

**Engine  
And  
Turbine  
Environmental  
Certification Workbook**

**For use with the MassDEP  
Environmental Results Program**

**Massachusetts Department of Environmental Protection**

# **THE ENVIRONMENTAL RESULTS PROGRAM**

## **INTRODUCTION**

The Massachusetts Environmental Results Program (ERP) is an on-going environmental performance enhancement and measurement initiative that seeks to cost-effectively improve the environmental performance of whole small business sectors. In this regulatory system, comprised of a unique set of linked regulatory tools, institutions and businesses are educated about their environmental impact and obligations, are required to self-evaluate and certify compliance, and are tracked to measure environmental performance changes. The Massachusetts Department of Environmental Protection (MassDEP) uses a statistical approach to track individual facility and whole-group performance results to identify poor performance areas and to effectively target limited agency compliance assistance and enforcement resources.

The ERP now includes performance standards that include the use of clean fuels, equipment maintenance, and record keeping requirements for new engines with a rated power output equal to or greater than 50 kilowatts (kW) and combustion turbines with a rated power output less than ten megawatts (MW). You must submit an initial installation certification that your facility meets environmental performance standards. By simplifying and clarifying the regulatory process, MassDEP hopes to reduce the cost and time required for compliance, while maintaining effective standards and improving environmental results. This workbook provides the information you must understand to meet your environmental obligations.

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## **GETTING STARTED**

### **1.1 WHO IS SUBJECT TO ERP FOR ENGINE AND TURBINES?**

An owner or operator who installs, after March 23, 2006, an engine with a rated power output equal to or greater than 50 kW or a combustion turbine with a rated power output equal to or less than ten MW is subject to the requirements of the Environmental Results Program (ERP) for engines and turbines.

*The applicability thresholds are based upon the engine or turbine rated power output, not the electrical output of the electrical generator.*

### **1.2 WHO SHOULD READ THIS WORKBOOK?**

#### Engine or Turbine Supplier/Installer:

All engines with a rated power output equal to or greater than 50 kW and combustion turbines with a rated power output equal to or less than one MW installed after March 23, 2006 must meet the air emission limits specified in the Engine and Combustion Turbine ERP regulation [310 CMR 7.26(43)] and outlined in this workbook. Therefore, it is crucial that you understand the requirements to ensure that the engine or turbine you install is capable of meeting the standards. You are also a primary source of technical expertise to your customers. Providing the information and service that your customer needs to operate and maintain the engine or turbine as efficiently and cleanly as possible not only minimizes emissions but is a good business practice as well. You are also responsible for supplying information to the owner/operator that each engine or turbine you supply/install complies with the applicable emission performance standards.

#### Facility Owner/Administrator:

As the owner or chief administrator of the facility, it is important that you understand the regulatory requirements described in this workbook. It is your responsibility to ensure that your new engine or turbine is operated in compliance with the applicable environmental regulations. By ensuring that the “hands-on” person who operates the engine or turbine understands the material in this workbook, you can make sure that the new engine or turbine is run cleanly and efficiently, with minimal impact to the environment. You will also be confident that the compliance certification you must sign is completed accurately and truthfully.

Under the heading "Related Activities", this workbook provides information you may need if underground petroleum storage tanks are located on your property.

#### Engine or Turbine Operator:

As the operator, it is equally important that you understand the material in this workbook. You are the “hands-on” person who has the daily responsibility to operate and maintain the unit properly. To ensure compliance you must understand the fuel, stack, operational and record keeping requirements. You should also read the Related Activities section if you manage underground petroleum storage tanks.

### **1.3 WHAT YOU SHOULD KNOW AS A FACILITY OWNER / ADMINISTRATOR**

- The cornerstone of the Engine and Turbine ERP is the requirement that these engines comply with the applicable emission standards contained in the regulations at the time of installation. For example, a 500kW engine installed in 2006 must meet emission limitations for a model year 2006, 500kW engine. (Note that a unit being relocated at the same site, to serve the same power need, i.e. the same building, is not considered installed after March 23, 2006, however care must be exercised in locating the unit to cause a condition of air pollution. See Sections 2.4 and 2.5.)
- Particular care is required when locating engines and turbines so as not to cause a localized health or nuisance problem from emissions or sound impacts. The clean fuels requirement is a key component in assuring exhaust impacts are minimized from these units.
- The air contaminants emitted by engines and turbines can have significant health impacts, especially to the very young, the elderly, and the people suffering from respiratory illnesses. Particulate matter, especially the small-sized particulate matter generated by fuel combustion, can cause and contribute to serious respiratory problems. Sulfur dioxide (SO<sub>2</sub>) and oxides of nitrogen (NO<sub>x</sub>) are respiratory irritants and key ingredients in the formation of acid rain. NO<sub>x</sub> is also a major contributor to summertime smog.
- There is no need to obtain a pre-construction plan approval under 310 CMR 7.02. Under ERP you submit a *certification* within 60 days following the start of engine or turbine operation. This allows you to quickly replace an old failing engine or turbine with a new unit that meets currently applicable standards for new units at the time of installation.
- If you identify compliance problems that cannot be corrected before submittal deadline, you must file a Return to Compliance Plan (RTC) for each of the problems along with your Compliance Certification. The RTC requires you to explain the problem, list the correction actions to be taken, and provide an anticipated return to compliance date. MassDEP may follow up with additional questions or an on-site inspection, if necessary.
- There is no fee associated with the certification. Please note that your facility still may be subject to other MassDEP fees, such as the annual air quality or hazardous waste compliance assurance fees.

- Installation of an engine or turbine subject to ERP requires the submittal of a Source Registration (310 CMR 7.12) to MassDEP, when:
  - the engine has a maximum energy input capacity of 3 million Btu/hr or greater, or
  - the turbine has a maximum energy input capacity of 10 million Btu/hr or greater, or is located at a facility with an energy input capacity of 10 million Btu/hr in total (including the newly installed turbine).
- If installation of the engine or turbine results in you being subject to the emissions reporting requirements of MassDEP's Source Registration for the first time, you must contact MassDEP by January 31, and follow up by submitting a Source Registration.
- If you are uncertain how to file a Source Registration, you should go to the MassDEP website at: <http://www.mass.gov/dep/service/compliance/srfaq.htm>. Under the heading: **Important Information for New Facilities**, you will find guidance on how to file a Source Registration.
- Installation of a new engine and turbine can have facility-wide ramifications. Potential emissions of the new engine and turbine may cause total emissions from your facility to exceed thresholds for other air pollution control requirements, including New Source Review (NSR), Operating Permits, and Prevention of Significant Deterioration (PSD).
- If are or become a major source of air emissions you could be subject to one or more of the following:
  - Operating Permit Program
  - Emission Offsets and Non-attainment Review
  - Prevention of Significant Deterioration requirements

If you have any questions concerning whether or not your facility is subject to any of these programs, please call your MassDEP Regional Service Center for additional information. See <http://mass.gov/dep/about/region/findyour.htm>.

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Central Regional Office: (508) 792-7650  
Northeast Regional Office: (978) 694-3200  
Southeast Regional Office: (508) 946-2714  
Western Regional Office: (413) 784-1100

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- You should also be aware that compliance with the requirements of engine and turbine ERP does not relieve you of the responsibility to comply with other regulations such as:
  - 40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.
  - 40 CFR 60 subpart JJJJ- Standards of Performance for Stationary Spark Ignition Internal Combustion Engines.
  - 40 CRR 63 Subpart ZZZZ—National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
  - 40 CFR 60 Subpart KKKK- Standards of Performance for Stationary Combustion Turbine

The EPA Customer Service Center at EPA-New England may be called at (617) 918-1111 for further information.

- *NOTIFICATION TO MassDEP IS REQUIRED within 60 days following the start of operation.* Certification Forms are available on the MassDEP web site at [www.mass.gov/dep/service/online/erpforms.htm](http://www.mass.gov/dep/service/online/erpforms.htm)

The following sections describe the specific air quality and industrial wastewater requirements for engines and turbines.

# AIR QUALITY REQUIREMENTS

## 2.1 EMISSION LIMITS

The owner or operator must obtain from the supplier a completed Emission Limit Certification form, certifying that the engine or turbine as designed and installed will comply with the applicable emission limits for the lesser of the first three years or 15,000 hours of operation when operated according to the manufacturer's instructions. The emission limitations are set forth in the following tables:

Emission Limitations – Engines

Installation Date	Oxides of Nitrogen	Particulate Matter (Liquid Fuel Only)	Carbon Monoxide
On and after March 23, 2006	0.6 lbs/MWh	≤ 1MW 0.7 lbs/MWh; > 1 MW 0.09 lbs/MW	10 lbs/MWh
On and after 1/1/08	0.3 lbs/MWh	0.07 lbs/MWh	2 lbs/MWh
On and after 1/1/12	0.15 lbs/MWh	0.03 lbs/MWh	1 lb/MWh

Emission Limitations – Turbines

Rated Power Output	Oxides of Nitrogen	Ammonia	Carbon Monoxide
Less than 1 MW	0.47 lbs/MW-hr Natural Gas	N/A	0.47 lbs/MW-hr Natural Gas
1 to 10 MW	0.14 lbs/MW-hr Natural Gas 0.34 lbs/MW-hr Oil	2.0 ppm at 15% O <sub>2</sub> dry basis	0.09 lbs/MW-hr Natural Gas 0.18 lbs/MW-hr Oil

Emission Limitations – Engines and Turbines

Installation Date	Carbon Dioxide
On and after March 23, 2006	1900 lbs/MWh
On and after 1/1/08	1900 lbs/MWh
On and after 1/1/12	1650 lbs/MWh

Visible emissions may not exceed 20% opacity at any time during engine and turbine operation. Visible emissions do not include water vapor.

## 2.2 FUEL REQUIREMENTS

To ensure efficient combustion and compliance with the emissions limitations, engines and turbines must be operated and maintained according to the manufacturer's instructions. On and after July 1, 2007, you shall not accept delivery for burning in your unit, fuel oil that does not conform to EPA's sulfur limits for transportation distillate fuel (15 parts per million (ppm) sulfur).

## 2.3 OPERATIONAL REQUIREMENTS

- An engine or turbine shall be operated and maintained in accordance with the manufacturer's recommended operating and maintenance procedures.

## 2.4 STACK DESIGN REQUIREMENTS

The stack must discharge vertically upward. Stack heads, devices used to prevent precipitation from entering the stack, must not restrict the vertical flow of the exhaust gas stream. Devices such as "shanty caps" and "egg beaters" are prohibited. Coning of the top of the stack is acceptable. No more than a one-inch change in diameter to every five inches in length of cone is recommended in order to avoid serious backpressure that may affect air flow at the point of origin.

Stacks must be designed to minimize plume entrapment in wakes caused by obstructions to air streams.

- Regardless of the physical stack height requirements specified below, care must be taken to locate units to avoid exhaust impacts upon people, windows and doors that open, fresh air intake, and other sensitive receptors.
- Units rated less than 300kw shall have a minimum stack height of five feet above the facility roof-top or the engine or turbine enclosure, whichever is lower.
- Units rated at 300kw but less than one megawatt shall have a minimum stack height of ten feet above the facility roof-top or engine or turbine enclosure, whichever is lower.
- For units rated at one megawatt and above, the minimum stack height must be 1.5 times the height of the building on which the stack is located. If the stack is less than 1.5 times the height of your building, or if any *adjacent structures* are taller than your stack (see *adjacent structure* in Definitions), air quality modeling must be performed to document that the National Ambient Air Quality Standards (NAAQS) will not be exceeded. Appendix 1 lists the minimum data inputs that would be needed to execute an EPA Screen3 Model run. If you need assistance, call the BWP Air Planning & Evaluation Branch at 617-292-5766. A copy of the modeling analysis must be attached to the certification.

## **2.5 SOUND**

Another potential result of improper attention to locating your unit is the creation of a noise nuisance. Units should be housed in enclosures specifically designed to attenuate sound. Similar to exhaust impacts, locations that will impact people, such as locations near windows and doors that open, and other sensitive receptors are to be avoided.

## **2.6 RECORD KEEPING REQUIREMENTS**

The following records must be kept onsite for the life of the ERP engine and/or turbine.

- Information on the equipment type, make and model and rated power output.
- If applicable, the results of an air quality model run which demonstrates that engine and/or turbine emissions have not caused an exceedence of the National Ambient Air Quality Standards (NAAQS).
- Copies of certificates and documents from the manufacturer and supplier related to the certificates.

You must also keep the following records for at least three years. This means that each individual record must be retained onsite (or at the closest facility where records can be maintained) for three years from the date it was “created”.

- A monthly log of hours of operation, fuel type, and for fuel oil, heating value and sulfur content.
- Purchase orders, invoices, and other documents to substantiate information in the monthly log.

## **RELATED ACTIVITIES**

### **3.0 Underground petroleum storage tanks:**

Single wall, bare steel underground storage tanks containing petroleum products, including those resting on the ground, were required to meet leak detection and corrosion protection standards, or be replaced, as of December 22, 1998. For more information, contact your local fire Department.

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## DEFINITIONS AND TERMS

***Adjacent structure:*** means a structure that is within 5L of the stack. 5L means five times the lesser dimension (height or maximum horizontal width) of the structure.

***Air contaminant:*** volatile organic compounds (VOC's), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), and particulate matter are contaminants of concern in achieving air quality standards in the United States. Each geographic area is required to meet specific limits for each contaminant.

***Distillate Fuel Oil:*** fuel oil that complies with the specifications for fuel oil, numbers 1 or 2, as defined by the American Society for Testing and Materials.

***Emission:*** any discharge or release of an air contaminant to the ambient air.

***Engines:*** spark ignition and compression ignition stationary reciprocating internal combustion engines.

***NAAQS (National Ambient Air Quality Standards):*** Massachusetts is subject to national standards that deal with six criteria pollutants: particulate matter (PM), nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), ozone, carbon monoxide (CO) and lead.

***Natural Gas:*** a naturally occurring mixture of hydrocarbon gases found in geologic formations beneath the earth's surface, of which the principal constituent is methane, or liquid petroleum gas (LPG), as defined by the American Society for Testing and Materials. LPG includes propane, butane, or a combination of propane and butane.

***Rated Power Output:*** the maximum electrical or equivalent mechanical power output stated on the nameplate affixed to the engine or turbine by the manufacturer.

***Supplier:*** a person that manufactures, assembles, or otherwise supplies engines or turbines.

***Turbine:*** a stationary combustion turbine.

# Appendix 1

## Minimum Data Inputs Required for an EPA Screen3 Model Run

(For use in determining emission impacts upon ambient air quality – Section 2.4.)

1. Stack height (feet) =>
2. Stack inside diameter (feet) =>
3. Stack gas exit temperature (<sup>o</sup>F) =>
4. Stack flow rate (cubic feet per minute) =>
5. Building height (feet) =>
6. Minimum horizontal building width (feet) =>
7. Maximum horizontal building width (feet) =>
8. Type of fuel (natural gas or red dye distillate fuel oil) =>
9. Millions of Btu per hour of fuel input =>
10. Emission rate (grams per second) =>