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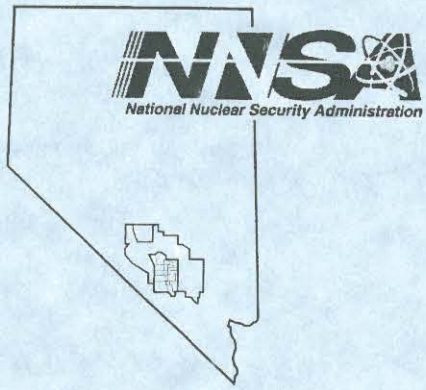

Post-Closure Inspection and Monitoring Report for Corrective Action Unit 417: Central Nevada Test Area - Surface, Hot Creek Valley, Nevada

For Calendar Year 2004

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Controlled Copy No.:

Revision: 0

April 2005

Environmental Restoration
Division

U.S. Department of Energy
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POST-CLOSURE INSPECTION AND MONITORING REPORT FOR CORRECTIVE ACTION UNIT 417: CENTRAL NEVADA TEST AREA - SURFACE, HOT CREEK VALLEY, NEVADA

FOR CALENDAR YEAR 2004

U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office
Under Contract No. DE-AC08-96NV11718

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FOR CALENDAR YEAR 2004

Approved By: _____ Date: 4/19/05
John B. Jones, Acting Project Manager
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ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CAP	Corrective Action Plan
CAS	Corrective Action Site
CAU	Corrective Action Unit
cm	centimeter(s)
CFR	Code of Federal Regulations
CMP	Central Mud Pit
CNTA	Central Nevada Test Area
CR	Closure Report
DOE/NV	U.S. Department of Energy, Nevada Operations Office
EPA	U.S. Environmental Protection Agency
FFACO	Federal Facility Agreement and Consent Order
ft	foot (feet)
hp	horsepower
in	inch(es)
km	kilometer(s)
kW	kilowatt(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
NTS	Nevada Test Site
SM	Subsidence Monument
TD	Total Depth
TDR	Time Domain Reflectometry
UTM	Universal Transverse Mercator
VMC	Volumetric Moisture Content

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EXECUTIVE SUMMARY

Corrective Action Unit (CAU) 417, Central Nevada Test Area - Surface, is located 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 CASs, aboveground monuments and warning signs were installed to mark the site 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.

Two CASs which 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 four sites, aboveground monuments and warning signs were installed to mark the site boundaries.

The remainder of the 34 CASs 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 2004, site inspections were performed on March 25, June 29, September 22, and December 15.

The inspections conducted at the UC-1 CMP documented the continued integrity of the cover unit. No new cracks or fractures were observed this year, and the cover did not exhibit any signs of subsidence or erosion. The vegetation was healthy and well established. No issues were identified with the fence, gate, or subsidence monuments.

The inspections at UC-3 indicated that the sites are in excellent condition. It was recommended during the March inspection that new monuments be installed on the UC-3 Southern Outlier (CAS 58-25-01), and this activity was performed in July. Signs were mounted on the monuments during the September inspection. No other issues or concerns were identified.

Inspections performed at UC-4 indicated that the sites are in good condition. It was recommended during the March inspection to install six new monuments to better demarcate the boundary of Mud Pits A and B. The monuments were installed in July, and signs were mounted on the monuments during the September inspection. No issues were identified with the monuments, fence, or gate.

Subsidence surveys were conducted at UC-1 and UC-4 in March and September of 2004. 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 was above average, with an annual rainfall total of 15.4 centimeters (6.08 inches) in 2004.

Soil moisture content data show that the UC-1 CMP cover is performing as designed with saturated conditions at the cover-mud interface and 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

1.1 SCOPE AND OBJECTIVES

This post-closure inspection and monitoring report has been prepared according to the stipulations laid out in the Closure Report (CR) for Corrective Action Unit (CAU) 417, Central Nevada Test Area (CNTA) - Surface (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 CAU 417, which is located in Hot Creek Valley, Nye County, Nevada. This report covers Calendar Year 2004.

Inspections at CAU 417 are conducted quarterly to document the physical condition of the UC-1, UC-3, and UC-4 soil covers, monuments, signs, fencing, and use restricted areas. The physical condition of fencing, monuments, and signs is noted, and any unusual conditions that could impact the integrity of the covers are reported.

The objective of the soil moisture monitoring program is to monitor the stability of soil moisture conditions within the upper 1.2 meters (m) (4 feet [ft]) of the UC-1 Central Mud Pit (CMP) cover and detect changes that may be indicative of moisture movement exceeding the cover design performance expectations.

1.2 BACKGROUND

The CNTA is located in Hot Creek Valley, Nye County, Nevada, approximately 22.5 kilometers (km) (14 miles [mi]) west of U.S. Highway 6, approximately 55 km (34 mi) north of Warm Springs, Nevada, and approximately 137 km (85 mi) northeast of Tonopah, Nevada (Figure 1).

The CNTA consists of three emplacement boreholes (UC-1, UC-3, and UC-4) that were to be used 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). 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 Corrective Action Sites (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.

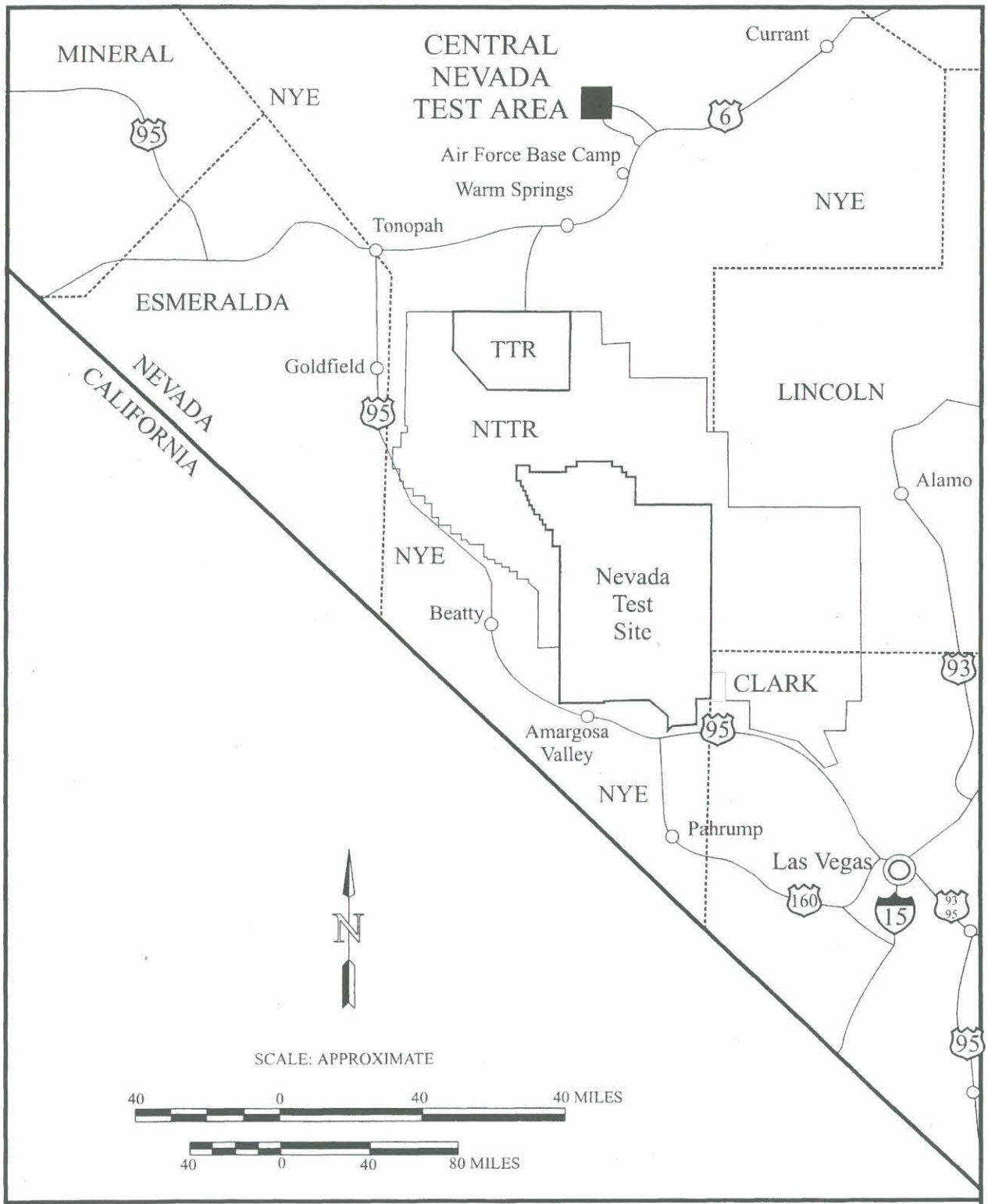

FIGURE 1
CENTRAL NEVADA TEST AREA LOCATION MAP

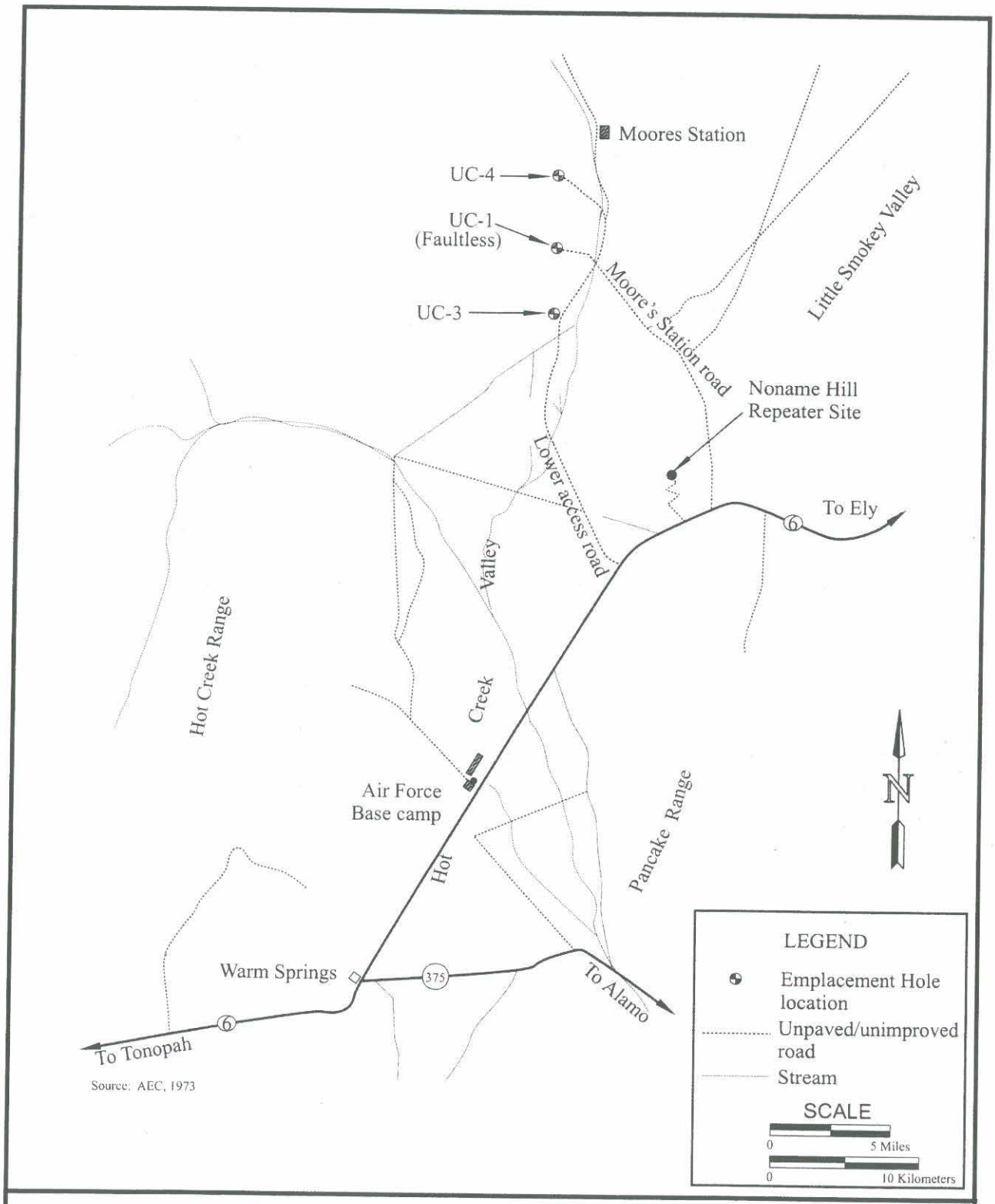

FIGURE 2
CAU 417, CENTRAL NEVADA TEST AREA - SURFACE MAP

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 uses 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 northern portion of Hot Creek Valley is thought to be underlain by the Morey Peak-Hot Creek Caldera (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 UC-1 Mud Pit dike 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 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:

- If maintenance and/or repairs to the UC-1 CMP or the UC-4 Mud Pit C covers, fences, or diversion channels are needed
- If the UC-1 CMP or UC-4 Mud Pit C covers are subsiding
- If the UC-1 CMP cover is performing as designed
- The health of the vegetation on the UC-1 CMP cover
- If maintenance and/or repairs to the aboveground monuments or warning signs are needed
- If 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 and with site photographs and field notes. Copies of the inspection checklists, field notes, and photographs for Calendar Year 2004 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 UC-1 CMP cover was designed to limit infiltration into the underlying waste unit by removing soil moisture from the cover through evapotranspiration by vegetation on the cover surface. The effectiveness of the cover design is determined by monitoring soil moisture content in the soil by TDR sensors buried at various depths in the cover.

TDR sensors were buried in the cover at two locations during cover construction (Figure 3). At both locations, two TDR sensors were placed at each of four separate depths below the surface of the cover (0.15, 0.46, 0.76, and 1.07 m [0.5, 1.5, 2.5, and 3.5 ft]). The TDR nests are located approximately 48 m (157 ft) northwest and 48 m (157 ft) northeast of the instrument vault, which is located just outside the southern edge of the cover. Data are collected once per day from each TDR sensor and stored in a data logger located in the instrument vault. The stored TDR and precipitation data are automatically sent via a satellite link to an earth station in Wallops Island, Virginia, from which they are retrieved for processing and analysis.

2.4 COMPLIANCE CRITERIA

The point of compliance for the UC-1 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. With above average rainfall this year and the steady state conditions that have been observed during the drought period, it is expected that soil moisture trigger values will be agreed upon with the Nevada Division of Environmental Protection (NDEP) in the next reporting period.

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 SITE 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.

- Cracks, settling features, erosional rills, and animal burrows larger than 15 centimeters (cm) (6 inches [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, erosional rills, and animal burrows less than 15 cm (6 in.) deep which extend less than 1 m (3 ft) will be repaired by hand during the site inspection visit.
- Twice a year, the 12 SMs on the UC-1 CMP cover and the two SMs on the UC-4 Mud Pit C cover will be surveyed to determine if the cover has subsided.
- 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.
- The method of repair and the schedule for repairs will be determined in consensus with the NDEP. All repair work will preserve the original "as-built" design and will be documented in the annual post-closure report.

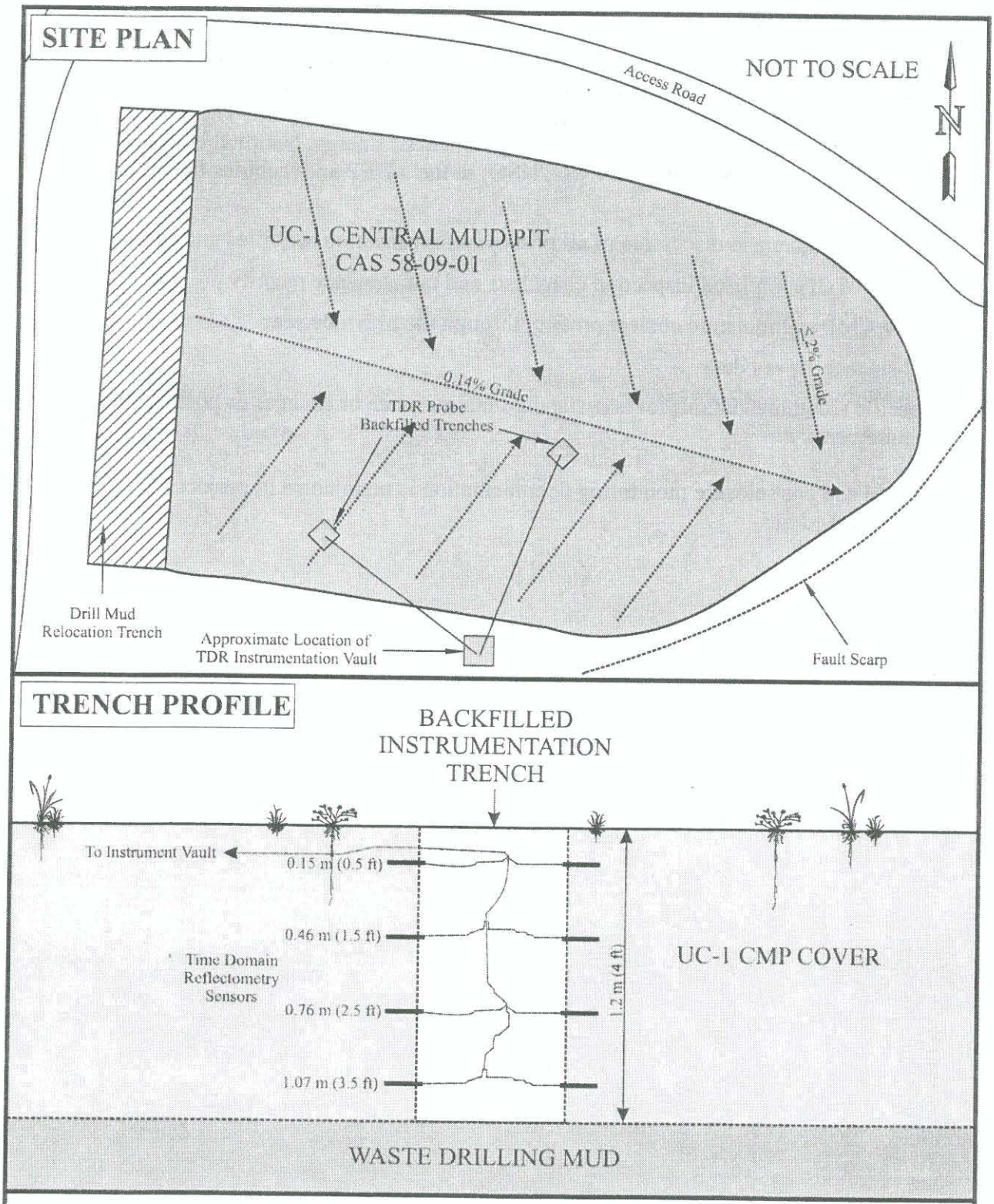

FIGURE 3
UC-1 CMP COVER MONITORING INSTRUMENTATION

2.6 ANNUAL REPORTING

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 INSPECTIONS, SURVEYS, AND MAINTENANCE

3.1 INTRODUCTION

Site inspections are conducted quarterly and began in September 2001. The inspections are conducted to evaluate and document the specific performance and maintenance needs of the covers and of the site in general. The inspection documents include copies of the inspection checklists, field notes, and site photographs, which are included in Appendix A.

3.2 SITE INSPECTION RESULTS

3.2.1 First Quarterly Inspection

The first quarterly inspection was performed on March 25, 2004.

3.2.1.1 UC-1

The fracture noted on the cover during the previous inspection was repaired on January 29, 2003. No new cracks or fractures were noted. The signs that were reattached to the fence on January 29, 2003, were still firmly attached and in good condition. The vegetation was dormant but in good condition. The overall condition of the unit was good, and all observations indicated continued integrity of the cover and appurtenances. No maintenance or repairs were recommended.

3.2.1.2 UC-3

The site was in good condition. Monuments were proposed to be installed on the UC-3 Southern Outlier site (CAS 58-25-01). The overall condition of the unit was good.

3.2.1.3 UC-4

The monuments and signs at Mud Pits A, B, and D were in good condition. Some paint was chipping off some of the signs, and it was recommended to repair or replace the signs. It was also recommended to install additional monuments to demarcate Mud Pits A and B. The Mud Pit C cover was in good condition. No erosion was observed. A removed weed exhibited bent roots, indicating a failure of the roots to penetrate the clay liner. It was recommended to remove the weeds from the cover. The three temporary survey hubs had been removed due to unreliable measurements. No issues were noted with Area S and Area X. The eastern signs on Area X were recommended for replacement.

3.2.2 Second Quarterly Inspection

The second quarterly inspection was performed on June 29, 2004.

3.2.2.1 UC-1

The site was in good condition. No issues were identified with the fence, gate, lock, monuments, or chicken wire. The signs were corrected by attaching stickers to update the contact information. It was recommended to replace the signs, which were peeling and difficult to read. An orange tube near SM-5 on the west edge of the cover was examined and removed. The vegetation on the cover was similar to the adjacent area. The cover was in excellent condition,

and no new cracks were observed. All observations indicated continued integrity of the cover and appurtenances.

3.2.2.2 UC-3

The site was in good condition. The signs were corrected by attaching stickers to update the contact information. No issues or concerns were identified.

3.2.2.3 UC-4

The site was in good condition. The Mud Pit A, B, and C signs were patched with stickers to update the contact information. The monuments on Mud Pits A and B were in good condition. The Mud Pit C gate, lock, fence, and signs were in excellent condition. The Mud Pit C cover was in good condition. One crack noted on the south edge of the cover was not at an actionable level, but should be monitored. Large tumbleweeds were noted on the Mud Pit C cover and side slopes and were recommended for removal. No issues were noted with Mud Pit D, Area S, or Area X. The overall condition of the site was good, and no issues were noted that affected the integrity of the cover and appurtenances.

3.2.3 Third Quarterly Inspection

The third quarterly inspection was performed on September 22, 2004.

3.2.3.1 UC-1

The site was in good condition. No new cracks were noted, and the vegetation on the cover was healthy. No issues were identified with the monuments, signs, fence, gate, or lock. New phone number stickers were attached to the signs. All observations indicated continued integrity of the unit, and no maintenance or repairs were recommended.

3.2.3.2 UC-3

The site was in excellent condition. Signs were hung on the new monuments that were installed in July. No issues or concerns were observed, and no maintenance or repairs were recommended.

3.2.3.3 UC-4

Mud Pit C was in excellent condition. The vegetation had been removed from the cover on July 20, and very little vegetation was present on the cover during this inspection. There was no change in the crack present along the south edge of the cover. The fence and signs were in good condition. New phone number stickers were attached to the signs. The six monuments at Mud Pits A and B that were installed in July were in excellent condition, and signs were attached to these new monuments during this inspection. No issues were identified with Mud Pit D, Area S, or Area X. The overall condition of the unit was good, and no repairs or maintenance were recommended.

3.2.4 Fourth Quarterly Inspection

The fourth quarterly inspection was performed on December 15, 2004.

3.2.4.1 UC-1

The site was in good condition. No new cracks were observed, and the vegetation on the cover was healthy. The signs, fence, and monuments were in good condition. No maintenance or repair activities were recommended.

3.2.4.2 UC-3

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

3.2.4.3 UC-4

The site was in excellent condition. The crack on the southern edge of Mud Pit C had not changed since the last inspection. No erosion or subsidence was observed on the cover. The signs and fence were in good condition. Mud Pits A, B, and D were in excellent condition, and no issues were identified with Area S or Area X. The overall condition of the unit was good, and no maintenance or repairs were recommended.

3.3 SUBSIDENCE SURVEY

3.3.1 Background

3.3.1.1 UC-1

The UC-1 CMP cover was designed using a vegetated monolayer cover to remove infiltrating precipitation and entrained water from the 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 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 run-off into an existing drainage channel (NNSA/NV, 2001).

Twelve SMs were 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, which was completed on December 4, 2000, is used as the reference survey to calculate subsidence after each 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.

Consolidation (settling) due to the weight of the cover on the CMP was calculated based on geotechnical testing, and is expected to be less than 20 cm (8 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 design specifications detailed in the Corrective Action Plan (CAP) (U.S. Department of Energy, Nevada Operations Office [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 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

3.3.1.2 UC-4

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 subsidence of the cover. A survey plat of the SM locations can be found 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 design specifications 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

3.3.2 Subsidence Survey Results

3.3.2.1 UC-1

Elevations and baseline subsidence data are provided in Table 3 and presented in graphical form in Figure 4. The settling pattern 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 2004 to the September 2004 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 mud in this area. The northern monuments, SM-2, SM-3, and SM-4, show the least subsidence due to the thinner layer of mud along this margin of the cover. The greatest degree of settling continues to be on SM-6, which has subsided a total of 11.1 cm (4.3 in.) since the baseline survey in December 2000.

3.3.2.2 UC-4

Elevations and baseline subsidence data are provided in Table 4 and presented in graphical form in Figure 5. Both the east and west monuments indicate a slight rise in elevation in the March and September surveys. Settling of the west monument is still slightly greater than the predicted settling of 5 cm (2 in.), with a total subsidence of 6.0 cm (2.4 in.) since the baseline survey in October 1999. The east monument has subsided a total of 2.1 cm (0.8 in.) since the baseline survey. The largest changes occurred within the first year, as expected. Settling of the monuments appears to have stabilized.

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

TABLE 3. UC-1 MONUMENT ELEVATIONS AND SUBSIDENCE

Date	ELEVATION AT TOP OF MONUMENT[1] 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
02/06/2001	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

[1] Vertical datum National Geodetic Vertical Datum of 1929 in meters

TABLE 4. UC-4 MONUMENT ELEVATIONS AND SUBSIDENCE

Date	ELEVATION AT TOP OF MONUMENT[1] SUBSIDENCE (m)	
	West Monument	East Monument
10/12/1999	1999.269	1999.062
Baseline	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

[1] Vertical datum National Geodetic Vertical Datum of 1929 in meters

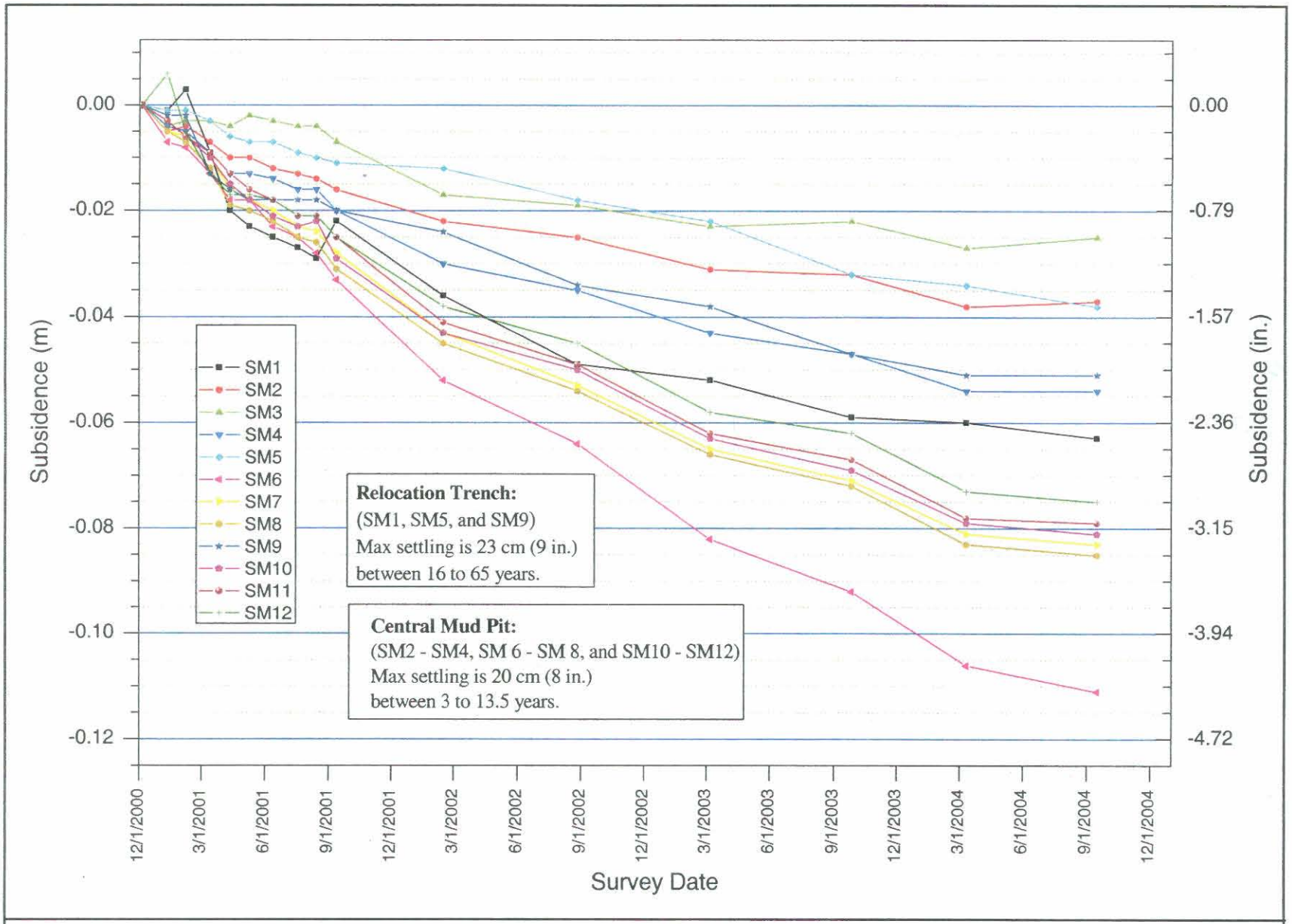

FIGURE 4
UC-1 COVER SETTLING

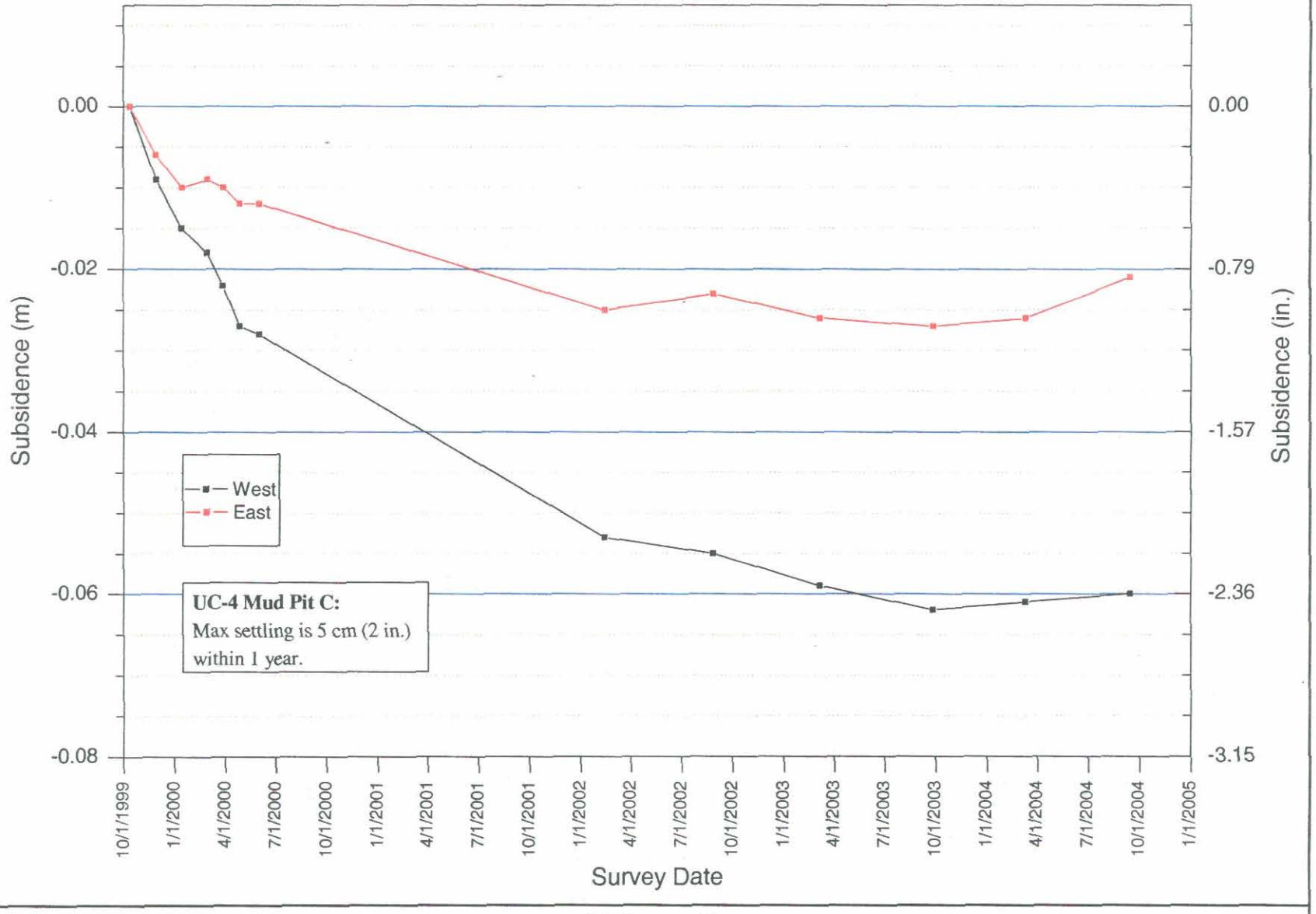

FIGURE 5
UC-4 COVER SETTLING

3.4 VEGETATION SURVEY

3.4.1 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, and June 2003 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.

On June 2, 2004, 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 August 2004, is included in Appendix C.

3.4.2 Survey Results

Remediation vegetation success is evaluated by comparing plant cover, density, and diversity to a reference area of well-established plants. For this remediation program, no percentage standards have been established. For similar projects at the Tonopah Test Range, 60 percent of native levels at ten years after vegetation is deemed successful. 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 declined slightly this year after showing a steady increase from March 2002 to June 2003. Total plant cover on the UC-1 CMP cap was 28 percent in 2003 and decreased to 23.2 percent in 2004, which was slightly less than the reference area. The reduction in cover is probably a result of the continued effects of below normal precipitation. Plant density continues to decrease from a high of 44.1 plants per square meter (m^2) in 2001 to a low of 22.1 plants per square meter in 2004. 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 double that of the reference area. Plant diversity has also declined each year but continues to be higher on the CMP cap compared to the native vegetation on the surrounding areas.

On the revegetated unfenced perimeter areas, total plant cover decreased from 2003 to 2004 as a result of heavy animal grazing. Overall plant density on the adjacent revegetated areas also decreased slightly from 2003 to 2004. As seeds were germinating and young seedlings tried to

root and become established, they were quickly exposed to herbivores, and many young seedlings did not survive. As a result, there are about half as many plant species on adjacent disturbed areas as there are on the CMP cap. Many plants on the CMP cap 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.

3.4.3 Summary and Conclusions

The 2004 survey results indicate the revegetation has been very successful. The success of revegetation efforts at CAU 417 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. Plant cover on the CMP was 96 percent of plant cover in the native plant community, which is down from the 112 percent in 2003. Cover on the disturbed areas was only 64 percent of plant cover in the native plant community, also down from 77 percent in 2003. Even though plant cover may be lower in 2004 than in 2003, it is still in good condition considering that precipitation has been below normal since the first growing season in the spring of 2001.

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 two 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 the vegetation on the cover, such as plant disease, bald areas, or unusual weather conditions.

3.5 MAINTENANCE AND REPAIR

Copies of the field notes recorded and the photographs taken during the maintenance and repair activities conducted during 2004 are located in Appendix A.

3.5.1 UC-1 Maintenance and Repair

The only maintenance activity performed at UC-1 in 2004 was placement of stickers with updated contact information on the site warning signs. This activity was performed during the June inspection.

3.5.2 UC-3 Maintenance and Repair

Stickers with updated contact information were placed on the site warning signs during the June inspection. Two concrete monuments were installed on July 20-22, 2004, on the UC-3 Southern Outlier site (CAS 58-25-01), and signs were attached to the monuments during the September inspection.

3.5.3 UC-4 Maintenance and Repair

Stickers with updated contact information were placed on the site warning signs during the June inspection. Brush and weeds were removed from the Mud Pit C cover on July 20, 2004. Six concrete monuments were installed around Mud Pits A and B on July 20-22, 2004, to better demarcate the pit perimeters. The top 15 inches of the Mud Pit A monuments were painted blue, and the top 15 inches of the Mud Pit B monuments were painted red. Signs were attached to the monuments during the September inspection.

4.0 SOIL MOISTURE MONITORING

4.1 INTRODUCTION

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 NDEP.

The soil moisture content is obtained using a Campbell Scientific TDR-100 Time Domain Reflectometer 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 (GOES 10) 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 archive.

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 4th order polynomial fit of the calibration data over the range of 5 to 35 percent VMC yielded the following calibration equation:

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

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

4.2 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 twice weekly 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 2004 was 15.4 cm (6.08 in.) which is considered above average.

4.3 SOIL MOISTURE MONITORING RESULTS

4.3.1 Discussion of Analytical Data Trends

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 was irrigated with 20 gallons of water to assist germination in the spring. Inspections during subsequent years indicate that vegetation is becoming established.

Graphs of the TDR-derived soil moisture content, combined with the daily precipitation 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 and are used to form a redundant 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 further 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 CR (NNSA/NV, 2001). The trenching and compaction of each of the soil lifts disturbed the soil profile and resulted in a vertical moisture content profile that was not necessarily monotonic with depth as would be expected with a natural profile. Consequently, some depths appeared wetter than others and will remain so until the system fully equilibrates. As noted earlier, vegetation is not established 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.

Wetting events can be seen as a rapid rise in the VMC in the shallow depths and lag in time as this pulse moves down through the cover soil to depth. All the profiles indicate a rapid increase in moisture content at the end of February 2001. This is coincident with temperatures rising above the freezing point, which allowed the snow melt to infiltrate as a sudden pulse. The rate of

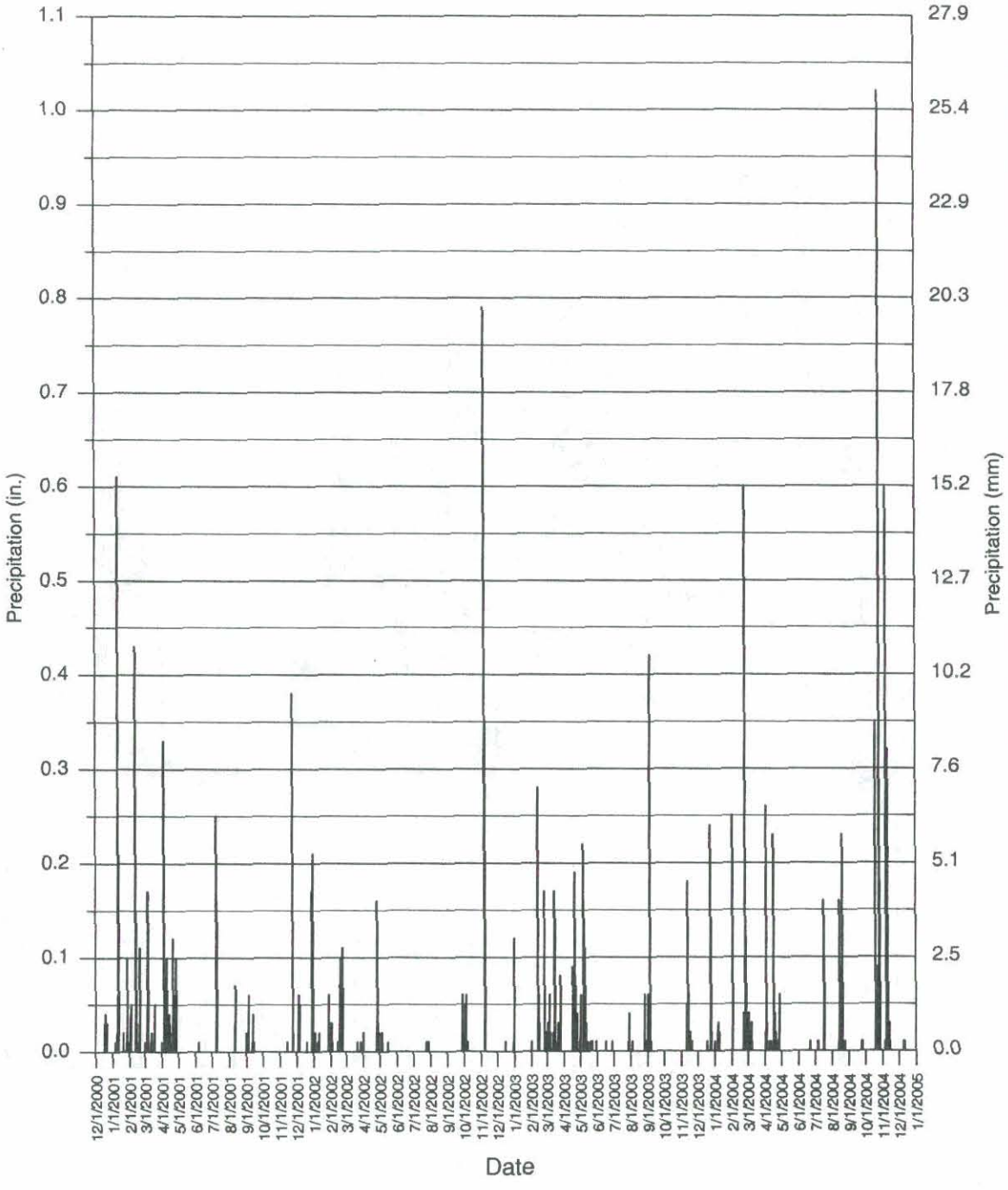

FIGURE 6
UC-1 PRECIPITATION

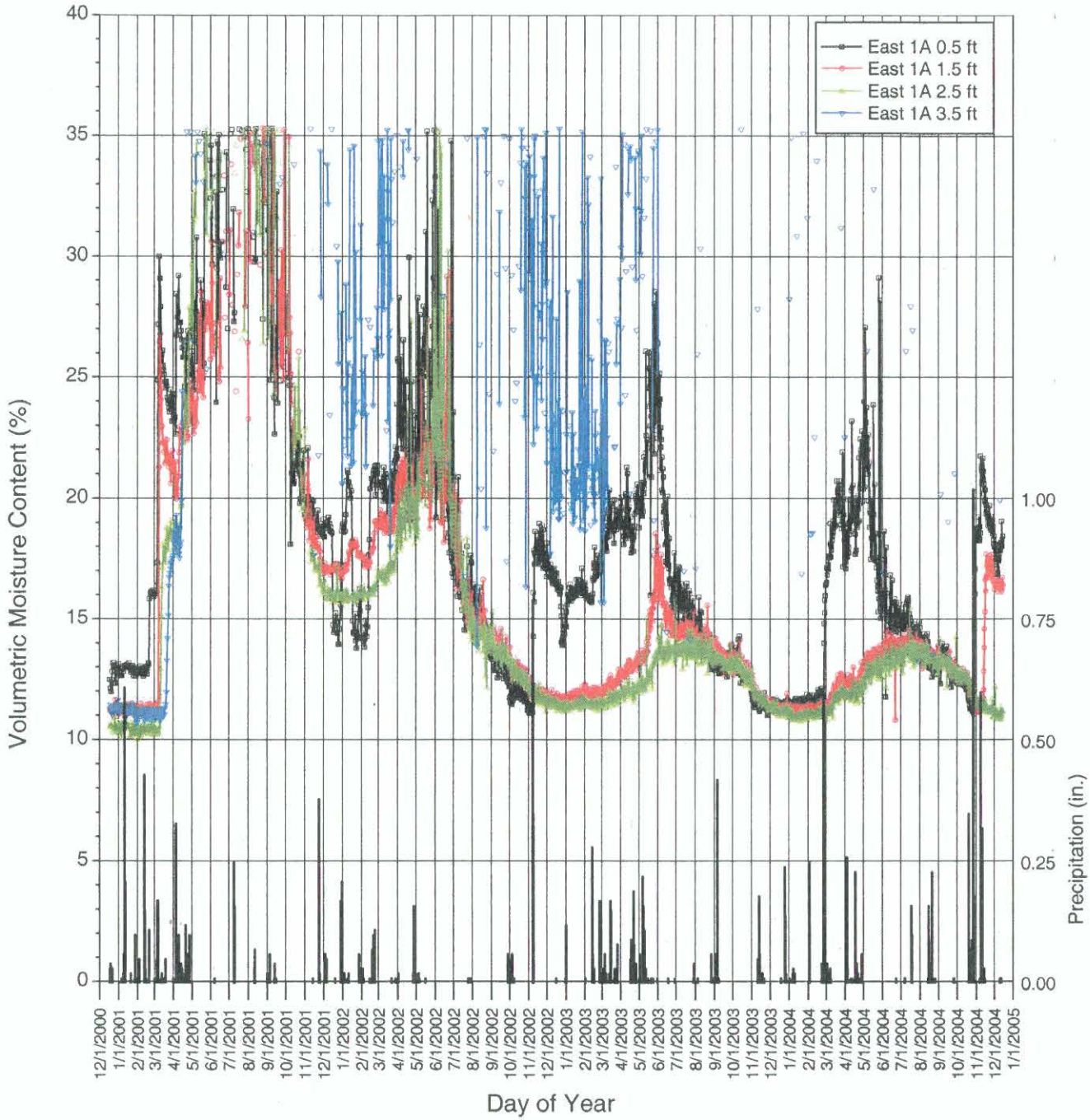

FIGURE 7
SOIL MOISTURE CONTENT, EAST TDR NEST A

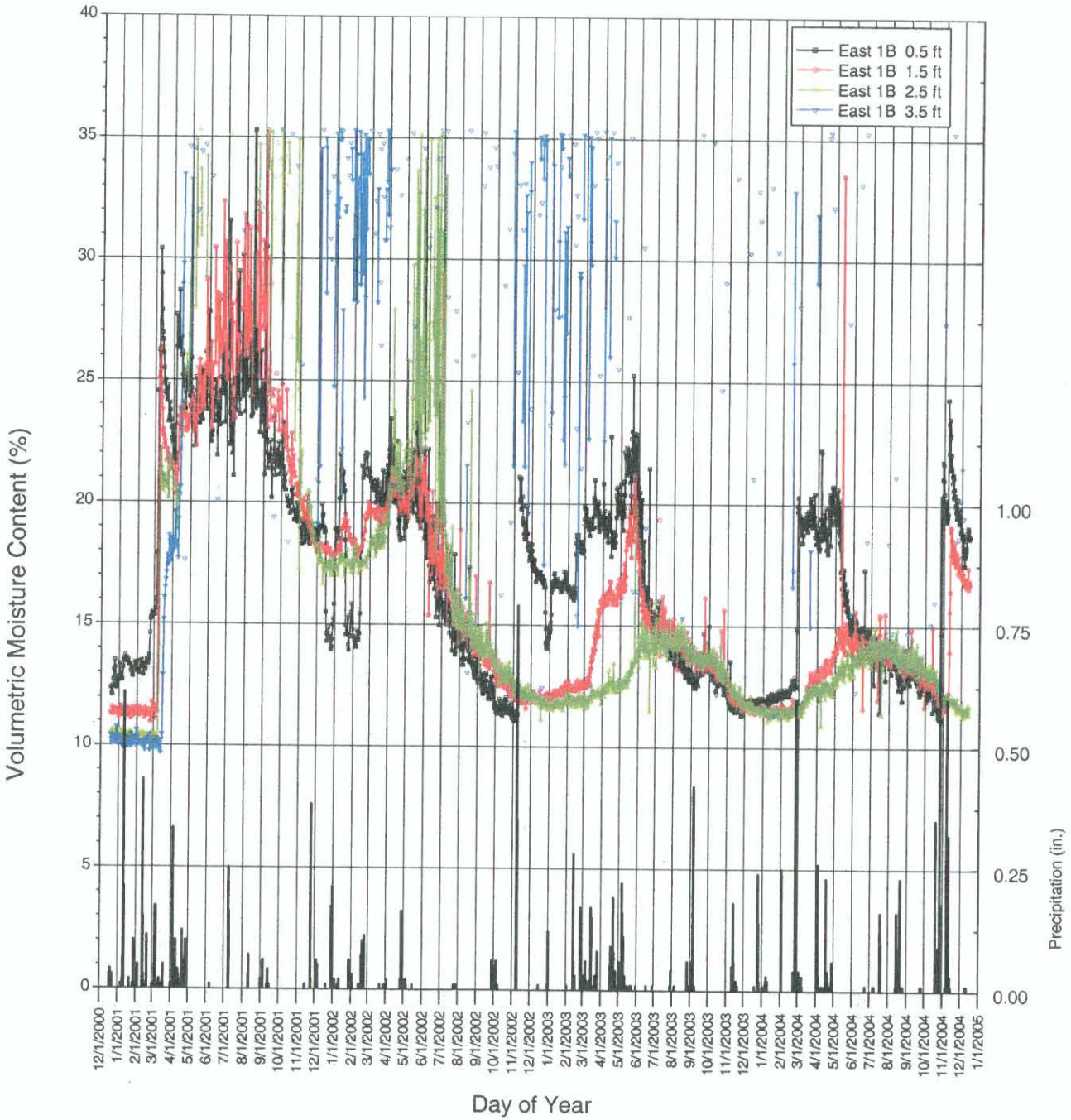

FIGURE 8
SOIL MOISTURE CONTENT, EAST TDR NEST B

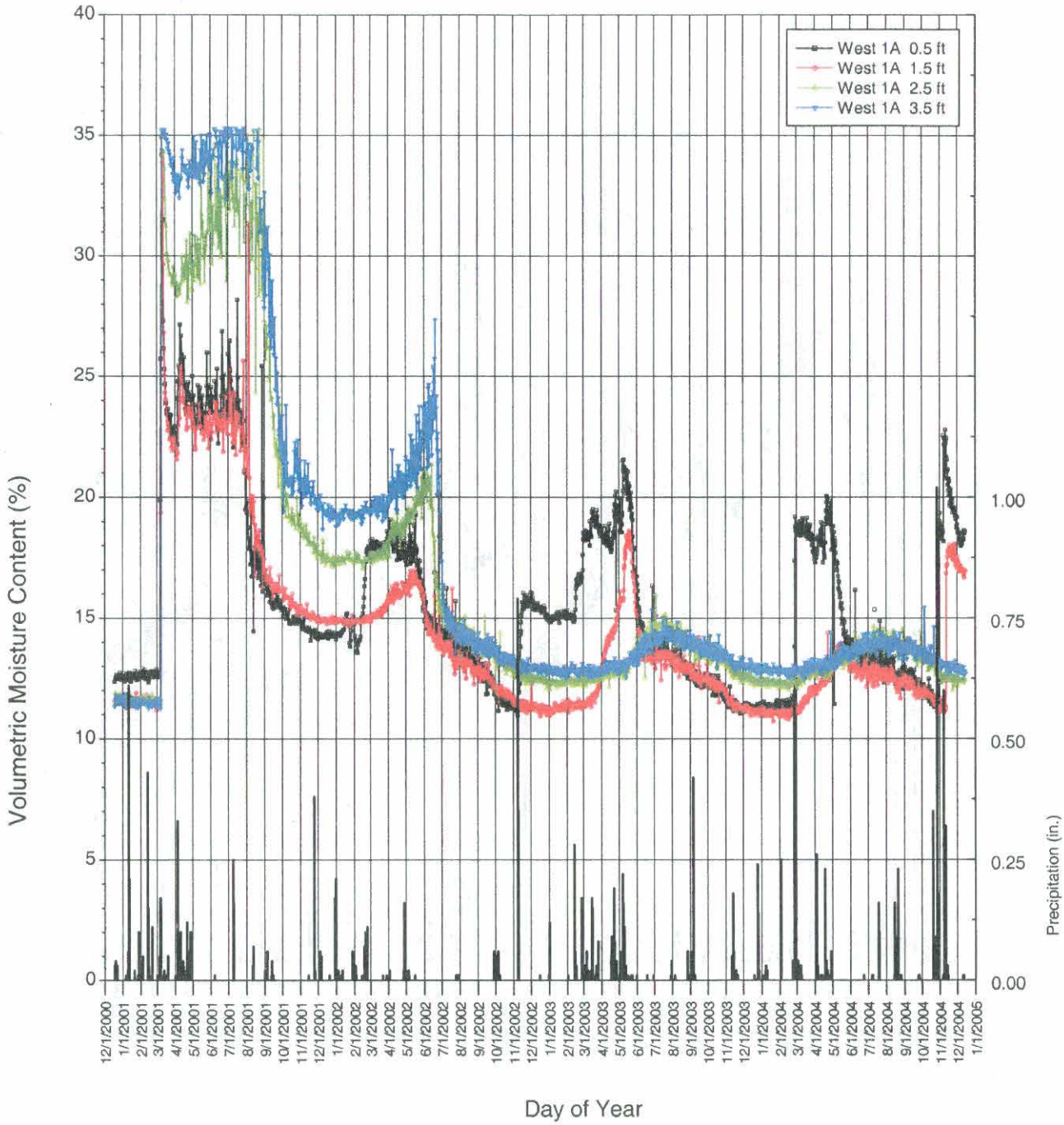

FIGURE 9
SOIL MOISTURE CONTENT, WEST TDR NEST A

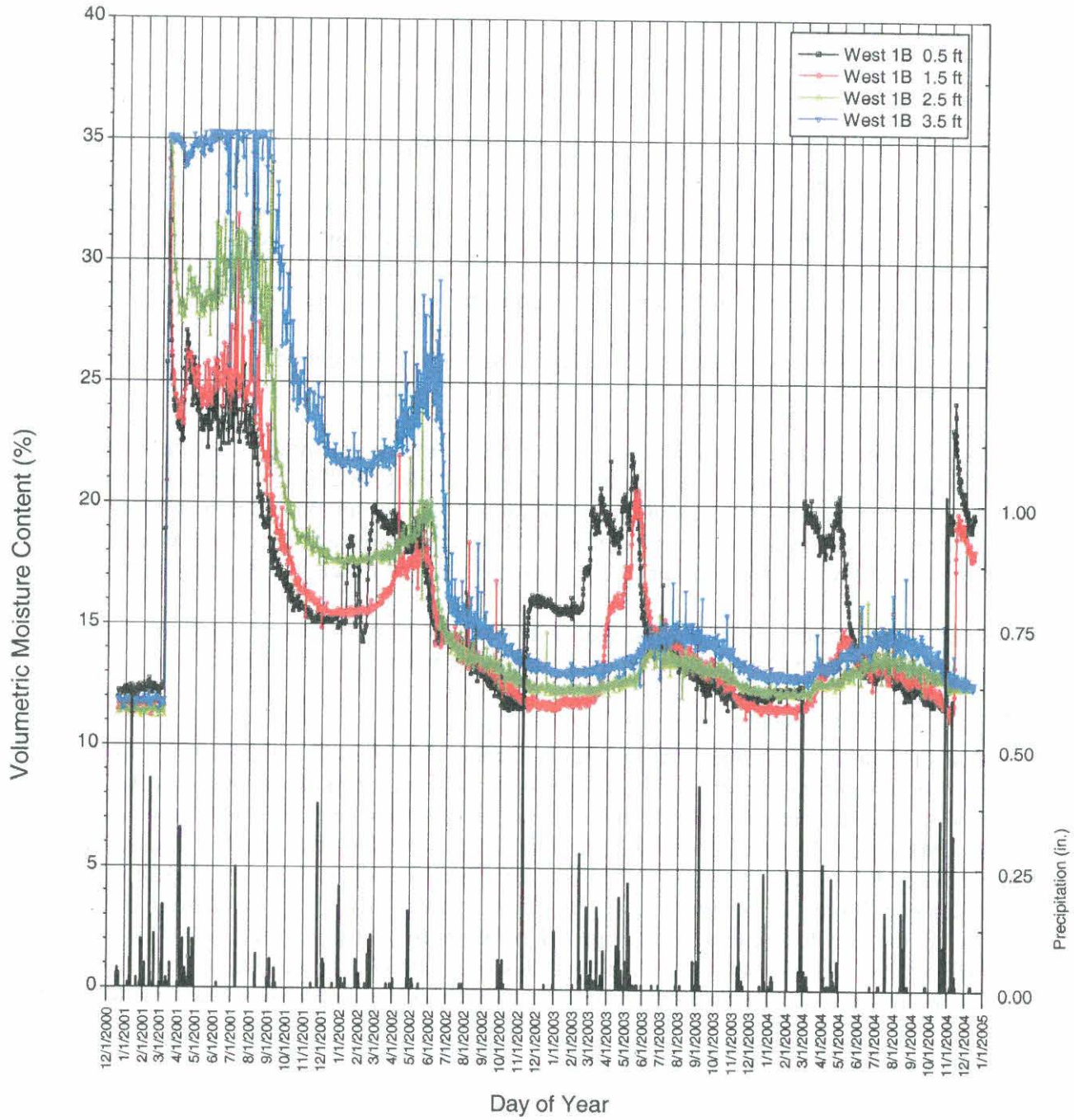

FIGURE 10
SOIL MOISTURE CONTENT, WEST TDR NEST B

infiltration on the barren cover was remarkable, especially on the west nests. Both the east and west nests remained very wet through July 2001, when the moisture contents began to fall, due to germination of the plant cover and evapotranspiration over the hot summer months. At the 1.1 m (3.5 ft) depth for both nests, the soil was saturated. This was a primary design feature of the cover and is due to the weight of the cover and settling, which forces the water out of the mud, making it available for root uptake and evapotranspiration.

Starting in 2002, at which point the vegetation was established, smaller scale wetting events were seen at both nests starting each year in mid-January and with snow melt, occurring each February. This infiltration can be seen each year until mid-June when, due to evapotranspiration from the vegetation and low seasonal precipitation, the profile shows a very 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 on the east nests, by the end of January 2003, moisture contents at depth are between 11 and 14 percent VMC and appear to have stabilized. Considering the above average rainfall this year and the stable conditions that have been observed during the drought period, it is expected that the compliance criteria can be established in the next reporting period.

The most recent results obtained indicate the cover system is performing as designed, with most VMC values decreasing from a maximum of 35 percent VMC in 2001 to about 12 percent VMC by the end of December 2004. Saturated conditions are still observed at depth at the cover-mud interface on the eastern nests, where the mud thickness and subsidence are the greatest. The western nests show a uniform dry profile with stable conditions below 0.76 m (2.5 ft) in depth.

Both TDR nests present a very similar profile and indicate that the cover is performing as designed, with evapotranspiration effectively removing water from the cover.

4.3.1.1 East TDR Nests

The east TDR nests are located near the drainage channel at about the center of the cover. Both run-on from precipitation events and water pressed out from the thickest portion of the underlying mud were expected to produce the highest soil moisture content that would be found on the CMP cover. Data obtained for both of the east nests indicate that to be the case. TDR data obtained from the 1.1-m (3.5-ft) depth are largely corrupted due to high moisture content (saturated conditions) coupled with a very high soil conductivity. The combination of these effects and the very long cable lengths created 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 at both nests. Due to the high soil conductivities, for percent VMC values greater than approximately 25 percent, the TDR data are outside the operation limits of the system, and the moisture content should be estimated only as "greater than 25 percent VMC."

Nest A and B both indicate dry stable conditions as were noted during the last reporting period. The heavy rainfall events in November and March 2004 show infiltration to approximately 0.5 m (1.5 ft) before the majority was removed from the cover by evapotranspiration. Moisture content measurements at depth are between 11 and 14 percent VMC and appear to have stabilized.

Both TDR nests present a very similar profile and indicate that the cover is performing as designed with saturated conditions at the cover-mud interface and evapotranspiration effectively removing water from the cover.

4.3.1.2 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 surface to depth from October 2001 to approximately October 2002 at which time the cover vegetation became established. Conditions remain dry and stable through the current monitoring period with moisture content measurements between 12 and 14 percent VMC.

Moisture content measurements at the surface indicate wet conditions from the February 2004 and November 2004 precipitation events. Infiltration extended to approximately 0.5 m (1.5 ft) before the majority was removed from the cover 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.

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5.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 SUMMARY

The inspections conducted at UC-1 indicated the continued integrity of the sites. No new cracks or fractures were observed on the UC-1 CMP cover this year, and the cover did not exhibit any signs of subsidence or erosion. The vegetation was healthy and well established. No issues were identified with the fence, gate, or monuments. The signs may need to be replaced in the future; however, stickers were placed on the fading signs with contact information during the September inspection. No other maintenance or repairs activities were performed during 2004, and none are recommended at this time.

The inspections at UC-3 indicated that the sites are in excellent condition. It was recommended during the March inspection that new monuments be installed on the UC-3 Southern Outlier (CAS 58-25-01), and this activity was performed in July. Signs were mounted on the monuments during the September inspection. No other issues or concerns were identified, and no maintenance or repair activities are recommended at this time.

Inspections performed at UC-4 indicated that the sites in good condition. It was recommended during the March inspection to install six new monuments to better demarcate the boundary of Mud Pits A and B. The monuments were installed in July, and signs were mounted on the monuments during the September inspection. One new crack was identified on the south side of the Mud Pit C cover during the June inspection. It did not progress to an actionable level during 2004. No issues were identified with the monuments, fence, or gate. Weeds were removed from the Mud Pit C cover in July. The signs may need to be replaced in the future; however, stickers were affixed to the signs during the September inspection with updated contact information. No other maintenance or repairs are recommended at this time.

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 2004 to the September 2004 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 and west monuments indicate a slight rise in elevation in the March and September surveys. 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 6.0 cm (2.4 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 two years or as needed to help monitor the health of the vegetation.

Precipitation was above average with an annual rainfall total of 15.4 cm (6.08 in.) in 2004.

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 for one more year to determine stable conditions.
- Continue vegetation surveys once every two 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, William. 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.

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APPENDIX A

INSPECTION CHECKLISTS, FIELD NOTES, AND PHOTOGRAPHS

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

Date of Last Inspection: 12/22/03	Reason for Last Inspection: Quarterly inspect
Responsible Agency: Bechtel Nevada ER	Project Manager: Jeffrey Smith
Inspection Date: 3/25/04	
Inspector (name, title, organization): Dudley Emer Sr. Scientist, BN/ER	
Assistant Inspector (name, title, organization): Shaughn Burnison 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.
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?		✓	No problems with Bentonite fill
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

	YES	NO	EXPLANATION
3. Waste Unit cover.			
a. Is there evidence of settling?		✓	No new or change in fractures, stable
b. Is there cracking?		✓	No fractures other than old
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?		✓	
5. Photo Documentation			
a. Has a photo log been prepared?	✓		
c. Number of photos exposed (5)			

D. FIELD CONCLUSIONS

	YES	NO	EXPLANATION
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?	✓		Very Good Coverage

6. Rationale for field conclusions: No New fractures. OLD Repairs in good shape
Veg dormant but has Good coverage
Signs OK
Fence perimeter OK

photos
39
38
37
36
35

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: [signature]	Printed Name: Dudley Ener
Title: Sr Scientist	Date: 3/25/01

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

Date of Last Inspection: 12/22/03	Reason for Last Inspection: Quarterly Insp.
Responsible Agency: Bechtel Nevada ER	Project Manager: Jeffery Smith
Inspection Date: 3/25/04	
Inspector (name, title, organization): Dooley Emer BNER Sr. Scientist	
Assistant Inspector (name, title, organization): Shaughn Bainison Tech 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.
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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.	YES	NO	EXPLANATION
a. Is there evidence of settling?		✓	
b. Is there cracking?	✓		minor does not affect integrity
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?		✓	Wood Survey pins have now been Removed
f. Is the vegetation on the cover?	✓		
g. Do natural processes threaten to integrity of any cover or site marker?		✓	
h. Other?			Unit is in Good Shape
4. Photo Documentation			
a. Has a photo log been prepared?	✓		
c. Number of photos exposed ( )			

D. FIELD CONCLUSIONS			
1. Is there an imminent hazard to the integrity of the unit? (Immediate report required)		✓	
Person/Agency to whom report made:			
2. Are more frequent inspections required?		✓	
3. Are existing maintenance/repair actions satisfactory?	✓		
4. Is other maintenance/repair necessary?	✓		Removal of Veg Recommended
5. Is current status/condition of vegetative cover satisfactory?	✓		

6. Rationale for field conclusions: pulled several plants from cover
all Roots indicate a bend at about clay Max depth
⇒ No penetration of liner.

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: Dudley Emer
Title: Sr Scientist	Date: 3/25/03

ORIGINAL

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

Date of Last Inspection: 3/22/04	Reason for Last Inspection: Qtly Post-Closure
Responsible Agency: BN ER	Project Manager: JEFF SMITH
Inspection Date: 6/29/04	
Inspector (name, title, organization): SHAUGHN BURNISON, TASK MGR, BN ER	
Assistant Inspector (name, title, organization): MIKE FLOYD, 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.
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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	
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: Ø)		X	
c. Were gates locked?	X		

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?		NONE	
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		excellent vegetative cover
d. Are weedy annual plants present? If yes, are they a problem?	X		sparsely distributed, no problem
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 (4) prescribed + 3 additional (TDR 1 & 2 nests + steel bar)			

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		excellent cover - see vegetation monitoring report

6. Rationale for field conclusions: Thorough walkdown - perimeter & transects, show no evidence of additional cracking & subsidence. Excellent vegetative cover, with some seasonal mortality. Excellent fence condition. All signs in place. No animal presence apparent.

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.

Shaughn A Burnison Chief Inspector's Signature:	SHAUGHN A. BURNISON Printed Name:
TASK MGR. Title:	6/29/04 Date:

ORIGINAL

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

Date of Last Inspection: 3/22/04	Reason for Last Inspection: Quarterly Post-Closure
Responsible Agency: BN ER	Project Manager: Jeff Smith
Inspection Date: 6/29/04	
Inspector (name, title, organization): SHAUGHN BURNISON, TASK MANAGER, BN ER	
Assistant Inspector (name, title, organization): MIKE FLOYD, TECH LEAD, BN ER	

A. GENERAL INSTRUCTIONS

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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	
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: 0)		X	
c. Were gates locked?	X		

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		A new crack has appeared on the south edge of cover
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		NE Monument Mud Pit A has two bullet marks, minor damage
f. Is the vegetation on the cover?	X		Some 10's of tumbleweeds growing on cover – to be addressed soon
g. Do natural processes threaten to integrity of any cover or site marker?		X	
h. Other?		X	
4. Photo Documentation			
a. Has a photo log been prepared?	X		
c. Number of photos exposed (5) cover → E, cover → W, SW END → E, SE END → W, SE END → N			

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		Tumbleweeds on cover need to be removed
5. Is current status/condition of vegetative cover satisfactory?	X		see 6. below

6. Rationale for field conclusions: Perimeter walk & transects indicate site to be in good condition overall. Fencing & signs in excellent condition. One new crack on the south edge noted (lengthy, but small lateral displacement – to be monitored). Tumbleweeds on cover top to be removed in near-term maintenance activity.

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.

Shaughn Burnison Chief Inspector's Signature:	SHAUGHN BURNISON Printed Name:
TASK MANAGER Title:	6/29/04 Date:

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

Date of Last Inspection: 6/29/04	Reason for Last Inspection: Quarterly
Responsible Agency: BN ER	Project Manager: Jeff Smith
Inspection Date: 9/22/04	
Inspector (name, title, organization): ALISSA TIBESAR, TECH LEAD, BNER	
Assistant Inspector (name, title, organization): SHAUGHN BURNISON, TASK MGR, BNER	

A. GENERAL INSTRUCTIONS

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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-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?		✓	
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?	✓		No problems
e. Are seeded plant species found on site?	✓		
f. Is there evidence of plant mortality?	✓		Normal seasonal changes.
5. Photo Documentation			
a. Has a photo log been prepared?	✓		
c. 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: Unit is in excellent condition. No issues or concerns noted.

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: Alissa	Printed Name: ALISSA TIBESAR
Title: TECHNICAL LEAD	Date: 9/22/04

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

Date of Last Inspection: 6/29/04	Reason for Last Inspection: Quarterly
Responsible Agency: BN ER	Project Manager: JEFF SMITH
Inspection Date: 9/22/04	
Inspector (name, title, organization): ALISSA TIBBSTAR, TECH LEAD, BN ER	
Assistant Inspector (name, title, organization): SHAUGHN BURNISON, 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.
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?	✓		Minor crack on south edge of cover - not affecting unit
b. Was maintenance performed?	✓		6 Monuments installed vegetation removed
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.	YES	NO	EXPLANATION
a. Is there evidence of settling?		✓	
b. Is there cracking?	✓		no change in crack on south edge of cover
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 the vegetation on the cover?		✓	
g. Do natural processes threaten to integrity of any cover or site marker?		✓	
h. Other?		✓	
4. Photo Documentation			
a. Has a photo log been prepared?	✓		
c. 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: Site in good condition. Hung 6 new signs on new monuments. Monitor crack on South edge of cover for change.

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: ALISSA TIEESAR
Title: TECHNICAL LEAD	Date: 9/22/04

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

Date of Last Inspection:	Reason for Last Inspection:
Responsible Agency: BECHTEL NEVADA	Project Manager: JEFF SMITH
Inspection Date: 12/15/04	
Inspector (name, title, organization): DUSTY EMER SR. SCIENTIST BN/ER	
Assistant Inspector (name, title, organization): MIKE FLOYD SR. TECH. 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.
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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?	✓		DOES NOT AFFECT UNIT ROAD IS TO SW OF UNIT ¼ MILE
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-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?	✓		No Problems
e. Are seeded plant species found on site?	✓		
f. Is there evidence of plant mortality?	✓		Normal Seasonal Changes
5. Photo Documentation			
a. Has a photo log been prepared?	✓		
c. Number of photos exposed (4)			

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: UNIT WAS found to Be 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: Dudley Emer
Title: Sr Scientist	Date: 12/15/04

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

Date of Last Inspection: 9/22/04	Reason for Last Inspection: QUARTERLY
Responsible Agency: BN ER	Project Manager: Jeff Smith
Inspection Date: 12/15/04	
Inspector (name, title, organization): Dudly Emick SR Scientist BN/ER	
Assistant Inspector (name, title, organization): M.L. Flood Sr Tech 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.
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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?	✓		MINOR CRACK ON S. EDGE OF UNIT, DOES NOT AFFECT
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?		✓	

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.	YES	NO	EXPLANATION
a. Is there evidence of settling?		✓	
b. Is there cracking?		✓	NO change
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 the vegetation on the cover?		✓	
g. Do natural processes threaten to integrity of any cover or site marker?		✓	
h. Other?			N/A
4. Photo Documentation			
a. Has a photo log been prepared?			
c. Number of photos exposed ( )			

D. FIELD CONCLUSIONS			
1. Is there an imminent hazard to the integrity of the unit? (Immediate report required)		✓	
Person/Agency to whom report made:			
2. Are more frequent inspections required?		✓	
3. Are existing maintenance/repair actions satisfactory?	✓		
4. Is other maintenance/repair necessary?		✓	
5. Is current status/condition of vegetative cover satisfactory?	✓		

6. Rationale for field conclusions: UC 4 Mud Pit Cover was found to be in good condition, continue regular inspections

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: Dudley Emmer	Printed Name: Dudley Emmer
Title: Sr Scientist I	Date: 12/15/05

CAU 417 – Post-Closure Inspection

Weather – Clear, Cool, Breezy

Personnel – Shaughn Burnison – BN ER Task Mgr

Dudley Emer – BN ER Tech Lead

11:00 AM Arrive onsite at UC-4

Monuments & signs at Mud Pit A, B, & D in good condition – minor paint chipping. All signs are legible. (Signs w/ chipped paint to be replaced within next 2 inspection periods.)

UC-4 Mudpit C Cover –

Note: all 3 temporary survey pegs have now been removed from the cover and will no longer be surveyed (reason: frost wedging made the measurement unreliable.)

No erosion on the edges. E & S edges have been bermed. Some vegetation on the cover & edges, dispersed, but well-established. This will be addressed in a later period. Pulled weeds exhibit bent/deviated roots, indicating failure to pierce the clay layer. About 40 weeds on the cover.

UC-4 Mudpit A –

Monuments & signs in good condition (some peeling but legible)

UC-4 Mudpit B –

...as with A Additional monuments to be placed to further demarcate A & B in next inspection period on N, E, & W side of A; & S, E, & W side of B

Area S & Area X – nothing notable (Eastward signs on Area X will be replaced in next inspection period)

12:30 pm Arrive @ UC-1 Central Mud Pit
Walked mud pit. Cracking noted in last inspection was repaired Jan 29. No new cracking noted. Signs reattached to fence on Jan 29 still firmly in place. Good vegetation

12:45 Arrive HTH 2
Estimate 30' ft cable available
Labeled "DOE-NV-MC-6 Rev. 4
Type G 4/C 4 AWG
0/2000V Power Cable -
Amercable 4/90 "

Four Conductor Red
Black
Green
ORG (?)

Ohmmeter Readings of Pump Cable

(Good) Blk - ORG 0.6
(Good) Blk - Red 0.6Ω
Sl charging associated with "white" indicates white is "ground" → Blk - White 10k ↑ 15kΩ polarity dependent
→ Wht - Red 14/26k changes
(Good) Red - ORG 1Ω
→ Wht - ORG 15k changing

- lead to Earth ORG 1 meg change
Red 1.2 Meg chang
Blk 1.5 changing
White 1.6 chang
good values

"ORG" corresponds to YELLOW WIRE in FRANKLIN MOTOR "AIM" manual
WHITE IS GROUND.

SIGNATURE			DATE 3/25/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

Casing - leader
White 0 or ~~[illegible]~~ 1.5 or
Red 30k ~~[illegible]~~ ~~300k~~ 22k
Blk 28 ~~185k~~ (10k) ~~[illegible]~~ ~~30~~ 22k
ORG 28k 13k 24k

2:30 Arrive UC-3 -
Walk the site. Monuments in good shape -
3 additional sites for proposed monuments on UC-3 southern outlier
1 sign bent by cow needs replacement next period
Good shape - no other significant issues.

3:00 PM DEPART FOR LAS VEGAS

6:45 PM Arrive Losee Road
Vehicle spends weekend - to be returned to NTS Monday

SIGNATURE			DATE
Shaughn A Bu[illegible]			3/25/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

TITLE CAU 417 Post-Closure Inspection

PROJECT NO. 6/29/2004

BOOK NO. CNTA

Work continued from Page N/A

CAU 417 Post-Closure Inspection

Weather: Clear, 80's, Breezy 10-20 mph SE

Personnel: Mike Floyd - BN-ER Tech

Shaughn Burnison - BN ER Task Mgr

10:15 AM Arrive on site UC-1 Central Mud Pit

Safety Briefing Given:

Buddy System

Emergency Communications: pagers & personal cell phone

... drive to base camp

Closest Emergency Contact: Base Camp (10 mi S)

Hazards: Slip/Trip/Fall

Vermin/Snakes

Driving: open range/cattle

10:30 Am Walk the UC-1 Mudpit. Fence/Gate/Lock/Signage/& Chicken wire all in good condition.

Vegetation both inside & outside of the fenced enclosure appears to be at similar condition & density — dryness & mortality due to aridness is occurring at similar rates.

TDR equipment appears untouched & in good condition.

Photos taken from photo-point using both digital & film cameras.

Photos: S → W (looking)

S → NW

S → NE

S → E

Photos: Central TDR nest

Steel rod → S

NW TDR nest

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page

SIGNATURE			DATE
Shaughn A Burnison			6/29/2004
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

PROJECT NO. CNTA
BOOK NO.

COVER CONDITION: VERY GOOD / EXCELLENT
SUBSIDENCE MONUMENTS CONDITION: VG/EXCELLENT
NO NEW CRACKS NOTED
REPAIRS OF OLD CRACKS APPEAR STABLE

THE ORANGE TRANSLUCENT PLASTIC TUBE (NOTICED BY THE CLIENT) NEAR MONUMENT 5 ON WEST EDGE OF COVER WAS EXAMINED AND REMOVED. THE TUBE WAS VERY BRITTLE & SHATTERED.
ANOTHER "STAKE", THIS TIME A 3/8" STEEL REBAR, WAS NOTICED STICKING UP ABOUT 12" FROM THE SURFACE OF COVER IN GENERAL VICINITY OF TDR EQPT. A PHOTO WAS TAKEN.

UC-1 MUDPIT & MONUMENTS & SIGNS WERE INSPECTED
3 OR 4 SIGNS ON THESE MONUMENTS HAVE PEELING THAT INTERFERES WITH ADDRESS OR PH # OR BOTH & ARE DUE FOR REPLACEMENT WITH NEW SIGNS IN THE NEAR FUTURE (1-3 MONTHS)
SIGNS PATCHED W/ STICKERS TO UPDATE PHONE # & PO BOX.

— END UC-1 INSPECTION —

12:00

UC-3 SITE INSPECTION

PATCHED SIGNS WITH STICKERS UPDATING PO BOX & PHONE #S ON MUD PITS A, B, & C.
MUD PITS A & B MONUMENTS IN GOOD CONDITION. NE exhibits 2 bullet marks SIGNS IN GOOD CONDITION
MUD PIT C GATE & LOCK, FENCE & SIGNS IN VERY GOOD CONDITION.
MUD PIT C COVER, SLOPES, & MARGINS WITHIN FENCE HAVE LARGE TUMBLEWEED GROWTH. THIS BRUSH SCHEDULED FOR REMOVAL.
MUD PIT C BERMS IN GOOD CONDITION
NO ANIMAL BURROWS BUT FREQUENT RABBIT DROPPINGS.

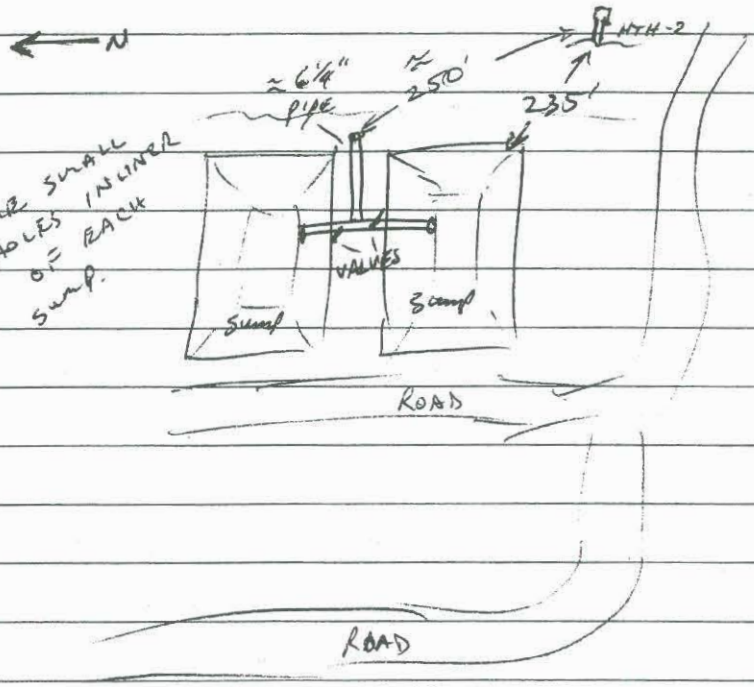
SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page

SIGNATURE			DATE 6/29/2004
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

11:00 - 11:30

Well HTH-2 & Sumps — 2 lined sumps uphill NW of well head 235' minimum distance



CHECKED ON STATE OF SUMPS NEAR HTH-2 WELL. MEASURED NEAREST DISTANCE AT ≈235' (WITH TAPE MEASURE) DISTANCE FM WELLHEAD TO 6" INTAKE PIPE ≈ 250'

SNTU INTENDS TO USE WELL HTH-2 FOR DRILLING PURPOSES IN SW CORNER LOCATION AFTER WATER IS TESTED FOR TRITIUM. BN TO SUPPORT INITIAL PUMPING FOR TEST

MUD PIT C PHOTOS — COVER LOOKING E
" " W
SW END " E
SE " " W
SE " " N

SURVEY MONUMENTS IN EXCELLENT CONDITION.

LENGTHY CRACK ON SOUTH EDGE OF COVER, BUT SMALL LATERAL DISPLACEMENT.
(RECOMMEND THAT THIS CRACK BE MONITORED FOR SUBSEQUENT GROWTH.)

— END UC-4 INSPECTION —

SIGNATURE		DATE 6/29/2004
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

108 TITLE

PROJECT NO. CNTA

BOOK NO.

Work continued from Page 107

1:00 PM +/- : WALK UC-4 AREA X ; PATCH SIGNS WITH STICKERS,
NOTHING NOTABLE

1:20 PM ARRIVE UC-3 ; SITE INSPECTION
PATCH ALL SIGNS WITH STICKERS (ROBOK & PHONE)
REVISIT PREVIOUSLY NOTED (pg 99 line 23) SUBSIDENCE HOLE
NEAR MUDPIT A. PHOTOS TAKEN. FILLING OF HOLE
BY NATURAL SLOUGHING HAD OCCURRED SINCE DEC. BUT A
TRIPPING HAZARD IS PRESENT.

2:45 DEPART CNTA FOR LV

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page

SIGNATURE			DATE 6/29/2004
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

TITLE MAINTENANCE UC4 & UC3 July 20, 2004 **PROJECT NO.** CNTA **109**

Work continued from Page N/A **BOOK NO.**

Depart Tonopah Hotel @ 5:45 AM

Arrive TTR @ 6:30 AM Badged / Mess / get lunches / fuel / property pass / keys

Depart TTR @ 8:30 AM

Arrive CNTA UC-4 @ 9:45 AM

Conduct Safety Briefing, Review PTHA, Review Work Package

Begin Brush removal on UC-4 MUDPIT & cover @ 10:15 AM

Laborers: Mo Cave

: Kelley Stillwell

Supervisor: Byron Evans

Tech Lead: Mike Floyd

Task Mgr: Shaughn Burnison

Continue clearing brush until lunch break at NOON (12:00)

Resume clearing brush @ 12:40 pm end 1:45 pm

11:15-11:45 FLOYD & BURNISON MEASURED & STAKED MONUMENT HOLE LOCATIONS.

1:45 pm begin digging 6 holes

3:00 pm dep UC-4 for UC-3

3:20 arr UC-3 - mark & dig 2 holes

3:55 depart UC-3 for UC-1 viewing

4:30 depart CNTA for TTR

- Maintenance scope 100% complete -

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page

SIGNATURE Shaughn A Burnison			DATE 7/20/2004
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

8:40 AM DEPART TTR ~~FOR CNTA~~ TONOPAH, PURCHASE SUPPLIES AT ACE HARDWARE (6 cans spraypaint & 1 qt exterior paint)

11:00 AM ARRIVE CNTA UC-3 -
Proceed to mask signs on UC-3 Outlier CAS & paint top 15" bright red.
Proceed to mask signs on UC-3 CAS adjacent to Outlier. Paint top 15" dark blue
Remove masking.
Replace one Sign - very difficult drilling w/ supplied bits - reused old cement nails instead of new hardware

1:00 PM DEPART UC-3 for UC-4
Lunch @ UC-4
1:45 PM Proceed to mask signs on UC-4 Mud Pit B monuments & paint top 15" bright red
Proceed to mask signs on UC-4 Mud Pit A monuments paint to 15" ~~Br~~ dark blue
Remove Masking

2:30 PM Pull/cut/or otherwise remove excess brush from slopes of Mudpit C

3:08 PM Depart UC-4 for TTR
4:45 PM Arrive ER Office @ TTR

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page

SIGNATURE			DATE 7/21/05
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

TITLE UC-3 & UC-4 July 22, 2004 **PROJECT NO.** CNTA CAU 417 **BOOK NO.** Maintenance **113**

Work continued from Page N/A

PPE: HARD HATS, GLOVES, STEEL TOES, SAFETY GLASSES

06:20 Out of dorm, key turned in, breakfast

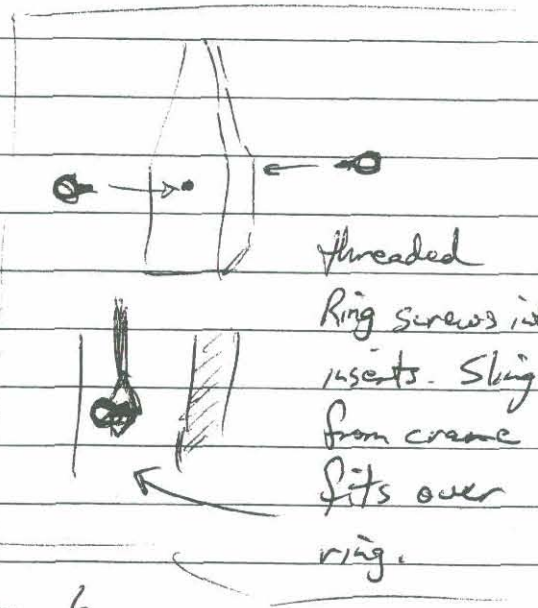
07:20 Exit Cedar Gate (TTR)

08:05 Arrive Rachel - meet truck from Jenson Pre-Cast (Keith) crane truck & trailer, 16 monuments

09:45 Arrive CNTA UC-4 - begin placement of 6 monuments

10:45 Dep. UC-4 for UC-3

11:00 - 11:30 Placement of 2 monuments at UC-3, truck departs for TTR



11:30 - 12:00 Brush paint white coat on 2 monuments UC-3

12:10 Break for lunch at UC-4

12:30 - 1:45 Brush paint white coat on 6 monuments, then color-code red spray paint on 3, blue spray paint on 3

[attempt & fail to drill sign holes!]

1:55 - 2:15 Color-code red on 2 at UC-3 (scope finished)

2:20 pm depart CNTA for LV

5:45 pm arrive Las Vegas

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page

SIGNATURE			DATE 7/22/2004
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

B 200 PH ©

9/22/04 CAU 417 - CNTA Surface

Personell- ALISSA TIBESAR (TC)
SHAUGHN BURNISON (TM)

Visitors - None

Equipment - None

Weather - Sunny, Clear, High 60's

SOW - Inspect monuments, cap, fencing, & signs at UC-1, UC-4, & UC-3

12:50pm - Arrived at UC-4 · gate locked

Mudpit C - little to no vegetation present on cover
- no change in crack along S edge of cover
- berms in good condition (S & E edge of cover)
- fencing and signs in good condition

Photos. 1. W edge looking E
2. E edge looking W
3. SE edge looking W
4. SE edge looking N
5. SW edge looking E

Attached new phone # stickers to 4 signs around fence (old: 295-7063, new: 295-2528)

Mudpits A & B - 6 signs hung on new monuments
- healthy vegetation
- monuments & signs in good condition

Areas - one sign is peeling & should be replaced

3:03 Arrived at UC-1

Photos - 1. From S Edge Center looking W
2. From " " " NE
3. " " " NW
4. " " " E
5. " " " N

SIGNATURE			DATE 9/22/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

vegetation good. Previous crack repairs holding. No new cracks noted. TDR nests appear normal. Vault & equipment appears normal. Survey monuments in good condition. Fencing & signs in good condition. (new phone #'s attached to signs) Gate & lock in good condition.

4:00 pm - Arrived at UC-3

- Hung 2 signs on new monuments
- Monuments & signs in good condition
- abundant & healthy vegetation

AJ7

SIGNATURE			DATE
			9/22/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

114 TITLE

PROJECT NO.

BOOK NO.

Work continued from Page ____ 12/15/04

CNTA Qt- inspections

D. Emer M. Floyd.

05:00 leave Iosco Rd

09:30 arrive UC-1

Download data - problem will download

use backup (MS tech Computer)

Good download with AMS tech.

Argonaut Computer fails to connect

but data is seen in I/O window but

no exchange.

troubleshoot System

! Problem with Com 1 on Argonaut

Switched program to Com 5 all ok.

⇒ Com 1 has problem.

inspect Cover no new fractures observed

Cover & Veg good shape

Signs ok, fence ok.

inspect CAS 58-0905 UC1 mud pit E

Signs Good

inspect CAS-58-902 UC1 mud pit A

ok, 1 Sign paint peeling.

11:35: leave for UC-4

11:55 arrive UC-4

inspect veg & Cover & side slopes

No Vegetation on Cover, No Rills or

erosion noted minor dessication cracks

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 Made in USA

Work continued to Page ____

SIGNATURE			DATE 12/15/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

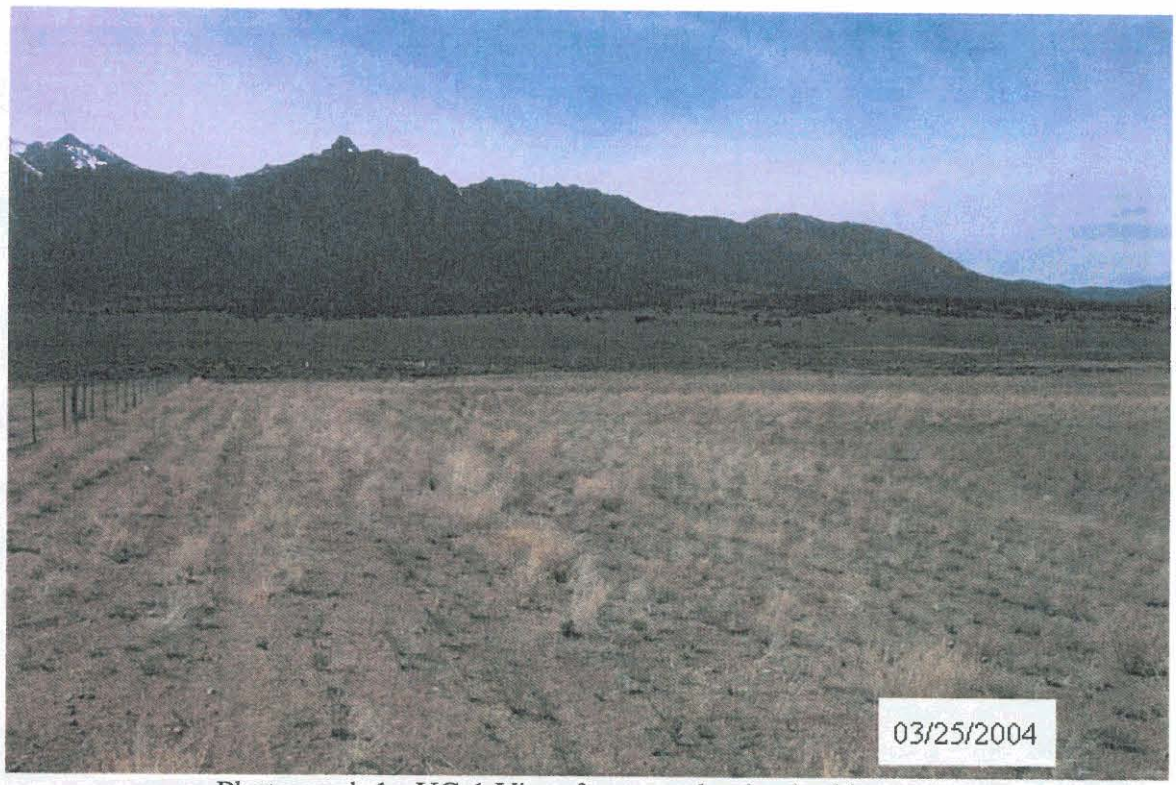
on Cover Surface - do not affect cover.
Signs in good Shape
No deficiencies noted
Mud pits A & B excellent condition
Mud pit D Good condition
Area X Signs OK.
Lunch
12:40 Arrive UC-3
Walk down Monuments
Signs ok Painting excellent
Condition.
No deficiencies noted.
13:15 leave site

SIGNATURE			DATE 12/15/04
DISCLOSED TO AND UNDERSTOOD BY	DATE 12/15/04	WITNESS	DATE

PHOTOGRAPH LOG

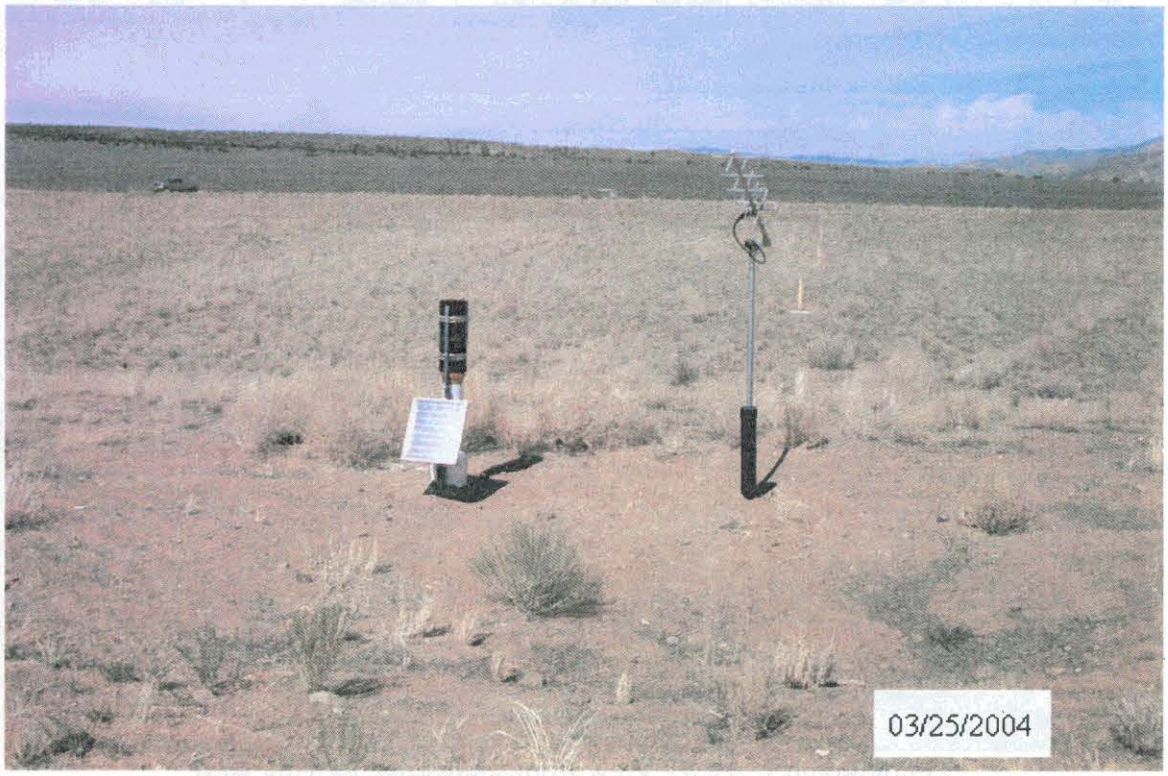
PHOTOGRAPH	DATE	DESCRIPTION
1	03/25/2004	UC-1 View from south side looking west
2	03/25/2004	UC-1 View from south side looking northwest
3	03/25/2004	UC-1 View from south side looking north
4	03/25/2004	UC-1 View from south side looking northeast
5	03/25/2004	UC-1 View from south side looking east
6	03/25/2004	UC-4 View from center looking west
7	03/25/2004	UC-4 View from center looking east
8	03/25/2004	UC-4 View from center looking southeast
9	06/29/2004	UC-1 View from south side looking west
10	06/29/2004	UC-1 View from south side looking northwest
11	06/29/2004	UC-1 View from south side looking northeast
12	06/29/2004	UC-1 View from south side looking east
13	06/29/2004	UC-4 View from center looking west
14	06/29/2004	UC-4 View from center looking east
15	06/29/2004	UC-4 View from south side looking east
16	06/29/2004	UC-4 View from south side looking west
17	07/22/2004	UC-3 Monument installation
18	07/22/2004	UC-4 Mud Pits A and B monument installation
19	09/22/2004	UC-1 View from south side looking west
20	09/22/2004	UC-1 View from south side looking northwest
21	09/22/2004	UC-1 View from south side looking north
22	09/22/2004	UC-1 View from south side looking northeast
23	09/22/2004	UC-1 View from south side looking east
24	09/22/2004	UC-4 View from center looking west
25	09/22/2004	UC-4 View from center looking east
26	09/22/2004	UC-4 View from south side looking west
27	09/22/2004	UC-4 View from south side looking east
28	12/15/2004	UC-1 View from south side looking west
29	12/15/2004	UC-1 View from south side looking northwest
30	12/15/2004	UC-1 View from south side looking north
31	12/15/2004	UC-1 View from south side looking northeast
32	12/15/2004	UC-1 View from south side looking east

PHOTOGRAPH	DATE	DESCRIPTION
33	12/15/2004	UC-4 View from center looking west
34	12/15/2004	UC-4 View from center looking east
35	12/15/2004	UC-4 View from south side looking west
36	12/15/2004	UC-4 View from south side looking north

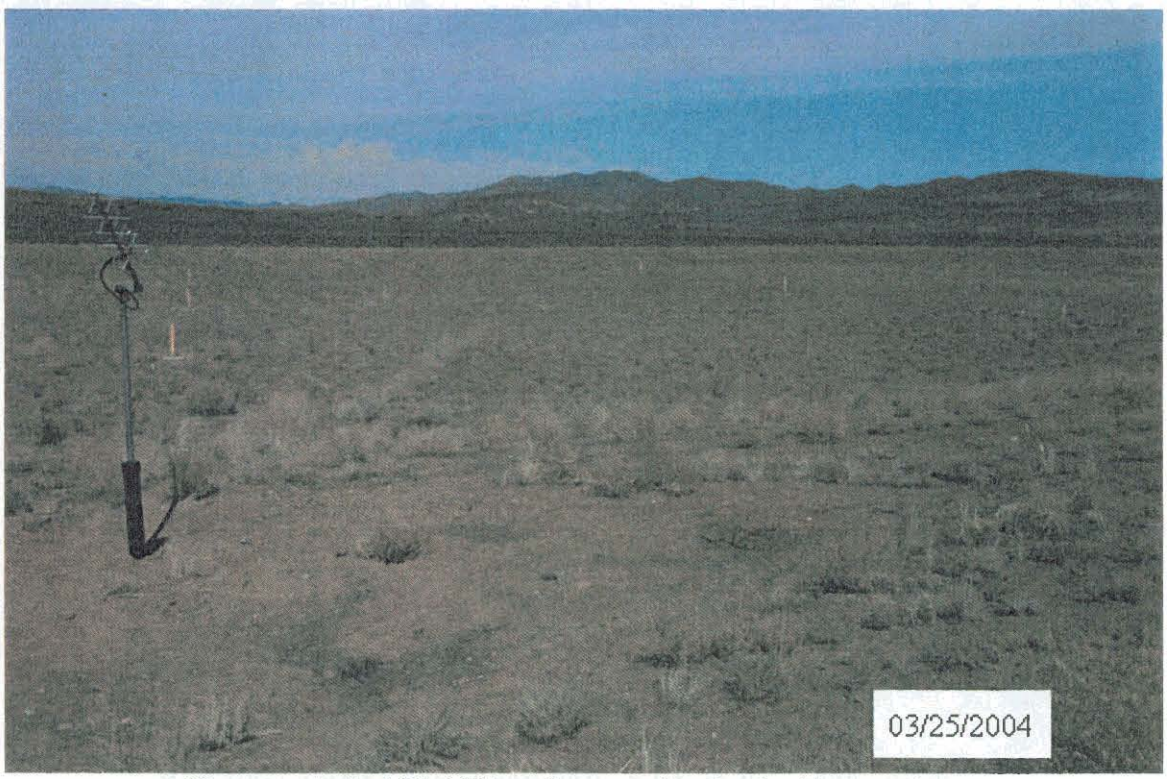


Photograph 1: UC-1 View from south edge looking west

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

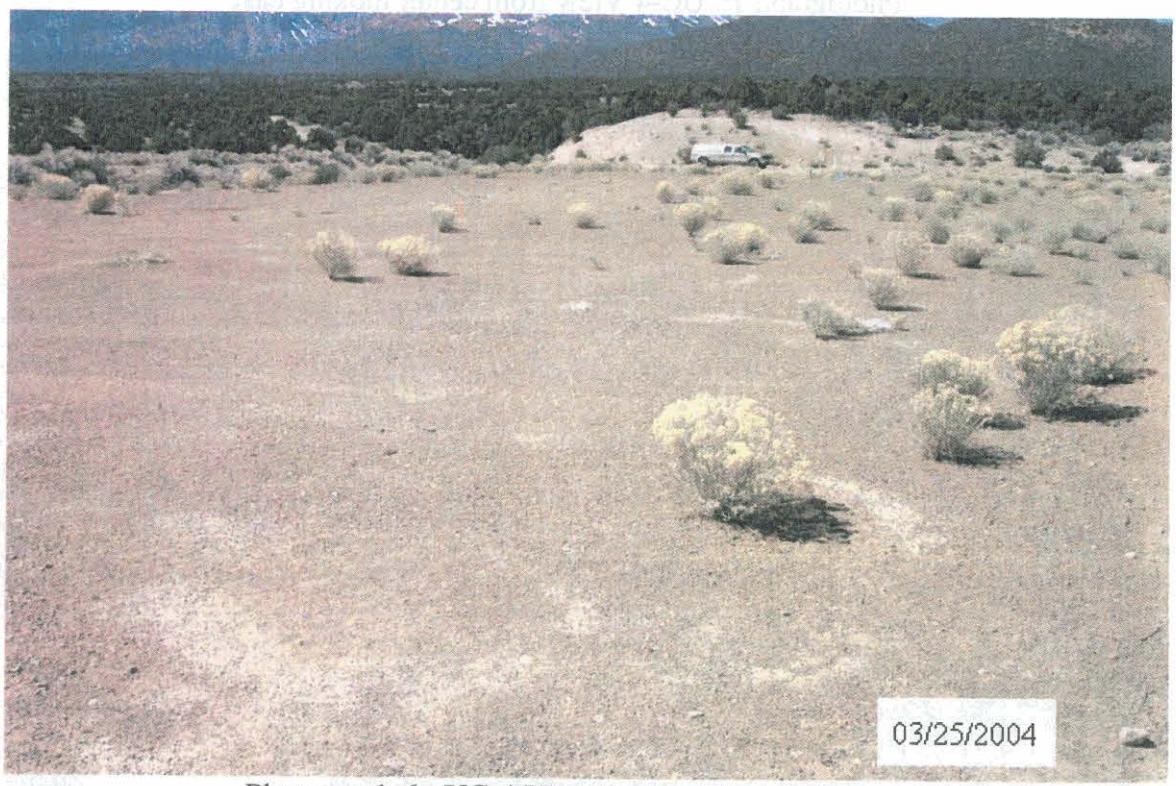


Photograph 3: UC-1 View from south edge looking north

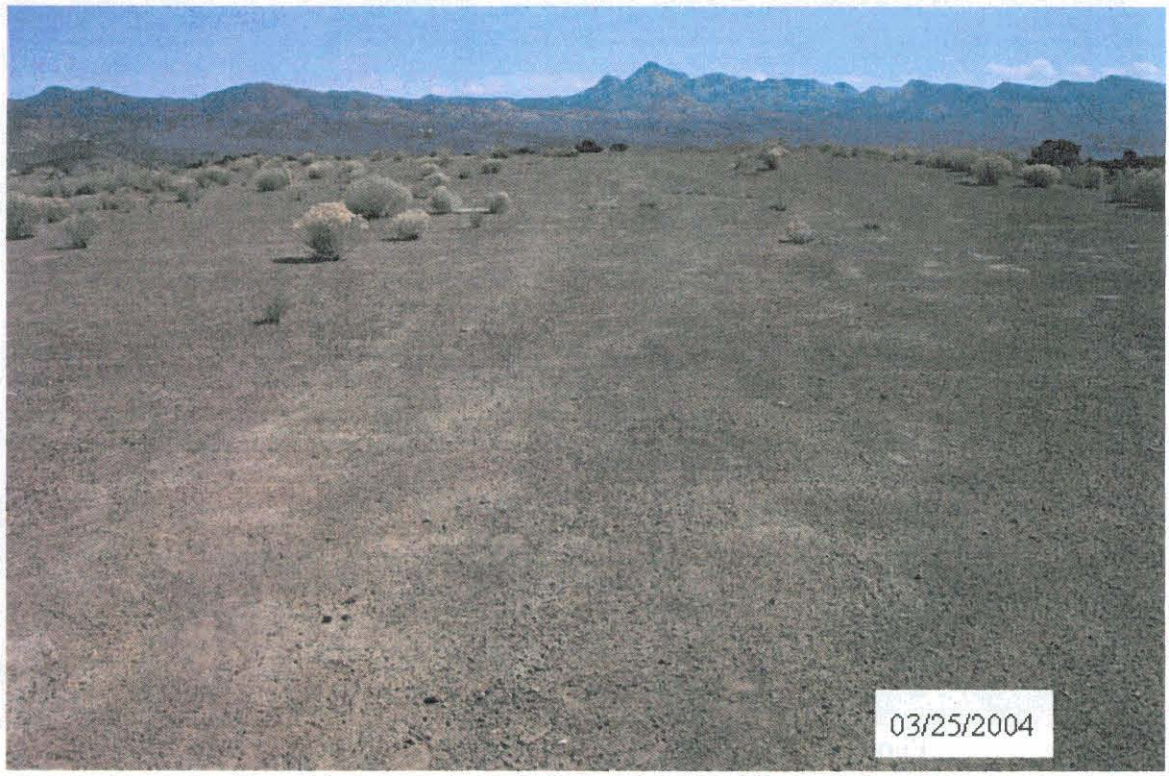


Photograph 4: UC-1 View from south edge looking northeast

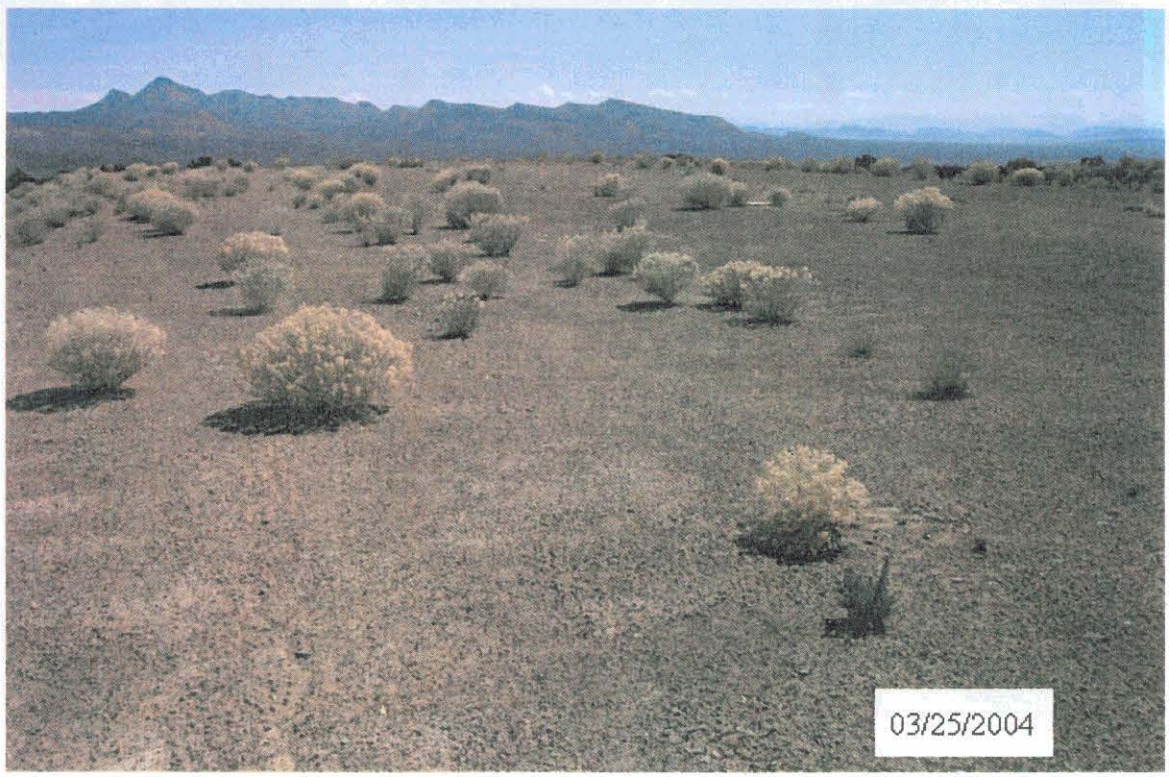
Photograph 5: UC-1 View from south edge looking east



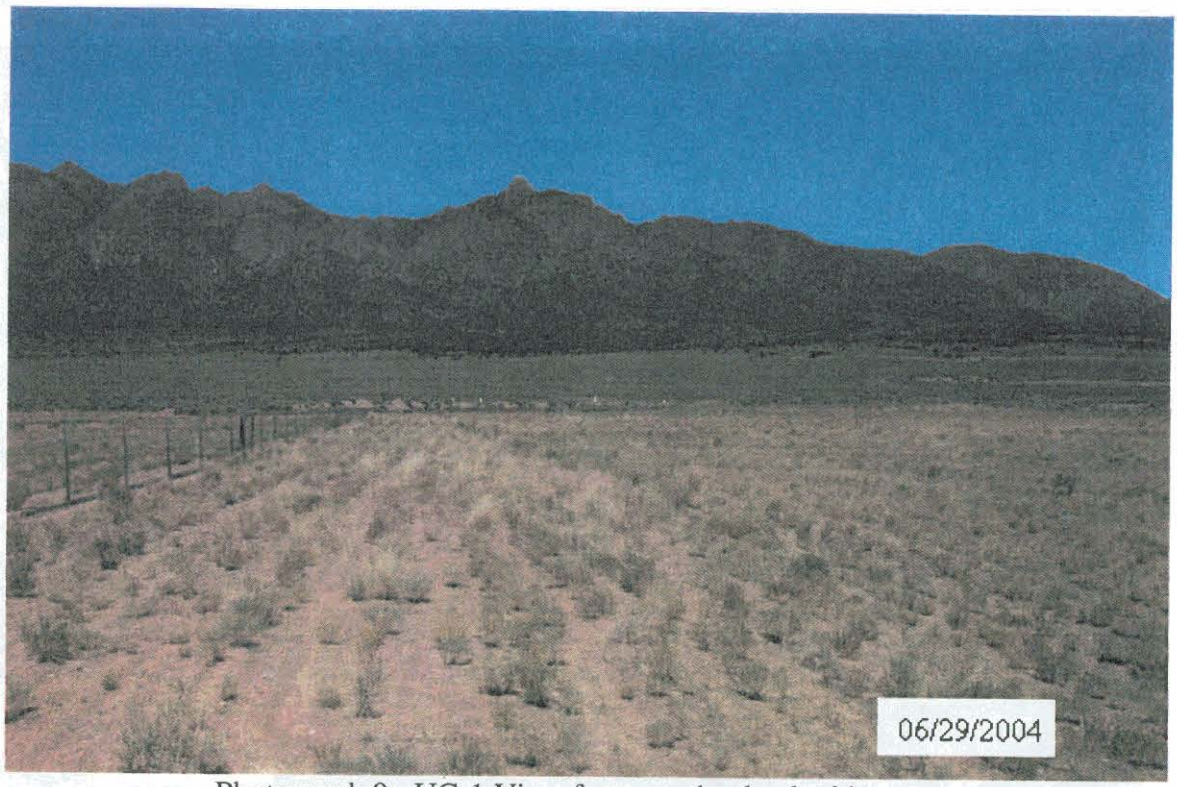
Photograph 6: UC-4 View from center looking west



Photograph 7: UC-4 View from center looking east

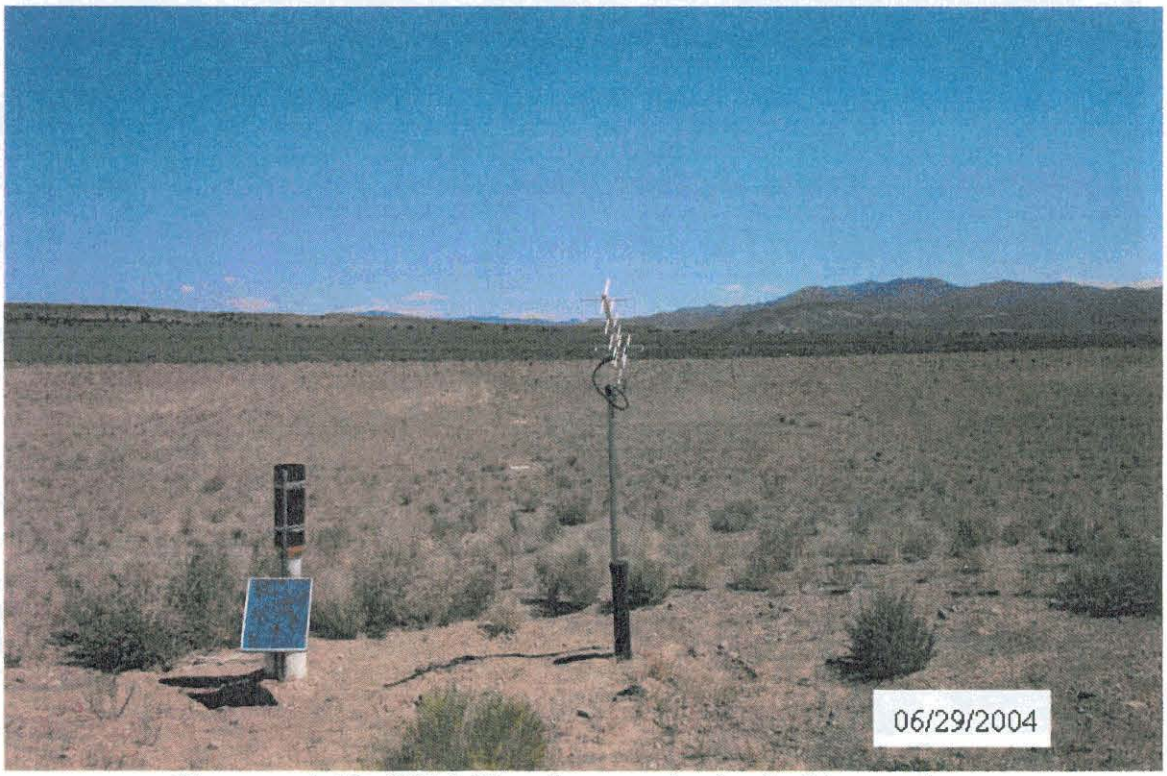


Photograph 8: UC-4 View from center looking southeast

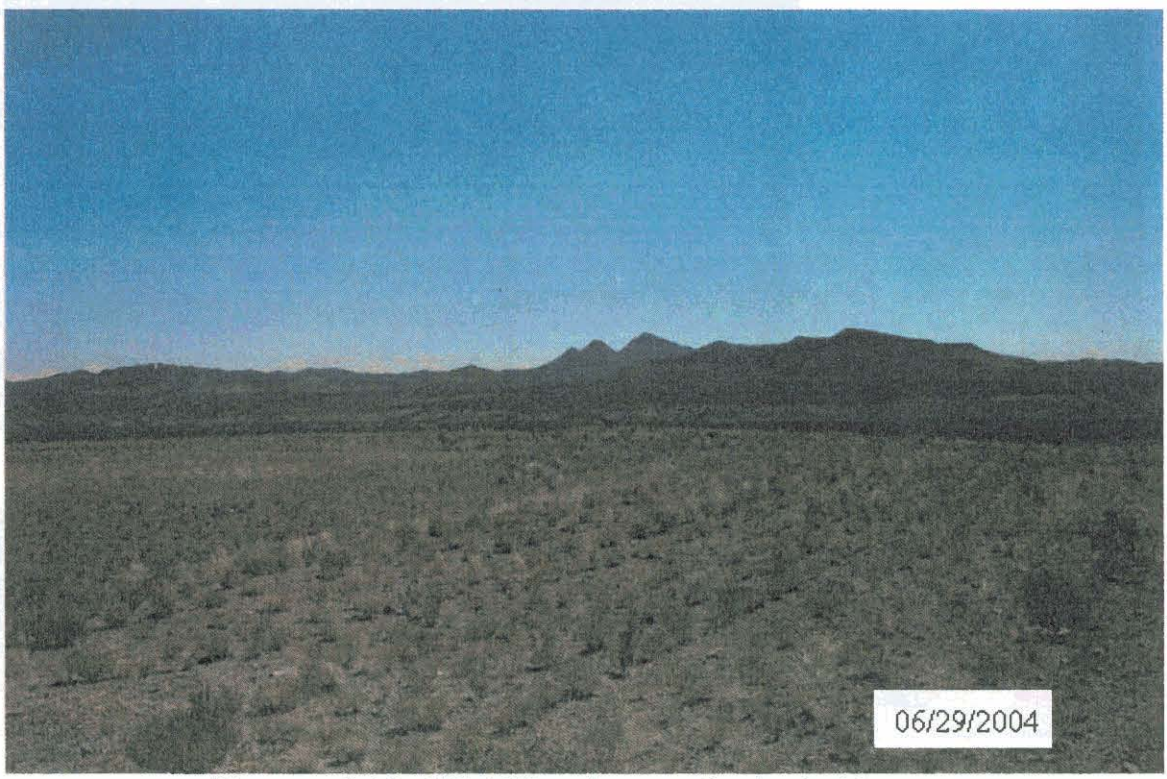


Photograph 9: UC-1 View from south edge looking west

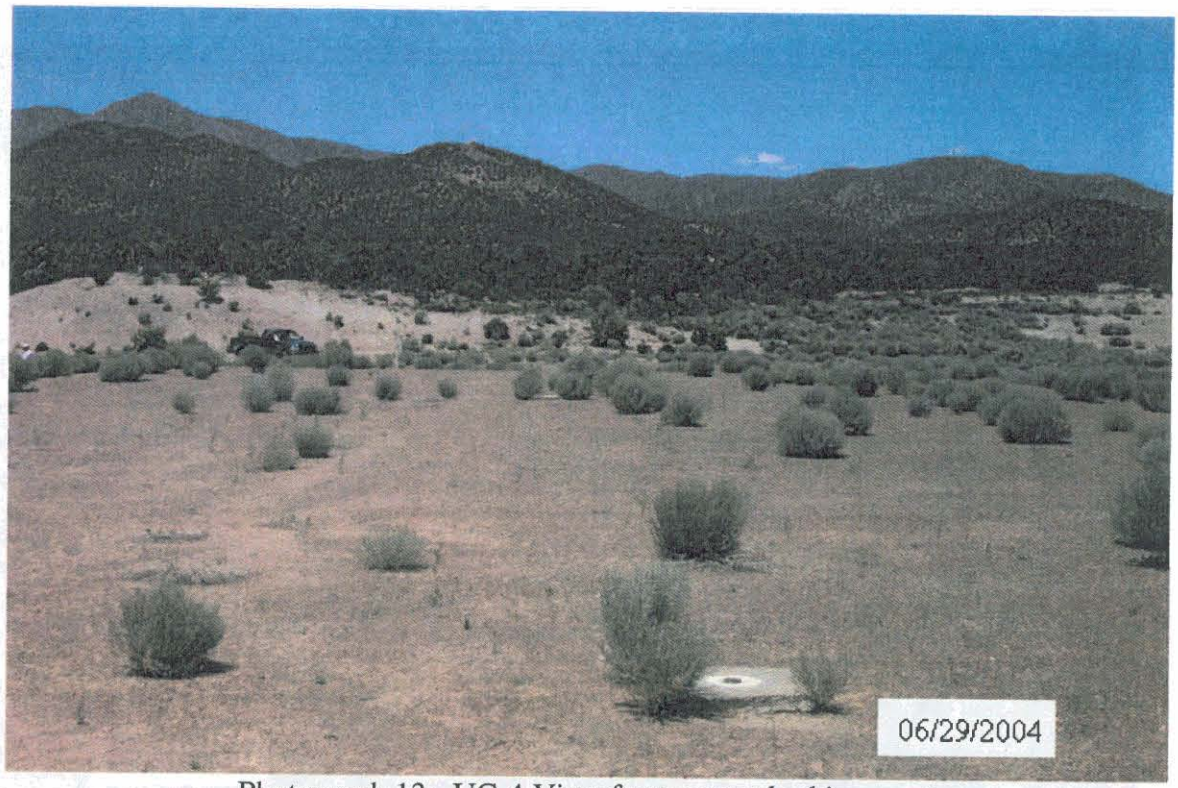
Photograph 10: UC-1 View from south edge looking northwest



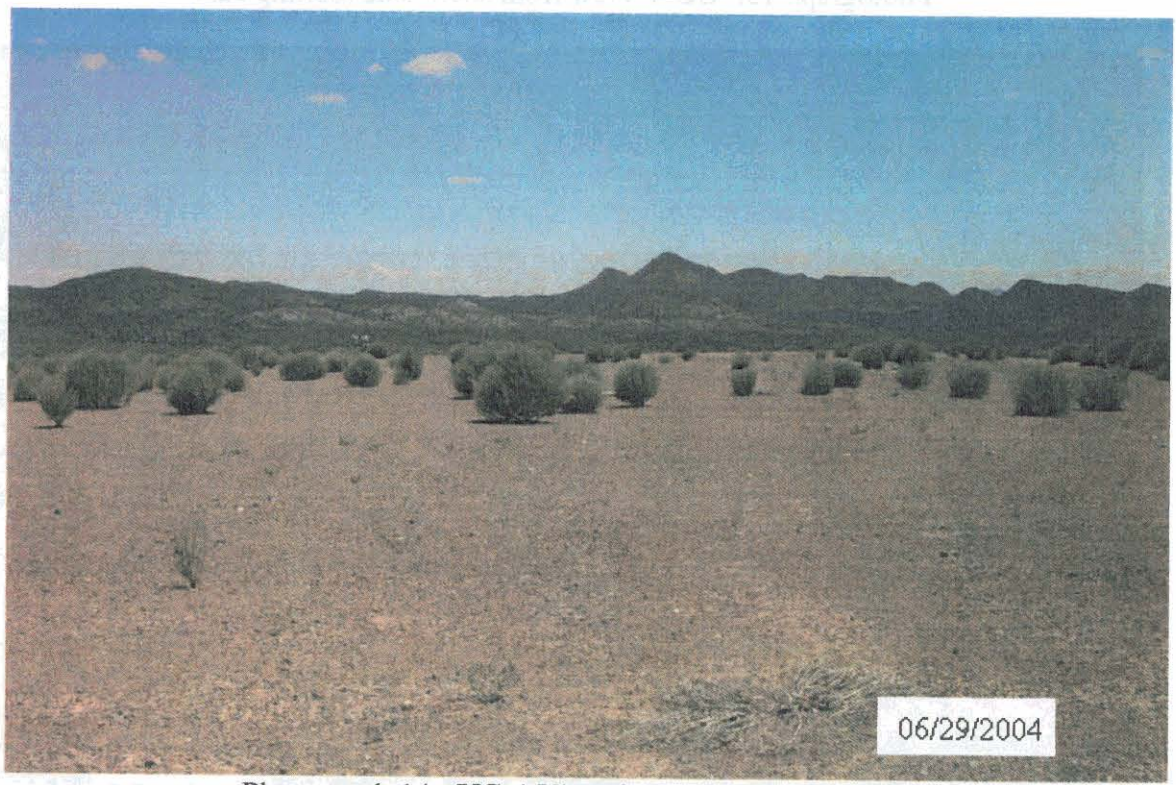
Photograph 11: UC-1 View from south edge looking northeast



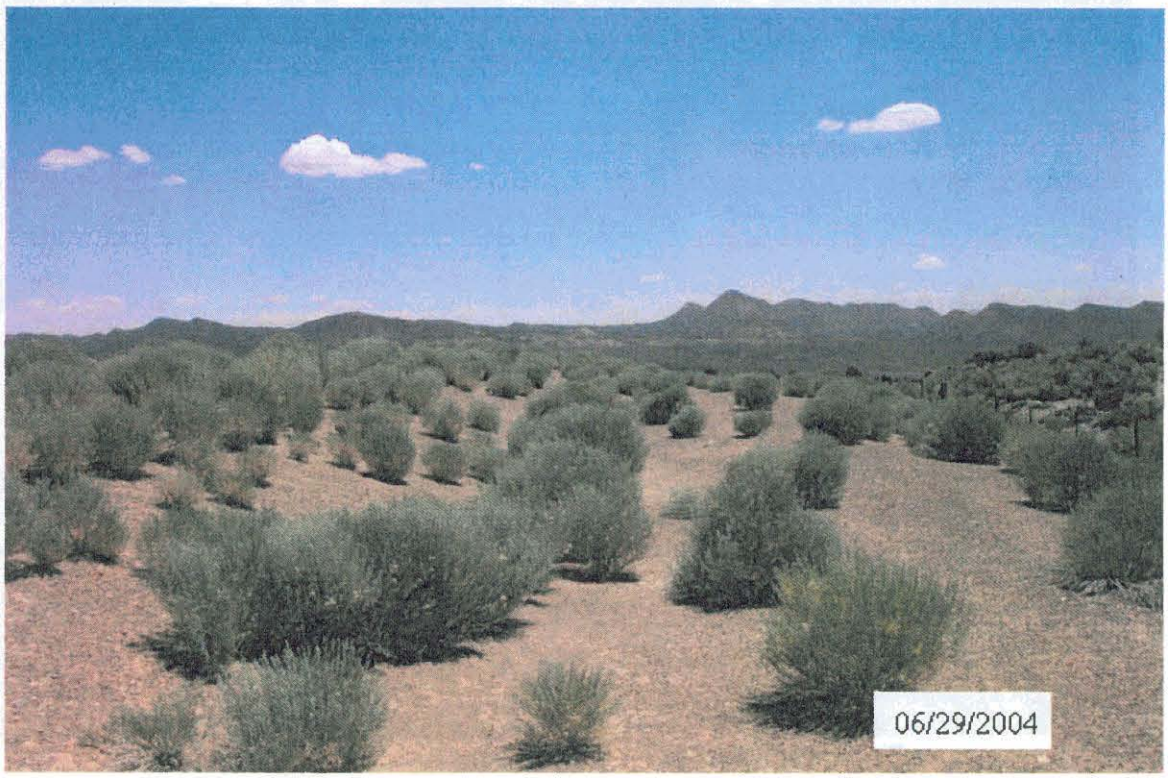
Photograph 12: UC-1 View from south edge looking east



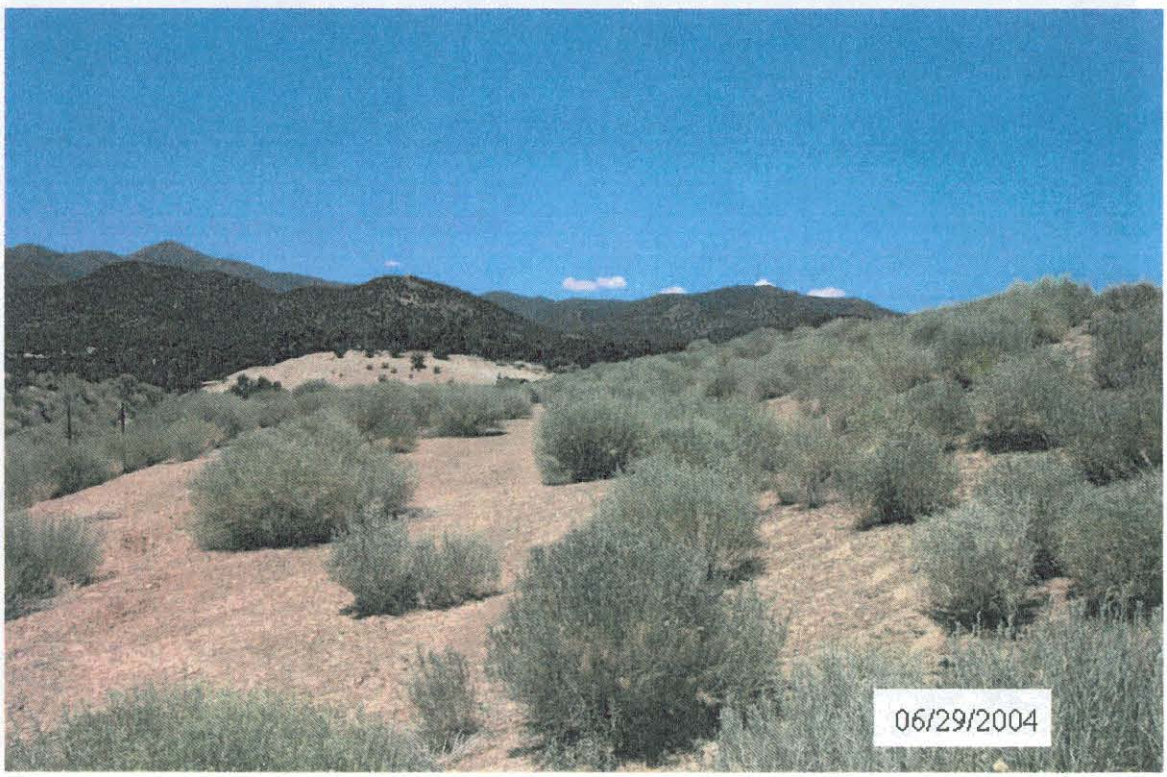
Photograph 13: UC-4 View from center looking west



Photograph 14: UC-4 View from center looking east



Photograph 15: UC-4 View from south side looking east

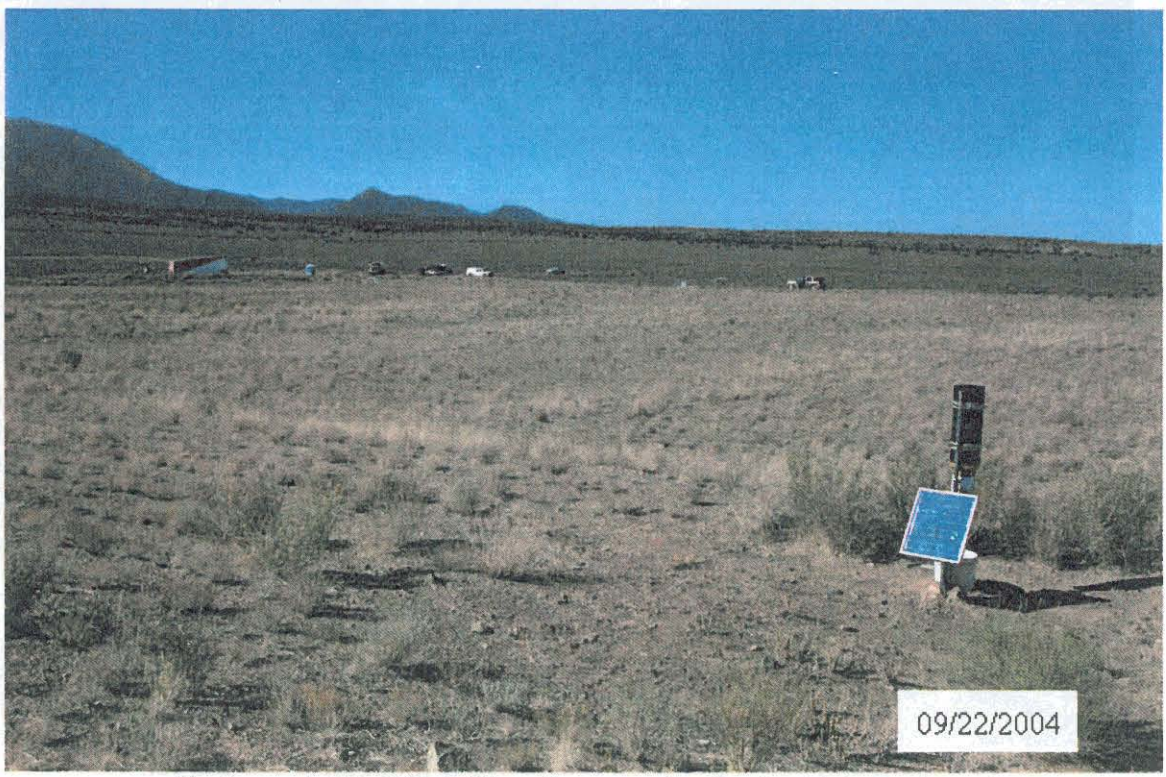


Photograph 16: UC-4 View from south side looking west

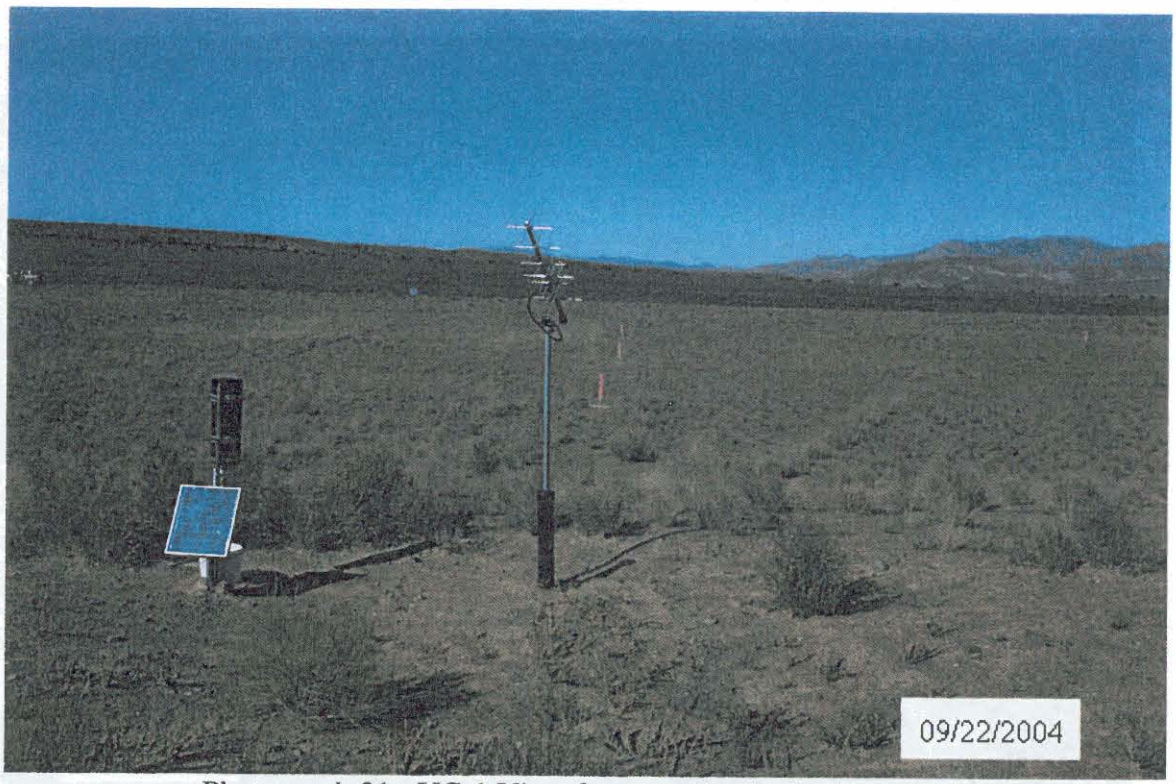
Photograph 17: UC-3 Monument installation

Photograph 18: UC-4 Mud Pits A and B monument installation

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



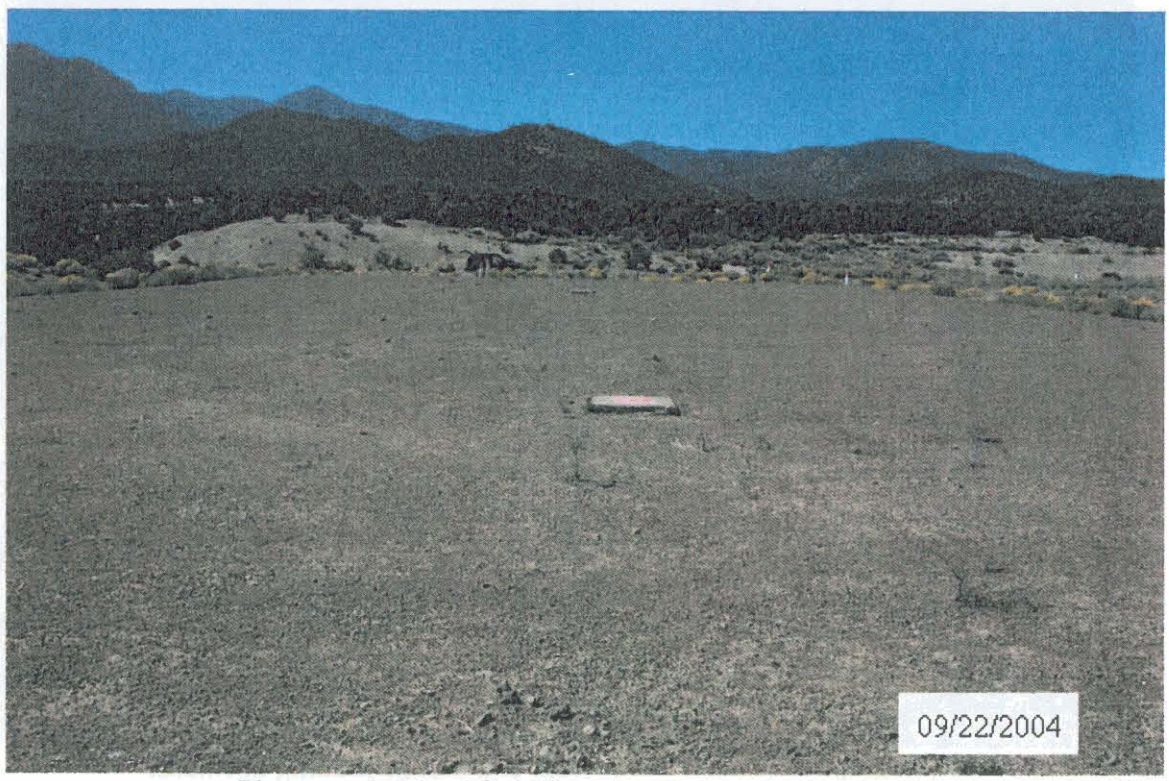
Photograph 20: UC-1 View from south edge looking northwest



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

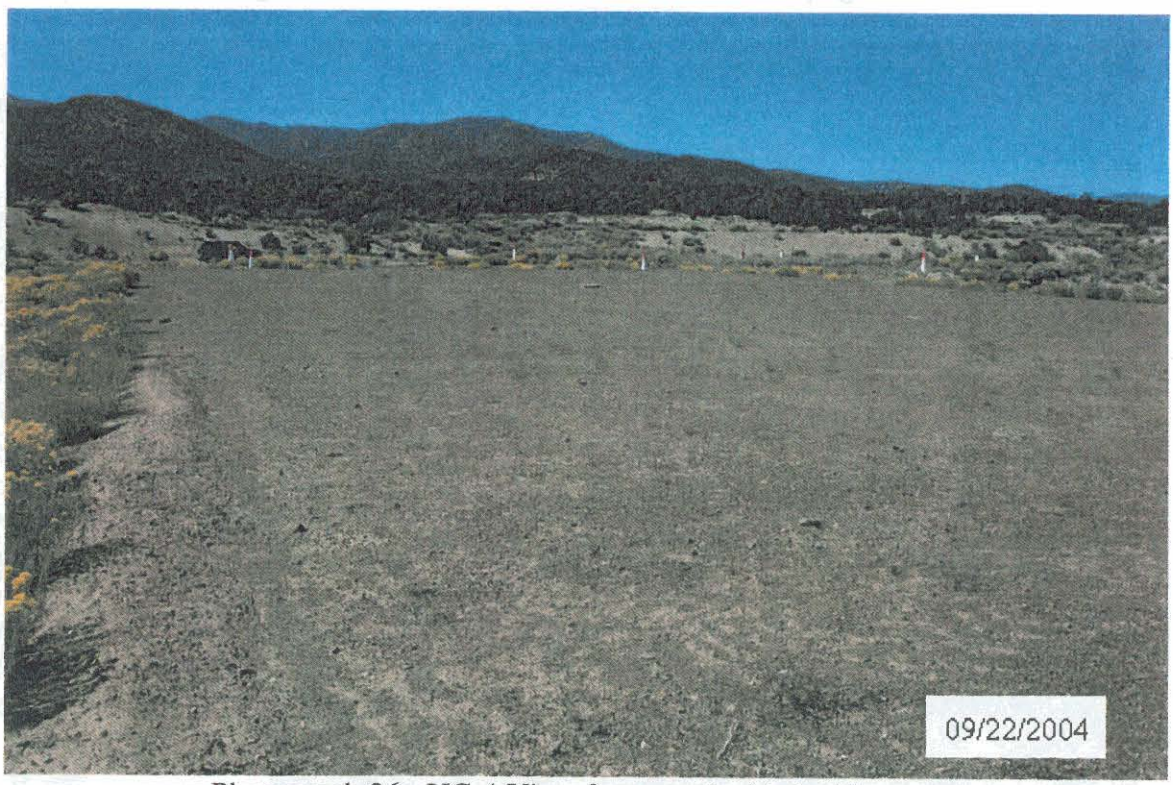
Photograph 22: UC-1 View from south edge looking northeast

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

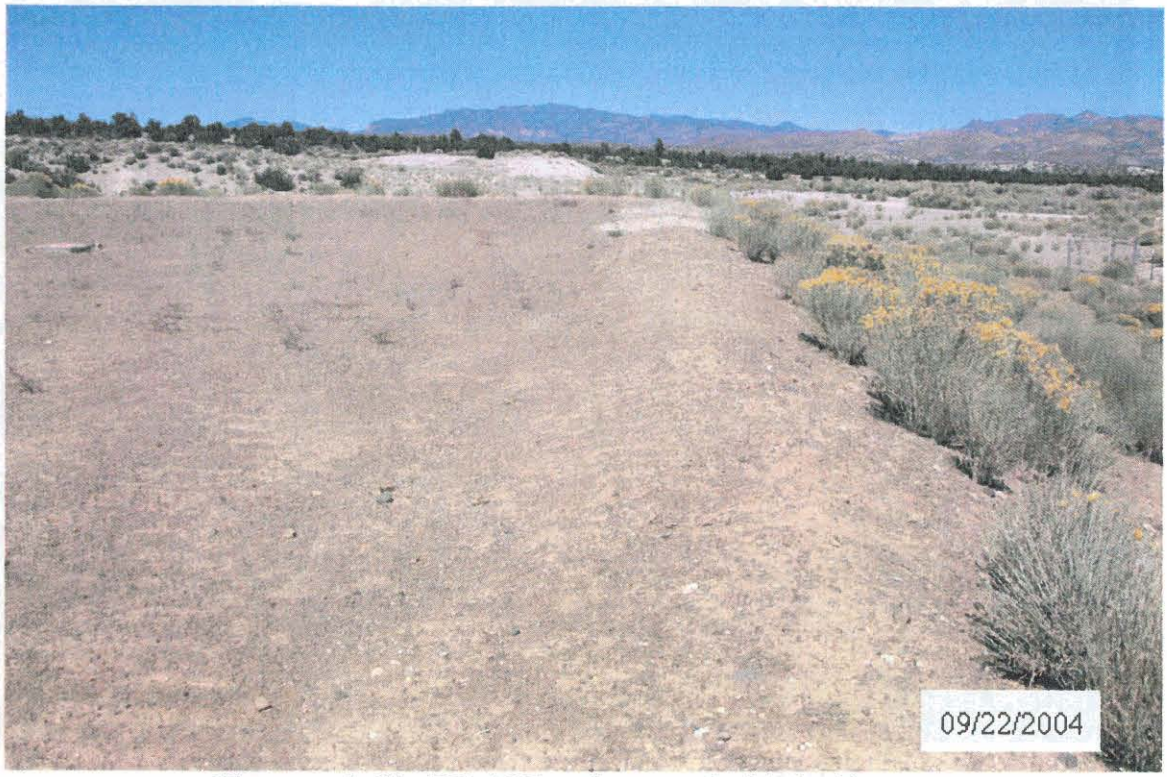


Photograph 24: UC-4 View from center looking west

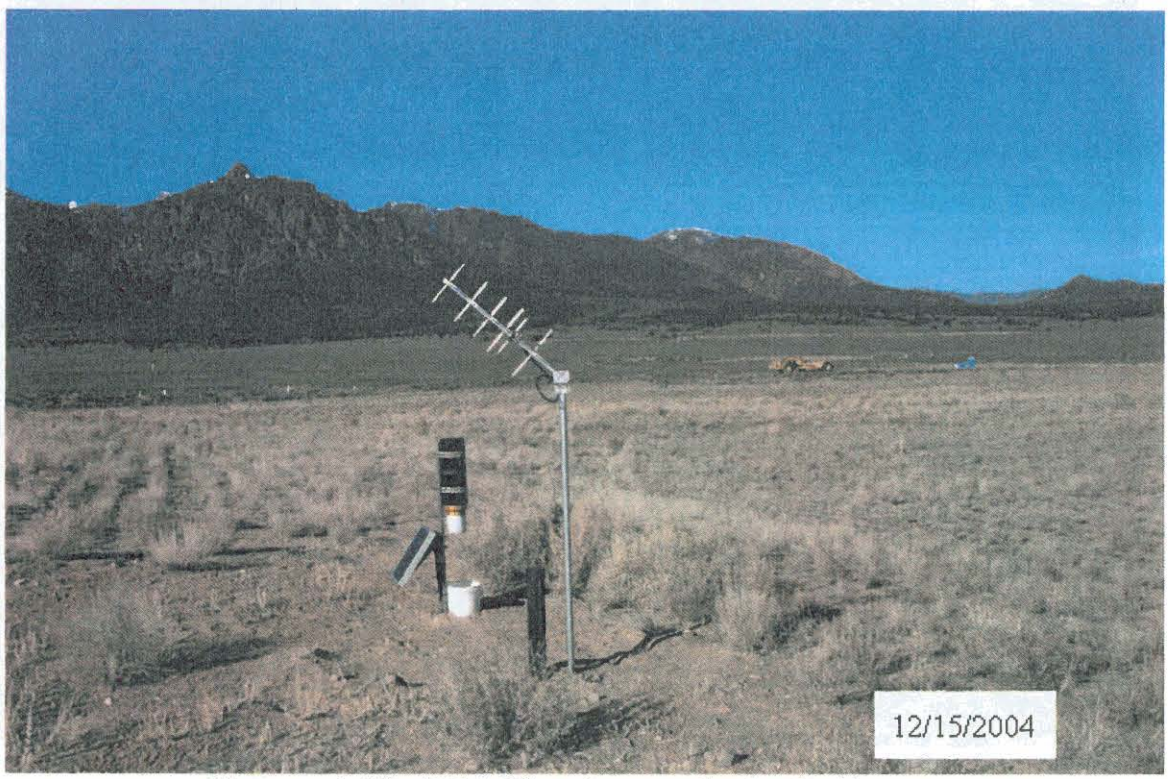
Photograph 25: UC-4 View from center looking east



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



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



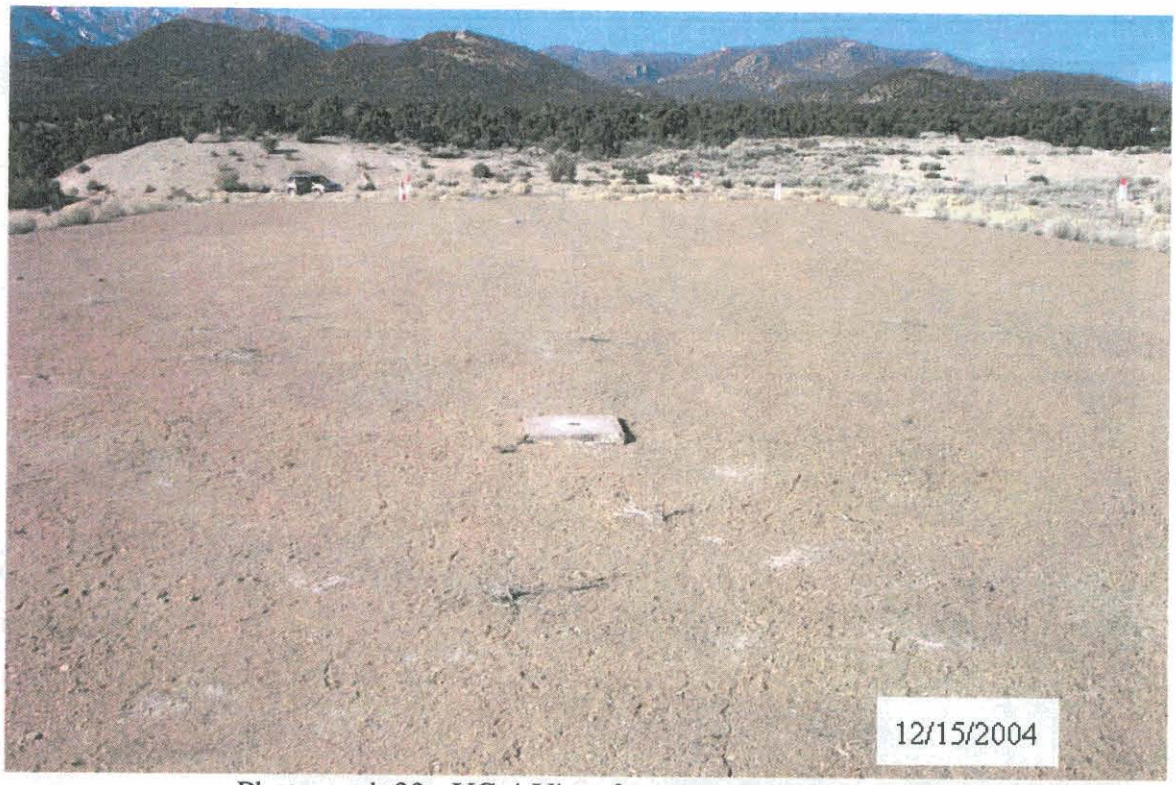
Photograph 28: UC-1 View from south edge looking west

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

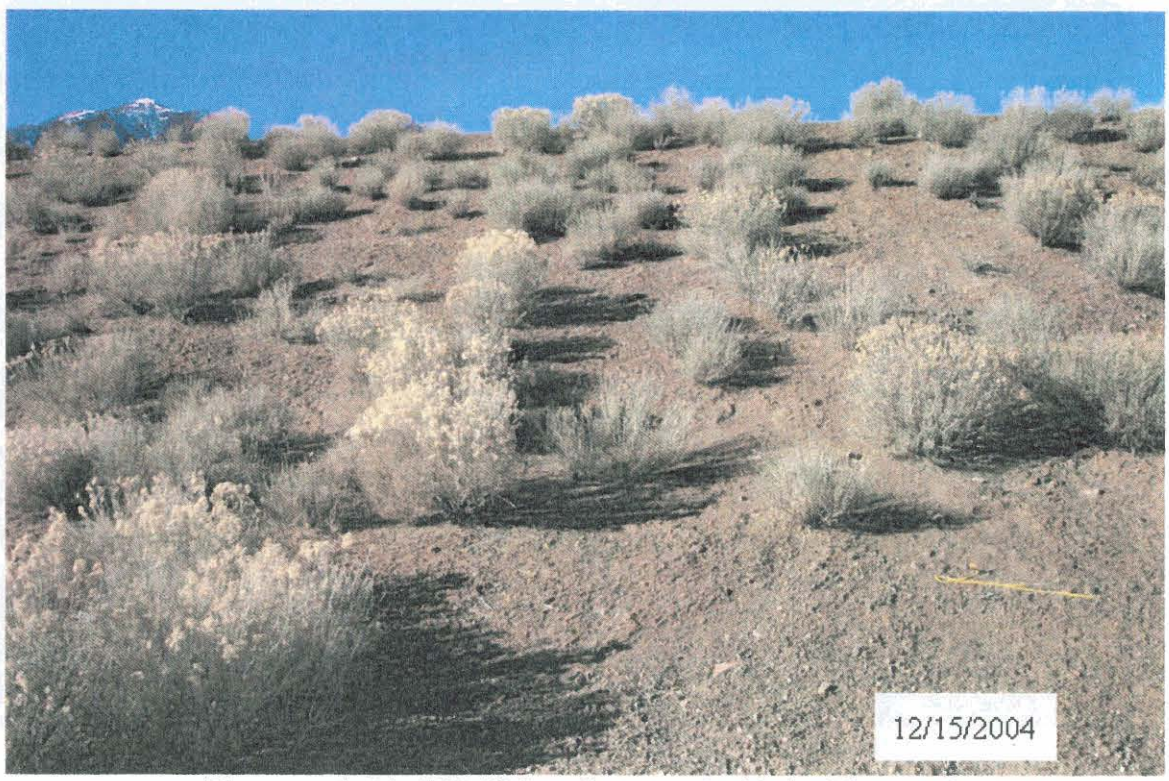
Photograph 32: UC-1 View from south edge looking east



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

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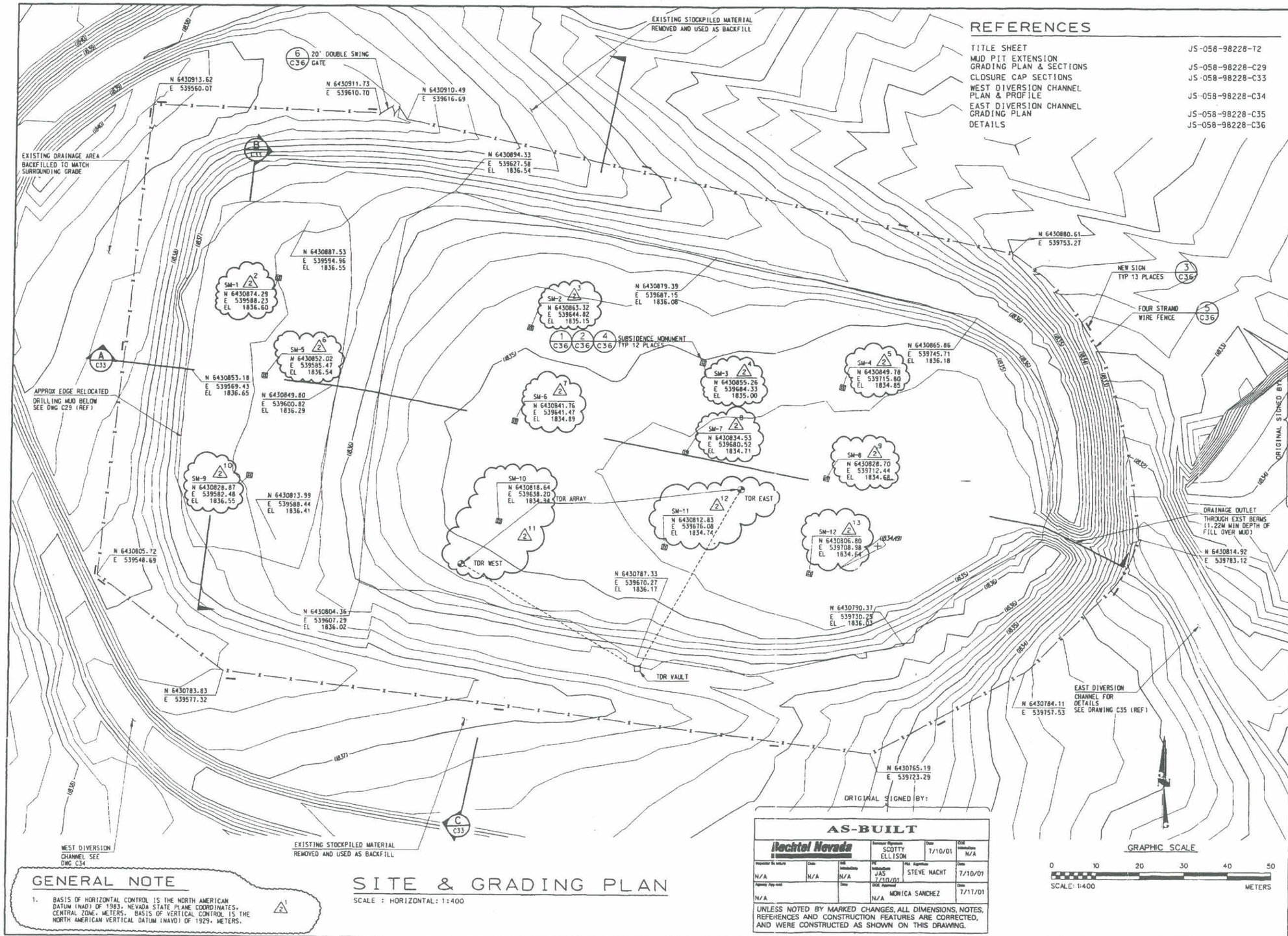


REFERENCES

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

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. 1/2

SITE & GRADING PLAN

SCALE : HORIZONTAL: 1:400

AS-BUILT

Bechtel Nevada

Surveyor Signature: SCOTTY ELLISON			Date 7/10/01	CGS Initials/Date N/A
Inspector Sig./Initials N/A	Date N/A	Sub Initials/Date N/A	PM Initials/Date JAS 7/10/01	PM Signature STEVE MACHT Date 7/10/01
Agency App.-Initial N/A		Date	GCE Approval N/A MONICA SANCHEZ	Date 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.

REV	DESCRIPTION	DRAWN	CHECKED	APPROVED	PROJ ENGR	PROJ MGR	DATE
2	ADDED GENERAL NOTE PER NDEP REQUEST	JAS	JAS	JAS	JAS	JAS	06
1	REVISED & REDRAWN AS-BUILT DATED 4/16/01	JAS	NDJ	JAS	JAS	SK	03
0	ISSUED FOR CONSTRUCTION 04/05/00						

REV	DATE	REVISION DESCRIPTION

2	4/5/00	
1	4/6/00	
0	4/7/00	

DESIGNED NDJ	SUBMITTED BENTEL NEVADA	ACTIVITY CODE C80013BB
DRAWN NDJ	K. M. SCHECHTER	PROJECT ALPH NO N/A
CHECKED JAS	MICHAEL SHOTTON	PROJECT NUMBER 98228A58
EVITR N/A	DEPT OF ENERGY PROJECT ENGINEER	MONICA SANCHEZ
MAP REF NO. N/A		

CENTRAL NEVADA TEST AREA — AREA 58
CAU 417 CLOSURE
CLOSURE CAP
SITE & GRADING PLAN

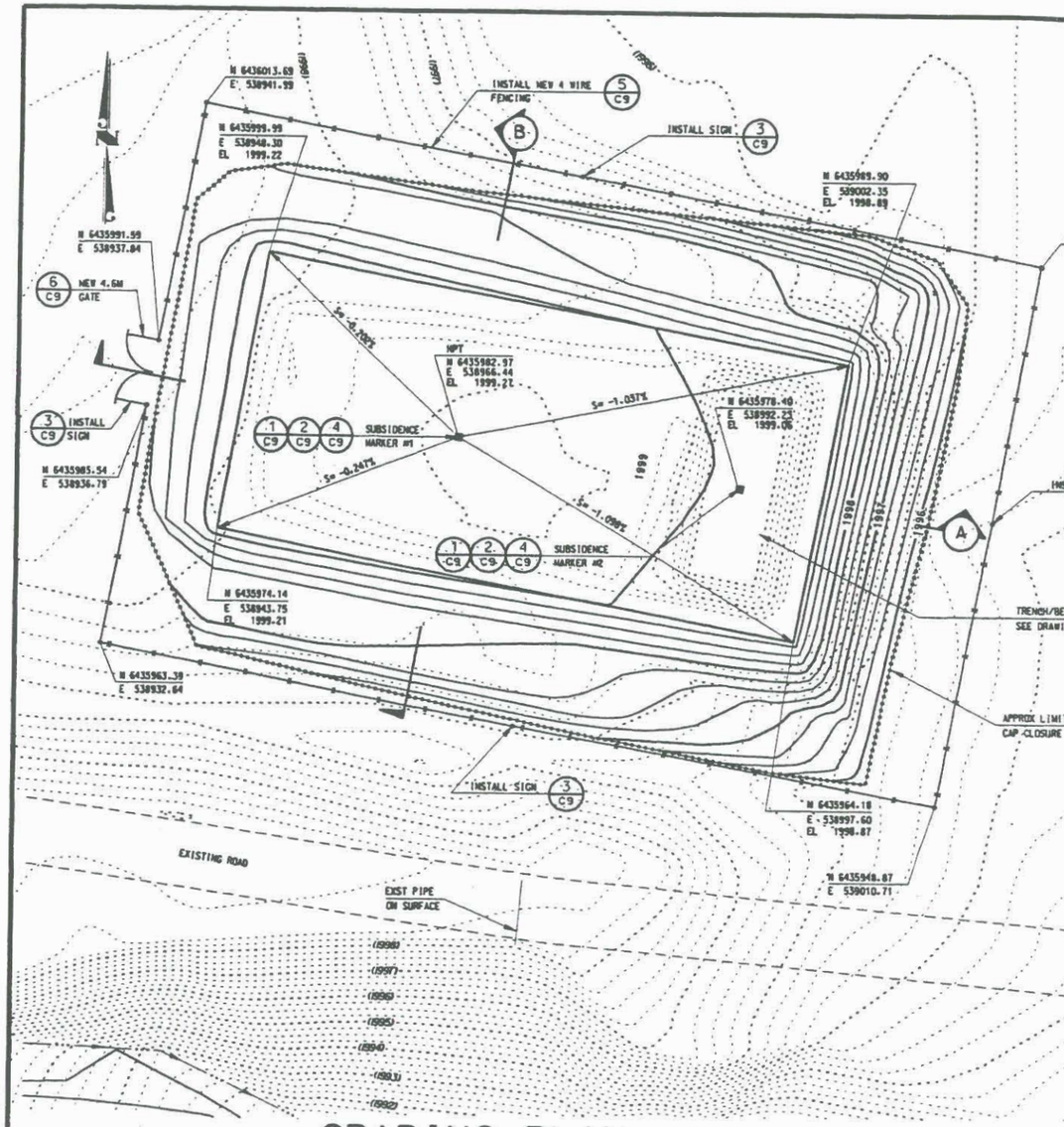
U.S. DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE
LAS VEGAS, NEVADA

Bechtel Nevada
P.O. BOX 98521 LAS VEGAS, NV 89193-8521

DRAWING NUMBER
JS-058-98228-C32
SHEET OF REV 2

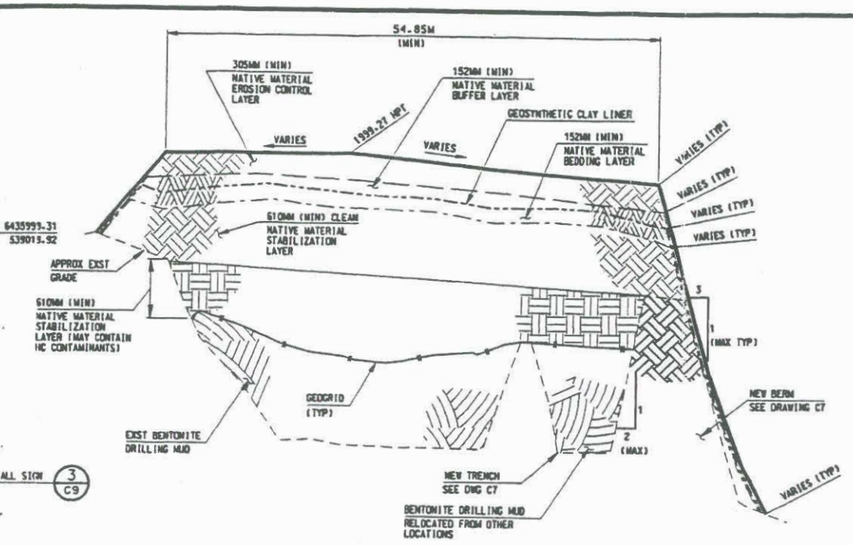
07/17/2003 12:06:02 PM g:\cgn\98228c58\cad_data\ucf\Option B\c32.dgn

DRAFT REVISION - FOR INFORMATION ONLY



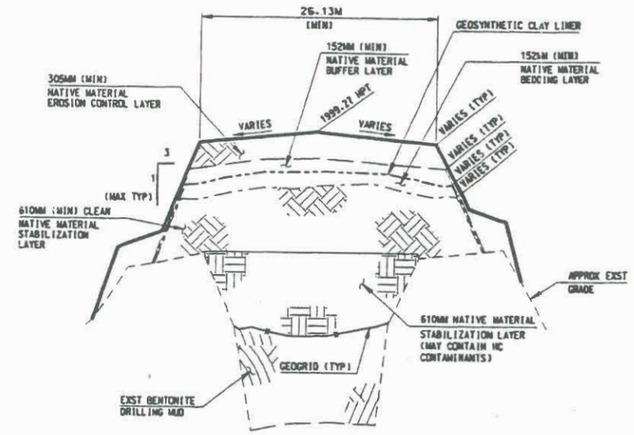
GRADING PLAN

SCALE : 1:250
CONTOUR INTERVAL = 0.25M



SECTION A

SCALE : HORIZONTAL: 1:300
VERTICAL : 1:30



SECTION B

SCALE : HORIZONTAL: 1:300
VERTICAL : 1:30

REFERENCES

TITLE SHEET	JS-058-99228-T1
MUD PIT EXTENSION SITE & GRADING PLAN	JS-058-99228-C7
DETAILS	JS-058-99228-C9

GENERAL NOTE

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.

AS-BUILT

Bechtel Nevada

Surveyor Signature: SCOTTY ELLISON		Date: 7/10/01	CGS Initials/Date
Inspector Signature: N/A	Date: N/A	RSS Initials/Date: N/A	PE Initials/Date: JAS 7/10/01
PM Signature: STEVE NACHT	Date: 7/10/01	Appendix Approved: N/A	Date: N/A
DOE Approval: MONICA SANCHEZ	Date: 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.

GRAPHIC SCALES

0 .3 .6 .9 1.2 1.5 1.8 2.1 2.4 2.7 3.0 3.3 3.6 METERS — SCALE 1:30

0 3 6 9 12 15 18 21 24 27 30 33 36 METERS — SCALE 1:300

0 10 20 30 METERS — SCALE 1:250

REV	DATE	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED
2		ADDED GENERAL NOTE PER NDEP REQUEST	JAS	NOJ	JAS
1		FINAL AS-BUILT DATED 4/16/01	GAS	N/A	KMS SM
0		AS-BUILT DATED 11/8/99	BF	JAS	KMS
		ISSUED FOR CONSTRUCTION 07/30/99			

ORIGINAL MYLAR SIGNED BY:

SUBMITTED BECHTEL NEVADA: DCP/E. LANER — DATE 7/27/99
CONCURRENCE: MICHAEL SHOTTON, DEPT OF ENERGY PROJECT ENGINEER — DATE 7/29/99
APPROVED: MICHAEL O. GIBLIN — DATE 7/30/99
PROJECT NO. 98228A58 — ACTIVITY CODE 5930/0004

CENTRAL NEVADA TEST AREA — AREA 58
CAU 417 REMEDIATION
MUD PIT UC4-C CLOSURE
CLOSURE CAP
GRADING PLAN & SECTIONS

U.S. DEPARTMENT OF ENERGY — NEVADA OPERATIONS OFFICE, LAS VEGAS, NEVADA — Bechtel Nevada

DRAWING NUMBER: JS-058-98228-C8

DRAFT REVISION - FOR INFORMATION ONLY

APPENDIX C

VEGETATION MONITORING REPORT

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Revegetation Success Monitoring

Central Nevada Test Area
Corrective Action Unit 417

Field Work Completed on
June 2, 2004

Report prepared
by
Bechtel Nevada - Ecological Services

August 2004

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Introduction

Corrective Action Unit (CAU) 417 is located at the Central Nevada Test Area (CNTA) in the Hot Creek valley of central Nevada. Hydrocarbon-impacted drilling mud and miscellaneous materials were cleaned up at several Corrective Action Sites in the summer and fall of 2000. A soil cover was constructed over the Central Mud Pit (CMP) at UC-1, and a fence was installed around its perimeter. The fenced area 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 CMP 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 CMP cap.

The first evaluation of the success of the revegetation was a subjective evaluation conducted in July 2001 that determined if germination had occurred and if some remedial action was needed. Quantitative estimates of plant cover and density began in October 2001 and have continued annually. The latest monitoring occurred on June 2, 2004. Both vascular plant cover and plant density measurements were taken along permanently marked transects located on revegetated areas and adjacent undisturbed native vegetation.

Methods

Transect Locations

Vegetation is sampled along permanently-marked transects. Two transects are located on the CMP cap inside the fence. One begins in the northwest corner of the fenced area and extends in a southeasterly direction. The other starts in the center near the southern edge, extends east for about 60 meters (m) then angles back to the northwest for 40 m. The other three transects are located outside the CMP fence. Each transect is 80 m in length. One is directly south of the CMP and starts on the eastern edge of the area and parallels the fence. The second parallels the fence bordering the western edge of the CMP. The third is located across the diversion channel to the far south, starting at the eastern edge of the site and traversing the site almost directly west.

An additional transect was established as a reference area in 2003 in an undisturbed native plant community located north of the main access road. Data collected from this transect are used as a standard for evaluating revegetation success. The starting point for the reference transect is at Universal Transverse Mercator (UTM) coordinates 4276177N, 568696E. The ending UTM coordinates are 4276269N and 568649E. The transect starts on the east and continues in a northwest direction for 100 m.

Sampling

In 2001 and 2002, plant cover was estimated by ocularly estimating the amount of cover within square meter quadrats located at intervals along five transects. Quadrats were placed along each transect, and the amount of plant cover was estimated. Cover estimates were averaged for each transect. In 2003 and 2004, a cover point projection device was used to estimate plant cover by ocularly projecting points downward. The reader then records the type of ground cover (plant species, bare ground, litter or rock) bisected by the crosshairs. The device is placed at regular intervals along each transect. At each sampling location, four points are projected at approximately 90-degree arcs. Percentage cover for each transect is determined by summing the number of points for each cover class and dividing by the total number of points projected.

Plant density (the number of individual plants per square meter [m^2]) is estimated by placing meter-square quadrats at five-meter intervals along each transect. At each sample location, the number of individual plants found within the quadrat boundaries is recorded by species. The data are then averaged to determine plant density.

Plant diversity is an indication of the species richness of the area and is derived from the density data. Plant diversity is calculated by averaging the number of different plant species found within each quadrat.

2004 Monitoring Results

UC-1 CMP (Fenced Area)

Total plant cover declined slightly this year after showing a steady increase from March 2002 to June 2003 (Table 1). There was a decrease in both shrub and grass cover. Grass cover has shown a steady decline since September 2002. Shrub cover increased from September 2002 to June 2003, but decreased this past year. Forb cover is the highest recorded to date.

Table 1. Plant cover on UC-1 CMP (fenced area) and reference area

	Oct '01	Mar '02	Sept '02	June '03	June '04	Reference
Shrub	24.5	19.3	23.7	26.0	21.3	21.0
Grass	2.3	2.2	3.2	2.0	1.3	3.0
Forb/Annuals	0.3	0.1	0.1	0.0	0.6	1.0
Total Plant Cover	27.1	21.6	26.5	28.0	23.2	25.0
Bare Ground	72.9	56.0	50.3	30.0	46.9	49.0
Litter	0.0	22.4	22.7	42.0	30.0	26.0

Plant density continues to decrease. Both shrub and grass density decreased by approximately 25 percent from 2003 (Table 2). The density of fourwing saltbush was approximately the same as in 2003, but the other species (big sagebrush, rubber rabbitbrush, and squirreltail) decreased by approximately 40 percent. Indian ricegrass decreased by 25 percent and Douglas' rabbitbrush by 15 percent. The density of unseeded species has shown an increase each year.

Table 2. Plant density (plants/m^2) on UC-1 CMP (fenced) and the reference area

	Oct '01	Mar '02	Sept '02	June '03	June '04	Reference
Artemisia tridentata	6.8	6.9	5.6	6.6	4.0	1.9
Atriplex canescens	10.8	10	6.1	5.3	5.5	0
Chrysothamnus viscidiflorus	4.5	5.7	3.7	5.8	4.9	0.4
Ericameria nauseosa	15.3	19.2	13.1	8.2	4.7	0
Achnatherum hymenoides	5.1	4.5	4.4	3.1	2.3	0
Aristida purpurea	0.1	0	0	0	0	0
Elymus elymoides	1.5	6.4	4	0.7	0.4	0.9
Hesperostipa comata	0	0	0	0	0	0.3
Pleuraphis jamesii	0	0	0	0	0	4.1
Shrubs	37.4	41.8	28.5	25.9	19.1	2.3
Grasses	6.7	10.9	8.4	3.8	2.7	5.3
Forbs/Unseeded	0	0	0.1	0.2	0.3	3.3
Total Plant Density	44.1	52.7	37.0	29.9	22.1	10.9

Scientific names of plants are given in Appendix C.1.

Plant diversity, like plant density, has declined each year. The number of shrub species remained relatively constant through June 2003 (Table 3), but declined by approximately 15 percent in 2004. The same is true for the number of grass species. There was a 25 percent decrease in the number of grass species from 2002 to 2003 and a 38 percent decrease from 2003 to 2004.

Table 3. Plant diversity on UC-1 CMP (fenced)

	Oct '01	Mar '02	Sept '02	June '03	June '04	Reference
Avg. # spp/quad	5.5	5.8	5.5	5.0	3.9	3.9
Shrubs	3.8	3.9	3.8	3.7	3.1	1.1
Grasses	1.7	1.8	1.8	1.3	0.8	1.4
Forbs/Unseeded	0	0	0	0.1	0.2	1.5

Adjacent Disturbances (Unfenced Area)

Both shrub and grass cover decreased from June 2003 to June 2004 on disturbed areas adjacent to the CMP (Table 4). These areas are not fenced, and young plants trying to establish the first couple years after seeding were browsed heavily. Plant cover was dangerously low in March 2002 but increased to a high of 20 percent in June 2003 before dropping slightly to 16.7 percent this year. Shrubs decreased by about 20 percent, and there was only half as much grass cover this year compared to last year.

Table 4. Plant cover on adjacent disturbances (unfenced area)

	Oct '01	Mar '02	Sept '02	June '03	June '04	Reference
Shrub	10.3	2.2	14.4	19.0	15.3	21.0
Grass	0.1	0.1	0.3	1.0	0.5	3.0
Forb/Annuals	0	0	1.1	0.0	0.9	1.0
Total Plant Cover	10.4	2.3	15.8	20.0	16.7	25.0
BareGround	89.6	78.2	69.7	39.0	57.6	49.0
Litter	-	19.5	14.5	41.0	28.7	26.0

Overall plant density on adjacent disturbed areas decreased slightly from 2003 to 2004 (Table 5). There was approximately a 10 percent increase in grass density and an increase in the number of unseeded species, but shrub density declined by about 25 percent. Douglas' rabbitbrush density increased from 2003 to 2004, but the density of the other three seeded species (big sagebrush, fourwing saltbush, and rubber rabbitbrush) all declined. Rubber rabbitbrush experienced the greatest decrease in density. Indian ricegrass declined by about 40 percent, and squirreltail grass increased by about the same percentage. The density of unseeded annual forbs and grasses increased for the third year in a row.

Table 5. Plant density (plants/m^2) on adjacent disturbances (unfenced)

	Oct '01	Mar '02	Sept '02	June '03	June '04	Reference
Artemisia tridentata	2.5	0.7	0.5	0.4	0.3	1.9
Atriplex canescens	23.7	7.7	9.9	9.5	7.2	0
Chrysothamnus viscidiflorus	0.3	0.2	0	0.1	0.2	0.4
Ericameria nauseosa	1.5	0.5	2	1.9	0.9	0
Achnatherum hymenoides	0.2	1.2	0.2	0.5	0.3	0
Aristida purpurea	0	0	0	0	0	0
Elymus elymoides	0	1.8	0.2	1.5	2.1	0.9
Hesperostipa comata	0	0	0	0	0	0.3
Pleuraphis jamesii	0	0	0	0	0	4.1
Shrubs	28	15.2	12.3	11.8	8.6	2.3
Grasses	0.2	5.8	0.4	2.1	2.4	5.3
Forbs/Unseeded	0	0	1.6	2.7	4.0	3.3
Total Plant Density	28.2	12.1	14.3	16.6	15.0	10.9

Scientific names of plants are given in Appendix C.1.

There were a fewer number of different plant species on the adjacent disturbed areas this year compared to previous years (Table 6). There were fewer shrub, grass, and unseeded annual species than in June 2003.

Table 6. Diversity of seeded species on adjacent disturbances (unfenced area)

	Oct '01	Mar '02	Sept '02	June '03	June '04	Reference
Avg. # spp/quad	2.5	3.1	2.3	2.6	1.9	3.9
Shrubs	2.4	1.9	2.0	1.9	1.5	1.1
Grasses	0.1	1.2	0.3	0.7	0.5	1.4
Forbs/Unseeded	0	0	0.3	0.5	1.0	1.5

Discussion

Trends of Vegetation

The vegetation on the CMP and adjacent disturbed areas is becoming well established. The amount of total plant cover appears to have stabilized over the last couple years (Figure 1). Plant cover on the both the CMP and the adjacent disturbed areas was less this year than was measured on the reference area, but the difference is not significant. The reduction in cover is probably a result of several factors with the most obvious being the continued effects of below normal precipitation. More precipitation was received this growing season than in the previous two seasons; however, the

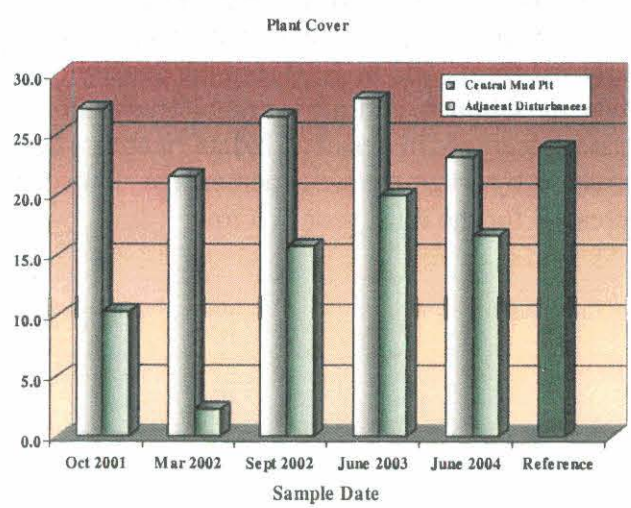

Figure 1. Total plant cover from 2001 to 2004 on the CMP, adjacent disturbances, and reference area

timing of the precipitation did not favor perennial plant growth. Another contributing factor is the decrease in plant density. In the revegetation process, a decline in plant density is anticipated as is an associated increase in plant cover. Basically, there are fewer plants competing for the same resources. However, the lack of adequate moisture again this year did not favor plant growth, although there were fewer plants competing for the little moisture that was received. The decrease in plant cover from 2003 to 2004 was 17 percent for the CMP and adjacent disturbed areas. Cover on the adjacent disturbed areas continues to be less than on the CMP. In 2003 and 2004, cover has increased to about 72 percent of the soil cap on the CMP. This is an improvement compared to plant cover in the spring of 2002, when it was critically low and represented about 10 percent of the cover inside the fence.

The decreases in plant density suggest that a percentage of the plants are dying annually as resources become more limited. Plant density has declined every year since the site was revegetated in the fall of 2000. However, plant density on these revegetated areas is still almost double the density of plants found in the native plant communities (Figure 2). There has been a 20 to 30 percent reduction in the density of seeded plants on the CMP every year since March 2002. On the adjacent disturbed areas that were seeded but not fenced, plant density is lower, and since March 2002, it has decreased by 5 percent. Changes in plant density have ranged from a low of 12.1 plants/m^2 in March 2002 to a high of 16.6 plants/m^2 in 2003. Although plant density was only 15.0 plants/m^2 in 2004, 30 percent lower than on the CMP, there are still more plants per unit area than in the native plant community. The rate of decline in plant density has been greater on the CMP, but after four years plant density is still double in the surrounding native plant communities.

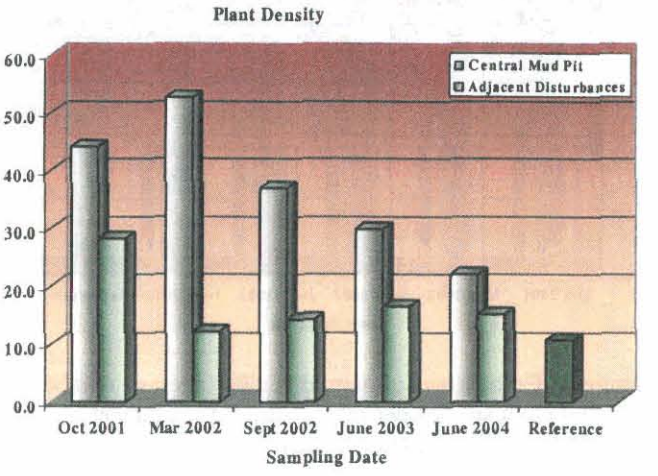

Figure 2. Comparison of plant density on the CMP, adjacent disturbed areas. and reference area

Plant diversity, which is another measure of the vigor of the vegetation, continues to be higher on the CMP compared to the native vegetation (Figure 3). All of the shrubs either seeded or planted onto the site are established on the CMP. Outside the fence, plant diversity is not as good. As seeds were germinating and young seedlings tried to root and become established, they were quickly exposed to herbivores, and many young seedlings of big sagebrush, rabbitbrushes, and Indian ricegrass did not survive. Only fourwing saltbush seemed to survive, even though it was also severely browsed. Fourwing saltbush has managed to withstand the pressures of herbivores and drought the last couple years, which has not been the case for the other species that were seeded. As a result, there are about half as many plant species on adjacent disturbances as there are on the CMP. Many plants on the CMP 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 may improve. In 2004,

there are as many species on the revegetated areas as there are in the native plant community. The composition is different between the two sites. There is a near equal mix of perennial shrub, perennial grass and herbaceous species in the native plant community. On the CMP there are three times as many shrubs as there are grasses and the contribution of herbaceous species is negligible, although the later category has increased the last couple years.

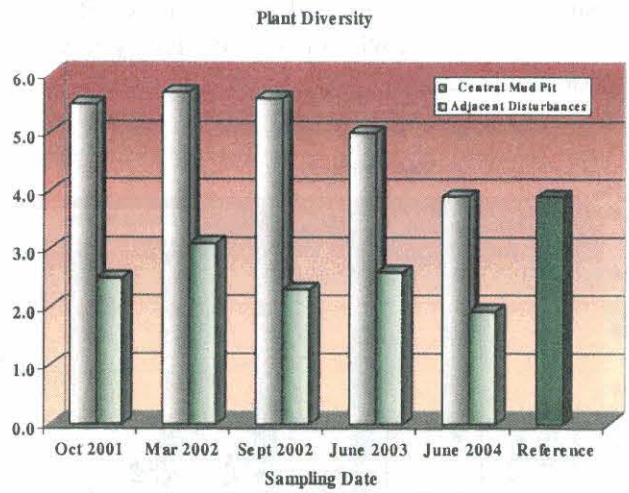

Figure 3. Comparison of plant diversity (average number of different plant species per m^2) on the CMP, adjacent disturbed areas, and reference area.

Revegetation Success

The success of revegetation efforts at CAU 417 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. Typically, such comparisons are made after plants have had time to establish and persist, which for this area could be as early as five years after reseeding. The term "similar" is commonly defined as a percentage of the cover and density measured on the reference area. A percentage for CAU 417 has not been established.

Based on plant density, both the CMP and adjacent disturbances 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 (Tables 2 and 4) than on the reference area. Plant cover on the CMP was 96 percent of plant cover in the native plant community, which is down from the 112 percent in 2003. Cover on the disturbed areas was only 64 percent, also down from 77 percent in 2003. Even though plant cover may be lower in 2004 than in 2003, it is still in good condition considering that precipitation has been below normal since the first growing season in the spring of 2001.

Overall, the plant community is becoming well established on the CMP and on the adjacent disturbed areas (See Figures 4a through 4e). Several species have flowered and set seed. Big sagebrush, fourwing saltbush, two species of rabbitbrush, Indian ricegrass, and squirreltail grass are common on the CMP. Fourwing saltbush, rabbitbrush, and squirreltail grass dominate the plant cover on adjacent disturbed sites and appear to have recovered from earlier browsing. These conditions are encouraging considering the drought conditions the area is experiencing. Based on plant cover and density, the revegetation process is successful.

Recommendations

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 on the CMP. Changes in plant cover and/or plant density should be evaluated periodically to ensure the presence of a viable plant community.

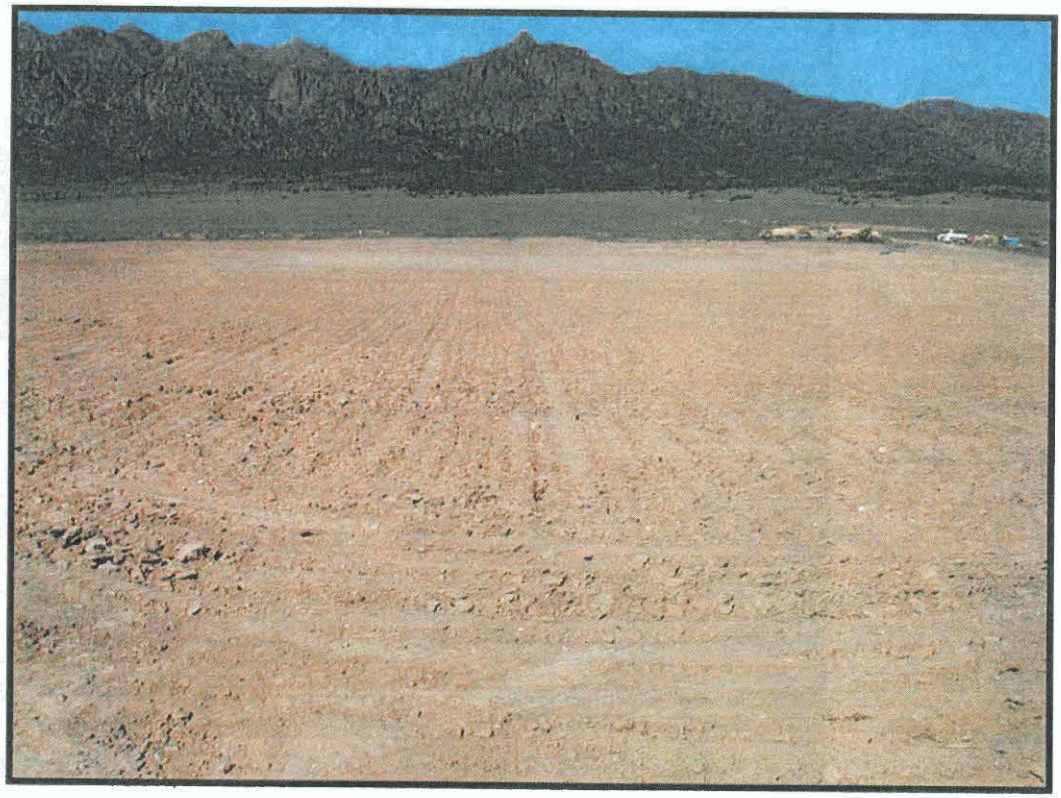

**Figure 4a.
UC-1 CMP, prior to revegetation, Fall 2000**

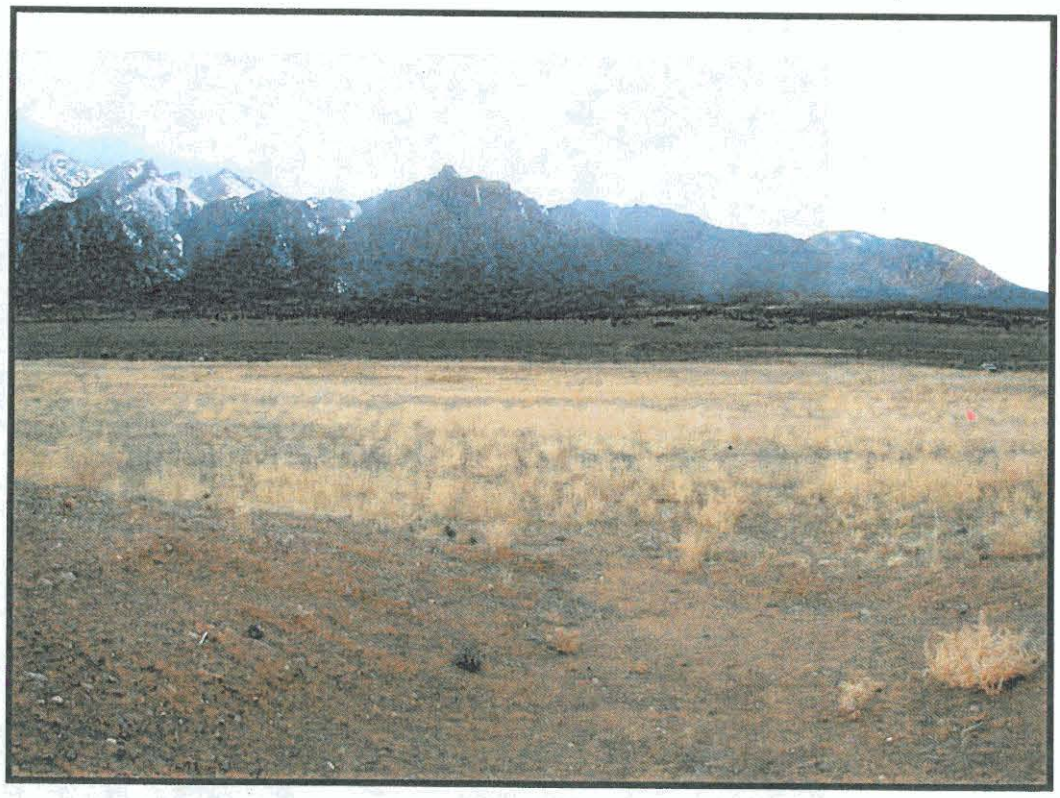

**Figure 4b.
UC-1 CMP, one year after revegetation, Fall 2001**

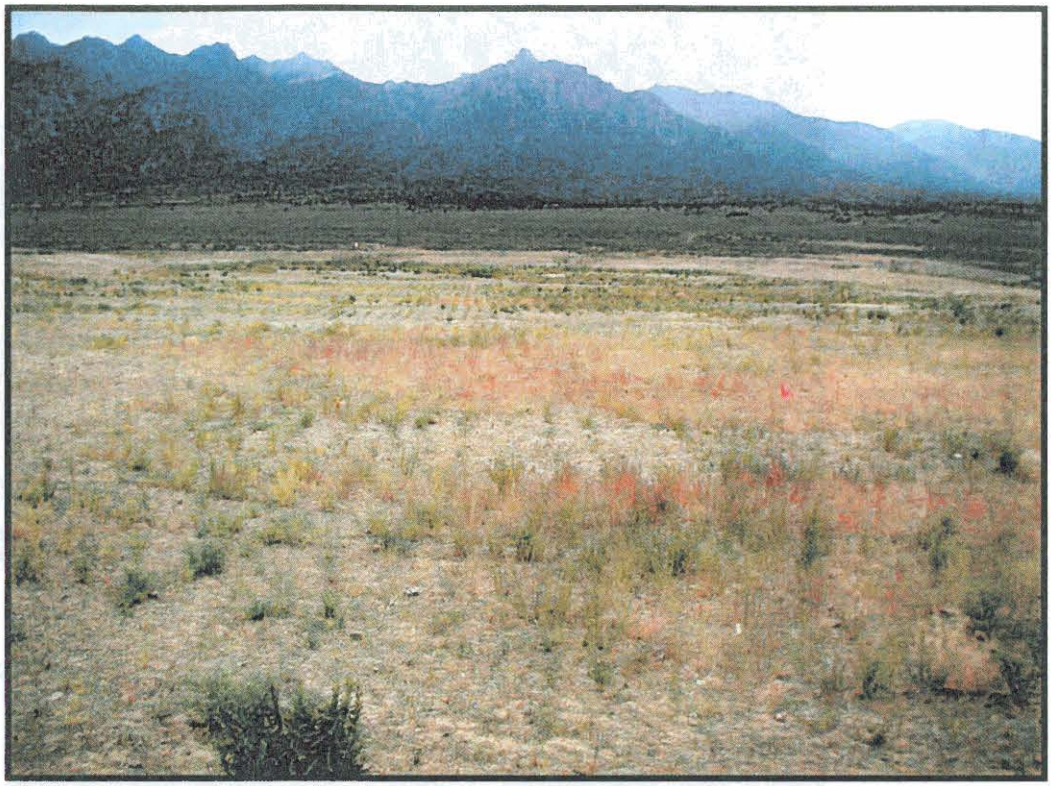

**Figure 4c.
UC-1 CMP, two years after revegetation, Fall 2002**

**Figure 4d.
UC-1 CMP, three years after revegetation, June 2003**

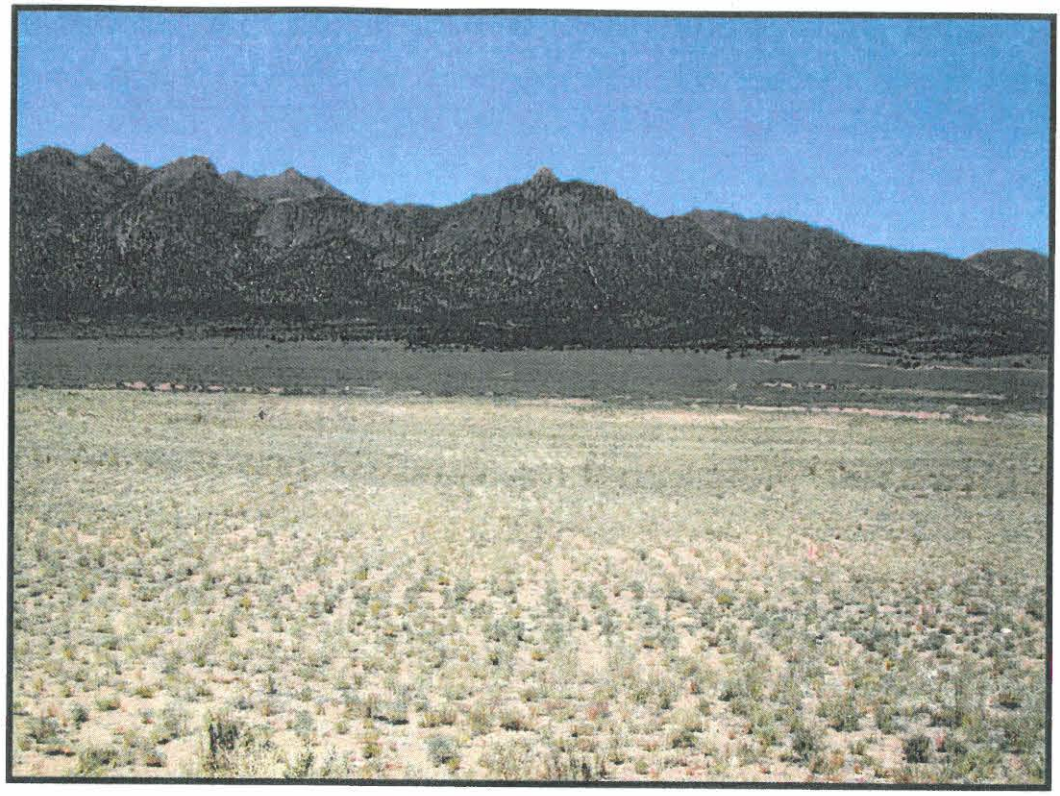

**Figure 4e.
UC-1 CMP, four years after revegetation, June 2004**

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Appendix C.1

Plant Species List

Scientific Name	Common Name
Artemisia tridentata	Big Sagebrush
Atriplex canescens	Fourwing Saltbush
Chrysothamnus viscidiflorus	Douglas' Rabbitbrush
Ericameria nauseosa	Rubber Rabbitbrush
Achnatherum hymenoides	Indian Ricegrass
Aristida purpurea	Threeawn
Elymus elymoides	Squirreltail
Hesperostipa comata	Needle & Thread
Pleuraphis jamesii	Galleta

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APPENDIX D

PUMP TEST AT HTH-2 WELL DOCUMENTATION

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PUMP TEST AT HTH-2 WELL

Included in the scope of work for Corrective Action Unit 417 during Fiscal Year 2004 were activities to verify the operability of the submersible pump that hangs within the HTH-2 well. The pump had not been started since closure activities ended in 2000. A source of water for drilling activities scheduled for Fiscal Year 2005 was needed, and a determination as to whether the pump would need to be replaced was required.

The HTH-2 well is located approximately 540 meters (m) (1770 feet [ft]) south-southwest of the UC-1 Central Mud Pit at Nevada State Central Zone coordinates N 1,411,929.43 ft, E 629,587.75 ft, and elevation 6024.80 ft. The well has a total depth (TD) of 305 m (1000 ft) below ground surface (bgs). Static water level is at 174 m (570 ft) bgs, and the well is cased with 9 5/8-inch casing to 154 m (504 ft) bgs, and slotted liner from 174 m (504 ft) to TD. Drilled during the testing days of the late 1960s, the well was one of four kept open for use in the long-term hydrologic monitoring program after testing had ceased and other wells were sealed and abandoned. In June of 1999, a Grundfos submersible pump powered by a 30 horsepower (hp), 460 volt, three-phase Franklin motor was installed at 235 m (770 ft) bgs to provide construction water for closure field activities. The pump was left in the well after completion of closure activities for use by the U.S. Environmental Protection Agency (EPA) for hydrologic sampling. However, the pump has not been successfully started in the intervening years since the completion of field work.

It was suspected that the 30 kilowatt (kW) generator used by the EPA for their sampling activities was not energetic enough to start the pump. Documentation for the Franklin motor recommended a 100 kW generator to start a 30 hp pump under 61 m (200 ft) of static head. On September 23, 2004, a 100 kW generator and a pump controller panel were mobilized to the well. Electricians connected the control panel between the generator and downhole pump. The wellhead output was directed to the nearby lined sumps for "containerization" with the use of large diameter fire hose. A representative from the EPA was onsite to collect a water sample if the pump was to prove operational.

The electricians warned that they were measuring significantly less insulation on one of the conductors than was required. Several attempts were made to start the pump, but each time the circuit breaker in the controller panel tripped within a second or two. It was not possible to determine if the fault lay within the electrical cable itself, where the cable joined the pump motor, or within the wiring of the pump. To make that determination, the pump will need to be pulled to the surface. In its current state, the pump was determined to be inoperable. The U.S. Department of Energy, National Nuclear Security Administration Nevada Site Office is looking at options for replacing the pump.

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APPENDIX D.1

FIELD NOTES

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TITLE CAU 417 Pump Test Well HTH-2

Work continued from Page n/a

9/22/04

Personell - Alissa Tibesar (TL) Dana Henry (Teamster)
Shaughn Burnison (TM) Charles Lingenfelter (Lab)
Dudley Emer (TL) Brian Duggan (Pipe fitter)
Paul Brown (Sup) Scott Roadhouse (RCT)
Ruben Cuaron (Elec)
Gary Gardner (Elec)

Visitors - Holly Diaz-Martano (EPA)

Equipment - 100 kW generator
VSD controller

Weather - 8am - 50's, High - upper 60's, sunny, clear

SOW - perform pump test at CAU 417 (CATA) water well - Well HTH-2
- mobe tools/equip. to site
- cordon off work zone
- Inspect pump's surface wiring
- Install temp. control panel
- wire pump to generator & energize (pump 3 well volumes)
- Water sample collection & de-mobe

8 am - Met at Machine shop in TTR to manufacture pipe fitting to attach to wellhead

8:20 am - Departed TTR for CATA

10:10 am - Arrived at HTH-2 Well

performed Tailgate Safety - Discussed SOW, signed PTHR,
Uneven ground, boots & gloves required (no overhead hazards),
Fall potential, pinch points, electrical shock, Lifting, sharp objects

10:20 am - wiring from pump to motor control (panel)
generator & panel remained on low boy truck during operation
Meg the cables (test insulation & electrical integrity of motor)
Grounded the generator, tested the ground wire

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Work continued to Page 15

SIGNATURE			DATE
[signature]			9/22/04
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

TITLE CAU 412 pump Test - Well HTH-2 **PROJECT NO.** **15**

Work continued from Page 14 **BOOK NO.**

10:50 am - connected pump motor to panel and panel to generator

11:00 am - Pipe fitter & laborer arrived with pipe junction to well head & hose

11:10 am - Tested resistance - Should read ∞ Ω, we have ~40Ω (After hook-up)

- probably a leak in the insulation down in well (Maybe)

- Attach phase meter to check rotation of pump - run 30 seconds

11:20 am - unlocked wellhead, attached fitting & hose & ran hose to sump (235 ft from wellhead)

11:25 am - small group of cows migrated across the road

11:45 am - Started generator

- Attached phaser - powered & applied 4 times - breaker tripped immediately 4 times.

- Breaker tripped - short in cable - Shut down generator

- Recommend pull pump & test at ground & attach new cable

12:00 pm - rolled up fire hose, detached pipe junction from wellhead

- disconnected cable from panel

12:15 pm - Crew broke for lunch

12:45 pm - Crew de-mobed site

AJT

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Work continued to Page n/a

SIGNATURE			DATE 9/22/09
DISCLOSED TO AND UNDERSTOOD BY	DATE	WITNESS	DATE

APPENDIX D.2

PHOTOGRAPHS

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Photograph 1: Generator and Pump Control Panel

Photograph 2: H2H-2 Well

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