



Environmental Regulations Affecting Anaerobic Digesters

Michigan Department of Environmental Quality • (800) 662-9278 • www.michigan.gov/deq

The Michigan Department of Environmental Quality (MDEQ) regulates activities that impact the state’s air, water, and land resources. This document discusses the environmental regulations that may apply to the installation and operation of an anaerobic digester (AD) on a farm or food processing facility in Michigan. It is important that you understand what regulations apply before construction begins because a permit or authorization may be required. The regulatory audit below can be used to quickly determine what regulations might apply to your AD project.



Additional information about ADs can be found at www.michigan.gov/mda (select “Farming” then “Environment”). MDEQ contact information can be found at the end of this document.

REGULATORY AUDIT FOR ANAEROBIC DIGESTERS

The following ten questions will help you identify the environmental requirements that may apply when installing or operating an AD on a farm or food processing facility. Detailed information on these requirements can be found on the pages following the audit.

1. Is the biogas generated by the AD going to a generator? (See page 2)	<input type="checkbox"/> Yes - Continue	<input type="checkbox"/> No – Go to question 4
2. Is the heat input capacity of the generator greater than 10,000,000 Btu/hr? (See page 2)	<input type="checkbox"/> Yes – An air permit is required for the generator. Go to question 4.	<input type="checkbox"/> No – Continue
3. Are more than two generators going to be installed? (See page 2)	<input type="checkbox"/> Yes – An air permit may be required. Contact MDEQ district office. Continue.	<input type="checkbox"/> No – Continue
4. Is the biogas generated by the AD going to a boiler or flare? (See page 2)	<input type="checkbox"/> Yes – Continue	<input type="checkbox"/> No – An air permit may be required. Contact MDEQ district office. Go to question 6.
5. Is the SO ₂ emission rate from the boiler or flare greater than 1 lb/hr? (See page 2)	<input type="checkbox"/> Yes – An air permit is required. Continue.	<input type="checkbox"/> No – Continue
6. Will material other than manure be added to the digester (e.g. food processing residuals)? (See page 3)	<input type="checkbox"/> Yes – Contact MDEQ to determine requirements prior to land applying or composting effluent. Continue.	<input type="checkbox"/> No - Continue
7. Is this a community AD (an AD that accepts feedstock from multiple sources)? (See page 3)	<input type="checkbox"/> Yes – Contact MDEQ to determine requirements prior to land applying effluent. Continue.	<input type="checkbox"/> No - Continue
8. Will construction of the AD impact a wetland area? (See page 3)	<input type="checkbox"/> Yes – Part 303 permit required prior to any construction. Contact MDEQ, Land and Water Management Division. Continue.	<input type="checkbox"/> No – Continue
9. During AD construction, will one or more acres of earth be disturbed, or will earth be disturbed within 500 ft of a lake or stream? (See page 4)	<input type="checkbox"/> Yes – Soil erosion and sedimentation control permit required prior to any construction. Contact county. Continue.	<input type="checkbox"/> No – Continue
10. Will any additional chemicals be used for the AD? (see page 4)	<input type="checkbox"/> Yes – SARA Title III reporting requirements and Emergency Planning requirements may apply.	<input type="checkbox"/> No

AIR QUALITY REGULATIONS

In Michigan, an air permit is required for any activity that generates an air contaminant, unless that activity is specifically exempted from having to obtain an air permit in the Michigan Air Pollution Control Rules. ADs have the potential to generate air contaminants either directly via the digestion process, or indirectly via the combustion of the gas generated from the AD. Therefore, prior to constructing the AD, you will need to determine if an air permit will be required or if the activities are exempt from air permitting. Whether or not the AD requires a permit depends on what happens to the gas that is generated. Usually, gas from an AD is sent to a combustion device such as a flare, boiler, or generator. The gas may also be piped off-site. Below is a discussion of permitting requirements associated with each of these options.

- **Piping Off-site** - If the gas from the AD will be piped off-site, there are no air emissions so an air permit is not required for this activity.
- **Flare or Boiler** – If the gas from the AD is going to a flare or boiler, a permit will not be required if the actual emission rate of sulfur dioxide (SO₂) will not exceed 1 pound per hour [R 336.1282(g)]. If you do not know the actual emission rate of SO₂ from the boiler or flare, you can use the SO₂ Emission Rate Worksheet and example provided on page 5. If the emission rate of SO₂ is greater than 1 lb/hr, you will need to obtain a Permit to Install from the MDEQ, Air Quality Division, prior to installing the flare or boiler.
- **Generator** – If the gas will be used to power a generator, you will not need to obtain an air permit if the generator has a maximum heat input capacity of less than 10,000,000 Btu/hr [R 336.1285(g)]. If the generator's heat input capacity is greater than 10,000,000 Btu/hr, you will need to obtain a Permit to Install from the MDEQ, Air Quality Division, prior to installing the generator. *Note that 10,000,000 Btu/hr is equivalent to a 1,875 KW generator or a 1,320 brake-HP engine.*

Odors

While an AD may lessen the intensity of odors from manure and wastewater management operations, odors will still exist that may be offensive to neighbors. All odor complaints are first investigated by the Michigan Department of Agriculture (MDA) Right-to-Farm Program. The MDA may refer an odor complaint to the MDEQ if it is determined that the farm is not adhering to the applicable Generally Accepted Agricultural Management Practices (GAAMPs).



Generator

IMPORTANT!

If several generators will be installed, they may be excluded from the exemption due to the amount of emissions generated [R 336.1278]. If more than two exempt generators will be installed, contact the appropriate MDEQ district office to determine if a permit is required (see page 6).

The MDEQ Air Quality Division Permit to Install application can be found at www.michigan.gov/deqair. Contact the appropriate MDEQ AQD district office to verify whether or not an air permit is required. There is no fee to obtain an air permit. For assistance call (800) 662-9278.

WATER QUALITY REGULATIONS

The effluent from an AD has the potential to impact groundwater and surface water quality if improperly managed. Most farming operations will not be required to obtain any additional water discharge permits or authorizations for an AD if only manure is being managed in the AD. If the facility is currently operating under a permit issued by the MDEQ, then the AD should be included as part of the manure management system of the comprehensive nutrient management plan (CNMP).



Land application of liquid effluent

If an operation will be combining different types of material in the AD and then land applying the effluent, additional requirements may apply. For example, if a farming operation will add material other than manure to the AD, such as food processing residuals or other wastes, a permit or authorization may be required to land apply the effluent. If the AD will process combined materials, it is recommended that the MDEQ Water Bureau and the Waste and Hazardous Materials Division (WHMD) be contacted to discuss the requirements that may apply prior to land application. A list of MDEQ district offices can be found on page 6. For specific questions about obtaining authorization to land apply mixed materials, contact Mr. Duane Roskoskey, MDEQ, WHMD, at (517) 335-4712.

Farming operations that wish to install an AD are not required to obtain any additional surface or ground water permits for the AD as long as only manure is processed in the AD.

WETLANDS REGULATIONS

The MDEQ, Land and Water Management Division (LWMD) regulates activities that may affect wetland areas. Part 303 of the Natural Resources and Environmental Protection Act defines a wetland as *“land characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances does support, wetland vegetation or aquatic life, and is commonly referred to as a bog, swamp, or marsh.”* The definition applies to public and private lands regardless of zoning or ownership. The following activities are prohibited in wetlands unless a Part 303 permit has been obtained from the MDEQ:



Wetland

- Deposit or permit the placing of fill material in a wetland.
- Dredge, remove, or permit the removal of soil or minerals from a wetland.
- Construct, operate, or maintain any use or development in a wetland.
- Drain surface water from a wetland.

If you believe the construction of an AD may impact a wetland area, contact the MDEQ, LWMD for guidance at (800) 662-9278 or go to www.michigan.gov/deqwetlands. The Part 303 application fee is \$100.

The MDEQ, LWMD Wetland Assessment Program offers a service to help businesses and the public identify wetland and upland areas on their properties. Individuals interested in assessment services must submit an assessment application to the LWMD, Wetlands and Submerged Lands Unit. For information call (517) 373-1746. The wetland assessment application and a list of associated fees can be downloaded at www.michigan.gov/deqwetlands.

SOIL EROSION AND SEDIMENTATION CONTROL REGULATIONS

A soil erosion and sedimentation control permit will be required for any earth change that disturbs one or more acres, or is within 500 feet of a lake or stream. Counties have the primary responsibility for issuing permits. In some cases, cities, villages, and townships have assumed permitting responsibility within their jurisdictions. Permit applications can be obtained from the respective county or municipal agencies. A list of county and municipal enforcing agencies can be found on the Soil Erosion and Sedimentation Control (SESC) website at www.michigan.gov/deqland (select "Soil Erosion and Sedimentation Control"). Fees for soil erosion and sedimentation control permits are established by the county or local agency issuing the permit.

PLANNING AND REPORTING REQUIREMENTS

If additional chemicals will be used for the AD, they may need to be reported under SARA Title III. These chemicals should also be considered when updating the Emergency Management Plan. Information about SARA Title III reporting requirements and emergency planning can be found at www.michigan.gov/deqsara and www.michigan.gov/deqemergencyplan or by calling the Environmental Assistance Center at (800) 662-9278.

SOLID WASTE REGULATIONS

If material other than manure will be added to the AD, authorization may be required from the MDEQ, WHMD, prior to composting any of the solid "biofibers" (R 299.4121) or land applying the liquid effluent as explained on page 3. If the AD will process material other than manure, it is recommended that the MDEQ be contacted to discuss the specific requirements that may apply regarding composting and land application. For information, contact Mr. Duane Roskoskey MDEQ, WHMD, at (517) 335-4712.



Biofibers

SO₂ Emission Rate Worksheet

As discussed on page 2, an air permit may be required if the gas from the AD will be combusted in a flare or boiler. Whether or not an air permit is required depends on the emission rate of sulfur dioxide (SO₂). Use this worksheet to determine the emission rate of SO₂ from a flare or boiler. You will need to know the heat input capacity of the boiler (Btu/hr), the heat content of the biogas (Btu/ft³), as well as the approximate concentration of hydrogen sulfide (H₂S) contained in the gas (ppm), which the vendor should be able to provide. The concentration of H₂S in an AD is typically 1,500 to 3,500 ppm. If you do not know the H₂S concentration, use 3,500 ppm.

A. Boiler/Flare Heat Input Capacity (Btu/hr): _____ Btu/hr	B. Heat Content of Biogas (Btu/ft ³): _____ Btu/ft ³	C. H ₂ S Concentration (ppm): _____ ppm
D. Biogas emission rate (ft ³ /hr): (A) / (B) =		_____ ft ³ /hr
E. H ₂ S emission rate (lbs/hr): (D) x (C/1,000,000 ft ³ biogas) x (0.088 lb H ₂ S / ft ³ H ₂ S)* =		_____ lbs H ₂ S /hr
F. SO ₂ emission rate (lbs/hr): (E) x (1.88 lbs SO ₂ /lb H ₂ S)** =		_____ lbs SO ₂ /hr

* (1 lb.-mole H₂S/387 ft³ H₂S) x (34 lb. H₂S/1 lb.-mole H₂S) = 0.088 lbs H₂S/ft³ H₂S

** (1 lb.-mole H₂S/34 lb. H₂S) x (1 lb.-mole SO₂/1 lb.-mole H₂S) x (64 lbs. SO₂/1 lb.-mole SO₂) = 1.88 lbs SO₂/lb H₂S

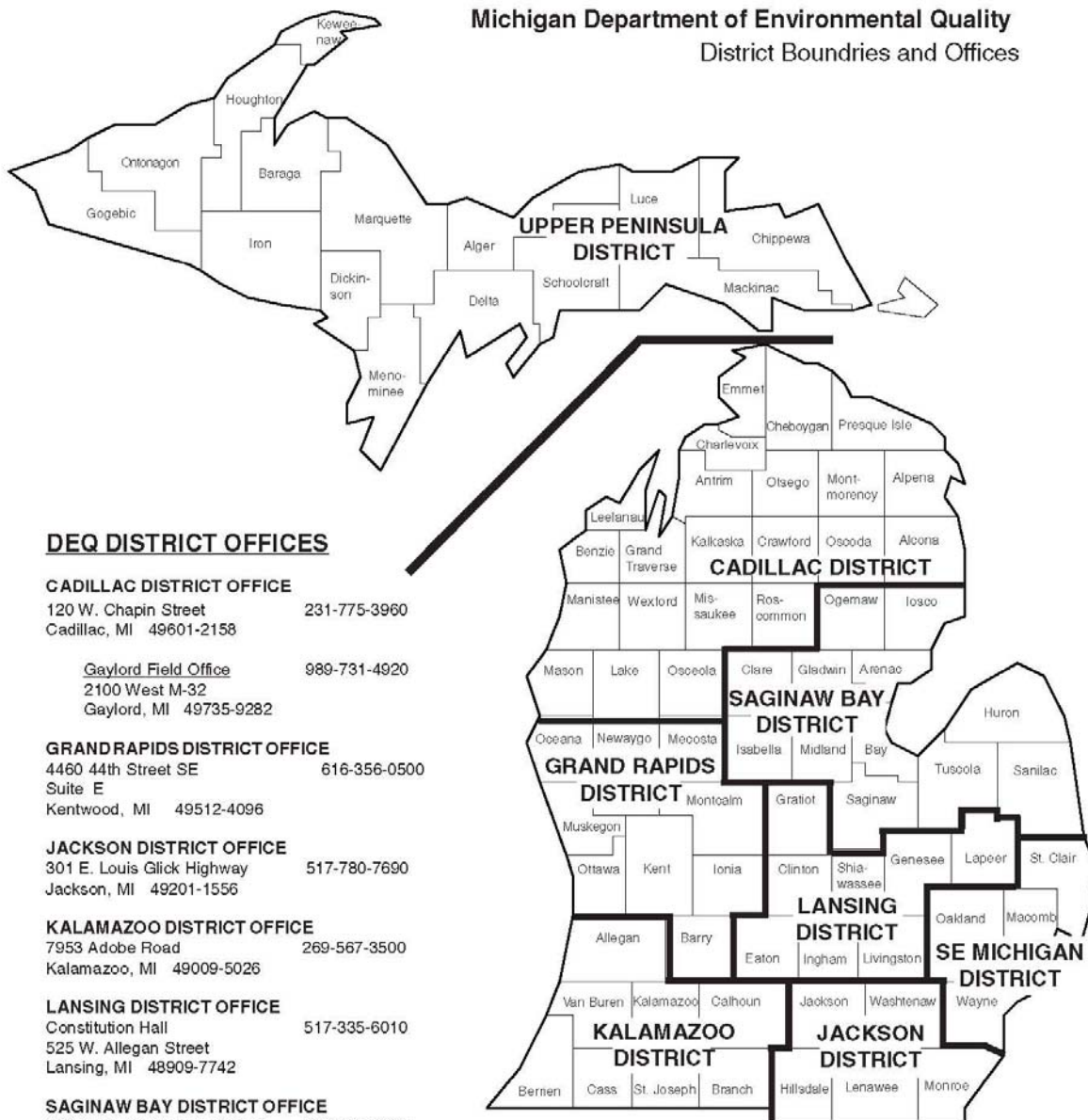
EXAMPLE

An AD project involves a large dairy farm with an AD and a 3,000,000 Btu/hr hot water heater/boiler. The biogas heat content was estimated to be 600 Btu/ft³, with an H₂S concentration of approximately 1,500 parts per million (ppm).

A. Boiler/Flare Heat Input Capacity (Btu/hr): 3,000,000 Btu/hr	B. Heat Content of Biogas (Btu/ft ³): 600 Btu/ft³	C. H ₂ S Concentration (ppm): 1,500 ppm
D. Biogas emission rate (ft ³ /hr): (3,000,000 Btu/hr) / (600 Btu/ ft³) =		5,000 ft³/hr
E. H ₂ S emission rate (lbs/hr): (5,000 ft³/hr) x (1,500/1,000,000 ft³ biogas) x (0.088 lb H₂S / ft³ H₂S) =		0.66 lbs H₂S /hr
F. SO ₂ emission rate (lbs/hr): (0.66 lbs H₂S/hr) x (1.88 lbs SO₂/lb H₂S) =		1.24 lbs SO₂/hr

SO₂ emission rate is greater than 1 lb/hr; therefore, the boiler is not exempt from air permitting. A Permit to Install application must be submitted prior to installing the boiler

**Michigan Department of Environmental Quality
District Boundaries and Offices**



DEQ DISTRICT OFFICES

CADILLAC DISTRICT OFFICE
120 W. Chapin Street
Cadillac, MI 49601-2158 231-775-3960

Gaylord Field Office 989-731-4920
2100 West M-32
Gaylord, MI 49735-9282

GRAND RAPIDS DISTRICT OFFICE
4460 44th Street SE 616-356-0500
Suite E
Kentwood, MI 49512-4096

JACKSON DISTRICT OFFICE
301 E. Louis Glick Highway 517-780-7690
Jackson, MI 49201-1556

KALAMAZOO DISTRICT OFFICE
7953 Adobe Road 269-567-3500
Kalamazoo, MI 49009-5026

LANSING DISTRICT OFFICE
Constitution Hall 517-335-6010
525 W. Allegan Street
Lansing, MI 48909-7742

SAGINAW BAY DISTRICT OFFICE
503 N. Euclid Avenue, Suite 1 989-686-8025
Bay City, MI 48706-2925

SOUTHEAST MICHIGAN DISTRICT OFFICE
27700 Donald Court 586-753-3700
Warren, MI 48092-2793

Detroit Field Office 313-456-4700
Cadillac Place
3058 West Grand Boulevard, Suite 2-300
Detroit, MI 48202-6058

UPPER PENINSULA DISTRICT OFFICE
420 5th Street 906-346-8300
Gwinn, MI 49841

ENVIRONMENTAL ASSISTANCE CENTER

(for general information):
Telephone: 800-662-9278
Fax: 517-241-0673

POLLUTION EMERGENCIES
Telephone: 800-292-4706

DEQ WEB PAGE
www.michigan.gov/deq

AUTHORITY: PA 451 of 1994, as amended
TOTAL COPIES:
TOTAL COST:
COST PER COPY:
Michigan Department of Environmental Quality

The Michigan Department of Environmental Quality (MDEQ) will not discriminate against any individual or group on the basis of race, sex, religion, age, national origin, color, marital status, disability or political beliefs. Questions or concerns should be directed to the MDEQ Office of Personnel Services, P.O. Box 30473, Lansing, MI 48909.

