LMS/MNT/S24028

Monticello, Utah, National Priorities List Sites Federal Facility Agreement (FFA) Quarterly Report: October 1–December 31, 2018

February 2019

U.S. DEPARTMENT OF ENERGY | Legacy Management

This page intentionally left blank

Contents

Tables

Appendixes

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
ICs	institutional controls
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 October through December 2018. 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 2018d) (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 to determine the best possible closure strategy for OU III.

Project milestones and guiding documents are further described in the *Monticello Site Management Plan* (DOE 2003).

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.
- The October semiannual water sampling event occurred the week of October 15, 2018.
- A drilling project was implemented for geochemical characterization of the subsurface to support evaluation of the OU III closure strategy. The drilling project began on November 5

and was completed on November 16, 2018. Portions of the soil samples were sent to a contract laboratory to be analyzed for cations (sodium, calcium, magnesium), anions (nitrate, sulfate, chloride), metals (iron, manganese, arsenic, selenium, molybdenum, uranium, and vanadium), total organic carbon, and total inorganic carbon; other portions of the soil samples will be used to conduct column tests, and the remainder have been placed in storage.

- 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.
- Water collection in the Pond 4 Leachate Collection and Removal System (LCRS) continued to exceed the action level for this quarter. LM has previously notified EPA and UDEQ of this Pond 4 action level exceedance. Furthermore, the Pond 4 LCRS flow meter stopped recording flow on October 5 and came back online October 25, 2018 (see Section 3.1.1).
- Routine surveillance noted no operating deficiencies for the temporary storage facility (TSF).
- October rains and snow in December helped alleviate some of the drought conditions.

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 Leak Detection System (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.
- Minor burrowing on the disposal cell and the Pond 4 berm by voles and small ground squirrels continues to be observed. These burrows are not deep and do 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 1105 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.
- 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:
  - On October 5, 2018, the Pond 4 LCRS flow meter stopped recording total flow. The flow meter was fixed and back online October 25, 2018. During this time, the LCRS pump continued to function and water was recirculated back into Pond 4.

Legacy Management Support (LMS) personnel estimated the flow and updated the data records for the missing period using flow meter records from the period between August 26 and October 5, a period that received relatively similar rainfall compared to the period when the flow meter was not recording. It was estimated that a total volume of approximately 32,963 gallons or 68 gallons per hour was pumped between October 5 and 25, 2018.

— Water collection at the Pond 4 LCRS continued to exceed the action level between October and December (see Appendix B). LM has previously notified EPA and UDEQ of this 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 is in good shape, and no correction items were identified.

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.

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.
- 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 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, which began full operation in January 2015, 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. Beginning in 2017, sampling of the extraction and monitoring wells occurred on a monthly basis for approximately 1 year. Starting in October 2018, sampling occurred following the extraction of every 1 million gallons from the GRO system per the *Remedial Action Completion Report for Operable Unit III Groundwater Contingency Remedy Optimization System, Monticello Mill Tailings Site, Monticello, Utah* (DOE 2016). The extraction and monitoring wells were last sampled during the October 2018 semiannual sampling event.

3.3.2.1 GRO System Quarterly Performance Summary

Groundwater extraction was approximately 0.97 million gallons, equivalent to an average flow rate of 7.3 gallons per minute (gpm).

- During the quarter, the volume of water stored in Pond 4 increased by 0.8 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).
- Cumulatively, the system has removed a total of approximately 19.1 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 maximum pore volume of 3.3 million gallons, the GRO system has removed between 5.8 and 8.0 pore volumes since system startup.
- Water-level monitoring during the quarter consisted of:
  - Collection of hand-measured water levels during the October 2018 semiannual sampling event.
  - 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.
- From January 2015 through October 2018, the GRO system has removed approximately 101.0 pounds of uranium from the AOA aquifer (Table 2). Samples were not collected from the end of October through December because the removal of 1 million gallons of water was not achieved.

Table 1. GRO System Treatment Volumes and Rates: Monthly and Cumulative Volumes (Since January 2015)

Calendar Month	Approximate Volume Pumped (million gallons)	Effective Pumping Rate (gpm)	Approximate Cumulative Volume[a] (million gallons)
October 2018	0.61	13.6	18.8
November 2018	0.25	5.8	19.0
December 2018[b]	0.12	2.6	19.1

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 December 31, 2018.

Table 2. Uranium Mass Removal from Groundwater in the AOA

Tank Effluent Sample Date[a]	Uranium Concentration (µg/L)	Volume Removed Between Tank Samples (million gallons)	Uranium Removed (pounds)[b]	Cumulative Mass Uranium Removed[c] (pounds)
September 26, 2018	270	Not applicable	Not applicable	100.18
October 18, 2018	330	0.34	0.86	101.04

Notes:
[a] Tank effluent sample dates are not shown for November and December because the removal of 1 million gallons of water did not occur.
[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 (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 OUIII and are detailed in the *OU III Closure Strategy for the Monticello Mill Tailings Site, Monticello, Utah* (DOE 2018e). 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.

Accomplishments this quarter (October to December) are as follows:

- Between November 5 and 16, 2018, LMS personnel and subcontractors completed a drilling project to collect subsurface soil samples for geochemical analysis. The drilling project was conducted in the OU III restrictive easement area, which included the MMTS (old mill site), the AOA, and private properties along Montezuma Creek. Thirty-two locations were drilled, resulting in 207 samples that were sent to a contract laboratory for analysis. Future column tests along with the evaluation of sample data will result in a geochemical study of uranium transport in OU III groundwater.
- LMS personnel completed updates to the conceptual site model including evaluations of site geology, aquifer geometry, aquifer hydraulic properties, groundwater hydrographs, hydraulic gradients, groundwater velocities, flow directions, and the development of a sitewide groundwater balance. The updated conceptual site model will be used as the basis for development of the numerical three-dimensional groundwater flow model.

4.0 Schedule of Activities and Deliverables

Table 3 summarizes the completion of recent and planned near-term 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	
Semiannual OU III groundwater and surface water monitoring	Completed the week of October 15, 2018.
Semiannual 2018 FFA meeting	Held October 24, 2018.
Discussion of closure strategies for Operable Unit III and the GRO system	Held October 24, 2018.
Monticello Mill Tailings Site Operable Unit III Annual Groundwater Report, May 2017 Through April 2018 (DOE 2018b)	Submitted to EPA and UDEQ October 30, 2018.
Soil sample collection from OU III for geochemical analysis	Completed the week of November 12, 2018.
Monticello, Utah, National Priorities List Sites Federal Facility Agreement (FFA) Quarterly Report: July 1–September 30, 2018 (DOE 2018c)	Submitted to EPA and UDEQ November 15, 2018.
2018 Annual Inspection Report for the DOE Monticello, Utah, Mill Tailings Site and Monticello Vicinity Properties (DOE 2018a)	Submitted to EPA and UDEQ December 17, 2018.
Near-Term	
Monticello, Utah, National Priorities List Sites Federal Facility Agreement (FFA) Quarterly Report: October 1–December 31, 2018	Submit to EPA and UDEQ by February 15, 2019.
Monticello Water Use Report	Submit to the State of Utah Water Board by March 1, 2019.
Spring Semiannual Sampling Event	Tentatively scheduled for the week of April 15, 2019.
Spring FFA Meeting	Tentatively scheduled for May 15, 2019.

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. *Annual Inspection Report for the DOE Monticello, Utah, Mill Tailings Site and Monticello Vicinity Properties*, LMS/MNT/S22046, Office of Legacy Management, December.

DOE (U.S. Department of Energy), 2018b. *Monticello Mill Tailings Site Operable Unit III Annual Groundwater Report May 2017 Through April 2018*, LMS/MNT/S19920, Office of Legacy Management, October.

DOE (U.S. Department of Energy), 2018c. *Monticello, Utah, National Priorities List Sites Federal Facility Agreement (FFA) Quarterly Report: July 1–September 30, 2018*, LMS/MNT/S22073, Office of Legacy Management.

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

This page intentionally left blank

Appendix A

Monthly and Quarterly Surveillance Checklists

This page intentionally left blank

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	☒	☐	Changed the lids on the manholes during October
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	☒	☐	Evidence of another vehicle on the far eastern section of the property, near J. Johnson and K. Young's property lines. No damage or issues. It appeared to be an accidental entry.
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:

Signature: _____ Date: 10/31/18

Monticello LM Representative

[a]Inspections required following a significant storm event

NAVARRO

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

Monthly Pond 4 Surveillance Checklist

Level of water in Pond 4 8.193

Inspection Item	Acceptable		Comments and Recommendation
	Yes	No	
Condition of:			
Fences, gates, and locks	☒	☐	
Roads	☒	☐	
Signs	☒	☐	
Visible piping	☒	☐	
Visible liner and anchors	☒	☐	
Rescue equipment	☒	☐	
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: Personnel installed new heat tape and new insallation in preparation for winter.

Monticello LM Representative: Joanna Bordelon Date: 10/31/2018

MONTHLY CLIMATOLOGICAL SUMMARY for OCT. 2018

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	60.0	66.5	12:30a	54.8	9:30a	5.0	0.0	0.01	7.0	24.0	12:30a	S
2	54.7	58.6	3:00p	52.6	7:00a	10.3	0.0	0.79	8.4	23.0	10:30a	SSE
3	58.6	66.7	4:00p	50.5	8:00a	6.5	0.1	0.09	7.7	24.0	2:00p	SSE
4	54.1	60.9	4:30p	46.1	8:30a	10.9	0.0	0.12	9.0	38.0	9:30a	S
5	49.7	59.0	2:30p	44.1	12:00m	15.3	0.0	0.07	6.6	22.0	2:30p	SSE
6	45.0	50.6	12:00p	40.7	2:30a	20.0	0.0	0.76	5.0	23.0	2:30p	WNW
7	41.2	44.0	3:30p	36.8	11:00p	23.8	0.0	0.36	7.7	24.0	12:30p	SSE
8	39.0	47.4	4:30p	33.5	7:30a	26.0	0.0	0.49	5.7	20.0	1:00p	S
9	41.3	46.8	11:30a	37.0	12:30a	23.7	0.0	0.09	4.0	17.0	11:00p	SSE
10	44.0	53.6	4:30p	37.6	8:00a	21.0	0.0	0.06	5.9	21.0	9:30a	S
11	43.3	49.5	5:00p	38.6	10:30a	21.7	0.0	0.11	4.9	18.0	3:00p	SSW
12	44.4	54.6	4:00p	36.9	6:30a	20.6	0.0	0.00	4.1	15.0	11:00a	NNW
13	47.0	59.3	4:00p	35.4	8:00a	18.0	0.0	0.00	4.8	23.0	12:00p	WSW
14	38.6	45.3	12:30a	29.2	12:00m	26.4	0.0	0.00	13.9	33.0	12:00p	NW
15	32.7	41.8	4:30p	25.1	7:30a	32.3	0.0	0.00	11.6	28.0	1:00a	NW
16	40.6	51.4	3:30p	30.3	7:00a	24.4	0.0	0.00	8.1	20.0	11:30p	NW
17	37.7	43.4	2:30p	32.9	3:30a	27.3	0.0	0.28	6.5	19.0	1:00a	S
18	40.0	48.3	3:00p	32.8	12:00m	25.0	0.0	0.08	7.3	20.0	2:30a	SSE
19	43.2	54.1	5:00p	32.6	1:00a	21.8	0.0	0.01	6.8	20.0	1:30p	NNW
20	49.4	61.6	4:30p	37.8	4:30a	15.6	0.0	0.00	4.7	19.0	11:30a	W
21	52.1	63.0	4:00p	44.2	1:00a	12.9	0.0	0.00	4.8	16.0	12:00p	SSE
22	50.7	63.3	4:30p	39.6	7:00a	14.3	0.0	0.10	5.1	21.0	1:30p	SSE
23	47.4	55.5	5:00p	40.6	5:00a	17.6	0.0	0.05	4.2	21.0	11:30a	SSE
24	47.3	55.6	3:00p	39.7	6:30a	17.7	0.0	0.01	7.9	23.0	1:00p	WNW
25	45.7	54.6	1:30p	37.7	7:00a	19.3	0.0	0.00	6.5	21.0	4:00p	NW
26	46.8	57.0	4:30p	37.8	8:00a	18.2	0.0	0.00	7.5	19.0	11:30a	WNW
27	50.9	64.8	4:00p	40.0	7:00a	14.1	0.0	0.00	3.5	14.0	12:30p	WNW
28	52.7	64.4	3:00p	40.8	7:30a	12.3	0.0	0.00	6.5	24.0	1:30p	SSW
29	52.9	60.5	5:00p	46.1	5:30a	12.1	0.0	0.00	8.9	24.0	1:00p	SE
30	41.0	54.5	12:30a	32.9	10:00p	24.0	0.0	0.03	7.9	24.0	10:30a	NW
31	37.0	44.2	3:30p	30.4	8:00a	28.0	0.0	0.01	13.1	31.0	8:00a	NW
	46.1	66.7	3	25.1	15	586.1	0.1	3.52	7.0	38.0	4	NW

Max >= 90.0: 0
Max <= 32.0: 0
Min <= 32.0: 4
Min <= 0.0: 0
Max Rain: 0.79 ON 10/02/18
Days of Rain: 15 (>.01 in) 7 (>.1 in) 0 (>1 in)
Heat Base: 65.0 Cool Base: 65.0 Method: Integration

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	☑	☐	Repaired broken wire along fence earlier in the month
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:

Signature: Joanna Dorl
Monticello LM Representative

Date: 11/30/2018

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

U.S. Department of Energy Office of Legacy Management

Monthly Pond 4 Surveillance Checklist

Level of water in Pond 4 8.268

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 shape.

Monticello LM Representative Larry MK Date: 11/27/2018

LMS 5501MON
07/15/2013

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	
☒	☐	Was the gate locked upon arrival?
☒	☐	Are signs posted in accordance with Section 3.4.4?
☒	☐	Are all posting 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 Section 3.4.5?
☒	☐	Is the security fence in good condition?

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

Bill Cam

Signature of Monticello LM Representative

11/29/2018

Date of Inspection

MONTHLY CLIMATOLOGICAL SUMMARY for NOV. 2018

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	41.2	49.7	3:30p	35.8	7:30a	23.8	0.0	0.00	11.5	30.0	3:30a	NW
2	45.4	55.5	3:30p	35.0	3:30a	19.6	0.0	0.00	6.6	21.0	11:30a	WNW
3	40.7	49.4	2:00a	32.8	10:00p	24.3	0.0	0.00	11.6	33.0	3:00a	NW
4	39.7	50.1	1:30p	28.7	6:00a	25.3	0.0	0.00	5.5	22.0	1:30p	S
5	39.9	49.7	2:30p	29.7	7:30a	25.1	0.0	0.00	5.5	30.0	12:00p	WNW
6	38.4	49.3	12:00p	29.7	12:00m	26.6	0.0	0.00	4.5	18.0	2:00p	WNW
7	36.9	48.9	3:00p	28.2	1:00a	28.1	0.0	0.00	5.9	18.0	1:00p	WNW
8	32.0	37.5	3:00p	27.1	7:30a	33.0	0.0	0.00	13.6	32.0	10:30a	NW
9	32.1	44.6	3:00p	23.8	10:30p	32.9	0.0	0.00	6.5	17.0	12:30p	NNW
10	35.7	44.4	2:00p	24.9	1:30a	29.3	0.0	0.00	9.6	30.0	11:30a	S
11	29.5	34.1	11:30a	24.9	12:00m	35.5	0.0	0.00	15.2	39.0	1:00p	NW
12	24.2	30.6	2:00p	19.5	7:30a	40.8	0.0	0.00	15.1	35.0	3:00a	NW
13	31.6	42.7	2:30p	22.7	2:30a	33.4	0.0	0.00	8.0	21.0	9:30a	WNW
14	36.1	48.7	2:30p	27.7	8:00a	28.9	0.0	0.00	3.5	16.0	3:00p	WNW
15	39.4	52.7	2:00p	27.0	6:00a	25.6	0.0	0.00	4.5	19.0	2:00p	WNW
16	37.6	51.0	2:00p	27.5	5:30a	27.4	0.0	0.00	3.5	15.0	12:00p	SE
17	39.0	51.3	2:00p	26.0	6:00a	26.0	0.0	0.00	6.9	24.0	11:00a	SE
18	33.2	40.9	2:00p	25.8	7:30a	31.8	0.0	0.00	7.9	21.0	3:00a	WNW
19	32.4	47.2	1:30p	21.2	3:30a	32.6	0.0	0.00	4.5	18.0	2:00p	WNW
20	34.2	50.6	3:00p	22.1	1:30a	30.8	0.0	0.00	3.3	15.0	11:30a	W
21	35.4	49.8	2:30p	24.2	5:00a	29.6	0.0	0.00	3.5	15.0	12:00p	SE
22	36.3	45.2	1:00p	29.6	1:30a	28.7	0.0	0.00	8.4	31.0	1:00p	SSE
23	34.0	43.6	2:00p	23.6	7:00a	31.0	0.0	0.00	8.0	24.0	9:30p	SSE
24	33.4	51.5	1:00p	23.9	11:30p	31.6	0.0	0.00	16.9	40.0	5:30p	NW
25	27.1	37.0	3:00p	20.6	7:00a	37.9	0.0	0.00	6.5	15.0	9:30a	WNW
26	29.8	43.8	3:00p	19.7	6:30a	35.2	0.0	0.00	4.8	18.0	12:30p	NW
27	31.8	42.6	12:30p	22.1	7:30a	33.2	0.0	0.00	3.7	19.0	12:30p	SE
28	36.8	46.6	1:00p	25.8	4:00a	28.2	0.0	0.00	7.4	27.0	9:00p	SSE
29	38.9	46.5	3:30p	32.7	12:00m	26.1	0.0	0.00	11.3	30.0	11:30p	SSE
30	32.4	38.8	2:00p	28.4	12:00m	32.6	0.0	0.12	6.0	23.0	12:30a	WNW
	35.2	55.5	2	19.5	12	894.9	0.0	0.12	7.7	40.0	24	WNW

Max >= 90.0: 0
Max <= 32.0: 1
Min <= 32.0: 26
Min <= 0.0: 0
Max Rain: 0.12 ON 11/30/18
Days of Rain: 1 (>.01 in) 1 (>.1 in) 0 (>1 in)
Heat Base: 65.0 Cool Base: 65.0 Method: Integration

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 is a few inches of snow on the ground but the site appears to be in good condition.

Signature: _____ Date: 12/27/2018
Monticello LM Representative

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

LMS 5502MON
07/15/2013

U.S. Department of Energy Office of Legacy Management

Monthly Pond 4 Surveillance Checklist

Level of water in Pond 4 8.218

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 pond is frozen over with a few inches of snow on the ground but things appear to be in good shape.

Monticello LM Representative: Gary McKinney Date: 12/27/2018

MONTHLY CLIMATOLOGICAL SUMMARY for DEC. 2018

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)

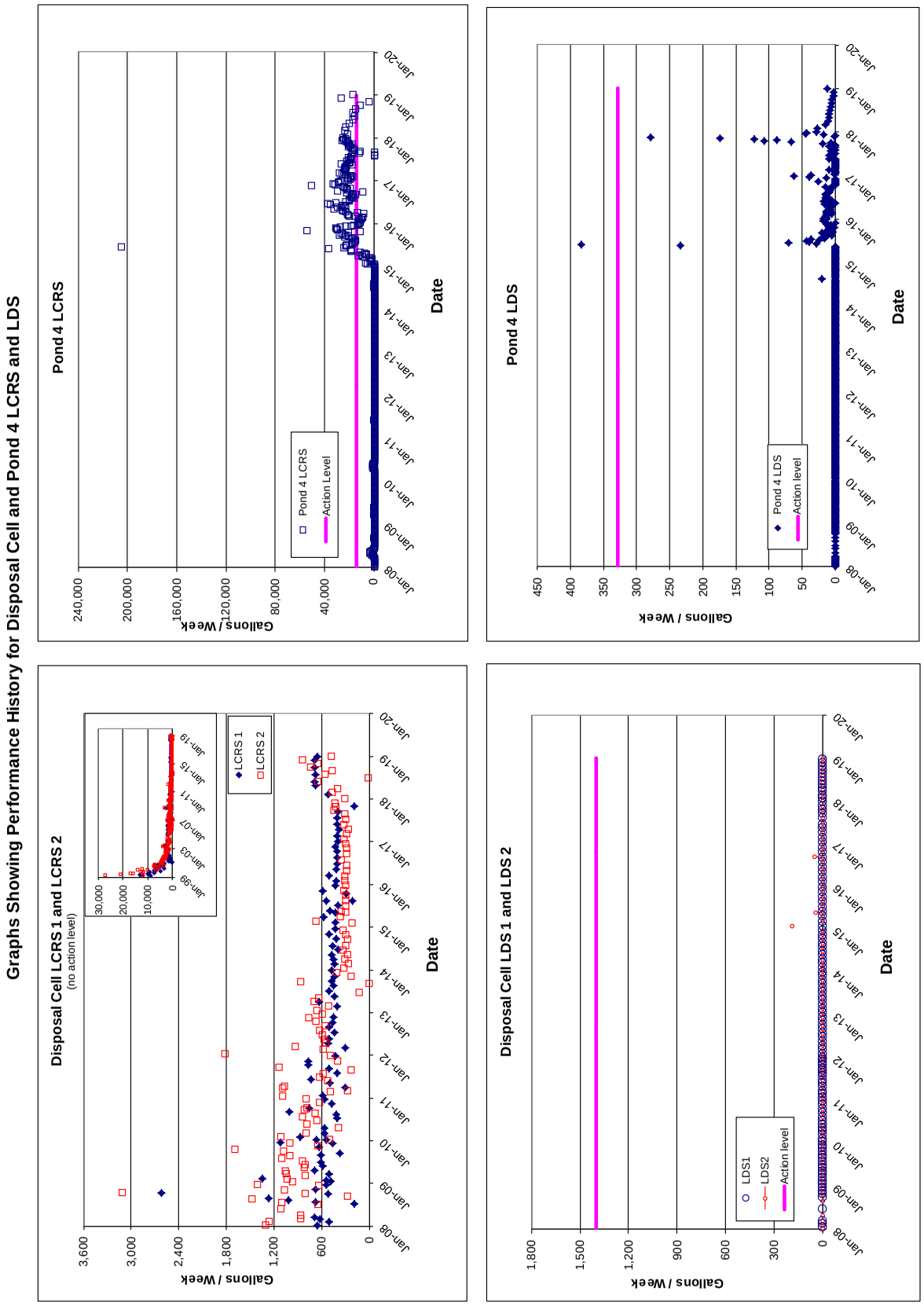
DAY	MEAN TEMP	HIGH	TIME	LOW	TIME	HEAT DEG DAYS	COOL DEG DAYS	RAIN	AVG WIND SPEED	HIGH	TIME	DOM DIR
1	27.9	34.9	2:30p	20.0	11:30p	37.1	0.0	0.03	5.3	25.0	8:30a	SE
2	24.0	30.8	12:30p	14.7	12:00m	41.0	0.0	0.02	7.0	32.0	1:30p	SSE
3	17.8	24.9	12:00p	9.0	11:00p	47.2	0.0	0.01	3.7	14.0	3:30p	SE
4	17.0	24.0	4:30p	8.2	2:30a	48.0	0.0	0.00	4.6	13.0	12:30p	NW
5	27.1	32.9	12:00m	15.3	12:30a	37.9	0.0	0.00	8.8	26.0	10:00a	S
6	30.7	33.9	3:30p	27.0	8:30p	34.3	0.0	0.00	6.4	19.0	12:00p	S
7	27.9	35.7	2:00p	21.1	6:00a	37.1	0.0	0.01	3.3	13.0	3:00p	S
8	29.0	40.4	3:00p	19.8	5:00a	36.0	0.0	0.00	2.3	9.0	2:30p	WNW
9	27.9	37.8	1:00p	21.1	6:00a	37.1	0.0	0.00	4.7	12.0	11:00a	W
10	26.3	34.5	12:00m	15.9	8:00a	38.7	0.0	0.00	6.5	19.0	10:00p	W
11	34.7	45.8	3:00p	26.0	11:00p	30.3	0.0	0.00	4.3	19.0	12:30a	S
12	27.9	38.0	1:00p	21.4	12:00m	37.1	0.0	0.00	12.7	41.0	3:30p	NW
13	24.6	32.3	2:30p	19.1	4:30a	40.4	0.0	0.00	10.2	28.0	1:30a	NW
14	27.3	36.1	2:00p	15.6	8:00a	37.7	0.0	0.00	5.8	25.0	11:30p	WNW
15	32.9	44.1	4:00p	22.4	6:30a	32.1	0.0	0.00	4.8	28.0	12:30a	SE
16	34.7	46.5	3:30p	26.4	2:00a	30.3	0.0	0.00	3.0	8.0	3:00a	SSE
17	35.2	42.4	9:30a	27.4	11:00p	29.8	0.0	0.00	5.4	26.0	8:30a	S
18	34.8	41.1	1:30p	28.1	3:00a	30.2	0.0	0.00	8.0	19.0	10:00a	NW
19	37.4	41.8	2:30p	29.2	10:00p	27.6	0.0	0.00	15.4	39.0	10:30a	NW
20	33.4	45.7	4:00p	24.7	4:00a	31.6	0.0	0.00	2.3	15.0	12:30p	WNW
21	33.5	40.4	12:00p	28.5	11:00p	31.5	0.0	0.00	6.7	30.0	4:00a	SE
22	31.1	36.8	2:30p	21.8	9:00p	33.9	0.0	0.00	8.3	30.0	8:30a	NW
23	30.4	38.4	2:30p	21.0	2:30a	34.6	0.0	0.00	5.6	21.0	1:30p	WNW
24	34.4	42.5	12:30p	26.9	7:30a	30.6	0.0	0.00	4.5	24.0	3:30a	SE
25	34.6	41.3	1:00p	28.1	6:30a	30.4	0.0	0.00	5.4	22.0	10:30a	S
26	28.5	31.9	12:30p	23.4	6:00a	36.5	0.0	0.06	9.3	27.0	3:00p	NW
27	20.9	26.2	9:30a	15.0	12:00m	44.1	0.0	0.00	7.7	16.0	12:30p	NW
28	16.2	18.5	1:30p	11.9	11:30p	48.8	0.0	0.00	8.8	23.0	10:00a	NW
29	15.3	23.1	2:30p	6.8	3:30a	49.7	0.0	0.00	6.5	16.0	1:30p	WNW
30	17.2	25.2	2:30p	8.8	8:00a	47.8	0.0	0.00	4.4	15.0	11:30p	SE
31	16.7	21.1	3:00p	13.6	11:30p	48.3	0.0	0.01	5.7	18.0	12:00m	SE
	27.7	46.5	16	6.8	29	1157.7	0.0	0.14	6.4	41.0	12	NW

Max >= 90.0: 0
Max <= 32.0: 9
Min <= 32.0: 31
Min <= 0.0: 0
Max Rain: 0.06 ON 12/26/18
Days of Rain: 3 (>.01 in) 0 (>.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

This page intentionally left blank


Graphs Showing Performance History for Disposal Cell and Pond 4 LCRS and LDS
Pond 4 LCRS
Gallons / Week
Date
Pond 4 LCRS
Action Level
Pond 4 LDS
Gallons / Week
Date
Pond 4 LDS
Action level
Disposal Cell LCRS 1 and LCRS 2
(no action level)
Gallons / Week
Date
LCRS 1
LCRS 2
Disposal Cell LDS 1 and LDS 2
Gallons / Week
Date
LDS1
LDS2
Action level

This page intentionally left blank