EGLE MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

TECHNICAL FACT SHEET

June 26, 2024

Purpose and Summary

The Michigan Department of Environment, Great Lakes, and Energy (EGLE), Air Quality Division (AQD), is proposing to act on Permit to Install (PTI) application No. APP-2022-0192 from the Warren Waste Water Treatment Plant (Warren WWTP). Warren WWTP's application is for the installation and operation of a new sewage sludge disposal process. The proposed process is subject to permitting requirements of the Department's Rules for Air Pollution Control. Prior to acting on this application, the AQD is holding a public comment period and a virtual public hearing to allow all interested parties the opportunity to comment on the proposed PTI. All relevant information received during the comment period and hearing will be considered by the decision maker prior to taking final action on the application.

Figure 1: Location of Warren Waste Water Treatment Plant

Background Information

Warren WWTP is located on the north bank of the Red Run Drain between Thirteen Mile Road and Fourteen Mile Road, east of Van Dyke Avenue and west of Chicago Road in Warren, Michigan. Warren WWTP is an existing municipal wastewater treatment plant that treats incoming municipal wastewater for discharge into the Red Run Drain. The plant consists of a liquid processing section and a solids processing section. In the liquid processing section, solids, referred to as "sewage sludge", are removed and must be disposed of. Currently the sewage sludge is passed through two three belt presses and is burned in the existing multiple hearth incinerator (MHI) at the plant. The MHI was installed in 1971. The facility also has two existing diesel fuel-fired emergency generators.

Proposed Facility

Warren WWTP is proposing to install a new sewage sludge disposal process to replace the MHI. The new process will be designed to dispose of approximately 31,200 wet tons of sewage sludge on an annual basis, or about 7,930 dry tons per year.

The new process will include a system to dewater the sewage sludge into a non-liquid material referred to as "cake" using screw presses, as well as two duplicate sludge disposal process systems. Each sludge disposal process will be able to handle 50 percent (%) of the proposed sludge throughput. According to Warren WWTP, having two process systems will provide redundancy in case one needs maintenance or is shutdown. Each process will consist of a BioCon biosolids dryer followed by an energy recovery system (ERS) furnace. The dryer and furnace combination has been developed by Veolia Water Technology and is called the "BioCon ERS" system. Warren WWTP proposes to build a new building for the new sewage sludge disposal process next to the existing MHI building and aeration tanks.

The BioCon dryers will remove moisture from the wet cake using heated air. The air in each dryer will be heated using a thermal oil system. Heat from combustion of dried cake in the ERS furnace will typically be used to heat the thermal oil. When not enough heat is available from the ERS furnace, the thermal oil will be heated using natural gas heaters, with one heater for each dryer. Natural gas will normally only be needed during startup, when the ERS furnace is not yet generating enough heat. The thermal oil heaters will have low nitrogen oxide (NO_x) burners. The air in the dryers will be recirculated with a condenser used to remove moisture from the drying air.

From the BioCon dryer, the dried cake will go to the ERS furnace associated with the dryer. In the ERS furnace, the organic matter in the dried cake will be burned to reduce the volume of the sewage sludge and to provide heat for the associated BioCon dryer through the thermal oil system. The ERS furnaces will operate at 1,994°F to ensure destruction of contaminants and pathogens in the dried cake. Most ash produced in the ERS furnaces will be removed from the bottom of the furnaces using conveyors and will be sent to the existing on-site ash lagoons. Some ash will be carried out with the furnace exhaust gas and will be controlled by air pollution control equipment.

The United States Environmental Protection Agency (USEPA) considers the BioCon ERS system to be an incineration process subject to New Source Performance Standard (NSPS) Subpart LLLL for New Sewage Sludge Incineration Units. In order to comply with the NSPS emission limits, each of the two BioCon ERS systems will be equipped with air pollution control equipment, in the following order:

- A cyclone to collect ash from the furnace exhaust,
- Selective Catalytic Reduction (SCR) to control emissions of NO_x,
- A wet scrubber to control emissions of hydrogen chloride (HCl), sulfur dioxide (SO_2), particulate matter (PM), and metals,
- A Wet Electrostatic Precipitator (WESP) to control emissions of particulate matter equal to or less than 10 microns in diameter (PM10), particulate matter equal to or less than 2.5 microns in diameter (PM2.5), and metals, including lead and cadmium,
- An activated carbon system to control emissions of mercury and dioxins/furans (D/F).

The new building will include natural gas heaters with a total heat input of about 3.5 million British Thermal Units per hour.

Warren WWTP also plans to install a 450-kilowatt emergency generator that will be driven by a 701 brake horsepower natural gas-fired internal combustion engine.

According to Warren WWTP's PTI application, the energy recycling and conservation provided by the design of the BioCon ERS system will reduce the amount of natural gas needed to convert dewatered cake to ash compared to the existing MHI. In addition, Warren WWTP proposed the BioCon ERS systems with air pollution controls that will result in lower air pollutant emissions than the existing MHI.

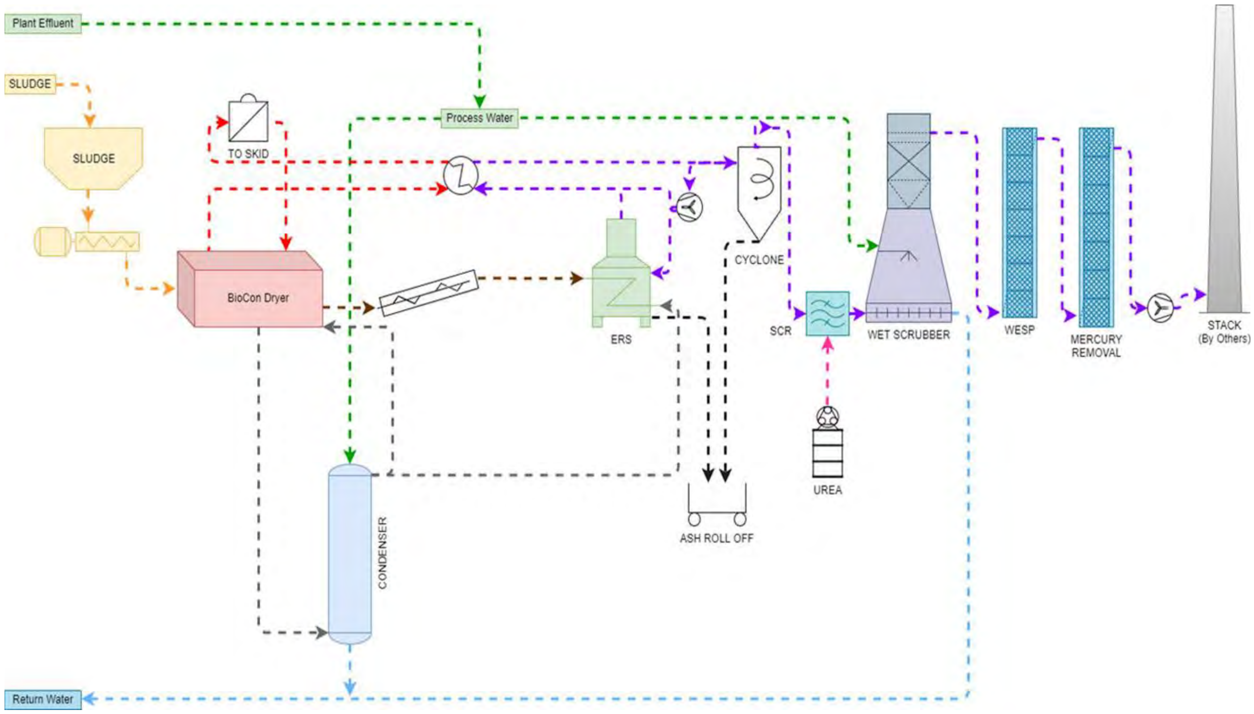

Figure 2: BioCon Dryer and ERS Furnace Process Flow Diagram with Air Pollution Control

Present Air Quality

Warren WWTP is located in Macomb County which is currently meeting all of the National Ambient Air Quality Standards (NAAQS) set by the USEPA. The NAAQS are for carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, PM10, PM2.5, and SO_2. All of the standards are set at levels designed to protect public health. This includes health protection for sensitive groups like those with heart and lung problems.

The AQD operates two air monitoring stations in Macomb County; one station in Warren (measures ozone) and one station in New Haven (measures ozone, particulate matter, and carbonyl compounds during ozone season); one station in Oakland County (measures ozone and particulate matter); and eleven stations in Wayne County which measure a variety of pollutants. The closest site is the Warren site that measures ozone 1.5 miles away. The next closest is seven miles away at Osborn High School in Detroit which measures ozone, particulate matter, nitrogen oxides, and air toxics during the summer months.

Pollutant Emissions

Warren WWTP used a variety of resources to estimate the potential emissions from the proposed BioCon ERS systems, as described below.

The potential emissions from the natural gas thermal oil heaters and building heaters were estimated using USEPA AP-42 emission factors. The natural gas emergency generator engine emissions were estimated using manufacturer data and USEPA AP-42 emission factors.

Most criteria pollutant emissions from the BioCon ERS systems were based on the NSPS LLLL emission limits and the expected exhaust flow rate. PM10 and PM2.5 emissions were estimated based on the PM emission factor and the ratios of PM10 and PM2.5 to PM from natural gas combustion to account for condensable PM. Volatile Organic Compounds (VOC) emissions were based on the estimated inlet loading to the ERS furnace and process models from the manufacturer.

Toxic air contaminant (TAC) emissions were based on USEPA AP-42 emission factors for sewage sludge incinerators without control devices and NSPS LLLL for cadmium, mercury, and hydrogen chloride. These estimates are expected to be worse case since the proposed ERS furnaces will be operated at higher temperatures, enabling greater destruction of combustible pollutants, and each furnace will also be equipped with a WESP and activated carbon to control emissions.

Due to the presence of perfluoro- and polyfluoro-alkyl substances (PFAS) in the wastewater treated at Warren WWTP, there is potential for PFAS emissions from the new BioCon ERS systems. Total PFAS emissions were estimated to be 3.62×10^{-5} pounds per hour and 0.317 pounds per year. This estimate was based on a total PFAS concentration of 200 nanograms per gram in the biosolids based on test data for the facility and a 90% PFAS reduction due to the high temperature and long residence time of the ERS furnaces. Note, the available data shows the total PFAS concentration in the sludge is less than 100 nanograms per gram.

The following table provides the estimated emissions for the proposed project:

Table 1: Project Emissions Summary

Pollutant	Potential Emissions* Tons Per Year (tpy)	Significant Emission Rate (SER) (tpy)	Emissions Greater than SER?
NO_x	5.4	40	No
CO	4.4	100	No
PM	0.6	25	No
PM10	2.4	15	No
PM2.5	2.4	10	No
SO_2	0.8	40	No
VOC	4.8	40	No
Lead	0.00005	0.6	No
Fluorides (hydrogen fluoride)	0.001	3	No
Sulfuric acid mist	0.5	7	No
Hydrogen sulfide	0.4	10	No
Mercury	0.00007	-	-
D/F	0.0000008	-	-
HCl	0.02	-	-
Carbon dioxide	11,043	75,000	No
Single highest Hazardous Air Pollutant (HAP)	1.9	-	-
Total HAPs	3.72	-	-
Total PFAS	0.00016	-	-
* These are the controlled potential emissions.			

How to evaluate this table: To help with understanding the contents of this table, look at whether the potential project emissions is greater than the SER. If it is not, then that pollutant is not subject to specific types of permit reviews called Prevention of Significant Deterioration (PSD). As shown in Table 1, the potential emissions are all less than their respective SER, so the project is not subject to PSD.

- **Emission Reduction Due to Project**
  Table 2 below compares the potential emissions of the current solids process, which will be removed as part of the project, to the potential emissions of the proposed new solids process. This table shows the project is expected to result in lower potential pollutant emissions.

Table 2: Comparison of Current Potential to Future Potential Emissions

Pollutant	Current Solids Process Potential to Emit (tpy)	BioCon ERS Systems Potential to Emit (tpy)	Expected Emission Change (tpy)
NO_x	70.7	3.36	-67.3
CO	743.2	1.84	-741.4
PM10	53.9	2.26	-51.6
PM2.5	53.9	2.26	-51.6
SO_2	11.6	0.83	-10.8
VOC	7.2	1.52	-5.7
Lead	0.05	0.000036	-0.049964

Key Permit Review Issues

Staff evaluated the proposed project to identify all state rules and federal regulations which are, or may be, applicable. The tables in Appendix 1 summarize these rules and regulations.

- **Minor/Major Modification Determination for Attainment Pollutants**
  Warren WWTP is in Macomb County which is currently in attainment for all criteria pollutants. The existing MHI has potential CO emissions above the major source threshold. If the source is modified and emissions of any regulated pollutant increase by more than the SER for that pollutant, the change will cause the project to be subject to PSD requirements for that pollutant. The proposed project is not subject to PSD because the potential emissions are less than the SERs for each pollutant. Table 1 above summarizes the project potential emissions.

- **Federal NSPS Regulations**
  NSPS were established under Title 40 of the Code of Federal Regulations (40 CFR) Part 60. The BioCon ERS systems will be subject to NSPS Subpart LLLL. The new emergency engine will be subject to NSPS Subpart JJJJ and will be certified to comply with the applicable emission limits.

- **Federal NESHAP Regulations**
  National Emission Standards for Hazardous Air Pollutants (NESHAP) were established under 40 CFR Part 63. The new emergency engine will be subject to NESHAP Subpart ZZZZ, which

requires compliance with NSPS Subpart JJJJ for Warren WWTP because it is an area source of HAP emissions.

- **PFAS Emission Control**
  In 2023, a pilot-scale study was done by ACS ES&T Engineering to evaluate thermal destruction of PFAS (Pilot-Scale Thermal Destruction of Per- and Polyfluoroalkyl Substances in a Legacy Aqueous Film Forming Foam | ACS ES&T Engineering). This study showed that, at the required ERS furnace operating temperature of 1,994°F, all PFAS measured in the study, including PFOS and PFOA, had a destruction efficiency of more than 99.99%.

  The proposed permit conditions require a destruction efficiency test using hexafluoroethane (or an equivalent compound) because it has the same difficult to break carbon-fluorine bond as PFAS but is non-toxic. A direct destruction efficiency test using a PFAS compound that is in the sludge cannot be done because the sludge composition cannot be continuously monitored. Note, the proposed permit conditions require a 90% PFAS destruction, rather than the 99.99% from the pilot study, due to significant differences between the pilot-scale equipment and the ERS furnaces.

- **Rule 224 Best Available Control Technology for Toxics (T-BACT) Analysis**
  Rule 224 requires Best Available Control Technology for toxic air contaminants (TAC) (T-BACT). Per Rule 224, VOC TACs that are subject to BACT requirements are not subject to T-BACT. Since the VOC emissions underwent a top-down BACT analysis, only the metal and particulate TAC emissions are subject to T-BACT for this project.

  The AQD has determined that the proposed air pollution control equipment, specifically the cyclones, wet scrubbers, WESPs, and activated carbon mercury control devices comply with T-BACT for the BioCon ERS systems.

  Use of natural gas is T-BACT for the emergency generator, oil heaters, and HVAC equipment.

- **Rule 225 Toxics Analysis**
  The Michigan Air Pollution Control Rules require the ambient air concentration of TACs be compared against health-based screening levels. AQD staff evaluated Warren WWTP's Rule 225 TAC emissions information and air quality modeling.

  TAC emissions from the proposed new process equipment were evaluated using AERMOD dispersion modeling. Each new emission source was modeled separately, and the maximum predicted ambient impacts (PAIs) were added together to estimate the maximum impact for each TAC. This is a worst-case analysis because it assumes the ambient impacts of the sources all occur at the same point, which will not be the case.

  For 1,4-dichlorobenzene and naphthalene, all emissions sources at the facility, not just the new BioCon ERS systems, were modeled together (not separately) and the ambient impacts were compared to the Secondary Risk Screening levels.

  The modeling analysis shows the predicted ambient impacts of the TACs are less than the AQD health-based screening levels. Table 3 shows the modeling results for TACs with predicted ambient impacts that are at least 10% of the screening levels. See Table 7 in Appendix 2 for a list of all TACs evaluated.

Table 3: TACs with Impacts More Than 10% of the Screening Levels

TAC	Averaging Period	Screening Level (μg/m³)	Screening Level Type	PAI (μg/m³)	Percent of Screening Level
Sulfuric acid	Annual	1	ITSL	0.21	20.7
1,4-Dichlorobenzene	Annual	2.5	SRSL	0.83	33.2
1,3-Butadiene	Annual	0.03	IRSL	0.003	9.4
Acetaldehyde	Annual	0.5	IRSL	0.09	17.6
Acrolein	Annual	0.4	ITSL	0.04	13.5
Acrolein	1 hour	5	ITSL	1.8	35.6
Diethyl hexyl phthalate	Annual	0.61	IRSL	0.14	23.2
1,2-Dibromoethane	Annual	0.002	IRSL	0.0005	23.3
Formaldehyde	Annual	0.08	IRSL	0.06	73.0
Naphthalene	Annual	3	ITSL	0.33	11.0
Naphthalene	Annual	0.8	SRSL	0.33	41.1
Arsenic	Annual	0.0002	IRSL	0.000025	12.4
Cadmium	Annual	0.0006	IRSL	0.00007	11.6
Chromium, hexavalent - particulate	Annual	0.000083	IRSL	0.000013	15.9

Rule 225 TAC Analysis for Evaluation Perfluoro- and Polyfluoro-alkyl Substances (PFAS)

For the TAC analysis, Warren WWTP provided a list of 36 PFAS compounds they measure at the facility; note that not all 36 compounds have been detected.

To evaluate worst case PFAS emissions, the AQD generated a PAI assuming each of the 36 PFAS compounds would be emitted at the uncontrolled emission rate of 1.81×10^{-4} pounds per hour from each system. For each PFAS compound that does not have an AQD health-based screening level, the AQD Toxics Unit evaluated the compound using available toxicology data and developed a surrogate screening level.

Using this approach, the PAI of each PFAS compound is less than fifty percent of the AQD health-based screening level or the surrogate screening level from the AQD Toxics Unit review, except for perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA).

For PFOS and PFOA, Warren WWTP calculated emission rates that meet the screening levels but are also higher than the levels that have been detected in the sludge. These emission rates are included, in the proposed permit, as emission limits that require stack testing to verify.

Based on this analysis, the potential PFAS emissions from the BioCon ERS systems comply with Rule 225. See Table 8 in Appendix 2.

- **Rule 702 VOC Emissions**
  This rule requires an evaluation of the following four items to determine what will result in the lowest maximum allowable emission rate of VOCs:

  a. BACT or a limit listed by the department on its own initiative
  b. New Source Performance Standards (NSPS)
  c. VOC emission rate specified in another permit
  d. VOC emission rate specified in the Part 6 rules for existing sources

  An evaluation of these four items determined that a VOC BACT limit (Rule 702(a)) analysis would dictate the lowest maximum allowable emission rate of VOC from the proposed new equipment based on the following rationale:

  - For the BioCon ERS systems based on the high operating temperatures and long residence times of the ERS furnaces and the low total emission rate of 4.38 tpy.
  - For the proposed emergency generator engine based on the engine being certified to have VOC emissions lower than the limit in NSPS JJJJ.
  - For the proposed thermal oil heaters and building heaters based on the heaters being natural gas fired and the low estimated emission rate of 0.11 tpy.

- **Criteria Pollutants Modeling Analysis**
  Computer dispersion modeling was performed to predict the impacts of air emissions from NO_x and PM2.5. NO_x refers specifically to nitrogen oxide and NO_2, with the larger portion being NO_2. NO_2 is a highly reactive gas and is the pollutant for which the USEPA established a NAAQS. Emissions from the proposed facility were evaluated against both the and the PSD increments. The NAAQS are intended to protect public health. The PSD increments are intended to allow industrial growth in an area, while ensuring that the area will continue to meet the NAAQS. The first step in this evaluation is to determine the predicted impacts from the proposed project. After impacts are determined, they are compared to the applicable PSD Significant Impact Levels (SIL). If the project impacts are less than the SIL, then no further review is required. The following table considers the potential emissions from the proposed project for NO_x and PM2.5 and compares them to their respective SILs.

Table 4 - Preliminary Modeling Impacts

Pollutant	Averaging Time	SIL ($\mu g/m^3$)	Predicted Impact ($\mu g/m^3$)	Additional Modeling?
PM2.5	Annual	0.13	1.05	Yes
PM2.5	24-hr	1.2	8.35	Yes
NO_2	Annual	1	3.06	Yes
NO_2	1-hr	7.5	44.23	Yes

As the Class II modeled impacts for NO_2 and PM2.5 exceeded their respective SILs, facility wide NAAQS and PSD Increment modeling analysis was required for those pollutants.

The PSD Increments are compared against the total facility impact plus other increment consuming facilities nearby. In the NAAQS analysis, total facility impact includes additional nearby facilities, or offsite sources. The total facility impact and the background concentrations, which is data from ambient air monitors, are summed and compared to the NAAQS.

As the following tables show, emissions of NO_2 and PM2.5 from the proposed project will meet their respective PSD Increments and NAAQS.

Table 5 - PSD Increment

Pollutant	Averaging Time	PSD Increment ($\mu g/m^3$)	Predicted Impact ($\mu g/m^3$)	Percent of Increment (%)
PM2.5	Annual	4	1.37	34%
PM2.5	24-hr	9	8.04	89%
NO_2	Annual	25	3.06	12.3%

Please note, there is not a PSD Increment for NO_2 for a 1-hour averaging time.

Table 6 - National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Time	NAAQS ($\mu g/m^3$)	Predicted Impact ($\mu g/m^3$)*	Percent of NAAQS (%)
PM2.5	Annual	9	8.7	97%
PM2.5	24-hr	35	28.2	80.5%
NO_2	Annual	100	17.9	17.9%
NO_2	1-hr	188	123.4	65.6%

*Includes background data.

A secondary formation assessment of ozone was performed. Secondary formation of ozone can occur from emissions of NO_x and VOC as these criteria pollutants are considered precursors.

There is an 8-hour NAAQS for ozone, but no PSD Increment. Ground-level ozone concentrations are the result of photochemical reactions among various chemical species. The chemical species that contribute to ozone formation, referred to as ozone precursors, include NO_x and VOC emissions from both anthropogenic (e.g., mobile and stationary sources) and natural sources (e.g., vegetation).

The secondary formation of ozone, or conversion of the precursors, is not instantaneous; it happens over time and is highly dependent upon weather conditions. Therefore, the conversion is often completed after the precursors have been dispersed away from the immediate area. Ozone formation is recognized as a long-range transport issue. As a result, there is no effective modeling method for ozone for single sources: the ozone modeling programs address larger areas of land and air movements and therefore must include many sources.

To address if a project may cause or contribute to a violation of the ozone NAAQS, the ozone precursors, NO_x and VOC, are evaluated. Warren WWTP followed guidance defined in the USEPA guidelines on Air Quality Models for addressing single source impacts of secondary pollutants. Specifically, Warren WWTP used the methodology provided in the USEPA guidance memo, Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program (4/3/19), to determine the secondary pollutant impact resulting from their proposed project. The ozone impact resulting from the proposed project was less than the 1.0 parts per billion SIL and is therefore not expected to cause or contribute to any violation of the ozone NAAQS standard.

Key Aspects of Proposed Permit Conditions

The proposed permit conditions include the following requirements:

Emergency generator engine

- NSPS JJJJ requirements consisting of emission limits, testing, and monitoring.

Thermal oil heaters

- Equipped with low NO_x burners, limits the type of fuel to natural gas, and limits the heat input capacity of each heater and the amount of natural gas used.

Building heaters

- Limits the type of fuel to natural gas and limits the heat input capacity of each heater.

BioCon ERS systems

- **Emission Limits**
  Emission limits for various pollutants for each system to make the permit enforceable and comply with the air quality rules and regulations, including the NAAQS, NSPS LLLL, and Rule 225. Key pollutants that have emission limits are criteria pollutants, dioxins/furans, mercury, lead, PFOS, and PFOA.

- **Usage Limits**
  A limit on the amount of sludge that can be processed.

  Warren WWTP is only allowed to process sludge generated by Warren WWTP.

- **Process/Operational Restrictions**
  A requirement that Warren WWTP develop and maintain a Malfunction Abatement Plan; the plan has to be submitted to the AQD for approval before trial operation of the systems begins.

  A requirement that Warren WWTP develop and submit a plan to the AQD for minimizing emissions during startups, shutdowns, and malfunctions.

  A requirement to develop a site specific monitoring plan for the air pollution control equipment to ensure it is operating properly.

- **Design/Equipment Parameters**
  A requirement to maintain a minimum temperature of 1,994°F in each ERS Furnace.

  A requirement to maintain a minimum PFAS destruction efficiency of 90% by weight in each ERS Furnace.

  A requirement to maintain the inlet gas temperature to each mercury control device at 180°F or less.

Requirements to have devices to monitor the following parameters:
- The combustion chamber temperature of each ERS Furnace
- The amount of sludge feed to each BioCon dryer
- The pressure drop of each cyclone control device
- Solids level in the dust box of each cyclone control device
- The pressure drop of each wet scrubber control device
- The liquid flowrate of each wet scrubber control device
- The pH of the liquid of each wet scrubber control device
- The secondary voltage and secondary amperage input to the collection plates of each WESP control device
- The minimum effluent water flow rate from each WESP control device
- The outlet NO_x concentration of each SCR control device
- The urea consumption of each SCR control device
- The inlet gas temperature to each mercury control device
- The differential pressure of each mercury control device

- **Federal Regulations**
  Many requirements from NSPS LLLL to ensure the systems operate in compliance with the NSPS.

- **Emission Control Device Requirements**
  Requirements to properly install and operate the following emission control devices. Each BioCon ERS system will have its own, separate control devices:
  - A particulate cyclone to control PM emissions from the furnace exhaust
  - A SCR to control NO_x emissions
  - A wet scrubber to control emissions of PM, metals, acid gases, SO_2, and other TACs
  - A WESP to control emissions of PM10, PM2.5, and metals
  - A activated carbon control device to control emissions of mercury and dioxins/furans

- **Testing & Monitoring Requirements**
  Testing requirements for each BioCon ERS system include:
  - PM, HCl, dioxins/furans (total mass basis or toxic equivalency basis), mercury, NO_X, SO_2, cadmium, lead, and fugitive emissions from ash handling
  - VOC, PM, PM10, and beryllium
  - PFOS and PFOA using the USEPA Method OTM-45 (or an alternate method approved by the AQD)
  - PFAS destruction efficiency by spiking a Principal Organic Constituent, such as hexafluoroethane
  - Testing of the PFAS concentration in the sludge as follows:
    - Within 180 days before startup of the new systems, testing the sludge feed to the existing incinerator once a month for three months.
    - After startup of the new systems, testing the sludge feed monthly for six months.
    - Once six consecutive samples show PFOS is below 169 ppb and PFOA is below 42 ppb, testing can be done quarterly.
    - If the quarterly PFOS concentration exceeds 169 ppb, the quarterly PFOA concentration exceeds 42 ppb, or if there could be an increase the PFAS concentration in the sludge due to changes in the sources of wastewater, monthly

sampling is required until five consecutive samples show PFOS is below 169 ppb and PFOA is below 42 ppb; after that sampling can be done quarterly.

Monitoring requirements for each BioCon ERS system include:

- A continuous emission monitoring system (CEMS) for CO
- Monitoring and recording air pollution control device operating parameters
- Monitoring and recording of the combustion chamber temperature
- Monitoring and recording of the sludge feed rate

- **Other**
  The new BioCon ERS systems cannot operate at the same time as the existing incinerator and the existing incinerator has to be permanently shut down no later than 2 years after startup of the new BioCon ERS systems.

Conclusion

Based on the analyses conducted to date, the AQD staff concludes that the proposed project would comply with all applicable state and federal air quality requirements. The AQD staff also concludes that this project, as proposed, would not violate the federal NAAQS or the state and federal PSD Increments.

Based on these conclusions, the AQD staff has developed proposed permit terms and conditions for the application which would ensure that the proposed equipment design and operation are enforceable, and that sufficient monitoring, recordkeeping, and reporting would be performed by the applicant to determine compliance with these terms and conditions. If the permit application is deemed approvable, the delegated decision maker may determine a need for additional or revised conditions to address issues raised during the public participation process. If you would like additional information about this proposal, please contact Andrew Drury, AQD, at DruryA@Michigan.gov or 517-648-6663.

Appendix 1
STATE AIR REGULATIONS

State Rule	Description of State Air Regulations
R 336.1201	Requires an Air Use Permit for new or modified equipment that emits, or could emit, an air pollutant or contaminant. However, there are other rules that allow smaller emission sources to be installed without a permit (see Rules 336.1279 through 336.1290 below). Rule 336.1201 also states that the Department can add conditions to a permit to assure the air laws are met.
R 336.1205	Outlines the permit conditions that are required by the federal Prevention of Significant Deterioration (PSD) Regulations and/or Section 112 of the Clean Air Act. Also, the same types of conditions are added to their permit when a plant is limiting their air emissions to legally avoid these federal requirements. (See the Federal Regulations table for more details on PSD.)
R 336.1224	New or modified equipment that emits toxic air contaminants must use the Best Available Control Technology for Toxics (T-BACT). The T-BACT review determines what control technology must be applied to the equipment. A T-BACT review considers energy needs, environmental and economic impacts, and other costs. T-BACT may include a change in the raw materials used, the design of the process, or add-on air pollution control equipment. This rule also includes a list of instances where other regulations apply and T-BACT is not required.
R 336.1225 to R 336.1232	The ambient air concentration of each toxic air contaminant emitted from the project must not exceed health-based screening levels. Initial Risk Screening Levels (IRSL) apply to cancer-causing effects of air contaminants and Initial Threshold Screening Levels (ITSL) apply to non-cancer effects of air contaminants. These screening levels, designed to protect public health and the environment, are developed by Air Quality Division toxicologists following methods in the rules and U.S. EPA risk assessment guidance.
R 336.1279 to R 336.1291	These rules list equipment to processes that have very low emissions and do not need to get an Air Use permit. However, these sources must meet all requirements identified in the specific rule and other rules that apply.
R 336.1301	Limits how air emissions are allowed to look at the end of a stack. The color and intensity of the color of the emissions is called opacity.
R 336.1331	The particulate emission limits for certain sources are listed. These limits apply to both new and existing equipment.
R 336.1370	Material collected by air pollution control equipment, such as dust, must be disposed of in a manner, which does not cause more air emissions.
R 336.1401 and R 336.1402	Limit the sulfur dioxide emissions from power plants and other fuel burning equipment.
R 336.1601 to R 336.1651	Volatile organic compounds (VOCs) are a group of chemicals found in such things as paint solvents, degreasing materials, and gasoline. VOCs contribute to the formation of smog. The rules set VOC limits or work practice standards for existing equipment. The limits are based upon Reasonably Available Control Technology (RACT). RACT is required for all equipment listed in Rules 336.1601 through 336.1651.
R 336.1702	New equipment that emits VOCs is required to install the Best Available Control Technology (BACT). The technology is reviewed on a case-by-case basis. The VOC limits and/or work practice standards set for a particular piece of new equipment cannot be less restrictive than the Reasonably Available Control Technology limits for existing equipment outlined in Rules 336.1601 through 336.1651.
R 336.1801	Nitrogen oxide emission limits for larger boilers and stationary internal combustion engines are listed.
R 336.1910	Air pollution control equipment must be installed, maintained, and operated properly.
R 336.1911	When requested by the Department, a facility must develop and submit a malfunction abatement plan (MAP). This plan is to prevent, detect, and correct malfunctions and equipment failures.
R 336.1912	A facility is required to notify the Department if a condition arises which causes emissions that exceed the allowable emission rate in a rule and/or permit.

State Rule	Description of State Air Regulations
R 336.2001 to R 336.2060	Allow the Department to request that a facility test its emissions and to approve the protocol used for these tests.
R 336.2801 to R 336.2804 Prevention of Significant Deterioration (PSD) Regulations **Best Available Control Technology (BACT)**	The PSD rules allow the installation and operation of large, new sources and the modification of existing large sources in areas that are meeting the National Ambient Air Quality Standards (NAAQS). The regulations define what is considered a large or significant source, or modification. In order to assure that the area will continue to meet the NAAQS, the permit applicant must demonstrate that it is installing the BACT. By law, BACT must consider the economic, environmental, and energy impacts of each installation on a case-by-case basis. As a result, BACT can be different for similar facilities. In its permit application, the applicant identifies all air pollution control options available, the feasibility of these options, the effectiveness of each option, and why the option proposed represents BACT. As part of its evaluation, the Air Quality Division verifies the applicant's determination and reviews BACT determinations made for similar facilities in Michigan and throughout the nation.
R 336.2901 to R 336.2903 and R 336.2908	Applies to new "major stationary sources" and "major modifications" as defined in R 336.2901. These rules contain the permitting requirements for sources located in nonattainment areas that have the potential to emit large amounts of air pollutants. To help the area meet the NAAQS, the applicant must install equipment that achieves the Lowest Achievable Emission Rate (LAER). LAER is the lowest emission rate required by a federal rule, state rule, or by a previously issued construction permit. The applicant must also provide emission offsets, which means the applicant must remove more pollutants from the air than the proposed equipment will emit. This can be done by reducing emissions at other existing facilities. As part of its evaluation, the AQD verifies that no other similar equipment throughout the nation is required to meet a lower emission rate and verifies that proposed emission offsets are permanent and enforceable.

FEDERAL AIR REGULATIONS

Citation	Description of Federal Air Regulations or Requirements
Section 109 of the Clean Air Act – National Ambient Air Quality Standards (NAAQS)	The United States Environmental Protection Agency has set maximum permissible levels for seven pollutants. These NAAQS are designed to protect the public health of everyone, including the most susceptible individuals, children, the elderly, and those with chronic respiratory ailments. The seven pollutants, called the criteria pollutants, are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter less than 10 microns (PM10), particulate matter less than 2.5 microns (PM2.5), and sulfur dioxide (SO_2). Portions of Michigan are currently non-attainment for either ozone or SO_2. Further, in Michigan, State Rules 336.1225 to 336.1232 are used to ensure the public health is protected from other compounds.
40 CFR 52.21 – Prevention of Significant Deterioration (PSD) Regulations **Best Available Control Technology (BACT)**	The PSD regulations allow the installation and operation of large, new sources and the modification of existing large sources in areas that are meeting the NAAQS. The regulations define what is considered a large or significant source, or modification. In order to assure that the area will continue to meet the NAAQS, the permit applicant must demonstrate that it is installing BACT. By law, BACT must consider the economic, environmental, and energy impacts of each installation on a case-by-case basis. As a result, BACT can be different for similar facilities. In its permit application, the applicant identifies all air pollution control options available, the feasibility of these options, the effectiveness of each option, and why the option proposed represents BACT. As part of its evaluation, the Air Quality Division verifies the applicant's determination and reviews BACT determinations made for similar facilities in Michigan and throughout the nation.

Citation	Description of Federal Air Regulations or Requirements
40 CFR 60 – New Source Performance Standards (NSPS)	The United States Environmental Protection Agency has set national standards for specific sources of pollutants. These New Source Performance Standards (NSPS) apply to new or modified equipment in a particular industrial category. These NSPS set emission limits or work practice standards for over 60 categories of sources.
40 CFR 63— National Emissions Standards for Hazardous Air Pollutants (NESHAP)	The United States Environmental Protection Agency has set national standards for specific sources of pollutants. The National Emissions Standards for Hazardous Air Pollutants (NESHAP) (a.k.a. Maximum Achievable Control Technology (MACT) standards) apply to new or modified equipment in a particular industrial category. These NESHAPs set emission limits or work practice standards for over 100 categories of sources.
Section 112 of the Clean Air Act **Maximum Achievable Control Technology (MACT)** **Section 112g**	In the Clean Air Act, Congress listed 189 compounds as Hazardous Air Pollutants (HAPS). For facilities which emit, or could emit, HAPS above a certain level, one of the following two requirements must be met: 1) The United States Environmental Protection Agency has established standards for specific types of sources. These Maximum Achievable Control Technology (MACT) standards are based upon the best-demonstrated control technology or practices found in similar sources. 2) For sources where a MACT standard has not been established, the level of control technology required is determined on a case-by-case basis.

Notes: An "Air Use Permit," sometimes called a "Permit to Install," provides permission to emit air contaminants up to certain specified levels. These levels are set by state and federal law, and are set to protect health and welfare. By staying within the levels set by the permit, a facility is operating lawfully, and public health and air quality are protected.

The Air Quality Division does not have the authority to regulate noise, local zoning, property values, off-site truck traffic, or lighting.

These tables list the most frequently applied state and federal regulations. Not all regulations listed may be applicable in each case. Please refer to the draft permit conditions provided to determine which regulations apply.

Appendix 2 – TAC Evaluation

Table 7: List of TACs Evaluated for Rule 225 Compliance

TAC	Percent of Screening Level(s)*		TAC	Percent of Screening Level(s)*
Sulfuric acid	21		Fluorene	< 0.01
Hydrogen chloride	0.05		Formaldehyde	73.0
Hydrogen fluoride	0.1		n-Hexane	< 0.01
Ammonia	5.6		Methanol	< 0.01
Hydrogen sulfide	1.0		Methylcyclohexane	< 0.01
Methyl chloroform	< 0.01		2-Methylnaphthalene	< 0.01
1,1,2,2-Tetrachloroethane	2.1		Methylene chloride	< 0.01
1,1,2-Trichloroethane	0.5		Naphthalene	41.4
1,1-Dichloroethane	< 0.01		n-Nonane	< 0.01
1,2,3-Trimethylbenzene	< 0.01		Pentane	< 0.01
1,2,4-Trimethylbenzene	< 0.01		Tetrachloroethylene	< 0.01
1,2-Dichloroethane	0.6		Phenanthrene	0.1
1,2-Dichlorobenzene	0.07		Phenol	< 0.01
1,4-Dichlorobenzene	33.2		Pyrene	< 0.01
Propylene dichloride	0.1		Styrene	< 0.01
1,3,5-Trimethyl benzene	< 0.01		Toluene	< 0.01
1,3-Butadiene	9.4		Trichloroethylene	0.1
1,3-Dichloropropene	0.1		Vinyl chloride	0.1
2-Methylnaphthalene	< 0.01		Mixed xylenes	< 0.01
2,2,4-Trimethyl pentane	< 0.01		Benzo(a)pyrene	2.3
Acenaphthene	< 0.01		Total PAH as benzo(a)pyrene	4.4
Acenaphthylene	< 0.01		Arsenic	12.4
Acetaldehyde	17.6		Barium and soluble barium compounds	0.2
Acrolein	35.6		Beryllium	0.3
Anthracene	< 0.01		Cadmium	11.6
Benzene	4.7		Cobalt and cobalt compounds that release cobalt ions	2.4
Benzo(g,h,i)perylene	< 0.01		Copper	0.6
Biphenyl	0.5		Lead (compared to the NAAQS)	0.2
Diethyl hexyl phthalate	23.2		Manganese and manganese compounds	0.4
Butane	< 0.01		Magnesium oxide	< 0.01
Butyraldehyde	< 0.01		Mercury and mercury compounds	< 0.01
Carbon tetrachloride	0.3		Molybdenum	< 0.01
Chlorobenzene	< 0.01		Nickel	1.6
Ethyl chloride	< 0.01		Selenium and inorganic selenium compounds	0.4
Chloroform	1.8		Tin	0.1
Cyclopentane	< 0.01		Titanium	0.1
Ethylbenzene	0.1		Zinc oxide	0.3
1,2-Dibromoethane	23.3		Chromium, hexavalent - particulate	15.9
Fluoranthene	< 0.01		Chromium, trivalent	0.3

* Some TACs have more than one screening level; highest percent of screening level is shown

Table 8: PFAS Rule 225 Analysis Assuming no Destruction

TAC	CAS Number	Averaging Period	Acceptable Impact (µg/m³)	PAI (µg/m³)	Percent of Acceptable Impact
Perfluorobutanoic acid	375-22-4	Annual	10	0.0007	0.0%
Perfluoropentanoic acid	2706-90-3	Annual	0.01	0.0007	6.9%
Perfluorohexanoic acid	307-24-4	Annual	2	0.0007	0.0%
Perfluoroheptanoic acid	375-85-9	Annual	0.08	0.0007	0.9%
Perfluorooctanoic acid (PFOA)*	335-67-1	24 hr	0.0001	0.000099	99.2%
Perfluorononanoic acid	375-95-1	24 hr	0.01	0.0047	47.2%
Perfluorodecanoic acid	335-76-2	Annual	0.05	0.0007	1.4%
Perfluoroundecanoic acid	2058-94-8	Annual	1.1	0.0007	0.1%
Perfluorododecanoic acid	307-55-1	Annual	0.04	0.0007	1.7%
Perfluorotridecanoic acid	72629-94-8	Annual	0.04	0.0007	1.7%
Perfluorotetradecanoic acid	376-06-7	Annual	0.04	0.0007	1.7%
Perfluorobutanesulfonic acid	375-73-5	24 hr	1.05	0.0047	0.4%
Perfluorohexanesulfonic acid	355-46-4	24 hr	0.03	0.0047	15.7%
Perfluoroheptanesulfonic acid	375-92-8	Annual	0.01	0.0007	6.9%
Perfluorooctanesulfonic acid (PFOS)*	1763-23-1	24 hr	0.0004	0.0003995	99.9%
Perfluorodecanesulfonic acid	335-77-3	Annual	0.04	0.0007	1.7%
Perfluorooctanesulfonamide	754-91-6	Annual	0.04	0.0007	1.7%
Perfluoropentanesulfonic acid	2706-91-4	Annual	0.01	0.0007	6.9%
Perfluorononanesulfonic acid	68259-12-1	Annual	0.01	0.0007	6.9%
N-methyl perfluorooctanesulfonamidoacetic acid	2355-31-9	Annual	0.01	0.0007	6.9%
N-ethylperfluorooctane sulfonamidoacetic acid	2991-50-6	Annual	0.01	0.0007	6.9%
1H, 1H, 1H, 2H, 2H-Perfluorohexanesulfonic Acid	757124-72-4	Annual	0.01	0.0007	6.9%
1H, 1H, 1H, 2H, 2H-Perfluorooctanesulfonic Acid	27619-97-2	annual	1.37	0.0007	0.1%
1H, 1H, 2H, 2H-perfluorodecanesulfonic acid	39108-34-4	Annual	0.01	0.0007	6.9%
1H, 1H, 2H, 2H-Perfluorodecanesulfonic Acid	120226-60-0	Annual	0.01	0.0007	6.9%
Perfluorohexadecanoic acid	67905-19-5	Annual	0.01	0.0007	6.9%
Perfluorooctadecanoic acid	16517-11-6	Annual	140	0.0007	0.0%
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	756426-58-1	Annual	0.01	0.0007	6.9%
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	763051-92-9	Annual	0.01	0.0007	6.9%
N-Methylperfluorooctanesulfonamide	31506-32-8	Annual	0.01	0.0007	6.9%
N-Ethylperfluorooctane-1-sulfonamide	4151-50-2	Annual	0.01	0.0007	6.9%
N-methyl perfluorooctane sulfonamido ethanol	24448-09-7	Annual	0.01	0.0007	6.9%
N-ethyl perfluorooctane sulfonamido ethanol	1691-99-2	Annual	0.01	0.0007	6.9%
Hexafluoropropylene oxide dimer acid	13252-13-6	Annual	0.27	0.0007	0.3%
4,8-dioxa-3H-perfluorononanoic acid	919005-14-4	Annual	1.1	0.0007	0.1%
Perfluorododecanesulfonic acid	1260224-54-1	Annual	0.01	0.0007	6.9%

* The PFOA and PFOS analyses account for destruction in the ERS furnaces