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

N132472404

FACILITY: South Kent Landfill		**SRN / ID:** N1324
LOCATION: 10300 South Kent Drive SW, BYRON CENTER		**DISTRICT:** Grand Rapids
CITY: BYRON CENTER		**COUNTY:** KENT
CONTACT: Dan Rose , Solid Waste Operations Manager		**ACTIVITY DATE:** 06/21/2024
STAFF: Chris Robinson	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** MAJOR
SUBJECT: FY '24 on-site inspection to determine the facility's compliance status with respect to MI-ROP-N1324-2023a and any other applicable air quality rules and regulations.		
RESOLVED COMPLAINTS:		

Staff Chris Robinson (CR) from Michigan's Department of Environment, Great Lakes, and Energy (EGLE) Air Quality Division (AQD) was onsite on May 31, 2024, to observe a scheduled Surface Emissions Monitoring (SEM) Event conducted by AQD staff Mike Kovalchick, Jeff Benya, and Brian Merle at the South Kent Landfill and Energy Developments of Byron Center LLC (EDBC) located at 10300 South Kent Drive SW, in Byron Center. Following the completion of the SEMs CR met with Landfill staff Dan Rose and Adam Canute and reviewed the ROP. A follow-up visit was conducted by CR on June 18, 2024, to complete the inspection and to follow-up on a spill concern noted during the AQD SEM event. CR met with Southkent staff Dan Rose and Adam Canute as well as EDBC staff Elizabeth Park, Compliance Specialist, Jake Ripke, Plant Manager, and Stewart Westly, Plant Operator.

The purpose of the inspection was to determine this facility's compliance status with respect to applicable state and federal air quality rules and regulations including Renewable Operating Permit (ROP) No. MI-ROP-N1324-2023a. Prior to entry on May 31st CR surveyed the perimeter of the facility for odors and visible emissions, none were observed. Weather conditions were approximately 66oF, fair sky conditions with south-southwest winds at approximately 13 mph (www.weatherunderground.com).

A. FACILITY DESCRIPTION

The South Kent Landfill (Southkent) is classified as a Type II or Municipal Solid Waste (MSW) landfill. Although construction of the landfill began in June 1981, the site did not accept waste until September 1982. According to South Kent's initial design capacity report submitted on June 6, 1996, the landfill has an active capacity of over 10 million cubic meters. In September 2017, the site received a construction permit for a lateral and vertical expansion which increased the permitted design capacity of the landfill to 16,116,321.0 cubic yards.

In addition, there is an electricity generating station on site. Energy Developments Byron Center, LLC, acquired Granger Electric of Byron Center in August 2017. The facility is located within the perimeter of the South Kent Landfill property. Energy Developments Byron Center, LLC consists of one landfill gas treatment system and three (3) Caterpillar model G3520C internal combustion engines used to generate electricity for sale. LFG from the South Kent Landfill is piped to the electric generating station treatment system where the gas is filtered, dewatered, compressed, and cooled. There are no atmospheric vents or emissions from the landfill gas treatment system; any gas not burned in the engines is routed to an open flare for control.

B) REGULATORY REQUIREMENTS:

In September 2017, South Kent received a construction permit to expand the landfill size which commenced in May 2019, subjecting the facility to the New Source Performance Standards (NSPS) promulgated under 40 CFR Part 60, Subpart XXX for New MSW Landfills.

The landfill has accepted waste since November 8, 1987, has additional capacity for waste deposition and meets the criteria of being collocated with a major source (of Hazardous Air Pollutants) as defined in 40 CFR 63.2. Therefore, the Facility is subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Municipal Solid Waste Landfills as promulgated in 40 CFR Part 63, Subparts A and AAAA.

Because the Non-methane Organic Compound (NMOC) emissions do not exceed 34 megagrams per year South Kent Landfill is not required to have a collection and control system (GCCS) under NSPS Subpart XXX and NESHAP AAAA. However, the County voluntarily operates a GCCS on the active portion of the landfill. The collected landfill gas is routed to EDBC where three internal combustion engines burn the landfill gas to produce electricity. The third engine was installed at the beginning of 2024.

The engines are subject to the NSPS for Stationary Spark Ignition Internal Combustion Engines (40 CFR Part 60, Subpart JJJJ) and the major source requirements of the NESHAP for Stationary Reciprocating Combustion Engines promulgated under 40 CFR Part 63, Subpart ZZZZ (RICE MACT).

B) COMPLIANCE EVALUATION

The landfill and Powerplant are considered one stationary source, therefore they are both covered under the same ROP (MI-ROP-N1324-2023a), which is a modification that was issued on February 25, 2021.

1) MI-ROP-N1324-2023a Section 1 (Southkent Landfill)
FGLANDFILL-XXX<34 & FGLANDFILL-AAAA<50:
South Kent's design capacity is greater than 2.5 million cubic meters and the NMOC mass emission rate has been calculated/projected to be less than 34 megagrams per year. In September 2019, Kent County conducted a Tier II test to determine the NMOC concentration and emission rate from the entire landfill including both closed and active portions. The Tier II results indicated that the average NMOC concentration from the site was 90.1 parts per million (ppm) as hexane and the emission rate, based on that concentration, was calculated to be 29.1 megagrams through 2024. Because NMOC emissions are under the 34 megagram per year threshold in NSPS Subpart XXX and the 50 megagram per year threshold in NESHAP Subpart AAAA the County is not subject to landfill gas collection and control requirements including operation, monitoring, and recordkeeping requirements. Tier 2 testing is conducted every five (5) years to demonstrate whether gas collection and control is required or not. The facility plans on conducting the 2024 test in August.

All records including the maximum design capacity, the year-by-year waste acceptance rate, and the current amount of MSW in place are being kept in accordance with the permit. Records of the current amount of MSW in place is maintained on a quarterly basis. Although records are not maintained on-site, they are available within 4 hours which is in compliance with NSPS Subpart XXX, NESHAP AAAA, and the ROP. Approximately 87,097 tons of refuse was accepted between January and May 2024 and there is 7,449,245 tons of waste in place at the active landfill.

The site operates an open flare which is used when there is extra gas that the engines cannot process, or in the event of a catastrophic failure of the engines and bypass is needed. The flare was not operating during the inspection or follow-up visit.

2) MI-ROP-N1324-2023a Section 2 (Energy Developments of Byron Center LLC)
EDBC operates three Caterpillar G3520 internal combustion engines which use the landfill gas as fuel to generate electricity. Landfill gas is sent through a treatment system to be de-watered, filtered and cooled prior to combustion. Two of the three internal combustion engines generally operate 24 hours per day, 7 days per week. Any landfill gas that is not combusted in the engines is routed to an open flare. Two of the three engines were operating on June 18th. The table below is a summary of each engine.

Engine #	Type	Serial #	Rating	Manufacture Date	Original Online Date	Installed under PTI/Rule	Known Replacement	**Operating Hours	NSPS
1	Caterpillar G3520C	GZJ00550	1600 kW (2233 hp)	2011	--	swap	5/2021	--	Y
2		GZJ00335		9/10/2007	2008	212-08B	9/2021	~101,236	N
3		Gzj00646	2,242 hp	2014	--	212-08C	--	69,152 (at time of install at EDBC - 66,114)	Y

** Since a non-resettable hour meter is installed, the operating hours reflect total hours of engine operation since it initially went into service, not just when it was installed at the South Kent Landfill site.

FGICEENGINES:
Each engine is subject to pound per hour (pph) emission limits for CO, NOx, SO2 and formaldehyde. The facility is required to verify the emission rates of these pollutants by testing once every five (5) years. Based on the results of the most recent performance test emissions are within applicable limits. The results are summarized in the table below. In addition, all three engines combined are subject to an annual (rolling 12-month) SO2 emission limit of 72.95 tons. The month with the highest rolling 12-month SO2 emissions was December 2023 at 31.46 tons.

EDBC monitors on a continuous basis, many parameters for engine operation including gas flow rate from the main header, gas flow rate into the engines, gas quality, electricity production, and hours of operation. Landfill gas is analyzed at regular intervals to verify the quality of the gas. Records are maintained on-site in accordance with ROP No. MI-ROP-N1324-2023a, and with the preventative maintenance plan. A daily record sheet is used to record various engine and treatment system parameters. According to company records, the total landfill gas feed rate for May 2023 through May 2024 was 572.18 million cubic feet (572,183,985 cubic feet) which is less than the permit limit of 853.05 million cubic feet. The average monthly methane content ranged from 47.5% to 55.6%. The company also records, once per day, the kilowatt output from each engine and maintains a monthly and a 12-month rolling record of the hours of operation. Again, the company uses non-resettable hour meters.

Engine	Pollutant	Limit (lb./hr.)	Result (lb./hr.)	Test Date
1	CO	16.23	14.38	11/1/23
2			13.14	11/1/23

3		16.30	11.08	2/27/24
1	NOx	4.92	1.60	11/1/23
2			1.97	11/1/23
3		4.94	1.55	2/27/24
1	SO2	5.55	3.68	11/1/23
2			3.68	11/1/23
3			4.19	2/27/24
1	Formaldehyde	2.10	1.94	11/1/23
2			1.84	11/1/23
3		2.42	1.68	2/27/24

Based on facility records, a preventative maintenance program is in place. Routine maintenance is conducted on the engines in accordance with manufacturer specifications which include replacing engine spark plugs, oil, and lubrication. Maintenance is also conducted on an as needed basis. In addition, a "top end" overhaul, which includes replacing/cleaning cylinder heads, turbochargers, and valves, is conducted on each engine after approximately 10,000 hours of operation. Maintenance records are attached, no engines were sent out for a major overhaul during 2023 through May 2024.

EDBC is required to verify the Hydrogen Sulfide (H2S), or Total Reduced Sulfur (TRS) content of the landfill gas burned. A Laboratory analysis is required semi-annually and monthly with a Draeger tube. These are being conducted as required, see attached records. Draeger tubes taken from January 1, 2023, through May 31, 2024, indicate sulfur concentrations range from approximately 580 to 937 ppm. Samples sent for laboratory analysis indicate sulfur was 800 ppmv (H2S = 860 ppmv) on 5/9/23, 967 ppmv (H2S = 960 ppmv) on 10/24/23, and 944 ppm (H2S = 930 ppmv) on 4/16/24. If at any time the H2S (TRS equivalent) concentration exceeds 1,000 ppmv weekly sampling must be conducted instead of monthly and all operating and maintenance activities shall be reviewed and corrective action shall be recorded.

Each engine is required to have a minimum stack height of 65.0 feet above ground level and maximum diameter of 14 inches. Stack dimensions were not verified but appear to meet these requirements.

FGRICENSPS:

The engines are subject to the requirements of 40 CFR Part 60, Subpart JJJJ based on the engine installation and manufacture dates. The company submitted an initial notification on June 6, 2012, for EUICENGINE1 and EUICENGINE2 and one on December 27, 2023, for EUICENGINE3. Under the NSPS an initial performance test and subsequent testing is required every 8,760 hours of operation (or 3 years). EDBC appears to be meeting Subpart JJJJ requirements at this time. The results of the most recent test are summarized in the table below.

Engine	Pollutant	Limit	Result g/hp-hr.	Test Date
1	NOx	3.0 g/hp-hr. or 220 ppmvd at 15% O2	0.43	11/5/2019
2			0.54	11/5/2019
3			0.33	2/27/24
1	CO	5.0 g/hp-hr. or 610 ppmvd at 15% O2	2.7	11/5/2019
2			2.6	11/5/2019
3			2.4	2/27/24
1	VOC	1.0 g/hp-hr. or 80 ppmvd at 15% O2	0.19	11/5/23
2			0.15	11/5/23
3			0.11	2/27/24

Hours of operation is being tracked as required and is listed above under FGICEENGINES.

FGRICEMACT:

The potential to emit of formaldehyde from the engines is 18.4 tons which is above the major source threshold of 10 tons for a single Hazardous Air Pollutant (HAP). Because the engines are considered a major source of HAPs and were installed after December 12, 2002, they are subject to the requirements of 40 CFR Part 63, Subpart ZZZZ, which are incorporated into ROP No. MI-ROP-N1324-2023a. The company submitted an initial notification on June 6, 2012, for EUICENGINE1 and EUICENGINE2 and one on December 27, 2023, for EUICENGINE3. EDBC appears to be meeting Subpart ZZZZ requirements at this time.

2) Rule 201 Permitting Exemptions

In 2023 EDBC discovered that treated landfill gas was being vented whenever the engines went offline duo to high oxygen concentration in the gas. The high oxygen concentration is caused from the landfill performing maintenance or expanding the system. Only the landfill gas in the fuel line from the treatment system to the engines was vented and EDBC estimates that it takes

approximately five (5) minutes to vent this line. To prevent the venting of this gas, in December 2023 EDBC installed a 140-cfm solar flare under exemption Rule 285(2)(aa). AQD calculated the SO2 PTE from this flare alone, based on the highest observed H2S reading (960 ppm), to be approximately 5.87 tons, which is well under the Rule 201 Significance level of 40 tpy.

((960/1,000,000) x (64.07 mol wt. SO2/385.4 scf/lb.-mole) x 8,400 scfh x 8760 hrs.) / 2000 lbs. = 5.87 tons

3) SEM Survey

AQD staff Mike Kovalchick, Jeff Benya, and Brian Merle conducted an abbreviated SEM survey for methane throughout the landfill, which included the active portion of the landfill, the open flare, and the perimeter of the energy plant. The survey identified 57 areas with methane concentrations greater than 500 ppm, which are listed in the table below. These areas included the top plateau portion, the southern portion of the landfill, along a 600-foot-long area where the ash pile over liner intersects the MSW portion of the landfill, and approximately a dozen leachate/sewer system manhole covers stretched over 2,000 feet. The following table shows the greater than 500 ppm results of the SEM survey:

ID*	Description	Location		Methane (ppm)
		Lat (N)	Long (W)	
M-1	Small erosion rill	42.77512367	-85.67851867	8,967
M-2	Penetration hit GW32	42.77454467	-85.67696167	1,003
M-3	Penetration hit GW30-sulfide staining	42.77408717	-85.677717	9,094
M-4	Penetration hit-GW49	42.772811	-85.6746065	3,426
M-5	Bare ground-No GCCS area.	42.77248767	-85.67391417	939
M-6	Bare ground	42.7723995	-85.67385967	1,180
M-7	Bare ground	42.7711875	-85.67323067	2,465
M-8	Edge of ash pile over liner/MSW interface	42.77002717	-85.67404533	1,517
M-9	Edge of ash pile over liner/MSW interface	42.77003867	-85.67379467	1,076
M-10	Edge of ash pile over liner/MSW interface	42.770033	-85.674176	744
M-11	Edge of ash pile over liner/MSW interface	42.77005017	-85.67428667	549
M-12	Edge of ash pile over liner/MSW interface	42.77003983	-85.67440383	675
M-13	Edge of ash pile over liner/MSW interface	42.77003883	-85.67448383	1,088
M-14	Edge of ash pile over liner/MSW interface	42.77003067	-85.67456683	1,861
M-15	Edge of ash pile over liner/MSW interface	42.77003017	-85.67468417	672
M-16	Edge of ash pile over liner/MSW interface	42.77003383	-85.67481733	3,370
M-17	Edge of ash pile over liner/MSW interface	42.77003367	-85.67490017	2,139
M-18	Edge of ash pile over liner/MSW interface	42.77003	-85.6750165	12,178
M-19	Edge of ash pile over liner/MSW interface	42.770043	-85.6751315	2,707
M-20	Edge of ash pile over liner/MSW interface	42.77006483	-85.67525333	2,836
M-21	Edge of ash pile over liner/MSW interface	42.77008783	-85.6753225	37,089
M-22	Edge of ash pile over liner/MSW interface	42.77009767	-85.67541267	18,992
M-23	Edge of ash pile over liner/MSW interface	42.77012333	-85.67564333	6,583
M-24	Edge of ash pile/5% LEL Alarm	42.77017917	-85.67575267	21,466
M-25	Edge of ash pile over liner/MSW interface	42.77018767	-85.67583583	1,092
M-26	Edge of ash pile over liner/MSW interface	42.7704795	-85.67652317	12,222
M-27	Edge of leachate riser cement vault	42.7709475	-85.67736117	1,371
M-28	Small erosion rill	42.77094233	-85.678384	750
M-29	Manhole cover opening	42.77095067	-85.67838083	738
M-30	Edge of leachate riser cement vault	42.770989	-85.6784135	2,090
M-31	Manhole cover opening	42.77132483	-85.67894017	474,066
M-32	Manhole cover opening	42.77204067	-85.68010233	9,432
M-33	Manhole cover opening	42.77238417	-85.68040433	3,529
M-34	Manhole cover opening	42.77274667	-85.68056617	102,829
M-35	Manhole cover opening	42.77347817	-85.680905	4,427
M-36	Manhole cover opening	42.77561883	-85.68180167	1,387
JB1	Bare ground W of GW32	42.77452083	-85.67712967	527.1
JB2	GW22	42.7739535	-85.6769495	1,243
JB3	Bare ground	42.7739435	-85.67696683	2,675
JB4	GW35	42.7732005	-85.6763675	952
JB5	Bare ground SE of GW48	42.77264117	-85.67514883	956
JB6	Side slope above active area	42.77245233	-85.67372567	615
JB7	Side slope above active area	42.77188667	-85.6733815	697
JB8	Side slope W of active area haul road	42.7710825	-85.67344617	719
JB9	Bare ground, SW slope	42.77026017	-85.67462533	535

JB10	Bare ground, SW slope	42.770259	-85.67507183	934
JB11	SW of well construction area	42.77074383	-85.675451	1,736
JB12	Mid-level of well construction area	42.77096917	-85.67547033	540
JB13	W slope of well construction area	42.7708665	-85.6760475	799
JB14	Downslope of W drilling pad	42.7708405	-85.67641283	536
JB15	Downslope of middle drilling pad	42.771041	-85.67687117	543
JB16	New well - no ID	42.771194	-85.677291	7,114
JB17	New well - no ID	42.771257	-85.67785083	22,965
JB18	New well - no ID	42.7718555	-85.67861883	664
JB19	Valve pit upslope from pond	42.7726855	-85.68004117	709
JB20	Manhole cover	42.77359633	-85.680686	4,127
JB21	Manhole cover	42.77490333	-85.68155583	9,108

Based on the SEM Survey, recommendations were made, which included the following:

- Address/fix all 57 SEM hits. All SEM hits should be resurveyed when the County commences Part 115 SEM surveys and prior to any Tier 2 testing that is conducted.
- Investigate reasons for elevated methane emissions in GCCS portion of the landfill such as impaired wells, wells that have no available screening at a greater depth than normal, improperly tuned wells and cover issues. Address as needed.
- Investigate/seal area near ash pile over liner interface with MSW cell.
- Investigate/address excess methane emissions coming from manhole covers. Consider applying vacuum to the leachate collection system to mitigate the problem.

A more detailed SEM report is available and has been provided to the facility. Since the facility's NMOC emissions rate is less than the NSPS Subpart XXX threshold of 34 megagrams per year and NESHAP Subpart AAAA threshold of 50 megagrams per year Southkent is not subject to the landfill gas collection and control requirements; this includes conducting SEM surveys and corrective action for areas with emissions greater than 500 ppm. Although Southkent has no Air Quality Division regulatory obligation to correct the 57 SEM hits, these areas need to be corrected if the facility will be taking header samples instead of probe samples for their upcoming Tier 2 test. In addition, any wells watered in and/or damaged in any way will need to be corrected. Otherwise probe samples will be required in these areas.

4) Annual Emissions Reporting

Reported 2023 Criteria Pollutant emissions are listed below:

Pollutant	Amount (Tons)
CO	99.05
NOX	20.37
PM10-PRI	7.86
PM25-PRI	1.29
SO2	32.00
VOC	20.45
NMOC	14.20

C) Compliance Determination

Based on observations and discussions made during the inspection and a subsequent records review, SouthKent Landfill and EDBC appear to be in compliance with applicable air quality rules and regulations including the requirements specified in MI-ROP-N1324-2023a.

NAME _____ DATE 7/24/2024 SUPERVISOR _____