

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

N598471513

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|---|--------------------------------------|----------------------------------|
| 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: 03/05/2024 |
| STAFF: Robert Joseph | COMPLIANCE STATUS: Compliance | SOURCE CLASS: MAJOR |
| SUBJECT: Scheduled inspection of municipal landfill (Pine Tree Acres - Section 1) and gas-to-energy plant (Sumpter Energy - Section 2) | | |
| RESOLVED COMPLAINTS: | | |

On December 6, 2023, and March 5, 2024, I, 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), also referred to as “the facility” 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. The facility currently is in the process of its ROP renewal.

Section 1 - Pine Tree Acres, Inc.

Opening Introduction

On March 6, 2024, arrived at the facility shortly after 11 a.m. and met with Richard Kunze, WMRE Supervisor. I introduced myself and presented my identification and credentials and stated the purpose of my visit. Pine Tree Acres, Inc. (PTA) is a subsidiary of WM (formerly Waste Management) and 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 are 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 that 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 16-years of service. The total landfill area (which includes active and

unconstructed cells) is 377.2 acres. Also, there are 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). Only those sections which contain relevant special conditions are referenced below.

GENERAL CONDITIONS

There were no concerns regarding these conditions at the facility. No visible emissions were observed, no malfunctioning equipment, and no obvious modifications of the facility's equipment were observed.

EU-ASBESTOS

The facility currently accepts friable asbestos and documents its location via GPS (Global Positioning System) and is mixed in with other waste during placement.

III. PROCESS/OPERATIONAL RESTRICTION(S)

I did not detect any asbestos fugitive emissions while on-site and the facility maintains a natural barrier that 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 February 8, 2024, from the General Motors facility in 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 58 locations that exceeded 500 ppm during the quarterly scans in 2023. There were 14 exceedances and 16 exceedances in the 3rd and 4th quarter scans in August and October, respectively. All exceedances were successfully remediated upon re-monitoring with additional soil cover added (primarily bentonite, an absorbent aluminum silicate clay) and wellfield vacuum adjustments.

Both the AQD and the U.S. EPA conducted independent surface emissions surveys of the landfill in August 2023. Although the landfill graded above average overall given its area, the U.S. EPA detected 19 exceedances during the visit (comparable to the facility's 14 exceedance self-monitoring event), however, the AQD observed 55 exceedances during its investigation. This prompted the U.S. EPA to issue an informational request to the landfill on January 25, 2024, regarding its Gas Collection and Control Design Plan (GCCS). The facility's response to the submittal was due March 25, 2024, however, received an extension from the U.S. EPA. The AQD has requested a copy of the submittal for review upon its completion.

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 (rilling). 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 approximately 2,600,00 tons in 2022, and 3,141,587 tons in 2023. 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 3,145,000 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 69 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 3,326,186 tons 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 3,100,000 tons 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 629 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 2023 (Jan. 1 - June 30), there were 11 gas well exceedances for pressure (positive) and none for temperature. All were remediated within 60-days per Subpart AAAA without the requirement of notifying the AQD. In the 2nd half of 2023 (July 1 - Dec. 31), there were eight gas well exceedances for pressure (positive) and one for temperature. 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 93 newly installed or redrilled gas wells along with 16 wells decommissioned in 2023.

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 629 gas collection wells onsite. Each well is equipped with a sample port and thermometer to measure the subsurface temperature. The facility submitted its gas collection control system design plans to the EGLE-MMD in 2018 for approval which was also reviewed by the AQD. The AQD has informed the facility to comply with all federal and state regulations regarding the GCCS plans and all deviations must be submitted to the AQD independently for review. 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, in addition to each gas well's 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 2023. 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 at a time. 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 were seven instances in 2023 when the treatment did not operate due to maintenance/construction, all lasting for under one hour – except for a power outage on October 24, which lasted for approximately 3.5 hours. There was no venting of gas documented by the facility and 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 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 | 20 ppmv dry as hexane at 3% oxygen-OR-98% weight reduction or more | Hourly | Enclosed Flares |

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 do not operate daily and primarily only operate when landfill gas within a specified section of the wellfield must be controlled, or when landfill gas produced requires combustion if all eight engines are operating or if any are not operating due to maintenance.

IV. DESIGN/EQUIPMENT PARAMETER(S)

Flare 4 and 6 were last calibrated on March 14, 2023, and April 3, 2023, 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

The 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's monitoring systems, the Golder Watch and Yokogawa systems – both monitor the flares and compressor remotely. The facility provided the data recorder readings for the most

recent flare operating periods (Flare 4 – February 23, Flare 6 – February 6, 2024) and they 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 also 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 2023 (Jan. 1 - June 30), there 15 instances 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. There were five instances when this occurred with flare 6. The flares did not operate for the entire 3-hour period during any of the occurrences as required in the NSPS Subpart XXX, therefore, all were noted as deviations. The facility was informed in September 2023 to ensure the flares are maintained and operated occasionally at minimum to ensure proper operating standards and to prevent potential metal buckling from occurring due to an idle state.

According to facility reports for the 2nd half of 2023 (July 1 - Dec 31), there were no instances when either flare 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 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. Flares are required to operate at for least three (15) minute periods per hour to constitute an average operating period.

FG-OPENFLARE-XXX

I. EMISSION LIMITS

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

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 December 3, 2023 and March 14, 2023, 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 non-assisted 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 2023, with the most occurrence on February 29. Flare 3 last operated on February 28, 2023.

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

The facility has submitted the appropriate semi-annual and annual reports for the flares.

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.

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. Monthly H₂S concentration samples varied between 184 ppm and 236 ppm for both flares 4 and 6 in 2023. The facility was originally permitted to conduct daily H₂S sampling, however, the facility petitioned the AQD in 2016 after one year of concentrations below 269 ppm requesting to perform weekly sampling. 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 is 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 2023 for flares 4 and 6 for months when flare operation occurred:

| Year | Flare 4 (lb/hr) | Flare 6 (lb/hr) |
|------------------|------------------------|------------------------|
| <i>2023 high</i> | (Dec.) 7.47 | (Feb.) 13.77 |
| <i>2023 low</i> | (Sept.) 1.70 | (April) 0.97 |

The facility maintains monthly and 12-month rolling volumes of gas combusted (MCF). The following are the high gas volumes for each flare in 2023:

| <u>Flare 3</u> | <u>Flare 4</u> | <u>Flare 5</u> | <u>Flare 6</u> |
|----------------|----------------|----------------|----------------|
| 109 (Feb.) | 47,902 (July) | 55,047 (Jan.) | 6,647 (Sept.) |

Flare 4 and 6 have 12-month rolling gas combusted totals of 93,336 MCF and 12,866 MCF, respectively, in 2023. Flare 3 and Flare 5 currently have 12-month rolling combusted totals of 109 MCF and 259,637 MCF, respectively, in 2023.

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 29, 2024. It had its highest operating month in December 2023 with 553 hours.

Flares 4 and 6 have monthly operating highs of 428 hours (July) and 10 hours (November), respectively, in 2023. Flare 3 only operated for approximately 20 minutes in February 2023.

The facility maintains a log of all maintenance activities conducted according to the malfunction abatement/preventative maintenance plan and is 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 is 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. No parts were 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 had 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 | 2.67 | 2.80 | 3.07 | 2.64 | 2.61 | 2.26 | 2.77 | 3.15 |
| 2. CO | 16.3 lbs/hr | 13.3 | 14.2 | 15.5 | 13.3 | 13.1 | 11.4 | 13.9 | 16.0 |
| 3. NOx | 0.6 g/bhp-hr | 0.33 | 0.27 | 0.23 | 0.30 | 0.24 | 0.24 | 0.21 | 0.25 |
| 4. NOx | 3.0 lbs/hr | 1.66 | 1.34 | 1.15 | 1.49 | 1.21 | 1.23 | 1.05 | 1.27 |

| 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 | 0.61 | 0.85 | 0.90 | 0.60 | 0.79 | 0.71 | 0.84 | 0.88 |
| 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 27 – March 2, 2023, 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 180 and 236 ppm in 2023.

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, NO_x, 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 180 to 236 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 86,000 to 176,000, Mscf in 2023. The highest total gas usage for all the engines occurred in October 2023 with 175,051 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 engine with the highest monthly kW-h in 2023 was Engine 2 at 1,065,647 kW-h (November). The engine with the highest 2023 monthly engine hours was engine 4 with 736 hours (January), and the engine with the lowest monthly hours was engine 6 with 10 hours (March). The highest 2023 SO₂ hourly emission rate occurred in December at 1.17 lb/hr with Engine 7.

Engine 3 had the highest 12-month rolling total for hours operated in 2023 with 7,970 hours. Engine 6 had the lowest operated hours with 6,388 hours. Engine 2 had the 2023 highest gas usage at over 24,826 ft³ in November.

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 2023/March 2023 and are required yearly per Subpart JJJJJ as well as every five years upon ROP renewal.

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 that 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 that 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 flow rate is each engine's gas usage per its operated hours. The facility monitors the gas flow rate 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 during the first half of 2023 (Jan. 1- June 30) is based on a methane concentration of approximately 52% and the higher heating value of methane at 1,012 BTU/ft³. Gas usage to the eight engines during the 1st half of 2023 was 749,177 MCF.

The heating value during the 2nd half of 2023 (July 1 – December 31) is based on a methane concentration of approximately 52% and the higher heating value of methane at 1,012 BTU/ft³. Gas usage to the eight engines during the 2nd half of 2023 was 996,768 MCF.

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.

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: 94,298 (GZJ00463)
Engine 2: 90,348 (GZJ00462)
Engine 3: 88,724 (GZJ00465)
Engine 4: 92,089 (GZJ00464)
Engine 5: 87,849 (GZJ00456)
Engine 6: 87,502 (GZJ00466)
Engine 7: 37,495 (GZJ00467)
Engine 8: 90,898 (GZJ00457)

V. TESTING/SAMPLNG

Testing is performed on a yearly basis per Subpart JJJJ. Testing last occurred in February/March 2023.

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 in compliance with the aforementioned requirements and conditions of the facility's Renewable Operating Permit (ROP) MI-ROP-N5984-2019.

Section 2 - Sumpter Energy Associates (N5984)

General Information

On December 6, 2023, I arrived at the facility shortly after 10 a.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. In 2023, the EPIC renewable energy portfolio was purchased by NEXtera Energy Resources.

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 the landfill's gas treatment system.

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 at 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 are Model No. CAT G3520C and rated at 2233 brake-horsepower at 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. 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, however, the

engine has not yet been installed and the facility has indicated that it likely will not be installed this year.

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 and then be removed.

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 engine 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 all seven engines. The daily landfill gas is maintained, and the monthly gas usage varied between 65,000,000 ft³ and 97,000,000 ft³ for all seven engines in 2023.

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, HCI).

VI. MONITORING/RECORDKEEPING

Each engine's electrical output averages approximately between 500,000 to 600,000 kW-hr each month, and each engine's hours range between 550 to 750 hours each month. The combined landfill gas usage for FG-ENGINES in 2023 was 1,060,096,000 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 of the engines varies with an average BTU rating between 40,000 and 50,000 MMBtu. The engines 12-month rolling operational total was 53,021 hrs in 2023.

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 a 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 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 September 2023 at 96,804,000 ft³ and in June 2023 at 65,068,000 ft³, respectively. Each engine's monthly and 12-month rolling totals for hours are approximately 660 hours and 7,200 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 | 15.6 lbs/hr |
| 4. NO _x | 3.0 lbs/hr | Hour | 1.17 lbs/hr |
| 6. VOC | 1.0 g/bhp-hr | Hour | 0.18 g/bhp-hr |

Engine #9

| Pollutant | Permit Limit | Time Period/ Operating Scenario | Test Result |
|--------------------|--------------|---------------------------------------|----------------|
| 2. CO | 16.3 lbs/hr | Hour | 13.7 lbs/hr |
| 4. NO _x | 3.0 lbs/hr | Hour | 1.46 lbs/hr |

| Pollutant | Permit Limit | Time Period/ Operating Scenario | Test Result | Stack test results performed on December 6, 2023, |
|-----------|--------------|---------------------------------------|----------------|---|
| 6. VOC | 1.0 g/bhp-hr | Hour | 0.14 g/bhp-hr | |

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 a 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 automatically adjusts daily based upon LFG quality. The air-fuel ratio (the mass flow rate ratio of fresh air to fuel) for engine 8 and 9 at the time of inspection was 8.2 and 7.3, respectively.

Each engine is equipped with a generator and gauge to monitor and record the hours of operation. Engine 8 generator read 109,925 hours and Engine 9 generator read 69,316 hours at the time of inspection. The engines average approximately 680 hours a 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 monitoring gauge and records the gas flow to the engines, however, the fuel usage for each engine is calculated using each engine's kW output and hours of operation. The landfill gas usage in 2023 was 491,192,102 ft³.

V. TESTING/SAMPLING

The facility performed the Subpart JJJJ performance tests as noted above in December 2023 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 2023 was approximately 21,000,000 ft³. The facility monitors and records the hours of each engine with Engine 8 varying between 336 and 737 hours, and Engine 9 varying between 500 and 737 hours per month in 2023.

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 4.43 lb/hr per month in 2023 with H₂S concentrations varying between 338 and 396 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 1,574 kW and Engine 9 read 1,507 kW at the time of inspection. Engine 8 has varied between 498,000 kW-hr and 1,169,000 kW-hr each month in 2023, and Engine 9 has varied between 641,000 kW-hr and 1,078,000 kW-hr each month in 2023.

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 varied between 10,000,000 ft³ and 24,000,000 ft³ each month, and the Engine 9 landfill gas usage varied between 13,000,000 and 25,000,000 ft³ in 2023.

The facility monitors and records monthly the average BTU content of the landfill gas burned in FG-ICEENGINE2 with an average MMBtu rating between 13,800 and 22,700 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-ICENGINES. The air-to-fuel ratio for FG-ICENGINES varies typically between 7.0 and 8.0 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 on 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 upon 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 2023 was 491,142,102 ft³ with an average methane concentration of 53.8 and an average heating value of 545 Btu/ft³. The volumetric flow rate to each engine at the time of inspection for engine 8 and 9 was 600 ft³/min and 550 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 04-12-24

SUPERVISOR Joyce