ROCKY MOUNTAIN ARSENAL

2025 RCRA Landfills and Groundwater Monitoring Report

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U.S. Department of the Army
Shell Oil Company

Prepared by:



Navarro Research and Engineering, Inc.

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Note: Software used to compile this report does not transfer electronic signatures, therefore, electronic forms provided in the following appendices are unsigned. Documentation with electronic signatures is available in the project files.

LIST OF ACRONYMS

ACB	Articulated Concrete Block
ADFR	Average Daily Flow Rate
ALR	Action Leakage Rate
ELF	Enhanced Hazardous Waste Landfill
HWL	Hazardous Waste Landfill
IC	Indicator Compound
LCS	Leachate Collection System
LDS	Leak Detection System
LGMR	Landfills and Groundwater Monitoring Report
LRCH	Leachate Riser Control House
LS/LF	Leachate Storage and Loadout Facility
Navarro	Navarro Research and Engineering, Inc.
NRAP	Non-Routine Action Plan
O&M	Operations and Maintenance
OCN	O&M Change Notice
PCGMP	Post-Closure Groundwater Monitoring Plan
PCGMR	Post-Closure Groundwater Monitoring Report
PCWMP	Post-Closure Wastewater Management Plan
PCP	Post-Closure Plan
RCRA	Resource Conservation and Recovery Act
RMA	Rocky Mountain Arsenal
SOP	Standard Operating Procedure
UFS	Unconfined Flow System

EXECUTIVE SUMMARY

This *2025 Resource Conservation and Recovery Act* (RCRA) *Landfills and Groundwater Monitoring Report* for the Rocky Mountain Arsenal Federal Facility Site was prepared in accordance with the *Hazardous Waste Landfill* (HWL) *Post-Closure Plan* (PCP), Revision 4 (Navarro 2019) and the *Enhanced Hazardous Waste Landfill* (ELF) PCP, Revision 1 (Navarro 2020). The purpose of this report is to provide a summary of post-closure care activities that occurred during the 2025 reporting period of May 1, 2024, through April 30, 2025, and to provide recommendations for post-closure care during the 2026 reporting period of May 1, 2025, through April 30, 2026.

The Army contracted Navarro Research and Engineering, Inc. (Navarro) to inspect, repair, and maintain the HWL and ELF facilities in accordance with the respective PCPs.

The HWL and ELF remained in good condition throughout this reporting period. Routine inspections, maintenance, repairs, and groundwater monitoring activities were performed as necessary and in accordance with the PCPs. Four Notifications were issued, one Non-Routine Action was required, and two Operations and Maintenance Change Notices were initiated to modify the PCPs.

The HWL and ELF PCPs include compliance standards for Action Leakage Rate, soil cover thickness loss, and impacts on groundwater quality. Evaluations of landfill performance confirmed that both landfills met all applicable compliance standards. Therefore, no corrective measures were necessary, and none are planned for the reporting period of 2026.

The Army recommends continuing routine inspections, monitoring, and maintenance as required by the PCPs. The Army also recommends closing damaged well 26051 and installing a replacement well in the same general area with similar depth and screened interval. Specifics regarding well design and changes to groundwater monitoring networks will be addressed using the Operations and Maintenance Change Notice process.

The costs for operating, inspecting, and maintaining the HWL and ELF over the reporting period, including groundwater sampling, Leachate Collection System (LCS)/Leak Detection System (LDS) sampling, LCS/LDS operations and maintenance, and wastewater disposal, totaled $387,451. The budget for the period of December 2024 to November 2025 is $569,839.

1.0 INTRODUCTION AND METHODOLOGY

This *2025 Resource Conservation and Recovery Act* (RCRA) *Landfills and Groundwater Monitoring Report* (LGMR) for the Rocky Mountain Arsenal (RMA) Federal Facility Site was prepared in accordance with the *Hazardous Waste Landfill* (HWL) *Post-Closure Plan* (PCP), Revision 4 (Navarro 2019) and the *Enhanced Hazardous Waste Landfill* (ELF) PCP, Revision 1 (Navarro 2020).

The purpose of this report is to provide a summary of post-closure care activities that occurred during the 2025 reporting period of May 1, 2024, through April 30, 2025, and to provide recommendations for the post-closure care during the 2026 reporting period of May 1, 2025, through April 30, 2026. Groundwater, Leachate Collection System (LCS), and Leak Detection System (LDS) analytical data presented in this report were collected between January 1, 2024, and December 31, 2024. This report addresses all components of the HWL and ELF facilities. Refer to the HWL PCP and ELF PCP for additional details regarding each component. Figure 1.0-1 illustrates the location of the HWL Army Maintained Area and ELF Army Maintained Area within the Rocky Mountain Arsenal National Wildlife Refuge.

The Army contracted Navarro Research and Engineering, Inc. (Navarro) to inspect, repair, and maintain the HWL and ELF facilities in accordance with the respective PCPs.

2.0 LANDFILL INSPECTIONS AND MAINTENANCE

Type I inspections were conducted quarterly, Type II inspections semiannually, and post-storm inspections after significant rain events. All landfill inspections were performed in accordance with Standard Operating Procedure (SOP) HWL-001 and SOP-ELF-001 presented in Appendix A of the respective PCPs. A summary of inspections is provided in Table 2.0-1.

Table 2.0-1: Cap Inspections

Date	Inspection Type	Note
May 1, 2024	Post-Storm	1.27” of rain fell on April 27, 2024.
July 3, 2024	Type I	Regularly scheduled quarterly inspection.
October 2, 2024	Type II	Regularly scheduled semiannual inspection.
February 5, 2025	Type I	Regularly scheduled quarterly inspection postponed from January due to inclement weather.
April 8, 2025	Type II	Regularly scheduled semiannual inspection.

Completed HWL and ELF landfill inspection forms are provided in Appendices B-1 and B-2 of this report. Summaries of HWL and ELF inspection observations and repairs are provided in Tables 2.0-2 and 2.0-4, respectively. Summaries of HWL and ELF vegetation management are provided in Tables 2.0-3 and 2.0-5, respectively.

Figure 2.0-1 illustrates the locations of routine activities performed on the HWL cap and surrounding areas, while Figure 2.0-2 shows the locations of routine maintenance and repair activities performed on the ELF cap and surrounding areas. Documentation of maintenance activities is provided in Appendices C-1 and C-2 of this report.

Table 2.0-2: HWL Inspection Observations and Repairs

Inspection Item	Observation	Action
Erosion rills or gullies	None	N/A
Sheet erosion or plant pedestalling	None	N/A
Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	None	N/A
Surface salts, crusting, or evidence of compaction	None	N/A
Excessive animal trails or tire tracks/ruts	None	N/A
Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	None	N/A
Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	None	N/A
Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	None	N/A
Bare area or areas of poor growth greater than 100 square feet	None	N/A
Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	None	N/A
Deep rooted, noxious or undesirable weeds	None	N/A
The perimeter fence is damaged	None	N/A
Debris has collected along the perimeter fence	None	N/A

Inspection Item	Observation	Action
Warning signs are not legible from 25 feet	None	N/A
Damage to the Access Road such as potholes, washouts or burrowing	Erosion noted on the two east manhole access roads for LCS/LDS2 and LCS/LDS4. (Inspection Form: 7/3/24)	Graded the access roads to repair erosion in November of 2024.
Cap perimeter survey monuments appear to be disturbed (Inspect every five years, in conjunction with the CERCLA Five Year Review for legibility and to confirm record locations)	Not inspected during this reporting period.	Next inspection required in 2025, after this reporting period.
Erosion rills or gullies, or burrowing animal holes around the LCS/LDS manholes	None	N/A
Leachate Storage/Load Out Facility (LS/LF) Building secondary containment is damaged or not intact. Storage tanks are leaking.	None	N/A
Damage to monitoring wells	None	N/A
Impeded drainage or ponding in a channel or downchute	None	N/A
Excessive siltation in a channel or downchute	None	N/A
Debris present in a channel or downchute	None	N/A
Erosion rills or gullies in a channel or downchute	None	N/A
Areas of degraded Articulated Concrete Block (ACB) or extensively cracked grout around ACB	None	N/A
Subsidence or undercutting of the downchutes or perimeter drainage channels	None	N/A
Damaged box culverts	None	N/A

The maintenance items listed below are focused on routine vegetation management to facilitate effective operations and maintenance (O&M) of the HWL. These maintenance items were observed independently of routinely scheduled inspections due to the timing of seasonal growth.

Table 2.0-3: HWL Vegetation Management

Target Species	Action	Date
Thistles, common mullein, kochia	Spot sprayed with the herbicides Escort® mixed with Vision®	June 2024
All species	Ground clear herbicides Piper EX® and Oust XP® were broadcast sprayed to roadways and working surfaces.	October 2024

Table 2.0-4: ELF Inspection Observations and Repairs

Inspection Item	Observation	Action
Erosion rills or gullies	Erosion was noted north of the LB Leachate Riser Control House (LRCH) building access road. (Inspection form: 10/2/24)	This area of erosion was repaired and seeded in November 2024.
Sheet erosion or plant pedestalling	None	N/A
Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	None	N/A
Surface salts, crusting, or evidence of compaction	None	N/A
Excessive animal trails or tire tracks/ruts	None	N/A
Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	None	N/A
Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	None	N/A
Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	None	N/A

Inspection Item	Observation	Action
Anchor Trench Drain outfalls exhibit flow, erosion, seepage, moisture or bare/ sparse vegetation.	The Carsonite marker for the western most anchor trench drain on the south slope needs to be replaced. (Inspection form: 7/3/24)	The Carsonite marker was replaced on July 9.
Bare area or areas of poor growth greater than 100 square feet	None	N/A
Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	None	N/A
Deep rooted, noxious or undesirable weeds	None	N/A
The perimeter fence is damaged	None	N/A
Debris has collected along the perimeter fence	None	N/A
Warning signs are not legible from 25 feet	None	N/A
Damage to the Access Road such as potholes, washouts or burrowing	None	N/A
Cap perimeter survey monuments appear to be disturbed (Inspect every five years, in conjunction with the CERCLA Five Year Review for legibility and to confirm record locations)	Not inspected during this reporting period	Next inspection required in 2025, after this reporting period.
Erosion rills or gullies, or burrowing animal holes around the LRCH Buildings	None	N/A
LS/LF Building secondary containment is damaged or not intact. Storage tanks are leaking.	None	N/A
Damage to monitoring wells	None	N/A
Impeded drainage or ponding in a channel or downchute	None	N/A
Excessive siltation in a channel or downchute	None	N/A

Inspection Item	Observation	Action
Debris present in a channel or downchute	None	N/A
Erosion rills or gullies in a channel or downchute	None	N/A
Areas of degraded ACB or extensively cracked grout around ACB	None	N/A
Subsidence or undercutting of the downchutes or perimeter drainage channels	None	N/A
Damaged box culverts	None	N/A

The maintenance items listed below are focused on routine vegetation management to facilitate effective O&M of the ELF. These maintenance items were observed independently of routinely scheduled inspections due to the timing of seasonal growth.

Table 2.0-5: ELF Vegetation Management

Target Species	Action	Date
Thistles, common mullein, kochia	Spot sprayed with the herbicides Escort® mixed with Vision®	June 2024
All species	Ground clear herbicides Piper EX® and Oust XP® were broadcast sprayed to roadways and working surfaces.	October 2024
Kochia and Russian thistle	Mowed annual weedy species and removed standing litter.	October 2024

2.1 Precipitation

Precipitation data was collected from a rain gauge located near the Lime Basins RCRA-Equivalent Cover in Section 36, which is located approximately 1.5 miles south of the HWL and ELF. Total precipitation measured at the rain gauge between May 1, 2024, and April 30, 2025, was 7.02 inches. Precipitation data for the reporting period is provided in Appendix A. No significant rain events exceeding 1.0 inch within a 24-hour period occurred during this reporting period; however, one post-storm inspection was performed on May 1, 2024, due to the RMA receiving 1.27” of precipitation within a 24-hour period on April 27, 2024.

2.2 Vegetation

Vegetative cover established on the HWL and ELF landfill caps continues to perform well, providing effective soil stabilization and minimizing erosion. The abundance of annual invasive species observed in previous monitoring periods has been largely mitigated through a combination of management

practices and establishment of native grass species. On the HWL and ELF caps, cool season grasses, most notably Western Wheatgrass (*Pascopyrum smithii),* remain the dominant component of the plant community. Common warm season grasses present on both landfills include Blue Grama (*Chondrosum gracile*), Buffalo Grass (*Buchloe dactyloides*), and Switchgrass (*Panicum virgatum*). These native grass species contribute to the long-term stability of the landfills by developing root systems that help control erosion and enhance soil structure, while limiting invasive species establishment.

The presence and distribution of broadleaf invasive species such as Kochia (*Bassia scoparia*) and Russian Thistle (*Salsola tragus*), which were previously concentrated in localized areas, have significantly decreased. Additionally, Cheatgrass (*Bromus tectorum*) occurrence on the HWL and ELF has been substantially reduced, likely because of targeted herbicide applications. These control measures have contributed to increased dispersion and establishment of perennial grass species in historically under-vegetated areas, including the southern slope of the ELF.

Fluctuations in plant community composition and productivity, characteristic of early successional stages and previously disturbed areas, have diminished as the vegetation has matured over sixteen growing seasons. Both landfills continue to transition toward a self-sustaining plant community.

2.3 Notifications and Non-Routine Actions

There were four notifications applicable to the HWL and ELF for this reporting period and these are included in Appendix F. These notifications were also discussed during the semiannual Landfills and Covers meetings held on October 23, 2024, and April 22, 2025.

2.3.1 Missing Analytical Data for Well 25194

The groundwater sample collected from HWL monitoring well 25194 in the second quarter (April) of 2024 was not analyzed for mercury or metals as required by the *HWL Post-Closure Groundwater Monitoring Plan* (PCGMP). For HWL groundwater samples, the laboratory extracts multiple analyses from one shared container. In this case, arsenic, metals, and mercury were to be extracted from a single 1-liter bottle. The sampling crew filled the bottle as required, but did not indicate the metals and mercury analyses on the Chain of Custody, so the lab only analyzed for arsenic. The regulatory agencies were notified of the missed analyses via email on September 24, 2024 (AECOM 2024b). The topic was also discussed at the Landfills and Covers O&M status meeting held on October 23, 2024. The regulatory agencies agreed that the issuance of a non-routine action plan (NRAP) was not required. The notification adequately documented the issue in lieu of an NRAP. The regulatory agencies requested earlier notification of missed analyses and that the missed analyses be documented in this report. This agreement was documented in the meeting notes of the Landfills and Covers O&M status meeting held on October 23, 2024 (AECOM 2024c).

2.3.2 HWL Sumps LDS4 and LDS3 Watch List Trigger Level Exceedances

A wastewater sample was collected from HWL LDS4 on March 11, 2024. Analytical results for endrin, endrin aldehyde, endrin ketone, and heptachlor chlordane exceeded the respective Watch List trigger levels listed in Table 3.2.5-2 of the HWL PCGMP. An evaluation was performed to determine if the

increase in concentrations resulted from a breach in the primary liner system. The evaluation did not indicate an issue with liner integrity. No additional action is required and continued routine sampling and monitoring is suggested. This notification was sent via email on April 17, 2025 (Army 2025a).

Similarly, A wastewater sample was collected from HWL LDS3 3 on July 8, 2024. Analytical results for alpha-endosulfan, endrin, and gamma-chlordane exceeded the respective Watch List trigger levels listed in Table 3.2.5-2 of the PCGMP. An evaluation was performed to determine if the increase in concentrations resulted from a breach in the primary liner system. Like the LDS4 evaluation mentioned above, the LDS3 evaluation did not indicate an issue with liner integrity. No additional action is required and continued routine sampling and monitoring is suggested. This notification was sent via email on April 18, 2025 (Army 2025b).

Although the Post-Closure Plans require a NRAP for exceedances of watch list analytes, the current notification process is more comprehensive than in previous years and includes elements typically found in an NRAP. The regulatory agencies concurred that a formal NRAP is not necessary for the watch list analyte exceedances in HWL sumps LDS4 and LDS3. This agreement was documented in the meeting notes from the Landfills and Covers O&M status meeting held on April 22, 2025 (Army 2025d).

2.3.3 Obstruction and Damage to Well 26051

The Navarro sampling staff were unable to collect a water level measurement at well 26051 in December of 2024 due to damage to the well's surface casing and an obstruction within the well. Well 26051 is listed in the water level monitoring networks for the HWL, ELF, and Basin F. On April 18, 2025, the Army sent a notification email to the regulatory agencies describing the well damage and failure to collect water level data (Army 2025c). The Army recommends closing well 26051 and installing a replacement well in the same general area with similar depth and screened interval. The well location and installation specifications will be documented in an O&M Change Notice (OCN). The time of the replacement well installation will be subject to available funds. Once installation is complete, OCNs will be prepared for the HWL PCP, ELF PCP, and Basin F PCP to make the appropriate changes to the water level monitoring networks. This recommendation was documented in NRAP-2025-001 (Navarro 2025), which was issued in May of 2025. NRAP-2025-001 was issued after the reporting period of this report and will be addressed in the 2026 LGMR.

2.3.4 NRAP-2024-001

One NRAP applicable to the HWL and ELF was prepared during this reporting period. NRAP-2024-001 (Navarro 2024a) is included in Appendix F. NRAP-2024-001 documents that during the 2024 annual water level measurements, the water level at well 25017 could not be measured because of an obstruction in the well. The regulatory agencies were notified via email on July 9, 2024 (AECOM 2024a) and NRAP-2024-001 was distributed for review on August 29, 2024. The Army recommended removing well 25017 from the HWL and ELF groundwater monitoring programs since the well is not necessary to meet the requirements of the HWL and ELF Post-Closure Groundwater Monitoring Plans. The NRAP was signed and approved by the regulatory agencies in September of 2024.

2.4 O&M Change Notices

Two OCNs for the HWL and ELF were prepared during this reporting period. Copies of both OCNs are included in Appendix G.

OCN-HWL-2024-002 (Navarro 2024b) and OCN-ELF-2024-002 (Navarro 2024c) changed the HWL PCGMP and ELF PCGMP to eliminate wells 25017 and 25122 from Table 3.1.2-1 and added well 25222 to Table 3.1.2-1. Wells 25017 and 25122 were eliminated from Figure 3.2-1 and well 25222 was added to Figure 3.2-1 of both PCGMPs. These OCNs also added notification protocol for obstructions in wells, or failure to collect water level data. The failure to collect water level measurements and well obstructions was added to Table 3.0-2: Non-Routine Action Trigger Levels in the HWL PCP and ELF PCP. Both OCNs were signed and approved by the regulatory agencies in September of 2024.

3.0 LCS & LDS OPERATIONS AND MONITORING

Quarterly inspections were performed on the HWL and ELF LCS and LDS wastewater conveyance systems in accordance with the *Post-Closure Wastewater Management Plans* (PCWMP), presented in Appendix C of the respective PCPs.

Sump levels for the LCS and LDS sumps, and tank levels in the LS/LF building were recorded monthly in accordance with the HWL and ELF PCWMPs.

Wastewater was sampled from the HWL LCS and LDS sumps in accordance with the HWL PCGMP, presented in Appendix B of the HWL PCP Revision 4 (Navarro 2019). Analytical results and data evaluation for HWL LCS and LDS wastewater sampling are presented in the *HWL Post-Closure Groundwater Monitoring Report* (PCGMR) *Calendar Year 2024*, provided in Appendix E-1 of this report.

The ELF sumps did not require sampling during this reporting period.

3.1 Wastewater Conveyance Systems Inspections and Maintenance

Wastewater conveyance systems inspection dates are shown in Table 3.1-1. Summaries of the inspection results are presented in Tables 3.1-2 and 3.1-3. Inspection documentation is provided in Appendices B-1 and B-2 of this report and Wastewater O&M Reports are provided in Appendices C-1 and C-2 of this report.

Table 3.1-1: Wastewater Conveyance System Inspections

Date	Inspection Type	Note
July 1, 2024	Wastewater Conveyance System	Regularly scheduled quarterly inspection.
October 1, 2024	Wastewater Conveyance System	Regularly scheduled quarterly inspection.
January 2, 2025	Wastewater Conveyance System	Regularly scheduled quarterly inspection.
April 2, 2025	Wastewater Conveyance System	Regularly scheduled quarterly inspection.

Table 3.1-2: HWL Wastewater Conveyance System Observations and Actions

Inspection Item	Observation	Action
Warning signs are not legible (Confined Space, Buried Pipe/Conduit, etc.)	None	N/A
Extreme temperature inside LCS/LDS manholes	None	N/A
Excessive liquid in LCS/LDS manholes	None	N/A
Improper operation/condition of LCS/LDS pumps or instrumentation	LDS3 needs a new motor and pump. LCS4 requires light bulb maintenance for the display. (Inspection Form: 7/1/24)	Repaired in July 2024.
Improper operation/condition of lift station pumps or instrumentation	None	N/A
Excessive liquid in lift station secondary containment	None	N/A
Blockage of leachate collection or leak detection discharge piping	None	N/A
Collapse of leachate collection or leak detection sump riser pipe	None	N/A
LS/LF tank levels are above high level set points.	None	N/A
Indication of leaks in the indoor piping system in the LS/LF.	None	N/A
Indication that the LS/LF secondary containment is damaged or inadequate.	None	N/A
Heating system in the LS/LF is malfunctioning.	None	N/A

Table 3.1-3: ELF Wastewater Conveyance System Observations and Actions

Inspection Item	Observation	Action
Improper operation/condition of instrumentation and valves	None	N/A
Improper operation of leachate collection and leak detection pumps	None	N/A
Excessive liquid in LRCHs or LS/LF.	None	N/A
Blockage of leachate collection leak detection discharge piping	None	N/A
Collapse of leachate collection or leak detection sump riser pipe	None	N/A
Flow meters or level indicators are malfunctioning.	None	N/A
LS/LF tank levels are above high level set points.	None	N/A
Indication of leaks in the indoor piping system in the LRCHs or LS/LF.	None	N/A
Indication that the LS/LF secondary containment is damaged or inadequate.	None	N/A
Heating system in the LRCHs or LS/LF is malfunctioning.	None	N/A

In addition to the quarterly wastewater conveyance system inspections, the following routine inspections, maintenance, and repair activities were performed on the HWL and ELF LCS/LDS components.

- Performed quarterly inspections for grounding and tool safety inspections and first aid kits.
- Performed monthly inspections on emergency lights and fire extinguishers.
- Performed weekly LS/LF tank inspections.
- Transferred wastewater from the HWL LCS/LDS sumps to the Lift Station, and then to the storage tanks in the LS/LF building as needed.
- Clean Harbors collected wastewater for off-site shipment and disposal.
- Pumped the LS/LF floor sump due to storm water accumulation, as necessary.
- Replaced Program Logic Controller batteries in the LS/LF, WP LRCH, and LB LRCH buildings.
- Installed a spare used motor and replaced the probe with a new one in HWL LDS3.

- Installed a new light bulb at the HWL LCS4 display panel for the "motor run" indicator.
- Replaced a blown power fuse in the HWL LCS3 circuit at the Program Logic Controller control cabinet at the Lift Station.
- The HWL LDS3 flow meter had no display; the issue was resolved by swapping the input/output board with one from an old Endress Hauser flow meter.
- Replaced the EPG® controller at the HWL LCS3 display panel.
- Cleaned the probes on LT401 and LT402 and tested the sump alarm at the LS/LF building.
- Installed a new motor for the west heater in the LB LRCH building and installed a new motor for the east heater in the LS/LF building.

3.2 Wastewater Management Quantities

A total of 18,759 gallons of wastewater was pumped out of the HWL sumps between May 2024 and April 2025. That equates to a 4.2 percent decrease in wastewater production compared to the previous period of May 2023 to April 2024 when 19,582 gallons of wastewater were removed from the sumps. The Army expects the overall trend in the HWL wastewater production to decrease in the following years. An annual wastewater production forecast for the HWL through 2065 is provided as Figure 3.2-1.

Navarro samples the leachate from the LS/LF storage tanks annually for waste characterization and to facilitate waste profile approval. Analytical results were reviewed by Navarro staff who determined that Land Disposal Requirements were met. The analytical results were included in the waste profile submitted to the Clean Harbors Deer Trail Landfill Facility located in Deer Trail, Colorado. The Deer Trail facility confirmed that the wastewater was acceptable for disposal at their facility prior to authorizing shipments from RMA. All leachate removed from the HWL during this reporting period was land disposed at the Clean Harbors Deer Trail Landfill Facility.

3.3 LCS/LDS Wastewater Quality

Sump samples were collected when the wastewater levels reached their respective High Level at each of the HWL sumps. All samples were shipped to Applied Research and Development Laboratory in Mount Vernon, Illinois for analysis. Refer to Table 3.3-1 for HWL sump sample dates and triggers.

The ELF sumps were not sampled in 2024 because the wastewater levels were not high enough to require sampling.

Table 3.3-1: HWL LCS & LDS Sump Sample Events (2024 Calendar Year)

Date	Sump							
	LCS1	LDS1	LCS2	LDS2	LCS3	LDS3	LCS4	LDS4
March 2024			High Level	High Level				High Level
April 2024	High Level							
July 2024					High Level	High Level	High Level	
August 2024			High Level					
September 2024	High Level							

The HWL wastewater analytical results and conclusions are available in the 2024 HWL PCGMR, provided in Appendix E-1 of this report. The LCS sample results were consistent with waste placed in the HWL.

The analytical results of samples collected from sump LDS4 in March and from sump LDS3 in July exceeded Watch List Trigger Levels and required regulatory agency notification. These notifications are described in Section 2.3 above, and in the 2024 HWL PCGMR provided in Appendix E-1 of this report. No corrective actions or non-routine actions resulted from the elevated analytical results. Routine monitoring will continue per the requirements of the HWL PCGMP.

It is common for analytes to be detected in HWL LDS sump samples. Typically, the detections are attributed to contaminants in the LCS clay liner material and consolidation water, rather than indications of leaks in the liner system. The soil used to construct the compacted clay liners of the HWL contained low levels of RMA contaminants that only became detectable after they were mobilized in water and analyzed using methods with much lower method reporting limits compared to MRLs for soil sample analyses.

4.0 GROUNDWATER MONITORING

The PCGMPs were implemented as presented in Appendix B of the HWL PCP and ELF PCP. Groundwater monitoring was performed quarterly in 2024. Analytical results and data evaluation for post-closure groundwater sampling performed during the 2024 calendar year are presented in the PCGMRs provided in Appendices E-1 and E-2 of this report. Section 5.3 of this report addresses aspects of groundwater monitoring that are relevant to compliance determination.

The potentiometric surface of the Unconfined Flow System (UFS) in the vicinity of the HWL shows that across the entire Corrective Action Management Unit, groundwater flow is generally to the north and northeast. No significant variations in groundwater flow directions have been identified during post-

closure monitoring, therefore the current monitoring network is sufficient to identify the landfills' potential impacts on groundwater quality.

In the 2023 LGMR (Navarro 2023a), the Army stated that well 25122 was compromised and could not provide the water level data required to support mapping of the potentiometric surface. Therefore, the Army recommended that well 25122 be closed, removed from the monitoring network, and replaced by a new well. Well 25122 was closed in October of 2023 and replacement well 25222 was installed in accordance with the technical requirement of OCN-HWL-2023-001 (Navarro 2023b) and OCN-ELF-2023-001 (Navarro 2023c). These OCNs were not approved by the EPA due to questions regarding the disposal of remediation waste. However, the EPA recommended that well 25222 should be used as intended (EPA 2024). Therefore, well 25222 was added to the groundwater level monitoring networks of the landfills via OCN-HWL-2024-002 (Navarro 2024b) and OCN-ELF-2024-002 (Navarro 2024c) in September of 2024. Quarterly groundwater level data collection began in the third quarter of 2024. Copies of OCN-HWL-2024-002 and OCN-ELF-2024-002 are provided in Appendix G.

5.0 COMPLIANCE DETERMINATION

The HWL and ELF PCPs include compliance standards for Action Leakage Rate (ALR), soil cover thickness loss, and impacts on groundwater quality. Evaluations of landfill performance relative to these compliance standards are provided in the following subsections.

5.1 Action Leakage Rate

The ALR is the liquid flow rate that, when withdrawn from the LDS sumps, warrants follow-up actions. The average daily flow rates (ADFRs) for the HWL and ELF LDS sumps were calculated using monthly flow rate data, then those values were compared with the ALRs identified in the *Post-Closure Action Leakage Rate/Response Action Plans* presented in Appendix D of the HWL PCP and ELF PCP, respectively. HWL ALR Evaluation

5.1.1 HWL ALR Evaluation

The monthly ALR evaluation for each of the four HWL LDS sumps is presented in Table 5.1.1-1. In all cases, the ADFRs of the HWL LDS sumps were much lower than the ALR and the Non-Routine Action trigger level (e.g. 85 percent of the ALR). Hence, the compliance standard and Non-Routine Action trigger levels for HWL leak detection liquids were not exceeded.

Table 5.1.1-1: HWL ALR Evaluation

Month	LDS1		LDS2	
	ADFR (gal./acre/day)	Less Than ALR? (132 gal./acre/day)	ADFR (gal./acre/day)	Less Than ALR? (131 gal./acre/day)
May 2024	0.00	Yes	0.00	Yes
June 2024	0.00	Yes	0.00	Yes
July 2024	0.00	Yes	0.00	Yes
August 2024	0.00	Yes	0.00	Yes
September 2024	0.00	Yes	0.00	Yes
October 2024	0.00	Yes	0.00	Yes
November 2024	0.00	Yes	0.00	Yes
December 2024	0.00	Yes	0.00	Yes
January 2025	0.00	Yes	0.00	Yes
February 2025	0.00	Yes	0.00	Yes
March 2025	0.00	Yes	0.00	Yes
April 2025	0.00	Yes	0.00	Yes

Month	LDS3		LDS4	
	ADFR (gal./acre/day)	Less Than ALR? (131 gal./acre/day)	ADFR (gal./acre/day)	Less Than ALR? (131 gal./acre/day)
May 2024	0.00	Yes	0.00	Yes
June 2024	0.00	Yes	0.00	Yes
July 2024	2.35	Yes	0.00	Yes
August 2024	0.00	Yes	0.00	Yes
September 2024	0.00	Yes	0.00	Yes
October 2024	0.00	Yes	0.00	Yes
November 2024	0.00	Yes	0.00	Yes
December 2024	0.00	Yes	0.00	Yes
January 2025	0.00	Yes	0.00	Yes
February 2025	0.00	Yes	0.00	Yes
March 2025	0.00	Yes	0.00	Yes
April 2025	0.00	Yes	0.00	Yes

The ALR values were not exceeded at any point during the reporting period for any of the HWL LDS sumps. Therefore, the compliance standard was met.

5.1.2 ELF ALR Evaluation

There was no wastewater flow in the ELF LDS sumps during this reporting period, therefore ADFRs were 0.00 gal./acre/day and did not exceed the ALR and the Non-Routine Action trigger levels of 50 and 85 percent of the ALR. Since the ALR values were not exceeded at any point during the reporting period for any of the ELF LDS sumps, the compliance standard was met.

5.2 Soil Cover Thickness Loss

Erosion/settlement monuments were measured on the HWL and ELF during the Type II inspections to quantify soil thickness loss. Soil thickness loss measurements are included in the Type II inspection forms provided in Appendices B-1 and B-2 of this report.

5.2.1 HWL Soil Cover Thickness Loss Evaluation

The measured soil thickness loss for all nine monuments on the HWL in the fall of 2024 and spring of 2025 ranged from 0.0 to 1.75 inches, which is within the historical range of the HWL monuments. These values are less than the Non-Routine Action trigger level of 0.4 feet (or 4.8 inches) and the compliance level of 1.0 foot. Therefore, the compliance standard for soil cover thickness loss was met.

During the reporting period, soil cover thickness loss exhibited the expected seasonal trend, characterized by increased loss during the fall and reduced loss during the spring, with minor deviations. These seasonal fluctuations have been consistently observed across all landfills and cover systems at RMA. The comparatively lower loss values observed in the spring are generally attributed to freeze/thaw cycles, which loosen soil near the surface and result in measurable vertical expansion.

5.2.2 ELF Soil Cover Thickness Loss Evaluation

The measured soil thickness loss for all eight monuments on the ELF in the fall of 2024 and spring of 2025 ranged from 1.0 to 3.0 inches, which is within the historical range of the ELF monuments. These values are less than the Non-Routine Action trigger level of 0.4 feet (or 4.8 inches) and the compliance level of 1.0 foot. Therefore, the compliance standard for soil cover thickness loss was met.

During this reporting period the soil cover thickness loss values followed the same seasonal pattern as described in Section 5.2.1, above.

5.2.3 Monument Survey Evaluation

Each monument's location was surveyed semiannually to assess potential movement of the caps. While there is no compliance standard related to changes in monument position, this information is valuable for assessing the stability of the landfills. Survey data are included in Appendix D of this report. The position of each monument was quantitatively compared to the original location documented in the construction records and the coordinates recorded during the previous survey. This dual comparison

identifies both long-term and short-term movement of each monument. A summary of the evaluations is shown in Table 5.2.3-1.

Table 5.2.3-1: Monument Survey Evaluation

Landfill	Number of Monuments	Long-Term Change in Location (ft)		Short-Term Change in Location (ft)	
		Vertical Average	Horizontal Average	Vertical Average	Horizontal Average
HWL	9	-0.5	0.2	-0.1	0.1
ELF	8	-0.4	0.2	-0.1	0.1

In general, the most significant change in each monument's location has been a decrease in the vertical component since construction was completed. Minor variations, generally less than half a foot, have been recorded in the horizontal plane.

Evaluation of the survey results did not indicate subsidence or creep of the HWL or ELF caps.

5.3 Impacts on Groundwater Quality

5.3.1 HWL Impacts on Groundwater Quality

Dieldrin and lead were the only Indicator Compounds (ICs) detected in the downgradient UFS wells. Neither analyte exceeded its respective 2024 prediction limit.

Trend analysis is performed annually on dieldrin concentrations in well 25194 due to historic detections in the well. Evaluation of dieldrin concentrations in well 25194 using Mann-Kendall trend analysis shows that for data collected from 2015 through 2024, dieldrin concentrations have exhibited a decreasing trend.

Groundwater data and data evaluation are presented in the 2024 HWL PCGMR, provided as Appendix E-1 of this report. The 2024 HWL PCGMR concludes that groundwater quality in the vicinity of the HWL has not been affected by operations, closure, or post-closure O&M of the landfill. Therefore, the compliance standard for impacts on groundwater quality was met.

5.3.2 ELF Impacts on Groundwater Quality

Lead was the only IC detected in the downgradient UFS wells, and all results were below the 2024 prediction limit value.

Groundwater data and data evaluation are presented in the 2024 ELF PCGMR, provided as Appendix E-2 of this report. The 2024 ELF PCGMR concludes that groundwater quality in the vicinity of the ELF has not been affected by operations, closure, or post-closure O&M of the landfill. Therefore, the compliance standard for impacts on groundwater quality was met.

6.0 RECOMMENDATIONS AND CORRECTIVE MEASURES

The O&M of the landfills in accordance with the HWL PCP and ELF PCP was effective, therefore, the Army recommends continuing the routine inspections, monitoring, and maintenance as required by the plans.

As stated in Section 2.3 above, the Army also recommends closing well 26051 and installing a replacement well in the same general area with similar depth and screened interval. Specifics regarding well design and changes to groundwater monitoring networks will be addressed through the OCN process.

The HWL and ELF met all compliance standards; therefore, no corrective measures were necessary, and none are planned for the reporting period of 2026.

7.0 COSTS AND BUDGETS

Table 7.0-1 shows the costs incurred between May 2024 and April 2025, as well as the current budgets established for O&M of the HWL and ELF.

Table 7.0-1: Costs and Budgets

Landfill	Costs		Budgets	
	Incurred	Period	Value	Period
HWL	$251,419	May 2024 – Apr 2025	$358,380	Dec 2024 – Nov 2025
ELF	$136,033	May 2024 – Apr 2025	$211,459	Dec 2024 – Nov 2025
TOTAL	$387,451		$569,839	

8.0 CONCLUSIONS

Based on the information presented in this report, the HWL and ELF were inspected and maintained in accordance with the HWL and ELF PCPs, and both landfills meet all applicable compliance standards. No corrective measures are required.

9.0 REFERENCES

AECOM

2024a (Jul 9) Email sent by Kelly Cable, Subject: FW: Landfills and Covers Notification - Obstruction in Monitoring Well 25017.

2024b (Sep 24) Email sent by Kelly Cable, Subject: FW: Landfills and Covers Notification - Missing Analytical Data for Well 25194.

2024c (Nov 12) Email sent by Kelly Cable, Subject: FW: Final meeting notes October 23.

Army (U.S. Army)

2025a (Apr 17) Email sent by Natalie Rymarz, Subject: Notification for HWL LDS4 Watch List Trigger Level Exceedance.

2025b (Apr 18) Email sent by Natalie Rymarz, Subject: Notification for HWL LDS3 Watch List Trigger Level Exceedance.

2025c (Apr 18) Email sent by Natalie Rymarz, Subject: Landfills and Covers Notification – Obstruction in Monitoring Well 26051.

2025d (May 21) Email sent by Natalie Rymarz, Subject: RMA Landfills & Covers Meeting Notes - 4/22/2025 - [UNCLASSIFIED].

EPA (United States Environmental protection Agency)

2024 (Aug 7) *Letter from David Connolly (EPA) to Scott Greene (Army) regarding comments on the 2024 RCRA Landfills and Groundwater Monitoring Report, Revision 0.*

Navarro (Navarro Research and Engineering, Inc.)

2025 (May 15) NRAP-2025-001.

2024a (Sep 3) NRAP-2024-001.

2024b (Sep 4) OCN-HWL-2024-002.

2024c (Sep 4) OCN-ELF-2024-002.

2023a (Jun 21) *2023 RCRA Landfills and Groundwater Monitoring Report.* Revision 0.

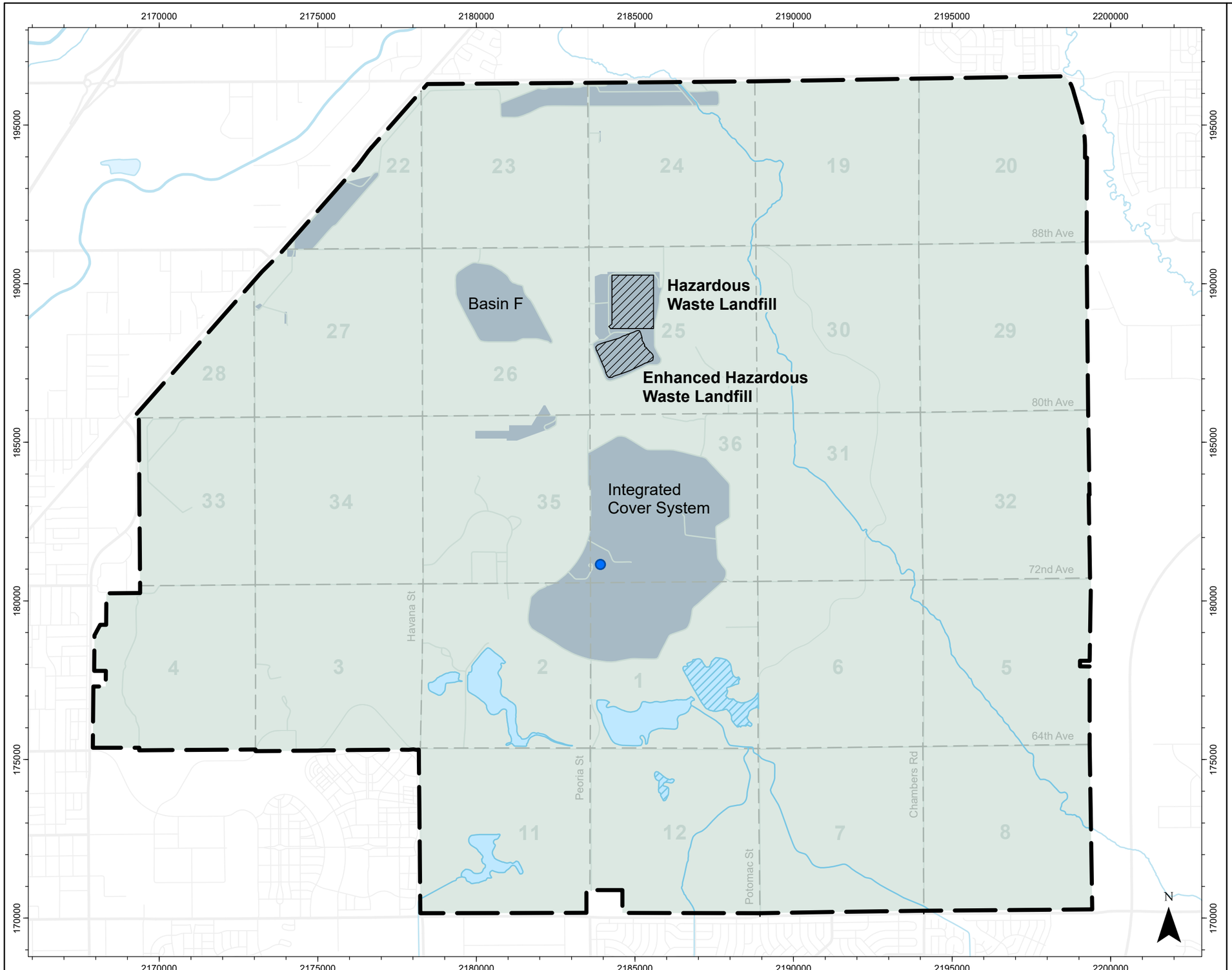
2023b (Sep 13) OCN-HWL-2023-001.

2023c (Sep 13) OCN-ELF-2023-001.

2020 (Apr 2) *Enhanced Hazardous Waste Landfill Post-Closure Plan*. Revision 1.

2019 (Dec 9) *Hazardous Waste Landfill Post-Closure Plan*. Revision 4.

FIGURES



Rocky Mountain Arsenal National Wildlife Refuge
USFWS Maintained Area
Army Maintained Area
Surface Water
Seasonal Surface Water
Landfills
Section Boundaries
On-Post Roads
Off-Post Roads
Rain Gauge

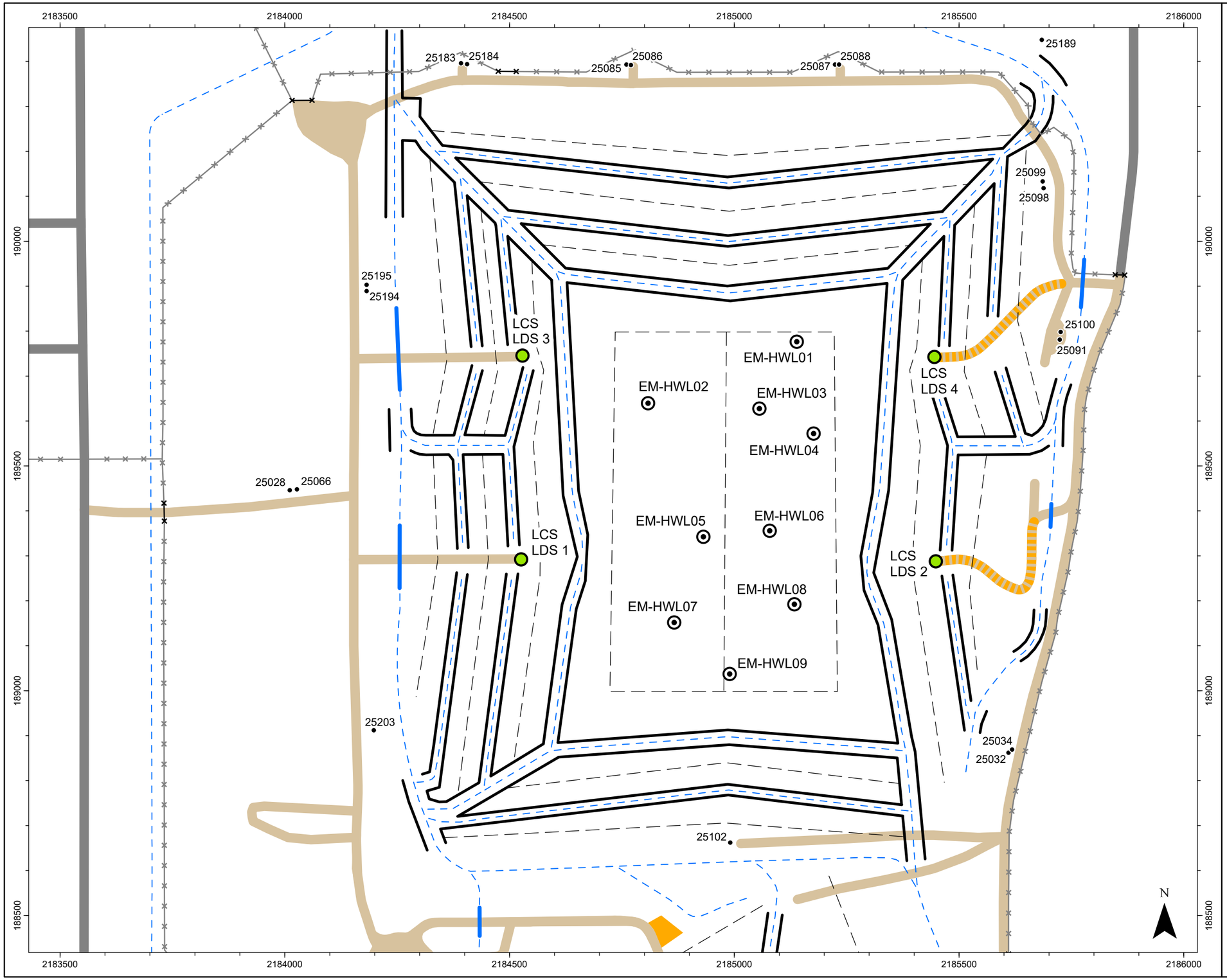
0 0.25 0.5 1 Miles

Rocky Mountain Arsenal
U.S. Army • COMMITTED TO PROTECTION OF THE ENVIRONMENT •

FIGURE 1.0-1

Rocky Mountain Arsenal
Site Location Map

Date: 2025-06-03 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal Final Path: M:\PROJECTS\2025\2025_05_ANNUALCOVERSREPORT [FIG_1_0_1]



Repaired Erosion
Ground Clear Herbicide
Articulated Concrete Block Cannels & Downchutes
Box Culvert
Channel Flow Line
On-Post Road
Gate
Fence
Vantage Path
Erosion/Settlement Monument
LCS/LDS Manhole
Monitoring Well

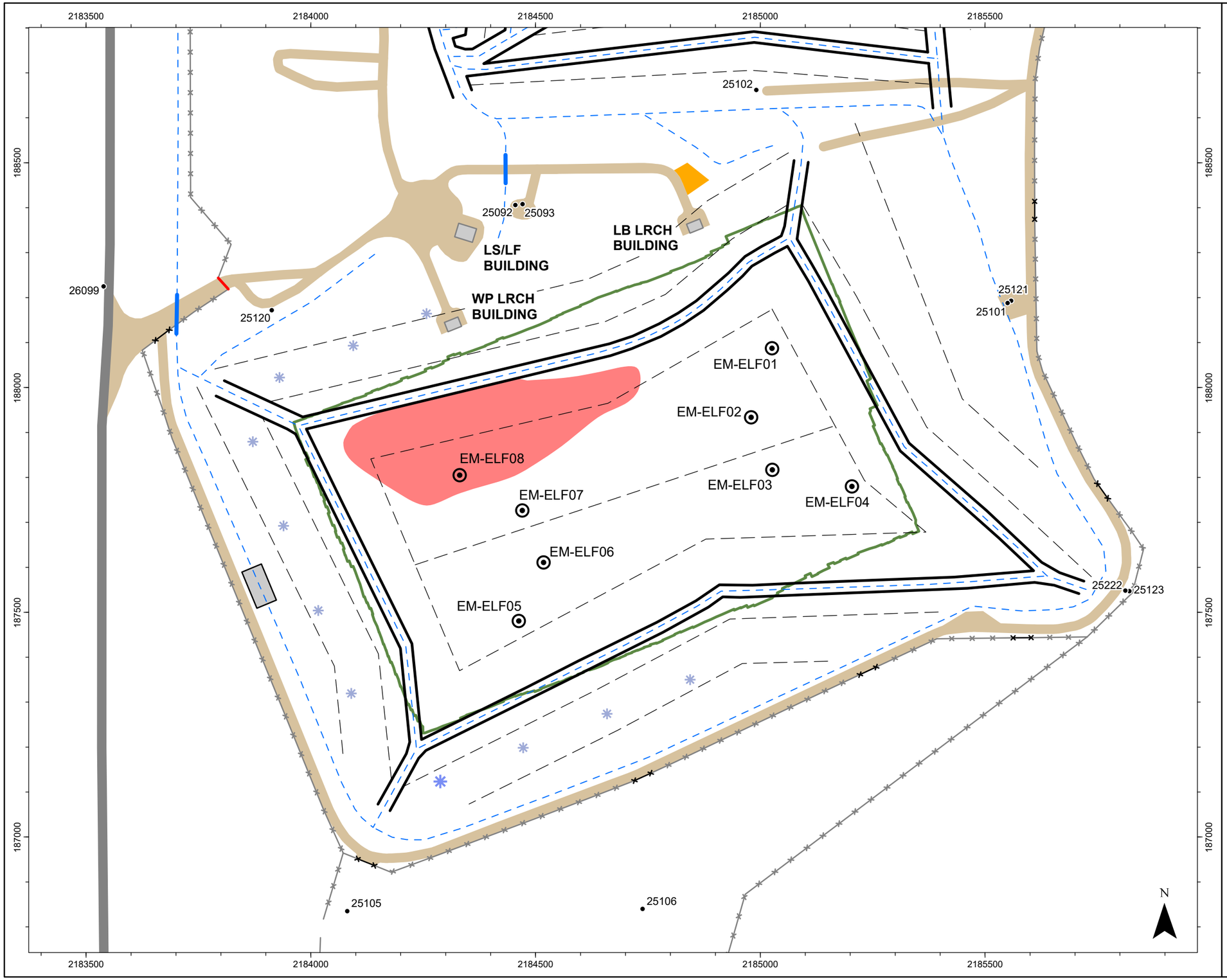
0 125 250 500 Feet

Rocky Mountain Arsenal
U.S. Army • COMMITTED TO PROTECTION OF THE ENVIRONMENT •

FIGURE 2.0-1

Hazardous Waste Landfill Routine Activities Map

Date: 2025-06-03 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal Final Path: M:\PROJECTS\2025\2025_05_ANNUALCOVERSREPORT [FIG_2_0_1]



- Repaired Erosion
- Ground Clear Herbicide
- Mowed
- Repaired Carsonite Marker
- On-Post Building
- Perimeter Channel Articulated Concrete Block
- Articulated Concrete Block Cannels & Downchutes
- Gas Vent
- Box Culvert
- Channel Flow Line
- On-Post Road
- Gate
- Fence
- Cattle Guard
- Vantage Path
- Anchor Trench Outlet
- Erosion/Settlement Monument
- Monitoring Well

0 125 250 500 Feet

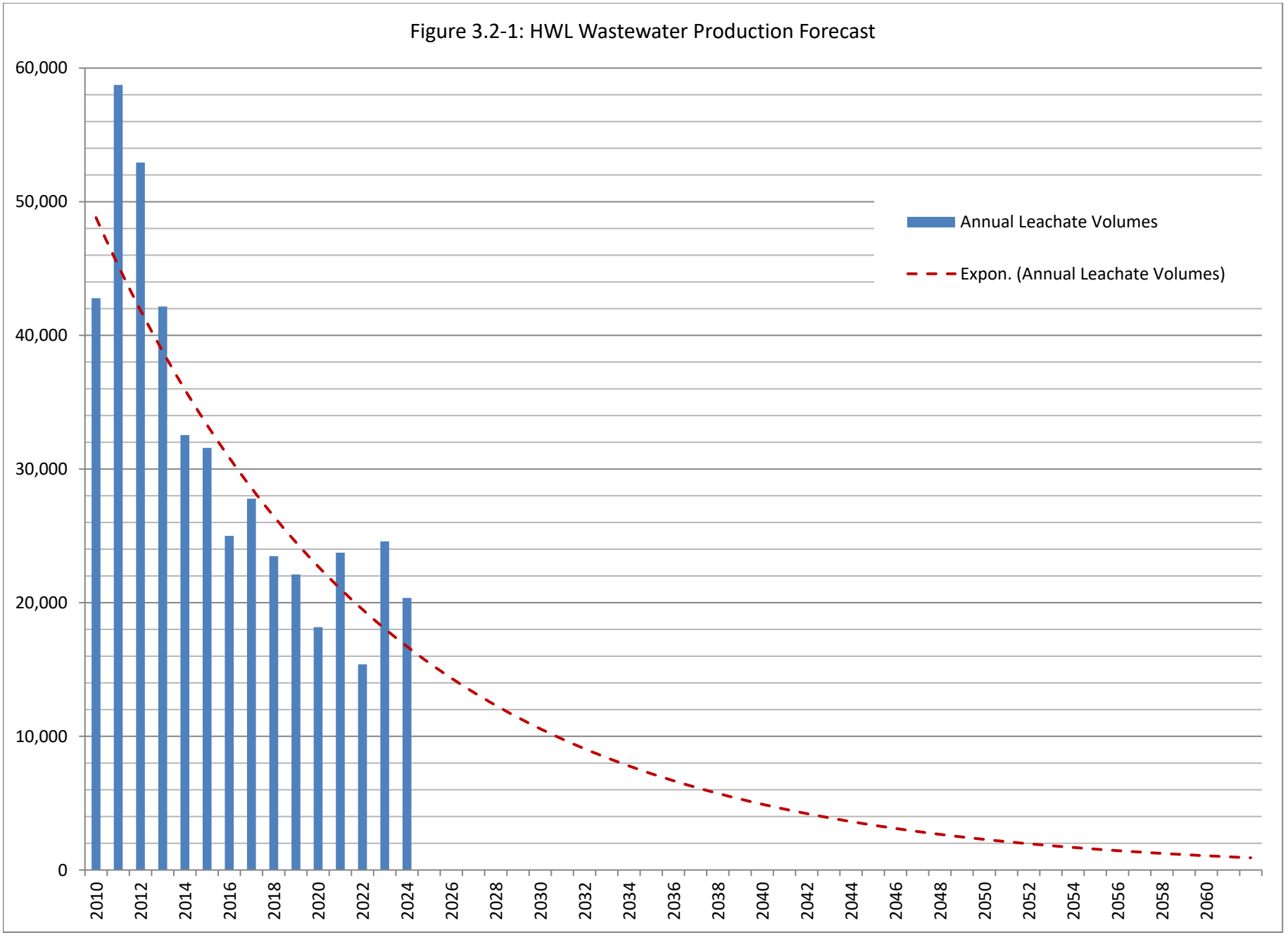
Rocky Mountain Arsenal
U.S. Army • COMMITTED TO PROTECTION OF THE ENVIRONMENT •

FIGURE 2.0-2

Enhanced Hazardous Waste Landfill Routine Activities Map

Date: 2025-06-03 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal Final Path: M:\PROJECTS\2025\2025_05_ANNUALCOVERSREPORT [FIG_2_0_2]

Figure 3.2-1: HWL Wastewater Production Forecast



APPENDICES

A	Precipitation Data
B-1	HWL Inspection Documentation
B-2	ELF Inspection Documentation
C-1	HWL Maintenance Documentation
C-2	ELF Maintenance Documentation
D	Erosion/Settlement Monument Survey Data
E-1	Hazardous Waste Landfill Post-Closure Groundwater Monitoring Report Calendar Year 2024
E-2	Enhanced Hazardous Waste Landfill Post-Closure Groundwater Monitoring Report Calendar Year 2024
F	Notifications and Non-Routine Action Plans
G	Operations and Maintenance Change Notices
H	Responses to Regulatory Agency Comments

Note: Software used to compile this report does not transfer electronic signatures, therefore, electronic forms provided in the following appendices are unsigned. Documentation with electronic signatures is available in the project files.

APPENDIX A

Precipitation Data

Appendix A - Precipitation Data (May 1, 2024 through April 30, 2025)

Note 1: The reporting period for this table is May 1, 2024 through April 30, 2025.

Note 2: Data presented in this table were collected from a rain gauge located on the Lime Basins RCRA-Equivalent Cover in Section 35.

Note 3: This table provides precipitation data for all dates when precipitation was recorded. For dates not shown, there was no recorded precipitation.

Date	Daily Precipitation (in)
May 11, 2024	0.04
May 12, 2024	0.36
May 15, 2024	0.08
May 20, 2024	0.03
May 21, 2024	0.22
May 30, 2024	0.68
May 31, 2024	0.03
June 9, 2024	0.19
June 10, 2024	0.01
June 19, 2024	0.01
June 20, 2024	0.04
June 26, 2024	0.12
June 29, 2024	0.01
July 2, 2024	0.03
July 16, 2024	0.06
July 18, 2024	0.01
July 20, 2024	0.27
July 21, 2024	0.05
July 27, 2024	0.01
July 28, 2024	0.01
August 2, 2024	0.01
August 5, 2024	0.30
August 6, 2024	0.11
August 10, 2024	0.01
August 13, 2024	0.19
August 15, 2024	0.01
August 19, 2024	0.02
August 22, 2024	0.05
August 23, 2024	0.04
September 4, 2024	0.04
September 5, 2024	0.27
September 15, 2024	0.05
September 21, 2024	0.04
September 22, 2024	0.62
October 18, 2024	0.04
October 31, 2024	0.01

Date	Daily Precipitation (in)
November 3, 2024	0.01
November 4, 2024	0.05
November 6, 2024	0.01
November 8, 2024	0.05
November 9, 2024	0.37
November 10, 2024	0.10
November 25, 2024	0.01
November 27, 2024	0.03
November 28, 2024	0.05
November 29, 2024	0.04
December 10, 2024	0.01
December 25, 2024	0.01
December 26, 2024	0.01
January 1, 2025	0.04
January 7, 2025	0.01
January 8, 2025	0.07
January 21, 2025	0.02
January 24, 2025	0.02
January 26, 2025	0.04
January 27, 2025	0.06
January 30, 2025	0.01
February 13, 2025	0.03
February 14, 2025	0.01
February 16, 2025	0.06
February 21, 2025	0.13
March 3, 2025	0.05
March 4, 2025	0.06
March 6, 2025	0.01
March 14, 2025	0.01
March 18, 2025	0.01
March 29, 2025	0.81
March 30, 2025	0.17
April 1, 2025	0.01
April 2, 2025	0.08
April 3, 2025	0.04
April 4, 2025	0.04

Appendix A - Precipitation Data (May 1, 2024 through April 30, 2025)

Date	Daily Precipitation (in)
April 5, 2025	0.01
April 14, 2025	0.08
April 18, 2025	0.14
April 19, 2025	0.14
April 25, 2025	0.03
April 30, 2025	0.01
Total:	**7.02"**

APPENDIX B-1

HWL Inspection Documentation

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

Inspector's Names: K. Hoffman, J. Chisholm	**Inspection Date(s):** 5/1/24
Inspection Type: ☐ Type I ☑ Post-Storm	
Drive-around Post-Storm Inspection Date (taken from Logbook): 4/30/24 *Note: Post-storm event inspection items are indicated with a * next to the Inspection Item number.*	**Date(s) of Significant Storm Event:** 4/27/24 **Total Precipitation (in):** 1.27
Inspection Conditions: Previous 24-hour precipitation: 0	Weather Conditions: windy, partly sunny, 50's
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat Or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.0 Surface Conditions								
1.1* Erosion rills or gullies	○	◉	○	○	○	◉	none	
1.2* Sheet erosion or plant pedestalling	○	◉	○	○	○	◉	none	
1.3* Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	○	◉	○	○	○	◉	none	
1.4 Surface salts, crusting, or evidence of compaction	○	○	◉	○	○	◉	N/A	
1.5 Excessive animal trails or tire tracks/ruts	○	○	◉	○	○	◉	N/A	
1.6 Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	○	○	◉	○	○	◉	N/A	

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.7* Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	○	◉	○	○	○	◉	none	
1.8 Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	○	○	◉	○	○	◉	N/A	
2.0 Vegetative Cover								
2.1 Bare area or areas of poor growth greater than 100 square feet	○	○	◉	○	○	◉	N/A	
2.2 Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	○	○	◉	○	○	◉	N/A	
3.0 Engineering and Access Controls								
3.1 The perimeter fence is damaged	○	○	◉	○	○	◉	N/A	
3.2 Debris has collected along the perimeter fence	○	○	◉	○	○	◉	N/A	
3.3 Warning signs are not legible from 25 feet	○	○	◉	○	○	◉	N/A	
3.4* Damage to the Access Road such as potholes, washouts or burrowing	○	◉	○	○	○	◉	none	

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
4.0 LCS/LDS and LS/LF Monitoring								
4.1* Erosion rills or gullies, or burrowing animal holes around the LCS/LDS manholes	○	◉	○	○	○	◉	none	
4.2 LS/LF Building secondary containment is damaged or not intact. Storage tanks are leaking.	○	○	◉	○	○	◉	N/A	
5.0 Groundwater Monitoring								
5.1 Damage to monitoring wells	○	○	◉	○	○	◉	N/A	
6.0 Surface Water Controls								
6.1* Impeded drainage or ponding in the channel	○	◉	○	○	○	◉	none	
6.2* Excessive siltation in the channel	○	◉	○	○	○	◉	none	
6.3* Debris present in the channel	○	◉	○	○	○	◉	none	
6.4* Erosion rills or gullies in the channel	○	◉	○	○	○	◉	none	
6.5 Areas of degraded Articulated Concrete Block (ACB) or extensively cracked grout around ACB	○	○	◉	○	○	◉	N/A	
6.6* Subsidence or undercutting of the downchutes or perimeter drainage channels	○	◉	○	○	○	◉	none	
6.7 Damaged box culverts	○	○	◉	○	○	◉	N/A	

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

Inspection Notes:	For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

No other inspection notes.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

Inspector's Names: K. Hoffman, V. Stewart	**Inspection Date(s):** 7/3/24
Inspection Type: ☑ Type I ☐ Post-Storm	
Drive-around Post-Storm Inspection Date (taken from Logbook): N/A *Note: Post-storm event inspection items are indicated with a * next to the Inspection Item number.*	**Date(s) of Significant Storm Event:** N/A **Total Precipitation (in):** N/A
Inspection Conditions: Previous 24-hour precipitation: 0	Weather Conditions: sunny, calm winds, 80's
Attachments: ☑ Photographs ☑ Figures ☐ Other	

Inspection Item	Condition Present			Repeat Or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.0 Surface Conditions								
1.1* Erosion rills or gullies	○	◉	○	○	○	◉	none	
1.2* Sheet erosion or plant pedestalling	○	◉	○	○	○	◉	none	
1.3* Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	○	◉	○	○	○	◉	none	
1.4 Surface salts, crusting, or evidence of compaction	○	◉	○	○	○	◉	none	
1.5 Excessive animal trails or tire tracks/ruts	○	◉	○	○	○	◉	none	
1.6 Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	○	◉	○	○	○	◉	none	

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.7* Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	○	◉	○	○	○	◉	none	
1.8 Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	○	◉	○	○	○	◉	none	
2.0 Vegetative Cover								
2.1 Bare area or areas of poor growth greater than 100 square feet	○	◉	○	○	○	◉	none	
2.2 Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	○	◉	○	○	○	◉	none	
3.0 Engineering and Access Controls								
3.1 The perimeter fence is damaged	○	◉	○	○	○	◉	none	
3.2 Debris has collected along the perimeter fence	○	◉	○	○	○	◉	none	
3.3 Warning signs are not legible from 25 feet	○	◉	○	○	○	◉	none	
3.4* Damage to the Access Road such as potholes, washouts or burrowing	◉	○	○	○	◉	○	Note 1.	Repaired November 2024.

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

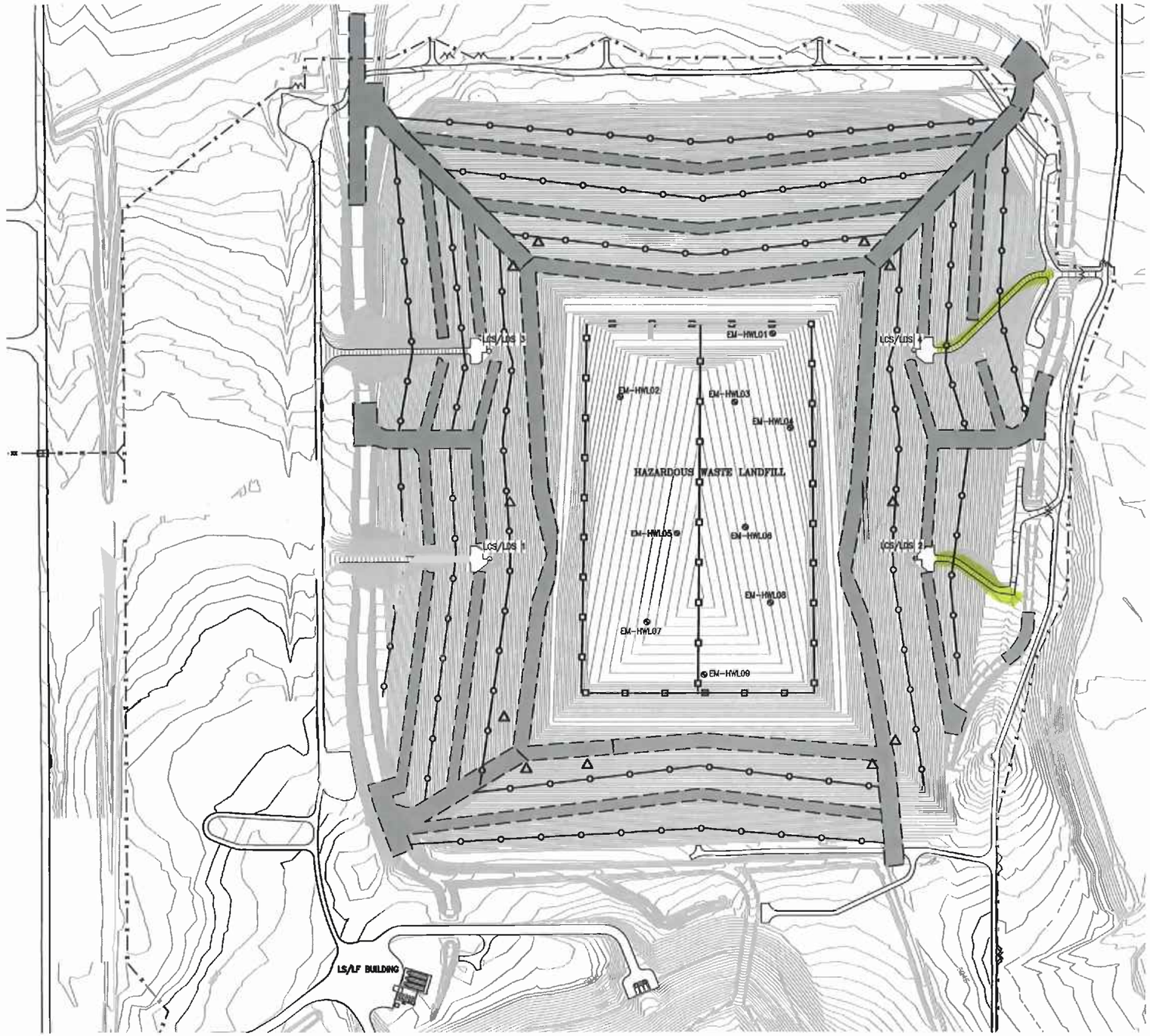
Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
4.0 LCS/LDS and LS/LF Monitoring								
4.1* Erosion rills or gullies, or burrowing animal holes around the LCS/LDS manholes	○	◉	○	○	○	◉	none	
4.2 LS/LF Building secondary containment is damaged or not intact. Storage tanks are leaking.	○	◉	○	○	○	◉	none	
5.0 Groundwater Monitoring								
5.1 Damage to monitoring wells	○	◉	○	○	○	◉	none	
6.0 Surface Water Controls								
6.1* Impeded drainage or ponding in the channel	○	◉	○	○	○	◉	none	
6.2* Excessive siltation in the channel	○	◉	○	○	○	◉	none	
6.3* Debris present in the channel	○	◉	○	○	○	◉	none	
6.4* Erosion rills or gullies in the channel	○	◉	○	○	○	◉	none	
6.5 Areas of degraded Articulated Concrete Block (ACB) or extensively cracked grout around ACB	○	◉	○	○	○	◉	none	
6.6* Subsidence or undercutting of the downchutes or perimeter drainage channels	○	◉	○	○	○	◉	none	
6.7 Damaged box culverts	○	◉	○	○	○	◉	none	

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

Note 1: Erosion noted on the two east manhole access roads for LCS/LDS 2 and LCS/LDS 4. See attached figure for location information and attached Photo 1.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name: Michael W. Jones	**Signature and Date:**



LEGEND:

- UPPER VANTAGE PATHS FOR MONTHLY AND SEMIANNUAL INSPECTIONS
- LOWER VANTAGE PATH FOR SEMIANNUAL INSPECTIONS
- PERIMETER FENCE/ARMY MAINTAINED AREA BOUNDARY
- ROAD
- CHANNELS AND DOWNCHUTES
- EROSION/SETTLEMENT MONUMENT (EM-HWL08)
- SURVEY MONUMENTS
- EROSION PRESENT

0 120 240
Scale In Feet

ROCKY MOUNTAIN ARSENAL
COMMERCE CITY, COLORADO

NAVARRO Research and Engineering, Inc.

PROJECT NAME
HWL POST-CLOSURE PLAN

TITLE
LOCATION OF CAP FEATURES

CAD FILE:	DATE	FIGURE NUMBER
FugSOP-HWL001-1.dwg	07.29.19	SPO HWL 001-1

S:\G PROJECTS\ANNUAL COVERS REPORT 2019\FigureSOP-HWL001-1.dwg



Photo 1: The erosion present on the HWL LCS/LDS 4 manhole access road.

Form SOP HWL 001-2
HWL Cap Type II Inspection Form

Inspector's Names: K. Hoffman, V. Stewart	**Inspection Date(s):** 10/2/24
Inspection Type: ☑ Type II ☐ Post-Storm	
Drive-around Post-Storm Inspection Date (taken from Logbook): N/A *Note: Post-storm event inspection items are indicated with a * next to the Inspection Item number.*	**Date(s) of Significant Storm Event:** N/A **Total Precipitation (in):** Not inpsected during this inspectior
Inspection Conditions: Previous 24-hour precipitation: 0	Weather Conditions: sunny, calm winds, warm
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.0 Surface Conditions								
1.1* Erosion rills or gullies	○	◉	○	○	○	◉	none	
1.2* Sheet erosion or plant pedestalling	○	◉	○	○	○	◉	none	
1.3* Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	○	◉	○	○	○	◉	none	
1.4 Surface salts, crusting, or evidence of compaction	○	◉	○	○	○	◉	none	
1.5 Excessive animal trails or tire tracks/ruts	○	◉	○	○	○	◉	none	
1.6 Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	○	◉	○	○	○	◉	none	

Form SOP HWL 001-2
HWL Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.7* Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	○	◉	○	○	○	◉	none	
1.8 Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	○	◉	○	○	○	◉	none	
2.0 Vegetative Cover								
2.1 Bare area or areas of poor growth greater than 100 square feet	○	◉	○	○	○	◉	none	
2.2 Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	○	◉	○	○	○	◉	none	
2.3 Deep rooted, noxious, or undesirable weeds	○	◉	○	○	○	◉	none	
3.0 Engineering and Access Controls								
3.1 The perimeter fence is damaged	○	◉	○	○	○	◉	none	
3.2 Debris has collected along the perimeter fence	○	◉	○	○	○	◉	none	
3.3 Warning signs are not legible from 25 feet	○	◉	○	○	○	◉	none	
3.4* Damage to the Access Road such as potholes, washouts or burrowing	◉	○	○	○	◉	○	Note 1.	Repaired November 2024.

Form SOP HWL 001-2
HWL Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
3.5 Cap perimeter survey monuments appear to be disturbed (Inspect every five years, in conjunction with the CERCLA Five Year Review for legibility and to confirm record locations)	○	○	◉	○	○	◉	Not inspected during this inspection.	
4.0 LCS/LDS and LS/LF Monitoring								
4.1* Erosion rills or gullies, or burrowing animal holes around the LCS/LDS manholes	○	◉	○	○	○	◉	none	
4.2 LS/LF Building secondary containment is damaged or not intact. Storage tanks are leaking.	○	◉	○	○	○	◉	none	
5.0 Groundwater Monitoring								
5.1 Damage to monitoring wells	○	◉	○	○	○	◉	none	
6.0 Surface Water Controls								
6.1* Impeded drainage or ponding in the channel or downchute	○	◉	○	○	○	○	none	
6.2* Excessive siltation in the channel or downchute	○	◉	○	○	○	◉	none	
6.3* Debris present in the channel or downchute	○	◉	○	○	○	◉	none	
6.4* Erosion rills or gullies in the channel or downchute	○	◉	○	○	○	◉	none	

Form SOP HWL 001-2
HWL Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
6.5 Areas of degraded Articulated Concrete Block (ACB) or extensively cracked grout around ACB	○	◉	○	○	○	◉	none	
6.6* Subsidence or undercutting of the downchutes or perimeter drainage channels	○	◉	○	○	○	◉	none	
6.7 Damaged box culverts	○	◉	○	○	○	◉	none	

Inspection Item	EM-HWL01	EM-HWL02	EM-HWL03	EM-HWL04	EM-HWL05	EM-HWL06	EM-HWL07	EM-HWL08	EM-HWL09
7.0 Erosion/Settlement Monuments: *Inspect monuments for damage and legibility, and record the soil thickness loss, if any.*									
7.1 Monument is damaged or illegible *Check all that apply.*	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.2 Measured Soil Thickness Loss (inches)	1	1.5	1.75	0.25	0.5	1	0.25	0	1.75

Form SOP HWL 001-2
HWL Cap Type II Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

Note 1: In July 2024, erosion was noted on the two east manhole access roads for LCS/LDS 2 and LCS/LDS 4. These areas have not been repaired.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name: Michael W. Jones	**Signature and Date:**

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

Inspector's Names: K. Hoffman, V. Stewart, J. Chisholm	**Inspection Date(s):** 2/5/25
Inspection Type: ☑ Type I ☐ Post-Storm	
Drive-around Post-Storm Inspection Date (taken from Logbook): N/A *Note: Post-storm event inspection items are indicated with a * next to the Inspection Item number.*	**Date(s) of Significant Storm Event:** N/A **Total Precipitation (in):** N/A
Inspection Conditions: Previous 24-hour precipitation: 0	Weather Conditions: sunny, calm winds, 30's
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat Or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.0 Surface Conditions								
1.1* Erosion rills or gullies	○	◉	○	○	○	◉	none	
1.2* Sheet erosion or plant pedestalling	○	◉	○	○	○	◉	none	
1.3* Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	○	◉	○	○	○	◉	none	
1.4 Surface salts, crusting, or evidence of compaction	○	◉	○	○	○	◉	none	
1.5 Excessive animal trails or tire tracks/ruts	○	◉	○	○	○	◉	none	
1.6 Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	○	◉	○	○	○	◉	none	

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.7* Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	○	◉	○	○	○	◉	none	
1.8 Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	○	◉	○	○	○	◉	none	
2.0 Vegetative Cover								
2.1 Bare area or areas of poor growth greater than 100 square feet	○	◉	○	○	○	◉	none	
2.2 Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	○	◉	○	○	○	◉	none	
3.0 Engineering and Access Controls								
3.1 The perimeter fence is damaged	○	◉	○	○	○	◉	none	
3.2 Debris has collected along the perimeter fence	○	◉	○	○	○	◉	none	
3.3 Warning signs are not legible from 25 feet	○	◉	○	○	○	◉	none	
3.4* Damage to the Access Road such as potholes, washouts or burrowing	○	◉	○	○	○	◉	none	

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
4.0 LCS/LDS and LS/LF Monitoring								
4.1* Erosion rills or gullies, or burrowing animal holes around the LCS/LDS manholes	○	◉	○	○	○	◉	none	
4.2 LS/LF Building secondary containment is damaged or not intact. Storage tanks are leaking.	○	◉	○	○	○	◉	none	
5.0 Groundwater Monitoring								
5.1 Damage to monitoring wells	○	◉	○	○	○	◉	none	
6.0 Surface Water Controls								
6.1* Impeded drainage or ponding in the channel	○	◉	○	○	○	◉	none	
6.2* Excessive siltation in the channel	○	◉	○	○	○	◉	none	
6.3* Debris present in the channel	○	◉	○	○	○	◉	none	
6.4* Erosion rills or gullies in the channel	○	◉	○	○	○	◉	none	
6.5 Areas of degraded Articulated Concrete Block (ACB) or extensively cracked grout around ACB	○	◉	○	○	○	◉	none	
6.6* Subsidence or undercutting of the downchutes or perimeter drainage channels	○	◉	○	○	○	◉	none	
6.7 Damaged box culverts	○	◉	○	○	○	◉	none	

Form SOP HWL 001-1
HWL Cap Type I Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

This inspection was moved to February due to inclement weather and snow covered inspection areas during January.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

Form SOP HWL 001-2
HWL Cap Type II Inspection Form

Inspector's Names: K. Hoffman, N. Rymarz	**Inspection Date(s):** 4/8/25
Inspection Type: ☑ Type II ☐ Post-Storm	
Drive-around Post-Storm Inspection Date (taken from Logbook): N/A *Note: Post-storm event inspection items are indicated with a * next to the Inspection Item number.*	**Date(s) of Significant Storm Event:** N/A **Total Precipitation (in):** N/A
Inspection Conditions: Previous 24-hour precipitation: 0	Weather Conditions: sunny, calm winds, 70's
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.0 Surface Conditions								
1.1* Erosion rills or gullies	○	◉	○	○	○	◉	none	
1.2* Sheet erosion or plant pedestalling	○	◉	○	○	○	◉	none	
1.3* Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	○	◉	○	○	○	◉	none	
1.4 Surface salts, crusting, or evidence of compaction	○	◉	○	○	○	◉	none	
1.5 Excessive animal trails or tire tracks/ruts	○	◉	○	○	○	◉	none	
1.6 Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	○	◉	○	○	○	◉	none	

Form SOP HWL 001-2
HWL Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.7* Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	○	◉	○	○	○	◉	none	
1.8 Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	○	◉	○	○	○	◉	none	
2.0 Vegetative Cover								
2.1 Bare area or areas of poor growth greater than 100 square feet	○	◉	○	○	○	◉	none	
2.2 Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	○	◉	○	○	○	◉	none	
2.3 Deep rooted, noxious, or undesirable weeds	○	◉	○	○	○	◉	none	
3.0 Engineering and Access Controls								
3.1 The perimeter fence is damaged	○	◉	○	○	○	◉	none	
3.2 Debris has collected along the perimeter fence	○	◉	○	○	○	◉	none	
3.3 Warning signs are not legible from 25 feet	○	◉	○	○	○	◉	none	
3.4* Damage to the Access Road such as potholes, washouts or burrowing	○	◉	○	○	○	◉	none	

Form SOP HWL 001-2
HWL Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
3.5 Cap perimeter survey monuments appear to be disturbed (Inspect every five years, in conjunction with the CERCLA Five Year Review for legibility and to confirm record locations)	○	○	◉	○	○	◉	Note 1.	
4.0 LCS/LDS and LS/LF Monitoring								
4.1* Erosion rills or gullies, or burrowing animal holes around the LCS/LDS manholes	○	◉	○	○	○	◉	none	
4.2 LS/LF Building secondary containment is damaged or not intact. Storage tanks are leaking.	○	◉	○	○	○	◉	none	
5.0 Groundwater Monitoring								
5.1 Damage to monitoring wells	○	◉	○	○	○	◉	none	
6.0 Surface Water Controls								
6.1* Impeded drainage or ponding in the channel or downchute	○	◉	○	○	○	◉	none	
6.2* Excessive siltation in the channel or downchute	○	◉	○	○	○	◉	none	
6.3* Debris present in the channel or downchute	○	◉	○	○	○	◉	none	
6.4* Erosion rills or gullies in the channel or downchute	○	◉	○	○	○	◉	none	

Form SOP HWL 001-2
HWL Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
6.5 Areas of degraded Articulated Concrete Block (ACB) or extensively cracked grout around ACB	○	◉	○	○	○	◉	none	
6.6* Subsidence or undercutting of the downchutes or perimeter drainage channels	○	◉	○	○	○	◉	none	
6.7 Damaged box culverts	○	◉	○	○	○	◉	none	

Inspection Item	EM-HWL01	EM-HWL02	EM-HWL03	EM-HWL04	EM-HWL05	EM-HWL06	EM-HWL07	EM-HWL08	EM-HWL09
7.0 Erosion/Settlement Monuments: *Inspect monuments for damage and legibility, and record the soil thickness loss, if any.*									
7.1 Monument is damaged or illegible *Check all that apply.*	☐	☐	☐	☐	☐	☐	☐	☐	☐
7.2 Measured Soil Thickness Loss (inches)	1.25	1.5	1.75	0.25	0.25	1	0.5	0	1.75

Form SOP HWL 001-2
HWL Cap Type II Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

Note 1: The Cap Perimeter Survey Monuments will be inspected during 2025, but were not inspected as part of this Type II inspection.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

Form 3.1.3-1
HWL LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspector's Names: K. Hoffman	**Inspection Date(s):** 7/1/2024
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1 Warning signs are not legible (Confined Space, Buried Pipe/Conduit, etc.)	○	◉	○	○	○	◉		
2 Extreme temperature inside LCS/LDS manholes	○	◉	○	○	○	◉		
3 Excessive liquid in LCS/LDS manholes	○	◉	○	○	○	◉		
4 Improper operation/condition of LCS/LDS pumps or instrumentation	◉	○	○	○	◉	○	Note 1.	Repaired in July.
5 Improper operation/condition of lift station pumps or instrumentation	○	◉	○	○	○	◉		
6 Excessive liquid in lift station secondary containment	○	◉	○	○	○	◉		
7 Blockage of leachate collection or leak detection discharge piping	○	◉	○	○	○	◉		
8 Collapse of leachate collection or leak detection sump riser pipe	○	◉	○	○	○	◉		
9 LS/LF tank levels are above high level set points.	○	◉	○	○	○	◉		
10 Indication of leaks in the indoor piping system in the LS/LF.	○	◉	○	○	○	◉		
11 Indication that the LS/LF secondary containment is damaged or inadequate.	○	◉	○	○	○	◉		
12 Heating system in the LS/LF is malfunctioning.	○	◉	○	○	○	◉		

Form 3.1.3-1
HWL LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

Note 1: LDS3 sump needs a new motor and pump. LCS4 requires light bulb maintenance for the display.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name: Michael W. Jones	**Signature and Date:**

Form 3.1.3-1
HWL LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspector's Names: K. Hoffman	**Inspection Date(s):** 10/1/24
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1 Warning signs are not legible (Confined Space, Buried Pipe/Conduit, etc.)	○	◉	○	○	○	◉		
2 Extreme temperature inside LCS/LDS manholes	○	◉	○	○	○	◉		
3 Excessive liquid in LCS/LDS manholes	○	◉	○	○	○	◉		
4 Improper operation/condition of LCS/LDS pumps or instrumentation	○	◉	○	○	○	◉		
5 Improper operation/condition of lift station pumps or instrumentation	○	◉	○	○	○	◉		
6 Excessive liquid in lift station secondary containment	○	◉	○	○	○	◉		
7 Blockage of leachate collection or leak detection discharge piping	○	◉	○	○	○	◉		
8 Collapse of leachate collection or leak detection sump riser pipe	○	◉	○	○	○	◉		
9 LS/LF tank levels are above high level set points.	○	◉	○	○	○	◉		
10 Indication of leaks in the indoor piping system in the LS/LF.	○	◉	○	○	○	◉		
11 Indication that the LS/LF secondary containment is damaged or inadequate.	○	◉	○	○	○	◉		
12 Heating system in the LS/LF is malfunctioning.	○	◉	○	○	○	◉		

Form 3.1.3-1
HWL LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

None.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

Form 3.1.3-1
HWL LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspector's Names: Kim Hoffman	**Inspection Date(s):** 1/2/25
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1 Warning signs are not legible (Confined Space, Buried Pipe/Conduit, etc.)	○	◉	○	○	○	◉		
2 Extreme temperature inside LCS/LDS manholes	○	◉	○	○	○	◉		
3 Excessive liquid in LCS/LDS manholes	○	◉	○	○	○	◉		
4 Improper operation/condition of LCS/LDS pumps or instrumentation	○	◉	○	○	○	◉		
5 Improper operation/condition of lift station pumps or instrumentation	○	◉	○	○	○	◉		
6 Excessive liquid in lift station secondary containment	○	◉	○	○	○	◉		
7 Blockage of leachate collection or leak detection discharge piping	○	◉	○	○	○	◉		
8 Collapse of leachate collection or leak detection sump riser pipe	○	◉	○	○	○	◉		
9 LS/LF tank levels are above high level set points.	○	◉	○	○	○	◉		
10 Indication of leaks in the indoor piping system in the LS/LF.	○	◉	○	○	○	◉		
11 Indication that the LS/LF secondary containment is damaged or inadequate.	○	◉	○	○	○	◉		
12 Heating system in the LS/LF is malfunctioning.	○	◉	○	○	○	◉		

Form 3.1.3-1
HWL LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

No other inspection notes.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

Form 3.1.3-1
HWL LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspector's Names: Kim Hoffman	**Inspection Date(s):** 4/2/25
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1 Warning signs are not legible (Confined Space, Buried Pipe/Conduit, etc.)	○	◉	○	○	○	◉	none	
2 Extreme temperature inside LCS/LDS manholes	○	◉	○	○	○	◉	none	
3 Excessive liquid in LCS/LDS manholes	○	◉	○	○	○	◉	none	
4 Improper operation/condition of LCS/LDS pumps or instrumentation	○	◉	○	○	○	◉	none	
5 Improper operation/condition of lift station pumps or instrumentation	○	◉	○	○	○	◉	none	
6 Excessive liquid in lift station secondary containment	○	◉	○	○	○	◉	none	
7 Blockage of leachate collection or leak detection discharge piping	○	◉	○	○	○	◉	none	
8 Collapse of leachate collection or leak detection sump riser pipe	○	◉	○	○	○	◉	none	
9 LS/LF tank levels are above high level set points.	○	◉	○	○	○	◉	none	
10 Indication of leaks in the indoor piping system in the LS/LF.	○	◉	○	○	○	◉	none	
11 Indication that the LS/LF secondary containment is damaged or inadequate.	○	◉	○	○	○	◉	none	
12 Heating system in the LS/LF is malfunctioning.	○	◉	○	○	○	◉	none	

Form 3.1.3-1
HWL LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

No other inspection notes.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

APPENDIX B-2

ELF Inspection Documentation

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspector's Names: K. Hoffman, J. Chisholm	**Inspection Date(s):** 5/1/24
Inspection Type: ☐ Type I ☑ Post-Storm	
Drive-around Post-Storm Inspection Date (taken from Logbook): 4/30/24 *Note: Post-storm event inspection items are indicated with a * next to the Inspection Item number.*	**Date(s) of Significant Storm Event:** 4/27/24 **Total Precipitation (in):** 1.27
Inspection Conditions: Previous 24-hour precipitation: 0	Weather Conditions: windy, mostly sunny, 50's
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.0 Surface Conditions								
1.1* Erosion rills or gullies	○	◉	○	○	○	◉	none	
1.2* Sheet erosion or plant pedestalling	○	◉	○	○	○	◉	none	
1.3* Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	○	◉	○	○	○	◉	none	
1.4 Surface salts, crusting, or evidence of compaction	○	○	◉	○	○	◉	N/A	
1.5 Excessive animal trails or tire tracks/ruts	○	○	◉	○	○	◉	N/A	
1.6 Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	○	○	◉	○	○	◉	N/A	

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.7* Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	○	◉	○	○	○	◉	none	
1.8 Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	○	○	◉	○	○	◉	N/A	
1.9 Anchor Trench Drain outfalls exhibit flow, erosion, seepage, moisture or bare/ sparse vegetation.	○	○	◉	○	○	◉	N/A	N/A
2.0 Vegetative Cover								
2.1 Bare area or areas of poor growth greater than 100 square feet	○	○	◉	○	○	◉	N/A	
2.2 Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	○	○	◉	○	○	◉	N/A	
3.0 Engineering and Access Controls								
3.1 The perimeter fence is damaged	○	○	◉	○	○	◉	N/A	
3.2 Debris has collected along the perimeter fence	○	○	◉	○	○	◉	N/A	
3.3 Warning signs are not legible from 25 feet	○	○	◉	○	○	◉	N/A	
3.4* Damage to the Access Road such as potholes, washouts or burrowing	○	◉	○	○	○	◉	none	

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
4.0 LRCH and LS/LF Monitoring								
4.1* Erosion rills or gullies, or burrowing animal holes around the LRCH Buildings	○	◉	○	○	○	◉	none	
4.2 LS/LF Building secondary containment is damaged or not intact. Storage tanks are leaking.	○	○	◉	○	○	◉	N/A	
5.0 Groundwater Monitoring								
5.1 Damage to monitoring wells	○	○	◉	○	○	◉	N/A	
6.0 Surface Water Controls								
6.1* Impeded drainage or ponding in the channel	○	◉	○	○	○	◉	none	
6.2* Excessive siltation in the channel	○	◉	○	○	○	◉	none	
6.3* Debris present in the channel	○	◉	○	○	○	◉	none	
6.4* Erosion rills or gullies in the channel	○	◉	○	○	○	◉	none	
6.5 Areas of degraded Articulated Concrete Block (ACB) or extensively cracked grout around ACB	○	○	◉	○	○	◉	N/A	
6.6* Subsidence or undercutting of the downchutes or perimeter drainage channels	○	◉	○	○	○	◉	none	
6.7 Damaged box culverts	○	○	◉	○	○	◉	N/A	

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspection Notes:	For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

No other inspection notes.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspector's Names: K. Hoffman, V. Stewart	**Inspection Date(s):** 7/3/24
Inspection Type: ☑ Type I ☐ Post-Storm	
Drive-around Post-Storm Inspection Date (taken from Logbook): N/A *Note: Post-storm event inspection items are indicated with a * next to the Inspection Item number.*	**Date(s) of Significant Storm Event:** N/A **Total Precipitation (in):** N/A
Inspection Conditions: Previous 24-hour precipitation: 0	Weather Conditions: sunny, calm winds, 80's
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.0 Surface Conditions								
1.1* Erosion rills or gullies	○	◉	○	○	○	◉	none	
1.2* Sheet erosion or plant pedestalling	○	◉	○	○	○	◉	none	
1.3* Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	○	◉	○	○	○	◉	none	
1.4 Surface salts, crusting, or evidence of compaction	○	◉	○	○	○	◉	none	
1.5 Excessive animal trails or tire tracks/ruts	○	◉	○	○	○	◉	none	
1.6 Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	○	◉	○	○	○	◉	none	

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.7* Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	○	◉	○	○	○	◉	none	
1.8 Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	○	◉	○	○	○	◉	none	
1.9 Anchor Trench Drain outfalls exhibit flow, erosion, seepage, moisture or bare/ sparse vegetation.	○	◉	○	○	○	◉	none	
2.0 Vegetative Cover								
2.1 Bare area or areas of poor growth greater than 100 square feet	○	◉	○	○	○	◉	none	
2.2 Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	○	◉	○	○	○	◉	none	
3.0 Engineering and Access Controls								
3.1 The perimeter fence is damaged	○	◉	○	○	○	◉	none	
3.2 Debris has collected along the perimeter fence	○	◉	○	○	○	◉	none	
3.3 Warning signs are not legible from 25 feet	○	◉	○	○	○	◉	none	
3.4* Damage to the Access Road such as potholes, washouts or burrowing	○	◉	○	○	○	◉	none	

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
4.0 LRCH and LS/LF Monitoring								
4.1* Erosion rills or gullies, or burrowing animal holes around the LRCH Buildings	○	◉	○	○	○	◉	none	
4.2 LS/LF Building secondary containment is damaged or not intact. Storage tanks are leaking.	○	◉	○	○	○	◉	none	
5.0 Groundwater Monitoring								
5.1 Damage to monitoring wells	○	◉	○	○	○	◉	none	
6.0 Surface Water Controls								
6.1* Impeded drainage or ponding in the channel	○	◉	○	○	○	◉	none	
6.2* Excessive siltation in the channel	○	◉	○	○	○	◉	none	
6.3* Debris present in the channel	○	◉	○	○	○	◉	none	
6.4* Erosion rills or gullies in the channel	○	◉	○	○	○	◉	none	
6.5 Areas of degraded Articulated Concrete Block (ACB) or extensively cracked grout around ACB	○	◉	○	○	○	◉	none	
6.6* Subsidence or undercutting of the downchutes or perimeter drainage channels	○	◉	○	○	○	◉	none	
6.7 Damaged box culverts	○	◉	○	○	○	◉	none	

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

The Carsonite marker for the western most anchor trench drain on the south slope is damaged and needs to be replaced. *Carsonite marker was replaced on July 9.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name: Michael W. Jones	**Signature and Date:**

Form SOP ELF 001-2
ELF Cap Type II Inspection Form

Inspector's Names: M. Jones, D. Connolly	**Inspection Date(s):** 10/2/24
Inspection Type: ☑ Type II ☐ Post-Storm	
Drive-around Post-Storm Inspection Date (taken from Logbook): N/A *Note: Post-storm event inspection items are indicated with a * next to the Inspection Item number.*	**Date(s) of Significant Storm Event:** N/A **Total Precipitation (in):** N/A
Inspection Conditions: Previous 24-hour precipitation: 0	Weather Conditions: sunny, calm winds, warm
Attachments: ☑ Photographs ☑ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.0 Surface Conditions								
1.1* Erosion rills or gullies	◉	○	○	○	◉	○	Note 1.	Repaired November 2024.
1.2* Sheet erosion or plant pedestalling	○	◉	○	○	○	◉	none	
1.3* Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	○	◉	○	○	○	◉	none	
1.4 Surface salts, crusting, or evidence of compaction	○	◉	○	○	○	◉	none	
1.5 Excessive animal trails or tire tracks/ruts	○	◉	○	○	○	◉	none	
1.6 Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	○	◉	○	○	○	◉	none	

Form SOP ELF 001-2
ELF Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.7* Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	○	◉	○	○	○	◉	none	
1.8 Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	○	◉	○	○	○	◉	none	
1.9 Anchor Trench Drain outfalls exhibit flow, erosion, seepage, moisture or bare/ sparse vegetation.	○	◉	○	○	○	◉	none	
2.0 Vegetative Cover								
2.1 Bare area or areas of poor growth greater than 100 square feet	○	◉	○	○	○	◉	none	
2.2 Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	○	◉	○	○	○	◉	none	
2.3 Deep rooted, noxious, or undesirable weeds	○	◉	○	○	○	◉	none	
3.0 Engineering and Access Controls								
3.1 The perimeter fence is damaged	○	◉	○	○	○	◉	none	
3.2 Debris has collected along the perimeter fence	○	◉	○	○	○	◉	none	
3.3 Warning signs are not legible from 25 feet	○	◉	○	○	○	◉	none	

Form SOP ELF 001-2
ELF Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
3.4* Damage to the Access Road such as potholes, washouts or burrowing	○	◉	○	○	○	◉	none	
3.5 Cap perimeter survey monuments appear to be disturbed (Inspect every five years, in conjunction with the CERCLA Five Year Review for legibility and to confirm record locations)	○	○	◉	○	○	◉	Not inspected during this inspection.	
4.0 LRCH and LS/LF Monitoring								
4.1* Erosion rills or gullies, or burrowing animal holes around the LRCH Buildings	○	◉	○	○	○	◉	none	
4.2 LS/LF Building secondary containment is damaged or not intact. Storage tanks are leaking.	○	◉	○	○	○	◉	none	
5.0 Groundwater Monitoring								
5.1 Damage to monitoring wells	○	◉	○	○	○	◉	none	
6.0 Surface Water Controls								
6.1* Impeded drainage or ponding in the channel or downchute	○	◉	○	○	○	◉	none	
6.2* Excessive siltation in the channel or downchute	○	◉	○	○	○	◉	none	
6.3* Debris present in the channel or downchute	○	◉	○	○	○	◉	none	
6.4* Erosion rills or gullies in the channel or downchute	○	◉	○	○	○	◉	none	

Form SOP ELF 001-2
ELF Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
6.5 Areas of degraded Articulated Concrete Block (ACB) or extensively cracked grout around ACB	○	◉	○	○	○	◉	none	
6.6* Subsidence or undercutting of the downchutes or perimeter drainage channels	○	◉	○	○	○	◉	none	
6.7 Damaged box culverts	○	◉	○	○	○	◉	none	

Inspection Item	EM-ELF01	EM-ELF02	EM-ELF03	EM-ELF04	EM-ELF05	EM-ELF06	EM-ELF07	EM-ELF08
7.0 Erosion/Settlement Monuments: *Inspect monuments for damage and legibility, and record the soil thickness loss, if any.*								
7.1 Monument is damaged or illegible *Check all that apply.*	☐	☐	☐	☐	☐	☐	☐	☐
7.2 Measured Soil Thickness Loss (inches)	1	3	3	2.5	1	1.75	1	1

Form SOP ELF 001-2
ELF Cap Type II Inspection Form

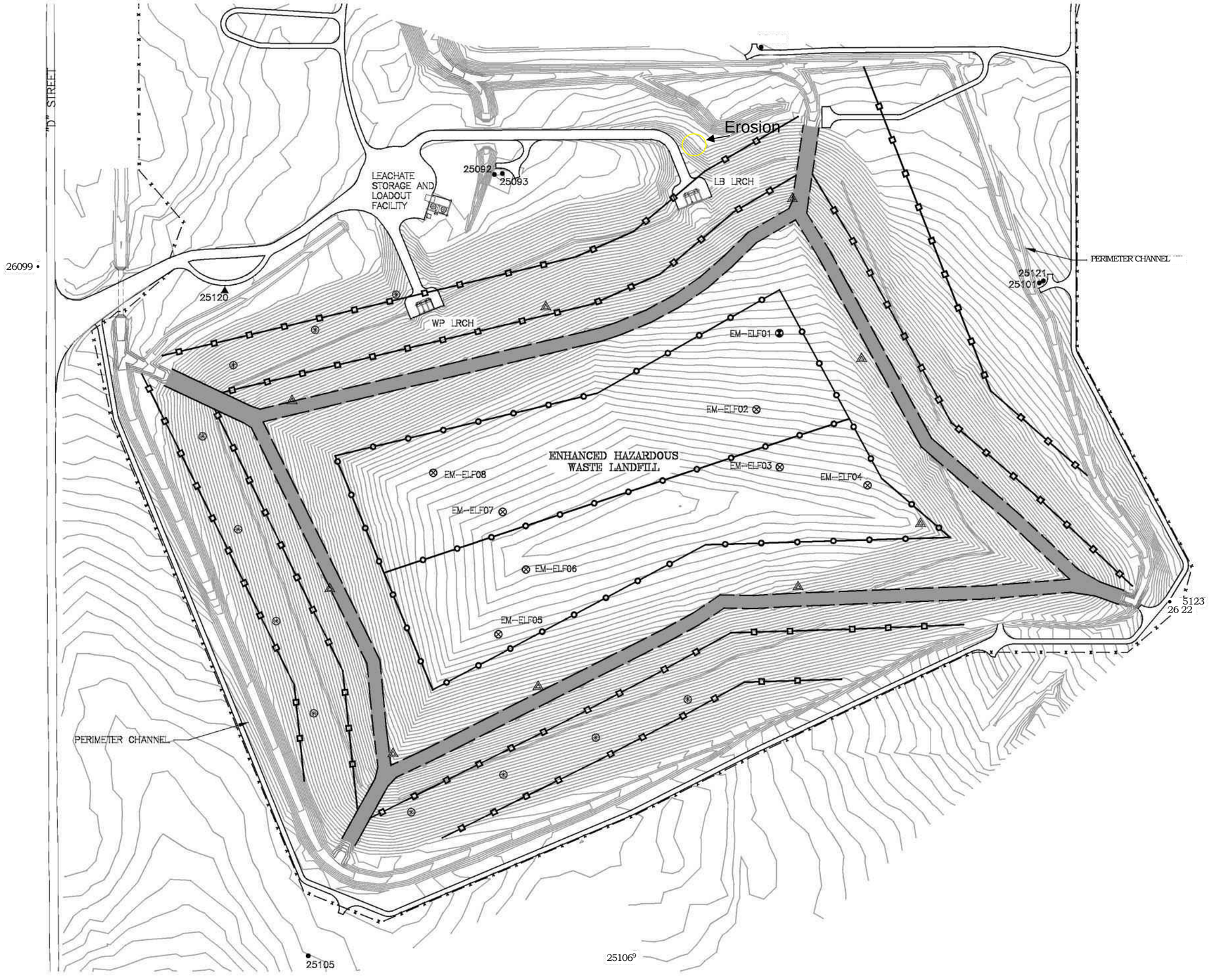
Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

Note 1: Erosion is present north of the LB LRCH building access road. See attached figure for location information and photo.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name: Michael W. Jones	**Signature and Date:**



10/2/24: Erosion present on north side of LB LRCH access road.



Program Manager Rocky Mountain Arsenal

ROCKY MOUNTAIN ARSENAL
COMMERCE CITY, COLORADO

NAVARRO Research and Engineering, Inc.

PROJECT NAME
ELF POST—CLOSURE PLAN

TITLE
LOCATION OF CAP FEATURES

CAD FILE	DATE	FIGURE NUMBER
90SOPELF001-1DWG	10.07.19	SOP ELF 001-1

S \G PROJECTS \ 0270-0375 \ ELF CLOSURE PLAN FIGURES \REV 0\ REV 0 - 100419 \FIG-SOP ELF 001-1 dwg

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspector's Names: K. Hoffman, V. Stewart, J. Chisholm	**Inspection Date(s):** 2/5/25
Inspection Type: ☑ Type I ☐ Post-Storm	
Drive-around Post-Storm Inspection Date (taken from Logbook): N/A *Note: Post-storm event inspection items are indicated with a * next to the Inspection Item number.*	**Date(s) of Significant Storm Event:** N/A **Total Precipitation (in):** N/A
Inspection Conditions: Previous 24-hour precipitation: 0	Weather Conditions: sunny, calm winds, 30's
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.0 Surface Conditions								
1.1* Erosion rills or gullies	○	◉	○	○	○	◉	none	
1.2* Sheet erosion or plant pedestalling	○	◉	○	○	○	◉	none	
1.3* Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	○	◉	○	○	○	◉	none	
1.4 Surface salts, crusting, or evidence of compaction	○	◉	○	○	○	◉	none	
1.5 Excessive animal trails or tire tracks/ruts	○	◉	○	○	○	◉	none	
1.6 Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	○	◉	○	○	○	◉	none	

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.7* Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	○	◉	○	○	○	◉	none	
1.8 Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	○	◉	○	○	○	◉	none	
1.9 Anchor Trench Drain outfalls exhibit flow, erosion, seepage, moisture or bare/ sparse vegetation.	○	◉	○	○	○	◉	none	
2.0 Vegetative Cover								
2.1 Bare area or areas of poor growth greater than 100 square feet	○	◉	○	○	○	◉	none	
2.2 Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	○	◉	○	○	○	◉	none	
3.0 Engineering and Access Controls								
3.1 The perimeter fence is damaged	○	◉	○	○	○	◉	none	
3.2 Debris has collected along the perimeter fence	○	◉	○	○	○	◉	none	
3.3 Warning signs are not legible from 25 feet	○	◉	○	○	○	◉	none	
3.4* Damage to the Access Road such as potholes, washouts or burrowing	○	◉	○	○	○	◉	none	

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
4.0 LRCH and LS/LF Monitoring								
4.1* Erosion rills or gullies, or burrowing animal holes around the LRCH Buildings	○	◉	○	○	○	◉	none	
4.2 LS/LF Building secondary containment is damaged or not intact. Storage tanks are leaking.	○	◉	○	○	○	◉	none	
5.0 Groundwater Monitoring								
5.1 Damage to monitoring wells	○	◉	○	○	○	◉	none	
6.0 Surface Water Controls								
6.1* Impeded drainage or ponding in the channel	○	◉	○	○	○	◉	none	
6.2* Excessive siltation in the channel	○	◉	○	○	○	◉	none	
6.3* Debris present in the channel	○	◉	○	○	○	◉	none	
6.4* Erosion rills or gullies in the channel	○	◉	○	○	○	◉	none	
6.5 Areas of degraded Articulated Concrete Block (ACB) or extensively cracked grout around ACB	○	◉	○	○	○	◉	none	
6.6* Subsidence or undercutting of the downchutes or perimeter drainage channels	○	◉	○	○	○	◉	none	
6.7 Damaged box culverts	○	◉	○	○	○	◉	none	

Form SOP ELF 001-1
ELF Cap Type I Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

This inspection was moved to February due to inclement weather and snow covered inspection areas during January.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

Form SOP ELF 001-2
ELF Cap Type II Inspection Form

Inspector's Names: K. Hoffman, N. Rymarz	**Inspection Date(s):** 4/8/25
Inspection Type: ☑ Type II ☐ Post-Storm	
Drive-around Post-Storm Inspection Date (taken from Logbook): N/A *Note: Post-storm event inspection items are indicated with a * next to the Inspection Item number.*	**Date(s) of Significant Storm Event:** N/A **Total Precipitation (in):** N/A
Inspection Conditions: Previous 24-hour precipitation: 0	Weather Conditions: sunny, calm winds, 70's
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.0 Surface Conditions								
1.1* Erosion rills or gullies	○	◉	○	○	○	◉	none	
1.2* Sheet erosion or plant pedestalling	○	◉	○	○	○	◉	none	
1.3* Depressions, ponding areas, sedimentation, or other conditions that could interrupt cap drainage	○	◉	○	○	○	◉	none	
1.4 Surface salts, crusting, or evidence of compaction	○	◉	○	○	○	◉	none	
1.5 Excessive animal trails or tire tracks/ruts	○	◉	○	○	○	◉	none	
1.6 Burrowing animal holes (localized burrows greater than 3 inches in diameter, or widespread burrows of any size)	○	◉	○	○	○	◉	none	

Form SOP ELF 001-2
ELF Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1.7* Seepage, differential settlement, cracking, subsidence, sliding, creep, or other signs of slope instability	○	◉	○	○	○	◉	none	
1.8 Intrusive damage such as unplanned excavation, drilling, grading, damage to engineering or access controls, vandalism	○	◉	○	○	○	◉	none	
1.9 Anchor Trench Drain outfalls exhibit flow, erosion, seepage, moisture or bare/ sparse vegetation.	○	◉	○	○	○	◉	none	
2.0 Vegetative Cover								
2.1 Bare area or areas of poor growth greater than 100 square feet	○	◉	○	○	○	◉	none	
2.2 Areas of poor vigor, disease, over grazing, stress, burned, or discoloration greater than 100 square feet	○	◉	○	○	○	◉	none	
2.3 Deep rooted, noxious, or undesirable weeds	○	◉	○	○	○	◉	none	
3.0 Engineering and Access Controls								
3.1 The perimeter fence is damaged	○	◉	○	○	○	◉	none	
3.2 Debris has collected along the perimeter fence	○	◉	○	○	○	◉	none	
3.3 Warning signs are not legible from 25 feet	○	◉	○	○	○	◉	none	

Form SOP ELF 001-2
ELF Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
3.4* Damage to the Access Road such as potholes, washouts or burrowing	○	◉	○	○	○	◉	none	
3.5 Cap perimeter survey monuments appear to be disturbed (Inspect every five years, in conjunction with the CERCLA Five Year Review for legibility and to confirm record locations)	○	◉	○	○	○	◉	Note 1.	
4.0 LRCH and LS/LF Monitoring								
4.1* Erosion rills or gullies, or burrowing animal holes around the LRCH Buildings	○	◉	○	○	○	◉	none	
4.2 LS/LF Building secondary containment is damaged or not intact. Storage tanks are leaking.	○	◉	○	○	○	◉	none	
5.0 Groundwater Monitoring								
5.1 Damage to monitoring wells	○	◉	○	○	○	◉	none	
6.0 Surface Water Controls								
6.1* Impeded drainage or ponding in the channel or downchute	○	◉	○	○	○	◉	none	
6.2* Excessive siltation in the channel or downchute	○	◉	○	○	○	◉	none	
6.3* Debris present in the channel or downchute	○	◉	○	○	○	◉	none	
6.4* Erosion rills or gullies in the channel or downchute	○	◉	○	○	○	◉	none	

Form SOP ELF 001-2
ELF Cap Type II Inspection Form

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
6.5 Areas of degraded Articulated Concrete Block (ACB) or extensively cracked grout around ACB	○	◉	○	○	○	◉	none	
6.6* Subsidence or undercutting of the downchutes or perimeter drainage channels	○	◉	○	○	○	◉	none	
6.7 Damaged box culverts	○	◉	○	○	○	◉	none	

Inspection Item	EM-ELF01	EM-ELF02	EM-ELF03	EM-ELF04	EM-ELF05	EM-ELF06	EM-ELF07	EM-ELF08
7.0 Erosion/Settlement Monuments: *Inspect monuments for damage and legibility, and record the soil thickness loss, if any.*								
7.1 Monument is damaged or illegible *Check all that apply.*	☐	☐	☐	☐	☐	☐	☐	☐
7.2 Measured Soil Thickness Loss (inches)	2.5	2.75	3	2.75	1.25	2	1.5	1

Form SOP ELF 001-2
ELF Cap Type II Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

Note 1: The Cap Perimeter Survey Monuments will be inspected during 2025, but were not inspected as part of this Type II inspection.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

Form 3.1.3-1
ELF LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspector's Names: K. Hofman	**Inspection Date(s):** 7/1/2024
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1 Improper operation/condition of instrumentation and valves	○	◉	○	○	○	◉	None	
2 Improper operation of leachate collection and leak detection pumps	○	◉	○	○	○	◉	None	
3 Excessive liquid in LRCHs or LS/LF	○	◉	○	○	○	◉	None	
4 Blockage of leachate collection leak detection discharge piping	○	◉	○	○	○	◉	None	
5 Collapse of leachate collection or leak detection sump riser pipe	○	◉	○	○	○	◉	None	
6 Flow meters or level indicators are malfunctioning	○	◉	○	○	○	◉	None	
7 LS/LF tank levels are above high-level set points	○	◉	○	○	○	◉	None	
8 Indication of leaks in the indoor piping system in the LRCHs or LS/LF	○	◉	○	○	○	◉	None	
9 Indication that the LS/LF secondary containment is damaged or inadequate	○	◉	○	○	○	◉	None	
10 Heating system in the LRCHs or LS/LF is malfunctioning	○	◉	○	○	○	◉	None	

Form 3.1.3-1
ELF LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.	
None	
Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

Form 3.1.3-1
ELF LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspector's Names: K. Hoffman	**Inspection Date(s):** 10/1/24
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1 Improper operation/condition of instrumentation and valves	○	◉	○	○	○	◉		
2 Improper operation of leachate collection and leak detection pumps	○	◉	○	○	○	◉		
3 Excessive liquid in LRCHs or LS/LF	○	◉	○	○	○	◉		
4 Blockage of leachate collection leak detection discharge piping	○	◉	○	○	○	◉		
5 Collapse of leachate collection or leak detection sump riser pipe	○	◉	○	○	○	◉		
6 Flow meters or level indicators are malfunctioning	○	◉	○	○	○	◉		
7 LS/LF tank levels are above high-level set points	○	◉	○	○	○	◉		
8 Indication of leaks in the indoor piping system in the LRCHs or LS/LF	○	◉	○	○	○	◉		
9 Indication that the LS/LF secondary containment is damaged or inadequate	○	◉	○	○	○	◉		
10 Heating system in the LRCHs or LS/LF is malfunctioning	○	◉	○	○	○	◉		

Form 3.1.3-1
ELF LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate. None	
Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

Form 3.1.3-1
ELF LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspector's Names: Kim Hoffman	**Inspection Date(s):** 1/2/25
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1 Improper operation/condition of instrumentation and valves	○	◉	○	○	○	◉		
2 Improper operation of leachate collection and leak detection pumps	○	◉	○	○	○	◉		
3 Excessive liquid in LRCHs or LS/LF	○	◉	○	○	○	◉		
4 Blockage of leachate collection leak detection discharge piping	○	◉	○	○	○	◉		
5 Collapse of leachate collection or leak detection sump riser pipe	○	◉	○	○	○	◉		
6 Flow meters or level indicators are malfunctioning	○	◉	○	○	○	◉		
7 LS/LF tank levels are above high-level set points	○	◉	○	○	○	◉		
8 Indication of leaks in the indoor piping system in the LRCHs or LS/LF	○	◉	○	○	○	◉		
9 Indication that the LS/LF secondary containment is damaged or inadequate	○	◉	○	○	○	◉		
10 Heating system in the LRCHs or LS/LF is malfunctioning	○	◉	○	○	○	◉		

Form 3.1.3-1
ELF LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

No other inspection notes.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

Form 3.1.3-1
ELF LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspector's Names: Kim Hoffman	**Inspection Date(s):** 4/2/25
Attachments: ☐ Photographs ☐ Figures ☐ Other	

Inspection Item	Condition Present			Repeat or Chronic Condition			Inspection Note	Confirm Completed Action (Initial and Date)
	Y	N	N/A	Y	N	N/A		
1 Improper operation/condition of instrumentation and valves	○	◉	○	○	○	◉	none	
2 Improper operation of leachate collection and leak detection pumps	○	◉	○	○	○	◉	none	
3 Excessive liquid in LRCHs or LS/LF	○	◉	○	○	○	◉	none	
4 Blockage of leachate collection leak detection discharge piping	○	◉	○	○	○	◉	none	
5 Collapse of leachate collection or leak detection sump riser pipe	○	◉	○	○	○	◉	none	
6 Flow meters or level indicators are malfunctioning	○	◉	○	○	○	◉	none	
7 LS/LF tank levels are above high-level set points	○	◉	○	○	○	◉	none	
8 Indication of leaks in the indoor piping system in the LRCHs or LS/LF	○	◉	○	○	○	◉	none	
9 Indication that the LS/LF secondary containment is damaged or inadequate	○	◉	○	○	○	◉	none	
10 Heating system in the LRCHs or LS/LF is malfunctioning	○	◉	○	○	○	◉	none	

Form 3.1.3-1
ELF LCS/LDS and Wastewater Conveyance System
Quarterly Inspection Form

Inspection Notes: For areas with deficiencies, provide identifying labels for deficient areas, descriptions of deficiencies, approximate dimensions of the areas, locations with GPS coordinates, and photographs as needed. Provide attachments as appropriate.

No other inspection notes.

Inspector	
Name: Kim Hoffman	**Signature and Date:**
Covers Manager Review of Inspection Documentation	
Name: Michael W. Jones	**Signature and Date:**
Covers Manager Confirmation of Completed Actions	
Name:	**Signature and Date:**

APPENDIX C-1

HWL Maintenance Documentation

CONTRACTOR DAILY QUALITY CONTROL REPORT

Project Information	
Subcontractor: Weed Wranglers	Project: HWL
Task: herbicide	Date: 6/18/24
Weather AM: acceptable	Weather PM: acceptable

Activities Inspected and Observed:

Weed Wranglers spot sprayed annual broad leaf species using Escort XP and Vision. Weed Wranglers identified and spot sprayed common mullein and thistles.

Summary Meetings and Discussions Held or Attended, including Job Safety:

None

Comments:

None

Additional Documentation Submitted:

None

Sign Off:	
Inspector Name: Kim Hoffman	Title/company: Inspector/Navarro
Signature and Date:	
Reviewer Name: Michael W. Jones	Title/company: Task Manager/Navarro
Signature and Date:	

CONTRACTOR DAILY QUALITY CONTROL REPORT

Project Information	
Subcontractor: Weed Wranglers	Project: HWL
Task: maintenance	Date: 10/22/24
Weather AM: acceptable	Weather PM: acceptable
Activities Inspected and Observed:	
Weed Wranglers sprayed Piper EX and Oust XP as a ground clear herbicide on roadways and working surfaces.	
Summary Meetings and Discussions Held or Attended, including Job Safety:	
N/A	
Comments:	
N/A	
Additional Documentation Submitted:	
N/A	
Sign Off:	
Inspector Name: Kim Hoffman	Title/company: Inspector/Navarro
Signature and Date:	
Reviewer Name: Michael W. Jones	Title/company: Task Manager/Navarro
Signature and Date:	

CONTRACTOR DAILY QUALITY CONTROL REPORT

Project Information	
Subcontractor: N/A	Project: HWL
Task: maintenance	Date: 11/20/24
Weather AM: acceptable	Weather PM: acceptable

Activities Inspected and Observed:

Navarro personnel graded to repair the erosion on the two east HWL manhole access roads. This erosion was first documented during the July 2024 Type I inspection.

Summary Meetings and Discussions Held or Attended, including Job Safety:

N/A

Comments:

N/A

Additional Documentation Submitted:

N/A

Sign Off:	
Inspector Name: Kim Hoffman	Title/company: Inspector/Navarro
Signature and Date:	
Reviewer Name: Michael W. Jones	Title/company: Task Manager/Navarro
Signature and Date:	

Operations and Maintenance Report

Beginning Date 05/01/2024 Ending Date 04/30/2025

ate	Start of Down Time	Plant Down Time (Hrs)	Summary of Significant Events
5/31/2024		0.00	Pumped stormwater from the LSLF floor sump. RMA experienced a severe/hail storm overnight and produced 0.71" of rain. init:kh
6/24/2024		0.00	Replaced PLC batteries in LSLF, WP LRCH, and LB LRCH buildings. init:kh
7/02/2024		0.00	Installed a spare used motor in HWL LDS3. Replaced a new probe in HWL LDS3. init:kh init:kh
7/08/2024		0.00	Installed a new light bulb at the HWL LCS4 display for "motor run" signal. init:kh
7/09/2024		0.00	Pumped HWL LCS4 and LDS3 to low level after high level sampling events. Lift Station started at 6.6 feet and ended at 5.3 feet. LCS4 started at 27.7 in and ended at 11.3 in. LDS3 started at 14.2" and ended at 13.1". LT 401 started at 10.5" and ended at 54.7". LT 402 started at 18.3" and ended at 102.2". When running HWL LCS3 pump/motor, there is no rea out on the display or LSLF computer. HWL LDS3 flow meter is not working. Notified Navarro maintenance personnel of issues. init:kh
7/10/2024		0.00	Navarro maintenance personnel trouble shot the HWL LCS3 and LDS3 issues from 7/9/24. The LCS3 power fuse was blown and needed to be repaired at the PLC control cabinet at th Lift Station. The LDS3 flow meter had no display. Maintenance changed the input/output board from an old Endress Hauser flow meter and repaired the issue. Pumped LCS3 and LDS3 to low level after maintenance repaired the issues. LDS3 started at 13.1 in and ended 10.1 inches. LCS3 started at 28.7 in and ended at 12.3 in. Lift station started at 5.3 feet and ended at 7.1 feet. LT401 started at 54.7 in and ended at 105.1 in. LT402 started at 102.0 in and ended at 104.6 in. init:kh
7/17/2024		0.00	Navarro personnel replaced the EPG controller at the HWL LCS3 display panel. init:kh
7/31/2024		0.00	Select Solutions onsite to remove leachate from T-402 for offsite disposal. Appoximately 47,762 gallons were removed. init:kh
8/05/2024		0.00	Select Solutions onsite to remove leachate from T-401 for offsite disposal. Approximately 4,965 gallons were removed. init:kh
8/19/2024		0.00	Pumped HWL LCS2 to low level after high level sampling event. HWL LCS2 started at 28.8 inches and ende at 7.3 inches. Lift Station started at 7.5 feet and ended at 7.3 feet. T401 started at 4.6 inches and ended at 53.9 inches. init:kh
9/25/2024		0.00	Pumped HWL LCS1 to low level after high level sampling event. Lift Station started at 7.8 fe and ended at 7.1 feet. LCS1 started at 27.5 inches and ended at 13.6 inches. LT-401 starte at 53.4 inches and ended at 88.8 inches.
9/26/2024		0.00	Continued to pump LCS1 to low level. LCS1 started at 14.9 inches and ended at 13.0 inche Lift Station started at 7.1 feet and ended at 6.4 feet. LT401 started at 88.7 inches and ende at 105.0 inches.
1/18/2024		0.00	Clean Harbors removed approximately 4,975 gallons for leachate for disposal. LT401 starte at 105.1 inches and ended at 6.2 inches.
2/17/2024		0.00	Cleaned probes on LT401 and LT402 and tested sump alarm in the LSLF building.
1/22/2025		0.00	Installed a new motor for the west heater in the LB LRCH. Installed a new motor for the eas heater in the LSLF building.

Operations and Maintenance Report

Beginning Date 05/01/2024 Ending Date 04/30/2025

)ate	Start of Down Time	Plant Down Time (Hrs)	Summary of Significant Events
)1/27/2025		0.00	Pumped HWL LCS1 and LCS2 to low level after high level sampling event. Lift Station start at 8.1 feet and ended at 8.7 feet. LT401 started at 6.1 inches and ended at 35.4 inches. LC started at 17.9 inches and ended at 14.3 inches. LCS2 started at 28.5 inches and ended at 9.4 inches.
)1/28/2025		0.00	Pumped Lift Station to LT401. Lift Station started at 8.7 feet and ended at 5.6 feet. LT401 started at 35.4 inches and ended at 103.0 inches.
'otal Down Time Hours:		**0.00**	

APPENDIX C-2

ELF Maintenance Documentation

CONTRACTOR DAILY QUALITY CONTROL REPORT

Project Information	
Subcontractor: Weed Wranglers	Project: ELF
Task: herbicide	Date: 6/18/24
Weather AM: acceptable	Weather PM: acceptable

Activities Inspected and Observed:

Weed Wranglers spot sprayed annual broad leaf species using Escort XP and Vision. Weed Wranglers identified and spot sprayed common mullein and thistles.

Summary Meetings and Discussions Held or Attended, including Job Safety:

None

Comments:

None

Additional Documentation Submitted:

None

Sign Off:	
Inspector Name: Kim Hoffman	Title/company: Inspector/Navarro
Signature and Date:	
Reviewer Name: Michael W. Jones	Title/company: Task Manager/Navarro
Signature and Date:	

CONTRACTOR DAILY QUALITY CONTROL REPORT

Project Information	
Subcontractor: N/A	Project: ELF
Task: maintenance	Date: 7/10/24
Weather AM: acceptable	Weather PM: acceptable

Activities Inspected and Observed:

Navarro personnel replaced a damaged Carsonite marker on the ELF. The marker identifies an anchor trench drain outfall on the south slope (western most trench).

Summary Meetings and Discussions Held or Attended, including Job Safety:

None

Comments:

None

Additional Documentation Submitted:

None

Sign Off:	
Inspector Name: Kim Hoffman	Title/company: Inspector/Navarro
Signature and Date:	
Reviewer Name: Michael W. Jones	Title/company: Task Manager/Navarro
Signature and Date:	

CONTRACTOR DAILY QUALITY CONTROL REPORT

Project Information	
Subcontractor: Weed Wranglers/MRC Services	Project: ELF
Task: maintenance	Date: 10/22/24
Weather AM: acceptable	Weather PM: acceptable

Activities Inspected and Observed:

Weed Wranglers sprayed Piper EX and Oust XP as a ground clear herbicide on roadways and working surfaces.

MRC Services mowed 2.58 acres on top of the ELF on the northwest corner.

All work was completed today.

Summary Meetings and Discussions Held or Attended, including Job Safety:

N/A

Comments:

N/A

Additional Documentation Submitted:

N/A

Sign Off:	
Inspector Name: Kim Hoffman	Title/company: Inspector/Navarro
Signature and Date:	
Reviewer Name: Michael W. Jones	Title/company: Task Manager/Navarro
Signature and Date:	

CONTRACTOR DAILY QUALITY CONTROL REPORT

Project Information	
Subcontractor: N/A	Project: ELF
Task: maintenance	Date: 11/20/24
Weather AM: acceptable	Weather PM: acceptable

Activities Inspected and Observed:

Navarro personnel repaired the erosion on the NE LB LRCH access road. This erosion was first documented during the October 2024 Type II inspection. Navarro used 4"-minus rock and existing soil to perform the repair.

Summary Meetings and Discussions Held or Attended, including Job Safety:

N/A

Comments:

N/A

Additional Documentation Submitted:

N/A

Sign Off:	
Inspector Name: Kim Hoffman	Title/company: Inspector/Navarro
Signature and Date:	
Reviewer Name: Michael W. Jones	Title/company: Task Manager/Navarro
Signature and Date:	

CONTRACTOR DAILY QUALITY CONTROL REPORT

Project Information	
Subcontractor: N/A	Project: ELF
Task: maintenance	Date: 11/21/24
Weather AM: acceptable	Weather PM: acceptable

Activities Inspected and Observed:

Navarro personnel overseeded the repaired erosion on the NE LB LRCH access road. This erosion was repaired on November 20, 2024.

Summary Meetings and Discussions Held or Attended, including Job Safety:

N/A

Comments:

N/A

Additional Documentation Submitted:

N/A

Sign Off:	
Inspector Name: Kim Hoffman	Title/company: Inspector/Navarro
Signature and Date:	
Reviewer Name: Michael W. Jones	Title/company: Task Manager/Navarro
Signature and Date:	

Operations and Maintenance Report

Beginning Date 05/01/2024 Ending Date 04/30/2025

ate	Start of Down Time	Plant Down Time (Hrs)	Summary of Significant Events
5/31/2024		0.00	Pumped stormwater from the LSLF floor sump. RMA experienced a severe/hail storm overnight and produced 0.71" of rain. init:kh
6/24/2024		0.00	Replaced PLC batteries in LSLF, WP LRCH, and LB LRCH buildings. init:kh
7/02/2024		0.00	Installed a spare used motor in HWL LDS3. Replaced a new probe in HWL LDS3. init:kh init:kh
7/08/2024		0.00	Installed a new light bulb at the HWL LCS4 display for "motor run" signal. init:kh
7/09/2024		0.00	Pumped HWL LCS4 and LDS3 to low level after high level sampling events. Lift Station started at 6.6 feet and ended at 5.3 feet. LCS4 started at 27.7 in and ended at 11.3 in. LDS3 started at 14.2" and ended at 13.1". LT 401 started at 10.5" and ended at 54.7". LT 402 started at 18.3" and ended at 102.2". When running HWL LCS3 pump/motor, there is no rea out on the display or LSLF computer. HWL LDS3 flow meter is not working. Notified Navarro maintenance personnel of issues. init:kh
7/10/2024		0.00	Navarro maintenance personnel trouble shot the HWL LCS3 and LDS3 issues from 7/9/24. The LCS3 power fuse was blown and needed to be repaired at the PLC control cabinet at th Lift Station. The LDS3 flow meter had no display. Maintenance changed the input/output board from an old Endress Hauser flow meter and repaired the issue. Pumped LCS3 and LDS3 to low level after maintenance repaired the issues. LDS3 started at 13.1 in and ended 10.1 inches. LCS3 started at 28.7 in and ended at 12.3 in. Lift station started at 5.3 feet and ended at 7.1 feet. LT401 started at 54.7 in and ended at 105.1 in. LT402 started at 102.0 in and ended at 104.6 in. init:kh
7/17/2024		0.00	Navarro personnel replaced the EPG controller at the HWL LCS3 display panel. init:kh
7/31/2024		0.00	Select Solutions onsite to remove leachate from T-402 for offsite disposal. Appoximately 47,762 gallons were removed. init:kh
8/05/2024		0.00	Select Solutions onsite to remove leachate from T-401 for offsite disposal. Approximately 4,965 gallons were removed. init:kh
8/19/2024		0.00	Pumped HWL LCS2 to low level after high level sampling event. HWL LCS2 started at 28.8 inches and ende at 7.3 inches. Lift Station started at 7.5 feet and ended at 7.3 feet. T401 started at 4.6 inches and ended at 53.9 inches. init:kh
9/25/2024		0.00	Pumped HWL LCS1 to low level after high level sampling event. Lift Station started at 7.8 fe and ended at 7.1 feet. LCS1 started at 27.5 inches and ended at 13.6 inches. LT-401 starte at 53.4 inches and ended at 88.8 inches.
9/26/2024		0.00	Continued to pump LCS1 to low level. LCS1 started at 14.9 inches and ended at 13.0 inche Lift Station started at 7.1 feet and ended at 6.4 feet. LT401 started at 88.7 inches and ende at 105.0 inches.
1/18/2024		0.00	Clean Harbors removed approximately 4,975 gallons for leachate for disposal. LT401 starte at 105.1 inches and ended at 6.2 inches.
2/17/2024		0.00	Cleaned probes on LT401 and LT402 and tested sump alarm in the LSLF building.
1/22/2025		0.00	Installed a new motor for the west heater in the LB LRCH. Installed a new motor for the eas heater in the LSLF building.

Operations and Maintenance Report

Beginning Date 05/01/2024 Ending Date 04/30/2025

)ate	Start of Down Time	Plant Down Time (Hrs)	Summary of Significant Events
)1/27/2025		0.00	Pumped HWL LCS1 and LCS2 to low level after high level sampling event. Lift Station start at 8.1 feet and ended at 8.7 feet. LT401 started at 6.1 inches and ended at 35.4 inches. LC started at 17.9 inches and ended at 14.3 inches. LCS2 started at 28.5 inches and ended at 9.4 inches.
)1/28/2025		0.00	Pumped Lift Station to LT401. Lift Station started at 8.7 feet and ended at 5.6 feet. LT401 started at 35.4 inches and ended at 103.0 inches.
'otal Down Time Hours:		**0.00**	

APPENDIX D

Erosion/Settlement Monument Survey Data

CHANGE IN HWL EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				SPRING 2010 SURVEY				FALL 2010 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 4/09/10*				*Date of survey: 9/30/10*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	A12943	189774.1	2185140.6	5298.0	Ahwlem1	189774.1	2185140.5	5297.9	0.2	-0.2	-0.1	0.0	-0.1	-0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	A12944	189637.2	2184809.8	5302.5	Ahwlem2	189637.2	2184809.8	5302.4	-0.1	0.0	-0.1	-0.1	0.1	-0.1
EM-HWL03	A12275	189625.9	2185058.0	5307.8	A12936	189626.0	2185058.0	5307.7	Ahwlem3	189626.0	2185058.1	5307.7	0.1	0.1	-0.1	0.0	0.1	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	A12937	189570.7	2185177.9	5301.6	Ahwlem4	189570.7	2185177.9	5301.6	0.1	0.0	-0.2	0.0	0.0	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	A12942	189342.4	2184932.0	5311.5	Ahwlem5	189342.4	2184931.9	5311.4	0.2	-0.1	-0.1	0.0	-0.1	-0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	A12938	189355.9	2185079.9	5309.1	Ahwlem6	189356.0	2185079.9	5309.1	0.2	-0.1	-0.1	0.0	0.0	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	A12941	189150.6	2184866.4	5309.9	Ahwlem7	189150.6	2184866.4	5309.8	-0.4	-0.3	-0.1	0.0	0.0	-0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	A12939	189192.2	2185133.8	5308.0	Ahwlem8	189192.2	2185133.8	5308.0	0.3	-0.1	-0.1	0.0	0.0	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	A12940	189037.2	2184990.3	5306.8	Ahwlem9	189037.3	2184990.3	5306.8	0.0	-0.1	-0.1	0.0	0.0	0.0

	RECORD CONDITION SURVEY				FALL 2010 SURVEY				SPRING 2011 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 9/30/10*				*Date of survey: 4/24/11*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	Ahwlem1	189774.1	2185140.5	5297.9	a1015	189774.1	2185140.6	5297.9	0.2	-0.1	-0.2	0.0	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	Ahwlem2	189637.2	2184809.8	5302.4	a1016	189637.2	2184809.8	5302.4	-0.1	0.0	-0.1	0.0	0.0	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	Ahwlem3	189626.0	2185058.1	5307.7	a1014	189626.0	2185058.0	5307.6	0.1	0.0	-0.1	0.1	-0.1	-0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	Ahwlem4	189570.7	2185177.9	5301.6	a1013	189570.6	2185177.9	5301.6	0.1	0.0	-0.2	-0.1	0.0	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	Ahwlem5	189342.4	2184931.9	5311.4	a1010	189342.3	2184931.9	5311.4	0.1	-0.1	-0.1	0.0	0.0	0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	Ahwlem6	189356.0	2185079.9	5309.1	a1011	189356.0	2185079.9	5309.1	0.2	-0.1	-0.1	0.0	0.0	-0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	Ahwlem7	189150.6	2184866.4	5309.8	a1009	189150.7	2184866.4	5309.9	-0.4	-0.4	-0.1	0.0	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	Ahwlem8	189192.2	2185133.8	5308.0	a1012	189192.3	2185133.8	5307.9	0.4	-0.1	-0.1	0.0	0.0	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	Ahwlem9	189037.3	2184990.3	5306.8	a1008	189037.2	2184990.3	5306.8	0.0	-0.2	-0.1	0.0	-0.1	0.0

	RECORD CONDITION SURVEY				SPRING 2011 SURVEY				FALL 2011 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 4/24/11*				*Date of survey: 10/12/11*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	a1015	189774.1	2185140.6	5297.9	9	189774.0	2185140.6	5297.9	0.1	-0.1	-0.2	-0.1	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	a1016	189637.2	2184809.8	5302.4	10	189637.2	2184809.8	5302.4	-0.1	0.0	-0.2	0.0	0.0	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	a1014	189626.0	2185058.0	5307.6	7	189625.9	2185058.0	5307.5	0.1	0.0	-0.2	-0.1	0.0	-0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	a1013	189570.6	2185177.9	5301.6	8	189570.6	2185177.8	5301.5	0.1	-0.1	-0.2	0.0	0.0	-0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	a1010	189342.3	2184931.9	5311.4	6	189342.4	2184931.9	5311.3	0.1	-0.1	-0.2	0.0	0.1	-0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	a1011	189356.0	2185079.9	5309.1	5	189355.9	2185079.9	5309.1	0.1	-0.1	-0.1	-0.1	0.0	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	a1009	189150.7	2184866.4	5309.9	2	189150.6	2184866.4	5309.8	-0.4	-0.3	-0.2	0.0	0.0	-0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	a1012	189192.3	2185133.8	5307.9	4	189192.2	2185133.7	5307.9	0.3	-0.2	-0.1	-0.1	0.0	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	a1008	189037.2	2184990.3	5306.8	3	189037.2	2184990.3	5306.8	0.0	-0.2	-0.1	0.0	0.0	0.0

	RECORD CONDITION SURVEY				FALL 2011 SURVEY				Spring 2012 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 10/12/11*				*Date of survey: 5/09/12*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	9	189774.0	2185140.6	5297.9	4322	189774.1	2185140.6	5297.9	0.2	-0.1	-0.2	0.1	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	10	189637.2	2184809.8	5302.4	4320	189637.2	2184809.8	5302.4	-0.1	0.0	-0.2	0.0	0.0	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	7	189625.9	2185058.0	5307.5	4321	189626.0	2185058.0	5307.6	0.1	0.0	-0.1	0.1	0.0	0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	8	189570.6	2185177.8	5301.5	4323	189570.6	2185177.8	5301.6	0.1	-0.1	-0.2	0.0	0.0	0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	6	189342.4	2184931.9	5311.3	4319	189342.4	2184931.9	5311.4	0.1	-0.1	-0.1	0.0	0.0	0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	5	189355.9	2185079.9	5309.1	4324	189356.0	2185079.8	5309.1	0.2	-0.2	-0.1	0.1	-0.1	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	2	189150.6	2184866.4	5309.8	4318	189150.7	2184866.4	5309.8	-0.3	-0.3	-0.2	0.1	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	4	189192.2	2185133.7	5307.9	4325	189192.2	2185133.7	5307.9	0.3	-0.2	-0.1	0.0	0.0	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	3	189037.2	2184990.3	5306.8	4317	189037.2	2184990.3	5306.7	0.0	-0.2	-0.2	0.0	0.0	-0.1

	RECORD CONDITION SURVEY				Spring 2012 SURVEY				Fall 2012 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 5/09/12*				*Date of survey: 9/20/12*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	4322	189774.1	2185140.6	5297.9	n1017	189774.1	2185140.5	5297.9	0.2	-0.2	-0.2	0.0	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	4320	189637.2	2184809.8	5302.4	n1018	189637.3	2184809.8	5302.3	-0.1	-0.1	-0.2	0.0	-0.1	-0.1
EM-HWL03	A12275	189625.9	2185058.0	5307.8	4321	189626.0	2185058.0	5307.6	n1016	189626.0	2185058.0	5307.5	0.1	0.0	-0.3	0.0	0.0	-0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	4323	189570.6	2185177.8	5301.6	n1015	189570.6	2185177.8	5301.5	0.1	-0.1	-0.3	0.0	0.0	-0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	4319	189342.4	2184931.9	5311.4	n1014	189342.4	2184931.9	5311.3	0.2	-0.1	-0.2	0.1	0.0	-0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	4324	189356.0	2185079.8	5309.1	n1013	189356.0	2185079.8	5309.0	0.2	-0.2	-0.2	0.0	0.0	-0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	4318	189150.7	2184866.4	5309.8	n1010	189150.7	2184866.4	5309.7	-0.3	-0.4	-0.2	0.0	0.0	-0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	4325	189192.2	2185133.7	5307.9	n1012	189192.3	2185133.7	5307.8	0.4	-0.2	-0.2	0.1	0.0	-0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	4317	189037.2	2184990.3	5306.7	n1011	189037.3	2184990.3	5306.7	0.1	-0.2	-0.2	0.1	0.0	0.0

CHANGE IN HWL EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				Fall 2012 SURVEY				Spring 2013 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 9/20/12*				*Date of survey: 5/07/13*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	n1017	189774.1	2185140.5	5297.9	EM01	189774.1	2185140.6	5297.8	0.2	-0.1	-0.3	0.0	0.0	-0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	n1018	189637.3	2184809.8	5302.3	EM02	189637.2	2184809.8	5302.3	-0.1	0.0	-0.2	0.0	0.0	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	n1016	189626.0	2185058.0	5307.5	EM03	189626.0	2185058.0	5307.5	0.1	0.0	-0.2	0.0	0.0	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	n1015	189570.6	2185177.8	5301.5	EM04	189570.6	2185177.8	5301.5	0.1	-0.1	-0.3	0.0	0.0	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	n1014	189342.4	2184931.9	5311.3	EM05	189342.4	2184931.9	5311.3	0.2	-0.1	-0.2	0.0	0.0	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	n1013	189356.0	2185079.8	5309.0	EM06	189356.0	2185079.9	5309.0	0.2	-0.1	-0.2	0.0	0.1	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	n1010	189150.7	2184866.4	5309.7	EM07	189150.7	2184866.4	5309.7	-0.3	-0.3	-0.2	0.0	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	n1012	189192.3	2185133.7	5307.8	EM08	189192.3	2185133.8	5307.8	0.4	-0.1	-0.2	0.0	0.1	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	n1011	189037.3	2184990.3	5306.7	EM09	189037.3	2184990.3	5306.7	0.0	-0.2	-0.2	0.0	0.0	0.0

	RECORD CONDITION SURVEY				Spring 2013 SURVEY				Fall 2013 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 5/07/13*				*Date of survey: 9/19/13*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.6	5297.8	EM01	189774.1	2185140.6	5297.8	0.2	-0.1	-0.3	0.0	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.8	5302.3	EM02	189637.3	2184809.8	5302.3	-0.1	-0.1	-0.3	0.0	0.0	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.0	5307.5	EM03	189626.0	2185058.0	5307.5	0.1	0.0	-0.3	0.0	0.0	-0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.6	2185177.8	5301.5	EM04	189570.7	2185177.8	5301.4	0.2	-0.1	-0.3	0.0	0.0	-0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184931.9	5311.3	EM05	189342.4	2184931.9	5311.3	0.2	-0.1	-0.3	0.0	0.0	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189356.0	2185079.9	5309.0	EM06	189356.0	2185079.9	5309.0	0.2	-0.2	-0.2	0.0	0.0	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.7	2184866.4	5309.7	EM07	189150.7	2184866.4	5309.7	-0.4	-0.4	-0.2	0.0	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.3	2185133.8	5307.8	EM08	189192.2	2185133.7	5307.8	0.3	-0.2	-0.2	-0.1	-0.1	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.3	2184990.3	5306.7	EM09	189037.3	2184990.3	5306.7	0.1	-0.2	-0.2	0.1	0.0	0.0

	RECORD CONDITION SURVEY				Fall 2013 SURVEY				Spring 2014 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 9/19/13*				*Date of survey: 5/29/14*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.6	5297.8	EM01	189774.1	2185140.7	5297.7	0.3	0.0	-0.4	0.1	0.2	-0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.3	2184809.8	5302.3	EM02	189637.3	2184809.9	5302.2	0.0	0.1	-0.3	0.0	0.1	-0.1
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.0	5307.5	EM03	189626.0	2185058.2	5307.4	0.2	0.2	-0.3	0.0	0.1	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.7	2185177.8	5301.4	EM04	189570.7	2185178.0	5301.4	0.2	0.1	-0.4	0.0	0.2	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184931.9	5311.3	EM05	189342.4	2184932.1	5311.3	0.2	0.1	-0.2	0.0	0.1	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189356.0	2185079.9	5309.0	EM06	189356.0	2185080.0	5308.9	0.2	0.0	-0.3	0.0	0.2	-0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.7	2184866.4	5309.7	EM07	189150.7	2184866.6	5309.6	-0.3	-0.2	-0.4	0.0	0.2	-0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.7	5307.8	EM08	189192.3	2185133.9	5307.7	0.4	0.0	-0.3	0.1	0.2	-0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.3	2184990.3	5306.7	EM09	189037.3	2184990.4	5306.6	0.1	0.0	-0.3	0.0	0.2	-0.1

	RECORD CONDITION SURVEY				Spring 2014 SURVEY				Fall 2014 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 5/29/14*				*Date of survey: 10/17/14*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.7	5297.7	EM01	189774.1	2185140.7	5297.8	0.2	0.0	-0.3	-0.1	0.0	0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.3	2184809.9	5302.2	EM02	189637.2	2184809.9	5302.3	-0.1	0.1	-0.2	-0.1	0.0	0.1
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.2	5307.4	EM03	189626.0	2185058.1	5307.4	0.1	0.2	-0.3	0.0	0.0	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.7	2185178.0	5301.4	EM04	189570.6	2185178.0	5301.4	0.1	0.1	-0.4	-0.1	0.0	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184932.1	5311.3	EM05	189342.4	2184932.1	5311.3	0.1	0.1	-0.3	0.0	0.0	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.9	2185080.0	5308.9	EM06	189355.9	2185080.0	5308.9	0.1	0.0	-0.3	0.0	0.0	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.7	2184866.6	5309.7	EM07	189150.6	2184866.5	5309.7	-0.4	-0.2	-0.3	-0.1	-0.1	0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.3	2185133.9	5307.7	EM08	189192.2	2185133.9	5307.8	0.3	0.0	-0.2	-0.1	0.0	0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.3	2184990.4	5306.6	EM09	189037.2	2184990.4	5306.6	0.0	-0.1	-0.2	-0.1	0.0	0.0

	RECORD CONDITION SURVEY				Fall 2014 SURVEY				Spring 2015 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 10/17/14*				*Date of survey: 5/29/15*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.7	5297.8	EM01	189774.1	2185140.7	5297.8	0.3	0.1	-0.2	0.1	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.9	5302.3	EM02	189637.3	2184809.9	5302.2	0.0	0.1	-0.3	0.1	0.0	-0.1
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.1	5307.4	EM03	189626.0	2185058.2	5307.4	0.1	0.2	-0.3	0.0	0.0	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.6	2185178.0	5301.4	EM04	189570.7	2185178.0	5301.5	0.2	0.1	-0.3	0.1	0.0	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184932.1	5311.3	EM05	189342.4	2184932.1	5311.3	0.2	0.1	-0.3	0.0	0.0	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.9	2185080.0	5308.9	EM06	189356.0	2185080.0	5309.0	0.2	0.0	-0.2	0.1	0.0	0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.6	2184866.5	5309.7	EM07	189150.7	2184866.5	5309.7	-0.3	-0.2	-0.2	0.1	0.0	0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.9	5307.8	EM08	189192.2	2185133.9	5307.8	0.3	0.0	-0.2	0.0	0.0	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.6	EM09	189037.2	2184990.4	5306.7	0.0	-0.1	-0.2	0.0	0.0	0.0

CHANGE IN HWL EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				Spring 2015 SURVEY				Fall 2015 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 5/29/15*				*Date of survey: 12/9/15*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.7	5297.8	EM01	189774.1	2185140.7	5297.7	0.3	0.0	-0.4	0.0	0.0	-0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.3	2184809.9	5302.2	EM02	189637.3	2184809.9	5302.2	0.0	0.1	-0.3	0.0	0.0	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.2	5307.4	EM03	189626.1	2185058.2	5307.4	0.2	0.2	-0.4	0.0	0.0	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.7	2185178.0	5301.5	EM04	189570.7	2185178.0	5301.3	0.1	0.1	-0.5	0.0	0.0	-0.2
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184932.1	5311.3	EM05	189342.4	2184932.1	5311.1	0.2	0.1	-0.4	0.0	0.0	-0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189356.0	2185080.0	5309.0	EM06	189356.0	2185080.0	5308.8	0.2	0.0	-0.4	0.0	0.0	-0.2
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.7	2184866.5	5309.7	EM07	189150.7	2184866.5	5309.6	-0.3	-0.2	-0.4	0.0	0.0	-0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.9	5307.8	EM08	189192.3	2185133.9	5307.6	0.4	0.0	-0.4	0.0	0.0	-0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.7	EM09	189037.3	2184990.4	5306.6	0.1	0.0	-0.3	0.1	0.0	-0.1

	RECORD CONDITION SURVEY				Fall 2015 SURVEY				Spring 2016 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 12/9/15*				*Date of survey: 6/20/16*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.7	5297.7	EM01	189774.1	2185140.7	5297.7	0.2	0.0	-0.3	0.0	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.3	2184809.9	5302.2	EM02	189637.2	2184809.9	5302.2	-0.1	0.1	-0.4	-0.1	0.0	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.1	2185058.2	5307.4	EM03	189626.0	2185058.2	5307.5	0.1	0.2	-0.3	-0.1	0.0	0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.7	2185178.0	5301.3	EM04	189570.7	2185178.0	5301.4	0.1	0.1	-0.4	0.0	0.0	0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184932.1	5311.1	EM05	189342.4	2184932.1	5311.3	0.2	0.1	-0.2	-0.1	0.0	0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189356.0	2185080.0	5308.8	EM06	189356.0	2185079.9	5308.9	0.2	-0.1	-0.3	0.0	-0.1	0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.7	2184866.5	5309.6	EM07	189150.7	2184866.5	5309.7	-0.3	-0.2	-0.3	0.0	0.0	0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.3	2185133.9	5307.6	EM08	189192.2	2185133.9	5307.7	0.3	0.0	-0.3	-0.1	0.0	0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.3	2184990.4	5306.6	EM09	189037.2	2184990.4	5306.6	0.0	0.0	-0.3	-0.1	0.0	0.1

	RECORD CONDITION SURVEY				Spring 2016 SURVEY				Fall 2016 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 6/20/16*				*Date of survey: 1/18/17*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.7	5297.7	EM01	189774.1	2185140.6	5297.7	0.2	0.0	-0.4	0.0	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.9	5302.2	EM02	189637.2	2184809.9	5302.2	-0.1	0.1	-0.3	0.0	0.0	0.1
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.2	5307.5	EM03	189626.0	2185058.1	5307.5	0.1	0.1	-0.3	0.0	0.0	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.7	2185178.0	5301.4	EM04	189570.6	2185178.0	5301.4	0.1	0.1	-0.4	0.0	0.0	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184932.1	5311.3	EM05	189342.4	2184932.0	5311.2	0.2	0.0	-0.3	0.0	0.0	-0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189356.0	2185079.9	5308.9	EM06	189355.9	2185080.0	5308.9	0.1	0.0	-0.3	-0.1	0.0	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.7	2184866.5	5309.7	EM07	189150.6	2184866.5	5309.6	-0.4	-0.2	-0.3	0.0	0.0	-0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.9	5307.7	EM08	189192.2	2185133.9	5307.7	0.3	0.0	-0.3	0.0	0.0	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.6	EM09	189037.2	2184990.4	5306.6	-0.1	-0.1	-0.3	0.0	0.0	0.0

	RECORD CONDITION SURVEY				Fall 2016 SURVEY				Spring 2017 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 6/20/16*				*Date of survey: 5/17/17*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.6	5297.7	EM01	189774.1	2185140.7	5297.7	0.2	0.0	-0.4	0.0	0.1	-0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.9	5302.2	EM02	189637.3	2184810.0	5302.2	0.0	0.1	-0.3	0.1	0.0	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.1	5307.5	EM03	189626.0	2185058.2	5307.4	0.1	0.2	-0.4	0.1	0.1	-0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.6	2185178.0	5301.4	EM04	189570.7	2185178.1	5301.3	0.1	0.2	-0.5	0.1	0.1	-0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184932.0	5311.2	EM05	189342.4	2184932.1	5311.3	0.2	0.1	-0.3	0.0	0.0	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189356.0	2185080.0	5308.9	EM06	189356.0	2185080.0	5308.9	0.2	0.0	-0.3	0.1	0.1	-0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.9	2184866.4	5309.5	EM07	189150.9	2184866.4	5309.5	-0.1	-0.3	-0.4	0.3	-0.1	-0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.9	5307.7	EM08	189192.2	2185133.9	5307.7	0.4	0.0	-0.3	0.0	0.1	-0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.6	EM09	189037.2	2184990.5	5306.5	0.0	0.0	-0.3	0.1	0.1	-0.1

	RECORD CONDITION SURVEY				Spring 2017 SURVEY				Fall 2017 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 5/17/17*				*Date of survey: 11/10/17*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.7	5297.7	EM01	189774.1	2185140.7	5297.7	0.2	0.0	-0.4	0.0	-0.1	0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.3	2184810.0	5302.2	EM02	189637.2	2184809.9	5302.2	-0.1	0.1	-0.3	0.0	-0.1	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.2	5307.4	EM03	189626.0	2185058.1	5307.4	0.1	0.1	-0.3	0.0	-0.1	0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.7	2185178.1	5301.3	EM04	189570.6	2185178.0	5301.4	0.1	0.1	-0.3	-0.1	-0.1	0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184932.1	5311.3	EM05	189342.4	2184932.0	5311.2	0.2	0.0	-0.3	0.0	-0.1	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189356.0	2185080.0	5308.9	EM06	189355.9	2185080.0	5308.9	0.2	-0.1	-0.3	0.0	-0.1	0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.9	2184866.4	5309.5	EM07	189150.7	2184866.5	5309.6	-0.3	-0.2	-0.4	-0.3	0.1	0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.9	5307.7	EM08	189192.2	2185133.9	5307.8	0.3	0.0	-0.3	0.0	-0.1	0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.5	5306.5	EM09	189037.3	2184990.4	5306.6	0.0	-0.1	-0.3	0.0	-0.1	0.0

CHANGE IN HWL EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				Fall 2017 SURVEY				Spring 2018 SURVEY				RESULTS					
	Date of survey: 11/12/08				Date of survey: 11/10/17				Date of survey: 06/18/18				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.7	5297.7	EM01	189774.1	2185140.7	5297.7	0.2	0.0	-0.3	0.0	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.9	5302.2	EM02	189637.1	2184810.0	5302.2	-0.2	0.1	-0.3	-0.1	0.1	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.1	5307.4	EM03	189626.0	2185058.2	5307.4	0.1	0.2	-0.4	0.0	0.0	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.6	2185178.0	5301.4	EM04	189570.6	2185178.0	5301.4	0.0	0.1	-0.3	0.0	0.0	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184932.0	5311.2	EM05	189342.3	2184932.1	5311.3	0.1	0.1	-0.2	-0.1	0.1	0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.9	2185080.0	5308.9	EM06	189355.9	2185080.0	5309.0	0.1	0.0	-0.2	0.0	0.0	0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.7	2184866.5	5309.6	EM07	189150.6	2184866.6	5309.6	-0.4	-0.2	-0.4	0.0	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.9	5307.8	EM08	189192.2	2185133.9	5307.9	0.3	0.0	-0.2	0.0	0.0	0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.3	2184990.4	5306.6	EM09	189037.2	2184990.4	5306.6	-0.1	0.0	-0.3	-0.1	0.0	0.0

	RECORD CONDITION SURVEY				Spring 2018 SURVEY				Fall 2018 SURVEY				RESULTS					
	Date of survey: 11/12/08				Date of survey: 06/18/18				Date of survey: 12/14/18				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.0	2185140.7	5297.7	EM01	189774.1	2185140.7	5297.7	0.2	0.0	-0.3	0.0	0.0	0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.9	5302.2	EM02	189637.1	2184810.0	5302.2	-0.2	0.1	-0.3	0.0	0.0	0.1
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.2	5307.3	EM03	189626.0	2185058.2	5307.4	0.1	0.2	-0.4	0.0	0.0	0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.6	2185178.0	5301.3	EM04	189570.6	2185178.0	5301.4	0.0	0.1	-0.3	0.0	0.0	0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184932.1	5311.1	EM05	189342.3	2184932.1	5311.3	0.1	0.1	-0.2	-0.1	0.0	0.2
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.9	2185080.0	5308.9	EM06	189355.9	2185080.0	5309.0	0.1	0.0	-0.2	0.0	0.0	0.2
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.6	2184866.5	5309.6	EM07	189150.6	2184866.6	5309.6	-0.4	-0.2	-0.4	0.0	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.1	2185133.9	5307.7	EM08	189192.2	2185133.9	5307.9	0.3	0.0	-0.2	0.0	0.0	0.2
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.5	EM09	189037.2	2184990.4	5306.6	-0.1	0.0	-0.3	0.0	0.0	0.1

	RECORD CONDITION SURVEY				Fall 2018 SURVEY				Spring 2019 SURVEY				RESULTS					
	Date of survey: 11/12/08				Date of survey: 12/14/18				Date of survey: 05/16/19				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.7	5297.7	EM01	189774.0	2185140.7	5297.6	0.2	0.0	-0.5	0.0	0.0	-0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.1	2184810.0	5302.2	EM02	189637.2	2184809.9	5302.1	-0.2	0.1	-0.4	0.0	0.0	-0.1
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.2	5307.4	EM03	189625.9	2185058.2	5307.4	0.0	0.2	-0.4	0.0	0.0	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.6	2185178.0	5301.4	EM04	189570.6	2185178.1	5301.4	0.1	0.2	-0.4	0.0	0.0	-0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.3	2184932.1	5311.3	EM05	189342.3	2184932.1	5311.2	0.1	0.1	-0.4	0.1	0.0	-0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.9	2185080.0	5309.0	EM06	189355.9	2185080.0	5308.8	0.1	0.0	-0.4	0.0	0.0	-0.2
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.6	2184866.6	5309.6	EM07	189150.6	2184866.5	5309.6	-0.4	-0.2	-0.4	0.0	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.9	5307.9	EM08	189192.2	2185133.9	5307.7	0.3	0.0	-0.3	0.0	0.0	-0.2
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.6	EM09	189037.2	2184990.4	5306.5	-0.1	0.0	-0.3	0.0	0.0	-0.1

	RECORD CONDITION SURVEY				Spring 2019 SURVEY				Fall 2019 SURVEY				RESULTS					
	Date of survey: 11/12/08				Date of survey: 05/16/19				Date of survey: 01/14/20				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.0	2185140.7	5297.6	EM01	189774.0	2185140.7	5297.7	0.1	0.0	-0.4	0.0	0.0	0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.9	5302.1	EM02	189637.2	2184809.9	5302.2	-0.1	0.1	-0.3	0.0	0.0	0.1
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189625.9	2185058.2	5307.4	EM03	189625.9	2185058.2	5307.4	0.0	0.2	-0.4	0.0	0.0	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.6	2185178.1	5301.4	EM04	189570.5	2185178.0	5301.3	0.0	0.1	-0.4	-0.1	0.0	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.3	2184932.1	5311.2	EM05	189342.3	2184932.1	5311.2	0.1	0.1	-0.3	0.0	0.0	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.9	2185080.0	5308.8	EM06	189355.9	2185080.0	5308.9	0.1	0.0	-0.3	0.0	0.0	0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.6	2184866.5	5309.6	EM07	189150.6	2184866.6	5309.6	-0.4	-0.2	-0.4	0.0	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.1	2185133.9	5307.6	EM08	189192.2	2185133.9	5307.6	0.2	0.0	-0.4	-0.1	0.0	-0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.5	EM09	189037.2	2184990.4	5306.5	-0.1	0.0	-0.3	0.0	0.0	0.0

	RECORD CONDITION SURVEY				Fall 2019 SURVEY				Spring 2020 SURVEY				RESULTS					
	Date of survey: 11/12/08				Date of survey: 01/14/20				Date of survey: 04/23/20				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.0	2185140.7	5297.7	EM01	189774.0	2185140.7	5297.6	0.1	0.0	-0.5	0.0	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.9	5302.2	EM02	189637.2	2184809.8	5302.2	-0.1	0.0	-0.4	0.1	-0.1	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189625.9	2185058.2	5307.4	EM03	189625.9	2185058.2	5307.4	0.0	0.2	-0.4	0.0	0.0	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.5	2185178.0	5301.3	EM04	189570.5	2185178.0	5301.3	0.0	0.1	-0.4	0.0	0.0	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.3	2184932.1	5311.2	EM05	189342.3	2184932.1	5311.1	0.1	0.1	-0.4	0.0	0.0	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.9	2185080.0	5308.9	EM06	189355.8	2185080.0	5308.9	0.1	0.0	-0.3	-0.1	0.0	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.6	2184866.6	5309.6	EM07	189150.6	2184866.5	5309.6	-0.4	-0.2	-0.4	0.0	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.1	2185133.9	5307.6	EM08	189192.2	2185133.9	5307.7	0.3	0.0	-0.3	0.1	0.0	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.5	EM09	189037.1	2184990.4	5306.5	-0.1	0.0	-0.4	0.0	0.0	0.0

CHANGE IN HWL EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				Spring 2020 SURVEY				Fall 2020 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 04/23/20*				*Date of survey: 10/01/20*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.0	2185140.7	5297.6	EM01	189774.0	2185140.7	5297.7	0.1	0.0	-0.4	0.0	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.8	5302.2	EM02	189637.2	2184809.9	5302.1	-0.1	0.1	-0.4	-0.1	0.1	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189625.9	2185058.2	5307.4	EM03	189626.0	2185058.2	5307.3	0.1	0.2	-0.4	0.1	-0.1	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.5	2185178.0	5301.3	EM04	189570.6	2185178.0	5301.3	0.1	0.1	-0.5	0.1	0.0	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.3	2184932.1	5311.1	EM05	189342.3	2184932.1	5311.2	0.1	0.1	-0.3	0.0	0.0	0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.8	2185080.0	5308.9	EM06	189355.9	2185080.0	5308.9	0.1	0.0	-0.3	0.1	0.0	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.6	2184866.5	5309.6	EM07	189150.6	2184866.5	5309.6	-0.4	-0.2	-0.4	0.0	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.9	5307.7	EM08	189192.1	2185133.9	5307.7	0.2	0.0	-0.4	0.0	0.0	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.1	2184990.4	5306.5	EM09	189037.2	2184990.4	5306.6	-0.1	-0.1	-0.3	0.0	0.0	0.1

	RECORD CONDITION SURVEY				Fall 2020 SURVEY				Spring 2021 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 10/01/20*				*Date of survey: 05/25/21*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.0	2185140.7	5297.7	EM01	189774.0	2185140.7	5297.6	0.1	0.0	-0.5	0.0	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.9	5302.1	EM02	189637.2	2184809.9	5302.1	-0.1	0.1	-0.4	0.0	0.0	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.2	5307.3	EM03	189625.9	2185058.2	5307.4	0.0	0.2	-0.3	0.0	0.0	0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.6	2185178.0	5301.3	EM04	189570.6	2185178.1	5301.4	0.1	0.2	-0.4	0.0	0.0	0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.3	2184932.1	5311.2	EM05	189342.3	2184932.1	5311.2	0.1	0.1	-0.3	0.0	0.0	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.9	2185080.0	5308.9	EM06	189355.9	2185080.0	5308.8	0.1	0.0	-0.4	0.0	0.0	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.6	2184866.5	5309.6	EM07	189150.6	2184866.6	5309.6	-0.4	-0.2	-0.3	0.0	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.1	2185133.9	5307.7	EM08	189192.2	2185133.9	5307.8	0.3	0.0	-0.3	0.1	0.0	0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.6	EM09	189037.2	2184990.4	5306.5	0.0	-0.1	-0.3	0.0	0.0	-0.1

	RECORD CONDITION SURVEY				Spring 2021 SURVEY				Fall 2021 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 05/25/21*				*Date of survey: 12/02/21*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.0	2185140.7	5297.6	EM01	189774.1	2185140.6	5297.7	0.2	-0.1	-0.4	0.0	-0.1	0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.9	5302.1	EM02	189637.2	2184809.9	5302.2	-0.1	0.1	-0.3	0.0	0.0	0.1
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189625.9	2185058.2	5307.4	EM03	189626.0	2185058.1	5307.4	0.1	0.2	-0.4	0.0	0.0	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.6	2185178.1	5301.4	EM04	189570.6	2185178.0	5301.3	0.0	0.1	-0.4	0.0	0.0	-0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.3	2184932.1	5311.2	EM05	189342.3	2184932.1	5311.1	0.1	0.1	-0.4	0.0	0.0	-0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.9	2185080.0	5308.8	EM06	189355.9	2185080.0	5308.9	0.1	-0.1	-0.3	0.0	-0.1	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.6	2184866.6	5309.6	EM07	189150.6	2184866.5	5309.6	-0.4	-0.2	-0.4	0.0	-0.1	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.9	5307.8	EM08	189192.2	2185133.9	5307.7	0.3	0.0	-0.3	0.0	0.1	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.5	EM09	189037.2	2184990.4	5306.6	-0.1	0.0	-0.3	0.0	0.0	0.1

	RECORD CONDITION SURVEY				Fall 2021 SURVEY				Spring 2022 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 12/02/21*				*Date of survey: 05/19/22*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.1	2185140.6	5297.7	EM01	189774.0	2185140.7	5297.6	0.1	0.0	-0.5	-0.1	0.1	-0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184809.9	5302.2	EM02	189637.1	2184809.8	5302.1	-0.2	0.0	-0.4	-0.1	-0.1	-0.1
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.1	5307.4	EM03	189626.0	2185058.1	5307.4	0.1	0.1	-0.4	0.0	0.0	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.6	2185178.0	5301.3	EM04	189570.6	2185177.9	5301.3	0.1	0.0	-0.4	0.0	-0.1	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.3	2184932.1	5311.1	EM05	189342.3	2184932.0	5311.2	0.0	0.0	-0.3	0.0	-0.1	0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.9	2185080.0	5308.8	EM06	189355.9	2185080.0	5308.8	0.1	-0.1	-0.4	0.0	0.0	-0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.6	2184866.6	5309.6	EM07	189150.6	2184866.4	5309.6	-0.4	-0.3	-0.4	0.0	0.0	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.8	5307.6	EM08	189192.2	2185133.8	5307.6	0.3	-0.1	-0.4	0.0	-0.1	-0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.6	EM09	189037.2	2184990.4	5306.3	-0.1	-0.1	-0.5	0.0	-0.1	-0.3

	RECORD CONDITION SURVEY				Spring 2022 SURVEY				Fall 2022 SURVEY				RESULTS					
	Date of survey: 11/12/08				*Date of survey: 05/19/22*				*Date of survey: 02/02/23*				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.0	2185140.7	5297.6	EM01	189773.6	2185140.5	5297.8	-0.3	-0.2	-0.3	-0.4	-0.2	0.2
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.1	2184809.8	5302.1	EM02	189636.6	2184809.7	5302.3	-0.7	-0.1	-0.2	-0.5	-0.2	0.2
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.0	2185058.1	5307.4	EM03	189625.3	2185058.1	5307.5	-0.5	0.1	-0.3	-0.6	0.0	0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.6	2185177.9	5301.3	EM04	189570.0	2185177.9	5301.5	-0.5	0.0	-0.3	-0.5	-0.1	0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.3	2184932.0	5311.2	EM05	189341.8	2184931.9	5311.2	-0.4	-0.1	-0.3	-0.5	-0.1	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.9	2185080.0	5308.8	EM06	189355.4	2185079.8	5308.9	-0.4	-0.2	-0.3	-0.6	-0.2	0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.6	2184866.4	5309.6	EM07	189150.1	2184866.3	5309.7	-0.9	-0.5	-0.3	-0.5	-0.2	0.0
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.2	2185133.8	5307.6	EM08	189191.6	2185133.7	5307.8	-0.3	-0.2	-0.2	-0.5	-0.1	0.2
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.4	5306.3	EM09	189037.1	2184990.2	5306.7	-0.1	-0.2	-0.2	0.0	-0.1	0.4

CHANGE IN HWL EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				Fall 2022 SURVEY				Spring 2023 SURVEY				RESULTS					
	Date of survey: 11/12/08				Date of survey: 02/02/23				Date of survey: 06/14/23				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189773.6	2185140.5	5297.8	EM01	189773.6	2185140.5	5297.8	-0.3	-0.1	-0.3	0.0	0.0	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189636.6	2184809.7	5302.3	EM02	189636.7	2184809.7	5302.0	-0.6	-0.1	-0.5	0.1	0.1	-0.3
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189625.3	2185058.1	5307.5	EM03	189625.4	2185058.0	5307.4	-0.5	0.0	-0.4	0.1	-0.1	-0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.0	2185177.9	5301.5	EM04	189570.1	2185177.9	5301.4	-0.4	0.0	-0.4	0.1	0.0	-0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189341.8	2184931.9	5311.2	EM05	189341.8	2184931.9	5311.2	-0.4	-0.1	-0.3	0.1	0.1	-0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.4	2185079.8	5308.9	EM06	189355.4	2185079.8	5308.8	-0.4	-0.2	-0.4	0.0	0.0	-0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.1	2184866.3	5309.7	EM07	189150.0	2184866.4	5309.5	-1.0	-0.4	-0.4	0.0	0.1	-0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189191.6	2185133.7	5307.8	EM08	189191.6	2185133.7	5307.7	-0.3	-0.2	-0.3	0.0	0.0	-0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.1	2184990.2	5306.7	EM09	189036.7	2184990.2	5306.5	-0.5	-0.2	-0.4	-0.4	0.0	-0.2

	RECORD CONDITION SURVEY				Spring 2023 SURVEY				Fall 2023 SURVEY				RESULTS					
	Date of survey: 11/12/08				Date of survey: 06/14/23				Date of survey: 01/03/24				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189773.6	2185140.5	5297.8	EM01	189773.9	2185140.7	5297.5	0.0	0.0	-0.5	0.4	0.2	-0.2
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189636.6	2184809.7	5302.3	EM02	189637.1	2184809.8	5302.0	-0.2	0.0	-0.5	0.5	0.1	-0.3
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189625.3	2185058.1	5307.5	EM03	189625.9	2185058.0	5307.3	0.0	0.1	-0.4	0.5	0.0	-0.2
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.0	2185177.9	5301.5	EM04	189570.5	2185177.9	5301.2	0.0	0.0	-0.6	0.5	0.1	-0.3
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189341.8	2184931.9	5311.2	EM05	189342.3	2184932.0	5311.1	0.1	0.0	-0.4	0.5	0.1	-0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.4	2185079.8	5308.9	EM06	189355.8	2185080.0	5308.8	0.0	-0.1	-0.4	0.4	0.1	-0.2
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.1	2184866.3	5309.7	EM07	189150.5	2184866.4	5309.5	-0.5	-0.3	-0.5	0.5	0.2	-0.2
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189191.6	2185133.7	5307.8	EM08	189192.1	2185133.8	5307.6	0.2	-0.1	-0.5	0.5	0.2	-0.2
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.1	2184990.2	5306.7	EM09	189037.1	2184990.3	5306.4	-0.2	-0.1	-0.5	-0.1	0.1	-0.3

	RECORD CONDITION SURVEY				Fall 2023 SURVEY				Spring 2024 SURVEY				RESULTS					
	Date of survey: 11/12/08				Date of survey: 01/03/24				Date of survey: 04/04/24				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189773.9	2185140.7	5297.5	EM01	189773.9	2185140.7	5297.6	0.1	0.0	-0.5	0.0	0.0	0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.1	2184809.8	5302.0	EM02	189637.2	2184810.0	5302.1	-0.1	0.1	-0.5	0.1	0.1	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189625.9	2185058.0	5307.3	EM03	189625.9	2185058.2	5307.4	0.0	0.2	-0.3	0.0	0.1	0.1
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.5	2185177.9	5301.2	EM04	189570.5	2185178.0	5301.3	0.0	0.1	-0.5	0.0	0.0	0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.3	2184932.0	5311.1	EM05	189342.3	2184931.9	5311.2	0.0	-0.1	-0.3	-0.1	0.0	0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.8	2185080.0	5308.8	EM06	189355.8	2185079.9	5308.8	0.1	-0.1	-0.4	0.0	0.0	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.5	2184866.4	5309.5	EM07	189150.5	2184866.4	5309.6	-0.5	-0.3	-0.4	0.0	0.0	0.2
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.1	2185133.8	5307.6	EM08	189192.1	2185133.9	5307.7	0.2	0.0	-0.4	0.0	0.0	0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.1	2184990.3	5306.4	EM09	189037.1	2184990.3	5306.6	-0.2	-0.1	-0.3	0.0	0.0	0.1

	RECORD CONDITION SURVEY				Spring 2024 SURVEY				Fall 2024 SURVEY				RESULTS					
	Date of survey: 11/12/08				Date of survey: 04/04/24				Date of survey: 12/04/24				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189773.9	2185140.7	5297.6	EM01	189774.2	2185140.8	5297.5	0.3	0.1	-0.6	0.2	0.1	-0.1
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.2	2184810.0	5302.1	EM02	189637.3	2184810.0	5302.0	0.0	0.2	-0.5	0.1	0.0	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189625.9	2185058.2	5307.4	EM03	189626.1	2185058.2	5307.2	0.2	0.2	-0.5	0.1	0.1	-0.2
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.5	2185178.0	5301.3	EM04	189570.7	2185178.1	5301.2	0.2	0.2	-0.6	0.2	0.1	-0.1
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.3	2184931.9	5311.2	EM05	189342.4	2184932.2	5311.1	0.2	0.2	-0.5	0.2	0.2	-0.1
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189355.8	2185079.9	5308.8	EM06	189356.0	2185080.1	5308.7	0.2	0.1	-0.4	0.2	0.1	-0.1
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.5	2184866.4	5309.6	EM07	189150.7	2184866.6	5309.4	-0.3	-0.2	-0.6	0.1	0.1	-0.3
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.1	2185133.9	5307.7	EM08	189192.3	2185134.0	5307.5	0.4	0.1	-0.5	0.2	0.1	-0.1
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.1	2184990.3	5306.6	EM09	189037.2	2184990.6	5306.4	0.0	0.2	-0.5	0.2	0.3	-0.2

	RECORD CONDITION SURVEY				Fall 2024 SURVEY				Spring 2025 SURVEY				RESULTS					
	Date of survey: 11/12/08				Date of survey: 12/04/24				Date of survey: 05/16/25				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
EM-HWL01	A12276	189773.9	2185140.7	5298.1	EM01	189774.2	2185140.8	5297.5	EM01	189774.2	2185140.9	5297.5	0.3	0.2	-0.6	0.1	0.1	0.0
EM-HWL02	A12274	189637.3	2184809.8	5302.5	EM02	189637.3	2184810.0	5302.0	EM02	189637.4	2184810.1	5302.0	0.1	0.3	-0.5	0.1	0.2	0.0
EM-HWL03	A12275	189625.9	2185058.0	5307.8	EM03	189626.1	2185058.2	5307.2	EM03	189626.1	2185058.3	5307.2	0.2	0.3	-0.5	0.1	0.1	0.0
EM-HWL04	A12277	189570.5	2185177.9	5301.8	EM04	189570.7	2185178.1	5301.2	EM04	189570.7	2185178.2	5301.2	0.2	0.3	-0.6	0.0	0.1	0.0
EM-HWL05	A12279	189342.2	2184932.0	5311.5	EM05	189342.4	2184932.2	5311.1	EM05	189342.5	2184932.2	5311.0	0.3	0.2	-0.5	0.1	0.1	0.0
EM-HWL06	A12278	189355.8	2185080.0	5309.2	EM06	189356.0	2185080.1	5308.7	EM06	189356.0	2185080.2	5308.7	0.3	0.2	-0.5	0.0	0.1	0.0
EM-HWL07	A12280	189151.0	2184866.7	5310.0	EM07	189150.7	2184866.6	5309.4	EM07	189150.8	2184866.6	5309.5	-0.2	-0.1	-0.5	0.1	0.1	0.1
EM-HWL08	A12281	189191.9	2185133.9	5308.0	EM08	189192.3	2185134.0	5307.5	EM08	189192.3	2185134.0	5307.6	0.4	0.1	-0.4	0.0	0.1	0.0
EM-HWL09	A12282	189037.2	2184990.5	5306.9	EM09	189037.2	2184990.6	5306.4	EM09	189037.3	2184990.5	5306.4	0.1	0.1	-0.5	0.1	-0.1	0.0

CHANGE IN ELF EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				FALL 2010 SURVEY				SPRING 2011 SURVEY				RESULTS					
					Date of survey: 9/30/10				Date of survey: 4/28/11				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	Aelfem1	188086.9	2185027.4	5287.8	a1004	188086.9	2185027.4	5287.8	0.0	-0.1	0.0	0.0	0.0	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	Aelfem2	187933.6	2184981.5	5297.1	a1005	187933.6	2184981.4	5297.1	0.0	0.0	0.0	0.0	-0.1	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	Aelfem3	187817.7	2185028.3	5303.4	a1006	187817.8	2185028.3	5303.4	0.1	0.0	0.0	0.0	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	Aelfem4	187781.1	2185204.8	5303.6	a1007	187781.2	2185204.8	5303.6	0.1	-0.1	0.0	0.1	0.0	0.0
ELF-EM5	EM5	187481.5	2184463.0	5302.4	Aelfem5	187481.5	2184463.0	5302.4	a1003	187481.6	2184463.0	5302.3	0.1	0.0	-0.1	0.1	0.0	-0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	Aelfem6	187611.7	2184518.4	5307.6	Monument damage. No survey.				N/A	N/A	N/A	N/A	N/A	N/A
ELF-EM7	EM7	187727.8	2184471.4	5304.4	Aelfem7	187727.8	2184471.4	5304.4	a1001	187727.9	2184471.4	5304.3	0.1	0.0	-0.1	0.1	0.0	-0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	Aelfem8	187806.3	2184332.0	5298.2	Monument damage. No survey.				N/A	N/A	N/A	N/A	N/A	N/A

	RECORD CONDITION SURVEY				SPRING 2011 SURVEY				FALL 2011 SURVEY				RESULTS					
					Date of survey: 4/28/11				Date of survey: 10/12/11				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	a1004	188086.9	2185027.4	5287.8	11	188087.0	2185027.4	5287.7	0.1	0.0	-0.1	0.0	0.0	-0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	a1005	187933.6	2184981.4	5297.1	12	187933.5	2184981.4	5297.1	0.0	-0.1	0.0	-0.1	0.0	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	a1006	187817.8	2185028.3	5303.4	13	187817.8	2185028.3	5303.4	0.2	0.0	0.0	0.1	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	a1007	187781.2	2185204.8	5303.6	14	187781.2	2185204.8	5303.5	0.1	0.0	-0.1	0.0	0.0	-0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	a1003	187481.6	2184463.0	5302.3	18	187481.5	2184463.0	5302.3	-0.1	0.0	-0.1	-0.1	0.0	0.0
ELF-EM6	EM6	187611.7	2184518.3	5307.7	Monument damage. No survey.				15	187611.6	2184518.3	5307.6	-0.1	0.0	-0.1	N/A	N/A	N/A
ELF-EM7	EM7	187727.8	2184471.4	5304.4	a1001	187727.9	2184471.4	5304.3	16	187727.9	2184471.3	5304.3	0.1	-0.1	-0.1	0.0	-0.1	0.0
ELF-EM8	EM8	187806.3	2184332.0	5298.2	Monument damage. No survey.				17	187806.4	2184331.9	5298.1	0.0	-0.1	-0.1	N/A	N/A	N/A

	RECORD CONDITION SURVEY				FALL 2011 SURVEY				Spring 2012 SURVEY				RESULTS					
					Date of survey: 10/12/11				Date of survey: 5/09/12				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	11	188087.0	2185027.4	5287.7	4309	188087.0	2185027.4	5287.7	0.1	0.0	-0.1	0.0	0.0	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	12	187933.5	2184981.4	5297.1	4310	187933.6	2184981.4	5297.0	0.0	-0.1	-0.1	0.1	0.0	-0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	13	187817.8	2185028.3	5303.4	4311	187817.7	2185028.3	5303.4	0.0	0.0	0.0	-0.1	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	14	187781.2	2185204.8	5303.5	4312	187781.1	2185204.8	5303.5	0.0	0.0	-0.1	-0.1	0.0	0.0
ELF-EM5	EM5	187481.5	2184463.0	5302.4	18	187481.5	2184463.0	5302.3	4314	187481.5	2184463.0	5302.2	-0.1	0.0	-0.2	0.0	0.0	-0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	15	187611.6	2184518.3	5307.6	4313	187611.7	2184518.3	5307.5	0.0	0.0	-0.2	0.1	0.0	-0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	16	187727.9	2184471.3	5304.3	4315	187727.9	2184471.4	5304.3	0.1	0.0	-0.1	0.0	0.1	0.0
ELF-EM8	EM8	187806.3	2184332.0	5298.2	17	187806.4	2184331.9	5298.1	4316	187806.4	2184332.0	5298.1	0.0	0.0	-0.1	0.0	0.1	0.0

	RECORD CONDITION SURVEY				Spring 2012 SURVEY				Fall 2012 SURVEY				RESULTS					
					Date of survey: 5/09/12				Date of survey: 9/20/12				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	4309	188087.0	2185027.4	5287.7	n1009	188087.0	2185027.4	5287.7	0.1	-0.1	-0.1	0.0	0.0	-0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	4310	187933.6	2184981.4	5297.0	n1006	187933.6	2184981.4	5297.0	0.0	0.0	-0.1	0.0	0.0	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	4311	187817.7	2185028.3	5303.4	n1007	187817.7	2185028.3	5303.3	0.1	-0.1	-0.1	0.0	0.0	-0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	4312	187781.1	2185204.8	5303.5	n1008	187781.1	2185204.8	5303.5	0.0	-0.1	-0.1	0.0	0.0	-0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	4314	187481.5	2184463.0	5302.2	n1002	187481.6	2184463.0	5302.1	0.0	0.0	-0.2	0.1	0.0	-0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	4313	187611.7	2184518.3	5307.5	n1003	187611.7	2184518.3	5307.4	0.0	-0.1	-0.3	0.0	0.0	-0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	4315	187727.9	2184471.4	5304.3	n1004	187727.9	2184471.4	5304.2	0.0	-0.1	-0.3	0.0	0.0	-0.2
ELF-EM8	EM8	187806.3	2184332.0	5298.2	4316	187806.4	2184332.0	5298.1	n1005	187806.4	2184332.0	5298.0	0.1	-0.1	-0.2	0.0	0.0	-0.1

	RECORD CONDITION SURVEY				Fall 2012 SURVEY				Spring 2013 SURVEY				RESULTS					
					Date of survey: 9/20/12				Date of survey: 5/07/13				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	n1009	188087.0	2185027.4	5287.7	EM1	188087.0	2185027.4	5287.7	0.1	0.0	-0.1	0.1	0.1	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	n1006	187933.6	2184981.4	5297.0	EM2	187933.6	2184981.4	5296.9	0.0	-0.1	-0.2	0.0	0.0	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	n1007	187817.7	2185028.3	5303.3	EM3	187817.8	2185028.3	5303.3	0.2	-0.1	-0.1	0.1	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	n1008	187781.1	2185204.8	5303.5	EM4	187781.3	2185204.9	5303.5	0.2	0.0	-0.1	0.1	0.1	0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	n1002	187481.6	2184463.0	5302.1	EM5	187481.6	2184463.0	5302.2	0.0	0.0	-0.2	0.0	0.1	0.0
ELF-EM6	EM6	187611.7	2184518.3	5307.7	n1003	187611.7	2184518.3	5307.4	EM6	187611.6	2184518.3	5307.4	-0.1	0.0	-0.3	0.0	0.0	0.0
ELF-EM7	EM7	187727.8	2184471.4	5304.4	n1004	187727.9	2184471.4	5304.2	EM7	187728.0	2184471.4	5304.2	0.1	0.0	-0.2	0.1	0.0	0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	n1005	187806.4	2184332.0	5298.0	EM8	187806.3	2184332.0	5298.0	0.0	0.0	-0.2	-0.1	0.0	0.0

CHANGE IN ELF EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				Spring 2013 SURVEY				Fall 2013 SURVEY				RESULTS					
					Date of survey: 5/07/13				Date of survey: 9/19/13				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.4	5287.7	EM1	188087.1	2185027.4	5287.7	0.1	-0.1	-0.1	0.0	0.0	0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.4	5296.9	EM2	187933.5	2184981.3	5297.0	0.0	-0.1	-0.1	0.0	0.0	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.8	2185028.3	5303.3	EM3	187817.8	2185028.3	5303.3	0.1	-0.1	-0.1	0.0	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.3	2185204.9	5303.5	EM4	187780.9	2185204.9	5303.5	-0.1	0.0	-0.1	-0.3	0.0	0.0
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.6	2184463.0	5302.2	EM5	187481.4	2184463.0	5302.2	-0.1	-0.1	-0.2	-0.2	-0.1	0.0
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.3	5307.4	EM6	187611.6	2184518.3	5307.4	-0.1	0.0	-0.3	0.0	0.0	0.0
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187728.0	2184471.4	5304.2	EM7	187727.9	2184471.4	5304.2	0.1	0.0	-0.2	0.0	0.0	0.0
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.3	2184332.0	5298.0	EM8	187806.4	2184331.9	5298.0	0.1	-0.1	-0.1	0.1	-0.1	0.0

	RECORD CONDITION SURVEY				Fall 2013 SURVEY				Spring 2014 SURVEY				RESULTS					
					Date of survey: 9/19/13				Date of survey: 5/29/14				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.1	2185027.4	5287.7	EM1	188087.0	2185027.5	5287.6	0.1	0.1	-0.2	0.0	0.1	-0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.5	2184981.3	5297.0	EM2	187933.6	2184981.5	5296.9	0.0	0.0	-0.2	0.1	0.2	-0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.8	2185028.3	5303.3	EM3	187817.8	2185028.4	5303.2	0.2	0.1	-0.2	0.0	0.2	-0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187780.9	2185204.9	5303.5	EM4	187781.3	2185204.9	5303.4	0.2	0.1	-0.2	0.3	0.1	-0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.4	2184463.0	5302.2	EM5	187481.5	2184463.1	5302.0	0.0	0.1	-0.3	0.1	0.1	-0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.3	5307.4	EM6	187611.6	2184518.4	5307.3	0.0	0.1	-0.4	0.1	0.1	-0.2
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.9	2184471.4	5304.2	EM7	187728.0	2184471.5	5304.1	0.1	0.0	-0.4	0.0	0.1	-0.2
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.4	2184331.9	5298.0	EM8	187806.5	2184332.1	5297.9	0.1	0.1	-0.3	0.1	0.2	-0.2

	RECORD CONDITION SURVEY				Spring 2014 SURVEY				Fall 2014 SURVEY				RESULTS					
					Date of survey: 5/29/14				Date of survey: 10/19/14				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.5	5287.6	EM1	188087.0	2185027.5	5287.6	0.0	0.0	-0.2	-0.1	-0.1	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.5	5296.9	EM2	187933.6	2184981.5	5297.0	0.0	0.0	-0.1	0.0	0.0	0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.8	2185028.4	5303.2	EM3	187817.7	2185028.4	5303.3	0.1	0.1	-0.1	-0.1	-0.1	0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.3	2185204.9	5303.4	EM4	187781.1	2185204.9	5303.5	0.1	0.0	-0.1	-0.1	0.0	0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.5	2184463.1	5302.0	EM5	187481.5	2184463.1	5302.1	0.0	0.1	-0.2	0.0	0.0	0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.4	5307.3	EM6	187611.6	2184518.4	5307.4	0.0	0.1	-0.3	0.0	0.0	0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187728.0	2184471.5	5304.1	EM7	187727.8	2184471.5	5304.1	0.0	0.1	-0.3	-0.2	0.0	0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.5	2184332.1	5297.9	EM8	187806.4	2184332.1	5298.0	0.1	0.1	-0.2	-0.1	0.0	0.1

	RECORD CONDITION SURVEY				Fall 2014 SURVEY				Spring 2015 SURVEY				RESULTS					
					Date of survey: 10/19/14				Date of survey: 5/29/15				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.5	5287.6	EM1	188087.0	2185027.5	5287.7	0.1	0.1	-0.1	0.1	0.1	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.5	5297.0	EM2	187933.6	2184981.5	5296.9	0.1	0.1	-0.2	0.0	0.0	-0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.7	2185028.4	5303.3	EM3	187817.8	2185028.4	5303.3	0.1	0.1	-0.1	0.0	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.1	2185204.9	5303.5	EM4	187781.1	2185205.0	5303.5	0.1	0.1	-0.1	0.0	0.1	0.0
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.5	2184463.1	5302.1	EM5	187481.6	2184463.1	5302.1	0.1	0.1	-0.2	0.1	0.0	0.0
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.4	5307.4	EM6	187611.7	2184518.4	5307.4	0.0	0.1	-0.3	0.0	0.0	0.0
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.8	2184471.5	5304.1	EM7	187727.9	2184471.5	5304.2	0.1	0.1	-0.2	0.1	0.0	0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.4	2184332.1	5298.0	EM8	187806.5	2184332.1	5298.0	0.1	0.1	-0.1	0.1	0.0	0.0

	RECORD CONDITION SURVEY				Spring 2015 SURVEY				Fall 2015 SURVEY				RESULTS					
					Date of survey: 5/29/15				Date of survey: 12/9/15				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.5	5287.7	EM1	188087.0	2185027.5	5287.5	0.1	0.1	-0.3	0.0	0.0	-0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.5	5296.9	EM2	187933.6	2184981.5	5296.8	0.0	0.0	-0.3	-0.1	0.0	-0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.8	2185028.4	5303.3	EM3	187817.9	2185028.4	5303.1	0.2	0.1	-0.3	0.1	0.0	-0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.1	2185205.0	5303.5	EM4	187781.2	2185205.0	5303.3	0.1	0.1	-0.2	0.1	0.0	-0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.6	2184463.1	5302.1	EM5	187481.5	2184463.2	5302.0	0.0	0.1	-0.4	-0.1	0.1	-0.2
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.7	2184518.4	5307.4	EM6	187611.6	2184518.4	5307.2	0.0	0.1	-0.5	0.0	0.1	-0.2
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.9	2184471.5	5304.2	EM7	187728.0	2184471.5	5304.0	0.1	0.1	-0.4	0.1	0.0	-0.2
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.5	2184332.1	5298.0	EM8	187806.4	2184332.1	5297.8	0.1	0.0	-0.4	-0.1	0.0	-0.2

CHANGE IN ELF EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				Fall 2015 SURVEY				Spring 2016 SURVEY				RESULTS					
					Date of survey: 12/9/15				Date of survey: 6/20/16				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.5	5287.5	EM1	188087.0	2185027.5	5287.6	0.1	0.1	-0.2	-0.1	0.0	0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.5	5296.8	EM2	187933.6	2184981.5	5296.9	0.0	0.1	-0.2	0.0	0.0	0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.9	2185028.4	5303.1	EM3	187817.8	2185028.4	5303.2	0.1	0.1	-0.2	-0.1	0.0	0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.2	2185205.0	5303.3	EM4	187781.1	2185204.9	5303.4	0.0	0.0	-0.2	-0.1	-0.1	0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.5	2184463.2	5302.0	EM5	187481.6	2184463.1	5302.1	0.0	0.1	-0.3	0.0	-0.1	0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.4	5307.2	EM6	187611.6	2184518.4	5307.3	0.0	0.1	-0.4	0.0	-0.1	0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187728.0	2184471.5	5304.0	EM7	187727.9	2184471.5	5304.1	0.0	0.1	-0.4	-0.1	0.0	0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.4	2184332.1	5297.8	EM8	187806.4	2184332.1	5297.9	0.1	0.1	-0.3	0.0	0.0	0.0

	RECORD CONDITION SURVEY				Spring 2016 SURVEY				Fall 2016 SURVEY				RESULTS					
					Date of survey: 6/20/16				Date of survey: 1/18/17				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.5	5287.6	EM1	188087.0	2185027.5	5287.6	0.1	0.0	-0.2	0.0	0.0	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.5	5296.9	EM2	187933.6	2184981.5	5296.9	0.0	0.0	-0.2	0.0	0.0	0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.8	2185028.4	5303.2	EM3	187817.8	2185028.4	5303.2	0.1	0.1	-0.2	0.0	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.1	2185204.9	5303.4	EM4	187781.2	2185204.9	5303.5	0.1	0.1	-0.1	0.0	0.0	0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.6	2184463.1	5302.1	EM5	187481.6	2184463.1	5302.1	0.0	0.1	-0.3	0.0	0.0	0.0
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.4	5307.3	EM6	187611.6	2184518.4	5307.4	0.0	0.1	-0.3	0.0	0.0	0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.9	2184471.5	5304.1	EM7	187727.9	2184471.5	5304.1	0.1	0.1	-0.3	0.0	0.0	0.0
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.4	2184332.1	5297.9	EM8	187806.4	2184332.1	5298.0	0.1	0.1	-0.2	0.0	0.0	0.1

	RECORD CONDITION SURVEY				Fall 2016 SURVEY				Spring 2017 SURVEY				RESULTS					
					Date of survey: 6/20/16				Date of survey: 05/17/17				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.5	5287.6	EM1	188087.0	2185027.5	5287.6	0.1	0.1	-0.2	0.0	0.1	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.5	5296.9	EM2	187933.7	2184981.6	5296.8	0.1	0.1	-0.2	0.1	0.1	-0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.8	2185028.4	5303.2	EM3	187817.8	2185028.4	5303.1	0.1	0.1	-0.3	0.0	0.1	-0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.2	2185204.9	5303.5	EM4	187781.2	2185205.0	5303.4	0.1	0.1	-0.2	0.0	0.0	-0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.6	2184463.1	5302.1	EM5	187481.6	2184463.1	5302.0	0.1	0.1	-0.4	0.0	0.1	-0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.4	5307.4	EM6	187611.7	2184518.5	5307.3	0.0	0.2	-0.4	0.1	0.1	-0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.9	2184471.5	5304.1	EM7	187727.9	2184471.6	5304.1	0.1	0.1	-0.4	0.0	0.1	-0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.4	2184332.1	5298.0	EM8	187806.4	2184332.1	5297.9	0.1	0.1	-0.3	0.1	0.0	-0.1

	RECORD CONDITION SURVEY				Spring 2017 SURVEY				Fall 2017 SURVEY				RESULTS					
					Date of survey: 05/17/17				Date of survey: 11/10/17				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.5	5287.6	EM1	188087.0	2185027.5	5287.7	0.1	0.1	-0.1	0.0	0.0	0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.7	2184981.6	5296.8	EM2	187933.6	2184981.5	5296.9	0.0	0.1	-0.2	-0.1	0.0	0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.8	2185028.4	5303.1	EM3	187817.7	2185028.4	5303.2	0.1	0.1	-0.2	0.0	-0.1	0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.2	2185205.0	5303.4	EM4	187781.2	2185204.9	5303.4	0.1	0.0	-0.2	0.0	-0.1	0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.6	2184463.1	5302.0	EM5	187481.6	2184463.1	5302.1	0.0	0.1	-0.3	0.0	0.0	0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.7	2184518.5	5307.3	EM6	187611.6	2184518.4	5307.3	0.0	0.1	-0.4	-0.1	-0.1	0.0
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.9	2184471.6	5304.1	EM7	187727.9	2184471.5	5304.1	0.0	0.1	-0.3	0.0	-0.1	0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.4	2184332.1	5297.9	EM8	187806.4	2184332.1	5297.9	0.1	0.1	-0.3	0.0	0.0	0.0

	RECORD CONDITION SURVEY				Fall 2017 SURVEY				Spring 2018 SURVEY				RESULTS					
					Date of survey: 11/10/17				Date of survey: 06/18/18				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.5	5287.7	EM1	188086.9	2185027.5	5287.6	0.0	0.1	-0.2	0.0	0.0	-0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.5	5296.9	EM2	187933.6	2184981.6	5296.9	0.0	0.1	-0.2	0.0	0.1	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.7	2185028.4	5303.2	EM3	187817.7	2185028.4	5303.1	0.0	0.1	-0.3	-0.1	0.1	-0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.2	2185204.9	5303.4	EM4	187781.1	2185205.0	5303.4	0.0	0.1	-0.2	-0.1	0.1	0.0
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.6	2184463.1	5302.1	EM5	187481.5	2184463.2	5302.0	-0.1	0.2	-0.4	-0.1	0.1	-0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.4	5307.3	EM6	187611.6	2184518.5	5307.2	-0.1	0.2	-0.5	-0.1	0.1	-0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.9	2184471.5	5304.1	EM7	187727.8	2184471.6	5304.0	0.0	0.2	-0.5	0.0	0.1	-0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.4	2184332.1	5297.9	EM8	187806.3	2184332.2	5297.8	0.0	0.1	-0.4	-0.1	0.1	-0.1

CHANGE IN ELF EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				Spring 2018 SURVEY				Fall 2018 SURVEY				RESULTS					
					Date of survey: 06/18/18				Date of survey: 12/14/18				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188086.9	2185027.5	5287.6	EM1	188086.9	2185027.5	5287.6	0.0	0.1	-0.2	0.0	0.0	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.6	5296.9	EM2	187933.5	2184981.5	5296.8	0.0	0.1	-0.3	0.0	0.0	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.7	2185028.4	5303.1	EM3	187817.7	2185028.4	5303.2	0.1	0.1	-0.2	0.0	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.1	2185205.0	5303.4	EM4	187781.1	2185205.0	5303.4	0.0	0.1	-0.2	0.0	0.0	0.0
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.5	2184463.2	5302.0	EM5	187481.5	2184463.1	5302.0	0.0	0.1	-0.4	0.0	-0.1	0.0
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.5	5307.2	EM6	187611.6	2184518.4	5307.2	-0.1	0.1	-0.5	0.0	-0.1	0.0
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.8	2184471.6	5304.0	EM7	187727.8	2184471.6	5304.0	0.0	0.1	-0.4	0.0	-0.1	0.0
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.3	2184332.2	5297.8	EM8	187806.3	2184332.1	5297.8	0.0	0.1	-0.3	0.0	-0.1	0.1

	RECORD CONDITION SURVEY				Fall 2018 SURVEY				Spring 2019 SURVEY				RESULTS					
					Date of survey: 12/14/18				Date of survey: 05/16/19				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188086.9	2185027.5	5287.6	EM1	188086.9	2185027.5	5287.6	0.0	0.1	-0.2	0.0	0.0	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.5	2184981.5	5296.8	EM2	187933.6	2184981.5	5296.8	0.0	0.1	-0.3	0.0	0.0	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.7	2185028.4	5303.2	EM3	187817.7	2185028.4	5303.2	0.1	0.1	-0.3	0.0	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.1	2185205.0	5303.4	EM4	187781.1	2185205.0	5303.4	0.0	0.1	-0.2	0.0	0.0	0.0
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.5	2184463.1	5302.0	EM5	187481.5	2184463.1	5302.0	0.0	0.1	-0.4	0.0	0.0	0.0
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.4	5307.2	EM6	187611.6	2184518.5	5307.2	-0.1	0.1	-0.5	0.0	0.0	0.0
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.8	2184471.6	5304.0	EM7	187727.8	2184471.6	5304.0	0.0	0.1	-0.4	0.0	0.0	0.0
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.3	2184332.1	5297.8	EM8	187806.3	2184332.1	5297.8	0.0	0.1	-0.4	0.0	0.0	0.0

	RECORD CONDITION SURVEY				Spring 2019 SURVEY				Fall 2019 SURVEY				RESULTS					
					Date of survey: 05/16/19				Date of survey: 01/14/20				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188086.9	2185027.5	5287.6	EM1	188087.0	2185027.5	5287.7	0.1	0.1	-0.1	0.0	0.0	0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.5	5296.8	EM2	187933.5	2184981.5	5296.8	0.0	0.1	-0.3	0.0	0.0	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.7	2185028.4	5303.2	EM3	187817.7	2185028.4	5303.2	0.0	0.1	-0.2	0.0	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.1	2185205.0	5303.4	EM4	187781.1	2185204.9	5303.4	0.0	0.1	-0.2	-0.1	0.0	0.0
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.5	2184463.1	5302.0	EM5	187481.5	2184463.1	5302.0	0.0	0.1	-0.4	0.0	0.0	0.0
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.5	5307.2	EM6	187611.6	2184518.4	5307.2	-0.1	0.1	-0.5	0.0	0.0	0.0
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.8	2184471.6	5304.0	EM7	187727.8	2184471.6	5304.0	0.0	0.1	-0.4	0.0	0.0	0.0
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.3	2184332.1	5297.8	EM8	187806.3	2184332.1	5297.8	0.0	0.1	-0.3	0.0	0.0	0.0

	RECORD CONDITION SURVEY				Fall 2019 SURVEY				Spring 2020 SURVEY				RESULTS					
					Date of survey: 01/14/20				Date of survey: 04/23/20				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.5	5287.7	EM1	188086.9	2185027.5	5287.7	0.0	0.1	-0.1	0.0	0.0	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.5	2184981.5	5296.8	EM2	187933.6	2184981.5	5296.9	0.0	0.1	-0.2	0.0	0.0	0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.7	2185028.4	5303.2	EM3	187817.7	2185028.4	5303.2	0.1	0.1	-0.2	0.0	0.0	0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.1	2185204.9	5303.4	EM4	187781.0	2185205.0	5303.5	0.0	0.1	-0.1	0.0	0.0	0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.5	2184463.1	5302.0	EM5	187481.5	2184463.2	5302.1	0.0	0.1	-0.3	0.0	0.0	0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.4	5307.2	EM6	187611.7	2184518.4	5307.3	0.0	0.1	-0.4	0.1	0.0	0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.8	2184471.6	5304.0	EM7	187727.8	2184471.6	5304.1	0.0	0.1	-0.4	0.0	0.0	0.0
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.3	2184332.1	5297.8	EM8	187806.4	2184332.1	5297.9	0.1	0.1	-0.3	0.0	0.0	0.0

	RECORD CONDITION SURVEY				Spring 2020 SURVEY				Fall 2020 SURVEY				RESULTS					
					Date of survey: 04/23/20				Date of survey: 10/01/20				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188086.9	2185027.5	5287.7	EM1	188086.9	2185027.5	5287.6	0.0	0.1	-0.2	0.0	0.0	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.5	5296.9	EM2	187933.6	2184981.5	5296.8	0.0	0.1	-0.3	0.0	0.0	-0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.7	2185028.4	5303.2	EM3	187817.7	2185028.4	5303.2	0.0	0.1	-0.3	0.0	0.0	-0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.0	2185205.0	5303.5	EM4	187781.1	2185205.0	5303.4	0.0	0.1	-0.2	0.0	0.0	-0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.5	2184463.2	5302.1	EM5	187481.5	2184463.1	5302.0	-0.1	0.1	-0.4	0.0	0.0	-0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.7	2184518.4	5307.3	EM6	187611.6	2184518.4	5307.2	-0.1	0.1	-0.5	-0.1	0.0	-0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.8	2184471.6	5304.1	EM7	187727.8	2184471.5	5304.0	0.0	0.1	-0.4	0.0	0.0	-0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.4	2184332.1	5297.9	EM8	187806.3	2184332.1	5297.9	0.0	0.1	-0.3	0.0	0.0	0.0

CHANGE IN ELF EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				Fall 2020 SURVEY				Spring 2021 SURVEY				RESULTS					
					Date of survey: 10/01/20				Date of survey: 05/25/21				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188086.9	2185027.5	5287.6	EM1	188086.9	2185027.5	5287.7	0.0	0.1	-0.1	0.0	0.0	0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.6	2184981.5	5296.8	EM2	187933.5	2184981.5	5297.0	0.0	0.1	-0.1	0.0	0.0	0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.7	2185028.4	5303.2	EM3	187817.7	2185028.4	5303.2	0.1	0.1	-0.2	0.0	0.0	0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.1	2185205.0	5303.4	EM4	187781.1	2185205.0	5303.5	0.0	0.1	-0.1	0.0	0.0	0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.5	2184463.1	5302.0	EM5	187481.5	2184463.2	5302.0	-0.1	0.1	-0.3	0.0	0.0	0.0
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.4	5307.2	EM6	187611.6	2184518.4	5307.2	-0.1	0.1	-0.5	0.0	0.0	0.0
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.8	2184471.5	5304.0	EM7	187727.8	2184471.6	5304.0	0.0	0.1	-0.4	0.0	0.1	0.0
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.3	2184332.1	5297.9	EM8	187806.4	2184332.1	5297.8	0.1	0.1	-0.4	0.0	0.0	0.0

	RECORD CONDITION SURVEY				Spring 2021 SURVEY				Fall 2021 SURVEY				RESULTS					
					Date of survey: 05/25/21				Date of survey: 12/02/21				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188086.9	2185027.5	5287.7	EM1	188087.0	2185027.4	5287.5	0.1	0.0	-0.3	0.1	-0.1	-0.2
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.5	2184981.5	5297.0	EM2	187933.5	2184981.6	5296.8	-0.1	0.1	-0.3	0.0	0.0	-0.2
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.7	2185028.4	5303.2	EM3	187817.7	2185028.4	5303.2	0.1	0.1	-0.2	0.0	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.1	2185205.0	5303.5	EM4	187781.2	2185205.0	5303.3	0.1	0.1	-0.2	0.1	0.0	-0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.5	2184463.2	5302.0	EM5	187481.5	2184463.1	5302.0	-0.1	0.1	-0.4	0.0	-0.1	-0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.4	5307.2	EM6	187611.6	2184518.5	5307.3	0.0	0.2	-0.4	0.0	0.1	0.0
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.8	2184471.6	5304.0	EM7	187727.9	2184471.5	5304.0	0.0	0.1	-0.5	0.1	-0.1	-0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.4	2184332.1	5297.8	EM8	187806.3	2184332.1	5297.8	0.0	0.1	-0.4	-0.1	0.0	0.0

	RECORD CONDITION SURVEY				Fall 2021 SURVEY				Spring 2022 SURVEY				RESULTS					
					Date of survey: 12/02/21				Date of survey: 05/19/22				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.4	5287.5	EM1	188087.0	2185027.4	5287.5	0.1	0.0	-0.3	0.0	0.0	0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.5	2184981.6	5296.8	EM2	187933.5	2184981.5	5296.8	0.0	0.1	-0.3	0.1	-0.1	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.7	2185028.4	5303.2	EM3	187817.6	2185028.3	5303.1	-0.1	0.0	-0.3	-0.1	-0.1	-0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.2	2185205.0	5303.3	EM4	187781.1	2185204.9	5303.2	0.0	0.0	-0.4	-0.1	-0.1	-0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.5	2184463.1	5302.0	EM5	187481.4	2184463.1	5301.9	-0.1	0.1	-0.5	-0.1	0.0	-0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.5	5307.3	EM6	187611.5	2184518.3	5307.2	-0.1	0.0	-0.5	-0.1	-0.2	-0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.9	2184471.5	5304.0	EM7	187727.9	2184471.5	5303.8	0.1	0.0	-0.6	0.1	0.0	-0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.3	2184332.1	5297.8	EM8	187806.3	2184332.0	5297.9	-0.1	0.0	-0.3	0.0	-0.1	0.0

	RECORD CONDITION SURVEY				Spring 2022 SURVEY				Fall 2022 SURVEY				RESULTS					
					Date of survey: 05/19/22				Date of survey: 02/02/23				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.0	2185027.4	5287.5	EM1	188086.8	2185027.3	5287.5	-0.1	-0.1	-0.3	-0.2	-0.1	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.5	2184981.5	5296.8	EM2	187933.4	2184981.4	5296.7	-0.2	-0.1	-0.4	-0.2	-0.1	-0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.6	2185028.3	5303.1	EM3	187817.6	2185028.2	5303.0	-0.1	-0.2	-0.4	0.0	-0.2	-0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.1	2185204.9	5303.2	EM4	187780.7	2185204.9	5303.4	-0.4	0.0	-0.2	-0.4	0.0	0.2
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.4	2184463.1	5301.9	EM5	187481.0	2184462.9	5302.0	-0.6	-0.1	-0.3	-0.4	-0.1	0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.5	2184518.3	5307.2	EM6	187611.0	2184518.3	5307.3	-0.7	0.0	-0.4	-0.5	0.0	0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.9	2184471.5	5303.8	EM7	187727.3	2184471.4	5304.2	-0.5	-0.1	-0.2	-0.6	-0.1	0.4
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.3	2184332.0	5297.9	EM8	187805.9	2184332.0	5298.1	-0.5	-0.1	-0.1	-0.4	-0.1	0.2

	RECORD CONDITION SURVEY				Fall 2022 SURVEY				Spring 2023 SURVEY				RESULTS					
					Date of survey: 02/02/23				Date of survey: 05/14/23				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188086.8	2185027.3	5287.5	EM1	188086.4	2185027.4	5287.7	-0.5	-0.1	-0.1	-0.4	0.0	0.2
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.4	2184981.4	5296.7	EM2	187933.0	2184981.4	5296.9	-0.5	0.0	-0.2	-0.3	0.0	0.2
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.6	2185028.2	5303.0	EM3	187817.3	2185028.4	5303.3	-0.4	0.0	-0.1	-0.3	0.2	0.3
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187780.7	2185204.9	5303.4	EM4	187780.7	2185204.8	5303.4	-0.4	-0.1	-0.2	0.0	-0.1	-0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.0	2184462.9	5302.0	EM5	187480.9	2184463.0	5302.1	-0.6	0.0	-0.3	-0.1	0.1	0.0
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.0	2184518.3	5307.3	EM6	187611.1	2184518.3	5307.4	-0.6	0.0	-0.3	0.1	0.0	0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.3	2184471.4	5304.2	EM7	187727.3	2184471.4	5304.1	-0.5	-0.1	-0.3	0.0	0.0	-0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187805.9	2184332.0	5298.1	EM8	187805.9	2184331.9	5297.9	-0.5	-0.1	-0.3	0.0	0.0	-0.2

	RECORD CONDITION SURVEY				Spring 2023 SURVEY				Fall 2023 SURVEY				RESULTS					
					Date of survey: 05/14/23				Date of survey: 01/03/24				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188086.8	2185027.3	5287.5	EM1	188086.9	2185027.4	5287.6	0.0	0.0	-0.2	0.1	0.1	0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.4	2184981.4	5296.7	EM2	187933.5	2184981.4	5296.8	-0.1	0.0	-0.3	0.1	0.1	0.1
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.6	2185028.2	5303.0	EM3	187817.7	2185028.3	5303.1	0.1	-0.1	-0.3	0.1	0.1	0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187780.7	2185204.9	5303.4	EM4	187781.2	2185204.9	5303.3	0.1	0.0	-0.3	0.5	0.0	-0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.0	2184462.9	5302.0	EM5	187481.4	2184463.0	5302.0	-0.1	0.0	-0.4	0.4	0.1	-0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.0	2184518.3	5307.3	EM6	187611.5	2184518.4	5307.1	-0.2	0.0	-0.6	0.4	0.1	-0.2
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.3	2184471.4	5304.2	EM7	187727.7	2184471.5	5304.0	-0.1	0.0	-0.5	0.4	0.1	-0.2
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187805.9	2184332.0	5298.1	EM8	187806.3	2184332.0	5297.8	0.0	-0.1	-0.4	0.5	0.0	-0.2

CHANGE IN ELF EROSION/SETTLEMENT MONUMENT POSITION

	RECORD CONDITION SURVEY				Fall 2023 SURVEY				Spring 2024 SURVEY				RESULTS					
					Date of survey: 01/03/24				Date of survey: 04/04/24				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188086.9	2185027.4	5287.6	EM1	188086.9	2185027.4	5287.6	-0.1	0.0	-0.2	0.0	0.0	0.0
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.5	2184981.4	5296.8	EM2	187933.5	2184981.5	5296.8	-0.1	0.1	-0.3	0.0	0.0	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.7	2185028.3	5303.1	EM3	187817.6	2185028.3	5303.2	-0.1	0.0	-0.2	-0.1	0.0	0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.2	2185204.9	5303.3	EM4	187781.2	2185205.0	5303.4	0.1	0.1	-0.2	0.0	0.1	0.1
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.4	2184463.0	5302.0	EM5	187481.4	2184463.1	5302.0	-0.1	0.1	-0.3	0.0	0.1	0.1
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.5	2184518.4	5307.1	EM6	187611.6	2184518.4	5307.2	-0.1	0.1	-0.5	0.1	0.0	0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.7	2184471.5	5304.0	EM7	187727.8	2184471.6	5304.0	-0.1	0.1	-0.4	0.1	0.1	0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.3	2184332.0	5297.8	EM8	187806.3	2184332.1	5297.9	0.0	0.0	-0.3	-0.1	0.1	0.1

	RECORD CONDITION SURVEY				Spring 2024 SURVEY				Fall 2024 SURVEY				RESULTS					
					Date of survey: 04/04/24				Date of survey: 12/04/24				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188086.9	2185027.4	5287.6	EM1	188087.1	2185027.5	5287.4	0.2	0.1	-0.4	0.2	0.1	-0.2
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.5	2184981.5	5296.8	EM2	187933.7	2184981.6	5296.8	0.1	0.2	-0.3	0.2	0.1	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.6	2185028.3	5303.2	EM3	187817.8	2185028.5	5303.1	0.2	0.2	-0.3	0.2	0.2	-0.1
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.2	2185205.0	5303.4	EM4	187781.3	2185205.0	5303.3	0.3	0.2	-0.3	0.1	0.1	-0.2
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.4	2184463.1	5302.0	EM5	187481.6	2184463.2	5301.9	0.1	0.1	-0.5	0.2	0.1	-0.2
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.6	2184518.4	5307.2	EM6	187611.7	2184518.4	5307.0	0.0	0.1	-0.7	0.1	0.1	-0.2
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.8	2184471.6	5304.0	EM7	187727.9	2184471.6	5304.0	0.1	0.2	-0.5	0.1	0.0	-0.1
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.3	2184332.1	5297.9	EM8	187806.4	2184332.3	5297.9	0.1	0.2	-0.3	0.2	0.2	0.0

	RECORD CONDITION SURVEY				Fall 2024 SURVEY				Spring 2025 SURVEY				RESULTS					
					Date of survey: 12/04/24				Date of survey: 05/16/25				CHANGE RELATIVE TO RECORD CONDITION			CHANGE RELATIVE TO PRIOR SURVEY		
Mon't No.	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	Point No.	Grid Northing	Grid Easting	Elevation	DELTA N	DELTA E	DELTA EL	DELTA N	DELTA E	DELTA EL
ELF-EM1	EM1	188086.9	2185027.4	5287.8	EM1	188087.1	2185027.5	5287.4	EM1	188087.0	2185027.6	5287.5	0.1	0.1	-0.3	0.0	0.0	0.1
ELF-EM2	EM2	187933.6	2184981.4	5297.1	EM2	187933.7	2184981.6	5296.8	EM2	187933.7	2184981.7	5296.8	0.1	0.2	-0.3	0.0	0.1	0.0
ELF-EM3	EM3	187817.7	2185028.3	5303.4	EM3	187817.8	2185028.5	5303.1	EM3	187817.8	2185028.5	5303.1	0.2	0.2	-0.3	0.0	0.0	0.0
ELF-EM4	EM4	187781.1	2185204.9	5303.6	EM4	187781.3	2185205.0	5303.3	EM4	187781.4	2185205.1	5303.3	0.3	0.2	-0.3	0.0	0.1	0.0
ELF-EM5	EM5	187481.5	2184463.0	5302.4	EM5	187481.6	2184463.2	5301.9	EM5	187481.6	2184463.3	5301.9	0.1	0.3	-0.5	0.0	0.1	0.0
ELF-EM6	EM6	187611.7	2184518.3	5307.7	EM6	187611.7	2184518.4	5307.0	EM6	187611.6	2184518.5	5307.1	-0.1	0.2	-0.6	-0.1	0.1	0.1
ELF-EM7	EM7	187727.8	2184471.4	5304.4	EM7	187727.9	2184471.6	5304.0	EM7	187728.0	2184471.7	5304.0	0.1	0.3	-0.5	0.1	0.1	0.0
ELF-EM8	EM8	187806.3	2184332.0	5298.2	EM8	187806.4	2184332.3	5297.9	EM8	187806.5	2184332.2	5297.8	0.2	0.2	-0.4	0.1	-0.1	-0.1

APPENDIX E-1

Hazardous Waste Landfill
Post-Closure Groundwater Monitoring Report
Calendar Year 2024

ROCKY MOUNTAIN ARSENAL

Hazardous Waste Landfill
Post-Closure Groundwater Monitoring Report

Calendar Year 2024

Revision 0

June 23, 2025

U.S. Department of the Army
Shell Oil Company

Prepared by:



Navarro Research and Engineering, Inc.

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ATTACHEMENTS

Mann-Kendall Trend Analysis – Wells 25034, 25121, and 25194

ACRONYMS

amsl	Above Mean Sea Level
ARDL	Applied Research and Development Laboratory
CAMU	Corrective Action Management Unit
CFS	Confined Flow System
CUSUM	Cumulative Sum
DQI	Data Quality Indicator
ELF	Enhanced Hazardous Waste Landfill
HWL	Hazardous Waste Landfill
IC	Indicator Compound
LCS	Leachate Collection System
LDS	Leak Detection System
MRL	Method Reporting Limit
µg/L	Microgram(s) per liter
NRAP	Non-Routine Action Plan
NWS	National Weather Service
OCN	Operational Change Notice
O&M	Operations and Maintenance
PCGMP	Post-Closure Groundwater Monitoring Plan
RMA	Rocky Mountain Arsenal
SOM	Supplemental Operational Monitoring
SQAPP	Sampling Quality Assurance Project Plan
UCL	Upper Confidence Limit
UFS	Unconfined Flow System

EXECUTIVE SUMMARY

The post-closure groundwater monitoring program for the Hazardous Waste Landfill (HWL) is designed to monitor groundwater flow directions, groundwater quality beneath and in the vicinity of the HWL and evaluate the potential for hazardous constituent releases into the groundwater sourced from the landfill.

This report summarizes the post-closure monitoring activities at the HWL for calendar year 2024, including quarterly groundwater sampling conducted in January, July, and October, as well as the annual sampling event completed in April. Groundwater flow directions beneath the HWL were consistent over the four quarters of 2024 post-closure monitoring and are consistent with previous groundwater monitoring events within the Corrective Action Management Unit area. As previously presented, a more pronounced groundwater high is present along the west side of the HWL consistent with recharge from the perimeter ditch located in the vicinity.

The wells sampled as part of the HWL 2024 post-closure groundwater monitoring include seven downgradient monitoring wells, four upgradient monitoring wells, and six Supplemental Operational Monitoring (SOM) wells. Downgradient wells 25086 and 25088 and SOM wells 25098 and 25100 were dry and not sampled in 2024. The groundwater samples were tested for a standard list of analytes including indicator compounds (ICs). The ICs selected for the monitoring program are presented in the *Hazardous Waste Landfill Post-Closure Groundwater Monitoring Plan* (HWL PCGMP) (Navarro 2019b).

Dieldrin and lead were the only ICs detected in the downgradient unconfined flow system wells (25087 and 25194). Lead was the only IC detected in the downgradient confined flow system wells (25085, 25183, and 25195). Dieldrin and lead concentrations did not exceed their respective 2024 prediction limits.

The ICs detected in the SOM wells include 1,1,1-trichloroethane, 1,1-dichloroethene, 1,1-dichloroethane, 1,2-dichloroethane, carbon tetrachloride, chloroform, diisopropyl methylphosphonate (DIMP) and lead. The analytes detected in the SOM wells, with the exception of SOM well 25203, are associated with the North Plants-Bedrock Ridge contaminant plume. The analytical data from SOM wells are not used in the HWL statistical evaluations.

The ICs detected in the HWL leachate collection system (LCS) wastewater in 2024 include arsenic, dichlorodifluoromethane, dicyclopentadiene, dieldrin, and DIMP, which are consistent with wastes placed in the landfills, and the chemical groups used to determine potential groundwater impacts.

No ICs were detected in the leak detection system (LDS) sumps in LDS1, LDS2, or LDS4 in 2024. ICs, Dichlorodifluoromethane and dieldrin, were detected in the wastewater of LDS3.

Refer to Table 2.2-2 for a summary of Notifications, Operational Change Notices and Non- Routine Actions. Refer to Table 2.4-1 for 2024 Leak Detection System (LDS) analytical results that exceeded their respective Watch List Trigger Levels.

As a component of the data review process, the analytical data were evaluated against the Data Quality Indicators (DQIs) of precision, accuracy, representativeness, completeness, comparability and sensitivity. Based on the findings of the DQI evaluation, the sample results are considered valid and usable for their intended purpose. Data quality requirements were met for the analytical data, and the data are appropriate for use in evaluation of the water quality conditions present at the site.

Based on data evaluations and trend analysis, the groundwater quality in the vicinity of the HWL has not been affected by operations, closure, or post-closure operations and maintenance of the landfill.

1.0 INTRODUCTION

The post-closure groundwater monitoring program for the Hazardous Waste Landfill (HWL) at the Rocky Mountain Arsenal (RMA) is designed to monitor groundwater flow directions, groundwater quality beneath and in the vicinity of the HWL and evaluate the potential for hazardous constituent releases into the groundwater sourced from the landfill. This report presents data generated by the HWL post-closure groundwater monitoring system in 2024 and an evaluation of the monitoring objectives.

Quarterly well sampling events were conducted in January, July, and October; and the annual sampling event was performed in April. The following information is presented in accordance with the *Hazardous Waste Landfill Post-Closure Groundwater Monitoring Plan* (HWL PCGMP) (Navarro 2019b).

- Groundwater level data collected from the HWL post-closure water level monitoring well network.
- Analytical results of groundwater samples collected from the HWL post-closure water quality monitoring well network.
- Analytical results of wastewater samples collected from the HWL Leachate Collection System (LCS) and Leak Detection System (LDS) sumps.
- Evaluation of data to determine compliance with post-closure groundwater monitoring criteria as presented in the HWL PCGMP.

Background information related to the HWL monitoring approach including site-specific characterization, applicable regulatory requirements, laboratory methods, statistical evaluation procedure, and monitoring program development are presented in the HWL PCGMP, the *Rocky Mountain Arsenal Sampling Quality Assurance Project Plan* (SQAPP) (Navarro 2024a), and previous annual groundwater reports.

2.0 GROUNDWATER MONITORING RESULTS

2.1 Field Activities

The field crew inspected the monitoring wells and well pads prior to each sampling event. As part of the annual sampling event, the casing height was measured prior to sampling the monitoring wells with dedicated pumps. The casing height and total depths were measured for monitoring wells without dedicated pumps. The inspection information, casing heights, and total depths are documented in the records.

2.2 Groundwater Levels

The wells included in HWL post-closure groundwater level monitoring are presented in Table 3.1.2-1 of the HWL PCGMP and Figure 2.2-1 of this report. Water levels were measured quarterly in wells to evaluate the unconfined flow system (UFS) and confined flow system (CFS) flow conditions in the area of the Corrective Action Management Unit (CAMU) and to identify any significant changes in flow direction in the area of the CAMU.

Water level monitoring measurements are provided in Table 2.2-1. Figures 2.2-2 and 2.2-3 represent the April 2024 water table elevations for the UFS and the Denver Formation Lower Sandstone Unit within the UFS and CFS, respectively. The potentiometric surface of the UFS in the vicinity of the HWL shows that across the entire CAMU, groundwater flow is generally to the north and northeast. No significant variations in groundwater flow directions have been identified during post-closure monitoring.

Figure 2.2-2 shows a more pronounced groundwater high along the west side of the HWL similar to the observed water table over the past several years. This configuration of the water table is consistent with recharge from the grass-lined perimeter channel located along the west side of the HWL. This interpretation is further supported by the increasing trend in water elevations in other monitoring wells located on the west side of the HWL.

The potentiometric surface of the Denver Formation lower sandstone unit indicates flow from the CFS into the UFS downgradient of the HWL and illustrates the water table across the area and the interaction between the two flow systems. Groundwater flow in the lower sandstone unit of the CFS merges with the UFS on the north, west, and east sides of the HWL and the Enhanced Hazardous Waste Landfill (ELF). Currently, the zone where the UFS and CFS merge is illustrated by a dashed line for the approximate boundary indicating the lower sandstone unit in Figure 2.2-3. South of the line, the flow is confined to semi-confined, while north of the line the flow is unconfined where the confining unit is not present (TtFW 2004).

Water levels measured in well 25021, south and upgradient of the ELF, are not consistent with other monitoring wells within the CAMU area suggesting the screened zone is not hydraulically connected with the lower sandstone unit mapped in this report. Therefore, the water level measurement for well 25021 is not used in contouring the potentiometric surface for the lower sandstone unit.

In 2024, water levels were not collected in confined flow system (CFS) well 25017 due to an obstruction. Additionally, unconfined flow system (UFS) well 26051, was damaged after the third quarter of 2024, preventing water level collection. Well 25122 was closed in September 2023 in accordance with the recommendations presented in the 2022 and 2023 HWL Post-Closure Groundwater Monitoring Reports (Navarro 2023, 2024b). Well 25222 was installed in October 2023 in accordance with the recommendations presented in the 2022 and 2023 HWL Post-Closure Groundwater Monitoring Reports (Navarro 2023, 2024b). Refer to Table 2.2-2 for a summary of applicable Notifications, NRAPs and OCNs.

Table 2.2-2: Notifications, Non-Routine Actions and Operational Change Notices

Well ID	Notification Date	Notification Description	Applicable NRAP	Applicable OCN	OCN Approval Date
25122	Presented in the 2022 and 2023 HWL Post-Closure Groundwater Monitoring Reports	DRY/ Closed in September 2023 and removed from water level (WL) monitoring network	Not Applicable	OCN-HWL-2024-002	9/4/2024
25222		Installed in October 2023 and added to WL monitoring network	Not Applicable	OCN-HWL-2023-001	9/25/2023
25017	7/9/2024	Damaged/ Removed from WL monitoring network	NRAP-2024-001	OCN-HWL-2024-002	9/4/2024
26051	4/18/2025	Damaged/ Removed from WL monitoring network	NRAP-2025-001	Pending	Pending

2.3 Groundwater Quality

The HWL water quality network wells and Supplemental Operational Monitoring (SOM) wells are identified in Table 3.2-1 of the HWL PCGMP. Groundwater samples collected from the HWL water quality monitoring network were shipped to Applied Research and Development Laboratory (ARDL) in Mount Vernon, Illinois for analysis. Annual samples were analyzed for the complete analyte list as shown in Table 3.2-2 of the HWL PCGMP. Quarterly samples were analyzed for 16 indicator compounds (ICs) identified by bold text in Table 3.2-2 of the HWL PCGMP.

The ICs detected in the HWL network wells, SOM wells and sumps are shown in Figures 2.3-1 and 2.3-2, respectively.

There was one additional notification written in 2024 for missed analytical data for well 25194. The groundwater sample collected from well 25194 in the second quarter of 2024 was not analyzed for mercury as required by the PCGMP. The regulatory agencies were notified of the missed analytical data on September 24, 2024. The non-routine condition was discussed at the semi-annual Landfills and Covers Operations and Maintenance status meeting on October 23, 2024 and all parties agreed that an NRAP is not required.

2.3.1 Upgradient HWL Network Wells

The ICs detected in wells upgradient of the HWL are presented in Figure 2.3-1 with their respective concentrations and sample dates.

Lead was detected in three of the four upgradient wells. The levels of lead in groundwater upgradient of the HWL appear consistent for all wells with detected concentrations just above the method reporting limit of 3 µg/L, which may be indicative of the natural water quality of the Denver Formation.

Detections of 1,1-dichloroethene, carbon tetrachloride, and chloroform in UFS well 25121 and CFS well 25034 are consistent with contaminants associated with the North Plants-Bedrock Ridge plumes. Detections in wells 25034 and 25121 were further evaluated using Mann-Kendall trend analysis. Supporting documentation related to the Mann-Kendall trend analysis is provided as an attachment.

- Concentrations of 1,1-dichloroethene in well 25034 have an increasing statistical trend, except for a non-detection in 2015.
- Carbon tetrachloride was first detected in well 25034 in 2021, and the concentration has increased each year.
- The concentration of chloroform continues to show a decreasing statistical trend in well 25121.
- Carbon tetrachloride data in well 25121 show neither a statically decreasing or increasing trend, although concentrations appear to be decreasing.

Detections of 1,1-dichloroethene and carbon tetrachloride in these upgradient HWL wells suggest the wells are in the flow path of the North Plants-Bedrock Ridge plume on the eastern edge of the HWL. An increase or change in the concentrations suggests variability within the plume. Supporting documentation related to the Mann-Kendall trend analysis is provided as an attachment.

2.3.2 Downgradient HWL Network Wells

The ICs detected in wells downgradient of the HWL are listed in Figure 2.3-1 with their respective concentrations and sample dates. Dieldrin and lead were the only ICs detected in the downgradient UFS wells (25087 and 25194). Lead was the only IC detected in the downgradient CFS wells (25085, 25183 and 25195).

Prior to 2024, dieldrin has been detected in well 25087 only two times (July 2021 and July 2023). Dieldrin was detected above the method reporting limit (MRL) in two of four sampling events in 2024. Dieldrin is present along the eastern boundary of the HWL due to migration of the North Plants-Bedrock Ridge plume where this compound has been present in groundwater downgradient of the Bedrock Ridge Extraction System.

The dieldrin present in the vicinity of downgradient well 25194 is believed to pre-date the construction and operation of the landfill. Potential sources of dieldrin were investigated in accordance with Non-Routine Action Plan (NRAP)-2016-004 (Navarro 2016b) and the *Hazardous Waste Landfill Groundwater*

Monitoring Wells 25194 and 25184 Subsurface Soil and Landfill Stormwater Runoff Sampling and Analysis Plan (Navarro 2016a). Results of the investigation were documented in the *Hazardous Waste Landfill Groundwater Monitoring Wells 25194 and 25184 Subsurface Soil and Landfill Stormwater Runoff Data Summary Report* (Navarro 2019c). The Data Summary Report noted that the source of dieldrin detected in well 25194 during routine quarterly sampling was not definitively identified and recommended the continuation of routine sampling in accordance with the HWL PCGMP.

Lead has been detected intermittently in CFS wells 25085, 25183 and 25195 since the post-closure monitoring began. Similar to upgradient water quality, detected concentrations of lead just above the MRL may be indicative of the natural water quality of the Denver Formation.

2.3.3 SOM Network Wells

SOM network wells 25091, 25099, 25189, and 25203 are sampled annually. SOM wells 25098 and 25100 were dry in 2024. The ICs detected in SOM wells are listed in Figure 2.3-1 with their respective concentrations and sample dates. The results of sampling SOM wells are consistent with groundwater quality associated with the North Plants-Bedrock Ridge plume. More than likely, the ICs detected in SOM wells along the eastern side of the HWL are attributed to the North Plants-Bedrock Ridge plume where these constituents have been detected in groundwater where migration through the less permeable Denver Formation is much slower than in the alluvial sediments of the UFS.

2.4 LCS and LDS Wastewater Analytical Results

The HWL includes four LCS sumps and four LDS sumps. Wastewater samples collected from the HWL sumps were submitted to ARDL in Mount Vernon, Illinois for analysis. The first sample of the year collected from each sump was analyzed for the list of analytes shown on Table 3.2-2 of the HWL PCGMP. All subsequent samples were tested for an abbreviated list of analytes shown on Table 3.2.5-2 of the HWL PCGMP.

Per the HWL PCGMP, sump sampling shall be performed prior to removal of wastewater from an HWL sump. The wastewater samples were collected to meet the post-closure monitoring requirements specified in the HWL PCGMP (Navarro 2019b) and were used to evaluate the chemistry of the wastewater to determine potential leakage from the HWL. The ICs detected in the HWL sumps are presented in Figure 2.3-2. Analytical results from the 2024 sampling events at the LCS and LDS sumps are included in the project files.

2.4.1 LCS Wastewater

The ICs detected in the HWL LCS wastewater in 2024 include arsenic, dichlorodifluoromethane, dicyclopentadiene, dieldrin, and DIMP, which are consistent with wastes placed in the landfills, and the chemical groups used to determine potential groundwater impacts.

2.4.2 LDS Wastewater

No ICs were detected in the wastewater of LDS1, LDS2 or LDS4 in 2024. The ICs, Dichlorodifluoromethane and dieldrin, were detected in the wastewater of LDS3.

It is common for analytes to be detected in HWL LDS sump samples. Typically, the detections are attributed to contaminants in the LCS clay liner material and consolidation water, rather than indications of leaks in the liner system. The soil used to construct the compacted clay liners of the HWL contained low levels of RMA contaminants that only became detectable after they were mobilized in water and analyzed using methods with much lower method reporting limits compared to MRLs for soil sample analyses.

Table 2.4-1 below lists the 2024 analytical results that required Regulatory Agency notification in accordance with Table 3.0-2 of the *Hazardous Waste Landfill Post-Closure Plan* (Navarro 2019a). Analytes noted in table 2.4-1 exceeded their respective Watch List Trigger Levels (HWL PCGMP Table 3.2.5-2). The Regulatory Agencies were notified of exceedances on April 18, 2025 via email. The exceedances were discussed at the semi-annual Cap and Covers meeting on April 22, and all parties agreed that an NRAP is not required. Routine monitoring will continue per the requirements of the HWL PCGMP.

Table 2.4-1: Leak Detection System Notifications

Analyte	Classification	Sample Date	Concentration (µg/L)	Method Reporting Limit (µg/L)	Watch List Trigger (µg/L)
Location – LDS3					
alpha-Endosulfan	Watch List	7/8/2024	0.126	0.004	0.073
Endrin			0.097	0.005	0.088
gamma-Chlordane			0.244	0.004	0.096
Location – LDS4					
Endrin	Watch List	3/11/2024	0.102	0.005	0.088
Endrin aldehyde			0.103	0.004	0.101
Endrin ketone			0.078	0.004	0.061
Heptachlor			0.061	0.007	0.047

2.5 Analytical Data Review

The objective of the analytical data review is to determine whether the analytical results are acceptable for use in making decisions for the project. As a component of the data review process, the analytical data are reviewed using the Data Quality Indicators (DQI) including precision, accuracy, representativeness, completeness, comparability, and sensitivity to interpret the degree of acceptability of data. These six parameters are identified in the SQAPP (Navarro 2024a). Failure to meet performance

criteria did not necessarily result in rejection or qualification of the data. Professional judgment combined with the DQI evaluation were used to determine data usability.

The analytical data were collected in accordance with the HWL PCGMP and were reviewed according to the DQI process as described in the SQAPP. Results of the DQI review are summarized below in Table 2.5-1. DQI evaluation data are provided in the project files.

Table 2.5-1: Data Quality Summary

Indicator	Summary
Precision	A total of 141 duplicate pair analyses of HWL target analytes were performed. Duplicate and investigative results are considered comparable in 141 cases. *No qualification of the data is required.*
Accuracy/Bias	The average recovery rate for the 1,474 matrix spike analyses was 88.14 percent. Recovery rates outside the lower or upper warning limits were observed in 56 analyses. Recovery rates outside the lower or upper control limits were observed in 14 analyses. *No issues were identified requiring data qualification.* The average recovery rate for the 1,474 corresponding laboratory control spike analyses was 94.87 percent. Recovery rates outside the lower or upper warning limits were observed in 14 analyses. Recovery rates outside the lower or upper control limits were observed in zero analyses. *No issues were identified requiring data qualification.*
Representativeness	Field blanks are collected and analyzed to evaluate possible cross contamination of the investigative samples. A total of 204 field blank analyses were performed. There was 1 field blank analysis above the MRL and 1 field blank analysis with an estimated value below the MRL. No technical problems are noted in the laboratory report. No data qualification is necessary because the corresponding investigative value is greater than the field blank analysis or the field blank analysis is below the MRL. *The data is considered acceptable for their intended use and no additional action is considered necessary.*
Completeness	Completeness was calculated at 100 percent. The completeness goal of 90 percent was achieved. *All results were determined to be acceptable by the laboratory.* Note – Missed metals analysis notification in September 2024 did not impact the completeness calculation because the samples were not analyzed.
Comparability	Standard sampling and analysis techniques, based on certified analytical methods approved by Navarro or promulgated SW-846 methods, and standard procedures for sample collection were used throughout the groundwater monitoring programs at the HWL. Consistent procedures for the reporting and management of the data generated were also followed. *All data are considered comparable.*

Table 2.5-1: Data Quality Summary

Indicator	Summary
Sensitivity	The laboratories prepared and analyzed method blanks as part of their analytical protocols. Method blanks measure potential contamination from laboratory sources such as glassware, reagents, and laboratory water. There were 1,660 method blank analyses in 2024 with 1 detection above the MRL. *Data qualification is not necessary as the associated investigative data is below the MRL*.

2.5.1 Data Quality Control Review

Data validation was conducted on a representative subset of the HWL groundwater analytical data. Validation checklists were completed, and laboratory case narratives were reviewed to determine potential problems identified by the analysts. The completeness result for all analytes achieves the minimum specification of 90 percent. No data were flagged as rejected in 2024.

Table 2.5.1-1 presents a summary of the quality control samples collected and analyzed to support HWL groundwater monitoring in 2024.

Table 2.5.1-1: Quality Control Samples

Sample Type/Site ID	Sample Date(s)
Field Duplicates	
25087	4/4/2024
25183	4/8/2024
Laboratory Duplicates	
LCS2	3/11/2024
25195	4/4/2024
25183	4/8/2024
25102	4/9/2024
25203	4/10/2024
25091	4/11/2024
LCS1	4/17/2024
25189	4/18/2024
LCS3	7/1/2024
LCS4	7/2/2024
LDS3	7/8/2024

Table 2.5.1-1: Quality Control Samples

Sample Type/Site ID	Sample Date(s)
Field Blanks	
25183	4/8/2024
25203	4/10/2024

2.5.2 Data Usability Evaluation

A data usability evaluation was conducted, and summary files are available in the project files. Based on the findings of the DQI review, the sample results are considered valid and usable for their intended purpose. Data quality requirements were sufficiently met for the analytical data, and data are appropriate for use in evaluation of the water quality conditions present at the site. The primary objectives of the sampling program were met.

3.0 STATISTICAL EVALUATIONS

The statistical evaluation of data includes comparing upgradient water quality to downgradient compliance wells utilizing prediction intervals that are calculated for each IC using upgradient water quality data. The prediction limits discussed in this section refer to the upper limit of each analyte-specific prediction interval. Comparison of downgradient water quality data to prediction limits should provide an indication whether groundwater has been impacted by the HWL.

The wells used to calculate prediction limits and statistical evaluations are presented in Table 3.0-1. A prediction interval was calculated for each IC, which included upgradient water quality data through the 2023 post-closure monitoring period. Sections 3.1 presents the results of the statistical evaluations for the HWL. The general approach for determining and evaluating prediction limits for the HWL is consistent with United States Environmental Protection Agency guidance document, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (EPA 2009).

ChemStat statistical analysis software (StarPoint Software 2023) is utilized to calculate the prediction limit values, and statistical software output is available in the Supporting Documentation files. The prediction limit values for 2025 are included in Table 3.0-3. If a compound was not detected in any sample, the default non-parametric prediction limit for the analyte is the 99 percent upper confidence limit (UCL). In accordance with the PCGMP, the 99 percent UCL is defined as 1.3 times the MRL.

3.1 2024 Prediction Limits and the Current HWL Water Quality Data

Table 3.0-2 presents the 2024 prediction limits that were calculated using upgradient well data collected during the pre-operational, operational, closure, and post-closure groundwater monitoring periods (1996–2023).

The analytical results of samples collected from the downgradient HWL groundwater monitoring network in 2024 were compared to the prediction limits presented in Table 3.0-2 to determine whether groundwater quality was impacted by the HWL.

Dieldrin and lead were the only ICs detected in the downgradient wells (Figure 2.3-1). Lead was detected in three of four downgradient wells. Concentrations ranged from 3.8 µg/L to 4.7 µg/L. Lead was also detected in CFS well 25195 at a concentration of 3.7 µg/L. The concentrations of lead did not exceed the 2024 prediction limit of 15 µg/L.

Dieldrin was detected at concentrations ranging from 0.00282 to 0.0246 µg/L in downgradient wells 25194 and 25087. Dieldrin concentrations did not exceed the 2024 prediction limit of 0.05 µg/L. Fluctuations in the concentrations of dieldrin in groundwater may indicate seasonal variability related to the water level changes.

The HWL PCP also provides for the use of trend analysis to evaluate groundwater quality. Further evaluation of dieldrin concentrations in well 25194 using Mann-Kendall trend analysis shows that for data collected from 2015 through 2024, dieldrin concentrations have exhibited a decreasing trend. Supporting documentation related to the Mann-Kendall trend analysis is provided as an attachment.

Based on the trend analysis for dieldrin in well 25194, it is apparent that groundwater quality in the vicinity of the HWL has not been affected by operations, closure, or post-closure operations and maintenance (O&M) of the landfill.

3.2 2025 Prediction Limits

Table 3.0-3 presents the upper prediction limits that will be applied to downgradient wells in 2025. The MRLs can change based on the method re-certification required every three years by the SQAPP (Navarro 2024a). In February 2024, the MRL for dieldrin increased, and the new MRL is reflected in Table 3.0-3. The change in the dieldrin MRL did not impact the upper prediction limit calculated for 2025 as presented in Table 3.0-3.

4.0 SUMMARY

The following summary is based on the groundwater and wastewater monitoring results for the 2024 post-closure monitoring at the HWL:

- The groundwater in the UFS and CFS flows to the north-northeast and is consistent with previous groundwater monitoring events for the HWL.
- Based on the findings of the DQI review, the analytical data collected are of acceptable quality for intended uses.
- Dieldrin and lead were the only ICs detected in downgradient wells. Dieldrin and lead concentrations did not exceed their respective 2024 prediction limits.
- The LCS sample results indicate that the ICs used in the statistical evaluations for the HWL are representative of the waste placed in the HWL and are appropriate for the contaminants present in the HWL leachate.
- The ICs, dieldrin and dichlorodifluoromethane, were detected in HWL sump LSD3 in 2024. No ICs were detected in the HWL sumps LDS1, LDS2, or LDS4 in 2024.
- Prediction limit values for all ICs were re-evaluated for 2025. No prediction limits were adjusted.

Based on the data evaluation and trend analysis, groundwater quality in the vicinity of the HWL has not been affected by operations, closure, or post-closure O&M of the landfill.

5.0 REFERENCES

EPA (U.S. Environmental Protection Agency)

2009 *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance*, EPA 530/R-09-007. March.

Navarro (Navarro Research and Engineering, Inc.)

2024a *Rocky Mountain Arsenal Sampling Quality Assurance Project Plan.* Revision 3. October 31, 2024.

2024b *Hazardous Waste Landfill Post-Closure Groundwater Monitoring Report, Calendar Year 2023.* Revision 0. June 20, 2024.

2023 *Hazardous Waste Landfill Post-Closure Groundwater Monitoring Report, Calendar Year 2022.* Revision 0. June 21, 2023.

2019a *Hazardous Waste Landfill, Post Closure Plan,* Revision 4. December 9, 2019.

2019b *Hazardous Waste Landfill, Post-Closure Groundwater Monitoring Plan.* Revision 4. December 9, 2019.

2019c *Hazardous Waste Landfill Groundwater Monitoring Wells 25194 and 25184 Subsurface Soil and Landfill Stormwater Runoff Data Summary Report.* Revision 0. November 18, 2019.

2016a *Hazardous Waste Landfill Groundwater Monitoring Wells 25194 and 25184 Subsurface Soil and Landfill Stormwater Runoff Sampling and Analysis Plan*. Revision 0. November 17, 2016.

2016b *Non-Routine Action Plan NRAP-2016-004*. July 21, 2016.

StarPoint Software, Inc. (StarPoint Software)

2023 ChemStat Statistical Analysis Software for Environmental Data. Version 6.5, January 2023.

TtFW (Tetra Tech FW, Inc.)

2004 *Hazardous Waste Landfill and Landfill Wastewater Treatment System Annual Groundwater Monitoring Report for July 2002–June 2003*. Revision 0. April 1, 2004.

TABLES

Table 2.2-1: 2024 Water Level Measurements

Well ID	Groundwater Elevations (ft amsl)			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Unconfined Flow System				
25003	5152.53	5152.54	5152.54	5152.52
25004	5217.66	5217.47	5217.41	5217.45
25015	5159.54	5159.34	5159.49	5159.58
25018	5164.65	5164.85	5164.83	5164.42
25022	5219.92	5219.87	5219.91	5219.91
25023	5218.68	5218.40	5218.54	5218.62
25027	5180.58	5180.61	5180.59	5180.55
25032	Dry	5226.53	Dry	Dry
25041	5185.13	5185.23	5185.28	5184.82
25048	5172.03	5172.19	5172.21	5171.70
25054	5174.33	5174.43	5174.52	5174.08
25059	5178.86	5179.12	5179.17	5178.74
25086	Dry	Dry	Dry	Dry
25087	5166.41	5166.31	5166.45	5166.49
25088	Dry	Dry	Dry	Dry
25091	5170.13	5170.13	5170.21	5170.27
25092	5180.64	5180.67	5180.66	5180.71
25098	Dry	Dry	Dry	Dry
25099	5169.09	5168.98	5169.15	5169.11
25100	Dry	Dry	Dry	Dry
25102	5180.50	5180.35	5180.31	5180.46
25105	5217.71	5217.28	5217.56	5217.61
25106	5205.02	5205.23	5204.99	5204.98
25120	5190.93	5190.95	5190.72	5191.04
25121	5180.47	5180.41	5180.42	5180.47
25122 [1]	Closed	Closed	Closed	Closed
25189	5167.18	5167.09	5167.30	5167.17
25194	5181.51	5181.54	5181.52	5181.50
25203	5180.39	5180.31	5180.41	5180.35
25222[1]	NA	NA	Dry	Dry
25500	5217.69	5217.44	5217.43	5220.04
25502	5185.19	5185.24	5185.31	5184.90
26040	5147.37	5147.38	5147.38	5147.37
26051[2]	5162.25	5162.31	5162.29	Obstructed

Table 2.2-1: 2024 Water Level Measurements

Well ID	Groundwater Elevations (ft amsl)			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
26073	5177.73	5183.20	5177.75	5177.76
26097	5184.26	5185.15	5184.16	5183.94
26099	5183.36	5182.93	5182.86	5183.18
26158	5179.69	5179.84	5179.78	5181.66
26159	5203.51	5203.15	5203.05	5203.38
26164	5144.20	5144.20	5144.17	5144.22
26170	5139.70	5139.71	5139.68	5139.67
26175	5157.11	5156.98	5156.97	5156.80
26176	Dry	Dry	Dry	Dry
26177	5159.14	5159.07	5159.13	5158.86
26178	Dry	Dry	Dry	Dry
26179	5167.94	5167.85	5167.86	5167.82
26180	5177.60	5177.49	5177.55	5177.52
26181	5166.63	5166.62	5166.64	5166.57
26182	5176.16	5176.14	5176.11	5176.07
26183	5164.97	5164.96	5164.90	5164.93
26184	Dry	Dry	Dry	Dry
26186	5163.70	5163.60	5163.59	5163.56
36186	5236.92	5235.99	5235.92	5235.21

Table 2.2-1: 2024 Water Level Measurements (Continued)

Well ID	Groundwater Elevations (ft amsl)			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Confined Flow System				
25016	5153.27	5153.53	5153.31	5153.28
25017 [1]	Obstructed	Obstructed	Obstructed	Obstructed
25019	5162.55	5162.87	5162.70	5162.65
25020	5148.84	5149.15	5148.95	5148.64
25021	5174.05	5174.03	5174.07	5174.13
25024	5201.37	5201.19	5201.82	5201.34
25034	5173.15	5174.35	5173.00	5173.05
25085	5164.76	5164.79	5164.71	5164.84
25093	5171.04	5171.31	5171.07	5171.11
25101	5173.88	5174.04	5173.97	5173.86
25123	5175.65	5175.74	5175.70	5175.53
25183	5164.23	5164.20	5164.12	5164.23
25195	5165.89	5165.90	5165.75	5165.85
26150	5171.21	5171.35	5171.11	5171.12
26185	5151.88	5151.62	5151.48	5151.53

Notes:

[1] OCN-HWL-2024-002 removed well 25017 and 25122 from the water level monitoring network and added well 25222.

[2] NRAP-2025-001 issued May 16, 2025.

amsl – above mean sea level NA – Not applicable

Table 3.0-1: HWL Groundwater Monitoring Well Usage

Well/ Designation	Data Used to Calculate Current (2024) Prediction Limits [1]			Prediction Limits Applied to Downgradient Wells Quarterly in 2024
	Data Used to Calculate Baseline (2009) Prediction Limits		Upgradient Data from Post-Closure Monitoring Period 5/21/2009 to 10/11/2023	
	Upgradient/Downgradient Data from Pre-operational Monitoring Period 10/1/1996 to 4/30/1999	Upgradient Data from Operational/Closure Monitoring Period 5/11/1999 to 5/20/2009		
Upgradient				
25034	X	X	X	
25101	X	X	X	
25102	X	X	X[2]	
25121		X	X	
Upgradient – Abandoned prior to post-closure monitoring				
25008	X			
25033	X			
25037	X	X		
25065	X			
25076B	X			
25081	X	X		
25082	X	X		
Downgradient				
25085	X			X
25087	X			X
25183	Refer to Well 25083 for pre-operational data			X
25194				X
25195				X
25086				Dry wells; no samples collected
25088				
Downgradient – Abandoned prior to post-closure monitoring				
25083	X			

Note:

[1] Analytical results from the pre-operational, operational, closure, and post-closure monitoring periods utilized to calculate the current HWL prediction limits are available in the project files.

[2] 25102 is sampled quarterly because it is also part of the Enhanced Hazardous Waste Landfill downgradient water quality network.

Table 3.0-2: Prediction Limits for HWL 2024 Water Quality Monitoring

Indicator Compound	Current Method Reporting Limit (µg/L)	Proportion of Upgradient Non-detected Sample Values (2006-2023)	Statistical Method Used	Selected Prediction Limit (µg/L)
Volatile Organic Compounds				
1,1,1-Trichloroethane	0.2	97.7	Non-parametric	0.395[2]
1,1-Dichloroethane	0.2	100	Non-parametric	0.26[1]
1,1-Dichloroethene	0.2	89.4	Non-parametric	7.79[2]
1,2-Dichloroethane	0.2	94.5	Non-parametric	0.9[2]
Benzene	0.2	99.5	Non-parametric	1.17[2]
Bicycloheptadiene	0.22	100	Non-parametric	0.29[1]
Carbon tetrachloride	0.2	88.5	Non-parametric	11.8[2]
Chloroform	0.2	80.6	Non-parametric	4.72[2]
Dichlorodifluoromethane	0.6	100	Non-parametric	0.78[1]
Dicyclopentadiene	0.2	100	Non-parametric	0.26[1]
Organochlorine Pesticides				
Dieldrin	0.00252	98.6	Non-parametric	0.05[2]
Organophosphorus Compounds				
DIMP	0.602	100	Non-parametric	0.78[1]
Metals				
Arsenic	1	99.1	Non-parametric	3.35[2]
Chromium	10	95.5	Non-parametric	24.1[2]
Lead	3	79.5	Non-parametric	15[2]
Mercury	0.2	100	Non-parametric	0.26[1]

Notes:

[1] Because this compound was not detected in any sample, the non-parametric prediction limit value for this analyte is the 99 percent upper confidence limit (UCL). For the purpose of this report, the 99 percent UCL is defined as 1.3 times the MRL.

[2] Maximum upgradient value.

µg/L – micrograms per liter

Table 3.0-3: Prediction Limits for HWL 2025 Water Quality Monitoring

Indicator Compound	Current Method Reporting Limit (µg/L)	Proportion of Upgradient Non-detected Sample Values (2006-2024)	Statistical Method Used	Selected Prediction Limit (µg/L)
Volatile Organic Compounds				
1,1,1-Trichloroethane	0.2	97.8	Non-parametric	0.395[2]
1,1-Dichloroethane	0.2	100	Non-parametric	0.26[1]
1,1-Dichloroethene	0.2	89.3	Non-parametric	7.79[2]
1,2-Dichloroethane	0.2	94.6	Non-parametric	0.9[2]
Benzene	0.2	99.6	Non-parametric	1.17[2]
Bicycloheptadiene	0.22	100	Non-parametric	0.29[1]
Carbon tetrachloride	0.2	87.9	Non-parametric	11.8[2]
Chloroform	0.2	80.6	Non-parametric	4.72[2]
Dichlorodifluoromethane	0.6	100	Non-parametric	0.78[1]
Dicyclopentadiene	0.2	100	Non-parametric	0.26[1]
Organochlorine Pesticides				
Dieldrin	0.00543[3]	98.7	Non-parametric	0.05[2]
Organophosphorus Compounds				
DIMP	0.602	100	Non-parametric	0.78[1]
Metals				
Arsenic	1	99.1	Non-parametric	3.35[2]
Chromium	10	95.6	Non-parametric	24.1[2]
Lead	3	78.9	Non-parametric	15[2]
Mercury	0.2	100	Non-parametric	0.26[1]

Notes:

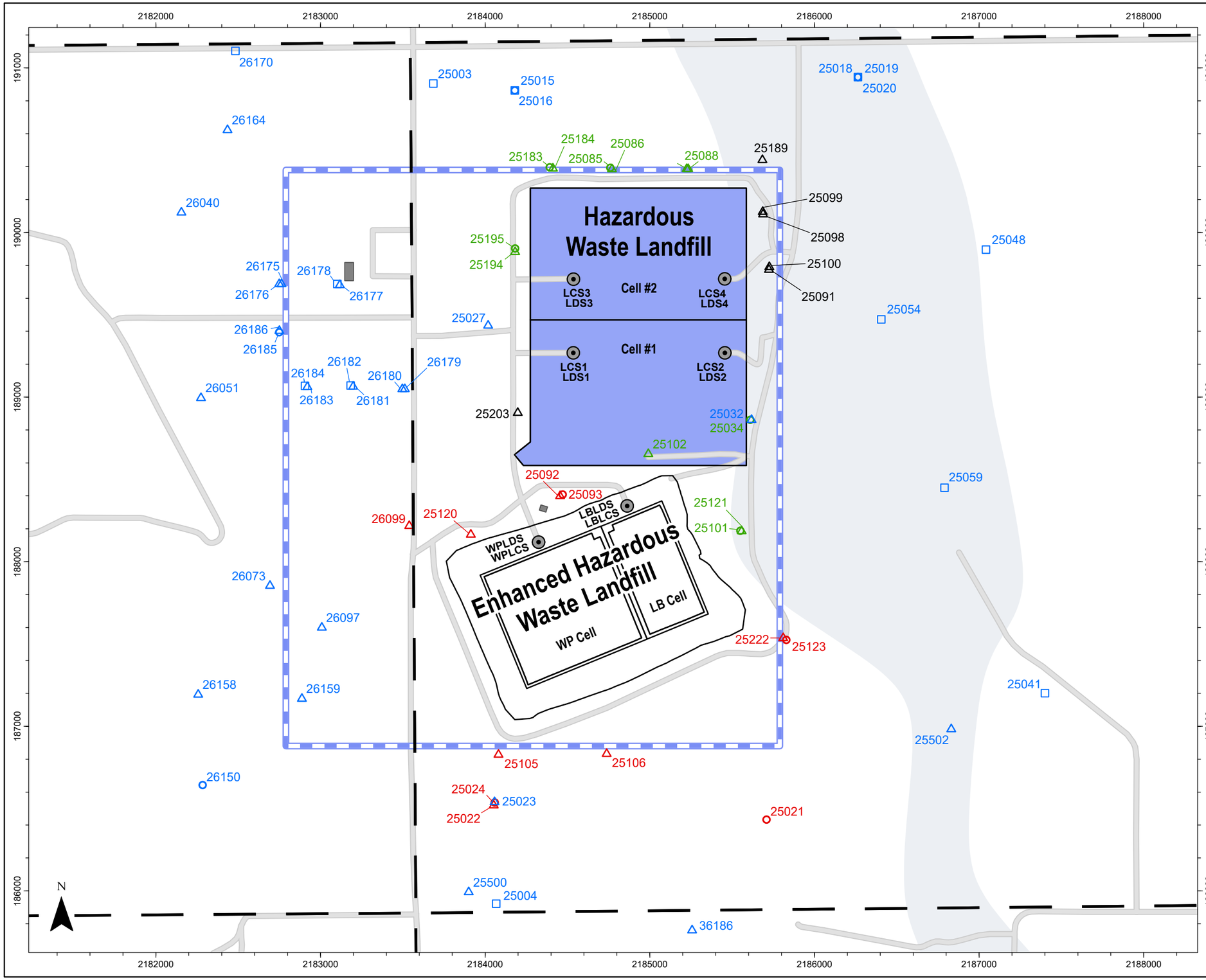
[1] Because this compound was not detected in any sample, the non-parametric prediction limit value for this analyte is the 99 percent upper confidence limit (UCL). For the purpose of this report, the 99 percent UCL is defined as 1.3 times the MRL.

[2] Maximum upgradient value.

[3] The reporting limit has changed as a result of an MRL study required by the SQAPP for method recertification every three years.

µg/L – micrograms per liter

FIGURES



MONITORING WELL NETWORK	FLOW SYSTEM / AQUIFER		
	Unconfined Alluvial	Unconfined Denver	Confined Denver
Hazardous Waste Landfill (HWL)	-	△	○
HWL Supplemental Operations	-	△	-
Enhanced Hazardous Waste Landfill (ELF)	-	△	○
HWL & ELF Water Level Only	□	△	○

- Section Boundaries
- CAMU Boundary
- 2014 North Plants/Bedrock Ridge Plume Extent
- Buildings
- On-Post Roads
- Sumps

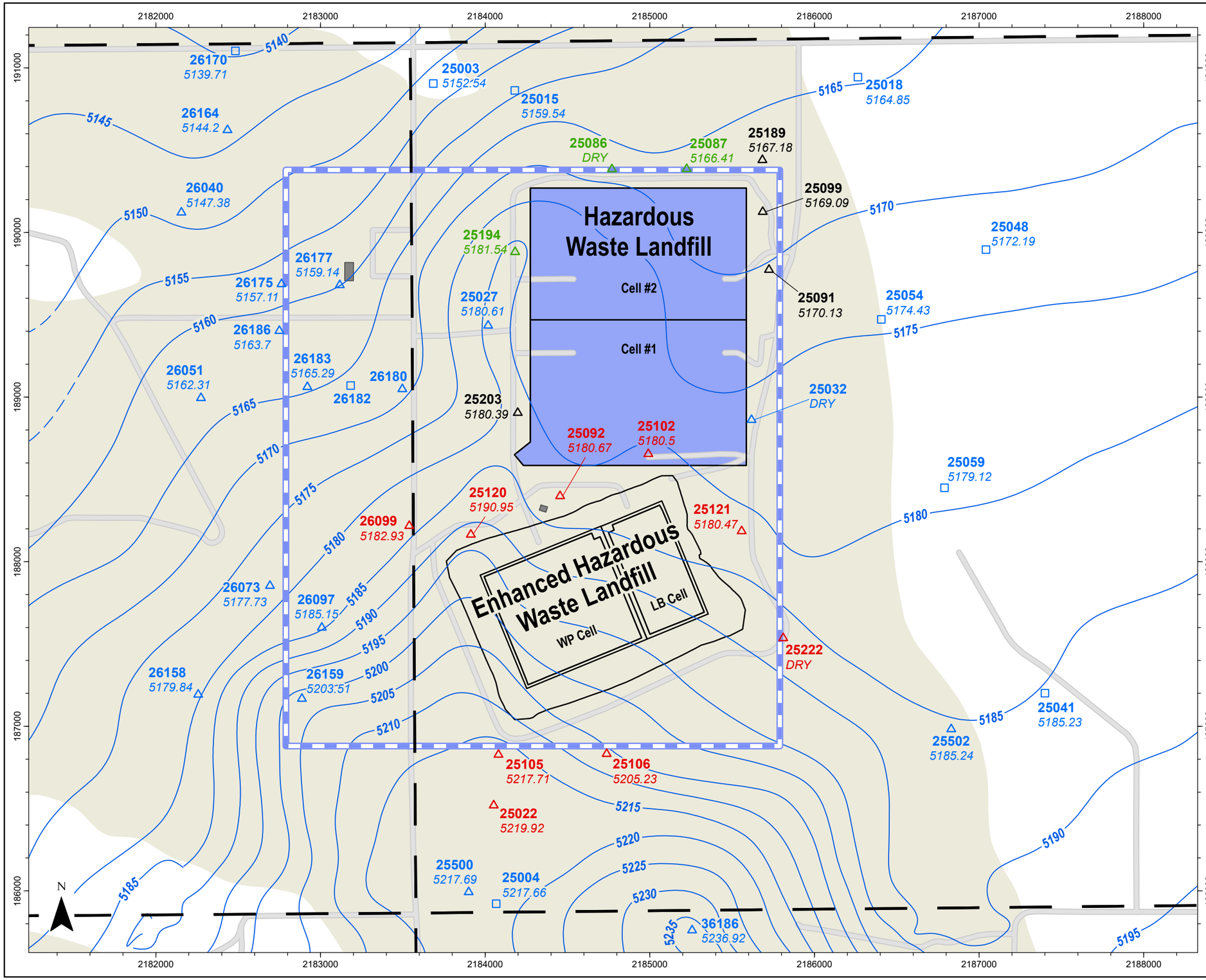
0 250 500 1,000 Feet

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FIGURE 2.2-1

2024 Groundwater Monitoring Well/Piezometer/Sump Location Map

Date: 2025-05-30 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal File Path: M:\PROJECTS\2025\2025_04_2024GMR_HWL (FIG_2_2_1)



MONITORING WELL NETWORK	FLOW SYSTEM / AQUIFER	
	Unconfined Alluvial	Unconfined Denver
Hazardous Waste Landfill (HWL)	-	△
HWL Supplemental Operations	-	△
Enhanced Hazardous Waste Landfill (ELF)	-	△
HWL & ELF Water Level Only	□	△

Site ID #
FY24 Groundwater Elevation

- Section Boundaries
- CAMU Boundary
- Unsaturated Alluvium (FY24)
- Buildings
- On-Post Roads
- Water Elevation Contours (5-ft)
- Inferred Water Elevation Contours (5-ft)

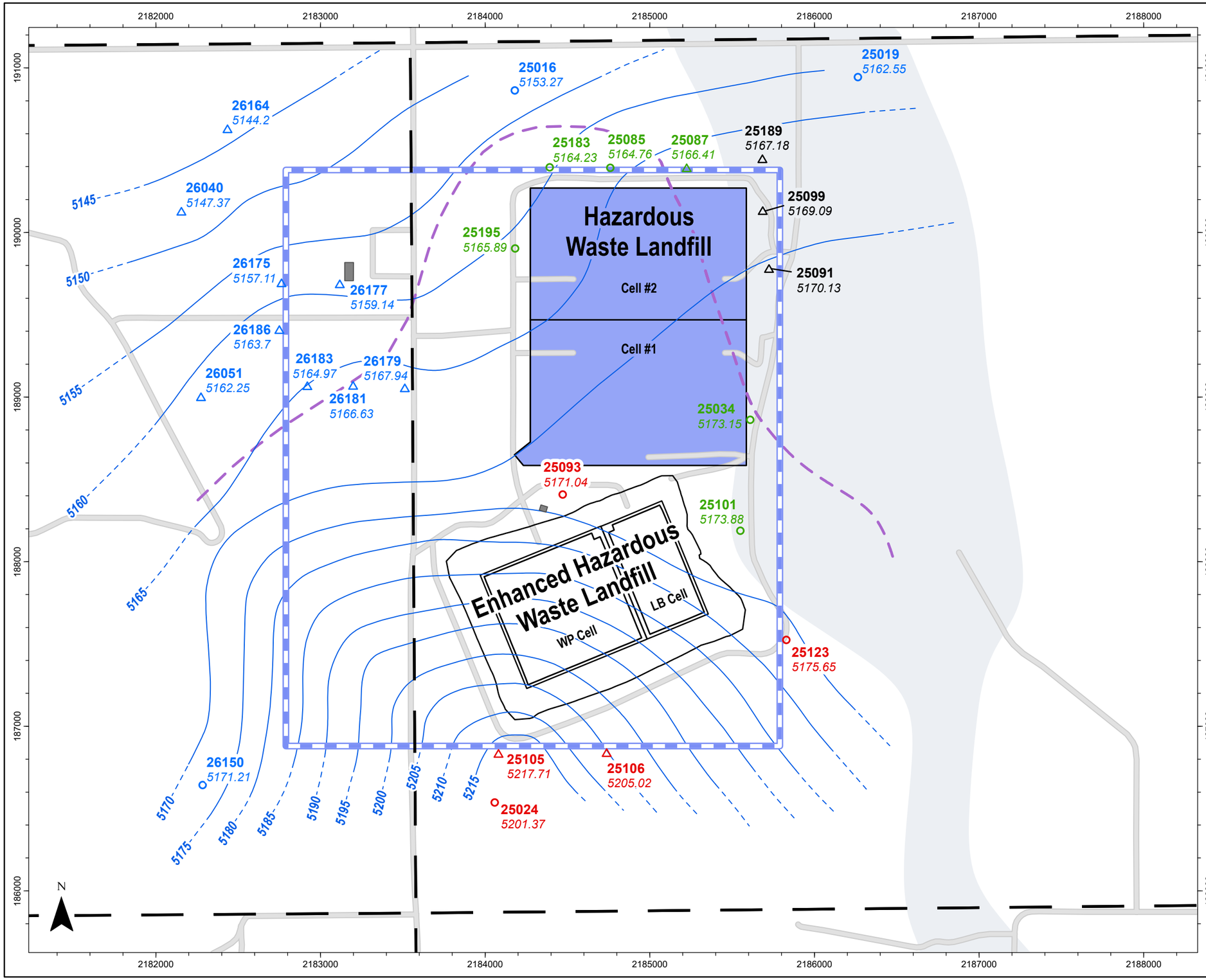
0 250 500 1,000 Feet

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FIGURE 2.2-2

2024 Groundwater Monitoring Hazardous Waste Landfill Potentiometric Surface

Date: 2025-05-30 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal File Path: M:\PROJECTS\2025\2025_04_2024GMR_HWL (FIG_2_2_2)



MONITORING WELL NETWORK	FLOW SYSTEM / AQUIFER	
	Unconfined Denver	Confined Denver
Hazardous Waste Landfill (HWL)	△	○
HWL Supplemental Operations	△	-
Enhanced Hazardous Waste Landfill (ELF)	△	○
HWL & ELF Water Level Only	△	○

Site ID #
FY24 Q2 Lower Sandstone Groundwater Elevation

- Section Boundaries
- CAMU Boundary
- 2014 North Plants/Bedrock Ridge Plume Extent
- Buildings
- On-Post Roads
- Approximate Boundary of the Lower Sandstone Units
- Water Elevation Contours (5-ft)
- Inferred Water Elevation Contours (5-ft)

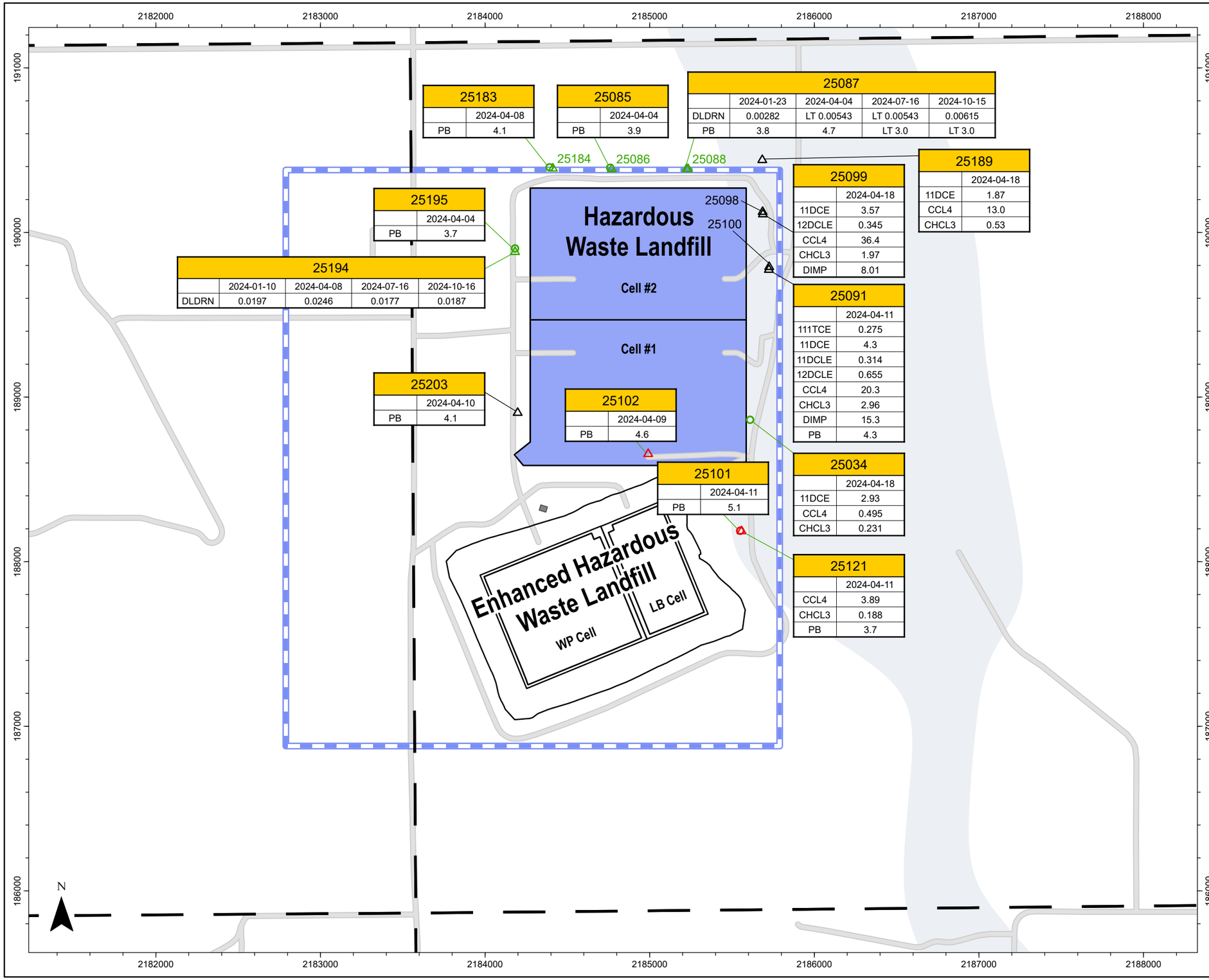
0 250 500 1,000 Feet

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FIGURE 2.2-3

2024 Groundwater Monitoring Lower Sandstone Units Potentiometric Surface

Date: 2025-05-30 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal File Path: M:\PROJECTS\2025\2025_04_2024GMR_HWL (FIG_2_2_3)



MONITORING WELL NETWORK	FLOW SYSTEM / AQUIFER		
	Unconfined Alluvial	Unconfined Denver	Confined Denver
Hazardous Waste Landfill (HWL)	-	△	○
HWL Supplemental Operations	-	△	-

NOTE

- *Concentrations are in micrograms per liter (µg/l).*
- *Data shown from calendar year 2024.*

Section Boundaries
CAMU Boundary
2014 North Plants/Bedrock Ridge Plume Extent
Buildings
On-Post Roads

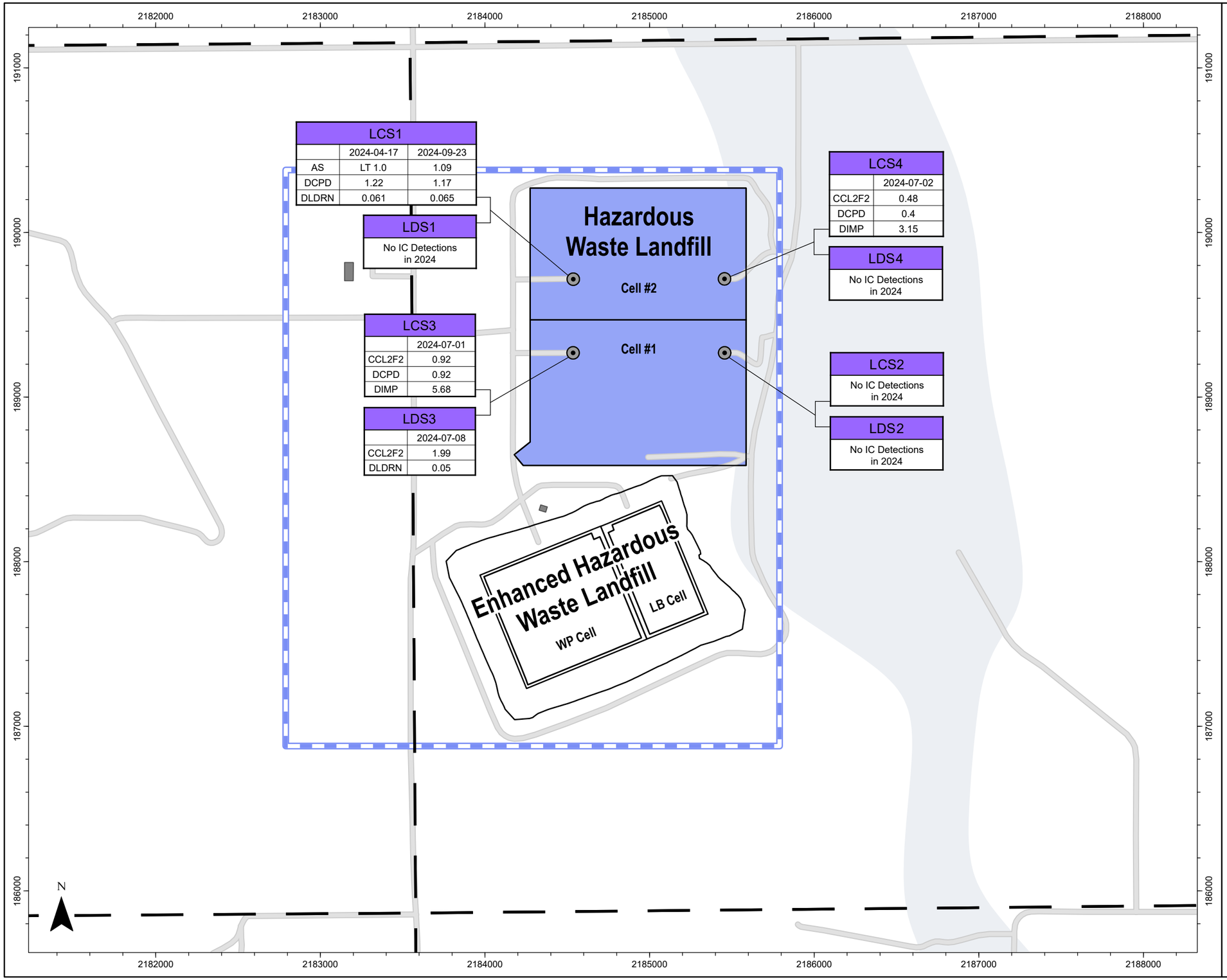
0 250 500 1,000 Feet

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FIGURE 2.3-1

2024 Groundwater Monitoring Indicator Compounds Detection Map

Date: 2025-06-17 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal File Path: M:\PROJECTS\2025\2025_04_2024GMR_HWL (FIG_2_3_1)



NOTE

- *Concentrations are in micrograms per liter (µg/l).*
- *Data shown from calendar year 2024.*

Section Boundaries

CAMU Boundary

2014 North Plants/Bedrock Ridge Plume Extent

Buildings

On-Post Roads

Sumps

0 250 500 1,000 Feet

Rocky Mountain Arsenal

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FIGURE 2.3-2

2024 HWL Leachate Collection & Leak Detection Systems Indicator Compounds Detection Map

Date: 2025-05-30 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal File Path: M:\PROJECTS\2025\2025_04_2024GMR_HWL (FIG_2_3_2)

ATTACHEMENTS

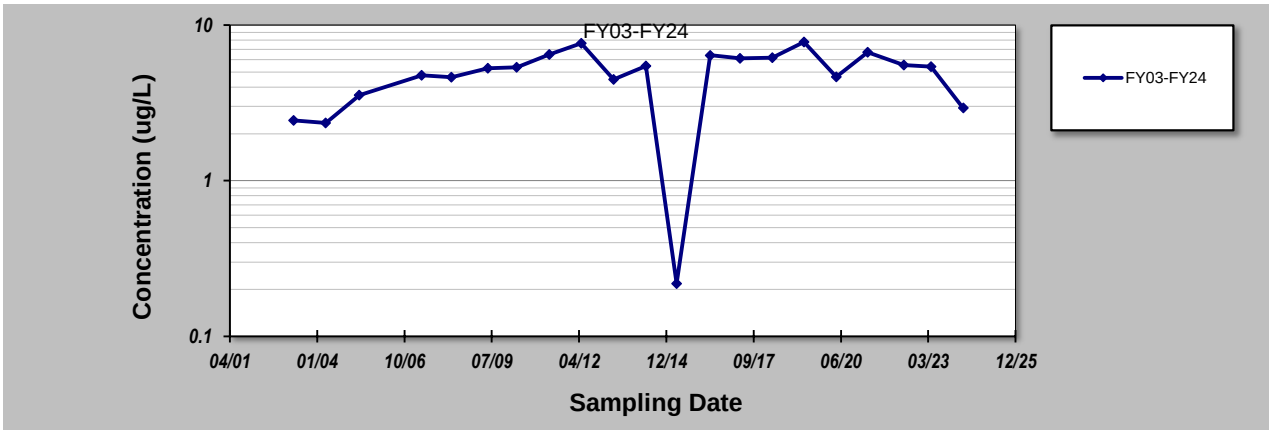
Mann-Kendall Trend Analysis – Wells 25034, 25121, and 25194

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	FY03-FY24	Job ID:	HWL GWMR
Facility Name:	RMA HWL Well 25034 - 11DCE	Constituent:	11DCE
Conducted By:	Nicole Luke	Concentration Units:	ug/L

Sampling Point ID:	FY03-FY24						

Sampling Event	Sampling Date	11DCE CONCENTRATION (ug/L)						
1	4/21/03	2.44						
2	4/22/04	2.35						
3	5/12/05	3.55						
4	4/26/07	4.76						
5	4/1/08	4.63						
6	5/21/09	5.28						
7	4/19/10	5.37						
8	4/27/11	6.47						
9	4/25/12	7.64						
10	5/2/13	4.48						
11	5/6/14	5.45						
12	4/23/15	0.218						
13	5/12/16	6.4						
14	4/19/17	6.12						
15	4/23/18	6.18						
16	4/22/19	7.79						
17	4/27/20	4.64						
18	4/19/21	6.68						
19	6/8/22	5.54						
20	4/17/23	5.41						
21	4/18/24	2.93						
22								
23								
24								
25								
Coefficient of Variation:		0.37						
Mann-Kendall Statistic (S):		62						
Confidence Factor:		96.8%						
Concentration Trend:		Increasing						



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

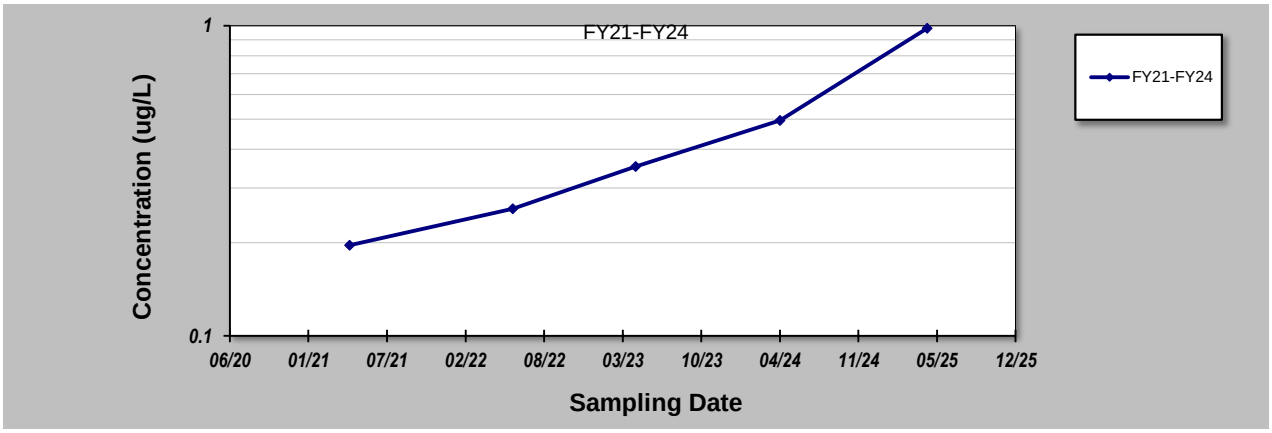
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GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	FY21-FY24	Job ID:	HWL GWMR
Facility Name:	RMA HWL Well 25034 - CCL4	Constituent:	CCL4
Conducted By:	Nicole Luke	Concentration Units:	ug/L

Sampling Point ID: FY21-FY24

Sampling Event	Sampling Date	CCL4 CONCENTRATION (ug/L)
1	4/19/21	0.196
2	6/8/22	0.257
3	4/17/23	0.352
4	4/18/24	0.495
5	4/28/25	0.982
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
Coefficient of Variation:		0.69
Mann-Kendall Statistic (S):		10
Confidence Factor:		99.2%
Concentration Trend:		Increasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

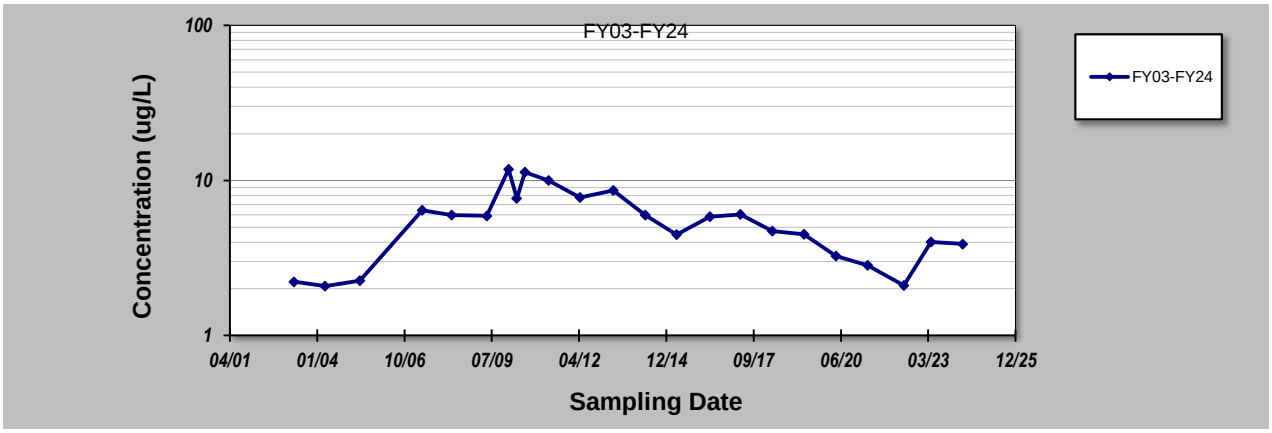
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GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	FY03-FY24	Job ID:	HWL GWMR
Facility Name:	RMA HWL Well 25121 - CCL4	Constituent:	CCL4
Conducted By:	Nicole Luke	Concentration Units:	ug/L

Sampling Point ID:	FY03-FY24

Sampling Event	Sampling Date	CCL4 CONCENTRATION (ug/L)
1	4/22/03	2.22
2	4/14/04	2.08
3	5/16/05	2.26
4	5/3/07	6.41
5	4/3/08	5.99
6	5/12/09	5.91
7	1/14/10	11.80
8	4/19/10	7.67
9	7/22/10	11.30
10	4/18/11	10.00
11	4/11/12	7.75
12	4/29/13	8.61
13	4/28/14	5.99
14	4/23/15	4.48
15	5/9/16	5.85
16	4/24/17	6.04
17	4/24/18	4.71
18	4/22/19	4.49
19	4/23/20	3.25
20	4/21/21	2.84
21	6/8/22	2.10
22	4/17/23	4.01
23	4/11/24	3.89
24		
25		
Coefficient of Variation:		0.51
Mann-Kendall Statistic (S):		-56
Confidence Factor:		92.6%
Concentration Trend:		Prob. Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
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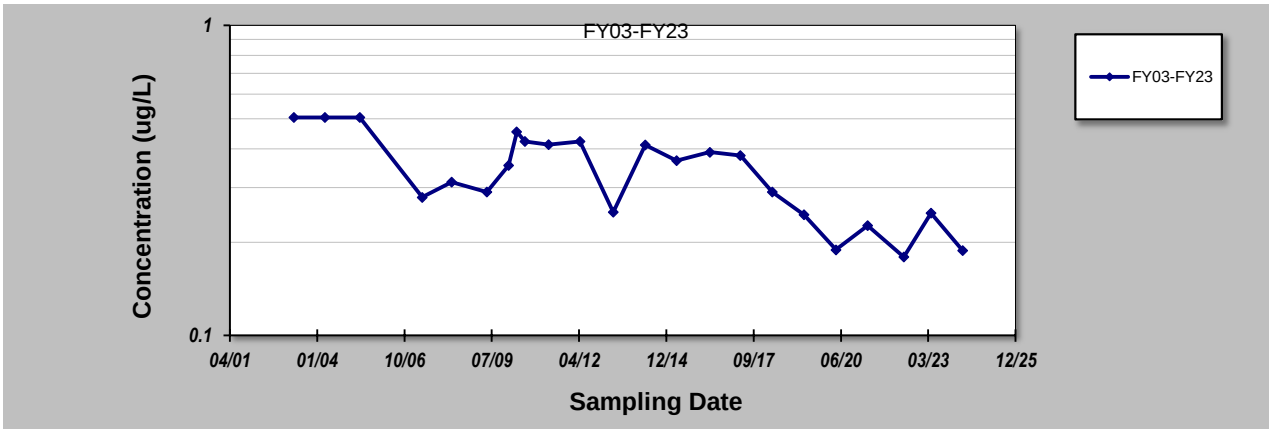
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GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	FY03-FY23	Job ID:	HWL GWMR
Facility Name:	RMA HWL Well 25121 - CHCL3	Constituent:	CHCL3
Conducted By:	Nicole Luke	Concentration Units:	ug/L

Sampling Point ID:	FY03-FY23						

Sampling Event	Sampling Date	CHCL3 CONCENTRATION (ug/L)						
1	4/22/03	0.505						
2	4/14/04	0.505						
3	5/16/05	0.505						
4	5/3/07	0.279						
5	4/3/08	0.312						
6	5/12/09	0.290						
7	1/14/10	0.353						
8	4/19/10	0.453						
9	7/22/10	0.422						
10	4/18/11	0.412						
11	4/11/12	0.422						
12	4/29/13	0.250						
13	4/28/14	0.411						
14	4/23/15	0.366						
15	5/9/16	0.390						
16	4/24/17	0.380						
17	4/24/18	0.290						
18	4/22/19	0.245						
19	4/23/20	0.189						
20	4/21/21	0.226						
21	6/8/22	0.179						
22	4/17/23	0.248						
23	4/11/24	0.188						
24								
25								
Coefficient of Variation:		0.31						
Mann-Kendall Statistic (S):		-144						
Confidence Factor:		>99.9%						
Concentration Trend:		Decreasing						



Notes:

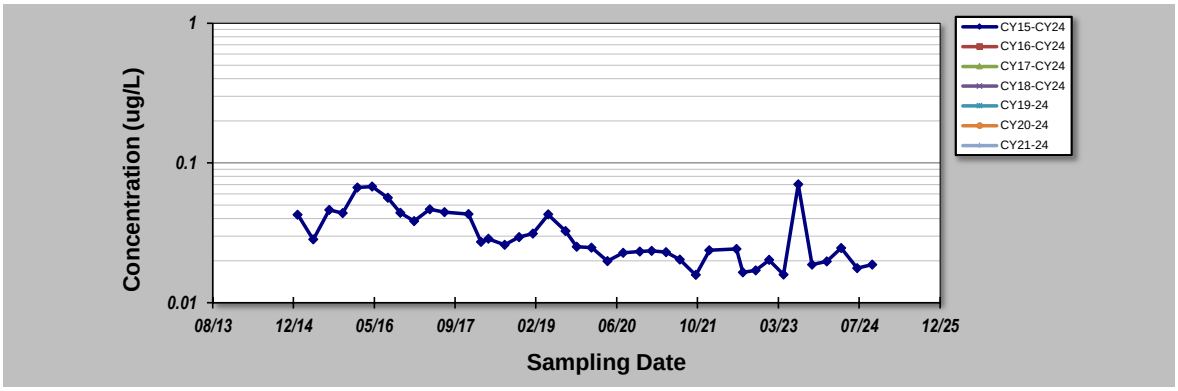
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
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GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	8-Apr-25	Job ID:	HWL GWMR
Facility Name:	RMA HWL Well 25194	Constituent:	DLDRN
Conducted By:	N. Luke	Concentration Units:	ug/L

Sampling Point ID:	CY15-CY24	CY16-CY24	CY17-CY24	CY18-CY24	CY19-24	CY20-24	CY21-24
Sampling Event	Sampling Date	DLDRN CONCENTRATION (ug/L)						
1	22-Jan-15	0.0426						
2	28-Apr-15	0.0283						
3	5-Aug-15	0.046						
4	27-Oct-15	0.0437						
5	26-Jan-16	0.0668						
6	26-Apr-16	0.0678						
7	2-Aug-16	0.0562						
8	18-Oct-16	0.044						
9	12-Jan-17	0.0383						
10	19-Apr-17	0.0466						
11	18-Jul-17	0.0445						
12	14-Dec-17	0.0431						
13	1-Mar-18	0.0272						
14	17-Apr-18	0.0286						
15	26-Jul-18	0.0259						
16	24-Oct-18	0.0294						
17	17-Jan-19	0.0312						
18	22-Apr-19	0.0427						
19	7-Aug-19	0.0326						
20	15-Oct-19	0.0251						
21	15-Jan-20	0.0248						
22	22-Apr-20	0.0198						
23	28-Jul-20	0.0227						
24	9-Nov-20	0.0232						
25	20-Jan-21	0.0235						
26	19-Apr-21	0.023						
27	14-Jul-21	0.0204						
28	20-Oct-21	0.0158						
29	13-Jan-22	0.0237						
30	30-Jun-22	0.0242						
31	8-Aug-22	0.0165						
32	27-Oct-22	0.017						
33	17-Jan-23	0.0202						
34	17-Apr-23	0.0159						
35	17-Jul-23	0.0703						
36	10-Oct-23	0.0187						
37	10-Jan-24	0.0197						
38	8-Apr-24	0.0246						
39	16-Jul-24	0.0177						
40	16-Oct-24	0.0187						
Coefficient of Variation:		0.46						
Mann-Kendall Statistic (S):		-370						
Confidence Factor:		>99.9%						
Concentration Trend:		Decreasing						



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
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APPENDIX E-2

Enhanced Hazardous Waste Landfill
Post-Closure Groundwater Monitoring Report
Calendar Year 2024

ROCKY MOUNTAIN ARSENAL

Enhanced Hazardous Waste Landfill
Post-Closure Groundwater Monitoring Report

Calendar Year 2024

Revision 0

June 23, 2025

U.S. Department of the Army
Shell Oil Company

Prepared by:

Navarro Research and Engineering, Inc.

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2.2-1 2024 Groundwater Monitoring Well/Piezometer/Sump Location Map

2.2-2 2024 Groundwater Monitoring Enhanced Hazardous Waste Landfill Potentiometric Surface

2.2-3 2024 Groundwater Monitoring Lower Sandstone Units Potentiometric Surface

2.3-1 2024 Groundwater Monitoring Indicator Compounds Detection Map

ACRONYMS

amsl	Above Mean Sea Level
CAMU	Corrective Action Management Unit
CFS	Confined Flow System
DQI	Data Quality Indicator
ELF	Enhanced Hazardous Waste Landfill
HWL	Hazardous Waste Landfill
IC	Indicator Compound
LBLCS	LB Leachate Collection System
LBLDS	LB Leak Detection System
LCS	Leachate Collection System
LDS	Leak Detection System
MRL	Method Reporting Limit
NRAP	Non-Routine Action Plan
µg/L	Microgram(s) per liter
O&M	Operations and Maintenance
OCN	Operations and Maintenance Change Notice
PCGMP	Post-Closure Groundwater Monitoring Plan
RMA	Rocky Mountain Arsenal
SQAPP	Sampling Quality Assurance Project Plan
UCL	Upper Confidence Limit
UFS	Unconfined Flow System
WPLCS	WP Leachate Collection System
WPLDS	WP Leak Detection System

EXECUTIVE SUMMARY

The post-closure groundwater monitoring program for the Enhanced Hazardous Waste Landfill (ELF) is designed to monitor groundwater flow directions, groundwater quality beneath and in the vicinity of the ELF and evaluate the potential for hazardous constituent releases into groundwater sourced from the landfill.

This report summarizes the post-closure monitoring activities at the ELF for the calendar year 2024, including quarterly sampling conducted in January, July, and October, as well as the annual sampling event completed in April. Groundwater flow directions beneath the ELF were consistent over the four quarters of 2024 post-closure monitoring and are consistent with the previous groundwater monitoring events within the Corrective Action Management Unit area.

The wells sampled as part of the ELF 2024 post-closure groundwater monitoring include five downgradient monitoring wells, six upgradient monitoring wells and one cross-gradient monitoring well. The groundwater samples were tested for a standard list of analytes including indicator compounds (IC). The ICs selected for the monitoring program are presented in the *Enhanced Hazardous Waste Landfill Post-Closure Groundwater Monitoring Plan* (ELF PCGMP) (Navarro 2020).

The IC, lead, was detected in all five downgradient wells. The lead concentrations ranged from 3.6 micrograms per liter (μg/L) to 4.6 μg/L. All results are below the prediction limit value of 26.3 μg/L. Historically, lead was detected in downgradient wells prior to waste being placed in the ELF in April 2006.

The ELF LB Leak Detection System (LBLDS) sumps and WP Leak Detection System (WPLDS) sumps were not sampled in 2024. They will be sampled prior to the next waste removal event per the ELF PCGMP (Navarro 2020).

Refer to Table 2.1-1 for a summary of Notifications, Operational Change Notices and Non- Routine Actions regarding the ELF water level monitoring network.

As a component of the data review process, the analytical data were evaluated against the Data Quality Indicators (DQI) of precision, accuracy, representativeness, completeness, comparability, and sensitivity. Based on the findings of the DQI review, requirements were met and the data are appropriate for use in evaluation of the water quality conditions present at the site.

Based on statistical evaluations, the groundwater quality around the ELF has not been affected by post-closure operations and maintenance of the landfill.

1.0 INTRODUCTION

The post-closure groundwater monitoring program for the Enhanced Waste Landfill (ELF) at the Rocky Mountain Arsenal (RMA) is designed to monitor groundwater flow directions, groundwater quality beneath and in the vicinity of the ELF and evaluate the potential for hazardous constituent releases into the groundwater sourced from the landfill. This report presents data generated by the ELF post-closure groundwater monitoring system in 2024 and an evaluation of the monitoring objectives.

Quarterly well sampling events were conducted during January, July, and October, and the annual sampling event was performed in April. The following information is presented in accordance with the *Enhanced Waste Landfill Post-Closure Groundwater Monitoring Plan* (ELF PCGMP) (Navarro 2020).

- Groundwater level data collected from the ELF post-closure water level monitoring well network.
- Analytical results of groundwater samples collected from the ELF post-closure water quality monitoring well network.
- Analytical results of wastewater samples collected from the ELF Leachate Collection System (LCS) and LB Leak Detection System (LBLDS) sumps and the WP Leak Detection System (WPLDS) sumps.
- Evaluation of data to determine compliance with post-closure groundwater monitoring criteria as presented in the ELF PCGMP.

Background information related to the ELF monitoring approach including site-specific characterization, applicable regulatory requirements, laboratory methods, statistical evaluation procedures, and monitoring program development are presented in the ELF PCGMP, *Rocky Mountain Arsenal Sampling Quality Assurance Project Plan* (SQAPP) (Navarro 2024a), and previous annual groundwater reports.

2.0 GROUNDWATER MONITORING RESULTS

2.1 Field Activities

The field crew inspected the monitoring wells and well pads prior to each sampling event. As part of the annual sampling event, the casing height was measured prior to sampling the monitoring wells with dedicated pumps. The casing heights and total depths were measured for monitoring wells without dedicated pumps. The casing heights and total depths are documented in the records.

2.2 Groundwater Levels

The wells included in the ELF post-closure groundwater level monitoring are presented in Table 3.2-1 of the ELF PCGMP and Figure 2.2-1 of this report. Water levels were measured quarterly in wells to evaluate the unconfined flow system (UFS) and confined flow system (CFS) flow conditions in the area of the Corrective Action Management Unit (CAMU) and to identify any significant changes in flow direction in the area of the CAMU.

Water level monitoring measurements are provided in Table 2.2-1. Figures 2.2-2 and 2.2-3 represent the first quarter 2024 water table elevation for the UFS and the Denver Formation Lower Sandstone Unit within the UFS and CFS, respectively. The potentiometric surface of the UFS in the vicinity of the ELF shows that across the entire CAMU, groundwater flow is generally to the north and northeast. No significant variations in groundwater flow directions have been identified during post-closure monitoring.

The potentiometric surface of the Denver Formation lower sandstone unit indicates flow from the CFS into UFS downgradient of the Hazardous Waste Landfill (HWL) and illustrates the water table across the area and the interaction between the two flow systems. Groundwater flow in the lower sandstone unit of the CFS merges with the UFS on the north, west, and east sides of the HWL and ELF. Currently, the zone where the UFS and CFS merge is illustrated by a dashed line for the approximate boundary indicating the lower sandstone unit in Figure 2.2-3. South of the line, the flow is confined to semi-confined, while north of the line the flow is unconfined where the confining unit is not present (TtFW 2004).

Water levels measured in well 25021, south and upgradient of the ELF, are not consistent with other monitoring wells near the ELF suggesting the screened zone is not hydraulically connected with the lower sandstone unit mapped in this report. Therefore, the water level data from well 25021 are not used in contouring the potentiometric surface for the lower sandstone unit. The well, however, will continue to be monitored as part of the upgradient ELF water-quality well network.

In 2024, water levels were not collected in CFS well 25017 due to an obstruction. Additionally, unconfined flow system (UFS) well 26051, was damaged after the third quarter of 2024, preventing water level collection. Well 25122 was closed in September 2023 in accordance with the recommendations presented in the 2022 and 2023 ELF Post-Closure Groundwater Monitoring Reports (Navarro 2023, 2024b). Well 25222 was installed in October 2023 in accordance with the recommendations presented in the 2022 and 2023 ELF Post-Closure Groundwater Monitoring Reports (Navarro 2023, 2024b).

Refer to Table 2.1-1 for a summary of applicable Notifications, Non-Routine Actions (NRAP) and Operational Change Notices (OCN).

Table 2.1-1: Notifications, Operational Change Notices and Non-Routine Actions

Well ID	Notification Date	Description	Applicable NRAP	Applicable OCN	Approval Date
25122	Presented in the 2022 and 2023 ELF Post-Closure Groundwater Monitoring Reports	DRY/ Closed in September of 2023 and removed from water level (WL) monitoring network	Not Applicable	OCN-ELF-2024-002	9/4/2024
25222		Installed in October of 2023 and added to WL monitoring network	Not Applicable	OCN-ELF-2023-001	9/25/2023
25017	7/9/2024	Damaged/ Removed from WL monitoring network	NRAP-2024-001	OCN-ELF-2024-002	9/4/2024
26051	4/18/2025	Damaged/ Removed from WL monitoring network	NRAP-2025-001	Pending	Pending

2.3 Groundwater Quality

The ELF water quality network wells are identified in Table 3.2-2 of the ELF PCGMP and Figure 2.2-1 of this report. Groundwater samples collected from the ELF water quality monitoring network were shipped to Applied Research and Development Laboratory, Mount Vernon, Illinois for analysis. Annual samples were analyzed for the complete analyte list as presented in Table 3.2-3 of the ELF PCGMP. Quarterly samples were analyzed for 13 indicator compounds (IC) identified by bold text in Table 3.2-3 of the ELF PCGMP.

The ICs detected in the ELF network wells are shown in Figures 2.3-1.

2.3.1 Upgradient and Cross-gradient ELF Network Wells

The ICs detected in wells upgradient and cross-gradient of the ELF are listed in Figure 2.3-1 with their respective concentrations and sample dates.

Detections of chloroform and carbon tetrachloride in cross-gradient well 25121 are consistent with contaminants associated with the North Plants/Bedrock Ridge plume. Concentrations of carbon tetrachloride and chloroform have decreased since 2010.

2.3.2 Downgradient ELF Network Wells

ICs detected in wells downgradient of the ELF are listed in Figure 2.3-1 with their respective concentrations and sample dates. The IC, lead, was detected in all five downgradient wells. The lead concentrations ranged from 3.6 micrograms per liter (μg/L) to 4.6 μg/L. Most of the detections occurred during the April 2024 sampling event.

2.4 LCS and LDS Wastewater Analytical Results

The ELF includes two LCS sumps, for the LB and WP waste cells, and four LDS sumps. Water levels in sumps LB Leachate Collection System (LBLCS) and WP Leachate Collection System (WPLCS) were not high enough to initiate sampling in accordance with the ELF PCGMP in 2024.

Water levels in sumps LBLDS1, LBLDS2, WPLDS1 and WPLDS2 were not high enough to initiate sampling in accordance with the PCGMP in 2024. Since there were no LDS analytical results in 2024, none required regulatory agency notification per Table 3.0-2 of the *Enhanced Hazardous Waste Landfill Post-Closure Plan* (Navarro 2020).

2.5 Analytical Data Review

The objective of the analytical data review is to determine whether the analytical results are acceptable for use in making decisions for the project. As a component of the data review process, the analytical data are evaluated against the Data Quality Indicators (DQI) including precision, accuracy, representativeness, completeness, comparability, and sensitivity to interpret the degree of acceptability of the data. These six parameters are identified in the SQAPP (Navarro 2024a). Failure to meet performance criteria did not necessarily result in rejection or qualification of the data. Professional judgment combined with the DQI evaluation were used to determine data usability.

The analytical data were collected in accordance with the ELF PCGMP and were reviewed consistent with the DQI process as presented in the SQAPP. Results of the DQI review are summarized below in Table 2.5-1. DQI evaluation data are available in the project files.

Table 2.5-1: Data Quality Summary

Indicator	Summary
Precision	A total of 220 duplicate pair analyses of ELF target analytes were performed. Duplicate and investigative results are considered comparable in 219 cases and not comparable in 1 case (silver). The non-comparable investigative and duplicate data will be assigned a "Z" data qualifier with comment "Duplicate and investigative values are not comparable". *The data are considered acceptable for their intended use and no additional action in addition to the data qualification is considered necessary.*
Accuracy/Bias	The average recovery rate for the 930 matrix spike analyses was 86.79 percent. Recovery rates outside the lower or upper warning limits were observed in 21 analyses. Recovery rates outside the lower or upper control limits were observed in 1 analysis. *No issues were identified requiring data qualification.* The average recovery rate for the 930 corresponding laboratory control spike analyses was 97.03 percent. Recovery rates outside the lower or upper warning limits were observed in 16 analyses. Recovery rates outside the lower or upper control limits were observed in zero analyses. *No issues were identified requiring data qualification.*
Representativeness	Field blanks are collected and analyzed to evaluate possible cross contamination of the investigative samples. A field blank was not collected for ELF in 2024.
Completeness	Completeness was calculated at 100 percent. The completeness goal of 90 percent was achieved. *All results were determined to be acceptable by the laboratory.*
Comparability	Standard sampling and analysis techniques, based on certified analytical methods approved by Navarro or promulgated SW-846 methods, and standard procedures for sample collection were used throughout the groundwater monitoring programs at the ELF. Consistent procedures for the reporting and management of the data generated were also followed. *All data are considered comparable.*
Sensitivity	The laboratories prepared and analyzed method blanks as part of their analytical protocols. Method blanks measure potential contamination from laboratory sources such as glassware, reagents, and laboratory water. There were 1,010 method blank analyses in 2024. There was one detection above the MRL. *Data qualification is not necessary as the associated investigative data is below the MRL.*

2.5.1 Data Quality Control Review

Data validation was conducted on a representative subset of the ELF groundwater analytical data. Validation checklists were completed, and laboratory case narratives were reviewed to determine potential problems identified by the analysts. The completeness result for all analytes achieves the minimum specification of 90 percent. No data were flagged as rejected in 2024.

Table 2.5.1-1 presents a summary of the quality control samples collected and analyzed to support ELF groundwater monitoring in 2024.

Table 2.5.1-1: Quality Control Samples

Sample Type/Site ID	Sample Date(s)
Field Duplicates	
26099	1/10/2024
25093	4/9/2024
Laboratory Duplicates	
25102	4/9/2024
25022	4/29/2024
25105	5/1/2024
25123	4/30/2024

2.5.2 Data Usability Evaluation

A data usability evaluation was conducted, and summary files are available in the project files. Based on the findings of the DQI review, the sample results are considered valid and usable for their intended purpose. Data quality requirements were sufficiently met for the analytical data, and data are appropriate for use in evaluation of the water quality conditions present at the site. The primary objectives of the sampling program were met.

3.0 STATISTICAL EVALUATIONS

The statistical evaluation of data includes comparing upgradient water quality to downgradient compliance wells utilizing prediction intervals that are calculated for each IC using upgradient water quality data. The prediction limits discussed in this section refer to the upper limit of each analyte-specific prediction interval. Comparison of downgradient water quality data to prediction limits should provide an indication whether groundwater has been impacted by the ELF.

The wells used to calculate prediction limits and statistical evaluations are presented in Table 3.0-1. A prediction interval was calculated for each IC, which included upgradient water quality data through the 2023 post-closure monitoring period. The general approach for determining and evaluating prediction limits for the ELF is consistent with United States Environmental Protection Agency guidance document (EPA 2009).

ChemStat statistical analysis software (StarPoint Software 2023) is utilized to determine the prediction limit values and documentation is available in the project files. The prediction limit values for 2024 are included in Table 3.0-3. If a compound was not detected in any sample, the default non-parametric prediction limit for the analyte is the 99 percent upper confidence limit (UCL). In accordance with the PCGMP, if an analyte is not detected in any sample, the 99 percent UCL is defined as 1.3 times the MRL. The following sections describe the results of the approach used for the statistical evaluation of the ELF groundwater data.

3.1 2024 Prediction Limits and the Current ELF Water Quality Data

Table 3.0-2 presents the 2024 prediction limits that were calculated using upgradient well data collected during the pre-operational, operational, closure, and post-closure groundwater monitoring periods (2003–2023).

The analytical results of samples collected from the downgradient ELF groundwater monitoring network in 2024 were compared with the prediction limit values presented in Table 3.0-2 to determine whether groundwater quality was impacted by the ELF.

The IC, lead, was detected in all five downgradient wells. The lead concentrations ranged from 3.6 micrograms per liter (μg/L) to 4.6 μg/L. All results are below the prediction limit value of 26.3 μg/L. Historically, lead was detected in downgradient wells prior to waste being placed in the ELF in April 2006.

Based on the statistical evaluation, it is concluded that the groundwater quality in the vicinity of the ELF has not been affected by operations, closure, or post-closure operations and maintenance (O&M) of the landfill.

3.2 2025 Prediction Limits

Table 3.0-3 presents the prediction limit values that will be applied to downgradient wells in 2025. The MRLs can change based on the analytical method re-certification required every three years by the SQAPP (Navarro 2019). In February 2024, the MRL for dieldrin increased, and the new MRL is reflected in Table 3.0-3. The change did not impact the prediction limits calculated for 2025 as presented in Table 3.0-3.

4.0 SUMMARY

The following conclusions are based on the groundwater and wastewater monitoring results for the 2024 post-closure groundwater monitoring at the ELF:

- The groundwater in the UFS and CFS flows to the north-northeast and is consistent with the previously monitored groundwater elevations and flow directions for the ELF.
- Based on the findings of the DQI evaluation, the analytical data collected are of acceptable quality for intended uses.
- No ICs exceeded the 2024 prediction limits.
- Carbon tetrachloride, chloroform and lead were detected in cross-gradient UFS well 25121. Detections of chloroform and carbon tetrachloride in well 25121 are consistent with contaminants associated with the North Plants/Bedrock Ridge plume.
- Due to an insufficient amount of sample material, the ELF LCS and LDS sumps were not sampled in 2024. They will be sampled prior to the next waste removal event per the ELF PCGMP.
- Prediction limit values for all ICs were re-evaluated for 2025. No prediction limits were adjusted.

Based on the statistical evaluation, it is concluded that the groundwater quality in the vicinity of the ELF has not been affected by operations, closure, or post-closure O&M of the landfill.

5.0 REFERENCES

EPA (U.S. Environmental Protection Agency)

2009 *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* Unified Guidance, EPA 530/R-09-007. March.

Navarro (Navarro Research and Engineering, Inc.)

2024a *Rocky Mountain Arsenal Sampling Quality Assurance Project Plan.* Revision 3. October 31, 2024.

2024b *Enhanced Waste Landfill Post-Closure Groundwater Monitoring Report, Calendar Year 2023.* Revision 0. June 20, 2024.

2023 *Enhanced Waste Landfill Post-Closure Groundwater Monitoring Report, Calendar Year 2022.* Revision 0. June 21, 2023.

2020 *Enhanced Hazardous Waste Landfill Post-Closure Groundwater Monitoring Plan*. Revision 1. April 2, 2020.

StarPoint Software, Inc. (StarPoint Software)

2023 ChemStat Statistical Analysis Software for Environmental Data. Version 6.5, January 2023.

TtFW (Tetra Tech FW, Inc.)

2004 *Hazardous Waste Landfill and Landfill Wastewater Treatment System Annual Groundwater Monitoring Report for July 2002–June 2003*. Revision 0.

TABLES

Table 2.2-1: 2024 Water Level Measurements

Well ID	Groundwater Elevations (ft amsl)			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Unconfined Flow System				
25003	5152.53	5152.54	5152.54	5152.52
25004	5217.66	5217.47	5217.41	5217.45
25015	5159.54	5159.34	5159.49	5159.58
25018	5164.65	5164.85	5164.83	5164.42
25022	5219.92	5219.87	5219.91	5219.91
25023	5218.68	5218.40	5218.54	5218.62
25027	5180.58	5180.61	5180.59	5180.55
25032	Dry	5226.53	Dry	Dry
25041	5185.13	5185.23	5185.28	5184.82
25048	5172.03	5172.19	5172.21	5171.70
25054	5174.33	5174.43	5174.52	5174.08
25059	5178.86	5179.12	5179.17	5178.74
25086	Dry	Dry	Dry	Dry
25087	5166.41	5166.31	5166.45	5166.49
25088	Dry	Dry	Dry	Dry
25091	5170.13	5170.13	5170.21	5170.27
25092	5180.64	5180.67	5180.66	5180.71
25098	Dry	Dry	Dry	Dry
25099	5169.09	5168.98	5169.15	5169.11
25100	Dry	Dry	Dry	Dry
25102	5180.50	5180.35	5180.31	5180.46
25105	5217.71	5217.28	5217.56	5217.61
25106	5205.02	5205.23	5204.99	5204.98
25120	5190.93	5190.95	5190.72	5191.04
25121	5180.47	5180.41	5180.42	5180.47
25122 [1]	Closed	Closed	Closed	Closed
25189	5167.18	5167.09	5167.30	5167.17
25194	5181.51	5181.54	5181.52	5181.50
25203	5180.39	5180.31	5180.41	5180.35
25222[1]	NA	NA	Dry	Dry
25500	5217.69	5217.44	5217.43	5220.04
25502	5185.19	5185.24	5185.31	5184.90

Table 2.2-1: 2024 Water Level Measurements

Well ID	Groundwater Elevations (ft amsl)			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
26040	5147.37	5147.38	5147.38	5147.37
26051[2]	5162.25	5162.31	5162.29	Obstructed
26073	5177.73	5183.20	5177.75	5177.76
26097	5184.26	5185.15	5184.16	5183.94
26099	5183.36	5182.93	5182.86	5183.18
26158	5179.69	5179.84	5179.78	5181.66
26159	5203.51	5203.15	5203.05	5203.38
26164	5144.20	5144.20	5144.17	5144.22
26170	5139.70	5139.71	5139.68	5139.67
26175	5157.11	5156.98	5156.97	5156.80
26176	Dry	Dry	Dry	Dry
26177	5159.14	5159.07	5159.13	5158.86
26178	Dry	Dry	Dry	Dry
26179	5167.94	5167.85	5167.86	5167.82
26180	5177.60	5177.49	5177.55	5177.52
26181	5166.63	5166.62	5166.64	5166.57
26182	5176.16	5176.14	5176.11	5176.07
26183	5164.97	5164.96	5164.90	5164.93
26184	Dry	Dry	Dry	Dry
26186	5163.70	5163.60	5163.59	5163.56
36186	5236.92	5235.99	5235.92	5235.21
Confined Flow System				
25016	5153.27	5153.53	5153.31	5153.28
25017 [1]	Obstructed	Obstructed	Obstructed	Obstructed
25019	5162.55	5162.87	5162.70	5162.65
25020	5148.84	5149.15	5148.95	5148.64
25021	5174.05	5174.03	5174.07	5174.13
25024	5201.37	5201.19	5201.82	5201.34
25034	5173.15	5174.35	5173.00	5173.05
25085	5164.76	5164.79	5164.71	5164.84
25093	5171.04	5171.31	5171.07	5171.11
25101	5173.88	5174.04	5173.97	5173.86
25123	5175.65	5175.74	5175.70	5175.53

Table 2.2-1: 2024 Water Level Measurements

Well ID	Groundwater Elevations (ft amsl)			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
25183	5164.23	5164.20	5164.12	5164.23
25195	5165.89	5165.90	5165.75	5165.85
26150	5171.21	5171.35	5171.11	5171.12
26185	5151.88	5151.62	5151.48	5151.53

Notes:

[1] OCN-ELF-2024-002 removed well 25017 and 25122 from the water level monitoring network and added well 25222.

[2] NRAP-2025-001 issued May 16, 2025.

amsl – above mean sea level NA – Not applicable

Table 3.0-1: ELF Groundwater Monitoring Well Usage

Well/ Designation	Data Used to Calculate Current (2024) Prediction Limits [1]			Prediction Limits Applied to Downgradient Wells Quarterly in 2024
	Data Used to Calculate Baseline (2010) Prediction Limits		Upgradient Data from Post-Closure Monitoring Period 5/27/2010 to 10/11/2023	
	Upgradient Data from Preoperational Monitoring Period 10/1/2003 to 3/31/2006	Upgradient Data from Operational/Closure Monitoring Period 4/1/2006 to 5/26/2010		
Upgradient				
25021	X	X	X	
25022	X	X	X	
25024	X	X	X	
25105	X	X	X	
25106	X	X	X	
25123	X	X	X	
Downgradient				
25092				X
25093				X
25102				X
25120				X
26099				X

Notes:

Well 25121 has been removed from this table. Detections of carbon tetrachloride and chloroform in cross-gradient well 25121 suggests the well is in a flow path with the North Plants/Bedrock Ridge Plume. In accordance with the ELF PCGMP (Navarro 2020) well 25121 is used to evaluate any cross-gradient potential impacts to the UFS and CFS from the North Plants/Bedrock Ridge plume contaminants. It is not used to calculate the prediction limits for ELF.

[1] Analytical results from the pre-operational, operational, closure, and post-closure monitoring periods utilized to calculate the current HWL prediction limits are available in the project files.

Table 3.0-2: Prediction Limits for ELF 2024 Water Quality Monitoring

Indicator Compound	Current Method Reporting Limit (µg/L)	Proportion of Upgradient Non-detected Sample Values (2003-2023)	Statistical Method Used	Selected Prediction Limit (µg/L)
Volatile Organic Compounds				
1,1,1-Trichloroethane	0.2	100	Non-parametric	0.26[1]
1,1-Dichloroethane	0.2	100	Non-parametric	0.26[1]
1,1-Dichloroethene	0.2	100	Non-parametric	0.26[1]
1,2-Dichloroethane	0.2	100	Non-parametric	0.26[1]
Benzene	0.2	99.2	Non-parametric	0.93[2]
Carbon tetrachloride	0.2	100	Non-parametric	0.26[1]
Chloroform	0.2	100	Non-parametric	0.26[1]
Organochlorine Pesticides				
Dieldrin	0.00252	80.9	Non-parametric	0.107[2]
Organophosphorus Compounds				
DIMP	0.602	98.4	Non-parametric	1.21[2]
Metals				
Arsenic	1	78.3	Non-parametric	11.5[2]
Chromium	10	99.6	Non-parametric	10.4[2]
Lead	3	68.8	Non-parametric	26.3[2]
Mercury	0.2	100	Non-parametric	0.26[1]

Notes:

[1] Because this compound was not detected in any sample, the non-parametric prediction limit value for this analyte is the 99 percent upper confidence limit (UCL). For purposes of this report, the 99 percent UCL is defined as 1.3 times the MRL.

[2] Maximum upgradient value.

µg/L – micrograms per liter

Table 3.0-3: Prediction Limits for ELF 2025 Water Quality Monitoring

Indicator Compound	Current Method Reporting Limit (µg/L)	Proportion of Upgradient Non-detected Sample Values (2003-2023)	Statistical Method Used	Selected Prediction Limit (µg/L)
Volatile Organic Compounds				
1,1,1-Trichloroethane	0.2	100	Non-parametric	0.26[1]
1,1-Dichloroethane	0.2	100	Non-parametric	0.26[1]
1,1-Dichloroethene	0.2	100	Non-parametric	0.26[1]
1,2-Dichloroethane	0.2	100	Non-parametric	0.26[1]
Benzene	0.2	99.2	Non-parametric	0.93
Carbon tetrachloride	0.2	100	Non-parametric	0.26[1]
Chloroform	0.2	100	Non-parametric	0.26[1]
Organochlorine Pesticides				
Dieldrin	0.00543[3]	80.5	Non-parametric	0.107[2]
Organophosphorus Compounds				
DIMP	0.602	98.4	Non-parametric	1.21[2]
Metals				
Arsenic	1	78.4	Non-parametric	11.5[2]
Chromium	10	99.6	Non-parametric	10.4[2]
Lead	3	69.5	Non-parametric	26.3[2]
Mercury[1]	0.2	100	Non-parametric	0.26[1]

Notes:

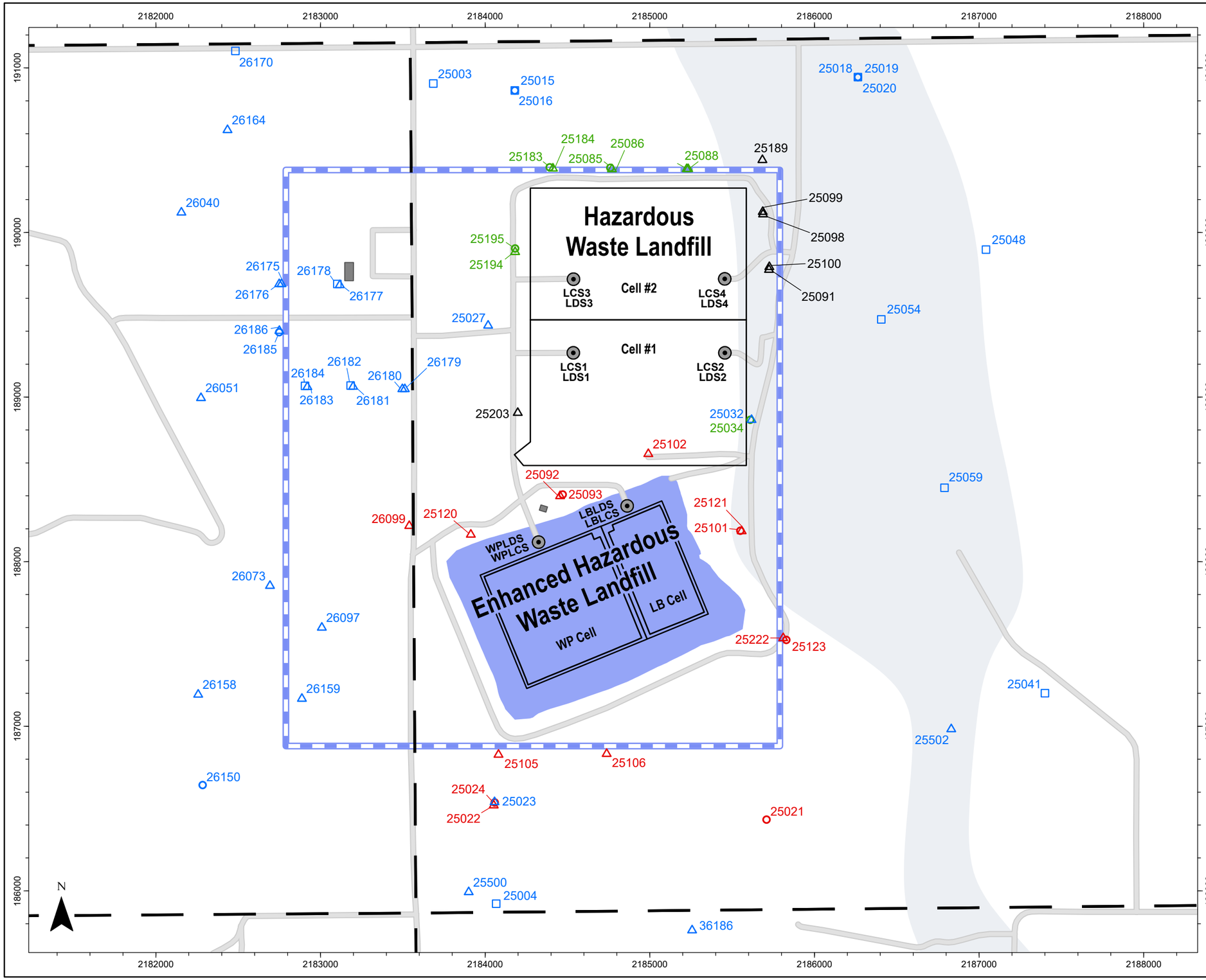
[1] Because this compound was not detected in any sample, the non-parametric prediction limit value for this analyte is the 99 percent upper confidence limit (UCL). For purposes of this report, the 99 percent UCL is defined as 1.3 times the MRL.

[2] Maximum upgradient value.

[3] The reporting limits have changed as a result of an MRL study required by the SQAPP for method recertification every three years.

µg/L – micrograms per liter

FIGURES



MONITORING WELL NETWORK	FLOW SYSTEM / AQUIFER		
	Unconfined Alluvial	Unconfined Denver	Confined Denver
Hazardous Waste Landfill (HWL)	-	△	○
HWL Supplemental Operations	-	△	-
Enhanced Hazardous Waste Landfill (ELF)	-	△	○
HWL & ELF Water Level Only	□	△	○

- Section Boundaries
- CAMU Boundary
- 2014 North Plants/Bedrock Ridge Plume Extent
- Buildings
- On-Post Roads
- Sumps

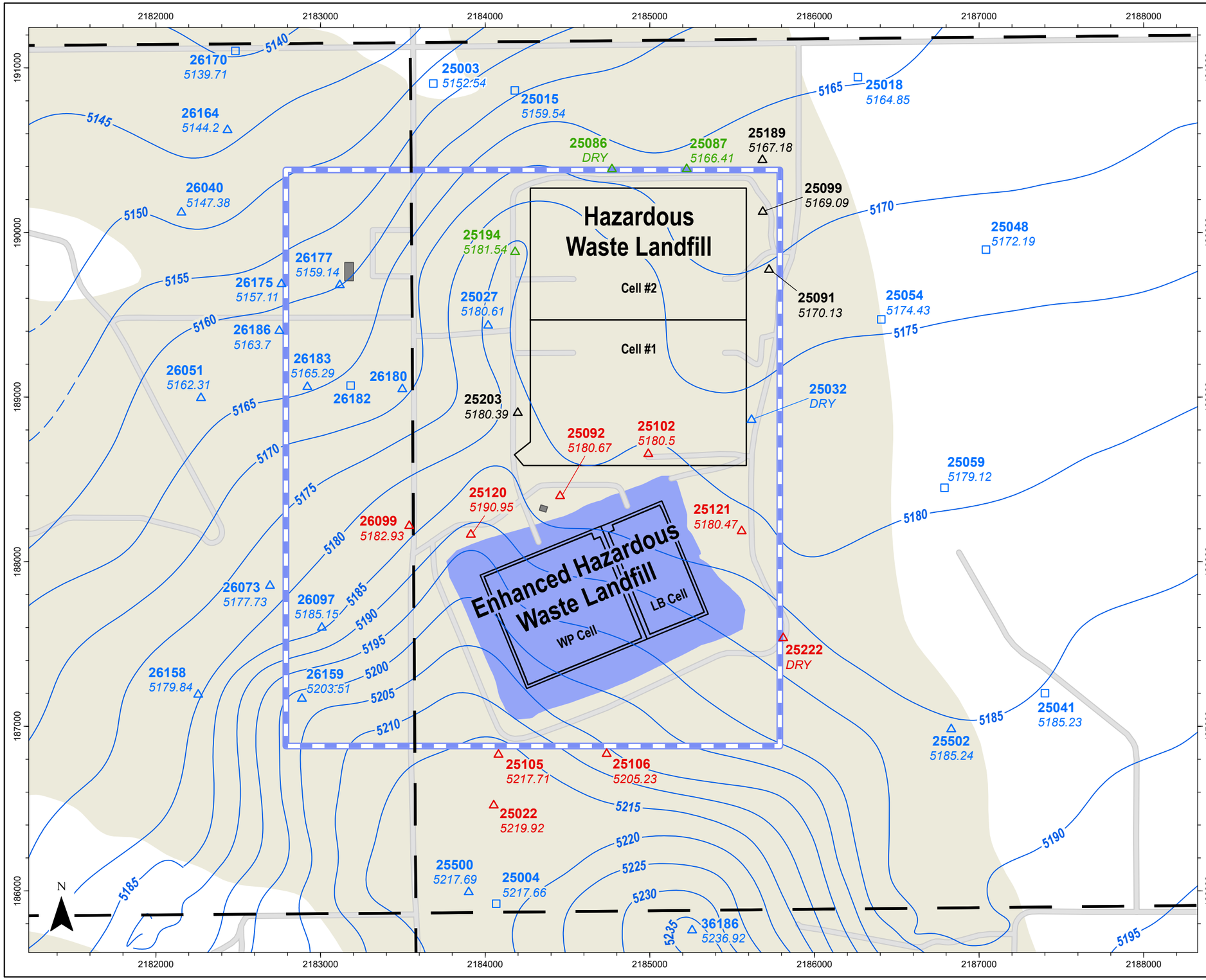
0 250 500 1,000 Feet

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FIGURE 2.2-1

2024 Groundwater Monitoring Well/Piezometer/Sump Location Map

Date: 2025-06-02 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal File Path: M:\PROJECTS\2025\2025_04_2024GMR_ELF (FIG_2_2_1)



MONITORING WELL NETWORK	FLOW SYSTEM / AQUIFER	
	Unconfined Alluvial	Unconfined Denver
Hazardous Waste Landfill (HWL)	-	△
HWL Supplemental Operations	-	△
Enhanced Hazardous Waste Landfill (ELF)	-	△
HWL & ELF Water Level Only	□	△

Site ID #
FY24 Groundwater Elevation

- Section Boundaries
- CAMU Boundary
- Unsaturated Alluvium (FY24)
- Buildings
- On-Post Roads
- Water Elevation Contours (5-ft)
- Inferred Water Elevation Contours (5-ft)

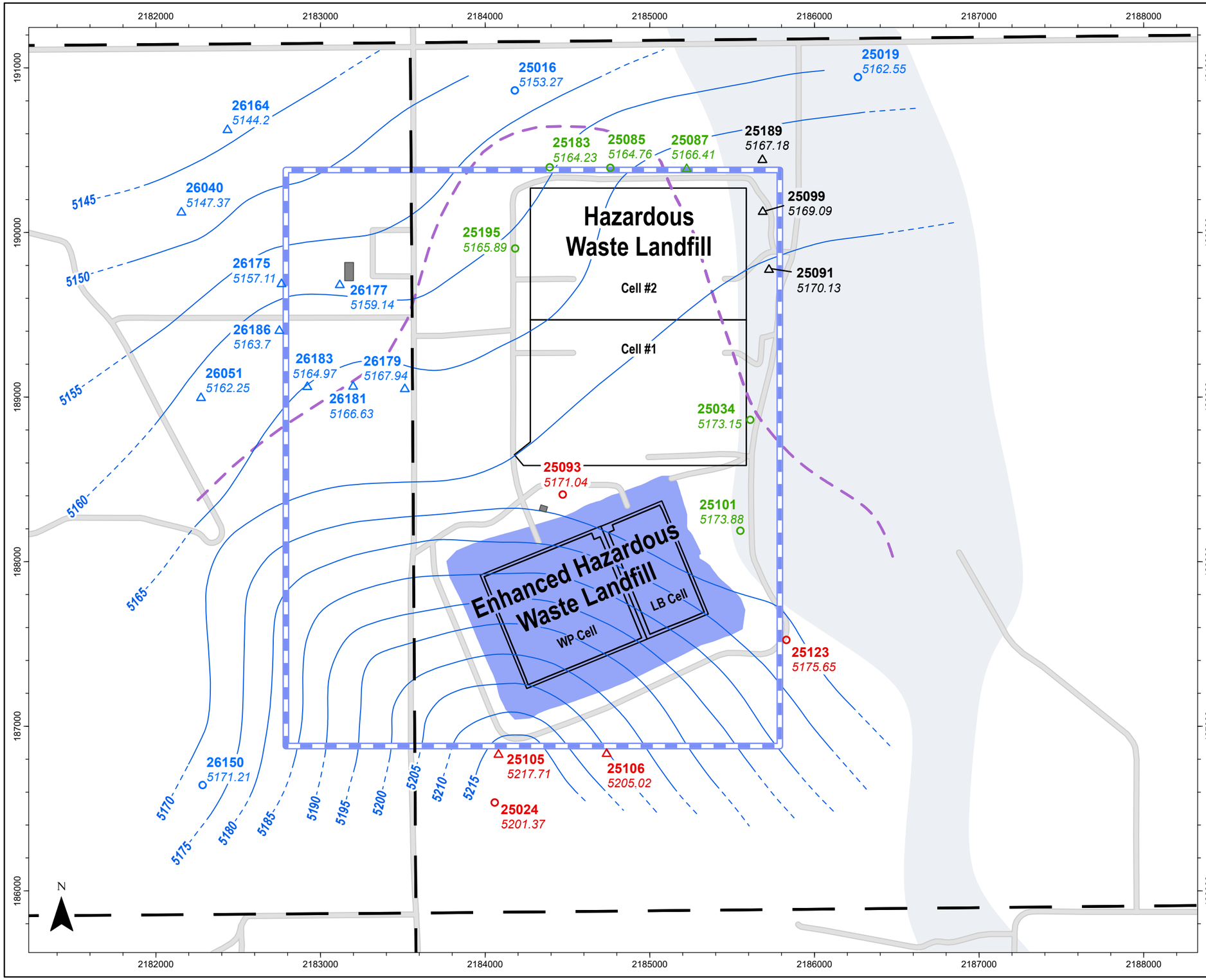
0 250 500 1,000 Feet

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FIGURE 2.2-2

2024 Groundwater Monitoring Enhanced Hazardous Waste Landfill Potentiometric Surface

Date: 2025-05-30 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal File Path: M:\PROJECTS\2025\2025_04_2024GMR_ELF (FIG_2_2_2)



MONITORING WELL NETWORK	FLOW SYSTEM / AQUIFER	
	Unconfined Denver	Confined Denver
Hazardous Waste Landfill (HWL)	△	○
HWL Supplemental Operations	△	-
Enhanced Hazardous Waste Landfill (ELF)	△	○
HWL & ELF Water Level Only	△	○

Site ID #
FY24 Q2 Lower Sandstone Groundwater Elevation

- Section Boundaries
- CAMU Boundary
- 2014 North Plants/Bedrock Ridge Plume Extent
- Buildings
- On-Post Roads
- Approximate Boundary of the Lower Sandstone Units
- Water Elevation Contours (5-ft)
- Inferred Water Elevation Contours (5-ft)

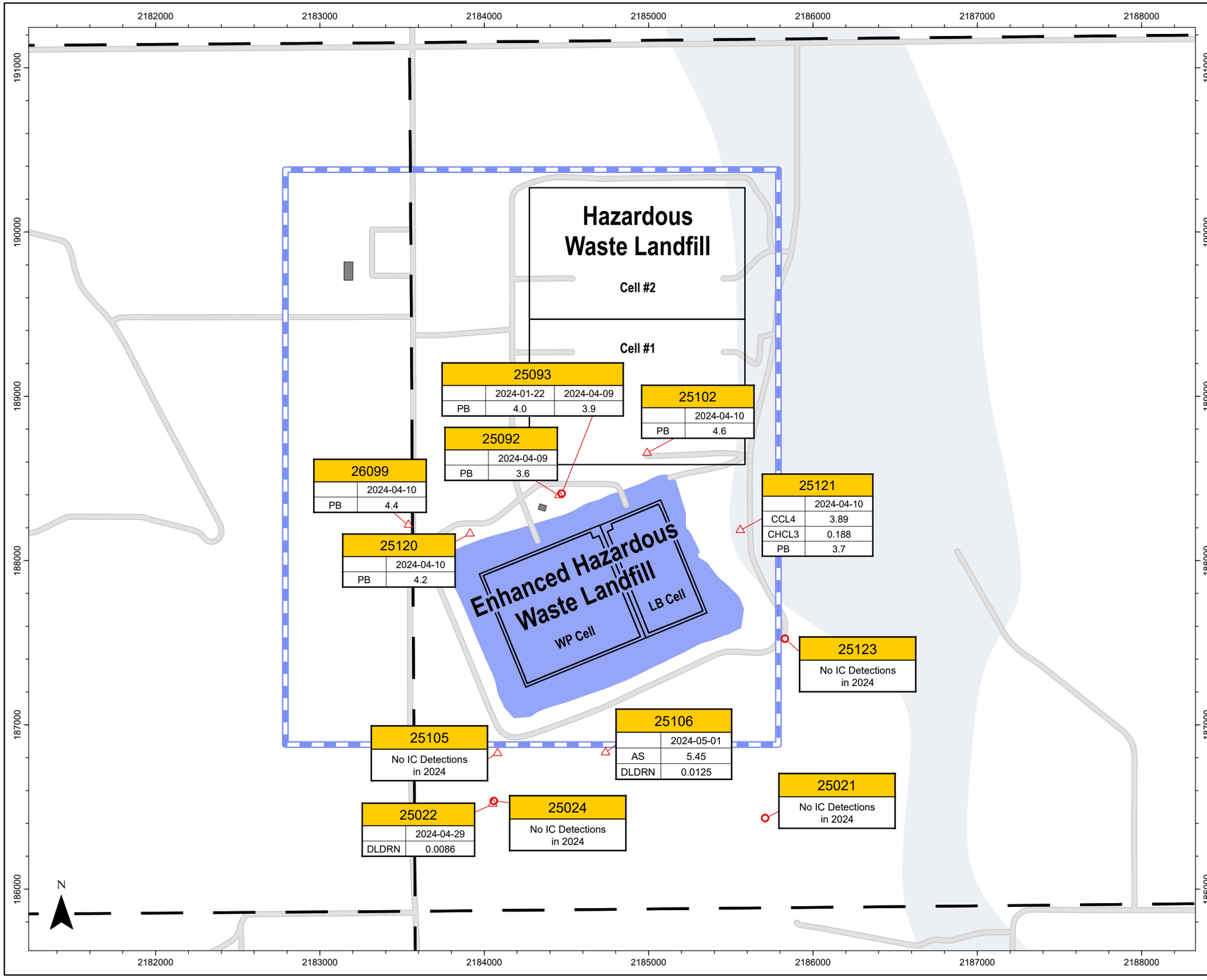
0 250 500 1,000 Feet

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FIGURE 2.2-3

2024 Groundwater Monitoring Lower Sandstone Units Potentiometric Surface

Date: 2025-05-30 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal File Path: M:\PROJECTS\2025\2025_04_2024GMR_ELF (FIG_2_2_3)



MONITORING WELL NETWORK	FLOW SYSTEM / AQUIFER		
	Unconfined Alluvial	Unconfined Denver	Confined Denver
Enhanced Hazardous Waste Landfill (ELF)	-	△	○

NOTE

- *Concentrations are in micrograms per liter (µg/l).*
- *Data shown from calendar year 2024.*

Section Boundaries
CAMU Boundary
2014 North Plants/Bedrock Ridge Plume Extent
Buildings
On-Post Roads

0 250 500 1,000 Feet

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FIGURE 2.3-1

2024 Groundwater Monitoring Indicator Compounds Detection Map

Date: 2025-05-30 | **Data Source**: U.S. Army, Navarro, Shell/AECOM | **Projection**: NAD27-NGVD29 Datum (1927), US Survey Feet, State Plane Colorado North FIPS 0501 | **Page Size**: 11" x 17"
Internal File Path: M:\PROJECTS\2025\2025_04_2024GMR_ELF (FIG_2_3_1)

APPENDIX F

Notifications and Non-Routine Action Plans

Michael W. Jones

From: Cable, Kelly <kelly.cable@aecom.com>
Sent: Tuesday, September 24, 2024 12:36 PM
To: Connolly, David; Schnitz, Ann; Susan Newton; Mark Collar; Vince Stewart; Thomas Butts; Joseph Chisholm
Cc: Natalie Rymarz; Michael W. Jones; Kim Hoffman
Subject: Fw: Landfills and Covers Notification - Missing Analytical Data for Well 25194

Good afternoon, Landfills and Covers Team,

Provided below is notification of lacking analysis of a sample in April. Mike provides the details below. Since there really is no follow-up action required, we are requesting to forego the development of an NRAP. Once you have read the notification provided, please let us know if you feel that an NRAP is required. To us, the NRAP would simply restate the information provided in the notification.

Thank you for taking the time to look this over and we look forward to hearing from you soon.

Kelly Cable
Project Manager
Rocky Mountain Arsenal Project
office: 303-853-3952
cell: 303-868-5467
kelly.cable@aecom.com

AECOM
7270 Kingston Parkway
Building 129
Commerce City, CO 80022
www.aecom.com

From: Michael W. Jones <JonesM@navarro-inc.com>
Sent: Tuesday, September 24, 2024 10:22 AM
To: Cable, Kelly <kelly.cable@aecom.com>
Cc: Kim Hoffman <hoffman@navarro-inc.com>; Ache, Scott <ache@navarro-inc.com>; Seth Kennedy <kennedy@navarro-inc.com>; Rieger, Carol <rieger@navarro-inc.com>; Nicole Luke <luke@navarro-inc.com>
Subject: Landfills and Covers Notification - Missing Analytical Data for Well 25194

Kelly,
This email is intended to notify the regulatory agencies of missed analytical data for HWL well 25194. Please transmit this to the team at your convenience.

According to the HWL Post-Closure Plan, a notification is typically followed by a Non-Routine Action Plan (NRAP) to document the field evaluation, consultation, plan of action, and consensus of the Army and regulatory agencies. However, an NRAP may be overkill in this instance. The subsequent quarterly sample was collected from well 25194 in July and there is no action that will provide the missing data from April. If the regulatory agencies are amicable, I suggest documenting concurrence through email. The non-routine

condition will be discussed at the semiannual Landfills and Covers O&M Status Meeting scheduled for October 23, 2024.

Let me know if you have any questions or concerns.
Thanks

Notification: The groundwater sample collected from Hazardous Waste Landfill (HWL) monitoring well 25194 in the second quarter of 2024 was not analyzed for mercury or metals as required by the HWL Post-Closure Groundwater Monitoring Plan (PCGMP). Laboratory data are not available.
Subject: HWL Post-Closure Plan Notification – Groundwater Monitoring
This is a required notification: During the annual sampling of the HWL groundwater monitoring well network in April of 2024, the sample from well 25194 was not analyzed for mercury or metals as required by the HWL PCGMP. For HWL groundwater samples, the laboratory extracts multiple analyses from one shared container. In this case, arsenic, metals, and mercury were to be extracted from a single 1-liter poly bottle. The sampling crew filled the 1-liter poly bottle as required, but did not indicate the metals and mercury analyses on the Chain of Custody, so the lab only analyzed for arsenic. According to Section 3.5 of the HWL Post-Closure Plan (PCP), and Table 3.0-2 of the HWL PCP, identification of a missed sample from any post-closure groundwater monitoring well or Supplemental Operational Monitoring well requires regulatory agency notification and triggers the consultative process, which will be documented in a Non-Routine Action Plan (NRAP).
Notification Requirement: HWL PCP Table 3.0-2: Non-Routine Action Trigger Levels
Monitoring Category: Groundwater Monitoring
Trigger Event: Identification of a missed sample or a missed water level measurement from any post-closure groundwater monitoring well or Supplemental Operational Monitoring well.
Associated Monitoring: Groundwater quality monitoring
Notification Schedule: A verbal notification will be made no more than 14 days following the determination that an action is considered to be non-routine. The notification to the CDPHE will be documented in an e-mail, letter, or similar record.
Consultation Required: A copy of the NRAP, including a schedule of activities, will be provided to the regulatory agencies within 30 days of the notification for review and concurrence.
Class of Modification to the Plan: N/A
Description of issue: The Chain of Custody for well 25194 was not completed correctly, so the laboratory did not run the required analyses.

NAVARRO
Michael W. Jones
Landfills, Covers & Non-Routine Projects
Office: 720-625-3647 Cell: 303-564-7645
Rocky Mountain Arsenal
7270 Kingston Parkway
Commerce City, CO 80022

Michael W. Jones

From: Rymarz, Natalie A CIV USARMY USAG (USA) <Natalie.a.rymarz.civ@army.mil>
Sent: Thursday, April 17, 2025 3:03 PM
To: Joseph Chisholm; Mark Collar; Rachel Puttmann; Susan Newton; Thomas Butts; Vince Stewart
Cc: Cable, Kelly; Michael W. Jones; Kim Hoffman; Adams, Jamar M CIV USARMY IMCOM (USA)
Subject: FW: Notification for HWL LDS4 Watch List Trigger Level Exceedance
Attachments: LDS4 Data Evaluation 041725.docx; Tables 1-8_LDS4_historical data.xlsx

Good afternoon Landfills and Covers Team,

Below is a notification of watch list trigger level exceedance for HWL sump LDS4. Since there is no recommended follow-up action to perform, we are requesting to forego the development of an NRAP.

Please review the notification and let us know if you feel that an NRAP is required. This notification will be discussed at the semiannual Landfills and Covers O&M status meeting next Tuesday at 11:00 AM.

Respectfully,
Natalie

Natalie Rymarz
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From: Michael W. Jones <JonesM@navarro-inc.com>
Sent: Thursday, April 17, 2025 1:31 PM
To: Rymarz, Natalie A CIV USARMY USAG (USA) <Natalie.a.rymarz.civ@army.mil>
Cc: Cable, Kelly <kelly.cable@aecom.com>; Kim Hoffman <hoffman@navarro-inc.com>; Ache, Scott <Ache@navarro-inc.com>
Subject: Notification for HWL LDS4 Watch List Trigger Level Exceedance

Natalie,
This email is intended to notify the regulatory agencies of analytical results from a sample collected from HWL sump LDS4 that exceeded Watch List trigger levels listed in the HWL Post-Closure Groundwater Monitoring Plan. The exceedances were identified while preparing the HWL Post-Closure Groundwater Monitoring Report for 2024. Please transmit this to the team at your convenience.

According to the HWL Post-Closure Plan, a notification is typically followed by a Non-Routine Action Plan (NRAP) to document the evaluation, consultation, plan of action, and consensus of the Army and regulatory agencies. However, this notification provides an evaluation of the available data and there is no recommended follow-up action to perform. The topic will be discussed at the semiannual Landfills and Covers O&M Status Meeting scheduled for Aprill

22, 2025 and the discussion will be captured in the meeting notes. Therefore, I suggest using this notification as documentation and foregoing the NRAP. The same approach was used last September when we realized that water quality data were missing for well 25194.

Let me know if you have any questions or concerns.
Thanks

Notification: A wastewater sample was collected from Hazardous Waste Landfill (HWL) Leak Detection System (LDS) sump 4 (LDS4) on March 11, 2024. Analytical results for endrin (ENDRN), endrin aldehyde (ENDRNA), endrin ketone (ENDRNK), and heptachlor chlordane (HPCL) exceeded the respective Watch List trigger levels listed in Table 3.2.5-2 of the HWL Post-Closure Groundwater Monitoring Plan (PCGMP).
Subject: HWL Post-Closure Plan Notification – LDS Water Quality Monitoring
This is a required notification: A wastewater sample was collected from HWL sump LDS4 on March 11, 2024, prior to removing wastewater from the sump. Analytical results indicated that four analytes exceeded the Watch List trigger levels listed in Table 3.2.5-2 of the HWL PCGMP. The results and trigger levels are tabulated below.

Analyte	Trigger Level (μg/L)	Analytical Result (μg/L)
ENDRN	0.088	0.102
ENDRNA	0.101	0.103
ENDRNK	0.061	0.078
HPCL	0.047	0.061

According to Section 3.5 of the HWL Post-Closure Plan (PCP), and Table 3.0-2 of the HWL PCP, detection of a watch list analyte above the watch list trigger level requires regulatory agency notification and triggers the consultative process. Figure 3.2-4 of the HWL PCGMP provides a flow chart specifically for LDS watch list exceedances.
Notification Requirement: HWL PCP Table 3.0-2: Non-Routine Action Trigger Levels
Monitoring Category: LDS Water Quality Monitoring
Trigger Event: Detection of a watch list analyte above the watch list trigger level
Associated Monitoring: Leachate Collection System (LCS) and sump levels
Notification Schedule: A verbal notification will be made no more than 14 days following the determination that an action is considered to be non-routine. The notification to the CDPHE will be documented in an e-mail, letter, or similar record.
Consultation Required: The Army and regulatory agencies will follow the sump data evaluation process identified in Figure 3.2-4 of the HWL PCGMP, in conjunction with the consultative process.
Class of Modification to the Plan: N/A
Description of issue: Four analytes from the LDS4 wastewater sample collected on March 11, 2024 exceeded their respective Watch List trigger levels. An evaluation was performed to determine if the increased concentrations resulted from a breach in the primary liner system that could have drained leachate from LCS4 into LDS4. The evaluation is attached. Analytical results of the four analytes in LDS4 and LCS4 are also attached.

Evaluation of the analytical results of LCS4 and LDS4 wastewater samples do not indicate an issue with LCS liner integrity. Likewise, sump level data do not indicate that leachate is entering the LDS4 sump from LCS4. Therefore, no additional action is required and continued routine sampling and monitoring is suggested.

The non-routine condition and results of the data evaluation will be discussed at the semiannual Landfills and Covers O&M Status Meeting scheduled for April 22, 2025.

Michael W. Jones

Landfills, Covers & Non-Routine Projects

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Description of issue – Four analytes from the LDS4 wastewater sample collected on March 11, 2024 exceeded their respective Watch List trigger levels. An evaluation was performed to determine if the increased concentrations resulted from a breach in the primary liner system that could have drained leachate from LCS4 into LDS4. The evaluation focused on two quantifiable tests:

1. Correlation between LDS4 analyte concentrations and concentrations of analytes in leachate collected from LCS4. Similar analyte concentrations between the two sumps could suggest that liquids drained from LCS4 into LDS4.
2. Evaluation of LDS4 sump level trends. A reduction in the time required to fill LDS4 prior to March of 2024, or an increase in the sump's filling rate could suggest that liquids drained from LCS4 into LDS4.

Test #1 – In 2018 sump sampling requirements were changed from a quarterly event to episodic based on water levels in each sump (i.e. each sump is sampled independently prior to pumping). Therefore, chronologically correlated samples are not available after October 2018. This evaluation reviewed LCS4 analyte concentrations that were most recent, both before and after March 11, 2024. Results are tabulated below.

Analyte	**LDS4 Concentration** (μg/L)	**Previous LCS4 Concentration** (μg/L)	**Subsequent LCS4 Concentration** (μg/L)	**Observation**
ENDRN	0.102 (03/11/2024)	0.24 (02/21/2023)	0.236 (07/02/2024)	The LDS4 concentration is less than half of the nearest LCS4 concentrations. The ENDRN concentration is also within the historic range. ENDRN was detected as high as 0.184 on 01/18/2017.
ENDRNA	0.103 (03/11/2024)	LT 0.00329 (02/21/2023)	0.380 (07/02/2024)	The LDS4 concentration is much less than the LCS4 concentration from July 2024. The July 2024 value is typical of the ENDRNA concentration in LCS4. The March 2024 value is the highest ENDRNA concentration recorded in LDS4 since sampling began in 2001.
ENDRNK	0.078 (03/11/2024)	LT 0.00632 (02/21/2023)	LT 0.004 (07/02/2024)	The ENDRNK concentration in LCS4 has typically been below the reporting limit since 2014. Since the LDS4 value is an order of magnitude higher than the LCS4 reporting limits, it is unlikely that Leachate from LCS4 was the source of the detection. The March 2024 value is the highest ENDRNK concentration recorded in LDS4 since sampling began in 2001.
HPCL	0.061 (03/11/2024)	0.191 (02/21/2023)	0.249 (07/02/2024)	The LDS4 concentration is much less than the LCS4 concentrations from February 2023 and July 2024, both of which are typical of LCS4 since 2018. The March 2024 value is the highest HPCL concentration recorded in LDS4 since sampling began in 2001.

Test #2 – HWL LDS4 sump level data were evaluated to determine if the sump filled faster, or if the filling rate increased. Both conditions could indicate that leachate had drained from LCS4 into LDS4. Figures 1 and 2 show the weekly sump level measurements of LDS4 over two filling cycles. Figure 1 illustrates a

filling cycle from May 2019 to October 2021, and Figure 2 illustrates a filling cycle from October 2021 to March 2024. Linear trend lines are included in both figures, with their corresponding trend line equations.

The time required to fill the sump from 10 inches to 20 inches was 707 days from September 2019 to October 2021. 863 days elapsed before the sump filled again between October 2021 and March 2024. The slower filling rate suggests that leachate from LCS4 did not contribute to the accumulation of wastewater in LDS4 between 2021 and 2024. Similarly, the rate at which LDS4 filled is represented numerically in the trend line equations. The slope of the earlier filling period's trend line is 0.012813 and the slope of the latter period's trend line is 0.009637. The lower value in the latter trend line indicates a slower filling rate.

The data also conform to a linear trend throughout both filling periods and there is no indication of an increase in the rate of accumulation that would correspond with a leak in the LCS liner system.

Figure 1: HWL LDS4 Sump Level Trending (May 2019 to October 2021)

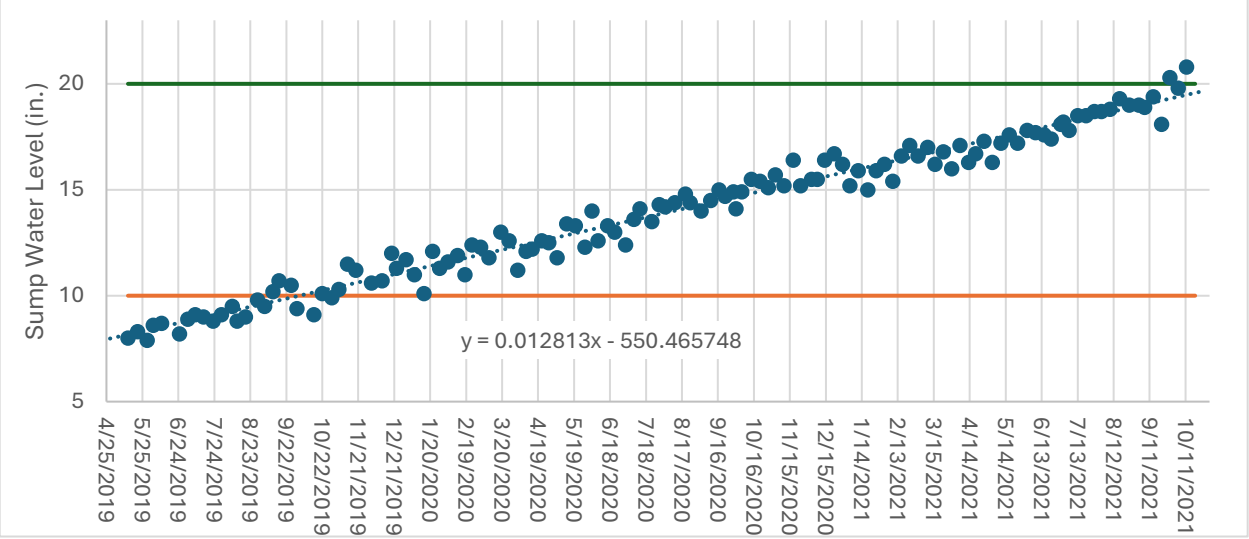
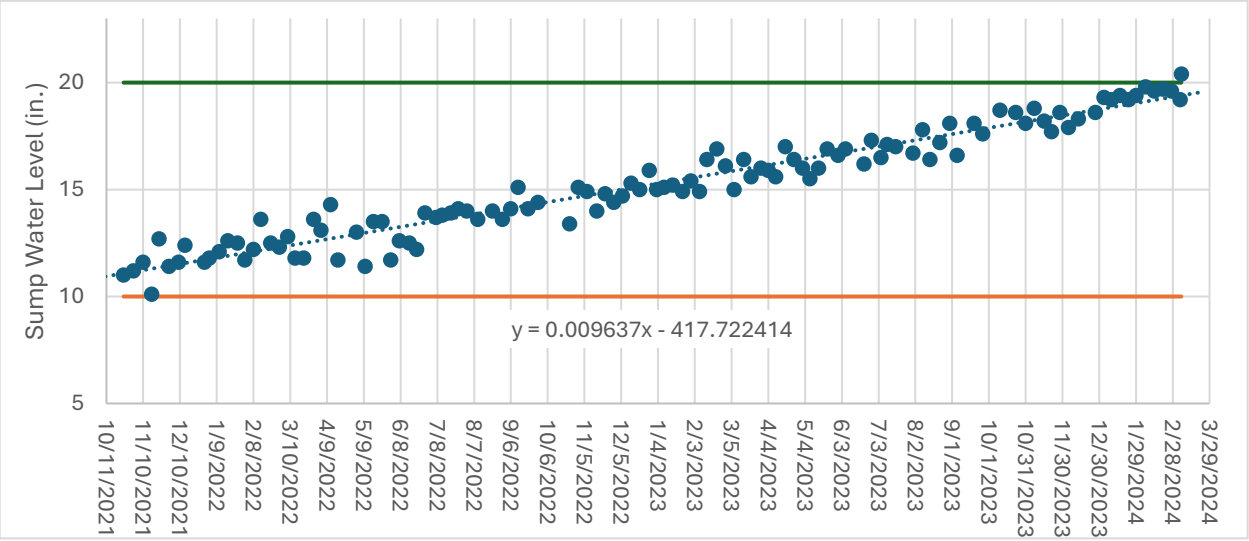


Figure 2: HWL LDS4 Sump Level Trending (October 2021 to March 2024)



Conclusion – Evaluation of the analytical results of LCS4 and LDS4 wastewater samples do not indicate an issue with LCS liner integrity. Likewise, sump level data do not indicate that leachate is entering the LDS4 sump from LCS4. Therefore, no additional action is required and continued routine sampling and monitoring is suggested.

Table 1: Historical Levels of Endrin in LCS4

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LCS4	10/12/2000	ENDRN	LT	0.073	UGL		IIX_	UH50
LCS4	1/10/2001	ENDRN	LT	0.073	UGL		INQ_	UH50
LCS4	4/18/2001	ENDRN	LT	0.073	UGL		IVW_	UH50
LCS4	7/10/2001	ENDRN	LT	0.073	UGL		JED_	UH50
LCS4	11/6/2001	ENDRN	LT	0.073	UGL		JTD_	UH50
LCS4	1/10/2002	ENDRN	LT	0.032	UGL		JWS_	UH51
LCS4	4/23/2002	ENDRN	LT	0.032	UGL		KFV_	UH51
LCS4	7/18/2002	ENDRN	LT	0.032	UGL		KPC_	UH51
LCS4	10/21/2002	ENDRN	LT	0.032	UGL		LDY_	UH51
LCS4	1/15/2003	ENDRN	LT	0.032	UGL		LOJ_	UH51
LCS4	4/16/2003	ENDRN	LT	0.032	UGL		LYZ_	UH51
LCS4	7/15/2003	ENDRN	LT	0.032	UGL		MKA_	UH51
LCS4	10/28/2003	ENDRN	LT	0.032	UGL		MTV_	UH51
LCS4	1/21/2004	ENDRN		0.0359	UGL		NBD_	UH51
LCS4	4/14/2004	ENDRN	LT	0.032	UGL		NHV_	UH51
LCS4	7/13/2004	ENDRN	LT	0.032	UGL		NRD_	UH51
LCS4	10/26/2004	ENDRN	LT	0.032	UGL		OHS_	UH51
LCS4	1/18/2005	ENDRN	LT	0.032	UGL		OMS_	UH51
LCS4	4/20/2005	ENDRN	LT	0.0347	UGL		OSN_	UH54
LCS4	7/21/2005	ENDRN	LT	0.0347	UGL		PDF_	UH54
LCS4	10/26/2005	ENDRN	LT	0.0347	UGL		POG_	UH54
LCS4	2/1/2006	ENDRN	LT	0.0347	UGL		PTW_	UH54
LCS4	4/20/2006	ENDRN	LT	0.0347	UGL		QDK_	UH54
LCS4	7/26/2006	ENDRN	LT	0.0347	UGL		QPK_	UH54
LCS4	11/8/2006	ENDRN	LT	0.0347	UGL		RHN_	UH54
LCS4	1/18/2007	ENDRN		0.0584	UGL		RPZ_	UH54
LCS4	4/25/2007	ENDRN	LT	0.0347	UGL		RZO_	UH54
LCS4	8/2/2007	ENDRN	LT	0.0347	UGL		SQE_	UH54
LCS4	11/14/2007	ENDRN		0.0769	UGL		TFN_	UH54
LCS4	1/28/2008	ENDRN		0.12	UGL		TNS_	UH54
LCS4	3/31/2008	ENDRN	LT	0.0347	UGL		TUL_	UH54
LCS4	7/16/2008	ENDRN		0.0945	UGL		UED_	UH56
LCS4	10/9/2008	ENDRN		0.0689	UGL		UQB_	UH56
LCS4	1/6/2009	ENDRN	LT	0.0344	UGL		VAM_	UH56
LCS4	5/6/2009	ENDRN	LT	0.0344	UGL		VNI_	UH56
LCS4	7/15/2009	ENDRN	LT	0.0344	UGL		VZK_	UH56
LCS4	10/7/2009	ENDRN		0.125	UGL		WMH_	UH56
LCS4	1/12/2010	ENDRN	LT	0.0344	UGL		WVD_	UH56
LCS4	4/12/2010	ENDRN	LT	0.0344	UGL		XBM_	UH56
LCS4	7/14/2010	ENDRN	LT	0.0344	UGL		XQF_	UH56
LCS4	10/6/2010	ENDRN	LT	0.0344	UGL		YAT_	UH56
LCS4	1/12/2011	ENDRN	LT	0.0344	UGL		YKR_	UH56
LCS4	4/12/2011	ENDRN	LT	0.0344	UGL		YOA_	UH56
LCS4	7/20/2011	ENDRN	LT	0.0104	UGL		YZN_	UH57
LCS4	10/18/2011	ENDRN	LT	0.0104	UGL		ZGB_	UH57
LCS4	1/23/2012	ENDRN	LT	0.0104	UGL		ZKD_	UH57
LCS4	4/23/2012	ENDRN	LT	0.0104	UGL		ZQC_	UH57
LCS4	7/11/2012	ENDRN	LT	0.0104	UGL		ZZE_	UH57
LCS4	10/10/2012	ENDRN	LT	0.0104	UGL		AAJQ	UH57
LCS4	1/17/2013	ENDRN	LT	0.0114	UGL		AANJ	UH57
LCS4	4/17/2013	ENDRN	LT	0.0104	UGL		AAUB	UH57
site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no

Table 1: Historical Levels of Endrin in LCS4

LCS4	7/22/2013	ENDRN	LT	0.0104	UGL	ABFO	UH57
LCS4	10/21/2013	ENDRN		0.0855	UGL	ABKV	UH57
LCS4	1/16/2014	ENDRN	LT	0.0104	UGL	ABQE	UH57
LCS4	4/21/2014	ENDRN	LT	0.0104	UGL	ABXY	UH57
LCS4	5/7/2014	ENDRN	LT	0.0104	UGL	ACCL	UH57
LCS4	7/23/2014	ENDRN	LT	0.0104	UGL	ACJC	UH57
LCS4	11/18/2014	ENDRN	LT	0.00399	UGL	ACQX	UH59
LCS4	1/19/2015	ENDRN	LT	0.00399	UGL	ACUD	UH59
LCS4	4/21/2015	ENDRN	LT	0.00399	UGL	ADAZ	UH59
LCS4	8/3/2015	ENDRN	LT	0.00399	UGL	ADMQ	UH59
LCS4	10/26/2015	ENDRN	LT	0.00399	UGL	ADRM	UH59
LCS4	1/20/2016	ENDRN	LT	0.00399	UGL	ADVM	UH59
LCS4	4/20/2016	ENDRN	LT	0.00399	UGL	AEEQ	UH59
LCS4	7/25/2016	ENDRN	LT	0.00399	UGL	AENG	UH59
LCS4	10/20/2016	ENDRN	LT	0.00399	UGL	AESH	UH59
LCS4	1/18/2017	ENDRN	LT	0.00399	UGL	AEXB	UH59
LCS4	4/12/2017	ENDRN		0.0385	UGL	AFEI	UH59
LCS4	7/12/2017	ENDRN		0.064	UGL	AFQR	UH59
LCS4	12/12/2017	ENDRN	LT	0.00382	UGL	AGAF	UH61
LCS4	2/8/2018	ENDRN		0.0329	UGL	AGCT	UH61
LCS4	5/15/2018	ENDRN		0.198	UGL	AGLZ	UH61
LCS4	7/23/2018	ENDRN		0.117	UGL	AGRI	UH61
LCS4	10/18/2018	ENDRN		0.115	UGL	AGYX	UH61
LCS4	1/15/2019	ENDRN		0.0899	UGL	AHDJ	UH61
LCS4	4/9/2019	ENDRN		0.0622	UGL	AHHA	UH61
LCS4	10/1/2019	ENDRN		0.078	UGL	AHZS	UH61
LCS4	7/13/2020	ENDRN		0.148	UGL	AIRD	UH61
LCS4	5/11/2021	ENDRN	LT	0.00488	UGL	AJKH	UH63
LCS4	2/16/2022	ENDRN		0.176	UGL	AKGC	UH63
LCS4	2/21/2023	ENDRN		0.24	UGL	ALLK	UH63
LCS4	7/2/2024	ENDRN		0.236	UGL	ANDQ	UH65

Table 2 - Historical Levels of Endrin in LDS4

site_id	samp_date	test_name	boolean	Data	uom	flag_code	lot_no	anal_meth_no
LDS4	1/10/2001	ENDRN	LT	0.073	UGL		INQ_	UH50
LDS4	4/18/2001	ENDRN		0.0698	UGL		IVW_	UH50
LDS4	7/10/2001	ENDRN	LT	0.073	UGL		JED_	UH50
LDS4	11/6/2001	ENDRN	LT	0.073	UGL		JTD_	UH50
LDS4	1/10/2002	ENDRN		0.0612	UGL		JWS_	UH51
LDS4	4/30/2002	ENDRN		0.058	UGL		KGG_	UH51
LDS4	6/18/2002	ENDRN		0.0582	UGL		KKB_	UH51
LDS4	7/18/2002	ENDRN		0.0432	UGL		KPC_	UH51
LDS4	8/27/2002	ENDRN		0.133	UGL		KWA_	UH51
LDS4	9/18/2002	ENDRN	LT	0.032	UGL		KZU_	UH51
LDS4	10/21/2002	ENDRN	LT	0.032	UGL		LDY_	UH51
LDS4	11/19/2002	ENDRN	LT	0.032	UGL		LHU_	UH51
LDS4	12/18/2002	ENDRN	LT	0.032	UGL		LKW_	UH51
LDS4	1/15/2003	ENDRN	LT	0.032	UGL		LOJ_	UH51
LDS4	2/19/2003	ENDRN	LT	0.032	UGL		LRL_	UH51
LDS4	3/26/2003	ENDRN	LT	0.032	UGL		LVE_	UH51
LDS4	4/16/2003	ENDRN	LT	0.032	UGL		LYZ_	UH51
LDS4	7/15/2003	ENDRN	LT	0.032	UGL		MKA_	UH51
LDS4	10/28/2003	ENDRN	LT	0.032	UGL		MTV_	UH51
LDS4	1/21/2004	ENDRN	LT	0.032	UGL		NBD_	UH51
LDS4	4/14/2004	ENDRN	LT	0.032	UGL		NHV_	UH51
LDS4	7/13/2004	ENDRN	LT	0.032	UGL		NRD_	UH51
LDS4	10/26/2004	ENDRN	LT	0.032	UGL		OHS_	UH51
LDS4	1/18/2005	ENDRN		0.0816	UGL		OMS_	UH51
LDS4	4/20/2005	ENDRN		0.0752	UGL		OSN_	UH54
LDS4	7/21/2005	ENDRN		0.103	UGL		PDF_	UH54
LDS4	10/26/2005	ENDRN		0.0444	UGL		POG_	UH54
LDS4	2/1/2006	ENDRN		0.055	UGL		PTW_	UH54
LDS4	4/20/2006	ENDRN		0.0489	UGL		QDK_	UH54
LDS4	7/26/2006	ENDRN		0.07	UGL		QPK_	UH54
LDS4	11/8/2006	ENDRN		0.0507	UGL		RHN_	UH54
LDS4	1/18/2007	ENDRN	LT	0.0347	UGL		RPZ_	UH54
LDS4	4/25/2007	ENDRN		0.058	UGL		RZO_	UH54
LDS4	8/2/2007	ENDRN	LT	0.0347	UGL		SQE_	UH54
LDS4	11/14/2007	ENDRN		0.0557	UGL		TFN_	UH54
LDS4	1/28/2008	ENDRN	LT	0.0347	UGL		TNS_	UH54
LDS4	3/31/2008	ENDRN	LT	0.0347	UGL		TUL_	UH54
LDS4	7/16/2008	ENDRN		0.0673	UGL		UED_	UH56
LDS4	10/9/2008	ENDRN	LT	0.0344	UGL		UQB_	UH56
LDS4	1/6/2009	ENDRN	LT	0.0344	UGL		VAM_	UH56
LDS4	7/15/2009	ENDRN	LT	0.0344	UGL		VZK_	UH56
LDS4	10/7/2009	ENDRN		0.0522	UGL		WMH_	UH56
LDS4	1/12/2010	ENDRN		0.0706	UGL		WVD_	UH56
LDS4	4/12/2010	ENDRN		0.0393	UGL		XBM_	UH56
LDS4	7/14/2010	ENDRN	LT	0.0344	UGL		XQF_	UH56
LDS4	10/6/2010	ENDRN	LT	0.0344	UGL		YAT_	UH56

Table 2 - Historical Levels of Endrin in LDS4

site_id	samp_date	test_name	boolean	Data	uom	flag_code	lot_no	anal_meth_no
LDS4	1/12/2011	ENDRN	LT	0.0344	UGL		YKR_	UH56
LDS4	4/12/2011	ENDRN	LT	0.0344	UGL		YOA_	UH56
LDS4	6/27/2011	ENDRN		0.115	UGL		YXM_	UH57
LDS4	7/20/2011	ENDRN		0.0845	UGL		YZN_	UH57
LDS4	8/22/2011	ENDRN		0.0324	UGL		ZCP_	UH57
LDS4	9/21/2011	ENDRN		0.0287	UGL		ZEI_	UH57
LDS4	10/18/2011	ENDRN		0.0164	UGL		ZGB_	UH57
LDS4	1/23/2012	ENDRN		0.0282	UGL		ZKD_	UH57
LDS4	4/23/2012	ENDRN	LT	0.0104	UGL		ZQC_	UH57
LDS4	7/11/2012	ENDRN		0.0456	UGL		ZZE_	UH57
LDS4	10/10/2012	ENDRN		0.0743	UGL		AAJQ	UH57
LDS4	1/17/2013	ENDRN		0.0715	UGL		AANK	UH57
LDS4	4/17/2013	ENDRN		0.0554	UGL		AAUB	UH57
LDS4	7/22/2013	ENDRN		0.0966	UGL		ABFO	UH57
LDS4	10/21/2013	ENDRN		0.063	UGL		ABKV	UH57
LDS4	1/16/2014	ENDRN		0.0313	UGL		ABQE	UH57
LDS4	4/21/2014	ENDRN		0.0966	UGL		ABXY	UH57
LDS4	5/7/2014	ENDRN		0.0427	UGL		ACCL	UH57
LDS4	7/23/2014	ENDRN		0.0457	UGL		ACJC	UH57
LDS4	11/18/2014	ENDRN	LT	0.00399	UGL		ACQX	UH59
LDS4	1/19/2015	ENDRN		0.0212	UGL		ACUD	UH59
LDS4	4/21/2015	ENDRN		0.0721	UGL		ADAZ	UH59
LDS4	8/3/2015	ENDRN		0.0404	UGL		ADMQ	UH59
LDS4	10/26/2015	ENDRN		0.0314	UGL		ADRM	UH59
LDS4	1/20/2016	ENDRN		0.0539	UGL		ADVM	UH59
LDS4	4/20/2016	ENDRN		0.0524	UGL		AEEQ	UH59
LDS4	7/25/2016	ENDRN		0.0426	UGL		AENG	UH59
LDS4	**10/20/2016**	**ENDRN**		**0.157**	**UGL**		**AESH**	**UH59**
LDS4	**1/18/2017**	**ENDRN**		**0.184**	**UGL**		**AEXB**	**UH59**
LDS4	4/12/2017	ENDRN		0.084	UGL		AFEI	UH59
LDS4	7/12/2017	ENDRN		0.0825	UGL		AFQR	UH59
LDS4	**12/12/2017**	**ENDRN**		**0.0922**	**UGL**		AGAF	UH61
LDS4	2/8/2018	ENDRN		0.0128	UGL		AGCT	UH61
LDS4	5/15/2018	ENDRN		0.077	UGL		AGLZ	UH61
LDS4	7/23/2018	ENDRN	LT	0.00382	UGL		AGRI	UH61
LDS4	10/18/2018	ENDRN		0.0186	UGL		AGYX	UH61
LDS4	10/12/2021	ENDRN		0.042	UGL		AJXX	UH63
LDS4	**3/11/2024**	**ENDRN**		**0.102**	**UGL**		**AMPY**	**UH65**

Table 3 - Historical Levels of Endrin Aldehyde in LCS4

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LCS4	10/12/2000	ENDRNA	LT	0.062	UGL		IIX_	UH50
LCS4	1/10/2001	ENDRNA	LT	0.062	UGL		INQ_	UH50
LCS4	4/18/2001	ENDRNA	LT	0.062	UGL		IVW_	UH50
LCS4	7/10/2001	ENDRNA	LT	0.062	UGL		JED_	UH50
LCS4	11/6/2001	ENDRNA	LT	0.062	UGL		JTD_	UH50
LCS4	1/10/2002	ENDRNA	LT	0.076	UGL		JWS_	UH51
LCS4	4/23/2002	ENDRNA	LT	0.076	UGL		KFV_	UH51
LCS4	7/18/2002	ENDRNA	LT	0.076	UGL		KPC_	UH51
LCS4	10/21/2002	ENDRNA	LT	0.076	UGL		LDY_	UH51
LCS4	1/15/2003	ENDRNA	LT	0.076	UGL		LOJ_	UH51
LCS4	4/16/2003	ENDRNA	LT	0.076	UGL		LYZ_	UH51
LCS4	7/15/2003	ENDRNA	LT	0.076	UGL		MKA_	UH51
LCS4	10/28/2003	ENDRNA	LT	0.076	UGL		MTV_	UH51
LCS4	1/21/2004	ENDRNA	LT	0.076	UGL		NBD_	UH51
LCS4	4/14/2004	ENDRNA	LT	0.076	UGL		NHV_	UH51
LCS4	7/13/2004	ENDRNA	LT	0.076	UGL		NRD_	UH51
LCS4	10/26/2004	ENDRNA	LT	0.076	UGL		OHS_	UH51
LCS4	1/18/2005	ENDRNA	LT	0.076	UGL		OMS_	UH51
LCS4	4/20/2005	ENDRNA	LT	0.0179	UGL		OSN_	UH54
LCS4	7/21/2005	ENDRNA	LT	0.0179	UGL		PDF_	UH54
LCS4	10/26/2005	ENDRNA	LT	0.0179	UGL		POG_	UH54
LCS4	2/1/2006	ENDRNA		0.0335	UGL		PTW_	UH54
LCS4	4/20/2006	ENDRNA	LT	0.0179	UGL		QDK_	UH54
LCS4	7/26/2006	ENDRNA		0.0327	UGL		QPK_	UH54
LCS4	11/8/2006	ENDRNA		0.0641	UGL		RHN_	UH54
LCS4	1/18/2007	ENDRNA	LT	0.0179	UGL		RPZ_	UH54
LCS4	4/25/2007	ENDRNA	LT	0.0179	UGL		RZO_	UH54
LCS4	8/2/2007	ENDRNA		0.0428	UGL		SQE_	UH54
LCS4	11/14/2007	ENDRNA		0.108	UGL		TFN_	UH54
LCS4	1/28/2008	ENDRNA		0.0995	UGL		TNS_	UH54
LCS4	3/31/2008	ENDRNA	LT	0.0179	UGL		TUL_	UH54
LCS4	7/16/2008	ENDRNA	LT	0.048	UGL		UED_	UH56
LCS4	10/9/2008	ENDRNA	LT	0.048	UGL		UQB_	UH56
LCS4	1/6/2009	ENDRNA	LT	0.048	UGL		VAM_	UH56
LCS4	5/6/2009	ENDRNA		0.284	UGL		VNI_	UH56
LCS4	7/15/2009	ENDRNA	LT	0.048	UGL		VZK_	UH56
LCS4	10/7/2009	ENDRNA		0.266	UGL		WMH_	UH56
LCS4	1/12/2010	ENDRNA	LT	0.048	UGL		WVD_	UH56
LCS4	4/12/2010	ENDRNA	LT	0.048	UGL		XBM_	UH56
LCS4	7/14/2010	ENDRNA	LT	0.048	UGL		XQF_	UH56
LCS4	10/6/2010	ENDRNA		0.422	UGL		YAT_	UH56
LCS4	1/12/2011	ENDRNA		0.271	UGL		YKR_	UH56
LCS4	4/12/2011	ENDRNA	LT	0.048	UGL		YOA_	UH56
LCS4	7/20/2011	ENDRNA		0.147	UGL		YZN_	UH57
LCS4	10/18/2011	ENDRNA		0.22	UGL		ZGB_	UH57
LCS4	1/23/2012	ENDRNA		0.205	UGL		ZKD_	UH57
LCS4	4/23/2012	ENDRNA	LT	0.0342	UGL		ZQC_	UH57

Table 3 - Historical Levels of Endrin Aldehyde in LCS4

LCS4	7/11/2012	ENDRNA		0.395	UGL	ZZE_	UH57
LCS4	10/10/2012	ENDRNA		0.25	UGL	AAJQ	UH57
LCS4	1/17/2013	ENDRNA		0.189	UGL	AANJ	UH57
LCS4	4/17/2013	ENDRNA		0.169	UGL	AAUB	UH57
LCS4	7/22/2013	ENDRNA		0.205	UGL	ABFO	UH57
LCS4	10/21/2013	ENDRNA		0.19	UGL	ABKV	UH57
LCS4	1/16/2014	ENDRNA		0.329	UGL	ABQE	UH57
LCS4	5/7/2014	ENDRNA		0.207	UGL	ACCL	UH57
LCS4	7/23/2014	ENDRNA	LT	0.0342	UGL	ACJC	UH57
LCS4	11/18/2014	ENDRNA		0.464	UGL	ACQX	UH59
LCS4	1/19/2015	ENDRNA		0.192	UGL	ACUD	UH59
LCS4	4/21/2015	ENDRNA		0.333	UGL	ADAZ	UH59
LCS4	8/3/2015	ENDRNA		0.478	UGL	ADMQ	UH59
LCS4	10/26/2015	ENDRNA		0.297	UGL	ADRM	UH59
LCS4	1/20/2016	ENDRNA		0.397	UGL	ADVM	UH59
LCS4	4/20/2016	ENDRNA		0.32	UGL	AEEQ	UH59
LCS4	7/25/2016	ENDRNA		0.431	UGL	AENG	UH59
LCS4	10/20/2016	ENDRNA		0.359	UGL	AESH	UH59
LCS4	1/18/2017	ENDRNA		0.397	UGL	AEXB	UH59
LCS4	4/12/2017	ENDRNA		0.274	UGL	AFEI	UH59
LCS4	7/12/2017	ENDRNA		0.468	UGL	AFQR	UH59
LCS4	12/12/2017	ENDRNA		0.331	UGL	AGAF	UH61
LCS4	2/8/2018	ENDRNA		0.0558	UGL	AGCT	UH61
LCS4	5/15/2018	ENDRNA		0.349	UGL	AGLZ	UH61
LCS4	7/23/2018	ENDRNA		0.281	UGL	AGRI	UH61
LCS4	10/18/2018	ENDRNA		0.325	UGL	AGYX	UH61
LCS4	1/15/2019	ENDRNA		0.335	UGL	AHDJ	UH61
LCS4	4/9/2019	ENDRNA	LT	0.0104	UGL	AHHA	UH61
LCS4	10/1/2019	ENDRNA		0.158	UGL	AHZS	UH61
LCS4	7/13/2020	ENDRNA		0.254	UGL	AIRD	UH61
LCS4	5/11/2021	ENDRNA	LT	0.00329	UGL	AJKH	UH63
LCS4	2/16/2022	ENDRNA		0.261	UGL	AKGC	UH63
LCS4	2/21/2023	ENDRNA	LT	0.00329	UGL	ALLK	UH63
LCS4	7/2/2024	ENDRNA		0.380	UGL	ANDQ	UH65

Table 4 - Historical Levels of Endrin Aldehyde in LDS4

site_id	samp_date	test_name	boolean	Data	uom	flag_code	lot_no	anal_meth_no
LDS4	1/10/2001	ENDRNA	LT	0.062	UGL		INQ_	UH50
LDS4	4/18/2001	ENDRNA	LT	0.062	UGL		IVW_	UH50
LDS4	7/10/2001	ENDRNA	LT	0.062	UGL		JED_	UH50
LDS4	11/6/2001	ENDRNA	LT	0.062	UGL		JTD_	UH50
LDS4	1/10/2002	ENDRNA	LT	0.076	UGL		JWS_	UH51
LDS4	4/30/2002	ENDRNA	LT	0.076	UGL		KGG_	UH51
LDS4	6/18/2002	ENDRNA	LT	0.076	UGL		KKB_	UH51
LDS4	7/18/2002	ENDRNA	LT	0.076	UGL		KPC_	UH51
LDS4	8/27/2002	ENDRNA	LT	0.076	UGL		KWA_	UH51
LDS4	9/18/2002	ENDRNA	LT	0.076	UGL		KZU_	UH51
LDS4	10/21/2002	ENDRNA	LT	0.076	UGL		LDY_	UH51
LDS4	11/19/2002	ENDRNA	LT	0.076	UGL		LHU_	UH51
LDS4	12/18/2002	ENDRNA	LT	0.076	UGL		LKW_	UH51
LDS4	1/15/2003	ENDRNA	LT	0.076	UGL		LOJ_	UH51
LDS4	2/19/2003	ENDRNA	LT	0.076	UGL		LRL_	UH51
LDS4	3/26/2003	ENDRNA	LT	0.076	UGL		LVE_	UH51
LDS4	4/16/2003	ENDRNA	LT	0.076	UGL		LYZ_	UH51
LDS4	7/15/2003	ENDRNA	LT	0.076	UGL		MKA_	UH51
LDS4	10/28/2003	ENDRNA	LT	0.076	UGL		MTV_	UH51
LDS4	1/21/2004	ENDRNA	LT	0.076	UGL		NBD_	UH51
LDS4	4/14/2004	ENDRNA	LT	0.076	UGL		NHV_	UH51
LDS4	7/13/2004	ENDRNA	LT	0.076	UGL		NRD_	UH51
LDS4	10/26/2004	ENDRNA	LT	0.076	UGL		OHS_	UH51
LDS4	1/18/2005	ENDRNA	LT	0.076	UGL		OMS_	UH51
LDS4	4/20/2005	ENDRNA	LT	0.0179	UGL		OSN_	UH54
LDS4	7/21/2005	ENDRNA		0.0595	UGL		PDF_	UH54
LDS4	10/26/2005	ENDRNA	LT	0.0179	UGL		POG_	UH54
LDS4	2/1/2006	ENDRNA	LT	0.0179	UGL		PTW_	UH54
LDS4	4/20/2006	ENDRNA	LT	0.0179	UGL		QDK_	UH54
LDS4	7/26/2006	ENDRNA	LT	0.0179	UGL		QPK_	UH54
LDS4	11/8/2006	ENDRNA	LT	0.0179	UGL		RHN_	UH54
LDS4	1/18/2007	ENDRNA	LT	0.0179	UGL		RPZ_	UH54
LDS4	4/25/2007	ENDRNA		0.0344	UGL		RZO_	UH54
LDS4	8/2/2007	ENDRNA	LT	0.0179	UGL		SQE_	UH54
LDS4	11/14/2007	ENDRNA	LT	0.0179	UGL		TFN_	UH54
LDS4	1/28/2008	ENDRNA	LT	0.0179	UGL		TNS_	UH54
LDS4	3/31/2008	ENDRNA	LT	0.0179	UGL		TUL_	UH54
LDS4	7/16/2008	ENDRNA	LT	0.048	UGL		UED_	UH56
LDS4	10/9/2008	ENDRNA	LT	0.048	UGL		UQB_	UH56
LDS4	1/6/2009	ENDRNA	LT	0.048	UGL		VAM_	UH56
LDS4	7/15/2009	ENDRNA	LT	0.048	UGL		VZK_	UH56
LDS4	10/7/2009	ENDRNA	LT	0.048	UGL		WMH_	UH56
LDS4	1/12/2010	ENDRNA	LT	0.048	UGL		WVD_	UH56
LDS4	4/12/2010	ENDRNA	LT	0.048	UGL		XBM_	UH56
LDS4	7/14/2010	ENDRNA	LT	0.048	UGL		XQF_	UH56
LDS4	10/6/2010	ENDRNA	LT	0.048	UGL		YAT_	UH56

Table 4 - Historical Levels of Endrin Aldehyde in LDS4

site_id	samp_date	test_name	boolean	Data	uom	flag_code	lot_no	anal_meth_no
LDS4	1/12/2011	ENDRNA	LT	0.048	UGL		YKR_	UH56
LDS4	4/12/2011	ENDRNA	LT	0.048	UGL		YOA_	UH56
LDS4	6/27/2011	ENDRNA		0.065	UGL		YXM_	UH57
LDS4	7/20/2011	ENDRNA	LT	0.0342	UGL		YZN_	UH57
LDS4	8/22/2011	ENDRNA	LT	0.0342	UGL		ZCP_	UH57
LDS4	9/21/2011	ENDRNA	LT	0.0342	UGL		ZEI_	UH57
LDS4	10/18/2011	ENDRNA	LT	0.0342	UGL		ZGB_	UH57
LDS4	1/23/2012	ENDRNA	LT	0.0342	UGL		ZKD_	UH57
LDS4	4/23/2012	ENDRNA	LT	0.0342	UGL		ZQC_	UH57
LDS4	7/11/2012	ENDRNA	LT	0.0342	UGL		ZZE_	UH57
LDS4	10/10/2012	ENDRNA		0.0314	UGL		AAJQ	UH57
LDS4	1/17/2013	ENDRNA	LT	0.0342	UGL		AANK	UH57
LDS4	4/17/2013	ENDRNA	LT	0.0342	UGL		AAUB	UH57
LDS4	7/22/2013	ENDRNA		0.0357	UGL		ABFO	UH57
LDS4	10/21/2013	ENDRNA		0.0303	UGL		ABKV	UH57
LDS4	1/16/2014	ENDRNA	LT	0.0342	UGL		ABQE	UH57
LDS4	4/21/2014	ENDRNA	LT	0.0342	UGL		ABXY	UH57
LDS4	5/7/2014	ENDRNA	LT	0.0342	UGL		ACCL	UH57
LDS4	7/23/2014	ENDRNA	LT	0.0342	UGL		ACJC	UH57
LDS4	11/18/2014	ENDRNA	LT	0.0275	UGL		ACQX	UH59
LDS4	1/19/2015	ENDRNA	LT	0.0275	UGL		ACUD	UH59
LDS4	4/21/2015	ENDRNA	LT	0.0275	UGL		ADAZ	UH59
LDS4	8/3/2015	ENDRNA		0.0878	UGL		ADMQ	UH59
LDS4	10/26/2015	ENDRNA	LT	0.0275	UGL		ADRM	UH59
LDS4	1/20/2016	ENDRNA	LT	0.0275	UGL		ADVM	UH59
LDS4	4/20/2016	ENDRNA	LT	0.0275	UGL		AEEQ	UH59
LDS4	7/25/2016	ENDRNA	LT	0.0275	UGL		AENG	UH59
LDS4	10/20/2016	ENDRNA	LT	0.0275	UGL		AESH	UH59
LDS4	1/18/2017	ENDRNA	LT	0.0275	UGL		AEXB	UH59
LDS4	4/12/2017	ENDRNA		0.0497	UGL		AFEI	UH59
LDS4	7/12/2017	ENDRNA		0.0706	UGL		AFQR	UH59
LDS4	12/12/2017	ENDRNA	LT	0.0104	UGL		AGAF	UH61
LDS4	2/8/2018	ENDRNA	LT	0.0104	UGL		AGCT	UH61
LDS4	5/15/2018	ENDRNA	LT	0.0104	UGL		AGLZ	UH61
LDS4	7/23/2018	ENDRNA	LT	0.0104	UGL		AGRI	UH61
LDS4	10/18/2018	ENDRNA	LT	0.0104	UGL		AGYX	UH61
LDS4	10/12/2021	ENDRNA	LT	0.00329	UGL		AJXX	UH63
LDS4	**3/11/2024**	**ENDRNA**		**0.103**	**UGL**		**AMPY**	**UH65**

Table 5 - Historical Levels of Endrin Ketone in LCS4

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LCS4	10/12/2000	ENDRNK	LT	0.022	UGL		IIX_	UH50
LCS4	1/10/2001	ENDRNK	LT	0.022	UGL		INQ_	UH50
LCS4	4/18/2001	ENDRNK	LT	0.022	UGL		IVW_	UH50
LCS4	7/10/2001	ENDRNK	LT	0.022	UGL		JED_	UH50
LCS4	11/6/2001	ENDRNK	LT	0.022	UGL		JTD_	UH50
LCS4	1/10/2002	ENDRNK	LT	0.016	UGL		JWS_	UH51
LCS4	4/23/2002	ENDRNK	LT	0.016	UGL		KFV_	UH51
LCS4	7/18/2002	ENDRNK	LT	0.016	UGL		KPC_	UH51
LCS4	10/21/2002	ENDRNK	LT	0.016	UGL		LDY_	UH51
LCS4	1/15/2003	ENDRNK	LT	0.016	UGL		LOJ_	UH51
LCS4	4/16/2003	ENDRNK		0.0217	UGL		LYZ_	UH51
LCS4	7/15/2003	ENDRNK	LT	0.016	UGL		MKA_	UH51
LCS4	10/28/2003	ENDRNK	LT	0.016	UGL		MTV_	UH51
LCS4	1/21/2004	ENDRNK	LT	0.016	UGL		NBD_	UH51
LCS4	4/14/2004	ENDRNK	LT	0.016	UGL		NHV_	UH51
LCS4	7/13/2004	ENDRNK	LT	0.016	UGL		NRD_	UH51
LCS4	10/26/2004	ENDRNK		0.199	UGL		OHS_	UH51
LCS4	1/18/2005	ENDRNK		0.061	UGL		OMS_	UH51
LCS4	4/20/2005	ENDRNK	LT	0.0345	UGL		OSN_	UH54
LCS4	7/21/2005	ENDRNK		0.0503	UGL		PDF_	UH54
LCS4	10/26/2005	ENDRNK		0.0494	UGL		POG_	UH54
LCS4	2/1/2006	ENDRNK		0.0671	UGL		PTW_	UH54
LCS4	4/20/2006	ENDRNK		0.0807	UGL		QDK_	UH54
LCS4	7/26/2006	ENDRNK		0.0367	UGL		QPK_	UH54
LCS4	11/8/2006	ENDRNK		0.0698	UGL		RHN_	UH54
LCS4	1/18/2007	ENDRNK		0.062	UGL		RPZ_	UH54
LCS4	4/25/2007	ENDRNK		0.0665	UGL		RZO_	UH54
LCS4	8/2/2007	ENDRNK	LT	0.0345	UGL		SQE_	UH54
LCS4	11/14/2007	ENDRNK		0.0592	UGL		TFN_	UH54
LCS4	1/28/2008	ENDRNK		0.265	UGL		TNS_	UH54
LCS4	3/31/2008	ENDRNK		0.0351	UGL		TUL_	UH54
LCS4	7/16/2008	ENDRNK		0.0569	UGL		UED_	UH56
LCS4	10/9/2008	ENDRNK		0.0814	UGL		UQB_	UH56
LCS4	1/6/2009	ENDRNK		0.0651	UGL		VAM_	UH56
LCS4	5/6/2009	ENDRNK		0.0414	UGL		VNI_	UH56
LCS4	7/15/2009	ENDRNK	LT	0.0297	UGL		VZK_	UH56
LCS4	10/7/2009	ENDRNK		0.0844	UGL		WMH_	UH56
LCS4	1/12/2010	ENDRNK		0.087	UGL		WVD_	UH56
LCS4	4/12/2010	ENDRNK		0.0654	UGL		XBM_	UH56
LCS4	7/14/2010	ENDRNK		0.0813	UGL		XQF_	UH56
LCS4	10/6/2010	ENDRNK		0.132	UGL		YAT_	UH56
LCS4	1/12/2011	ENDRNK		0.101	UGL		YKR_	UH56
LCS4	4/12/2011	ENDRNK		0.0718	UGL		YOA_	UH56
LCS4	7/20/2011	ENDRNK		0.0347	UGL		YZN_	UH57
LCS4	10/18/2011	ENDRNK		0.041	UGL		ZGB_	UH57
LCS4	1/23/2012	ENDRNK		0.0231	UGL		ZKD_	UH57
site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no

Table 5 - Historical Levels of Endrin Ketone in LCS4

LCS4	4/23/2012	ENDRNK		0.0152	UGL	ZQC_	UH57
LCS4	7/11/2012	ENDRNK		0.054	UGL	ZZE_	UH57
LCS4	10/10/2012	ENDRNK		0.0275	UGL	AAJQ	UH57
LCS4	1/17/2013	ENDRNK		0.0199	UGL	AANJ	UH57
LCS4	4/17/2013	ENDRNK		0.0183	UGL	AAUB	UH57
LCS4	7/22/2013	ENDRNK		0.023	UGL	ABFO	UH57
LCS4	10/21/2013	ENDRNK		0.0375	UGL	ABKV	UH57
LCS4	1/16/2014	ENDRNK		0.0373	UGL	ABQE	UH57
LCS4	4/21/2014	ENDRNK	LT	0.011	UGL	ABXY	UH57
LCS4	5/7/2014	ENDRNK	LT	0.011	UGL	ACCL	UH57
LCS4	7/23/2014	ENDRNK		0.0116	UGL	ACJC	UH57
LCS4	11/18/2014	ENDRNK	LT	0.0025	UGL	ACQX	UH59
LCS4	1/19/2015	ENDRNK	LT	0.0025	UGL	ACUD	UH59
LCS4	4/21/2015	ENDRNK	LT	0.0025	UGL	ADAZ	UH59
LCS4	8/3/2015	ENDRNK		0.0652	UGL	ADMQ	UH59
LCS4	10/26/2015	ENDRNK	LT	0.0025	UGL	ADRM	UH59
LCS4	1/20/2016	ENDRNK	LT	0.0025	UGL	ADVM	UH59
LCS4	4/20/2016	ENDRNK		0.0764	UGL	AEEQ	UH59
LCS4	7/25/2016	ENDRNK	LT	0.0025	UGL	AENG	UH59
LCS4	10/20/2016	ENDRNK	LT	0.0025	UGL	AESH	UH59
LCS4	1/18/2017	ENDRNK	LT	0.0025	UGL	AEXB	UH59
LCS4	4/12/2017	ENDRNK	LT	0.0025	UGL	AFEI	UH59
LCS4	7/12/2017	ENDRNK	LT	0.0025	UGL	AFQR	UH59
LCS4	12/12/2017	ENDRNK	LT	0.00901	UGL	AGAF	UH61
LCS4	2/8/2018	ENDRNK	LT	0.00901	UGL	AGCT	UH61
LCS4	5/15/2018	ENDRNK	LT	0.00901	UGL	AGLZ	UH61
LCS4	7/23/2018	ENDRNK	LT	0.00901	UGL	AGRI	UH61
LCS4	10/18/2018	ENDRNK		0.044	UGL	AGYX	UH61
LCS4	1/15/2019	ENDRNK	LT	0.00901	UGL	AHDJ	UH61
LCS4	4/9/2019	ENDRNK	LT	0.00901	UGL	AHHA	UH61
LCS4	10/1/2019	ENDRNK	LT	0.00901	UGL	AHZS	UH61
LCS4	7/13/2020	ENDRNK	LT	0.00901	UGL	AIRD	UH61
LCS4	5/11/2021	ENDRNK		0.0377	UGL	AJKH	UH63
LCS4	2/16/2022	ENDRNK	LT	0.00632	UGL	AKGC	UH63
LCS4	2/21/2023	ENDRNK	LT	0.00632	UGL	ALLK	UH63
LCS4	7/2/2024	ENDRNK	LT	0.004	UGL	ANDQ	UH65

Table 6 - Historical Levels of Endrin Ketone in LDS4

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LDS4	1/10/2001	ENDRNK	LT	0.022	UGL		INQ_	UH50
LDS4	4/18/2001	ENDRNK	LT	0.022	UGL		IVW_	UH50
LDS4	7/10/2001	ENDRNK	LT	0.022	UGL		JED_	UH50
LDS4	11/6/2001	ENDRNK	LT	0.022	UGL		JTD_	UH50
LDS4	1/10/2002	ENDRNK	LT	0.016	UGL		JWS_	UH51
LDS4	4/30/2002	ENDRNK	LT	0.016	UGL		KGG_	UH51
LDS4	6/18/2002	ENDRNK	LT	0.016	UGL		KKB_	UH51
LDS4	7/18/2002	ENDRNK	LT	0.016	UGL		KPC_	UH51
LDS4	8/27/2002	ENDRNK	LT	0.016	UGL		KWA_	UH51
LDS4	9/18/2002	ENDRNK	LT	0.016	UGL		KZU_	UH51
LDS4	10/21/2002	ENDRNK	LT	0.016	UGL		LDY_	UH51
LDS4	11/19/2002	ENDRNK	LT	0.016	UGL		LHU_	UH51
LDS4	12/18/2002	ENDRNK	LT	0.016	UGL		LKW_	UH51
LDS4	1/15/2003	ENDRNK	LT	0.016	UGL		LOJ_	UH51
LDS4	2/19/2003	ENDRNK	LT	0.016	UGL		LRL_	UH51
LDS4	3/26/2003	ENDRNK	LT	0.016	UGL		LVE_	UH51
LDS4	4/16/2003	ENDRNK	LT	0.016	UGL		LYZ_	UH51
LDS4	7/15/2003	ENDRNK	LT	0.016	UGL		MKA_	UH51
LDS4	10/28/2003	ENDRNK	LT	0.016	UGL		MTV_	UH51
LDS4	1/21/2004	ENDRNK	LT	0.016	UGL		NBD_	UH51
LDS4	4/14/2004	ENDRNK	LT	0.016	UGL		NHV_	UH51
LDS4	7/13/2004	ENDRNK	LT	0.016	UGL		NRD_	UH51
LDS4	10/26/2004	ENDRNK	LT	0.016	UGL		OHS_	UH51
LDS4	1/18/2005	ENDRNK		0.0599	UGL		OMS_	UH51
LDS4	4/20/2005	ENDRNK	LT	0.0345	UGL		OSN_	UH54
LDS4	7/21/2005	ENDRNK		0.054	UGL		PDF_	UH54
LDS4	10/26/2005	ENDRNK	LT	0.0345	UGL		POG_	UH54
LDS4	2/1/2006	ENDRNK	LT	0.0345	UGL		PTW_	UH54
LDS4	4/20/2006	ENDRNK	LT	0.0345	UGL		QDK_	UH54
LDS4	7/26/2006	ENDRNK	LT	0.0345	UGL		QPK_	UH54
LDS4	11/8/2006	ENDRNK	LT	0.0345	UGL		RHN_	UH54
LDS4	1/18/2007	ENDRNK	LT	0.0345	UGL		RPZ_	UH54
LDS4	4/25/2007	ENDRNK	LT	0.0345	UGL		RZO_	UH54
LDS4	8/2/2007	ENDRNK	LT	0.0345	UGL		SQE_	UH54
LDS4	11/14/2007	ENDRNK	LT	0.0345	UGL		TFN_	UH54
LDS4	1/28/2008	ENDRNK	LT	0.0345	UGL		TNS_	UH54
LDS4	3/31/2008	ENDRNK	LT	0.0345	UGL		TUL_	UH54
LDS4	7/16/2008	ENDRNK	LT	0.0297	UGL		UED_	UH56
LDS4	10/9/2008	ENDRNK	LT	0.0297	UGL		UQB_	UH56
LDS4	1/6/2009	ENDRNK	LT	0.0297	UGL		VAM_	UH56
LDS4	7/15/2009	ENDRNK	LT	0.0297	UGL		VZK_	UH56
LDS4	10/7/2009	ENDRNK	LT	0.0297	UGL		WMH_	UH56
LDS4	1/12/2010	ENDRNK	LT	0.0297	UGL		WVD_	UH56
LDS4	4/12/2010	ENDRNK	LT	0.0297	UGL		XBM_	UH56
LDS4	7/14/2010	ENDRNK		0.039	UGL		XQF_	UH56
LDS4	10/6/2010	ENDRNK	LT	0.0297	UGL		YAT_	UH56

Table 6 - Historical Levels of Endrin Ketone in LDS4

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LDS4	1/12/2011	ENDRNK	LT	0.0297	UGL		YKR_	UH56
LDS4	4/12/2011	ENDRNK	LT	0.0297	UGL		YOA_	UH56
LDS4	6/27/2011	ENDRNK	LT	0.011	UGL		YXM_	UH57
LDS4	7/20/2011	ENDRNK	LT	0.011	UGL		YZN_	UH57
LDS4	8/22/2011	ENDRNK	LT	0.011	UGL		ZCP_	UH57
LDS4	9/21/2011	ENDRNK		0.0207	UGL		ZEI_	UH57
LDS4	10/18/2011	ENDRNK	LT	0.011	UGL		ZGB_	UH57
LDS4	1/23/2012	ENDRNK	LT	0.011	UGL		ZKD_	UH57
LDS4	4/23/2012	ENDRNK	LT	0.011	UGL		ZQC_	UH57
LDS4	7/11/2012	ENDRNK	LT	0.011	UGL		ZZE_	UH57
LDS4	10/10/2012	ENDRNK		0.0153	UGL		AAJQ	UH57
LDS4	1/17/2013	ENDRNK	LT	0.011	UGL		AANK	UH57
LDS4	4/17/2013	ENDRNK	LT	0.011	UGL		AAUB	UH57
LDS4	7/22/2013	ENDRNK	LT	0.011	UGL		ABFO	UH57
LDS4	10/21/2013	ENDRNK	LT	0.011	UGL		ABKV	UH57
LDS4	1/16/2014	ENDRNK	LT	0.011	UGL		ABQE	UH57
LDS4	4/21/2014	ENDRNK		0.0363	UGL		ABXY	UH57
LDS4	5/7/2014	ENDRNK	LT	0.011	UGL		ACCL	UH57
LDS4	7/23/2014	ENDRNK	LT	0.011	UGL		ACJC	UH57
LDS4	11/18/2014	ENDRNK	LT	0.0025	UGL		ACQX	UH59
LDS4	1/19/2015	ENDRNK		0.00818	UGL		ACUD	UH59
LDS4	4/21/2015	ENDRNK	LT	0.0025	UGL		ADAZ	UH59
LDS4	8/3/2015	ENDRNK		0.0397	UGL		ADMQ	UH59
LDS4	10/26/2015	ENDRNK		0.013	UGL		ADRM	UH59
LDS4	1/20/2016	ENDRNK	LT	0.0025	UGL		ADVM	UH59
LDS4	4/20/2016	ENDRNK	LT	0.0025	UGL		AEEQ	UH59
LDS4	7/25/2016	ENDRNK	LT	0.0025	UGL		AENG	UH59
LDS4	10/20/2016	ENDRNK	LT	0.0025	UGL		AESH	UH59
LDS4	1/18/2017	ENDRNK	LT	0.0025	UGL		AEXB	UH59
LDS4	4/12/2017	ENDRNK		0.00855	UGL		AFEI	UH59
LDS4	7/12/2017	ENDRNK	LT	0.0025	UGL		AFQR	UH59
LDS4	12/12/2017	ENDRNK	LT	0.00901	UGL		AGAF	UH61
LDS4	2/8/2018	ENDRNK	LT	0.00901	UGL		AGCT	UH61
LDS4	5/15/2018	ENDRNK	LT	0.00901	UGL		AGLZ	UH61
LDS4	7/23/2018	ENDRNK	LT	0.00901	UGL		AGRI	UH61
LDS4	10/18/2018	ENDRNK	LT	0.00901	UGL		AGYX	UH61
LDS4	10/12/2021	ENDRNK	LT	0.00632	UGL		AJXX	UH63
LDS4	**3/11/2024**	**ENDRNK**		**0.078**	**UGL**		**AMPY**	**UH65**

Table 7 - Historical Levels of Heptachlor in LCS4

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LCS4	10/12/2000	HPCL	LT	0.03	UGL		IIX_	UH50
LCS4	1/10/2001	HPCL	LT	0.03	UGL		INQ_	UH50
LCS4	4/18/2001	HPCL	LT	0.03	UGL		IVW_	UH50
LCS4	7/10/2001	HPCL	LT	0.03	UGL		JED_	UH50
LCS4	11/6/2001	HPCL	LT	0.03	UGL		JTD_	UH50
LCS4	1/10/2002	HPCL	LT	0.023	UGL		JWS_	UH51
LCS4	4/23/2002	HPCL	LT	0.023	UGL		KFV_	UH51
LCS4	7/18/2002	HPCL	LT	0.023	UGL		KPC_	UH51
LCS4	10/21/2002	HPCL	LT	0.023	UGL		LDY_	UH51
LCS4	1/15/2003	HPCL	LT	0.023	UGL		LOJ_	UH51
LCS4	4/16/2003	HPCL	LT	0.023	UGL		LYZ_	UH51
LCS4	7/15/2003	HPCL	LT	0.023	UGL		MKA_	UH51
LCS4	10/28/2003	HPCL		0.0522	UGL		MTV_	UH51
LCS4	1/21/2004	HPCL	LT	0.023	UGL		NBD_	UH51
LCS4	4/14/2004	HPCL	LT	0.023	UGL		NHV_	UH51
LCS4	7/13/2004	HPCL	LT	0.023	UGL		NRD_	UH51
LCS4	10/26/2004	HPCL		0.0655	UGL		OHS_	UH51
LCS4	1/18/2005	HPCL	LT	0.023	UGL		OMS_	UH51
LCS4	4/20/2005	HPCL	LT	0.0106	UGL		OSN_	UH54
LCS4	7/21/2005	HPCL		0.0332	UGL		PDF_	UH54
LCS4	10/26/2005	HPCL		0.0212	UGL		POG_	UH54
LCS4	2/1/2006	HPCL		0.0171	UGL		PTW_	UH54
LCS4	4/20/2006	HPCL		0.016	UGL		QDK_	UH54
LCS4	7/26/2006	HPCL	LT	0.0106	UGL		QPK_	UH54
LCS4	11/8/2006	HPCL		0.0239	UGL		RHN_	UH54
LCS4	1/18/2007	HPCL	LT	0.0106	UGL		RPZ_	UH54
LCS4	4/25/2007	HPCL	LT	0.0106	UGL		RZO_	UH54
LCS4	8/2/2007	HPCL		0.0307	UGL		SQE_	UH54
LCS4	11/14/2007	HPCL	LT	0.0106	UGL		TFN_	UH54
LCS4	1/28/2008	HPCL	LT	0.0106	UGL		TNS_	UH54
LCS4	3/31/2008	HPCL		0.0338	UGL		TUL_	UH54
LCS4	7/16/2008	HPCL		0.051	UGL		UED_	UH56
LCS4	10/9/2008	HPCL		0.0403	UGL		UQB_	UH56
LCS4	1/6/2009	HPCL	LT	0.025	UGL		VAM_	UH56
LCS4	5/6/2009	HPCL		0.155	UGL		VNI_	UH56
LCS4	7/15/2009	HPCL	LT	0.025	UGL		VZK_	UH56
LCS4	10/7/2009	HPCL		0.0823	UGL		WMH_	UH56
LCS4	1/12/2010	HPCL		0.0938	UGL		WVD_	UH56
LCS4	4/12/2010	HPCL		0.0596	UGL		XBM_	UH56
LCS4	7/14/2010	HPCL		0.0771	UGL		XQF_	UH56
LCS4	10/6/2010	HPCL		0.0682	UGL		YAT_	UH56
LCS4	1/12/2011	HPCL		0.0809	UGL		YKR_	UH56
LCS4	4/12/2011	HPCL		0.0721	UGL		YOA_	UH56
LCS4	7/20/2011	HPCL	LT	0.009	UGL		YZN_	UH57
LCS4	10/18/2011	HPCL	LT	0.009	UGL		ZGB_	UH57
LCS4	1/23/2012	HPCL	LT	0.009	UGL		ZKD_	UH57
site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no

Table 7 - Historical Levels of Heptachlor in LCS4

LCS4	4/23/2012	HPCL		0.0101	UGL	ZQC_	UH57
LCS4	7/11/2012	HPCL	LT	0.009	UGL	ZZE_	UH57
LCS4	10/10/2012	HPCL		0.0229	UGL	AAJQ	UH57
LCS4	1/17/2013	HPCL	LT	0.0099	UGL	AANJ	UH57
LCS4	4/17/2013	HPCL	LT	0.009	UGL	AAUB	UH57
LCS4	7/22/2013	HPCL		0.024	UGL	ABFO	UH57
LCS4	10/21/2013	HPCL		0.0193	UGL	ABKV	UH57
LCS4	1/16/2014	HPCL	LT	0.009	UGL	ABQE	UH57
LCS4	4/21/2014	HPCL	LT	0.009	UGL	ABXY	UH57
LCS4	5/7/2014	HPCL	LT	0.009	UGL	ACCL	UH57
LCS4	7/23/2014	HPCL	LT	0.009	UGL	ACJC	UH57
LCS4	11/18/2014	HPCL	LT	0.005	UGL	ACQX	UH59
LCS4	1/19/2015	HPCL	LT	0.005	UGL	ACUD	UH59
LCS4	4/21/2015	HPCL		0.117	UGL	ADAZ	UH59
LCS4	8/3/2015	HPCL		0.0798	UGL	ADMQ	UH59
LCS4	10/26/2015	HPCL		0.0301	UGL	ADRM	UH59
LCS4	1/20/2016	HPCL	LT	0.005	UGL	ADVM	UH59
LCS4	4/20/2016	HPCL		0.11	UGL	AEEQ	UH59
LCS4	7/25/2016	HPCL		0.132	UGL	AENG	UH59
LCS4	10/20/2016	HPCL	LT	0.005	UGL	AESH	UH59
LCS4	1/18/2017	HPCL		0.147	UGL	AEXB	UH59
LCS4	4/12/2017	HPCL	LT	0.005	UGL	AFEI	UH59
LCS4	7/12/2017	HPCL	LT	0.005	UGL	AFQR	UH59
LCS4	12/12/2017	HPCL		0.195	UGL	AGAF	UH61
LCS4	2/8/2018	HPCL		0.0303	UGL	AGCT	UH61
LCS4	5/15/2018	HPCL	LT	0.0073	UGL	AGLZ	UH61
LCS4	7/23/2018	HPCL		0.245	UGL	AGRI	UH61
LCS4	10/18/2018	HPCL		0.25	UGL	AGYX	UH61
LCS4	1/15/2019	HPCL		0.241	UGL	AHDJ	UH61
LCS4	4/9/2019	HPCL		0.0323	UGL	AHHA	UH61
LCS4	10/1/2019	HPCL		0.215	UGL	AHZS	UH61
LCS4	7/13/2020	HPCL		0.18	UGL	AIRD	UH61
LCS4	5/11/2021	HPCL		0.225	UGL	AJKH	UH63
LCS4	2/16/2022	HPCL	LT	0.00321	UGL	AKGC	UH63
LCS4	2/21/2023	HPCL		0.191	UGL	ALLK	UH63
LCS4	7/2/2024	HPCL		0.249	UGL	ANDQ	UH65

Table 8 - Historical Levels of Heptachlor in LDS4

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LDS4	1/10/2001	HPCL	LT	0.03	UGL		INQ_	UH50
LDS4	4/18/2001	HPCL	LT	0.03	UGL		IVW_	UH50
LDS4	7/10/2001	HPCL	LT	0.03	UGL		JED_	UH50
LDS4	11/6/2001	HPCL	LT	0.03	UGL		JTD_	UH50
LDS4	1/10/2002	HPCL	LT	0.023	UGL		JWS_	UH51
LDS4	4/30/2002	HPCL	LT	0.023	UGL		KGG_	UH51
LDS4	6/18/2002	HPCL		0.0321	UGL		KKB_	UH51
LDS4	7/18/2002	HPCL	LT	0.023	UGL		KPC_	UH51
LDS4	8/27/2002	HPCL	LT	0.023	UGL		KWA_	UH51
LDS4	9/18/2002	HPCL		0.0502	UGL		KZU_	UH51
LDS4	10/21/2002	HPCL	LT	0.023	UGL		LDY_	UH51
LDS4	11/19/2002	HPCL	LT	0.023	UGL		LHU_	UH51
LDS4	12/18/2002	HPCL	LT	0.023	UGL		LKW_	UH51
LDS4	1/15/2003	HPCL	LT	0.023	UGL		LOJ_	UH51
LDS4	2/19/2003	HPCL	LT	0.023	UGL		LRL_	UH51
LDS4	3/26/2003	HPCL		0.0393	UGL		LVE_	UH51
LDS4	4/16/2003	HPCL	LT	0.023	UGL		LYZ_	UH51
LDS4	7/15/2003	HPCL	LT	0.023	UGL		MKA_	UH51
LDS4	10/28/2003	HPCL	LT	0.023	UGL		MTV_	UH51
LDS4	1/21/2004	HPCL	LT	0.023	UGL		NBD_	UH51
LDS4	4/14/2004	HPCL	LT	0.023	UGL		NHV_	UH51
LDS4	7/13/2004	HPCL	LT	0.023	UGL		NRD_	UH51
LDS4	10/26/2004	HPCL	LT	0.023	UGL		OHS_	UH51
LDS4	1/18/2005	HPCL	LT	0.023	UGL		OMS_	UH51
LDS4	4/20/2005	HPCL		0.023	UGL		OSN_	UH54
LDS4	7/21/2005	HPCL		0.0185	UGL		PDF_	UH54
LDS4	10/26/2005	HPCL		0.0301	UGL		POG_	UH54
LDS4	2/1/2006	HPCL		0.0261	UGL		PTW_	UH54
LDS4	4/20/2006	HPCL		0.0184	UGL		QDK_	UH54
LDS4	7/26/2006	HPCL		0.0295	UGL		QPK_	UH54
LDS4	11/8/2006	HPCL	LT	0.0106	UGL		RHN_	UH54
LDS4	1/18/2007	HPCL	LT	0.0106	UGL		RPZ_	UH54
LDS4	4/25/2007	HPCL	LT	0.0106	UGL		RZO_	UH54
LDS4	8/2/2007	HPCL		0.0254	UGL		SQE_	UH54
LDS4	11/14/2007	HPCL	LT	0.0106	UGL		TFN_	UH54
LDS4	1/28/2008	HPCL	LT	0.0106	UGL		TNS_	UH54
LDS4	3/31/2008	HPCL	LT	0.0106	UGL		TUL_	UH54
LDS4	7/16/2008	HPCL	LT	0.025	UGL		UED_	UH56
LDS4	10/9/2008	HPCL	LT	0.025	UGL		UQB_	UH56
LDS4	1/6/2009	HPCL	LT	0.025	UGL		VAM_	UH56
LDS4	7/15/2009	HPCL	LT	0.025	UGL		VZK_	UH56
LDS4	10/7/2009	HPCL	LT	0.025	UGL		WMH_	UH56
LDS4	1/12/2010	HPCL		0.0407	UGL		WVD_	UH56
LDS4	4/12/2010	HPCL	LT	0.025	UGL		XBM_	UH56
LDS4	7/14/2010	HPCL		0.0366	UGL		XQF_	UH56
LDS4	10/6/2010	HPCL	LT	0.025	UGL		YAT_	UH56

Table 8 - Historical Levels of Heptachlor in LDS4

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LDS4	1/12/2011	HPCL	LT	0.025	UGL		YKR_	UH56
LDS4	4/12/2011	HPCL		0.0348	UGL		YOA_	UH56
LDS4	6/27/2011	HPCL		0.0278	UGL		YXM_	UH57
LDS4	7/20/2011	HPCL		0.0183	UGL		YZN_	UH57
LDS4	8/22/2011	HPCL	LT	0.009	UGL		ZCP_	UH57
LDS4	9/21/2011	HPCL		0.0123	UGL		ZEI_	UH57
LDS4	10/18/2011	HPCL		0.0162	UGL		ZGB_	UH57
LDS4	1/23/2012	HPCL		0.017	UGL		ZKD_	UH57
LDS4	4/23/2012	HPCL		0.0101	UGL		ZQC_	UH57
LDS4	7/11/2012	HPCL		0.023	UGL		ZZE_	UH57
LDS4	10/10/2012	HPCL		0.0194	UGL		AAJQ	UH57
LDS4	1/17/2013	HPCL		0.0246	UGL		AANK	UH57
LDS4	4/17/2013	HPCL	LT	0.009	UGL		AAUB	UH57
LDS4	7/22/2013	HPCL	LT	0.009	UGL		ABFO	UH57
LDS4	10/21/2013	HPCL	LT	0.009	UGL		ABKV	UH57
LDS4	1/16/2014	HPCL	LT	0.009	UGL		ABQE	UH57
LDS4	4/21/2014	HPCL	LT	0.009	UGL		ABXY	UH57
LDS4	5/7/2014	HPCL	LT	0.009	UGL		ACCL	UH57
LDS4	7/23/2014	HPCL	LT	0.009	UGL		ACJC	UH57
LDS4	11/18/2014	HPCL	LT	0.005	UGL		ACQX	UH59
LDS4	1/19/2015	HPCL	LT	0.005	UGL		ACUD	UH59
LDS4	4/21/2015	HPCL	LT	0.005	UGL		ADAZ	UH59
LDS4	8/3/2015	HPCL	LT	0.005	UGL		ADMQ	UH59
LDS4	10/26/2015	HPCL	LT	0.005	UGL		ADRM	UH59
LDS4	1/20/2016	HPCL	LT	0.005	UGL		ADVM	UH59
LDS4	4/20/2016	HPCL	LT	0.005	UGL		AEEQ	UH59
LDS4	7/25/2016	HPCL	LT	0.005	UGL		AENG	UH59
LDS4	10/20/2016	HPCL	LT	0.005	UGL		AESH	UH59
LDS4	1/18/2017	HPCL	LT	0.005	UGL		AEXB	UH59
LDS4	4/12/2017	HPCL	LT	0.005	UGL		AFEI	UH59
LDS4	7/12/2017	HPCL	LT	0.005	UGL		AFQR	UH59
LDS4	12/12/2017	HPCL	LT	0.0073	UGL		AGAF	UH61
LDS4	2/8/2018	HPCL	LT	0.0073	UGL		AGCT	UH61
LDS4	5/15/2018	HPCL	LT	0.0073	UGL		AGLZ	UH61
LDS4	7/23/2018	HPCL	LT	0.0073	UGL		AGRI	UH61
LDS4	10/18/2018	HPCL		0.0175	UGL		AGYX	UH61
LDS4	10/12/2021	HPCL	LT	0.00321	UGL		AJXX	UH63
LDS4	**3/11/2024**	**HPCL**		**0.061**	**UGL**		**AMPY**	**UH65**

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From: Rymarz, Natalie A CIV USARMY USAG (USA) <Natalie.a.rymarz.civ@army.mil>
Sent: Friday, April 18, 2025 10:40 AM
To: Joseph Chisholm; Mark Collar; Rachel Puttmann; Susan Newton; Thomas Butts; Vince Stewart
Cc: Cable, Kelly; Michael W. Jones; Kim Hoffman; Adams, Jamar M CIV USARMY IMCOM (USA)
Subject: FW: Notification for HWL LDS3 Watch List Trigger Level Exceedance
Attachments: LDS3 Data Evaluation 041725.docx; Tables 1-6_LDS3_historical data.xlsx

Good morning Landfills and Covers Team,

Below is a notification of watch list trigger level exceedance for HWL sump LDS3. Since there is no recommended follow-up action to perform, we are requesting to forego the development of an NRAP.

Please review the notification and let us know if you feel that an NRAP is required. This notification will be discussed at the semiannual Landfills and Covers O&M status meeting next Tuesday at 11:00 AM.

Respectfully,
Natalie

Natalie Rymarz
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From: Michael W. Jones <JonesM@navarro-inc.com>
Sent: Friday, April 18, 2025 10:04 AM
To: Rymarz, Natalie A CIV USARMY USAG (USA) <Natalie.a.rymarz.civ@army.mil>
Cc: Cable, Kelly <kelly.cable@aecom.com>; Kim Hoffman <hoffman@navarro-inc.com>; Ache, Scott <Ache@navarro-inc.com>
Subject: Notification for HWL LDS3 Watch List Trigger Level Exceedance (Resend)

Natalie,
This email is intended to notify the regulatory agencies of analytical results from a sample collected from HWL sump LDS3 that exceeded Watch List trigger levels listed in the HWL Post-Closure Groundwater Monitoring Plan. The exceedances were identified while preparing the HWL Post-Closure Groundwater Monitoring Report for 2024. Please transmit this to the team at your convenience.

Similar to the recent LDS4 notification, I would like the team to consider foregoing an NRAP on this issue. We will discuss the situation and evaluation at the semiannual Landfills and Covers O&M Status Meeting scheduled for Aprill 22, 2025 and the discussion will be captured in the meeting notes.

Let me know if you have any questions or concerns.

Thanks

Notification: A wastewater sample was collected from Hazardous Waste Landfill (HWL) Leak Detection System (LDS) sump 3 (LDS3) on July 8, 2024. Analytical results for alpha-endosulfan (AENSLF), endrin (ENDRN), and gamma-chlordane (GCLDAN) exceeded the respective Watch List trigger levels listed in Table 3.2.5-2 of the HWL Post-Closure Groundwater Monitoring Plan (PCGMP).
Subject: HWL Post-Closure Plan Notification – LDS Water Quality Monitoring
This is a required notification: A wastewater sample was collected from HWL sump LDS3 on July 8, 2024, prior to removing wastewater from the sump. Analytical results indicated that three analytes exceeded the Watch List trigger levels listed in Table 3.2.5-2 of the HWL PCGMP. The results and trigger levels are tabulated below.

Analyte	**Trigger Level** (μg/L)	**Analytical Result** (μg/L)
AENSLF	0.073	0.126
ENDRN	0.088	0.097
GCLDAN	0.096	0.244

According to Section 3.5 of the HWL Post-Closure Plan (PCP), and Table 3.0-2 of the HWL PCP, detection of a watch list analyte above the watch list trigger level requires regulatory agency notification and triggers the consultative process. Figure 3.2-4 of the HWL PCGMP provides a flow chart specifically for LDS watch list exceedances.
Notification Requirement: HWL PCP Table 3.0-2: Non-Routine Action Trigger Levels
Monitoring Category: LDS Water Quality Monitoring
Trigger Event: Detection of a watch list analyte above the watch list trigger level
Associated Monitoring: Leachate Collection System (LCS) and sump levels
Notification Schedule: A verbal notification will be made no more than 14 days following the determination that an action is considered to be non-routine. The notification to the CDPHE will be documented in an e-mail, letter, or similar record.
Consultation Required: The Army and regulatory agencies will follow the sump data evaluation process identified in Figure 3.2-4 of the HWL PCGMP, in conjunction with the consultative process.
Class of Modification to the Plan: N/A
Description of issue: Three analytes from the LDS3 wastewater sample collected on July 8, 2024 exceeded their respective Watch List trigger levels. An evaluation was performed to determine if the increased concentrations resulted from a breach in the primary liner system that could have drained leachate from LCS3 into LDS3. The evaluation is attached. Analytical results of the three analytes in LDS3 and LCS3 are also attached.

Evaluation of the analytical results of LCS3 and LDS3 wastewater samples do not indicate an issue with LCS liner integrity. Likewise, sump level data do not indicate that leachate is entering the LDS3 sump from LCS3. Therefore, no additional action is required and continued routine sampling and monitoring is suggested.

The non-routine condition and results of the data evaluation will be discussed at the semiannual Landfills and Covers O&M Status Meeting scheduled for April 22, 2025.

Michael W. Jones

Landfills, Covers & Non-Routine Projects

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Description of issue: Three analytes from the LDS3 wastewater sample collected on July 8, 2024 exceeded their respective Watch List trigger levels. An evaluation was performed to determine if the increased concentrations resulted from a breach in the primary liner system that could have drained leachate from LCS3 into LDS3. The evaluation focused on two quantifiable tests:

1. Correlation between LDS3 analyte concentrations and concentrations of analytes in leachate collected from LCS3. Similar analyte concentrations between the two sumps could suggest that liquids drained from LCS3 into LDS3.
2. Evaluation of LDS3 sump level trends. A reduction in the time required to fill LDS3 prior to July of 2024, or an increase in the sump's filling rate could suggest that liquids drained from LCS3 into LDS3.

Test #1 – In 2018 sump sampling requirements were changed from a quarterly event to episodic based on water levels in each sump (i.e. each sump is sampled independently prior to pumping). Therefore, chronologically correlated samples are not always available after October 2018. However, leachate from sump LCS3 was sampled on July 1, 2024, just one week before the July 8 sample of LDS3. These sample dates are close enough to provide a meaningful comparison between the analytical results. Results of the evaluation are tabulated below.

Analyte	**LDS3 Concentration** (μg/L)	**Corresponding LCS3 Concentration** (μg/L)	**Observation**
AENSLF	0.126 (07/08/2024)	LT 0.004 (07/01/2024)	The AENSLF concentration in LCS3 was below the reporting limit in July of 2024, but is regularly two orders of magnitude higher (0.546, 0.397, and 0.208 in the previous three samples). The July 8, 2024 result from LDS3 is in the typical range of LCS3. The July 2024 value is the highest AENSLF concentration recorded in LDS3 since sampling began in 2000.
ENDRN	0.097 (07/08/2024)	LT 0.005 (07/01/2024)	The ENDRN concentration in LCS3 has been below the reporting limit since 2017. Since the LDS3 value is an order of magnitude higher than the ENDRN reporting limit, it is unlikely that leachate from LCS3 was the source of the detection. The July 2024 value is the highest ENDRN concentration recorded in LDS3 since sampling began in 2000.
GCLDAN	0.244 (07/08/2024)	LT 0.004 (07/01/2024)	The GCLDAN concentration in LCS3 has been below the reporting limit since 2019. Since the LDS3 value is two orders of magnitude higher than the GCLDAN reporting limit, it is unlikely that leachate from LCS3 was the source of the detection. The July 2024 value is the highest GCLDAN concentration recorded in LDS3 since sampling began in 2000.

Test #2 – HWL LDS3 sump level data were evaluated to determine if the sump filled faster, or if the filling rate increased. Both conditions could indicate that leachate had drained from LCS3 into LDS3. Figures 1 and 2 show the weekly sump level measurements of LDS3 over two filling cycles. Figure 1 illustrates a filling cycle from November 2020 to April 2022, and Figure 2 illustrates a filling cycle from May 2022 to July 2024. Linear trend lines are included in both figures, with their corresponding trend line equations.

The time required to fill the sump from 10 inches to 20 inches was 524 days from November 2020 to April 2022. 790 days elapsed before the sump filled again between May 2022 and July 2024. The longer

filling time of the second period suggests that leachate from LCS3 did not contribute to the accumulation of wastewater in LDS3 between 2022 and 2024. Similarly, the rate at which LDS3 filled is represented numerically in the trend line equations. The slope of the earlier filling period's trend line is 0.013995 and the slope of the latter period's trend line is 0.011116. The lower value in the latter trend line indicates a slower filling rate.

The data also conform to a linear trend throughout both filling periods and there is no indication of a sudden increase in the rate of accumulation that would correspond with a leak in the LCS liner system.

Figure 1: HWL LDS3 Sump Level Trending (November 2020 to April 2022)

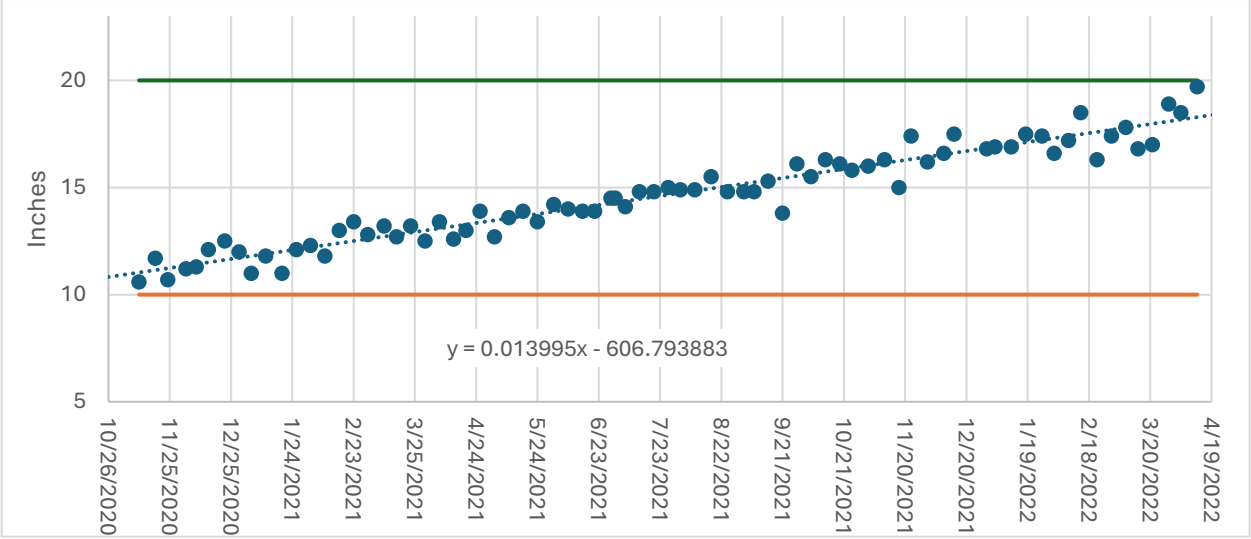
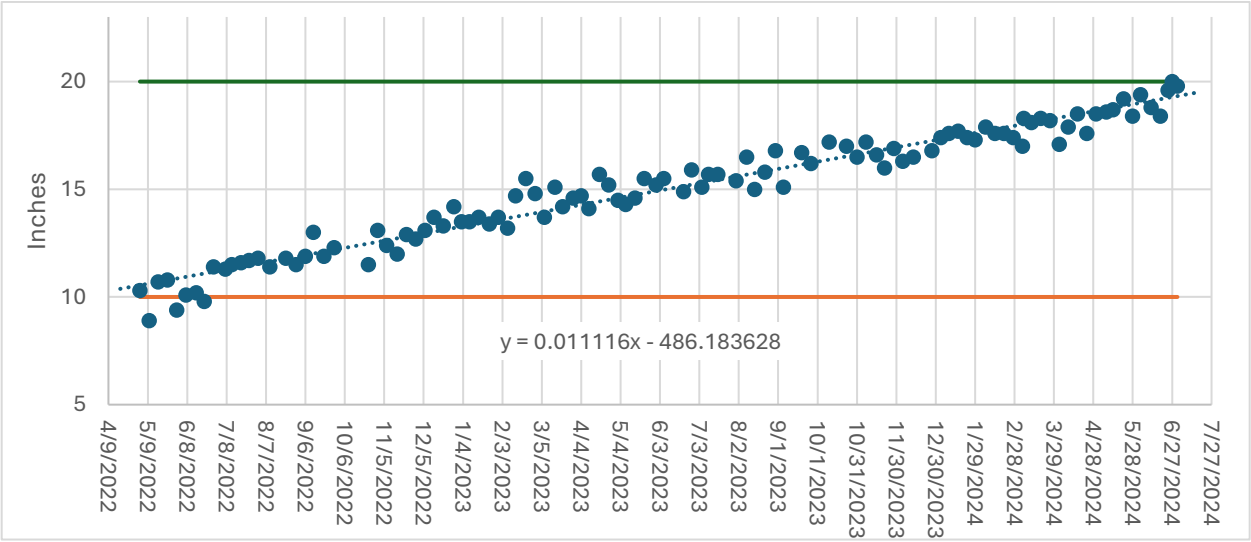


Figure 2: HWL LDS3 Sump Level Trending (May 2022 to July 2024)



Conclusion – Evaluation of the analytical results of LCS3 and LDS3 wastewater samples do not indicate an issue with LCS liner integrity. Likewise, sump level data do not indicate that leachate is entering the LDS3 sump from LCS3. Therefore, no additional action is required and continued routine sampling and monitoring is suggested.

Table 1: Historical Levels of alpha-Endosulfan in LCS3

site_id	samp_date	test_name	boolean	Data	uom	flag_code	lot_no	anal_meth_no
LCS3	10/11/2000	AENSLF	LT	0.024	UGL		IIX_	UH50
LCS3	7/10/2001	AENSLF	LT	0.026	UGL		JDZ_	UH50
LCS3	1/10/2002	AENSLF	LT	0.033	UGL		JWS_	UH51
LCS3	4/23/2002	AENSLF	LT	0.033	UGL	V	KFV_	UH51
LCS3	7/17/2002	AENSLF	LT	0.033	UGL		KPC_	UH51
LCS3	10/21/2002	AENSLF	LT	0.033	UGL		LDY_	UH51
LCS3	1/15/2003	AENSLF	LT	0.033	UGL		LOJ_	UH51
LCS3	4/16/2003	AENSLF	LT	0.033	UGL		LYZ_	UH51
LCS3	7/15/2003	AENSLF	LT	0.033	UGL		MKA_	UH51
LCS3	10/28/2003	AENSLF	LT	0.033	UGL		MTV_	UH51
LCS3	1/21/2004	AENSLF	LT	0.033	UGL		NBD_	UH51
LCS3	4/13/2004	AENSLF	LT	0.033	UGL		NHV_	UH51
LCS3	7/13/2004	AENSLF	LT	0.033	UGL		NRD_	UH51
LCS3	10/26/2004	AENSLF	LT	0.033	UGL		OHS_	UH51
LCS3	1/18/2005	AENSLF	LT	0.033	UGL		OMS_	UH51
LCS3	4/20/2005	AENSLF	LT	0.0343	UGL		OSN_	UH54
LCS3	7/21/2005	AENSLF	LT	0.0343	UGL		PDF_	UH54
LCS3	10/26/2005	AENSLF	LT	0.0343	UGL		POG_	UH54
LCS3	2/1/2006	AENSLF	LT	0.0343	UGL		PTW_	UH54
LCS3	7/26/2006	AENSLF	LT	0.0343	UGL		QPK_	UH54
LCS3	11/8/2006	AENSLF	LT	0.0343	UGL		RHN_	UH54
LCS3	1/18/2007	AENSLF	LT	0.0343	UGL		RPZ_	UH54
LCS3	4/25/2007	AENSLF	LT	0.0343	UGL		RZO_	UH54
LCS3	8/2/2007	AENSLF	LT	0.0343	UGL		SQE_	UH54
LCS3	11/14/2007	AENSLF	LT	0.0343	UGL		TFN_	UH54
LCS3	1/28/2008	AENSLF		0.212	UGL		TNS_	UH54
LCS3	3/31/2008	AENSLF	LT	0.0343	UGL		TUL_	UH54
LCS3	7/16/2008	AENSLF		0.0509	UGL		UED_	UH56
LCS3	10/9/2008	AENSLF		0.0435	UGL		UQB_	UH56
LCS3	1/6/2009	AENSLF		0.171	UGL		VAM_	UH56
LCS3	5/6/2009	AENSLF		0.123	UGL		VNI_	UH56
LCS3	7/15/2009	AENSLF	LT	0.028	UGL		VZK_	UH56
LCS3	10/7/2009	AENSLF		0.147	UGL		WMH_	UH56
LCS3	1/12/2010	AENSLF		0.233	UGL		WVD_	UH56
LCS3	4/12/2010	AENSLF		0.0868	UGL		XBM_	UH56
LCS3	7/14/2010	AENSLF		0.0749	UGL		XQF_	UH56
LCS3	10/6/2010	AENSLF		0.0897	UGL		YAT_	UH56
LCS3	1/12/2011	AENSLF		0.0896	UGL		YKR_	UH56
LCS3	4/12/2011	AENSLF		0.122	UGL		YOA_	UH56
LCS3	7/25/2011	AENSLF	LT	0.0112	UGL		ZAF_	UH57
LCS3	10/18/2011	AENSLF		0.0347	UGL		ZGB_	UH57
LCS3	1/23/2012	AENSLF		0.0366	UGL		ZKD_	UH57
LCS3	4/23/2012	AENSLF		0.0254	UGL		ZQC_	UH57
LCS3	7/11/2012	AENSLF		0.0774	UGL		ZZE_	UH57
LCS3	10/10/2012	AENSLF		0.0652	UGL		AAJQ	UH57
LCS3	1/17/2013	AENSLF		0.0646	UGL		AANJ	UH57
LCS3	4/18/2013	AENSLF		0.0624	UGL		AAUU	UH57
LCS3	7/22/2013	AENSLF		0.0566	UGL		ABFO	UH57
LCS3	10/21/2013	AENSLF		0.0671	UGL		ABKV	UH57
LCS3	1/16/2014	AENSLF		0.0654	UGL		ABQE	UH57
LCS3	4/22/2014	AENSLF		0.0468	UGL		ABYM	UH57
site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no

Table 1: Historical Levels of alpha-Endosulfan in LCS3

LCS3	7/23/2014	AENSLF		0.0775	UGL	ACJC	UH57
LCS3	11/18/2014	AENSLF	LT	0.0025	UGL	ACQX	UH59
LCS3	1/19/2015	AENSLF	LT	0.0025	UGL	ACUD	UH59
LCS3	4/20/2015	AENSLF		0.0737	UGL	ADAR	UH59
LCS3	8/3/2015	AENSLF		0.337	UGL	ADMQ	UH59
LCS3	10/26/2015	AENSLF		0.415	UGL	ADRM	UH59
LCS3	1/20/2016	AENSLF		0.0787	UGL	ADVM	UH59
LCS3	4/19/2016	AENSLF		0.101	UGL	AEEG	UH59
LCS3	7/25/2016	AENSLF		0.348	UGL	AENG	UH59
LCS3	10/20/2016	AENSLF	LT	0.0025	UGL	AESH	UH59
LCS3	1/18/2017	AENSLF	LT	0.0025	UGL	AEXB	UH59
LCS3	4/11/2017	AENSLF	LT	0.0025	UGL	AFEI	UH59
LCS3	7/12/2017	AENSLF	LT	0.0025	UGL	AFQR	UH59
LCS3	12/12/2017	AENSLF	LT	0.00502	UGL	AGAF	UH61
LCS3	2/8/2018	AENSLF		0.352	UGL	AGCT	UH61
LCS3	5/14/2018	AENSLF	LT	0.00502	UGL	AGLZ	UH61
LCS3	7/23/2018	AENSLF		0.627	UGL	AGRI	UH61
LCS3	10/18/2018	AENSLF		0.621	UGL	AGYX	UH61
LCS3	1/14/2019	AENSLF		0.703	UGL	AHDE	UH61
LCS3	4/15/2019	AENSLF		0.546	UGL	AHHK	UH61
LCS3	3/1/2021	AENSLF		0.397	UGL	AJEC	UH63
LCS3	2/21/2023	AENSLF		0.208	UGL	ALLK	UH63
LCS3	7/1/2024	AENSLF	LT	0.004	UGL	ANDQ	UH65

Table 2 - Historical Levels of alpha-Endosulfan in LDS3

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LDS3	10/11/2000	AENSLF	LT	0.24	UGL		IIX_	UH50
LDS3	1/10/2001	AENSLF	LT	0.024	UGL		INT_	UH50
LDS3	4/18/2001	AENSLF	LT	0.024	UGL		IVW_	UH50
LDS3	7/10/2001	AENSLF	LT	0.024	UGL		JDZ_	UH50
LDS3	11/6/2001	AENSLF	LT	0.024	UGL		JTD_	UH50
LDS3	1/10/2002	AENSLF	LT	0.033	UGL		JWS_	UH51
LDS3	4/30/2002	AENSLF	LT	0.033	UGL		KGG_	UH51
LDS3	6/18/2002	AENSLF	LT	0.033	UGL		KKB_	UH51
LDS3	7/17/2002	AENSLF	LT	0.033	UGL		KPC_	UH51
LDS3	8/27/2002	AENSLF	LT	0.033	UGL		KWA_	UH51
LDS3	9/18/2002	AENSLF	LT	0.033	UGL		KZU_	UH51
LDS3	10/21/2002	AENSLF	LT	0.033	UGL		LDY_	UH51
LDS3	11/19/2002	AENSLF	LT	0.033	UGL		LHU_	UH51
LDS3	12/18/2002	AENSLF	LT	0.033	UGL		LKW_	UH51
LDS3	1/15/2003	AENSLF	LT	0.033	UGL		LOJ_	UH51
LDS3	2/19/2003	AENSLF	LT	0.033	UGL		LRL_	UH51
LDS3	3/26/2003	AENSLF	LT	0.033	UGL		LVE_	UH51
LDS3	4/16/2003	AENSLF	LT	0.033	UGL		LYZ_	UH51
LDS3	7/15/2003	AENSLF	LT	0.033	UGL		MKA_	UH51
LDS3	10/28/2003	AENSLF	LT	0.033	UGL		MTV_	UH51
LDS3	1/21/2004	AENSLF	LT	0.033	UGL		NBD_	UH51
LDS3	4/13/2004	AENSLF	LT	0.033	UGL		NHV_	UH51
LDS3	7/13/2004	AENSLF	LT	0.033	UGL		NRD_	UH51
LDS3	10/26/2004	AENSLF	LT	0.033	UGL		OHS_	UH51
LDS3	1/18/2005	AENSLF	LT	0.033	UGL		OMS_	UH51
LDS3	4/20/2005	AENSLF	LT	0.0343	UGL		OSN_	UH54
LDS3	7/21/2005	AENSLF	LT	0.0343	UGL		PDF_	UH54
LDS3	10/26/2005	AENSLF	LT	0.0343	UGL		POG_	UH54
LDS3	2/1/2006	AENSLF	LT	0.0343	UGL		PTW_	UH54
LDS3	4/20/2006	AENSLF	LT	0.0343	UGL		QDK_	UH54
LDS3	7/26/2006	AENSLF	LT	0.0343	UGL		QPK_	UH54
LDS3	11/8/2006	AENSLF	LT	0.0343	UGL		RHN_	UH54
LDS3	1/18/2007	AENSLF	LT	0.0343	UGL		RPZ_	UH54
LDS3	4/25/2007	AENSLF	LT	0.0343	UGL		RZO_	UH54
LDS3	8/2/2007	AENSLF	LT	0.0343	UGL		SQE_	UH54
LDS3	1/28/2008	AENSLF	LT	0.0343	UGL		TNS_	UH54
LDS3	3/31/2008	AENSLF	LT	0.0343	UGL		TUL_	UH54
LDS3	7/16/2008	AENSLF	LT	0.028	UGL		UED_	UH56
LDS3	10/9/2008	AENSLF	LT	0.028	UGL		UQB_	UH56
LDS3	1/6/2009	AENSLF	LT	0.028	UGL		VAM_	UH56
LDS3	5/6/2009	AENSLF	LT	0.028	UGL		VNI_	UH56
LDS3	7/15/2009	AENSLF	LT	0.028	UGL		VZK_	UH56
LDS3	10/7/2009	AENSLF	LT	0.028	UGL		WMH_	UH56
LDS3	1/12/2010	AENSLF		0.0413	UGL		WVD_	UH56
LDS3	4/19/2010	AENSLF	LT	0.028	UGL		XCZ_	UH56
LDS3	7/14/2010	AENSLF	LT	0.028	UGL		XQF_	UH56

Table 2 - Historical Levels of alpha-Endosulfan in LDS3

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LDS3	10/6/2010	AENSLF	LT	0.028	UGL		YAT_	UH56
LDS3	1/12/2011	AENSLF	LT	0.028	UGL		YKR_	UH56
LDS3	4/12/2011	AENSLF	LT	0.028	UGL		YOA_	UH56
LDS3	7/25/2011	AENSLF	LT	0.0112	UGL		ZAF_	UH57
LDS3	8/22/2011	AENSLF	LT	0.0149	UGL		ZCP_	UH57
LDS3	9/21/2011	AENSLF		0.0192	UGL		ZEI_	UH57
LDS3	10/18/2011	AENSLF		0.0249	UGL		ZGB_	UH57
LDS3	1/23/2012	AENSLF	LT	0.0112	UGL		ZKD_	UH57
LDS3	4/23/2012	AENSLF	LT	0.0112	UGL		ZQC_	UH57
LDS3	7/11/2012	AENSLF	LT	0.0112	UGL		ZZE_	UH57
LDS3	10/10/2012	AENSLF		0.0146	UGL		AAJQ	UH57
LDS3	1/17/2013	AENSLF		0.0115	UGL		AANK	UH57
LDS3	4/18/2013	AENSLF		0.0181	UGL		AAUU	UH57
LDS3	7/22/2013	AENSLF		0.0299	UGL		ABFO	UH57
LDS3	10/21/2013	AENSLF	LT	0.0112	UGL		ABKV	UH57
LDS3	1/16/2014	AENSLF	LT	0.0112	UGL		ABQE	UH57
LDS3	4/17/2014	AENSLF		0.011	UGL		ABXQ	UH57
LDS3	7/23/2014	AENSLF		0.0147	UGL		ACJC	UH57
LDS3	11/18/2014	AENSLF	LT	0.0025	UGL		ACQX	UH59
LDS3	1/19/2015	AENSLF	LT	0.0025	UGL		ACUD	UH59
LDS3	4/20/2015	AENSLF	LT	0.0025	UGL		ADAR	UH59
LDS3	8/3/2015	AENSLF		0.0184	UGL		ADMQ	UH59
LDS3	10/26/2015	AENSLF		0.028	UGL		ADRM	UH59
LDS3	1/20/2016	AENSLF		0.0636	UGL		ADVM	UH59
LDS3	4/19/2016	AENSLF		0.037	UGL		AEEG	UH59
LDS3	7/25/2016	AENSLF		0.0211	UGL		AENG	UH59
LDS3	10/20/2016	AENSLF		0.0471	UGL		AESH	UH59
LDS3	1/18/2017	AENSLF	LT	0.0025	UGL		AEXB	UH59
LDS3	4/11/2017	AENSLF		0.0597	UGL		AFEI	UH59
LDS3	7/12/2017	AENSLF	LT	0.0025	UGL		AFQR	UH59
LDS3	12/12/2017	AENSLF	LT	0.00502	UGL		AGAF	UH61
LDS3	2/8/2018	AENSLF		0.00639	UGL		AGCT	UH61
LDS3	5/14/2018	AENSLF		0.0319	UGL		AGLZ	UH61
LDS3	7/23/2018	AENSLF		0.00716	UGL		AGRI	UH61
LDS3	10/18/2018	AENSLF		0.0307	UGL		AGYX	UH61
LDS3	1/14/2019	AENSLF		0.0297	UGL		AHDE	UH61
LDS3	4/15/2019	AENSLF		0.00818	UGL		AHHK	UH61
LDS3	10/29/2020	AENSLF		0.0234	UGL		AIZB	UH61
LDS3	4/18/2022	AENSLF		0.0283	UGL		AKLK	UH63
LDS3	**7/8/2024**	**AENSLF**		**0.126**	**UGL**		**ANEA**	**UH65**

Table 3 - Historical Levels on Endrin in LCS3

site_id	samp_date	test_name	boolean	Data	uom	flag_code	lot_no	anal_meth_no
LCS3	10/11/2000	ENDRN	LT	0.073	UGL		IIX_	UH50
LCS3	7/10/2001	ENDRN	LT	0.08	UGL		JDZ_	UH50
LCS3	1/10/2002	ENDRN	LT	0.032	UGL		JWS_	UH51
LCS3	4/23/2002	ENDRN	LT	0.032	UGL	V	KFV_	UH51
LCS3	7/17/2002	ENDRN	LT	0.032	UGL		KPC_	UH51
LCS3	10/21/2002	ENDRN	LT	0.032	UGL		LDY_	UH51
LCS3	1/15/2003	ENDRN	LT	0.032	UGL		LOJ_	UH51
LCS3	4/16/2003	ENDRN	LT	0.032	UGL		LYZ_	UH51
LCS3	7/15/2003	ENDRN	LT	0.032	UGL		MKA_	UH51
LCS3	10/28/2003	ENDRN	LT	0.032	UGL		MTV_	UH51
LCS3	1/21/2004	ENDRN	LT	0.032	UGL		NBD_	UH51
LCS3	4/13/2004	ENDRN	LT	0.032	UGL		NHV_	UH51
LCS3	7/13/2004	ENDRN	LT	0.032	UGL		NRD_	UH51
LCS3	10/26/2004	ENDRN	LT	0.032	UGL		OHS_	UH51
LCS3	1/18/2005	ENDRN	LT	0.032	UGL		OMS_	UH51
LCS3	4/20/2005	ENDRN	LT	0.0347	UGL		OSN_	UH54
LCS3	7/21/2005	ENDRN	LT	0.0347	UGL		PDF_	UH54
LCS3	10/26/2005	ENDRN	LT	0.0347	UGL		POG_	UH54
LCS3	2/1/2006	ENDRN	LT	0.0347	UGL		PTW_	UH54
LCS3	7/26/2006	ENDRN	LT	0.0347	UGL		QPK_	UH54
LCS3	11/8/2006	ENDRN	LT	0.0347	UGL		RHN_	UH54
LCS3	1/18/2007	ENDRN	LT	0.0347	UGL		RPZ_	UH54
LCS3	4/25/2007	ENDRN	LT	0.0347	UGL		RZO_	UH54
LCS3	8/2/2007	ENDRN		0.0751	UGL		SQE_	UH54
LCS3	11/14/2007	ENDRN		0.0518	UGL		TFN_	UH54
LCS3	1/28/2008	ENDRN		0.117	UGL		TNS_	UH54
LCS3	3/31/2008	ENDRN	LT	0.0347	UGL		TUL_	UH54
LCS3	7/16/2008	ENDRN	LT	0.0344	UGL		UED_	UH56
LCS3	10/9/2008	ENDRN		0.0965	UGL		UQB_	UH56
LCS3	1/6/2009	ENDRN		0.0801	UGL		VAM_	UH56
LCS3	5/6/2009	ENDRN		0.133	UGL		VNI_	UH56
LCS3	7/15/2009	ENDRN	LT	0.0344	UGL		VZK_	UH56
LCS3	10/7/2009	ENDRN		0.169	UGL		WMH_	UH56
LCS3	1/12/2010	ENDRN		0.179	UGL		WVD_	UH56
LCS3	4/12/2010	ENDRN		0.174	UGL		XBM_	UH56
LCS3	7/14/2010	ENDRN		0.194	UGL		XQF_	UH56
LCS3	10/6/2010	ENDRN		0.144	UGL		YAT_	UH56
LCS3	1/12/2011	ENDRN	LT	0.0344	UGL		YKR_	UH56
LCS3	4/12/2011	ENDRN	LT	0.0344	UGL		YOA_	UH56
LCS3	7/25/2011	ENDRN	LT	0.0104	UGL		ZAF_	UH57
LCS3	10/18/2011	ENDRN	LT	0.0104	UGL		ZGB_	UH57
LCS3	1/23/2012	ENDRN	LT	0.0104	UGL		ZKD_	UH57
LCS3	4/23/2012	ENDRN		0.0449	UGL		ZQC_	UH57
LCS3	7/11/2012	ENDRN		0.163	UGL		ZZE_	UH57
LCS3	10/10/2012	ENDRN		0.097	UGL		AAJQ	UH57
LCS3	1/17/2013	ENDRN		0.0937	UGL		AANJ	UH57
site_id	samp_date	test_name	boolean	Data	uom	flag_code	lot_no	anal_meth_no

Table 3 - Historical Levels on Endrin in LCS3

LCS3	4/18/2013	ENDRN		0.0966	UGL	AAUU	UH57
LCS3	7/22/2013	ENDRN		0.0825	UGL	ABFO	UH57
LCS3	10/21/2013	ENDRN		0.0735	UGL	ABKV	UH57
LCS3	1/16/2014	ENDRN		0.198	UGL	ABQE	UH57
LCS3	4/22/2014	ENDRN		0.0272	UGL	ABYM	UH57
LCS3	7/23/2014	ENDRN		0.0625	UGL	ACJC	UH57
LCS3	11/18/2014	ENDRN		0.243	UGL	ACQX	UH59
LCS3	1/19/2015	ENDRN		0.144	UGL	ACUD	UH59
LCS3	4/20/2015	ENDRN		0.234	UGL	ADAR	UH59
LCS3	8/3/2015	ENDRN		0.143	UGL	ADMQ	UH59
LCS3	10/26/2015	ENDRN	LT	0.00399	UGL	ADRM	UH59
LCS3	1/20/2016	ENDRN		0.167	UGL	ADVM	UH59
LCS3	4/19/2016	ENDRN		0.13	UGL	AEEG	UH59
LCS3	7/25/2016	ENDRN	LT	0.00399	UGL	AENG	UH59
LCS3	10/20/2016	ENDRN	LT	0.00399	UGL	AESH	UH59
LCS3	1/18/2017	ENDRN		0.111	UGL	AEXB	UH59
LCS3	4/11/2017	ENDRN	LT	0.00399	UGL	AFEI	UH59
LCS3	7/12/2017	ENDRN		0.134	UGL	AFQR	UH59
LCS3	12/12/2017	ENDRN	LT	0.00382	UGL	AGAF	UH61
LCS3	2/8/2018	ENDRN	LT	0.00382	UGL	AGCT	UH61
LCS3	5/14/2018	ENDRN	LT	0.00382	UGL	AGLZ	UH61
LCS3	7/23/2018	ENDRN	LT	0.00382	UGL	AGRI	UH61
LCS3	10/18/2018	ENDRN	LT	0.00382	UGL	AGYX	UH61
LCS3	1/14/2019	ENDRN	LT	0.00382	UGL	AHDE	UH61
LCS3	4/15/2019	ENDRN	LT	0.00382	UGL	AHHK	UH61
LCS3	3/1/2021	ENDRN	LT	0.00488	UGL	AJEC	UH63
LCS3	2/21/2023	ENDRN	LT	0.00488	UGL	ALLK	UH63
LCS3	7/1/2024	ENDRN	LT	0.005	UGL	ANDQ	UH65

Table 4 - Historical Levels of Endrin in LDS3

site_id	samp_date	test_name	boolean	Data	uom	flag_code	lot_no	anal_meth_no
LDS3	10/11/2000	ENDRN	LT	0.73	UGL		IIX_	UH50
LDS3	1/10/2001	ENDRN	LT	0.073	UGL		INT_	UH50
LDS3	4/18/2001	ENDRN	LT	0.073	UGL		IVW_	UH50
LDS3	7/10/2001	ENDRN	LT	0.073	UGL		JDZ_	UH50
LDS3	11/6/2001	ENDRN	LT	0.073	UGL		JTD_	UH50
LDS3	1/10/2002	ENDRN	LT	0.032	UGL		JWS_	UH51
LDS3	4/30/2002	ENDRN		0.12	UGL		KGG_	UH51
LDS3	6/18/2002	ENDRN		0.0618	UGL		KKB_	UH51
LDS3	7/17/2002	ENDRN	LT	0.032	UGL		KPC_	UH51
LDS3	8/27/2002	ENDRN	LT	0.032	UGL		KWA_	UH51
LDS3	9/18/2002	ENDRN	LT	0.032	UGL		KZU_	UH51
LDS3	10/21/2002	ENDRN	LT	0.032	UGL		LDY_	UH51
LDS3	11/19/2002	ENDRN	LT	0.032	UGL		LHU_	UH51
LDS3	12/18/2002	ENDRN	LT	0.032	UGL		LKW_	UH51
LDS3	1/15/2003	ENDRN	LT	0.032	UGL		LOJ_	UH51
LDS3	2/19/2003	ENDRN	LT	0.032	UGL		LRL_	UH51
LDS3	3/26/2003	ENDRN	LT	0.032	UGL		LVE_	UH51
LDS3	4/16/2003	ENDRN	LT	0.032	UGL		LYZ_	UH51
LDS3	7/15/2003	ENDRN	LT	0.032	UGL		MKA_	UH51
LDS3	10/28/2003	ENDRN	LT	0.032	UGL		MTV_	UH51
LDS3	1/21/2004	ENDRN	LT	0.032	UGL		NBD_	UH51
LDS3	4/13/2004	ENDRN	LT	0.032	UGL		NHV_	UH51
LDS3	7/13/2004	ENDRN	LT	0.032	UGL		NRD_	UH51
LDS3	10/26/2004	ENDRN	LT	0.032	UGL		OHS_	UH51
LDS3	1/18/2005	ENDRN	LT	0.032	UGL		OMS_	UH51
LDS3	4/20/2005	ENDRN	LT	0.0347	UGL		OSN_	UH54
LDS3	7/21/2005	ENDRN		0.05	UGL		PDF_	UH54
LDS3	10/26/2005	ENDRN	LT	0.0347	UGL		POG_	UH54
LDS3	2/1/2006	ENDRN	LT	0.0347	UGL		PTW_	UH54
LDS3	4/20/2006	ENDRN	LT	0.0347	UGL		QDK_	UH54
LDS3	7/26/2006	ENDRN		0.041	UGL		QPK_	UH54
LDS3	11/8/2006	ENDRN	LT	0.0347	UGL		RHN_	UH54
LDS3	1/18/2007	ENDRN	LT	0.0347	UGL		RPZ_	UH54
LDS3	4/25/2007	ENDRN	LT	0.0347	UGL		RZO_	UH54
LDS3	8/2/2007	ENDRN	LT	0.0347	UGL		SQE_	UH54
LDS3	1/28/2008	ENDRN	LT	0.0347	UGL		TNS_	UH54
LDS3	3/31/2008	ENDRN	LT	0.0347	UGL		TUL_	UH54
LDS3	7/16/2008	ENDRN	LT	0.0344	UGL		UED_	UH56
LDS3	10/9/2008	ENDRN	LT	0.0344	UGL		UQB_	UH56
LDS3	1/6/2009	ENDRN	LT	0.0344	UGL		VAM_	UH56
LDS3	5/6/2009	ENDRN	LT	0.0344	UGL		VNI_	UH56
LDS3	7/15/2009	ENDRN	LT	0.0344	UGL		VZK_	UH56
LDS3	10/7/2009	ENDRN	LT	0.0344	UGL		WMH_	UH56
LDS3	1/12/2010	ENDRN	LT	0.0344	UGL		WVD_	UH56
LDS3	4/19/2010	ENDRN	LT	0.0344	UGL		XCZ_	UH56
LDS3	7/14/2010	ENDRN		0.0593	UGL		XQF_	UH56

Table 4 - Historical Levels of Endrin in LDS3

LDS3	10/6/2010	ENDRN	LT	0.0344	UGL	YAT_	UH56
LDS3	1/12/2011	ENDRN	LT	0.0344	UGL	YKR_	UH56
LDS3	4/12/2011	ENDRN		0.06	UGL	YOA_	UH56
LDS3	7/25/2011	ENDRN		0.029	UGL	ZAF_	UH57
LDS3	8/22/2011	ENDRN		0.0141	UGL	ZCP_	UH57
LDS3	9/21/2011	ENDRN		0.0539	UGL	ZEI_	UH57
LDS3	10/18/2011	ENDRN		0.03	UGL	ZGB_	UH57
LDS3	1/23/2012	ENDRN		0.0263	UGL	ZKD_	UH57
LDS3	4/23/2012	ENDRN		0.0127	UGL	ZQC_	UH57
LDS3	7/11/2012	ENDRN		0.0383	UGL	ZZE_	UH57
LDS3	10/10/2012	ENDRN		0.0326	UGL	AAJQ	UH57
LDS3	1/17/2013	ENDRN		0.0322	UGL	AANK	UH57
LDS3	4/18/2013	ENDRN		0.0118	UGL	AAUU	UH57
LDS3	7/22/2013	ENDRN		0.0638	UGL	ABFO	UH57
LDS3	10/21/2013	ENDRN		0.0184	UGL	ABKV	UH57
LDS3	1/16/2014	ENDRN		0.0168	UGL	ABQE	UH57
LDS3	4/17/2014	ENDRN		0.0163	UGL	ABXQ	UH57
LDS3	7/23/2014	ENDRN		0.0433	UGL	ACJC	UH57
LDS3	11/18/2014	ENDRN	LT	0.00399	UGL	ACQX	UH59
LDS3	1/19/2015	ENDRN	LT	0.00399	UGL	ACUD	UH59
LDS3	4/20/2015	ENDRN		0.0185	UGL	ADAR	UH59
LDS3	8/3/2015	ENDRN		0.0133	UGL	ADMQ	UH59
LDS3	10/26/2015	ENDRN	LT	0.00399	UGL	ADRM	UH59
LDS3	1/20/2016	ENDRN	LT	0.00399	UGL	ADVM	UH59
LDS3	4/19/2016	ENDRN	LT	0.00399	UGL	AEEG	UH59
LDS3	7/25/2016	ENDRN	LT	0.00399	UGL	AENG	UH59
LDS3	10/20/2016	ENDRN	LT	0.00399	UGL	AESH	UH59
LDS3	1/18/2017	ENDRN	LT	0.00399	UGL	AEXB	UH59
LDS3	4/11/2017	ENDRN		0.0389	UGL	AFEI	UH59
LDS3	7/12/2017	ENDRN		0.045	UGL	AFQR	UH59
LDS3	12/12/2017	ENDRN		0.0381	UGL	AGAF	UH61
LDS3	2/8/2018	ENDRN	LT	0.00382	UGL	AGCT	UH61
LDS3	5/14/2018	ENDRN		0.0364	UGL	AGLZ	UH61
LDS3	7/23/2018	ENDRN	LT	0.00382	UGL	AGRI	UH61
LDS3	10/18/2018	ENDRN	LT	0.00382	UGL	AGYX	UH61
LDS3	1/14/2019	ENDRN		0.0275	UGL	AHDE	UH61
LDS3	4/15/2019	ENDRN		0.0141	UGL	AHHK	UH61
LDS3	10/29/2020	ENDRN		0.0292	UGL	AIZB	UH61
LDS3	4/18/2022	ENDRN		0.0315	UGL	AKLK	UH63
LDS3	**7/8/2024**	**ENDRN**		**0.097**	**UGL**	**ANEA**	**UH65**

Table 5 - Historical Levels of gamma-Chlordane in LCS3

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LCS3	10/11/2000	GCLDAN	LT	0.022	UGL		IIX_	UH50
LCS3	7/10/2001	GCLDAN	LT	0.024	UGL		JDZ_	UH50
LCS3	1/10/2002	GCLDAN	LT	0.012	UGL		JWS_	UH51
LCS3	4/23/2002	GCLDAN	LT	0.012	UGL	V	KFV_	UH51
LCS3	7/17/2002	GCLDAN	LT	0.012	UGL		KPC_	UH51
LCS3	10/21/2002	GCLDAN	LT	0.012	UGL		LDY_	UH51
LCS3	1/15/2003	GCLDAN	LT	0.012	UGL		LOJ_	UH51
LCS3	4/16/2003	GCLDAN	LT	0.012	UGL		LYZ_	UH51
LCS3	7/15/2003	GCLDAN		0.0338	UGL		MKA_	UH51
LCS3	10/28/2003	GCLDAN	LT	0.012	UGL		MTV_	UH51
LCS3	1/21/2004	GCLDAN	LT	0.012	UGL		NBD_	UH51
LCS3	4/13/2004	GCLDAN		0.0278	UGL		NHV_	UH51
LCS3	7/13/2004	GCLDAN	LT	0.012	UGL		NRD_	UH51
LCS3	10/26/2004	GCLDAN	LT	0.012	UGL		OHS_	UH51
LCS3	1/18/2005	GCLDAN	LT	0.012	UGL		OMS_	UH51
LCS3	4/20/2005	GCLDAN	LT	0.0126	UGL		OSN_	UH54
LCS3	7/21/2005	GCLDAN		0.0723	UGL		PDF_	UH54
LCS3	10/26/2005	GCLDAN	LT	0.0126	UGL		POG_	UH54
LCS3	2/1/2006	GCLDAN		0.311	UGL		PTW_	UH54
LCS3	7/26/2006	GCLDAN		0.221	UGL		QPK_	UH54
LCS3	11/8/2006	GCLDAN	LT	0.0126	UGL		RHN_	UH54
LCS3	1/18/2007	GCLDAN		0.118	UGL		RPZ_	UH54
LCS3	4/25/2007	GCLDAN	LT	0.0126	UGL		RZO_	UH54
LCS3	11/14/2007	GCLDAN		0.178	UGL		TFN_	UH54
LCS3	1/28/2008	GCLDAN		0.125	UGL		TNS_	UH54
LCS3	3/31/2008	GCLDAN	LT	0.0126	UGL		TUL_	UH54
LCS3	7/16/2008	GCLDAN	LT	0.0386	UGL		UED_	UH56
LCS3	10/9/2008	GCLDAN	LT	0.0386	UGL		UQB_	UH56
LCS3	1/6/2009	GCLDAN	LT	0.0386	UGL		VAM_	UH56
LCS3	5/6/2009	GCLDAN		0.176	UGL		VNI_	UH56
LCS3	7/15/2009	GCLDAN	LT	0.0386	UGL		VZK_	UH56
LCS3	10/7/2009	GCLDAN		0.146	UGL		WMH_	UH56
LCS3	1/12/2010	GCLDAN		0.17	UGL		WVD_	UH56
LCS3	4/12/2010	GCLDAN		0.127	UGL		XBM_	UH56
LCS3	7/14/2010	GCLDAN		0.233	UGL		XQF_	UH56
LCS3	10/6/2010	GCLDAN	LT	0.0386	UGL		YAT_	UH56
LCS3	1/12/2011	GCLDAN	LT	0.0386	UGL		YKR_	UH56
LCS3	4/12/2011	GCLDAN		0.127	UGL		YOA_	UH56
LCS3	7/25/2011	GCLDAN	LT	0.0185	UGL		ZAF_	UH57
LCS3	10/18/2011	GCLDAN		0.102	UGL		ZGB_	UH57
LCS3	1/23/2012	GCLDAN		0.218	UGL		ZKD_	UH57
LCS3	4/23/2012	GCLDAN	LT	0.0185	UGL		ZQC_	UH57
LCS3	7/11/2012	GCLDAN		0.278	UGL		ZZE_	UH57
LCS3	10/10/2012	GCLDAN		0.137	UGL		AAJQ	UH57
LCS3	1/17/2013	GCLDAN		0.213	UGL		AANJ	UH57
LCS3	4/18/2013	GCLDAN		0.13	UGL		AAUU	UH57

Table 5 - Historical Levels of gamma-Chlordane in LCS3

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LCS3	7/22/2013	GCLDAN		0.104	UGL		ABFO	UH57
LCS3	10/21/2013	GCLDAN		0.225	UGL		ABKV	UH57
LCS3	1/16/2014	GCLDAN		0.435	UGL		ABQE	UH57
LCS3	4/22/2014	GCLDAN		0.127	UGL		ABYM	UH57
LCS3	7/23/2014	GCLDAN		0.22	UGL		ACJC	UH57
LCS3	11/18/2014	GCLDAN	LT	0.00656	UGL		ACQX	UH59
LCS3	1/19/2015	GCLDAN		0.223	UGL		ACUD	UH59
LCS3	4/20/2015	GCLDAN	LT	0.00656	UGL		ADAR	UH59
LCS3	8/3/2015	GCLDAN		0.623	UGL		ADMQ	UH59
LCS3	10/26/2015	GCLDAN		0.222	UGL		ADRM	UH59
LCS3	1/20/2016	GCLDAN		0.299	UGL		ADVM	UH59
LCS3	4/19/2016	GCLDAN		0.188	UGL		AEEG	UH59
LCS3	7/25/2016	GCLDAN		0.569	UGL		AENG	UH59
LCS3	10/20/2016	GCLDAN		0.261	UGL		AESH	UH59
LCS3	1/18/2017	GCLDAN		0.222	UGL		AEXB	UH59
LCS3	4/11/2017	GCLDAN		0.254	UGL		AFEI	UH59
LCS3	7/12/2017	GCLDAN		0.142	UGL		AFQR	UH59
LCS3	12/12/2017	GCLDAN	LT	0.00769	UGL		AGAF	UH61
LCS3	2/8/2018	GCLDAN	LT	0.00769	UGL		AGCT	UH61
LCS3	5/14/2018	GCLDAN		0.202	UGL		AGLZ	UH61
LCS3	7/23/2018	GCLDAN		0.267	UGL		AGRI	UH61
LCS3	10/18/2018	GCLDAN	LT	0.00769	UGL		AGYX	UH61
LCS3	1/14/2019	GCLDAN		0.755	UGL		AHDE	UH61
LCS3	4/15/2019	GCLDAN	LT	0.00769	UGL		AHHK	UH61
LCS3	3/1/2021	GCLDAN	LT	0.00426	UGL		AJEC	UH63
LCS3	2/21/2023	GCLDAN	LT	0.00426	UGL		ALLK	UH63
LCS3	7/1/2024	GCLDAN	LT	0.004	UGL		ANDQ	UH65

Table 6 - Historical Levels of gamma-Chlordane in LDS4

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LDS3	10/11/2000	GCLDAN	LT	0.22	UGL		IIX_	UH50
LDS3	1/10/2001	GCLDAN	LT	0.022	UGL		INT_	UH50
LDS3	4/18/2001	GCLDAN	LT	0.022	UGL		IVW_	UH50
LDS3	7/10/2001	GCLDAN	LT	0.022	UGL		JDZ_	UH50
LDS3	11/6/2001	GCLDAN	LT	0.022	UGL		JTD_	UH50
LDS3	1/10/2002	GCLDAN	LT	0.012	UGL		JWS_	UH51
LDS3	4/30/2002	GCLDAN	LT	0.012	UGL		KGG_	UH51
LDS3	6/18/2002	GCLDAN	LT	0.012	UGL		KKB_	UH51
LDS3	7/17/2002	GCLDAN	LT	0.012	UGL		KPC_	UH51
LDS3	8/27/2002	GCLDAN	LT	0.012	UGL		KWA_	UH51
LDS3	9/18/2002	GCLDAN	LT	0.012	UGL		KZU_	UH51
LDS3	10/21/2002	GCLDAN	LT	0.012	UGL		LDY_	UH51
LDS3	11/19/2002	GCLDAN	LT	0.012	UGL		LHU_	UH51
LDS3	12/18/2002	GCLDAN	LT	0.012	UGL		LKW_	UH51
LDS3	1/15/2003	GCLDAN	LT	0.012	UGL		LOJ_	UH51
LDS3	2/19/2003	GCLDAN	LT	0.012	UGL		LRL_	UH51
LDS3	3/26/2003	GCLDAN	LT	0.012	UGL		LVE_	UH51
LDS3	4/16/2003	GCLDAN	LT	0.012	UGL		LYZ_	UH51
LDS3	7/15/2003	GCLDAN	LT	0.012	UGL		MKA_	UH51
LDS3	10/28/2003	GCLDAN	LT	0.012	UGL		MTV_	UH51
LDS3	1/21/2004	GCLDAN	LT	0.012	UGL		NBD_	UH51
LDS3	4/13/2004	GCLDAN	LT	0.012	UGL		NHV_	UH51
LDS3	7/13/2004	GCLDAN	LT	0.012	UGL		NRD_	UH51
LDS3	10/26/2004	GCLDAN	LT	0.012	UGL		OHS_	UH51
LDS3	1/18/2005	GCLDAN	LT	0.012	UGL		OMS_	UH51
LDS3	4/20/2005	GCLDAN	LT	0.0126	UGL		OSN_	UH54
LDS3	7/21/2005	GCLDAN	LT	0.0126	UGL		PDF_	UH54
LDS3	10/26/2005	GCLDAN	LT	0.0126	UGL		POG_	UH54
LDS3	2/1/2006	GCLDAN	LT	0.0126	UGL		PTW_	UH54
LDS3	4/20/2006	GCLDAN	LT	0.0126	UGL		QDK_	UH54
LDS3	7/26/2006	GCLDAN	LT	0.0126	UGL		QPK_	UH54
LDS3	11/8/2006	GCLDAN	LT	0.0126	UGL		RHN_	UH54
LDS3	1/18/2007	GCLDAN	LT	0.0126	UGL		RPZ_	UH54
LDS3	4/25/2007	GCLDAN	LT	0.0126	UGL		RZO_	UH54
LDS3	1/28/2008	GCLDAN	LT	0.0126	UGL		TNS_	UH54
LDS3	3/31/2008	GCLDAN	LT	0.0126	UGL		TUL_	UH54
LDS3	7/16/2008	GCLDAN	LT	0.0386	UGL		UED_	UH56
LDS3	10/9/2008	GCLDAN	LT	0.0386	UGL		UQB_	UH56
LDS3	1/6/2009	GCLDAN	LT	0.0386	UGL		VAM_	UH56
LDS3	5/6/2009	GCLDAN	LT	0.0386	UGL		VNI_	UH56
LDS3	7/15/2009	GCLDAN	LT	0.0386	UGL		VZK_	UH56
LDS3	10/7/2009	GCLDAN	LT	0.0386	UGL		WMH_	UH56
LDS3	1/12/2010	GCLDAN	LT	0.0386	UGL		WVD_	UH56
LDS3	4/19/2010	GCLDAN	LT	0.0386	UGL		XCZ_	UH56
LDS3	7/14/2010	GCLDAN	LT	0.0386	UGL		XQF_	UH56
LDS3	10/6/2010	GCLDAN	LT	0.0386	UGL		YAT_	UH56

Table 6 - Historical Levels of gamma-Chlordane in LDS4

site_id	samp_date	test_name	boolean	data	uom	flag_code	lot_no	anal_meth_no
LDS3	1/12/2011	GCLDAN		0.0738	UGL		YKR_	UH56
LDS3	4/12/2011	GCLDAN	LT	0.0386	UGL		YOA_	UH56
LDS3	7/25/2011	GCLDAN	LT	0.0185	UGL		ZAF_	UH57
LDS3	8/22/2011	GCLDAN	LT	0.0246	UGL		ZCP_	UH57
LDS3	9/21/2011	GCLDAN	LT	0.0185	UGL		ZEI_	UH57
LDS3	10/18/2011	GCLDAN	LT	0.0185	UGL		ZGB_	UH57
LDS3	1/23/2012	GCLDAN		0.0216	UGL		ZKD_	UH57
LDS3	4/23/2012	GCLDAN	LT	0.0185	UGL		ZQC_	UH57
LDS3	7/11/2012	GCLDAN		0.0262	UGL		ZZE_	UH57
LDS3	10/10/2012	GCLDAN	LT	0.0185	UGL		AAJQ	UH57
LDS3	1/17/2013	GCLDAN	LT	0.0185	UGL		AANK	UH57
LDS3	4/18/2013	GCLDAN	LT	0.0185	UGL		AAUU	UH57
LDS3	7/22/2013	GCLDAN		0.0245	UGL		ABFO	UH57
LDS3	10/21/2013	GCLDAN	LT	0.0185	UGL		ABKV	UH57
LDS3	1/16/2014	GCLDAN	LT	0.0185	UGL		ABQE	UH57
LDS3	4/17/2014	GCLDAN	LT	0.0185	UGL		ABXQ	UH57
LDS3	7/23/2014	GCLDAN	LT	0.0185	UGL		ACJC	UH57
LDS3	11/18/2014	GCLDAN	LT	0.00656	UGL		ACQX	UH59
LDS3	1/19/2015	GCLDAN	LT	0.00656	UGL		ACUD	UH59
LDS3	4/20/2015	GCLDAN	LT	0.00656	UGL		ADAR	UH59
LDS3	8/3/2015	GCLDAN		0.01	UGL		ADMQ	UH59
LDS3	10/26/2015	GCLDAN	LT	0.00656	UGL		ADRM	UH59
LDS3	1/20/2016	GCLDAN	LT	0.00656	UGL		ADVM	UH59
LDS3	4/19/2016	GCLDAN	LT	0.00656	UGL		AEEG	UH59
LDS3	7/25/2016	GCLDAN	LT	0.00656	UGL		AENG	UH59
LDS3	10/20/2016	GCLDAN	LT	0.00656	UGL		AESH	UH59
LDS3	1/18/2017	GCLDAN	LT	0.00656	UGL		AEXB	UH59
LDS3	4/11/2017	GCLDAN	LT	0.00656	UGL		AFEI	UH59
LDS3	7/12/2017	GCLDAN	LT	0.00656	UGL		AFQR	UH59
LDS3	12/12/2017	GCLDAN	LT	0.00769	UGL		AGAF	UH61
LDS3	2/8/2018	GCLDAN	LT	0.00769	UGL		AGCT	UH61
LDS3	5/14/2018	GCLDAN	LT	0.00769	UGL		AGLZ	UH61
LDS3	7/23/2018	GCLDAN	LT	0.00769	UGL		AGRI	UH61
LDS3	10/18/2018	GCLDAN	LT	0.00769	UGL		AGYX	UH61
LDS3	1/14/2019	GCLDAN	LT	0.00769	UGL		AHDE	UH61
LDS3	4/15/2019	GCLDAN	LT	0.00769	UGL		AHHK	UH61
LDS3	10/29/2020	GCLDAN	LT	0.00769	UGL		AIZB	UH61
LDS3	4/18/2022	GCLDAN		0.00921	UGL		AKLK	UH63
LDS3	7/8/2024	GCLDAN		0.244	UGL		ANEA	UH65

Michael W. Jones

From: Rymarz, Natalie A CIV USARMY USAG (USA) <Natalie.a.rymarz.civ@army.mil>
Sent: Friday, April 18, 2025 2:26 PM
To: Joseph Chisholm; Mark Collar; Rachel Puttmann; Susan Newton; Thomas Butts; Vince Stewart
Cc: Cable, Kelly; Michael W. Jones; Kim Hoffman; Adams, Jamar M CIV USARMY IMCOM (USA)
Subject: FW: Landfills and Covers Notification - Obstruction in Monitoring Well 26051
Attachments: 26051 Notification Map.pdf

Good afternoon Landfills and Covers Team,

Below is a notification of an obstruction in monitoring well 26051 resulting in a missed water level measurement in December of 2024.

Please review the notification and let us know if you have any questions or comments. This notification will be discussed at the semiannual Landfills and Covers O&M status meeting next Tuesday at 11:00 AM. An NRAP will be provided to the regulatory agencies within 30 days of this notification.

Respectfully,
Natalie

Natalie Rymarz
Mechanical Engineer
Rocky Mountain Arsenal
natalie.a.rymarz.civ@army.mil
MS Teams: +1 520-692-3940
Gov Cell: (719) 726-8987

From: Michael W. Jones <JonesM@navarro-inc.com>
Sent: Friday, April 18, 2025 11:28 AM
To: Rymarz, Natalie A CIV USARMY USAG (USA) <Natalie.a.rymarz.civ@army.mil>
Cc: Cable, Kelly <kelly.cable@aecom.com>; Kim Hoffman <hoffman@navarro-inc.com>; Ache, Scott <Ache@navarro-inc.com>
Subject: Landfills and Covers Notification - Obstruction in Monitoring Well 26051

Natalie,
This email is intended to notify the regulatory agencies of an issue with well 26051. Please transmit this to the team at your convenience. This issue will be included in the agenda of our status meeting scheduled for April 22. Please let me know if you have any questions or concerns.
Thanks

Notification: The Navarro sampling staff were unable to collect a water level measurement at well 26051 in December of 2024 due to damage to the well's surface casing and an obstruction within the well. Well 26051 is listed in the water level monitoring networks for the Hazardous Waste Landfill (HWL), the Enhanced Hazardous Waste Landfill (ELF), and Basin F.

Subject: HWL Post-Closure Plan and ELF Post-Closure Plan Notification – Groundwater Monitoring
This is a required notification: While measuring groundwater levels in December of 2024, the water level at well 26051 could not be measured because the surface casing had been damaged and there was an obstruction in the well. Well 26051 is part of the water level monitoring network listed in Table 3.1.2-1 of the HWL Post-Closure Groundwater Monitoring Plan (PCGMP) and Table 3.2-1 of the ELF PCGMP. According to Section 3.5 of the HWL Post-Closure Plan (PCP) and ELF PCP, and Table 3.0-2 of both plans, damage to a groundwater monitoring well, or a missed groundwater monitoring sample requires regulatory agency notification and triggers the consultative process, which will be documented in a Non-Routine Action Plan (NRAP).
Note: Well 26051 is also listed as a water level monitoring network well in Table 3.3-2 of the Basin F PGGMP. However, the Basin F PCP does not require notification of well damage of interrupted groundwater data collection. The impact on Basin F groundwater monitoring is included in this notification for completeness.
Notification Requirement: HWL PCP Table 3.0-2: Non-Routine Action Trigger Levels and ELF PCP Table 3.0-2: Non-Routine Trigger Levels
Monitoring Category: Groundwater Monitoring Wells/Groundwater Monitoring
Trigger Event: Groundwater monitoring well damage has been observed for more than six months. Identification of a missed sample from any post-closure groundwater monitoring well.
Associated Monitoring: Groundwater level monitoring
Notification Schedule: A verbal notification will be made no more than 14 days following the determination that an action is considered to be non-routine. The notification to the CDPHE will be documented in an e-mail, letter, or similar record.
Consultation Required: A copy of the NRAP, including a schedule of activities, will be provided to the regulatory agencies within 30 days of the notification for review and concurrence.
Class of Modification to the Plan: N/A
Description of Issue: Well 26051 is used to collect groundwater level data for the HWL, ELF, and Basin F, and is also used in the development of site-wide water level mapping. This well is used for water level monitoring only and is not included in the three post-closure water quality networks. Well 26051 is in Section 26, east of Basin F, and is screened in the Denver Formation in the Unconfined Flow System (UFS). Refer to the attached map showing the location of the damaged well.
In December of 2024 Navarro's sampling team were unable to collect data from the well. Field notes recorded by the sampling crew stated that well 26051 was "filled with dead biota/broken/no TOC". The Sampling Manager stated that the surface casing appeared to have been damaged by a mower and that the crew was unable to clear the blockage while attempting to measure the water level.
This non-routine condition will be discussed at the semiannual Landfills and Covers O&M Status Meeting scheduled for Aprill 22, 2025, and an NRAP will be provided to the regulatory agencies within 30 days of this notification.

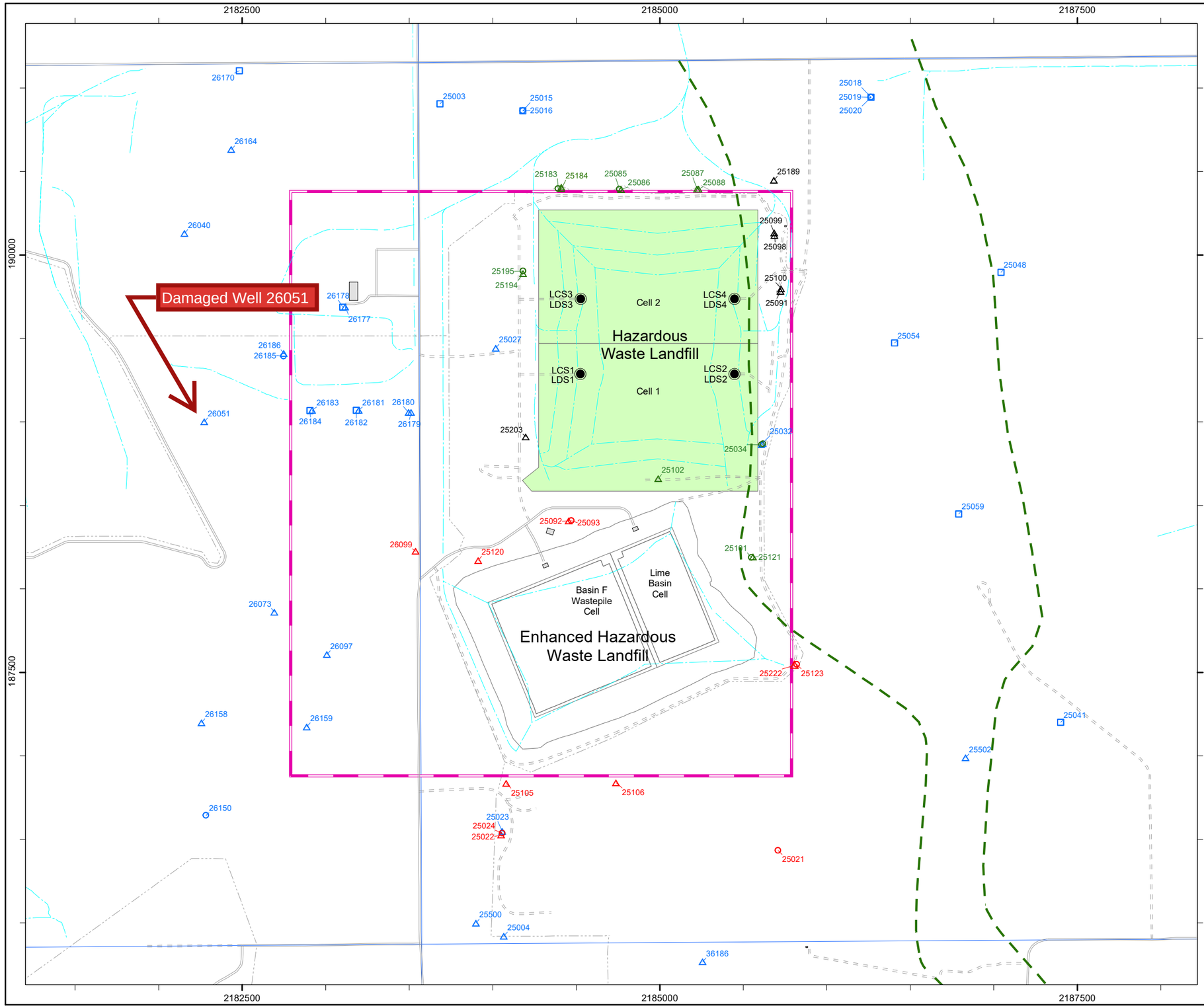
NAVARRO

Michael W. Jones

Landfills, Covers & Non-Routine Projects

Office: 720-625-3647 Cell: 303-564-7645

Rocky Mountain Arsenal
7270 Kingston Parkway
Commerce City, CO 80022



Legend

- Sumps
- Estimated North Plants/ Bedrock Ridge Plume Extent
- CAMU Boundary
- Buildings
- ELF Cells
- Section Lines
- Light Duty Roads
- Unpaved Roads
- Fences
- Ditches, Canals

Monitoring Well Network	Flow System/Aquifer		
	Unconfined Alluvial	Unconfined Denver	Confined Denver
Hazardous Waste Landfill (HWL)		△	○
HWL Supplemental Operations		△	
Enhanced Hazardous Waste Landfill (ELF)		△	○
Water Level Only	□	△	○

N

0 300 600 1,200
Feet

Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Program Manager
Rocky Mountain Arsenal

U.S. Army • COMMITTED TO PROTECTION OF THE ENVIRONMENT •

HWL Post-Closure Groundwater Monitoring Plan

Figure 3.2-1

Well Location Map

M:\projects\hwl_post-closure\mxds\hwl_well_piezometer_loc_082824.mxd
8/28/2024

NRAP Number	**NRAP-2024-001**
Applicable Design(s)	☒ Hazardous Waste Landfill – Record Documents ☒ Enhanced Hazardous Waste Landfill – Record Documents
Applicable Design Document(s)	☐ Drawing Number/Title/Revision: ☐ Spec. Number /Title/Revision: ☒ Plan Title/Revision: *HWL Post-Closure Plan*, Rev. 4 and *ELF Post-Closure Plan*, Rev. 1
Description of the Condition Requiring Action	During the annual water level measurements of the Hazardous Waste Landfill (HWL) and the Enhanced Hazardous Waste Landfill (ELF) well networks in 2024, the water level at well 25017 could not be measured because of an obstruction in the well. Well 25017 is part of the water level monitoring network listed in Table 3.1.2-1 of the *HWL Post-Closure Groundwater Monitoring Plan* (PCGMP) and Table 3.2-1 of the ELF PCGMP. Well 25017 is located north of the HWL, downgradient of both landfills, and is screened in the Denver Formation in the Confined Flow System (CFS). The well is screened between 74 and 80 feet below the top of casing (TOC). The well is obstructed approximately 42 feet below grade, preventing measuring equipment from contacting the water. The Navarro sampling crew attempted to clear the obstruction using a weighted bailer, but was unsuccessful. The sampling crew also attempted to break through the obstruction using a length of all-thread, but that attempt was also unsuccessful. According to Section 3.5 of the HWL Post-Closure Plan (PCP) and ELF PCP, and Table 3.0-2 of both plans, damage to a groundwater monitoring well, or a missed groundwater monitoring sample requires regulatory agency notification and triggers the consultative process between the Army and regulatory agencies. While well obstructions are not specifically addressed in the Post-Closure Plans, the plans do require notifications when monitoring wells are damaged and when samples are not collected as required. Well 25017 is not included in the groundwater quality sampling networks of either landfill.
Description of the Action	On June 24, 2024, an obstruction was confirmed within well 25017, located northwest and downgradient of the HWL. The Army notified the regulatory agencies of the obstruction via email on July 9, 2024. Well 25017 is co-located with wells 25015 and 25016. Well 25015 is screened in the Unconfined Flow System (UFS) across the Alluvium-Denver Formation contact at a depth of 33 to 43 feet below TOC. Well 25016 is screened in the CFS within the Denver Formation at a depth of 60 to 66 feet below TOC. Wells 25015, 25016, and 25017 are included in the water level monitoring networks for the HWL and ELF. Water levels data for well 25016 are used to map the CFS potentiometric surface, which is reported in the annual HWL Post-Closure Groundwater Monitoring Reports and the annual ELF Post-Closure Groundwater Monitoring Reports. Data for well 25017 are not used in the preparation of these reports. Well 25017 is screened deeper within the CFS and does not correlate with groundwater located in the shallower water-bearing zone of the CFS where 25016 is screened. The deeper water-bearing zone is not pertinent to the landfill groundwater monitoring programs. Thus, water level data from well 25017 are of little value from a post-closure monitoring perspective. The HWL and ELF post-closure requirements for mapping the UFS and CFS potentiometric surfaces are currently being met by wells 25015 and 25016. The Army recommends removal of well 25017 from the HWL and ELF groundwater monitoring programs since the well is not necessary to meet the requirements of the HWL and ELF Post-

	Closure Groundwater Monitoring Plans. The water level networks in both plans will be changed through OCNs.	
	Material Requirements: None	
	Performance Criteria: None	
	Does the action deviate from the requirements of the applicable design package(s)? ☐ Yes ☒ No If so, provide rationale for the deviation from the design package(s). **Rationale:** N/A	
Closeout Requirements	Is a multi-Agency post-action inspection required? ☐ Yes ☒ No Are modifications to monitoring or inspection frequencies required? ☐ Yes ☒ No Others:_____	
Consultation Record	Consultation Date: July 9, 2024 (email) and July 24, 2024 (meeting) Consultation Method: E-mail and meeting Consulted Parties: EPA, CDPHE, ACHD	
Attached Exhibits	☐ None ☐ Inspection Form(s) ☐ Map of Affected Area ☐ Correspondence	☐ Supplemental Work Plan(s) ☐ Rationale for Deviation From Design ☐ Modified Inspection Frequencies ☐ Others:

Approvals

Signature indicates the Parties are in consensus and concur with the proposed action and closeout requirements.

Cover Manager, or Designee Signature:	Army Project Manager, or Designee Signature:	
EPA Signature:	CDPHE Signature:	ACHD Signature:

APPENDIX G

Operations and Maintenance Change Notices

ROCKY MOUNTAIN ARSENAL
O&M CHANGE NOTICE

WBS Number: 4.01.01.24		OCN Number: **OCN-HWL-2024-002**
Affected Plan/Procedure	☒ HWL Post-Closure Plan	☐ Long-Term Monitoring Plan for GW & Surface Water
	☐ ELF Post-Closure Plan	☐ Land Use Controls Plan
	☐ Basin F Post-Closure Plan	☐ RVO SOP No. _____:
	☐ Long-Term Care Plan	☐ Other:
Recommended disposition: Class 1 Modification (required for HWL, ELF, and Basin F Post-Closure Plans)		

Describe proposed change (Exact change in redlined/strike-through format preferred. Provide below or in attachment):	Reason for change:
This OCN includes changes to the Hazardous Waste Landfill (HWL) groundwater level monitoring network described in the *HWL Post-Closure Groundwater Monitoring Plan* (PCGMP). Changes to the HWL PCGMP include the elimination of wells 25017 and 25122 from Table 3.1.2-1, and addition of well 25222 to Table 3.1.2-1. Wells 25017 and 25122 were eliminated from Figure 3.2-1, and well 25222 was added to Figure 3.2-1. The *HWL Post-Closure Plan* (PCP) does not specify notification protocol for obstructions in wells, or failure to collect water level data. This OCN adds failure to collect water level measurements, and well obstructions, to Table 3.0-2: Non-Routine Action Trigger Levels in the HWL PCP. These circumstances will require regulatory agency notification and initiation of the consultative process as outlined in the PCP. All changes to the HWL PCGMP and HWL PCP are shown in redline/strikeout format.	Well 25017 is included in the HWL groundwater level monitoring network defined in the HWL PCGPM. In June of 2024, the Army determined that the well is obstructed, and a water measurement could not be obtained. While the source of the obstruction is unknown, the Army concluded that well 25017 will no longer provide reliable water level data and should be removed from the well level monitoring network. Refer to NRAP-2024-001 for additional information regarding the obstruction and recommendation to remove the well from the water level network. OCN-HWL-2023-001 includes specifications for closure of well 25122 and construction of replacement well 25222, which was installed in October of 2023. This OCN documents the corresponding changes to the HWL water level monitoring network in the HWL PCGMP. This OCN updates Table 3.0-2: Non-Routine Action Trigger Levels in the HWL PCP to include obstruction notifications and missed water level monitoring from any post-closure groundwater monitoring well or Supplemental Operational Monitoring well.

Exhibits attached: ☐ None ☒ List:

- *HWL Post-Closure Groundwater Monitoring Plan* in redline/strikeout format (affected pages only)
- *HWL Post-Closure Plan* in redline/strikeout format (affected pages only)

Originator: Kim Hoffman	Date: August 28, 2024

Final Approval:	
ERS Project Manager	Army Project Manager
ERS Project Engineer (required for record drawing/design changes)	ERS Regulatory Compliance Manager

Regulatory Approvals:

EPA	CDPHE	ACHD

TABLE 3.0-2: Non-Routine Action Trigger Levels

Appendix/ SOP	**Item**	**Inspection Frequency**	**Type of Problem**	**Non-Routine Trigger Level** (Consultation Required)
Appendix A/ SOP HWL 001	Engineering and Access Controls	Monthly Semiannually	Unauthorized access	Breach of access controls.
Appendix A/ SOP HWL 001	Groundwater Monitoring Wells	Monthly Semiannually	Damaged groundwater monitoring wells	Groundwater monitoring well damage or an obstruction has been observed for more than six months.
Appendix B	Groundwater Monitoring	Quarterly	Increase in downgradient groundwater contamination	Exceedance of prediction interval for detected contaminant(s).
			Missed groundwater monitoring well data collection	Identification of a missed sample or a missed water level measurement from any post-closure groundwater monitoring well or Supplemental Operational Monitoring well.
			Analytical data quality problems in finalized data	Identification of a problem with the final analytical data quality obtained from groundwater, LCS, or LDS sampling.
Appendix B	LDS Water Quality Monitoring	Quarterly	Detection of a watch list analyte above the watch list trigger level	Detection of a watch list analyte above the watch list trigger level will result in a non-routine action (following the process described in Section 3.5 of this PCP) that will follow the sump data evaluation process identified in Figure 3.2-4 of the PCGMP, in conjunction with the consultative process, for resolution. The Regulatory Agencies will be notified of the exceedance and provided an evaluation and recommended action.
Appendix B	LDS Water Quality Monitoring	Quarterly	Detection of an analyte above the reporting limit with no watch list trigger level which requires reporting if detected (excludes analytes listed on Table 3.2.5-1 in PCGMP).	Any detection above the reporting limit of these analytes for the first or third time will result in a non-routine action (following the process described in Section 3.5 of this PCP) that will follow the sump data evaluation process identified in Figure 3.2-4 of the PCGMP, in conjunction with the consultative process, for resolution. The Regulatory Agencies will be notified of the exceedance and provided an evaluation and recommended action.
Appendix C	LCS/LDS Discharge Piping	Quarterly	Collapsed or plugged piping.	Restricted flow to the extent that leachate collection and leak detection sump low levels cannot be maintained.

Commented [KH1]: OCN-HWL-2024-002

Commented [KH2]: OCN-HWL-2024-002

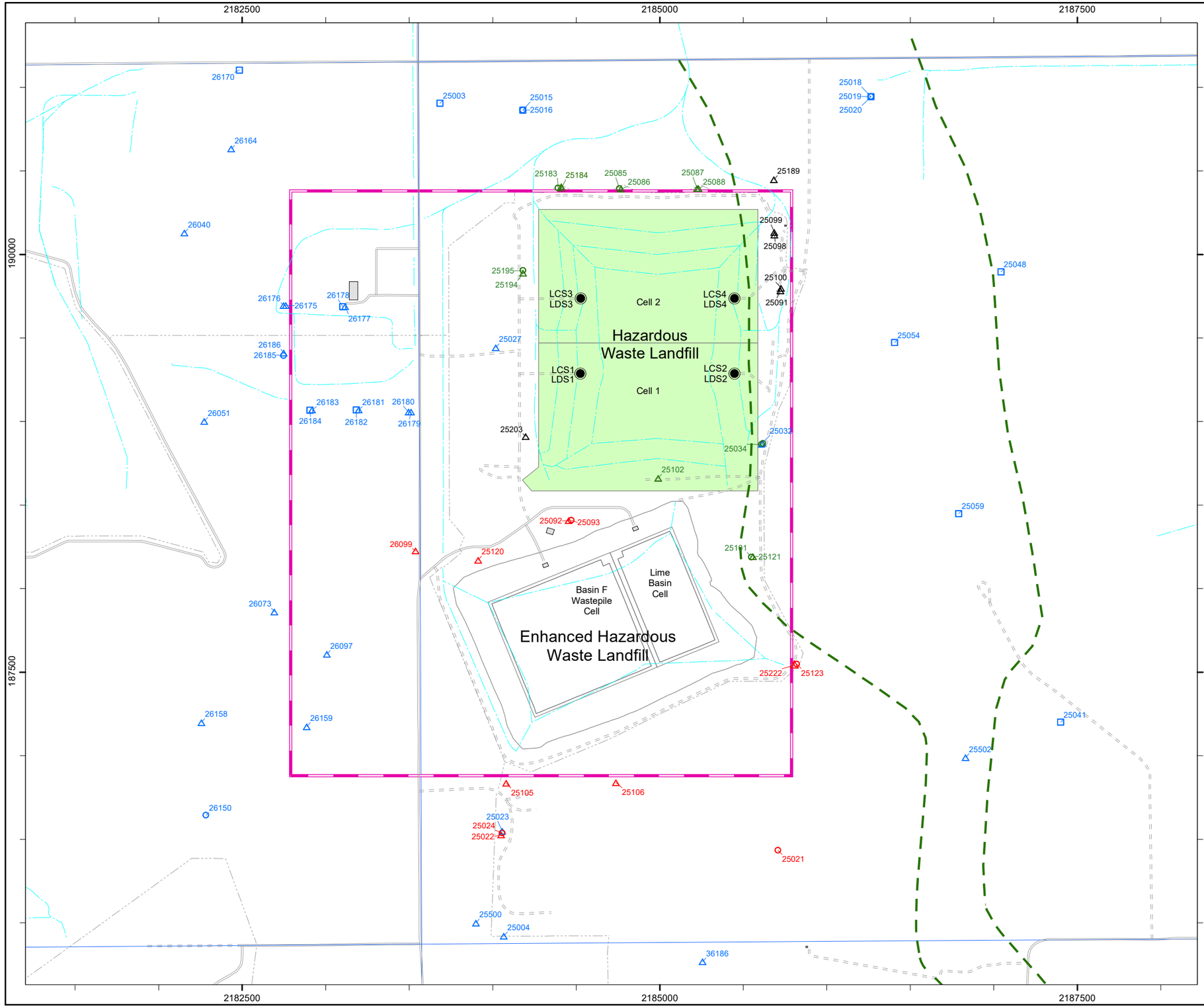
Table 3.1.2-1: Water Level Monitoring Network

Well Number	Aquifer	Groundwater Flow System
25003	Alluvium	UFS
25004	Denver Fm	UFS
25015	Alluvium/Denver Fm	UFS
25016	Denver Fm	CFS
~~25017~~	~~Denver Fm~~	~~CFS~~
25018	Alluvium/Denver Fm	UFS
25019	Denver Fm	CFS
25020	Denver Fm	CFS
25021	Denver Fm	CFS
25022	Denver Fm	UFS
25023	Denver Fm	UFS
25024	Denver Fm	CFS
25027	Denver Fm	UFS
25032	Denver Fm	UFS
25034	Denver Fm	CFS
25041	Alluvium	UFS
25048	Alluvium	UFS
25054	Alluvium	UFS
25059	Alluvium/Denver Fm	UFS
25183	Denver Fm	CFS
25085	Denver Fm	CFS
25086	Denver Fm	UFS
25087	Denver Fm	UFS
25088	Denver Fm	UFS
25189	Denver Fm	UFS
25091	Denver Fm	UFS
25092	Denver Fm	UFS
25093	Denver Fm	CFS
25194	Denver Fm	UFS
25195	Denver Fm	CFS
25098	Denver Fm	UFS
25099	Denver Fm	UFS
25100	Denver Fm	UFS
25101	Denver Fm	CFS
25102	Denver Fm	UFS
25203	Denver Fm	UFS
25105	Denver Fm	UFS
25106	Denver Fm	UFS
25120	Denver Fm	UFS
25121	Denver Fm	UFS
~~25122~~	~~Denver Fm~~	~~UFS~~
25123	Denver Fm	CFS
25222	Denver Fm	UFS

Commented [KH1]: OCN-HWL-2024-002

Commented [MWJ2]: OCN-HWL-2024-002

Commented [MWJ3]: OCN-HWL-2024-002



Legend

- Sumps
- Estimated North Plants/ Bedrock Ridge Plume Extent
- CAMU Boundary
- Buildings
- ELF Cells
- Section Lines
- Light Duty Roads
- Unpaved Roads
- Fences
- Ditches, Canals

Monitoring Well Network	Flow System/Aquifer		
	Unconfined Alluvial	Unconfined Denver	Confined Denver
Hazardous Waste Landfill (HWL)		△	○
HWL Supplemental Operations		△	
Enhanced Hazardous Waste Landfill (ELF)		△	○
Water Level Only	□	△	○

N

0 300 600 1,200
Feet

Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Program Manager
Rocky Mountain Arsenal

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HWL Post-Closure Groundwater Monitoring Plan

Figure 3.2-1

Well Location Map

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8/28/2024

ROCKY MOUNTAIN ARSENAL
O&M CHANGE NOTICE

WBS Number: 4.01.01.24		OCN Number: **OCN-ELF-2024-002**
Affected Plan/Procedure	☐ HWL Post-Closure Plan	☐ Long-Term Monitoring Plan for GW & Surface Water
	☒ ELF Post-Closure Plan	☐ Land Use Controls Plan
	☐ Basin F Post-Closure Plan	☐ RVO SOP No. _____:
	☐ Long-Term Care Plan	☐ Other:
Recommended disposition: Class 1 Modification (required for HWL, ELF, and Basin F Post-Closure Plans)		
Describe proposed change (Exact change in redlined/strike-through format preferred. Provide below or in attachment): This OCN includes changes to the Enhanced Hazardous Waste Landfill (ELF) groundwater level monitoring network described in the *ELF Post-Closure Groundwater Monitoring Plan* (PCGMP). Changes to the ELF PCGMP include the elimination of wells 25017 and 25122 from Table 3.1.2-1 and addition of well 25222 to Table 3.1.2-1. Wells 25017 and 25122 were eliminated from Figure 3.2-1, and well 25222 was added to Figure 3.2-1. The *ELF Post-Closure Plan* (PCP) does not specify notification protocol for obstructions in wells, or failure to collect water level data This OCN adds failure to collect water level measurements, and well obstructions, to Table 3.0-2: Non-Routine Action Trigger Levels in the ELF PCP. These circumstances will require regulatory agency notification and initiation of the consultative process as outlined in the PCP. All changes to the ELF PCGMP and ELF PCP are shown in redline/strikeout format.		Reason for change: Well 25017 is included in the ELF groundwater level monitoring network defined in the ELF PCGPM. In June of 2024, the Army determined that the well is obstructed, and a water measurement could not be obtained. While the source of the obstruction is unknown, the Army concluded that well 25017 will no longer provide reliable water level data and should be removed from the well level monitoring network. Refer to NRAP-2024-001 for additional information regarding the obstruction and recommendation to remove the well from the water level network. OCN-ELF-2023-001 includes specifications for closure of well 25122 and construction of replacement well 25222, which was installed in October of 2023. This OCN documents the corresponding changes to the ELF water level monitoring network in the ELF PCGMP. This OCN updates Table 3.0-2: Non-Routine Action Trigger Levels in the ELF PCP to include obstruction notifications and missed water level monitoring from any post-closure groundwater monitoring well.
Exhibits attached: ☐ None ☒ List: • *ELF Post-Closure Groundwater Monitoring Plan* in redline/strikeout format (affected pages only) • *ELF Post-Closure Plan* in redline/strikeout format (affected pages only)		
Originator: Kim Hoffman		Date: August 28, 2024

Final Approval:	
ERS Project Manager	Army Project Manager
ERS Project Engineer (required for record drawing/design changes)	ERS Regulatory Compliance Manager

Regulatory Approvals:

EPA	CDPHE	ACHD

TABLE 3.0-2: Non-Routine Action Trigger Levels

Appendix/ SOP	**Item**	**Inspection Frequency**	**Type of Problem**	**Non-Routine Trigger Level** (Consultation Required)
Appendix A/ SOP ELF 001	Engineering and Access Controls	Monthly Semiannually	Unauthorized access	Breach of access controls.
Appendix A/ SOP ELF 001	Groundwater Monitoring Wells	Monthly Semiannually	Damaged groundwater monitoring wells	Groundwater monitoring well damage or an obstruction has been observed for more than six months.
Appendix B	Groundwater Monitoring	Quarterly	Increase in downgradient groundwater contamination	Exceedance of prediction interval for detected contaminant(s).
			Missed groundwater monitoring well data collection	Identification of a missed sample or a missed water level measurement from any post-closure groundwater monitoring well or Supplemental Operational Monitoring well.
			Analytical data quality problems in finalized data	Identification of a problem with the final analytical data quality obtained from groundwater, LCS, or LDS sampling.
Appendix B	LDS Water Quality Monitoring	Prior to removing wastewater from the sump	Detection of a watch list analyte above the watch list trigger level	Detection of a watch list analyte above the watch list trigger level will result in a non-routine action (following the process described in Section 3.5 of this PCP) that will follow the sump data evaluation process identified in Figure 3.2-4 of the PCGMP, in conjunction with the consultative process, for resolution. The Regulatory Agencies will be notified of the exceedance and provided an evaluation and recommended action.
Appendix B	LDS Water Quality Monitoring	Prior to removing wastewater from the sump	Detection of an analyte above the reporting limit with no watch list trigger level which requires reporting if detected (excludes analytes listed on Table 3.2.5-1 in PCGMP).	Any detection above the reporting limit of these analytes for the first or third time will result in a non-routine action (following the process described in Section 3.5 of this PCP) that will follow the sump data evaluation process identified in Figure 3.2-4, in conjunction with the consultative process (RVO 2012a), for resolution. The Regulatory Agencies will be notified of the exceedance and provided an evaluation and recommended action.
Appendix C	LCS/LDS Discharge Piping	Prior to removing wastewater from the sump	Collapsed or plugged piping.	Restricted flow to the extent that leachate collection and leak detection sump low levels cannot be maintained.

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Commented [KH17]: OCN-ELF-2024-002

Table 3.2-1: Water Level Monitoring Network

Well Number	Aquifer	Groundwater Flow System
25003	Alluvium	UFS
25004	Denver Formation	UFS
25015	Alluvium/Denver Formation	UFS
25016	Denver Formation	CFS
~~25017~~	~~Denver Formation~~	~~CFS~~
25018	Alluvium/Denver Formation	UFS
25019	Denver Formation	CFS
25020	Denver Formation	CFS
25021	Denver Formation	CFS
25022	Denver Formation	UFS
25023	Denver Formation	UFS
25024	Denver Formation	CFS
25027	Denver Formation	UFS
25032	Denver Formation	UFS
25034	Denver Formation	CFS
25041	Alluvium	UFS
25048	Alluvium	UFS
25054	Alluvium	UFS
25059	Alluvium/Denver Formation	UFS
25085	Denver Formation	CFS
25086	Denver Formation	UFS
25087	Denver Formation	UFS
25088	Denver Formation	UFS
25091	Denver Formation	UFS
25092	Denver Formation	UFS
25093	Denver Formation	CFS
25098	Denver Formation	UFS
25099	Denver Formation	UFS
25100	Denver Formation	UFS
25101	Denver Formation	CFS
25102	Denver Formation	UFS
25105	Denver Formation	UFS
25106	Denver Formation	UFS
25120	Denver Formation	UFS
25121	Denver Formation	UFS
~~25122~~	~~Denver Formation~~	~~UFS~~
25123	Denver Formation	CFS
25183	Denver Formation	CFS
25189	Alluvium/Denver Formation	UFS
25194	Alluvium/Denver Formation	UFS
25195	Denver Formation	CFS
25203	Alluvium/Denver Formation	UFS

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Commented [MWJ3]: OCN-ELF-2024-002

Table 3.2-1: Water Level Monitoring Network

Well Number	Aquifer	Groundwater Flow System
25222	Denver Formation	UFS
25500	Denver Formation	UFS
25502	Denver Formation	UFS
26040	Denver Formation	UFS
26051	Denver Formation	UFS
26073	Denver Formation	UFS
26097	Denver Formation	UFS
26099	Denver Formation	UFS
26150	Denver Formation	CFS
26158	Denver Formation	UFS
26159	Denver Formation	UFS
26164	Denver Formation	UFS
26170	Alluvium/Denver Formation	UFS
26175	Denver Formation	UFS
26176	Denver Formation	UFS
26177	Denver Formation	UFS
26178	Alluvium	UFS
26179	Denver Formation	UFS
26180	Denver Formation	UFS
26181	Denver Formation	UFS
26182	Alluvium	UFS
26183	Denver Formation	UFS
26184	Alluvium	UFS
26185	Denver Formation	CFS
26186	Denver Formation	UFS
36186	Denver Formation	UFS

CFS Confined Flow System
UFS Unconfined Flow System

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2182500 2185000 2187500

190000 187500

26170 25003 25015 25016 25018 25019 25020 26164 25183 25184 25085 25086 25087 25088 25189 26040 25099 25098 25048 25195 25194 25100 25091 26176 26175 26178 26177 25054 26186 26185 25027 Hazardous Waste Landfill 26183 26184 26181 26182 26180 26179 26051 25203 25032 25034 25102 25059 25092 25093 26099 25120 25101 25121 LB Cell WP Cell Enhanced Hazardous Waste Landfill 26073 26097 25222 25123 25041 25502 26158 26159 25105 25106 26150 25023 25024 25022 25021 25500 25004 36186

Legend

- CAMU Boundary
- Buildings
- Estimated North Plants/ Bedrock Ridge Plume Extent
- Section Lines
- Light Duty Roads
- Unpaved Roads
- Fences
- Ditches, Canals

Monitoring Well Network	Flow System/Aquifer		
	Unconfined Alluvial	Unconfined Denver	Confined Denver
Hazardous Waste Landfill (HWL)		△	○
HWL Supplemental Operations		△	
Enhanced Hazardous Waste Landfill (ELF)		△	○
Water Level Only	□	△	○

N

0 300 600 1,200

Feet

Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Program Manager
Rocky Mountain Arsenal

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ELF Post-Closure Groundwater Monitoring Plan

Figure 3.2-1

Well Location Map

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8/28/2024

APPENDIX H

Responses to Regulatory Agency Comments

U.S. Department of the Army Responses to U.S. Environmental Protection Agency (EPA) August 7, 2024 Technical Comments on the 2024 RCRA Landfills and Groundwater Monitoring Report, Revision 0

Comment 1. **Section 2.4 O&M Change Notices, page 8, pdf pg 13,** highlights OCN-HWL-2023-001 and OCN-ELF-2023-001 that have not been approved by EPA. Please note the lack of approval is related to the disposal of remediation wastes and is not connected to the successful installation of replacement well 25222. For clarification, Army can and should use the replacement well 25222 without delay.

Response: Well 25222 was added to the groundwater level monitoring networks of the landfills via OCN-HWL-2024-002 and OCN-ELF-2024-002 in September of 2024. Quarterly groundwater level data collection began in Quarter 3 of 2024.

Comment 2. **Section 3.2 Wastewater Management Guidelines,** states "The Army continued investigating alternative disposal methods for the leachate after analytical data demonstrated that the leachate is suitable for land disposal. The leachate will be land disposed during the reporting period for the 2025 LGMR." EPA requests copies of the leachate analytical data and further information on the land disposal method and location being considered.

Response: Providing waste profile analytical data is beyond the scope of this report. Wastewater is sampled from the LS/LF storage tanks annually for the purpose of waste characterization and to facilitate waste profile approval. Analytical results were reviewed by Navarro staff who determined that Land Disposal Requirements (LDRs) were met. The analytical results were included in the waste profile submitted to the Clean Harbors Deer Trail Landfill Facility. The TSDF confirmed that the wastewater was acceptable for disposal at their facility prior to authorizing shipments from RMA.

Comment 3. **Hazardous Waste Landfill 2023 Post-Closure Groundwater Monitoring Report, Rev 0, Executive Summary, page ES-2, pdf page 148** uses the phrase "pre-existing contamination" to describe the dieldrin concentrations downgradient of 25194. This phrase could be misinterpreted by the reader. EPA presumes what Army is communicating is that this dieldrin was manufactured and released into the environment during Army operations at RMA and that it was not pre-existing prior to the establishment of RMA; however, it presumably occurred during the RMA production years, and not during the landfill construction or post-closure operations and maintenance of the landfill. Recommend re-phrasing to avoid potential confusion.

Response: The time at which the dieldrin detected in well 25194 was released into the environment is unknown. However, the Army and regulatory agencies have accepted that the dieldrin pre-dates the construction and operation of the HWL.

Comment 4. **Enhanced Hazardous Waste Landfill 2023 Post-Closure Groundwater Monitoring Report, Rev, 0, Section 2.1 Field Activities, page 2, pdf page 179** states that well 25222 "will be added to the monitoring network when OCN-ELF-2023-001 is approved by the regulatory agencies." The OCN approval delay is related to the handling on (sic) remedial waste and is not related to the installation and monitoring of well 25222. EPA recommends Army use the new well for its intended monitoring purposes without delay.

Response: See response to Comment 1, above.