

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection

N598466529

FACILITY: PINE TREE ACRES, INC.		SRN / ID: N5984
LOCATION: 36600 29 MILE RD., LENOX		DISTRICT: Warren
CITY: LENOX		COUNTY: MACOMB
CONTACT: Rachael Gregory , District Manager		ACTIVITY DATE: 03/02/2023
STAFF: Robert Joseph	COMPLIANCE STATUS: Non Compliance	SOURCE CLASS: MAJOR
SUBJECT: Scheduled inspection of the municipal solid waste landfill (Section 1) and the gas-to-energy plant (Section 2).		
RESOLVED COMPLAINTS:		

On March 2, 2023, Michigan Department of Environment, Great Lakes, and Energy-Air Quality Division (EGLE-AQD) staff Robert Joseph, conducted a scheduled inspection of Pine Tree Acres, Inc. (SRN: N5984) located at 36600 29 Mile Road, Lenox Township, Michigan 48048. The facility consists of WM - Pine Tree Acres (Section 1 – landfill and a gas-to-energy plant) and Sumpter Energy (Section 2 – gas-to-energy plant). The purpose of the inspection was to determine the facility’s compliance with the requirements of the Federal Clean Air Act; Part 55 - Air Pollution Control of the Natural Resources and Environmental Protection Act, 1994 PA 451; Michigan Department of Environment, Great Lakes, and Energy-Air Quality Division (EGLE-AQD) Administrative Rules, and conditions of the facility’s Renewable Operating Permit (ROP) MI-ROP-N5984-2019.

Section 1 - Pine Tree Acres, Inc.

Opening Introduction

I arrived at the facility shortly after 11 a.m. and met with Rachael Gregory, District Manager, and Richard Clark, Landfill Engineer. I introduced myself and presented my identification and credentials and stated the purpose of my visit. I asked them both to provide me current information regarding the facility. Richard indicated that Pine Tree Acres, Inc. (PTA) is a subsidiary of WM (formerly Waste Management). The facility consists of a landfill and a gas-to-energy plant referred to as WMRE (WM Renewable Energy). The hours of operation of the facility are 6am-4pm, Monday-Friday, and most Saturdays 7am-11pm. There are approximately 35 employees at the facility which began operations in 1987 and operates roughly 286 days a year.

The facility is a type II sanitary municipal landfill which is a discrete area of land that receives household waste. It also receives other types of non-hazardous wastes such as commercial solid waste, non-hazardous sludge, conditionally exempt small quantity generator waste, construction and demolition debris, and industrial non-hazardous solid waste. The facility also accepts asbestos waste and has a recycling center.

Pine Tree Acres is subject to the National Standards of Performance for Municipal Solid Waste Landfills (NSPS), 40 CFR Part 60 Subpart XXX. Due to the expansion of the facility in 2015 which permitted seven (7) landfill cells the facility became subject to the NSPS, 40 CFR Part 60, Subpart XXX. These regulations are applicable to landfills that have commenced construction, reconstruction, or modification after July 17, 2014. The facility was issued a permit to construct a landfill expansion on May 8, 2015, and commenced construction of the expansion on May 15, 2015. An initial design capacity and NMOC emission rate report was submitted on November 23, 2016, and a GCCS design plan was submitted on November 17, 2017.

The facility is also subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Municipal Solid Waste Landfills, 40 CFR Part 63, Subpart AAAA.

Both the NSPS and NESHAP share similar regulations with some slight differences. The NESHAP allows landfills more flexibility with gas collection operations, however, additional monitoring and enhanced reporting - when necessary, are required to remain compliant. The facility chose to opt-in to the operational standards, compliance provisions, and monitoring of operations of the NESHAP (AAAA) over their counterparts in the NSPS (XXX) before the regulation applicability due date of September 28, 2021, however, the facility remains subject to the remaining sections of both.

Prior to October 1, 2020, the facility was also subject to the NSPS – Subpart WWW. The facility opted-out of this subpart on October 1, 2020, which was earlier than the federal end date of this subpart on September 27, 2021.

Prior to March 26, 2020, the NESHAP regulations were intertwined with the Subpart WWW regulations. The U.S. Environmental Protection Agency (U.S. EPA) modified the NESHAP regulations as a single set of regulations and all landfills that were subject to Subpart WWW were required to opt-in to the new NESHAP regulations no later than September 28, 2021. Given the July 30, 2019, issuance date of the facility's ROP, the Subpart WWW regulations are still listed in the facility's ROP and the modified NESHAP regulations are not.

The facility has four flares (two enclosed flares, 4 and 6, and two open flares, 3 and 5) for combustion of the landfill gas when it is not being routed to the eight reciprocating internal combustion engines (Caterpillar G3520C, 2,233 bhp at 100% load) to produce electricity (1.6 MW gross electrical output) at the WMRE engine plant. The engines drive an associated generator set to produce electricity and the facility is a major source of Hazardous Air Pollutants (HAPs). The engines are subject to the National Emission Standards for Hazardous Air Pollutant (NESHAP) for Stationary Reciprocating Internal Combustion Engines, 40 CFR Part 63 Subpart ZZZZ, and the National Standards of Performance for Stationary Spark Ignition Internal Combustion Engines, 40 CFR Part 60 Subpart JJJJ.

Approximately 10,000 waste tons is accepted daily at the facility from the country of Canada, and the counties of Wayne, Oakland, Macomb, and Washtenaw in Michigan.

Facility Tour

The landfill gas (LFG) is collected through an active landfill gas collection system, which consists of wells, headers, and gas mover equipment. Risers are also installed to tie-in the collectors. The collected LFG is contractually obligated to be first sent to Sumpter Energy Associates, Inc. (formerly N8004) which the AQD combined with Pine Tree Acres in 2019 to become a single area source (listed as Section 2 in the facility's ROP). Sumpter Energy Associates, Inc. is a gas-to-energy plant which houses nine reciprocating internal combustion engines.

The remaining landfill gas is sent to WMRE's gas-to-energy eight engine plant (which is utilized for Consumers Energy), or sent to the facility's flares for combustion.

The site currently has 4 active landfill cells (cell numbers 27 - 30) and is projected to have approximately another 15-years of service. There is one cell that is currently under construction, cell 18, and the total landfill area (which includes active and unconstructed

cells) is 377.2 acres. Also, there is 203 acres that are used for conservation easement. All cells that are covered have 2-synthetic liners except for cell one.

MI-ROP-N5984-2019

The facility has permit conditions for the following Emission Units: EU-ABESTOS, EU-LANDFILL, EU-ACTIVECOLLECTION, EU-TREATMENTSYSYSTEM, EU-FLARE 3 through 6, EU-COLDCLEANER, EU-ICENGINE 1 through 8.

These flexible groups have permit conditions: FG-LANDFILL-XXX, FG-ACTIVECOLLECTION-XXX, FG-TREATMENTSYSYSTEM-XXX, FG-ENCLOSEDFLARES-XXX, FG-OPENFLARES-XXX, FG-FLARES, FG-COLDCLEANERS, FG-ICENGINES, FG-RICEMACT, FG-RICENSPS.

All subpart WWW conditions in the facility's ROP are no longer applicable as this federal regulation is no longer active (it was replaced with the Federal Plan Subpart OOO for landfills that meet its criteria other than that of Subpart XXX).

EU-ASBESTOS

The facility currently accepts friable asbestos and documents its location via GPS (Global Positioning System). The AQD was contacted by the EGLE-MMD in April 2022 stating that the facility was requesting flexibility in submitting the 45-day notification requirement to the AQD regarding potential asbestos disturbance. The landfill was preparing for a Detroit Police investigation regarding a missing female who may have been transported to the site in January 2022. The AQD informed the facility that the 45-day notification requirement may be waived – provided that the required information is submitted prior to disturbance once an excavation date had been set. The facility indicated that no asbestos disturbance occurred during the investigation.

III. PROCESS/OPERATIONAL RESTRICTION(S)

I did not detect any asbestos fugitive emissions while on-site and the facility maintains a natural barrier which adequately deters access by the public. The facility places topsoil and aggregate over the asbestos area daily when waste is added and uses a petroleum-based cover to minimize dust generation.

IV. DESIGN/EQUIPMENT PARAMETERS

There are no areas in the landfill where asbestos is placed by itself as it is placed in active waste cell areas with other waste. Its location is documented to prevent unnecessary disturbance or damage to the waste during future construction.

VI. MONITORING/RECORDKEEPING

The facility maintains waste shipment records of all asbestos containing waste received. It lists the name, address and phone number of the waste generator and transporter. The most recent asbestos shipment received by the facility occurred on January 13, 2023, from a site located in the city of Pontiac. PTA documents the location, depth, and quantity of asbestos containing waste. There are no asbestos containing areas excluded from the collection.

FG-LANDFILL-XXX

I. EMISSION LIMITS

Pollutant	Limit	Time Period/ Operating Scenario	Equipment
1. Methane concentration	Less than 500 ppm above background level	Calendar quarter	Surface of Landfill

There were 44 locations that exceeded 500 ppm during the quarterly scans in 2022. There were 11 exceedances and 15 exceedances, respectively, in the 3rd and 4th quarter scans in 2022. All exceedances were successfully remediated upon re-monitoring with additional soil cover added (primarily bentonite, an absorbent aluminum silicate clay) and wellfield vacuum adjustments.

III. PROCESS/OPERATIONAL RESTRICTIONS

The facility has provided a SSM plan describing how emissions will be minimized during periods of startup, shutdown, and malfunction. The facility is no longer required to submit an SSM report since they've opted-in to the modified NESHAP regulations which require landfills to now comply with the SSM work practices at all times to minimize emissions. The facility monitors all events and records them if monthly corrective actions are taken. The facility did not report any occurrences that were not consistent with the SSM plan.

IV. DESIGN/EQUIPMENT PARAMETERS

The facility currently has a network of devices consisting of wells, pipes, and a blower system to capture the landfill gas. Flares 4 and 6 are enclosed flares and flares 3 and 5 are open flares. All are designed in accordance with 40 CFR part 60. The facility's treatment system is outlined in the preventative maintenance plan listing the operating parameters and maintenance schedule.

V. TESTING/SAMPLING

The facility performs quarterly scans of the landfill areas, and the results and exceedances are documented in the facility's NESHAP reports.

VI. MONITORING/RECORDKEEPING

The facility monitors the cover integrity of the gas well collection system on a monthly basis and intermittently each week. PTA provided monthly cover integrity records indicating repairs with additional clays/soils when landfill areas become exposed commonly with rills. The facility also maintains on-site records of the design capacity for the current amount of solid waste in place and the year-by-year waste acceptance rate. The facility accepted 2,234,746 tons in 2020, 2,437,868 tons in 2021, and approximately 2,600,00 tons in 2022. The facility has not converted design capacity from volume to mass or mass to volume. The maximum design capacity was noted in a letter to the AQD as 81,251,000 yd³.

Leachate forms from the waste mass and is captured within a collection pipe that is constructed outside the waste area. Per 60.767(k) of Subpart XXX, the facility reported the following for 09/01/21 through 08/30/22:

- The volume of leachate recirculated (gallons per year) and the reported basis of those estimates (records or engineering estimates) was 445,000 gallons via records.
- The total volume of all other liquids added (gallons per year) and the reported basis of those estimates (records or engineering estimates) was zero gallons.
- The surface area (acres) over which the leachate is recirculated (or otherwise applied) was 13 acres.
- The surface area (acres) over which any other liquids are applied did not occur.
- The total waste disposed (megagrams) in the areas with recirculated leachate and/or added liquids based on on-site records to the extent data are available, or engineering estimates, and the reported basis of those estimates was 474,043 megagrams via disposal records.
- The annual waste acceptance rates (megagrams per year) in the areas with recirculated leachate and/or added liquids, based on on-site records to the extent data are available, or engineering estimates, was 1,185,107 megagrams via disposal records.

FG-ACTIVECOLLECTION-XXX

III. PROCESS/OPERATIONAL RESTRICTIONS

In the event the collection or control system is inoperable, the gas mover system shuts down and all valves in the GCCS contributing to the venting of the gas (to the atmosphere) are closed within one hour per the Startup, Shutdown, and Malfunction plan. There have not been any such events that were not consistent with the plan.

The facility operates the gas collection system for all waste that has been in-place for five years. There are approximately 590 gas wells in operation. Facility equipment includes blowers, vertical wells, horizontal wells, and risers. There have not been any documented events of a subsurface fire.

In the first half of 2022 (Jan. 1 - June 30), there were three gas well exceedances for temperature or pressure. In the 2nd half of 2022 (July 1 - Dec. 31), there were 137 gas well exceedances for temperature or pressure. The exceedances were resolved under 60-days through decreasing/increasing the wellfield vacuum and via liquid removal. No enhanced monitoring was conducted during this reporting period. The wellfield was expanded/modified with 50 newly installed or redrilled gas wells. There was also 17 wells decommissioned during this period.

The facility is required to operate each interior wellhead in the collection system with a landfill gas temperature less than 62.7°C (145°F) under negative pressure per NESHAP regulations.

IV. DESIGN/EQUIPMENT PARAMETERS

The facility monitors the gas well collection field, and if necessary, adjustments are made to handle the gas flow rate by either adjusting the parameters of a specific well or installing additional wells or risers. Geosynthetic liners are placed over a clay liner for horizontal wells. All collected gases are first sent to Sumpter Energy Associates Inc. with the remaining landfill gas routed to the facility's gas-to-energy plant or for combustion to the facility's flares.

The facility has installed a series of horizontal, vertical, and horizontal wells capable of controlling and extracting gas per the landfill regulations (Subparts XXX and AAAA). There are approximately 590 gas collection wells onsite. Each well is equipped with a sample port and thermometer to measure the subsurface temperature. The facility submits their gas collection control system designs plans to the EGLE-MMD for approval which is also reviewed by the AQD. The facility also accepts asbestos waste and it is placed in the landfill with other waste as there are no documented areas that are excluded from gas control.

The facility's vertical wells are constructed of PVC (polyvinyl chloride) and the horizontal wells are constructed of HDPE (polyethylene). The wells are perforated to allow for gas entry. Horizontal wells are placed in areas of shallow waste to allow for greater gas collection. Vertical wells are placed in areas where the waste is deep and in areas where the gas well can be adjusted vertically to allow for gas collection at varying heights. Pea gravel is used as aggregate to support the wells and allows for the filtration of leachate to percolate through the waste.

VI. MONITORING/RECORDKEEPING

The facility measures gauge pressure monthly at the gas collection header of each individual well, as well the temperature and other landfill gases (oxygen, carbon dioxide, methane). The facility is required to submit a root cause analysis, corrective action plan, and an implementation timeline (beginning and end date) for all exceedances expected to exceed 120-days from the initial exceedance date. Notifications for this are required no later than 75-days from the initial exceedance date. In addition, notifications are required if corrective actions are not completed within 60-days per Subpart AAAA and must be submitted no later than 75-days from the initial exceedance date.

The facility maintains an up-to-date plot showing each existing and planned collector in the system and maintains the dates of the newly installed collectors. Records were reviewed for gas collectors redrilled and new collectors installed in 2022. The facility also maintains a record of all exceedances within the GCCS, and a wellfield map of all vertical wells, horizontal wells and other gas extraction devices – this includes the proposed sites for the future collection system expansion.

Additional components of the GCCS include the following; Knockout Pot Filters designed to remove moisture droplets and particulate debris, a central blower station with (4) 7-stage blowers – each designed to deliver 2,300-5,000 standard ft³/min from 80 inches water column vacuum to 7 lbs/in² gage discharge pressure, gas-to-air aftercoolers, and a filtering vessel (filtration system) designed to remove entrained moisture.

The facility bases the density of the gas wells on waste acceptance rates and expected gas generation. All asbestos is placed in locations that are GPS coordinated within the landfill and there are no waste areas where gas collectors are excluded. The present gas mover

equipment is adequate to handle the gas flow rates. Dates of the landfill gas well installations are maintained within the facility's database, and the age of the waste in which the landfill gas wells are installed is also documented.

FG-TREATMENTS SYSTEM-XXX

This emission unit treats landfill gas before it is delivered off-site and to flares 4 and 6. Hydrogen Sulfide (H₂S) removal consists of the SulfaTreat control system. The process consists of four 70,000 tanks which use Fe₂O₃ (iron oxide) as a media. The gas is first scrubbed with a mild alkaline solution which then flows to a 25,000-gallon bioreactor tank. There are four tanks and typically only one is used. Bacteria is killed off at 105 degrees F. Elemental sulfur is separated from the liquid phase as concentrated sludge by centrifuge. The facility's permit requires the H₂S concentration not to exceed 269 ppm.

The three blower stations (knockout pot filters, central blower station and filter vessel) incorporate filtration, compression, and dewatering. The operating and maintenance plan indicates complete combustion when the treated gas is delivered to the facility's engines. There are no atmospheric vents associated with PTA's treatment system. Moisture is removed via treatment and is managed by PTA's leachate system in accordance with the Solid Waste Rules in Part 115.

III. PROCESS/OPERATIONAL RESTRICTIONS

There was four instances in 2022 when the treatment did not operate due to maintenance/construction lasting for under one hour. There are no atmospheric vents associated with PTA's treatment system. A site-specific monitoring plan has been submitted by the facility which outlines the treatment system's processes and monitoring protocols, as well as the responsible individual who oversees each occurrence.

IV. DESIGN/EQUIPMENT PARAMETER(S)

The facility has installed a device to continuously measure gas flow to the treatment system.

VI. MONITORING/RECORDKEEPING

Per facility records and NESHAP reports, there have not been any control or treatment exceedances. The facility maintains records of all maintenance activities per the preventative maintenance plan (PMP). The gas scrubber liquid level and bioreactor pH are checked daily, and all systems related to the treatment system are continuously monitored. PTA does not have a bypass of the control system so landfill gas is not discharged directly to the ambient air. The facility provided a GCCS diagram during the inspection and provided an updated malfunction abatement plan for the H₂S removal system during their ROP renewal in 2019.

FG-ENCLOSED FLARE-XXX

Pollutant	Limit	Time Period/ Operating Scenario	Equipment
1. NMOC		Hourly	Enclosed Flares

Pollutant	Limit	Time Period/ Operating Scenario	Equipment
	20 ppmv dry as hexane at 3% oxygen-OR-98% weight reduction or more		

The above emission limits apply to the facility's two enclosed flares, flare 4 (3,000 ft³/min) and flare 6 (6,000 ft³/min). The NMOC performance test for each flare occurred on January 14, 2020, and June 18, 2020, respectively, for flares 4 and 6. Flare 4 resulted with 0.54 ppmv and Flare 6 resulted with 0.33 ppmv. Both were determined at 20 ppmv dry as hexane at 3% oxygen. Neither flare was operating at the time of inspection.

III. PROCESS/OPERATIONAL RESTRICTIONS

The facility only sends treated landfill gas to flares 4 and 6 after it has gone through the SulfaTreat system per the malfunction abatement plan for H₂S removal. These flares are designed to reduce NMOC by 98% and the data recorder downloads the operating parameters every ten minutes. The flares currently only operate when the facility's gas-to-energy plant is down for maintenance due to the decreased volume of landfill gas.

IV. DESIGN/EQUIPMENT PARAMETER(S)

Flare 4 and 6 were last calibrated on May 19, 2022, and October 7, 2021, respectively, by Thermal Instruments - a third party source. The Golder Watch and Yokogawa systems monitor gas flow to the control devices and no bypass system exists. Each flare is also equipped with a temperature monitoring device.

V. TESTING/SAMPLING

Both flares were tested upon the facility's ROP renewal. Testing was conducted January 14 and June 18, 2020.

VI. MONITORING/RECORDKEEPING

These flares are not equipped with a bypass control system and both flares are equipped with a gas flow measuring device to continuously record the actual gas flow. The facility monitoring systems, notably the Golder Watch and Yokogawa systems, which monitor the flares and compressor remotely. The facility provided the data recorder readings for the most recent run times of the flares and flares 4 and 6 are calibrated approximately every 18 -months by the manufacturer.

Flare 4 is an enclosed flare with a 4,000 ft³/min capacity and receives treated H₂S landfill gas via the central blower skid. A flare alarm sounds if a temperature of 2,000 F is reached, and it is air assisted. Flare 6 is an enclosed flare with a 6,000 ft³/min capacity and receives treated H₂S landfill gas via the central blower skid. A flare alarm sounds if a temperature of 2,050 F is reached, and it is air assisted.

Both flares appear to be operating within the performance operating range when in use. The following data was observed for 4 and 6 during the performance test:

FLARE 4

Combustion zone temperature: 1,638 F

Fuel flowrate: 2,625 ft³/min

LFG methane content: 54.2%LFG

Lower heating value: 493 Btu/ft³

Exhaust temperature: 1,633 F

FLARE 6

Combustion zone temperature: 1,601 F

Fuel flowrate: 2,620 ft³/min

LFG methane content: 49.0%

LFG Lower heating value: 446 Btu/ft³

Exhaust temperature: 1,550 F

According to facility reports for the 1st half of 2022 (Jan. 1 - June 30), there was one instance in January 2022 when flare 4 operated during which the average temperature was more than 28 degrees Celsius (82.4 degrees F) below the average combustion temperature during the most recent performance test. The flare operated at 1,538 degrees F during the 3-hour block which had a performance test result of 1,638 degrees F. The flare operated 17.6 degrees F below this limit. Flare 6 did not have any such occurrences which had a performance test result of 1,601 degrees F.

According to facility reports for the 2nd half of 2022 (July 1 - Dec 30), there 27 instances when flare 4 and six instances when flare 6 operated during which the average temperature was more than 28 degrees Celsius (82.4 degrees F) below the average combustion temperature during the most recent performance test. All 33 events occurred for a specified time period when the flares did not operate during the entire 3-hour block.

The U.S. EPA now requires all facilities subject to the NESHAP to include all times of startups, shutdowns, and malfunctions in a 3-hour block calculation per 40 CFR 63.1975. The facility stated that since no control device starts or stops immediately, there are short periods when combustion temperatures are below the normal operating temperature setpoint as each identified 3-hour block included a startup or shutdown occurrence - and that they do not represent normal operating conditions. Given that these are reporting requirements only, they are reported as deviations rather than violations.

FG-OPENFLARE-XXX

I. EMISSION LIMITS

Flares 3 and 5 were not in operation at the time of inspection.

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTIONS

Based on the flare data, these flares appear to operate appropriately per 40 CFR 60.18 when the collected gas is routed to them.

IV. DESIGN/EQUIPMENT PARAMETERS

The flares are calibrated according to manufacturer's specifications and there is no bypass to the flares. Flare 3 and 5 were last calibrated in October 2022 and July 2012, respectively. Each flare is equipped with a thermocouple to detect the presence of a flame.

V. TESTING/SAMPLING

There were no visible emissions during the performance test for both flares #3 and #5 on January 14, 2020.

VI. MONITORING/RECORDKEEPING

Flare 3 is a non-assisted flare and has a 3,000 standard ft³/min capacity. Flare 5 is used as a backup only with 2,100 ft³/min capacity. Both flares receive untreated H₂S landfill gas via the central blower skid. Records indicate that flare 5 has operated intermittently in 2022.

Both flares operate (non-assisted) with a net heating value of 17.12 MJ/m³ (standard) which is greater than the required value of 7.45 MJ/m³ (standard). The exit velocity for the flares is not greater than the permitted maximum velocity (V_{max}). The last performance test for flare 5 was performed in October 2009 and in February 2010 for flare 3.

The following are the test results for flares 3 and 5:

Parameter	Flare 3	Flare 5
<i>Net Heating Value</i>	18.28 MJ/m ³	17.81 MJ/m ³
<i>Exit Velocity</i>	88.7 ft/s	94.6 ft/s
V_{max}	88.7 ft/s	96.8 ft/s

The facility does not have a bypass of the control system, therefore, there have not been any instances when landfill gas was discharged directly to ambient air. The flares are monitored and recorded via the Golder Watch and Yokogawa systems which provide continuous monitoring.

VII. REPORTING

There was one instance when flare 5 did not record flow data in August 2022 for nearly five hours due to electrical utility maintenance.

FG-FLARES

I. EMISSION LIMITS

Pollutant	Limit	Time Period/Operating Scenario	Stack Test Flare #4 (01/27/20)	Stack Test Flare #6 (06/18/20)
1. SO ₂	8.1 lb/hr	hour	3.13 lb/hr	—
2. SO ₂	16.1 lb/hr	hour	—	4.24 lb/hr
3. NO _x	0.06 lb/MMBtu	hour	0.05 lb/MMBtu	0.05 lb/MMBtu
4. CO	0.2 lb/MMBtu	hour	0.08 lb/MMBtu	0.05 lb/MMBtu*
5. PM	1.4 lb/hr	hour	0.63 lb/hr	
6. PM	2.9 lb/hr	hour		2.26 lb/hr
7. PM ₁₀	1.4 lb/hr	hour	1.02 lb/hr	
8. PM ₁₀	2.9 lb/hr	hour		2.26 lb/hr
9. Visible Emissions	20% Opacity	According to Method	0	0

* Flare 6 was not tested on January 20, 2020, due to sheet buckling of the flare metal. It was then tested on May 14, 2020, and the CO emission rate exceeded the permit limit with a value of 1.37 lb/MMBtu. The facility determined it was due to condensation build-up due to flare 6 inactivity. A violation notice was issued, and the facility's MAP was updated to monitor this and to remove the excess moisture after extended periods of shutdown. All other pollutants (except PM due to probe malfunction) were tested on May 14, 2020, and passed. All pollutants were then re-tested including PM on June 18, 2020, and all were below the permit limits.

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

The facility maintains records for the usage of flare 5 and records indicate it has only been in-use when the other flares are off-line. The facility has submitted a malfunction abatement plan (MAP) and the enclosed flares operate per 40 CFR 60.752(b)(2)(iii)(B), "A control system designed and operated to reduce NMOC by 98 weight-percent, or, when an enclosed combustion device is used for control, to either reduce NMOC by 98 weight percent or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen. The reduction efficiency or parts per million by volume shall be established by an initial performance test." These parameters meet the permit requirement.

The facility operates the enclosed flares at all times when the collected gas is routed to them and there are no documented instances when the flares were not operating when emissions were vented. The flares are designed for unattended operation via automatic spark, pilot flame, and a thermocouple.

IV. DESIGN/EQUIPMENT PARAMETERS

The facility submitted the updated malfunction abatement plan and a description of the H₂S removal process during their ROP renewal.

V. TESTING/SAMPLING

The facility conducts weekly H₂S sampling and maintains records of this each month, and PTA has performed testing for all the required pollutants for their respective emission units. H₂S concentration samples varied to 200 ppm for both flares 4 and 6 in 2022. The facility was originally permitted to conduct daily H₂S sampling. The facility then petitioned the AQD in 2016 after one year of concentrations below 269 ppm requesting to perform weekly sampling as permitted, however, if at any time the H₂S concentration readings exceed 269 ppm (TRS equivalent), the facility must resume daily sampling and recording and review all operating and maintenance activities for the GCCS system along with keeping records of corrective actions taken. Once the concentration determined from the daily readings are maintained below 269 ppm for one year after an exceedance, the facility may resume weekly monitoring and recordkeeping. Facility records do not indicate that concentrations have risen above 269 ppm.

VI. MONITORING/RECORDKEEPING

Each flare has a gas flow measuring device to continuously record the total landfill gas flow. The facility maintains monthly SO₂ mass emission calculation records and the sampling frequency is based on the 269-ppm limit. Permit limits are 8.1 lb/r and 16.1 lb/hr for flares 4 and 6, respectively. The following are the high and low SO₂ emissions in 2022 for flares 4 and 6:

Year	Flare 4 (lb/hr)	Flare 6 (lb/hr)
<i>2022 high</i>	(Dec.) 5.68	(Jan.) 11.02
<i>2022 low</i>	(Feb.) 2.80	(June) 0.22

The facility maintains monthly and 12-month rolling volumes of gas combusted. The following are the high gas volumes for each flare in 2022:

<u>Flare 3</u>	<u>Flare 4</u>	<u>Flare 5</u>	<u>Flare 6</u>
8 MCF (Sept.)	2,794 MCF (Sept.)	32,940 MCF (Jan.)	4,137 MCF (Dec.)

Flare 4 and 6 have 12-month rolling gas combusted totals of 15,836 MCF and 18,856 MCF, respectively, in 2022. Flare 3 and Flare 5 currently have 12-month rolling combusted totals of 17 MCF and 45,142 MCF, respectively, in 2022.

Records are maintained regarding the usage of Flare 5. This includes the date, time, and reason for operation. Flare 5 operates when the facility attempts to remove landfill gas from that area of the site. The flare last operated on February 23, 2023. It had its highest operating month in January 2022 with 681 hours.

The facility maintains a log of all maintenance activities conducted according to the malfunction abatement/preventative maintenance plan and are referenced in the facility's MAP. This includes enclosed flare turndown and the engines off-line.

FG-COLDCLEANERS

The coldcleaner is utilized by the facility and is located in the landfill garage and used for maintenance purposes.

II. MATERIAL LIMITS

The facility does not use any of cleaning solvents listed in this condition that are more than 5% by weight.

III. PROCESS/OPERATIONAL RESTRICTION(S)

The facility indicated that routine maintenance is performed on each cold cleaner as recommended. There were no parts draining at the time of inspection and the lid was closed.

IV. DESIGN/EQUIPMENT PARAMETERS

The cold cleaner air/vapor interface is less than 10 ft² (3 ft x 2 ft x 1.4 ft) and its emissions are released into the general plant environment. The cleaner is equipped with a device for draining parts. The Reid vapor pressure of the chemical is less than 0.3 lb/in² and the facility indicates that no solvents are agitated or heated.

VI. MONITORING/RECORDKEEPING

There was no documentation indicating the facility has heated solvent during its use. The following information was recorded; Serial #0021359, Model number #906201, Date of Installation 03/18/2000, solvent naphtha (petroleum) medium aliphatics manufactured by the Zep Manufacturing Company. Reid vapor pressure at 20 degrees Celsius (68 Fahrenheit) varies between 0.02 and 0.09 lb/in² per manufacturer specification. The facility maintains a copy of the written operating procedures posted on the cold cleaner unit and does not report any deviations with this emission unit.

FG-ICENGINES

All information for the facility's engines is monitored and recorded via the facility's database known as SCADA (Supervisory Control and Data Acquisition).

I. EMISSION LIMITS

Pollutant	Limit	1	2	3	4	5	6	7	8
1. CO	3.3 g/bhp-hr	2.55	3.03	2.83	3.09	2.30	2.66	3.12	2.89
2. CO	16.3 lbs/hr	12.8	15.2	14.2	15.5	11.5	13.4	15.7	14.5
3. NOx	0.6 g/bhp-hr	0.35	0.36	0.40	0.33	0.42	0.36	0.33	0.47
4. NOx	3.0 lbs/hr	1.73	1.82	2.01	1.66	2.10	1.80	1.66	2.36

Pollutant	Limit	1	2	3	4	5	6	7	8
5. SO ₂ (30-day average)	1.57 lbs/hr	1.18	1.12	1.15	1.34	1.18	1.19	1.38	1.25
6. PM	0.24 g/bhp-hr	0.07	0.07	0.09	0.12	0.11	0.09	0.09	0.10
7. PM	1.2 lb/hr	0.35	0.37	0.46	0.61	0.56	0.47	0.44	0.52
8. PM10	0.24 g/bhp-hr	0.07	0.07	0.09	0.12	0.11	0.09	0.09	0.10
9. PM10	1.2 lb/hr	0.35	0.37	0.46	0.61	0.56	0.47	0.44	0.52
10. VOC	1.0 lb/hr	0.87	0.86	0.75	0.79	0.50	0.82	0.93	0.57
11. Visible Opacity	10%	0	0	0	0	0	0	0	0
Emissions									
12. Formaldehyde	2.07 lb/hr	1.58	1.51	1.58	1.71	1.65	1.49	1.72	1.87

All within the permit limit. Stack test conducted during the period January 14 -28, 2020. The above results for the eight engines were from the most recent performance tests conducted on February 14-16, 2022, for CO, NO_x, and VOC per Subpart JJJJ. All other pollutants were tested during the ROP renewal on Jan. 14, 20-24, 27, 2020. All are below the permit limits.

II. MATERIAL LIMIT

There does not appear to be any exceedance of the facility's H₂S limit as concentrations have varied between 150 and 205 ppm in 2022.

III. PROCESS/OPERATIONAL RESTRICTION(S)

The facility only burns landfill gas that has been treated via the SulfaTreat system. The facility provided an updated malfunction abatement/preventative maintenance plan (MAP) during the facility's last ROP renewal.

The MAP on file includes the following; identification of the equipment and the supervisory personnel responsible for overseeing it, the description of the items and the frequency of the inspection and repairs, the identification of the equipment and operating parameters that are monitored to detect a malfunction or failure, the identification of the major replacement parts that are maintained in inventory for quick replacement, and a description of the corrective procedures or operational changes that are taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits. The facility submitted the most recent updated malfunction abatement plan in 2019 for the hydrogen sulfide removal system (H₂S) during the recent ROP renewal.

IV. DESIGN/EQUIPMENT PARAMETER(S)

The engines air/fuel ratio controller is installed, maintained and operated in a satisfactory manner and is inspected daily by the facility. The engine's air/fuel ratio automatically adjusts (typically around 7.0) as needed to ensure that the engines operate at their maximum design output. Each engine is equipped with an automatic air-to-fuel ratio controller for NO_x and CO emission control, and each engine drives an associated generator which has a

digital metering display to monitor and record the monthly hours of operation. The engines are rated at 2,233 horsepower by the manufacturer, Caterpillar. The daily fuel usage is displayed on each engine's generator and the total daily fuel usage is recorded for the plant as a whole.

V. TESTING/SAMPLING

The facility performs yearly Subpart JJJJ testing for the pollutants of CO, NOx, and VOC for each engine, as well as testing for all the pollutants listed in Section I every five years for each engine. The facility obtains H₂S weekly sampling (as described for FG-Flares) which is post treatment of the landfill gas ranging between 150 to 205 ppm.

VI. MONITORING/RECORDKEEPING

The facility continuously monitors, in a satisfactory manner, the total landfill gas usage to the engines. The total gas usage by the engines varied between 64,000 to 155,000,000 MSCF in 2022. The highest total gas usage for all the engines occurred in May 2022 with 149,781 MSCF. The facility maintains a log of all maintenance activities conducted according to the malfunction abatement/preventative maintenance plan. Some activities include oil and filter changes, spark plug replacement, piston cleaning, and high voltage maintenance on all the engines. The activities are maintained via notebook and electronically.

The facility maintains monthly SO₂ mass emission calculations using the highest kW-h output per engine with the lowest engine hours. The facility did not have this information readily available despite all calculations necessary to show compliance with permit limits must be made readily available. The engine with the highest monthly kW-h in 2022 was Engine #4 at 1,071,288 kW-h in March 2022. The engine with the highest monthly engine hours was engine #5 with 738 hours in May 2022, and the engine with the least monthly hours was engine #7 in December 2022. The highest SO₂ hourly emission rate occurred in March 2022 at 1.04 lb/hr for Engine #5.

The engines are manufactured by Caterpillar in 2010, and have the model number G3520C, and are lean burn 4 stroke engines. Each engine has 2,233 brake-horsepower with an engine displacement of 86 liters. The initial start-up date for the engines is February 2011.

Compliance tests were last performed by the facility in February 2022 and are required yearly per Subpart JJJJJ and every five years upon ROP renewal.

The facility did not maintain each engine's monthly and 12-month rolling total gas usage, but rather maintained this information for all eight engines in total. The facility provided the monthly gas usage for each engine after several correspondence exchanges occurred, but did not provide the 12-month rolling gas totals for each engine. The facility did not believe this was necessary to demonstrate compliance despite the condition requirement in the ROP.

The AQD conducted a virtual meeting with the facility on March 28, 2023. The facility ultimately provided the 12-month rolling totals for each engine after the AQD requested that each engine's usage be determined based on its electrical output (kW-hr) rather than its operating hours. Engine #1 had the highest 12-month rolling total for hours operated in

2022 with 7,198 hours. Engine #4 had the lowest operated hours with 6,017 hours. Engine #4 had the highest gas usage at over 23,000 ft³ in March 2022.

This facility documents maintenance activities per the PM/MAP electronically.

FG-RICEMACT

III. PROCESS/OPERATIONAL RESTRICTION(S)

Each engine appears to operate in a manner which reasonably minimizes HAP emissions. The average air-to-fuel ratio varies between 7 and 8. The engines are turbo-charged, after-cooled, and are of a lean burn design. They are equipped with air-to-fuel ratio controllers which maintain a constant fuel to air mixture.

Each engine operates in a manner which minimizes time spent at idle during startup, and minimizes the startup time to a period needed for appropriate and safe loading of each engine. After the engine oil has obtained a minimum operating temperature, the engines can be loaded to a desired load. There was no indication or documentation which indicates the idle times have exceeded 30 minutes.

IV. DESIGN/EQUIPMENT PARAMETER(S)

The facility measures the volumetric flow to each engine via its associated generator on an electronic display. The volumetric flowrate is each engine's gas usage per its operated hours. The facility monitors the gas flowrate to the plant as a whole for all eight engines. Each engine is not equipped with separate fuel meters to record each fuel type since each engine only operates with landfill gas. The AQD received guidance from the EPA indicating this was acceptable since each engine only utilizes one type of fuel (landfill gas). The facility was instructed to calculate each engine's gas usage based on each engine's kW-hr output and its operating hours as a percentage of the plant's total gas usage.

VI. MONITORING/RECORDKEEPING

The engines are monitored for fuel usage and the flow is measured for the eight-engine plant as stated in section IV. The heating value is based on a methane concentration of approximately 48% and the higher heating value of methane at 1,012 BTU/ft³. Gas usage to the eight engines during the first half of 2022 was 834,747 MCF and 540,254 MCF in the second half of 2022.

FG-RICENSPS

I. EMISSION LIMIT(S)

Pollutant	Limit
1. NOx	2.0 g/hp-hr ²
2. CO	5.0 g/hp-hr ²
3. VOC	1.0 g/hp-hr ²

All emission limits above are met and noted in FG-ICENGINES Section I. Emission Limits.

II. MATERIAL LIMIT(S)

NA

III. PROCESS/OPERATIONAL RESTRICTION(S)

All the engines are certified, operated, and maintained to meet the emission limits established over the entire life of the engine. The engines appear to be operating per the permit limits and are in-compliance when tested.

IV. DESIGN/EQUIPMENT PARAMETER(S)

The following hours were recorded for each generator which is driven by each engine:

Engine 1: 86,646 (GZJ00463)
Engine 2: 82,195 (GZJ00462)
Engine 3: 80,544 (GZJ00465)
Engine 4: 83,764 (GZJ00464)
Engine 5: 79,950 (GZJ00456)
Engine 6: 80,077 (GZJ00466)
Engine 7: 29,474 (GZJ00467)
Engine 8: 83,028 (GZJ00457)

V. TESTING/SAMPLING

Testing is performed on a yearly basis per Subpart JJJJ. Testing last occurred in February 2022.

VI. MONITORING/RECORDKEEPING

All engines are certified, and the facility monitors and records the operating hours of each engine. The facility appears to monitor and record all source emissions and operating information continuously.

VII. REPORTING

The facility provides the required information via the annual NESHAP and NSPS semi-annual reports.

Conclusion

Based on the AQD inspection and current records review, Section 1 - Pine Tree Acres, Inc. is not in compliance with the aforementioned requirements and conditions of the facility's Renewable Operating Permit (ROP) MI-ROP-N5984-2019. The facility has undergone staff changes within the last 12-months and the facility did not have some of the above stated records readily available upon request. Rather than issue a violation notice to the facility, the AQD has provided guidance to the facility regarding what is specifically required to be maintained regarding the gas engines.

Section 2 - Sumpter Energy Associates (N5984)

General Information

I arrived at the facility shortly after 1 p.m. and met with Josh Wrubel, Facility Manager. I introduced myself and presented my identification and credentials and stated the purpose of my visit.

On March 1, 2021, Aria Energy LLC, owner and parent company of LES Project Holdings LLC, entered into an agreement with Energy Power Investment Company, LLC (EPIC), in which EPIC agreed to purchase 100% membership interest in LES Project Holdings, LLC. LES Project Holdings LLC wholly owns Sumpter Energy Associates at Pine Tree Acres Landfill.

With the closing of the transaction on June 10, 2021, the ownership and operation of Sumpter Energy Associates was transferred to EPIC which accepts the responsibility of the permit coverage and liability. Site operators stayed on with LES Project Holdings, LLC / EPIC.

Sumpter Energy Associates, LLC receives its landfill gas (LFG) for its nine internal combustion engines from neighboring Pine Tree Acres Landfill (PTA) as they both are combined into one single source. The two companies have a contractual agreement in which PTA sells LFG to Sumpter Energy Associates, LLC. The facility then sells the energy produced to the power grid through a 20-year service contract. The facility operates its engines 24 hours/7 days a week (unless maintenance is being performed) with staff on-site from 7:30 a.m. to 4:30 p.m. The facility employs approximately four people.

Facility Tour

Sumpter Energy Associates, LLC has two buildings located adjacent to PTA's two enclosed flares and landfill gas treatment systems.

Building #1 (referred to as Phase I) houses engines 1 through 7. These seven engines are reciprocating internal combustion engines manufactured by Caterpillar, Inc. (All have the Model No. CAT G3516 and are rated at 1,138 horsepower and 8.6 MMBtu/hr) with 16 cylinders each. Sumpter Energy receives their landfill gas from PTA with the sulfur content removed through PTA's sulfur removal process before using it as fuel in these engines.

Building #2 (referred to as Phase II) houses engines 8 and 9. These two engines are reciprocating internal combustion engines manufactured by Caterpillar, Inc. (both with Model No. CAT G3520C and rated at 2233 brake-horsepower with 1.6 megawatts of gross electrical output) with 20 cylinders each. Engines 8 through 9 do not receive their gas with the sulfur content removed. This was known at the time Sumpter Energy applied for the permit, and instead of undergoing PSD review and potentially installing a sulfur removal treatment, Sumpter Energy accepted permit limitations for Engines 8 and 9. The facility currently decreases the gas flow and engine load to meet the permit limits maintaining a sulfur monitoring and SO₂ emission curtailment plan.

These engines operate as lean burn reciprocating internal combustion engines – which means that the combustion mixture contains excess air compared to stoichiometric combustion. The engines are turbocharged and equipped with aftercoolers to further increase the intake charge density. The engines operate at almost stoichiometric air/fuel

ratio (AFR) and require after-treatment, whereas lean burn engines use a lot of excess air – usually about twice the stoichiometric amount. The air dilution effectively cools down the peak combustion temperature in the cylinder that reduces NO_x emissions.

EU-ICEENGINE10

On June 20, 2016, the facility applied for a permit for an additional engine, EU-ICEENGINE10. Permit to Install (105-16) was approved on October 25, 2016. This engine has permit limits for the same pollutants as Engines 8 and 9 with the addition of Formaldehyde.

In December 2017, this engine had not yet been installed and was given an extension by the AQD, therefore, it was rolled into the facility's ROP renewal in 2019. Furthermore, in April 2022, the engine still had not been installed and the AQD required the facility to re-apply for a PTI to address regulation changes and was issued PTI 68-22 on June 6, 2022. This will be rolled into the facility's next ROP upon renewal in 2024 as the engine has not yet been installed.

FG-ENGINES (Engines 1 through 7)

I. EMISSION LIMITS

Pollutant	Permit Limit	Time Period/ Operating Scenario	Stack Test Result	2022 12-month total
1. NO _x	35.2 lbs/hr	Hour	10.6 lbs/hr	N/A
2. NO _x	154.2 tons	12-month rolling time period	N/A	43.14 tons
3. CO	51.1 lbs/hr	Hour	47.5 lbs/hr	—
4. CO	223.8 tons	12-month rolling time period	—	190.93 tons
5. HCl	0.7 lbs/hr	Hour	0.636 lbs/hr	—
6. HCl	3.0 tons	12-month rolling time period	—	N/A*
7. NMOC	8.8 lbs/hr	Hour	4.18 lbs/hr	—
8. NMOC	38.5 tons	12-month rolling time period	—	16.97

Stack test results for the above pollutants were conducted on June 3-5, 2019.

*The facility submitted the PTI modification application to the AQD permits division on 04/27/20. Per discussion with the AQD TPU staff on 08/26/19, this type of chlorine test per section condition V.2 is not a fuel gas chlorine test. Method 26A only tests for the presence of chlorine in HCl and Cl and not the total chlorine compounds present such as in chlorinated organic compounds, therefore, no such EPA test method is available for this pollutant (no lab performs fuel gas analysis for chlorine).

Permits Division determined the condition never originated from a PTI, so the application was withdrawn. This condition was determined to be unnecessary given that condition V.3 verifies compliance for this pollutant. Further discussions with the permits staff indicated that the condition should have been previously removed from the ROP since special condition V.3 requires a chlorine test every five years upon renewal. The condition will remain in the ROP until renewal should a fuel gas chlorine test be available at a test lab.

III. PROCESS/OPERATIONAL LIMITS

The facility only burns landfill gas in FG-ENGINES. The facility updated its FG-ENGINES Malfunction Abatement/Preventative Maintenance Plan which addresses the following:

The identification of the equipment and the supervisory personnel responsible for overseeing the inspection, maintenance, and repair, a description of the items or conditions to be inspected and frequency of the inspections or repairs, the identification of the equipment and operating parameters monitored to detect a malfunction or failure, the normal operating range of these parameters and a description of the method of monitoring or surveillance procedures, the identification of the major replacement parts maintained, and a description of the corrective procedures or operational changes taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.

IV. DESIGN/EQUIPMENT PARAMETER(S)

Each engines electronically adjusts its air/fuel ratio to ensure that each engine operates at its maximum design output based on the fuel available to burn. This occurs within the intake manifold. Each generator is equipped with a device to monitor and record the hours of operation for each engine using a non-resettable hour meter via its respective generator and the hours are also entered electronically.

A measuring device is used to monitor and record the total daily fuel usage of the engines as whole for all seven engines. The daily landfill gas is maintained and the monthly gas usage varied between 73,000,000 ft³ and 112,000,000 ft³ for all seven engines in 2022.

V. TESTING/SAMPLING

The engines are exempt from the National Standards of Performance for Stationary Spark Ignition Internal Combustion Engines 40 CFR 60 Subpart JJJJ due to their installation date, therefore, they are only tested upon ROP renewal (NO_x, CO, NMOC, HCl).

VI. MONITORING/RECORDKEEPING

Each engines' electrical output averages approximately between 500,000 to 600,000 kW-hr each month, and each engine's hours range between 650 to 800 hours each month. The combined landfill gas usage for FG-ENGINES in 2022 was 1,127,175,000 ft³.

The facility also monitors and records the emissions of CO, NO_x, NMOC on a monthly and 12-month rolling basis. The heating value varies with an average BTU rating between 30,000 and 40,000 MMBtu. and the engines operated for a combined 57,526 hrs in 2021, and the current 12-month rolling operational total is 57,611 hours.

The facility only monitors the air/fuel mixture at the aftercooler of each engine. The facility submitted a minor modification application requesting to remove Special Conditions 4 and 5 under Section VI. Monitoring/Recording for FG-ENGINES in the facility's ROP MI-ROP-N5984-2019:

4. The permittee shall monitor and record the temperature of the air/fuel mixture at the after cooler outlet a minimum of once per day, excluding holidays and weekends, when an engine operator is not scheduled or called in, to be on site. A list of excluded holidays shall be maintained on site and be made available to the Air Quality Division upon request.

5. The permittee shall record and report as a deviation any air/fuel mixture temperature reading greater than five degrees Fahrenheit in excess of the maximum air/fuel mixture temperature observed during the performance test in which compliance with the NO_x emission limit was established.

The facility states that the AQD no longer issues permits requiring the measurement of the air/fuel mixture temperature at the aftercooler. They state not only is this not an proper indicator regarding the NO_x emission limit, but that recent permits issued by the AQD to similar facilities do not require monitoring/recordkeeping conditions related to ongoing NO_x compliance. The facility proposed the following conditions be added to the ROP:

4. The permittee shall maintain records of all information necessary for all notifications and reports for each engine in FG-ENGINES, as specified in these special conditions as well as that information necessary to demonstrate compliance with the emission limits of the permit."

5. Monthly average BTU content of the landfill gas burned."

The AQD agreed that these conditions may be removed since they did not derive from a PTI, and it was determined in conversations with ROP modification staff Caryn Owens that the modification would be processed now and then be incorporated during the facility's upcoming ROP renewal in 2024.

The facility logs all maintenance activities conducted on each engine in FG-ENGINES which include spark plug replacement, cylinder head work, and engine tune-up. The facility maintains all the necessary information (monitoring, calculations, engine manufacture information and maintenance activities) to demonstrate compliance with the emission limits of this permit.

The facility has provided proper notification for each engine replacement and they are replaced with like-engines. The highest and lowest amount of monthly landfill gas usage occurred for the engines in January 2022 at 86,321,000 ft³ and in April 2022 at 111,383,000 ft³, respectively. The engine's monthly and 12-month rolling totals for hours are approximately 700 hours and 8,000 hours, respectively. There were no visible emissions or obstructions with each engine's stack.

FG-ICENGINES2

I. EMISSION LIMITS

Engine #8

Pollutant	Permit Limit	Time Period/ Operating Scenario	Test Result
2. CO	16.3 lbs/hr	Hour	15.1 lbs/hr
4. NO _x	3.0 lbs/hr	Hour	1.68 lbs/hr
6. VOC	1.0 g/bhp-hr	Hour	0.15 g/bhp-hr

Engine #9

Pollutant	Permit Limit	Time Period/ Operating Scenario	Test Result
2. CO	16.3 lbs/hr	Hour	13.0 lbs/hr
4. NO _x	3.0 lbs/hr	Hour	1.7 lbs/hr
6. VOC	1.0 g/bhp-hr	Hour	0.13 g/bhp-hr

Stack test results performed on December 6, 2022, for the above pollutants are below the permit limits for engines 8 and 9 (CO, NO_x, and VOC). The engines are subject to the National Standards of Performance for Stationary Spark Ignition Internal Combustion Engines 40 CFR 60 Subpart JJJJ.

III. PROCESS/OPERATIONAL LIMITS

The facility only burns landfill gas in FG-ICENGINE2, but the gas is not sulfur treated for these engines prior to them receiving it. The facility submitted an SO₂ monitoring and curtailment plan to the AQD in 2013 and it was approved to meet the permit emission limits.

The facility updated its FG-CENGINE2 Malfunction Abatement/Preventative Maintenance Plan which addresses the following:

The identification of the equipment and the supervisory personnel responsible for overseeing the inspection, maintenance, and repair, a description of the items or conditions to be inspected and frequency of the inspections or repairs, the identification of the equipment and operating parameters monitored to detect a malfunction or failure, the normal operating range of these parameters and a description of the method of monitoring or surveillance procedures, the identification of the major replacement parts maintained, and a description of the corrective procedures or operational changes taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.

The engines are operated at constant power output as to minimize HAP emissions. The engines are equipped to operate in a satisfactory manner as the air-to-fuel ratio automatically adjusts daily based upon LFG quality.

The sulfur monitoring and emission curtailment plan is implemented and maintained through daily monitoring and recordkeeping of the sulfur content and by decreasing the flow and engine load to meet the permit limits.

IV. DESIGN/EQUIPMENT PARAMETER(S)

The engines are operated in a satisfactory manner as the air-to-fuel ratio is automatically adjusts daily based upon LFG quality. Air-fuel ratio (the mass flow rate ratio of fresh air to fuel) for engine 8 and 9 at the time of inspection was 7.5 and 6.8, respectively.

Each engine is equipped with a generator and gauge to monitor and record the hours of operation. Engine 8 generator read 101,869 hours and Engine 9 generator read 61,317 hours at the time of inspection. The engines average between 700 to 800 hours of operation each month.

Each engine is not equipped with separate fuel meters to record each fuel type since each engine only operates with landfill gas. The AQD received guidance from the EPA indicating this was acceptable since each engine only utilizes one type of fuel (landfill gas). The plant uses a gauge to records the gas flow to the plant as whole engines 8 and 9, however, the fuel usage is calculated using each engine's kW output and hours of operation. The daily landfill gas usage in 2022 was 541,917,004 ft³.

V. TESTING/SAMPLING

The facility performed the Subpart JJJJ performance tests as noted above in December 2022 and all pollutants during the previous ROP renewal in 2019.

The AQD received a letter dated July 24, 2020, from Sumpter Energy Associates requesting to reduce the H₂S monitoring frequency. Special condition V.3 (FG-ICEENGINE2) of the facility's permit and the facility's sulfur monitoring and emission curtailment plan, requires the hydrogen sulfide (H₂S) content of the burned landfill gas to be monitored on a daily basis whenever a concentration of 600 parts per million (ppm) is observed, and on a weekly basis whenever a concentration of 500 ppm is observed. Daily monitoring for over one year revealed the hydrogen sulfide concentration to be under 500 ppm, therefore, the facility requested that the monitoring frequency be reduced from daily to monthly as outlined in the facility's permit.

The EGLE-AQD approved this request on 09/08/20 based on the monitoring data observed for that year. Should the hydrogen sulfide concentration increase to 500 ppm for any single monitoring event, the monitoring frequency will revert back to the conditions outlined in the facility's permit and the facility's sulfur monitoring and emission curtailment plan.

VI. MONITORING/RECORDKEEPING

The facility monitors and records the total landfill gas fuel usage of the engines and the hours of operation for each engine daily. Monthly landfill gas usage in 2022 varied between 40,000,000 ft³ and 53,000,000 ft³. The facility monitors and records the hours of each engine with Engine 8 varying between 540 and 732 hours, and Engine 9 varying between 664 and 739 hours per month in 2022.

The facility maintains a log of all maintenance activities conducted according to the malfunction abatement/preventative maintenance plans as stated in Section II. This includes spark plug replacement, cylinder head work, and engine tune-up.

The facility determines the monthly SO₂ mass emission calculation for each engine in FG-ICEENGINE2. The SO₂ emission calculations are based on the most recent landfill gas sulfur sampling results and the monthly landfill gas usage of the engines. Emission rates vary between 2.73 and 4.28 lb/hr per month in 2022 with H₂S concentrations varying between 227 and 417 ppm. The facility also monitors and records the monthly emissions of CO, NO_x, and NMOC.

The facility continuously monitors the kilowatt output from each engine. Engine 8 read 1,599 kW and Engine 9 read 1,579 kW at the time of inspection. Engine 8 has varied between 877,000 kW-hr and 1,200,000 kW-hr each month in 2022, and Engine 9 has varied between 1,000,000 kW-hr and 1,200,000 kW-hr each month in 2022.

The facility calculates and maintains records of the daily gas usage for each engine and on a monthly basis using the kilowatt output from each engine. The landfill gas usage for Engine 8 has varied between 19,000,000 and 27,000,000 ft³ each month in 2022, and the Engine 9 landfill gas usage has varied between 19,000,000 and 26,000,000 ft³ in 2022.

The facility monitors and records monthly the average BTU content of the landfill gas burned in FG-ICEENGINE2 with an average MMBtu rating between 17,200 and 23,100 for the engines.

There were no visible emissions or obstructions with each engine's stack.

VII. REPORTING

The facility provides the required information via the annual NESHAP report.

FG-RICEMACT

III. PROCESS/OPERATIONAL LIMITS

The facility operates the engines to minimize the HAP emissions by monitoring the air-to-fuel ratio daily based upon LFG quality. The air-to-fuel ratio is self-adjusting based upon the LFG quality to minimize HAP emissions for FG-ICEENGINES. The air-to-fuel ratio for FG-ICEENGINES varied between 7.0 and 8.0 at the time of inspection and operates at steady state and via arm controller to minimize time spent idling. There have been no reported exceedances.

IV. DESIGN/EQUIPMENT PARAMETER(S)

The facility monitors the gas flowrate to the plant as a whole for both engines. Each engine is not equipped with separate fuel meters to record each fuel type since each engine only operates with landfill gas. The AQD received guidance from the EPA indicating this was acceptable since each engine only utilizes one type of fuel (landfill gas). The facility calculates each engine's gas usage based on each engine's kW output and its operating hours as a percentage of the plant's total gas usage for both engines.

VI. MONITORING/RECORDKEEPING

The engines are monitored for fuel usage and the volumetric flow usage is measured for the two-engine plant as stated in section IV. The total gas usage by the two engine plant in 2022 was 541,917,004 ft³. The volumetric flow to each engine at the time of inspection for engine 8 and 9 was 642 ft³/min and 623 ft³/min, respectively.

Conclusion

Based on the EGLE-AQD inspection and records review, Sumpter Energy Associates, LLC is in compliance with the aforementioned requirements and conditions of the facility's Renewable Operating Permit (ROP) MI-ROP-N5984-2019.

NAME Robert Joseph

DATE 03-31-23

SUPERVISOR Joyce