be given just after lunch.

SIGNATURE

DATE

11/27/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page 82 Monday 11/27/00

BOOK NO.

Visitors: Frank Eck,

Issues: C. Nance spoke w/ SHFSO about symptoms of CO, CO₂ poisoning.
Had some symptoms last week after working on a piece of equipment.
Asking about symptoms of exposure.

5 SHFSO is checking on symptoms, monitoring, reporting issues etc. Passed on
issue to P. Brown @ 11:30

1230 spoke with J. Sorola. ^{was conditional} She released the Engineering Hold Point on
Ax/bd survey tape data. We need to repair the cover side slopes
to 40% (v) from present steeper slope. We can place subsidence
monuments and begin ripping for planting.

BE:

Corrected cover toe slope to 40%.

5 Ripping cover to 6 inches using blade.

Completed pouring concrete and finishing 6 lysimeters.

~~Last Line~~

SIGNATURE

DATE

11/27/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Weather: Clear, 60° calm

Safety: Targets given prior to work

Visitors: Bob Romel, 2 Fuelers

5 Atmospheric measurements made on lysimeters prior to allowing personnel to enter. No abnormal atmospheric readings were detected. Will take meter to Bob Bandreux for monthly calibration at end of shift.

Off loading Tee posts for A2/B2 fence

10 Continuing to pour concrete in lysimeters.

Laying out Tee posts for A2/B2 fence

1200 Completed ripping the A2/B2 cover with blade

1230 Completed placing cement in last lysimeter

15 P. Brown ordered roll-off for site clean up

20

25

SIGNATURE

DATE

11/28/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Monday 12/4/00Weather: Clear, sunny, 70'sSafety: Tailgate given prior to beginning work.Visitors: Sabine Curtis - DOETed Zafraates - NDEP

5

Late/slow start due to all hands meeting. 2.5 hour delay.Delay caused by not having respirator removal permit. Superintendent did not realize it was in project files did not call Tech lead.

0

Working on A/B/E2 fencing, only one ironworker on site.
Completed dishing A/B/E1 coverP. Robinson acting as crane operator because D. Siegi on personal leave.
P. Robinson at DTT for some training.

5

- Sprayed down road soil pile- Cleaning by vacuum lysimeters- Applying two part epoxy to base of lysimeters. 2 gallons of epoxy per lysimeterPlacing seed on A/B/E2 cover using seed drillCompleted epoxying 4 lysimeters. Will complete epoxying remaining 4
~~lysimeters~~Ted Zafraates

SIGNATURE

Shawn Campbell

DATE

12/4/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Tuesday 12/5/00

Weather: High clouds, 60's

Safety: Tailgate given prior to beginning work

Visitors: Bob Rammel, Dave Kr, Duane Fuchet, Roberto Lopez

Preparing to place straw on cover

5 Crane temporarily down. Mechanic sent for.

Working on preparing TDR and Heat probes for placement in lysimeters.

1300 Blowing straw on cover using trailer & straw blower. (4 laborers, 1 tractor, 1 OE) / RW biologist

10/300 Crimping straw on cover using trailer & crimper (2 OE)

1300 Continuing to wire lysimeters w/ TDR/Heat probes. Cables from probes are being attached to a piece of PVC piping which is in turn secured to the side of the lysimeter.

1400 Completed attaching top rails & diagonal bracing to R2/B2 corner posts.

15 1547 G. Hendrick called to convey that survey data shows some spots of cover are short greater than 50 ft inside of original fence line. Asked to speak with Paul Robinson.

According to BN Engineers

16/10 Survey data indicated that a spot on SE has too steep a slope.

20 And a spot in NE corner is ~16 ft short of the designed 50 ft inside original fence line. Eng asked that P. Robinson remeasure area and make repairs/corrections.

5 Last Line

SIGNATURE

DATE

12/05/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Wednesday 12/6/00

BOOK NO.

Weather: Clear, 60s calm.

Safety: Tailgate given prior to starting work.

Visitors: ~~2 fuelers~~ 2 fuelers (teamsters), teamster dropping off equipment.Dave Kranicevich, Dennis Finney, Ed Holtman^(BN), Rick Betheridge^(DOE), Ralph Smeeish^(BOE), ^{DWIGHT} Pucke^{to be}

- 5 P. Robinson reviewed information faxed by J. Sorola regarding corrections made to A1/B1 cover. Requested 1 belly dump, 1 loader, 1 blade for repair work. According to BN engineering the cover is just a few feet short on eastern end. Need to extend cover a few feet to the east, adjust the slopes to 10:1 or shallower.

- 10 Continuing to run TOR/Heat probe cables from lysimeters.
Waiting on epoxy to finish sealing last 2 lysimeters

- 11:30 SH&SO made atmospheric measurements of inside of lysimeters. No abnormal readings. Monitoring documented of JH survey forms. Forms on file at job site.

5

10:30 Blade loader and belly dump on site for cover work.

11:00 First load of fill from A3 borrow pit brought to cover.

- BN technicians testing TOR & Heat probes.
- 10 - Electricians continuing to install/secure Probes & cabling.
- Backfilling around ASD Vault with clean fill/sand. Backfill being compacted using wheel hand operated vibrating roller and "thumper" tamping units. Mechanic working on 2 thumper units.
- Continue to blow and crimp straw on cover.

- 5 12:00 Completed covering A1/B1 cover with straw

Repositioned the crane so that it can be used to lift bucket loads of dirt into the ASD trench.

Don Lavit on site to test TOR/Temp probes in lysimeters, also checked cover TOR per

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Just / Tim

Work continued to Page N/A

SIGNATURE

DATE

12/06/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Weather: High clouds, 60's, calm

Safety: Tailgate given pass to begin work.

Will be reinstating RWP and PPE (Level C PPE requirements when backfilling ASTD trench with suspect soil. RWP will be enforced until suspect soil is placed, covered with a layer of clean soil, and a rad survey of area (stump & stump) shows area is not contaminated.

Visitors: Craig Layone

P. Robinson will continue to place new borrow soil along eastern & southern edges of Ax/Bx cover.

Spoke with Norm Lindry regarding what soil was used in the construction of the Ax/Bx cover. Was mostly soil from Ahat and excavated from between Ax & Bx. Tom Gomers was also involved with Ax/Bx cover construction.

Dug several spade holes along eastern edge of cover near the 50 ft line. All show that there is 1 ft or more of cover material over the original operational cover at the 50 ft line inside original area rad fence.

Marked Top of Slope and Toe of Slope for new reworked/repaired cover slope. ^{East & southern sides} Cut slope to 10:1 or shallower. Survey arranged for Monday morning to BS-built slopes once again.

- Ironworkers cut up one removed gate returned with incorrect wire back to warehouse.

- No earth work on ASTD done today

Start Line

SIGNATURE

DATE

12/07/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Monday 12/11/2000

Weather: Cold 50's clear calm.

Safety: Tailgate given prior to beginning work. Cold stress, heavy equipment

Visitors: Angela Ray BNTH for OST, Craig Lyons, Dupine Pickett

5 - Survey on site to resurvey Ax/BL top of slope and toe of slope; monument locations and as-built fence.

- Operators & laborers dressing out to enter ASD area/pit to begin backfilling pit.

10

- Crane down mechanic called. Crane & reeks will not release.

11:30 Mechanic on site to repair crane.

Crane repaired. Backfilling ASD pit.

5 - Surveyor placing brass pins in subsidence monuments on Ax/BL.

They completed as-building survey of the new fence, the cover edge where engineering indicated thin areas and/or areas where cover is short, not extensive enough. Set 3 of the 7 brass pins in subsidence monuments. Batteries on drill went dead. Data delivered to Scotty Ellison at approx noon.

0

- Completed placing first 1 ft lift in ASD trench. Compaction of lift done using tampers & hand operated roller. ^{Performance} Compaction ~~met~~ specification (80 met or exceeded).

5 - Dust controlled by watering.

Fast Time

SIGNATURE

DATE

12/11/00

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Weather: Overcast, cold SO's, calm, scattered showers, hail, gusty winds ^{afternoon}

Safety: Tailgate given prior to beginning work

Visitors: Von Moll RSL photographer, Galen Messer

5 Slow start to ASTD dirt work due to light precipitation

10:00 Laborers in ASTD pit compacting lift.

Mechanic on site working on crane

10:30 Crane still having problems. Mechanic called back to site. Using crane without swing brake

10 Placing lift in ASTD & compacting using tampers & roller

- Decided to turn crane back in on Thurs Wednesday 12/13. Making good progress backfilling ASTD with backhoe and loader.

- Waiting on A1/B2 side slope Hold Point release from engineering.

15 - If HP is released will blow and cover straw on 12/13 on cover edges.

R.C.T.s surveying the crane hook for release.

Swipes of crane hook show no rad. Crane released for demobilization

20

5

SIGNATURE

DATE

12/12/2000

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

TITLE

CAU 110 Closure Activities

PROJECT NO.

91

BOOK NO.

Work continued from Page N/A Wednesday 12/13/00

Weather: Cold 50's, high clouds, calm.

Safety: Tailgate given prior to beginning work

Visitors: Rich Smith, Bob Rammel

Surveyors on site drilling subsidence monuments and affixing brown survey pins.

Will survey and stamp pins by end of the day.

Crew for straw blowing on hand - 1 operator, 2 laborers.

Crew to move crane on site - 1 operator & 1 rigger.

10:00 Nearly finished with placing straw on cover edges. Engineering released the HP on the cover edges on 12/12 @ 17:30 via an email message. Straw will be crimped into place.

- Continuing to backfill ASDD trench. Jay Dixon arrived on site with the remains of the last probe for the lysimeters.

RCTs preparing to take dirty laundry to ^{Arcab:} Laundry

Crane moved demobilized from site.

~~Test Line~~

SIGNATURE

DATE

12/13/2000

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Work continued from Page N/A Thursday 12/14/00

Weather: Clear, cold 50's, light winds

Safety: Tailgate given pass to beginning work.

Visitors: Frank Euk transfer GF, 2 Eukers, 2 oilers

- 5 Continuing to back fill ASTO trench from soil pile
Waiting on lowboy to load farm equipment to transport Farm Equip.

0900 Sent transfer & operator to get lowboy for farm equip.

10:00 Survey finished with as-built of A/B monuments

10 14:30 Second load of farm equipment to Mercury.

1500 844 loader delivered to site. Now we are moving some dirt.

1520 Tanker truck emptied and returned to filling station

1530 Lowboy off to Fleet. Should be off renter as of 12/14/00

1530 Completed placing all suspected contaminated soil in ASTO trench pit.

5 Covering ASTO bottom with "clean" soil from excavation pile.

1600 R. Cruise had to attend a security briefing

~~1600~~ 1540 Spoke with Craig Lyons (IH) regarding Red survey Stump's Tramp
of ASTO scheduled for Friday 12/15. It is a go

b

SIGNATURE

DATE

12/14/00

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APPENDIX I

U-3ax/bl TDR CALIBRATION

Closure Report - CAU 110
Section: Appendix I
Revision: 1
Date: August 6, 2001

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U-3ax/bl TDR CALIBRATION

Conducted March 2001

Dan Levitt, Environmental Technical Services, Bechtel Nevada

April 4, 2001

Introduction

Calibration of time-domain reflectometry (TDR) sensors is required because soil type affects TDR response, and because TDR trace length (and subsequent volumetric water content) measurements increase as cable lengths and numbers of multiplexers increase. A "dry-down" calibration was conducted on a TDR probe in a laboratory in March 2001.

Results indicate that a linear equation fit the calibration data with a correlation coefficient (R^2) of 0.9963, which is an excellent fit. The calibration data fell just far enough away from standard calibration equations such as Topp's equation (Topp et al., 1980), that it is recommended that the site-specific and cable length-specific U-3ax/bl linear regression equation be used. A 2nd order polynomial equation was also fit to these data ($R^2 = 0.9966$), but the gain in accuracy is so slight, that a linear regression equation should be used for simplicity.

Calibration Procedure

[Note: A BN Draft Procedure is currently being prepared, but has not been formalized yet.]

A bucket of soil was collected from the U-3ax/bl cover in November 2000. Soil from that bucket was placed in a flat pan with dimensions of 52 x 26 x 7 cm, with one Campbell Scientific Inc. (CSI) TDR probe model CS610 buried horizontally in the middle of the pan. The probe had 2 cm of soil above and below the probe rods. The TDR probe had 165 feet of RG8 cable, and was wired through a level-two SMDX50 multiplexer, with 10 feet of RG58 cable connecting to the level-one multiplexer, with 1.5 feet of RG58 cable connecting to a TDR100 TDR controller. This configuration is identical to the two U-3ax/bl TDR system configurations.

The soil pan was placed on an electronic balance for NIST-traceable mass balance measurements. The electronic balance was configured such that its digital output could be logged by an analog datalogger as TDR measurements were made, providing a dataset of TDR measurements of trace length divided by probe length (L/L), with simultaneous measurements of mass.

After initial setup, the soil pan was saturated, and left to dry for two weeks. After drying to a final volumetric water content (VWC) of 5.5%, the soil from the soil pan was weighed, oven-dried for 24 hours, and weighed again to determine final VWC. This "anchor point" was used to convert mass balance measurements into VWC readings, and compared to L/L measurements made by TDR.

Results and Discussion

Results from this dry-down calibration are shown in Figure 1. Due to the long cable lengths and soil type at U-3ax/bl, the TDR trace end-points were extremely flat under saturated, and near-saturated conditions, rendering the TDR data unreliable under such conditions. Therefore, the TDR data was only fit through a VWC of 30 %. Fortunately, only the top few centimeters of soil at U-3ax/bl is expected to get this wet (following significant rains), so the use of a TDR calibration in the range of 5 to 30 % volumetric water content should be sufficient. The noisy data at the wet end of this calibration are shown in Figure 1. Figure 2 is the same as Figure 1, but with Area 5, and CNTA TDR calibration data included for comparison.

A linear equation, and a 2nd order polynomial equation were fit to the U-3ax/bl data using linear regression data analysis tools in MicroSoft Excel. The correlation coefficient (R^2) for these fits were 0.9963 for the linear equation, and 0.9966 for the 2nd order equation. There is essentially no difference between these equations, so it is recommended that the linear equation be used for simplicity.

If the calibration data were closer to one of the standard calibration equations, such as Topp, Topp's equation could be used for simplicity. However, the U-3ax/bl TDR system configuration uses the longest cable lengths known to be used by staff at CSI (Jim Bilskie, CSI, Personal Communication). If the Topp equation is used, VWC will be over-predicted by about 5 % VWC (at a VWC of 25 %).

This method does not account for hysteresis. However, field soil is usually in a drying state, with wetting only occurring following precipitation events, and the error associated with hysteresis is generally a few percent VWC. In addition, this method of calibration is recommended by Campbell Scientific Inc., and by researchers at several Universities who use and calibrate TDR regularly (Jim Bilskie, CSI, Personal Communication).

U-3ax/bl TDR Calibration Equation

Results of linear regression analysis yielded the following table of coefficients:

Intercept	-17.13722
X Variable 1	10.373701

Such that $VWC (\%) = -17.137 + 10.3737 * (L/L)$

Where (L/L) is trace length / probe length and output by the datalogger.

References

Topp, G.C., J.L. Davis and A.P. Annan, 1980. Electromagnetic determination of soil water content: Measurements in coaxial transmission lines. *Water Resources Research* 16(3):574-582.

Figure 1. U-3ax/bl TDR calibration fits with the Topp Equation.

Figure 2. U-3ax/bl TDR calibration with other calibration data and equations.

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APPENDIX J

NDEP COMMENT RESOLUTION

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DOCUMENT REVIEW SHEET

<p>Document Title/Number: <u>Draft Closure Report for Corrective Action Unit 110: Area 3 RWMS U-3ax/bl Disposal Unit, Nevada Test Site, Nevada.</u></p> <p>Document Date: April 2001</p> <p>Revision Number: 0</p> <p>Originator/Organization: Jeff Smith, Bechtel Nevada Environmental Restoration</p> <p>Date Comments Due: May 30, 2001</p> <p>Reviewer/Organization: Paul Liebendorfer, NDEP</p>				
Comment Number/ Location	Type"	Comment	Comment Response	Accept
1. Page ix and Page 1, General Comment	M	The CAS Number should be referenced along with the CAU Number.	The text has been modified as requested.	Yes
2. Various pages in ES, Introduction, References, & Appendix A	M	All references to RCRA Part B permit NEV HW009 should include the statement, "As updated by the RCRA Part B permit (NEV HW009), reissued November, 2000".	The text has been modified as requested.	Yes

DOCUMENT REVIEW SHEET

Comment Number/ Location	Type"	Comment	Comment Response	Accept
3. Page 4, Section 1.2, Last bullet	M	It should be noted that NDEP will add post-closure monitoring criteria to the Permit, however the specific performance criteria will be established as stated in the CR.	The text has been modified in this bullet to indicate the post-closure inspection and subsidence monitoring requirements will be added to the Permit.	Yes
4. Page 5, Section 1.3	M	Section 5 of the CR contains Conclusions and Recommendations, not References. Section 6 (References) should be added to this listing.	The text has been modified as requested.	Yes
5. Page 7, Section 2.1.1, First Paragraph	M	"...a vertical moisture can be developed..." should be changed to read "...a moisture profile can be developed..."	The text has been modified as requested.	Yes
6. Page 8, Section 2.1.1, Last bullet	M	The TDR moisture calibration curves, referred to in this paragraph, should be included in an appendix to the CR.	The TDR calibration curves are provided in Appendix I of the CR.	Yes
7. Page 12, Section 2.1.3, 2 nd bullet	M	"...22.79 kilograms (kg) per ha (pounds [lb] per ac) of pure live seed...". The numerical value of the pounds per ac should be inserted immediately ahead of the pounds per ac reference.	The text has been modified as requested.	Yes

DOCUMENT REVIEW SHEET

Comment Number/ Location	Type ^a	Comment	Comment Response	Accept
8. Page 14, Section 2.2	M	Discussion of DCN 01/10-448, shown in Appendix E, should be included in this section.	DCN 00/08-418 was inadvertently included in Appendix E. The discussion in Section 2.2.1 refers to DCN 01/10-448. The text has been modified to indicate the correct DCN number.	Yes
9. Page 15, Section 2.2	M	A DCN for the November 11, 2000 E-mail should be filed on this item for consistency of project procedures.	According to BN Engineering procedures a DCN can not be issued after an activity has been completed. The procedure is to not the change in the final "as built" drawings.	No
10. Page 21, Section 4.0	M	The referenced checklist is not contained in Appendix A. The certifications of Closure are in Appendix A and the Checklist is in Appendix B.	The text has been modified to indicate that the checklist is located in Appendix B.	Yes

DOCUMENT REVIEW SHEET

Comment Number/ Location	Type ^a	Comment	Comment Response	Accept
11.Pgs 24 & 25 Section 5.1.1 & Section 5.1.3	M	These two items state the survey markers will be surveyed on an annual basis. The DOE/NV Closure Plan states the survey markers will be surveyed on an annual basis (Closure Plan for Corrective Action Unit 110: Area 3 RWMS, U-3ax/bl Disposal Unit, Nevada Test Site, Nevada, Section 4.1 Inspections, Pg. 23, second bullet item). The survey should be conducted on a bi-annual basis (every six months).	The text has been modified to reflect that subsidence monitoring will be conducted twice a year.	Yes
12.Appendix G	M	The Northeast coordinates shown in Appendix G are 836,782.110 ft N; 687,113.43 ft E. The as-built drawings shown in Appendix F, shows the coordinates as 836,782.10 ft N; 687,113.43 ft E. Please correct as appropriate.	A new drawing for the Land Use Restriction survey area was developed for the document.	Yes
13.Appendix H	M	The photographs should be labeled for reference purposes.	The photographs have been labeled as requested.	Yes

DOCUMENT REVIEW SHEET

<p>Document Title/Number: <u>Closure Report for Corrective Action Unit 110: Area 3 RWMS U-3ax/bl Disposal Unit, Nevada Test Site, Nevada.</u></p> <p>Document Date: June 2001</p> <p>Revision Number: 0</p> <p>Originator/Organization: Jeff Smith, Bechtel Nevada Environmental Restoration</p> <p>Date Comments Due: July 16, 2001</p> <p>Reviewer/Organization: Paul Liebendorfer, NDEP</p>				
Comment Number/ Location	Type ^a	Comment	Comment Response	Accept
1) Page 7, Section 2.1.1.1, 1 st paragraph, 3 rd sentence	M	Change sentence from ... <i>a moisture can be developed...</i> to ... <i>a moisture profile can be developed.</i>	The text has been modified as requested.	Yes
2) Page 24, Section 5.1.1.1, 2 nd bullet	M	The survey markers are to be surveyed biannually, every six months, to determine if the cover has subsided.	The text has been modified as requested.	Yes
3) Page 15, Section 2.2.3	M	The section number should be 2.2.2.	The text has been modified as requested.	Yes

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Comment Number/ Location	Type ^a	Comment	Comment Response	Accept
4) Page 27, Section 6.0	M	The correct reference section is VII.B.7 for CAU 110 in the Nevada Division of Environmental Protection, November 2000 Permit for a Hazardous Waste Facility, Permit Number NEV HW009.	The text has been modified as requested.	Yes

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Comment Number/ Location	Type ^a	Comment	Comment Response	Accept
5) Appendix G	M	The CAU Use Restriction Information Form and drawing SK-003-00004-C1 should indicate the datum used for the survey. The datum used for this appendix and Drawing JS-003-00004-C1, in Appendix F, appear different. An explanation would be helpful.	<p>All Engineering drawings created at the Nevada Test Site have been standardized on the North American Horizontal Datum established in 1927 and North American Vertical Datum established in 1929. These datums are what are used by USGS topographic maps. Unfortunately, the CAU Use Restriction Information Form has been standardized using the World Geodetic System (WGS) developed in 1984. The WGS longitude and latitude system is used by the Global Positioning System (GPS), since this is easy to use WGS 1984 has become the NNSA/NV ERD Common Document Repository (CDR) standard.</p> <p>The Use Restriction Information Drawing SK-003-00004-C1 has been modified to include the WGS 1984 information.</p>	Yes

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