2017 Annual Inspection Report for the DOE Monticello, Utah, Mill Tailings Site and Monticello Vicinity Properties

December 2017
This page intentionally left blank
# Contents

Abbreviations ................................................................................................................................. iii  
Executive Summary ............................................................................................................................ v  
1.0 Introduction ............................................................................................................................. 1  
  1.1 Monticello Site Background Information .............................................................................. 1  
    1.1.1 Site History .............................................................................................................. 1  
    1.1.2 Properties and ICs Included in the Annual Inspection .................................................... 2  
      1.1.2.1 Repository Site .................................................................................................. 2  
      1.1.2.2 City-Owned and Private Properties ................................................................. 2  
      1.1.2.3 City Streets and Utility Corridors ........................................................................ 3  
      1.1.2.4 Operable Unit III ............................................................................................... 4  
  1.2 Long-Term Surveillance and Maintenance ............................................................................. 4  
  1.3 Annual Site Inspection Scope .................................................................................................. 4  
  1.4 2017 Annual Site Inspection Participants and Schedule .......................................................... 6  
    1.4.1 Additional Inspection-Related Activities ........................................................................ 6  
2.0 Site Inspection Results ............................................................................................................. 6  
  2.1 DOE Repository Site and Disposal Cell ................................................................................... 6  
    2.1.1 Access Area ............................................................................................................ 7  
    2.1.2 Repository Perimeter .................................................................................................. 7  
    2.1.3 Repository Runoff and Run-On Controls ....................................................................... 8  
    2.1.4 Pond 4 ..................................................................................................................... 8  
    2.1.5 Repository Cover ....................................................................................................... 9  
    2.1.6 Cover Penetrations .................................................................................................... 10  
  2.2 City-Owned Properties .......................................................................................................... 11  
    2.2.1 Recreational Use ......................................................................................................... 11  
    2.2.2 Construction of Habitable Structures .......................................................................... 11  
    2.2.3 Supplemental Standards Areas on Piñon/Juniper Properties ....................................... 11  
    2.2.4 Soil Movement, Drainage, and Runoff Controls .......................................................... 11  
    2.2.5 Wetlands ..................................................................................................................... 12  
    2.2.6 Groundwater Use ....................................................................................................... 12  
  2.3 City Streets and Utility Corridors, and UDOT Rights-of-Way .................................................. 12  
  2.4 Private Property MS-00176-VL .......................................................................................... 12  
  2.5 Properties in the Montezuma Creek Restrictive Easement Area ........................................... 12  
  2.6 Groundwater Restricted Area ............................................................................................... 13  
  2.7 Operable Unit III .................................................................................................................. 13  
    2.7.1 Groundwater Remedy Optimization System ............................................................... 13  
    2.7.2 Water Quality Monitoring Well Inspection ................................................................. 13  
  2.8 Administrative and Records Inspection ................................................................................ 13  
3.0 Conclusions and Recommendations ....................................................................................... 14  
4.0 Photographs ............................................................................................................................. 14
Figures

Figure 1. Location and Features of Monticello MMTS and MVP Sites ........................................ 31
Figure 2. Monticello, Utah, Repository Site ................................................................................. 32
Figure 3. MMTS and MVP Supplemental Standards and Groundwater Restricted Areas........... 33
Figure 4. Monticello, Utah, Former Mill Site and Surrounding Area ........................................... 34

Appendixes

Appendix A    Annual Inspection Checklist
Appendix B    Geotechnical Inspection Report
Abbreviations

CERCLA  Comprehensive Environmental Response, Compensation, and Liability Act
DOE  U.S. Department of Energy
EPA  U.S. Environmental Protection Agency
GWRA  Groundwater Restricted Area
IC  institutional control
LCRS  Leachate Collection and Removal System
LDS  Leak Detection System
LM  Office of Legacy Management
LTS&M  long-term surveillance and maintenance
MMTS  Monticello Mill Tailings Site
MVP  Monticello Vicinity Properties
NPL  National Priorities List
OU  Operable Unit
PL  photograph location
PRB  permeable reactive barrier
TSF  Temporary Storage Facility
UDEQ  Utah Department of Environmental Quality
UDOT  Utah Department of Transportation
This page intentionally left blank
Executive Summary

The annual inspection of the U.S. Department of Energy (DOE) Monticello Mill Tailings Site (MMTS) and Monticello Vicinity Properties (MVP) was conducted on September 11, 12, and 13, 2017. These sites, which are part of the Monticello, Utah, Disposal and Processing Sites, are inspected annually to ensure that the selected remedies remain protective of human health and the environment. Under those remedies, uranium mill tailings–related contamination remains in place at locations where use is restricted and exposure is limited. Annual inspections (1) verify that long-term surveillance and maintenance (LTS&M) activities implemented throughout the year are effective and appropriate, (2) confirm that the institutional controls (ICs) restricting land and groundwater use under the MMTS and MVP remedies remain effective, and (3) identify deficiencies and maintenance items and recommend corrective actions as needed. This report summarizes the results of the 2017 annual inspection.

Repository Findings

The repository site consists of the access area (support buildings and the Temporary Storage Facility [TSF]), the repository perimeter, runoff and run-on controls, Pond 4, the repository cover, and cover penetrations (manholes, settlement monuments, and structures associated with the embedded lysimeter). The site is well-maintained and well-managed. Signs displaying information were in order. The TSF bin did not contain any material. Evidence of wire breaks and gaps were noted at two areas on the northeast site fence; repairs were completed in September 2017. The repository cover did not show any settling, slumping, fracturing, seepage, ponding, or significant erosion. Site vegetation is healthy and composed primarily of desirable species. Sediment movement and vegetation were apparent in some of the drainage channels and toe trenches but do not impair their function. Perimeter signs are being replaced. The water in Pond 4 was approximately 8 feet deep, mostly from the operation of the groundwater remedy optimization system.

City-Owned Property Findings

There was no evidence that any ICs were violated on properties owned by the City of Monticello (City). Some signs on the properties posting ICs (such as a prohibition against overnight camping) were peeling and difficult to read. Wetlands were ecologically healthy and undamaged. No groundwater drilling applications were sought for the City-owned properties, and no drilling activities within the restricted area were noted or reported by onsite personnel. No fire pits or overnight campsites were discovered. The existing mountain bike trails were in good condition, and they appeared to be regularly used by the public. Intermittent work on an additional bike trail was begun in September, and the bike trail work showed no evidence that soil or brush has been removed from the site.

City Streets and Utility Corridor Findings

No unplanned or unmonitored excavations related to city streets and utility corridors were identified during the 2017 annual inspection. No new erosion of highway shoulders or along the U.S. Highway 191 embankment at Montezuma Creek was apparent. A roadside drainage pipe was added along the embankment of U.S. 191, but no excavation was required. All planned excavations had been properly monitored by onsite personnel.
Private Property Findings

No changes in land use on restricted properties were apparent. No well-drilling permit applications were received by the Utah Division of Water Rights within the Montezuma Creek Restrictive Easement Area or the Groundwater Restricted Area. Onsite personnel verified that no wells were drilled in the alluvial aquifer for domestic use within the Groundwater Restricted Area. No significant land-use changes in these areas were apparent.

Records Findings

Deed restrictions were verified at the San Juan County Recorder’s Office, including those associated with the sale of properties. The Information Repository and the Operable Unit III Administrative Record were converted to electronic format in 2017. These collections were present and accessible electronically at the site. The site record books were correct and complete with only minor deficiencies, which were corrected before completion of the annual site inspection.

Operable Unit III Findings

Facilities related to the groundwater remedy optimization system—including the pipeline access road, transfer building, and extraction well field—were intact and functioning. Water sampling teams noted no deficiencies during routine well inspections in April 2017 and September 2017. Several inactive wells on property MP-00179 are still missing surface components.

Conclusions and Recommendations

The 2017 annual inspection confirmed that DOE LTS&M activities implemented throughout the year remain effective and appropriate, and ICs restricting land and groundwater use as part of the MMTS and MVP remedies remain effective. No corrective actions or maintenance actions are necessary. Minor maintenance of inactive wells on property MP-00179 is recommended to prevent damage from and harm to livestock. The Information Repository will be updated in 2017.
1.0 Introduction

The annual inspection of the U.S. Department of Energy (DOE) Monticello Mill Tailings Site (MMTS) and Monticello Vicinity Properties (MVP) was conducted on September 11, 12, and 13, 2017. These sites, which are part of the Monticello, Utah, Disposal and Processing Sites, are inspected annually to ensure that the selected remedies remain protective of human health and the environment. Under those remedies, uranium mill tailings–related contamination remains in place at locations where use is restricted and exposure is limited. Annual inspections (1) verify that long-term surveillance and maintenance (LTS&M) activities implemented throughout the year are effective and appropriate, (2) confirm that the institutional controls (ICs) restricting land and groundwater use under the MMTS and MVP remedies remain effective, and (3) identify deficiencies and maintenance items and recommend corrective actions as needed. This report summarizes the results of the 2017 annual inspection. Photographs to support specific observations are identified in the text and by photograph location (PL) numbers.

1.1 Monticello Site Background Information

1.1.1 Site History

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

The MVP and MMTS projects were placed on the National Priorities List (NPL) in 1986 and 1989, respectively, to address mill-related contamination. Figure 1 shows the locations of the Monticello NPL sites. In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), DOE completed remediation of soil contamination at the MMTS and MVP in August 1999. Radioactively contaminated materials were placed in an engineered disposal cell about 1 mile south of the former mill site. The disposal cell (which was completed in October 1999) and associated support facilities are known collectively as the repository site (Figure 2).

In some locations, radioactively contaminated material was left in place in compliance with supplemental standards, as codified in Title 40 Code of Federal Regulations Section 192.21 (40 CFR 192.21). These areas referred to as supplemental standards areas (Figure 3 and Figure 4) are on City-owned and private properties, beneath city streets, and in utility corridors. ICs are applied to these properties and to the former mill site, although the former mill site is not a supplemental standards area. Restrictions are also applied to properties overlying contaminated groundwater.

Figure 3 identifies the locations of the Monticello properties affected by the remedial actions and subject to annual inspection. In this report, many of the inspection items refer to a specific property identifier, such as MS-00893. These identifiers were assigned during remedial actions for the purpose of tracking the scope and progress of remedial actions on individual land holdings.
1.1.2 Properties and ICs Included in the Annual Inspection

1.1.2.1 Repository Site

The repository site inspection includes the field office, the disposal cell, constructed features and support facilities, and Pond 4.

The field office consists of a main office building, support structures, and the Temporary Storage Facility (TSF). Support structures include outbuildings, concrete walks and pads, parking lots, electrical boxes, a meteorological station, an 8-foot-high chainlink fence, and gates. The TSF is a restricted-access, fenced, gravel-surfaced area where newly excavated or operations-generated radioactively contaminated materials are stored before eventual disposal offsite.

The disposal cell consists of a soil-covered, vegetated cap and rock riprap side slopes (portions of which also contain surface soil). Around the base of the disposal cell are engineered, rock-lined runoff and run-on controls that collect and direct storm water and meltwater from the disposal cell. These include the West Drainage Channel, South Drainage Channel, East Toe Trench, and North Toe Trench. 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 (Figure 2). Manholes 1 and 3 enclose equipment for the repository Leachate Collection and Removal System (LCRS) and Leak Detection System (LDS).

Constructed features and support facilities include fences, gates, signs, access roads, boundary markers, and site monuments. A 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 for “entrance” and P1–P39 for “perimeter signs” 1–39) are fixed to separate posts along the perimeter, and additional signs are posted on or near site gates. Between the perimeter fence and disposal cell is an 8-foot-high wire-mesh wildlife fence that contains two vehicle access gates and five narrow wildlife apertures. Gravel-covered roads access the disposal cell, Pond 4, and the groundwater remedy optimization system. Two-track roads access other parts of the site, including most of the perimeter. Six boundary markers are located along the site perimeter fence. There is one site monument along the access road to the disposal cell and one at the apex of the disposal cell.

Pond 4 is a lined, solar-evaporation pond that collects disposal cell leachate, effluent from the groundwater remedy optimization system, and a small amount of precipitation. Pond 4 was constructed with its own separate LCRS and LDS. An 8-foot-high security fence surrounds Pond 4, and an appropriately posted rope barrier surrounds the radiological restricted area of the pond within the security fence. Water rescue equipment is also located around the pond. Two pedestrian gates and one vehicle gate are locked when not in use.

1.1.2.2 City-Owned and Private Properties

Figure 3 shows City-owned and private properties included in the annual inspection and subject to ICs. Supplemental standards areas are located on private property MS-00176 and properties in the Montezuma Creek Restrictive Easement Area (also known as the Montezuma Creek Soil and Sediment Properties: MP-00951, MP-00990, MG-01026, MG-01027, MG-01029, MG-01030, MG-01033, and MP-01084). Groundwater restriction ICs are applied to properties in the
Groundwater Restricted Area (GWRA) (also known as the Groundwater Management Area: MP-00179, MP-00181, MP-00211, MS-00893, MP-00947, MP-00951, MP-00990, MG-01033, and MP-01084).

DOE transferred several remediated properties to the City of Monticello in 2000 for use as a public park. The properties include the former mill site (MP-00181 and MS-00893), three nearby properties with supplemental standards areas (also known as Piñon/Juniper properties: MP-00391, MP-01041, and MP-01077), and two nearby properties without supplemental standards areas (MP-01040 and MP-01042). Property MP-00211, adjacent to the former mill site, was always City-owned. The City-owned properties were annexed in 2007 and are now within city limits, where bow hunting is allowed but hunting with firearms is prohibited. Pedestrian and mountain bike trails are used throughout the properties.

Land and groundwater use restrictions apply to the following City-owned and private properties:

- City-owned properties transferred from DOE are restricted to recreational day use. Overnight camping and the building of habitable structures are prohibited.
- City-owned supplemental standards properties (Piñon/Juniper properties) have an additional restriction that no soil be removed from the properties.
- In addition to the restrictions cited above, damage to Wetlands 1, 2, and 3 is prohibited on the former mill site properties.
- Within the Montezuma Creek Restrictive Easement Area, portions of the properties where supplemental standards have been applied have restrictive easements to prohibit soil removal or the construction of habitable structures.
- Within the GWRA, drilling for and appropriation of groundwater from the alluvial aquifer for domestic use is prohibited. This IC is administered by the Utah Division of Water Rights (Office of the State Engineer) through the well permitting and water rights processes.
- Special zoning ordinances affect properties MP-00211 and MS-00176; the ordinances require radiological scanning for certain ground-disturbing activities such as the construction of habitable structures.

### 1.1.2.3 City Streets and Utility Corridors

Radioactively contaminated soil remains in some places beneath city streets and utility corridors in Monticello, in the U.S. 191 embankment over Montezuma Creek, and in Utah Department of Transportation (UDOT) rights-of-way along U.S. 191 and U.S. 491. Supplemental standards have been applied to these areas. Through a cooperative agreement with the City, onsite personnel monitor excavations in supplemental standards areas for radioactively contaminated material, and the City transports any such material to the TSF under direction of the onsite personnel. Onsite personnel also monitor excavations of U.S. 191 and U.S. 491 within city limits. Through a Memorandum of Understanding between UDOT and DOE, UDOT has the option of returning contaminated material to the excavation as backfill or having City workers, under the direction of onsite personnel, haul the material to the TSF.
1.1.2.4 Operable Unit III

Surface components of the Operable Unit (OU) III groundwater remedy optimization systems and groundwater well surface completions are inspected annually. The systems are located on the DOE repository site, City-owned properties, and private property MP-00179.

In 2014, facilities related to the groundwater remedy optimization system were installed on property MP-00179, City-owned properties MP-01077 and MP-01042, and the repository site. Facilities include extraction wells, monitoring wells, utility vaults, a groundwater transfer building, and a water transmission pipeline. The system became functional in January 2015. Areas disturbed by the project were revegetated in 2015.

A groundwater treatment system comprising the permeable reactive barrier (PRB) and ex situ treatment cells is on property MP-00179. With the operation of the groundwater remedy optimization system, the treatment cells were deactivated in December 2014 and are no longer inspected. The PRB is a subsurface structure and cannot be inspected.

OU III water quality is monitored at an established network of active groundwater monitoring wells and surface water monitoring sites. A number of inactive wells are also located on property MP-00179.

1.2 Long-Term Surveillance and Maintenance

The DOE Office of Legacy Management (LM) administers the long-term stewardship of the Monticello NPL sites to ensure that the selected remedies continue to be protective of human health and the environment. The U.S. Environmental Protection Agency (EPA) Region 8 and the Utah Department of Environmental Quality (UDEQ) provide oversight. Annual inspections are one component of LTS&M at Monticello. Other primary components include operating and maintaining the disposal cell’s leachate management system (LCRS and LDS), inspecting the repository site and properties affected by ICs on a monthly or quarterly basis, and monitoring and managing radioactively contaminated materials encountered at City and UDOT excavations inside Monticello city limits. Because the surface water and groundwater remedy is still being implemented, activities associated with OU III are not LTS&M activities. However, long-term procedures related to OU III are included in the Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites (DOE-LM/1465-2007), hereafter called the LTS&M Plan, and several items are inspected annually (Section 2.7). CERCLA Five-Year Reviews (begun in 1997) are also conducted separately from the annual inspections to monitor and document the protectiveness of the MMTS and MVP remedies.

LTS&M activities, including annual inspection and reporting, are conducted by onsite personnel (LM contractor site operations lead and site representatives) and offsite personnel (LM and LM contractor employees) in accordance with the procedures provided in the LTS&M Plan.

1.3 Annual Site Inspection Scope

Annual inspections of the MMTS and MVP focus on five general topics: recordkeeping and administrative review, DOE repository site, City-owned and private properties, city streets and
utility corridors, and OU III. The “Annual Inspection Checklist” (Appendix A) records the items inspected; Appendix A comprises the completed checklist for the 2017 annual inspection.¹

Inspectors review site recordkeeping to ensure that day-to-day activities are properly documented. Findings are recorded in Section II of Appendix A. Onsite record books, surveillance checklists, and radiological as-built drawings are verified. Radiological as-built drawings, in addition to onsite record books, document the location and findings of radiological control measures provided by onsite personnel during municipal and State of Utah construction activities inside Monticello city limits in accordance with the LTS&M Plan. The inspection confirms that deed annotations applicable to restricted properties remain accurately filed and accessible at the San Juan County courthouse, updated copies of relevant LTS&M documents are available to onsite personnel, and workers accessing the TSF are appropriately trained or escorted. Inspectors also verify that the Monticello copy of the Information Repository and OU III Administrative Record documents are accessible to the public.²

The repository site is inspected for the integrity of constructed features, support facilities, the perimeter, the disposal cell cover, and cover penetrations. The disposal cell cover is monitored for evidence of slumping or settlement. The health and composition of vegetation, an integral part of vegetated cover performance, is assessed. The Pond 4 and TSF inspection are included in the repository site inspection. Observations are recorded in Section III of Appendix A.

City-owned and private properties related to MMTS and MVP are inspected annually to confirm that ICs, as described in the LTS&M Plan, remain effective and to document changes in 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, and VIII-C of Appendix A.

During the annual inspection, the supplemental standards areas within city streets and utility corridors and UDOT rights-of-way for U.S. 191 and U.S. 491 are inspected for evidence of unmonitored excavations or soil movement. Results are recorded in Sections VIII-A and VIII-B of Appendix A.

Surface components of the OU III groundwater remedy optimization system and groundwater well surface completions are inspected annually and recorded in Section VII of Appendix A. Facilities related to the groundwater remedy optimization system are regularly inspected and maintained by onsite personnel. Facilities include surface features of extraction and monitoring wells, utility vaults, the groundwater-transfer building, and the water transmission pipeline. Water sampling teams inspect groundwater wells during sampling in April and October of each year; onsite personnel also note any deficiencies during routine inspections.

¹ Revised in 2017, this checklist was taken from the revised draft LTS&M Plan and is being reviewed by EPA and UDEQ. The final approved checklist is planned to be used for the 2018 inspection.
² The MMTS OU I and II and MVP Administrative Record documents were archived in accordance with CERCLA guidelines in 2008. The MMTS OU III Administrative Record and the sites’ Information Repository were scanned in 2017 and are available electronically onsite. Portions of these collections are also available on LM’s website.
1.4 2017 Annual Site Inspection Participants and Schedule

Inspection team members and affiliations are listed on page 1 of Appendix A. D. Marshall, P. Wetherstein, and L. Sheader conducted the physical site inspection on September 11, 12, and 13, 2017. J. Nguyen, F. Smith, and G. McKinnon also participated in the inspection. EPA representatives were not in attendance; however, UDEQ representative M. Storck was onsite September 12, 2017, and toured the site and OU III with J. Nguyen and F. Smith. M. Stilson, regional engineer with the Utah Division of Water Rights, was contacted in conjunction with the inspection.

Monday, September 11, 2017

Inspection team members convened at the DOE Monticello field office to review the inspection procedure, inspection checklist, and health and safety documents. Inspectors completed an inspection of the onsite records, the TSF, Pond 4, the repository site access area, field office facilities, runoff and run-on controls, the disposal cell cover and penetrations, City-owned properties MP-00211 and MP-01081, city streets and utilities, UDOT rights-of-way for U.S. 191 and U.S. 491, private property MS-00176, and the groundwater-transfer building and transmission pipeline for the groundwater remedy optimization system.

Tuesday, September 12, 2017

Field inspection was conducted of the remainder of the repository site, including the site perimeter, site markers, boundary markers, and the repository perimeter fence and signs. The former mill site properties and City-owned supplemental standards areas were also inspected.

Wednesday, September 13, 2017

Property deed restrictions were verified at the San Juan County Recorder’s Office, ICs in the Montezuma Creek Restrictive Easement Area were verified with the onsite personnel, OU III monitoring wells were visited, and portions of Montezuma Canyon were inspected from observation points above the area.

1.4.1 Additional Inspection-Related Activities

In 2017, areas associated with OU III were inspected by water sampling crews in conjunction with maintenance and sampling activities at the OU III groundwater wells and surface water locations. Structures associated with the groundwater remedy optimization system were regularly inspected and maintained by onsite personnel. Compliance with drilling and water use ICs in the GWRA were verified in a phone call with M. Stilson of the Utah Division of Water Rights on September 13, 2017.

2.0 Site Inspection Results

2.1 DOE Repository Site and Disposal Cell

The repository site consists of the access area (support buildings and the TSF), the repository perimeter, runoff and run-on controls, Pond 4, the repository cover, and cover penetrations (manholes, settlement monuments, and structures associated with the embedded lysimeter).
Results of the 2017 repository site inspection are summarized below and in Appendix A, Section III.

2.1.1 Access Area

The Monticello field office buildings and associated structures were in excellent condition and well-maintained (PL-1). The office building flooring had been upgraded. Site access signs displaying contact information were visible, and the new signs containing updated information were in place and in good condition. The site’s paved access road was in very good condition, and the parking lot had been regraveled.

During the 2017 annual inspection, the TSF fence was appropriately posted with access control signs, and there was no evidence of vandalism or trespassing (PL-2). The TSF bin (PL-3) was not opened during the inspection, but the site operations lead reported that it did not contain any material. The TSF yard was well-maintained. The lay-down area for potential mixed waste was in good working order, as were clamshell containers. The TSF was also inspected quarterly by site personnel in 2017, and inspection results were presented in quarterly reports to EPA and UDEQ.

2.1.2 Repository Perimeter

Perimeter Fence

Two sections of the northwest perimeter fence need to be repaired (PL-4 and PL-5). No evidence of vandalism or areas of excessive tumbleweed or debris buildup were present.

Location-Reference Signs

Most perimeter signs were legible but faded, and several were damaged but legible (PL-6). All perimeter signs are being replaced and will contain consistent, updated wording. It is recommended that black numbered decals be used to identify the sign number instead of black markers that fade quickly.

Boundary Markers

All six boundary markers were located during the inspection, and all markers were in good condition (PL-7).

Erosion and Gullies

Erosion channels and drainages around the site perimeter were generally well-vegetated and had not significantly changed since the 2016 annual inspection. Erosion controls and revegetated areas related to the groundwater remedy optimization system were in good condition, and no major erosional areas were noted. The deep gully on the west edge of the disposal site described in previous inspection reports had not changed significantly since 2016 (PL-8). The gully does not threaten the integrity of site features but will continue to be monitored.

Perimeter Vegetation

Vegetation between the perimeter fence and the wildlife fence (inner fence) was healthy and composed primarily of desirable species. Several small populations of noxious weeds were
treated with herbicide after the annual inspection on October 10, 2017. Prairie dog activity was observed along the eastern portion of the site. That activity, which had declined significantly over the past few years, appears to be increasing in 2017.

2.1.3 Repository Runoff and Run-On Controls

Over time, siltation has occurred within the site’s drainage channels and the North and East Toe Trenches.

South Drainage Channel and West Drainage Channel

The South Drainage Channel and West Drainage Channel were in very good condition, with no evidence of new erosion (PL-9 and PL-10). Shrubs observed in portions of the ditches do not block potential flow, and burrows from small rodents that are found in places along the margin of the ditches do not threaten their integrity.

East Toe Trench and North Toe Trench

The East Toe Trench and North Toe Trench were in good condition. Erosion of these trenches was not evident. Beginning in 2013, inspectors observed increased siltation from the repository side slope into both toe trenches during heavy rainfall events. The siltation does not impair the functioning of the trenches. PL-11 and PL-12 show additional lighter colored rock within the toe trench. There are no erosional features upgradient of this rock indicating that the rock has been displaced.

2.1.4 Pond 4

The Pond 4 area is inspected annually and also inspected monthly by site personnel. The results of the inspections are presented in quarterly reports to EPA and UDEQ.

Gate, Fence, Entrance, and Perimeter Signs

All gates were in good working condition. Warning signs on the perimeter fence were easily visible and legible. There was no evidence of vandalism or trespass, and all gates were locked at the time of the inspection.

Pond Perimeter and Berm

The pond’s radiological rope barrier was intact and in good condition. Animal burrows made by voles and other small rodents were visible on and below the pond’s berm on all sides. However, no large burrows that might threaten the berm’s integrity were found (PL-13). Vegetation on the slopes of the berm was well-established and healthy. Pond 4 is shown in PL-14.

Lifesaving Equipment

Lifesaving rings and a rescue and work skiff were present and easily accessible near the pond. Cabinets containing water rescue equipment were also highly visible, adequately labeled, and in good condition.
**Pond 4 LCRS/LDS Control Cabinet**

The weatherproof LCRS and LDS control cabinet was in good condition. Operation of the Pond 4 LCRS and LDS is described in Section 2.1.6.

**Liner and Pond Interior**

The water in Pond 4 was approximately 8 feet deep at the time of the inspection, due mostly to the operation of the groundwater remedy optimization system. No visible evidence of holes or other damage to the pond liner was observed.

**2.1.5 Repository Cover**

The repository cover is inspected annually and also inspected monthly by site personnel. Results of the monthly inspections are provided in quarterly reports to EPA and UDEQ.

**Roads, Wildlife Fence, Site Monuments, and Raptor Perches**

The gravel road surrounding the disposal cell and the road to Pond 4 were in very good condition. The wildlife fence and gate apertures were functional and showed no evidence of vandalism. Damaged sections of the wildlife fence were apparent, but the fence remained functional, and repairs were not required. All gates in the wildlife fence were open. Both site monuments—one at the west access gate inside the wildlife fence and one at the apex of the disposal cell (PL-15)—were present and intact. Six raptor perches, installed near the disposal cell cover in 2007, were also in good condition, and the supporting beam brace on one perch is still detached but that does not interfere with its function.

**Vegetation**

Desirable plants remained well-established on the cover, and no significant barren or eroded areas were identified (PL-16). No damage to vegetation or soils from rainstorms was apparent, and no species of phreatophyte shrubs were growing on the cover. As in recent years, there were a large number of healthy young sagebrush (*Artemisia tridentata*) plants. The small quantity of field bindweed (*Convolvulus arvensis*), which the State of Utah lists as a Class C noxious weed, was still present on the cover, but control was not necessary.

The Repository Cover Vegetation Index, developed in 2009 for use during annual inspections (pages A-13 and A-14 in Appendix A), indicated that the cover vegetation remains healthy. The vegetation condition score, used to detect trends in the health of the vegetation community, was 3.8 in 2017, similar to the score in 2016. Dominant species identified on the cover in 2017 included sagebrush (*Artemisia tridentata*), rubber rabbitbrush (*Ericameria nauseosa*), western wheatgrass (*Pascopyrum smithii*), crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Thinopyrum intermedium*), smooth brome (*Bromus inermis*), and cheatgrass (*Bromus tectorum*). Three of these species are native, and one is weedy (cheatgrass).

Vegetation on the repository’s soil-covered side slopes, rock slopes, and outlying areas, similar in composition to that on the repository cover, was also healthy.

**Burrowing Animals**

Evidence of small burrowing animals has been observed on the repository cover for years. Raptors and other predators have kept these populations at low to moderate levels since a vole
outbreak occurred in 2006. In 2013, prairie dog burrows were found on the repository cover for the first time. The burrows appeared to be abandoned in 2015, and there was no evidence of prairie dog activity in 2016. In 2017, a small amount of new prairie dog activity was observed. Because the repository cover was engineered to withstand prairie dog and small rodent activity, populations are not a concern, but burrows will continue to be monitored. Inspectors and onsite personnel will look for evidence of gray-colored soils being cast to the surface, as this would indicate excavation into the biointrusion layer. No such soils have been observed on the surface to date.

**Stability**

No area of the cover indicated settling, slumping, fracturing, seepage, ponding, or significant erosion. An inspection was performed at the Monticello Repository on September 12, 2017, and again on November 6, 2017, with the lead inspector and site engineer. The purpose was to evaluate geotechnical behavior of the repository as part of the comprehensive inspection and to confirm stability of two areas suspected of riprap movement. The site was visited both times by G. Smith of Geo-Smith Engineering, LLC. The areas inspected by the geotechnical engineer were observed to be in good to excellent condition from a geotechnical standpoint. The irregularities at the two locations of concern are the residual tracks from the construction equipment used during the riprap rock placement. Based on evidence gathered during the November 6, 2017, inspection, there is no conclusive evidence of postconstruction rock movement or future erosion concerns on the Monticello Repository riprap slopes. No depressions, erosion, slope stability, or foundation conditions exist that present problems. Mr. Smith’s full report is attached in Appendix B. PL-17 shows a disposal cell side slope. Figure 2 shows the locations of observed suspect riprap movement.

2.1.6 Cover Penetrations

**Manholes and Video Ports**

The manholes are restricted areas and were not entered during the annual inspection, but the exteriors were observed without entering and were in good condition (PL-18). All five manhole covers were secure and operable. Appropriate safety warnings and entry procedures were posted on all of the manholes, exterior pump access ports were undamaged, telemetry surface installations were in good condition, and no leakage or drainage was evident. Covers of the inoperable video ports were locked and secure.

**Settlement Plates**

Nine settlement plates, identified by the letters A through I, are on the disposal cell. The outer protective casings (8-inch PVC pipe) and the inner plates were intact and undamaged (PL-19). Elevation surveys on the settlement plates are performed every 5 years in preparation for the CERCLA Five-Year Review. No significant settlement was reported in 2016 during the last survey, and the next scheduled survey is in 2021.

**Embedded Lysimeter**

External features of the embedded lysimeter were inspected. Along lysimeter cover penetrations, no seepage was evident, and instrumentation installations were in good condition.
**Operation of Repository and Pond 4 LCRS and LDS**

Monitoring of leachate production is performed automatically via the repository telemetry system, which relays data to the LM System Operation and Analysis at Remote Sites (SOARS) system for offsite viewing, evaluation, and management. Onsite personnel routinely monitor infrastructure and leachate production in accordance with specifications in the LTS&M Plan. Leachate production rates are provided in quarterly reports to EPA and UDEQ. Interviews with onsite operations personnel indicate that the repository and Pond 4 LCRS and LDS are operating properly.

### 2.2 City-Owned Properties

Results of the 2017 annual inspection of City-owned properties are summarized below and in Section IV of Appendix A.

#### 2.2.1 Recreational Use

The City-owned properties transferred from DOE are accessible to the public. Access roads were serviceable, although roads on property MP-01040 were eroded and may not be accessible by two-wheel drive vehicles. Some signs on these properties that post ICs (such as a prohibition against overnight camping) were peeling and difficult to read (PL-20). The signs were also outdated, as bow hunting is now allowed on the properties. No evidence of overnight camping was observed on any of the properties. Mountain bike trails were in good condition, and they appeared to be regularly used by the public. Work had begun on a new addition to the existing trails in September.

#### 2.2.2 Construction of Habitable Structures

No evidence of construction of habitable structures was observed on these properties during the 2017 inspection.

#### 2.2.3 Supplemental Standards Areas on Piñon/Juniper Properties

No evidence of soil removal was noted on any of the Piñon/Juniper properties supplemental standards areas, including in areas disturbed by construction of new mountain bike trails. The supplemental standards areas were physically delineated by four-strand wire fences when the mill site remediation was complete. The City breached sections of these fences to accommodate mountain bike trails, and other sections of the fence have degenerated due to age. The bike trails and areas of eroded soils are routinely scanned after heavy storms (as defined in the LTS&M Plan). Radiation levels above background have never been detected, and survey records are available at the Monticello field office. Soils disturbed by construction of new mountain bike trails were also radiologically surveyed, and radiation levels in the soils were below supplemental standards limits.

#### 2.2.4 Soil Movement, Drainage, and Runoff Controls

All riprap-armored structures, dams, check dams, berms, and runoff control drainages (Figure 4) were intact and functional. PL-21 shows a portion of City-owned property MP-01040, and PL-22
shows a portion of the access road near Deer Draw Dam. Both photographs illustrate the well-vegetated and intact soils that characterize the City-owned properties.

The erosion gully on the hillside on property MP-01077 above the transfer building was inspected in 2017. The gully has not deepened since 2016.

2.2.5 Wetlands

Wetlands 1, 2, and 3 on the former mill site (Figure 4) were ecologically healthy, and no evidence of damage by human activity or natural causes was apparent (PL-23, PL-24, and PL-25).

2.2.6 Groundwater Use

No evidence of water-well drilling on City-owned properties with groundwater restrictions was observed during routine inspections or during the 2017 annual inspection. No applications to appropriate water or to drill were filed with the Utah Division of Water Rights for these areas (Section 2.6), and no drilling activities within the restricted area were noted or reported by onsite personnel.

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

Section VIII of Appendix A presents results of the 2017 annual inspection of UDOT rights-of-way and city streets and utility corridors. No unmonitored or unplanned excavations were identified. Onsite personnel were aware of all planned excavations, and excavations were monitored in accordance with the LTS&M Plan. PL-26 shows an area of work in city streets during 2017. PL-27 shows the U.S. 191 embankment along the former mill site with minimal erosion. On the embankment is a drainage pipe that was installed in 2017 with no excavation required. No excavation work was performed within any UDOT rights-of-way in 2017.

2.4 Private Property MS-00176-VL

During the 2017 annual inspection, there was no evidence of erosion, soil removal, or construction of habitable structures (Appendix A, Section VIII-C) on property MS-00176. Over time, storm water runoff has deposited sediment from this property along the road, and this sediment is radiologically surveyed after significant rainfall events by onsite personnel. Levels of radiation in the sediment have never been above background.

2.5 Properties in the Montezuma Creek Restrictive Easement Area

Properties in the Montezuma Creek Restrictive Easement Area are inspected on a regular basis by onsite and water sampling personnel; during these visits, no evidence of significant erosion or soil removal from the restricted areas of these properties was noted. In 2017, portions of Montezuma Canyon were inspected from observation points above the area, and no evidence of land-use changes or disturbance to the easement area was found. Observations in the easement area (PL-28) are recorded in Appendix A, Section V.
2.6 Groundwater Restricted Area

On September 13, 2017, M. Stilson of the Utah Division of Water Rights confirmed that there were no applications to appropriate water from the shallow alluvial aquifer in the GWRA. There were also no applications or approvals to drill into or through the shallow alluvial aquifer (Appendix A, Section VI). Onsite personnel also verified during routine surveillance that no new wells were installed within the GWRA.

2.7 Operable Unit III

2.7.1 Groundwater Remedy Optimization System

Facilities related to the groundwater remedy optimization system are regularly inspected and maintained by onsite personnel, and results are provided to EPA and UDEQ in quarterly reports and annual groundwater reports. During the annual inspection, the pipeline access road (PL-29), transfer building, and extraction well field were visited, and the visible components of the system were intact and functioning.

2.7.2 Water Quality Monitoring Well Inspection

Water sampling teams noted no deficiencies during routine well inspections in April 2016 and September 2017. During the 2017 annual inspection, several inactive wells on property MP-00179 were still missing surface components, as described in Appendix A, Section VII.A. The landowner is using the area for a livestock pasture, so repair of these features is recommended to prevent damage from, and to, mules and other livestock.

2.8 Administrative and Records Inspection

The following documents and records, recorded by the onsite personnel, were inspected for completeness and accuracy of information (Appendix A, Section II):

- Radiological as-built drawings (residential and utility maps that document the location and results of radiological control provided by onsite personnel).
- Site record books, which include the repository site, the TSF, City-owned properties, private property restricted areas, and public roads and utilities.
- Surveillance checklists, which include meteorological monitoring data; TSF access and security logs; and monthly, quarterly, and Pond 4 surveillance checklists. Pond 4 and repository LCRS and LDS monitoring records are maintained electronically.

Deed restrictions (verified in the San Juan County Recorder’s Office) were inspected to ensure that administrative controls remain in effect with the City of Monticello and San Juan County.
The following categories of documents and records were inspected to ensure that pertinent information for implementing LTS&M activities is readily available to onsite personnel and the general public:

- LTS&M Plan (including site-specific emergency response information), the Safety and Health Manual (LMS/POL/S04321), and the Quality Assurance Manual (LMS/POL/S04320). These documents are available electronically.
- Information Repository and OU III Administrative Record.
- LTS&M training records (applicable to onsite personnel and unescorted employees from the City of Monticello who access the TSF).

No major deficiencies were noted in the above administrative categories. LTS&M documents were available electronically from the field office. Deed restrictions were verified at the San Juan County Recorder’s Office, including those associated with the sale of properties. Annotations were in place for properties sold or divided, and deed restrictions were attached. The Information Repository (updated in April 2014) and OU III Administrative Record (updated in October 2012) were present at the Monticello field office. The Information Repository will be updated in 2017. The site record books were correct and complete and contained only minor errors that were corrected by onsite personnel before the end of the annual inspection.

### 3.0 Conclusions and Recommendations

The 2017 annual inspection confirmed that DOE LTS&M activities implemented throughout the year remain effective and appropriate, and ICs restricting land and groundwater use as part of the MMTS and MVP remedies remain effective. No corrective actions are necessary. Minor fence repairs along the northwest fence line are recommended. Minor maintenance of inactive wells on property MP-00179 is recommended to prevent damage from and to livestock. The Information Repository will be updated in 2017.

### 4.0 Photographs

Photographs were taken to document findings of the 2017 annual inspection. The location and orientation of the photographs are identified in Figure 2, Figure 3, and Figure 4.
PL-3. Empty TSF Bin

PL-4. Gap in Northwest Fence Line
PL-5. Northwest Fence Wires Broken

PL-6. Perimeter Sign P36 Legible but Will Be Replaced
PL-7. Boundary Marker S1R

PL-8. Looking North Toward Perimeter Sign 1 Where Erosion Channel Shows Little Change
PL-9. South Drainage Channel, Looking East

PL-10. West Drainage Channel, Looking North
PL-11. East Toe Trench, Looking South

PL-12. North Toe Trench Showing Rock Degradation and Sediment Disposition
PL-13. Small Animal Burrows in Pond 4, North Berm

PL-14. Pond 4, Looking East
PL-15. Looking North at Site Monument 2

PL-16. Disposal Cell Cover, Looking West from Site Marker
PL-17. North Toe Trench and Side Slope of Disposal Cell

PL-19. Looking at Interior of Settlement Plate Monument A

PL-20. Institutional Controls Sign Peeling and Difficult to Read on City-Owned Property MP-01040
PL-21. Well-Established Vegetation and Check Dams on City-Owned Property MP-01040

PL-22. Deer Draw Dam
PL-23. View of Wetland 1 on Former Mill Site

PL-24. View of Wetland 2 on Former Mill Site
PL-25. View of Wetland 3 on Former Mill Site

PL-26. Utilities Construction, Looking North on Clay Hill Drive

PL-28. Montezuma Canyon, View Downstream
PL-29. Pipeline Access Road
Figure 2. Monticello, Utah, Repository Site
Figure 3. MMTS and MVP Supplemental Standards and Groundwater Restricted Areas
Figure 4. Monticello, Utah, Former Mill Site and Surrounding Area
Appendix A

Annual Inspection Checklist
This page intentionally left blank
Annual Inspection Preparation:
The following tasks were completed in preparation for the current MMTS and MVP annual inspection:

Review annual inspection requirements in the LTS&M Plan □ □ X
Review additional requirements for 5-Year Review inspections when applicable □ □ X
Schedule site inspection and appoint chief and assistant inspectors X □ □
Review previous reports and records as outlined in the LTS&M Plan X □ □

Notes:

Provide team members with background information, maps, and inspection checklists □
Prepare Job Safety Analysis and other required Safety and Health documents □
Notify EPA and UDEQ at least 2 weeks before site visit and invite them to participate □
Notify representatives from other agencies as necessary and invite them to participate □
Verify names and telephone numbers of parties with access or notification agreements □
Contact State Engineer’s Office for water well permit applications in and near GWMA □

Date(s) of Annual Inspection: 9/11/17 – 9/13/17

Inspection Team Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Phone Number</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danika Marshall</td>
<td>Navarro Research and Engineering, Inc. (ecologist)</td>
<td>(970) 248-6137</td>
<td><a href="mailto:Danika.Marshall@lm.doe.gov">Danika.Marshall@lm.doe.gov</a></td>
</tr>
<tr>
<td>Linda Sheader</td>
<td>Navarro Research and Engineering, Inc. (ecologist and curator of site records)</td>
<td>(970) 248-6711</td>
<td><a href="mailto:Linda.Sheader@lm.doe.gov">Linda.Sheader@lm.doe.gov</a></td>
</tr>
<tr>
<td>Fred Smith</td>
<td>Navarro Research and Engineering, Inc. (site lead)</td>
<td>(970) 248-6182</td>
<td><a href="mailto:Fred.Smith@lm.doe.gov">Fred.Smith@lm.doe.gov</a></td>
</tr>
<tr>
<td>Paul Wetherstein</td>
<td>Navarro Research and Engineering, Inc. (Environmental Compliance)</td>
<td>(970) 248-6645</td>
<td><a href="mailto:Paul.Wetherstein@lm.doe.gov">Paul.Wetherstein@lm.doe.gov</a></td>
</tr>
<tr>
<td>Jason Nguyen</td>
<td>U.S. Department of Energy (site manager)</td>
<td>(970) 248-6707</td>
<td><a href="mailto:Jason.Nguyen@lm.doe.gov">Jason.Nguyen@lm.doe.gov</a></td>
</tr>
</tbody>
</table>
### I. Interviews

<table>
<thead>
<tr>
<th>Name of Individual Interviewed</th>
<th>Affiliation</th>
<th>Date Interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gary McKinnon</td>
<td>Contractor operations lead</td>
<td>9/11/17</td>
</tr>
</tbody>
</table>

**Notes:**

The onsite contractor operations lead accompanied inspectors on portions of the inspection. Notes are included in individual checklist sections below.

<table>
<thead>
<tr>
<th>Name of Individual Interviewed</th>
<th>Affiliation</th>
<th>Date Interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marc Stilison</td>
<td>State engineer</td>
<td>9/13/17</td>
</tr>
</tbody>
</table>

**Notes:**

Mr. Stilson, Southeastern Regional Engineer with the Utah State Engineer’s office (i.e., Utah Division of Water Rights), confirmed during the interview to P. Wetherstein that in 2017:

- There were no requests or approvals to drill into or through the shallow alluvial aquifer in DOE’s Groundwater Restricted Area (GWRA).
- There were no new applications or approvals, or change applications or approvals, to appropriate water for domestic purposes from or near the shallow alluvial aquifer in DOE’s GWRA.

Limitations on water appropriation and drilling activities in DOE’s GWRA were established at DOE’s request in the UDWR Ground-Water Management Policy for the Monticello Mill Tailings Site and Adjacent Areas, May 1999.

<table>
<thead>
<tr>
<th>Name of Individual Interviewed</th>
<th>Affiliation</th>
<th>Date Interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fred Smith</td>
<td>Site lead</td>
<td>9/11/17</td>
</tr>
</tbody>
</table>

**Notes:**

Mr. Smith, site lead with Navarro Research and Engineering, Inc., confirmed during the interview that in 2017:

- There was no construction or disturbance within the planned restricted areas.
- A bike path addition was installed in supplemental standards areas on City-owned properties and it was radiologically surveyed. The highest soil sample was 19.6 picocuries per gram (pCi/g) (below the supplemental standards, for that area, of 32 pCi/g).
## II. Administrative and Records Inspection

<table>
<thead>
<tr>
<th>Readily Available</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. General LTS&amp;M Documents</strong></td>
<td></td>
</tr>
<tr>
<td>Ready access from field office to online manuals</td>
<td>X</td>
</tr>
<tr>
<td>Ready access from field office to online MMTS/MVP Administrative Record, OU III Administrative Record, and Information Repository collection</td>
<td>X</td>
</tr>
<tr>
<td><strong>2. LTS&amp;M Training Records for Access to Radiologically Controlled Areas</strong></td>
<td></td>
</tr>
<tr>
<td>Onsite employees</td>
<td>X</td>
</tr>
<tr>
<td>Unescorted City workers</td>
<td>□</td>
</tr>
<tr>
<td>All City workers were escorted</td>
<td>□</td>
</tr>
<tr>
<td><strong>3. Record Books</strong></td>
<td></td>
</tr>
<tr>
<td>Record book entries and documentation</td>
<td>X</td>
</tr>
<tr>
<td>Repository Site Record Book</td>
<td>X</td>
</tr>
<tr>
<td>City-owned properties</td>
<td>X</td>
</tr>
<tr>
<td>Private property restricted areas</td>
<td>X</td>
</tr>
<tr>
<td>Public Roads and Utilities Record Book</td>
<td>X</td>
</tr>
<tr>
<td>Documentation/recordkeeping requirements met</td>
<td>X</td>
</tr>
<tr>
<td>Information readily traced to updated drawings</td>
<td>X</td>
</tr>
<tr>
<td>Rad scan data for eroded/excavated material</td>
<td>X</td>
</tr>
<tr>
<td>Entries include TSF transfers</td>
<td>□</td>
</tr>
<tr>
<td>Entries include information on stockpiled material and follow-up scan results</td>
<td>X</td>
</tr>
<tr>
<td>U.S. 191/491 entries include information on scan results and material returned to excavation</td>
<td>X</td>
</tr>
<tr>
<td>Storm event surveys documented</td>
<td>X</td>
</tr>
</tbody>
</table>

### Notes for Record Books Inspection:

*General LTS&M documents are available online. Currently the paper-based system has been moved to permanent storage in Morgantown, West Virginia. An electronic version of the paper-based system is located at the Monticello, Utah, site. Evaluation of the electronic version of the Information Repository is occurring now and will be posted to the website upon completion. The electronic version being posted to the website will be updated through 2017. No transfer of radioactive material into TSF in fiscal year 2017.

Record books and radiological as-built drawings had some minor discrepancies that were corrected by the Monticello staff before the end of the inspection.*

**4. Radiological As-Built Drawings**

<table>
<thead>
<tr>
<th>Readily Available</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawing updated annually</td>
<td>X</td>
</tr>
<tr>
<td>Documentation and recordkeeping requirements met</td>
<td>X</td>
</tr>
<tr>
<td>Radiological scan information recorded</td>
<td>X</td>
</tr>
</tbody>
</table>

**5. Surveillance Checklists and Records**

<table>
<thead>
<tr>
<th>Readily Available</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSF Access/Security Logs</td>
<td>X</td>
</tr>
<tr>
<td>Meteorological Monitoring Data, Monthly and Quarterly Repository Surveillance Checklists, and Monthly Pond 4 Surveillance Checklists</td>
<td>X</td>
</tr>
</tbody>
</table>

### Notes for Checklist and Records Inspection:

**6. Agreements (verify on Five-Year Review inspections only)**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DOE/City Cooperative Agreement (verify current with Environmental Compliance)</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>DOE/UDOT Memorandum of Understanding doesn’t expire</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**7. Zoning Restriction—Overlay Zone OL-1 (verify on Five-Year Review inspections only)**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Restriction is verified as current through City for property MP-00211-VL</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Restriction is verified as current through City for property MP-00176-VL</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
8. Deed Restrictions *(verify at San Juan County Recorder's Office, 117 S. Main Street)*

<table>
<thead>
<tr>
<th>Properties Transferred from DOE to City of Monticello</th>
<th>IC Annotations in Place</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DOE ID</strong></td>
<td><strong>Parcel</strong></td>
</tr>
<tr>
<td>Electronic record</td>
<td></td>
</tr>
<tr>
<td>MP-00181-OT</td>
<td>A32330367201</td>
</tr>
<tr>
<td>33S23E367204</td>
<td></td>
</tr>
<tr>
<td>MP-00391-VL</td>
<td>33S23E316001</td>
</tr>
<tr>
<td>MS-00893-OT</td>
<td>33S23E315400</td>
</tr>
<tr>
<td>MP-01040-VL (N)</td>
<td>34S24E061200</td>
</tr>
<tr>
<td>34S24E061201</td>
<td>electronic record</td>
</tr>
<tr>
<td>MP-01041-VL</td>
<td>34S24E060600</td>
</tr>
<tr>
<td>MP-01042-VL</td>
<td>34S24E060000</td>
</tr>
<tr>
<td>MP-01077-VL</td>
<td>33S24E318400</td>
</tr>
</tbody>
</table>

**Notes:**

Correction to quitclaim deed for properties transferred to City recorded as E062130, B789, P450-452 (applies to all of the above listed properties).

<table>
<thead>
<tr>
<th>Properties Sold by DOE to Private Party</th>
<th>IC Annotations in Place</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DOE ID</strong></td>
<td><strong>Parcel</strong></td>
</tr>
<tr>
<td>MP-01081-VL</td>
<td>34S24E053000</td>
</tr>
</tbody>
</table>

**Montezuma Creek Soil and Sediment Properties**

| **DOE ID** | **Parcel** | **Document** | **Book** | **Page** | **Y** | **N** |
| MP-00990-CS | 33S24E324800 | E063343 | B793 | 831-852 | X | |
| 33S24E328400 | E063343 | B921 | 474-476 | X | |
| 33S24E324802 | E063343 | electronic record | X | |
| A33240324802 | E063343 | electronic record | X | |
| A33240324804 | E063343 | electronic record | X | |
| MG-01033-VL | 34S24E050000 | E063343 | B793 | 831-852 | X | |
| 34S24E050601 | E063343 | electronic record | X | |
| MS-01026-VL | 34S24E043000 | E063343 | B793 | 831-852 | X | |
| MS-01027-VL | 34S24E042400 | E063343 | B793 | 831-852 | X | |
| MG-01030-VL | 34S24E047200 | E063255 | B793 | 526-538 | X | |
| MG-01029-VL | 34S24E040000 | E063255 | B793 | 390-404 | X | |
| 34S24E040001 | E063255 | electronic record | X | |
| MP-00951-VL | 33S24E317200 | E063926 | B796 | 188-202 | X | |
| 33S24E317207 | E063926 | electronic record | X | |
| 33S24E317204 | E063926 | electronic record | X | |
| A33240317206 | E063926 | electronic record | X | |
| MP-01084-VL | 33S24E326000 | E063926 | B796 | 188-202 | X | |

**Notes:**

<table>
<thead>
<tr>
<th>Utah Department of Transportation Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DOE ID</strong></td>
</tr>
<tr>
<td>MS-00895-OT</td>
</tr>
<tr>
<td>A33230367825</td>
</tr>
<tr>
<td>MS-00892-OT</td>
</tr>
<tr>
<td>MS-01021-OT</td>
</tr>
<tr>
<td>MS-01020-OT</td>
</tr>
</tbody>
</table>

**Notes for Deed Restriction Inspection:**

Property MP-00181 has an error: The access agreement shows a well, but the well is on MP-00179. Parcel 33S24E317207 was added. Parent to 34S24E040001.
### III. Repository Inspection

#### A. Access Area

1. **Site Access Sign/Emergency Information**  
   - [ ] Satisfactory  
   - [ ] Repairs/Maintenance Needed
2. **Field Office**  
   - [ ] Satisfactory  
   - [ ] Repairs/Maintenance Needed
3. **Temporary Storage Facility**  
   - [ ] Satisfactory  
   - [ ] Repairs/Maintenance Needed
   - **Bin cover**  
     - [ ] Functional  
     - [ ] Not Functional
   - **Approximate volume of bin contents (cubic yards)**: 0
   - **Safety and Health/RAD postings**  
     - [ ] Appropriate  
     - [ ] Inadequate
   - **Drums and secondary containment**  
     - [ ] Good condition  
     - [ ] Unavailable/not good condition
   - **Vandalism/trespassing**  
     - [ ] Not evident  
     - [ ] Evident (locate on map)

Describe Access Area Repairs/Maintenance Needed:

The office building interior flooring has been replaced and upgraded. The parking lot has been regraveled.

#### B. Repository Perimeter

*(Note locations of erosion, noxious weeds, vandalism, or excessive vegetation on map)*

1. **Outer Fencing and Gates**  
   - [ ] Satisfactory  
   - [ ] Repairs/Maintenance Needed
2. **Signs** *(Note condition of 40 numbered reference signs and posts)*
   - Signs damaged but legible, requiring monitoring:
   - Signs requiring replacement:
3. **South Boundary Markers**  
   - [ ] All six markers located  
   - [ ] Marker(s) __________ not located
4. **Erosion/Gullying**  
   - [ ] Not evident  
   - [ ] Evident
5. **Vegetation**  
   - [ ] No excessive weeds absent  
   - [ ] Noxious weeds present
6. **Land Use Changes on Adjoining Property**  
   - [ ] No change  
   - [ ] Change
7. **Vandalism/Trespassing**  
   - [ ] Not evident  
   - [ ] Evident

Notes for Condition of Repository Perimeter (e.g., repairs needed, erosion areas, vandalism):

The signs are being replaced; recommend that numbered decals be used to reference the signs. The outer fencing between signs P3 and P4 and P7 and P8 need to be repaired. Bullet holes were observed on a “No Hunting” sign (MP-01081 South). The sign is still legible.

### Repository Runoff/Run-On Controls

*(North and East Toe Trenches; South and West Drainage Channels)*

1. **Settlement**  
   - [ ] Not evident  
   - [ ] Evident
2. **Material Degradation**  
   - [ ] Not evident  
   - [ ] Evident
3. **Erosion/gullies**  
   - [ ] Not evident  
   - [ ] Evident
4. **Siltation**  
   - [ ] Not evident  
   - [ ] Evident
5. **Obstructions**  
   - [ ] Not evident  
   - [ ] Evident
6. **Excessive Vegetation**  
   - [ ] Not evident  
   - [ ] Evident

Notes for Condition of Repository Runoff and Run-On Controls (Note: Locate all areas of concern on map):

Rock above the North Toe Trench shows evidence of expected siltation. Continued monitoring is recommended. The degrading material is softer red rock that was mixed in when the toe trenches were constructed. Although it continues to degrade, it is a lesser component of the riprap, and the harder rocks are not degrading.

### Pond 4 *(Note: Locate all areas of concern on map)*

1. **Perimeter Fence and Access Gate**  
   - [ ] Satisfactory  
   - [ ] Unsatisfactory
2. **Erosion/Biointrusion of Pond Berm**  
   - [ ] Not evident  
   - [ ] Evident
3. **Safety Equipment**  
   - Pond barrier rope intact:  
     - [ ] Yes  
     - [ ] No
   - Personal floatation devices and postings present and visible:  
     - [ ] Yes  
     - [ ] No
4. **Pond 4 LCRS and LDS Electrical Housing/Surface Installations**
   - Physical condition is:  
     - X Satisfactory  
     - □ Unsatisfactory

5. **Liner—Holes/Cracks/Tears**
   - X Not Evident  
     - □ Evident

6. **Siltation and Vegetation in Pond 4**
   - X Not evident  
     - □ Evident

7. **Pond 4 Water Level**
   - Estimated water depth is ___8___ feet

8. **Vandalism**
   - X Not evident  
     - □ Evident

**Notes for Condition of Pond 4 Features:**
- Evidence of rodent biointrusion on the north and west sides, but liner function is not impaired. Continued monitoring is recommended.

---

C. **Repository Cover Inspection**

1. **Top Perimeter Road and Road to Pond 4**
   - X Satisfactory  
     - □ Unsatisfactory

2. **Interior Wildlife Fence and Wildlife Gates**
   - Physical condition is:  
     - X Satisfactory  
     - □ Unsatisfactory

3. **Cover Vegetation**
   - See attached Repository Cover Vegetation Index form; note areas of concern on map

4. **Riprap Armoring**
   - X Slumping/sliding not evident  
     - □ Slumping/sliding evident (locate on map)
   - X Rock deterioration not evident  
     - □ Rock deterioration evident (locate on map)

5. **Settlement/Desiccation/Erosion/Gullies**
   - X Settlement depressions not evident  
     - □ Settlement depressions evident (locate on map)
   - X Desiccation cracking not evident  
     - □ Desiccation cracking evident (locate on map)
   - X Erosion/gullies not evident  
     - □ Erosion/gullies evident (locate on map)

6. **Holes/Burrows/Biointrusion**
   - □ Holes/burrows/biointrusion not evident  
     - X Holes/burrows/biointrusion evident (locate on map)

7. **Seepage/Ponding**
   - X Seepage not evident  
     - □ Seepage evident (locate on map)
   - X Ponding not evident  
     - □ Ponding evident (locate on map)
   - X Soft subgrade not evident  
     - □ Soft subgrade evident (locate on map)
   - X Phreatophytes not present  
     - □ Phreatophytes present (note species/locate on map)

8. **Site Monument at Apex of Cover**
   - X Satisfactory  
     - □ Repairs/maintenance needed

**Notes for Repository Cover Inspection:**
- Evidence of small rodent biointrusion, but cover function is not impaired. Continued monitoring is recommended.

---

**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  
     - X Yes  
     - □ No
   - Exterior pump access ports are undamaged  
     - X Yes  
     - □ No
   - Evidence of leakage into vaults  
     - □ Yes  
     - X No
   - Evidence of drainage through cover penetrations  
     - □ Yes  
     - X No

2. **Manholes 2, 4, and 5**
   - Covers secure and operable  
     - X Yes  
     - □ No
   - Evidence of drainage through cover penetrations  
     - □ Yes  
     - X No

**Notes for Condition of Manholes (include condition of telemetry equipment and appropriateness of safety and health postings):**

3. **LCR Video Ports (check covers only; ports are inoperable)**
   - Covers secure and operable  
     - X Yes  
     - □ No
   - Evidence of drainage through cover penetrations  
     - X Yes  
     - □ No
4. Settlement Monuments (A to I) (Note: Plates surveyed during Five-Year Review inspections only)
   - Surface completions undamaged: X Yes X No
   - Inner plates undamaged: X Yes □ No

5. Embedded Lysimeter
   - Evidence of seepage at outlet: □ Yes X No
   - Instrumentation installations undamaged: X Yes □ No
   - Evidence of drainage along cover penetrations: □ Yes X No
   - Telemetry surface installations in good condition: X Yes □ No

6. Operation of Repository and Pond 4 LCRS and LDS (interview onsite LM operator)
   - Pumping rates are reported in quarterly Federal Facility Agreement reports to EPA and UDEQ. Reports are available in System Operation and Analysis at Remote Sites (SOARS).

   **Note Any Anomalies or Other Observations Reported by the LM Operator:**

   None

   **Notes for Cover Penetrations Inspection and Operation of LCRS/LDS:**

   None

---

### IV. City-Owned Properties Inspection

#### A. City-Owned Properties Transferred from DOE

<table>
<thead>
<tr>
<th>Property</th>
<th>181</th>
<th>391</th>
<th>893</th>
<th>1040</th>
<th>1041</th>
<th>1042</th>
<th>1077</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessible to public</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
</tr>
<tr>
<td>Evidence of camping</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
</tr>
<tr>
<td>Habitable structure(s)</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
</tr>
<tr>
<td>Gullies/erosion</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
</tr>
<tr>
<td>Runoff/drainage controls intact and in good repair (ditches, riprap structures, dams, check dams, berms)</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
</tr>
<tr>
<td>Land use changes</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
</tr>
<tr>
<td>Evidence of vandalism</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
<td>□ X</td>
</tr>
<tr>
<td>Soil removal evident</td>
<td>n/a</td>
<td>□ n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>□ n/a</td>
<td>n/a</td>
<td>□ n/a</td>
</tr>
<tr>
<td>Water well installation</td>
<td>□ X</td>
<td>n/a</td>
<td>□ X</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>□ X</td>
</tr>
<tr>
<td>Wetland/creek damage</td>
<td>□ X</td>
<td>n/a</td>
<td>□ X</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Supplemental standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fence intact</td>
<td>n/a</td>
<td>□ X</td>
<td>n/a</td>
<td>□ X</td>
<td>n/a</td>
<td>□ X</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**Describe Any Violations of Institutional Controls and/or Repair/Maintenance Issues (locate on map):**

#### B. City-Owned Property MP-00211

<table>
<thead>
<tr>
<th>Evidence of Excavation or Construction</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ X X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If yes, confirm the following with onsite LM representative:

- In accordance with Monticello zoning district Overlay Zone (OL-1) □ □ X
- Violation has been reported □ □ X
- Radiological contamination was encountered □ □ X
- Radiological contamination was appropriately managed □ □ X

**Corrective Action Required**

**Notes for City-Owned Property MP-00211 Inspection:**

A spilled chemical container was observed on the property. The spill was reported to the city.
## V. Montezuma Creek Soil and Sediment Properties

<table>
<thead>
<tr>
<th>Evidence of Habitable Structures Within the Restricted Area</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence of Soil Removal From the Restricted Area</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Land Use/Ownership Has Changed*</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Landowners Are Aware of Use Restrictions*</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Violations Have Been Reported *</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Corrective Action Required</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*confirms with onsite LM representative

### Notes for Soil and Sediment Properties Inspection:
The entire canyon was not visited, as beaver or muskrat dams blocked access to the lower canyon. No anomalies have been reported by sampling teams or onsite representatives.

## VI. Groundwater Management Area

<table>
<thead>
<tr>
<th>Evidence of Water Well Installation Within the Restricted Area*</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Permits for Water Well Installation Within the Restricted Area</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Violations Have Been Reported*</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Land Ownership Has Changed*</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Landowners Are Aware of Water Use Restriction*</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Corrective Action Required</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

*confirms with onsite LM representative

### Notes for Groundwater Management Area Inspection:
Onsite representatives regularly inspect area to verify that new wells have not been drilled.

## VII. OU III Monitoring Wells and Water Treatment Systems

### A. Monitoring Well Surface Completions

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer Casing or Flush Mount Vault of Inactive Wells Intact</td>
<td>X</td>
</tr>
<tr>
<td>Wells Are Locked, and Flush Mount Well Lids Are Secured</td>
<td>X</td>
</tr>
<tr>
<td>Groundwater Treatment Facility and Building</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Pipeline</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Repairs/Maintenance Needed</td>
<td>Repairs/Maintenance Needed</td>
</tr>
</tbody>
</table>

### Notes for Inactive Monitoring Well Inspection (Note location of any maintenance issues on map):
Wells are checked and maintained twice a year by groundwater sampling team. The same inactive wells are missing bolts, and one is missing a cover, and some are no longer flush-mounted. Repairs will be requested to prevent damage to the wells by the landowner's livestock.

## VIII. MVP Field Inspection

### A. City Streets and Utilities

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads/Utilities Under Construction</td>
<td>X</td>
</tr>
<tr>
<td>Unmonitored excavations observed during inspection</td>
<td>X</td>
</tr>
<tr>
<td>Planned excavations are identified by onsite LM representative</td>
<td>X</td>
</tr>
<tr>
<td>Radiological material is properly controlled and managed</td>
<td>X</td>
</tr>
</tbody>
</table>

### Notes for City Streets and Utilities Inspection:
Onsite personnel normally drive city streets daily to look for excavation work. The utility locator service is accessed through blue stakes notices (811 from the State of Utah). No radioactive material was encountered during 2017.
VIII. MVP Field Inspection (continued)

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

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads Under Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unmonitored excavations observed during inspection</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Planned excavations are identified by onsite LM representative</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Radiological material is properly controlled and managed</td>
<td>☑</td>
<td>☑</td>
</tr>
</tbody>
</table>

Notes for UDOT Highways Inspection:


Erosion (highway shoulders and U.S. 191 embankment at Montezuma Creek)

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>X</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>New erosion evident</td>
<td>☑</td>
<td>☑ No</td>
<td>X</td>
<td>N/A</td>
</tr>
<tr>
<td>Previous erosion evident; unchanged</td>
<td>☑</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No erosion evident</td>
<td>☑</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Eroded Material Scanned for Radiological Contamination and Properly Managed

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>X</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☑</td>
<td>☑ No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Describe Erosion Noted on UDOT Highways:

UDOT installed a new drainage pipe to repair erosion areas on the embankment of U.S. 191 near property 181. There is no evidence of excavation.

C. Property MS-00176

(Note: Observations and activities for MS-00176-VL are recorded by the onsite 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 onsite LM representative.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>X</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unmonitored Excavations Observed During Inspection</td>
<td>☑</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planned Excavations Are Identified by Onsite LM Representative</td>
<td></td>
<td>☑ No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site Conditions Indicate ICs Properly Implemented</td>
<td>☑</td>
<td>☑ No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes for Property MS-00176 Inspection:

No changes noted since last annual inspection.

Record the photographs taken during the annual inspection, including the location on map(s), azimuth, and a brief description of the feature(s) photographed.
Repository Cover Vegetation Index  
Monticello, Utah

Date inspected: _9/12/17______      Inspected by: Danika Marshall and Linda Sheader

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):

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Growth Form</th>
<th>Life Cycle</th>
<th>Vegetation Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shrub</td>
<td>Grass</td>
<td>Other</td>
</tr>
<tr>
<td><em>Agropyron cristatum</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><em>Thinopyrum intermedium</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><em>Bromus inermis</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><em>Artemisia tridentata</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><em>Pascopyrum smithii</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><em>Ericameria nauseosa</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><em>Bromus tectorum</em></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Less common species present on repository cover:
*Grindelia squarrosa, Machaeranthera canescens, Lactuca serriola, Viguiera multiflora, Sisymbrium altissimum, and Convolvulus arvensis.*

Noxious weed species present (record locations on map or GPS):
*Convolvulus arvensis* (State of Utah Class C noxious weed; no control warranted).

Additional notes:
*Pascopyrum smithii* did not bloom; low moisture and drought year.

Vegetation Condition Score (see reverse): ___3.8____

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 recommendations.)
### Condition of Vegetative Cover

(Indicate number in each row that best represents current conditions):

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

Add up all columns for total condition score:

\[
\begin{align*}
0 & \times 1 = 0 \\
0 & \times 2 = 0 \\
3 & \times 3 = 9 \\
4 & \times 4 = 16 \\
2 & \times 5 = 10 \\
\text{Total:} & = 35 \\
\end{align*}
\]

Divide total by 9 to calculate vegetative cover condition score = \_3.8\_.

---

U.S. Department of Energy  
2017 Annual Inspection—Monticello, Utah  
December 2017  
Doc. No. S17109
Appendix B

Geotechnical Inspection Report
November 17, 2017

Fred Smith  
Monticello Site Lead  
Navarro Research and Engineering, Inc.

RE: Geotechnical inspection addendum, erosion control riprap Monticello repository

Introduction

An additional geotechnical inspection was performed at the Monticello repository on November 6, 2017, to reevaluate reported riprap movement on the north slope of the repository. This inspection was conducted to address concerns that were reported in the 2015 and 2016 Annual Inspection Reports performed by Navarro Research and Engineering, Inc. (Navarro). Observations of suspect riprap rock movement forming horizontal ridges on the north slope were noted by the lead ecologist on the inspection team. No slope stability concerns related to this suspected movement were reported; however, due to repeated reports of potential riprap rock movement, it was decided to perform a follow-up inspection with engineering subject matter experts (SMEs) to confirm the insignificance of the ridges on the performance of the repository.

The site was visited by Greg Smith, P.E. (geotechnical engineer and field engineer during construction of the Monticello repository), of Geo-Smith Engineering LLC, and Dan Brennecke, P.E. (civil engineer of record for the design of the Monticello repository), of Weston Solutions. The engineering SMEs were accompanied by Linda Sheader (ecologist and annual site inspection lead), Danika Marshall (ecologist and trainee for the annual site inspection lead), and Fred Smith (site lead), all of Navarro. The site inspection was conducted from approximately 10 a.m. to 2:30 p.m., when the weather was clear and breezy.

Erosion control riprap slope conditions:

After the observation of suspect riprap rock movement was reported by the 2016 annual inspection team, the northwest riprap slope was inspected in December 2016 by Greg Smith (see letter from Geo-Smith Engineering LLC of December 16, 2016, to Fred Smith, Monticello site lead, Navarro) to investigate the reported horizontal ridges and determine if slope movement was indicated. This inspection resulted in finding that the observed riprap horizontal ridges resulted from equipment traffic during construction of the repository (see Figure 1) and not from any slope instability.
The follow-up inspection conducted on November 6, 2017, investigated two areas of concern as shown on Figure 2: (1) the lower portion of the northwest riprap slope and (2) the lower portion of the center northeast slope. At location 1, angled ridges that cut across the contours are present (see Figure 3), and at location 2, a vertical channel exists in a facet created by the repository geometry (see Figure 4).
Repository design drawings kept at the office trailers in Monticello were reviewed to determine the materials making up the side slope construction. The north facing riprap side slopes have a 5H:1V grade and consist of (from the top down) 12 inches of 8-inch-minus riprap (designated R6 riprap on design drawings) underlain by two 6-inch-thick graded filter bedding layers (type FS1 and FS2), creating a 2-foot-thick erosion cover. Additionally, a minimum 2-foot-thick rock-filled toe trench was constructed at the base of all side slopes with grades equal to or steeper than 10H:1V. The toe trench is designed to prevent offsite erosion channels from head-cutting into the repository cover.

For any negative performance issues to arise, both areas of concern investigated would require erosion channels to cut through the 2-foot riprap/filter erosion protective cover. If erosion channels were developing beneath the rock surface, it would be expected to see downgradient sediment deposits below the erosion channels. No sediment deposits were observed. There also were no erosion channels observed downgradient of the toe trench.

Figure 3. Northwest Slope, Track Marks (Ridge Lines), Location 1 in Figure 2
The riprap surface in the general area of the two areas of concern has many undulations and irregularities at different angles on the side slope that are parallel to each other and equally spaced. It is my opinion that these irregularities are the residual tracks from the construction equipment used during the riprap rock placement. Based on evidence gathered during this follow-up investigation, there is no conclusive evidence of post construction rock movement or erosion concerns on the Monticello repository riprap slopes.

Please contact me with any questions or comments.

Sincerely,

[Signature]

**Figure 4. Northeast Slope, Facet Line (Arrow), Location 2 in Figure 2**

Gregory M. Smith, P.E.
Manager, Geo-Smith Engineering LLC