

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 includes performance standards for 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). If you plan on installing an affected engine or turbine, you must submit an initial installation certification that your facility meets environmental performance standards. This workbook provides the information you must understand to meet your environmental obligations.

Table of Contents

Getting Started

- 1.1 Who is Subject**
- 1.2 Who Should Read This Workbook**
- 1.3 What You Should Know as a Facility Owner/Administrator**

Air Quality Requirements

- 2.1 Emission Limits**
- 2.2 Fuel Requirements**
- 2.3 Operational Requirements**
- 2.4 Stack Design**
- 2.5 Sound**
- 2.6 Record Keeping**

Definitions and Terms

Appendix 1: Information Needed for Air Dispersion Modeling

Appendix 2: MassDEP Regional Offices

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 eligible for coverage under 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:

To be eligible under this program, an engine with a rated power output equal to or greater than 50 kW and combustion turbine with a rated power output equal to or less than ten 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.

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.

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. (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 avoid causing a condition of air pollution. (See Sections 2.4 and 2.5)
- Particular care is required when locating engines and turbines to avoid causing a localized health or nuisance problem from emissions or sound impacts. The clean fuels requirement is a key component in minimizing exhaust impacts from these units.
- The air contaminants emitted by engines and turbines can have significant health impacts, especially to children, the elderly, and people suffering from respiratory illnesses. Particulate matter, especially the finer-particle size particulate matter generated by fuel combustion, can cause and contribute to serious respiratory problems. Sulfur dioxide (SO₂) and oxides of nitrogen (NO_x) are respiratory irritants and key ingredients in the formation of acid rain. NO_x is also a major contributor to smog.
- There is no need to obtain a pre-construction plan approval under 310 CMR 7.02 if you are complying with ERP. Under ERP you submit a certification 30 days **prior** to the start (first fire) of engine or turbine operation. Engines or turbines that will not be able to comply with ERP must file a plan approval under 310 CMR 7.02 and should contact the appropriate regional office to set up a pre-application meeting.
- If you identify compliance problems that cannot be corrected before the certification submittal deadline, you must file a Return to Compliance (RTC) Plan for each of the problems along with your Compliance Certification. The RTC requires you to explain the problem, list the corrective 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.
- If you are otherwise required to submit Source Registration under 310 CMR 7.12, you must include the engine and/or turbine installed under the ERP regulation in your next required submittal.

- Installation of an engine or turbine subject to ERP may trigger the requirement to submit Source Registration (310 CMR 7.12) for the facility, 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 Source Registration (310 CMR 7.12) 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: <https://www.mass.gov/guides/massdep-source-registration> . Under the heading: **How to File Your Source Registration**, 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 Emission Offsets and Non-attainment Review (“NSR,” 310 CMR 7.00 Appendix A), Operating Permits (310 CMR 7.00 Appendix C), and Prevention of Significant Deterioration (“PSD,” 40 CFR part 52 section 52.21). Installations that trigger preconstruction review under NSR or PSD are not eligible for ERP and must file a plan approval under 310 CMR 7.02.

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 <https://www.mass.gov/service-details/massdep-regional-offices-by-community> .

Central Regional Office:	(508) 792-7650
Northeast Regional Office:	(978) 694-3200
Southeast Regional Office:	(508) 946-2714
Western Regional Office:	(413) 784-1100
Boston Office	(617) 292-5705

- 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 CFR 60 Subpart KKKK- Standards of Performance for Stationary Combustion Turbines
 - 40 CRR 63 Subpart ZZZZ—National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

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

NOTIFICATION TO MassDEP IS REQUIRED 30 days prior to the start of operation. Certification Forms are available on the MassDEP web site at <https://www.mass.gov/how-to/compliance-certification-stationary-engine-or-turbine> .

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

AIR QUALITY REQUIREMENTS

2.1 EMISSION LIMITS

The owner or operator must obtain from the supplier a completed Supplier Certification of Emission Performance 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/MWh	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/MWh Natural Gas	N/A	0.47 lbs/MWh Natural Gas
1 to 10 MW	0.14 lbs/MWh Natural Gas 0.34 lbs/MWh Oil	2.0 ppm at 15% O ₂ dry basis	0.09 lbs/MWh Natural Gas 0.18 lbs/MWh 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 shall not exceed 20% opacity at any time during engine and turbine operation. Visible emissions do not include water vapor.

2.2 FUEL REQUIREMENTS

No person shall accept delivery for burning in any engine or turbine subject to 310 CMR 7.26(43) diesel or any other distillate fuel that does not meet the sulfur content limit for fuel pursuant to 310 CMR 7.05 (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, or 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.

Stack Height and Emission Dispersion (*verbatim from 310 CMR 7.26(43)(d)3.a.*)

- All engines or turbines shall utilize an exhaust stack that discharges so as to not cause a condition of air pollution (310 CMR 7.01(1)).
- Exhaust stacks shall be configured to discharge the combustion gases vertically and shall not be equipped with any part or device that impedes the vertical exhaust flow of the emitted combustion gases.
- Any emission impacts of exhaust stacks upon sensitive receptors such as people, windows and doors that open, and building fresh air intakes shall be minimized by employing good air pollution control engineering practices. Such practices include without limitation:
 - Avoiding locations that may be subject to downwash of the exhaust.
 - Installing a stack of sufficient height in a location that will prevent and minimize flue gas impacts upon sensitive receptors.
- Engines and turbines burning liquid fuel and with a rated power output of less than 300 kW shall be equipped with an exhaust stack with a minimum stack height of five feet above the rooftop or the engine or turbine enclosure, whichever is higher.

- Engines and turbines with a rated power output equal to or greater than 300kw shall be equipped with an exhaust stack with a minimum stack height of ten feet above the rooftop or the engine or turbine enclosure, whichever is higher.
- Engines and turbines with a rated power output equal to or greater than one MW shall be equipped with an exhaust stack with a minimum stack height of 1.5 times the height of the building on which the stack is located. If the stack is lower than 1.5 times the building height or lower than the height of a structure that is within 5L of the stack (5L being five times the lesser of the height or maximum projected width of the structure), the owner/operator shall submit documentation that the operations of the engine or turbine will not cause an exceedance of any National Ambient Air Quality Standard.

Appendix 1 lists the minimum data inputs that would be needed to perform an EPA Guideline Screening Model run. Emissions inputs for modeling should be the maximum, not-to-exceed emission rates. If you need assistance, call the BAW 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, must 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 exceedance 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 log of fuel type and supplier.
- Purchase orders, invoices, and other documents to substantiate information in the monthly log.

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 (VOCs), sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), particulate matter, and toxic air contaminants, such as benzene.

Applicable Model Year means the model year that corresponds to the calendar year in which the engine is installed.

Distillate Fuel Oil means 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 means any discharge or release of an air contaminant to the ambient air.

Engine means spark ignition (SI) and compression ignition (CI) stationary reciprocating internal combustion engine.

NAAQS (National Ambient Air Quality Standards) means national standards promulgated by EPA for six pollutants: particulate matter (PM), nitrogen oxides (NO_x), sulfur dioxide (SO₂), ozone, carbon monoxide (CO) and lead.

Natural Gas means 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 means the maximum mechanical power output stated on the nameplate affixed to the engine or turbine by the manufacturer.

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

Turbine means a stationary combustion turbine.

Appendix 1

Minimum Data Inputs Required for an EPA Guideline Model Run (For use in determining emission impacts on ambient air quality – Section 2.4.)

1. Stack height (feet)
2. Stack inside diameter (feet)
3. Stack gas exit temperature ($^{\circ}$ 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 ultra-low sulfur distillate fuel oil)
9. Millions of Btu per hour of fuel input
10. Maximum Emission rate (grams per second)