

NPDES Inspection Report – Wastewater Treatment Facility

National Database Information	
Inspection Date: September 10, 2024	Inspection Type: CEI – Wastewater Treatment Facility
Entry/Exit Time: Opening Conference: 8:00 a.m. - 9:00 a.m. Site Review: 4:10 p.m. - 4:30 p.m.	NPDES ID Number: SDG589808
NAICS Code: 221320	Inspection ID: 202409_SDG589808
Lead inspector and affiliation: Stephanie Meyers / EPA Region 8	
Inspector and affiliation: Stephanie Passarelli / EPA Region 8	

Facility Location Information	
Site/Facility Name & Location: Enemy Swim Wastewater Treatment Facility Lake Traverse Reservation, South Dakota Lat/Long: 45°25'18.0"N 97°17'40.0"W	Email Report to: John Cloud, III, Program Manager Lake Traverse Utility Commission johncloud@swu.com

Contact Information	
	Name(s)/Title
Facility Contacts:	John Cloud, III / Program Manager / Lake Traverse Utility Commission (LTUC) / present during the opening conference
	Enrique Pagan / Operator / LTUC / present during the opening conference
	Jerwyn “JJ” Marks / Operator / LTUC / present during the inspection and closing conference
	Ross Hanson / Environmental Engineer Consultant / Indian Health Service (IHS) / present during the opening conference as well as the inspections
	Jon Ireland / Tribal Utility Consultant / Indian Health Service (IHS) / present during the inspection and closing conference
Person/Company meeting definition of “Operator”	Sisseton-Wahpeton Oyate Tribe, LTUC
Authorized Official(s)	John Cloud, III / Program Manager / LTUC

Permit Information		
Is the permit on site and available? Yes, digitally	Lagoon Category: No Discharge	Monitoring Frequency: N/A
Effective Date: 01/01/2023	Expiration Date: 3/31/2027	Is the Facility under a compliance schedule? No
Is correct contact information indicated on ICIS? Yes	Indicate correct contact information: N/A	
Receiving Water(s): No-discharge		
Regulatory Inspector’s source of information: Notice of Intent for the permit, ICIS, ECHO and facility representatives		

Areas Evaluated During Inspection		
<u>Permit</u>	<u>Self-Monitoring Program</u>	Pretreatment
<u>Records</u>	Compliance Schedule	Pollution Prevention
<u>Facility Site Review</u>	Laboratory	Stormwater
<u>Effluent/Receiving Waters</u>	<u>Operations and Maintenance</u>	Combined Sewer Overflow
Flow Measurement	Sludge Handling/Disposal	Sanitary Sewer Overflow

Report Review and Signature		
Drafter Name	Draft Date	Contact Information
Stephanie Meyers	11/4/2024	U.S. EPA Region 8 Denver, Colorado meyers.stephanie@epa.gov (303) 312-6938
Reviewer Name	Draft Date	Contact Information
Stephanie Passarelli	11/18/2024	U.S. EPA Region 8 Denver, Colorado passarelli.stephanie@epa.gov (303) 312-6803
Management Reviewer Name/Signature/Date		Contact Information
EMILIO LLAMOZAS  Digitally signed by EMILIO LLAMOZAS Date: 2024.11.21 15:27:50 -07'00'		U.S. EPA Region 8 Denver, Colorado llamozas.emilio@epa.gov (303) 312-6407
Emilio Llamozas, NPDES and Wetlands Enforcement Section Supervisor		

Inspection Narrative and Site Description
The inspection was conducted at the Enemy Swim Housing wastewater treatment facility (facility; WWTF) located within the exterior boundaries of the Lake Traverse Reservation in South Dakota, to evaluate compliance with the facility's National Pollutant Discharge Elimination System (NPDES) permit. The EPA is responsible for implementing the NPDES program in Indian Country within the State of South Dakota. The inspection was announced approximately three weeks prior to the inspection to coordinate logistics for the inspection. On the morning of September 10, 2024, U.S. Environmental Protection Agency (EPA) inspectors Stephanie Meyers and Stephanie Passarelli (inspectors) met with Sisseton-Wahpeton Oyate Tribe, Lake Traverse Utility Commission (LTUC) Program Manager, John Cloud, III. Inspectors were also joined by Enrique Pagan, LTUC Operator, and Ross Hanson, IHS Environmental Engineer Consultant during the opening conference.

Inspectors presented their credentials and had an opening conference in the LTUC office to explain the purpose of the inspection and discussed current operations and future planned upgrades of all WWTFs operated by LTUC, including the subject facility. During the opening conference, LTUC representatives shared that there were six staff responsible for wastewater operations and that staffing levels are not currently sufficient. After the opening conference, inspectors proceeded to conduct site reviews of the WWTFs operated by LTUC, including the subject facility, for the remainder of the day on September 10, 2024. During the field portion of the inspections, inspectors were joined by Ross Hanson, Jon Ireland, and JJ Marks. Throughout the inspection, inspectors noted observations in a checklist. Photographs taken during the inspection are included in the attached photo log.

The facility serves the community of roughly 260 people in the Lake Traverse Reservation. The facility is permitted as a No-discharge facility, under the Lagoon General Permit (Permit) for the Lake Traverse Reservation. The year the lagoon system was originally built is unknown to LTUC. The average design flow, peak design flow, average design organic treatment capacity, and peak design organic treatment capacity are also unknown to LTUC. The facility does not accept hauled septic waste currently and only receives domestic wastewater from the surrounding homes and nearby school. The facility has one lift station associated with it owned by the Bible Camp.

The inspectors proceeded to inspect the lagoon cells. The facility is a two-cell lagoon system. The table below has the operating volume for both cells.

Cell ID	Area (acres)	Operating Volume (MG)
Cell 1	2.85	5.5
Cell 2	1.25	2.4
Total	4.1	7.9

During the inspection of the facility, inspectors and facility representatives arrived on site to discover a herd of bison contained within the field surrounding the lagoon system. Inspectors and facility representatives proceeded to enter the field with caution while remaining inside vehicles. Bison were observed near the entrance of the fenced lagoon system. As the vehicles approached the entrance to the lagoons, the bison started to move out of the way allowing inspectors and facility representatives an opportunity to gain access to the lagoon system. Upon entry, inspectors observed vegetation and trees that had reached heights greater than six inches growing inside of and around the berms of cell 1 (photo 1). Due to safety concerns over the bison being nearby, inspectors were unable to walk the entirety of the system and observe cell 2. Inspectors did not evaluate the lift station, which is owned and maintained by the Bible Camp. Facility representatives did note that sewer lines from the school clog occasionally from cafeteria grease but is resolved by jetting the lines.

At the end of each inspection of LTUC-operated WWTFs on September 10, 2024, inspectors held a brief closing conference with JJ Marks and Jon Ireland where preliminary findings were discussed.

Findings, Corrective Actions and Recommendations

Finding #1: The Permittee was not properly conducting nor documenting weekly lagoon inspections.

A facility representative stated that LTUC staff visit each lagoon on a regular basis and maintain logs, but logs did not include all required documentation of weekly lagoon inspections and LTUC staff were not walking the entirety of the lagoons.

Permit requirement:

Part 6.5.1 of the Permit states, "On at least a weekly basis, unless otherwise modified by written approval from EPA, the Permittee shall inspect its wastewater treatment facility. Permission for less frequent inspections must be requested in writing by the Permittee and may be granted on a case-by-case basis where appropriate (e.g. a lagoon located in a remote area where access is a problem during the winter and compliance issues are not present), at the discretion of EPA. The Permittee shall maintain a notebook/logbook recording all information obtained during the inspection using indelible ink pens (or inspection logs may be kept in electronic format in accordance with proper record-keeping procedures) and in sufficient detail so that decision logic may be traced back, once reviewed. At a minimum, the notebook/logbook shall include the following (see Appendix D of this Permit for an Example Lagoon Inspection Form):

- 6.5.1.1. Name of facility and permit number;
- 6.5.1.2. Date and time of the inspection;
- 6.5.1.3. Name of the inspector(s);
- 6.5.1.4. The facility's discharge status;
- 6.5.1.5. The flow rate of the discharge, if occurring;
- 6.5.1.6. Determine if a discharge is occurring, has occurred since the previous inspection, and/or if a discharge is likely to occur before the next inspection. (Note: If a discharge has occurred or is likely to occur before the next inspection, perform the appropriate monitoring and reporting requirements in Sections 3 and 5.4 of this Permit if not already done.);
- 6.5.1.7. If there is any leakage through the dikes;
- 6.5.1.8. If there are any animal burrows in the dike;
- 6.5.1.9. If there is any erosion of the dikes (e.g., rills, cracks or other structural indications of erosion);
- 6.5.1.10. If there are any rooted plants, including weeds or trees growing in the water;
- 6.5.1.11. If the vegetative growth on the dikes need mowing (i.e. no greater than 6" tall or any height that may interfere with monitoring, operation and maintenance of the system);
- 6.5.1.12. Visual observation for visible sheen, floating oil, floating solids and foam;
- 6.5.1.13. Visual observation to check for evidence of illicit septic dumping;
- 6.5.1.14. List the date scheduled for operation and maintenance procedures to be undertaken at the wastewater treatment facility;
- 6.5.1.15. Identification of operational and/or maintenance problems, and a determination of whether proper operation and maintenance procedures are being undertaken at the frequency necessary to maintain working operations and the overall treatment and collection systems of the wastewater treatment lagoon system;
- 6.5.1.16. Recommendations, as appropriate, to remedy identified problems;

6.5.1.17. A brief description of any actions taken with regard to problems identified;

6.5.1.18. Overall visual observations to identify potential concerns with the “health” of the lagoon system (e.g., water is cloudy, water coloration concerns (e.g. red, black, grey, dark blue-green and cloudy), etc.); and

6.5.1.19. Other information, problems identified, or observations, as appropriate.

The Permittee shall maintain the notebook/logbook in accordance with required record-keeping items listed above and shall make the log available for inspection, upon request, by authorized representatives of the U.S. Environmental Protection Agency or the applicable Tribe(s) (see Appendix A for list of Tribes).

Problems identified during the inspection (including, but not limited to, those associated with this section of the Permit) shall be corrected at the time of inspection, if possible. If they cannot be corrected at the time of the inspection, the inspector must identify a corrective action to remedy the problem(s), as well as a timeline for completion of the remedy. Corrective actions to remedy problem(s) shall be in line with (and addressed through) proper operation and maintenance (Section 6.6 of this Permit.). All problems identified during inspections, as well as associated corrective actions and timelines, shall be documented in the inspection log.”

Part 5.9 of the permit states, “The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Permit, and records of all data used to complete the application for the Permit, for a period of at least three years from the date of the sample, measurement, report or application. Records of monitoring required by the Permit related to sludge use and disposal activities must be kept at least five years (or longer as required by 40 CFR Part 503). This period may be extended by request of the EPA at any time. Data collected on site, data used to prepare the DMR, copies of DMRs, and a copy of this NPDES Permit must be maintained on site.”

Corrective Action:

Ensure that weekly lagoons inspections are conducted and documented in accordance with the permit. Ensure that weekly lagoon inspection reports are retained in accordance with the recordkeeping requirements of the permit. Provide the EPA and IHS with 1 months’ worth of weekly lagoon inspection reports.

Finding #2: Excessive vegetation and trees were evident throughout the cells.

Vegetation and trees had reached greater than six inches in height along the berms and on the inside of the cells (photo 1).

Permit requirement:

Part 6.6 of the Permit states, “The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems

which are installed by a Permittee only when the operation is necessary to achieve compliance with the conditions of this Permit.

The Permittee shall do the following as part of the operation and maintenance program for the wastewater treatment facility...

6.6.1.10. The Permittee shall ensure that necessary action to promptly remove burrowing animals from the dikes is taken and documented in the maintenance log;

6.6.1.11. The Permittee shall ensure prompt repair of damage to dikes caused by burrowing animals and/or erosion and documentation of all actions in the maintenance log;

6.6.1.12. The Permittee shall ensure removal of rooted plants, including weeds and trees, from the water on a regular basis or as needed and documentation of all actions in the maintenance log; and

6.6.1.13. The Permittee shall ensure that the dikes are kept mowed on a regular basis during the growing season or as needed (i.e., vegetation not greater than 6" tall or any height that may interfere with monitoring, operation and maintenance of the system) and that documentation of all actions taken are recorded in the maintenance log..."

Corrective Action:

Remove the overgrown vegetation and trees on the inside and around the berms in all cells in accordance with Part 6.6 and relevant subparts of the Permit. Submit to the EPA and the IHS photos once the vegetation and trees have been removed.

Finding #3: The facility does not have enough staff or funding.

During the opening conference, staffing and funding resources were discussed. It is apparent based on that conversation as well as field observations that this facility does not have adequate staff or funding to fully comply with the permit.

Permit requirement:

Part 6.6.2 of the Permit states, "Staffing and Funding: The Permittee shall provide adequate staff and funding to carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of this Permit. The level of staffing needed, in numbers, training and experience, shall be determined taking into account the work involved in operating the system, conducting maintenance, and complying with this Permit."

Corrective Action:

Develop a staffing and funding plan (plan) that includes the number of staff needed to comply with the permit, staff retention plan (competitive pay and proper training), SOPs for collection of outstanding fees, and evaluation of alternative funding sources. The plan should include deadlines for accomplishing each of the items listed in the plan. Provide the EPA and the IHS with a copy of the plan.

Finding #4: The facility was not safe to access.

A large herd of bison were blocking the entrance to the lagoon system, making it difficult and unsafe for inspectors and facility representatives to access. This also makes access difficult for the required weekly lagoon inspections.

Recommendation:

Ensure the lagoon system is easily and safely accessible at all times. If possible, contain bison in an area other than that immediately adjacent to the lagoon system entrance.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 8

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Phone 800-227-8917
www.epa.gov/region8

DATE: See date of Branch Manager signature

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Waste Management – Denver Arapahoe Disposal Site Landfill,
Aurora, CO

FROM: Katelyn Bergl, Environmental Engineer
Enforcement and Compliance Assurance Division,
Air and Toxics Enforcement Branch

THRU: Scott Patefield, Branch Manager
Enforcement and Compliance Assurance Division,
Air and Toxics Enforcement Branch

TO: File

BASIC INFORMATION

Facility Name: Denver Arapahoe Disposal Site (DADS) Landfill

Facility Location: 3500 Gun Club Road, Aurora, Colorado 80022

Date of Inspection: August 24, 2022

EPA Inspector(s):

1. Katelyn Bergl, Environmental Engineer
2. Sara Loiacono, Environmental Scientist

State Inspector(s):

1. Jeanna Beard, Environmental Protection Specialist – Colorado Department of Health and Environment (CDPHE), Air Pollution Control Division (APCD)
2. Alex Ehrman, CDPHE, APCD Inspector

Waste Management Attendees:

1. Kahner Cleveland, EP Specialist	7. Chad Hearn, Engineer
2. Brian Dodek, EP Manager	8. Martin Parra, GOS
3. Cheyenne Jurick, EP Specialist	9. Chris Anderson, Area Manager
4. David Thorley, Area Director	10. Matt Meyers, Western Regional Manager
5. Phil Spencer, Disposal Operations Manager Trainee	11. Andres Chacon, Gas Plant Operator
6. Trevor Surroca, Operation Manager	12. Eric DiEsposti, Gas Operations Manager

Contact Email Address: dthorley@wm.com; cander14@wm.com; bdodek@wm.com

Purpose of Inspection: To determine Clean Air Act (CAA) compliance and perform a comparative Surface Emissions Monitoring (SEM) survey

Facility Type: Municipal solid waste (MSW) landfill

Regulations Central to Inspection: 40 C.F.R. Part 60, Subpart Cf (formerly subject to 40 C.F.R. Part 60, Subpart WWW); 40 C.F.R. Part 63, Subpart AAAAA; Title V Permit Requirements of Operating Permit 99OPAR217

Arrival Time: 8:00 MDT

Departure Time: 15:30 MDT

Inspection Type:

- ☐ Unannounced Inspection
- ☒ Announced Inspection

OPENING CONFERENCE

- ☒ Presented Credentials
- ☒ Stated authority and purpose of inspection
- ☐ Provided Small Business Resource Information Sheet
- ☒ Small Business Resource Information Sheet not provided. Reason: Not a small business
- ☒ Provided CBI warning to facility

The following information was obtained verbally from Waste Management of Colorado, Inc. representatives or through review of facility records.

Process Description:

Denver Arapahoe Disposal Site Landfill (DADS) is a municipal solid waste (MSW) landfill located in Aurora, Colorado. DADS is owned by the City and County of Denver and operated by Waste Management Disposal Services of Colorado, Inc. (WMDSC). DADS is a lined RCRA Subtitle D site, having started operations in 1990. DADS accepts municipal solid waste, construction and demolition debris, contaminated soils, friable and nonfriable asbestos, and special wastes such as shredder fluff and fly or bottom ash. DADS accepts petroleum contaminated soils (PCS), which accounted for 1.2% of total waste disposed at DADS in 2020. The facility also recycles tires, household recyclables, appliances, e-waste, and scrap metal. Its design capacity is approximately 348 million cubic yards, with an expected closure date in 2150.

DADS receives approximately 8,000 tons of waste per day, a majority of which is MSW. Other wastes, such as construction and demolition waste, are comingled for disposal with MSW. The site is currently divided into three sections for MSW disposal: Section 31, Section 32, and Section 5. Section 31 has been under final cover since 2001 and is under active landfill gas (LFG) collection. Section 32 contains the current active fill area and is under intermediate cover with active LFG collection first installed in 2006. Section 5 is permitted for waste and has not yet been developed. DADS plans to expand into Section 5 in or around 2044, when Section 32 reaches capacity. DADS has a dedicated 26-acre monofill which is used exclusively for friable and non-friable asbestos; this monofill is excluded from LFG collection.

Condensate and leachate collected at DADS is recirculated or used for dust control in Subtitle D lined areas, sent to an on-site wastewater pre-treatment plant, or sent to an off-site wastewater treatment plant.

A gas collection and control system (GCCS) to collect and control LFG was first installed in Section 31 in 2001 and Section 32 in 2006. Currently, the leachate collection system is not connected to the GCCS. The GCCS consists of approximately 211 LFG extraction wells, consisting of primarily vertical extraction wells and a few horizontal collection wells. The LFG collection system spans all areas where waste has been disposed. During the process of refuse filling operations, vertical LFG gas extraction wells may be raised to prevent covering the well with new refuse. From 2012 through 2018, CDPHE approved various requests from DADS to increase future well spacing from 250-foot to 600-foot well spacing for specific areas of GCCS expansion installed in Section 32 after 2012. CDPHE, as part of their approval, requires DADS to monitor (the entire collection system) for and report methane readings between 200 and 500 ppm discovered during quarterly surface emission monitoring (SEM) events to verify adequacy of the increased well spacing.

DADS' GCCS control system consists of three control devices rated to accommodate a combined inlet LFG flow of up to 3,932 standard cubic feet per minute (scfm). The control devices include two open (candlestick) flares with capacities of 2,000 scfm and 600 scfm, and an on-site landfill gas-to-energy (LFGTE) plant with a rated maximum capacity of 1,332 scfm. The LFGTE consists of four reciprocating internal combustion Caterpillar 3516 engines with a rated maximum flow capacity of 333 scfm of LFG per engine. LFG generated by Section 32 is sent to the LFGTE plant due to its higher quality, while any excess LFG from Section 32 and all LFG from Section 31 and an adjacent facility's LFG are sent to the flares.

During the inspection, DADS personnel stated that the current LFG flow rate collected through the GCCS is approximately 2700 scfm. This includes approximately 200 scfm routed to the DADS control system from the adjacent Lowry Landfill Superfund Site, which is a closed landfill and is considered a separate facility but shares control devices with DADS. According to DADS' 2019 design plan, the combined modeled Sections 31 and 32 LFG generation rate for 2019 was estimated to be 5,062 scfm using EPA Landfill Gas Emissions modeling (LandGEM). DADS assumed a collection efficiency factor of 75% to project the maximum gas recovery rate for 2019 to be 3,796 scfm. The EPA Landfill LandGEM model yielded a peak LFG generation value of 10,379 scfm in 2044, currently projected to be the approximate final year of waste placement in Section 32. Section 5 projected peak LFG generation rate will be 18,769 scfm in 2151. DADS has stated the control devices will be upgraded or replaced as needed to control the LFG as flows increase in the future.

During CDPHE's review of DADS' May 17, 2021 *Revised Gas Collection and Control System Design Plan* (2021 GCCS Design Plan), CDPHE expressed concern that the control device capacity appeared to only provide a buffer of 136 scfm, according to 2019 gas generation estimations, when control devices are operated at 100% capacity. CDPHE requested clarification on DADS' process for verifying that control device capacity is sufficient for LFG production at the site. According to DADS' response, WMDSC performs an annual review of estimated gas generation and extraction versus actual gas production. Utilizing predictive models, control

device planning is continuously updated to ensure sufficient control device capacity is maintained for the gas collection system.

Surface Emission Monitoring:

According to DADS, the GCCS has been designed to minimize both subsurface lateral migration and surface emissions of LFG from the landfill. System performance depends upon the installation of a satisfactory GCCS system, proper management and installation, and maintenance of intermediate and suitable final refuse cover. Exceedances are addressed by evaluating both the GCCS and intermediate/final cover systems. In the past five years, exceedances have been addressed as required in all but one instance in March 2022. CDPHE issued a warning letter for failure to timely address the exceedance.

Verification of the GCCS' ability to minimize LFG migration is achieved through routine quarterly SEM monitoring as well as quarterly monitoring of gas probes around the perimeter of the landfill. Currently monitoring probes are installed around Section 31 and developed portions of Section 32. Monthly surface integrity cover monitoring is also performed to minimize LFG surface emissions. Due to increased well spacing of a number of wells in Section 32 of up to 600 feet between wells, DADS also records all methane readings between 200 and 500 ppm during SEM quarterly monitoring to verify adequacy of this well spacing design. Historic SEM methane exceedances above 500 ppmr are included in Table 1 below.

Table 1. DADS Historical SEM methane exceedance findings.

Monitoring Period	DADS Historical Methane Exceedances			
Quarter	Q1	Q2	Q3	Q4
2022	6	5	3	Not yet reported
2021	0	0	0	1
2020	0	0	*	0
2019	0	0	1	0
2018	*	*	*	0

* Data could not be located while reviewing records and does not indicate that monitoring was not performed during those quarters.

DADS personnel stated that SEM is conducted in all accessible areas including:

- Areas of active fill under interim cover, where waste has been in place for > 5 years,
- Areas that have waste in-place for more than 2 years and are closed or at final grade, or
- Areas where GCCS components have been installed.

Contractors for DADS do monitor penetrations during surface emissions monitoring. As stated in their 2021 GCCS Design Plan, SEM excludes areas with potentially dangerous conditions including “asbestos disposal areas, active areas including active waste disposal areas, vehicle and mobile equipment routes, and heavy equipment use areas”. The 2021 GCCS Design Plan also mentions exclusion of steep slopes and other dangerous areas, as provided for in Per 40 CFR 60.753(d).

Approved Alternatives:

Through its design plan and historical correspondence with CDPHE and EPA, DADS has obtained several approvals for operating and monitoring practices which deviate from regulation or standard practice. Alternatives include increased LFG extraction well spacing, LFG extraction well

decommissioning procedures, and increased allowable oxygen concentration in LFG extraction wells connected to the leachate collection system. These alternatives are described briefly below.

Well Spacing

From 2012 through 2018, CDPHE approved various requests from DADS to increase future well spacing from 250-feet as required by regulation to 600-foot well spacing for specific areas of GCCS expansion installed in Section 32 after 2012. CDPHE, as part of their approval, requires DADS to monitor for and report methane readings between 200 and 500 ppm discovered during quarterly surface emission monitoring (SEM) events to verify adequacy of the increased well spacing.

Well Decommissioning

A decommissioned well is a well that is shut down for a period of time by fully closing the well valve or by disconnecting the well from the gas collection lateral. A decommissioned well is maintained for potential future use, differentiating it from an abandoned well which is not maintained for future use.

The following procedure will be used for decommissioned wells:

- a. The reason for well decommissioning will be noted in the NSPS semi-annual report;
- b. The decommissioned well will still be monitored monthly per NSPS requirements;
- c. Although the pressure may be positive for a decommissioned well, the temperature levels must continue to be monitored and meet NSPS requirements;
- d. The well may be temporarily opened during a monitoring event or left open only very slightly to relieve pressure buildup; and
- e. Quarterly surface monitoring will continue in the area of the well to make sure fugitive gas emissions are still below the 500-ppm compliance limit;

These procedures were approved as alternative operating scenarios as detailed in EPA clarification letters dated February 9, 2005 and February 12, 2003.

Oxygen Concentration

Currently, the leachate collection system is not connected to the GCCS, but may be connected in the future for various reasons. For GCCS connections to the leachate sidewall risers, oxygen concentrations up to 21 percent will be allowed at the wellhead, provided that the LFG temperature is maintained less than 55 degrees C (131°F). Additionally, gas collected from leachate risers may appear to be operated under positive pressure when the leachate pumps are operating, and therefore the gas collection of the leachate system should also be allowed to operate under positive pressure. This variance applies to wellheads that collect gas exclusively from the leachate system, and does not apply to LFG extraction wells/HGCs within the waste mass. This alternative is documented in a CDPHE variance approval letter, dated January 7, 2009.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:

EPA conducted a partial SEM survey of the facility. EPA used one ThermoFisher Toxic Vapor Analyzers 2020 (TVA2020) to perform EPA Reference Method 21 for the SEM. EPA offered Waste Management facility representatives the opportunity to visually confirm each exceedance

above 500 ppm measured on the TVA during the SEM survey.

EPA calibrated the TVA2020 before beginning the SEM survey, and conducted two drift checks after returning from lunch and at the conclusion of SEM survey. All readings were within 10% of the calibration gas.

The EPA SEM survey covered a small western portion of the landfill, estimated to represent approximately 15% of the landfill surface. EPA inspectors detected and documented 7 points on the landfill surface with concentrations of methane above 500 ppm. See Appendix B for more details. Some documented points involved multiple exceedances in close proximity, primarily at locations of surface erosion surrounding wellheads. Throughout the landfill, and particularly on the southern slope of the intermediate cover area, EPA observed recurring areas with little to no vegetation and erosion gullies.

During the inspection, EPA inspectors observed widespread surface erosion at the site consistent with heavy rain. DADS personnel stated that there were several unaddressed cover integrity issues at the site at the time of the inspection. The cause of the cover integrity issues as well as the delay in repairing the landfill cover was stated to have been recent abnormal rain events which were high in frequency and which produced a significant amount of precipitation in a short time period. There were several heavy rain events in the weeks prior to the inspection, consistent with statements made by DADS personnel.

CLOSING CONFERENCE

☒ Provided U.S. EPA point of contact to the facility

Compliance Assistance: None.

Photos and/or Videos: were taken during the inspection. See Appendix A

Field Measurements: were taken during this inspection. See Appendix B.

Records: were not taken during this inspection. Publicly available records were reviewed as part of the inspection.

Concerns:

EPA observed widespread cover integrity issues during the inspection which was also communicated to EPA inspectors by DADS personnel as an ongoing issue that they were aware of. DADS personnel described a delay in cover repair due to the extent and severity of recent rain events. DADS articulated a commitment to address the issue as quickly as possible.

Considering the small area of the landfill that was monitored during the inspection, EPA found a high rate of SEM methane readings above 500 ppm, distinctly above historic rates. The locations of the methane exceedances were communicated to DADS personnel during the closing conference as well as through email following the inspection. DADS committed to addressing the methane exceedances in the same way that is required for exceedances identified through quarterly SEM and followed up with EPA to confirm correction of the exceedance a return to appropriate methane levels at the surface.

No other concerns were noted.

DIGITAL SIGNATURES

Katelyn Bergl, Report Author

SCOTT PATEFIELD Digitally signed by SCOTT PATEFIELD
Date: 2023.01.11 09:58:19 -07'00'

Scott Patefield, Manager

Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill
Facility Location: 3500 Gun Club Road, Aurora, CO 80022
Date of Inspection: August 24, 2022

APPENDICES AND ATTACHMENTS

Appendix A: Digital Image Log

Appendix B: Field Measurement Data, Including Maps

Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill
Facility Location: 3500 Gun Club Road, Aurora, CO 80022
Date of Inspection: August 24, 2022

APPENDIX A: DIGITAL IMAGE LOG

Photographer: Sara Loiacono			
Image #	File Name	Date/Time (Eastern)	Description of Image
1	DC_3066.jpg	2022-08-24 10:52	TVA Reading 3, Surface east of well GW-127; signs of erosion; no vegetation.
2	DC_3067.jpg	2022-08-24 10:55	TVA Reading 4, Surface north of well GW-127; signs of erosion; no vegetation.

Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill
Facility Location: 3500 Gun Club Road, Aurora, CO 80022
Date of Inspection: August 24, 2022

APPENDIX B: FIELD MEASUREMENT DATA

Measured Exceedances

#	Reading Time	Well / Location Description	Reading (PPM)	Latitude	Longitude	Observations
	10:44 AM	Southeast of active face of landfill	0.9 ppm	N 39.65359	W 104.70529	Downwind Background Reading
	10:58 AM	North northeast of active face of landfill	0.8 ppm	N 39.66696	W 104.69765	Upwind Background Reading
1	11:50 AM	Surface east of GW-127	1500 ppm	N 39.66039	W -104.68658	DC-3066.jpg
2	11:51 AM	Surface North of GW-127	3400 ppm	N 39.66043	W -104.68662	DC-3067.jpg
3	11:51 AM	Surface west of GW-127	900 ppm	N 39.66035	W -104.68678	
4	2:03 PM	HL-03 Leachate Riser penetration downslope from GW-91A	850 ppm	N 39.66574	W -104.67971	
5	2:54 PM	Upslope of GW-80 Extraction well penetration	12,600 ppm	N 39.66543	W -104.68352	
6	3:00 PM	Upslope of GW-84 at gas header pipe penetration	1028 ppm	N 39.66545	W -104.68295	
7	3:13 PM	GW-92 Extraction well penetration	10,070 ppm	N 39.66523	W -104.67998	

Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill

Facility Location: 3500 Gun Club Road, Aurora, CO 80022

Date of Inspection: August 24, 2022

Calibration and Instrument Information

EPA used one ThermoFisher Toxic Vapor Analyzer 2020 (TVA2020). The EPA TVA2020 response times are in the 4 to 5 second range.

- Katelyn Bergl and Sara Loiacono used the EPA TVA 2020 for the duration of the survey.
- Waste Management did not operate a TVA or similar instrument during the survey.
- Waste Management staff were shown readings on EPA instruments for visual confirmation of exceedances.

	TVA2020 Calibration Gas Readings		
Calibration/Drift Check Time	Zero ppm	500 ppm	10,000 ppm
10:00 calibration reading	1.2	501	1%
13:20 drift check reading	-0.8	489	957
15:45 end of day drift check	-1.1	485	948

Background readings:

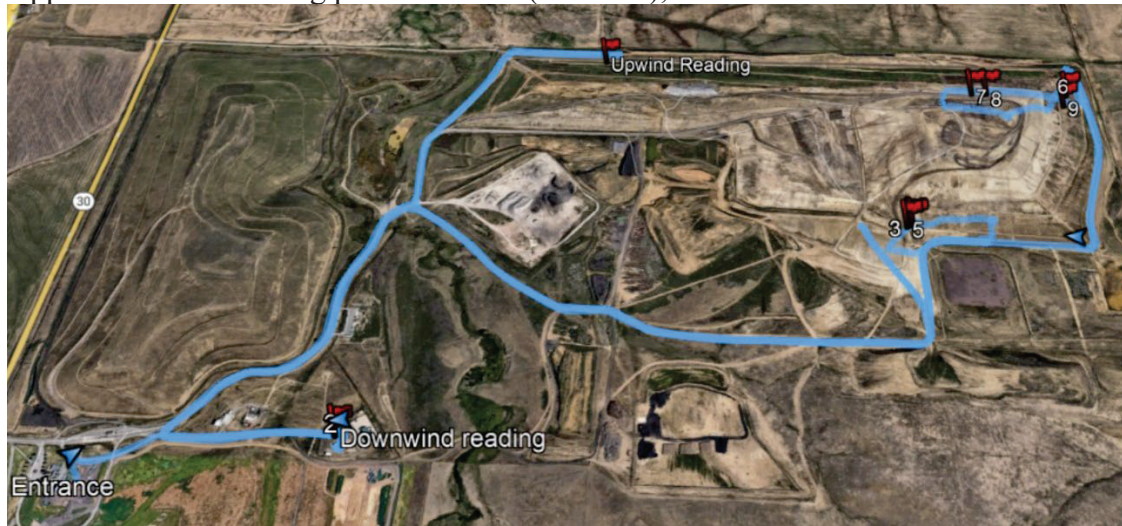
Upwind: 0.8 ppm

Downwind: 0.9 ppm

Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill
Facility Location: 3500 Gun Club Road, Aurora, CO 80022
Date of Inspection: August 24, 2022

Map of Detected Hits

SEM hit locations plotted over satellite imagery from June 7, 2015 as depicted on Google Earth. Approximate monitoring paths included (blue line), derived from GPS data.



Detail view on South East portion of landfill



Detail view on North East portion of landfill





REGION 8

DENVER, CO 80202

DATE: See date of Branch Manager signature

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Denver Arapahoe Disposal Site Landfill, Aurora, CO

FROM: Katelyn Bergl, Environmental Engineer
Enforcement and Compliance Assurance Division,
Air and Toxics Enforcement Branch

THRU: Scott Patefield, Branch Manager
Enforcement and Compliance Assurance Division,
Air and Toxics Enforcement Branch

TO: File

BASIC INFORMATION

Facility Name: Denver Arapahoe Disposal Site (DADS) Landfill
Facility Location: 3500 Gun Club Road, Aurora, Colorado 80022
Date of Inspection: July 19 – 20, 2023

EPA Inspector(s):

1. Katelyn Bergl, Environmental Engineer
2. Lindsey Barnes, Physical Scientist
3. Julia Witteman, Environmental Engineer

State Inspector(s):

1. Haley Bargabos, Environmental Protection Specialist – CDPHE, APCD
2. Charlie Obermeyer, CDPHE, APCD Inspector

Waste Management Attendees:

1. Kahner Cleveland, EP Specialist	6. Travis Apodaca, Senior District Manager
2. Cheyenne Jurick, EP Specialist	7. Michelle Wittenbrink, Site Engineer
3. Martin Parra, GOS	8. Andres Chacon, Gas Plant Operator
4. David Thorley, Area Director, via Microsoft Teams	9. Tahni Jungst, Consultant, WSP USA
5. Chris Anderson, Area Manager	

Contact Email Address: dtorley@wm.com; cander14@wm.com; bdodek@wm.com

Purpose of Inspection: To determine Clean Air Act (CAA) compliance, including comparative Method 21 surface emission monitoring (SEM).

Facility Type: Municipal solid waste (MSW) landfill

Regulations Central to Inspection: Colorado's 111(d) State Plan for MSW landfills implementing 40 C.F.R. Part 60, Subpart Cf (State Plan); 40 C.F.R. Part 63, Subpart AAAA – National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Municipal Solid Waste Landfills (NESHAP AAAA); Title V Permit Requirements of Operating Permit 99OPAR217

Date:	<u>7/19/2023</u>	<u>7/20/2023</u>
Arrival Time:	10:00 MDT	9:20 MDT
Departure Time:	16:40 MDT	16:30 MDT

Inspection Type:

- ☐ Unannounced Inspection
- ☒ Announced Inspection

OPENING CONFERENCE

- ☒ Presented Credentials
- ☒ Stated authority and purpose of inspection
- ☐ Provided Small Business Resource Information Sheet
- ☒ Small Business Resource Information Sheet not provided. Reason: Not a small business
- ☒ Provided CBI warning to facility

The following information was obtained verbally from Waste Management of Colorado, Inc. representatives or through review of facility records.

Process Description:

Denver Arapahoe Disposal Site Landfill (DADS) is a municipal solid waste (MSW) landfill located in Aurora, Colorado. DADS is owned by the City and County of Denver and operated by Waste Management Disposal Services of Colorado, Inc. (WMDSC). DADS is a lined RCRA Subtitle D site, having started operations in 1990. DADS accepts municipal solid waste, construction and demolition debris, contaminated soils, friable and nonfriable asbestos, and special wastes such as shredder fluff and fly or bottom ash. DADS accepts petroleum contaminated soils (PCS), which accounted for 1.2% of total waste disposed at DADS in 2020. The facility also recycles tires, household recyclables, appliances, e-waste, and scrap metal. Its design capacity is approximately 348 million cubic yards, with an expected closure date in 2150.

DADS receives approximately 9,000 tons of waste per day, a majority of which is MSW. Other wastes, such as construction and demolition waste, are comingled for disposal with MSW. The site is currently divided into three sections for MSW disposal: Section 31, Section 32, and

Section 5. Section 31 has been under final cover since 2001 and is under active landfill gas (LFG) collection. Section 32 contains the current active fill area and is under intermediate cover with active LFG collection first installed in 2006. Section 5 is permitted for waste and has not yet been developed. DADS plans to expand into Section 5 in or around 2044, when Section 32 reaches capacity. DADS has a dedicated 26-acre monofill which is used exclusively for friable and non-friable asbestos; this monofill is excluded from LFG collection.

Condensate and leachate collected at DADS is recirculated or used for dust control in Subtitle D lined areas, sent to an on-site wastewater pre-treatment plant, or sent to an off-site wastewater treatment plant.

A gas collection and control system (GCCS) to collect and control LFG was first installed in Section 31 in 2001 and Section 32 in 2006. Currently, the leachate collection system is not connected to the GCCS. The GCCS consists of approximately 211 LFG extraction wells, consisting of primarily vertical extraction wells and a few horizontal collection wells. The LFG collection system spans all areas where waste has been disposed.

DADS' GCCS control system consists of three control devices rated to accommodate a combined inlet LFG flow of up to 3,932 standard cubic feet per minute (scfm). The control devices include two open (candlestick) flares with capacities of 2,000 scfm and 600 scfm, and an on-site landfill gas-to-energy (LFGTE) plant with a rated maximum capacity of 1,332 scfm. The LFGTE consists of four reciprocating internal combustion Caterpillar 3516 engines with a rated maximum flow capacity of 333 scfm of LFG per engine. LFG generated by Section 32 is sent to the LFGTE plant due to its higher quality, while any excess LFG from Section 32 and all LFG from Section 31 and an adjacent facility's LFG are sent to the flares.

During the inspection, DADS personnel stated that the current LFG flow rate collected through the GCCS is approximately 2700 scfm. This includes approximately 200 scfm routed to the DADS control system from the adjacent Lowry Landfill Superfund Site, which is a closed landfill and is considered a separate facility but shares control devices with DADS. According to DADS' 2019 GCCS Design Plan, the combined modeled Sections 31 and 32 LFG generation rate for 2019 was estimated to be 5,062 scfm using EPA Landfill Gas Emissions modeling (LandGEM). DADS assumed a collection efficiency factor of 75% to project the maximum gas recovery rate for 2019 to be 3,796 scfm. The EPA Landfill LandGEM model yielded a peak LFG generation value of 10,379 scfm in 2044, currently projected to be the approximate final year of waste placement in Section 32. Section 5 projected peak LFG generation rate will be 18,769 scfm in 2151. DADS has stated the control devices will be upgraded or replaced as needed to control the LFG as flows increase in the future.

During CDPHE's review of DADS' May 17, 2021 *Revised Gas Collection and Control System Design Plan* (2021 GCCS Design Plan), CDPHE expressed concern that the control device capacity appeared to only provide a buffer of 136 scfm, according to 2019 gas generation estimations, when control devices are operated at 100% capacity. CDPHE requested clarification on DADS' process for verifying that control device capacity is sufficient for LFG production at the site. According to DADS' response, WMDSC performs an annual review of

estimated gas generation and extraction versus actual gas production. Utilizing predictive models, control device planning is continuously updated to ensure sufficient control device capacity is maintained for the gas collection system. Additionally, on February 16, 2024 DADS submitted a Title V Minor Modification Application to install a 5,000 scfm enclosed flare, which will provide the site additional capacity to combust collected LFG as gas generation increases.

Surface Emission Monitoring:

According to DADS, the GCCS has been designed to minimize both subsurface lateral migration and surface emissions of LFG from the landfill. System performance depends upon the installation of a satisfactory GCCS system, proper management and installation, and maintenance of intermediate and suitable final refuse cover. Exceedances are addressed by evaluating both the GCCS and intermediate/final cover systems. In the past five years, exceedances have been addressed as required in all but one instance in March 2022. CDPHE issued a warning letter for failure to timely address the exceedance.

Verification of the GCCS' ability to minimize LFG migration is achieved through routine quarterly SEM monitoring as well as quarterly monitoring of gas probes around the perimeter of the landfill. Currently monitoring probes are installed around Section 31 and developed portions of Section 32. Monthly surface integrity cover monitoring is also performed to minimize LFG surface emissions. Due to increased well spacing of a number of wells in Section 32 of up to 600 feet between wells, DADS previously was required to record all methane readings between 200 and 500 ppm during SEM quarterly monitoring to verify adequacy of this well spacing design. This requirement was removed on September 2, 2021 as part of CDPHE's review of a 2021 GCCS Design Plan. Historic SEM methane exceedances above 500 ppm are included in Table 1 below.

Table 1. DADS Historical SEM methane exceedance findings.

Monitoring Period	DADS Historical Methane Exceedances			
Quarter	Q1	Q2	Q3	Q4
2024	43			
2023	17	21	4	10
2022	6	5	3	5
2021	0	0	0	1
2020	0	0	*	0
2019	0	0	1	0
2018				0

* Data could not be located while reviewing records and does not indicate that monitoring was not performed during those quarters.

DADS personnel stated that SEM is conducted in all accessible areas including:

- Areas of active fill under interim cover, where waste has been in place for > 5 years,
- Areas that have waste in-place for more than 2 years and are closed or at final grade, or
- Areas where GCCS components have been installed.

DADS representatives confirmed that SEM contractors monitor penetrations during surface

emission monitoring. DADS' 2023 Design Plan defines penetrations as "any landfill gas collection well or landfill gas collection device that completely passes through the landfill cover into waste and is located within an area of the landfill where waste has been placed and a gas collection system is required. Cover penetrations do not include items such as survey stakes, fencing or litter fencing, flags, signs, trees, and utility poles." As stated in DADS' 2023 Design Plan, SEM excludes areas with potentially dangerous conditions including the following:

- roads;
- working areas and/or the working face;
- truck traffic areas;
- steep and dangerous slopes;
- icy, snow covered, and/or extremely muddy slopes; and
- areas where the landfill cover material has been exposed for the express purpose of installing, expanding, replacing, or repairing components of the GCCS, leachate, or gas condensate collection and removal systems.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:

EPA conducted a partial SEM survey of the facility. EPA used one ThermoFisher Toxic Vapor Analyzer 2020 (TVA2020) to perform EPA Reference Method 21 for the SEM. EPA offered Waste Management facility representatives the opportunity to visually confirm each exceedance above 500 ppm measured on the TVA during the SEM survey. Cheyenne Jurick of WMDSC visually confirmed all but one exceedance and took cell phone pictures of the TVA2020 readings as digital evidence.

EPA calibrated the TVA2020 before beginning the SEM survey each morning, and conducted drift checks each day at the conclusion of SEM survey. All readings were within 10% of the calibration gas.

The EPA SEM survey covered small portions of the north-central and south-western slopes of section 32 of the landfill, estimated to represent approximately 15% of the surface area of section 32. Large sections of the northern and western slopes could not be accessed or monitored due to the presence of thick, thistle-like vegetation and safety concerns for poisonous snakes living within the vegetation. Additionally, EPA inspectors were limited to SEM monitoring only along the slopes of section 32, since the working face extended throughout the top-central portions of the cell and were designated as unsafe to monitor by MWDSC staff. EPA inspectors detected and documented 18 points on the landfill surface with concentrations of methane at or above 500 ppm. Some documented points involved multiple exceedances in close proximity, primarily at locations of surface erosion surrounding wellheads. See Appendix B for more details.

During the inspection, EPA observed a large continuous area on the northern slope with little

to no vegetation and extensive erosion rills. Many of the exceedances on July 20 were discovered in this unvegetated area. DADS personnel communicated that construction activities associated with drilling or repairing wells were recently completed in that area, so there had not been sufficient time to establish new vegetation and erosion was more prevalent due to the lack of vegetation. DADS personnel were aware of the erosion issues and were actively working to address them in the weeks before the inspection.

EPA also observed the development of a new cell, cell 10, located on the western side of section 32. The first layer of waste had been placed in the cell at the time of inspection. The first layer of waste was referred to as “fluff”, which is MSW that has been sorted into finer materials with large items removed to protect the cell liner. There was no cover applied to the waste in cell 10, despite active operations only occurring in a small, isolated area of cell 10. WMDSC staff explained that because DADS actively fills 24 hours per day 6 days per week, they only apply cover on Saturdays when no active filling occurs. On Saturdays, cover is applied to the entire extent of exposed waste. DADS personnel asserted that daily cover is only required at the end of the day when active filling stops, and because active filling is conducted 24 hours per day except on Saturdays at DADS, there is no requirement to apply daily cover Sunday – Friday. Because cover is only routinely applied on Saturdays, DADS will apply 1 foot layers of dirt as intermediate cover as needed.

CLOSING CONFERENCE

☒ Provided U.S. EPA point of contact to the facility

Compliance Assistance: None.

Photos and/or Videos: were taken during the inspection. See Appendix A

Field Measurements: were taken during this inspection. See Appendix B.

Records: were not taken during this inspection. Publicly available records were reviewed as part of the inspection.

Concerns:

EPA observed cover integrity issues during the inspection which were communicated to the facility at the time of the inspection. DADS personnel communicated that cover issues flagged by EPA were ongoing matters that the facility was previously aware of. DADS personnel explained that the cover integrity issues and associated delay of repair of the cover were attributed to significant rain events in the months prior to the inspection that the facility was actively and continually addressing. DADS personnel committed to addressing existing cover integrity issues as quickly as possible and to continue follow-up of cover integrity issues caused by unusual weather as part of the facility’s routine monthly cover monitoring activities.

Although EPA’s number of SEM methane readings above 500 is consistent with recent facility SEM event findings, considering the small area of the landfill that was monitored during the inspection, EPA’s rate of SEM methane readings above 500 ppm per surface area monitored may be elevated compared to facility findings. The locations of the methane exceedances were communicated to DADS personnel during the closing conference as well as through email

following the inspection. DADS committed to addressing the methane exceedances in the same way that is required for exceedances identified through quarterly SEM and followed up with EPA to confirm correction of the exceedance a return to appropriate methane levels at the surface.

In addition to on-site findings, review of the 2023 Design Plan revealed a few alternative requests that are not supported by EPA: 1) SEM exclusion areas and, 2) DADS' interpretation of the cover penetration definition.

First, areas may be excluded from SEM only if the act of monitoring an area poses a significant risk of death or injury of the person conducting the monitoring, and/or the act of monitoring an area would violate state or federal occupational safety standards. Consistent with the State Plan and NESHAP AAAA, slopes may be excluded from monitoring only if it is not practically feasible for the area to be monitored safely and legally during the quarter. Final design slopes should not be designed in such a way that prevents SEM in applicable areas.

The working face (if above applicable waste) should only be excluded if there is active truck traffic and waste deposition on the day of monitoring – areas under daily cover where waste has been in place for greater than 5 years are still otherwise subject to SEM requirements. SEM should be scheduled around large-scale construction projects that would make significant areas of the landfill unsafe to monitor. SEM should be scheduled to avoid or minimize snowy, icy, or muddy surfaces, and within a weather window during the quarterly period that is conducive to monitoring in the preferred conditions. Excluding areas from monitoring that could have been safely and legally monitored during the quarter constitute a violation of the Clean Air Act. SEM reports should include detailed explanations for reasons of excluding any areas subject to the collection and control requirements of the regulations.

Finally, the 2023 Design plan incorrectly interprets the definition of cover penetration by shortening the full definition. Survey stakes, fencing including litter fences, flags, signs, utility posts, and trees would all be considered cover penetrations if they pass through the cover, according to the definition of “cover penetration” at 40 C.F.R. § 63.1990. The landfill cover includes that portion which covers the waste, as well as the portion which borders the waste extended to the point where it is sealed with the landfill liner or the surrounding land mass.

No other concerns were noted.

DIGITAL SIGNATURES

Katelyn Bergl, Report Author

SCOTT PATEFIELD Digitally signed by SCOTT PATEFIELD
Date: 2024.07.12 16:26:50 -06'00'

Scott Patefield, Manager

Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill

Facility Location: 3500 Gun Club Road, Aurora, CO 80022

Date of Inspection: July 19 – 20, 2023

APPENDICES AND ATTACHMENTS

Appendix A: Digital Image Log

Appendix B: Field Measurement Data

Appendix C: Calibration Data

Appendix D: Maps of SEM Results and Satellite Imagery

Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill

Facility Location: 3500 Gun Club Road, Aurora, CO 80022

Date of Inspection: July 19 – 20, 2023

APPENDIX A: DIGITAL IMAGE LOG

Photographer: Katelyn Bergl			
Image #	File Name	Date/ Time (MDT)	Description of Image
1	DSCN0023.JPG	7/19/2023 10:52	Most recent WM Monthly Cover Integrity Report map from 7/5 and 7/18.
2	DSCN0024.JPG	7/19/2023 10:52	Most recent WM Monthly Cover Integrity Report inspection form from 7/5 and 7/18.
3	DSCN0025.JPG	7/19/2023 10:52	Public waste disposal area
4	DSCN0026.JPG	7/19/2023 10:52	Public waste disposal area with shredder fluff cover
5	DSCN0027.JPG	7/19/2023 3:07	Erosion rill approximately 2 feet deep. Area displayed signs of erosion. No vegetation was observed.
6	DSCN0028.JPG	7/19/2023 3:34	Erosion rill approximately 8 inches wide and 4 inches deep. Area displayed signs of erosion. No vegetation was observed.
7	DSCN0029.JPG	7/20/2023 11:52	Erosion rill approximately 6 inches wide and 6 inches deep. Area displayed signs of erosion. No vegetation was observed.
8	DSCN0030.JPG	7/20/2023 11:52	General landfill surface near the rill captured in DSCN0029.JPG
9	DSCN0031.JPG	7/20/2023 12:35	Bench erosion rill large enough to look like an irrigation or road-side ditch. WM reported that this rill is unintentional and due to erosion.
10	DSCN0032.JPG	7/20/2023 1:26	Erosion rill several feet deep containing exposed trash adjacent to and surrounding extraction well EW-23, labeled "23 DADS E 023". No vegetation was observed.

Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill

Facility Location: 3500 Gun Club Road, Aurora, CO 80022

Date of Inspection: July 19 – 20, 2023

APPENDIX B: FIELD MEASUREMENT DATA

Measured Exceedances

#	Reading Date/ Time	Well / Location / Description/ Observations	Reading (ppm)	Latitude	Longitude	Media Records
1	7/19/2023 2:10 PM	Downwind Background Reading, Office Parking Lot *Not an exceedance*	1.9	N 39.65231	W -104.71330	
2	7/19/2023 2:20 PM	Upwind Background Reading, Road on north side of landfill. *Not an exceedance*	1.6	N 39.66681	W -104.68036	
3	7/19/2023 3:07 PM	Surface exceedance recorded in an erosion rill approximately 2 feet deep. No vegetation noted.	1500	N 39.66095	W -104.68948	DSCN0027.JPG
4	7/19/2023 3:34 PM	Surface exceedance recorded in a small erosion rill. No vegetation noted.	1400	N 39.66262	W -104.69214	DSCN0028.JPG
5	7/19/2023 3:56 PM	Penetration exceedance recorded at well 307. No vegetation noted.	3000	N 39.66227	W -104.69405	
6	7/19/2023 4:06 PM	Penetration exceedance recorded at well 308. No vegetation noted.	700	N 39.66223	W -104.69315	
7	7/19/2023 9:30 AM	Upwind Background Reading, Office Parking Lot *Not an exceedance*	1.3	N 39.65231	W -104.71330	
8	7/19/2023 10:24 AM	Downwind Background Reading, Road on north side of landfill. *Not an exceedance*	3.8	N 39.66498	W -104.69630	
9	7/20/2023 11:30 AM	Surface exceedance recorded in an erosion rill, approximately 6" deep and 4' wide, with a large amount of unburied waste. No vegetation noted.	600	N 39.66489	W -104.69038	
10	7/20/2023 11:32 AM	Penetration exceedance recorded at well 302. It was noted that work was being done in the area to place a new well.	2000	N 39.66478	W -104.69041	
11	7/20/2023 11:35 AM	Penetration exceedance recorded at decommissioned well 302.	600	N 39.66516	W -104.69023	
12	7/20/2023 11:40 AM	Surface exceedance recorded in an erosion rill approximately 6"X6". The erosion ran the extent of the slope from top to bottom. No vegetation noted.	700	N 39.66508	W -104.69015	

Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill

Facility Location: 3500 Gun Club Road, Aurora, CO 80022

Date of Inspection: July 19 – 20, 2023

13	7/20/2023 11:52 AM	Surface exceedance recorded in an erosion rill approximately 6"X6". The erosion ran the extent of the slope from top to bottom. No vegetation noted.	600	N 39.66482	W -104.68930	DSCN0029.JPG DSCN0030.JPG
14	7/20/2023 12:00 PM	Surface exceedance recorded in an erosion rill approximately 6"X6". The erosion ran the extent of the slope from top to bottom. No vegetation noted.	500	N 39.66479	W -104.68880	
15	7/20/2023 12:15 PM	Surface exceedance recorded in an erosion rill approximately 6"X6", downslope from well 303/305. The erosion ran the extent of the slope from top to bottom. No vegetation noted.	500	N 39.66486	W -104.68829	
16	7/20/2023 12:28 PM	Penetration exceedance recorded at well 53. Exceedances were recorded at both penetrations.	1000	N 39.66550	W -104.68920	
17	7/20/2023 12:35 PM	Surface exceedance recorded in a large bench erosion rill, similar in size to an irrigation ditch.	800	N 39.66545	W -104.68977	DSCN0031.JPG
18	7/20/2023 12:40 PM	Penetration exceedance recorded at well 49. Exceedances were recorded at both penetrations. No vegetation noted.	1000	N 39.66552	W -104.69006	
19	7/20/2023 1:01 PM	Penetration exceedance recorded at well 41. Sparse vegetation noted.	600	N 39.66555	W -104.69186	
20	7/20/2023 1:13 PM	Penetration exceedance recorded at well 34. No vegetation noted.	600	N 39.66560	W -104.69273	
21	7/20/2023 3:33 PM	Surface exceedance recorded in an erosion rill, approximately 6"X6", with a large amount of unburied waste. No vegetation noted.	700	N 39.66300	W -104.69597	
22	7/20/2023 3:53 PM	Surface exceedance recorded in an erosion rill, approximately 3" deep and 1' wide, with unburied waste in the rill. No vegetation noted.	500	N 39.66273	W -104.69590	

Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill

Facility Location: 3500 Gun Club Road, Aurora, CO 80022

Date of Inspection: July 19 – 20, 2023

APPENDIX C: CALIBRATION DATA

EPA used one ThermoFisher Toxic Vapor Analyzer 2020 (TVA2020). The EPA TVA2020 response times are in the 4 to 5 second range.

- Katelyn Bergl used the EPA TVA 2020 for the duration of the survey.
- Waste Management did not operate a TVA or similar instrument during the survey.
- Waste Management staff were shown readings on EPA instruments for visual confirmation of exceedances.

TVA2020 Calibration Gas Readings: TVA # C01086 w/ extension probe			
Calibration/Drift Check Time	Zero ppm	500 ppm	10,000 ppm
07/19/23, 12:50 PM initial calibration reading	2.5	503	10,020
mid-day drift check reading	N/A - due to half day monitoring, mid-day check was not performed		
07/19/2023, 4:30 PM end of day drift check	0.1	497	10,010
07/20/2023, 9:40 AM initial calibration reading	2.6	501	10,000
7/20/2023, 1:20 PM mid-day drift check reading	-0.9	482	10,030
07/20/2023, 4:00 PM end of day drift check	-0.5	484	9,987

EPA Calibration Gases			
Manufacturer	Composition	Lot #	Expiration
GASCO	Zero Air	1-095-784	05/2024
GASCO	500 ppm CH ₄	1-123-781	05/2024
GASCO	10,000 ppm CH ₄	1-123-782	05/2024

Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill
Facility Location: 3500 Gun Club Road, Aurora, CO 80022
Date of Inspection: July 19 – 20, 2023

APPENDIX D: MAPS OF SEM RESULTS AND SATELLITE IMAGERY

SEM hit locations plotted over satellite imagery from June 9, 2023 as depicted on Google Earth. Approximate monitoring path and monitored areas included (purple highlight), derived from GPS data.



Google Earth satellite imagery from June 9, 2023, demonstrating extensive erosion rills and sparse vegetation on the northern slope of the landfill near exceedances #11 – #21



Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill

Facility Location: 3500 Gun Club Road, Aurora, CO 80022

Date of Inspection: July 19 – 20, 2023

Google Earth satellite imagery from June 9, 2023, demonstrating extensive erosion rills and sparse vegetation on the eastern slope of the landfill near exceedances #22 and #23.



Google Earth satellite imagery from June 9, 2023, demonstrating extensive erosion rills and sparse vegetation on the south-central slope of the landfill near exceedance #3.



Facility Name: Waste Management Denver Arapahoe Disposal Site (DADS) Landfill

Facility Location: 3500 Gun Club Road, Aurora, CO 80022

Date of Inspection: July 19 – 20, 2023

Google Earth satellite imagery from June 9, 2023, demonstrating erosion rills and sparse vegetation on the eastern slope of the landfill near exceedances #4 – #6.





REGION 8

DENVER, CO 80202

DATE: See date of Branch Manager signature

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Waste Connections – Front Range Landfill, Erie, CO

FROM: Katelyn Bergl, Environmental Engineer
Enforcement and Compliance Assurance Division,
Air and Toxics Enforcement Branch

THRU: Scott Patefield, Branch Manager
Enforcement and Compliance Assurance Division,
Air and Toxics Enforcement Branch

TO: File

BASIC INFORMATION

Facility Name: Front Range Landfill

Facility Location: 1830 Weld CR 5, Erie, Colorado 80516

Date of Inspection: October 18, 2023

EPA Inspector(s):

1. Katelyn Bergl, Clean Air Act Inspector, EPA Region 8
2. Daniel Heins, Clean Air Act Inspector, EPA Headquarters
3. Zel Nebiyar, Clean Air Act Inspector, EPA NEIC

Front Range Landfill Attendees:

1. Randy Tourville, District Manager
2. Roger Whitley, Assistant District Manager
3. Dennis Stover, Lead Site Operator
4. Dalton Ellis, Region Engineer
5. Derek Coleman, Gas Technician

Contact Email Address: Randy.Tourville@WasteConnections.com;
Dalton.Ellis@WasteConnections.com

Purpose of Inspection: To determine Clean Air Act (CAA) compliance and perform a comparative Surface Emissions Monitoring (SEM) survey

Facility Type: Municipal solid waste (MSW) landfill

Regulations Central to Inspection: 40 C.F.R. Part 60, Subpart Cf (formerly subject to 40 C.F.R. Part 60, Subpart WWW); 40 C.F.R. Part 63, Subpart AAAA; Title V Permit Requirements of Operating Permit 97OPWE188

Date: 10/18/2023

Arrival Time: 8:45 MDT

Departure Time: 13:30 MDT

Inspection Type:

- ☐ Unannounced Inspection
- ☒ Announced Inspection

OPENING CONFERENCE

- ☒ Presented Credentials
- ☒ Stated authority and purpose of inspection
- ☐ Provided Small Business Resource Information Sheet
- ☒ Small Business Resource Information Sheet not provided. Reason: Not a small business
- ☒ Provided CBI warning to facility

The following information was obtained verbally from Front Range Landfill (FRLF) representatives or through review of facility records.

Process Description:

Front Range Landfill (FRLF) is a municipal solid waste (MSW) landfill located near Erie, in Weld County, Colorado and is owned and operated by Waste Connections, Inc. FRLF is part of a larger facility which includes Denver Regional Landfill South (DRLS) (Operating Permit 03OPWE254), also owned by Waste Connections; Denver Regional Landfill North (DRLN) (Operating Permit 99OPWE215), owned by Allied Waste; and a landfill gas to energy plant (GTEP) owned by Timberline Energy (Operating Permit 10WE1096). Both Denver Regional Landfill South and Denver Regional Landfill North have stopped accepting waste since December 2020 and April 1992, respectively. The Timberline Energy GTEP receives and processes landfill gas from all three landfills. Only the operations covered under Operating Permit 97OPWE188 and within the boundaries of FRLF were inspected during the EPA inspection.

FRLF began accepting waste in 1996 and accepts MSW, construction and demolition debris, non-friable asbestos, and various contaminated soils. Asbestos wastes and PCS are buried at the working face when they are received. The landfill accepts white goods, but does not

conduct recycling, open burning, or composting. Its design capacity is approximately 348 million cubic yards or 35,768,342 megagrams (Mg). FRLF is expected to remain open until approximately 2040.

By itself, Front Range Landfill does not exceed the emissions thresholds of 34 and 50 Mg/yr of non-methane organic compounds (NMOC) above which emissions must be controlled. However, CDPHE conducted a single source determination in 2009 and determined that FRLF was to be considered a single source with DRLS and DRLN. Once Front Range Landfill became a single source with DRLS and DRLN, total facility emissions on an uncontrolled basis exceeded 50 Mg NMOC/year, and NSPS Subpart WWW required the existing gas collection and control system (GCCS) at DRLS and DRLN be expanded to FRLF. CDPHE informed FRLF of the single source determination and associated control requirements in a letter dated August 25, 2009, and established a deadline of April 1, 2010, for submission of a GCCS design plan, and of October 1, 2011, to install the GCCS. A GCCS and open flare began operation at FRLF on October 1, 2011, as required under the terms of Construction Permit 11WE1680.

FRLF receives approximately 7,000 - 9,000 tons of waste per day, a majority of which is MSW. Other wastes, such as construction and demolition waste as well as asbestos waste, are comingled for disposal with MSW. Since there are no dedicated monofills at the landfill, all portions of the landfill with waste-in-place for greater than five years are under active landfill gas (LFG) collection.

Condensate and leachate collected at FRLF is recirculated or managed via the leachate management system and/or managed in accordance with FRLF's operating plan. From June 2022 through May 2023, the landfill recirculated 274,100 gallons of leachate.

Based on the 2009 single source determination, an initial GCCS design plan was submitted April 1, 2010 and the initial GCCS was subsequently installed and began operation on October 1, 2011. At the time of the inspection, the GCCS consisted of approximately 60 vertical landfill gas extraction wells. The LFG collection system spans all areas where waste has been in place for at least 5 years.

FRLF's GCCS control system consists of two control devices rated to accommodate a combined inlet LFG flow of up to 3,200 standard cubic feet per minute (scfm). The control devices include one open (candlestick) flare with a capacity of 2,000 scfm and an on-site landfill GTEP with a rated maximum capacity of 1,200 scfm. The GTEP consists of two reciprocating internal combustion Caterpillar G3520C engines. On August 8, 2023, FRLF submitted a permit modification application to replace the 2,000 scfm flare with a 3450 scfm flare. According to a GCCS design plan prepared by FRLF on March 2, 2023 (2023 Design Plan), EPA Landfill LandGEM modeling predicts LFG generation of 4,165 scfm in 2024, with peak LFG generation in 2031 of 6,861 scfm and declining LFG generation thereafter. FRLF assumes 75% of LFG is captured through the GCCS, with the remaining 25% uncollected and venting directly through the landfill surface.

Surface Emission Monitoring:

According to the 2023 Design Plan, the GCCS is design to extract LFG at a sufficient rate to minimize subsurface lateral migration and surface emissions of LFG. Among other monitoring and operational practices, FRLF is required to conduct quarterly surface emission monitoring (SEM) to verify the GCCS' ability to minimize LFG migration. Methane concentrations above 500 ppm discovered during a SEM event are considered exceedances and require that FRLF perform corrective actions and follow-up monitoring to ensure the exceedance has been resolved. SEM exceedances are addressed by evaluating both the GCCS and intermediate/final cover systems.

A 2018 CDPHE inspection found FRLF out of compliance for failing to demonstrate repairs and follow-up monitoring after surface emissions were discovered. CDPHE Enforcement Case No. 2018-144 was opened because the source had a history of other noncompliance related to SEM, including failing to maintain SEM records in 2015 and failing to calibrate SEM equipment to approved background values of methane in 2016. The enforcement case was settled with an early settlement agreement on January 14, 2019, with a penalty of \$5,100. Historic SEM methane exceedances above 500 ppm from past FRLF SEM surveys are included in Table 1 below.

Table 1. FRLF Historical SEM methane exceedance findings.

Monitoring Period	FRLF Historical Methane Exceedances			
Quarter	Q1	Q2	Q3	Q4
2024	8			
2023	0	5	3	6
2022	0	0	0	0
2021	0	0	0	0
2020	0	0	0	0
2019	0	0	0	1
2018	1	0	0	0

FRLF semiannual reports indicate that SEM is conducted in all accessible areas, including:

- Areas of active fill under interim cover, where waste has been in place for > 5 years,
- Areas that have waste in-place for more than 2 years and are closed or at final grade, and
- Areas where GCCS components have been installed to meet regulatory requirements.

FRLF representatives confirmed that in-house SEM technicians monitor penetrations during surface emission monitoring. FRLF's 2023 Design Plan defines penetrations as "any landfill gas collection well or landfill gas collection device that completely passes through the landfill cover into waste and is located within an area of the landfill where waste has been placed and a gas collection system is required. Cover penetrations do not include items such as survey stakes, fencing or litter fencing, flags, signs, trees, and utility poles." As stated in FRLF's 2023 Design Plan, SEM excludes areas with potentially dangerous conditions including the following:

- roads;
- working areas and/or the working face;
- truck traffic areas;

- steep and dangerous slopes;
- icy, snow covered, and/or extremely muddy slopes; and
- areas where the landfill cover material has been exposed for the express purpose of installing, expanding, replacing, or repairing components of the GCCS, leachate, or gas condensate collection and removal systems.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:

EPA conducted a partial SEM and cover integrity survey of the facility. EPA used two ThermoFisher Toxic Vapor Analyzer 2020s (TVA2020) to perform EPA Reference Method 21 for the SEM survey. EPA confirmed each exceedance with both TVA2020s and also offered FRLF representatives the opportunity to visually confirm each exceedance above 500 ppm measured on the TVA2020s during the SEM survey. Derek Coleman and Dennis Stover of FRLF visually confirmed all exceedances. See Appendix C for additional instrument and calibration information.

The EPA SEM survey covered central and eastern slopes of the landfill, estimated to constitute roughly 30% of the area routinely monitored during quarterly SEM events. EPA did not monitor northern portions of the landfill in order to avoid the working face, which was designated as unsafe to monitor by FRLF staff. Areas monitored during the EPA SEM survey were selected in accordance with regulatory requirements, focusing on locations with visual indicators of elevated landfill gas (e.g., distressed vegetation, cracks, seeps, cover penetrations) and areas with sparse vegetation, which are also prone to elevated emissions. EPA inspectors recorded 6 points on the landfill surface where methane concentrations equaled or exceeded 500 ppm, including 4 exceedances recorded at penetrations and 2 exceedances recorded on the landfill surface. Note that exceedance #8 of Appendix B is labeled as a penetration exceedance, although it does not meet FRLF's definition of a penetration. See Appendix B for more details.

On the landfill slope where exceedances #3 - #5 were recorded, EPA observed a large continuous area with little to no vegetation and some erosion rills. These conditions were also noted near exceedances #6 and #7. Aside from these locations, the landfill cover was generally in good condition, with minimal erosion and well-established vegetation.

CLOSING CONFERENCE

☒ Provided U.S. EPA point of contact to the facility

Compliance Assistance: None.

Photos and/or Videos: were taken during the inspection. See Appendix A

Field Measurements: were taken during this inspection. See Appendix B.

Records: were not taken during this inspection. Publicly available records were reviewed as part of the inspection.

Concerns:

EPA recorded cover integrity and SEM exceedances issues during the inspection which were communicated to FRLF staff during the closing conference.

The locations of the methane exceedances were communicated to FRLF personnel during the closing conference. FRLF committed to addressing the methane exceedances in the same way that is required for exceedances identified through quarterly SEM and followed up with EPA to confirm correction of the exceedances and return to appropriate methane levels at the surface.

Review of the 2023 Design Plan revealed a few alternative requests that are not supported by EPA: 1) SEM exclusion areas and, 2) FRLF's interpretation of the cover penetration definition.

First, areas may be excluded from monitoring only if the act of monitoring an area poses a significant risk of death or injury of the person conducting the monitoring, and/or the act of monitoring an area would violate state or federal occupational safety standards. Consistent with the State Plan and NESHAP AAAA, slopes may be excluded from monitoring only if it is not practically feasible for the area to be monitored safely and legally during the quarter. Final design slopes should not be designed in such a way that prevents surface emissions monitoring (SEM) in applicable areas.

The working face (if above applicable waste) should only be excluded if there is active truck traffic and waste deposition on the day of monitoring – areas under daily cover where waste has been in place for greater than 5 years are still otherwise subject to SEM requirements. SEM should be scheduled around large-scale construction projects that would make significant areas of the landfill unsafe to monitor. SEM should be scheduled to avoid or minimize snowy, icy, or muddy surfaces, and within a weather window during the quarterly period that is conducive to monitoring in the preferred conditions. Excluding areas from monitoring that could have been safely and legally monitored during the quarter constitute a violation of the Clean Air Act. SEM reports should include detailed explanations for reasons of excluding any areas subject to the collection and control requirements of the regulations.

Finally, the FRLF 2023 Design plan incorrectly interprets the definition of cover penetration by shortening the full definition. Survey stakes, fencing including litter fences, flags, signs, utility posts, and trees would all be considered cover penetrations if they pass through the cover, according to the definition of "cover penetration" at 40 C.F.R. § 63.1990. The landfill cover includes that portion which covers the waste, as well as the portion which borders the waste extended to the point where it is sealed with the landfill liner or the surrounding land mass.

No other concerns were noted.

DIGITAL SIGNATURES

Katelyn Bergl, Report Author

SCOTT PATEFIELD Digitally signed by SCOTT PATEFIELD
Date: 2024.07.01 16:23:41 -06'00'

Scott Patefield, Manager

Facility Name: Front Range Landfill

Facility Location: 1830 Weld CR 5, Erie, Colorado 80516

Date of Inspection: October 18, 2023

APPENDICES AND ATTACHMENTS

Appendix A: Digital Image Log

Appendix B: Field Measurement Data

Appendix C: Calibration Data

Appendix D: Maps of SEM Results and Satellite Imagery

Facility Name: Front Range Landfill

Facility Location: 1830 Weld CR 5, Erie, Colorado 80516

Date of Inspection: October 18, 2023

APPENDIX A: DIGITAL IMAGE LOG

Photographer: Katelyn Bergl Camera: Canon PowerShot ELPH 100 HS (S43435)		
File Name	Date/ Time (MST)	Description of Image
IMG_0038.JPG	10/18/2023 10:28	Taken at the location of exceedance #3. Captures Well 37 surrounded by exposed waste and loosely packed dirt with no vegetation in the vicinity.
IMG_0039.JPG	10/18/2023 10:35	Taken at the location of exceedance #4. Image demonstrates a lack of vegetation in the vicinity.
IMG_0040.JPG	10/18/2023 10:42	Taken at the location of exceedance #5. Demonstrates the extent of several erosion rills in the area and a lack of vegetation in the vicinity of the exceedance.
IMG_0041.JPG	10/18/2023 10:59	Taken at the location of exceedance #6. Captures Well 31 surrounded by a mound of dirt with no vegetation in the vicinity. The red circle in the image is red spray paint used by facility staff to mark the main point of the exceedance after inspectors logged the location.
IMG_0042.JPG	10/18/2023 11:03	Taken at the location of exceedance #7. Captures Well 29 surrounded by a mound of dirt with no vegetation in the vicinity.
IMG_0043.JPG	10/18/2023 11:09	A duct-taped seal on a collection well under vacuum. Ambient air being sucked into the pipe through the duct-taped seal was audible.
IMG_0044.JPG	10/18/2023 11:19	Exposed waste and some erosion on the surface of the landfill.
IMG_0045.JPG	10/18/2023 12:08	Taken at the location of exceedance #8. Captures an unnamed isolation valve and concrete pillar penetrations with no vegetation in the vicinity.

Facility Name: Front Range Landfill
Facility Location: 1830 Weld CR 5, Erie, Colorado 80516
Date of Inspection: October 18, 2023

APPENDIX B: FIELD MEASUREMENT DATA

Measured Exceedances

#	Reading Time	Well / Location / Description/ Observations	Reading (ppm)	Conf. Reading (ppm)	Latitude	Longitude	Media Records
1	9:59 AM	Downwind reading *Not exceedance*	0		N 40.02063	W -105.01585	
2	10:04 AM	Upwind Reading *Not exceedance*	0		N 40.01824	W -105.00865	
3	10:23 AM	Well 37 penetration exceedance. Inspectors noted no vegetation and presence of exposed waste.	12000	30000	N 40.02198	W -105.01184	IMG_0038.JPG
4	10:30 AM	Surface exceedance with elevated methane readings in the general vicinity. No vegetation was noted.	600	600	N 40.02215	W -105.0123	IMG_0039.JPG
5	10:37 AM	Surface exceedance recorded in a small 6"X6" erosion rill. No vegetation was noted.	1200	750	N 40.02212	W -105.01262	IMG_0040.JPG
6	10:55 AM	Well 31 penetration exceedance. Elevated readings were also recorded in the general vicinity of the well. No vegetation was noted.	600	600	N 40.02086	W -105.01368	IMG_0041.JPG
7	11:01 AM	Well 29 penetration exceedance, specifically on the extraction well penetration. No vegetation was noted.	650	1600	N 40.02011	W -105.01353	IMG_0042.JPG
8	12:03 PM	Exceedance recorded at an isolation valve penetration at the edge of the waste mass near the flare. Exceedances noted at both the valve penetration and the northwestern post, and methane was elevated in the general area as well. No vegetation was noted.	1600	2500	N 40.02188	W -105.00903	IMG_0045.JPG

Facility Name: Front Range Landfill

Facility Location: 1830 Weld CR 5, Erie, Colorado 80516

Date of Inspection: October 18, 2023

APPENDIX C: CALIBRATION DATA

EPA used two ThermoFisher Toxic Vapor Analyzer 2020s (TVA2020). The EPA TVA2020 response times are in the 4 to 5 second range.

- Katelyn Bergl used the EPA TVA 2020 #C01087 with an extension probe for the duration of the survey.
- Daniel Heins used the EPA TVA 2020 #C01086 with an extension probe for the duration of the survey.
- Both EPA TVA2020s were used to confirm all exceedances.
- Front Range Landfill staff did not operate a TVA or similar instrument during the survey.
- Front Range Landfill staff were shown readings on EPA instruments for visual confirmation of exceedances.

TVA2020 Calibration Gas Readings: TVA # C01086 w/ extension probe			
Calibration/Drift Check Time	Zero ppm	500 ppm	10,000 ppm
10/18/2023, 8:00 AM initial calibration reading	0.6 ppm	498 ppm	10,000 ppm
10/18/2023, 1:30 PM end of day drift check		490 ppm	

TVA2020 Calibration Gas Readings: TVA # C01087 w/ extension probe			
Calibration/Drift Check Time	Zero ppm	500 ppm	10,000 ppm
10/18/2023, 8:00 AM initial calibration reading		515 ppm	10,020 ppm
10/18/2023, 1:30 PM end of day drift check		507 ppm	

EPA Calibration Gases			
Manufacturer	Composition	Lot #	Expiration
GASCO	Zero Air	1-114-61	05/2024
GASCO	500 ppm CH ₄	1-112-80	05/2024
GASCO	10,000 ppm CH ₄	1-070-80	05/2024

Facility Name: Front Range Landfill

Facility Location: 1830 Weld CR 5, Erie, Colorado 80516

Date of Inspection: October 18, 2023

APPENDIX D: MAPS OF SEM RESULTS AND SATELLITE IMAGERY

SEM hit locations plotted over satellite imagery from September 4, 2023 as depicted on Google Earth. Approximate monitoring path and monitored areas included (green line and green highlight), derived from GPS data.



Detail view of exceedances in the central portion of landfill



Facility Name: Front Range Landfill

Facility Location: 1830 Weld CR 5, Erie, Colorado 80516

Date of Inspection: October 18, 2023

Google Earth satellite imagery from September 4, 2023, demonstrating extensive erosion rills and sparse vegetation on the central slope of the landfill near exceedances #3 – #5



Google Earth satellite imagery from September 4, 2023, demonstrating erosion rills and sparse vegetation on the western slope of the landfill near exceedances #6 and #7.





REGION 8

DENVER, CO 80202

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Salt Lake Valley Landfill,
Salt Lake City, UT

FROM: Katelyn Bergl, Clean Air Act Inspector
Enforcement and Compliance Assurance Division,
Air and Toxics Enforcement Branch

THRU: Scott Patefield, Branch Manager
Enforcement and Compliance Assurance Division,
Air and Toxics Enforcement Branch

TO: File

BASIC INFORMATION

Facility Name: Salt Lake Valley Landfill

Facility Location: 6030 W. California Ave. (1300S.), Salt Lake City, Utah 84104

Date of Inspection: July 31 – August 1, 2023

EPA Inspector(s):

1. Katelyn Bergl, Clean Air Act Inspector
2. Youn Joo Kim, Clean Air Act Inspector

Salt Lake Valley Landfill Attendees:

1. Tom Burrup, Environmental Manager
2. Amit Nair, Kleinfelder, Environmental Compliance Contractor
3. Annie Matzke, Kleinfelder, Environmental Compliance Contractor

Contact Email Address: TBurrup@slco.org

Purpose of Inspection: To determine Clean Air Act (CAA) compliance and perform a comparative Surface Emissions Monitoring (SEM) survey

Facility Type: Municipal solid waste (MSW) landfill

Regulations Central to Inspection: 40 C.F.R. Part 62, Subpart OOO – Federal Plan Requirements for Municipal Solid Waste Landfills (Federal Plan); 40 C.F.R. Part 63, Subpart AAAAA – National Emission Standards for Hazardous Air Pollutants for Municipal Solid Waste Landfills (NESHAP AAAAA); Permit Requirements of Title V Operating Permit 3500536003 (Title V Permit)

Date:	<u>7/31/2023</u>	<u>8/1/2023</u>
Arrival Time:	8:00 MDT	7:15 MDT
Departure Time:	17:30 MDT	17:30 MDT

Inspection Type:

- ☐ Unannounced Inspection
- ☒ Announced Inspection

OPENING CONFERENCE

- ☒ Presented Credentials
- ☒ Stated authority and purpose of inspection
- ☐ Provided Small Business Resource Information Sheet
- ☒ Small Business Resource Information Sheet not provided. Reason: Not a small business
- ☒ Provided CBI warning to facility

The following information was obtained verbally from Salt Lake Valley Solid Waste Management representatives or through review of facility records.

Process Description:

Salt Lake Valley Solid Waste Management (SLVSWM) is a municipal solid waste (MSW) landfill located in Salt Lake City, Utah, which is jointly owned and operated by Salt Lake City and Salt Lake County. SLVSWM is a lined RCRA Subtitle D site which first began receiving waste in July 1993. The facility accepts municipal solid waste, commercial solid waste, industrial waste such as construction and demolition debris, asbestos waste, small quantity household hazardous waste, and infectious waste. The facility's current design capacity is approximately 45,150,000 cubic yards, or 24,575,630 megagrams (Mg), and closure is not expected until 2080 or later.

SLVSWM receives approximately 1200 tons of waste per day, a majority of which is MSW. Other wastes, such as construction and demolition waste, are comingled for disposal with MSW. The site is divided into 11 modules for landfilling and site development. Modules 1 – 7 have waste-in-place while modules 8 – 11 are planned for future waste disposal. Currently, portions of modules 2 – 5 are under final cover. During the inspection, the active tipping face was located approximately in module 6, which was under intermediate cover.

Leachate is collected at SLVSWM from a leachate collection and recovery system (LCRS), which consists of a network of horizontal leachate inspection/cleanout pipes and leachate collection sumps at the lowest points of the landfill base equipped with vertical leachate risers through which leachate can be removed. Leachate removed from the LCRS is either: 1) sprayed back on the surface of Subtitle D lined areas to suppress fugitive dust, 2) pumped into treatment ponds where it is treated either by evaporation/infiltration or by enhanced macrophyte treatment, or 3) re-injected into the landfill waste to enhance waste degradation and methane production.

In December 1998, SLVSWM reported non-methane organic compound (NMOC) emissions of 77 Mg/yr based on a June 1998 Tier II gas sampling test, which exceeded the 50 Mg/yr threshold for installing a gas collection and control system (GCCS) to collect and control LFG. A GCCS design plan was submitted on June 15, 1999 and the initial GCCS was subsequently installed and began operation on December 15, 2000. At the time of the inspection, the GCCS consisted of approximately 41 vertical landfill gas extraction wells and approximately 37 horizontal gas extraction wells, although SLVSWM representatives stated that the facility is moving design away from horizontal wells as the GCCS is updated.

The SLVSWM GCCS control system consists of two control devices rated to accommodate a combined inlet LFG flow of up to approximately 3,878 standard cubic feet per minute (scfm). The control devices include one enclosed combustor flare with a capacity of 2,650 scfm, and an on-site landfill gas-to-energy plant (LFGTEP) with a rated maximum capacity of 1,228 scfm. The LFGTEP is owned and operated by Salt Lake Energy Systems, LLC., and operates under a separate Title V Operating Permit, Permit Number 3500604003. The LFGTEP consists of three reciprocating internal combustion Caterpillar engines: Two 1,138 hp G3516 engines with a rated capacity of 341 scfm each, and one 2,233 hp G3520C engine with a rated capacity of 546 scfm. The LFGTEP plant is run at full capacity and receives the majority of collected gas, while the flare is utilized to combust any collected gas in excess of the LFGTEP capacity. During the inspection, SLVSWM personnel stated that the current LFG flow rate collected through the GCCS was approximately 2,000 scfm. Of the total gas collected, 800 scfm was being sent to the flare, and 1,200 scfm was being sent to the LFGTEP.

Surface Emission Monitoring and Cover Integrity:

Surface emission monitoring (SEM) is required on a quarterly basis to verify that the GCCS is working properly to minimize subsurface lateral migration and surface emissions of LFG. Historic SEM methane exceedances above 500 ppm recorded during SLVSWM quarterly SEM events are included in Table 1 below.

Table 1. SLVSWM Historical SEM methane exceedance findings.

Monitoring Period	SLVSWM Historical Methane Exceedances			
Quarter	Q1	Q2	Q3	Q4
2023	0	3	1	
2022	1	0	1	0
2021	3	3	5	1

2020	2	1	0	1
2019	1	3	2	6
2018		2	1	6

SLVSWM personnel stated that SEM is not conducted in the following areas:

- a) At a dedicated asbestos cell located in Module 1,
- b) At the tipping face, including a 25 – 50 foot buffer around the tipping face as a safety measure, depending on site conditions,
- c) In areas with steep slopes,
- d) At the leachate evaporation pond on Modules 6 and 7, and
- e) At the location of one-time construction activities coinciding with the dates of SEM events.

In addition to quarterly SEM, monthly surface integrity cover monitoring is also required to minimize LFG surface emissions and ensure maximum collection by the GCCS. SLVSWM representatives perform a weekly “Landfill Visual Inspection” to meet the monthly cover integrity monitoring requirement. Records of each weekly Landfill Visual Inspection are maintained. The Landfill Visual Inspection is completed via a template which prompts the inspector to note the presence of certain conditions such as “Litter”, “Surface Water or Liquid Waste”, “Daily Cover” including type and estimated thickness, “Intermediate Cover”, “Location of the Active Tipping Face”, and “Odor Observations”, among other conditions. The Landfill Visual Inspection template does not include sections for noting concerns such as erosion, vegetation, or the condition of collection system components. SLVSWM personnel report that they make attempts to correct issues identified during the weekly landfill visual inspections as soon as possible.

EPA requested copies of the Landfill Visual Inspection records from August 2022 through July 2023. The recorded observations under the “Intermediate Cover” section were marked as “yes,” with the exception of one instance of “good” and one instance of “dirt”. The “Daily Cover” section prompts the inspector to indicate the presence of daily cover, the type, and the estimated thickness of the cover; the responses for this section sometimes indicate type of soil and estimated thickness, although many of the forms contain a checkmark in the estimated thickness field rather than a thickness. Under the “Litter” section, responses varied from “good” to “yes” to “yes, crew working”. The only needs for follow-up noted in the forms were related to repairs needed on fences or gates. There were no other issues noted in the “Other Issues” section of any of the weekly forms.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:

During the facility tour, EPA conducted a partial SEM and cover integrity survey of the facility. EPA used two ThermoFisher Toxic Vapor Analyzer 2020s (TVA2020) to perform EPA Reference Method 21 for the SEM survey. EPA offered SLVSWM representatives the opportunity to visually confirm each exceedance above 500 ppm measured on the TVA2020s during the SEM survey. When available, Annie Matzke of Kleinfelder (SEM contractor) used a Kleinfelder TVA

to perform concurrent monitoring to confirm EPA's exceedances. However, due to scheduling conflicts as well as extreme heat during the EPA inspection, Ms. Matzke and other SLVSWM representatives were unavailable to remain with EPA inspectors for the entirety of the SEM event and were therefore unable to perform concurrent monitoring or otherwise visually confirm all EPA recorded exceedances. See Appendix C for additional instrument and calibration information.

The EPA SEM survey monitored limited areas in the northern portions of modules 2 – 5, southern and western portions of modules 4 and 5, limited portions near the border of modules 3 and 6, and southern portions of modules 1 and 6. The EPA SEM monitored areas constitute an estimated 15% of the area routinely monitored during quarterly SEM events. At the direction of SLVSWM personnel, EPA inspectors did not conduct SEM monitoring near the working face, which extended throughout the north-central and north-eastern portions of the landfill and was designated as unsafe to monitor by SLVSWM staff. Areas monitored during the EPA SEM survey were selected in accordance with regulatory requirements, focusing on locations with visual indicators of elevated landfill gas (e.g., distressed vegetation, cracks, seeps, cover penetrations) and areas with sparse vegetation, which are also prone to elevated emissions. EPA inspectors recorded 41 points on the landfill surface where methane concentrations equaled or exceeded 500 ppm, including 21 exceedances recorded at penetrations and 20 exceedances recorded on the landfill surface. See Appendix B for more details.

In nearly all areas with recorded surface-type SEM exceedances, EPA inspectors observed concurrent cover integrity issues, such as large continuous areas with little to no vegetation, exposed waste, or erosion rills. This information is captured in Appendix B; however, a description of three areas where significant cover integrity issues coincided with SEM exceedances is also included below to provide additional details:

1. Near the southeast corner of the landfill in Module 6, EPA inspectors observed that large swaths of the slope were under cover with little to no vegetation, dead vegetation, and/or erosion rills. Areas with erosion and sparse vegetation where exceedances were recorded appear to have had persistent erosion and vegetation issues since at least 2022, as demonstrated by satellite imagery. This area is associated with exceedances #3 – #8 and is captured in images DSCN0041.JPG – DSCN0046.JPG of Appendix A and satellite image 2 of Appendix D.
2. On the southeastern portion of Module 5, EPA inspectors observed large swaths of unburied waste and a lack of vegetation. Satellite imagery indicates that the exposed waste was buried prior to October 2021 but was exposed and visible to EPA inspectors during the 2023 inspection. Satellite imagery also demonstrates a persistent lack of vegetation in the area. This area is associated with exceedances #15 – #21 and is captured in images DSCN0064.JPG – DSCN0076.JPG and satellite image 3 of Appendix D.
3. In the west-central portion of Module 4, EPA inspectors observed large swaths of unburied waste, no vegetation, and loose disturbed dirt. While this area was part of

the active face at some point in late 2022 or early 2023, the area should have been under intermediate cover conditions for several months at the time of the inspection. This area is associated with exceedances #23 and #24 and is captured in images DSCN0078.JPG – DSCN0080.JPG and satellite image 4 of Appendix D.

Satellite image 5 of Appendix D shows a widespread lack of vegetation in the areas described in points 2 and 3 above, as well as other areas of the landfill, despite thick, healthy vegetation growing at the fence line of the landfill indicating that seasonal vegetation is achievable in the area.

Although not associated with any methane exceedances, EPA also observed a large swath of unburied medical waste approximately in Modules 4 and 7. This area was not part of the active face of the landfill and had not been under active filling for several months prior to the EPA inspection. This area is captured in images DSCN0047.JPG – DSCN0057.JPG and satellite images 1 and 7 of Appendix D. In follow-up communications on August 25, 2023 regarding the unburied medical waste, SLVSWM provided the following statement: “On or about June 3, 2023, the landfill added cover to this area. It appears that a bulldozer scraped too deeply during its passes to cover other areas and exposed the once buried medical waste. It had gone unnoticed since tipping face location changed and has now been re-covered and corrected.” The EPA observations described above were not noted in the weekly Landfill Visual Inspection forms.

CLOSING CONFERENCE

☒ Provided U.S. EPA point of contact to the facility

Compliance Assistance: None.

Photos and/or Videos: were taken during the inspection. See Appendix A

Field Measurements: were taken during this inspection. See Appendix B.

Records: were taken during this inspection. Weekly Landfill Visual Inspection forms from 8/1/2022 – 7/31/2023, semi-annual and SEM reports from 2018 – 2023, and the GCCS Design Plan were obtained as part of this inspection. Publicly available records were also reviewed as part of the inspection.

Concerns:

The findings of the EPA inspection, which are detailed in the “Data Collected and Observations” section of this report as well as Appendix B and Appendix D, revealed facility SEM practices, cover integrity monitoring, and GCCS design as potential areas of concern. SEM and cover integrity monitoring concerns were discussed with SLVSWM representatives during the EPA SEM survey as well as during the closing conference. GCCS design concerns were identified by the facility after the inspection.

The cover integrity issues detailed in the “Data Collected and Observations” section of this report were communicated with SLVSWM representatives by EPA inspectors. SLVSWM noted the areas of concern and communicated to EPA via email that they had initiated corrective action to apply additional cover materials to the exposed waste. They also discussed introducing a practice of documenting repair activities initiated as part of the Landfill Visual

Inspection process, as they had not previously been officially tracking repair activities associated with the weekly inspections. Additional changes to the Landfill Visual Inspection process may be necessary to meet monthly cover integrity monitoring requirements.

During EPA's SEM survey, inspectors noted 41 exceedances. Considering the small area of the landfill that was monitored during the inspection, EPA found a high rate of SEM methane readings above 500 ppm, distinctly above historic rates summarized in Table 1 of this report. EPA's findings were also considerably higher than the most recent facility SEM event, which was conducted just 2 weeks prior to the EPA inspection, on July 17, 2023, and only recorded one methane exceedance. The locations of the methane exceedances were communicated to SLVSWM personnel during the closing conference as well as through email following the inspection. SLVSWM committed to addressing the methane exceedances in the same way that is required for exceedances identified through quarterly SEM and followed up with EPA to confirm correction of the exceedances and a return to appropriate methane levels at the surface in all but one exceedance. Exceedance #33 of Appendix B was still elevated above 500 ppm at the 10 and 30 day checks, and the facility initiated further corrective actions to address that exceedance.

The findings of the EPA SEM survey indicate that SLVSWM SEM practices may not be sufficient. However, the high number of exceedances recorded may also indicate that the GCCS is not sufficiently designed to minimize surface emissions of LFG. On November 7, 2023, SLVSWM submitted a deviation report recognizing that the GCCS may not be adequately expanded into all areas with qualifying waste. SLVSWM is currently designing an expansion of the LFG collection system to meet the conditions of permit provision II.B.2.g of the Title V Permit, which requires the facility to operate the GCCS in all areas where waste has been in place for 5 years or more if the area is active, and 2 years or more if the area is no longer accepting waste. The GCCS expansion design is anticipated to be completed by September 2024, with construction activities beginning in the spring of 2025.

Finally, the SEM exclusion areas identified by SLVSWM personnel may not be appropriate for routine exclusion. First, areas may be excluded from SEM only if the act of monitoring an area poses a significant risk of death or injury of the person conducting the monitoring, and/or the act of monitoring an area would violate state or federal occupational safety standards. Consistent with the Federal Plan and NESHAP AAAA, slopes may be excluded from monitoring only if it is not practically feasible for the area to be monitored safely and legally during the quarter. Final design slopes should not be designed in such a way that prevents SEM in applicable areas.

The working face (if above applicable waste) should only be excluded if there is active truck traffic and waste deposition on the day of monitoring – areas under daily cover where waste has been in place for greater than 5 years are still otherwise subject to SEM requirements. SEM should be scheduled around large-scale construction projects that would make significant areas of the landfill unsafe to monitor. Excluding areas from monitoring that could have been safely and legally monitored during the quarter constitute a violation of the Clean Air Act. SEM reports should include detailed explanations for reasons of excluding any areas subject to the collection and control requirements of the regulations rather than establishing

routine exclusion areas.

No other concerns were noted.

DIGITAL SIGNATURES

Katelyn Bergl, Report Author

SCOTT PATEFIELD  Digitally signed by SCOTT PATEFIELD
Date: 2024.07.12 16:16:04 -06'00'

Scott Patefield, Manager

Facility Name: Salt Lake Valley Landfill

Facility Location: 6030 W. California Ave. (1300S.), Salt Lake City, Utah 84104

Date of Inspection: July 31 – August 1, 2023

APPENDICES

Appendix A: Digital Image Log

Appendix B: Field Measurement Data

Appendix C: Calibration Data

Appendix D: Maps of SEM Results and Satellite Imagery

Facility Name: Salt Lake Valley Landfill

Facility Location: 6030 W. California Ave. (1300S.), Salt Lake City, Utah 84104

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APPENDIX A: DIGITAL IMAGE LOG

Photographer: Katelyn Bergl		
File Name	Date/ Time (MDT)	Description of Image
DSCN0041.JPG	7/31/2023 12:05	Taken at the location of exceedance #3. Captures sparse/dead vegetation at exceedance.
DSCN0042.JPG	7/31/2023 12:17	Taken at the location of exceedance #4. Demonstrates sparse/dead vegetation in the vicinity of the exceedance.
DSCN0043.JPG	7/31/2023 12:25	Taken at the location of exceedance #5. Captures sparse/dead vegetation at exceedance.
DSCN0044.JPG	7/31/2023 12:33	Taken at the location of exceedance #6. Captures sparse/dead vegetation and signs of erosion at exceedance.
DSCN0045.JPG	7/31/2023 12:40	Taken at the location of exceedance #7. Captures sparse/dead vegetation at exceedance.
DSCN0046.JPG	7/31/2023 12:44	Taken at the location of exceedance #8. Captures lack of vegetation at exceedance.
DSCN0047.JPG	7/31/2023 17:18	Exposed, unburied medical waste with no vegetation on the cover.
DSCN0048.JPG	7/31/2023 17:18	Exposed, unburied medical waste with no vegetation on the cover.
DSCN0049.JPG	7/31/2023 17:19	Exposed, unburied medical waste with no vegetation on the cover.
DSCN0050.JPG	7/31/2023 17:19	Exposed, unburied medical waste with no vegetation on the cover.
DSCN0051.JPG	7/31/2023 17:19	Exposed, unburied medical waste with no vegetation on the cover.
DSCN0052.JPG	7/31/2023 17:19	Exposed, unburied medical waste with no vegetation on the cover.
DSCN0053.JPG	7/31/2023 17:20	Exposed, unburied medical waste with no vegetation on the cover.
DSCN0054.JPG	7/31/2023 17:20	Exposed, unburied medical waste with no vegetation on the cover.
DSCN0055.JPG	7/31/2023 17:20	Exposed, unburied medical waste with no vegetation on the cover.
DSCN0056.JPG	7/31/2023 17:21	Exposed, unburied medical waste with no vegetation on the cover.
DSCN0057.JPG	7/31/2023 17:22	Exposed, unburied medical waste with no vegetation seen throughout the area captured in the image.

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DSCN0058.JPG	8/1/2023 9:33	Taken at the location of exceedance #11. Captures lack of vegetation and signs of erosion at exceedance.
DSCN0059.JPG	8/1/2023 10:00	Taken at the location of exceedance #12. Captures lack of vegetation and some exposed waste at exceedance.
DSCN0060.JPG	8/1/2023 10:55	Taken at the location of exceedance #13. Captures valve penetration CV-110 with no vegetation in the vicinity.
DSCN0061.JPG	8/1/2023 11:19	Landfill surface with no vegetative coverage and loosely packed dirt over a large surface area. Exposed waste and a large flock of birds can also be seen.
DSCN0062.JPG	8/1/2023 11:21	Landfill surface with no vegetative coverage and loosely packed dirt over a large surface area. Exposed waste and a large flock of birds can also be seen.
DSCN0063.JPG	8/1/2023 12:51	Taken at the location of exceedance #14. Captures a leachate riser with little to no vegetation in the vicinity.
DSCN0064.JPG	8/1/2023 13:07	Taken at the location of exceedance #15. Captures lack of vegetation at exceedance.
DSCN0065.JPG	8/1/2023 13:08	Taken at the location of exceedance #15. Captures lack of vegetation at exceedance.
DSCN0066.JPG	8/1/2023 13:16	Taken at the location of exceedance #16. Captures lack of vegetation and exposed waste at exceedance.
DSCN0067.JPG	8/1/2023 13:17	Taken at the location of exceedance #16. Captures lack of vegetation and the extent of exposed waste at the exceedance.
DSCN0068.JPG	8/1/2023 13:18	Taken at the location of exceedance #17. Captures lack of vegetation and the extent of exposed waste at the exceedance.
DSCN0069.JPG	8/1/2023 13:19	Taken at the location of exceedance #17. Captures lack of vegetation and the extent of exposed waste at the exceedance.
DSCN0070.JPG	8/1/2023 13:20	Landfill surface with an extensive swath of exposed waste and dead vegetation.
DSCN0071.JPG	8/1/2023 13:20	Landfill surface with an extensive swath of exposed waste and dead vegetation.
DSCN0072.JPG	8/1/2023 13:24	Taken at the location of exceedance #18. Captures lack of vegetation at exceedance.
DSCN0073.JPG	8/1/2023 13:27	Taken at the location of exceedance #19. Captures sparse/dead vegetation at exceedance.
DSCN0074.JPG	8/1/2023 13:29	Taken at the location of exceedance #20. Captures sparse/dead vegetation at exceedance.
DSCN0075.JPG	8/1/2023 13:33	Taken at the location of exceedance #21. Captures sparse vegetation at exceedance.

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DSCN0076.JPG	8/1/2023 13:45	Taken at the location of exceedance #22. Captures lack of vegetation and the extent of exposed waste at the exceedance.
DSCN0077.JPG	8/1/2023 13:45	Taken at the location of exceedance #22. Captures lack of vegetation and the extent of exposed waste at the exceedance.
DSCN0078.JPG	8/1/2023 14:08	Taken at the location of exceedance #23. Captures lack of vegetation, extent of exposed waste, and loose dirt at the exceedance.
DSCN0079.JPG	8/1/2023 14:08	Taken at the location of exceedance #23. Captures lack of vegetation, extent of exposed waste, and loose dirt at the exceedance.
DSCN0080.JPG	8/1/2023 14:12	Taken at the location of exceedance #24. Captures sparse vegetation, extent of exposed waste, and signs of erosion at the exceedance.
DSCN0081.JPG	8/1/2023 14:24	Taken at the location of exceedance #25. Captures well HW-5 with the penetration cover removed.
DSCN0082.JPG	8/1/2023 14:24	Taken at the location of exceedance #25. Captures well HW-5.
DSCN0083.JPG	8/1/2023 14:24	Taken at the location of exceedance #25. Captures well HW-5.
DSCN0084.JPG	8/1/2023 14:36	Taken at the location of exceedance #26. Captures a well near the CT1 electrical panel. Demonstrates sparse vegetation and signs of erosion in the vicinity of the penetration.
DSCN0085.JPG	8/1/2023 14:37	Taken at the location of exceedance #26. Captures a well near the CT1 electrical panel. Demonstrates sparse vegetation and signs of erosion in the vicinity of the penetration.
DSCN0086.JPG	8/1/2023 14:37	Taken at the location of exceedance #26. Captures a well near the CT1 electrical panel with standing water inside the manhole.
DSCN0087.JPG	8/1/2023 14:38	Taken at the location of exceedance #27. Captures electrical panel CT1 penetration with sparse vegetation and signs of erosion in the vicinity.
DSCN0088.JPG	8/1/2023 14:39	Taken at the location of exceedance #27. Captures electrical panel CT1 penetration with sparse vegetation and signs of erosion in the vicinity.
DSCN0089.JPG	8/1/2023 14:40	Taken at the location of exceedance #27. Captures electrical panel CT1 penetration with sparse vegetation and signs of erosion in the vicinity.

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DSCN0090.JPG	8/1/2023 14:49	Taken at the location of exceedance #28. Captures well HW-4 with sparse vegetation in the vicinity.
DSCN0091.JPG	8/1/2023 14:49	Taken at the location of exceedance #28. Captures well HW-4.
DSCN0092.JPG	8/1/2023 14:49	Taken at the location of exceedance #28. Captures well HW-4.
DSCN0093.JPG	8/1/2023 15:01	Taken at the location of exceedance #29. Captures a leachate riser surrounded by exposed waste with dead vegetation and signs of erosion in the vicinity.
DSCN0094.JPG	8/1/2023 15:01	Taken at the location of exceedance #29. Captures a leachate riser surrounded by exposed waste with dead vegetation and signs of erosion in the vicinity.
DSCN0095.JPG	8/1/2023 15:01	Taken at the location of exceedance #29. Captures a leachate riser surrounded by exposed waste with dead vegetation and signs of erosion in the vicinity.
DSCN0096.JPG	8/1/2023 15:02	Taken at the location of exceedance #30. Captures a leachate riser with dead vegetation and signs of erosion in the vicinity.
DSCN0097.JPG	8/1/2023 15:02	Taken at the location of exceedance #30. Captures a leachate riser with dead vegetation and signs of erosion in the vicinity.
DSCN0098.JPG	8/1/2023 15:02	Taken at the location of exceedance #30. Captures a leachate riser with dead vegetation and signs of erosion in the vicinity.
DSCN0099.JPG	8/1/2023 15:14	Taken at the location of exceedance #31. Captures at an unnamed penetration in front of the CT2 electrical box, with no vegetation in the vicinity.
DSCN0100.JPG	8/1/2023 15:15	Taken at the location of exceedance #32. Captures electrical panel CT2 penetration with sparse/dead vegetation in the vicinity.
DSCN0101.JPG	8/1/2023 15:15	Taken at the location of exceedance #32. Captures electrical panel CT2 penetration with sparse/dead vegetation in the vicinity.
DSCN0102.JPG	8/1/2023 15:22	Taken at the location of exceedance #33. Captures a cover near the CT3 electrical panel with sparse vegetation and exposed waste in the vicinity.
DSCN0103.JPG	8/1/2023 15:23	Taken at the location of exceedance #33. Captures a cover near the CT3 electrical panel with sparse vegetation and exposed waste in the vicinity.
DSCN0104.JPG	8/1/2023 15:23	Taken at the location of exceedance #33. Captures a cover near the CT3 electrical panel with sparse vegetation and exposed waste in the vicinity.

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DSCN0105.JPG	8/1/2023 15:35	Taken at the location of exceedance #34. Captures a valve penetration with no vegetation and signs of erosion in the vicinity.
DSCN0106.JPG	8/1/2023 15:35	Taken at the location of exceedance #34. Captures a valve penetration with no vegetation and signs of erosion in the vicinity.
DSCN0107.JPG	8/1/2023 15:41	Taken at the location of exceedance #35. Captures a leachate riser with sparse vegetation and gravel cover in the vicinity.
DSCN0108.JPG	8/1/2023 15:43	Taken at the location of exceedance #36. Captures an unnamed penetration with no vegetation and loose dirt in the vicinity.
DSCN0109.JPG	8/1/2023 15:43	Taken at the location of exceedance #36. Captures an unnamed penetration.
DSCN0110.JPG	8/1/2023 15:47	Taken at the location of exceedance #37. Captures a leachate riser surrounded by exposed waste.
DSCN0111.JPG	8/1/2023 15:55	Taken at the location of exceedance #38. Captures valve penetration CV-118 with no vegetation and signs of erosion and soil disturbance in the vicinity.
DSCN0112.JPG	8/1/2023 16:01	Taken at the location of exceedance #39. Captures a depression in the landfill surface filled with unburied waste.
DSCN0113.JPG	8/1/2023 16:01	Taken at the location of exceedance #39. Captures a depression in the landfill surface filled with unburied waste.
DSCN0114.JPG	8/1/2023 16:05	Taken at the location of exceedance #40. Captures an unnamed penetration with no vegetation and loose dirt in the vicinity.
DSCN0115.JPG	8/1/2023 16:06	Taken at the location of exceedance #41. Captures an "irrigation control valve" cover with sparse vegetation in the vicinity.
DSCN0116.JPG	8/1/2023 16:07	Taken at the location of exceedance #42. Captures an unnamed concrete beam with sparse vegetation and loose dirt in the vicinity.
DSCN0117.JPG	8/1/2023 16:09	Taken at the location of exceedance #43. Captures an electrical panel penetration with sparse vegetation and exposed waste in the vicinity.
DSCN0118.JPG	8/1/2023 16:10	Taken at the location of exceedance #44. Captures an unnamed concrete beam with sparse vegetation and exposed waste in the vicinity.
DSCN0119.JPG	8/1/2023 16:11	Taken at the location of exceedance #45. Captures an unnamed concrete beam with sparse vegetation and exposed waste in the vicinity.

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APPENDIX B: FIELD MEASUREMENT DATA

Measured Exceedances

#	Reading Date/ Time	Well / Location / Description/ Observations	Reading (ppm)	Latitude	Longitude	Media Records
1	7/31/2023 10:40 AM	Upwind Background Reading, Office	1.5	N 40.74061	W -112.03478	
2	7/31/2023 10:50 AM	Downwind Background Reading, Road on north side of landfill.	5.4	N 40.75014	W -112.03589	
3	7/31/2023 12:03 PM	Surface exceedance recorded in a small area with no vegetation, surrounded by dead vegetation.	670	N 40.74483	W -112.04047	DSCN0041.JPG
4	7/31/2023 12:17 PM	Surface exceedance recorded in an area with some dead vegetation.	924	N 40.74482	W -112.04041	DSCN0042.JPG
5	7/31/2023 12:25 PM	Surface exceedance recorded in a small area with no vegetation, surrounded by dead vegetation.	990	N 40.74480	W -112.04037	DSCN0043.JPG
6	7/31/2023 12:34 PM	Surface exceedance at a patch of dead vegetation. Small erosion cracks were also present throughout the area.	674	N 40.74484	W -112.04019	DSCN0044.JPG
7	7/31/2023 12:40 PM	Surface exceedance recorded in an area with some dead vegetation.	556	N 40.74479	W -112.04016	DSCN0045.JPG
8	7/31/2023 12:43 PM	Surface exceedance recorded in a small area with no vegetation, located south of a large mound of clay deposited on the surface.	815	N 40.74480	W -112.04007	DSCN0046.JPG
9	8/1/2023 7:23 AM	Upwind Background Reading, Office	1.1	N 40.74061	W -112.03478	
10	8/1/2023 7:32 AM	Downwind Background Reading, Road on north side of landfill.	2.1	N 40.75051	W -112.05078	
11	8/1/2023 9:25 AM	Surface exceedance recorded in an area with no vegetation and signs of erosion forming.	13700	N 40.74936	W -112.05017	DSCN0058.JPG
12	8/1/2023 9:58 AM	Surface exceedance recorded in an area with no vegetation and some exposed waste in the vicinity.	829	N 40.74933	W -112.04929	DSCN0059.JPG

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13	8/1/2023 10:54 AM	Exceedance recorded adjacent to penetration CV-110. No vegetation was noted in the vicinity.	769	N 40.75038	W -112.04663	DSCN0060.JPG
14	8/1/2023 12:51 PM	Exceedance recorded at a leachate riser penetration with no vegetation in the vicinity.	830	N 40.74767	W -112.04113	DSCN0063.JPG
15	8/1/2023 1:07 PM	Surface exceedance recorded in an area with no vegetation.	3400	N 40.74887	W -112.04746	DSCN0064.JPG DSCN0065.JPG
16	8/1/2023 1:16 PM	Surface exceedance recorded in an area with no vegetation and exposed waste.	514	N 40.74873	W -112.04760	DSCN0066.JPG DSCN0067.JPG
17	8/1/2023 1:18 PM	Surface exceedance recorded in an area with dead vegetation and exposed waste.	505	N 40.74874	W -112.04765	DSCN0068.JPG DSCN0069.JPG
18	8/1/2023 1:24 PM	Surface exceedance recorded in an area with no vegetation.	1062	N 40.74873	W -112.04790	DSCN0072.JPG
19	8/1/2023 1:27 PM	Surface exceedance recorded in an area with dead vegetation.	782	N 40.74874	W -112.04795	DSCN0073.JPG
20	8/1/2023 1:29 PM	Surface exceedance recorded in an area with sparse vegetation.	674	N 40.74875	W -112.04806	DSCN0074.JPG
21	8/1/2023 1:34 PM	Surface exceedance recorded in an area with sparse vegetation.	634	N 40.74879	W -112.04817	DSCN0075.JPG
22	8/1/2023 1:45 PM	Surface exceedance recorded in a patch with no vegetation and exposed waste mingled with wood chip cover.	530	N 40.74889	W -112.04903	DSCN0076.JPG DSCN0077.JPG
23	8/1/2023 2:08 PM	Surface exceedance recorded in an area with no vegetation, exposed waste, and loosely packed dirt.	643	N 40.74931	W -112.04678	DSCN0078.JPG DSCN0079.JPG
24	8/1/2023 2:11 PM	Surface exceedance recorded in a depressed area with exposed waste, erosion cracks, and sparse vegetation.	608	N 40.74939	W -112.04684	DSCN0080.JPG
25	8/1/2023 2:24 PM	Penetration exceedance recorded at penetration HW-5. Plastic cover was removed from the top of the corrugated plastic manhole.	942	N 40.74801	W -112.05313	DSCN0081.JPG DSCN0082.JPG DSCN0083.JPG

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26	8/1/2023 2:37 PM	Penetration exceedance recorded at penetration CT1. Erosion cracks were visible around the penetration. There was standing water in the manhole, approximately 6 feet from the top of the casing.	1375	N 40.74884	W -112.05331	DSCN0084.JPG DSCN0085.JPG DSCN0086.JPG
27	8/1/2023 2:40 PM	Penetration exceedance recorded at the CT1 electrical box penetration.	876	N 40.74883	W -112.05329	DSCN0087.JPG DSCN0088.JPG DSCN0089.JPG
28	8/1/2023 2:49 PM	Penetration exceedance recorded inside penetration HW-4.	1121	N 40.75034	W -112.05296	DSCN0090.JPG DSCN0091.JPG DSCN0092.JPG
29	8/1/2023 3:01 PM	Penetration exceedance recorded at a leachate riser surrounded by exposed waste with signs of erosion and dead vegetation in the vicinity. A landfill gas odor was also noted by inspectors.	78900	N 40.75039	W -112.04906	DSCN0093.JPG DSCN0094.JPG DSCN0095.JPG
30	8/1/2023 3:03 PM	Penetration exceedance recorded at a leachate riser surrounded by exposed waste with dead vegetation in the vicinity. A landfill gas odor was also noted by inspectors.	34700	N 40.75039	W -112.04906	DSCN0096.JPG DSCN0097.JPG DSCN0098.JPG
31	8/1/2023 3:12 PM	Penetration exceedance recorded at a covered manhole located in front of the CT2 electrical box. No vegetation was present in the area.	12300	N 40.75038	W -112.04802	DSCN0099.JPG
32	8/1/2023 3:15 PM	Penetration exceedance recorded at the CT2 electrical box penetration. Sparse and dead vegetation was also noted.	3791	N 40.75036	W -112.04804	DSCN0100.JPG DSCN0101.JPG
33	8/1/2023 3:22 PM	Penetration exceedance recorded at an "irrigation control valve" cover near the CT3 electrical box penetration. Sparse vegetation and exposed waste were noted.	1223	N 40.75034	W -112.04469	DSCN0102.JPG DSCN0103.JPG DSCN0104.JPG

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34	8/1/2023 3:35 PM	Penetration exceedance recorded at a valve penetration with no vegetation in the vicinity, signs of erosion, and a strong landfill gas odor noted.	574	N 40.75029	W -112.04370	DSCN0105.JPG DSCN0106.JPG
35	8/1/2023 3:40 PM	Penetration exceedance recorded at leachate riser "M7-L4N-H3R". Specifically, the exceedance was recorded at the gravel overlying the pipe. Vegetation was sparse in the vicinity.	763	N 40.75016	W -112.04364	DSCN0107.JPG
36	8/1/2023 3:43 PM	Penetration exceedance recorded at an uncovered, unnamed HW penetration.	1889	N 40.75022	W -112.04350	DSCN0108.JPG DSCN0109.JPG
37	8/1/2023 3:47 PM	Penetration exceedance recorded at a leachate riser surrounded by exposed waste.	1030	N 40.750296	W - 112.043446	DSCN0110.JPG
38	8/1/2023 3:55 PM	Penetration exceedance recorded at a valve penetration CV-118 with no vegetation in the vicinity and signs of erosion and soil disturbance.	19600	N 40.75021	W -112.04141	DSCN0111.JPG
39	8/1/2023 4:02 PM	Surface exceedance recorded at a depression in the surface just west of a leachate riser penetration that was filled with unburied waste. No vegetation was noted at the point of the exceedance.	570	N 40.75019	W -112.04115	DSCN0112.JPG DSCN0113.JPG
40	8/1/2023 4:05 PM	Penetration exceedance recorded at an unnamed penetration. Sparse, dead vegetation was noted. Exceedances 40-45 are co-located penetrations, although a unique exceedance was recorded at each penetration.	3169	N 40.75024	W -112.04081	DSCN0114.JPG
41	8/1/2023 4:07 PM	Penetration exceedance recorded at an "irrigation control valve" cover penetration. Sparse dead vegetation and exposed waste were noted.	1897	N 40.75021	W -112.04081	DSCN0115.JPG

Facility Name: Salt Lake Valley Landfill

Facility Location: 6030 W. California Ave. (1300S.), Salt Lake City, Utah 84104

Date of Inspection: July 31 - August 1, 2023

42	8/1/2023 4:08 PM	Penetration exceedance recorded at a yellow concrete beam in the northwest direction of the cluster of penetrations. Signs of erosion and disturbed dirt were noted.	1769	N 40.75020	W -112.04082	DSCN0116.JPG
43	8/1/2023 4:09 PM	Penetration exceedance at an electrical panel support penetration. Unburied waste was noted in the vicinity.	570	N 40.75019	W -112.04079	DSCN0117.JPG
44	8/1/2023 4:10 PM	Penetration exceedance recorded at a yellow concrete beam in the southwest direction of the cluster of penetrations. The penetration was surround by unburied waste.	1540	N 40.75018	W -112.04082	DSCN0118.JPG
45	8/1/2023 4:12 PM	Penetration exceedance recorded at a yellow concrete beam in the southeast direction of the cluster of penetrations. The penetration was surround by unburied waste.	622	N 40.75020	W -112.04078	DSCN0119.JPG

Facility Name: Salt Lake Valley Landfill

Facility Location: 6030 W. California Ave. (1300S.), Salt Lake City, Utah 84104

Date of Inspection: July 31 - August 1, 2023

APPENDIX C: CALIBRATION DATA

EPA used two ThermoFisher Toxic Vapor Analyzer 2020s (TVA2020). The EPA TVA2020 response times are in the 4 to 5 second range.

- Katelyn Bergl and Youn Joo Kim used the EPA TVA 2020 #C01087 with an extension probe for the duration of the survey on 7/31/2023.
- Katelyn Bergl and Youn Joo Kim used the EPA TVA 2020 #C01086 with an extension probe for the duration of the survey on 8/1/2023.
- When available, SLVSWM contractors (Kleinfelder) used a Kleinfelder supplied TVA to confirmed EPA exceedances for the first half of EPA monitoring each day.
- During the second half of each day, Kleinfelder and SLVSWM staff were unavailable to accompany inspectors.

TVA2020 Calibration Gas Readings: TVA # C01087 w/ extension probe			
Calibration/Drift Check Time	Zero ppm	500 ppm	10,000 ppm
07/31/23, 10:21 AM initial calibration reading	2.1	520	9,950
mid-day drift check reading	N/A - due to half day monitoring, mid-day check was not performed		
07/31/23, 1:20 PM end of day drift check	2.3	508	9,680

TVA2020 Calibration Gas Readings: TVA # C01086 w/ extension probe			
Calibration/Drift Check Time	Zero ppm	500 ppm	10,000 ppm
08/01/2023, 6:30 AM initial calibration reading	1.1	515	10,000
08/01/2023, 12:33 PM mid-day drift check reading	2.2	521	9,600
08/01/2023, 4:21 PM end of day drift check	3.2	467	10,000

EPA Calibration Gases - 7/31/2023			
Manufacturer	Composition	Lot #	Expiration
GASCO	Zero Air	1-095-784	05/2024
GASCO	500 ppm CH ₄	1-123-781	05/2024
GASCO	10,000 ppm CH ₄	1-123-782	05/2024

EPA Calibration Gases - 8/1/2023			
Manufacturer	Composition	Lot #	Expiration
GASCO	Zero Air	277700	05/2026
GASCO	500 ppm CH ₄	281436	06/2026
GASCO	10,000 ppm CH ₄	1-123-782	05/2024

Facility Name: Salt Lake Valley Landfill

Facility Location: 6030 W. California Ave. (1300S.), Salt Lake City, Utah 84104

Date of Inspection: July 31 - August 1, 2023

Map of Detected Hits

1. SEM hit locations plotted over satellite imagery from May 29, 2023, as depicted on Google Earth. Approximate monitored areas included (green highlight), derived from GPS data.



2. Google Earth satellite imagery of exceedances #3 – #8 on the Southeast corner of the landfill, on June 14, 2022, and May 29, 2023, demonstrating persistent erosion rills and vegetation dead spots on the landfill surface.

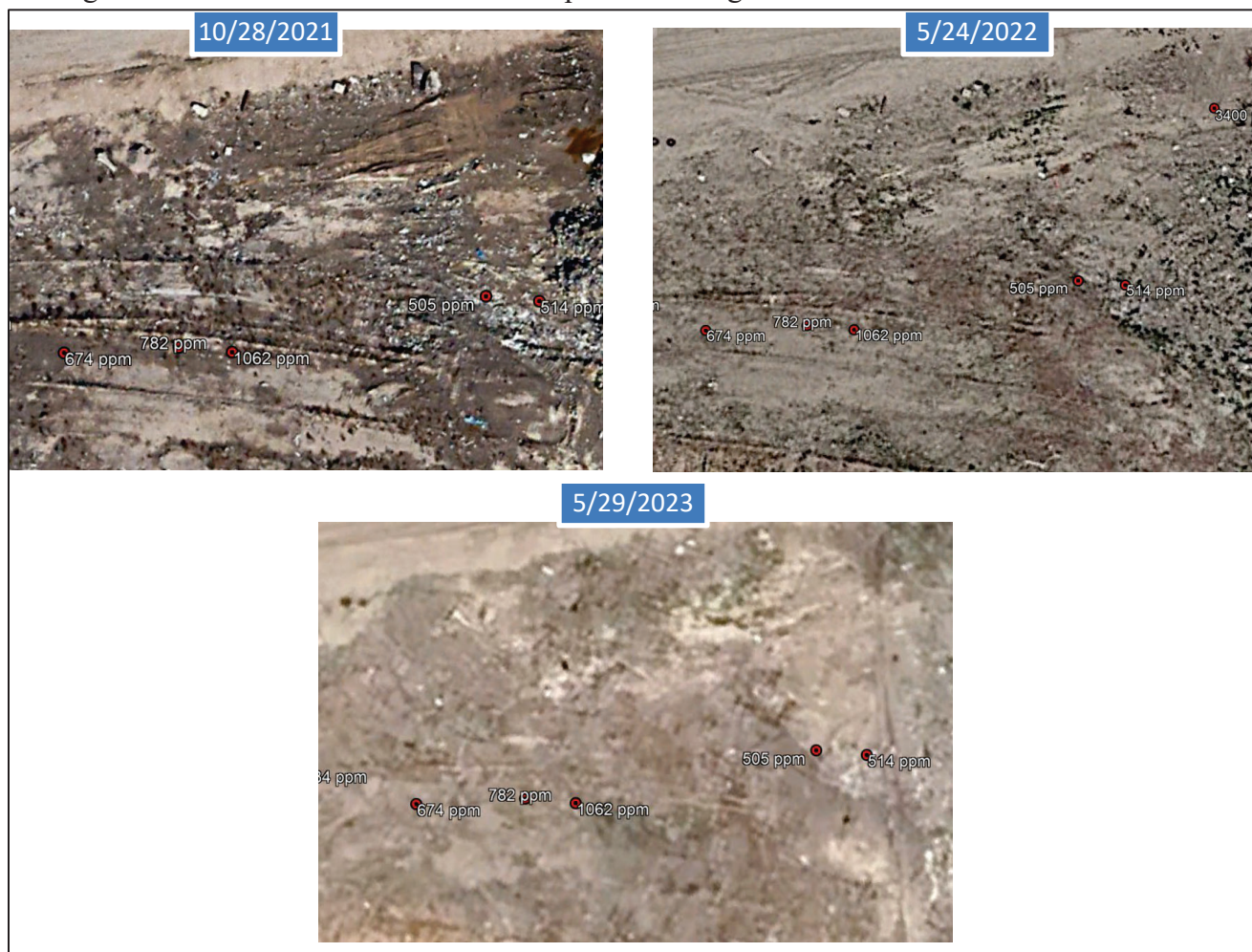


Facility Name: Salt Lake Valley Landfill

Facility Location: 6030 W. California Ave. (1300S.), Salt Lake City, Utah 84104

Date of Inspection: July 31 - August 1, 2023

3. Google Earth satellite imagery of exceedances #15 – #21 in the center of the Northwestern cell of the landfill, from October 28, 2021, through May 29, 2023, demonstrating waste placed prior to October 2021 that was unburied and visible during the 2023 EPA inspection, as well as persistent lack of vegetation in the area. This area is also captured in images 64 – 76.



Facility Name: Salt Lake Valley Landfill

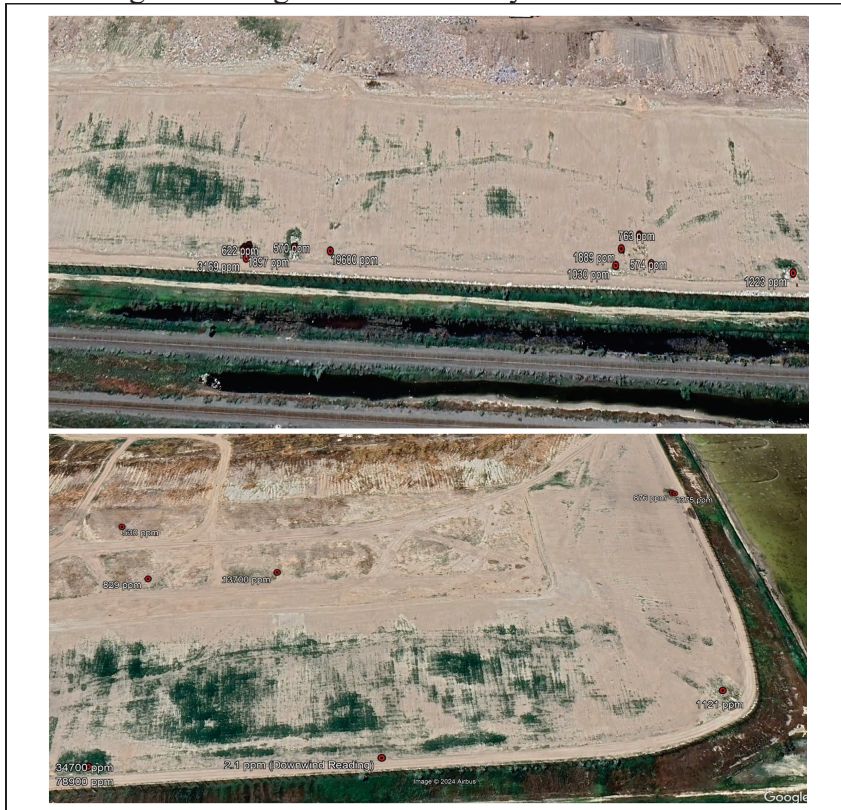
Facility Location: 6030 W. California Ave. (1300S.), Salt Lake City, Utah 84104

Date of Inspection: July 31 - August 1, 2023

4. Google Earth satellite imagery of exceedances #23 and #24 on the Northeastern area of the landfill on May 29, 2023, demonstrating an extensive swath of unburied waste. This area is also captured in images 78 – 80.



5. Google Earth satellite imagery of exceedances #25 – #45 on the Northwest perimeter of the landfill, on May 29, 2023. The images capture large swaths of unvegetated surface, despite thick vegetation past the fence line and a patch of vegetation on the landfill surface which demonstrate the potential for vegetation to grow in the vicinity.

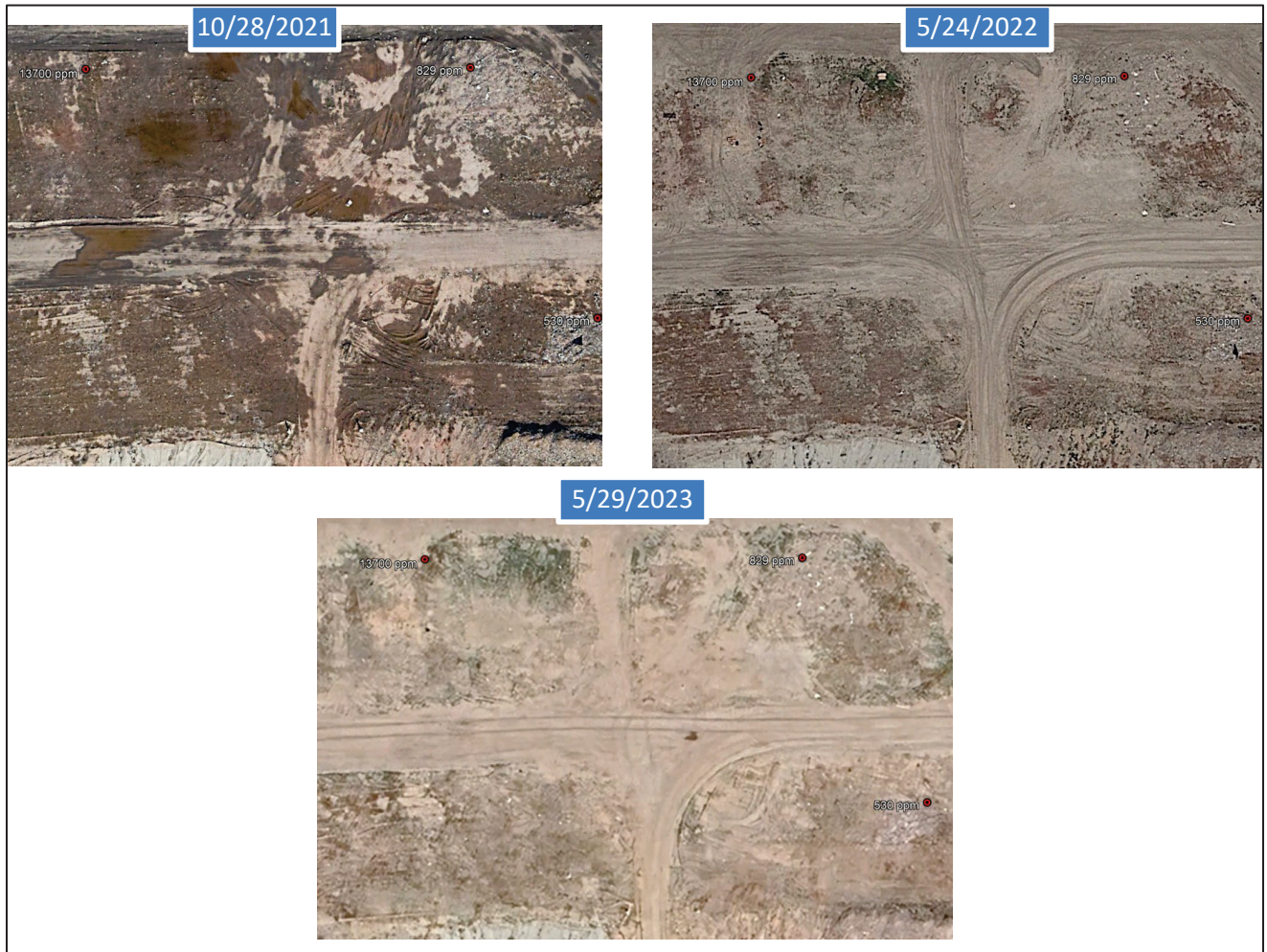


Facility Name: Salt Lake Valley Landfill

Facility Location: 6030 W. California Ave. (1300S.), Salt Lake City, Utah 84104

Date of Inspection: July 31 - August 1, 2023

6. Google Earth satellite imagery of exceedances #11, #12, and #22 in the center of the Northwestern cell of the landfill, from October 28, 2021, through May 29, 2023, demonstrating a persistent lack of vegetation in the area. This area is also captured in images 58, 59, 76 and 77.



7. Highlighted areas of unburied waste over satellite imagery as seen on Google Earth satellite imagery from May 29, 2023. The second image captures an area of unburied medical waste also captured in images 47 – 57.





REGION 8

DENVER, CO 80202

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Tower Landfill, Commerce City, CO

FROM: Katelyn Bergl, Environmental Engineer
Enforcement and Compliance Assurance Division,
Air and Toxics Enforcement Branch

THRU: Scott Patefield, Branch Manager
Enforcement and Compliance Assurance Division,
Air and Toxics Enforcement Branch

TO: File

BASIC INFORMATION

Facility Name: Tower Landfill

Facility Location: 8480 Tower Road, Commerce City, Colorado 80022

Date of Inspection: October 17, 2023

EPA Inspector(s):

1. Katelyn Bergl, Environmental Engineer
2. Daniel Heins, Environmental Scientist

Tower Landfill Attendees:

1. Steve Derus, General Manager
2. Vittoria Zucchelli, Environmental Manager
3. Daniel Bartman, Site Operations Manager

Contact Email Address: sderus@republicservices.com, vzucchelli2@republicservices.com

Purpose of Inspection: To determine Clean Air Act (CAA) compliance, including comparative Method 21 surface emission monitoring (SEM).

Facility Type: Municipal solid waste (MSW) landfill

Regulations Central to Inspection: Colorado's 111(d) State Plan for MSW landfills implementing 40 C.F.R. Part 60, Subpart Cf (State Plan); 40 C.F.R. Part 63, Subpart AAAA – National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Municipal Solid Waste Landfills (NESHAP AAAA); Title V Permit Requirements of Operating Permit 99OPAD220 (Permit #99OPAD220)

Date: 10/17/2023

Arrival Time: 9:00 MDT

Departure Time: 16:20 MDT

Inspection Type:

- ☐ Unannounced Inspection
- ☒ Announced Inspection

OPENING CONFERENCE

- ☒ Presented Credentials
- ☒ Stated authority and purpose of inspection
- ☐ Provided Small Business Resource Information Sheet
- ☒ Small Business Resource Information Sheet not provided. Reason: Not a small business
- ☒ Provided CBI warning to facility

The following information was obtained verbally from Tower Landfill representatives or through review of facility records.

Process Description:

The Tower Landfill (TLF) is a municipal solid waste (MSW) landfill located in Commerce City, Colorado and is owned by Allied Waste Systems of Colorado, LLC (Allied). Allied is a wholly owned subsidiary of Republic Services, Inc. The facility is subject to the requirements of the State Plan, NESHAP AAAA, and Permit #99OPAD220. TLF began operations in 1981 and accepts municipal solid waste, construction and demolition debris, non-hazardous industrial wastes, liquid waste, contaminated soils, and both friable and non-friable asbestos. The landfill's current maximum design capacity is 44,405,343 Megagrams (Mg) by mass and 50,917,918 cubic meters by volume, with an expected closure date in 2044.

TLF receives approximately 6,000 tons of waste per day, a majority of which is MSW. Permit #99OPAD220 limits the waste acceptance rate to 2,880,288 tons per year. In recent years, the landfill has accepted approximately 900,000 short tons per year of waste and currently has approximately 20,000,000 Mg of Waste-In-Place. Other wastes, such as construction and demolition waste as well as asbestos waste, are comingled for disposal with MSW. Since there

are no dedicated monofills at the landfill, all portions of the landfill with waste-in-place for greater than five years are under active landfill gas (LFG) collection. The northwestern half of the landfill is under final cover. The remainder of the landfill is under intermediate cover. During the inspection, the active landfill face was located centrally within the eastern half of the landfill. See Appendix D, containing a map of the landfill, for the approximate location of the working face.

Condensate and leachate collected at TLF was not being recirculated at the time of the inspection.

In December 1999, TLF reported non-methane organic compound (NMOC) emissions of 137.8 Mg/yr based on an April 1997 Tier II gas sampling test, which exceeded the 50 Mg/yr threshold for installing a gas collection and control system (GCCS). A GCCS design plan was submitted in November 1999 and the initial GCCS was subsequently installed and began operation in 2001. At the time of the inspection, the GCCS consisted of approximately 100 vertical landfill gas extraction wells. The LFG collection system spans all areas where waste has been in place for at least 5 years.

The TLF GCCS control system is currently equipped with one enclosed flare rated to accommodate an inlet LFG flow of up to 4,000 standard cubic feet per minute (scfm). This flare was brought online on February 9, 2023, to replace a 1,600 scfm flare that was installed in 2003 and decommissioned February 6, 2023. According to a GCCS design plan prepared by TLF in 2023 (2023 Design Plan), EPA Landfill LandGEM modeling predicts LFG generation of 4,067 scfm in 2024, 4,214 scfm in 2025, and 4,365 scfm in 2026, with declining LFG generation thereafter. TLF assumes 75% of LFG is captured through the GCCS, with the remaining 25% uncollected and venting directly through the landfill surface.

Surface Emission Monitoring:

According to the 2023 TLF GCCS Design Plan, the GCCS is design to extract LFG at a sufficient rate to minimize subsurface lateral migration and surface emissions of LFG. Among other monitoring and operational practices, TLF is required to conduct quarterly surface emission monitoring (SEM) to verify the GCCS' ability to minimize LFG migration. Methane concentrations above 500 ppm discovered during a SEM event are considered exceedances and require that TLF perform corrective actions and follow-up monitoring to ensure the exceedance has been resolved. Exceedances are addressed by evaluating both the GCCS and intermediate/final cover systems. Historic SEM methane exceedances above 500 ppm are included in Table 1 below.

Table 1. TLF Historical SEM methane exceedance findings.

Monitoring Period	TLF Historical Methane Exceedances			
Quarter	Q1	Q2	Q3	Q4
2023	4	8	22	28
2022	0	0	0	2
2021	0	0	0	0
2020	0	0	0	0
2019	0	0	5	0
2018	*	*	0	0
2017	0	0	0	0

* Data could not be located while reviewing records and does not indicate that monitoring was not performed during those quarters.

TLF semiannual reports indicate that SEM is conducted in all accessible areas, including:

- Areas of active fill under interim cover, where waste has been in place for > 5 years,
- Areas that have waste in-place for more than 2 years and are closed or at final grade, and
- Areas where GCCS components have been installed.

TLF representatives confirmed that SEM contractors monitor penetrations during surface emission monitoring. TLF's 2023 Design Plan defines penetrations as "any landfill gas collection well or landfill gas collection device that completely passes through the landfill cover into waste and is located within an area of the landfill where waste has been placed and a gas collection system is required. Cover penetrations do not include items such as survey stakes, fencing or litter fencing, flags, signs, trees, and utility poles." As stated in TLF's 2023 Design Plan, SEM excludes areas with potentially dangerous conditions including the following:

- roads;
- working areas and/or the working face;
- truck traffic areas;
- steep and dangerous slopes;
- icy, snow covered, and/or extremely muddy slopes; and
- areas where the landfill cover material has been exposed for the express purpose of installing, expanding, replacing, or repairing components of the GCCS, leachate, or gas condensate collection and removal systems.

In addition to quarterly SEM, monthly surface integrity cover monitoring is also performed to minimize LFG surface emissions and ensure maximum collection by the GCCS. TLF representatives perform monthly cover integrity monitoring. During the inspection, TLF representatives stated that no records of cover integrity monitoring are generated, and cover integrity issues are typically addressed within 24-hours of the initial observation through direct communication to relevant staff. If TLF staff are unable to address issues within 24 hours, the monitoring staff will either place a flag at the problem areas for later identification, generate a map to provide to staff to locate the problem area for resolution at a later time, or a combination of these methods to ensure the cover integrity issues are eventually resolved.

Alternatives Requested in the 2023 Design Plan:

Through its 2023 Design Plan, TLF has proposed several alternatives for operating and monitoring practices which deviate from regulation or standard practice. Alternatives for wellhead monitoring exclusions and LFG extraction well decommissioning procedures are described briefly below.

Well Monitoring

In accordance with §60.38f(d)(2) and §63.1981(d) (2), TLF proposed excluding wells which are in “dangerous areas” of the site, such as raised wells and wells in active and/or construction areas, from monthly wellhead monitoring. Any times that a collection device is not monitored due to unsafe conditions, will be noted in the State Plan/NESHAP AAAA reports.

Additionally, TLF has specified that the site intends to exclude any collection devices installed prior to the deadlines required by the State Plan/NESHAP AAAA from the operational, monitoring, and/or recordkeeping requirements of the State Plan/NESHAP AAAA until the age of the initial waste placed in the affected area reaches five years old if active, or two years if closed or at final grade. This alternative is supported by a May 31, 2007 approval from EPA Region 4.

Well Decommissioning

The 2023 Design Plan describes a decommissioned well as a well that is shut down for a period of time by fully closing the well valve. Examples of when it might be necessary to decommission a well may include if the well temperature becomes elevated and must be turned off as a remedial method for a period of time, or if a well is shut down based on poor gas quality until the gas is able to recharge sufficiently. A decommissioned well is maintained for potential future use, differentiating it from an abandoned well which is not maintained for future use. The following procedure will be used for decommissioned wells.

- The reason that the well was decommissioned will be noted in the monthly monitoring records;
- The decommissioned well will still be monitored monthly per State Plan and NESHAP requirements;
- Although, the pressure may be positive for a decommissioned well, the temperature levels must continue to meet and be monitored per State Plan and NESHAP requirements;
- The well may be temporarily opened during a monitoring event or left open only very slightly to relieve pressure buildup;
- Quarterly surface monitoring will continue as if the well was active to document fugitive gas emissions are still in control.

If a well remains decommissioned for six consecutive months, the site will determine if the well should be abandoned. If it is determined to keep the well decommissioned, the site will continue to evaluate the well as described. TLF also proposed that extraction wells may be re-drilled, abandoned, and/or decommissioned without prior approval from CDPHE or EPA, provided that a written statement indicating that the landfill will still have sufficient well density in compliance with the State Plan/NESHAP AAAA and a certified updated GCCS layout drawing by a professional engineer

are provided in the semi-annual State Plan/NESHAP AAAA report.

These procedures were approved as alternative operating scenarios as detailed in EPA clarification letters dated February 9, 2005 and February 12, 2003.

Please note that EPA no longer concurs with well decommissioning procedures as an appropriate alternative operating scenario. In 2023 EPA design plan review communications, EPA asserts that a “decommissioned well” under Clean Air Act (CAA) landfill regulations is clearly a well that is permanently abandoned. EPA’s position is that a landfill must obtain approval before either decommissioning or abandoning a well consistent with procedures set forth in CAA landfill regulations.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:

EPA conducted a partial SEM and cover integrity survey of the facility. EPA used two ThermoFisher Toxic Vapor Analyzer 2020s (TVA2020) to perform EPA Reference Method 21 for the SEM survey. EPA confirmed each reading with both TVA2020s and also offered TLF representatives the opportunity to visually confirm each exceedance above 500 ppm measured on the TVA2020 during the SEM survey. Steve Derus and Vittoria Zucchelli of TLF visually confirmed all exceedances. See Appendix C for additional instrument and calibration information.

The EPA SEM survey covered portions of the north-east and south-central slopes of the landfill, estimated to constitute roughly 10% of the area routinely monitored during quarterly SEM events. EPA did not monitor any portions of the western half of the landfill, which has been under final cover for several years. Additionally, EPA inspectors were limited to SEM monitoring only along the slopes of the eastern half of the landfill in order to avoid the working face, which extended throughout the top-central portions of the eastern cell and was designated as unsafe to monitor by TLF staff. Areas monitored during the EPA SEM survey were selected in accordance with regulatory requirements, focusing on locations with visual indicators of elevated landfill gas (e.g., distressed vegetation, cracks, seeps, cover penetrations) and areas with sparse vegetation, which are also prone to elevated emissions. EPA inspectors recorded 26 points on the landfill surface where methane concentrations equaled or exceeded 500 ppm, including 11 exceedances recorded at penetrations and 15 exceedances recorded on the landfill surface. Note that exceedance #26 of Appendix B is labeled as a penetration exceedance, although it does not meet TLF’s definition of a penetration. See Appendix B for more details.

In nearly all areas with recorded SEM exceedances, EPA inspectors observed concurrent cover integrity issues, such as large continuous areas with little to no vegetation, exposed waste, loose soil, and erosion rills. This information is captured in Appendix B; however, a description of three areas where significant cover integrity issues coincided with SEM exceedances is also

included below to provide additional details:

1. On the northern slope, EPA inspectors observed large swaths of unburied waste and loose dirt. The area was part of the working face several months prior, although the working face had shifted south, and large amounts of waste remained exposed at the time of the inspection. This area is associated with exceedances #4 - #6 and is captured in images IMG_0001.JPG – IMG_0005.JPG of Appendix A and satellite images 4, 5, and 6 of Appendix D.
2. On the central portion of the eastern slope, EPA inspectors discovered a large, continuous swath of unburied waste with vegetation, including an unknown variety of fruiting melon, growing through the waste. Some of the melons were fully developed (IMG_0018 and IMG_0019), indicating that this patch of waste had been left unburied for at least 80-100 days (average period for melons to mature from seed), which corresponds to at least 3 monthly cover integrity monitoring events. TLF representatives initially guessed the unburied waste had only been left unburied for a week. However, upon sighting the melons in the waste, they concurred with EPA that the waste had been left unburied for at least several months. This area is associated with exceedance #17 and is captured in images IMG_0016.JPG – IMG_0021.JPG and satellite images 4 and 7 of Appendix D.
3. On the northern portion of the eastern slope, EPA inspectors noted sparse vegetation, exposed waste, loosely packed dirt, and extensive erosion. Although the satellite image resolution is poor, satellite image 9 of Appendix D demonstrates that there has been a “T”-shaped area with sparse vegetation and erosion since at least July 14, 2022. It is widely recognized that establishing landfill surface vegetation helps mitigate erosion, minimizing potential pathways for landfill gas to escape. Consistent with areas with persistent lack of vegetation, the “T”-shaped subject area displayed signs of erosion observed by EPA inspectors. Given the observed erosion and lack of vegetation, SEM was appropriately conducted in the area, revealing methane exceedances (#13-15). Furthermore, SEM exceedances were detected in the same area during TLF SEM events during the first and third quarters of 2023. This data, along with EPA inspector observations, support this area as a persistent source of surface emissions requiring attention. This area is associated with exceedances #13 - #15 and is captured in images IMG_0013.JPG – IMG_0014.JPG and DSCN0002.JPG of Appendix A and satellite images 4 and 9 of Appendix D.
4. On the south-eastern slope, EPA inspectors noted large erosion rills running the extent of the slope from top to bottom with very little vegetation established on the slope. This area is associated with exceedances #22 – #24 and is captured in images IMG_0026.JPG – IMG_0033.JPG of Appendix A and satellite images 1, 3, and 8 of Appendix D.

TLF representatives communicated that unprecedented rain events throughout the summer of 2023 had caused difficulties in cover maintenance, including the formation of erosion rills and difficulty keeping waste buried.

CLOSING CONFERENCE

☒ Provided U.S. EPA point of contact to the facility

Compliance Assistance: None.

Photos and/or Videos: were taken during the inspection. See Appendix A

Field Measurements: were taken during this inspection. See Appendix B.

Records: were not taken during this inspection. Publicly available records were reviewed as part of the inspection.

Areas of Concern:

The findings of the EPA SEM survey revealed facility SEM practices and cover integrity monitoring as potential areas of concern. Both concerns were discussed with TLF representatives during the EPA SEM survey as well as during the closing conference.

The cover integrity issues detailed in the “Data Collected and Observations” section of this report were communicated with TLF representatives by EPA inspectors. According to discussions during the closing conference, TLF staff expressed concern that it was unlikely that monthly cover integrity monitoring was performed adequately in the months prior to the EPA inspection because the issues EPA inspectors noted “should have been obvious in August and September as well and should have been noted.” TLF representatives indicated that they intended to meet with relevant staff to discuss deficiencies suspected in the cover integrity monitoring. TLF representatives also expressed that unprecedented rainfall in the months preceding the EPA inspection had created difficulties in many areas of the landfill’s operations, including cover maintenance.

During EPA’s SEM survey, inspectors noted 26 exceedances. TLF conducted its Q3 2023 SEM survey in August 2023 and noted 22 exceedances. Although the number of SEM methane readings above 500 ppm found during the EPA SEM survey are similar to the Q3 2023 TLF SEM survey total number of exceedances, overall trends and discrepancies warrant concern. First, while the quantity of exceedances are similar, it is important to note that EPA’s SEM survey covered only 10% of the total landfill surface. Additionally, aside from 2023 SEM surveys and two other quarterly SEM events, TLF had historically not recorded any methane exceedances during quarterly SEM. The exceptions since 2017 were in Q4 2022 when two exceedances were recorded, and Q3 2019 when five exceedances were recorded (See Table 1). Using satellite imagery and past exceedance data, a comparison of TLF’s historical SEM findings within only the EPA monitored areas, as compared to EPA’s 26 findings, can be completed. This comparison indicates that TLF’s historical findings within the monitored area are significantly less than EPA’s, with a maximum of 10 exceedances historically recorded by TLF in the monitored area. See Table 2.

Table 2. TLF Historical SEM methane exceedance findings within the EPA SEM survey boundary.

Monitoring Period	Number of TLF SEM Survey exceedances out of the total exceedances found that were recorded in EPA monitored areas	Total TLF SEM Survey exceedances recorded in the monitoring period
EPA MONITORING, Q4 2023	26	26
Q4 2023*	10	28
Q3 2023	4	22
Q2 2023	6	8
Q1 2023	1	4
Q4 2022	1	2

* Note that Q4 2023 monitoring was performed in December 2023, after the EPA inspection.

In addition to on-site findings, review of the 2023 Design Plan revealed a few alternative requests that are not supported by EPA: 1) SEM exclusion areas and, 2) TLF's interpretation of the cover penetration definition.

First, areas may be excluded from SEM only if the act of monitoring an area poses a significant risk of death or injury of the person conducting the monitoring, and/or the act of monitoring an area would violate state or federal occupational safety standards. Consistent with the State Plan and NESHAP AAAA, slopes may be excluded from monitoring only if it is not practically feasible for the area to be monitored safely and legally during the quarter. Final design slopes should not be designed in such a way that prevents SEM in applicable areas.

The working face (if above applicable waste) should only be excluded if there is active truck traffic and waste deposition on the day of monitoring – areas under daily cover where waste has been in place for greater than 5 years are still otherwise subject to SEM requirements. SEM should be scheduled around large-scale construction projects that would make significant areas of the landfill unsafe to monitor. SEM should be scheduled to avoid or minimize snowy, icy, or muddy surfaces, and within a weather window during the quarterly period that is conducive to monitoring in the preferred conditions. Excluding areas from monitoring that could have been safely and legally monitored during the quarter constitute a violation of the Clean Air Act. SEM reports should include detailed explanations for reasons of excluding any areas subject to the collection and control requirements of the regulations.

Finally, the 2023 Design plan incorrectly interprets the definition of cover penetration by shortening the full definition. Survey stakes, fencing including litter fences, flags, signs, utility posts, and trees would all be considered cover penetrations if they pass through the cover, according to the definition of "cover penetration" at 40 C.F.R. § 63.1990. The landfill cover includes that portion which covers the waste, as well as the portion which borders the waste extended to the point where it is sealed with the landfill liner or the surrounding land mass.

No other concerns were noted.

DIGITAL SIGNATURES

Katelyn Bergl, Report Author

SCOTT PATEFIELD Digitally signed by SCOTT PATEFIELD
Date: 2024.07.01 15:13:51 -06'00'

Scott Patefield, Manager

Facility Name: Allied Waste Systems of Colorado - Tower Landfill
Facility Location: 8480 Tower Road, Commerce City, Colorado 80022
Date of Inspection: October 17, 2023

APPENDICES

Appendix A: Digital Image Log

Appendix B: Field Measurement Data

Appendix C: Calibration Data

Appendix D: Maps of SEM Results and Satellite Imagery

Facility Name: Allied Waste Systems of Colorado - Tower Landfill
Facility Location: 8480 Tower Road, Commerce City, Colorado 80022
Date of Inspection: October 17, 2023

APPENDIX A: DIGITAL IMAGE LOG

Photographer: Daniel Heins Camera: Canon PowerShot ELPH 100 HS (S43435)		
File Name	Date/ Time (MDT)	Description of Image
IMG_0001.JPG	10/17/2023 10:52	Taken at the location of exceedance #4. Captures Well EW-39A surrounded by exposed waste and loosely packed dirt with little to no vegetation in the vicinity.
IMG_0002.JPG	10/17/2023 11:02	Taken at the location of exceedance #5. Captures Well EW-40 surrounded by exposed waste and loosely packed dirt with little to no vegetation in the vicinity.
IMG_0003.JPG	10/17/2023 11:03	Taken in the vicinity of exceedance #5. Demonstrates the extent of exposed waste and lack of vegetation in the general vicinity.
IMG_0004.JPG	10/17/2023 11:06	Taken at the location of exceedance #6. Captures an exposed mattress, lack of vegetation, and loosely packed dirt. Methane readings were elevated above 500 ppm throughout this area.
IMG_0005.JPG	10/17/2023 11:12	Taken at the location of exceedance #6. Captures exposed waste, lack of vegetation, and loosely packed dirt. Methane readings were elevated above 500 ppm throughout this area.
IMG_0006.JPG	10/17/2023 11:14	Taken at the location of exceedance #7. Demonstrates the extent of erosion and sparse vegetation at the exceedance point. Exposed waste is also present in the image.
IMG_0007.JPG	10/17/2023 11:17	Taken at the location of exceedance #8. Demonstrates the extent of erosion and sparse vegetation at the exceedance point. Exposed waste is also present in the image.
IMG_0008.JPG	10/17/2023 11:20	Taken at the location of exceedance #9. Demonstrates the extent of erosion and sparse vegetation at the exceedance point. Exposed waste is also present in the image.
IMG_0009.JPG	10/17/2023 11:25	Taken at the location of exceedance #10. Captures Well EW-89 surrounded by exposed waste and loosely packed dirt with no vegetation in the vicinity.
IMG_0010.JPG	10/17/2023 11:32	Taken at the location of exceedance #11. Demonstrates the extent of exposed waste and sparse vegetation in the vicinity.
IMG_0011.JPG	10/17/2023 11:37	Taken at the location of exceedance #12. Demonstrates the extent of exposed waste, erosion rills, and sparse vegetation in the vicinity.
IMG_0012.JPG	10/17/2023 11:43	Erosion, sparse vegetation, and exposed waste on the far northeastern face of the landfill.
IMG_0013.JPG	10/17/2023 11:47	Taken at the location of exceedance #13. Captures Well EW-95 with sparse, dead vegetation in the vicinity.
IMG_0014.JPG	10/17/2023 11:53	Taken at the location of exceedance #14. Demonstrates the sparse, dead vegetation in the vicinity.

Facility Name: Allied Waste Systems of Colorado - Tower Landfill
Facility Location: 8480 Tower Road, Commerce City, Colorado 80022
Date of Inspection: October 17, 2023

IMG_0015.JPG	10/17/2023 12:08	Taken at the location of exceedance #16. Captures Well EW-97 with sparse, dead vegetation in the vicinity.
IMG_0016.JPG	10/17/2023 12:14	Taken at the location of exceedance #17, which was noted to have elevated methane readings throughout the swath of unburied waste seen in this image. Image demonstrates a large swath of unburied waste. Established vegetation is growing up through the waste and had been growing long enough to bear fruit. This area was not the active working phase of the landfill at the time of the inspection.
IMG_0017.JPG	10/17/2023 12:14	
IMG_0018.JPG	10/17/2023 12:15	
IMG_0019.JPG	10/17/2023 12:15	
IMG_0020.JPG	10/17/2023 12:15	
IMG_0021.JPG	10/17/2023 12:20	
IMG_0022.JPG	10/17/2023 12:27	Taken at the location of exceedance #18. The area of exceedance #18 was under intermediate cover of wood chips with no vegetation.
IMG_0023.JPG	10/17/2023 12:32	Taken at the location of exceedance #19. Captures Well EW-61 with no vegetation and some exposed waste in the vicinity.
IMG_0024.JPG	10/17/2023 14:28	Taken at the location of exceedance #20. Captures Well EW-82C with no vegetation in the vicinity. Some erosion is also visible.
IMG_0025.JPG	10/17/2023 14:37	Taken at the location of exceedance #21. Captures Well EW-36A with no vegetation in the vicinity.
IMG_0026.JPG	10/17/2023 14:53	Taken at the location of exceedance #22. Demonstrates the extent of the erosion rill and sparse vegetation at the exceedance point. Exposed waste is also present in the image.
IMG_0027.JPG	10/17/2023 14:56	Taken at the location of exceedance #23. Demonstrates the extent of the erosion rill and sparse vegetation at the exceedance point.
IMG_0028.JPG	10/17/2023 14:59	Taken at the location of exceedance #23. Captures several erosion rills in the vicinity of exceedance #23, including a large exposure rill in the center of the image. Fleeting exceedances were noted throughout the area captured in this image. Image also demonstrates sparse vegetation.
IMG_0029.JPG	10/17/2023 15:05	Taken at the location of exceedance #24. Images demonstrate the extent of erosion, sparse vegetation, dead vegetation, and exposed waste at the exceedance location.
IMG_0030.JPG	10/17/2023 15:06	
IMG_0031.JPG	10/17/2023 15:06	
IMG_0032.JPG	10/17/2023 15:06	
IMG_0033.JPG	10/17/2023 15:07	

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IMG_0034.JPG	10/17/2023 15:10	Taken at the location of exceedance #25. Image demonstrates erosion, surface disturbance, and lack of vegetation at the location of the exceedance.
IMG_0035.JPG	10/17/2023 15:13	Taken at the location of exceedance #26. Captures an unnamed valve penetration with no vegetation surrounding the penetration.
IMG_0036.JPG	10/17/2023 15:20	Area of landfill surface under wood chip cover with sparse vegetation and a mattress protruding from the surface. Methane was elevated in the area but not consistent enough to be noted as an exceedance.
IMG_0037.JPG	10/17/2023 15:34	Taken at the location of exceedance #28. Captures Well EW-72A with no vegetation in the vicinity. Disturbed dirt is also captured in the image.

Photographer: Katelyn Bergl Camera: Nikon Coolpix P4 VR (S00897)		
File Name	Date/ Time (MDT)	Description of Image
DSCN0001.JPG	10/17/2023 10:35	Taken at the location of exceedance #3. Captures Well EW-60 surrounded by a mound of loosely packed dirt with no vegetation in the vicinity.
DSCN0002.JPG	10/17/2023 11:52	Taken at the location of exceedance #15. Demonstrates the extent of sparse vegetation, erosion, and exposed waste in the vicinity.
DSCN0003.JPG	10/17/2023 15:13	Taken in the vicinity of exceedance #27. Demonstrates the state of surface cover and lack of vegetation in the vicinity of the exceedance.

Videographer: Daniel Heins Camera: FLIR GX20		
File Name	Date/ Time (MDT)	Description of Image
MOV_3339.mp4	10/17/2023 11:27	Taken at the location of exceedance #10. Infrared video shows landfill gas escaping from the PVC pipe adjacent to Well EW-89.

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APPENDIX B: FIELD MEASUREMENT DATA

Measured Exceedances of methane greater than 500 ppm

#	Reading Time	Well / Location / Description/ Observations	Reading (ppm)	Conf. Reading (ppm)	Latitude	Longitude	Media Records
1	9:51 AM	Upwind background reading in office parking lot. *Not exceedance*	1.2	-	N 39.85015	W - 104.77175	
2	10:14 AM	Downwind background reading at the northeast corner of the landfill. *Not exceedance*	5.3	-	N 39.85617	W - 104.75406	
3	10:35 AM	Well EW-60, near penetration; no vegetation present.	1500	900	N 39.85445	W - 104.75896	DSCN0001.JPG
4	10:49 AM	Well EW-39A, exceedances noted at both penetrations. Lack of vegetation, exposed waste, and discolored standing water also noted.	2700	2500	N 39.85544	W - 104.75972	IMG_0001.JPG
5	10:58 AM	EW-40 penetration exceedance. No vegetation noted; some exposed trash visible.	10040	10020	N 39.85546	W - 104.75826	IMG_0002.JPG IMG_0003.JPG
6	11:02 AM	Surface exceedance. The absence of vegetation, an exposed mattress, and fresh unpacked dirt was noted. This was noted as a wide area of exceedances rather than a single point source.	3500	1600	N 39.8554	W - 104.75802	IMG_0004.JPG IMG_0005.JPG
7	11:11 AM	Exceedance recorded at an erosion rill slightly north of well EW-91. Sparse vegetation was noted.	2100	1800	N 39.85572	W - 104.75752	IMG_0006.JPG
8	11:12 AM	Exceedance recorded at an erosion rill slightly northeast of well EW-91. Sparse vegetation was noted.	690	1600	N 39.85572	W - 104.75731	IMG_0007.JPG
9	11:19 AM	Exceedance recorded at an erosion rill approximately 2 feet deep and 1 foot wide. 1. The absence of vegetation and presence of exposed visible waste were noted.	2200	2200	N 39.85574	W - 104.75675	IMG_0008.JPG

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10	11:21 AM	EW-89 penetration exceedance. Exceedance recorded at both well penetrations and an adjacent PVC pipe penetration. The absence of vegetation, presence of exposed visible waste, and landfill gas odor were noted.	2900	3500	N 39.85549	W - 104.75681	IMG_0009.JPG MOV_3339.mp4
11	11:25 AM	Surface exceedance near penetration of well EW-90.	1500	2200	N 39.85535	W - 104.75675	IMG_0010.JPG
12	11:35 AM	Surface exceedance southwest of EW-92. The exceedance was recorded within a large area of exposed waste with no established vegetation.	900	1200	N 39.85564	W - 104.75614	IMG_0011.JPG
13	11:43 AM	EW-95 penetration exceedance recorded at both well penetrations. Absence of vegetation and loosely packed dirt were noted.	1200	1200	N 39.85447	W - 104.75613	IMG_0013.JPG
14	11:49 AM	Surface exceedance in area with no vegetation.	1200	1300	N 39.85437	W - 104.75617	IMG_0014.JPG
15	11:53 AM	Surface exceedance in area with no vegetation, exposed waste, and extensive erosion.	1500	900	N 39.85419	W - 104.75647	DSCN0002.JPG
16	12:03 PM	EW-97 penetration exceedance recorded at both well penetrations. Absence of vegetation was noted.	650	800	N 39.85341	W - 104.75663	IMG_0015.JPG
17	12:15 PM	Multiple surface exceedances recorded in a large area. The area contained a large amount of exposed, unburied waste. Vegetation was coming up and growing through the exposed waste, indicating the unburied waste had been present for greater than 1-2 months.	3500	1500	N 39.85371	W - 104.75687	IMG_0016.JPG -- IMG_0021.JPG
18	12:23 PM	Surface exceedance recorded in an area under intermediate cover of wood chips. No vegetation was noted.	900	1700	N 39.85434	W - 104.75695	IMG_0022.JPG
19	12:27 PM	EW-61 penetration exceedance. No vegetation observed. Exposed waste was also noted in the area.	3000	1700	N 39.85453	W - 104.75729	IMG_0023.JPG
20	2:25 PM	EW-82C penetration exceedance. No vegetation was noted.	900	2200	N 39.85138	W - 104.76064	IMG_0024.JPG

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21	2:31 PM	EW-36A penetration exceedance recorded at both well penetrations. No vegetation noted.	6800	7900	N 39.85107	W - 104.76191	IMG_0025.JPG
22	2:50 PM	Surface exceedance recorded in an erosion rill with exposed waste visible. Fleeting exceedances were observed throughout the large area in and surrounding the rill.	1300	900	N 39.8503	W - 104.76164	IMG_0026.JPG
23	2:52 PM	Surface exceedance recorded in an erosion rill with exposed waste visible. Fleeting exceedances were observed throughout the large area in and surrounding the rill.	1200	1400	N 39.85009	W - 104.76181	IMG_0027.JPG IMG_0028.JPG
24	3:01 PM	Surface exceedance recorded in a 3'X3' erosion rill. Exceedances greater than 1000 ppm were recorded throughout the rill. Dead vegetation was noted nearby, and a methane concentration of >500 ppm was recorded at the dead vegetation. A strong pervasive landfill gas odor was also noted.	6400	900	N 39.84966	W - 104.76201	IMG_0029.JPG -- IMG_0033.JPG
25	3:06 PM	Surface exceedance recorded in an area where some erosion and surface disturbance were noted. Some exposed waste was visible, and no vegetation was noted.	900	12000	N 39.84926	W - 104.76209	IMG_0034.JPG
26	3:08 PM	Exceedance recorded at an unnamed valve penetration. Inspectors noted that there were relatively few gas extraction wells in the vicinity.	1500	1400	N 39.84961	W - 104.76276	IMG_0035.JPG
27	3:17 PM	Surface exceedance recorded at a small rill. The general area had elevated methane levels. No vegetation was noted.	1100	1100	N 39.84892	W - 104.76202	DSCN0003.JPG
28	3:30 PM	EW-72A penetration exceedance. No vegetation noted.	12000	2500	N 39.85027	W - 104.76088	IMG_0037.JPG

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APPENDIX C: CALIBRATION DATA

Calibration and Instrument Information

EPA used two ThermoFisher Toxic Vapor Analyzer 2020s (TVA2020). The EPA TVA2020 response times are in the 4 to 5 second range.

- Katelyn Bergl used the EPA TVA 2020 #C01087 with an extension probe for the duration of the survey.
- Daniel Heins used the EPA TVA 2020 #C01086 with an extension probe for the duration of the survey.
- Both EPA TVA2020s were used to confirm all exceedances.
- Tower Landfill staff did not operate a TVA or similar instrument during the survey and were shown readings on EPA instruments for visual confirmation of exceedances.

TVA2020 Calibration Gas Readings: TVA # C01086 w/ extension probe			
Calibration/Drift Check Time	Zero ppm	500 ppm	10,000 ppm
10/17/2023, 8:40 AM initial calibration reading	0 ppm	502 ppm	10,000 ppm
10/17/2023, 12:45 PM mid-day drift check reading		507 ppm	
10/17/2023, 1:55 PM mid-day recalibration due to changing out hydrogen		502 ppm	
10/17/2023, 3:35 PM end of day drift check		507 ppm	

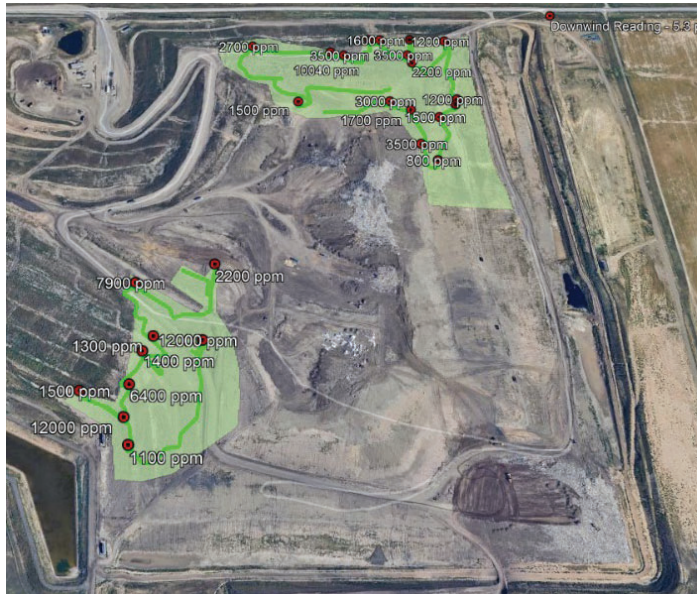
TVA2020 Calibration Gas Readings: TVA # C01087 w/ extension probe			
Calibration/Drift Check Time	Zero ppm	500 ppm	10,000 ppm
10/17/2023, 8:40 AM initial calibration reading	0.7 ppm	490 ppm	10,010 ppm
10/17/2023, 12:45 PM mid-day drift check reading		498 ppm	
10/17/2023, 1:55 PM mid-day recalibration due to changing out hydrogen		507 ppm	
10/17/2023, 3:35 PM end of day drift check		534 ppm	

EPA Calibration Gases			
Manufacturer	Composition	Lot #	Expiration
GASCO	Zero Air	1-114-61	05/2024
GASCO	500 ppm CH ₄	1-112-80	05/2024
GASCO	10,000 ppm CH ₄	1-070-80	05/2024

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APPENDIX D: MAPS OF SEM RESULTS AND SATELLITE IMAGERY

1. SEM hit locations plotted over satellite imagery from September 4, 2023, as depicted on Google Earth. Approximate monitoring path and monitored areas included (green line and green highlight), derived from GPS data.

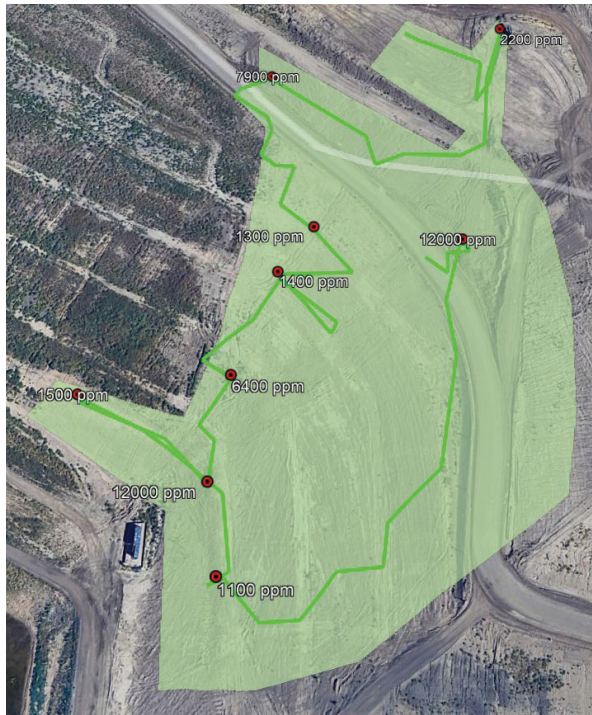


2. Detailed view of exceedances on the Northeast portion of landfill



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3. Detailed view of exceedances on the South-Central portion of landfill

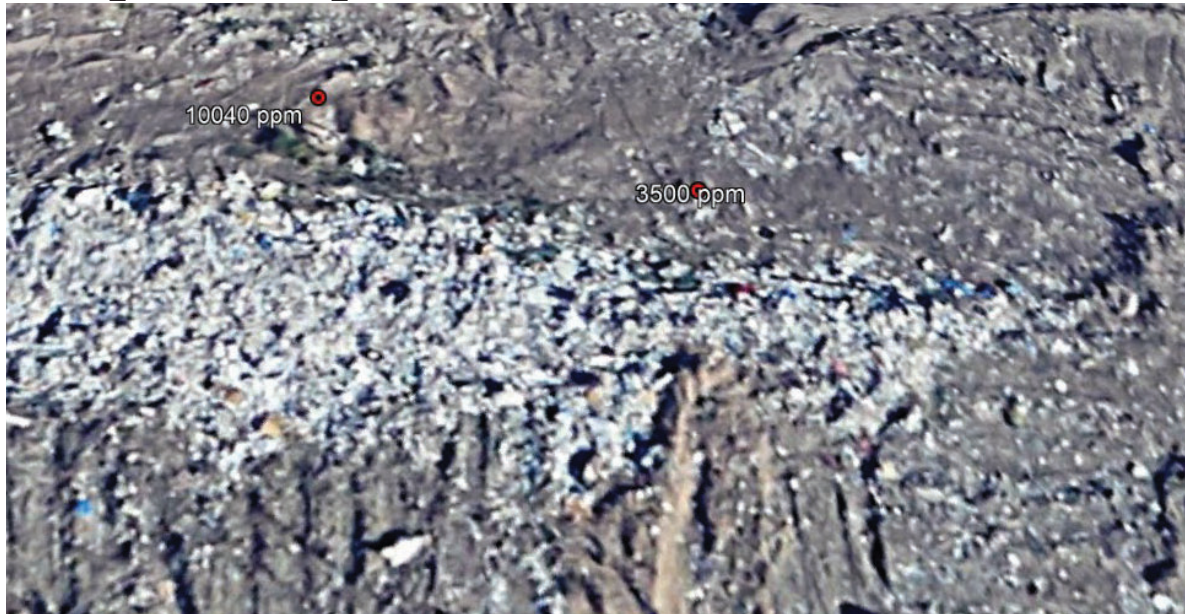


4. Satellite imagery demonstrating exposed waste, separate from the active working face of the landfill, as seen on Google Earth satellite imagery from September 4, 2023. The two smaller green circled areas indicate swaths of unburied waste, as observed by inspectors during the EPA inspection.



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5. Satellite imagery demonstrating exposed waste near exceedances #5 and #6, as seen on Google Earth satellite imagery from September 4, 2023. This area is also captured in IMG_0002.JPG – IMG_0005.JPG.



6. Satellite imagery demonstrating exposed waste near exceedance #4, as seen on Google Earth satellite imagery from September 4, 2023. This area is also captured in IMG_0001.JPG.



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7. Satellite imagery demonstrating exposed waste near exceedance #17, as seen on Google Earth satellite imagery from September 4, 2023. This area is also captured in IMG_0016.JPG – IMG_0021.JPG.



8. Satellite imagery demonstrating a large erosion rill near exceedances #22 - #24, as seen on Google Earth satellite imagery from both May 16 and September 4, 2023.



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9. Satellite imagery demonstrating persistent sparse vegetation and erosion near exceedances #13 and #14, as seen on Google Earth satellite imagery between July 14, 2022, and September 4, 2023.

7/14/2022



5/16/2023



9/4/2023

