

# AIR ISSUES FOR DIGESTER PROJECTS

## 1 INTRODUCTION

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Manure digesters offer significant environmental benefits compared to other methods of manure management. Digesters accelerate the natural breakdown of manure into methane gas that is easily captured and burned as a productive fuel. Digester gas can be used to heat water, produce steam, or generate electricity. Methane gas, the same component of natural gas burned by residences, commercial operations, industries, and power plants, is a cleaner-burning fuel compared to coal, the fuel used for the majority of electricity generation in Indiana. Furthermore, burning digester gas has a net overall reduction in greenhouse gas impact compared to the emission of uncaptured methane gas released by manure lagoons or other passive forms of management.

Although these benefits are significant, the Indiana Department of Environmental Management (IDEM) and the US Environmental Protection Agency (EPA) regulate air emissions from digesters and associated combustion units. Burning digester gas releases traditionally regulated air pollutants, such as carbon monoxide and nitrogen oxides into the atmosphere - often at levels that require permits from IDEM before construction of a project can begin. In addition, boilers, water heaters, and engines that burn the digester gas may be subject to specific emission standards, data collection, record keeping, and reporting requirements under IDEM and EPA regulations.

This guidance describes the types of questions and issues a farm needs to address to successfully navigate air quality management issues under the Clean Air Act, including the following questions:

- I want to build a digester and burn the digester gas, what do I need to do for air permitting?
- When do I need an air permit?
- What information do I need to file an application for an air permit?
- How long does it take to get an air permit?
- What are the fees required to obtain a permit?
- What kind of terms and conditions can I expect to see in an air permit?
- What activities can be started before the air permit is issued?
- Who can help you apply for an IDEM air permit?

## 2 I WANT TO BUILD A DIGESTER AND BURN THE DIGESTER GAS. WHAT DO I NEED TO DO FOR AIR PERMITTING?

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A prospective digester project developer must understand the project may need an air permit from IDEM and incorporate getting an air permit into the project timeline. Although this section addresses only air quality permits, it is important to remember permits may be required from IDEM's water and land quality divisions. IDEM and EPA regulations prohibit starting construction of the digester and the digester gas combustion operations (flares, engines, boilers, etc.) before an air permit is issued.

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Depending on the size and complexity of your project, it typically takes 2 to 5 months to get a permit once the application is submitted to IDEM.

Recognizing the need for an air permit, and incorporating the permitting process into the project timeline is the crucial first step. Getting the permit into the project plan increases the likelihood the project will be able to move forward without delays or risk of enforcement for failure to have all the appropriate permits.

### 3 WHEN DO I NEED AN AIR PERMIT?

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Agricultural operations are not exempt from air permitting requirements. Although there are some exemptions for some agricultural operations, a farm may need an air permit. Digester projects are frequently subject to permitting and regulatory requirements.

IDEM has issued guidance to help farmers understand the air permitting requirements. One guidance document, "Permitting of Activities Located at Crop Production Operations", NPD-Air-039<sup>1</sup>, provides guidance for crop production facilities. The other guidance document, "Permitting of Activities Located at Livestock Production Operations including Concentrated Animal Feeding Operations", NPD-Air-038<sup>2</sup>, is aimed at livestock farms, particularly those with CAFOs (as defined in USEPA regulations at 40 CFR 122.23). Although the guidance documents are helpful, the details in the documents can be confusing. For farms considering installation of a digester and a combustion device to convert the digester gas to usable energy, the following paragraphs describe the critical questions and issues regarding air permits.

Generally IDEM's air permitting rules apply when a "source" has the "potential to emit" regulated air pollutants such as carbon monoxide (CO), nitrogen oxides (NOx), and particulate matter (PM) at rates that are above clearly defined levels in IDEM's rules. (See Table 3-1) This concept seems like a straightforward idea, but unfortunately the terms "source" and "potential to emit" contain a great deal of background context that are not obvious or even apparent when reading the formal definitions of these terms in IDEM's rules and guidance.

#### 3.1 THE SOURCE

The idea behind the term "source" is to identify the entity that needs a permit. The traditional notion in air permitting is the "source" would be a power plant, a factory, or a large commercial operation. If a factory had the potential to emit air pollutants at levels that exceeded IDEM's thresholds, then the factory would need an air permit. Similarly, an expansion at an existing factory would also be considered a source.

By analogy, a farm is a source. A big project, such as installing a digester with gas engines, could also be considered a source.

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<sup>1</sup> <http://www.in.gov/idem/files/npd-air-039.pdf>

<sup>2</sup> <http://www.in.gov/idem/files/npd-air-038.pdf>

A single farm with a digester project may find that all the other sources of air emissions at the farm may need to be included in the permit application. This could include emergency generators, boilers, grain dryers and feed mills - equipment that may have never been involved in air permitting before.

An even more complicating element of defining the source, for both industrial facilities and farms, is whether other operations owned or controlled by the same people or entity are nearby. In some cases, multiple operations owned by the same people located within a few miles of each other are combined into a single source for determining whether an air permit is needed. Because the combined source is bigger and has more operations, the possibility of exceeding air permit thresholds and needing a permit increases. It also increases the scope of a permit.

Practically, this means a digester project may end up with a permit that covers your other farming operations that are nearby.

The source determination question must be answered before IDEM or a consultant can definitively decide whether your digester project needs a permit and the type of permit that will be needed.

Under IDEM and USEPA rules, two or more farming operations will be combined into a single source for air permitting decisions if the operations meet all three of the following criteria:

- The farms or agribusinesses share common ownership or control;
- The farms or agribusinesses are on contiguous or adjacent properties; and
- The farms or agribusinesses are in the same two digit Standard Industrial Classification Code (SIC Code) or one of the farms is considered a support facility to the other.

Common ownership or control means the two operations share common owners or management. This is more than a superficial test. IDEM looks beyond the LLCs and corporations that may own a farm or agribusiness. They may look at the individual shareholders in a business entity or the individual property owners. If the same person or business entity owns more than 50% of the value of each operation, common ownership exists. For common control, IDEM looks at the business relationship between the entities. For example, if two farms do not have common ownership, but are managed by the same people or company, or operated mostly for the benefit of one or the other and have significant reporting and other management functions, then common control may exist. IDEM will also find common control if one operation directly serves another operation and there is day to day control of one operation over the other. Another way IDEM can find common control is if a majority of the output of an operation is consumed by the other operation.

Under the second criteria, contiguous means that the two properties must be touching. The term "adjacent", however, has a much broader meaning. It can mean nearby with some functional relationship between the two operations. In industrial settings, IDEM conducts a source determination whenever two facilities that share common ownership or control are within 2 miles of one another, and there are times when IDEM has looked at operations that are several miles apart. Because it is common for an agribusiness to own farm properties in multiple locations, the adjacent property question is something farmers who plan to install digesters must pay particular attention to, especially if manure from one or more locations owned by the same agribusiness would be sent to the same digester. IDEM has made at least one determination combining several farm operations into a single source in a permit review of a digester project.

In the third test, both the SIC Code and support facility aspects must be evaluated. Generally crop production facilities are in SIC Code 01 and livestock production is in SIC Code 02. That means a crop farm and a livestock farm are not necessarily tied together unless the crop farm is determined to be a support facility for a livestock farm, or vice versa. For example, if a farmer wanted to put in a digester on the same property as his hog farm, and use the manure from the hog farm, but he also owned a soybean farm that shipped the majority of its soybeans down the road to his own hog farm where the beans were milled into feed, then the digester, emission sources as the hog farm, and emission sources at the soybean farm might need to be combined into a single permit.

It is important to remember that if a farmer proposing a digester project owns or operates other farms or businesses that have a functional or business relationship with the activities on the property where the digester will be built, the source determination must be evaluated as the first step. Just as importantly, the complexity of the regulations that determine whether two or more properties must be combined are not a barrier to getting an air permit for a digester project, it simply means that any emission sources on these other properties must be included in the permit application. For example, if a crop farm is combined with a hog farm, the emissions from diesel-fired irrigation pumps and propane-fired grain dryers at the crop farm would need to be added to the permit application. These small emission sources will usually not change the permitting process, but they are important to IDEM's view of the completeness of the permit application.

### **3.2 POTENTIAL TO EMIT**

Once the source is defined, the next step in determining the type of air permitting requirements is to calculate the potential to emit (PTE) of all the emission sources at the site and add them up.

Like source determinations, PTE has significant regulatory context behind it. Generally, it is the amount of emissions that would be emitted by a machine or operation if it operated at its maximum capacity for 8760 hours per year. Most of the time this value exceeds the actual emissions that will occur as a result of running the equipment under normal operating conditions and times. For digesters with combustion devices, IDEM requires farms to assume these worst case conditions when estimating potential to emit.

If there are other emissions sources at the farm, such as emergency generators, space heaters in barns, or grain dryers, IDEM will allow the farm to calculate potential to emit based on historical usage rates instead of the maximum capacity and usage. IDEM has endorsed this idea in guidance documents described earlier.

Typically PTE is calculated by multiplying an emission factor, usually expressed in pounds of emissions per unit of output or usage by the capacity and 8760 hours. USEPA publishes emission factors for a variety of operations, but the best source of these factors is often the manufacturer of an engine, boiler or other device. Sometimes emission factors or emission test results used by other similar operations are excellent methods of projecting emissions from a project.

IDEM uses a specific technique for estimating the amount of gas a digester can produce, based on research by Purdue University<sup>3</sup>. The amount of gas produced by the digesters establishes a capacity of the digester flares and engines, or other combustion units that will burn the digester gas.

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<sup>3</sup> Basics of energy Production through

To estimate PTE for a digester project, PTE for each of the following equipment must be included:

- The digester
- Digester flares
- Digester gas combustion units (engines/boilers)
- Other emission sources at the farm/source, if applicable
  - Emergency generators
  - Space heaters
  - Boilers and water heaters
  - Diesel irrigation pumps
  - Grain dryers
  - Grain receiving, handling, storing
  - Feed mills
  - Feed handling
  - Livestock carcass incineration
  - Vehicle traffic

### 3.3 IDEM PERMIT THRESHOLDS

Once the PTE for the digester project and the rest of the emission sources at the site are calculated, the type of permit can be determined. PTE values for both the digester project and the entire source will be compared to IDEM permitting thresholds. If the PTE exceeds a threshold then a permit is required, and the farm should begin the process submitting a permit application.

The IDEM permitting thresholds are described below. In many cases, digester projects will trigger Registrations or Minor Source Operating Permits (MSOP), which are relatively simple documents. The pollutants emitted by a digester gas engine or digester gas boilers that are most likely to trigger air permitting requirements are carbon monoxide, and nitrogen oxides.

**Table 3-1: IDEM Air Permitting Thresholds**

Pollutant	Exempt	Registration	Minor Source	Title V/FESOP
CO	< 25 tpy	25 > 100 tpy	--	≥ 100 tpy
NOx	< 10 tpy	10 > 25 tpy	25 < 100 tpy	≥ 100 tpy
PM/PM <sub>10</sub> /PM <sub>2.5</sub>	< 5 tpy	5 > 25 tpy	25 < 100 tpy	≥ 100 tpy
SO <sub>2</sub>	< 10 tpy	10 < 25 tpy	25 < 100 tpy	≥ 100 tpy
VOC	< 10 tpy	10 < 25 tpy	25 < 100 tpy	≥ 100 tpy
Single HAP	< 10 tpy	--	--	≥ 10 tpy
All HAPs	< 25 tpy	--	--	≥ 25 tpy

For example, a hog production site that includes a digester with flares, a 400 hp digester gas engine, three 150 hp emergency generators, some space heaters, and some small boilers would likely need a

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Ileleji, Martin, and Jones, *Basics of Energy Production through Anaerobic Digestion of Livestock Manure*, Purdue Extension, ID-406-W, <https://www.extension.purdue.edu/extmedia/ID/ID-406-W.pdf>, URL last visited October 8, 2015

registration from IDEM. As the digester and the digester engine capacity increases, it becomes more likely a Minor Source permit is required.

## 4 WHAT INFORMATION SHOULD BE IN AN AIR PERMIT APPLICATION?

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In order to obtain an air permit from IDEM for a digester project, an application must be submitted to the agency. Once IDEM receives the application, the process to issue the permit may begin.

There are two aspects of permit application development that should always be kept in mind before submitting the application. First, the content of the permit application is the only part of the entire permitting process the applicant can control. Once the application is submitted, the rest of the permit review process is controlled by IDEM, EPA, and members of the public interested in your permit. For this reason, permit applicants should use the application to present their positions on technical and regulatory issues. A well-developed application will provide the basis to support IDEM's permitting decisions in case the permit is appealed by project opponents. In addition, if permit limits or other compliance requirements will be required, the application provides an opportunity for the applicant to begin the negotiations with a well-crafted proposal.

Second, prospective applicants should meet with IDEM to review the project and the contents of the permit application before the application is submitted. The pre-application meeting provides an opportunity to get IDEM's verbal agreement on the source determination, likely permitting path, and application content, and to discover any unforeseen issues before the application is submitted. Clarifying issues prior to application submittal will ensure a more predictable IDEM review process.

The application should include the following information at a minimum:

- A proposed source determination.
- A description of the project including a process flow diagram and descriptions of equipment capacities.
- Potential to emit estimates and the explanations of how the emissions were calculated.
- A regulatory summary that describes which state and federal regulations apply to the project. In some cases an explanation of why certain regulations do not apply is also useful.
- Proposed permit conditions, if needed.
- IDEM permit application forms (at a minimum the following forms should be submitted)
  - Permit application cover sheet
  - Basic information form GSD-01
  - Affidavit of adjoining property owner notifications (2 forms)
  - Notification of local government officials form GSD-15

## 5 HOW LONG DOES IT TAKE TO GET AN AIR PERMIT?

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The amount of time IDEM takes to review a permit application and issue the permit varies depending on whether the permit is a registration, a minor source operating permit, or one of the more complicated permits. IDEM is required by state law to issue registrations within 45 days of receiving the application, and to issue MSOPs within 120 days of application. In the vast majority of permit reviews, IDEM meets

these deadlines. In the few occasions they do not meet these time frames, it is usually because the applicant has caused the delays by not replying promptly to information requests or other actions that delay the process.

A typical air permit review process will follow these general steps:

- Initial IDEM review of the application; verification of emission calculations and projected permit type.
- Development of the draft permit
- Applicant review of the draft permit
- Publication of notice and comment in local newspaper (not required for registrations)
- 30 day public comment period (not required for registrations)
- Public hearing (if requested)
- Response to comments (if any)
- Permit issued

## 6 PERMIT FEES

IDEM assesses fees to permit applicants as part of the permit review process to cover the agency's cost of review the application. The fees vary by permit type and whether additional reviews of federal regulations are required to complete the permit. The initial permit fee is paid near the end of the permit review process. In some cases, an annual permit fee is required. Typical fees assessed for a digester permitting project are summarized below.

**Table 6-1: Typical Air Permitting Fees**

Pollutant	Exemption	Registration	Minor Source	Title V/FESOP
Permit review fee	None	\$600	\$3,500	\$4,375
NSPS review fee	\$500	\$500	\$500	\$625
NESHAP review fee	\$500	\$500	\$500	\$625
Annual permit fees	None	None	\$200	\$1,875+

## 7 WHAT KIND OF TERMS AND CONDITIONS CAN I EXPECT TO SEE IN AN AIR PERMIT?

IDEM air permits usually include a complete listing of all state and federal Clean Air Act requirements that apply to a project or a source. This enables the permit holder to understand all of their air compliance obligations and increases the likelihood of compliance. In addition, a typical IDEM permit will include boilerplate permit terms that create no significant obligations for a digester operator.

In the unusual circumstance that emission limits are taken to avoid certain types of permits, then the permit may include requirements to ensure emissions do not exceed the emission limits. There could be data collection, record keeping, and reporting requirements in the permit.

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Most often, the requirements in a permit for a digester project involve emission performance requirements for engines under the EPA New Source Performance Standards for gas-fired engines (40 CFR 63 Subpart JJJJ). Depending on the size of the engine, this rule can require some or all of the following.

- Notifications to IDEM/EPA
- Emission limits on CO, NOx and VOCs
- Stack testing (as much as once per year)
- Data collection and record keeping
- Periodic Reporting

Projects where the digester gas is burned in a boiler or water heater are less likely to trigger any additional EPA regulatory requirements.

## **8 WHAT CONSTRUCTION CAN I START BEFORE THE PERMIT IS ISSUED?**

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IDEM and EPA rules prohibit starting construction of a digester project before the permit is issued. This does not mean no construction activity can take place because the word "construction" has a very specific meaning in the air permit rules. Until the air permit is issued, you cannot begin installation of the digester, flares, engines, boilers or other emission sources, but you may undertake the following activities:

- Ordering equipment
- Clearing ground and other earthwork
- Pouring foundations
- Building shells and buildings
- Piping, wiring, etc
- Storing emission units on site

## 9 AIR PERMITTING AND REGULATORY COMPLIANCE CHECKLIST

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The air permitting process may seem foreign, but it is important to remember that if you include getting the permit in your project timeline and utilize IDEM as a partner to get the permit, the process is manageable. Hiring consultants or attorneys experienced in air permitting is invaluable. They can guide you through the entire process and ensure that appropriate contacts with IDEM are made throughout the process.

As part of the process to build and operate a digester, this checklist should be followed:

- Incorporate air permitting into the project timeline; include time to prepare the permit application and time for IDEM to review the application/issue the permit.
- Conduct a source determination to establish the extent of farm(s) that need to be included in the permit application.
- Identify the maximum capacities of the digester and combustion devices (typically in MMBtu/hr for flares and boilers, and horsepower for engines).
- Obtain historical production rates, fuel usage, and vehicle traffic for other farm operations that fall under the source.
- Determine the potential to emit for the digester project and the entire source and determine the type of air permit that will be needed (if any).
- Identify if an NSPS rule or other regulatory requirements will apply to the project and develop a compliance strategy.
- Prepare an air permit application.
- Meet with the IDEM Office of Air Quality before submitting the permit application.
- If public notice is required for the permit, determine if a public hearing should be requested.
- Submit the permit application.
- Promptly respond to questions and requests from the IDEM permit reviewer.
- Provide feedback to the IDEM permit reviewer on draft copies of the permit to ensure the permit accurately describes the project and the applicable regulatory requirements.
- Submit comments on the public notice version of the permit if necessary.
- Pay permit fees promptly.
- Develop a permit compliance management plan before the final permit is issued.