

2009 Annual Inspection of the Monticello Mill Tailings (USDOE) and Monticello Radioactively Contaminated Properties Sites

December 2009



U.S. DEPARTMENT OF
ENERGY

Legacy
Management

This page intentionally left blank

**2009 Annual Inspection of the
Monticello Mill Tailings (USDOE) and
Monticello Radioactively Contaminated Properties Sites**

December 2009

This page intentionally left blank

Contents

Executive Summary	iii
1.0 Introduction	1
1.1 Monticello Site Background Information	1
1.2 Long-Term Surveillance and Maintenance	1
1.3 Annual Site Inspection Scope	2
1.4 2009 Annual Site Inspection Participants and Schedule	4
2.0 Site Inspection Results	4
2.1 DOE Repository Site and Disposal Cell	4
2.1.1 Access Area	4
2.1.2 Repository Perimeter	5
2.1.3 Repository Run-on and Runoff Controls	6
2.1.4 Pond 4	6
2.1.5 Disposal Cell Cover	7
2.1.6 Cover Penetrations	8
2.2 City-Owned Properties	9
2.3 City Streets and Utility Corridors and UDOT Rights-of-Way	10
2.4 Private Property MS-00176-VL	11
2.5 Properties in the Montezuma Creek Restrictive Easement Area	11
2.6 Groundwater Restricted Area	11
2.7 Operable Unit III	11
2.8 Administrative and Records Inspection	12
3.0 Conclusions and Recommendations	12
4.0 Photograph Log and Photographs	13

Figures

Figure 1. Location and Features of Monticello MMTS and MVP Sites	21
Figure 2. Monticello, Utah, Repository Site	22
Figure 3. MMTS and MVP Supplemental Standards and Groundwater Restricted Areas	23
Figure 4. Monticello, Utah, Former Mill Site and Surrounding Area	24

Appendix

Appendix A MMTS & MVP Annual Inspection Checklist	
---	--

This page intentionally left blank

Executive Summary

The annual inspection of the U.S. Department of Energy (DOE) Monticello Mill Tailings Site (MMTS) and the Monticello Vicinity Properties (MVP) was conducted on September 9–10, 2009. Pre-inspection activities occurred on September 8, 2009. DOE inspects these sites annually to ensure that the selected remedies remain protective of human health and the environment. Under those remedies, contamination remains in place at some locations where use is restricted and exposure is limited. Annual inspections (1) verify that DOE long-term surveillance and maintenance (LTS&M) activities implemented throughout the year are effective and appropriate, (2) confirm that the institutional controls restricting land and water use under the MMTS and MVP remedies remain effective, and (3) identify deficiencies and recommend corrective actions as needed. This report summarizes the results of the 2009 annual inspection.

Repository Findings

The repository is well maintained and managed. No remedy-related maintenance items were identified. Site features and support structures are in good condition. Repairs to the field office building were underway at the time of the annual inspection. Vegetation across the site is in very good condition, but two patches of noxious weeds were treated in the vicinity of the office building during the annual inspection. Vegetation on the repository cover, assessed with a new vegetation index, is ecologically healthy and diverse. Monitoring of Sediment Ponds A, B, and C has been discontinued because the ponds were decommissioned. No major erosion or maintenance needs were identified at the repository site. Minor maintenance items include the need to store empty 55-gallon drums under a tarp or in a shed to prevent corrosion, minor repairs to a damaged fence near perimeter sign P15, and replacing perimeter sign P28.

City Property Findings

No violation of institutional controls restricting land and water use was evident during the 2009 annual inspection. Drainage and runoff control structures were in good condition. There were no major repair or maintenance items to report to the City of Monticello. Bicycle trails constructed by the City of Monticello will be mapped with a GPS in 2010 to facilitate future monitoring.

City Streets and Utility Corridor Findings

No unplanned or unmonitored excavations were evident during the 2009 annual inspection. No new erosion of highway shoulders and along the Highway 191 embankment at Montezuma Creek was evident.

Private Property Findings

No violation of any land or water use restriction was evident during the 2009 annual inspection. In 2008, a land use change occurred on Property MP–00990 with the diversion of water from Montezuma Creek for irrigation. DOE continues to evaluate the change to determine its effect on the risk assessment. No well drilling occurred in 2009 in or near the Groundwater Restricted Area.

Records Findings

No major deficiencies were noted in radiological as-built drawings, site record books, or surveillance checklists. LTS&M documents were available electronically from the field office, the Information Repository and Operable Unit III Administrative Record were present and in good condition, and deed restrictions were verified at the San Juan County Recorder's office.

1.0 Introduction

The annual inspection of the U.S. Department of Energy (DOE) Monticello Mill Tailings Site (MMTS) and the Monticello Vicinity Properties (MVP) was conducted on September 9–10, 2009. Pre-inspection activities occurred on September 8, 2009. DOE inspects these sites annually to ensure that the selected remedies remain protective of human health and the environment. Under those remedies, contamination remains in place at some locations where use is restricted and exposure is limited. Annual inspections (1) verify that DOE long-term surveillance and maintenance (LTS&M) activities implemented throughout the year are effective and appropriate, (2) confirm that the institutional controls restricting land and water use under the MMTS and MVP remedies remain effective, and (3) identify deficiencies and recommend corrective actions as needed. This report summarizes the results of the 2009 annual inspection.

1.1 Monticello Site Background Information

Between the early 1940s and 1960, uranium and vanadium ore was intermittently processed at the mill and ore-buying station in Monticello, Utah. Mill tailings with low-level radioactivity were impounded at the former mill (mill site), and over time, some were dispersed to nearby properties by wind and water or used for construction in Monticello. Drainage of liquids from the impounded tailings contaminated groundwater in the underlying shallow alluvial aquifer.

The MVP and MMTS projects were placed on the National Priorities List (NPL) in 1986 and 1989, respectively, to address mill-related contamination. Locations of the Monticello NPL sites are shown in Figure 1. DOE, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as implemented through a Federal Facilities Agreement (FFA), completed remediation of soil contamination at the MMTS and MVP in August 1999. Radiologically contaminated materials were placed in an engineered disposal cell located about 1 mile south of the mill site. The disposal cell, completed in October 1999, and associated support facilities are known collectively as the repository site (see Figure 2). The repository site includes a temporary storage facility (TSF), where radiologically contaminated materials are stored before eventual disposal off site.

In some locations, radiologically contaminated material was left in place in compliance with supplemental standards, as codified at Title 40 *Code of Federal Regulations* Part 192.21. These locations, referred to as supplemental standards properties (see Figure 3), occur on City and private property, beneath city streets, and in utility corridors. Land use restrictions are applied to these properties and to the former mill site. The former mill site property, including supplemental standards areas on that property, were transferred to the City of Monticello in 2000 for use as a public park. Restrictions are also applied to properties overlying contaminated groundwater.

1.2 Long-Term Surveillance and Maintenance

Long-term stewardship of the Monticello NPL sites is administered by the DOE Office of Legacy Management (LM), with oversight provided by the U.S. Environmental Protection Agency (EPA) Region 8 and the Utah Department of Environmental Quality (UDEQ), to ensure that the selected remedies continue to be protective of human health and the environment. Annual inspections are one component of LTS&M at Monticello. Other primary components include routine inspection, operation, and maintenance of the on-site permanent disposal cell and

leachate management system; routine inspection of all properties affected by land and water use controls to ensure compliance with the controls; monitoring and management of radiologically contaminated soil encountered at City and Utah Department of Transportation (UDOT) excavations in Monticello; monitoring groundwater and surface water quality; annual evaluation/reporting of the water quality restoration effort; and CERCLA 5-year reviews (begun in 1997) to monitor and document the protectiveness of the MMTS and MVP remedies.

LTS&M activities, including the annual inspection and reporting, are conducted by on-site and off-site staff in accordance with the procedures provided in the *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites*, Rev. 0, June 2007 (DOE-LM/1465-2007) (LTS&M Plan).

1.3 Annual Site Inspection Scope

Annual inspections of the MMTS and MVP focus on four general topics: Recordkeeping and Administrative Review, DOE Repository Site, City and Private Properties, and City Streets and Utility Corridors. The Annual Inspection Checklist records the items inspected; Appendix A includes the completed checklist for the 2009 annual inspection. Revised in 2009, the new checklist format, concurred by EPA and UDEQ through FFA meetings, and the checklist supersedes Appendix K of the LTS&M Plan.

Recordkeeping and Administrative Review

During pre-inspection activities, recordkeeping by the on-site contractor staff is reviewed for proper documentation of day-to-day activities and recorded in Section II of the Annual Inspection Checklist. On-site record books, surveillance checklists, and radiological as-built maps are verified. The inspection also confirms that deed annotations applicable to the supplemental standards properties remain accurately filed at the County Courthouse; the Information Repository and Operable Unit III (OU III) Administrative Record documents are complete and current; updated copies of relevant LTS&M documents are available to on-site staff; and those workers accessing the TSF are appropriately trained or escorted. The inspection no longer includes a review of the MMTS and MVP Administrative Record, because these files were sent to the Federal Records Center in Denver, Colorado, in 2008.

DOE Repository Site

The repository site is inspected for the integrity of constructed features and support facilities (e.g., signs, buildings, fences, and gates) and the integrity of the disposal cell cover, including the health of the plant community, and recorded in Section III of the Annual Inspection Checklist. Areas needing maintenance or repair are noted, as are areas of soil erosion or siltation. Management and operation of Pond 4 and the disposal cell leachate collection system and management and operation of the TSF are also included in the repository site inspection.

City and Private Properties

City and private properties are inspected annually to confirm that institutional controls, as described in the LTS&M Plan, remain effective and to document any site conditions that may affect the protectiveness of the remedies. Properties are inspected for evidence of violations of

applicable restrictions, and findings are recorded in Sections IV, V, VI, VII, and VIII-C of the Annual Inspection Checklist.

Land and water use restrictions apply to the following City and private properties (see Figure 3 for locations):

- City-owned properties transferred from DOE: MP-00391, MP-01077, MP-01040 (north), MP-01041, MP-01042, MS-00893, and MP-00181. All of these properties are restricted to recreational day use. Overnight camping and the building of habitable structures are prohibited.
- Piñon/Juniper properties supplemental standards areas (a subset of the City-owned properties): MP-00391, MP-01077, and MP-01041 have an added restriction of no soil removal.
- Former mill site properties (a subset of the City-owned properties): MS-00893 and MP-00181. In addition to other restrictions, damage to wetlands is prohibited in these areas.
- Groundwater Management Area (also known as the Groundwater Restricted Area [GWRA]; includes both City-owned and private properties): MS-00893, MP-00181, MP-01077, MP-00211, MP-00179, MP-00947, MP-01083, MP-00951, MP-01084, MP-00990, MG-01033, MG-01026, MG-01027, MG-01029, and MG-01030. Domestic use of groundwater from the alluvial aquifer is prohibited on these properties. This institutional control is administered by the State Engineer's Office through the well permitting process.
- Montezuma Creek Soil and Sediment Properties (also known as the Montezuma Creek Restrictive Easement Area; privately owned): MP-00951, MP-00990, MP-01084, MG-01026, MG-01027, MG-01029, MG-01030, and MG-01033. Portions of these properties have restrictive easements to prohibit soil removal or the construction of habitable structures.
- Special zoning ordinances affect property MP-00211 (City-owned but not transferred from DOE) and property MS-00176 (privately owned), which require radiological scanning for certain ground-disturbing activities.

Surface components of the OU III groundwater treatment system and inactive monitoring well surface completions, located on private property MP-00179, are also inspected annually. Inspectors also note any evidence of standing water, saturated soil, surface disturbance, or stressed vegetation in the area of the groundwater treatment system.

City Streets and Utility Corridors

During the annual inspection, City streets, utility corridors, and Highways 191 and 491 rights-of-way are inspected for evidence of unmonitored excavations or soil movement. Results are recorded in Sections VIII-A and VIII-B of the Annual Inspection Checklist.

Radiologically contaminated soil remains in some places beneath streets and utility corridors in Monticello, in the Highway 191 embankment over Montezuma Creek, and UDOT rights-of-way along Highways 191 and 491. Supplemental standards have been applied to these areas. Through a cooperative agreement with the City, on-site staff monitors all excavations in these areas for radiologically contaminated material. The City transports any radiologically contaminated material to the TSF under direction of the on-site staff. All excavations of Highways 191 and 491

are monitored by on-site Stoller personnel. UDOT has the option of returning contaminated material to the excavation as backfill or having City workers, under the direction of on-site personnel, haul the material to the TSF.

1.4 2009 Annual Site Inspection Participants and Schedule

Inspection team members and affiliations are listed on page 1 of the Annual Inspection Checklist (Appendix A). J. Dayvault, T. Bartlett, L. Sheader, and P. Wetherstein conducted the physical site inspection on September 9–10, 2009. T. Moon, M. Kastens, C. Wilson, and N. Langston participated in portions of the inspection. M. Stilson (Utah Department of Natural Resources, Division of Water Rights) was contacted in conjunction with the annual inspection.

Tuesday, September 8, 2009

L. Sheader and M. Kastens performed pre-inspection activities, including portions of the Administrative Record inspection and assessment of vegetation on the repository cover.

Wednesday, September 9, 2009

Inspection team members convened at the Monticello field office for review of the Job Safety Analysis by P. Wetherstein and a pre-entry site briefing by Site Safety Supervisor T. Moon. Repository features, including Pond 4, the repository cover, repository perimeter, and the TSF, were inspected by P. Wetherstein and L. Sheader. T. Bartlett, J. Dayvault, and C. Wilson inspected City-owned properties MP-00211, MP-00181 and MS-00893, privately-owned property MS-00176, Montezuma Creek Soil and Sediment Properties, the Groundwater Management Area, City Streets and Utilities, and UDOT Highways 191 and 491. At the invitation of DOE, N. Langston accompanied inspectors during portions of the City-owned properties inspection. After field inspection activities, inspectors convened for an inspection debriefing at the field office.

Thursday, September 10, 2009

P. Wetherstein and L. Sheader inspected the remaining City-owned properties, including the former haul road (property MP-01077) and the inactive OU III monitoring wells. The field inspection concluded at approximately 12:00 p.m.

2.0 Site Inspection Results

2.1 DOE Repository Site and Disposal Cell

The repository site consists of the access area (support buildings and TSF), repository perimeter, run-on and runoff drainage controls, Pond 4, disposal cell cover, and cover penetrations (manholes, settlement monuments, and structures associated with the embedded lysimeter). Results of the repository inspection are summarized below and in Appendix A, Section III.

2.1.1 Access Area

The Monticello field office buildings and associated structures remain in satisfactory condition, but repairs to the field office building were underway at the time of the inspection. Site access signs displaying contact information are current and visible. Two noxious weed species were

found near the access area. Russian knapweed (*Acroptilon repens*) was treated with herbicide along the west fence of the support area during the inspection. Diffuse knapweed (*Centaurea diffusa*) was also treated near the main access gate.

The TSF is a restricted-access, gravel-surfaced area enclosed by an 8-foot-high chain link fence. The fence is appropriately posted with access control signs, and there is no evidence of vandalism or trespassing. Within the fence, the TSF bin and newly constructed lay-down area for potential mixed waste are in good working order. At the time of the inspection, the bin contained about 50 cubic yards of material, representing approximately 60 percent capacity (Photo 1).

Outside the TSF fence, several empty 55-gallon drums, intended for storage of potential mixed waste, show minor corrosion. It is recommended that these drums be sheltered from the elements.

Maintenance Item: Store empty 55-gallon drums under tarp or in shed to prevent further corrosion.

2.1.2 Repository Perimeter

A conventional barbed wire stock fence, containing several gates, marks the repository site boundary and discourages human trespass and livestock entry. Forty numbered location reference signs (E and P1–P39) are fixed to the fence or on separate posts nearby. The site entrance gate (Photo 2) is locked at night and at other times when on-site personnel are not present.

Perimeter Fence

The perimeter fence along the south edge of the repository site was replaced in fall 2008, but snow and livestock damaged the fence again in winter 2008–2009. Damaged sections were repaired in spring 2009, and the perimeter fence was in working condition at the time of the annual inspection. A small section of fence is damaged near perimeter sign P15 and requires repair (Photo 3).

Location Reference Signs

The lettering on perimeter sign P28 is peeling, and the sign is no longer legible. New “No Hunting” signs have been posted at each gate and are in excellent condition. No evidence of fence or sign vandalism (e.g., bullet holes) is present.

Boundary Markers

All six boundary markers were located and are in good condition.

Erosion/Gullies

No new erosion was evident during the 2009 inspection. Previous inspection reports describe a gully between perimeter signs E and P2, which threatened portions of the fence line along the west boundary of the site. Because sources of water to the gully have been re-routed or repaired, no action was taken to fill the gully or to move the perimeter fence. In 2009, the gully was still present but had become shallower in places where walls had collapsed and materials were deposited (Photo 4). It is anticipated that this process will continue to fill the gully over time.

Perimeter Vegetation

Vegetation between the perimeter fence and the wildlife fence (inner fence) is healthy and composed primarily of desirable species. Few weedy species are present. Inspectors found no significant accumulations of tumbleweeds or debris along the perimeter fence line.

Sediment Ponds

In past years, Sediment Ponds A, B, and C near the repository perimeter were monitored, but monitoring was discontinued in 2009 because the ponds have been decommissioned. UDEQ requested radiological scans of the ponds prior to decommissioning. Results of the scans, which showed background levels at all three ponds, were sent to UDEQ and EPA on July 21, 2009.

Maintenance Item: Repair section of damaged fence near perimeter sign P15.

Maintenance Item: Replace perimeter sign P28.

2.1.3 Repository Run-on and Runoff Controls

Engineered rock-lined drainage controls that collect and direct runoff from the disposal cell are the West Drain Ditch, South Drain Ditch, East Toe Trench, and North Toe Trench. These features prevent erosion of the disposal cell. Some areas of siltation, the result of natural processes where rock channels are filled in slowly over time, were observed within the ditches and trenches (Photo 5). All ditches and trenches are in good condition and do not contain excessive vegetation.

West Drain Ditch

In 2002, eroded areas in the West Drain Ditch channel immediately north of the inner fence were repaired, and the channel was lined with rock all the way to North Draw. This repaired section is in good condition. Minor erosion is evident in a small armored gully noted during the 2008 annual inspection and will continue to be monitored (Photo 6).

South Drain Ditch

Erosion rills are present on the South Drain Ditch's north side in places. These features do not require action other than continued monitoring. Rabbitbrush was observed in portions of the South Drain Ditch.

East Toe Trench and North Toe Trench

Some rock at the surface of the East and North Toe Trenches has continued to degrade; windblown sediment has accumulated at the surface, and in places, plants are becoming established. However, erosion or bypass of these trenches is not evident. Soils and vegetation have accumulated in the drainage downgradient from the East Toe Trench, but flows are not impeded. Soils and vegetation have also accumulated in the drainage downgradient from the North Toe Trench; some slopes in this area show evidence of minor sheet erosion.

2.1.4 Pond 4

Pond 4 is a lined solar evaporation pond that collects water pumped from the disposal cell's Leachate Collection and Recovery System (LCRS). Pond 4 also collects a small amount of precipitation. Pond 4 is constructed with its own LCRS and leak detection system (LDS). The Pond 4 LCRS has collected water infrequently in the past when the pond was used to store

construction water or at times of increased precipitation. The Pond 4 LDS has never collected water.

Gate, Fence, Entrance, and Perimeter Signs

An 8-foot-high chain link security fence surrounds Pond 4. Locked chain link gates are present at the northeast and southwest corners, and a locked vehicle access gate is located in the west fence. The security fence and all gates are in good working condition. There is no evidence of vandalism or trespass. Warning signs on the perimeter fence are easily visible and legible.

Pond Perimeter and Berm

The pond's rope barrier is in place, and warning signs are visible and legible. There is no visible evidence of damage (burrowing, erosion, slumping) to the berm. Vegetation on the slopes of the berm is well established and primarily composed of non-weedy species.

Lifesaving Equipment

Water rescue equipment is stored in a weatherproof metal cabinet on the berm near the northeast corner of Pond 4. The cabinet is highly visible, adequately labeled, and in good condition. The contents of the cabinet (throw buoys, rope, rope ladder, personal flotation devices) are easily accessible and in good condition.

Pond 4 LCRS/LDS Control Cabinet

The cabinet is in good condition. No evidence of insects or rodent damage is present, and the cabinet remains weatherproof. Operation of the Pond 4 LCRS and LDS is reported under Section 2.1.6, "Cover Penetrations."

Liner, Anchors, and Pond Interior

No evidence of holes in the pond liner was observed (Photo 7). Liner anchors, consisting of sand-filled polyethylene pipe installed in 2007, are in good condition. Approximately one foot of water is standing in the northeast corner of the pond. The pond also contains minor silt and vegetation. A doe deer was discovered in Pond 4 several weeks before the annual inspection. The fence was inspected at the time of the incident and no holes or breaches were observed. The liner was inspected at the time of the incident and also after the annual inspection, and no evidence of breaches, tears or damage was identified. The deer was chased out of the enclosure at the time of the incident and has not returned. Routine inspections continue to include looking for wildlife in the enclosure.

2.1.5 Disposal Cell Cover

The repository cover inspection includes the disposal cell cover and other features within the inner wildlife fence, including roads, riprap areas, and site monuments. The wildlife fence is a 6-foot-high wire mesh fence that contains a vehicle access gate on the west end, a Pond 4 access gate on the east end, and five narrow gate apertures that allow ingress and egress of wildlife.

Roads, Wildlife Fence, Site Monuments, and Raptor Perches

The graveled road surrounding the disposal cell and the road to Pond 4 are in good condition. Weeds up to 18 inches high grow in places but do not impede travel. All sections of the wildlife fence and gates are in good condition and show no evidence of vandalism or damage. The gates were open at the time of the inspection. Two site monuments, one located along the access road inside the wildlife fence and one located at the apex of the repository, are present and intact. Six

raptor perches were installed near the disposal cell cover in 2007, to assist in managing a vole infestation. All perches remain in place and are in good condition, and raptors are frequently observed using the perches.

Vegetation

Desirable plants are well established on the cover, and no barren areas, eroded areas, or phreatophyte shrubs were identified. Some dead sagebrush (*Artemisia tridentata*) and rabbitbrush (*Ericameria nauseosa*) plants, the result of a past vole infestation, were scattered across the cover. Trace quantities of bindweed (*Convolvulus arvensis*), a Category C noxious weed, were found on the cover. Because management goals for Category C weeds include prevention of spread rather than eradication, biocontrol insects may be more effective than herbicide application.

A Repository Cover Vegetation Index was developed in 2009 for use during annual inspections (pages 11–12 of Appendix A). This index replaces previous style of monitoring performed on the site between 2000 and 2008. A vegetation condition score of 3.56 out of 5.00 was assigned to the repository cover vegetation. An average score is considered to be 3.00. The vegetation condition score will be used in future monitoring to detect trends in the health of the vegetation community. Dominant species identified on the cover in 2009 include western wheatgrass (*Pascopyrum smithii*), cheatgrass (*Bromus tectorum*), crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Thinopyrum intermedium*), and sagebrush.

Vegetation on the repository's soil-covered side slopes and outlying areas is in good condition. Plants have also established on portions of the rock riprap armoring, mainly rabbitbrush and yarrow (*Achillea millefolium*), with occasional patches of oak brush (*Quercus gambelii*). None of this vegetation is of concern because it does not overlie tailings or threaten the integrity of the side slopes.

Burrowing

Burrows of small rodents were identified in several places on the repository cover, but such burrowing is expected and is not excessive.

Stability

No area of the cover indicated settling, slumping, fracturing, seepage, ponding, or significant erosion. The steep, rock-lined slopes show no evidence of rock movement or degradation, settling, slumping, or erosion.

2.1.6 Cover Penetrations

Cover penetrations include five manholes, two video ports, nine settlement monuments, and structures associated with a large lysimeter, which measures water flow, embedded in the eastern portion of the disposal cell (see Figure 2).

Manholes and Video Ports

Manholes 1 and 3 enclose equipment for the disposal cell LCRS and LDS. They were not entered during the annual inspection, but the interiors of both manholes were observed from above ground (Photo 8 shows Manhole 3). All five manhole covers are secure and operable, appropriate safety warnings and entry procedures are posted, the exterior pump access ports are

undamaged, telemetry surface installations are in good condition, and no leakage or drainage is evident. Covers of the inoperable video ports on MH-1 and MH-2 are locked and secure.

Settlement Monuments

Nine settlement monuments, identified by the letters A through I, are located on the disposal cell. The outer protective casings (12-inch PVC pipe) and the inner plates are intact and undamaged. Data from elevation surveys of the settlement monuments in 2006 indicated no evidence of settlement. Settlement monument elevations are surveyed every 5 years; the next survey is scheduled for 2011.

Embedded Lysimeter

External features of the embedded lysimeter were inspected, and no drainage or seepage was detected at the outlet or along cover penetrations. Instrumentation installations are in good condition.

Operation of Repository and Pond 4 LCRS and LDS

The LDS transducer was not functioning at the time of the inspection but is scheduled for replacement. As a result, the pump has been manually operated. Monitoring of leachate production is performed automatically via the repository telemetry system. Upgraded in 2007, the telemetry system relays data to the LM "SOARS" system for off-site viewing, evaluation, and management. The telemetry data are routinely summarized by on-site staff and provided to DOE, EPA, and UDEQ in quarterly reports. Annual inspection of the repository telemetry system is conducted through interview with on-site staff. Currently, less than 1,800 gallons of water per week are pumped from the LCRS and delivered to Pond 4. In 1999, initial leachate production was about 30,000 gallons per week. To date, no water has been collected in the LDS. No water was collected in the Pond 4 LCRS or LDS in 2009.

2.2 City-Owned Properties

City-owned properties MP-00181, MP-00391, MS-00893, MP-01040 (north), MP-01041, MP-01042, and MP-01077 were transferred from DOE to the City of Monticello in 2000. Specific restrictions on these properties are listed in Table 1. Photos 9-11 show the former mill site properties. Property MP-00211 was always City-owned and is subject only to zoning restrictions on excavation and construction. Results from the 2009 annual inspection are summarized below and in Section IV of Appendix A.

Recreational Use

The City-owned properties transferred from DOE are accessible to the public. In 2007, these properties were annexed by the City of Monticello. Hunting with firearms is not allowed within city limits, but bow hunting was authorized in 2009.

Construction of Habitable Structures

No overnight camping or the construction of habitable structures was evident on any property.

Supplemental Standards Areas on Piñon/Juniper Properties

No evidence of new soil removal by human activity or natural processes was noted on any of the Piñon/Juniper properties supplemental standards areas during the 2009 inspection. The supplemental standards areas are physically delineated by four-strand wire fence. Sections of this

fence have been breached by the City of Monticello to accommodate mountain bike trails, and other sections have degenerated due to age. Radiological scans of the bike trails indicate no concerns, and survey records are available at the field office. DOE will continue to monitor these areas regularly. Monitoring will be facilitated by creating a GPS map of the trails; this activity is planned for 2010.

Soil Movement, Drainage, and Runoff Controls

During the annual inspection, inspectors observed construction related to water line repair on property MP-00181. The irrigation water line break occurred on September 3, 2009, and resulted in some erosion and redistribution of soils. On-site personnel were instructed to scan the area for radiological contamination according to established protocol when soils were dry. This was completed on September 17, 2009, and all scan readings were consistent with background readings.

All riprap-armored structures, dams, check dams, berms, and runoff control drainages (see Figure 4) are intact and functional. No major erosion issues were noted during the 2009 inspection (for example, see Photo 12). A silted trench with reduced capacity was noted on Property MP-01077 by the adjacent landowner (Photo 13). The landowner indicated that the City of Monticello had partially repaired the trench, but more work was required to restore it to full capacity and prevent a possible breach by storm events. The landowner has reported this to the City of Monticello.

Wetlands

Wetlands on the former mill site were constructed according to EPA-specific criteria, and these wetlands are protected by cooperative agreement. Under this agreement the City will not disturb these areas without prior approval from appropriate state and federal agencies and is not responsible for repairing damage to these areas by natural causes. Montezuma Creek and three constructed marsh wetlands on the City-owned properties are ecologically healthy, and no evidence of damage by human activity or natural causes was observed during the 2009 inspection. Canada thistle (*Cirsium arvense*), a noxious weed, was observed in some wetland areas. Bull thistle (*Cirsium vulgare*) was also observed in some wetland areas, but this species is not noxious in the State of Utah or in San Juan County.

Groundwater Use

No evidence of groundwater use or water-well drilling on City-owned properties with groundwater restrictions was observed during the 2009 inspection or through the year. No applications to drill were filed with the Utah Department of Natural Resources Division of Water Rights for these areas (see Section 2.6 below).

Maintenance Item: Create a GPS map of bicycle trails to facilitate future monitoring through supplemental standards areas.

2.3 City Streets and Utility Corridors and UDOT Rights-of-Way

Results of the 2009 annual inspection of city streets and utility corridors and UDOT rights-of-way are found in Appendix A, Section VIII. Throughout the 2009 inspection, city streets were observed at random for unmonitored or unplanned excavations. None were identified. On-site personnel were aware of all planned excavations. Extensive excavations to Highways 191 and

491 were underway at the time of the inspection. No evidence of unmonitored or unplanned excavations was apparent, and no new erosion of highway shoulders or along the Highway 191 embankment at Montezuma Creek was evident.

2.4 Private Property MS-00176-VL

Monticello zoning ordinance requires a special building permit based on radiological scanning results before construction of a habitable structure on this property. There is no evidence of erosion, soil removal, or construction of habitable structures (see Appendix A, Section VIII-C). A portion of this property was sold in 2006. The portion that was sold does not have supplemental standards areas, but the new owner did not remove the land use restriction annotated to the deed.

2.5 Properties in the Montezuma Creek Restrictive Easement Area

There was no evidence of significant erosion or soil removal from the restricted areas of these properties during the 2009 inspection (see Appendix A, Section V). In 2006, a new residence was constructed on property MP-00990 outside the supplemental standards area. At that time, on-site personnel assisted the landowner in delineating the restricted area of this property. A portion of the property is cultivated in the restricted area in compliance with the land use restriction. In 2008, the landowner began diverting water from Montezuma Creek near monitoring well 92-09 to apply to cultivated areas. This represents a change in land use, which continues to be evaluated by DOE. No properties in the restrictive easement area (Montezuma Creek Soil and Sediment Properties) changed ownership in 2009.

2.6 Groundwater Restricted Area

In the past year there has been no evidence of well-drilling activity in or near the GWRA (Appendix A, Section VI). This was confirmed on August 26, 2009, by M. Stilson of the State Engineer's Office, who indicated that there were no applications filed in the past year for water wells in or near the Monticello GWRA.

2.7 Operable Unit III

Permeable Reactive Barrier (PRB) and Auxiliary Treatment System

A groundwater treatment system comprising the PRB and treatment cells (Photo 14) is on private property MP-00179 east of the former mill site. Features of these systems are inspected each year to ensure that the current land use, ranching, is not adversely affected. Visible components of the groundwater treatment system (vaults, telecommunications antenna, electrical panel, fence enclosures) are intact. Personnel were on site at the time of the inspection to install a new outfall flow meter on the treatment system. No evidence of ponded water, stressed vegetation, or saturated soil was present (see Appendix A, Section VII-B).

Water Quality Monitoring and Well Inspection

OU III water quality is monitored at an established network of active groundwater monitoring wells and surface water monitoring sites. Active wells are inspected during sampling in April and October of each year, and field personnel noted no deficiencies in routine well inspections in 2009. Inactive wells at the PRB were inspected during the 2009 annual inspection. All wells

indicated on the field map were located except TW-06 and R2-M10, which are probably buried under soil accumulations. Surface completions of the inactive wells are generally in good condition (see Appendix A, Section VII-A). In 2009, repainting of inactive well numbers was discontinued, as the field map attached to the Annual Inspection Checklist had been updated in 2008 to more easily locate inactive wells.

2.8 Administrative and Records Inspection

The records inspection was completed on September 8, 2009. The following documents/records, recorded by on-site staff, were inspected for completeness and accuracy of information (see Appendix A, Section II):

- Radiological as-built drawings.
- Site record books, which include the repository, TSF, City-owned properties, private property restricted areas, and public roads and utilities.
- Surveillance checklists, which include Meteorological Monitoring Data; TSF Access/Security Logs; and Monthly, Quarterly, and Pond 4 Surveillance Checklists. Pond 4 and Repository LCRS and LDS Monitoring Records are recorded electronically.

The following categories of documents/records were inspected to ensure that pertinent information for implementing LTS&M activities is readily available to on-site staff and the general public:

- Electronic availability of LTS&M Plan, including site-specific emergency response information, LM Health and Safety Manual, and Quality Assurance manual.
- Information Repository and OU III Administrative Record.
- LTS&M training records (applicable to on-site and unescorted City employees accessing the TSF).

Deed restrictions (verified in the San Juan County Recorder's office) were inspected to ensure that administrative controls remain in effect with the City and County.

No major deficiencies were noted in any of the above administrative categories. Some minor errors were found due to the large volume of entries related to recent excavations. Outdated field manuals noted during the 2008 inspection have been appropriately labeled, and electronic access to all updated manuals is available through the office computers. Copies of the Information Repository and OU III Administrative Record are complete and current.

3.0 Conclusions and Recommendations

The 2009 annual inspection confirmed that DOE LTS&M activities implemented throughout the year remain effective and appropriate, and institutional controls restricting land and water use under the MMTS and MVP remedies remain effective. No corrective actions are necessary.

The following recommendations address maintenance and monitoring issues identified during the 2009 annual inspection:

Maintenance Item	Schedule for Item Resolution
Store empty 55-gallon drums under tarp or in shed to prevent further corrosion	January–March 2010
Repair section of damaged fence near perimeter sign P15	April–June 2010
Replace perimeter sign P28	April–June 2010
Create a GPS map of bicycle trails to facilitate future monitoring	April–June 2010

DOE, EPA and UDEQ implemented changes in inspection procedures in 2009 which include the decommissioning of Sediment Ponds A, B, and C and subsequent omission from inspection procedure; the use of the revised Annual Inspection Checklist; the use of a new “Repository Cover Vegetation Index” instead of annual vegetation monitoring and reporting; and the use of an updated map showing all inactive monitoring wells.

4.0 Photograph Log and Photographs

Photographs were taken to document findings of the 2009 annual inspection. The location and orientation of the photographs included below are identified in Figures 2, 3, and 4. A Field Photograph Log associated with all photographs taken during the 2009 annual inspection is included as Appendix A, Section IX.



1. Material in TSF bin at the time of annual inspection.



2. Repository site main access gate.



3. Damaged fence section near perimeter sign P15, view north.



4. Gully between perimeter signs P1 and P2, view south.



5. Sediment and vegetation in East Toe Trench extension near wildlife gate.



6. Minor erosion area near West Drain Ditch.



7. Pond 4 showing liner, water, vegetation, and silt.



8. View inside Manhole 3.



9. Former millsite, view southwest.



10. Former mill site, view south.



11. Former mill site, view southeast.



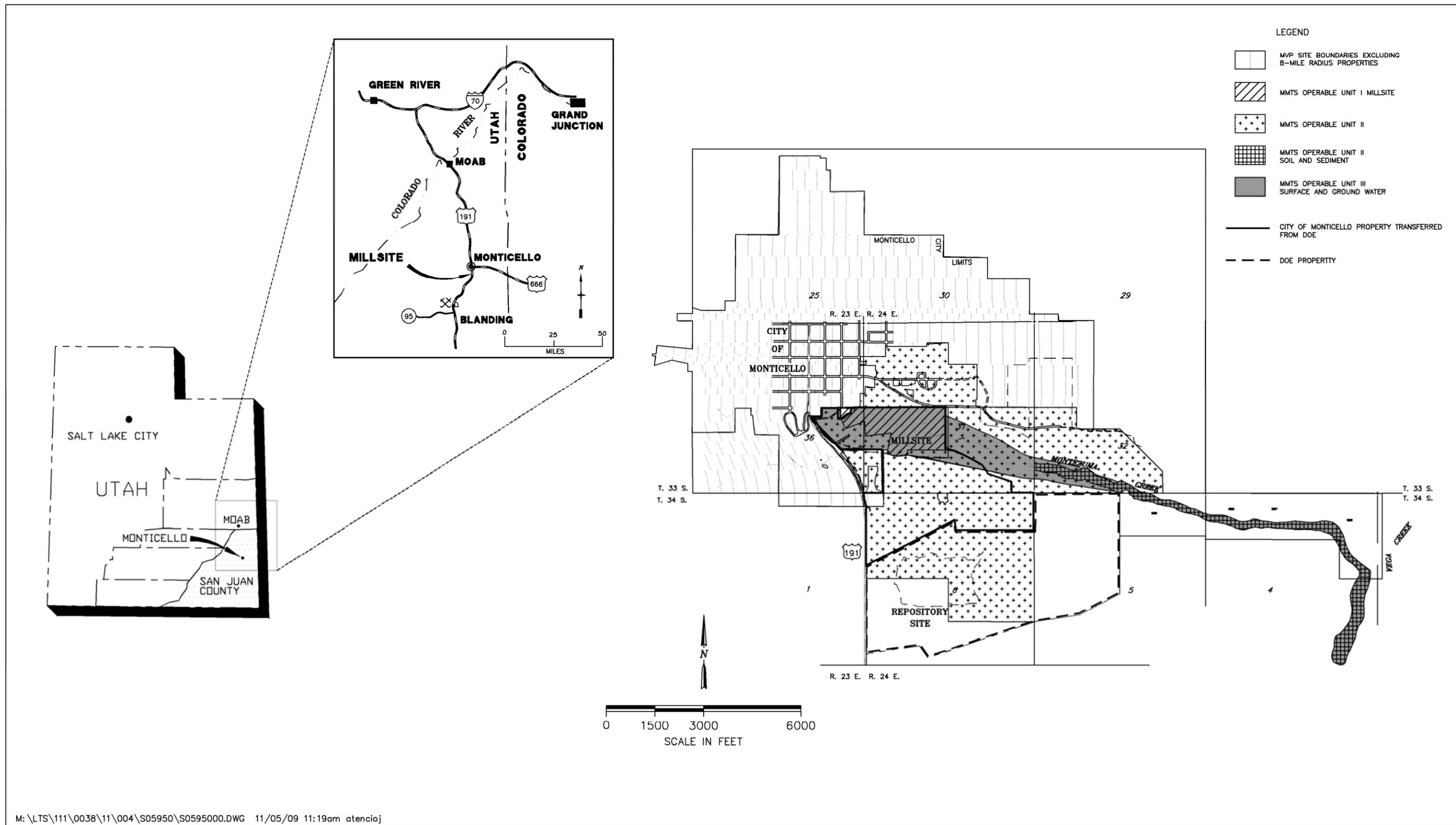
12. View southwest from Deer Dam showing vegetated check dams.



13. Silted trench on Property MP-01077, view east.



14. Auxiliary treatment cells, view east.



M:\LTS\111\0038\11\004\S05950\S0595000.DWG 11/05/09 11:19am atencioj

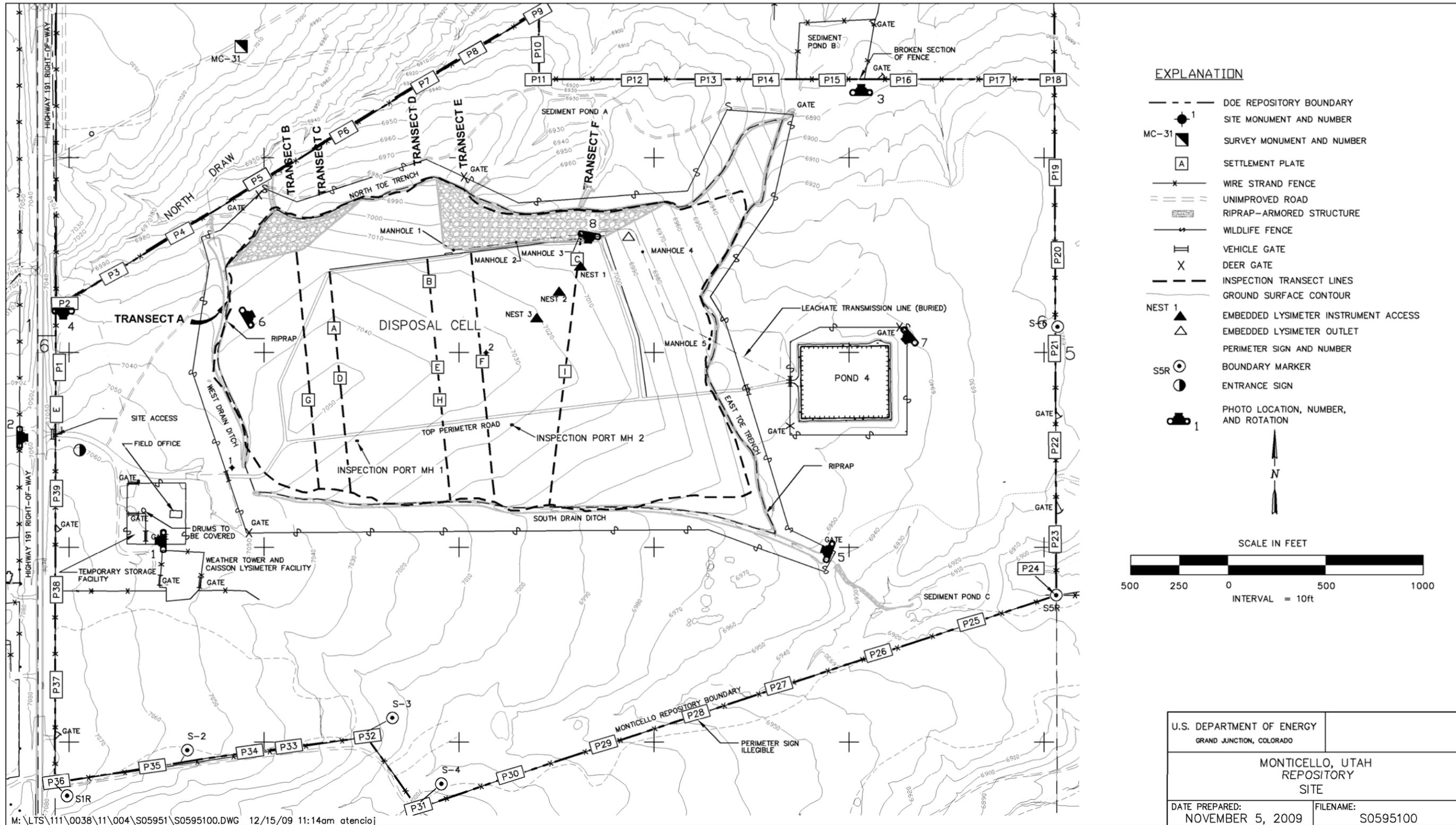


Figure 2. Monticello, Utah, Repository Site

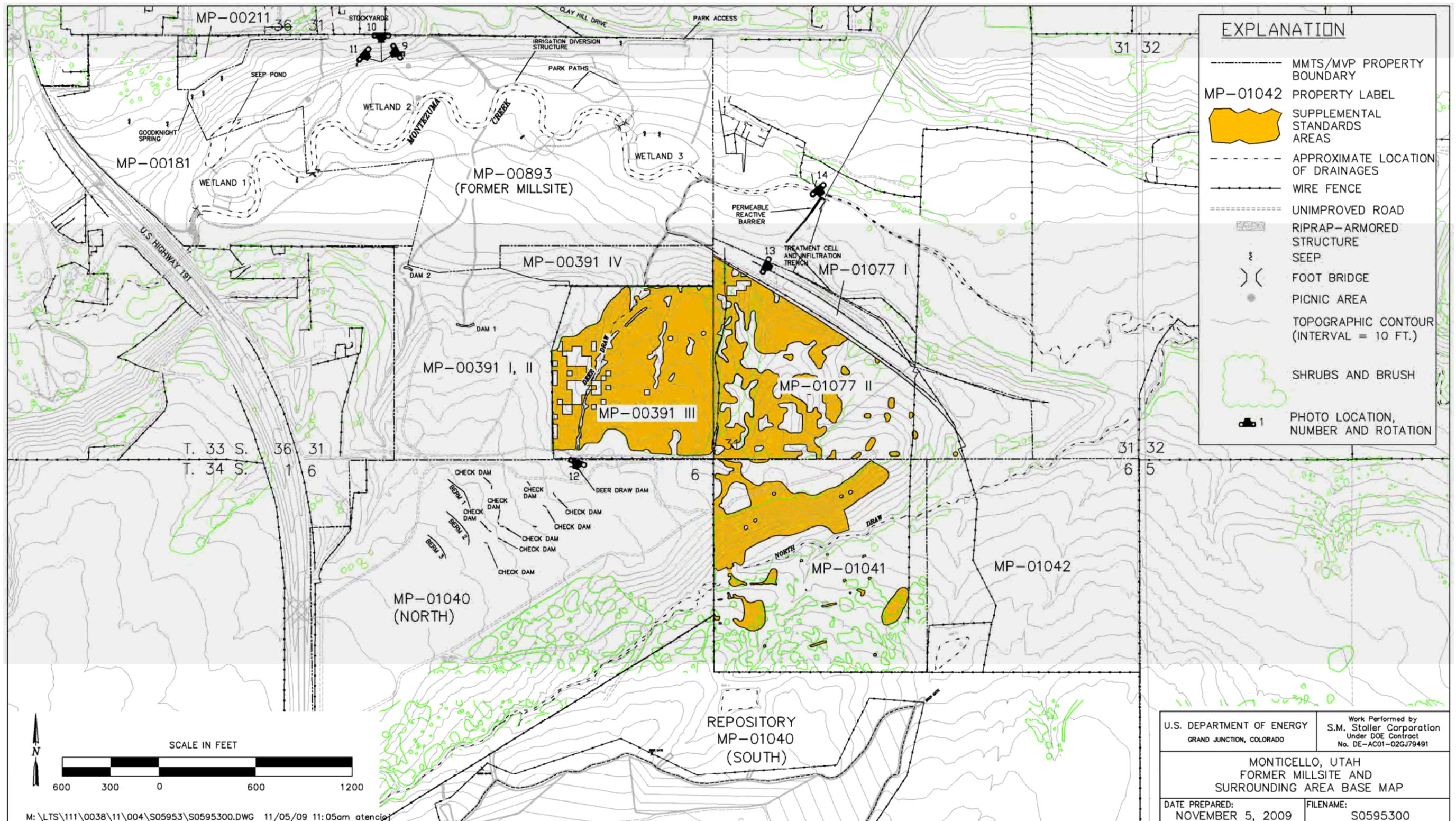


Figure 4. Monticello, Utah, Former Mill Site and Surrounding Area

Appendix A

Annual Inspection Checklist

This page intentionally left blank

MMTS: Monticello Mill Tailings (USDOE) Site; Operable Units I, II, and III (UT 3890090035)
MVP: Monticello Radioactively Contaminated Properties (Monticello Vicinity Properties) (UTD 980667208)
 Location: Monticello, Utah: EPA Region 8

Note: Section 6.1 of the Long-Term Surveillance and Maintenance Plan contains detailed inspection procedures. See attached maps for the location of site inspection features identified in this checklist.

Annual Inspection Preparation:

The following tasks were completed in preparation for the current MMTS and MVP annual inspection:

	Y	N
Review annual inspection requirements outlined in Section 6.1 of the LTS&M Plan	X	<input type="checkbox"/>
Schedule site inspection and appoint chief inspector	X	<input type="checkbox"/>
Review previous reports and records as outlined in Section 6.1.2 of LTS&M Plan	X	<input type="checkbox"/>
Notes:		
Review OU III water quality data for contaminant trends and distribution	X	<input type="checkbox"/>
Provide team members with background information, maps, and inspection checklists	X	<input type="checkbox"/>
Notify EPA and UDEQ at least 2 weeks prior to site visit and invite them to participate	X	<input type="checkbox"/>
Notify representatives from other agencies as necessary and invite them to participate	X	<input type="checkbox"/>
Verify names and telephone numbers of parties with access or notification agreements	X	<input type="checkbox"/>
Verify key contact information listed in Section 6.1.2 of the LTS&M Plan	X	<input type="checkbox"/>
Contact State Engineer's Office for water well permit applications in/near GWMA	X	<input type="checkbox"/>
Verify annual contact with UDOT re: planned highway projects for current year	X	<input type="checkbox"/>
Verify regular contact with City of Monticello re: planned or unplanned excavations	X	<input type="checkbox"/>

Date(s) of Annual Inspection: 9/9/09–9/10/09 (pre-inspection 9/8/09)

Inspection Team Members

Name	Affiliation	Phone Number	E-mail
Timothy Bartlett	S.M. Stoller Corp. (Lead Inspector and Project Hydrogeologist)	970-248-7741	Timothy.Bartlett@lm.doe.gov
Linda Sheader	S.M. Stoller Corp. (Plant Ecologist and curator of Information Repository records and the OU III Administrative Record)	970-248-6711	Linda.Sheader@lm.doe.gov
Paul Wetherstein	S.M. Stoller Corp. (Environmental Compliance)	970-248-6645	Paul.Wetherstein@lm.doe.gov
Todd Moon	S.M. Stoller Corp. (on-site representative)	435-587-3115	Todd.Moon@lm.doe.gov
Jalena Dayvault	U.S. Department of Energy (Project Manager)	970-248-6016	Jalena.Dayvault@lm.doe.gov
Christina Wilson	U.S. Environmental Protection Agency (Remedial Project Manager)	303-312-6706	Wilson.Christina@epa.gov
Nate Langston	City of Monticello (Maintenance Foreman)	435-587-2271	
Marilyn Kastens	S.M. Stoller Corp. (Ecologist and Soil Scientist)	970-248-6781	Marilyn.Kastens@lm.doe.gov

Note: attach additional sheets as needed for any of the following sections.

I. Interviews		
Name of Individual Interviewed	Affiliation	Date Interviewed
Todd Moon (Notes from meeting)	On-Site LM Representative	9/9/09
Notes: <i>No properties sold or land use changes</i> <i>Utility excavations will be re-engineered for shallow excavation to avoid encountering potential mixed waste</i>		
Name of Individual Interviewed	Affiliation	Date Interviewed
Nate Langston	City of Monticello	9/9/09
Notes: Mr. Langston accompanied J. Dayvault and T. Bartlett on portions of the inspection (City-owned properties).		
Name of Individual Interviewed	Affiliation	Date Interviewed
Mark Stilson	State Engineer	August 26, 2009
Notes: P. Wetherstein contacted M. Stilson by phone prior to annual inspection to verify that no well permits were issued in restricted areas. No well permits were requested or issued in restricted areas in 2009.		
Name of Individual Interviewed	Affiliation	Date Interviewed
Notes:		

II. Administrative and Records Inspection

	Readily Available		Current	
	Y	N	Y	N
1. General LTS&M Documents				
Ready access from field office to online manuals (Long-Term Surveillance and Maintenance Plan, Health and Safety Manual, QA Manual)	X	<input type="checkbox"/>	X	<input type="checkbox"/>
2. LTS&M Training Records (<i>ID names in TSF log; verify with Training dept.</i>)				
On-site employees			X	<input type="checkbox"/>
City workers (<i>unescorted workers must have current training</i>) - all employees were escorted; n/a				
3. Public Records (<i>verify records are present and in order</i>)				
OU III Administrative Record	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information Repository (Monticello)	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information Repository (Grand Junction)	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Record Books (<i>Note: Inspection guidelines are listed inside covers of record books; LTS&M Plan Appendix B contains record book management and entry protocol</i>)				
Record book entries/documentation	X	<i>satisfactory</i>	<input type="checkbox"/>	<i>unsatisfactory</i>
Repository Site Record Book	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TSF Record Book (<i>see LTS&M Plan Section 3.4</i>)	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
City-owned properties (<i>see LTS&M Plan Section 4.4</i>)	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Private Property Restricted Areas (<i>see LTS&M Sec. 4.4</i>)	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public Roads and Utilities Record Book	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Documentation/recordkeeping requirements met	X	<i>satisfactory</i>	<input type="checkbox"/>	<i>unsatisfactory</i>
Information readily traced to updated drawings	X	<i>satisfactory</i>	<input type="checkbox"/>	<i>unsatisfactory</i>
Rad scan info for eroded/excavated material	X	<i>satisfactory</i>	<input type="checkbox"/>	<i>unsatisfactory</i>
Entries include TSF transfers	X	<i>satisfactory</i>	<input type="checkbox"/>	<i>unsatisfactory</i>
Entries include info on stockpiled material and follow-up scan results	X	<i>satisfactory</i>	<input type="checkbox"/>	<i>unsatisfactory</i>
Hwy 191/491 entries include information on scan				<input type="checkbox"/> N/A
Results and material returned to excavation	X	<i>satisfactory</i>	<input type="checkbox"/>	<i>unsatisfactory</i>
Storm event surveys documented	X	<i>satisfactory</i>	<input type="checkbox"/>	<i>unsatisfactory</i>
Notes for Record Books Inspection:				
Because of large volume of entries, checked entries for 9/18/08, 10/6/08, 4/22/09, 5/14/09, 4/29/09, 4/30/09, 5/26/09, 6/3/09, 6/15/09, 8/1/09 and 8/4/09. Most recorded fully. Some minor omissions on as-builts.				
On 11/12/08, there was one entry in TSF record book for two hauls, five minutes apart.				
5. Radiological As-Built Drawings				
Drawing updated annually	X	<i>satisfactory</i>	<input type="checkbox"/>	<i>unsatisfactory</i>
Documentation/recordkeeping requirements met	X	<i>satisfactory</i>	<input type="checkbox"/>	<i>unsatisfactory</i>
Radiological scan information recorded	X	<i>satisfactory</i>	<input type="checkbox"/>	<i>unsatisfactory</i>
6. Surveillance Checklists and Records				
<i>(Note: Repository and Pond 4 LCRS and LDS monitoring records are sent electronically on a regular basis.)</i>				
TSF Access/Security Logs	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meteorological Monitoring Data, Monthly and Quarterly Repository Surveillance Checklists, and Monthly Pond 4 Surveillance Checklists	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Notes for checklist and records inspection:				
Met data for 6/09 were misfiled; corrected during inspection				
No data were reported for 12/08				
7. Agreements (<i>Note: verify inclusion in Information Repository</i>)				
DOE/City Cooperative Agreement			X	<input type="checkbox"/>
DOE/UDOT Memorandum of Understanding			X	<input type="checkbox"/>
8. Zoning Restriction—Overlay Zone OL-1				
Restriction is verified as current through City for property MP-00211-VL			X	<input type="checkbox"/>
Restriction is verified as current through City for property MP-00176-VL			X	<input type="checkbox"/>

9. Deed Restrictions (verify at San Juan County Recorder's Office, 117 S. Main)

Properties Transferred from DOE to City of Monticello

IC Annotations in Place

DOE ID	Parcel	Document	Book	Page	Y	N
MP-00181-OT	A33230367201& 33S23E367204	E061691	B788	100-113	X	<input type="checkbox"/>
MP-00391-VL	33S24E316001	E061691	B788	100-113	X	<input type="checkbox"/>
MS-00893-OT	33S24E315400	E061691	B788	100-113	X	<input type="checkbox"/>
MP-01040-VL (N)	34S24E061200	E061691	B788	100-113	X	<input type="checkbox"/>
MP-01041-VL	34S24E060600	E061691	B788	100-113	X	<input type="checkbox"/>
MP-01042-VL	34S24E060000	E061691	B788	100-113	X	<input type="checkbox"/>
MP-01077-VL	33S24E318400	E061691	B788	100-113	X	<input type="checkbox"/>

Note: Correction to quitclaim deed for properties transferred to City recorded as E062130, B789, P450-452.

Montezuma Creek Soil and Sediment Properties

DOE ID	Parcel	Document	Book	Page	Y	N
MP-00990-CS	33S24E324800	E063343	B793	831-852	X	<input type="checkbox"/>
MG-01033-VL	34S24E050000	E063343	B793	831-852	X	<input type="checkbox"/>
MS-01026-VL	34S24E043000	E063343	B793	831-852	X	<input type="checkbox"/>
MS-01027-VL	34S24E042400	E063343	B793	831-852	X	<input type="checkbox"/>
MG-01030-VL	34S24E047200	E063255	B793	526-538	X	<input type="checkbox"/>
MG-01029-VL	34S24E040000	E063219	B793	390-404	X	<input type="checkbox"/>
MP-00951-VL	33S24E317200	E063926	B796	188-202	X	<input type="checkbox"/>
MP-01084-VL	33S24E326000	E063926	B796	188-202	X	<input type="checkbox"/>

Note: Correction to warranty deed recorded as E073394, B830, P611.

Utah Department of Transportation Properties

DOE ID	Parcel	Document	Book	Page	Y	N
MS-00895-OT	A33230367811	E068703	B814	533	X	<input type="checkbox"/>
MS-00892-OT	A33230367202	E068704	B814	534	X	<input type="checkbox"/>
MS-01021-OT	A33230367812	E068705	B814	535-536	X	<input type="checkbox"/>
MS-01020-OT	A33230369001	E068706	B814	537-538	X	<input type="checkbox"/>

Notes for deed restriction inspection:

III. Repository Inspection

A. Access Area

1. Site Access Sign/Emergency Information	X	Satisfactory	<input type="checkbox"/>	Repairs/Maintenance Needed
2. Field Office	<input type="checkbox"/>	Satisfactory	X	Repairs/Maintenance Needed
3. Temporary Storage Facility	X	Satisfactory	<input type="checkbox"/>	Repairs/Maintenance Needed
Bin cover	X	Functional	<input type="checkbox"/>	Not Functional
Approximate volume of bin contents (cubic yards)		50		(about 60% of capacity)
Health and safety/rad postings	X	Appropriate	<input type="checkbox"/>	Inadequate
Drums and secondary containment	X	Good condition	<input type="checkbox"/>	Unavailable/not good condition
Vandalism/trespassing	X	Not evident	<input type="checkbox"/>	Evident (locate on map)

Describe access area repairs/maintenance needed:

Repairs to field office in progress at the time of inspection

Drums located outside of TSF fence; drums are exposed to elements; minor corrosion is evident; recommend painting stencils on drums with DOT information; recommend tarping or storage in shed

Infestations of Russian knapweed (Acroptilon repens) and diffuse knapweed (Centaurea diffusa) in field office lot and near front gate treated with herbicide during inspection

B. Repository Perimeter (Note locations of erosion, noxious weeds, vandalism, or excessive vegetation on map)			
1. Outer Fencing and Gates	<input checked="" type="checkbox"/> Satisfactory	<input type="checkbox"/> Repairs/Maintenance Needed	
2. Signs (Note condition of 40 numbered reference signs and posts)	Signs damaged but legible, requiring monitoring: P9 (cracks); P13 (peeling paint) Signs requiring replacement: P28		
3. South Boundary Markers	<input checked="" type="checkbox"/> All six markers located	<input type="checkbox"/> Marker(s) _____ not located	
4. Erosion/Gullyng	<input checked="" type="checkbox"/> Not evident	<input type="checkbox"/> Evident	
5. Vegetation	<input checked="" type="checkbox"/> Not excessive	<input type="checkbox"/> Excessive growth	
	<input checked="" type="checkbox"/> Noxious weeds absent	<input type="checkbox"/> Noxious weeds present	
6. Land use changes on adjoining property	<input checked="" type="checkbox"/> No change	<input type="checkbox"/> Change	
7. Vandalism/trespassing	<input checked="" type="checkbox"/> Not evident	<input type="checkbox"/> Evident	
Notes for condition of repository perimeter (e.g., repairs needed, erosion areas, vandalism): No new erosion/gullyng evident; evidence of erosion/gullyng from previous years East perimeter fence and signs checked 9/8/09 by P. Wetherstein; remaining fence and signs checked 9/9/09 by L. Sheader Erosion channel along west fence remains, but has filled in somewhat; walls have collapsed in places Fence damaged at Sign P15 (Photo #14) South perimeter fence replaced in winter 2008/2009; damaged and repaired; currently intact			
C. Repository Runoff/Run-On Controls (North and East Toe Drains; South and West Drain Ditches)			
1. Settlement	<input checked="" type="checkbox"/> Not evident	<input type="checkbox"/> Evident	
2. Material Degradation	<input checked="" type="checkbox"/> Not evident	<input type="checkbox"/> Evident	
3. Erosion/gullies	<input checked="" type="checkbox"/> Not evident	<input type="checkbox"/> Evident	No new gullies
4. Siltation	<input type="checkbox"/> Not evident	<input checked="" type="checkbox"/> Evident	
5. Obstructions	<input type="checkbox"/> Not evident	<input checked="" type="checkbox"/> Evident	
6. Excessive Vegetation	<input checked="" type="checkbox"/> Not evident	<input type="checkbox"/> Evident	
Notes for condition of repository runoff and run-on controls (Note: locate all areas of concern on map): Siltation has occurred in some channels, as expected; not a concern Some bushes obstruct channels in places; not excessive Rabbitbrush noted in south drain ditch			
D. Pond 4 (Note: locate all areas of concern on map)			
1. Perimeter Fence and Access Gate	<input checked="" type="checkbox"/> Satisfactory	<input type="checkbox"/> Unsatisfactory	
2. Erosion/Biointrusion of Pond Berm	<input checked="" type="checkbox"/> Not evident	<input type="checkbox"/> Evident	
3. Safety Equipment	Pond barrier rope intact	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
	Personal floatation device posting present and visible	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
	PFD storage container appropriately marked and in good condition	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
	PFDs accessible, in good condition, and appropriately sized	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
4. Pond 4 LCRS and LDS Electrical Housing/Surface Installations	Physical condition is:	<input checked="" type="checkbox"/> Satisfactory	<input type="checkbox"/> Unsatisfactory
5. Liner—Holes/Cracks/Tears	<input checked="" type="checkbox"/> Not Evident	<input type="checkbox"/> Evident	
6. Liner Anchors	<input checked="" type="checkbox"/> Intact	<input type="checkbox"/> Not intact	
7. Siltation and Vegetation in Pond 4	<input type="checkbox"/> Not evident	<input checked="" type="checkbox"/> Evident	Minor silt/veg
8. Pond 4 Water Level	Estimated water depth is <u>1</u> ft.	Water in NE corner of pond	
9. Vandalism	<input checked="" type="checkbox"/> Not evident	<input type="checkbox"/> Evident	
Notes for condition of Pond 4 features: Todd Moon walked fence on 9/8/09 to look for holes (deer access); no holes evident			

E. Repository Cover Inspection			
1. Top Perimeter Road and Road to Pond 4	<input checked="" type="checkbox"/> Satisfactory	<input type="checkbox"/> Unsatisfactory	
2. Interior Wildlife Fence and Wildlife Gates			
Physical condition is:	<input checked="" type="checkbox"/> Satisfactory	<input type="checkbox"/> Unsatisfactory	
Wildlife gates are:	<input checked="" type="checkbox"/> Open	<input type="checkbox"/> Closed	
3. Cover Vegetation	See attached Repository Cover Vegetation Index form; note areas of concern on map		
4. Rip-Rap Armoring			
<input checked="" type="checkbox"/> Slumping/sliding not evident	<input type="checkbox"/> Slumping/sliding evident (locate on map)		
<input checked="" type="checkbox"/> Rock deterioration not evident	<input type="checkbox"/> Rock deterioration evident (locate on map)		
5. Settlement/Desiccation/Erosion/Gullies			
<input checked="" type="checkbox"/> Settlement depressions not evident	<input type="checkbox"/> Settlement depressions evident (locate on map)		
<input checked="" type="checkbox"/> Desiccation cracking not evident	<input type="checkbox"/> Desiccation cracking evident (locate on map)		
<input checked="" type="checkbox"/> Erosion/gullies not evident	<input type="checkbox"/> Erosion/gullies evident (locate on map)		
6. Holes/Burrows/Biointrusion			
<input type="checkbox"/> Holes/burrows/biointrusion not evident	<input checked="" type="checkbox"/> Holes/burrows/biointrusion evident (locate on map)		
7. Seepage/Ponding			
<input checked="" type="checkbox"/> Seepage not evident	<input type="checkbox"/> Seepage evident (locate on map)		
<input checked="" type="checkbox"/> Ponding not evident	<input type="checkbox"/> Ponding evident (locate on map)		
<input checked="" type="checkbox"/> Soft subgrade not evident	<input type="checkbox"/> Soft subgrade evident (locate on map)		
<input checked="" type="checkbox"/> Phreatophytes not present	<input type="checkbox"/> Phreatophytes present (locate on map)		
8. Site Monument at apex of cover	<input checked="" type="checkbox"/> Satisfactory	<input type="checkbox"/> Repairs/maintenance needed	
Site Monument at boundary gate	<input checked="" type="checkbox"/> Satisfactory	<input type="checkbox"/> Repairs/maintenance needed	
Notes for repository cover inspection:			
<i>Small mammals have shallow burrows in places on north facet of repository; not a concern</i>			
<i>Tied off loose wires at southeast wildlife gate to eliminate tripping hazard</i>			
<i>Red rock on cell is prone to disintegration; no additional breakdown was observed</i>			
F. Cover Penetrations (Caution: confined space entry requirements in effect for all manholes)			
1. Manholes 1 and 3 (LCRS and LDS access vaults)			
Covers secure and operable	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Exterior pump access ports are undamaged	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Evidence of leakage into vaults	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Evidence of drainage through cover penetrations	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Telemetry surface installations in good condition	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Vaults are posted as confined-spaces	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
2. Manholes 2, 4, and 5			
Covers secure and operable	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Evidence of drainage through cover penetrations	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Manholes are posted as confined-spaces	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Notes for condition of manholes:			
<i>Manholes 1 and 3 were open during inspection; closed at end of day by T. Moon</i>			
<i>Manhole 4 shows slight degradation of concrete surface where rebar is visible</i>			
3. LCR Video Ports (check covers only; ports are inoperable)			
Covers secure and operable	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Evidence of drainage through cover penetrations	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
4. Settlement Monuments (A to I) (Note: plates surveyed during 5-year reviews only)			
Surface completions undamaged	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Inner plates undamaged	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
5. Embedded Lysimeter			
Evidence of seepage at outlet	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Instrumentation installations undamaged	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Evidence of drainage along cover penetrations	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Telemetry surface installations in good condition	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	

6. Operation of Repository and Pond 4 LCRS and LDS (interview on-site LM operator)

LCRS and LDS pumps, water level sensors, and flow meters are fully operational Yes No
 Telemetry system is fully operational Yes No
 Leachate production is below action levels Yes No
 Leachate production rates are stable Yes No
 Water levels do not exceed top of sumps Yes No
 Monitoring data are managed through SOARS Yes No
 Pumping rates (gallons/week): LCRS 1 ~1000 LCRS 2 ~1000 LDS 1 0
 LDS 2 0 Pond 4 LCRS 1 0 Pond 4 LDS 1 0

Notes for cover penetrations inspection and operation of LCRS/LDS:

LDS 1 transducer not functioning. Scheduled for replacement Sept–Oct 2009 after JSAs are developed. Pump is manually operated until then.

Pumping rates from July 2009 quarterly report.

IV. City-Owned Properties Inspection

A. City-Owned Properties Transferred from DOE

(MP–00181, MP–00391, MP–00893, MP–01040 (North Portion), MP–01041, MP–01042, and MP–01077)

Property	181		391		893		1040		1041		1042		1077	
	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
Accessible to public	<input checked="" type="checkbox"/>	<input type="checkbox"/>												
Evidence of camping	<input type="checkbox"/>	<input checked="" type="checkbox"/>												
Habitable structure(s)	<input type="checkbox"/>	<input checked="" type="checkbox"/>												
Gullies/erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Runoff/drainage controls intact and in good repair (ditches, riprap structures, dams, check dams, berms)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Land use changes	<input type="checkbox"/>	<input checked="" type="checkbox"/>												
Evidence of vandalism	<input type="checkbox"/>	<input checked="" type="checkbox"/>												
Soil removal evident	n/a		<input type="checkbox"/>	<input checked="" type="checkbox"/>	n/a		n/a		<input type="checkbox"/>	<input checked="" type="checkbox"/>	n/a		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Water well installation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	n/a		<input type="checkbox"/>	<input checked="" type="checkbox"/>	n/a		n/a		n/a		<input type="checkbox"/>	<input checked="" type="checkbox"/>
Wetland/creek damage	<input type="checkbox"/>	<input checked="" type="checkbox"/>	n/a		<input type="checkbox"/>	<input checked="" type="checkbox"/>	n/a		n/a		n/a		n/a	
Supp. Stds. fence intact	n/a		<input type="checkbox"/>	<input checked="" type="checkbox"/>	n/a		n/a		<input checked="" type="checkbox"/>	<input type="checkbox"/>	n/a		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Describe any violations of institutional controls and/or repair/maintenance issues (locate on map):

Supplemental standards fence was cut in several places for access to mountain bike trails; fence is down on east side in places (due to age)

Recommend GPS bike trails for use in next year's inspection

Canada thistle was found in some wetland areas on former mill site, particularly behind Wetland 3

Bull thistle (not noxious in San Juan County) is growing in wetland below Seep 6

Water line repair on Property 181 in progress. Some erosion and redistribution of soil on mill site.

On-site reps will do rad scans when soil from water line break is dry. Erosion damage not extensive.

Siltation of trench on Property 1077 reported by downslope landowner; landowner has reported to City and some repairs had been performed, but trench still inadequate in places.

B. City-Owned Property MP–00211

	Yes	No	N/A
Evidence of excavation or construction	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If yes, confirm the following with on-site LM representative:			
In accordance with Monticello zoning district Overlay Zone (OL-1)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Violation has been reported	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Radiological contamination was encountered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Radiological contamination was appropriately managed	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Corrective action required	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes for City-owned property MP–00211 inspection:

V. Montezuma Creek Soil and Sediment Properties

(Note: Refer to Plates 2 and 3 in the LTS&M Plan for boundary of restricted areas on these properties: MP-00951, MP-00990, MP-01084, MG-01026, MG-01027, MG-01029, MG-01030, and MG-01033)

Evidence of habitable structures within the restricted area	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Evidence of soil removal from the restricted area	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Land use/ownership has changed *	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Land owners are aware of use restrictions *	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Violations have reported *	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Corrective action required	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	

Notes for Soil and Sediment Properties inspection:

* confirm with on-site LM representative

VI. Groundwater Management Area

(Note: the boundary of the Groundwater Management Area [GWMA] is shown in Plate 4 of the LTS&M Plan and includes the following properties: MP-00181, MP-00893, MP-00211, MP-00179, MP-00947, MG-00951, MG-01084, MG-00990, and MG-01033)

Evidence of water well installation within the restricted area *	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
No permits for water well installation within the restricted area †	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Violations have been reported *	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Land ownership has changed *	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Landowners are aware of water use restriction*	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Corrective action required	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	

Notes for Groundwater Management Area inspection:

* confirm with on-site LM representative

† confirm with State Engineer's Office

VII. OU III Monitoring Wells and Water Treatment Systems

A. Monitoring well surface completions *(Note: active wells are inspected and maintained biannually during sampling events. Inactive wells are inspected during the annual inspection [see attached map for locations])*

	Yes	No
Active wells in working condition (verify with sampling teams)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Outer casing or flush mount vault intact	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Wells are locked/flush mount well lids secured	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Notes for inactive monitoring well inspection (note location of any maintenance issues on map):
Missing bolts replaced in 2008; some inactive wells have missing bolts, but cannot be replaced because bolts cannot be inserted.

**Recommend installing t-post at SW94-01. Label posts at SW92-09 & SW94-01. GPS locations of SW92-09 & SW94-01 if coordinates not in database.
 TW-06 and R2-M10 not found; probably buried with soil**

B. Permeable Reactive Barrier (PRB) and Auxiliary Treatment Cells and Infiltration Trench

	Yes	No
Electrical panel, antenna, fence, and vault access in satisfactory condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Evidence of ponded water or saturated soil	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Evidence of surface disturbance	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Evidence of stressed vegetation	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Notes for PRB and treatment cells inspection:

Stan Morrison and Josh Troyer on site to install new outfall flow meter on treatment system.**VIII. MVP Field Inspection****A. City Streets and Utilities**

Roads/Utilities under Construction	Y	N
Unmonitored excavations observed during inspection	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Planned excavations are identified by on-site LM representative	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiological material is properly controlled and managed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The utility locator service is contacted regularly by the on-site LM representative	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Notes for city streets and utilities inspection:

B. UDOT Highways 191 and 491 Rights-of-Way

1. Roads under Construction	Y	N
Unmonitored excavations observed during inspection	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Planned excavations are identified by on-site LM representative	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiological material is properly controlled and managed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The local UDOT official is contacted periodically by the on-site LM representative	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Notes for UDOT highways inspection:

Very extensive UDOT construction on 191 and 491.**2. Erosion (highway shoulders and Highway 191 embankment at Montezuma Creek)**
 New erosion evident Previous erosion evident; unchanged No erosion evident

Eroded material scanned for radiological contamination and properly managed

 Yes No N/A

Describe erosion noted on UDOT highways:

C. Property MS-00176 (Note: observations and activities for MS-00176-VL are recorded by the on-site LM representative in the Private Properties Restricted Areas Record Book)

Monticello zoning district Overlay Zone (OL-1) requires radiological scanning of the footprint of new habitable structures. Radiologically contaminated material is removed under the direction of the on-site LM representative.

	Y	N
Unmonitored excavations observed during inspection	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Planned excavations are identified by on-site LM representative	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Site conditions indicate ICs properly implemented	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Notes for Property MS-00176 inspection:

Photo numbers in parentheses below indicate the Photo Number designation in the annual inspection report.

IX. Photo Log (attach additional pages as necessary)

Photo No.	Feature Photographed	Description (include photo location on map)
1	Access area	T. Moon opening TSF bin during inspection
2 (1)	Access area	Material in TSF bin at time of inspection
3	Access area	ZVI in TSF bin at time of inspection
4	Access area	Lay-down area for potential mixed waste in TSF
5 (2)	Repository perimeter	Main access gate
6	Repository drains	East Toe Trench, view S from near Manhole 5
7 (7)	Pond 4	Water in bottom of Pond 4
8	Pond 4	Silt and vegetation in Pond 4
9	Pond 4	Silt and vegetation in Pond 4
10	Repository perimeter	View N of erosion gully near Sign P1
11 (4)	Repository perimeter	View S of undercut posts between Signs P1 and P2
12	Repository perimeter	View W of erosion near Sign P9
13	Repository perimeter	Yucca and oak on site
14 (3)	Repository perimeter	View N of damaged fence near Sign P15
15 (5)	Repository drains	East Toe Trench extension by wildlife gate
16 (8)	Cover penetrations	View inside manhole 3
17	Repository drains	North Toe Drain and rock slope, view W
18 (6)	Repository drains	Erosion near West Drain Ditch
19 (9)	City-owned properties	Former mill site, view southwest
20 (10)	City-owned properties	Former mill site, view south
21 (11)	City-owned properties	Former mill site, view southeast
22 (14)	PRB and aux cells	Auxiliary treatment cells, view E
23	PRB and aux cells	PERT wall area and PRB, view S
24 (13)	City-owned properties	Silted trench on Property 1077; view E
25	City-owned properties	Silted trench on Property 1077; view W
26 (12)	City-owned properties	View SW from Deer Dam showing vegetated check dams
27	City-owned properties	View W of Deer Dam basin; no siltation evident
28	City-owned properties	View E of Piñon Juniper properties

Repository Cover Vegetation Index
Monticello, Utah

Date inspected: 9/8/09 Inspected by: L. Sheader & M. Kastens

Dominant species present on the repository cover at time of inspection (Note: dominant species make up an estimated 10% or more of the vegetative cover):

Species Name	Growth Form			Life Cycle		Vegetation Type		
	Shrub	Grass	Other	Annual	Perennial	Native	Weedy	Other
<i>Pascopyrum smithii</i>		X			X	X		
<i>Bromus tectorum</i>		X		X			X	
<i>Agropyron cristatum</i>		X			X			X
<i>Thinopyrum intermedium</i>		X			X			X
<i>Artemisia tridentata</i>	X				X	X		

Less common species present on repository cover: *Bromus inermis*, *Sphaeralcea coccinea*, *Sphaeralcea parvifolia*, *Sphaeralcea grossulariifolia*, *Tragopogon dubius*, *Pseudoroegneria spicata*, *Ericameria nauseosa*, *Lactuca serriola*, *Elymus trachycaulus*, *Helianthus annuus*, *Achnatherum hymenoides*, *Convolvulus arvensis*, *Grindelia squarrosa*, *Melilotus officinalis*

Noxious weed species present (record locations on map or GPS): *Convolvulus arvensis*

Additional notes: Recommend using control insects on *C. arvensis* (bindweed) next summer

Vegetation Condition Score (see reverse): 3.56

Notes:

(Has the composition of vegetation changed, including plant diversity? If so, how? Describe any evidence of vegetation disturbance or relevant climate factors. If the vegetation score is less than 3.0, provide explanation and/or recommendation(s).)

This is the first year we have used the vegetation condition score, so there is no previous year for comparison. Canopy cover of grasses appears to have decreased in response to low rainfall, but basal cover of desirable perennials remains good. Grass seed heads, particularly native species, not abundant but basal leaves intact and healthy. Forbs (especially palatable forbs like *Melilotus officinalis*) browsed heavily. Many grasshoppers observed in region with similar evidence of browsing. Limited grazing may decrease standing dead; continued access to repository grasses by deer recommended. No evidence of new vole damage to shrubs, but dead shrubs (from previous years) observed.

Condition of Vegetative Cover (indicate number in each row that best represents current conditions):

Indicator	1	2	3	4	5
Composition of Plant Cover (estimated visually)	Annual weeds dominant; non-weedy perennial species <20% of total cover	Annual weeds abundant and expanding; non-weedy perennial species 20–40% of total cover	Annual weeds present and expanding; non-weedy perennial species 40–60% of total cover	Some weeds present; non-weedy perennial species 60–80% of total cover	No obvious weeds; non-weedy perennial species exceeding 80% of total cover
Total Plant Cover (visual estimate)	Canopy cover less than 30%	Canopy cover 30–50%	Canopy cover 50–70%	Canopy cover 70–90%	Canopy cover over 90%
Bare Soil	Mostly bare soil	Large areas of bare soil	Moderate areas of bare soil	Few areas of bare soil	No obvious areas of bare soil
Diversity of Dominant Species	One species dominant across site	2–3 species dominant across site, one or both of which are weedy; species occur in patches	2–3 species dominant across site, both of which are non-weedy; species evenly distributed with some monoculture patches	More than 3 species dominant across site, at least 2 of which are non-weedy perennials; few patches of monocultures	More than 4 non-weedy perennial species dominant across site; few to no patches of monocultures
Diversity of Trace Species	0–1 non-weedy trace species observed on cover	2 non-weedy trace species observed	3–4 non-weedy trace species observed	5–6 non-weedy trace species observed	7 or more non-weedy trace species observed
Plant Residue	No plant residue on soil surface	1–10% of soil surface covered with plant residue	10–20% of soil surface covered with plant residue	20–30% of soil surface covered with plant residue	30–70% plant residue on soil surface
Standing dead vegetation (visual estimate)	Standing dead >25%	Standing dead 15–25%	Standing dead 5–15%	Standing dead <5%	No obvious standing dead
Erosion	Sheet erosion visible; rills/gullies present OR blowouts or dunes forming	Sheet erosion visible; some small rills present OR soil swept from on site causing burial or abrasion of vegetation	Sheet erosion not obvious; no visible rills or rills stabilized OR soil swept from off site causing burial or abrasion	No obvious sheet erosion; rills not present or fully stabilized OR some soil deposition from off site without burial or abrasion	No visible signs of current or past sheet or wind erosion.
Disturbance	Evidence of mass disturbance to several species of vegetation (fire, animal damage, etc.)	Evidence of some disturbance to several species of vegetation OR major disturbance to one species	Evidence of minor disturbance to one or two species of vegetation; localized to individual patches	Evidence of minor damage to individual plants only; disturbance not sitewide	No evidence of disturbance to any plant species or individual plants
Total each column	2	0	0	5	2

Add up all columns for total condition score:

$$\begin{array}{r}
 \underline{2} \text{ (Column 1)} \times 1 = \underline{2} \\
 \underline{0} \text{ (Column 2)} \times 2 = \underline{\quad} \\
 \underline{0} \text{ (Column 3)} \times 3 = \underline{\quad} \\
 \underline{5} \text{ (Column 4)} \times 4 = \underline{20} \\
 + \underline{2} \text{ (Column 5)} \times 5 = \underline{10} \\
 \hline
 \underline{\quad\quad\quad} \text{ Total}
 \end{array}$$

Divide total by 9 to calculate vegetative cover condition score = 3.56