LMS/MNT/S27446

Monticello, Utah, National Priorities List Sites Federal Facility Agreement (FFA) Quarterly Report: July 1–September 30, 2019

November 2019

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Abbreviations

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
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
NPL	National Priorities List
OU	Operable Unit
PRB	permeable reactive barrier
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) (the LM Monticello, Utah, Disposal and Processing Sites) for the period of July through September 2019. The MVP and MMTS are regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (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) inspections (monthly, quarterly, and annually) of site infrastructure and operations as specified under the *Long-Term Surveillance and Maintenance Plan for the Monticello NPL Sites* (DOE 2018a) (referred to here as the 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 long-term surveillance and maintenance (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 that is referred to as the Area of Attainment (AOA).

Annual groundwater reports present comprehensive data evaluation for the groundwater and surface water OU III remedy. LM is utilizing the data presented in the most recent annual groundwater report to update the conceptual site model and develop a three-dimensional 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). Section 5 of that document is updated annually.

1.1 Quarterly Site Status

A summary of the activities and observations for this quarter is as follows:

- The Groundwater Remedy Optimization (GRO) system operated as planned during the current period and pumped approximately 0.59 million gallons of water from the AOA.
- Laboratory analytical results of the soil samples collected in November 2018 were evaluated to determine the distribution of solid-phase concentrations and identify borehole soils for column tests and wells to supply source water for column tests. Site groundwater was collected in April 2019 to use in the column work. Column work was started on

April 2, 2019, and was completed on July 3, 2019. All 24 planned column tests were completed, and analysis is ongoing.

- LM and Legacy Management Support (LMS) personnel attended the July 15, 2019, Monticello City Council meeting as a continuing outreach to the community on the status of the Monticello project. The presentation was well received.
- Routine surveillance noted no anomalous conditions for the MVP remedy.
- Routine surveillance noted no violations of MMTS ICs regarding land- and groundwater-use restrictions.
- Routine surveillance noted no anomalous conditions for the surface features of the disposal cell and Pond 4.
- The volume of water pumped from the Pond 4 Leachate Collection and Removal System (LCRS) exceeded the action level in July, August, and September. The Leak Detection System (LDS) did not exceed the action level for this quarter. Per the LTS&M Plan, LM has previously notified EPA and UDEQ of the continued Pond 4 LCRS exceedance and water pumped from the LDS.
- Routine surveillance noted no operating deficiencies for the Temporary Storage Facility (TSF).
- Approximately 7861 lineal feet of the old western and southern boundary fence was removed and replaced with new wildlife-friendly fence. The replacement went from the access road to the Hammons gate.
- A new solar-powered auto gate was installed at the access to the site in September.
- New HVAC units with better energy saving ratings were installed on the administration building. These replaced units that were 28 years old and were nearing the end of their life expectancy.
- The cool spring temperatures, precipitation, and higher than normal runoff reduced the normal spring evaporation rates from Pond 4. To achieve the desired pond operating depth of approximately 8 feet, the AOA extraction pumps remained at a reduced flow rate until August 28, 2019. Pumping rates were increased then so that optimal uranium mass removal and desired pond water balance could be maintained.
- The Navajo Nation Uranium Commission, including representatives from Region IX EPA, toured the disposal cell area in September. The group was interested in the vegetated cover and evapotranspiration. Additionally, the site's lysimeter project was viewed and discussed.
- The Monticello Annual Site Inspection was held the week of September 23, 2019. Attending were EPA, LM, and LMS personnel.

2.0 Monticello Vicinity Properties

The LTS&M for the MVP consists of providing radiological control at excavations in Monticello roadway and utility corridors, in Utah Department of Transportation (UDOT) right-of-ways within the 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 of Monticello (City) officials in planning meetings regarding construction and excavation activities by the City, UDOT, and utility companies in roadway and utility corridors. LM has followed and will continue to follow normal LTS&M protocol to provide radiological control in the affected roadways.
- There were no planned or unplanned excavations in city streets or utility corridors where radiologically contaminated material was encountered that required LM management.
- Neither excessive erosion nor unauthorized excavations were observed at the Highway 191 embankment at Montezuma Creek (supplemental standards property).

Surveillance of property MS-00176-VL identified no excessive erosion of supplemental standards material or violation of the land-use restriction.

3.0 Monticello Mill Tailings Site

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

3.1 Operable Unit I

OU I consists of the property of the former Monticello mill (mill site) and the 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 that the waste remains isolated from the environment. Inspection observations and maintenance activities for the quarter are as follows:

- No area of the cover indicated 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.

- The minor burrowing on the disposal cell and the Pond 4 berm by voles and small ground squirrels was not observed this quarter. Previously observed burrows were not deep and did not pose a concern.
- 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:
  - Leachate production from the disposal cell was approximately 940 gallons per week combined for LCRS 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.
  - Minor electrical upgrades in both LCRS 1 and 2 were completed this quarter. Amperage was increased to better operate 1.0 horsepower motors attached to the pumps.
- Operation of the GRO system has resulted in increased water collection in the Pond 4 LCRS and LDS. However, the Pond 4 LCRS and LDS monitoring and pumping systems continue to function as designed, to circulate water back to the pond. Findings for the Pond 4 LCRS and LDS this period include:
  - Water collection at the Pond 4 LCRS continued and did exceed the action level in July, August, and September during this quarter (see Appendix B). LM has previously notified EPA and UDEQ of any Pond 4 action level exceedance.
  - Water collection in the Pond 4 LDS remained below the action level (see Appendix B). LM has previously notified EPA and UDEQ of water collection and removal in the Pond 4 LDS.

3.1.2 Temporary Storage Facility

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 results for this quarter (see surveillance checklists in Appendix A) are as follows:

- 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. The following summarizes recent TSF activity:

- The volume of waste stored in the TSF controlled area is approximately 1.5 cubic yards. Currently, there are no soils or excavation products from city street projects or supplemental standards areas stored in the TSF. Present contents consist primarily of used personal protective equipment, one pump, and materials removed from onsite radiological areas during maintenance.

3.1.3 Former Mill Site

LM conducts surveillance of the former 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. The ICs applicable to the former mill site include no installation of domestic-use wells in the alluvial aquifer, no construction of habitable structures, no camping, and preserving the properties as a public park for day-use recreation.

Surveillance results for this quarter are as follows:

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

3.2 Operable Unit II

OU II consists of private and City-owned properties peripheral to the former 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 as follows:

- **Montezuma Creek Restrictive Easement Area (supplemental standards properties, both City-owned and privately owned):** No evidence of nonconformance with land-use restrictions (no soil removal or construction of habitable structures in supplemental standards areas) was observed.
- **Groundwater-use restrictions (i.e., no installation of 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 MS-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 exceeding 2.8 inches of precipitation in a 24-hour period occurred to require surveillance of supplemental standards cleanup properties for excessive erosion.

3.3 Operable Unit III

OU III consists of groundwater and surface water contamination resulting from operation of the former Monticello mill. Routine monitoring of OU III (water quality and water level) is performed semiannually in April and October.

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) monitored natural attenuation 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 is 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/Institutional Controls

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 Utah Department of Natural Resources, 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. Sampling the wells is performed after the extraction of approximately 1 million gallons from the GRO system, and the next sampling is scheduled to occur during the October semiannual sampling event.

3.3.2.1 GRO System Performance Summary

The following summarize the performance of the GRO system:

- Groundwater extraction over the quarter was approximately 0.59 million gallons, equivalent to an average flow rate of 4.5 gallons per minute (gpm). Assuming the concentration of extracted water did not change since the last sample was collected from the tank effluent on April 22, 2019, a total of 3.0 pounds of uranium were removed during this quarter.
- During the quarter, the volume of water stored in Pond 4 decreased by approximately 1.1 million gallons. The GRO system is operated by balancing the extraction rate and the Pond 4 evaporation rate while maintaining the Pond 4 storage volume at approximately 8 million gallons (the maximum storage volume of Pond 4 is approximately 15.6 million gallons).

- Water-level monitoring during the quarter consisted of:
  - Continuous water-level monitoring in AOA extraction and monitoring wells using pressure transducers and data loggers (programed to record at 5-minute intervals) connected to the LM System Operation and Analysis at Remote Site (SOARS) system.
- Cumulatively, the system has removed a total of approximately 20.5 million gallons of contaminated groundwater from the aquifer since system startup in January 2015 (Table 1). Assuming a minimum AOA uranium plume pore volume of 2.4 million gallons and a maximum pore volume of 3.3 million gallons, the GRO system has removed between 6.2 and 8.5 pore volumes since system startup.
- From January 2015 through April 22, 2019, the GRO system removed approximately 106 pounds of uranium from the AOA aquifer (Table 2). A total of 0.59 million gallon were removed during this quarter. This estimate will be updated following the sampling event scheduled to occur in October 2019 following the extraction of approximately 1 million more 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).

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

Calendar Month	Approximate Volume Pumped (million gallons)	Effective Pumping Rate (gpm)	Approximate Cumulative Volume[a] (million gallons)
July 2019	0.14	3.2	20.0
August 2019	0.21	4.6	20.2
September 2019[b]	0.25	5.7	20.5

Notes:
[a] Cumulative volume is based on the volume of groundwater extracted by the GRO system since system startup in January 2015.
[b] Reporting end date is September 30, 2019.

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 (million gallons)	Uranium Removed (pounds)[b]	Cumulative Mass Uranium Removed[c] (pounds)
October 18, 2018	330	0.34	0.86	101
April 22, 2019	610	1.14	4.5	106

Notes:
[a] Sampling occurs following the extraction of approximately 1 million gallons. No sampling occurred during this quarter. Sampling last occurred on April 22, 2019.
[b] Based on median concentration between sampling dates.
[c] Since GRO system startup in January 2015.

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 Federal Facility Agreement 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 are detailed in the *OU III Closure Strategy for the Monticello Mill Tailings Site, Monticello, Utah* (DOE 2018b). These scenarios include (Scenario 1) monitored natural attenuation (MNA) and ICs, with remedy transition, decommissioning, and long-term monitoring; (Scenario 2) GRO system termination based on asymptotic trends prior to transitioning to MNA and ICs; and (Scenario 3) evaluation of alternative technologies and technical impracticability waiver. Efforts to determine the best possible closure strategy include hydrogeologic and geochemical characterization along with the development of a three-dimensional numerical fate and transport model to forecast remedial time frames. OU III closure strategy accomplishments this quarter are as follows:

- The OU III column test studies were completed on July 3, 2019, and analysis of the data was conducted this quarter.
- The draft *Monticello Mill Tailing Site Operable Unit III Geochemical Conceptual Site Model Update*, October 2019, was completed and sent for internal review.

4.0 Schedule of Activities and Deliverables

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

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

Activity or Deliverable	Schedule
Recent	
Column tests were completed this quarter, and the data are being analyzed	Continues
Section 5.0 Project Schedules and Milestones (FY 2020–FY 2022) from the *Monticello Site Management Plan,* (DOE 2003)	Submitted to EPA and UDEQ July 30, 2019
Monticello, Utah, National Priorities List Sites Federal Facility Agreement (FFA) Quarterly Report: April 1–June 30, 2019 (DOE 2019)	Submitted to EPA and UDEQ August 14, 2019
Annual Site Inspection	Completed September 25, 2019

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

Activity or Deliverable	Schedule
Near-Term	
Fall Semiannual Sampling Event	Scheduled for the week of October 14, 2019
Fall FFA Meeting	Scheduled October 24, 2019
Monticello Mill Tailings Site Operable Unit III Annual Groundwater Report May 2018–April 2019	October 31, 2019
Annual Site Inspection Report	December 31, 2019
Monticello, Utah, National Priorities List Sites Federal Facility Agreement (FFA) Quarterly Report: October 1–December 31, 2019	Submit to EPA and UDEQ by February 15, 2020

5.0 References

DOE (U.S. Department of Energy), 2003. *Monticello Site Management Plan*, GJO-2003-493-TAC, Section 5 (this section is continually updated), Office of Legacy Management, 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, 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 the 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), 2019. *Monticello, Utah, National Priorities List Sites Federal Facility Agreement (FFA) Quarterly Report: April 1–June 30, 2019*, LMS/MNT/S26148, Office of Legacy Management, July.

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Appendix A

Monthly and Quarterly Surveillance Checklists

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NAVARRO

Contractor to the U.S. Department of Energy Office of Legacy Management

Monthly Pond 4 Surveillance Checklist

Level of water in Pond 4 8.821

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: The site appears to be in good condition with lots of healthy vegatation.

Monticello LM Representative: Date: 7/31/2019

NAVARRO

Contractor to the U.S. Department of Energy Office of Legacy Management

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	☒	☐	Comments below.
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: Due to the 2019 Removal/Replace BoundaryFence project there are sections of the boundary fence that is down and being replaced. There are other Boundary Fence, Administration Fence, Pond 4 Fence and Repository Fence that are keeping the site secure during the 2019 Removal/Replace Boundary Fence Project.

Signature: _____ Date: 7/31/2019
Monticello LM Representative

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

MONTHLY CLIMATOLOGICAL SUMMARY for JUL. 2019

NAME: Monticello Office CITY: STATE:
ELEV: 7069 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	69.0	80.6	1:30p	57.3	4:00a	1.3	5.4	0.01	5.9	29.0	1:30p	SW
2	71.1	82.5	4:00p	57.2	4:30a	1.0	7.1	0.00	7.3	22.0	4:00p	S
3	69.6	81.4	4:00p	53.7	6:30a	1.5	6.0	0.00	7.1	28.0	1:00p	S
4	68.8	80.2	4:00p	56.4	3:30a	1.8	5.6	0.00	7.5	23.0	2:30p	SSE
5	69.7	82.3	4:30p	53.2	5:30a	1.8	6.5	0.00	6.1	21.0	12:00p	WSW
6	69.1	80.2	3:30p	55.3	6:30a	1.5	5.6	0.00	8.3	30.0	3:30p	WSW
7	68.4	80.6	5:30p	57.9	5:00a	1.4	4.8	0.00	7.0	23.0	11:00a	S
8	67.7	78.1	4:00p	58.1	4:30a	1.5	4.3	0.00	8.7	30.0	2:00p	S
9	67.6	80.7	5:00p	48.5	6:00a	2.8	5.4	0.00	6.7	22.0	2:00p	WSW
10	73.3	88.7	5:00p	54.2	6:30a	1.5	9.7	0.00	4.7	14.0	2:00p	WSW
11	74.6	88.9	4:30p	58.9	2:30a	0.6	10.1	0.00	6.3	21.0	7:30p	WSW
12	76.5	88.6	4:30p	62.0	4:30a	0.2	11.7	0.00	5.0	21.0	9:30p	WNW
13	74.2	85.9	5:00p	62.8	11:30p	0.1	9.3	0.06	4.9	20.0	12:30p	SW
14	71.1	84.3	5:00p	57.9	6:30a	1.2	7.4	0.02	4.3	35.0	2:30a	WNW
15	72.3	85.4	1:00p	62.7	2:00a	0.1	7.4	0.24	5.1	30.0	3:00p	WSW
16	75.5	88.3	5:30p	59.1	6:30a	0.3	10.8	0.00	6.2	21.0	11:00a	SW
17	74.6	86.4	4:30p	63.5	6:30a	0.1	9.6	0.00	6.9	24.0	2:30p	SSW
18	73.9	86.3	5:00p	56.1	6:30a	0.7	9.6	0.00	6.7	25.0	3:00p	SSW
19	75.0	88.5	4:30p	59.5	6:00a	0.7	10.7	0.00	5.6	24.0	2:00p	WSW
20	73.5	85.8	5:00p	62.3	6:00a	0.2	8.8	0.00	6.1	26.0	2:00p	SSE
21	75.5	89.3	4:00p	58.2	6:00a	0.7	11.3	0.00	5.4	20.0	3:00p	WSW
22	75.3	88.9	6:00p	59.0	7:00a	0.2	10.5	0.00	7.5	24.0	6:30p	S
23	72.5	85.7	5:00p	63.3	6:00a	0.2	7.7	0.00	8.6	26.0	1:00a	S
24	73.2	85.0	2:00p	63.4	10:30p	0.1	8.3	0.06	6.4	22.0	9:00p	SSE
25	66.3	80.3	4:00p	59.3	6:30a	1.9	3.2	0.27	5.4	27.0	7:30p	WNW
26	69.2	81.4	4:30p	58.5	6:30a	1.4	5.5	0.01	4.2	17.0	7:30p	WNW
27	66.7	76.2	5:00p	57.8	6:00a	1.4	3.1	0.65	4.8	23.0	2:00p	WNW
28	71.8	83.9	5:00p	59.6	5:30a	0.5	7.3	0.00	6.6	18.0	6:00p	WNW
29	73.2	87.3	4:30p	59.6	6:30a	0.8	9.0	0.00	4.6	14.0	11:00a	W
30	73.6	83.3	4:30p	65.7	12:30a	0.0	8.6	0.00	7.8	26.0	10:00a	S
31	71.1	83.5	3:30p	62.2	12:00m	0.2	6.3	0.00	7.4	31.0	7:30p	S
	71.7	89.3	21	48.5	9	27.7	236.6	1.32	6.3	35.0	14	S

Max >= 90.0: 0
Max <= 32.0: 0
Min <= 32.0: 0
Min <= 0.0: 0
Max Rain: 0.65 ON 07/27/19
Days of Rain: 6 (>.01 in) 3 (>.1 in) 0 (>1 in)
Heat Base: 65.0 Cool Base: 65.0 Method: Integration

NAVARRO

Contractor to the U.S. Department of Energy Office of Legacy Management

Monthly Pond 4 Surveillance Checklist

Level of water in Pond 4 8.16

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: The site appears to be in good condition with lots of vegatation.

Monticello LM Representative: Gary Mik Date: 8/29/2019

NAVARRO

Contractor to the U.S. Department of Energy Office of Legacy Management

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 site appears to be in good condition with lots of vegetation.

Signature: _____ Date: 8/29/2019

Monticello LM Representative

[a]Inspections required following a significant storm event

[b]Open to inspect quarterly

MONTHLY CLIMATOLOGICAL SUMMARY for AUG. 2019

NAME: Monticello Office CITY: STATE:
ELEV: 7069 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	66.6	77.3	7:30p	57.5	4:30a	1.9	3.5	0.04	5.5	20.0	12:30p	SSE
2	71.3	84.7	4:00p	56.7	4:00a	1.8	8.1	0.00	3.6	15.0	6:30p	WSW
3	72.5	85.6	2:30p	57.3	7:00a	0.5	8.0	0.01	5.5	22.0	4:30p	S
4	68.5	80.5	1:30p	59.9	12:00m	0.7	4.1	0.00	6.1	25.0	7:00p	S
5	71.1	86.3	5:30p	55.8	5:30a	2.2	8.3	0.00	5.2	23.0	2:00p	NNW
6	75.7	87.9	2:30p	61.2	6:00a	0.1	10.9	0.00	5.5	21.0	12:00m	WSW
7	69.2	78.5	4:00p	62.3	6:00a	0.3	4.5	0.00	6.8	20.0	1:00a	SSE
8	71.4	83.4	6:00p	59.6	3:00a	1.2	7.6	0.00	5.0	21.0	2:30p	WSW
9	71.3	82.1	1:30p	60.8	7:00a	0.2	6.4	0.00	7.6	28.0	6:00p	S
10	69.5	81.3	5:00p	54.7	7:00a	1.7	6.2	0.00	6.2	23.0	2:00p	SSE
11	70.2	79.8	5:30p	63.1	5:30a	0.1	5.4	0.00	7.6	22.0	6:00p	S
12	70.1	82.4	3:30p	56.2	7:30a	1.3	6.4	0.00	6.9	23.0	12:30p	SSW
13	70.5	80.8	1:00p	58.5	7:00a	0.4	5.9	0.01	4.3	19.0	1:00p	WSW
14	74.2	87.8	3:30p	59.8	6:30a	0.3	9.5	0.00	5.3	15.0	12:00p	WSW
15	73.9	86.1	2:30p	58.3	7:00a	0.5	9.4	0.00	6.8	17.0	9:00a	WSW
16	74.4	85.8	4:30p	61.4	5:30a	0.3	9.6	0.00	8.0	27.0	6:30p	SW
17	73.6	84.9	4:30p	59.1	7:00a	0.6	9.1	0.00	7.2	23.0	1:00p	SW
18	72.0	85.2	4:30p	54.2	7:00a	1.5	8.5	0.00	6.5	23.0	3:30p	S
19	72.9	85.7	5:00p	60.2	2:00a	0.6	8.5	0.00	5.4	22.0	3:00p	WSW
20	75.2	88.2	4:00p	61.2	6:00a	0.2	10.3	0.00	5.7	22.0	3:30p	WSW
21	73.9	88.0	4:30p	57.7	5:30a	0.6	9.5	0.00	5.4	21.0	2:30p	S
22	71.8	82.7	2:00p	61.2	4:00a	0.2	7.0	0.00	8.1	26.0	10:00a	S
23	72.5	83.4	4:30p	63.0	7:30a	0.1	7.5	0.00	7.5	28.0	4:00p	S
24	72.9	86.9	5:00p	57.0	7:00a	1.1	9.0	0.00	5.3	23.0	3:30p	SW
25	74.0	88.8	5:00p	56.7	7:00a	1.1	10.1	0.00	5.0	21.0	6:30p	SW
26	75.2	85.5	3:30p	64.9	11:30p	0.0	10.2	0.00	9.0	25.0	11:00a	NW
27	72.5	85.0	4:30p	59.6	12:00m	0.5	8.0	0.00	7.2	23.0	11:00a	NW
28	72.5	87.2	3:00p	57.3	6:30a	1.4	9.0	0.00	5.2	23.0	3:30p	W
29	71.9	82.7	12:30p	61.8	4:00a	0.2	7.1	0.04	5.0	22.0	2:00p	WSW
30	72.0	85.4	6:00p	59.4	3:30a	0.7	7.7	0.03	5.0	26.0	1:30p	WSW
31	74.0	86.6	4:30p	62.1	7:30a	0.1	9.1	0.00	6.0	21.0	10:00a	WSW
	72.2	88.8	25	54.2	18	22.4	244.4	0.13	6.1	28.0	9	WSW

Max >= 90.0: 0
Max <= 32.0: 0
Min <= 32.0: 0
Min <= 0.0: 0
Max Rain: 0.04 ON 08/01/19
Days of Rain: 3 (>.01 in) 0 (>.1 in) 0 (>1 in)
Heat Base: 65.0 Cool Base: 65.0 Method: Integration

NAVARRO

Contractor to the U.S. Department of Energy Office of Legacy Management

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

Acceptable?

Yes	No	
X	☐	Was the gate locked upon arrival?
X	☐	Are signs posted in accordance with Section 3.4.4?
X	☐	Are all posting legible?
X	☐	Are enclosures on the concrete bin and stored drum containers tight?
X	☐	Are containers in good physical condition (no rust, no holes, no bulges, etc.)?
X	☐	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.
X	☐	Is the surface area of the TSF in good physical condition (no erosion, no flood damage, no excessive vegetation growth, etc.)?
X	☐	Has radiological monitoring been conducted in accordance with Section 3.4.5?
X	☐	Is the security fence in good condition?

Comments: There is no radiologically contaminated material in the concrete bin.

Bill Cary

Signature of Monticello LM Representative

8/29/19

Date of Inspection

NAVARRO

Contractor to the U.S. Department of Energy Office of Legacy Management

Monthly Pond 4 Surveillance Checklist

Level of water in Pond 4 7.747

Inspection Item	Acceptable		Comments and Recommendation
	Yes	No	
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: The site appears to be in good condition with lots of healthy vegatation.

Monticello LM Representative: Dany MK Date: 9/30/2019

NAVARRO

Contractor to the U.S. Department of Energy Office of Legacy Management

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 with lots of healthy vegatation.

Signature: _____ Date: 9/30/2019

Monticello LM Representative

[a]Inspections required following a significant storm event

[b]Open to inspect quarterly

MONTHLY CLIMATOLOGICAL SUMMARY for SEP. 2019

NAME: Monticello Office CITY: STATE:
ELEV: 7069 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	74.9	88.1	4:00p	61.4	4:00a	0.1	10.0	0.00	7.3	26.0	10:00a	WSW
2	74.4	87.1	5:30p	64.0	5:30a	0.1	9.4	0.00	8.1	24.0	8:00a	S
3	73.4	85.8	2:30p	58.8	5:00a	1.0	9.4	0.00	4.8	21.0	2:30p	WNW
4	72.7	87.8	4:00p	63.1	4:30a	0.0	7.8	0.00	5.9	21.0	3:30p	WSW
5	73.2	87.2	5:00p	57.4	6:30a	0.9	9.1	0.00	6.4	22.0	10:00a	SSW
6	75.3	87.4	4:00p	61.5	7:00a	0.2	10.5	0.00	6.4	23.0	5:00p	WSW
7	71.4	81.5	5:00p	62.9	11:30p	0.1	6.5	0.00	5.1	16.0	5:00p	WNW
8	68.0	78.7	4:30p	59.4	11:00p	0.7	3.7	0.00	9.4	30.0	4:00p	S
9	63.9	75.6	4:30p	49.2	6:30a	4.1	3.0	0.00	5.8	23.0	3:00p	SSE
10	59.5	73.1	4:00p	50.8	6:30a	6.6	1.1	0.12	6.4	29.0	2:00p	SSE
11	59.0	70.5	3:30p	50.7	1:00a	7.0	1.0	0.00	10.5	33.0	1:00p	S
12	55.1	67.0	5:00p	38.1	7:00a	10.1	0.2	0.00	8.2	23.0	1:00a	WNW
13	60.4	75.6	5:00p	46.5	7:00a	7.2	2.6	0.00	5.0	15.0	12:30p	WSW
14	66.2	80.4	3:30p	53.3	3:00a	3.7	4.8	0.00	5.4	18.0	4:30p	WSW
15	61.7	68.1	4:00p	53.1	6:00a	3.7	0.4	0.00	8.6	22.0	11:30a	S
16	61.1	71.9	3:30p	52.3	7:00a	5.3	1.4	0.00	7.8	23.0	12:00p	S
17	61.0	73.6	4:30p	49.6	5:30a	5.8	1.8	0.00	6.6	30.0	11:30a	SW
18	61.1	72.8	5:00p	46.8	5:30a	5.5	1.6	0.00	8.1	35.0	2:30p	SSE
19	63.2	77.1	4:30p	46.1	6:30a	5.0	3.1	0.00	10.6	37.0	4:30p	SSE
20	58.7	68.9	4:00p	46.4	12:00m	6.8	0.5	0.00	11.5	37.0	11:30a	S
21	53.5	67.2	4:00p	43.1	7:00a	11.6	0.1	0.00	6.4	23.0	3:30p	WNW
22	56.2	69.5	4:00p	42.3	4:00a	9.4	0.6	0.00	6.0	20.0	3:00p	WNW
23	56.0	66.8	1:00p	47.7	12:30a	9.1	0.1	0.00	8.1	27.0	1:00p	S
24	57.0	72.6	4:00p	41.9	6:30a	9.4	1.4	0.00	5.3	18.0	11:00a	NNW
25	63.8	77.1	3:30p	52.5	6:00a	4.4	3.2	0.00	4.8	22.0	5:00p	WNW
26	61.0	73.8	3:30p	47.1	7:30a	6.1	2.1	0.00	6.5	27.0	2:30p	WSW
27	59.9	71.0	5:00p	48.6	6:30a	6.2	1.1	0.00	10.2	28.0	11:00a	SSE
28	61.2	72.4	5:30p	48.7	6:00a	5.3	1.5	0.00	14.5	44.0	4:30p	SSE
29	59.7	68.2	5:00p	54.5	2:30a	5.5	0.1	0.00	18.1	44.0	12:30p	SSE
30	58.6	69.6	4:30p	50.6	5:00a	6.9	0.5	0.00	14.6	39.0	11:00a	S
	63.4	88.1	1	38.1	12	147.8	98.6	0.12	8.1	44.0	28	S

Max >= 90.0: 0
Max <= 32.0: 0
Min <= 32.0: 0
Min <= 0.0: 0
Max Rain: 0.12 ON 09/10/19
Days of Rain: 1 (>.01 in) 1 (>.1 in) 0 (>1 in)
Heat Base: 65.0 Cool Base: 65.0 Method: Integration

Appendix B

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

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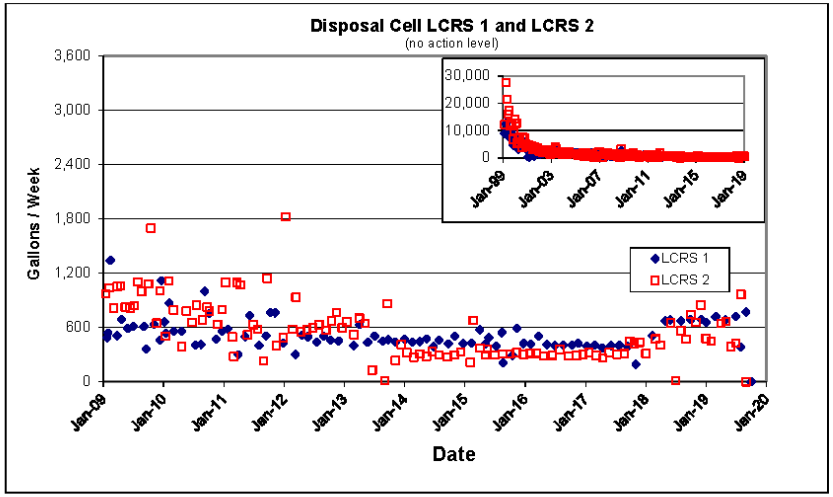
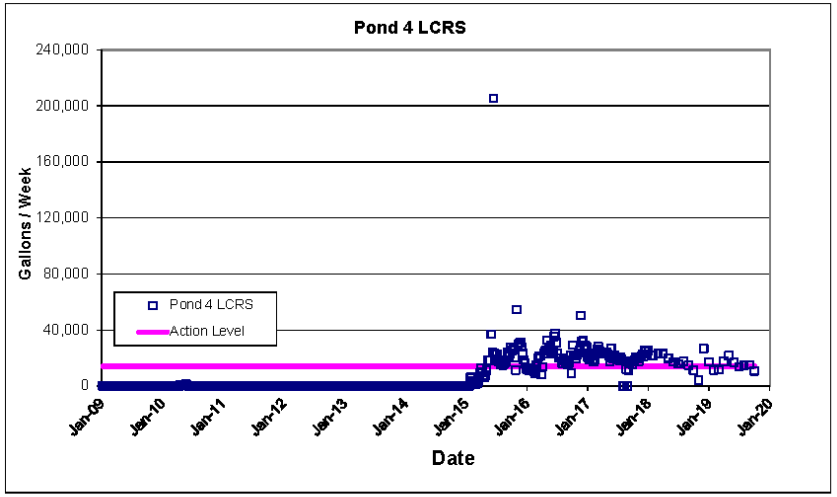
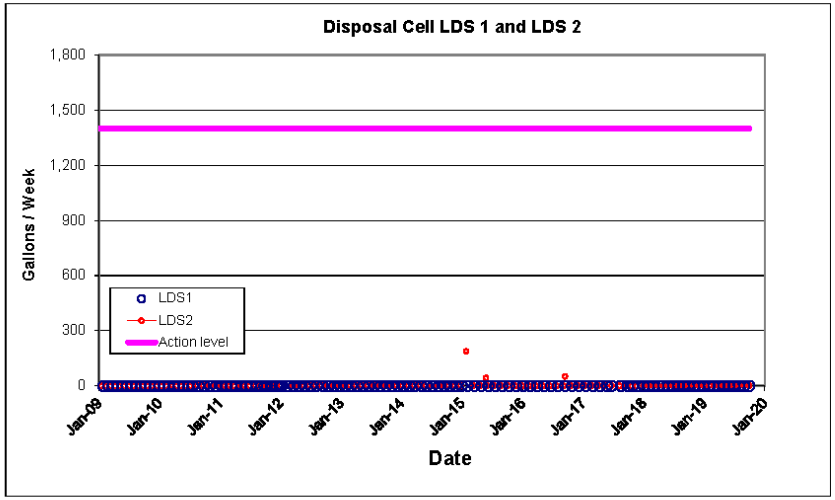
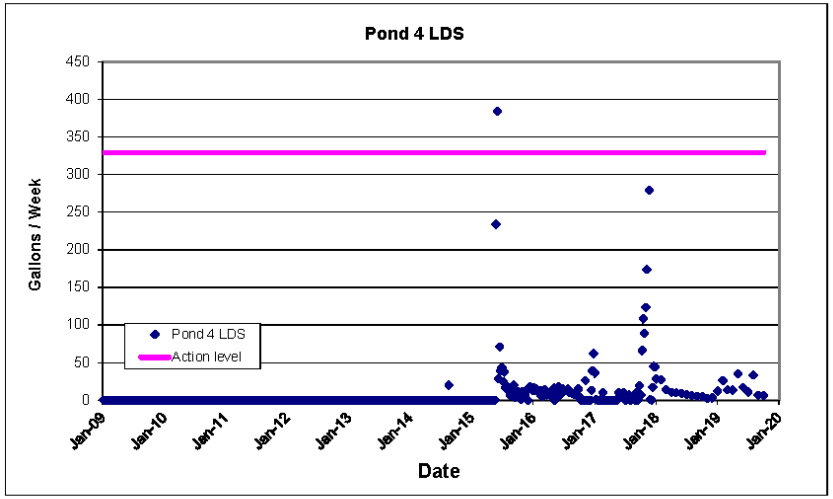
Graphs Showing Performance History for Disposal Cell and Pond 4 LCRS and LDS









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