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Genevieve

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Scheduled Inspection

B159849228

FACILITY: FLINT WATER POLLUTION CONTROL FACILITY		SRN / ID: B1598
LOCATION: G-4652 BEECHER RD, FLINT		DISTRICT: Lansing
CITY: FLINT		COUNTY: GENESEE
CONTACT: Don Lewis , Operations Supervisor		ACTIVITY DATE: 06/21/2019
STAFF: Daniel McGeen	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MINOR
SUBJECT: Unannounced, scheduled inspection.		
RESOLVED COMPLAINTS:		

On 6/21/2019 the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Air Quality Division (AQD) conducted an unannounced, scheduled inspection of Flint Water Pollution Control (WPC).

Environmental contacts:

Don Lewis, Operations Supervisor; 810-766-7210; dlewis@cityofflint.com

Chad Antle, Owner; BioWorks Energy; chad.antle@bioworksenergy.com

Facility description:

Flint WPC is the wastewater treatment plant for all of the residences in Flint, as well as for numerous commercial and industrial facilities.

Emission units:

Emission unit*	Exemption rule	Federal regulations, if applicable	Compliance status
Primary tanks	285(m)	NA	Compliance
Existing (north) digester	285(m)	NA	Compliance
South digester (new unit)	285(2)(m)	NA	Compliance
Digestate tank	285(m)	NA	Compliance
Filter press building	285(m)	NA	Compliance
Loadout building	285(m)	NA	Compliance
Original internal combustion engine (ICE) generator for combusting digester gas, rated at <10 million Btu/hour heat input capacity	285(g)	40 CFR Part 60, Subpart JJJJ	Compliance
Newer ICE generator for combusting digester gas, rated at <10 million Btu/hour heat input capacity	285(2)(g)	40 CFR Part 60, Subpart JJJJ	Compliance
Flare for combusting digester gas	282(g)	NA	Compliance

* An *emission unit* is any part of a stationary source that emits or has the potential to emit an air contaminant.

Regulatory overview:

This facility is considered to be a true minor source, rather than a major source of air emissions. A *major source* has the potential to emit (PTE) of 100 tons per year (TPY) or more, of one of the criteria pollutants. *Criteria pollutants* are those for which a National Ambient Air Quality Standard exists, and include carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide, volatile organic compounds (VOCs), lead, particulate matter smaller than 10 microns, and particulate matter smaller than 2.5 microns.

It is also considered a minor, or *area source*, for Hazardous Air Pollutants (HAPs), because it is not known to have a PTE of 10 TPY or more for a single HAP, nor to have a PTE of 25 TPY or more for combined HAPs.

The facility has no active permits to install (PTIs). The wastewater and sewage treatment equipment currently operating at the facility is considered to meet relevant exemption criteria from the requirement

of Michigan Air Pollution Control Rule 201 to obtain a permit to install. The relevant exemptions are Rule 285(m), for processes installed prior to the 12/20/2016 revisions to the exemption rules, and Rule 285(2)(m), for processes installed on or after 12/20/2016.

Rule 285(2)(m), which became effective on 12/20/2016, exempts the following:

- (m) Lagoons, process water treatment equipment, wastewater treatment equipment, and sewage treatment equipment, except for any of the following:
 - (i) Lagoons and equipment primarily designed to treat volatile organic compounds in process water, wastewater, or groundwater, unless the emissions from the lagoons and equipment are only released into the general in-plant environment.
 - (ii) Sludge incinerators and dryers.
 - (iii) Heat treatment processes.

Rule 285(m), before the 12/20/2016 revision, read very similar to Rule 285(2)(m), above, but excluded odor control equipment used with waste water systems from exemption. This exclusion was eliminated by Rule 285(2)(m).

There are a number of voided PTIs, for once-permitted equipment which has been removed, as indicated in the table below.

Voided permits to install for this facility:

Voided PTI No.	Process equipment	Reason voided	Date voided
228-73	2 sludge incinerators with 6 hearths, afterburner and scrubber control, and equipment upgrade control	PTI 228-73A subsequently was issued for these processes.	12/17/2004
228-73A	4 six-hearth sludge incinerators, CO limit applied for to avoid being subject to Title V of Clean Air Act Amendments	Incinerators taken out of service.	4/14/2016
1011-80	Vaportek odor controller	Unknown*	6/9/1981
659-81	Quad odor control system for Zimpro system	Zimpro and incinerators shut down permanently	9/27/2016
660-81	Odor control vent system for Zimpro system	Zimpro and incinerators shut down permanently	9/27/2016

*Vaportek permit-related records were evidently sent to the State of Michigan Record Center some years ago, after the permit was voided in 1981. The records were eventually destroyed, according to the entry in the AQD Permit Cards database. The State of Michigan has a record retention schedule for management of records at the Record Center, which can ultimately include destruction.

The facility has two Internal Combustion Engine (ICE) generator which are subject to 40 CFR Part 60, Subpart JJJJ, *Standards for Performance for Stationary Spark Ignition Internal Combustion Engines*.

Fee status:

This facility is not considered fee-subject. It is not considered a major source for criteria pollutants, and so is not Category I fee-subject. It is not considered to be a major source for HAPs, one of the factors which can make a facility Category II fee-subject. However it is subject to 40 CFR Part 60, Subpart JJJJ. Ordinarily, being subject to a New Source Performance Standard (NSPS) would make a facility be considered Category II fee-subject, but where ICEs alone are the only reason a facility would be fee-subject, AQD is not collecting fees.

This facility is not required to report to the Michigan Air Emissions Reporting System. AQD Operational Memorandum No. 13 requires reporting in MAERS if emissions thresholds have been exceeded, but Flint WPC is not known to have exceeded these thresholds.

Location:

The facility is located in a mixed residential and commercial area, on the south bank of the Flint River.

To the immediate north and northwest are some residential areas, a couple hundred feet from the facility. To the immediate northeast are large cemeteries. To the immediate south are residential areas. To the immediate east are commercial and residential areas, including apartment complexes. To the west is some undeveloped land, and some residences, including apartment complexes.

History:

Four sewage sludge incinerators operated at the site for decades. The last of these units to run ceased operations on 3/10/2016, due to new regulatory constraints. The permits were subsequently voided, as noted in the table of voided permits, above. By ceasing operations of the incinerators, the facility did not become subject to the regulatory requirements of 40 CFR Part 60, Subpart M, *Emission Guidelines and Compliance Times for Existing Sewage Sludge Incineration Units*, which had regulatory requirements that would have begun on 3/30/2016.

Around May of 2011, Flint WPC installed a bio digester with a flare, through a Swedish company, BioWorks Energy. The digester and flare are owned by the City. The site initially installed one internal combustion engine (ICE) to produce electricity, using the gas from the digester as fuel. The engine was purchased by BioWorks, who will maintain ownership yet operate the engine on the Flint WPC property. The engine is considered exempt under Rule 285(g), due to being less than 10 million Btu/hr rated heat input capacity. A newer ICE is partially installed at the site, and is subject to Rule 285(2)(g), which replaced Rule 285(g) on 12/20/2016. The exemption criteria is the same as the earlier Rule 285(g).

Recent complaints:

The history of odor complaints at this facility since 2007 is as follows:

- 2008: 1 complaint.
- 2015: 1 complaint.
- 2016: 1 complaint.
- 2017: 18 complaints.
- 2018: 28 complaints.
- 2019: as of 9/18/2019 (the date of this report) there have been 0 complaints.

Recent odor issues:

In 2017, AQD received a series of odor complaints regarding Flint WPC. AQD conducted a number of complaint investigations. Staff of Flint WPC explained that they were working to resolve issues with their sludge digester (the original or north unit was the only digester at that time). Because the digester was in an upset condition, sludge could not be processed in the digester at a normal rate, and sludge was gradually rising higher within the east sludge storage tank. Undigested sludge was being sent to the dewatering building, to be dewatered and sent to a landfill for disposal, but for part of 2017, only one of the two belt filter presses was running, slowing the rate at which they could remove undigested sludge from the east sludge storage tank.

It was my impression that odors of undigested sludge were sometimes exiting the east sludge storage tank, and causing odor impacts offsite. In late 2017, odors were determined to be in violation of Rule 901(b), which prohibits unreasonable interference with the comfortable enjoyment of life and property. A Violation Notice (VN) was sent in February 2018, once all supporting documentation had been assembled.

In their response to the VN, Flint WPC described repairs made to the east belt filter press, as well as the use of an odor reducing chemical added to undigested sludge, and possible use of another chemical to be added to the sludge. They also described a larger carbon filter to be installed as a replacement for a current carbon filter made from a 55 gallon drum. They also proposed shifting digestion of sludge from current north digester to the proposed south digester (under construction).

In the early months of 2018, there was a brief lull in odor complaints, but odor complaints increased during the warm months of 2018, surpassing the number of complaints received in 2017. In August

2018, odors were determined to again be in violation of Rule 901(b). A VN was sent on 8/14/2018.

On 8/31/2018, AQD received the 8/29/2018 response. Flint WPC did not necessarily agree that R 901 has been violated, but acknowledged odors can occur from WWTP operations. They described recent issues with biosolids in storage or in process at Flint WPC at Flint WPC, including a sludge backup in July 2018 due to several plugged lines in digester complex and other equipment failures. They also described a recent issue where truckloads of a substrate at an elevated temperature were delivered, causing digestion to start within the east sludge storage tank, creating a rise in sludge level that may have caused gas to escape from under the geodesic dome roof, which is not air tight.

For corrective actions, they reported they have worked with the company to lower the substrate temperature before delivery, and feel this has been working. Issues with sensor and a meter were said to be addressed with the North tank (digester). Additionally, a two-stage odor control system was purchased to replace the existing small carbon filter for the east sludge storage tank. This included converting media in the first stage and activated carbon in the second. The unit was intended to be on line as soon as possible (it was installed and operating around late October 2018). Lastly, a second anaerobic digester was under construction at Flint WPC. It has a floating cover, which should be much better at preventing gases from escaping than the original (north) digester. The new south unit will operate in conjunction with the existing north unit, rather than replace it completely.

In autumn of 2018, offsite odors appeared to be decreasing. The most recent complaint received by AQD was on 12/6/2018. Odors offsite were noted by AQD to be less in late 2018 than during 2017 and the first part of 2018.

Most recent odor evaluations and complaint investigations:

- 11/13/2018 odor evaluation: level 1 primary tank odor at Flushing Road and Mill Road intersection; level 2 sludge odor along Flushing Road.
- 12/6/2018 complaint investigation: level 1 wastewater odor on Mill Road, east of plant.
- 3/7/2019 odor evaluation: no odors detected offsite.
- 5/20/2019 odor evaluation: level sewage 2 odor on Beecher Road, southwest of Huntington Circle Apartments. The odor was not detected while driving through the apartment complex..

The 0 to 5 odor scale used by AQD is as follows:

Level	Description
0	Non-detect
1	Just barely detectable
2	Distinct and definite
3	Distinct and definite objectionable odor
4	Odor strong enough to cause a person attempt to avoid it completely
5	Odor so strong as to be overpowering and intolerable for any length of time

Recent stack testing:

On 6/15/2016, stack testing of the older generator for NOx, CO, and VOC was observed by AQD's Nathan Hude. Although the unit is considered exempt from needing a permit to install under Rule 285(g), it is subject to 40 CFR Part 60, Subpart JJJJ, *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines*. The testing was required by Section 60.4243(a)(2)(ii), which applies to non-certified spark ignition internal combustion engines greater than or equal to 100 horsepower (HP) and less than or equal to 500 HP.

Results indicated compliance for NOx, CO, and VOC, as follows:

Emission unit	NOx ppm @ 15% O2	CO ppm @ 15% O2	VOC ppm @ 15% O2
ENG-01 (existing ICE)	119	143	2.8
Regulatory limit	150	610	80
Compliance?	Yes	Yes	Yes

A fuel sample of the digester gas was taken the day before the testing, and the sulfur content of the gas was reported to be 50 ppm.

Stack testing for the newest ICE, ENG-02, was done on 4/12/2018. I was unable to attend, but AQD's Regina Hines from the Detroit Field Office witnessed the test. Results indicated compliance for NOx, CO, and VOC, as follows:

Emission unit	NOx ppm @ 15% O2	CO ppm @ 15% O2	VOC ppm @ 15% O2
ENG-02 (new ICE)	128.5	215.1	5.4
Regulatory limit	150	610	80
Compliance?	Yes	Yes	Yes

Offsite odor evaluation:

Today, 6/21/2019, I checked for odors offsite, prior to arrival at the plant. Please see attached odor evaluation form, and summary of weather data for 6/21/2019. I detected no odor offsite. At 10:58 AM, weather conditions were sunny and 71 degrees F, with wind out of the north at 5 miles per hour.

Safety attire required:

Safety glasses with side shields are suggested by AQD. Hearing protection is recommended by Flint WPC and by AQD, if going inside the building where the filter presses are used to dewater sludge.

Arrival:

At 11:17 AM, I arrived by the Administration building, onsite. As I exited the car, I detected a level 1 odor like one of the substrate materials brought to Flint WPC for use in the digester. At 11:18 AM, I detected a level 2 (distinct and definite) sewage odor, but was uncertain of the source. Wind was out of the northwest at this time. One of the two methane gas burning engines could be heard running, but I could not see any visible emissions from either ICE exhaust stack.

Mr. Don Lewis, Operations Supervisor, was not in, nor was Mr. Chad Antle, Owner of BioWorks Energy. I was directed to Mr. Eric Brubaker, Lab Supervisor, who walked with me around the plant. Per AQD procedure, I had my identification/credentials with me, but Flint WPC staff recognize me from past visits.

Inspection:

Flint WPC is the wastewater treatment plant for all of the residences in Flint, as well as for numerous commercial and industrial facilities. Flint WPC is sized to treat 50 million gallons of waste water per day, but with the decrease in Flint's population in recent decades, the plant only treats about 15 million gallons per day, I have been told. I have also been told the average is around 22 million gallons per day. Storm water from rainfall is said to be a higher percentage of overall waste water flow because they have less sanitary waste water.

It is my understanding that on its own, the present mix of sludge that Flint WPC receives from residences, businesses, and industries would not be sufficient to produce enough digester gas to make the digester(s) economically viable. Therefore, Flint WPC adds substrates to the digester. These substrates are said to be more biologically active and have more energy value than the sludge. AQD has been advised that substrates they accept include grease from restaurant grease traps, and also soy, milk waste water, and powdered milk. Pickle waste has also been added as a substrate. Substrates are usually brought into the site by tanker trucks. I have been told that they conduct bench scale tests with new substrates to determine the potential effects on the digester.

My understanding is that methanogens in the digester are naturally occurring bacteria, which feed on biological materials and produce methane gas. I have been advised that volatile fatty acid formation can lead to foul odors. Some of the odorous compounds which can be produced include sulfur compounds.

Today, Mr. Brubaker and I walked around the site. He showed me the covered pit, onsite, where pickle and now tomato waste is delivered. I could barely detect a pickle-like odor. I was advised that carrots and soy are sometimes brought in as substrates. Mr. Brubaker explained that the substrates are high in "compatible pollutants" like high biological oxygen demand, phosphorous, total suspended solids, ammonia, and nitrogen.

Primary tanks; Rule 285(m):

It is my understanding that in the primary tanks, incoming wastewater is kept, and solids settle out as sludge. These solids then go to the east sludge storage tank. I could not detect any primary wastewater tank odors. at this time

East sludge storage tank; Rule 285(m):

An existing tank with a geodisic dome is the east sludge storage tank. Sludge is pumped there and stored. I was advised that substrates are mixed in there. Sludge can go to either the existing (north) digester, or the new (south) digester, for treatment.

There were no visible emissions from the east sludge storage tank. The original carbon filter unit was made from a 55 gallon drum, and has been replaced with a new, larger 2-stage odor scrubber. Please see attached photo 001. I could not see any visible emissions from the scrubber exhaust. The only odor I could detect, standing by the scrubber outlet, was a brief sour odor that was distinct and definite. It did not resemble sludge odors.

During the inspection, a City Sewer Cleaners truck arrived to deliver a load of substrates. From where we stood, I could not detect any odors, at the time.

I was told that once per week, a sample is taken from the east sludge tank, and it is checked for pH, volatile fatty acids (VFAs), alkalinity, total solids, and volatile solids.

Existing (north) digester; Rule 285(m):

The existing digester was operating, with no visible emissions. I was told that its capacity is over one million gallons. It underwent an upset condition in 2017, as was described earlier in this report, but appears to be working normally now, as I understand it.

Odors from sludge which has been digested are only about 1/10 of the odors from undigested sludge, I have been told in the past, and the volume of digested sludge is reduced about 30% from the undigested state. Inside the digester building, there was a distinct and definite smell of sludge, but it was not particularly strong. It is my understanding that a boiler system and a heat exchange system keep the sludge warm, to facilitate digestion. I've been informed in the past that this once had an internal floating roof (IFR), but that was replaced with a more fixed roof some years ago. The new roof has a limited range of movement, and a water seal. Mr. Brubaker mentioned that future plans for this digester include the addition of a new IFR roof, to do a better job of keeping the water seal than the current roof does. The roof has been painted black to absorb heat from the sun. There were no visible emissions coming from the north digester.

South digester (new unit); Rule 285(2)(m):

The recently completed south digester is now operating. Mr. Brubaker estimated the start up was around March. It has a capacity of over one million gallons, I was told. Please see photo 002. It has an internal floating roof, which is expected to provide superior odor control compared with the roof of the

existing (north) digester. The roof has been painted black to absorb heat from the sun. There were no visible emissions from the south digester.

Digestate tank; Rule 285(m):

The post-digester sludge goes into the digestate tank, and then to the filter press building for dewatering. The sludge contains non-organics or inorganics at this point, I was advised. The digestate tank has a soft dome on top, which expands as the amount of gas in the tank increases. There were no visible emissions from the digestate tank.

Filter press building; Rule 285(m or 285(2)(m):

The filter press building was once the building which housed the sludge incinerators. Now, post-digester sludge is dewatered there, by the addition of polymer, as well as the use of belts and rollers to squeeze out water. The material is then known as filter cake. The removed water is called filtrate, and goes back to the start of the plant, I was told.

It is my understanding that they are using fans in the filter press building to exhaust the indoor air via the exhaust stacks on the roof. There were no visible emissions from the filter press building or its exhaust stacks. Hearing protection should be worn, if one enters this building. We did not go into it at this time, but I was told that both the east and west filter press appeared to be running.

Loadout building:

In the loadout building, the dewatered sludge or filter cake is loaded into truck trailers in one of two cargo bays. It is then taken to a landfill, for disposal. There were no visible emissions or odors from the truck loadout building.

Original (north) ICE generator; Rule 285(2)(g); 40 CFR Part 60, Subpart JJJJ:

The original generator is considered to meet the criteria for the Rule 285(g) exemption for internal combustion engines with rated heat input capacity of less than 10 million Btu/hour. This is a six-cylinder unit, rated at 167 kilowatts (kW), and rated at less than 500 horsepower (hp). No visible emissions were seen from the ICE.

Note: in a previous activity report(s), I incorrectly referred to the north generator as the newest one.

New (south) generator; Rule 285(2)(g); 40 CFR Part 60, Subpart JJJJ:

This unit is subject to the revised Rule 285(2)(g) exemption, which became effective on of 12/20/2016. The exemption criteria is the same as for the prior version of the exemption, Rule 285(g). The new ICE is larger, being a twelve-cylinder engine, rated at 360 kW. It is still less than 10 million Btu/hour, qualifying for Rule 285(2)(g), It is rated at less than 500 hp. No visible emissions were seen from the ICE.

For both generators, the applicable requirement under Subpart JJJJ is Section 60.4243,(a)(2), the relevant portions of which read as follows:

§60.4243 What are my compliance requirements if I am an owner or operator of a stationary SI internal combustion engine?

(a) If you are an owner or operator of a stationary SI internal combustion engine that is manufactured after July 1, 2008, and must comply with the emission standards specified in §60.4233(a) through (c), you must comply by purchasing an engine certified to the emission standards in §60.4231(a) through (c), as applicable, for the same engine class and maximum engine power. In addition, you must meet one of the requirements specified in (a)(1) and (2) of this section.

(1) If you operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions, you must keep records of conducted

~~maintenance to demonstrate compliance, but no performance testing is required if you are an owner or operator. You must also meet the requirements as specified in 40 CFR part 1068, subparts A through D, as they apply to you. If you adjust engine settings according to and consistent with the manufacturer's instructions, your stationary SI internal combustion engine will not be considered out of compliance.~~

(2) If you do not operate and maintain the certified stationary SI internal combustion engine and control device according to the manufacturer's emission-related written instructions, your engine will be considered a non-certified engine, and you must demonstrate compliance according to (a)(2)(i) through (iii) of this section, as appropriate.

~~(i) If you are an owner or operator of a stationary SI internal combustion engine less than 100 HP, you must keep a maintenance plan and records of conducted maintenance to demonstrate compliance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions, but no performance testing is required if you are an owner or operator.~~

(ii) If you are an owner or operator of a stationary SI internal combustion engine greater than or equal to 100 HP and less than or equal to 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test within 1 year of engine startup to demonstrate compliance.

~~(iii) If you are an owner or operator of a stationary SI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test within 1 year of engine startup and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.~~

Flare; Rule 282(g):

The flare was installed prior to the 12/20/2016 revisions to AQD permit exemptions, and is therefore subject to Rule 282(g), rather than the revised Rule 282(2)(g) which became effective on 12/20/2016. The exemption criteria remain unchanged, and are stated below:

(g) Sour gas-burning equipment, if the actual emission of sulfur dioxide does not exceed 1 pound per hour.

The flare was operating, and the flame was readily apparent, please see photo 003. I observed no visible emissions from the flare, so opacity was instantaneously 0%. The opacity limit of Rule 310 of 20% over a 6-minute average, except for one 6-minute average per hour not to exceed 27% opacity was not violated.

The flare is used to burn excess methane, when there is more methane than can be burned in the generator(s). A short while later, the flare went out, which indicated that there was no excess methane, at that time.

Departure:

I advised Mr. Brubaker that AQD may consider resolving the Rule 901 violation, based upon the lack of offsite odor impacts today, the reduced offsite odors noted on other recent visits, the lack of complaints since 12/6/2018, and the progress made with new equipment at the plant. Mr. Brubaker requested that I send email to Ms. Jeanette Best, Flint WPC Supervisor and Mr. Don Lewis, Operations Supervisor, if AQD resolves the violation. I agreed to this.

I left the site at 12:35 PM.

Conclusion:

No instances of noncompliance were identified at this time. Odors detected offsite today and on other recent dates were found to be insufficient to constitute unreasonable interference with the comfortable enjoyment of life and property. If no further odor complaints are detected for the remainder of fiscal year 2019, AQD will consider resolving the outstanding violation of Rule 901(b) that has existed since

the February 2018 VN for Rule 901 was sent.



Image 1(001) : 2-stage odor scrubber.



Image 2(002) : South (new) digester.



Image 3(003) : Flare.

NAME 

DATE 9/27/09

SUPERVISOR 

