

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

**October 2010**

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# Contents

Abbreviations.....	iii
Executive Summary.....	v
1.0 Introduction.....	1-1
1.1 Purpose.....	1-1
1.2 Site Location and Background.....	1-1
1.3 Geologic Setting.....	1-2
2.0 Post-Closure Monitoring Requirements.....	2-1
2.1 Site Inspections.....	2-1
2.2 Maintenance and Repair.....	2-1
2.3 Cover Moisture Monitoring.....	2-2
2.4 Cover Moisture Compliance Criteria.....	2-2
2.5 Reporting Requirements.....	2-4
3.0 Site Inspections, Surveys, and Maintenance.....	3-1
3.1 Annual Site Inspection Results.....	3-1
3.1.1 UC-1 Inspection.....	3-1
3.1.2 UC-3 Inspection.....	3-1
3.1.3 UC-4 Inspection.....	3-1
3.2 Subsidence Survey Results.....	3-3
3.2.1 UC-1 Survey.....	3-3
3.2.2 UC-4 Survey.....	3-4
3.3 Vegetation Survey Results.....	3-6
3.4 Precipitation and Soil Moisture Monitoring Results.....	3-6
3.4.1 UC-1 Soil Moisture Results.....	3-6
4.0 Summary, Conclusions, and Recommendations.....	4-1
4.1 Summary.....	4-1
4.2 Conclusions.....	4-2
4.3 Recommendations.....	4-2
5.0 References.....	5-1

## Figures

Figure 1-1. CNTA Location Map.....	1-2
Figure 1-2. CAU 417, CNTA Surface Map.....	1-4
Figure 2-1. UC-1 CMP Cover Monitoring Instrumentation.....	2-3
Figure 3-1. Location of UC-1 Significant Features.....	3-2
Figure 3-2. Location of UC-3 Significant Features.....	3-2
Figure 3-3. Location of UC-4 Significant Features.....	3-3
Figure 3-4. UC-1 Cover Settlement.....	3-4
Figure 3-5. UC-4 West and East Monuments.....	3-5
Figure 3-6. UC-4 Cover Settlement.....	3-6
Figure 3-7. July 1, 2009, through June 30, 2010, Precipitation Data.....	3-7
Figure 3-8. UC-1 Soil Moisture Content, East TDR Nest A.....	3-7
Figure 3-9. UC-1 Soil Moisture Content, East TDR Nest B.....	3-8
Figure 3-10. UC-1 Soil Moisture Content, West TDR Nest A.....	3-8
Figure 3-11. UC-1 Soil Moisture Content, West TDR Nest B.....	3-9

# Appendixes

- Appendix A Inspection Checklists and Photographs
- Appendix B Survey Data
- Appendix C NDEP Correspondence and Record of Review

## Abbreviations

bgs	below ground surface
CAU	Corrective Action Unit
cm	centimeter(s)
CMP	Central Mud Pit
CNTA	Central Nevada Test Area
DOE	U.S. Department of Energy
LM	U.S. Department of Energy Office of Legacy Management
FFACO	Federal Facility Agreement and Consent Order
ft	foot (feet)
in	inch(s)
km	kilometer(s)
m	meter(s)
mi	mile(s)
mm	millimeter(s)
NDEP	Nevada Division of Environmental Protection
SM	subsidence monument
SOARS	System Operation and Analysis at Remote Sites
TDR	time domain reflectometry
VMC	volumetric moisture content

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## Executive Summary

This report presents results of data collected during the annual post-closure site inspection conducted at the Central Nevada Test Area surface Corrective Action Unit (CAU) 417 in June 2010. The annual post-closure site inspection included inspections of the UC-1, UC-3, and UC-4 sites in accordance with the Post-Closure Monitoring Plan provided in the CAU 417 Closure Report (NNSA/NV 2001).

The annual inspection conducted at the UC-1 Central Mud Pit (CMP) indicated that the site and soil cover was in good condition. Three fractures (one new and two smaller fractures at previously existing locations) were identified in the soil cover, indicating that the cover is still settling, and were filled with bentonite chips during the inspection. The vegetation on the soil cover was adequate. No issues with the CMP fence, gate, or subsidence monuments were identified. No issues with the warning signs and monuments at the other two UC-1 locations were identified.

The annual subsidence survey was conducted at the UC-1 CMP and UC-4 Mud Pit C in June 2010. The results of the subsidence surveys indicate that the covers are performing as expected, and no unusual subsidence was observed. However, the two UC-4 subsidence markers have shown increases in elevation over the past year.

A biennial vegetation survey of the UC-1 CMP cover and adjacent areas was not conducted as part of the annual inspection this year but will be performed next year.

Precipitation from July 1, 2009, through June 30, 2010, was slightly less than in the previous year; the total rainfall for this period was 6.9 inches. Soil moisture content data showed that the UC-1 CMP cover is performing as designed, and evapotranspiration is effectively removing water from the cover.

The inspection at UC-3 indicated that the site is in good condition. All monuments and signs showed no displacement or damage, and none have been removed. No other issues or concerns were identified.

The inspection at UC-4 indicated that the site is in good condition. All monuments and signs showed no displacement or damage, and none have been removed.

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## 1.0 Introduction

This report presents data collected during the annual post-closure site inspection conducted by the U.S. Department of Energy (DOE) Office of Legacy Management (LM) at the Central Nevada Test Area (CNTA) surface Corrective Action Unit (CAU) 417. This report has been prepared in accordance with the Post-Closure Monitoring Plan contained in the CAU 417 Closure Report (NNSA/NV 2001) and Federal Facility Agreement and Consent Order (FFACO) (FFACO 1996). Responsibility for environmental site restoration of the CNTA was transferred from the DOE Office of Environmental Management to LM on October 1, 2006.

This report provides an analysis and summary of the annual site inspection and subsidence survey, meteorological information, vegetation survey, and soil moisture monitoring data collected since the last annual inspection in June 2009. In 2010, the annual site inspection was conducted to document the physical condition of the CAU 417 soil covers, monuments, signs, fencing, and restricted-use areas. Subsidence surveys of the UC-1 Central Mud Pit (CMP) and UC-4 Mud Pit C covers were also conducted. In addition, the UC-1 CMP cover is instrumented to monitor the soil moisture conditions within the upper 1.2 meters (m) (4 feet [ft]) of the cover to determine if the cover is performing as designed.

### 1.1 Purpose

The purpose of the post-closure monitoring at CAU 417 is to determine if:

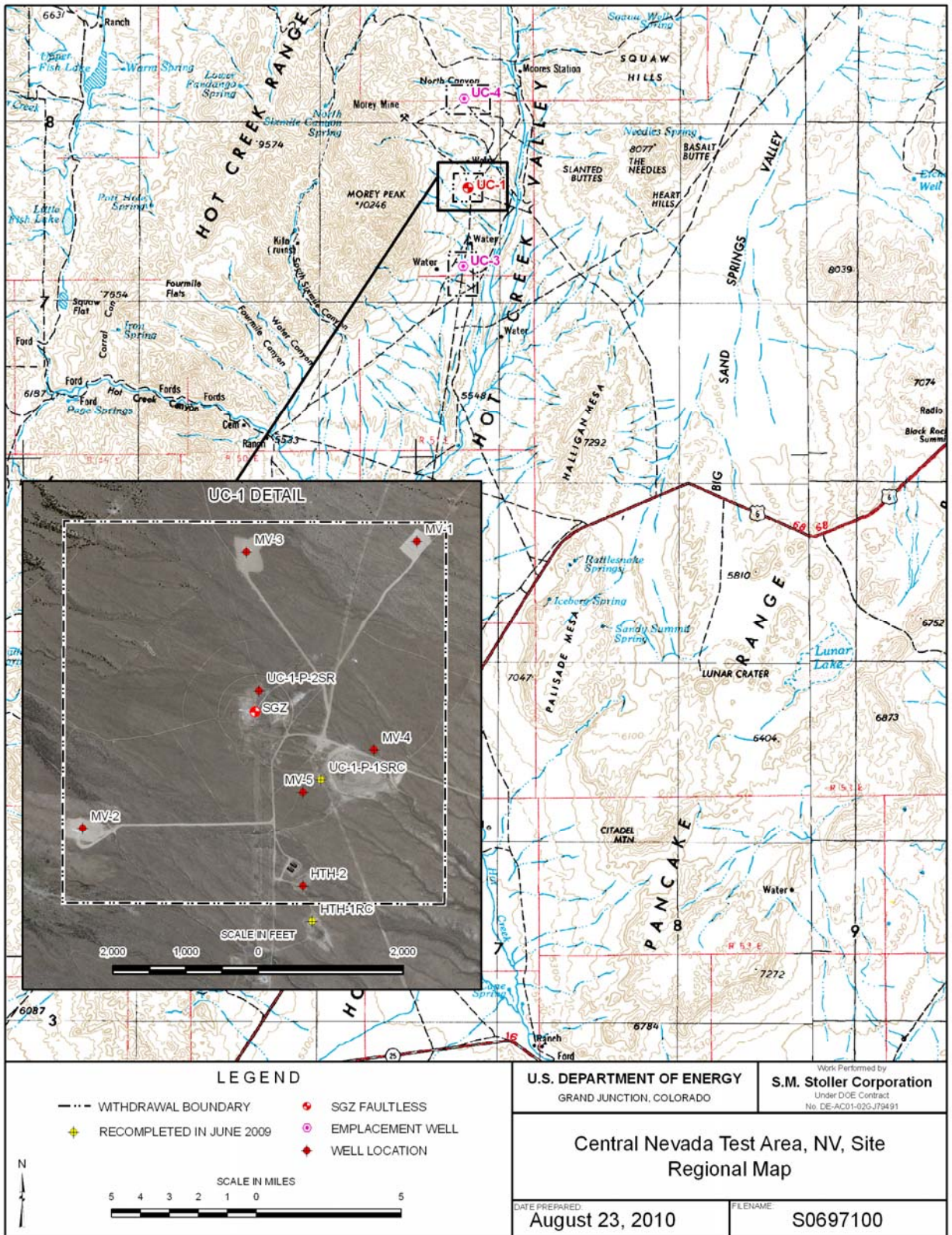
- The UC-1 CMP or UC-4 Mud Pit C cover, fences, or diversion channels need maintenance or repairs;
- The UC-1 CMP or UC-4 Mud Pit C cover is subsiding;
- The UC-1 CMP cover is performing as designed;
- Vegetation on the UC-1 CMP cover is healthy;
- The aboveground monuments or warning signs at UC-1, UC-3, and UC-4 need maintenance or repairs; and
- The administrative controls need modifications.

### 1.2 Site Location and Background

CNTA is approximately 22.5 kilometers (km) (14 miles [mi]) north of U.S. Highway 6 and approximately 137 km (85 mi) northeast of Tonopah in Nye County, Nevada (Figure 1–1). Three emplacement boreholes, UC-1, UC-3, and UC-4, were drilled at CNTA for underground nuclear weapons testing. On January 19, 1968, the Project Faultless underground nuclear test was conducted in borehole UC-1 at a depth of 975 m (3,200 ft) below ground surface (bgs). The other two emplacement boreholes (UC-3 and UC-4) were not used, and no further testing was conducted at CNTA. Boreholes UC-1, UC-3, and UC-4 are located on three separate land withdrawals that range in size from approximately 1 to 1.5 square mi (Figure 1–2). All three land withdrawals are accessible to the public.



suspect because difficulties were encountered during the well's drilling and construction in 1968. Historically, the reported depth to water of 550 ft bgs at the CMP was based on measurements obtained from well HTH-2. Well HTH-2 is outside the down-drop graben block, nearly 1,500 ft southwest of the CMP. Well UC-1-P-1S is inside the down-drop graben block, less than 200 ft west of the CMP. The differing depths to water inside and outside the graben block (northwest and southeast of the southeast bounding fault) were confirmed by the 2009 drilling program. Wells MV-4 and MV-5 drilled through the southeast graben fault and were dual completions with a piezometer inside the graben and a well outside the graben. The depth to water of the piezometers is consistent with that of well UC-1-P-1S, approximately 275 ft bgs. The depth to water of the wells is consistent with that of well HTH-2, approximately 550 ft bgs. Well HTH-1 (outside the graben block) was also recompleted in 2009 with two piezometers (upper and lower alluvial aquifer) and a well (upper volcanic section). The depth to water of both HTH-1 piezometers is approximately 550 ft bgs.



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Figure 1-2. CAU 417, CNTA Surface Map

## 2.0 Post-Closure Monitoring Requirements

### 2.1 Site Inspections

Quarterly inspections were conducted since the site's closure (in 2000) through 2006. Beginning in 2007, post-closure inspections of CAU 417 have been performed annually. The annual site inspection is documented on an inspection checklist, with site photographs and, if applicable, field notes. The post-closure inspection consists of the following:

- Inspecting the UC-1 CMP cover and UC-4 Mud Pit C cover and fencing. This includes walking the entire perimeter of the fence and documenting the condition of the barbed-wire and chicken-wire fencing, warning signs, and entrance gate.
- Inspecting all aboveground monuments, attached warning signs, and affixed survey pins placed at the UC-1, UC-3, and UC-4 sites for signs of wear, disturbance, vandalism, animal burrows, and other damage. Repairing monuments and attached signs during site inspections or, if necessary, later in the calendar year.
- Inspecting the condition of the 2 subsidence monuments (SMs) on the UC-4 cover and 12 SMs on the UC-1 CMP cover. A subsidence survey of all SMs is conducted annually to determine if the covers have subsided.
- Documenting any changes to the covers or fenced areas, including but not limited to the presence of trash and debris inside the fenced areas, animal burrows on the covers or under the perimeter fences, erosion features on the covers or diversion channels, and any change in the health of the UC-1 CMP cover vegetation.
- Documenting the soil water content profile of the UC-1 CMP cover to evaluate whether the cover is performing as designed.
- Biennially reporting on the health and stability of the UC-1 CMP cover vegetation.

### 2.2 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, if conditions requiring major repairs are noted, or if any other problems in critical areas are noted, then issues will be evaluated and reported to the Nevada Division of Environmental Protection (NDEP) within 60 days of detection (in compliance with the FFAO). The following guidelines apply to CAU 417 maintenance and repairs:

- Cracks, settling features, erosion rills, and animal burrows more than 15 centimeters (cm) (6 inches [in]) deep that 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.
- Noncritical cracks, settling features, erosion rills, and animal burrows less than 15 cm (6 in) deep that extend less than 1 m (3 ft) will be repaired during the site inspection visit.
- Damage to the fencing surrounding the UC-1 CMP cover or the UC-4 Mud Pit C cover, warning signs, or monuments will be evaluated and repaired within 90 days of detection.
- Major damage to use-restriction warning signs or monuments will be evaluated and repaired during subsequent site inspections.
- All repair work will preserve the original as-built design and will be documented in the annual Post-Closure Inspection and Monitoring Report.

## 2.3 Cover Moisture Monitoring

The CNTA UC-1 CMP monolayer cover is designed to limit infiltration of moisture into the disposal unit by evapotranspiration from vegetation that was established on the cover. The cover performance is monitored using time domain reflectometry (TDR) sensor data to provide a profile of the water content in the cover. The soil water content profile determines whether the cover is performing as designed and if it is in compliance with the closure plan and agreements.

The soil moisture content is obtained using a Campbell Scientific TDR-100 and recorded by a Campbell Scientific data logger (CR1000) and a radio housed in an instrument vault located just off the southern edge of the cover. The radio transmits data to an on-site telemetry station. Soil moisture data are being recorded twice daily, and are imported into and saved in the System Operation and Analysis at Remote Sites (SOARS) system at LM's Grand Junction office. The post-processing software that SOARS uses automatically produces graphs, creates tables, and backs up data daily.

TDR sensors were buried in the cover at two locations (West TDR and East TDR) during cover construction. At both locations, two TDR sensors were placed below the surface of the cover at the following depths: 0.15, 0.46, 0.76, and 1.07 m (0.5, 1.5, 2.5, and 3.5 ft) (Figure 2–1). The TDR nests are located approximately 48 m (157 ft) northwest and 48 m (157 ft) northeast of the instrument vault.

The TDR probes were calibrated to volumetric moisture content (VMC) using a dry-down method with native soil and full-length cable. The results of the calibration indicated that a site-specific calibration equation should be used instead of the standard Topp equation (Topp et al. 1980). It was also found that long cable lengths and soil conductivities caused the TDR reflection end points to become extremely flat under saturated and near-saturated conditions, resulting in unreliable data in these regions.

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

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

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

## 2.4 Cover Moisture Compliance Criteria

The depth of the deepest TDR soil moisture probe is the point of compliance for the UC-1 CMP cover, which is approximately 1.07 m (3.5 ft) below ground surface. Cover compliance will be based on the soil moisture content of the cover once steady-state conditions are reached. Cover performance modeling presented in the CAU 417 Corrective Action Plan (DOE/NV 2000) predicted that steady-state conditions would be achieved within 10 years of cover construction, which was completed in September 2000.

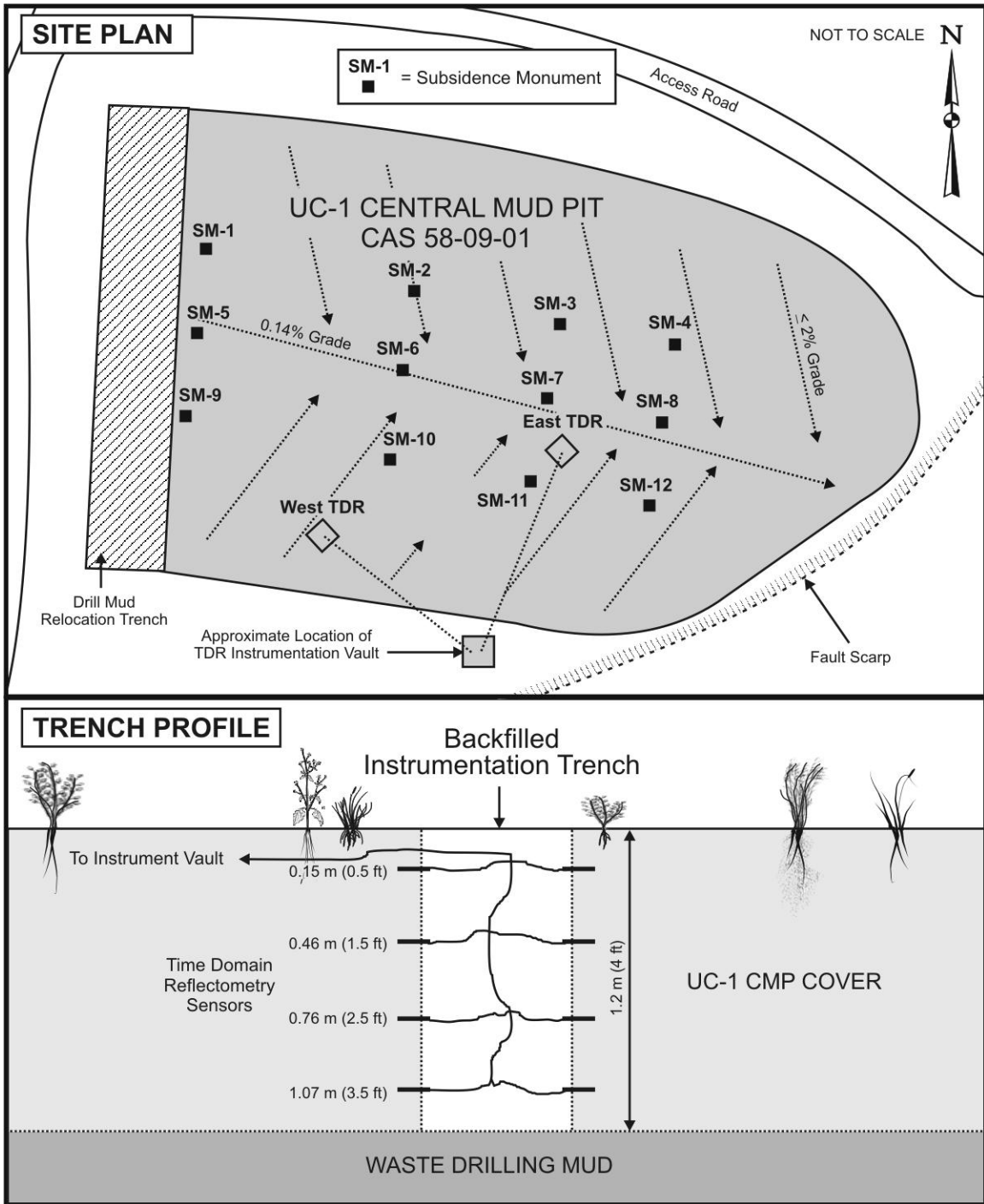


Figure 2-1. UC-1 CMP Cover Monitoring Instrumentation

If soil moisture data indicate that the cover is not operating according to established compliance criteria, NDEP will be notified of the noncompliance within 14 days. After NDEP has been notified of the noncompliance, LM will submit a work plan to NDEP within 90 days; the work plan will outline the proposed remediation/investigation plan. All corrective actions will be documented in the annual Post-Closure Inspection and Monitoring Report.

## 2.5 Reporting Requirements

All inspection and maintenance activities conducted during the year are documented and included in the annual Post-Closure Inspection and Monitoring Report. LM submits the report to 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 for the current monitoring period,
- Subsidence survey data, and
- Specific recommendations for nonstandard maintenance or changes in post-closure requirements.

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

## **3.0 Site Inspections, Surveys, and Maintenance**

### **3.1 Annual Site Inspection Results**

The annual inspection of the three sites was performed on June 15, 2010. Copies of the inspection checklists and photographs are included in Appendix A. The following sections summarize the inspection results.

#### **3.1.1 UC-1 Inspection**

The locks, fencing, SMs, and signs associated with the CMP were in good order, with the exception of one sign that had fallen along the southeast side of the fence line and was reattached to the fence at the time of this inspection. One new and two existing cracks or fractures were identified in the soil cover, indicating that consolidation (settling) due to the weight of the cover on the CMP continues, and were repaired at the time of the inspection. The vegetation on the cover continues to look healthy. All other signs and monuments at Mud Pits A and E (Figure 3–1) were in excellent condition.

Near the downstream toe of the CMP, outside of the perimeter fence, a hole in the ground was observed in the drainage channel extending along the northeast side of the CMP. The hole was approximately 1.5 ft in diameter, and a shovel placed into the hole went in approximately 2 ft. There was no mounding of dirt around the hole, which indicates that the hole was not an animal borrow. The feature looks to be a result of piping erosion. Piping is a subsurface form of erosion that involves the removal of subsurface soils in pipe-like erosion channels to a free or escape exit. No exit area was observed. Photographs 13 through 15 in Appendix A show the erosion piping feature. At the time of the inspection, this erosion feature was backfilled up to surface grade with a mixture of soil and a 50-lb bag of bentonite.

#### **3.1.2 UC-3 Inspection**

The site was in excellent condition (Figure 3–2). No issues with the monuments or signs were identified, and no maintenance or repairs were recommended.

#### **3.1.3 UC-4 Inspection**

The Mud Pit C fence and SMs were in good condition. A pin on the gate lock hasp was missing, but it does not affect the integrity of the locking mechanism. The two small erosion rills that were identified and repaired at last year's inspection showed no further signs of activity. No new erosion concerns were apparent at this year's inspection. Some vegetation is growing on the cap, however, and the inspection team removed a large amount of the sagebrush that was growing on the west side of the cap. No issues that affected the integrity of the cover and appurtenances were noted. Mud Pits A, B, and D were in excellent condition, and no issues were identified with Area S or Area X (Figure 3–3).

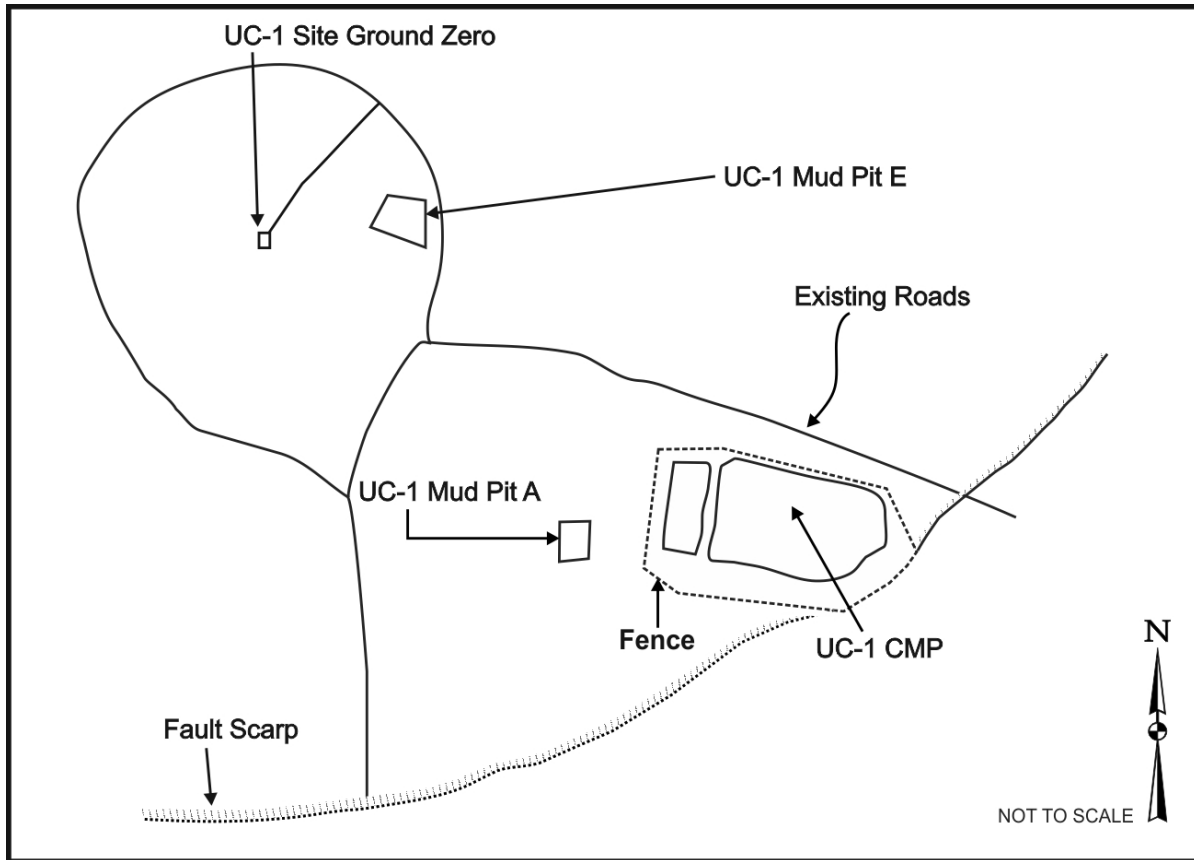


Figure 3-1. Location of UC-1 Significant Features

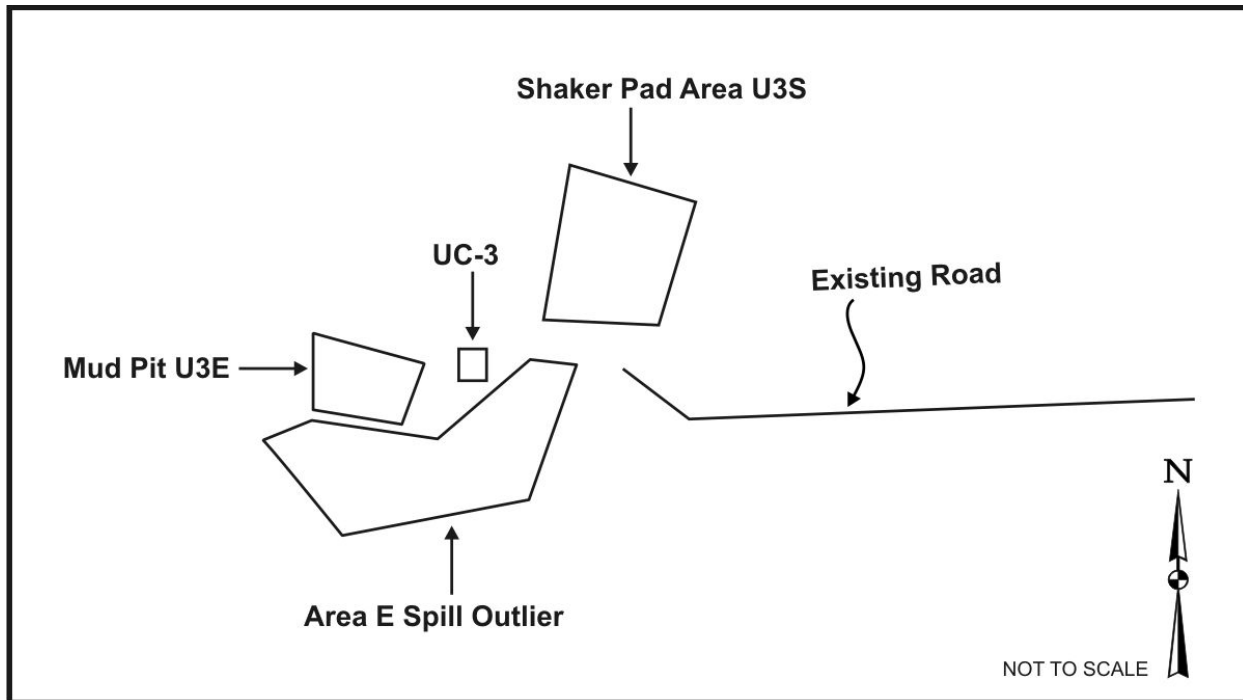


Figure 3-2. Location of UC-3 Significant Features

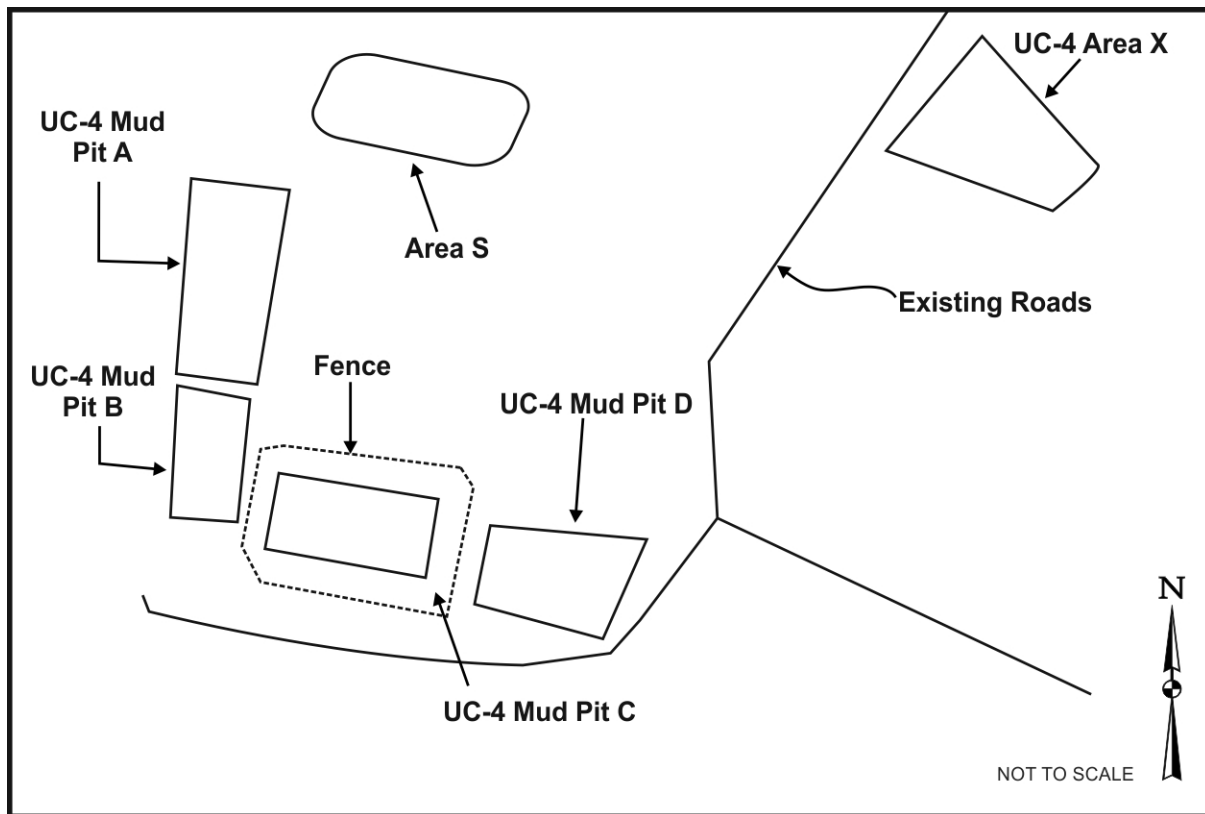


Figure 3–3. Location of UC-4 Significant Features

## 3.2 Subsidence Survey Results

Surveys of the SMs for UC-1 and UC-4 were performed on June 15, 2010. The following sections summarize the survey results.

### 3.2.1 UC-1 Survey

Twelve SMs were installed on the UC-1 CMP cover to provide elevation control and measure subsidence of the cover and relocation trench (NNSA/NV 2001). Figure 2–1 shows these SMs. The baseline subsidence survey was completed on December 4, 2000, and is used as the reference to calculate subsidence for each subsequent survey. Beginning in 2007, annual subsidence monitoring replaced the biannual subsidence monitoring that had taken place since 2002. The UC-1 baseline survey locations and elevations are provided in Table B–1 in Appendix B, and are presented in graphical form in Figure 3–4.

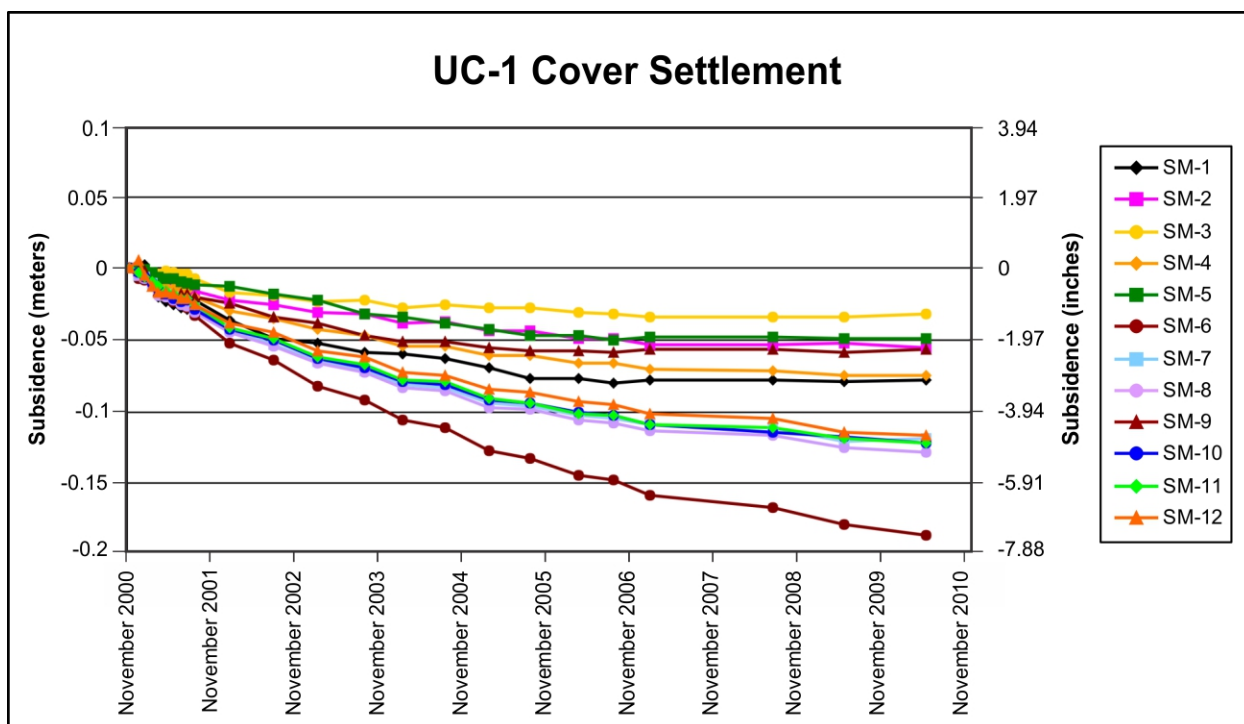


Figure 3–4. UC-1 Cover Settlement

The degree of settlement in the relocation trench and 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 along the centerline of the CMP, including SM-6, SM-7, and SM-8, and along the southern portion of the cap at SM-10, SM-11, and SM-12. This was expected because of the thicker layer of underlying mud in these areas. The northern monuments (SM-2, SM-3, and SM-4) and the westernmost monuments (SM-1, SM-5, and SM-9) show the least subsidence because the layer of underlying mud along these margins of the cover is thinner. The greatest degree of settlement continues to be on SM-6, which has subsided a total of 0.186 m (7.32 in) since the baseline survey in December 2000.

### 3.2.2 UC-4 Survey

Two SMs (west and east monuments) were installed in the UC-4 cover to provide elevation control for measuring the subsidence of the cover. Figure 3–5 shows these SMs. An initial subsidence survey was completed on October 12, 1999, and is used as a baseline to calculate subsidence. The UC-4 baseline survey locations and elevations are provided in Table B–2 in Appendix B, and are presented in graphical form in Figure 3–6. Since the last subsidence survey in 2009, both SMs continued to show increases in elevation. The elevation of the east SM increased 0.003 m (0.12 in), and the elevation of the west SM increased 0.007 m (0.28 in) since the last subsidence survey.

Historically, settling of the west SM is still slightly greater than the predicted settling of 0.05 m (2 in); the total subsidence is 0.066 m (2.60 in) since the baseline survey in October 1999. The east SM has subsided a total of 0.031 m (1.22 in) since the baseline survey. The largest changes occurred during the first three years.

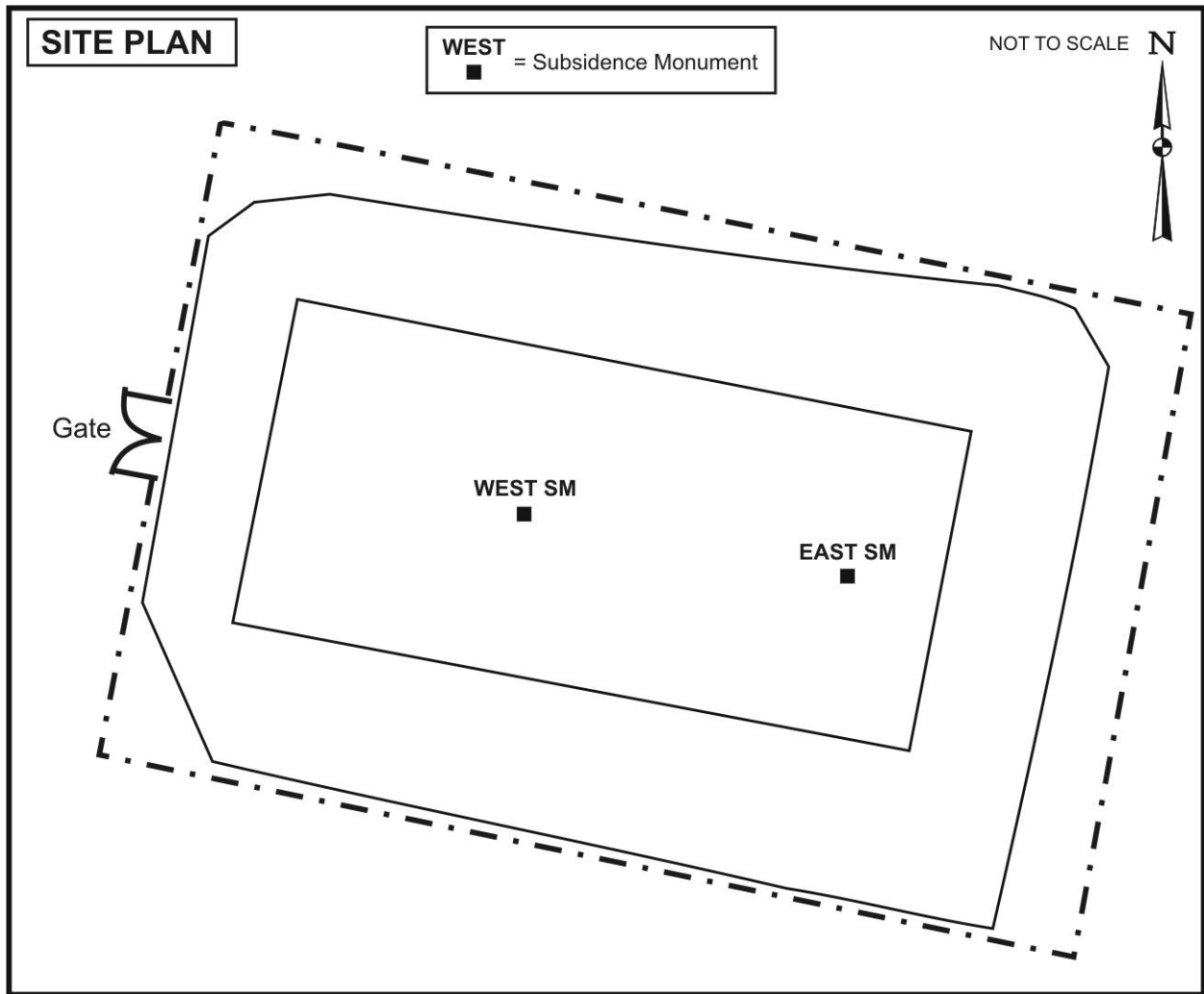


Figure 3-5. UC-4 West and East Monuments

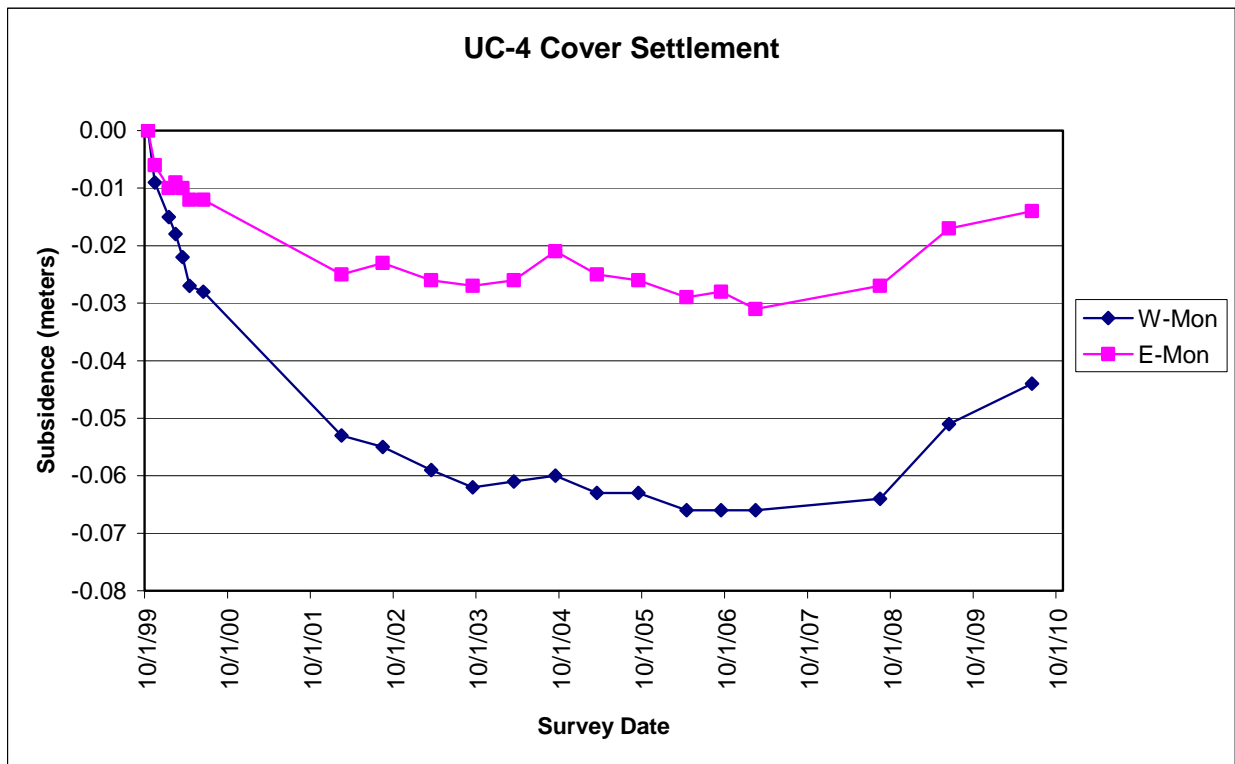


Figure 3–6. UC-4 Cover Settlement

### 3.3 Vegetation Survey Results

A vegetation survey was not performed in 2010. The next vegetation survey will be conducted in 2011.

### 3.4 Precipitation and Soil Moisture Monitoring Results

A Campbell Scientific TE525 tipping bucket rain gauge collects precipitation data at the UC-1 CMP cover. A CS705 precipitation adapter is used for snowfall measurements. The rain gauge data are collected and stored by the data logger and sent to an on-site telemetry station. The data are then sent to, and saved on, SOARS. The rain gauge was evaluated and repaired during a general site maintenance visit conducted in early October 2008.

Figure 3–7 presents the 12-month precipitation record from the UC-1 CMP rain gauge. Precipitation measured from July 1, 2009, through June 30, 2010, totaled 175.3 millimeters (mm) or 6.9 in. This year’s precipitation total is similar to what was recorded during 2009 and 2008 after the rain gauge was repaired.

#### 3.4.1 UC-1 Soil Moisture Results

Figure 3–8 through Figure 3–11 present graphs of the TDR-derived soil moisture content for July 1, 2009 through June 30, 2010.

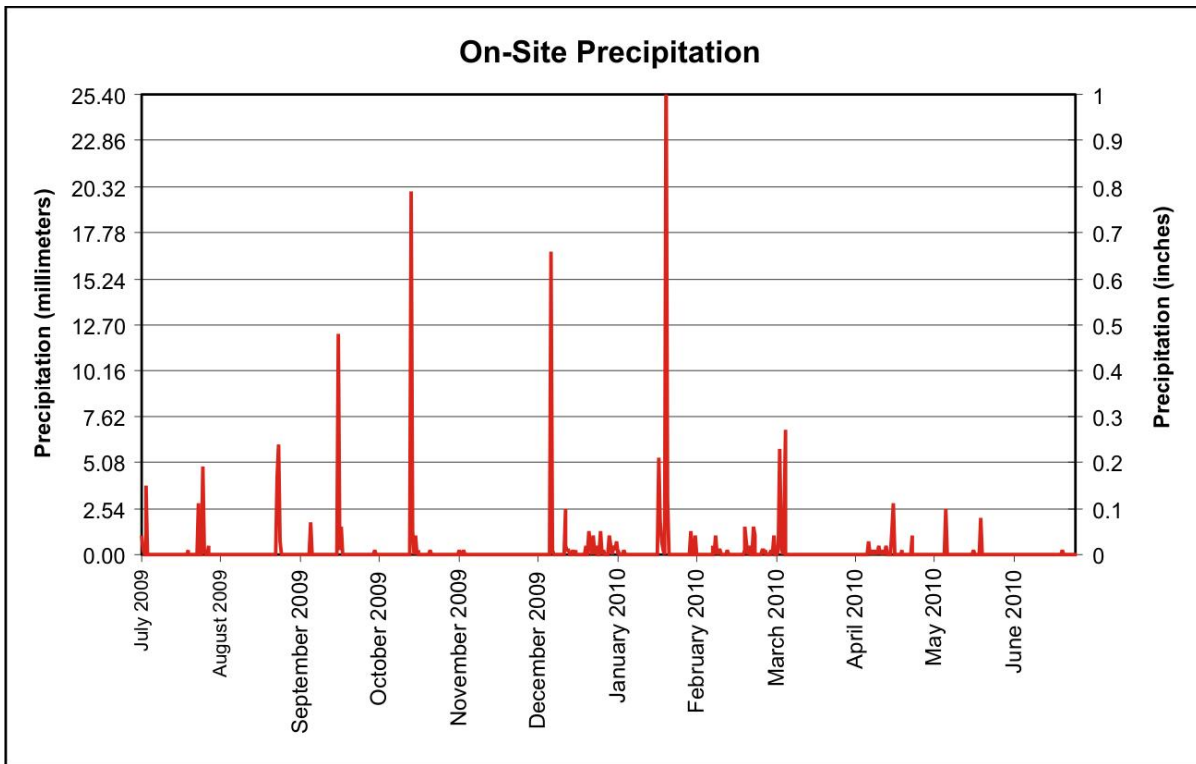


Figure 3–7. July 1, 2009, through June 30, 2010, Precipitation Data

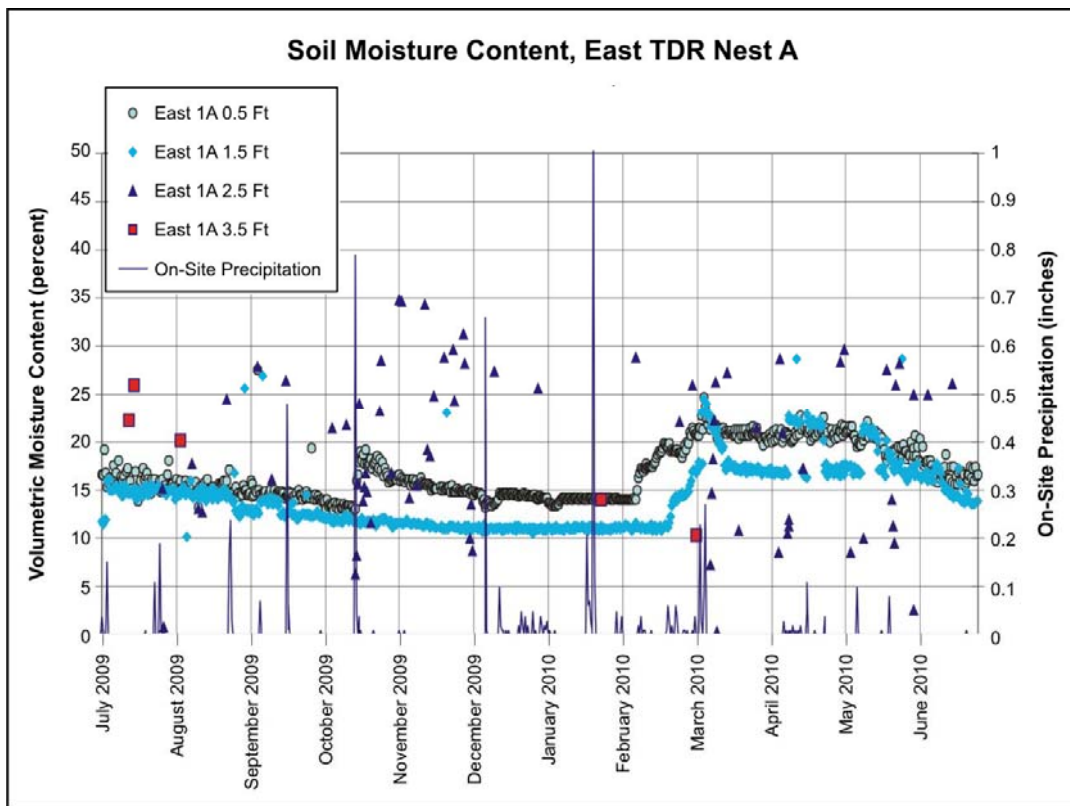


Figure 3–8. UC-1 Soil Moisture Content, East TDR Nest A

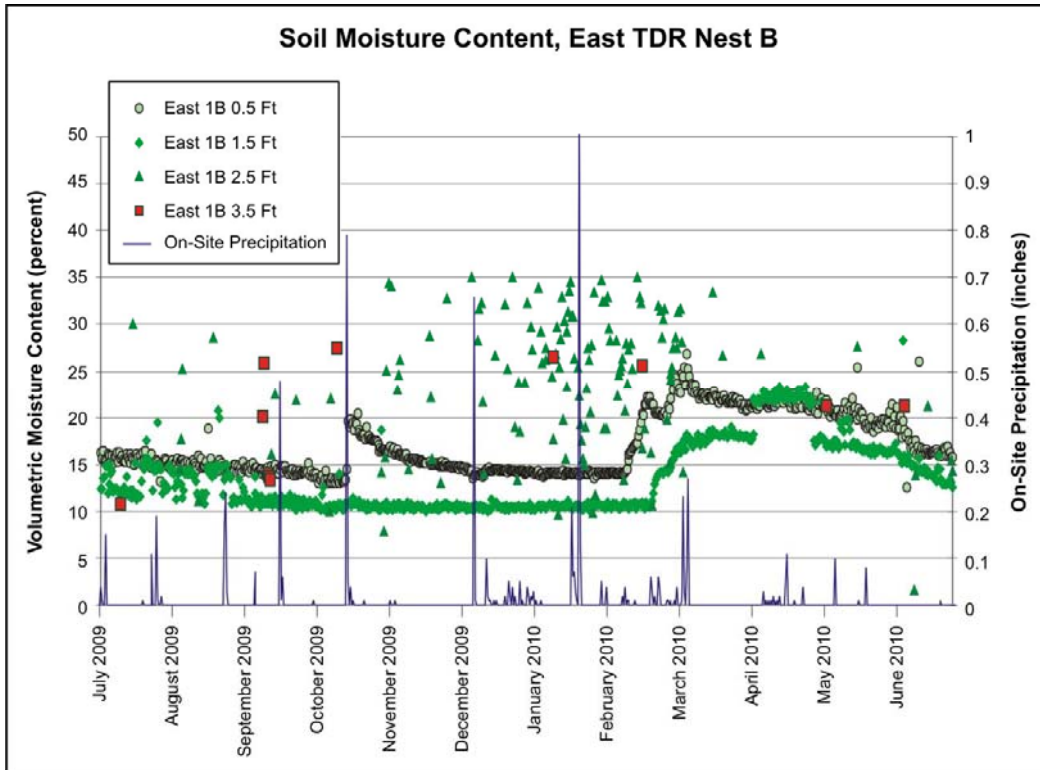


Figure 3–9. UC-1 Soil Moisture Content, East TDR Nest B

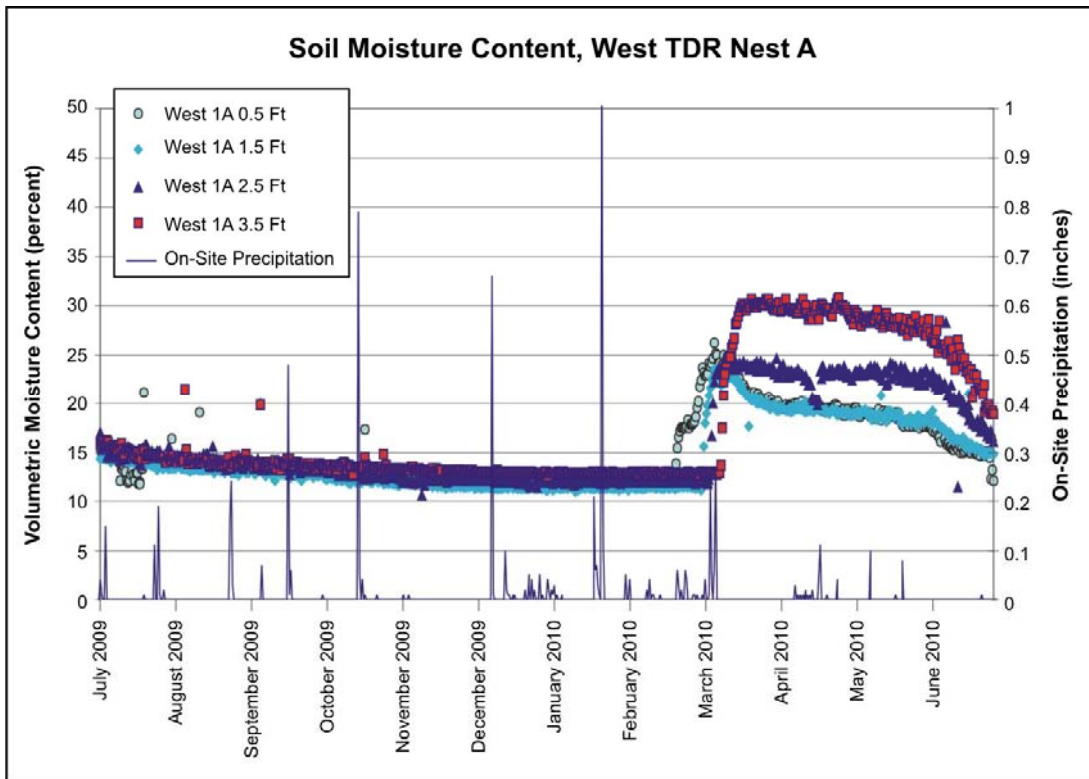


Figure 3–10. UC-1 Soil Moisture Content, West TDR Nest A

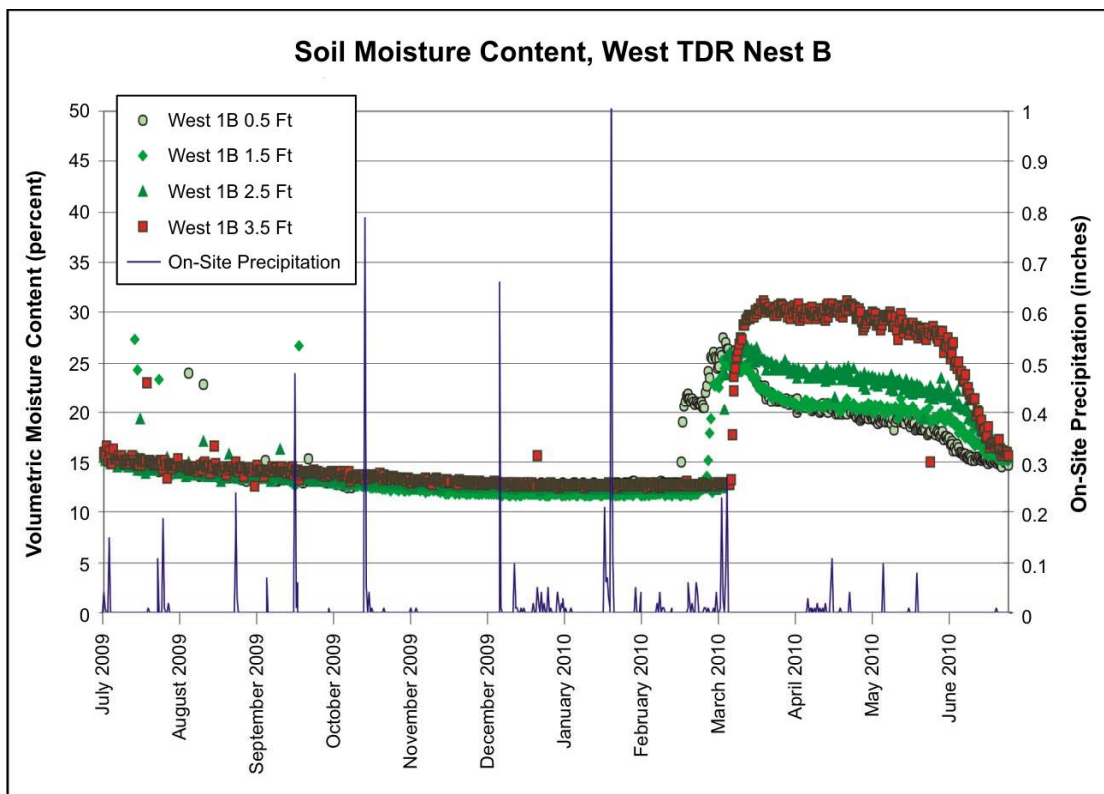


Figure 3–11. UC-1 Soil Moisture Content, West TDR Nest B

#### UC-1 East TDR Nest

Soil moisture data obtained for the east TDR nests (Figure 3–8 and Figure 3–9), measured at depths of 0.76 m and 1.07 m (2.5 and 3.5 ft), and were corrupted by an unknown cause. Previously, the lengthy cable created a problem in measuring the reflected signal from the TDR probes (NNSA/NV 2007). Inappropriate signal responses from the two lower stations in the east TDR nest make interpreting the data difficult. The TDR data from all depths are presented in Figure 3–8 and Figure 3–9 but only the two TDR sensors at the shallower depths appear to be responding to the infiltrating moisture. The VMC data fluctuates seasonally in response to snow melt during spring thaw and precipitation events. Annually, the VMC data are highest during spring thaw and slowly decreases throughout the Spring and early Summer when VMC reaches steady state conditions ranging from 11 to 15 percent in the upper 1.5 ft of the cover.

#### UC-1 West TDR Nest

Soil moisture data obtained for the west TDR nest (Figure 3–10 and Figure 3–11) indicate that conditions have been steady throughout most of the year and that VMC has varied by less than 1 percent in the upper 2.5 ft of the cap. The VMC data fluctuates seasonally in response to snow melt during spring thaw. Annually, the VMC data are highest during spring thaw and slowly decreases throughout the Spring and early Summer when VMC reaches steady state conditions ranging from 11 to 15 percent in the upper 3.5 ft of the cover. These trends extended into mid-May, when surface temperatures increased and evapotranspiration again began removing moisture from the cover effectively.

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## 4.0 Summary, Conclusions, and Recommendations

### 4.1 Summary

The 2010 annual inspection of the UC-1 CMP indicated the continued integrity of the cover unit. Three fractures (one new and two smaller fractures at previously existing locations) were observed on the UC-1 CMP cover during the 2010 annual inspection and are the result of the cover's continuing settlement. These cracks were repaired with an application of bentonite fill at the time of the inspection. No issues with the fence or gate were identified.

Near the downstream toe of the CMP, outside of the perimeter fence, a hole in the ground was observed in the drainage channel extending along the northeast side of the CMP. The hole was approximately 1.5 feet in diameter, and a shovel placed into the hole went in approximately 2 ft. There was no mounding of dirt around the hole, which indicates that the hole was not an animal borrow. The feature looks to be a result of piping erosion. Piping is a subsurface form of erosion that involves the removal of subsurface soils in pipe-like erosion channels to a free or escape exit. No exit area was observed. At the time of the inspection, this erosion feature was backfilled up to surface grade with a mixture of soil and a 50-lb bag of bentonite.

No vegetation survey was conducted in 2010. The next vegetation survey will be performed in 2011.

From July 1, 2009, through June 30, 2010, the rainfall total was 175.3 mm (6.9 in). Soil moisture content data show that the UC-1 cover is performing as designed, and evapotranspiration is effectively removing water from the cover.

The UC-1 settling trend that has been occurring since December 2000 continued to show a slight decrease in cover elevation during the current monitoring period. The degree of settling in both the relocation trench and the CMP is within the predicted range and shows no unusual subsidence.

The inspection of UC-3 indicated that the sites are in excellent condition. All monuments and use-restriction signs are in good condition. No issues were identified, and no maintenance or repair activities are recommended at this time.

The inspection of UC-4 indicated that the sites are in excellent condition. All monuments and use-restriction signs are in good condition. No concerns with the monuments or gate were identified.

In the annual subsidence survey, measurements at the UC-4 east monument indicated a continued slight increase in elevation. Subsidence at the west monument is still slightly greater than the predicted settling; the total subsidence was 6.6 cm (2.6 in) since the baseline survey in October 1999. The cause of the continued increase in elevation of the two UC-4 monuments is unknown.

## 4.2 Conclusions

The following conclusions are based on the 2010 annual inspection:

- No significant concerns were noted for the UC-1 CMP and UC-4 Mud Pit C covers during the annual inspection, and no further maintenance or repairs are recommended at this time. However, personnel traveling to CNTA for routine work will monitor the erosion piping feature on the northeast side of the downstream toe of the CMP throughout the coming year.
- No significant concerns were noted on the subsidence surveys for UC-1 and UC-4. The increases in elevation of the UC-4 monuments will be further evaluated during the 2011 annual inspection.
- With the exception of the lower two stations at the East TDR nest, soil moisture monitoring data indicate that the cover is performing as designed and that evapotranspiration appears to be effectively removing water from the cover.
- The UC-1 CMP cover appears to have performed as designed, and evapotranspiration is effectively removing water from the cover; however, data from the two lower stations in the east TDR nest make it difficult to establish soil-moisture-monitoring compliance criteria.

## 4.3 Recommendations

The following recommendations are based on the 2010 annual inspection:

- Continue site inspections annually, as scheduled, to observe the condition of the covers, fence, vegetation, signs, and monuments.
- Continue annual subsidence surveys on UC-1 and UC-4.
- Conduct a vegetation survey in 2011 to comply with the agreement to perform the vegetation survey biennially.
- Remove large vegetation from the UC-4 cover during the 2011 inspection.
- Continue to collect soil moisture data from both TDR nests.
- Respond to reports from the public of detrimental conditions at the site within 90 days.
- Develop and present to NDEP a work plan that includes an assessment of the hydrocarbon contamination associated with surface use-restricted areas and provides a path forward for future post-closure monitoring of the surface.

## 5.0 References

Barnes, W., 1968. *Report of Exploration Progress, Central Nevada, Period August 1, 1967 December 31, 1967*, U.S. Geological Survey Technical Letter, Central Nevada 3-2.

DOE/NV (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, Nevada.

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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 (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, Rev. 1, Las Vegas, Nevada.

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Topp, G.C., Davis, J.L., and Annan, A.P., 1980. “Electromagnetic Determination of Soil Water Content: Measurements in Coaxial Transmission Lines,” *Water Resources Research*, vol. 16, pp. 574–582.

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**Appendix A**  
**Inspection Checklists**  
**and Photographs**

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

Date of Last Inspection: JUNE 23, 2009 Reason for Last Inspection: Annual inspection

Responsible Agency: DOE-LM Project Manager: RICK HUTTON

Inspection Date: JUNE 15, 2010

Inspector (name, title, organization): Paul S. Darr, Project Specialist, S.M. Stoller

Assistant Inspector (name, title, organization): Mark Kautsky, Project Manager, DOE-LM

**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>B. PREPARATION (To be completed prior to site visit)</b>	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?	✓		Continual expansion of existing cracks in cover. Bentonite hole plug used to fill in cracks. ✓
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?		✓	

<b>C. SITE INSPECTION (To be completed during inspection)</b>	YES	NO	EXPLANATION
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1. Adjacent off-site features within watershed areas.			
a. Have there been any changes in use of adjacent area?	✓	<del>PS</del>	Two new hydrologic well pads are adjacent the cell.
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: _____)	✓		One sign that had fallen down was reattached.
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?	✓		see subsidence monitoring data
b.	Is there cracking?	✓		historical presence noted and cracks continue to be present.
c.	Is there evidence of erosion around the cap (wind or water)?	✓		Piping featured observed near eastern portion of cap, outside fence.
d.	Is there evidence of animal burrowing?		✓	
e.	Have the site markers been disturbed by man or natural processes?	✓		one marker near Mud Pit A has moved slightly due to pad.
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?	✓		Deer tracks on site. Rabbit feces inside fence.
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 ( 15 )			
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: Overall integrity of the site is good. Only one small tensional crack filled this time. A small hole (1.5 ft in diameter) noted outside of fence east of the cap was observed. Appears to be piping erosion in the channel adjacent the cap. The hole was filled in with dirt and one bag of bentonite hole plug was mixed in with the backfill dirt.				
E. CERTIFICATION				
I have conducted an inspection of the UC-1 Central 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: <i>Paul S. Darr</i>		Printed Name: PAUL S. DARR		
Title: Project Specialist		Date: June 15, 2010		

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

Date of Last Inspection: <i>June 23, 2009</i>	Reason for Last Inspection: <i>Annual inspection</i>
Responsible Agency: <i>DOE - LM</i>	Project Manager: <i>Rick Hutton</i>
Inspection Date: <i>June 15, 2010</i>	
Inspector (name, title, organization): <i>Paul S. Darr, Project Specialist, S.M. Stoller</i>	
Assistant Inspector (name, title, organization): <i>Mark Kautsky, Project Manager, DOE-LM</i>	

**A. GENERAL INSTRUCTIONS**

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

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

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

CAU 417: CNTA UC-3, POST-CLOSURE INSPECTION CHECKLIST			
<b>D. FIELD CONCLUSIONS</b>			
1. Is there an imminent hazard to the integrity of the unit? (Immediate report required)		✓	
Person/Agency to whom report made:			
2. Are more frequent inspections required?		✓	
3. Are existing maintenance/repair actions satisfactory?	✓		
4. Is other maintenance/repair necessary?		✓	
5. Is current status/condition of unit satisfactory?	✓		
6. Rationale for field conclusions: <i>site is in good condition.</i>			
<b>E. CERTIFICATION</b>			
I have conducted an inspection of UC-3, CAU 417, at the Central Nevada Test Area in accordance with the Post-Closure Monitoring Plan (see Closure Report) as recorded on this checklist, attached sheets, field notes, photo logs, and photographs.			
Chief Inspector's Signature: <i>Paul S. Daar</i>		Printed Name: <i>PAUL S. DAAR</i>	
Title: <i>Project Specialist</i>		Date: <i>June 15, 2010</i>	

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

Date of Last Inspection: <i>June 23, 2009</i>	Reason for Last Inspection: <i>Annual inspection</i>
Responsible Agency: <i>DOE - LM</i>	Project Manager: <i>RICK Hutton</i>
Inspection Date: <i>June 15, 2010</i>	
Inspector (name, title, organization): <i>Paul S. Darr, Project Specialist, S.M. Staller</i>	
Assistant Inspector (name, title, organization): <i>Mark Kautsky, Project Manager, DOE - LM</i>	

**A. GENERAL INSTRUCTIONS**

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

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

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

**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?		✓	
c. Is there evidence of erosion around the cap (wind or water)?		✓	
d. Is there evidence of animal burrowing?		✓	
e. Have the site markers been disturbed by man or natural processes?		✓	
f. Is there vegetation on the cover?	✓		yes. Majority of the larger vegetative brush removed.
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 ( <i>8</i> )		

**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: <i>Overall integrity of the site is good. Considerable vegetation removed. Remainder will be removed in 2011.</i>			

**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: <i>Paul S. Dan</i>	Printed Name: <i>PAUL S. DAN</i>
Title: <i>Project Specialist</i>	Date: <i>June 15, 2010</i>

# Photograph Log

Note: All photographs were taken June 15, 2010

Photograph 1. UC-1 View from south edge looking west.....	A-9
Photograph 2. UC-1 View from south edge looking northwest.....	A-9
Photograph 3. UC-1 View from south edge looking north.....	A-10
Photograph 4. UC-1 View from south edge looking northeast.....	A-10
Photograph 5. UC-1 View from south edge looking east .....	A-11
Photograph 6. UC-1 View south along SM-1, SM-5 and SM-9.....	A-11
Photograph 7. UC-1 View north along SM-9, SM-5 and SM-1 .....	A-12
Photograph 8. UC-1 View north along SM-10, SM-6 and SM-2 .....	A-12
Photograph 9. UC-1 View south along SM-2, SM-6 and SM-10.....	A-13
Photograph 10. UC-1 View north along SM-11, SM-7 and SM-3 .....	A-13
Photograph 11. UC-1 View south along SM-3, SM-7 and SM-11 .....	A-14
Photograph 12. UC-1 View north along SM-12, SM-8 and SM-4 .....	A-14
Photograph 13. UC-1 Possible piping structure near east toe of cap.....	A-15
Photograph 14. UC-1 Possible piping structure near east toe of cap.....	A-16
Photograph 15. UC-1 Possible piping structure near east toe of cap.....	A-17
Photograph 16. UC-4 View to east from west SM .....	A-18
Photograph 17. UC-4 View to west from east SM .....	A-18
Photograph 18. UC-4 View to southeast from northwest corner of cap.....	A-19
Photograph 19. UC-4 View to northeast from southwest corner of cap.....	A-19
Photograph 20. UC-4 View to northwest from southeast corner of cap.....	A-20
Photograph 21. UC-4 View to southwest from northeast corner of cap.....	A-20
Photograph 22. View of UC-3 .....	A-21
Photograph 23. View of UC-3 .....	A-21
Photograph 24. View of UC-3 .....	A-22

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*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-1, View south along SM-1, SM-5, and SM-9*



*Photograph 7. UC-1, View north along SM-9, SM-5, and SM-1*



*Photograph 8. UC-1, View north along SM-10, SM-6, and SM-2*



*Photograph 9. UC-1, View south along SM-2, SM-6, and SM-10*



*Photograph 10. UC-1, View north along SM-11, SM-7, and SM-3*



*Photograph 11. UC-1, View south along SM-3, SM-7, and SM-11*



*Photograph 12. UC-1, View north along SM-12, SM-8, and SM-4*



*Photograph 13. UC-1, Possible piping structure near east toe of cap*



*Photograph 14. UC-1, Possible piping structure near east toe of cap*



*Photograph 15. UC-1, Possible piping structure near east toe of cap*



*Photograph 16. UC-4, View to east from west SM*



*Photograph 17. UC-4, View to west from east SM*



*Photograph 18. UC-4, View to southeast from northwest corner of cap*



*Photograph 19. UC-4, View to northeast from southwest corner of cap*



*Photograph 20. UC-4, View to northwest from southeast corner of cap*



*Photograph 21. UC-4, View to southwest from northeast corner of cap*



*Photograph 22. View of UC-3*



*Photograph 23. View of UC-3*



*Photograph 24. View of UC-3*

**Appendix B**  
**Survey Data**

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Table B-1. UC-1 Monument Elevations and Subsidence

Date	Elevation at Top of Monument <sup>ab</sup> Subsidence (m)											
	SM-1 N 6,430,874.2869 E 539,588.2339	SM-2 N 6,430,863.3239 E 539,644.8195	SM-3 N 6,430,855.2553 E 539,684.3327	SM-4 N 6,430,849.7763 E 539,715.7991	SM-5 N 6,430,852.0243 E 539,585.4651	SM-6 N 6,430,841.7590 E 539,641.4674	SM-7 N 6,430,834.5289 E 539,680.5243	SM-8 N 6,430,828.6994 E 539,712.4350	SM-9 N 6,430,828.8720 E 539,582.4750	SM-10 N 6,430,818.6353 E 539,638.2030	SM-11 N 6,430,812.8276 E 539,676.0839	SM-12 N 6,430,806.7973 E 539,708.9837
12/04/2000 Baseline	1836.604	1835.154	1834.995	1834.854	1836.541	1834.887	1834.709	1834.681	1836.547	1834.943	1834.744	1834.635
	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
06/12/2001	1836.579	1835.142	1834.992	1834.840	1836.534	1834.864	1834.689	1834.659	1836.529	1834.922	1834.726	1834.617
	-0.025	-0.012	-0.003	-0.014	-0.007	-0.023	-0.020	-0.022	-0.018	-0.021	-0.018	-0.018
07/18/2001	1836.577	1835.141	1834.991	1834.838	1836.532	1834.862	1834.686	1834.656	1836.529	1834.920	1834.723	1834.614
	-0.027	-0.013	-0.004	-0.016	-0.009	-0.025	-0.023	-0.025	-0.018	-0.023	-0.021	-0.021
08/14/2001	1836.575	1835.140	1834.991	1834.838	1836.531	1834.859	1834.685	1834.655	1836.529	1834.921	1834.723	1834.614
	-0.029	-0.014	-0.004	-0.016	-0.010	-0.028	-0.024	-0.026	-0.018	-0.022	-0.021	-0.021
09/12/2001	1836.582	1835.138	1834.988	1834.834	1836.530	1834.854	1834.681	1834.650	1836.527	1834.914	1834.719	1834.610
	-0.022	-0.016	-0.007	-0.020	-0.011	-0.033	-0.028	-0.031	-0.020	-0.029	-0.025	-0.025
02/13/2002	1836.568	1835.132	1834.978	1834.824	1836.529	1834.835	1834.666	1834.636	1836.523	1834.900	1834.703	1834.597
	-0.036	-0.022	-0.017	-0.030	-0.012	-0.052	-0.043	-0.045	-0.024	-0.043	-0.041	-0.038
08/26/2002	1836.555	1835.129	1834.976	1834.819	1836.523	1834.823	1834.656	1834.627	1836.513	1834.893	1834.695	1834.590
	-0.049	-0.025	-0.019	-0.035	-0.018	-0.064	-0.053	-0.054	-0.034	-0.050	-0.049	-0.045
03/06/2003	1836.552	1835.123	1834.972	1834.811	1836.519	1834.805	1834.644	1834.615	1836.509	1834.880	1834.682	1834.577
	-0.052	-0.031	-0.023	-0.043	-0.022	-0.082	-0.065	-0.066	-0.038	-0.063	-0.062	-0.058
09/26/2003	1836.545	1835.122	1834.973	1834.807	1836.509	1834.795	1834.638	1834.609	1836.500	1834.874	1834.677	1834.573
	-0.059	-0.032	-0.022	-0.047	-0.032	-0.092	-0.071	-0.072	-0.047	-0.069	-0.067	-0.062
03/10/2004	1836.544	1835.116	1834.968	1834.800	1836.507	1834.781	1834.628	1834.598	1836.496	1834.864	1834.666	1834.562
	-0.060	-0.038	-0.027	-0.054	-0.034	-0.106	-0.081	-0.083	-0.051	-0.079	-0.078	-0.073
09/15/2004	1836.541	1835.117	1834.970	1834.800	1836.503	1834.776	1834.626	1834.596	1836.496	1834.862	1834.665	1834.560
	-0.063	-0.037	-0.025	-0.054	-0.038	-0.111	-0.083	-0.085	-0.051	-0.081	-0.079	-0.075
03/22/2005	1836.535	1835.110	1834.967	1834.793	1836.499	1834.760	1834.615	1834.584	1836.492	1834.851	1834.653	1834.551
	-0.069	-0.044	-0.028	-0.061	-0.042	-0.127	-0.094	-0.097	-0.055	-0.092	-0.091	-0.084
09/21/2005	1836.527	1835.110	1834.968	1834.793	1836.494	1834.755	1834.613	1834.583	1836.490	1834.849	1834.650	1834.548
	-0.077	-0.044	-0.027	-0.061	-0.047	-0.132	-0.096	-0.098	-0.057	-0.094	-0.094	-0.087
04/19/2006	1836.527	1835.105	1834.964	1834.788	1836.494	1834.743	1834.606	1834.575	1836.490	1834.843	1834.643	1834.542
	-0.077	-0.049	-0.031	-0.066	-0.047	-0.144	-0.103	-0.106	-0.057	-0.100	-0.101	-0.093
09/19/2006	1836.524	1835.105	1834.963	1834.788	1836.491	1834.739	1834.604	1834.573	1836.488	1834.840	1834.641	1834.54
	-0.080	-0.049	-0.032	-0.066	-0.050	-0.148	-0.105	-0.108	-0.059	-0.103	-0.103	-0.095
02/22/2007	1836.526	1835.101	1834.961	1834.784	1836.493	1834.729	1834.600	1834.568	1836.491	1834.834	1834.635	1834.534
	-0.078	-0.053	-0.034	-0.070	-0.048	-0.158	-0.109	-0.113	-0.056	-0.109	-0.109	-0.101
08/12/2008	1836.526	1835.101	1834.961	1834.783	1836.493	1834.720	1834.598	1834.565	1836.491	1834.829	1834.633	1834.530
	-0.078	-0.053	-0.034	-0.071	-0.048	-0.167	-0.111	-0.116	-0.056	-0.114	-0.111	-0.105

Table B-1 (continued). UC-1 Monument Elevations and Subsidence

Date	Elevation at Top of Monument <sup>a,b</sup> Subsidence (m)											
	SM-1 N 6,430,874.2869 E 539,588.2339	SM-2 N 6,430,863.3239 E 539,644.8195	SM-3 N 6,430,855.2553 E 539,684.3327	SM-4 N 6,430,849.7763 E 539,715.7991	SM-5 N 6,430,852.0243 E 539,585.4651	SM-6 N 6,430,841.7590 E 539,641.4674	SM-7 N 6,430,834.5289 E 539,680.5243	SM-8 N 6,430,828.6994 E 539,712.4350	SM-9 N 6,430,828.8720 E 539,582.4750	SM-10 N 6,430,818.6353 E 539,638.2030	SM-11 N 6,430,812.8276 E 539,676.0839	SM-12 N 6,430,806.7973 E 539,708.9837
06/23/2009	1836.525	1835.102	1834.961	1834.779	1836.492	1834.708	1834.588	1834.556	1836.488	1834.826	1834.625	1834.521
	-0.079	-0.052	-0.034	-0.075	-0.049	-0.179	-0.121	-0.125	-0.059	-0.117	-0.119	-0.114
06/15/2010	1836.526	1835.099	1834.963	1834.779	1836.492	1834.701	1834.590	1834.553	1836.491	1834.821	1834.622	1834.518
	-0.078	-0.055	-0.032	-0.075	-0.049	-0.186	-0.119	-0.128	-0.056	-0.122	-0.122	-0.117

<sup>a</sup> Vertical datum: National Geodetic Vertical Datum of 1929

<sup>b</sup> Horizontal datum: U.S. State Plane of 1983

N = northing E = easting

Table B-2. UC-4 Monument Elevations and Subsidence

Date	Elevation at Top of Monument <sup>a,b</sup>	
	Subsidence (m)	
	West Monument N 6,435,982.965 E 538,966.436	East Monument N 6,435,978.404 E 538,992.231
<b>10/12/1999</b> <b>Baseline</b>	<b>1999.269</b>	<b>1999.062</b>
	<b>0.000</b>	<b>0.000</b>
11/29/1999	1999.260	1999.056
	-0.009	-0.006
01/14/2000	1999.254	1999.052
	-0.015	-0.010
02/28/2000	1999.251	1999.053
	-0.018	-0.009
03/28/2000	1999.247	1999.052
	-0.022	-0.010
04/27/2000	1999.242	1999.05
	-0.027	-0.012
06/01/2000	1999.241	1999.05
	-0.028	-0.012
02/13/2002	1999.216	1999.037
	-0.053	-0.025
08/27/2002	1999.214	1999.039
	-0.055	-0.023
03/06/2003	1999.21	1999.036
	-0.059	-0.026
09/26/2003	1999.207	1999.035
	-0.062	-0.027
03/10/2004	1999.208	1999.036
	-0.061	-0.026
09/14/2004	1999.209	1999.041
	-0.060	-0.021
03/22/2005	1999.206	1999.037
	-0.063	-0.025
09/21/2005	1999.206	1999.036
	-0.063	-0.026
04/18/2006	1999.203	1999.033
	-0.066	-0.029
09/19/2006	1999.203	1999.034
	-0.066	-0.028
02/22/2007	1999.203	1999.031
	-0.066	-0.031
08/12/2008	1999.205	1999.035
	-0.064	-0.027
06/23/2009	1999.218	1999.045
	-0.051	-0.017
<b>06/15/2010</b>	1999.225	1999.048
	-0.044	-0.014

<sup>a</sup> Vertical datum: National Geodetic Vertical Datum of 1929

<sup>b</sup> Horizontal datum: U.S. State Plane of 1983

N = northing

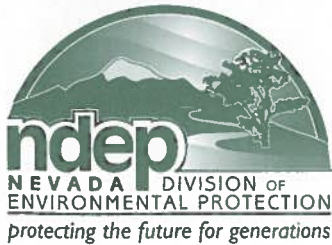
E = easting

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## **Appendix C**

### **NDEP Correspondence and Record of Review**

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STATE OF NEVADA  
Department of Conservation & Natural Resources  
DIVISION OF ENVIRONMENTAL PROTECTION

Jim Gibbons, Governor

Allen Biaggi, Director

Leo M. Drozdoff, P.E., Administrator

November 9, 2010

Mr. Mark Kautsky  
Site Manager  
U.S. Department of Energy  
Office of Legacy Management  
2597 B ¾ Road  
Grand Junction, CO 81503

RE: Draft Post-Closure Inspection and Monitoring Report for Corrective Action Unit 417:  
Central Nevada Test Area Surface, Hot Creek Valley, Nevada  
October 2010  
Federal Facility Agreement and Consent Order

Dear Mr. Kautsky:

The Nevada Division of Environmental Protection, Bureau of Federal Facilities (NDEP) staff has received and reviewed the above-referenced report on the post-closure inspection and monitoring activities conducted at the Central Nevada Test Area during calendar year 2010. The annual report was prepared in accordance with the Federal Facility Agreement and Consent Order (FFACO) and the Closure Report for Corrective Action Unit 417. The NDEP has the following comment and question on this draft report:

1. Page 1-2, Section 1.3, **Geologic Setting**, First Paragraph, Second Sentence: Every previous Post-Closure Inspection and Monitoring Report for Corrective Action Unit 417, states that "This province consists of regularly spaced mountain ranges..." Has new information become available on the spacing of the mountain ranges or is the use of the word "irregularly" in this years' report a typographical error?

The NDEP concurs with the recommendations stated in Section 4.3 of the report. Please address any questions regarding this matter to Chris Andres at (702) 486-2850 ext. 232.

Sincerely,

T. H. Murphy  
Chief  
Bureau of Federal Facilities



Mr. Mark Kautsky  
Page 2 of 2  
November 8, 2010

cc: Jeffrey Fraher, DTRA/CXTS, Kirtland AFB, NM  
J. B. Chapman, DRI, Las Vegas, NV  
NSTec Technical Information Officer, Las Vegas, NV  
E. F. DiSanza, WMP, NNSA/NSO, Las Vegas, NV  
FFACO Group, SNJV, Las Vegas, NV  
D. Crawford, Stoller, Grand Junction, CO  
R. Hutton, Stoller, Grand Junction, CO  
R. Findlay, Stoller, Grand Junction, CO

## Record of Review

<b>Due Date</b> 11/09/10	<b>Review No.</b> 1	<b>Project</b> Office of Legacy Management - CNT	<b>Type of Review</b> Technical
<b>Document Title and/or Number and Revision</b> Post-Closure Inspection and Monitoring Report for Corrective Action Unit 417: Central Nevada Test Area Surface, Hot Creek Valley, Nevada			<b>Reviewers' Recommendation</b>  <input type="checkbox"/> Release Without Comment <input type="checkbox"/> Consider Comments <input checked="" type="checkbox"/> Resolve Comments and Reroute for Review  <p style="text-align: right;">Refer to the NDEP letter dated November 9, 2010</p> <hr/> <p style="text-align: right;"><i>Mark Keating</i>      2010.11.15 07:21:48 -07'00'</p> <p style="text-align: right;"><small>Signature of Reviewer and Date</small></p> <input checked="" type="checkbox"/> Comments Have Been Addressed  <input checked="" type="checkbox"/> Comment Resolution Satisfactory <input type="checkbox"/> Comment Resolution Unsatisfactory  <p style="text-align: right;"><i>Christ-Jadues</i> 11/23/10</p> <p style="text-align: right;"><small>Signature of Reviewer and Date</small></p>
<b>Author</b> Rick Findlay/Paul Darr			
<b>Author's Organization</b> S.M. Stoller Corporation - Offsites Project		<b>Author's Phone</b> (970) 248-6419	
<b>Reviewer</b> Tim Murphy			
<b>Reviewer's Organization</b> Nevada Division of Environmental Protection		<b>Reviewer's Phone</b> (970) 486-2850	

Item No.	Reviewer's Comments and Recommendation	Reqd. (Y/N)	Item No.	Author's Response (if required)
1	Page 1-2, Section 1.3, Geologic Setting, First Paragraph, Second Sentence: Every previous Post-Closure Inspection and Monitoring Report for Corrective Action Unit 417, states that "This province consists of regularly spaced mountain ranges..." Has new information become available on the spacing of the maintain ranges or is the use of the word "irregularly" in this years' report a typographical error?	Y	1	No new information but I prefer changing the sentence to the following: "This province consists of roughly north-south-trending mountain ranges separated by alluvial valleys."

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