Nevada
Environmental
Restoration
Project

Post-Closure Inspection and
Monitoring Report for
Corrective Action Unit 417:
Central Nevada Test Area - Surface,
Hot Creek Valley, Nevada

For Calendar Year 2005

Controlled Copy No.: _____

Revision: 0

April 2006

Environmental Restoration
Division

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

DISCLAIMER

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the U.S. Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced directly from the best available copy.

Available for sale to the public from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161-0002
Telephone: (800) 553-6847
Fax: (703) 605-6900
E-mail: orders@ntis.gov
Online ordering: <http://www.ntis.gov/ordering.htm>

Available electronically at <http://www.osti.gov/bridge/>

Available for a processing fee to the U.S. Department of Energy and its contractors, in paper, from:

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062
Telephone: (865) 576-8401
Fax: (865) 576-5728
E-mail: reports@adonis.osti.gov

**POST-CLOSURE INSPECTION AND MONITORING
REPORT FOR CORRECTIVE ACTION UNIT 417:
CENTRAL NEVADA TEST AREA - SURFACE,
HOT CREEK VALLEY, NEVADA

FOR CALENDAR YEAR 2005**

**U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office
Las Vegas, NV**

**Controlled Copy No. _____
Revision: 0
April 2006**

THIS PAGE INTENTIONALLY LEFT BLANK

**POST-CLOSURE INSPECTION AND MONITORING
REPORT FOR CORRECTIVE ACTION UNIT 417:
CENTRAL NEVADA TEST AREA - SURFACE,
HOT CREEK VALLEY, NEVADA

FOR CALENDAR YEAR 2005**

Approved By: Date: 4/26/06
John B. Jones, Federal Offsites/Soils Sub-Project Director
Environmental Restoration Project

Approved By: Date: 4/26/06
Janet Appenzeller-Wing, Federal Project Director
Environmental Restoration Project

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS	vii
EXECUTIVE SUMMARY	ix
1.0 INTRODUCTION	1
1.1 SCOPE AND OBJECTIVES.....	1
1.2 BACKGROUND.....	1
1.3 GEOLOGIC SETTING.....	4
2.0 POST-CLOSURE MONITORING REQUIREMENTS	5
2.1 BACKGROUND.....	5
2.2 SITE INSPECTIONS	5
2.3 SOIL MOISTURE MONITORING	5
2.4 COMPLIANCE CRITERIA	8
2.5 REPORTING REQUIREMENTS	8
3.0 SITE INSPECTIONS, SURVEYS, AND MAINTENANCE	9
3.1 SITE INSPECTION RESULTS.....	9
3.1.1 First Quarterly Inspection	9
3.1.2 Second Quarterly Inspection	9
3.1.3 Third Quarterly Inspection.....	10
3.1.4 Fourth Quarterly Inspection	10
3.2 SUBSIDENCE SURVEY	11
3.2.1 UC-1 Background.....	11
3.2.2 UC-4 Background.....	12
3.2.3 UC-1 Subsidence Survey Results	13
3.2.4 UC-4 Subsidence Survey Results	13
3.3 VEGETATION SURVEY	13
3.3.1 Background	13
3.3.2 Survey Results	18
3.3.3 Summary and Conclusions.....	18
3.4 MAINTENANCE AND REPAIR	19
3.4.1 UC-1 Maintenance and Repair	19
3.4.2 UC-3 Maintenance and Repair	19
3.4.3 UC-4 Maintenance and Repair	20
4.0 SOIL MOISTURE MONITORING.....	21
4.1 PRECIPITATION DATA	21
4.2 SOIL MOISTURE MONITORING RESULTS	21
4.2.1 Results.....	21
4.2.2 Data Trends	27
5.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS.....	29
5.1 SUMMARY.....	29
5.2 CONCLUSIONS	30
5.3 RECOMMENDATIONS	30

TABLE OF CONTENTS (continued)

6.0 REFERENCES	31
----------------------	----

FIGURES

FIGURE 1. CENTRAL NEVADA TEST AREA LOCATION MAP	2
FIGURE 2. CAU 417, CENTRAL NEVADA TEST AREA - SURFACE MAP	3
FIGURE 3. UC-1 CMP COVER MONITORING INSTRUMENTATION	7
FIGURE 4. UC-1 COVER SETTLEMENT	16
FIGURE 5. UC-4 COVER SETTLEMENT	17
FIGURE 6. UC-1 PRECIPITATION	22
FIGURE 7. SOIL MOISTURE CONTENT, EAST TDR NEST A	23
FIGURE 8. SOIL MOISTURE CONTENT, EAST TDR NEST B	24
FIGURE 9. SOIL MOISTURE CONTENT, WEST TDR NEST A	25
FIGURE 10. SOIL MOISTURE CONTENT, WEST TDR NEST B	26

TABLES

TABLE 1. UC-1 MONUMENT COORDINATES AND BASELINE ELEVATIONS	12
TABLE 2. UC-4 MONUMENT COORDINATES AND BASELINE ELEVATIONS	12
TABLE 3. UC-1 MONUMENT ELEVATIONS AND SUBSIDENCE	14
TABLE 4. UC-4 MONUMENT ELEVATIONS AND SUBSIDENCE	15

APPENDICES

APPENDIX A: INSPECTION CHECKLISTS, FIELD NOTES, AND PHOTOGRAPHS
APPENDIX B: SUBSIDENCE SURVEY PLATS
APPENDIX C: VEGETATION MONITORING REPORT
LIBRARY DISTRIBUTION LIST

ACRONYMS AND ABBREVIATIONS

CAP	Corrective Action Plan
CAS	Corrective Action Site
CAU	Corrective Action Unit
cm	centimeter(s)
CMP	Central Mud Pit
CNTA	Central Nevada Test Area
CR	Closure Report
DOE/NV	U.S. Department of Energy, Nevada Operations Office
FFACO	Federal Facility Agreement and Consent Order
ft	foot (feet)
in.	inch(es)
km	kilometer(s)
m	meter(s)
m ²	square meter(s)
mi	mile(s)
NDEP	Nevada Division of Environmental Protection
NNSA/NSO	U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office
NNSA/NV	U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office
SM	Subsidence Monument
TDR	Time Domain Reflectometry
VMC	Volumetric Moisture Content

THIS PAGE INTENTIONALLY LEFT BLANK

EXECUTIVE SUMMARY

Corrective Action Unit (CAU) 417, Central Nevada Test Area - Surface, is located in Hot Creek Valley in northern Nye County, Nevada, and consists of three areas commonly referred to as UC-1, UC-3, and UC-4. CAU 417 consists of 34 Corrective Action Sites (CASs) which were closed in 2000 (U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office, 2001).

Three CASs at UC-1 were closed in place with administrative controls. At CAS 58-09-01, Central Mud Pit (CMP), a vegetated soil cover was constructed over the mud pit. At the remaining two sites CAS 58-09-02, Mud Pit and 58-09-05, Mud Pits (3), aboveground monuments and warning signs were installed to mark the CAS boundaries.

Three CASs at UC-3 were closed in place with administrative controls. Aboveground monuments and warning signs were installed to mark the site boundaries at CAS 58-09-06, Mud Pits (5), CAS 58-25-01, Spill and CAS 58-10-01, Shaker Pad Area.

Two CASs that consist of five sites at UC-4 were closed in place with administrative controls. At CAS 58-09-03, Mud Pits (5), an engineered soil cover was constructed over Mud Pit C. At the remaining three sites in CAS 58-09-03 and at CAS 58-10-05, Shaker Pad Area, aboveground monuments and warning signs were installed to mark the site boundaries.

The remaining 26 CASs at CAU 417 were either clean-closed or closed by taking no further action.

Quarterly post-closure inspections are performed at the CASs that were closed in place at UC-1, UC-3, and UC-4. During calendar year 2005, site inspections were performed on March 15, June 16, September 22, and December 7.

The inspections conducted at the UC-1 CMP documented that the site was in good condition and continued to show integrity of the cover unit. No new cracks or fractures were observed until the December inspection. A crack on the west portion of the cover showed evidence of lateral expansion; however, it is not at an actionable level. The crack will be sealed by filling with bentonite during the first quarter of 2006 and monitored during subsequent inspections. The cover vegetation was healthy and well established. No issues were identified with the CMP fence, gate, or subsidence monuments. No issues were identified with the warning signs and monuments at the other two UC-1 locations.

The inspections at UC-3 indicated that the sites are in excellent condition. All monuments and signs showed no displacement, damage, or removal. A small erosion gully from spring rain runoff was observed during the June inspection, but it did not grow to an actionable level during 2005. No other issues or concerns were identified.

Inspections performed at UC-4 Mud Pit C cover revealed that erosion rills were formed during March and September exposing the geosynthetic clay liner. Both erosion rills were repaired within 90 days of reporting. Sparse vegetation is present on the cover. The overall condition of

the monuments, fence, and gate are in good condition. No issues were identified with the warning signs and monuments at the other four UC-4 locations.

Subsidence surveys were conducted at UC-1 CMP and UC-4 Mud Pit C in March and September of 2005. The results of the subsidence surveys indicate that the covers are performing as expected, and no unusual subsidence was observed.

The June vegetation survey of the UC-1 CMP cover and adjacent areas indicated that the revegetation has been very successful. The vegetation should continue to be monitored to document any changes in the plant community and identify conditions that could potentially require remedial action in order to maintain a viable vegetative cover on the site. Vegetation surveys should be conducted only as required.

Precipitation during 2005 was above average, with an annual rainfall total of 21.79 centimeters (8.58 inches).

Soil moisture content data show that the UC-1 CMP cover is performing as designed, with evapotranspiration effectively removing water from the cover.

It is recommended to continue quarterly site inspections and the collection of soil moisture data for the UC-1 CMP cover.

1.0 INTRODUCTION

Corrective Action Unit (CAU) 417, Central Nevada Test Area (CNTA) - Surface is located in Hot Creek Valley, Nye County, Nevada, approximately 22.5 kilometers (km) (14 miles [mi]) west of U.S. Highway 6, approximately 137 km (85 mi) northeast of Tonopah, Nevada (Figure 1). CAU 417 consists of 34 Corrective Action Sites (CASs) located at three distinct land withdrawal areas commonly referred to as UC-1, UC-3, and UC-4.

1.1 SCOPE AND OBJECTIVES

This report has been prepared according to the Post-Closure Monitoring Plan contained in the CAU 417 Closure Report (CR) (U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office [NNSA/NV], 2001) and the Federal Facility Agreement and Consent Order (FFACO, 1996).

This report provides an analysis and summary of site inspections, subsidence surveys, meteorological information, and soil moisture monitoring data for Calendar Year 2005. Inspections are conducted quarterly to document the physical condition of the CAU 417 soil covers, monuments, signs, fencing, and use-restricted areas. Subsidence surveys of the UC-1 Central Mud Pit (CMP) and UC-4 Mud Pit C covers are done semi-annually, and surveys of the CMP cover vegetation are conducted periodically. In addition, the CMP cover is instrumented to monitor the soil moisture conditions within the upper 1.2 meters (m) (4 feet [ft]) of the cover to determine if the cover is performing as designed.

1.2 BACKGROUND

The CNTA consists of three emplacement boreholes (UC-1, UC-3, and UC-4) that were to be drilled for nuclear tests. A nuclear device for Project Faultless was detonated on January 19, 1968, in emplacement borehole UC-1 at a depth of approximately 975 m (3,200 ft) below ground surface. The other two emplacement boreholes (UC-3 and UC-4) were never used. Boreholes UC-1, UC-3, and UC-4 comprise three separate land withdrawal areas which range in size from approximately 1 to 1.5 square miles (Figure 2). All three CNTA land withdrawal areas are accessible to the public.

Site closure activities are detailed in the CR for CAU 417 (NNSA/NV, 2001). CAU 417 consists of 34 CASs. Three CASs at UC-1 were closed in place with administrative controls. At the UC-1 CMP (CAS 58-09-01), a vegetated soil cover was constructed over the mud pit. At the remaining two CASs at UC-1, aboveground monuments and warning signs were installed. Three CASs at UC-3 were closed in place with administrative controls. Two CASs at UC-4 consisting of five sites were closed in place with administrative controls. At the UC-4 Mud Pit C (CAS 58-09-03), an engineered soil cover was constructed. At the remaining four sites, aboveground monuments and warning signs were installed. The remainder of the 34 CASs were either clean-closed or closed by taking no further action.

The UC-1 CMP contains hydrocarbon- and chromium-impacted soil and drilling mud. Immediately west of and adjacent to the UC-1 CMP, a trench was excavated, and hydrocarbon-impacted mud from other CNTA mud pits was relocated to the trench. A single engineered monolayer cover was constructed to close both the CMP and the adjacent relocation trench. The cover is vegetated and instrumented with time-domain reflectometry (TDR) sensors to monitor the soil moisture content in the cover. The UC-4 Mud Pit C was closed with an engineered cover to prove the cover design and construction methods that would be used at the UC-1 CMP. The cover includes a geosynthetic clay liner and is neither vegetated nor instrumented.

1.3 GEOLOGIC SETTING

The CNTA is located in the north-central portion of the Hot Creek Valley within the Basin and Range physiographic province. This province consists of regularly spaced, roughly north-south trending mountain ranges separated by alluvial valleys formed by faulting. The UC-1 site lies at an elevation of 1,860 m (6,100 ft) above mean sea level and is bordered by the Hot Creek Range to the west, at an elevation of 1,370 m (4,500 ft) above the valley floor. The Pancake Range to the east of UC-1 rises 550 m (1,800 ft) above the valley floor. The Hot Creek Range is composed of Paleozoic sedimentary rocks and Tertiary volcanic rocks. The Paleozoic rocks comprise sandstones, quartzite, limestone, and dolomite, while the Tertiary volcanic rocks comprise welded tuff, nonwelded bedded tuff, argillized and zeolitized tuff, conglomeratic tuffaceous sandstone, carbonaceous siltstone, and rhyolite (Healey, 1968). The alluvium at UC-1 is approximately 730 m (2,400 ft) thick and is underlain by tuffaceous sediments and zeolitized tuffs to a depth of approximately 998 m (3,275 ft) (Barnes, 1968). The Morey Peak-Hot Creek Caldera is thought to be buried by deposits of tuff and alluvium beneath the northern portion of Hot Creek Valley (Healey, 1968).

The Project Faultless test resulted in the subsidence of an irregularly shaped area of approximately 0.9 square kilometers (0.6 square miles). As a result, one northeast-trending fault scarp extends beneath the south eastern corner of the UC-1 Mud Pit and cover with as much as 4.6 m (15 ft) vertical displacement. Normal drainage patterns were disrupted by the formation of this scarp, so flood diversion channels were constructed to protect the cover and prevent infiltration along the fault scarp (NNSA/NV, 2001). Depth to the water table at the UC-1 CMP is approximately 168 m (550 ft).

2.0 POST-CLOSURE MONITORING REQUIREMENTS

2.1 BACKGROUND

Post-closure requirements for the CNTA, CAU 417, are described in the CR for CAU 417 (NNSA/NV, 2001) and are detailed in the following sections. Post-closure activities at the CNTA are intended to determine the following:

- Whether maintenance and/or repairs to the UC-1 CMP or the UC-4 Mud Pit C covers, fences, or diversion channels are needed
- Whether the UC-1 CMP or UC-4 Mud Pit C covers are subsiding
- Whether the UC-1 CMP cover is performing as designed
- The health of the vegetation on the UC-1 CMP cover
- Whether maintenance and/or repairs to the aboveground monuments or warning signs are needed
- Whether modifications to the administrative controls are needed

2.2 SITE INSPECTIONS

Post-closure inspections of CAU 417 are performed quarterly. Each site inspection is documented on an inspection checklist, with site photographs, and with field notes. Copies of the inspection checklists, field notes, and photographs for Calendar Year 2005 are included in Appendix A. The post-closure inspection consists of the following:

- A detailed inspection of the UC-1 CMP cover and the UC-4 Mud Pit C cover and fencing, including walking the entire perimeter of the fence and documenting the condition of the barbed wire and chicken wire fencing, warning signs, and entrance gate
- A visual inspection of all aboveground monuments, attached warning signs, and affixed survey pins placed at UC-1, UC-3, and UC-4 sites for signs of wear, disturbance, vandalism, animal burrows, etc.; repair of monuments and/or attached signs during site inspection visits or, if necessary, at a later time in the calendar year
- A determination of the condition of the two subsidence monuments (SMs) on the UC-4 cover and the 12 SMs on the UC-1 CMP cover; a subsidence survey of all SMs twice a year to determine if the covers have subsided
- Documentation of any changes to the cover or fenced area, including, but not limited to, the presence of trash/debris inside the fenced areas, animal burrows on the cover or under the perimeter fence, erosion features on the covers or diversion channels, and any change in the health of the UC-1 CMP cover vegetation

2.3 SOIL MOISTURE MONITORING

The CNTA UC-1 CMP monolayer cover is designed to limit infiltration of moisture into the disposal unit by evapotranspiration from vegetation that was established on the cover for that purpose. The cover performance is monitored using TDR sensor data to provide a profile of the

water content in the cover. The soil water content profile will determine whether the cover is performing as designed and if it is in compliance with the closure plan and agreements.

The point of compliance for the UC-1 CMP cover is at the depth of the deepest TDR soil moisture probe, which is approximately 1.07 m (3.5 ft) below ground surface. Cover compliance criteria will be based on the soil moisture content of the cover. The specific criteria will not be set until the cover has had sufficient time to reach equilibrium. Once the soil moisture content in the cover has reached equilibrium, soil moisture compliance values will be agreed upon with the Nevada Division of Environmental Protection (NDEP).

The soil moisture content is obtained using a Campbell Scientific TDR-100 and a data logger housed in an instrument vault located just off the southern edge of the cover. TDR sensors were buried in the cover at two locations during cover construction. At both locations, two TDR sensors were placed at each of the following depths: 0.15, 0.46, 0.76, and 1.07 m (0.5, 1.5, 2.5, and 3.5 ft) below the surface of the cover (Figure 3). The TDR nests are located approximately 48 m (157 ft) northwest and 48 m (157 ft) northeast of the instrument vault. Data are collected daily from each TDR sensor and stored in a data logger located in the instrument vault. The stored TDR and precipitation data are automatically transmitted via a satellite uplink to a Geostationary Operational Environmental Satellite for relay to the National Oceanic and Atmospheric Administration's Wallops Island, Virginia, earth station. The data are retrieved from the earth station twice weekly for processing, analysis, and archiving.

The TDR probes were calibrated to Volumetric Moisture Content (VMC) using a "dry-down" method with native soil and the full cable length. The results of the calibration indicated that a site-specific calibration equation should be used instead of the standard Topp equation. It was also found that because of the long cable lengths and soil conductivities, the TDR reflection end points were extremely flat under saturated and near-saturated conditions, resulting in unreliable data in these regions.

A fourth order polynomial fit of the calibration data over the range of 5 to 35 percent VMC yielded the following calibration equation:

$$\text{VMC (\%)} = -308.701 + 373.1803(\text{L/L}) - 163.644(\text{L/L})^2 + 31.82972(\text{L/L})^3 - 2.25548(\text{L/L})^4$$

Where L/L is the ratio of trace length to probe length as recorded by the data logger.

2.4 COMPLIANCE CRITERIA

The point of compliance for the UC-1 CMP cover is the depth of the deepest TDR soil moisture probe, which is approximately 1.07 m (3.5 ft) below ground surface. Cover compliance will be based on the soil moisture content of the cover once steady state conditions are reached. With above average rainfall in 2005 preceded by several years of drought conditions, the cover has not yet reached steady state conditions. Cover performance modeling presented in the CAU 417 Corrective Action Plan (CAP) (U.S. Department of Energy, Nevada Operations Office [DOE/NV], 2000) predicted that steady state conditions will be achieved within 10 years of cover construction, which was completed in September of 2000. At that time it is expected that soil moisture trigger values will be agreed upon as compliance criteria with the NDEP.

If soil moisture data indicate that the cover is not operating according to established compliance criteria, the NDEP will be notified of the noncompliance within 14 days. After the NDEP has been notified 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 the annual Post-Closure Inspection and Monitoring Report.

2.5 REPORTING REQUIREMENTS

Quarterly post-closure inspections are to continue for five years following the completion of closure field activities. All inspection and maintenance activities conducted during the year are documented and included in an annual inspection and monitoring report. The annual post-closure report is submitted by the U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office (NNSA/NSO) to the NDEP and includes the following information:

- A brief narrative and discussion of all post-closure inspection activities and observations
- Copies of all completed inspection checklists and maintenance records
- UC-1 CMP soil moisture content profiles through the previous year
- Subsidence survey data
- Specific recommendations for non-standard maintenance or changes in post-closure requirements

All closure and post-closure monitoring documentation is maintained in project files and is available on request.

3.0 SITE INSPECTIONS, SURVEYS, AND MAINTENANCE

3.1 SITE INSPECTION RESULTS

3.1.1 First Quarterly Inspection

The first quarterly inspection was performed on March 15, 2005.

UC-1

The overall condition of the CMP unit was good, and all observations indicated continued integrity of the cover and appurtenances. Cover vegetation was healthy and no new cracks or fractures were noted. No maintenance or repairs were recommended. In addition, all monuments and signs at Mud Pit A and Mud Pit E were in excellent condition with no issues or concerns.

UC-3

The site was in good condition. All monuments and signs were in good order with no issues or concerns found.

UC-4

The site was in good condition. The monuments and signs at Mud Pits A, B, D, and Area X were all in good condition. Minor spots of paint have chipped off some monuments due to weather and may need to be repainted during 2006. At Mud Pit C, the gate, lock, fence, and warning signs were in excellent condition and no vegetation was present on the cover. One erosion rill was present on the northeast corner side slope of the cover. A small portion of the edge of the geosynthetic liner was exposed by the erosion rill. It was recommended that the erosion rill be repaired before the next scheduled site inspection.

3.1.2 Second Quarterly Inspection

The second quarterly inspection was performed on June 16, 2005.

UC-1

The CMP site was in excellent condition. No issues were identified with the fence, gate, lock, or monuments. The CMP cover was in excellent condition with healthy vegetation and no cracks present. All observations indicated continued integrity of the cover, with no maintenance or repairs recommended. All monuments and signs at Mud Pit A and Mud Pit E were in excellent condition with no issues or concerns.

UC-3

The site was in good condition. A small erosion gully had formed from spring rain runoff, but was not significant enough to require repair. All monuments and signs were in good condition. No issues or concerns were identified for immediate action.

UC-4

Repairs noted in the March inspection were made prior to the June inspection. The fence line on the southern edge of the Mud Pit C cover was damaged with broken barbed wire and a downed sign. Approximately 50 ft of this barbed wire was loose or down from the break. Two warning signs were peeling slightly but still legible. A small amount of vegetation was present on the

cover. It was recommended that the fence be repaired and the vegetation be removed from the cover. No erosion was observed. No issues were noted with Mud Pits A, B, D, or Area X.

3.1.3 Third Quarterly Inspection

The third quarterly inspection was performed on September 22, 2005.

UC-1

The CMP site was in good condition. No cracks were noted, and the vegetation on the cover was healthy and similar in appearance to the surrounding vegetation outside of the fence. No issues were identified with the signs, fence, gate, or lock. The subsidence survey monuments need an additional application of thinset during the next survey in 2006. All observations indicated continued integrity of the unit. All monuments and signs at Mud Pits A and E were in excellent condition with no issues or concerns.

UC-3

The site was in excellent condition. All signs and monuments were in excellent condition. No issues or concerns were observed, and no maintenance or repairs were recommended.

UC-4

A new small erosion rill had appeared on the southeast corner of the mud pit. A new large erosion rill requiring immediate repair was noted on the northeast corner. Both rills have penetrated the control berm at the eastern edge of the cover. The large rill has exposed the edge of the geosynthetic clay liner. No vegetation is present on the cover since the removal in August. The fence on the north side of the cover is in good condition after the repair in August. All signs and monuments at Mud Pits A, B, D, and Area X are in good condition. Some signs exhibited minor paint peeling, but are still legible.

3.1.4 Fourth Quarterly Inspection

The fourth quarterly inspection was performed on December 7, 2005.

UC-1

The CMP site was in good condition. All locks, fencing, and signs were in good order. The vegetation on the cover was healthy. No issues were identified with the monuments. A crack located in the west portion of the cover at the toe of the slope of the mud pit relocation trench showed evidence of lateral expansion. It was recommended the crack be sealed by adding bentonite. All other signs and monuments at Mud Pits A and E were in excellent condition.

UC-3

The site was in excellent condition. No issues were identified with the monuments or signs, and no maintenance or repairs were recommended.

UC-4

The Mud Pit C fence and SMs were in good condition. The warning sign on the southern fence line was worn, and it was recommended the sign be replaced in 2006. A pin on the gate lock hasp was missing, but it does not affect the integrity of the locking mechanism. No erosion or subsidence was observed on the cover. Mud Pits A, B, and D were in excellent condition, and no issues were identified with Area S or Area X. Engineers observed the site repairs to identify

potential long-term options for minimizing future cover and side slope erosion. The overall condition of the site was good, and no issues were noted that affected the integrity of the cover and appurtenances.

3.2 SUBSIDENCE SURVEY

3.2.1 UC-1 Background

The UC-1 CMP cover was designed using a vegetated monolayer cover to remove infiltrating precipitation and entrained water from the underlying drilling mud through evapotranspiration. The cover consists of a 1.2-m (4-ft) thick vegetated stabilization layer overlying a supportive geogrid that is in contact with the underlying hydrocarbon-impacted drilling mud. The vegetated cover consists of a 0.6-m (2-ft) layer of borrow soil and hydrocarbon-impacted materials obtained from UC-1, UC-3, and UC-4, with a top layer consisting of 0.6 m (2 ft) of clean borrow material. The cover is sloped inward and designed to direct runoff into an existing drainage channel (NNSA/NV, 2001).

Twelve SMs have been installed on the UC-1 CMP cover to provide elevation control for measuring subsidence of the cover over both the CMP and the relocation trench (NNSA/NV, 2001). A survey plat of the SM locations can be found in Appendix B. The baseline subsidence survey was completed on December 4, 2000, and is used as the reference survey to calculate subsidence for each subsequent survey. Biannual subsidence monitoring was started in February 2002 and is conducted in the first and third quarters of the year. The UC-1 baseline survey locations and elevations are provided in Table 1.

Expected consolidation (settling) due to the weight of the cover on the drilling mud was calculated based on geotechnical testing, and is projected to be less than 20 centimeters (cm) (8 inches [in.]), with 90 percent of this settling expected to occur over a period of 3 to 13.5 years. As the cover settles, water will be squeezed from the drilling mud and will be available for evapotranspiration through the vegetated cover. Monthly surveys were conducted from December 2000 through September 2001 to determine if the settling rate of the cover was within the predicted range as detailed in the CAP (DOE/NV, 2000). Because the mud was placed in the pit as a slurry, it is expected to be relatively homogenous, and differential settling is expected to be minimal. Settling of the cover will be directly proportional to the mud thickness and will vary across the length of the CMP. The SMs for the CMP cover are denoted as SM-2, SM-3, SM-4, SM-6, SM-7, SM-8, SM-10, SM-11, and SM-12.

Consolidation of the material placed in the relocation trench (SM-1, SM-5, and SM-9) was calculated to be approximately 23 cm (9 in.), with 90 percent of this settling expected to occur between 16 and 65 years (DOE/NV, 2000). Because the material in this area is relatively homogenous, differential settling is not expected to occur.

TABLE 1. UC-1 MONUMENT COORDINATES AND BASELINE ELEVATIONS

Subsidence Monument	Coordinates ¹ (m)		Baseline Elevation (m) December 4, 2000
	Northing (ft)	Easting (ft)	
SM-1	6,430,874.2869	539,588.2339	1836.604
SM-2	6,430,863.3239	539,644.8195	1835.154
SM-3	6,430,855.2553	539,684.3327	1834.995
SM-4	6,430,849.7763	539,715.7991	1834.854
SM-5	6,430,852.0243	539,585.4651	1836.541
SM-6	6,430,841.7590	539,641.4674	1834.887
SM-7	6,430,834.5289	539,680.5243	1834.709
SM-8	6,430,828.6994	539,712.4350	1834.681
SM-9	6,430,828.8720	539,582.4750	1836.547
SM-10	6,430,818.6353	539,638.2030	1834.943
SM-11	6,430,812.8276	539,676.0839	1834.744
SM-12	6,430,806.7973	539,708.9837	1834.635

¹ Horizontal datum U.S. State Plane 1983; vertical datum National Geodetic Vertical Datum of 1929

3.2.2 UC-4 Background

The UC-4 Mud Pit C soil cover was constructed to assist the design and planning for the construction of the UC-1 CMP cover. The UC-4 cover used a geosynthetic clay liner as opposed to the vegetated monolayer cover used at UC-1. Two permanent SMs (west and east monuments) were installed in the cover to provide elevation control for measuring the subsidence of the cover. A survey plat of the SM locations is included in Appendix B. The baseline subsidence survey was completed on October 12, 1999, and is used as the reference survey to calculate subsidence. The UC-4 baseline survey locations and elevations are provided in Table 2.

Based on site-specific geotechnical data, the amount of consolidation (settling) of the UC-4 cover and mud pit was calculated to be less than 5 cm (2 in.), with 90 percent of this settling expected to occur within the first year. Monthly surveys were conducted from October 1999 through June 2000 to determine if the settling rate of the cover was within the predicted range detailed in the CAP (DOE/NV, 2000).

TABLE 2. UC-4 MONUMENT COORDINATES AND BASELINE ELEVATIONS

Subsidence Monument	Coordinates ¹ (m)		Baseline Elevation (m) October 12, 1999
	Northing (ft)	Easting (ft)	
West Monument	6,435,982.965	538,966.436	1999.269
East Monument	6,435,978.404	538,992.231	1999.062

¹ Horizontal datum U.S. State Plane 1983; vertical datum North American Vertical Datum of 1929

3.2.3 UC-1 Subsidence Survey Results

Elevations and baseline subsidence data are provided in Table 3 and presented in graphical form in Figure 4. The settling trend that has been observed since December 2000 appears to have stabilized during the current monitoring period, with most survey monuments showing little to no change from the March 2005 to the September 2005 surveys. The degree of settling in both the relocation trench and in the CMP is within the predicted range and shows no unusual subsidence. The data collected over the CMP section of the cover indicate that the largest subsidence is located along the center line of the CMP, including SM-6, SM-7, and SM-8. This was expected due to the thicker layer of underlying mud in this area. The northern monuments, SM-2, SM-3, and SM-4, show the least subsidence due to the thinner layer of underlying mud along this margin of the cover. The greatest degree of settling continues to be on SM-6, which has subsided a total of 13.2 cm (5.2 in.) since the baseline survey in December 2000.

3.2.4 UC-4 Subsidence Survey Results

Elevations and baseline subsidence data are provided in Table 4 and presented in graphical form in Figure 5. Only the east monument indicated a slight decrease in elevation in the March and September surveys. The elevation of the west monument was unchanged between surveys. Settling of the west monument is still slightly greater than the predicted settling of 5 cm (2 in.), with a total subsidence of 6.3 cm (2.48 in.) since the baseline survey in October 1999. The east monument has subsided a total of 2.6 cm (1.0 in.) since the baseline survey. The largest changes occurred within the first year. Settling of the cover appears to have stabilized.

Monitoring of the UC-4 cover, as specified in the closure plan, was to continue for at least 2 years after the initial monthly surveys. The subsidence surveys at UC-4 will continue until all monuments have stabilized.

3.3 VEGETATION SURVEY

3.3.1 Background

The fenced UC-1 CMP cover and adjacent unfenced disturbed area were seeded in the autumn of 2000, and 5,000 transplants were planted on the soil cover in the spring of 2001. Evapotranspiration by the vegetation reduces infiltration and percolation of storm water through the cover. The vegetation also helps reduce erosion of the cover by wind and water by reducing surface velocities.

Post-closure requirements for this site include periodic vegetation surveys to assess the establishment of a healthy and stable vascular plant cover and to monitor its effectiveness. A preliminary evaluation of the site was conducted in July 2001 to confirm germination, and subsequent surveys were conducted in October 2001, March 2002, September 2002, June 2003, and June 2004 to evaluate the density, diversity, and overall condition of the vegetation. These evaluations demonstrated successful establishment of healthy plant communities and adequate resistance of the plants to cold weather. Seeded vegetation in the adjacent area outside the fence has not done as well as the vegetation on the cover due to animal grazing.

TABLE 3. UC-1 MONUMENT ELEVATIONS AND SUBSIDENCE

Date	ELEVATION AT TOP OF MONUMENT¹											
	SUBSIDENCE (m)											
	SM-1	SM-2	SM-3	SM-4	SM-5	SM-6	SM-7	SM-8	SM-9	SM-10	SM-11	SM-12
12/04/2000	1836.604	1835.154	1834.995	1834.854	1836.541	1834.887	1834.709	1834.681	1836.547	1834.943	1834.744	1834.635
Baseline	0	0	0	0	0	0	0	0	0	0	0	0
01/10/2001	1836.603	1835.149	1834.991	1834.850	1836.540	1834.880	1834.704	1834.676	1836.545	1834.940	1834.741	1834.641
	-0.001	-0.005	-0.004	-0.004	-0.001	-0.007	-0.005	-0.005	-0.002	-0.003	-0.003	0.006
2/06/2001	1836.607	1835.150	1834.992	1834.849	1836.540	1834.879	1834.703	1834.674	1836.545	1834.937	1834.738	1834.630
	0.003	-0.004	-0.003	-0.005	-0.001	-0.008	-0.006	-0.007	-0.002	-0.006	-0.006	-0.005
03/13/2001	1836.595	1835.147	1834.992	1834.845	1836.538	1834.874	1834.699	1834.669	1836.534	1834.933	1834.735	1834.622
	-0.009	-0.007	-0.003	-0.009	-0.003	-0.013	-0.010	-0.012	-0.013	-0.010	-0.009	-0.013
04/11/2001	1836.584	1835.144	1834.991	1834.841	1836.535	1834.869	1834.693	1834.662	1836.531	1834.928	1834.731	1834.618
	-0.020	-0.010	-0.004	-0.013	-0.006	-0.018	-0.016	-0.019	-0.016	-0.015	-0.013	-0.017
05/09/2001	1836.581	1835.144	1834.993	1834.841	1836.534	1834.869	1834.691	1834.661	1836.529	1834.925	1834.728	1834.618
	-0.023	-0.010	-0.002	-0.013	-0.007	-0.018	-0.018	-0.020	-0.018	-0.018	-0.016	-0.017
6/12/2001	1836.579	1835.142	1834.992	1834.840	1836.534	1834.864	1834.689	1834.659	1836.529	1834.922	1834.726	1834.617
	-0.025	-0.012	-0.003	-0.014	-0.007	-0.023	-0.020	-0.022	-0.018	-0.021	-0.018	-0.018
07/18/2001	1836.577	1835.141	1834.991	1834.838	1836.532	1834.862	1834.686	1834.656	1836.529	1834.920	1834.723	1834.614
	-0.027	-0.013	-0.004	-0.016	-0.009	-0.025	-0.023	-0.025	-0.018	-0.023	-0.021	-0.021
08/14/2001	1836.575	1835.140	1834.991	1834.838	1836.531	1834.859	1834.685	1834.655	1836.529	1834.921	1834.723	1834.614
	-0.029	-0.014	-0.004	-0.016	-0.010	-0.028	-0.024	-0.026	-0.018	-0.022	-0.021	-0.021
09/12/2001	1836.582	1835.138	1834.988	1834.834	1836.530	1834.854	1834.681	1834.650	1836.527	1834.914	1834.719	1834.610
	-0.022	-0.016	-0.007	-0.020	-0.011	-0.033	-0.028	-0.031	-0.020	-0.029	-0.025	-0.025
02/13/2002	1836.568	1835.132	1834.978	1834.824	1836.529	1834.835	1834.666	1834.636	1836.523	1834.900	1834.703	1834.597
	-0.036	-0.022	-0.017	-0.030	-0.012	-0.052	-0.043	-0.045	-0.024	-0.043	-0.041	-0.038
08/26/2002	1836.555	1835.129	1834.976	1834.819	1836.523	1834.823	1834.656	1834.627	1836.513	1834.893	1834.695	1834.590
	-0.049	-0.025	-0.019	-0.035	-0.018	-0.064	-0.053	-0.054	-0.034	-0.050	-0.049	-0.045
03/06/2003	1836.552	1835.123	1834.972	1834.811	1836.519	1834.805	1834.644	1834.615	1836.509	1834.880	1834.682	1834.577
	-0.052	-0.031	-0.023	-0.043	-0.022	-0.082	-0.065	-0.066	-0.038	-0.063	-0.062	-0.058
09/26/2003	1836.545	1835.122	1834.973	1834.807	1836.509	1834.795	1834.638	1834.609	1836.500	1834.874	1834.677	1834.573
	-0.059	-0.032	-0.022	-0.047	-0.032	-0.092	-0.071	-0.072	-0.047	-0.069	-0.067	-0.062
03/10/2004	1836.544	1835.116	1834.968	1834.800	1836.507	1834.781	1834.628	1834.598	1836.496	1834.864	1834.666	1834.562
	-0.060	-0.038	-0.027	-0.054	-0.034	-0.106	-0.081	-0.083	-0.051	-0.079	-0.078	-0.073
09/15/2004	1836.541	1835.117	1834.970	1834.800	1836.503	1834.776	1834.626	1834.596	1836.496	1834.862	1834.665	1834.560
	-0.063	-0.037	-0.025	-0.054	-0.038	-0.111	-0.083	-0.085	-0.051	-0.081	-0.079	-0.075
03/22/2005	1836.535	1835.110	1834.967	1834.793	1836.499	1834.760	1834.615	1834.584	1836.492	1834.851	1834.653	1834.551
	-0.069	-0.044	-0.028	-0.061	-0.042	-0.127	-0.094	-0.097	-0.055	-0.092	-0.091	-0.084
09/21/2005	1836.527	1835.110	1834.968	1834.793	1836.494	1834.755	1834.613	1834.583	1836.490	1834.849	1834.650	1834.548
	-0.077	-0.044	-0.027	-0.061	-0.047	-0.132	-0.096	-0.098	-0.057	-0.094	-0.094	-0.087

¹ Vertical datum National Geodetic Vertical Datum of 1929 in meters

TABLE 4. UC-4 MONUMENT ELEVATIONS AND SUBSIDENCE

Date	ELEVATION AT TOP OF MONUMENT¹	
	SUBSIDENCE (m)	
	West Monument	East Monument
10/12/1999 Baseline	1999.269	1999.062
	0.000	0.000
11/29/1999	1999.260	1999.056
	-0.009	-0.006
01/14/2000	1999.254	1999.052
	-0.015	-0.010
02/28/2000	1999.251	1999.053
	-0.018	-0.009
03/28/2000	1999.247	1999.052
	-0.022	-0.010
04/27/2000	1999.242	1999.05
	-0.027	-0.012
06/01/2000	1999.241	1999.05
	-0.028	-0.012
02/13/2002	1999.216	1999.037
	-0.053	-0.025
08/27/2002	1999.214	1999.039
	-0.055	-0.023
03/06/2003	1999.21	1999.036
	-0.059	-0.026
09/26/2003	1999.207	1999.035
	-0.062	-0.027
03/10/2004	1999.208	1999.036
	-0.061	-0.026
09/14/2004	1999.209	1999.041
	-0.060	-0.021
03/22/2005	1999.206	1999.037
	-0.063	-0.025
09/21/2005	1999.206	1999.036
	-0.063	-0.026

¹ Vertical datum National Geodetic Vertical Datum of 1929 in meters

On June 5, 2005, a vegetation survey was performed and is summarized in the following sections. In 2003 and 2004, a cover point projection device was used to estimate plant cover, which provided greater accuracy than visual estimates used in earlier surveys. An area with a well-established native plant community was used to provide a reference point with which to compare the cover vegetation. The complete vegetation monitoring report, which was prepared in September 2005, is included in Appendix C.

3.3.2 Survey Results

Vegetation success is evaluated by comparing plant cover, density, and diversity to a reference area of well-established plants. For the UC-1 CMP cover, no percentage standards have been established. For similar projects at the Tonopah Test Range, 60 percent of native plant levels at 10 years after revegetation is deemed successful (Appendix C). For this project at this stage, vegetation is deemed successful if plant cover and density are on track to being similar to the native vegetation.

Total plant cover increased slightly this year after showing a steady decrease from June 2003 to June 2004. Total plant cover on the UC-1 CMP cover was 23.2 percent in 2004 and increased to 26.1 percent in 2005, which was slightly more than the reference area. The increase is reflected in increases in both shrub and grass cover. Plant density continues to decrease from a high of 44.1 plants per square meter (m^2) in 2001 to a low of 16.2 plants per m^2 in 2005. The decreases in plant density suggest that a percentage of the plants are dying annually as resources become more limited. However, the plant density on the revegetated areas is still more than the reference area. Plant diversity has also declined each year in the number of shrubby species and grass species, but continues to be higher on the CMP cover compared to the native vegetation on the surrounding areas. The number of annual species doubled from 2004 estimates and is the highest recorded to date. This two-fold increase is probably a result of increased spring precipitation.

On the revegetated unfenced perimeter areas, total plant cover increased from 2004 to 2005. This increase in vascular plant cover is somewhat misleading. Shrub cover showed a 15 percent decrease, which essentially accounts for the majority (about 70 percent) of the total plant cover. Overall plant density on the adjacent revegetated areas increased dramatically from 2004 to 2005. Winter and spring rains caused an increase in annual plants this year with 54.7 annual plants per m^2 . This is almost 13 times the density of annuals recorded in previous years. A slight increase in the number of grass species was also observed, while shrub species remained about the same as in 2004. Many plants on the CMP cover flower and set seed annually. Seed from surrounding native plant communities is also infiltrating these sites. With favorable growing conditions, more species may eventually become established, and plant diversity will improve.

3.3.3 Summary and Conclusions

The 2005 survey results indicate the revegetation has been very successful. The success of revegetation efforts at the CMP site can be declared if plant cover and density on the revegetated areas are similar to corresponding values from a native plant community or reference area. Based on plant density, both the CMP and adjacent disturbed areas would exceed any criteria for successful revegetation. There are twice as many plants on the CMP and 50 percent more plants on the adjacent disturbed areas than on the reference area. In the reference area, perennial plant cover dropped dramatically from 10.7 percent in 2001 to 3.2 percent in 2002. This decrease was

primarily caused by browsing/grazing animals. In 2003, the plants increased to 20 percent, but decreased in 2004 to 15.6 percent. In 2005, the cover decreased even more to 13.7 percent. A continued decline in the density of perennial species is expected until an ecological equilibrium is reached. This will provide adequate available resources such as water and nutrients for the perennial species.

Vegetation should continue to be monitored to document any changes in the plant community and identify conditions that could potentially require remedial action in order to maintain a viable vegetative cover on the site, especially the CMP. However, given the apparent success of the vegetation program, it is suggested that future surveys be conducted once every 2 years or as needed to help monitor the health of the vegetation. TDR soil moisture monitoring will continue to provide a measure of the success of the vegetated cover to limit infiltration of precipitation to the waste materials below. Quarterly visual inspections and photographic documentation will also provide a means to monitor changes in the state of vegetation on the cover.

3.4 MAINTENANCE AND REPAIR

If a site inspection detects that either the UC-1 CMP cover or the UC-4 Mud Pit C cover is not in compliance, conditions requiring major repairs are noted, or any other problems in critical areas are noted, the issue will be evaluated and reported to the NDEP within 60 days of detection. The following guidelines apply to CAU 417 maintenance and repairs:

- Cracks, settling features, erosion rills, and animal burrows larger than 15 cm (6 in.) deep which extend 1 m (3 ft) or more, and that do not compromise the UC-1 CMP or UC-4 Mud Pit C covers, will be evaluated and repaired within 90 days of detection.
- Non-critical cracks, settling features, erosion rills, and animal burrows less than 15 cm (6 in.) deep which extend less than 1 m (3 ft) will be repaired during the site inspection visit.
- Damage to the fencing surrounding the UC-1 CMP cover or the UC-4 Mud Pit C cover, warning signs, or monuments will be evaluated and repaired within 90 days of detection.
- Major damage to use-restriction warning signs or monuments will be evaluated and repaired during subsequent site inspections.
- All repair work will preserve the original "as-built" design and will be documented in the annual post-closure report.

Copies of the field notes and the photographs taken during the maintenance and repair activities conducted during 2005 are included in Appendix A.

3.4.1 UC-1 Maintenance and Repair

No maintenance activities were performed at UC-1 in 2005. During the December inspection, a crack showing lateral expansion was observed and will be repaired during the first quarter of 2006. The SMs on the cover need an additional application of thinset to reattach the brass survey pins to the monuments. This will be done at the time of the first subsidence survey in 2006.

3.4.2 UC-3 Maintenance and Repair

No issues or concerns were found during the inspections in 2005; therefore, no maintenance or repairs were performed.

3.4.3 UC-4 Maintenance and Repair

An erosion rill located on the northeast corner of the cover was found during the March inspection and repaired on May 4, 2005. The southern edge of the barbed wire fence was damaged and vegetation was found on the cover during the June inspection. Repairs to the fence were made on August 12, 2005, and all vegetation was removed from the top surface of the cover. During the September inspection, two erosion rills were found in the southeast and northeast corners of the cover. Repairs were made on November 14, 2005. During the December inspection, additional wear was noted on a sign on the south fence line, and a pin was missing from the cover fence gate latch. The warning sign and latch pin will be replaced during the first quarter of 2006.

4.0 SOIL MOISTURE MONITORING

4.1 PRECIPITATION DATA

Precipitation data are collected at the UC-1 CMP cover by a Campbell Scientific TE525 tipping bucket rain gauge fitted with a CS705 precipitation adapter for snowfall measurements. The rain gauge data are collected and stored by the data logger until the daily TDR and precipitation data are transmitted via a satellite uplink to an earth station in Wallops Island, Virginia. The data are retrieved from the earth station periodically for processing, analysis, and archive.

The precipitation record for the UC-1 CMP cover is presented in Figure 6. The total precipitation for Calendar Year 2005 was 21.79 cm (8.58 in.), which is considered above average and a third greater than last year.

4.2 SOIL MOISTURE MONITORING RESULTS

4.2.1 Results

In September 2002, the ground surface above each TDR nest was seeded. A straw mulch layer was placed over the nests in November 2002, and each area was irrigated with 20 gallons of water to encourage seed germination the following spring. Inspections during subsequent years indicate that vegetation has become established in the areas around the nests, but is sparse directly above the TDR nests.

Graphs of the TDR-derived soil moisture content, combined with the precipitation data from the rain gauge, are presented in Figures 7 through 10. Each TDR location (east and west) is composed of two separate stacks of four TDR probes, designated as Nest A and Nest B. The nests are set approximately 1 m (3.3 ft) apart to form a redundant soil moisture measurement profile. The east nest is located near the centerline of the cover where the mud thickness is the greatest, while the west nest is located farther up the flank of the CMP cover where the underlying mud layer is thinner. The east nest was placed to monitor the area where maximum soil water content would be expected, that is, near the cover drainage channel and over an area of maximum mud thickness where the weight of the cover would force the most excess water from the underlying drilling mud. The west nest was placed in an area more representative of the cover in general.

The soil moisture graphs, Figures 7 through 10, show several responses: the initial conditions, wetting events, infiltration, and the return to steady-state conditions under both barren and vegetated conditions. The initial conditions at the beginning of the data collection reflect the disturbed soil's intrinsic moisture conditions. The installation of the TDR probes is described in detail in the CAU 417 CR (NNSA/NV, 2001). The trenching and compaction of each of the soil lifts disturbed the soil profile and resulted in a non-uniform vertical soil moisture profile. Consequently, some depths appeared wetter than others and will remain so until the system reaches equilibrium. Vegetation is not present directly over the TDR nests, only surrounding them. Therefore, some excess infiltration and lower than normal evapotranspiration can be expected until the vegetation over the TDR nests become established.

FIGURE 6
UC-1 PRECIPITATION

FIGURE 7
SOIL MOISTURE CONTENT, EAST TDR NEST A

FIGURE 8
SOIL MOISTURE CONTENT, EAST TDR NEST B

FIGURE 9
SOIL MOISTURE CONTENT, WEST TDR NEST A

FIGURE 10
SOIL MOISTURE CONTENT, WEST TDR NEST B

In general, wetting fronts can be seen as a rapid increase in the VMC near the surface followed by increased moisture at greater depths. All the profiles indicate a rapid increase in moisture content at the end of February 2001, as temperatures rose above the freezing point and allowed snow melt to infiltrate. This occurred before vegetation was established on the cover, showing the effect of infiltration on a non-vegetated cover. Both the east nest and west nest remained wet through July 2001. At this time, cover vegetation became established and the cover began to dry out, due to evapotranspiration over the hot summer months. TDR data for both nests show that the cover remained saturated at the 1.1 m (3.5 ft) depth. This was anticipated due to the weight of the cover forcing water out of the underlying drilling mud.

In general, beginning in 2002 and through 2004, less intense wetting fronts are seen at both nests during January and February. Infiltration can be seen each year through mid June when, due to evapotranspiration from the vegetation and low seasonal precipitation, the soil moisture profile shows a rapid drying trend throughout the cover to a depth of 1.1 m (3.5 ft). With the exception of the 1.1-m (3.5-ft) probes in the east nests, by the end of January 2003 and January 2004, moisture content at depth is less than 15 percent and appears stable.

Data collected during 2005 indicate the cover system is performing as designed, with most VMC values decreasing to less than 15 percent by the end of 2005. Due to several heavy precipitation events early in 2005, both the eastern and western nests initially show saturated conditions throughout the cover profile. However, by June 2005, the cover dried out due to evapotranspiration from the cover vegetation. The one exception is at the 1.1 m (3.5 ft) depth at the east nests, which continue to show saturated soil moisture conditions. The western nests show a uniform dry profile with stable conditions below 0.76 m (2.5 ft) in depth.

Both TDR nests present similar profiles and indicate that the cover is performing as designed, with evapotranspiration effectively removing water from the cover. Because precipitation was unusually high and persistent in 2005, evapotranspiration was not as effective at removing soil moisture until the end of year.

4.2.2 Data Trends

4.2.2.1 East TDR Nests

The east TDR nests are located near the drainage channel at the approximate center of the cover. Run-on from precipitation events and water pressed out of the thickest portion of the underlying drilling mud were expected to produce the highest soil moisture content found on the CMP cover at the location where the east TDR nests were placed. Data obtained for both of the east nests indicate this to be the case. TDR data obtained for the 1.1-m (3.5-ft) depth are largely corrupted due to high moisture content (saturated conditions) and a high soil conductivity. The combination of these effects and the long cable length create problems in measuring the reflected signal from the TDR probes. As a result, the data are very noisy and practically missing at the 1.1-m (3.5-ft) depth for both east nests. For VMC values greater than 25 percent and high soil conductivities, the TDR data are outside the system operating limits, and the moisture content should be estimated as greater than 25 percent VMC.

Both east TDR nests indicate dry, stable conditions for the 2004 reporting period. The unusually heavy rainfall events from January 2005 through May 2005 caused infiltration to approximately 0.76 m (2.5 ft) before the majority was removed from the cover by evapotranspiration. Moisture content measurements to approximately the 0.76 m (2.5 ft) depth are less than 15 percent VMC and appear to have stabilized.

Both east TDR nests present similar profiles and indicate that the cover is performing as designed, with saturated conditions persisting at the cover-mud interface and evapotranspiration effectively removing water from the cover.

4.2.2.2 West TDR Nests

The west TDR nests are located on the western flank of the CMP cover and represent the typical conditions to be expected over the majority of the cover.

The data obtained from both west nests are not affected by the signal loss problems observed on the east nests. The data presented are similar to those of the east nests, with the initial very wet conditions extending from early March 2001 to approximately September 2001. Drying conditions extend from the cover surface to a depth of 1.1 m (3.5 ft) from October 2001 to approximately October 2002, at which time the cover vegetation was established. Conditions remain dry and stable through the current monitoring period with moisture content measurements less than 15 percent VMC by the end of 2005.

Moisture content measurements indicate extremely wet conditions from January 2005 through May 2005, with infiltration reaching to 1.1 m (3.5 ft) depth before being removed by evapotranspiration.

Both west nests present a very similar profile and indicate the cover is performing as designed, with evapotranspiration effectively removing water from the cover. The moisture content at all depths appears to be approaching steady state.

5.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 SUMMARY

The 2005 inspections of UC-1 CMP indicated the continued integrity of the cover unit. No new cracks or fractures were observed on the UC-1 CMP cover until the December 2005 inspection. A crack located in the west portion of the cover showed evidence of lateral expansion. The crack will be repaired with an application of bentonite fill during the first quarter of 2006. The repair will be inspected throughout 2006. The CMP cover vegetation was healthy and well established. No issues were identified with the fence or gate. The brass survey pins will be reattached to the cover SMs during the first quarter of 2006. No maintenance or repair activities were performed during 2005.

The inspections of UC-3 indicated that the sites are in excellent condition. All monuments and use-restriction signs are in good condition. A small erosion gully formed from Spring runoff was noted during the June inspection, but it did not progress to an actionable level during 2005. No other issues were identified, and no maintenance or repair activities are recommended at this time.

Inspections done during March and September at UC-4 revealed that erosion rills had formed and exposed the geosynthetic clay liner of the Mud Pit C cover. Both rills were repaired within 90 days of discovery. No concerns were identified with the monuments, or gate. In August 2005, weeds were removed from the Mud Pit C cover, and the barbed wire fence was repaired. During the December inspection, it was noted that one use-restriction sign and the pin on the cover gate lock hasp need to be replaced. This will be done during the first quarter of 2006.

The UC-1 settling trend that has been seen since December 2000 appears to have stabilized during the current monitoring period, with most survey monuments showing little to no change from the March 2005 to the September 2005 surveys. The degree of settling in both the relocation trench and in the CMP is within the predicted range and shows no unusual subsidence.

Measurements at the UC-4 east monument indicated a slight decrease in elevation in the March and September surveys. The measurements in the elevation of the west monument stayed the same in both months of the survey. Subsidence at the west monument is still slightly greater than the predicted settling of 5.0 cm (2.0 in.) with a total subsidence of 6.3 cm (2.48 in.) since the baseline survey in October 1999. Settling of the monuments appears to have stabilized.

The June vegetation survey indicates that the UC-1 CMP revegetation has been very successful. The vegetation should continue to be monitored to document any changes in the plant community and identify conditions that could potentially require remedial action in order to maintain a viable vegetative cover on the site. It is suggested that future vegetation surveys be conducted once every 2 years or as needed to help monitor the health of the vegetation.

Precipitation was above average with an annual rainfall total of 21.79 cm (8.58 in.) in 2005.

Soil moisture content data show that the UC-1 cover is performing as designed, with saturated conditions at the cover-mud interface and evapotranspiration effectively removing water from the cover.

5.2 CONCLUSIONS

- No significant concerns were noted during the quarterly inspections, and no further maintenance or repairs are recommended at this time.
- No significant concerns were noted on the subsidence surveys on UC-1 and UC-4.
- The vegetation survey indicated that the vegetation on the UC-1 CMP and adjacent areas is healthy and well established.
- Soil moisture monitoring data indicate that the cover is performing as designed with evapotranspiration effectively removing water from the cover.
- With the above average rainfall this year and the steady-state conditions that have been observed during the drought period, it is expected that the soil moisture monitoring compliance criteria will be established in the next reporting period.

5.3 RECOMMENDATIONS

- Continue site inspections quarterly as scheduled to observe the condition of the covers, fence, vegetation, signs, and monuments.
- Continue subsidence surveys on UC-1. Continue subsidence surveys at UC-4 until data has confirmed stable conditions.
- Continue vegetation surveys once every 2 years or as needed to help monitor the health of the vegetation.
- Continue TDR data collection for at least one more year to establish equilibrium conditions before establishing compliance criteria.

6.0 REFERENCES

- Barnes, W. 1968. Report of Exploration Progress, Central Nevada, Period August 1, 1967 December 31, 1967. U.S. Geological Survey Technical Letter, Central Nevada 3-2.
- DOE/NV, see U.S. Department of Energy, Nevada Operations Office.
- FFACO, see Federal Facility Agreement and Consent Order.
- Federal Facility Agreement and Consent Order. 1996 (as amended). Agreed to by the State of Nevada, the U.S. Department of Energy, and the U.S. Department of Defense.
- Healey, D. L. 1968. Gravity Survey of Northern Hot Creek Valley, Nye County, Nevada. U.S. Geological Survey Technical Letter, Central Nevada-18.
- NNSA/NV, see U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office.
- U.S. Department of Energy, Nevada Operations Office. 2000. Corrective Action Plan for Corrective Action Unit 417: Central Nevada Test Area Surface, Nevada, DOE/NV--588. Las Vegas, NV.
- U.S. Department of Energy, National Nuclear Security Administration Nevada Operations Office. 2001. Closure Report for Corrective Action Unit 417: Central Nevada Test Area Surface, Nevada. DOE/NV--743 REV1. Las Vegas, NV.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A

**INSPECTION CHECKLISTS,
FIELD NOTES AND PHOTOGRAPHS**

THIS PAGE INTENTIONALLY LEFT BLANK

CAU 417: CNTA UC-1 CENTRAL MUD PIT COVER, POST-CLOSURE INSPECTION CHECKLIST

Date of Last Inspection:

 Reason for Last Inspection: quarterly

 Responsible Agency: BN-ER

 Project Manager: JEFF SMITH

 Inspection Date: 3/15/05

 Inspector (name, title, organization): ALISSA TIBESAR, TECHNICAL LEAD, BN-ER

 Assistant Inspector (name, title, organization): SHAUGHN BURNISON, TASK MANAGER, BN-ER
A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
3. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
4. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
5. A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
6. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

YES

NO

EXPLANATION

1. Site as-built plans and site base map reviewed.

☒

2. Previous inspection reports reviewed.

☒

a. Were anomalies or trends detected on previous inspections?

☒

b. Was maintenance performed?

☒

3. Site maintenance and repair records reviewed.

☒

a. Has site repair resulted in a change from as-built conditions?

☒

b. Are revised as-builts available that reflect repair changes?

☒

N/A

C. SITE INSPECTION (To be completed during inspection)

YES

NO

EXPLANATION

1. Adjacent off-site features within watershed areas.

a. Have there been any changes in use of adjacent area?

☒

b. Are there any new roads or trails?

☒

c. Has there been a change in the position of nearby washes?

☒

d. Has there been lateral excursion or erosion/deposition of nearby washes?

☒

e. Are there new drainage channels?

☒

f. Change in surrounding vegetation?

☒

excavation noted off NE corner of site, adjacent to drainage channel

2. Security fence, signs.

a. Displacement of fences, site markers, boundary markers, or monuments?

☒

 b. Have any signs been damaged or removed?
(Number of signs replaced: 0)

☒

c. Were gates locked?

☒

CAU 417: CNTA UC-1 CENTRAL MUD PIT COVER, POST-CLOSURE MONITORING CHECKLIST

3. Waste Unit cover.

YES

NO

EXPLANATION

- Is there evidence of settling?
- Is there cracking?
- Is there evidence of erosion around the cap (wind or water)?
- Is there evidence of animal burrowing?
- Have the site markers been disturbed by man or natural processes?
- Do natural processes threaten to integrity of any cover or site marker?
- Other?

4. Vegetative cover.

- Is perimeter fence or mesh fencing damaged?
- Is there evidence of horses or rabbits on site?
- Is organic mulch and/or plants adequate to prevent erosion?
- Are weedy annual plants present? If yes, are they a problem?
- Are seeded plant species found on site?
- Is there evidence of plant mortality?

5. Photo Documentation

- Has a photo log been prepared?
- Number of photos exposed (5)

D. FIELD CONCLUSIONS

- Is there an imminent hazard to the integrity of the unit? (Immediate report required)

Person/Agency to whom report made:

- Are more frequent inspections required?
- Are existing maintenance/repair actions satisfactory?
- Is other maintenance/repair necessary?
- Is current status/condition of vegetative cover satisfactory?

- Rationale for field conclusions: The unit is in good condition. No erosion, cracking, or subsidence was observed. The fence, signs, monuments, and vegetation were all in good condition.

E. CERTIFICATION

I have conducted an inspection of the UC-1 Cental Mud Pit Cover, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Monitoring Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature

Printed Name:

Title:

Date:

TECHNICAL LEAD

3/15/05

ALISSA TIBESAR

CAU 417: CNTA UC-3, POST-CLOSURE INSPECTION CHECKLIST

Date of Last Inspection:

 Reason for Last Inspection: Quarterly

 Responsible Agency: BN-ER

 Project Manager: JEFF SMITH

 Inspection Date: 3/15/05

 Inspector (name, title, organization): ALISSA TIBESAR, TECHNICAL LEAD, BN-ER

 Assistant Inspector (name, title, organization): SHAUGHN BURNISON, TASK MANAGER, BN-ER
A. GENERAL INSTRUCTIONS

- 1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
3. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
4. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
5. A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
6. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

YES

NO

EXPLANATION

1. Site as-built plans and site base map reviewed.

☒

2. Previous inspection reports reviewed.

☒

a. Were anomalies or trends detected on previous inspections?

☒

b. Was maintenance performed?

☒

3. Site maintenance and repair records reviewed.

☒

a. Has site repair resulted in a change from as-built conditions?

☒

b. Are revised as-builts available that reflect repair changes?

☒

N/A

C. SITE INSPECTION (To be completed during inspection)

YES

NO

EXPLANATION

1. Adjacent off-site features within watershed areas.

a. Have there been any changes in use of adjacent area?

☒

b. Are there any new roads or trails?

☐

c. Has there been a change in the position of nearby washes?

☒

d. Has there been lateral excursion or erosion/deposition of nearby washes?

☒

e. Are there new drainage channels?

☒

f. Change in surrounding vegetation?

☒

2. Security fence, signs.

a. Displacement of fences, site markers, boundary markers, or monuments?

☒

 b. Have any signs been damaged or removed?
(Number of signs replaced: 0)

☒

c. Were gates locked?

☒

N/A

CAU 417: CNTA UC-3, POST-CLOSURE INSPECTION CHECKLIST

D. FIELD CONCLUSIONS

1. Is there an imminent hazard to the integrity of the unit?
(Immediate report required)

	✓
--	---

Person/Agency to whom report made:

2. Are more frequent inspections required?

	✓
--	---

3. Are existing maintenance/repair actions satisfactory?

✓	
---	--

4. Is other maintenance/repair necessary?

	✓
--	---

5. Is current status/condition of unit satisfactory?

✓	
---	--

6. Rationale for field conclusions: *All monuments and signs were in excellent condition. No issues or concerns were noted. The unit is in good condition.*

E. CERTIFICATION

I have conducted an inspection of UC-3, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Monitoring Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature:

[Signature]

Printed Name:

ALISSA TIBESAK

Title:

TECHNICAL LEAD

Date:

3/15/05

CAU 417: CNTA UC-4 MUD PIT C COVER, POST-CLOSURE INSPECTION CHECKLIST

Date of Last Inspection:

 Reason for Last Inspection: Quarterly

 Responsible Agency: BN-ER

 Project Manager: JEFF SMITH

 Inspection Date: 3/15/05

 Inspector (name, title, organization): ALISSA TIBESAR, TECHNICAL LEAD, BN-ER

 Assistant Inspector (name, title, organization): SHAUGHN BURNISON, TASK MANAGER, BN-ER
A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
3. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
4. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
5. A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
6. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

YES

NO

EXPLANATION

1. Site as-built plans and site base map reviewed.

☒

2. Previous inspection reports reviewed.

☒

a. Were anomalies or trends detected on previous inspections?

☒

b. Was maintenance performed?

☒

3. Site maintenance and repair records reviewed.

☒

a. Has site repair resulted in a change from as-built conditions?

☒

b. Are revised as-builts available that reflect repair changes?

☒

N/A

C. SITE INSPECTION (To be completed during inspection)

YES

NO

EXPLANATION

1. Adjacent off-site features within watershed areas.

a. Have there been any changes in use of adjacent area?

☒

b. Are there any new roads or trails?

☒

c. Has there been a change in the position of nearby washes?

☒

d. Has there been lateral excursion or erosion/deposition of nearby washes?

☒

e. Are there new drainage channels?

☒

f. Change in surrounding vegetation?

☒

2. Security fence, signs.

a. Displacement of fences, site markers, boundary markers, or monuments?

☒

 b. Have any signs been damaged or removed?
(Number of signs replaced: 0)

☒

c. Were gates locked?

☒

CAU 417: CNTA UC-4 MUD PIT C COVER, POST-CLOSURE INSPECTION CHECKLIST

3. Waste Unit cover.

- a. Is there evidence of settling?
- b. Is there cracking?
- c. Is there evidence of erosion around the cap (wind or water)?
- d. Is there evidence of animal burrowing?
- e. Have the site markers been disturbed by man or natural processes?
- f. Is there vegetation on the cover?
- g. Do natural processes threaten to integrity of any cover or site marker?
- h. Other?

YES NO EXPLANATION

☐	☒	
☐	☒	
☒	☐	one rill noted on NE corner edge needs repair.
☐	☒	
☐	☒	
☐	☒	
☐	☒	
☐	☒	

4. Photo Documentation

- a. Has a photo log been prepared?
- c. Number of photos exposed (6)

☒	☐
-------------------------------------	--------------------------

D. FIELD CONCLUSIONS

- 1. Is there an imminent hazard to the integrity of the unit? (Immediate report required)

☐	☒
--------------------------	-------------------------------------

Person/Agency to whom report made:

- 2. Are more frequent inspections required?

☐	☒
--------------------------	-------------------------------------

- 3. Are existing maintenance/repair actions satisfactory?

☒	☐
-------------------------------------	--------------------------

- 4. Is other maintenance/repair necessary?

☐	☒
--------------------------	-------------------------------------

- 5. Is current status/condition of vegetative cover satisfactory?

☒	☐
-------------------------------------	--------------------------

no vegetation on cover - only on side slopes.

- 6. Rationale for field conclusions:

The unit is in excellent condition. The monuments, fence, and signs are all in good condition/repair. one isolated erosion rill needs repair on the NE corner side slope of Mud Pit C.

E. CERTIFICATION

I have conducted an inspection of the UC-4 Mud Pit C Cover, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Inspection Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature

[Signature]

Printed Name:

ALISSA TIBESAR

Title:

TECHNICAL LEAD

Date:

3/15/05

3/15/05

Personnel- Krissa Tipesar (TL)

Shaughn Burnison (TR)

Visitors- None

⁵ Equipment- None

Weather- Sunny, clear, 60's

Saw- perform post-closure inspections at UC-1, UC-3, and UC-4

925- Arrived at UC-1 CMP

Installed new lock on gate.

10

- walked mud pit and fence

- vegetation on cover is not as established as surrounding areas -

Some seasonal plant mortality

- fence and signs in excellent condition

- monuments in good condition.

15

- no subsidence, cracking, or erosion was observed.

- recent excavation by heavy equipment noted 50 m away from the northeast corner of the site adjacent to the drainage channel

1005- Arrived at UC-4

20

- Installed new lock on Mud Pit C gate

- Monuments on Mud Pits A & B look good. Due to weather wear, some may need to be repainted in spots during next inspection (paint has chipped off in spots- minor)

- Signs on Mud Pits A & B monuments are in good condition.

25

- signs and fence around Mud Pit C are in excellent condition.

- No vegetation is present on top of the cover. Vegetation is healthy on the side slopes to prevent erosion.

- Subsidence monuments are in good condition.

SIGNATURE

DATE

3/15/05

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

TITLE CAU 417 Inspection

Work continued from Page 66

PROJECT NO.

BOOK NO.

67

- An erosion rill was noted on the Northeast corner of the cap on the side slope exposing the edge of the geosynthetic liner. It is recommended to fill it as soon as practical.

51040 - Arrived at UC-3

- Monuments in excellent condition; signs in excellent condition.
- No issues or concerns.

10

15

20

25

(Ar)

SIGNATURE

DATE

3/15/05

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

TITLEWork continued from Page N/A

CNTA: SURFACE

CALL 417- UC-4 MUDPIT C EROSION REPAIR

CAS 58-09-03

May 4, 2005

PROJECT NO.

BOOK NO.

183

PERSONNEL: TL: SHAUGHN BURNISON (BN)

ENGINEER: GREG DYLE (BN)

LABOR: SNJV hand

LABOR:

5 PROJ MGR: PAT MATTHEWS (SNJV)

VISITORS:

EQUIPMENT: HAND TOOLS (shovels, wheelbarrow, rake, broom)

10 WEATHER: CLOUDY/OVERCAST, 70°, SLIGHT BREEZE, POTENTIAL RAIN AFTER NOON

SCOPE: MODEST EROSION RILL ON NE CORNER OF MUDPIT C COVER

15 ACTIVITIES: MEET W/ PAT M. on ARRIVAL @ 10:00 AM. LOCATE
FILL LOCATION NEAR UC-1. PAT & ONE SNJV laborer +
Dyle & BURNISON + 2 pickups - LOAD FILL INTO PICKUPS.
DRIVE 2 UC-4. REVIEW RILL & COMPACTION OF COVER.
OFFLOAD FILL INTO RILL.

20 5 loads TRANSPORTED & OFFLOADED. COMPACTED WITH BOOTS.

REPAIR BERM. RAKE SURFACE.

2:30 PM - JOB COMPLETE.

DEPART SITE

SIGNATURE

DATE

5/4/05

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

CAU 417: CNTA UC-1 CENTRAL MUD PIT COVER, POST-CLOSURE INSPECTION CHECKLIST

Date of Last Inspection: MARCH 15, 2005

Reason for Last Inspection: QUARTERLY

Responsible Agency: BELMONT NEVADA - ENV. RESTORATION

Project Manager: JEFF SMITH

Inspection Date: 6-16-2005

Inspector (name, title, organization): STEPHAN BURNISON : FSTL BNER

Assistant Inspector (name, title, organization): MIKE FLOYD : SRTL BNER

A. GENERAL INSTRUCTIONS

- All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
- Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
- The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
- A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
- This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

	YES	NO	EXPLANATION
1. Site as-built plans and site base map reviewed.	☒	☐	
2. Previous inspection reports reviewed.	☒	☐	
a. Were anomalies or trends detected on previous inspections?	☐	☒	
b. Was maintenance performed?	☐	☒	
3. Site maintenance and repair records reviewed.	☒	☐	
a. Has site repair resulted in a change from as-built conditions?	☐	☒	
b. Are revised as-builts available that reflect repair changes?	☐	☒	N/A

C. SITE INSPECTION (To be completed during inspection)

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

CAU 417: CNTA UC-1 CENTRAL MUD PIT COVER, POST-CLOSURE MONITORING CHECKLIST

3. Waste Unit cover.

	YES	NO	EXPLANATION
a. Is there evidence of settling?		X	
b. Is there cracking?		X	
c. Is there evidence of erosion around the cap (wind or water)?		X	
d. Is there evidence of animal burrowing?		X	
e. Have the site markers been disturbed by man or natural processes?		X	
f. Do natural processes threaten to integrity of any cover or site marker?		X	
g. Other?		X	

4. Vegetative cover.

a. Is perimeter fence or mesh fencing damaged?		X	
b. Is there evidence of horses or rabbits on site?		X	
c. Is organic mulch and/or plants adequate to prevent erosion?		X	
d. Are weedy annual plants present? If yes, are they a problem?		X	
e. Are seeded plant species found on site?	X		
f. Is there evidence of plant mortality?		X	

5. Photo Documentation

a. Has a photo log been prepared?

X

c. Number of photos exposed (5)

D. FIELD CONCLUSIONS

1. Is there an imminent hazard to the integrity of the unit? (Immediate report required)

X

Person/Agency to whom report made:

2. Are more frequent inspections required?

X

3. Are existing maintenance/repair actions satisfactory?

X

4. Is other maintenance/repair necessary?

X

5. Is current status/condition of vegetative cover satisfactory?

X

6. Rationale for field conclusions:

SITE IS IN GOOD CONDITION ON ALL MEASURES.

E. CERTIFICATION

I have conducted an inspection of the UC-1 Cental Mud Pit Cover, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Monitoring Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature:

Shaughn A. Burnison

Printed Name:

SHAUGHN BURNISON

Title:

FIELD SUPPORT TECH LEAD

Date:

June 16, 2005

CAU 417: CNTA UC-3, POST-CLOSURE INSPECTION CHECKLIST

Date of Last Inspection: MARCH 15, 2005

Reason for Last Inspection: QTLY

Responsible Agency: BN-ER

Project Manager: JEFF SMITH

Inspection Date: 6-16-2005

Inspector (name, title, organization): SHAUGHN BURNISON - BNER - FSTL

Assistant Inspector (name, title, organization): MIKE FLOYD - BNER - SRTL

A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
3. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
4. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
5. A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
6. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

	YES	NO	EXPLANATION
1. Site as-built plans and site base map reviewed.	X		
2. Previous inspection reports reviewed.	X		
a. Were anomalies or trends detected on previous inspections?		X	
b. Was maintenance performed?		X	
3. Site maintenance and repair records reviewed.	X		
a. Has site repair resulted in a change from as-built conditions?		X	
b. Are revised as-builts available that reflect repair changes?		X	N/A

C. SITE INSPECTION (To be completed during inspection)

	YES	NO	EXPLANATION
1. Adjacent off-site features within watershed areas.			
a. Have there been any changes in use of adjacent area?		X	
b. Are there any new roads or trails?		X	
c. Has there been a change in the position of nearby washes?		X	
d. Has there been lateral excursion or erosion/deposition of nearby washes?		X	
e. Are there new drainage channels?		X	
f. Change in surrounding vegetation?		X	
2. Security fence, signs.			
a. Displacement of fences, site markers, boundary markers, or monuments?		X	
b. Have any signs been damaged or removed? (Number of signs replaced: _____)		X	
c. Were gates locked?		X	N/A

CAU 417: CNTA UC-3, POST-CLOSURE INSPECTION CHECKLIST

D. FIELD CONCLUSIONS

1. Is there an imminent hazard to the integrity of the unit?
(Immediate report required)

X

Person/Agency to whom report made:

2. Are more frequent inspections required?

X

3. Are existing maintenance/repair actions satisfactory?

X

4. Is other maintenance/repair necessary?

X

5. Is current status/condition of unit satisfactory?

X

6. Rationale for field conclusions:

WALKED SITE - VIEWED MONUMENTS & SIGNS,
ALL IS IN GOOD CONDITION.

E. CERTIFICATION

I have conducted an inspection of UC-3, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Monitoring Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature:

Shaughn Burnison

Printed Name:

SHAUGHN BURNISON

Title:

FSTL

Date:

6/16/05

CAU 417: CNTA UC-4 MUD PIT C COVER, POST-CLOSURE INSPECTION CHECKLIST

Date of Last Inspection: <u>MARCH 15, 2005</u>	Reason for Last Inspection: <u>QUARTERLY</u>
Responsible Agency: <u>BENTEL NEVADA ENVIRONMENTAL REGULATION</u>	Project Manager: <u>JEFF SMITH</u>
Inspection Date: <u>JUNE 16, 2005</u>	
Inspector (name, title, organization): <u>SHAUGHN BURNISON - BNER - FIELD SUPPORT TECH LEAD</u>	
Assistant Inspector (name, title, organization): <u>MIKE FLOYD - BNER - SR. TECH LEAD</u>	

A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
3. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
4. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
5. A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
6. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

	YES	NO	EXPLANATION
1. Site as-built plans and site base map reviewed.	X		
2. Previous inspection reports reviewed.	X		
a. Were anomalies or trends detected on previous inspections?	X		Anomaly - large erosion rill on NE corner
b. Was maintenance performed?	X		RILL REPAIRED 5/4/05
3. Site maintenance and repair records reviewed.	X		
a. Has site repair resulted in a change from as-built conditions?		X	
b. Are revised as-builts available that reflect repair changes?		X	N/A

C. SITE INSPECTION (To be completed during inspection)

	YES	NO	EXPLANATION
1. Adjacent off-site features within watershed areas.			
a. Have there been any changes in use of adjacent area?		X	
b. Are there any new roads or trails?		X	
c. Has there been a change in the position of nearby washes?		X	
d. Has there been lateral excursion or erosion/deposition of nearby washes?		X	
e. Are there new drainage channels?		X	
f. Change in surrounding vegetation?		X	
2. Security fence, signs.			
a. Displacement of fences, site markers, boundary markers, or monuments?	X		ON N side of MUD PIT C FENCE & SIGN ARE DOWN
b. Have any signs been damaged or removed? (Number of signs replaced: _____)	X		SIGN DOWN DUE TO WIND ACTION
c. Were gates locked?	X		

CAU 417: CNTA UC-4 MUD PIT C COVER, POST-CLOSURE INSPECTION CHECKLIST

3. Waste Unit cover.

- a. Is there evidence of settling?
- b. Is there cracking?
- c. Is there evidence of erosion around the cap (wind or water)?
- d. Is there evidence of animal burrowing?
- e. Have the site markers been disturbed by man or natural processes?
- f. Is there vegetation on the cover?
- g. Do natural processes threaten to integrity of any cover or site marker?
- h. Other?

YES NO EXPLANATION

	X	
	X	
	X	
	X	
	X	
X		SMALL VEGETATION IS TAKING HOLD ON COVER
	X	
	X	

4. Photo Documentation

- a. Has a photo log been prepared?

X		
---	--	--

- c. Number of photos exposed (8)

D. FIELD CONCLUSIONS

- 1. Is there an imminent hazard to the integrity of the unit?
(Immediate report required)

	X	
--	---	--

Person/Agency to whom report made:

- 2. Are more frequent inspections required?

	X	
--	---	--

- 3. Are existing maintenance/repair actions satisfactory?

X		
---	--	--

- 4. Is other maintenance/repair necessary?

X		FENCE & SIGN ON NORTH SIDE OF MUD PIT C NEEDS REPAIR
---	--	---

- 5. Is current status/condition of vegetative cover satisfactory?

	X	VEGETATION REMOVAL RECOMMENDED
--	---	--------------------------------

- 6. Rationale for field conclusions:

FENCE & SIGN NOTED TO BE DOWN N. SIDE
MUDPIT C. ALSO VEGETATION TAKING HOLD.

E. CERTIFICATION

I have conducted an inspection of the UC-4 Mud Pit C Cover, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Inspection Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature:

Shaughn A. Burnison

Printed Name:

SHAUGHN A. BURNISON

Title:

FIELD SUPPORT TECH LEAD

Date:

JUNE 16, 2005

6/16/05

CAU 417 UC-1, UC-4, UC-3

PERSONNEL: TL: Mike Floyd

TL: SHAWN BURATSON

5 No EQUIPMENT

WEATHER: 80's, breezy (15 mph), overcast

Scope: Quarterly inspections of UC-1, UC-3, UC-4 use restricted areas & mud pit covers

10 Tailgate: HEAT; biohazards; slips/trips, buddy system, comm.

11:00 AM - Arrive UC-4 site; Inspect monuments & signs on Mudpits A & B

Inspect fence & signs & look on mud pit C, walk cover, inspect May
15 repair of berm & fill (no problem w/ further erosion - repair has held)

Fence line on South edge damaged... broken barbed wire, sign down.

Approx. 50' of barbed wire fence either loose or down from break.

Repair due w/in 60 days. Two signs exhibit peeling but are
legible. No evidence of intrusion or any other damage. Small20 vegetation taking hold on cover. ~~They~~ Suggest remediation in conjunction
with fence repair. Mud pit D okay. Area X okay.

12:00 Noon - Arrive UC-1 Central Mudpit. Fence & signs in excellent condition.

Cover in excellent condition - no cracks, good vegetation coverage. Good
25 vegetation coverage on TDR nests. No breaks in chicken wire. Survey pads
in excellent condition. No problems here. 5 pics taken.

Mud pit E okay. Mud pit A okay.

SIGNATURE

DATE

6/16/05

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

12:45 PM Arrive UC-3 - Inspect Monuments & signs - walk
perimeters of use restricted areas. View previously noted "hole"
to see collapsed ^{edges} from moist winter. Spring rain's runoff created
one erosion gully a few inches deep running through area (not
significant). Area looks good. No deficiencies noted.

13:15 Leave Field

SIGNATURE

DATE

6/16/05

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

8/12/05

CATA

UC-4 Mud Pit.

SAFETY: HEAT STRESS, BIO HAZARD (Snakes, Bugs)

DRIVING SAFETY, EMERGENCY PROCEDURES,
Buddy System.

SCOPE: REPAIR 30'-50' of fence

Rehang Sign.

DE-VEG CAP.

0930 - ARRIVE ON LOCATION: PEARSONELL ON LOCATION

DAVE MADSEN - BMD PM

MILK FLOID TL

GARY GARRETT SS.

0940 - Perform SAFETY TAIL Gate Meeting.

0945 - Begin Fence Repairs + CAP DEVEG

1200 - Lunch

1230 - Continue Fence Repairs, DE-VEG and Sign hang.

1445 - All scope Completed, Site Secure

8/12/05

CAU 417: CNTA UC-1 CENTRAL MUD PIT COVER, POST-CLOSURE MONITORING CHECKLIST

Date of Last Inspection: 6/16/05 Reason for Last Inspection: Quarterly Inspection

Responsible Agency: Bechtel Nevada Project Manager: Jeff Smith

Inspection Date: 9/22/05

Inspector (name, title, organization): Glenn Richardson, Task Manager, BN-ER

Assistant Inspector (name, title, organization): Shanghu Burnison, Sr. Tech Lead, BN-ER

A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
2. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
3. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
4. A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
5. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

	YES	NO	EXPLANATION
1. Site as-built plans and site base map reviewed.	☒	☐	
2. Previous inspection reports reviewed.	☒	☐	
a. Were anomalies or trends detected on previous inspections?	☐	☒	
b. Was maintenance performed?	☐	☒	
3. Site maintenance and repair records reviewed.	☒	☐	
a. Has site repair resulted in a change from as-built conditions?	☐	☒	
b. Are revised as-builts available that reflect repair changes?	☐	☐	N/A

C. SITE INSPECTION (To be completed during inspection)

	YES	NO	EXPLANATION
1. Adjacent off-site features within watershed areas.			
a. Have there been any changes in use of adjacent area?	☐	☒	
b. Are there any new roads or trails?	☐	☒	
c. Has there been a change in the position of nearby washes?	☐	☒	
d. Has there been lateral excursion or erosion/deposition of nearby washes?	☐	☒	
e. Are there new drainage channels?	☐	☒	
f. Change in surrounding vegetation?	☐	☒	
2. Security fence, signs.			
a. Displacement of fences, site markers, boundary markers, or monuments?	☐	☒	
b. Have any signs been damaged or removed? (Number of signs replaced: _____)	☐	☒	Drove around fenced area. Fencing/signs are in good condition.
c. Were gates locked?	☒	☐	

CAU 417: CNTA UC-1 CENTRAL MUD PIT COVER, POST-CLOSURE MONITORING CHECKLIST

3. Waste Unit cover.

YES NO EXPLANATION

- a. Is there evidence of settling?
- b. Is there cracking?
- c. Is there evidence of erosion around the cap (wind or water)?
- d. Is there evidence of animal burrowing?
- e. Have the site markers been disturbed by man or natural processes?
- f. Do natural processes threaten to integrity of any cover or site marker?
- g. Other?

	✓	
	✓	
	✓	
	✓	
	✓	
	✓	
		N/A

4. Vegetative cover.

- a. Is perimeter fence or mesh fencing damaged?
- b. Is there evidence of horses or rabbits on site?
- c. Is organic mulch and/or plants adequate to prevent erosion?
- d. Are weedy annual plants present? If yes, are they a problem?
- e. Are seeded plant species found on site?
- f. Is there evidence of plant mortality?

	✓	
	✓	
✓		
✓		No problems or issues.
✓		
✓		

5. Photo Documentation

- a. Has a photo log been prepared?
- b. Number of photos exposed (5)

✓	
---	--

D. FIELD CONCLUSIONS

- 1. Is there an imminent hazard to the integrity of the unit? (Immediate report required)

	✓	
--	---	--

Person/Agency to whom report made:

- 2. Are more frequent inspections required?
- 3. Are existing maintenance/repair actions satisfactory?
- 4. Is other maintenance/repair necessary?
- 5. Is current status/condition of vegetative cover satisfactory?

	✓	
✓		
	✓	
	✓	

6. Rationale for field conclusions:

The site is in good condition. No problems or significant issues were discovered.

E. CERTIFICATION

I have conducted an inspection of the UC-1 Cental Mud Pit Cover, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Monitoring Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature:

Glenn Richardson

Printed Name:

Glenn Richardson

Title:

Task Manager

Date:

9/22/05

CAU 417: CNTA UC-3 POST-CLOSURE INSPECTION CHECKLIST

 Date of Last Inspection: 6/16/05

 Reason for Last Inspection: Quarterly Inspection

 Responsible Agency: Bechtel Nevada

 Project Manager: Jeff Smith

 Inspection Date: 9/22/05

 Inspector (name, title, organization): Glenn Richardson, Task Manager, BN-ER

 Assistant Inspector (name, title, organization): Shaughn Burnison, Sr. Tech Lead, BN-ER
A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
2. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
3. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
4. A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
5. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

YES

NO

EXPLANATION

1. Site as-built plans and site base map reviewed.

☒

2. Previous inspection reports reviewed.

☒

a. Were anomalies or trends detected on previous inspections?

☒

b. Was maintenance performed?

☒

3. Site maintenance and repair records reviewed.

☒

a. Has site repair resulted in a change from as-built conditions?

☒

b. Are revised as-builts available that reflect repair changes?

N/A

C. SITE INSPECTION (To be completed during inspection)

YES

NO

EXPLANATION

1. Adjacent off-site features within watershed areas.

a. Have there been any changes in use of adjacent area?

☒

b. Are there any new roads or trails?

☒

c. Has there been a change in the position of nearby washes?

☒

d. Has there been lateral excursion or erosion/deposition of nearby washes?

☒

e. Are there new drainage channels?

☒

f. Change in surrounding vegetation?

☒

2. Security fence, signs.

a. Displacement of fences, site markers, boundary markers, or monuments?

☒

 b. Have any signs been damaged or removed?
(Number of signs replaced: 0)

☒

c. Were gates locked?

N/A

CAU 417: CNTA UC-3 POST-CLOSURE INSPECTION CHECKLIST

D. FIELD CONCLUSIONS

1. Is there an imminent hazard to the integrity of the unit?
(Immediate report required)

	✓
--	---

Person/Agency to whom report made:

2. Are more frequent inspections required?

	✓
--	---

3. Are existing maintenance/repair actions satisfactory?

✓	
---	--

4. Is other maintenance/repair necessary?

	✓
--	---

5. Is current status/condition of vegetative cover satisfactory?

✓	
---	--

6. Rationale for field conclusions:

Performed a walkdown of the site. The monuments and signs are in good condition.

E. CERTIFICATION

I have conducted an inspection of the UC-4 Mud Pit C Cover, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Inspection Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature:

Glenn Richardson

Printed Name:

Glenn Richardson

Title:

Task Manager

Date:

9/22/05

CAU 417: CNTA UC-4 MUD PIT C COVER, POST-CLOSURE INSPECTION CHECKLIST

 Date of Last Inspection: 6/16/05 Reason for Last Inspection: Quarterly Inspection

 Responsible Agency: Bechtel Nevada

 Project Manager: Jeff Smith

 Inspection Date: 9/22/05

 Inspector (name, title, organization): Glenn Richardson, Task Manager, BN-ER

 Assistant Inspector (name, title, organization): Shaughn Burnison, Sr. Tech Lead, BN-ER
A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
2. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
3. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
4. A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
5. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

YES

NO

EXPLANATION

1. Site as-built plans and site base map reviewed.

☒

2. Previous inspection reports reviewed.

☒

a. Were anomalies or trends detected on previous inspections?

b. Was maintenance performed?

3. Site maintenance and repair records reviewed.

☒

a. Has site repair resulted in a change from as-built conditions?

b. Are revised as-builts available that reflect repair changes?

☐
☒

N/A

C. SITE INSPECTION (To be completed during inspection)

YES

NO

EXPLANATION

1. Adjacent off-site features within watershed areas.

a. Have there been any changes in use of adjacent area?

b. Are there any new roads or trails?

c. Has there been a change in the position of nearby washes?

d. Has there been lateral excursion or erosion/deposition of nearby washes?

e. Are there new drainage channels?

f. Change in surrounding vegetation?

☐
☒
☐
☒
☐
☒
☐
☒
☒
☐

Two new significant erosion rills were noted on UC-4 Mudpit C cover.

☐
☒

2. Security fence, signs.

a. Displacement of fences, site markers, boundary markers, or monuments?

 b. Have any signs been damaged or removed?
(Number of signs replaced: 0)

c. Were gates locked?

☐
☒

Fence damage identified during June inspection has been repaired.

☐
☒

A sign that was down during June inspection has been rehung. The sign was located on north side of Mudpit C cover.

☒
☐

CAU 417: CNTA UC-4 MUD PIT C COVER, POST-CLOSURE INSPECTION CHECKLIST

3. Waste Unit cover.

- Is there evidence of settling?
- Is there cracking?
- Is there evidence of erosion around the cap (wind or water)?
- Is there evidence of animal burrowing?
- Have the site markers been disturbed by man or natural processes?
- Is the vegetation on the cover?
- Do natural processes threaten to integrity of any cover or site marker?
- Other?

YES NO EXPLANATION

	✓	
	✓	
✓		Two large erosion rills were discovered on the northeast corner of Mudpit C Cover.
	✓	
	✓	
	✓	Tumbleweed and brush growth discovered during June inspection has been removed.
✓		The erosion rills are significant in size and require repair.
		N/A

4. Photo Documentation

- Has a photo log been prepared?
- Number of photos exposed (8)

✓	
---	--

D. FIELD CONCLUSIONS

- Is there an imminent hazard to the integrity of the unit? (Immediate report required)

	✓	The erosion rills were discovered on the NE edge of the cover.
--	---	--

Person/Agency to whom report made:

- Are more frequent inspections required?

	✓	Repairs need to be made within 90 days.
--	---	---

- Are existing maintenance/repair actions satisfactory?

	✓	
--	---	--

- Is other maintenance/repair necessary?

	✓	Erosion rill repairs need to be made within 90 days.
--	---	--

- Is current status/condition of vegetative cover satisfactory?

		N/A - The UC-4 site has a non-vegetative cover.
--	--	---

- Rationale for field conclusions:

Fencing, signage, and monuments are in good condition. Erosion rill repairs for UC-4 Mudpit C cover are required within 90 days of discovery.

E. CERTIFICATION

I have conducted an inspection of the UC-4 Mud Pit C Cover, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Inspection Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature:

Glenn Richardson

Printed Name:

Glenn Richardson

Title:

Task Manager

Date:

9/22/05

TITLE

CANTA POST CLOSURE INSPECTION

PROJECT NO.

121

Work continued from Page NA

9/21/05

BOOK NO.

CAU 417 UC-1, UC-3, UC-4 AREAS CENTRAL NEVEDA TEST AREA

PERSONNEL: GLENN RICHARDSON - TM

SHANGHAI BURNISON - TL

EQUIPMENT: CAMERA, CLOSURE REPORT, PCMR

5 WEATHER: SUNNY, CLEAR, 80% SLIGHT BREEZE

SCOPE: QUARTERLY POST-CLOSURE INSPECTION

TAILGATE: SLIPS/TRIPS, SNAKES, GRAVEL ROADS/MUDDY ROADS, COMMS,
EMERGENCY PROCEDURES

10 ACTIVITIES: ARRIVE UC-4 $\approx$ 10:30, REVIEW PREVIOUS INSPECTION NOTES,
CLOSURE REPORT, ENG'G. DIAGRAMS, HOLD SAFETY TAILGATE.
PROCEED WITH VISUAL INSPECTION OF MONUMENTS, SIGNS, FENCING,
COVER CONDITIONS, FENCE REPAIRS, EROSION RILL REPAIR, BERM
CONDITION. TAKE PHOTOGRAPHS, CHECK AREA X MON'TS & SIGNS.

15 { NOTE: UC-4 CAS 58-09-03 (MUDPITS A, B, C, D, E)
CAS 58-10-05 (AREA X)
MUDPIT C

NE Corner EXHIBITS A NEW, LARGE EROSION RILL REQUIRING
REPAIR. SE CORNER EXHIBITS NEW, SMALLER RILL, WHICH
WILL DEVELOP QUICKLY. BOTH RILLS HAVE PENETRATED THE

20 CONTROL BERM AT THE EASTERN EDGE OF COVER. THE LARGE
RILL HAS EXPOSED THE EDGE OF THE GEOSYNTHETIC CLAY LINER.
VEGETATION ON MUDPIT C COVER IS WELL UNDER CONTROL AFTER
REMOVAL IN AUGUST. FENCE ON N. SIDE OF COVER ^{IS} IN
GOOD CONDITION AFTER REPAIR IN AUGUST. MONUMENTS AND

25 SIGNS ARE IN GOOD CONDITION. SIGNS ARE LEGIBLE, SOME
EXHIBIT SOME PEELING OF THE PAINT. GATE LOCKED & IN GOOD
CONDITION.

SB

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page 122

SIGNATURE

Shanghai A. Burnison

DATE

9/22/05

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

UC-4 ACTIVITIES CONTINUED ...

PHOTO LOG FOR UC-4 — FM CTR LOOKING WEST

FM CTR LOOKING EAST

FM S EDGE LOOKING W

" " E

EROSION RILL 1 FM COVER LOOKING NE

EROSION RILL 1 FM SLOPE LOOKING SW

EROSION RILL 2 FM SLOPE LOOKING NNE

" " " " " NW

COMPLETE CHECKLIST & DEPART FOR UC-1

1:00 PM ARRIVE UC-1 (CAS 58-09-01) CENTRAL MUDPIT

DRIVE AROUND FENCED AREA TO VIEW FENCE & SIGN CONDITIONS.

ALL LOOKS WELL. GATE IS IN GOOD CONDITION & LOCKED

VEGETATION INSIDE THE UNIT IS ~~SO~~ HEALTHY & PLENTIFUL & VERY
SIMILAR IN APPEARANCE TO VEGETATION OUTSIDE THE FENCE

SURFACE CRACKING: NONE NOTICEABLE

CONDITION OF ABOVE GROUND MONITORING STATION EQPT: GOOD —

NO INDICATION OF TAMPERING

CONDITION OF ^{SURVEY} MONUMENTS: OKAY — ADDITIONAL ~~SET~~ THINSET IS RECD.

PHOTO LOG FOR UC-1 — FM MIDDLE OF SOUTH EDGE LOOKING W

" " " NW

" " " N

" " " NE

" " " E

SIGNATURE

DATE

9/22/05

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

10-01
9-06
25-01

TITLE CNTA PCM INSPECTION

PROJECT NO.

123

Work continued from Page 122

BOOK NO.

1:55 PM ARRIVE LC-3 (CAS 58-10-01)
(CAS 58-09-06)
(CAS 58-25-01)

WALK SITE, CHECK CONDITION OF MONUMENTS & SIGNS. CHECK

5

GENERAL CONDITION OF SITE. ALL APPEARS OKAY.

NO PHOTOS.

2:20 PM DEPART SITE - PROCEED TO NTS

10

15

SB
9/22/05

20

25

Work continued to Page _____

SIGNATURE

Stephen B...

DATE

9/22/05

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

CAU 417: CNTA UC-4 MUD PIT C COVER, POST-CLOSURE INSPECTION CHECKLIST

 Date of Last Inspection: Sept. 22, 2005

 Reason for Last Inspection: Quarterly

 Responsible Agency: BN ER

 Project Manager: JEFF L. SMITH

 Inspection Date: Dec. 7, 2005

 Inspector (name, title, organization): Shaughn Burnison, Tech Lead, BN ER

 Assistant Inspector (name, title, organization): Glenn Richardson, Task Mgr., BNER
A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
2. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
3. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
4. A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
5. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

	YES	NO	EXPLANATION
1. Site as-built plans and site base map reviewed.	☒	☐	
2. Previous inspection reports reviewed.	☒	☐	
a. Were anomalies or trends detected on previous inspections?	☒	☐	Several erosion rills had developed on the cover slopes.
b. Was maintenance performed?	☒	☐	The erosion rills were repaired.
3. Site maintenance and repair records reviewed.	☒	☐	
a. Has site repair resulted in a change from as-built conditions?	☐	☒	
b. Are revised as-builts available that reflect repair changes?	☒	☐	N/A

C. SITE INSPECTION (To be completed during inspection)

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

CAU 417: CNTA UC-4 MUD PIT C COVER, POST-CLOSURE INSPECTION CHECKLIST
3. Waste Unit cover.

YES NO EXPLANATION

a. Is there evidence of settling?

X

b. Is there cracking?

X

c. Is there evidence of erosion around the cap (wind or water)?

X

d. Is there evidence of animal burrowing?

X

e. Have the site markers been disturbed by man or natural processes?

X

f. Is the vegetation on the cover?

X

g. Do natural processes threaten to integrity of any cover or site marker?

X

h. Other?

N/A

4. Photo Documentation

a. Has a photo log been prepared?

X

 b. Number of photos exposed (**7**) CRW, CTR E, S-SW, S-SE, NE CORNER (1, 2, 3)

D. FIELD CONCLUSIONS

1. Is there an imminent hazard to the integrity of the unit? (Immediate report required)

X

Person/Agency to whom report made:

2. Are more frequent inspections required?

X

3. Are existing maintenance/repair actions satisfactory?

X

4. Is other maintenance/repair necessary?

X

~~X~~

BN ENGINEERING DEPT. IS EVALUATING NEED - see below *

5. Is current status/condition of vegetative cover satisfactory?

X

6. Rationale for field conclusions: * Erosion rills required two separate maintenance activities this year for the first time. The problem has been referred to BN Engineering for development of a more robust fix if deemed necessary.

E. CERTIFICATION

I have conducted an inspection of the UC-4 Mud Pit C Cover, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Inspection Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature:

Printed Name:

SHAUGHN A. BURNISON

Title:

TECH LEAD

Date:

12/7/2005

CAU 417: CNTA UC-1 CENTRAL MUD PIT COVER, POST-CLOSURE MONITORING CHECKLIST

 Date of Last Inspection: Sept. 22, 2005

 Reason for Last Inspection: Quarterly

 Responsible Agency: BN ER

 Project Manager: JEFF L. SMITH

 Inspection Date: December 7, 2005

 Inspector (name, title, organization): SHAUNAN BURTONSON, TECH LEAD, BN ER

 Assistant Inspector (name, title, organization): GLENN RICHARDSON, TASK MGR, BN ER
A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
2. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
3. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
4. A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
5. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

	YES	NO	EXPLANATION
1. Site as-built plans and site base map reviewed.	☒	☐	
2. Previous inspection reports reviewed.	☒	☐	
a. Were anomalies or trends detected on previous inspections?	☐	☒	
b. Was maintenance performed?	☐	☒	
3. Site maintenance and repair records reviewed.	☒	☐	
a. Has site repair resulted in a change from as-built conditions?	☐	☐	<u>N/A</u>
b. Are revised as-builts available that reflect repair changes?	☐	☐	<u>N/A</u>

C. SITE INSPECTION (To be completed during inspection)

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

CAU 417: CNTA UC-1 CENTRAL MUD PIT COVER, POST-CLOSURE MONITORING CHECKLIST
3. Waste Unit cover.

	YES	NO	EXPLANATION
a. Is there evidence of settling?		X	
b. Is there cracking?	X		Evidence of growth of one set of previously repaired cracks.
c. Is there evidence of erosion around the cap (wind or water)?		X	
d. Is there evidence of animal burrowing?		X	
e. Have the site markers been disturbed by man or natural processes?		X	
f. Do natural processes threaten to integrity of any cover or site marker?		X	
g. Other?			N/A

4. Vegetative cover.

a. Is perimeter fence or mesh fencing damaged?		X	
b. Is there evidence of horses or rabbits on site?		X	
c. Is organic mulch and/or plants adequate to prevent erosion?	X		
d. Are weedy annual plants present? If yes, are they a problem?		X	
e. Are seeded plant species found on site?	X		
f. Is there evidence of plant mortality?		X	

5. Photo Documentation

a. Has a photo log been prepared?	X		
b. Number of photos exposed (5)			

D. FIELD CONCLUSIONS

1. Is there an imminent hazard to the integrity of the unit? (Immediate report required)		X	
Person/Agency to whom report made:			
2. Are more frequent inspections required?		X	
3. Are existing maintenance/repair actions satisfactory?	X		
4. Is other maintenance/repair necessary?	X		Additional patching of cracks showing growth is advised.
5. Is current status/condition of vegetative cover satisfactory?	X		

6. Rationale for field conclusions: Fencing, signs, & chicken wire are in excellent condition. One set of previously repaired cracks are exhibiting signs of lateral widening (located middle-west portion of cover.) Additional fill is advised during next inspection or before.

E. CERTIFICATION

I have conducted an inspection of the UC-1 Cental Mud Pit Cover, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Monitoring Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature:	Printed Name: SHAUN A. BURNISON
Title: Tech Lead	Date: 12/7/2005

CAU 417: CNTA UC-3 POST-CLOSURE INSPECTION CHECKLIST

Date of Last Inspection: <u>September 22, 2005</u>	Reason for Last Inspection: <u>Quarterly</u>
Responsible Agency: <u>BN Environmental Restoration</u>	Project Manager: <u>Jeff L. Smith</u>
Inspection Date: <u>December 7, 2005</u>	
Inspector (name, title, organization): <u>Salgin Burnison, Tech Lead, BN ER</u>	
Assistant Inspector (name, title, organization): <u>Glenn Richardson, Task Manager, BN ER</u>	

A. GENERAL INSTRUCTIONS

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used as necessary to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
2. Any checklist line item marked by an inspector in a SHADED BOX, must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of inspector observations and the inspector's rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, annotated site maps.
3. The site inspection is a walking inspection of the entire site including the perimeter and sufficient transects to be able to inspect the entire surface and all features specifically described in this checklist.
4. A standard set of color 35 mm photographs (or equivalent) is required. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
5. This unit will be inspected biannually with formal reporting to the Nevada Division of Environmental Protection to be done annually. The annual report will include an executive summary, this inspection checklist with field notes and photo log attached, and recommendations and conclusions.

B. PREPARATION (To be completed prior to site visit)

	YES	NO	EXPLANATION
1. Site as-built plans and site base map reviewed.	X		
2. Previous inspection reports reviewed.	X		
a. Were anomalies or trends detected on previous inspections?		X	
b. Was maintenance performed?		X	
3. Site maintenance and repair records reviewed.	X		
a. Has site repair resulted in a change from as-built conditions?		X	N/A
b. Are revised as-builts available that reflect repair changes?			N/A

C. SITE INSPECTION (To be completed during inspection)

	YES	NO	EXPLANATION
1. Adjacent off-site features within watershed areas.			
a. Have there been any changes in use of adjacent area?		X	
b. Are there any new roads or trails?		X	
c. Has there been a change in the position of nearby washes?		X	
d. Has there been lateral excursion or erosion/deposition of nearby washes?		X	
e. Are there new drainage channels?		X	
f. Change in surrounding vegetation?		X	
2. Security fence, signs.			
a. Displacement of fences, site markers, boundary markers, or monuments?		X	
b. Have any signs been damaged or removed? (Number of signs replaced: _____)		X	
c. Were gates locked?			N/A

CAU 417: CNTA UC-3 POST-CLOSURE INSPECTION CHECKLIST

D. FIELD CONCLUSIONS

1. Is there an imminent hazard to the integrity of the unit?
(Immediate report required)

☒ ☐ ☐

Person/Agency to whom report made:

2. Are more frequent inspections required?

☐ ☒ ☐

3. Are existing maintenance/repair actions satisfactory?

☒ ☐ ☐

4. Is other maintenance/repair necessary?

☐ ☒ ☐

5. Is current status/condition of vegetative cover satisfactory?

☒ ☐ ☐

6. Rationale for field conclusions:

Signs, Monuments, & covered areas are all in good condition.

E. CERTIFICATION

I have conducted an inspection of the UC-4 Mud Pit C Cover, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Inspection Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.

Chief Inspector's Signature:

Shaughn A. Burnison

Printed Name:

SHAUGHN A. BURNISON

Title:

Tech Lead

Date:

12/7/2005

TITLE

CAU 417 - CNTA POST-CLOSURE INSPECTIONS

PROJECT NO.

POST CLOSURE
MONITORING

1

Work continued from Page N/A

DECEMBER 7, 2005

BOOK NO. 2

CNTA POST CLOSURE INSPECTION - DEC 2005

PERSONNEL: TL: SHAUGHN BURNISON
TM: GLENN RICHARDSON

5

VISITORS: ENG: LUIS LOPEZ
SR. ENG: SALIGAMA RAO (SRAP)

EQUIPMENT: ~~ANALOG~~ DIGITAL CAMERA

10

WEATHER: OVERCAST TO PTLY CLOUDY, COLD $\approx$ 25°F, NE BREEZE

TAILGATE: COLD STRESS/WEATHER, DRIVING, BIOTA, SLIPS/TRIPS, BARBED WIRE, COMMS, NEAREST MEDICAL, NEAREST SHELTER

15

SCOPE OF WORK: QUARTERLY PC INSPECTIONS AT UC-4, UC-1, UC-3.
INSPECTION PHOTOS. POST-REPAIR PHOTOS. REVIEW REPAIRS
& BRIEF ENGINEERS ON ^{EROSION} RILL ^{ISSUES,} DEVELOPMENT

20

ACTIVITIES: 12:10 ARR CNTA UC-4. ~~ARRIVE~~ BN ENGINEERS ARRIVE WITH US. PROVIDE OVERVIEW OF EROSION RILL ISSUES, SHOW/POINT OUT REPAIRED AREAS. REVIEW ENGINEERING DESIGN, REPAIR PROCEDURES & SPECIFICATIONS FOLLOWED, MATERIAL/FILL SPEC, ETC. EYEBALL GRADE & GRADIENT. ENGINEERS WOULD LIKE SURVEYORS TO DO TOPOGRAPHIC/ELEV. SURVEY, CONCENTRATING ON EASTERN HALF OF COVER, TO ENSURE GRADE DOES NOT CAUSE PONDING. A REPORT AND RECOMMENDATION WILL BE GEN'D.
13:00 Engineers depart site for Las Vegas

SIGNATURE

Shaughn A Burnison

DATE

12/7/2005

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

ACTIVITIES CONTINUED: INSPECTION ACTIVITIES (UC-4)

PHOTO LOG: CENTER COVER LOOKING WEST

" " " EAST

SE EDGE LOOKING NW

SW " " NE

CLOSE-IN VIEW OF REPAIRED NE CORNER LOOKING NE

" " " " " SW

" " " " " "

10

A pin on the gate lock ^{has} come out, leaving it free to fall when lock is removed. It does not effect locking integrity of mechanism. Fence is in good condition. All signs hanging - some ^{additional} wear on large south-facing one of mudpit c fence. Signs on monuments in good condition. Monuments in good condition. (This sign is due for replacement in 2006 due to wear) ←

15

Cover surface (mudpit c) has no vegetation - looks good.

Erosion rills noted during last inspection have been repaired. ^{Repair of} Erosion rill noted in March 2005 is holding well.

20

With the exceptions noted, the site is in good condition.

1:45 PM DEPARTED UC-4

1:55 PM ARR UC-1

DRIVE AROUND MUDPIT - VIEW DRAINAGE DIVERSION CHANNEL - VIEW CONDITION OF FENCE & SIGNS - ALL LOOKS IN GOOD CONDITION.

25

RETURN TO GATE - GATE LOCKED - CHICKEN WIRE IN GOOD CONDITION. ENTERED MUDPIT - WALKED MUDPIT SURFACE. VEGETATION IN GOOD CONDITION (SEASONAL MORTALITY)

SIGNATURE

Shaugh A. Brown

DATE

12/7/05

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

Herbicide - Apply Sonora in December

Get approval from Sabine & Ted

Action - email Sabine & Ted informal request & heads
a MSDS. Follow w/ formal letter up.

Send Formal Letter. On approval arrange
December application - possibly last week
1 of Dec via SWO (Andy Testin)

SB 12/7/05

SIGNATURE

DATE

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

4

PROJECT NO.

BOOK NO.

TITLE CMTA DEC'05 INSPECTIONS

Work continued from Page 2

12/7/05

ACTIVITIES CONTINUED - NOTED CONDITION OF CRACKS THAT HAD BEEN
PREVIOUSLY REPAIRED - LOCATED WEST PORTION OF MUDDPIT AT
* JUST BEFORE THE INTERFACE BETWEEN ORIGINAL PIT & RELOCATION
TRENCH - ~~THE CRACK~~ ONE CRACK IN PARTICULAR EXHIBITS EVIDENCE
OF LATERAL EXPANSION (WIDENING) THO' NOT PARTICULARLY DRAMATIC;
SUGGEST ADDITIONAL APPLICATION OF BENTONITE FILL & NOTIFICATION OF
EN ENGINEERING DEPARTMENT. (AS BEST MGMT PRACTICE). ALSO MAKE NOTE
TO OBSERVE CLOSELY ~~DURING~~ ^{DURING} NEXT INSPECTION(S).

10

PHOTOS TAKEN FROM PHOTO POINT...
1) LOOKING W
2) LOOKING NW
3) " N
4) " NE
5) " E

5

WITH EXCEPTION NOTED, UC-1 SITE IS IN EXCELLENT CONDITION.

2:20 DEP UC-1

2:25 ARR UC-3

20

VIEW SITE; SIGNS & MONUMENTS IN EXCELLENT CONDITION. NO NEW
ISSUES NOTED OR OBSERVED.

2:40 PM DEP UC-3 FOR TTR

15

INSPECTION COMPLETE

SB 12/7/05

SIGNATURE

DATE

12/7/05

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

PHOTOGRAPH LOG

PHOTOGRAPH	DATE	DESCRIPTION
1	03/15/2005	UC-1 View from south edge looking west
2	03/15/2005	UC-1 View from south edge looking northwest
3	03/15/2005	UC-1 View from south edge looking north
4	03/15/2005	UC-1 View from south edge looking northeast
5	03/15/2005	UC-1 View from south edge looking east
6	03/15/2005	UC-4 View from center looking west
7	03/15/2005	UC-4 View from center looking east
8	03/15/2005	UC-4 View from center looking southeast
9	03/15/2005	UC-4 Erosion rill
10	05/04/2005	UC-4 Repaired location of erosion rill
11	06/16/2005	UC-1 View from south edge looking west
12	06/16/2005	UC-1 View from south edge looking northwest
13	06/16/2005	UC-1 View from south edge looking northeast
14	06/16/2005	UC-1 View from south edge looking east
15	06/16/2005	UC-4 View from center looking west
16	06/16/2005	UC-4 View from center looking east
17	06/16/2005	UC-4 View from north side looking east
18	06/16/2005	UC-4 View from south side looking west
19	09/22/2005	UC-1 View from south edge looking west
20	09/22/2005	UC-1 View from south edge looking northwest
21	09/22/2005	UC-1 View from south edge looking north
22	09/22/2005	UC-1 View from south edge looking northeast
23	09/22/2005	UC-1 View from south edge looking east
24	09/22/2005	UC-4 View from center looking west
25	09/22/2005	UC-4 View from center looking east
26	09/22/2005	UC-4 View from south side looking west
27	09/22/2005	UC-4 View from south side looking east
28	12/07/2005	UC-1 View from south edge looking west
29	12/07/2005	UC-1 View from south edge looking northwest
30	12/07/2005	UC-1 View from south edge looking north
31	12/07/2005	UC-1 View from south edge looking northeast
32	12/07/2005	UC-1 View from south edge looking east

PHOTOGRAPH LOG

PHOTOGRAPH	DATE	DESCRIPTION
33	12/07/2005	UC-4 View from center looking west
34	12/07/2005	UC-4 View from center looking east
35	12/07/2005	UC-4 View from south side looking west
36	12/07/2005	UC-4 View from south side looking north

Photograph 1: UC-1 View from south edge looking west

Photograph 2: UC-1 View from south edge looking northwest

Photograph 3: UC-1 View from south edge looking north

Photograph 4: UC-1 View from south edge looking northeast

Photograph 5: UC-1 View from south edge looking east

Photograph 6: UC-4 View from center looking west

Photograph 7: UC-4 View from center looking east

Photograph 8: UC-4 View from center looking southeast

Photograph 9: UC-4 Erosion rill

Photograph 10: UC-4 Repaired location of erosion rill

Photograph 11: UC-1 View from south edge looking west

Photograph 12: UC-1 View from south edge looking northwest

Photograph 13: UC-1 View from south edge looking northeast

Photograph 14: UC-1 View from south edge looking east

Photograph 15: UC-4 View from center looking west

Photograph 16: UC-4 View from center looking east

Photograph 17: UC-4 View from north side looking east

Photograph 18: UC-4 View from south side looking west

Photograph 19: UC-1 View from south edge looking west

Photograph 20: UC-1 View from south edge looking northwest

Photograph 21: UC-1 View from south edge looking north

Photograph 22: UC-1 View from south edge looking northeast

Photograph 23: UC-1 View from south edge looking east

Photograph 24: UC-4 View from center looking west

Photograph 25: UC-4 View from center looking east

Photograph 26: UC-4 View from south side looking west

Photograph 27: UC-4 View from south side looking east

Photograph 28: UC-1 View from south edge looking west

Photograph 29: UC-1 View from south edge looking northwest

Photograph 30: UC-1 View from south edge looking north

Photograph 31: UC-1 View from south edge looking northeast

Photograph 32: UC-1 View from south edge looking east

Photograph 33: UC-4 View from center looking west

Photograph 34: UC-4 View from center looking east

Photograph 35: UC-4 View from south side looking west

Photograph 36: UC-4 View from south side looking north

APPENDIX B

SUBSIDENCE SURVEY PLATS

THIS PAGE INTENTIONALLY LEFT BLANK

REFERENCES	
TITLE SHEET	JS-058-98228-T2
MUD PIT EXTENSION	JS-058-98228-C29
GRADING PLAN & SECTIONS	JS-058-98228-C33
CLOSURE CAP SECTIONS	JS-058-98228-C34
WEST DIVERSION CHANNEL	JS-058-98228-C35
PLAN & PROFILE	JS-058-98228-C36
EAST DIVERSION CHANNEL	
GRADING PLAN	
DETAILS	

GENERAL NOTE

1. BASIS OF HORIZONTAL CONTROL IS THE NORTH AMERICAN DATUM (NAD) OF 1983, NEVADA STATE PLANE COORDINATES, CENTRAL ZONE, METERS. BASIS OF VERTICAL CONTROL IS THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1929, METERS.

SITE & GRADING PLAN

SCALE : HORIZONTAL: 1:400

AS-BUILT			
Bechtel Nevada			
Inspector	DATE	BY	DATE
N/A	N/A	SCOTTY ELLISON	7/10/01
Checked	DATE	BY	DATE
N/A	N/A	JAS	7/10/01
Approved	DATE	BY	DATE
N/A	N/A	MONICA SANCHEZ	7/17/01
UNLESS NOTED BY MARKED CHANGES, ALL DIMENSIONS, NOTES, REFERENCES AND CONSTRUCTION FEATURES ARE CORRECTED, AND WERE CONSTRUCTED AS SHOWN ON THIS DRAWING.

CENTRAL NEVADA TEST AREA - AREA 58		CAU 417 CLOSURE		CLOSURE CAP		SITE & GRADING PLAN	
U.S. DEPARTMENT OF ENERGY	NEVADA OPERATIONS OFFICE	U.S. DEPARTMENT OF ENERGY	NEVADA OPERATIONS OFFICE	U.S. DEPARTMENT OF ENERGY	NEVADA OPERATIONS OFFICE	U.S. DEPARTMENT OF ENERGY	NEVADA OPERATIONS OFFICE
DRAWING NUMBER		JS-058-98228-C32		SHEET		REV 2	
DATE		4/5/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
CHECKED		JAS		CHECKED		JAS	
DATE		4/6/00		DATE		4/7/00	
BY		MONICA SANCHEZ		BY		MONICA SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE		4/7/00	
BY		L. M. SANCHEZ		BY		L. M. SANCHEZ	
DATE		4/7/00		DATE

APPENDIX C

VEGETATION MONITORING REPORT

THIS PAGE INTENTIONALLY LEFT BLANK

Revegetation Success Monitoring

Corrective Action Unit 417

Central Nevada Test Area - Surface

Hot Creek Valley, Nevada

Field Work Completed on
June 5, 2005

Report prepared
By
Bechtel Nevada
Ecological Services

September 2005

Revegetation Success Monitoring Central Nevada Test Area, Correction Action Unit 417

Introduction

Corrective Action Unit 417 is located at Site UC-1 at the Central Nevada Test Area (CNTA), in the Hot Creek valley of central Nevada. Hydrocarbon-impacted drilling muds and miscellaneous materials were cleaned up at several Corrective Action Sites in the summer and fall of 2000. A soil cover was constructed over a central mud pit area at UC-1 and a fence installed around its perimeter. The area fenced was approximately 2.0 hectares. Adjacent disturbances outside the fence to the south and west and a small area across the diversion channel to the southwest totaled about 1.5 hectares. In the fall of 2000 after cleanup activities were completed, the UC-1 Central Mud Pit and adjacent disturbed areas were seeded with a mix of native plant species. The following spring approximately 5000 transplants were planted on the UC-1 Central Mud Pit.

An evaluation of the success of the revegetation effort has been conducted annually since October 2001. The latest monitoring occurred on June 5, 2005. Vascular plant cover and plant density was estimated by sampling the permanently marked transects located at several locations representative of the areas that were revegetated in 2000. The adjacent, undisturbed, native plant community is also periodically sampled.

Methodology

Transect Locations

Vegetation is sampled along permanently-marked transects at the site. Two permanent transects are located on the Central Mud Pit inside the fence. One begins in the northwest corner of the fenced area and extends in a southeasterly direction. The other transect starts in the center towards the southern edge, extends east for about 60 meters then angles back to the northwest for 40 meters. The other three transects are located outside the fence. One is directly south of the Central Mud Pit and starts on the eastern edge of the area and parallels the fence for 100 meters. The second transect parallels the fence bordering the western edge of the Central Mud Pit and the third transect is located across the diversion channel to the far south. Both of these transects are 80 meters long. The transect in the native plant community is located north of the main access road across from the main gate to the closure cover. Data collected at this site serve as a standard for evaluating revegetation success.

Sampling

Plant cover was estimated using a cover class system in 2001 and 2002, the first two years after revegetation. Since then a cover point projection device has been used to estimate plant cover. Plant density (the number of individual plants per square meter [m^2]) is estimated by placing a meter-square quadrat at given intervals along each permanently-marked transect. The number of individual plants found within the boundaries of each quadrat is counted and recorded. The data are then averaged to determine plant density per unit area (square meter [m^2]).

Plant diversity is an indication of the species richness of the area and is derived from the density data. Plant diversity is calculated by determining the average number of different plant species encountered along each transect.

2005 Monitoring Results

UC-1 Central Mud Pit Cover Cap

Plant Cover - After five years perennial plant cover is 26.1% which represents a 13% increase over the amount of plant cover in 2004 (Table 1). The increase is reflected in increases in both shrub and grass cover. Shrub cover continues slightly above 20%, which it has since the fall of 2001.

The 3.4% grass cover is the highest recorded to date and shows a more than 150% increase over last year. The amount of cover from grasses had dropped to an all time low last year as a result of near drought conditions in 2003 and 2004.

The amount of bare ground remains about the same whereas litter declined slightly as it has since it was first measured in the fall of 2002.

Table 1. Plant cover on UC-1 Central Mud Pit and reference area.

	<u>Oct '01</u>	<u>Sept '02</u>	<u>June '03</u>	<u>June '04</u>	<u>June '05</u>	<u>Reference</u>
Shrub	24.5	23.3	26.1	21.3	22.7	21.2
Grass	2.3	3.2	2.3	1.3	3.4	2.3
Forbs/Annuals	<u>0.3</u>	<u>0.1</u>	<u>0.0</u>	<u>0.6</u>	<u>0.4</u>	<u>0.8</u>
Total Plant Cover	27.1	26.5	28.4	23.2	26.1	24.2
Bare Ground	72.9	22.7	30.0	46.9	47.4	50.0
Litter	-	50.8	42.0	30.0	26.1	25.8

Plant Density – Plant density continues to decline toward a level of equilibrium with available resources. The density of shrubs is still relatively high at 13.7 plants/m² (Table 2), even though it represents an almost 30% decrease from shrub density in 2004. Three of the four most prominent shrub species, big sagebrush (Figure 1), fourwing saltbush and rubber rabbitbush (Figure 2), declined from densities reported in 2004. In fact the density for all three species is the lowest recorded to date. Shrub density is about 1/3 the shrub density recorded in the fall of 2001 which was the first year after revegetation occurred.

Figure 1. Big sagebrush is well established and commonly found on the central mud pit area.

Like shrub density, the density of grasses is slightly less this year than it was last year and represents a continuation of a decline that began in 2002. Indian ricegrass declined from 2.3 to 1.7 plants/m² whereas the other grass found on site, squirreltail, showed a slight increase. The number of grasses found on the site is about 1/3 what it was in the fall of 2001.

Forbs have shown a small, but consistent, increase since the fall of 2002.

Table 2. Plant density (plants/m²) on UC-1 Central Mud Pit and the reference area. Scientific names of plants are given in Appendix A.

	<u>Oct '01</u>	<u>Sept '02</u>	<u>June '03</u>	<u>June '04</u>	<u>June '05</u>	<u>Reference</u>
Big Sagebrush	6.8	5.6	6.6	4.0	2.6	1.9
Fourwing Saltbush	10.8	6.1	5.3	5.5	3.0	0.0
Douglas' Rabbitbrush	4.5	3.7	5.8	4.9	4.9	0.4
Rubber Rabbitbrush	15.3	13.1	8.2	4.7	3.2	0.0
Indian Ricegrass	5.1	4.4	3.1	2.3	1.7	0.0
Threeawn	0.1	0.0	0.0	0.0	0.0	0.0
Squirreltail	1.5	4.0	0.7	0.4	0.5	0.9
Needle and Thread	0.0	0.0	0.0	0.0	0.0	0.3
Galleta	0.0	0.0	0.0	0.0	0.0	4.1
Shrubs	37.4	28.5	25.9	19.1	13.7	2.2
Grasses	6.7	8.4	3.8	2.7	2.1	5.3
Forbs/Unseeded	<u>0.0</u>	<u>0.1</u>	<u>0.2</u>	<u>0.3</u>	<u>0.4</u>	<u>3.3</u>
Total Plant Density	44.1	37.0	29.9	22.1	16.2	10.8

Diversity – There was another slight decline in plant diversity this year both in the number of shrubby species and grass species. Shrub diversity declined by about 6% from 2004 estimates and grasses declined by about 10% from 2004 diversity estimates. The number of annual species doubled from 2004 estimates and is the highest recorded to date.

Table 3. Plant diversity of perennial plant species on UC-1 Central Mud Pit and reference area.

	<u>Oct '01</u>	<u>Sept '02</u>	<u>June '03</u>	<u>June '04</u>	<u>June '05</u>	<u>Reference</u>
Avg. # spp/quad	5.5	5.5	5.0	3.9	3.6	3.9
Shrubs	3.8	3.8	3.7	3.1	2.9	1.1
Grasses	1.7	1.8	1.3	0.8	0.7	1.4
Forbs/Unseeded	0.0	0.0	0.1	0.2	0.4	1.5

Perimeter Disturbances

Plant Cover – The increase in vascular plant cover on the perimeter disturbances is somewhat misleading. Actually there was a 15% decrease in shrub cover, which accounts for the majority (about 70%) of the total plant cover.

Grass cover increased from 0.5% to 0.8% which represents a 60% increase. However grasses account for less than 5% of the total plant cover.

The most significant increase in cover in 2005 was from annual plants. There was a seven-fold increase from 2004 to 2005. In previous years annuals have accounted for less than 5% of the total plant cover. In 2005 annuals account for 31% of the total cover.

The amount of bare ground remains at around 60% and the amount of litter decreased to about 20% this year.

Table 4. Plant cover on perimeter disturbances.

	<u>Oct '01</u>	<u>Sept '02</u>	<u>June '03</u>	<u>June '04</u>	<u>June '05</u>
Shrub	10.3	14.7	19.0	15.3	12.9
Grass	0.1	0.2	1.0	0.5	0.8
Forbs/Annuals	<u>0.0</u>	<u>0.9</u>	<u>0.0</u>	<u>0.9</u>	<u>6.2</u>
Total Plant Cover	10.4	15.9	20.0	16.7	20.0
Bare Ground	89.6	69.8	39.0	57.6	60.0
Litter	-	14.4	41.0	28.7	20.0

Plant Density - Shrub density continues its decline on the perimeter areas. Fourwing saltbush and rubber rabbitbrush showed the largest decreases at 17% and 33%, respectively. The density of big sagebrush increased slightly and the density of Douglas' rabbitbrush remained the same (Table 5).

Indian ricegrass (Figure 2) experienced an almost four-fold increase from 2004 to 2005 and is the highest density for this species since revegetation occurred. Squirreltail grass (Figure 3) was at 2.1 plants/m² this year, the same as last year.

The winter and spring rains resulted in a flush of annuals this year. There were 54.7 annual plants/m² in 2005, which is almost 13 times the density of annuals as recorded in previous years. Overall plant density increased dramatically from 2004 to 2005, but over 80% of the plants were annuals. Perennial plant density actually declined from 11.0 plants/m² in 2004 to about 10.5 plants/m² in 2005.

Figure 2. Indian ricegrass in seed with background of rabbitbrush, fourwing saltbush and big sagebrush.

Figure 3. Squirreltail grass in full seed with background of rabbitbrush.

Table 5. Plant density (plants/m²) on perimeter disturbances. Scientific names of plants are given in Appendix A.

	<u>Oct '01</u>	<u>Sept '02</u>	<u>June '03</u>	<u>June '04</u>	<u>June '05</u>
Big Sagebrush	2.5	0.5	0.4	0.3	0.4
Fourwing Saltbush	23.7	9.9	9.5	7.2	6.0
Douglas' Rabbitbrush	0.3	0.0	0.1	0.2	0.2
Rubber Rabbitbrush	1.5	2.0	1.9	0.9	0.6
Indian Ricegrass	0.2	0.2	0.5	0.3	1.3
Threeawn	0.0	0.0	0.0	0.0	0.0
Squirreltail	0.0	0.20	1.5	2.1	2.1
Needle and Thread	0.0	0.0	0.0	0.0	0.0
Galleta	0.0	0.0	0.0	0.0	0.0
Shrubs	28.0	12.3	11.8	8.6	7.1
Grasses	0.2	0.4	2.1	2.4	3.4
Forbs/Unseeded	<u>0.0</u>	<u>1.6</u>	<u>2.7</u>	<u>4.0</u>	<u>54.7</u>
Total Plant Density	28.2	14.3	16.6	15.0	65.2

Plant diversity – The number of different species found on perimeter disturbances has never been high. This year saw a slight increase in the number of grass species but shrub species remains about the same as in 2004. The number of shrubby species has declined since sampling began in 2001 whereas the number of grass species has increased. Of note this year is the two-fold increase in the number of annual species which is most probably a result of increased spring precipitation.

Table 6. Diversity of seeded species on perimeter disturbances.

	<u>Oct '01</u>	<u>Sept '02</u>	<u>June '03</u>	<u>June '04</u>	<u>June '05</u>
Avg. # spp/quad	2.5	2.3	2.6	1.9	2.1
Shrubs	2.4	2.0	1.9	1.5	1.4
Grasses	0.1	0.3	0.7	0.5	0.7
Forbs/Unseeded	0.0	0.3	0.5	1.0	2.2

Discussion

Revegetation Success

Revegetation is typically considered successful when a pre-determined percentage of perennial plant cover and density are achieved. The pre-determined values are usually a percentage of the plant cover and density on an adjacent, undisturbed plant community. A percentage was not established for the revegetation of CAU 417, however, a typical percentage used in determining reclamation success is 70%. A determination of revegetation success is usually made, at the earliest, five years after revegetation is completed and more typically ten years after.

To evaluate reclamation success at CAU 417, plant cover and density were measured in the spring of 2003 on the native plant community directly north of the central mud pit using the same sampling techniques as were used to determine plant cover and density for the revegetated sites (Tables 1-3). Using these cover and density estimates and using a percentage of 70%, a realistic goal and criteria to determine successful revegetation would be 16.5% perennial plant cover and a density of 5.3 perennial plants/m².

The amount of perennial plant cover on the central mud pit has exceeded the goal of 16.5% since the first year after revegetation (Figure 4). The success of the revegetation effort can be attributed to the use of sound reclamation techniques and abundant precipitation. The site was properly prepared for seeding by ripping compacted soils; seed of native plant species adapted to the area were used in the seed mix; a combination of seeding and transplants was used to insure vegetation establishment; near normal and above normal precipitation during the winter and spring following reseeding initiated seed germination and facilitated plant establishment. Optimum growing conditions the first two years proved to be very important because two years of below normal precipitation followed which resulted in a decline in plant cover in 2004. The increase in plant cover this year is an indication of the good vigor of the plant community on the central mud pit.

Perennial plant cover on the perimeter disturbances is not as high as it is on the central mud pit area (Figure 4). Cover dropped dramatically from 10.7% in 2001 to only 3.2% in 2002, primarily due to browsing/grazing animals. Plants recovered from grazing and cover increased to 20% in 2003 which is the only time perennial plant cover met success criteria on perimeter disturbance areas. Since 2003 cover has decreased to 15.6% in 2004 and 13.7% in 2005, neither year was revegetation success criteria met.

Figure 4. Comparison of perennial plant cover on the Central Mud Pit, adjacent disturbed areas and reference area from October 2001 to June 2005.

As expected, the density of perennial plants on the central mud pit was high the first couple years after revegetation, exceeding revegetation success criteria by almost 10 times (Figure 5). Density has decreased annually to where this year the 15.8 perennial plants/m² is about triple the goal of 5.3 perennial plants/m². The density of perennial species is expected to continue to decline over the next few years until an ecological equilibrium is reached with available resources such as water and nutrients.

Figure 5. Comparison of plant density on the Central Mud Pit, adjacent disturbed areas and reference area.

Perennial plant density shows a similar trend on perimeter disturbances as on the central mud pit but at a lower level (Figure 5). The first year plant density was about half the density as found on the central mud pit. Density has declined to 10.5 perennial plants/m² this year which is 30% lower than on the central mud pit but still double the revegetation success goal of 5.3 plants/m².

Reclamation Techniques

At the beginning of this project a recommendation was made to fence the central mud pit area for several reasons but the major reason was to protect young seedlings and transplants from domestic grazing animals and large mammals native to the area, such as deer and wild horses. The effect of fencing has been positive. Both cover and plant density are higher on the central mud pit, which was fenced, than on the adjacent, unfenced perimeter disturbances. After five years there is almost twice as much perennial plant cover on the central mud pit than on the perimeter disturbances. Annuals add an additional 6.2% cover on the perimeter disturbances but only 0.4% on the central mud pit, indicating that the perimeter disturbances may be more susceptible to an invasion of weedy annual plant species. This possible trend is also verified

when plant density is considered. In 2005 there were over 50 annual plants/m² on the perimeter disturbances but less than one annual plant/m² on the central mud pit.

Plant diversity also differs between the two areas (Tables 3 and 6). On the central mud pit an average of about four different plant species were found within a sampling quadrat. The same number of plant species was found on the perimeter disturbances, however, 2 of those were annuals (Figure 6), indicating that there are half as many perennial plant species on the perimeter disturbances as on the central mud pit.

A viable plant community is becoming established on both the central mud pit and the perimeter disturbances (Figures 6-11). It is obvious at this point in time, however, that the installation of the fence around the central mud pit has resulted in an increase in perennial plant cover, plant density and in species diversity.

Figure 6. CNTA
UC-1 Central Mud
Pit prior to
revegetation. Fall
2000

Figure 7. CNTA
UC-1 Central Mud
Pit one season after
revegetation. Fall
2001

Figure 8. CNTA
UC-1 Central Mud
Pit two seasons after
revegetation. Fall
2002

Figure 9. CNTA
UC-1 Central Mud
Pit three seasons
after revegetation.
June 2003

Figure 10. CNTA
UC-1 Central Mud
Pit four seasons
after revegetation.
June 2004

Figure 11. CNTA
UC-1 Central Mud
Pit five seasons
after revegetation.
June 2005

Appendix C.1

Common and scientific names of plant species encountered at CAU 417 or were included in original seed mix.

	<u>Scientific Name</u>	<u>Common Name</u>
Shrubs	<i>Artemisia tridentata</i>	Big sagebrush
	<i>Atriplex canescens</i>	Fourwing saltbush
	<i>Chrysothamnus viscidiflorus</i>	Douglas' rabbitbrush
	<i>Ericameria nauseosa</i>	Rubber rabbitbrush
Grasses	<i>Achnatherum hymenoides</i>	Indian ricegrass
	<i>Aristida purpurea</i>	Threeawn
	<i>Elymus elymoides</i>	Squirreltail
	<i>Hesperostipa comata</i>	Needle & Thread
	<i>Pleuraphis jamesii</i>	Galleta
Annuals	<i>Astragalus</i> species	Milkvetch species
	<i>Bromus tectorum</i>	Cheatgrass
	<i>Crypantha circumscissa</i>	Matted cryptantha
	<i>Cryptantha</i> species	Cryptantha species
	<i>Descurainia Sophia</i>	Flixweed tansymustard
	<i>Eriastrum eremicum</i>	Desert woolstar
	<i>Gilia</i> species	Gilia species
	<i>Halogeton glomeratus</i>	Halogeton
	<i>Mentzelia albicaulis</i>	White blazingstar
	<i>Salsola tragus</i>	Prickly Russian thistle

LIBRARY DISTRIBUTION LIST

THIS PAGE INTENTIONALLY LEFT BLANK

LIBRARY DISTRIBUTION LIST

U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office
Technical Library
P.O. Box 98518, M/S 505
Las Vegas, NV 89193-8518

1 (Uncontrolled)

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062

1 (Uncontrolled, electronic copy)

Southern Nevada Public Reading Facility
c/o Nuclear Testing Archive
P.O. Box 98521, M/S 400
Las Vegas, NV 89193-8521

2 (Uncontrolled, electronic copies)

Manager, Northern Nevada FFACO
Public Reading Facility
c/o Nevada State Library & Archives
Carson City, NV 89701-4285

1 (Uncontrolled, electronic copy)

THIS PAGE INTENTIONALLY LEFT BLANK