LMS/MNT/S36977

Monticello, Utah, National Priorities List (NPL) Sites Federal Facility Agreement (FFA) Quarterly Report: July 1–September 30, 2021

November 2021

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Abbreviations

3D	three-dimensional
AOA	Area of Attainment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
gpad	gallons per acre per day
gpm	gallons per minute
GRO	Groundwater Remedy Optimization
IC	institutional control
LCRS	Leachate Collection and Removal System
LDS	Leak Detection System
LM	Office of Legacy Management
LMS	Legacy Management Support
LTS&M	long-term surveillance and maintenance
MMTS	Monticello Mill Tailings Site
MNA	monitored natural attenuation
MVP	Monticello Vicinity Properties
OU	Operable Unit
PRB	permeable reactive barrier
QAPP	Quality Assurance Project Plan
SMP	Site Management Plan
TSF	Temporary Storage Facility
UDEQ	Utah Department of Environmental Quality
UDOT	Utah Department of Transportation
ZVI	zero-valent iron

1.0 Introduction

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) submits this quarterly report to inform the U.S. Environmental Protection Agency (EPA) and the Utah Department of Environmental Quality (UDEQ) of the status of the Monticello Vicinity Properties (MVP) and the Monticello Mill Tailings Site (MMTS), collectively called the LM Monticello, Utah, Disposal and Processing Sites, for July 1 through September 30, 2021. The MVP and MMTS are regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (Title 42 *United States Code* Section 9601 et seq. [42 USC 9601 et seq.]) (CERCLA). Quarterly reports are submitted to EPA and UDEQ in February (for October through December), May (January through March), August (April through June), and November (July through September).

LM assesses MVP and MMTS conditions and remedy protectiveness through (1) monthly, quarterly, and annual inspections of site infrastructure and operations as specified under the *Long-Term Surveillance and Maintenance Plan for Monticello NPL Sites* (DOE 2018a), also called the Long-Term Surveillance and Maintenance (LTS&M) Plan; (2) semiannual monitoring of groundwater and surface water under the *Record of Decision for the Monticello Mill Tailings (USDOE) Site Operable Unit III, Surface Water and Ground Water, Monticello, Utah* (DOE 2004); and (3) CERCLA Five-Year Reviews.

The primary LTS&M activities at the MVP and MMTS are conducted to (1) provide radiological control at properties where residual soil contamination from mill tailings remains in place (supplemental standards properties), (2) operate and maintain the mill tailings repository, (3) ensure that institutional controls (ICs) restricting the use of land and water remain effective, (4) monitor water quality restoration progress, and (5) operate the Operable Unit (OU) III pump-and-treat groundwater contingency remedy optimization system. This system, implemented in January 2015, focuses on groundwater remediation within a specified region of the alluvial aquifer called the Area of Attainment (AOA).

Annual groundwater reports present comprehensive data evaluation for the groundwater and surface water OU III remedy. LM has utilized the data presented in the most recent annual groundwater report to update the conceptual site model and develop a three-dimensional (3D) numerical fate and transport model to assess remedial time frames.

Project milestones and guiding documents are further described in the *Monticello Site Management Plan* (DOE 2003), also called the SMP. Section 5.0 of that document is updated annually.

1.1 Quarterly Site Status

In summary, the activities and observations for this quarter consist of the following:

- The Groundwater Remedy Optimization (GRO) system operated as planned from July through September and pumped approximately 828,000 gallons of water from the AOA.
- LM sent its response to comments from EPA and UDEQ on the *Quality Assurance Project Plan, Monticello, Utah, Disposal and Processing Sites* (LM-Plan-3-21-1.0, LMS/MNT/S27252), also called the QAPP, to those agencies on June 15, 2021. UDEQ responded with no further comments in July 2021 and EPA provided additional comments in September 2021.

- Comment responses for the *Monticello Mill Tailings Site Operable Unit III Annual Groundwater Report, May 2019–May 2020* (DOE 2020) were sent to EPA and UDEQ on June 15, 2021. UDEQ responded with no further comments in July 2021. LM anticipates comments from EPA in October 2021.
- The previous period's Federal Facility Agreement (FFA) quarterly report was sent to EPA and UDEQ in August 2021.
- LM received no further comments from UDEQ on the draft *Monticello Mill Tailings Site Operable Unit III Groundwater Flow and Contaminant Transport Model Report* (DOE 2021c). LM anticipates comments from EPA in October 2021.
- Comments on the draft *Monitored Natural Attenuation Demonstration Report, Operable Unit III, Monticello Mill Tailings Site, Monticello, Utah* (DOE 2021a), also called the monitored natural attenuation (MNA) demonstration report, were received from EPA last reporting period and from UDEQ on April 30, 2021. The Legacy Management Support (LMS) contractor prepared responses that were submitted to EPA and UDEQ in July 2021.
- The *Monticello Mill Tailings Site Operable Unit III Technical Basis for Groundwater Remedy Optimization System Termination* (DOE 2021d), also called the GRO termination report, was sent to EPA and UDEQ on May 10, 2021. Comments were received from UDEQ in June 2021 and EPA in August 2021. Draft responses to comments were sent to LM in August 2021.
- The draft *Monticello Mill Tailings Site Operable Unit III Annual Groundwater Report May 2020–April 2021* (DOE 2021a) was submitted to LM for review in September 2021.
- The LMS contractor worked on the draft CERCLA Five-Year Review.
- Weekly site inspections were performed by site personnel to verify the integrity of the site's systems and to monitor activities that might occur in supplemental standards properties (e.g., city of Monticello streets and utility corridors).
- Site personnel continued working under Phase 3 of the coronavirus-related limited operations return-to-work procedures, which allowed people to work at the site every day except weekends and holidays (i.e., a continuation of the policy in effect since May 18, 2020).
- Site personnel performed monthly and quarterly site inspections in accordance with the LTS&M Plan.
- Routine surveillance noted no anomalous conditions for the MVP remedy.
- Routine surveillance noted no violations of MMTS ICs that restrict land and groundwater use.
- Routine surveillance noted no anomalous conditions for the surface features of the disposal cell and Pond 4, the engineered solar evaporation pond.
- The volume of water pumped from the Pond 4 Leachate Collection and Removal System (LCRS) did not exceed the action level this quarter.
- Routine surveillance noted no operational deficiencies for the Temporary Storage Facility (TSF).

2.0 MVP

LTS&M for the MVP consists of providing radiological control at excavations in Monticello roadway and utility corridors, in Utah Department of Transportation (UDOT) rights-of-way within city limits, and at property MS-00176-VL (privately owned supplemental standards property).

Surveillance results for this quarter are as follows:

- No anomalous conditions for the MVP remedy were noted.
- LM representatives continued to coordinate with city officials via telecommunications regarding construction and excavation activities by the city, UDOT, and utility companies in roadway and utility corridors. LM follows the normal LTS&M protocol to provide radiological control in the affected roadways.
- Seven excavations occurred in the city streets and utility corridors this quarter. Site personnel radiologically surveyed the removed soils from the excavations, and no radiologically contaminated materials were found.
- Neither excessive erosion nor unauthorized excavations were observed at the U.S. Highway 191 embankment at Montezuma Creek (supplemental standards property).
- A surveillance of property MS-00176-VL identified no excessive erosion of supplemental standards material or violation of the land-use restriction.
- The annual inspection of the MVP and MMTS, which also served as the Five-Year Review inspection, was conducted in September.

3.0 MMTS

LTS&M activities for the MMTS consist of (1) maintaining the onsite repository and operating the associated LCRS and Leak Detection System (LDS) for the disposal cell and Pond 4, (2) surveillance of properties affected by groundwater- and land-use ICs on the former Monticello mill (mill site) and peripheral properties, and (3) operation and maintenance of the OU III groundwater remediation system.

3.1 OU I

OU I consists of the property that contained the mill site and repository. Radioactively contaminated materials were removed from the MVP, the mill site, and peripheral properties (OU II) and encapsulated at the repository as a remedial action that was completed in 1999. LM owns and manages the repository; the city owns the former mill site and manages it as a public park.

3.1.1 Repository

Monthly, quarterly, and annual inspections of the repository ensure that remedy controls remain intact and the waste remains isolated from the environment.

Inspection observations and maintenance activities for the quarter consist of the following:

- No area of the cover showed settling, slumping, fracturing, seepage, ponding, or significant erosion.
- No anomalous surface feature conditions were observed at the disposal cell or Pond 4. Surveillance checklists for this quarter are attached as Appendix A. No further minor burrowing by voles and small ground squirrels was observed this quarter on the disposal cell and Pond 4 berm.
- The disposal cell LCRS and LDS were operated in accordance with the requirements specified in the LTS&M Plan. Findings for the disposal cell LCRS and LDS this period include the following:
  - Leachate production from the disposal cell was approximately 515 gallons per week combined for sumps LCRS 1 and LCRS 2. There is no action level for the disposal cell LCRS. See Appendix B for a graphical depiction of leachate production history.
  - The disposal cell LDS continues to receive no water; therefore, the disposal cell LDS action level was not exceeded. See Appendix B for a graphical depiction of leachate production history.
- Operation of the OU III GRO system resulted in increased water collection in the Pond 4 LCRS. LCRS and LDS action levels, approved by EPA and UDEQ, were formally developed in the *Repository and Pond 4 Groundwater Contingency Plan-Final* (DOE 1998) and are also found in Section D5.0 of the LTS&M Plan. The leakage rate established for the Pond 4 LCRS is 851 gallons per acre per day (gpad) (2000 gallons per day), and the leakage rate for the LDS is 20 gpad (47 gallons per day), which is averaged over a 7-day period. These leakage rates are based on the area of the floor of Pond 4, which is 2.35 acres. Currently, the LCRS and LDS monitoring and pumping systems are functioning as designed to recirculate water back into Pond 4.
- Findings for the Pond 4 LCRS and LDS this period are as follows:
  - Water collection at the Pond 4 LCRS continued but did not exceed the action levels this quarter (see Appendix B).
  - Water collection in the Pond 4 LDS remained below the action level (see Appendix B).

3.1.2 TSF

Routine surveillance of the TSF ensures that maintenance and radiological controls that govern access to and the placement, storage, and transfer of contaminated material in the TSF are current and effective. Surveillance this quarter (see surveillance checklists in Appendix A) revealed that:

- The TSF cover, fencing, radiological controls, and signs have been maintained in accordance with the LTS&M Plan, and the TSF has been inspected and verified as ready to receive contaminated materials.

LM is required to initiate the transfer of TSF materials for permanent disposal at the Grand Junction, Colorado, Disposal Site when the contents reach a volume of approximately 75 cubic yards. In summary, recent TSF activity consists of the following:

- The TSF stores no soils or excavation products from city street projects or supplemental standards properties.

3.1.3 Mill Site

LM conducts surveillance of the mill site (properties MP-00181-VL and MS-00893-VL) to ensure compliance with ICs that were implemented to preserve the OU I remedy for soil and groundwater. ICs applicable to the mill site include prohibitions on installing domestic-use wells in the alluvial aquifer, constructing habitable structures, and camping, as well as preserving the properties for day use as a public park.

Surveillance results for this quarter revealed:

- No nonconformance with water- and land-use restrictions.

3.2 OU II

OU II consists of private and city-owned properties peripheral to the mill site. LM conducts surveillance of OU II properties to verify compliance with ICs that were implemented to preserve the OU II remedy for soil and groundwater.

Surveillance results for this quarter are summarized below for the different components of OU II.

- **Montezuma Creek Restrictive Easement Area (supplemental standards properties, both city-owned and privately owned):** No evidence of nonconformance with land-use restrictions (soil removal or construction of habitable structures in supplemental standards properties) was observed.
- **Groundwater-use restrictions (e.g., prohibition on installing domestic-use wells in the alluvial aquifer):** These were applied to several OU II properties under the 2004 covenant by which DOE transferred selected properties to the city. No evidence of nonconformance with this restriction was observed during the quarter.
- **Property MP-00211-VL (city-owned):** No evidence of nonconformance with the land-use restriction on building construction was observed.
- **Pinyon-juniper supplemental standards properties (city-owned):** No evidence of nonconformance with land- and groundwater-use restrictions was observed.
- **Excessive erosion:** No storm events resulted in more than 2.8 inches of precipitation in 24 hours, which would require surveillance of supplemental standards cleanup properties for excessive erosion.

3.3 OU III

OU III consists of groundwater and surface water contamination resulting from operation of the mill site. Routine monitoring of OU III (water quality and water level) is normally performed semiannually in April and October; the next semiannual sampling event is scheduled for October 2021.

The contaminated groundwater is within the alluvial aquifer beneath the valley of Montezuma Creek; some sections of Montezuma Creek are contaminated by the discharge of contaminated groundwater. The alluvial aquifer has no record of past or present use; however, a portion of the aquifer is subject to ICs to restrict use. Montezuma Creek is used for limited irrigation and livestock watering. There are no ICs that restrict surface water use.

The current groundwater remedy includes (1) MNA with ICs and (2) pump-and-treat remediation by evaporation that was implemented as the GRO system in January 2015. Operation and performance of the groundwater remedy are reported annually. Previous remediation efforts have included (1) treatment by a zero-valent iron (ZVI) in situ permeable reactive barrier (PRB) and (2) pump-and-treat remediation that used ex situ ZVI treatment. The ex situ ZVI treatment system was deactivated in December 2014 and replaced by the GRO system, which is described in greater detail in Section 3.3.2. The PRB remains a component of the GRO system as a groundwater flow barrier.

3.3.1 Groundwater Restricted Area/ICs

During spring and fall, LM conducts surveillance of properties where groundwater contamination is present to ensure compliance with the groundwater-use restriction (i.e., no installation of domestic-use wells in the alluvial aquifer). The affected OU III properties constitute the Monticello Groundwater Restricted Area, as defined and administered by the State of Utah Division of Water Rights. Surveillance found:

- No evidence of nonconformance with the groundwater-use restriction since its implementation in May 1999.

3.3.2 OU III Groundwater Contingency Remedy Optimization System

The GRO system includes eight vertical extraction wells strategically placed in the AOA to extract contaminated groundwater and an associated monitoring system. The water from the extraction wells is transmitted in buried pipelines to an aboveground holding tank in the groundwater transfer building; from there it is pumped through a buried water transmission line for about 1 mile to Pond 4 for evaporation.

The associated monitoring system consists of 22 wells installed in the AOA. Sixteen of the 22 wells were installed south of Montezuma Creek in 2014, and 6 wells were installed north of Montezuma Creek in 2017. These 22 wells are currently sampled following the extraction of approximately 1,000,000 gallons from the GRO system as stated in Section 1.5 of the *Remedial Action Completion Report for Operable Unit III Groundwater Contingency Remedy Optimization System, Monticello Mill Tailings Site, Monticello, Utah* (DOE 2016).

3.3.2.1 GRO System Quarterly Performance Summary

The GRO system performance for the quarter is summarized below.

- Groundwater extraction during the quarter was approximately 830,000 gallons, equivalent to an average flow rate of 6.25 gallons per minute (gpm). Assuming the concentration of extracted water throughout the quarter was equal to the uranium concentration of the tank effluent on April 14, 2021 (the date of the most recent sample collected), a total of 3.4 pounds of uranium were removed during this quarter.
- During the quarter, the volume of water stored in Pond 4 decreased by approximately 80,000 gallons. The GRO system operates by balancing the extraction rate and the Pond 4 evaporation rate while maintaining the Pond 4 storage volume between 5,000,000 and 8,000,000 gallons (the maximum storage volume of Pond 4 is approximately 15,600,000 gallons).

- Water-level monitoring during the quarter consisted of:
  - Continuous water-level monitoring in AOA extraction and monitoring wells using pressure transducers and dataloggers (programmed to record at 5-minute intervals) connected to the LM System Operation and Analysis at Remote Sites (SOARS) system.
- Cumulatively, the system has removed 25,400,000 gallons of contaminated groundwater from the aquifer since system startup in January 2015 (Table 1). Assuming a minimum AOA uranium plume pore volume of 2,400,000 gallons and a maximum pore volume of 3,300,000 gallons, the GRO system has removed between 7.7 and 10.6 pore volumes since system startup.
- From January 2015 through April 14, 2021, the GRO system removed approximately 123 pounds of uranium from the AOA aquifer (Table 2). Estimates of cumulative uranium mass removed are updated only at sampling events.

Table 1. GRO System Treatment: Monthly Volumes and Rates for This Quarter and Cumulative Volumes Since January 2015

Calendar Month	Approximate Volume Pumped (Millions of Gallons)	Effective Pumping Rate (gpm)	Approximate Cumulative Volume[a] (Millions of Gallons)
July 2021	0.18	3.98	24.7
August 2021	0.24	5.30	25.0
September 2021	0.41	9.58	25.4

Note:
[a] Cumulative volume is based on the volume of groundwater extracted by the GRO system since system startup in January 2015.

Table 2. Uranium Mass Removal from Groundwater in the AOA

Tank Effluent Sample Date[a]	Effluent Tank Uranium Concentration (µg/L)	Volume Removed Between Tank Samples (Millions of Gallons)	Uranium Removed (Pounds)[b]	Cumulative Mass of Uranium Removed[c] (Pounds)
October 20, 2020	480	1.00	4.1	118
April 14, 2021	490	1.15	4.7	123

Notes:
[a] Sampling occurs following the extraction of approximately 1,000,000 gallons.
[b] Uranium removed since last sampling event. Estimate is based on median concentration between sampling dates.
[c] Since GRO system startup in January 2015. Estimates of cumulative mass removed are updated every sampling event.

Abbreviation:
µg/L = micrograms per liter

Monitoring and reporting guidelines for the GRO system are described in the *Final Groundwater Contingency Remedy Optimization Remedial Design/Remedial Action Work Plan for the Monticello Mill Tailings Site Operable Unit III, Monticello, Utah* (DOE 2014). Evaluation of water quality trends and whether remediation goals are being met, in the AOA and sitewide, is beyond the scope of this FFA quarterly report but is provided in annual groundwater reports that are submitted to EPA and UDEQ.

3.3.3 OU III Closure Strategy

Several scenarios are being evaluated to develop a closure strategy for OU III, and these are detailed in the *OU III Closure Strategy for the Monticello Mill Tailings Site, Monticello, Utah* (DOE 2018b). These scenarios include MNA and ICs, with remedy transition, decommissioning, and long-term monitoring (Scenario 1); GRO system termination based on asymptotic trends before transitioning to MNA and ICs (Scenario 2); and evaluation of alternative technologies and a technical impracticability waiver (Scenario 3). Efforts to determine the best possible closure strategy include hydrogeologic and geochemical characterization along with 3D numerical fate and transport modeling to forecast remedial time frames.

With regard to the OU III closure strategy, the LMS contractor completed the following this quarter:

- A revised draft of the MNA demonstration report (DOE 2021b) and responses to regulator comments were submitted to EPA and UDEQ.
- A revised draft of the *Monticello Mill Tailings Site Operable Unit III Groundwater Flow and Contaminant Transport Model Report* (DOE 2021c) and responses to regulator comments were submitted to EPA and UDEQ.
- A draft of the GRO termination report (DOE 2021d) was revised, and responses to comments from EPA and UDEQ were prepared.

4.0 Schedule of Activities and Deliverables

Table 3 summarizes the completion dates of recently completed and near-term planned activities and deliverables for the Monticello National Priorities List sites.

Table 3. Monticello Sites Recent and Near-Term Activities and Deliverables

Activity or Deliverable	Schedule
Recent	
Revised QAPP (LM-Plan-3-21-1.0, LMS/MNT/S27252)	Comments received from EPA September 14, 2021 Response anticipated in October 2021
Monticello, Utah, National Priorities List (NPL) Sites Federal Facility Agreement (FFA) Quarterly Report: April 1–June 30, 2021 (DOE 2021e)	Submitted to EPA and UDEQ August 12, 2021
Monticello Mill Tailings Site Operable Unit III Groundwater Flow and Contaminant Transport Model Report (DOE 2021b)	Submitted response to comments July 2021
Monitored Natural Attenuation Demonstration Report Operable Unit III, Monticello Mill Tailings Site, Monticello, Utah (DOE 2021c)	Submitted to EPA and UDEQ November 19, 2020 Comments received from EPA March 22, 2021 Comments received from UDEQ April 30, 2021 Response to comments sent to EPA and UDEQ July 9, 2021
Annual update to Section 5.0 of the SMP (DOE 2003)	Submitted to EPA and UDEQ July 30, 2021
Near-Term	
Fall semiannual ground, surface water, and seep 6 sampling event	Planned for week of October 4, 2021
Monticello Mill Tailings Site Operable Unit III Annual Groundwater Report, May 2020–May 2021 (LMS/MNT/S35992)	Will submit to EPA and UDEQ before October 31, 2021
Monticello, Utah, National Priorities List (NPL) Sites Federal Facility Agreement (FFA) Quarterly Report: July 1–September 30, 2021 (LMS/MNT/S36977)	Will submit to EPA and UDEQ before November 15, 2021, deadline
2020 Annual Inspection Report for the DOE Monticello, Utah, Mill Tailings Site and Monticello Vicinity Properties (DOE forthcoming)	Will submit to EPA and UDEQ by December 31, 2021
Technical report to terminate GRO operations (DOE 2021c)	Plan to submit response to EPA and UDEQ comments October 2021
Sixth CERCLA Five-Year Reviews for the MVP and MMTS	Started summer 2021

5.0 References

42 USC 9601 et seq. "Comprehensive Environmental Response, Compensation, and Liability Act" as amended, *United States Code.*

DOE (U.S. Department of Energy), 1998. *Repository and Pond 4 Groundwater Contingency Plan-Final*, MAC-MRAP 3.5.8, February.

DOE (U.S. Department of Energy), 2003. *Monticello Site Management Plan*, GJO-2003-493-TAC, Section 5.0 (this section is continually updated), Grand Junction Office, Grand Junction, Colorado, October.

DOE (U.S. Department of Energy), 2004. *Record of Decision for the Monticello Mill Tailings (USDOE) Site Operable Unit III, Surface Water and Ground Water, Monticello, Utah*, DOE-LM/GJ629-2004, Office of Legacy Management, May.

DOE (U.S. Department of Energy), 2014. *Final Groundwater Contingency Remedy Optimization Remedial Design/Remedial Action Work Plan for the Monticello Mill Tailings Site Operable Unit III, Monticello, Utah*, LMS/MNT/S10629, Office of Legacy Management, May.

DOE (U.S. Department of Energy), 2016. *Remedial Action Completion Report for Operable Unit III Groundwater Contingency Remedy Optimization System, Monticello Mill Tailings Site, Monticello, Utah*, LMS/MNT/S13373, Office of Legacy Management, May.

DOE (U.S. Department of Energy), 2018a. *Long-Term Surveillance and Maintenance Plan for Monticello NPL Sites*, LMS/MNT/S00387, Office of Legacy Management, June.

DOE (U.S. Department of Energy), 2018b. *OU III Closure Strategy for the Monticello Mill Tailings Site, Monticello, Utah*, LMS/MNT/S18146, Office of Legacy Management, May.

DOE (U.S. Department of Energy), 2020. *Monticello Mill Tailings Site Operable Unit III Annual Groundwater Report, May 2019–May 2020*, LMS/MNT/S30735, Office of Legacy Management, October.

DOE (U.S. Department of Energy), 2021a. *Monticello Mill Tailings Site Operable Unit III Annual Groundwater Report, May 2020–April 2021*, LMS/MNT/S35992, Office of Legacy Management, October.

DOE (U.S. Department of Energy), 2021b. *Monitored Natural Attenuation Demonstration Report, Operable Unit III, Monticello Mill Tailings Site, Monticello, Utah*, LMS/MNT/S32631, Office of Legacy Management, July.

DOE (U.S. Department of Energy), 2021c. *Monticello Mill Tailings Site Operable Unit III Groundwater Flow and Contaminant Transport Model Report*, LMS/MNT/S30707, Office of Legacy Management, June.

DOE (U.S. Department of Energy), 2021d. *Monticello Mill Tailings Site Operable Unit III Technical Basis for Groundwater Remedy Optimization System Termination*, LMS/MNT/S33213, Office of Legacy Management, April.

DOE (U.S. Department of Energy), 2021e. *Monticello, Utah, National Priorities List (NPL) Sites Federal Facility Agreement (FFA) Quarterly Report: April 1–June 30, 2021*, LMS/MNT/S33836, Office of Legacy Management, May.

DOE (U.S. Department of Energy), forthcoming. *2020 Annual Inspection Report for the DOE Monticello, Utah, Mill Tailings Site and Monticello Vicinity Properties*, Office of Legacy Management, to be published.

Quality Assurance Project Plan, Monticello, Utah, Disposal and Processing Sites, LM-Plan-3-21-1.0, LMS/MNT/S27252, continually updated, prepared by the LMS contractor for the U.S. Department of Energy Office of Legacy Management.

Appendix A

Monthly and Quarterly Surveillance Checklists

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Repository Area Surveillance Checklist

☒ Monthly surveillance ☐ Quarterly surveillance: ☐ February ☐ May ☐ August ☐ November

☐ Storm event triggered surveillance due to _____ inches of rainfall over the past 24 hours.

Inspection Item	Acceptable Yes	Acceptable No	Comments and Recommendation
Condition of:			
Fences, gates, and locks	☒	☐	
Roads[a]	☒	☐	
Signs	☒	☐	
Site monuments	☒	☐	
Drainage ditches[a]	☒	☐	
Manholes	☒	☐	
Vegetation	☒	☐	
Evidence of erosion of:			
Top of disposal cell[a]	☒	☐	
Disposal cell sideslopes[a]	☒	☐	
Ditches	☒	☐	
Surrounding area	☒	☐	
Evidence of:			
Vandalism	☒	☐	
Intrusion by livestock	☒	☐	
Burrowing animal damage	☒	☐	
Intrusion by humans	☒	☐	
Accumulation of trash	☒	☐	
Additional Quarterly Surveillance Requirements			
Note: *All transects, shown in Figure 3-1, must be walked during this inspection.*			
Condition of:			
Settlement plate structures	☐	☐	
Manholes[b]	☐	☐	
Sediment ponds	☐	☐	
Evidence of:	☐	☐	
Structural instability	☐	☐	

Additional comments: The repository appears to be in good condition. Vegatation looks really good.

Signature: Gary L. McKinnon Digitally signed by Gary L. McKinnon Date: 2021.07.29 13:04:35 -06'00' Date: 7/29/2021

Monticello LM Representative

[a]Inspections required following a significant storm event
[b]Open to inspect quarterly

Monthly Pond 4 Surveillance Checklist

Level of water in Pond 4 6.486

Inspection Item	Acceptable Yes	Acceptable No	Comments and Recommendation
Condition of:			
Fences, gates, and locks	☒	☐	
Roads	☒	☐	
Signs	☒	☐	
Visible piping	☒	☐	
Visible liner and anchors	☒	☐	
Rescue equipment	☒	☐	Boat remains at the pond and in good condition.
Evidence of erosion of:			
Top of Pond 4 berm	☒	☐	
Pond 4 sideslopes	☒	☐	
Ditches	☒	☐	
Surrounding area	☒	☐	
Seepage from Pond 4	☒	☐	
Overtopping of Pond 4	☒	☐	
Evidence of:			
Vandalism	☒	☐	
Intrusion by wildlife	☒	☐	
Intrusion by humans	☒	☐	
Accumulation of trash	☒	☐	

Additional comments: Things appear to be good condition.

Monticello LM Representative: Gary L. McKinnon Digitally signed by Gary L. McKinnon Date: 2021.07.29 10:15:14 -06'00' Date: 7/29/2021

MONTHLY CLIMATOLOGICAL SUMMARY for JUL. 2021

NAME: Monticello Office CITY: ~~Blanding~~ Monticello STATE: Utah
ELEV: 7070 ft LAT: 37° 54' 00" N LONG: 109° 18' 00" W

TEMPERATURE (°F), RAIN (in), WIND SPEED (mph)

DAY	MEAN TEMP	HIGH	TIME	LOW	TIME	HEAT DEG DAYS	COOL DEG DAYS	RAIN	AVG WIND SPEED	HIGH	TIME	DOM DIR
1	68.4	81.9	6:30p	53.0	5:00a	2.6	5.9	0.00	6.1	23.0	2:00p	SSE
2	73.7	86.4	6:00p	62.8	1:30a	0.4	9.0	0.00	6.7	25.0	2:30p	WSW
3	75.5	88.7	5:00p	65.4	4:30a	0.0	10.5	0.00	8.3	30.0	6:30p	S
4	76.4	90.4	6:00p	60.6	6:30a	0.4	11.7	0.00	6.5	21.0	2:30p	WSW
5	74.7	84.9	12:30p	64.4	2:30p	0.0	9.7	0.19	6.4	32.0	1:30p	S
6	76.7	88.6	4:30p	61.4	6:00a	0.1	11.8	0.00	7.2	23.0	5:30p	NW
7	76.0	89.2	5:30p	59.5	4:30a	0.2	11.3	0.00	6.4	23.0	10:30a	WSW
8	77.3	88.4	3:00p	68.8	7:30a	0.0	12.3	0.02	8.7	37.0	3:30p	S
9	83.0	96.3	5:00p	67.5	5:30a	0.0	18.0	0.00	6.8	20.0	5:00p	SSW
10	81.1	94.3	4:30p	64.9	6:30a	0.0	16.1	0.00	8.6	30.0	5:30p	NW
11	79.2	92.6	4:00p	65.4	5:00a	0.0	14.2	0.00	7.6	25.0	5:00p	W
12	77.3	91.8	4:00p	60.0	7:00a	0.2	12.6	0.00	5.3	21.0	8:30a	WSW
13	75.0	87.0	4:00p	67.1	10:30p	0.0	10.0	0.01	9.0	30.0	10:00a	S
14	64.5	76.9	5:00p	56.1	10:00p	3.4	2.9	0.40	4.3	37.0	9:00p	NNW
15	69.5	83.8	4:30p	54.5	4:30a	2.5	7.0	0.00	4.5	18.0	3:00p	WSW
16	74.7	85.8	4:00p	62.6	7:00a	0.1	9.8	0.05	5.4	31.0	11:30p	WNW
17	72.8	86.6	6:00p	63.5	6:30a	0.1	7.9	0.00	6.2	23.0	1:30p	SSE
18	76.3	89.8	5:30p	62.4	4:30a	0.1	11.3	0.00	7.3	26.0	11:30p	SSE
19	73.8	88.4	4:30p	65.8	12:00m	0.0	8.8	0.31	7.0	25.0	7:30p	SE
20	72.7	86.9	6:00p	64.4	2:00a	0.0	7.8	0.00	6.2	24.0	7:00p	SE
21	70.2	82.3	12:30p	61.7	11:30p	0.3	5.5	0.28	5.0	29.0	8:30p	SW
22	70.8	84.0	5:30p	60.2	5:00a	1.2	7.0	0.05	5.1	30.0	7:30p	SSW
23	72.4	83.6	4:00p	61.4	6:30a	0.5	7.8	0.05	5.9	23.0	2:30p	NNW
24	65.6	82.0	2:30p	58.6	8:00p	2.5	3.2	0.18	4.6	24.0	3:30p	SSW
25	66.8	79.8	4:00p	58.9	6:00a	1.7	3.4	0.02	4.1	31.0	4:00p	S
26	68.9	83.4	4:00p	60.8	5:30a	0.8	4.7	0.01	4.8	23.0	5:30p	SE
27	66.2	78.2	1:00p	58.3	5:00a	1.7	2.9	0.37	4.2	20.0	1:30p	SSE
28	69.4	84.5	5:00p	60.5	6:00a	0.8	5.2	0.05	4.4	17.0	6:00p	S
29	70.8	85.4	3:00p	61.2	11:00p	0.8	6.6	0.25	4.7	20.0	8:30p	WNW
30	69.4	82.1	5:00p	58.8	6:00a	1.4	5.8	0.01	5.7	23.0	11:30a	SSE
31	69.2	81.5	3:30p	56.9	6:00a	1.4	5.6	0.00	4.6	20.0	2:00p	WSW
	72.8	96.3	9	53.0	1	23.2	266.3	2.25	6.1	37.0	8	WSW

Max >= 90.0: 5
Max <= 32.0: 0
Min <= 32.0: 0
Min <= 0.0: 0
Max Rain: 0.40 ON 07/14/21
Days of Rain: 13 (>.01 in) 7 (>.1 in) 0 (>1 in)
Heat Base: 65.0 Cool Base: 65.0 Method: Integration

Monthly Pond 4 Surveillance Checklist

Level of water in Pond 4 6.31

Inspection Item	Acceptable Yes	Acceptable No	Comments and Recommendation
Condition of:			
Fences, gates, and locks	☒	☐	
Roads	☒	☐	
Signs	☒	☐	
Visible piping	☒	☐	
Visible liner and anchors	☒	☐	
Rescue equipment	☒	☐	Boat remains at the pond.
Evidence of erosion of:			
Top of Pond 4 berm	☒	☐	
Pond 4 sideslopes	☒	☐	
Ditches	☒	☐	
Surrounding area	☒	☐	
Seepage from Pond 4	☒	☐	
Overtopping of Pond 4	☒	☐	
Evidence of:			
Vandalism	☒	☐	
Intrusion by wildlife	☒	☐	
Intrusion by humans	☒	☐	
Accumulation of trash	☒	☐	

Additional comments: Things appear to be in good condition.

Monticello LM Representative: Gary L. McKinnon Digitally signed by Gary L. McKinnon Date: 2021.08.31 15:44:06 -06'00' Date: 8/31/2021

Repository Area Surveillance Checklist

☐ Monthly surveillance ☒ Quarterly surveillance: ☐ February ☐ May ☒ August ☐ November

☐ Storm event triggered surveillance due to _____ inches of rainfall over the past 24 hours.

Inspection Item	Acceptable Yes	Acceptable No	Comments and Recommendation
Condition of:			
Fences, gates, and locks	☒	☐	
Roads[a]	☒	☐	
Signs	☒	☐	
Site monuments	☒	☐	
Drainage ditches[a]	☒	☐	
Manholes	☒	☐	
Vegetation	☒	☐	
Evidence of erosion of:			
Top of disposal cell[a]	☒	☐	
Disposal cell sideslopes[a]	☒	☐	
Ditches	☒	☐	
Surrounding area	☒	☐	
Evidence of:			
Vandalism	☒	☐	
Intrusion by livestock	☒	☐	
Burrowing animal damage	☒	☐	
Intrusion by humans	☒	☐	
Accumulation of trash	☒	☐	
Additional Quarterly Surveillance Requirements			
Note: *All transects, shown in Figure 3-1, must be walked during this inspection.*			
Condition of:			
Settlement plate structures	☒	☐	
Manholes[b]	☒	☐	
Sediment ponds	☒	☐	
Evidence of:	☐	☐	
Structural instability	☒	☐	

Additional comments: The repository appears to be in good condition.

Signature: Gary L. McKinnon Digitally signed by Gary L. McKinnon Date: 2021.08.31 14:09:43 -06'00' Date: 8/31/2021

Monticello LM Representative

[a]Inspections required following a significant storm event
[b]Open to inspect quarterly

Monticello Long-Term Surveillance and Maintenance Temporary Storage Facility (TSF) Record Book Inspection Report

Are these areas acceptable?		
Yes	**No**	
☒	☐	Was the gate locked upon arrival?
☒	☐	Are signs posted in accordance with 10 CFR 835.602[a]?
☒	☐	Are all postings legible?
☒	☐	Are enclosures on the concrete bin and stored drum containers tight?
☒	☐	Are containers in good physical condition (no rust, no holes, no bulges, etc.)?
☒	☐	How much radiologically-contaminated material is in the concrete bin? *Note: the material should be shipped when the volume in storage approaches 75 percent of the storage capacity.*
☒	☐	Is the surface area of the TSF in good physical condition (no erosion, no flood damage, no excessive vegetation growth, etc.)?
☒	☐	Has radiological monitoring been conducted in accordance with 10 CFR 835.405[d]?
☒	☐	Is the security fence in good condition?

Comments:

There is no radiologically contaminated material in the concrete bin.

Signature of Monticello LM Representative

8/31/2021
Date of Inspection

MONTHLY CLIMATOLOGICAL SUMMARY for AUG. 2021

NAME: Monticello Office CITY: Blanding STATE: Utah
ELEV: 7070 ft LAT: 37° 54' 00" N LONG: 109° 18' 00" W

TEMPERATURE (°F), RAIN (in), WIND SPEED (mph)

DAY	MEAN TEMP	HIGH	TIME	LOW	TIME	HEAT DEG DAYS	COOL DEG DAYS	RAIN	AVG WIND SPEED	HIGH	TIME	DOM DIR
1	67.8	79.9	2:30p	60.9	5:00a	0.8	3.5	0.01	3.1	29.0	3:00p	W
2	63.6	73.7	5:30p	55.9	6:30a	3.1	1.7	0.71	4.6	23.0	7:00p	WNW
3	69.2	78.7	4:30p	58.6	6:00a	0.9	5.2	0.00	8.5	25.0	3:30p	NW
4	71.6	82.0	4:00p	58.7	6:00a	0.8	7.3	0.00	7.5	25.0	2:30p	WNW
5	72.6	85.5	6:00p	59.7	7:00a	0.5	8.1	0.00	5.6	17.0	11:30a	SE
6	75.8	86.7	5:30p	65.9	6:30a	0.0	10.8	0.00	9.0	31.0	1:30p	S
7	69.6	79.7	4:30p	60.9	6:30a	0.7	5.3	0.00	9.6	26.0	10:30a	WNW
8	72.2	85.3	4:30p	58.1	4:00a	1.1	8.4	0.00	5.9	20.0	3:00p	SW
9	73.4	86.6	5:00p	58.8	3:00a	0.9	9.3	0.00	5.7	28.0	2:30p	SW
10	74.4	87.3	4:00p	60.4	5:30a	0.2	9.6	0.00	5.2	21.0	8:30p	SE
11	70.9	85.6	3:30p	55.7	7:00a	1.9	7.9	0.00	4.3	23.0	3:30p	WSW
12	73.0	88.1	6:00p	57.7	6:00a	1.0	8.9	0.00	4.3	23.0	5:30p	WNW
13	74.2	88.5	6:00p	63.0	1:30a	0.1	9.3	0.00	6.8	23.0	7:30p	S
14	72.6	86.7	4:30p	62.9	6:00a	0.2	7.9	0.04	8.8	22.0	1:00a	SSE
15	74.6	87.9	4:00p	63.2	7:00a	0.1	9.7	0.01	7.4	26.0	11:00p	SSE
16	69.1	84.2	5:00p	57.8	5:00a	1.4	5.5	0.00	5.4	24.0	1:00p	SSE
17	71.5	83.4	3:30p	58.7	3:30a	0.9	7.4	0.00	8.6	24.0	12:30p	SSE
18	63.2	75.6	1:00p	53.4	11:00p	3.9	2.1	0.42	8.0	35.0	2:30a	SSE
19	55.9	68.9	5:30p	47.5	10:00p	9.3	0.2	0.83	8.5	33.0	2:30p	S
20	56.0	68.0	5:30p	42.9	5:00a	9.4	0.4	0.00	3.9	13.0	1:30p	NE
21	63.7	75.7	6:00p	51.5	2:30a	4.1	2.7	0.00	7.4	27.0	2:00p	S
22	67.0	78.3	5:30p	54.4	7:00a	2.0	4.1	0.00	7.3	24.0	4:00p	SSE
23	68.6	80.4	4:30p	56.8	6:30a	1.5	5.1	0.00	7.6	26.0	5:00p	SSE
24	67.3	80.0	5:00p	53.3	7:00a	2.5	4.7	0.00	7.0	23.0	12:30p	SSE
25	71.2	83.9	4:30p	59.1	1:00a	1.4	7.5	0.00	6.5	30.0	5:00p	SE
26	71.3	83.5	5:30p	61.3	12:30a	0.3	6.6	0.00	4.5	20.0	6:30a	SSW
27	72.0	83.8	4:00p	63.1	7:30a	0.1	7.1	0.00	8.6	25.0	9:30a	SSW
28	72.7	85.1	4:00p	63.1	6:00a	0.2	7.9	0.00	8.4	23.0	10:30a	S
29	72.1	85.8	2:00p	58.6	7:30a	0.8	8.0	0.00	5.2	21.0	3:00p	WSW
30	70.0	81.3	5:30p	57.5	3:30a	0.4	5.4	0.11	7.3	36.0	3:30p	S
31	71.4	83.2	3:00p	54.2	7:00a	1.5	7.9	0.00	6.3	20.0	2:00p	SSE
	69.6	88.5	13	42.9	20	52.0	195.5	2.13	6.7	36.0	30	SSE

Max >= 90.0: 0
Max <= 32.0: 0
Min <= 32.0: 0
Min <= 0.0: 0
Max Rain: 0.83 ON 08/19/21
Days of Rain: 5 (>.01 in) 4 (>.1 in) 0 (>1 in)
Heat Base: 65.0 Cool Base: 65.0 Method: Integration

Monthly Pond 4 Surveillance Checklist

Level of water in Pond 4 6.34

Inspection Item	Acceptable Yes	Acceptable No	Comments and Recommendation
Condition of:			
Fences, gates, and locks	☒	☐	
Roads	☒	☐	
Signs	☒	☐	
Visible piping	☒	☐	
Visible liner and anchors	☒	☐	
Rescue equipment	☒	☐	Boat remains at the pond.
Evidence of erosion of:			
Top of Pond 4 berm	☒	☐	
Pond 4 sideslopes	☒	☐	
Ditches	☒	☐	
Surrounding area	☒	☐	
Seepage from Pond 4	☒	☐	
Overtopping of Pond 4	☒	☐	
Evidence of:			
Vandalism	☒	☐	
Intrusion by wildlife	☒	☐	
Intrusion by humans	☒	☐	
Accumulation of trash	☒	☐	

Additional comments: Things appear to be in good condition.

Monticello LM Representative: Gary L. McKinnon Digitally signed by Gary L. McKinnon Date: 2021.09.28 08:38:47 -06'00' Date: 9/28/2021

Repository Area Surveillance Checklist

☒ Monthly surveillance ☐ Quarterly surveillance: ☐ February ☐ May ☐ August ☐ November

☐ Storm event triggered surveillance due to _____ inches of rainfall over the past 24 hours.

Inspection Item	Acceptable Yes	Acceptable No	Comments and Recommendation
Condition of:			
Fences, gates, and locks	☒	☐	
Roads[a]	☒	☐	
Signs	☒	☐	
Site monuments	☒	☐	
Drainage ditches[a]	☒	☐	
Manholes	☒	☐	
Vegetation	☒	☐	
Evidence of erosion of:			
Top of disposal cell[a]	☒	☐	
Disposal cell sideslopes[a]	☒	☐	
Ditches	☒	☐	
Surrounding area	☒	☐	
Evidence of:			
Vandalism	☒	☐	
Intrusion by livestock	☒	☐	
Burrowing animal damage	☒	☐	
Intrusion by humans	☒	☐	
Accumulation of trash	☒	☐	
Additional Quarterly Surveillance Requirements			
Note: *All transects, shown in Figure 3-1, must be walked during this inspection.*			
Condition of:			
Settlement plate structures	☐	☐	
Manholes[b]	☐	☐	
Sediment ponds	☐	☐	
Evidence of:	☐	☐	
Structural instability	☐	☐	

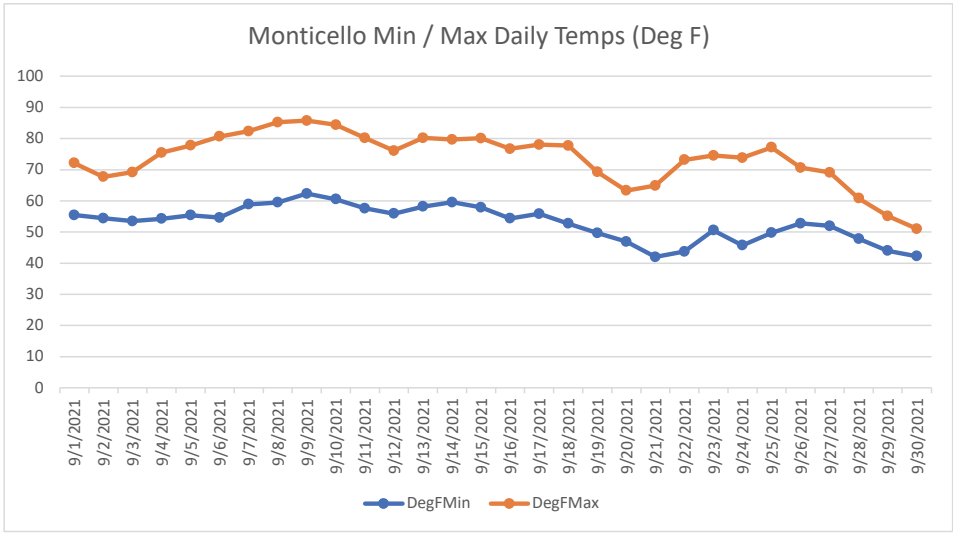
Additional comments: The repository appears to be in good condition.

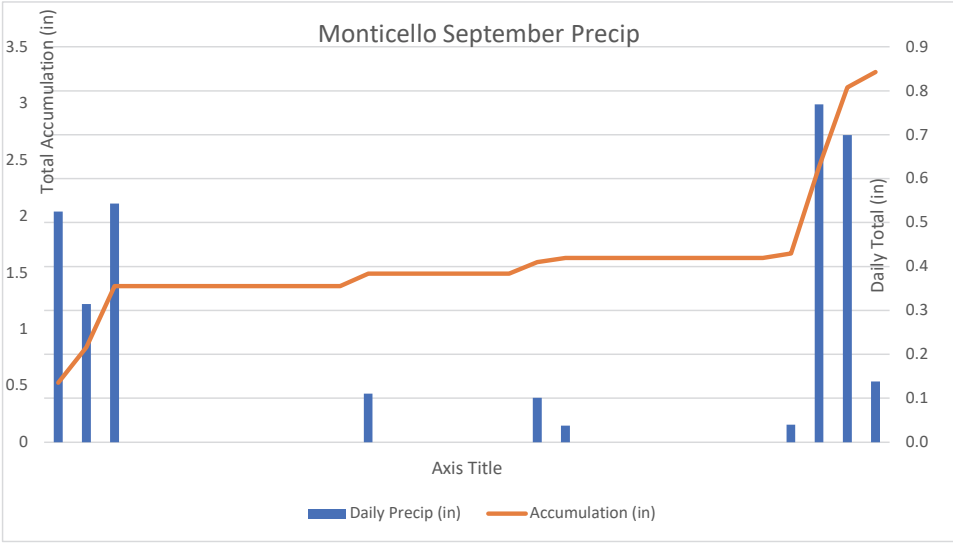
Signature: Gary L. McKinnon Digitally signed by Gary L. McKinnon Date: 2021.09.28 13:23:41 -06'00' Date: 9/28/2021

Monticello LM Representative

[a]Inspections required following a significant storm event
[b]Open to inspect quarterly

Date	DegFMin	DegFMax	Daily Precip (in)	Accumulation (in)
9/1/2021	55.46	72.14	0.5252	0.5252
9/2/2021	54.40	67.73	0.3142	0.8394
9/3/2021	53.50	69.19	0.5433	1.3827
9/4/2021	54.28	75.50	0.0000	1.3827
9/5/2021	55.41	77.79	0.0000	1.3827
9/6/2021	54.60	80.65	0.0000	1.3827
9/7/2021	58.88	82.34	0.0000	1.3827
9/8/2021	59.52	85.27	0.0000	1.3827
9/9/2021	62.34	85.72	0.0000	1.3827
9/10/2021	60.53	84.41	0.0000	1.3827
9/11/2021	57.60	80.19	0.0000	1.3827
9/12/2021	55.89	76.08	0.1106	1.4933
9/13/2021	58.17	80.18	0.0000	1.4933
9/14/2021	59.55	79.69	0.0000	1.4933
9/15/2021	57.91	80.09	0.0000	1.4933
9/16/2021	54.38	76.72	0.0000	1.4933
9/17/2021	55.84	78.03	0.0000	1.4933
9/18/2021	52.72	77.71	0.1012	1.5945
9/19/2021	49.67	69.34	0.0378	1.6323
9/20/2021	46.93	63.32	0.0000	1.6323
9/21/2021	41.96	64.90	0.0000	1.6323
9/22/2021	43.72	73.18	0.0000	1.6323
9/23/2021	50.57	74.57	0.0000	1.6323
9/24/2021	45.75	73.86	0.0000	1.6323
9/25/2021	49.74	77.19	0.0000	1.6323
9/26/2021	52.78	70.67	0.0000	1.6323
9/27/2021	51.96	69.10	0.0398	1.6720
9/28/2021	47.84	60.85	0.7689	2.4409
9/29/2021	43.99	55.14	0.6992	3.1402
9/30/2021	42.24	50.98	0.1382	3.2783





Appendix B

Graphs Showing Performance History for Disposal Cell and Pond 4 LCRS and LDS

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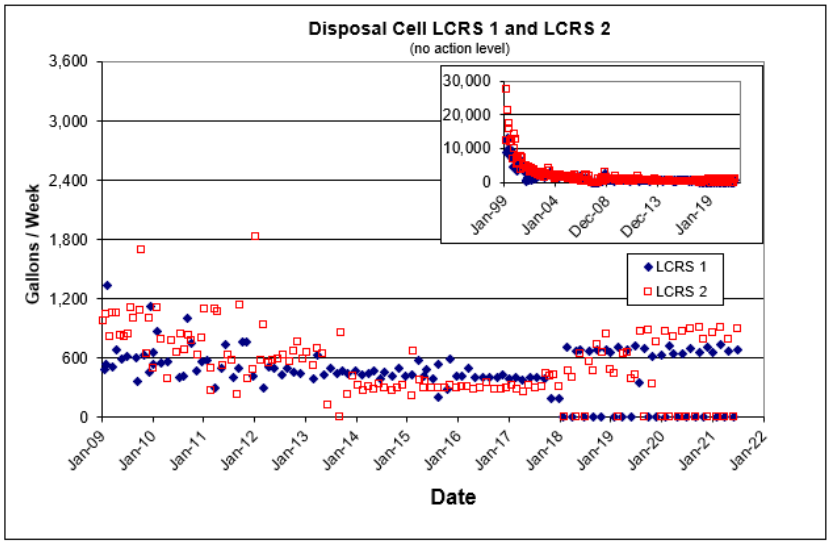
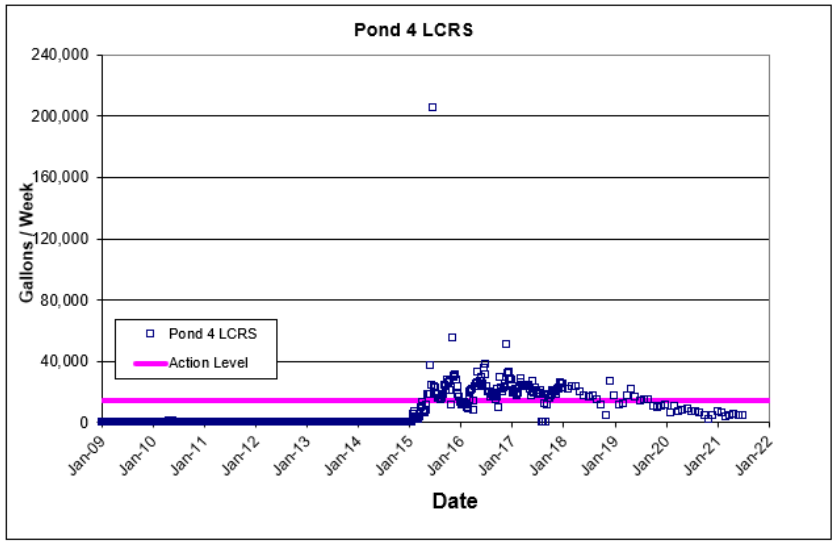
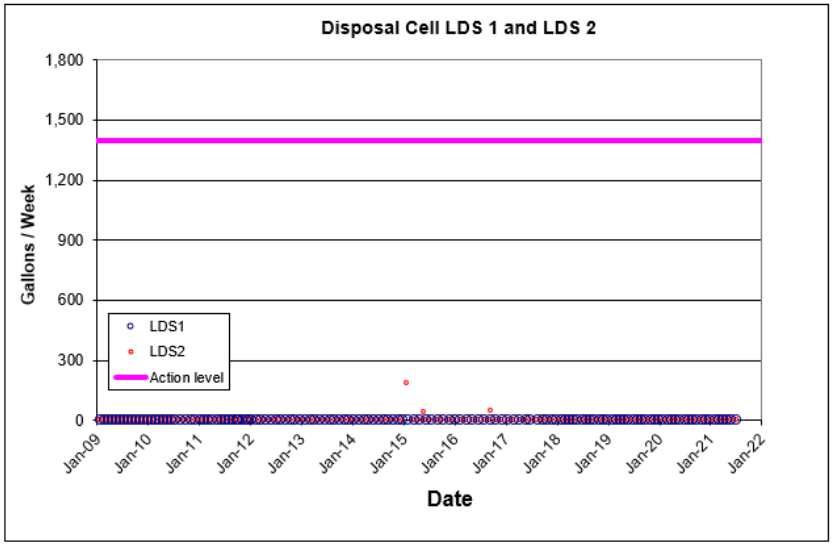
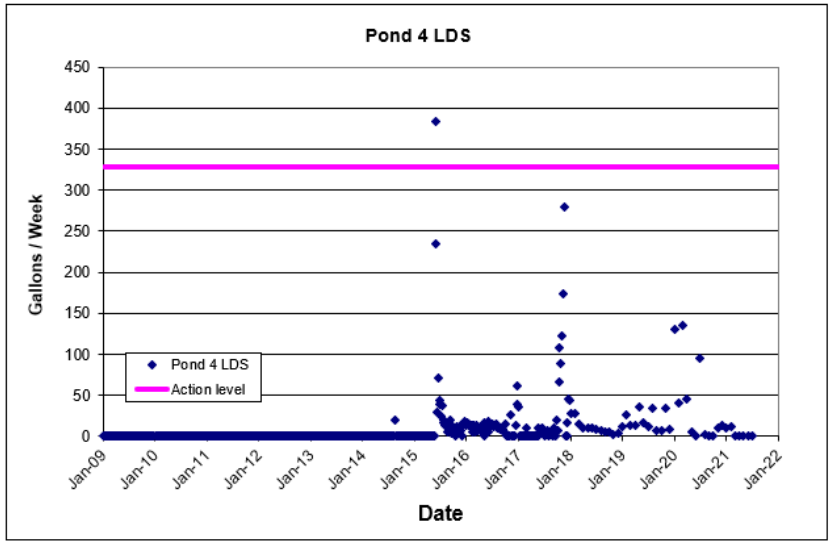
Graphs Showing Performance History for Disposal Cell and Pond 4 LCRS and LDS









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