State of Oregon
Department of
Environmental
Quality

Department of Environmental Quality
Air Quality Program

GENERAL
AIR CONTAMINANT DISCHARGE PERMIT
ASSESSMENT REPORT

ELECTRICAL POWER GENERATORS

SOURCE DESCRIPTION AND QUALIFICATION

1. This General Permit is designed to regulate air contaminant emissions from Electrical Power Production at stationary and portable facilities with up to 25 megawatts combined generating capacity, powered by reciprocating internal combustion diesel or dual-fuel engines. Generators operated only during periods of loss of utility power (and brief periods for testing and maintenance) are exempt from the requirement to obtain a permit.

2. For the purpose of the permit and this report, Electrical Power Production means either or both of the following:

    a. Supplying electrical power to a utility grid at any time;
    b. Producing electrical power for use by the owner or operator at any time other than during loss of utility power.

3. The facilities assigned to this General Permit have no other air pollution sources which require regulation beyond that specified in this permit, or have other pollution sources that also qualify for General Permits. Facilities eligible for assignment to this permit have not experienced recurring or serious compliance problems.

ASSESSMENT OF EMISSIONS

4. Facilities assigned to this General Permit are sources of PM, PM_{10}, SO_2, CO, NO_X, and VOC emissions. Some generators burn only diesel fuel and some burn a mixture of diesel fuel and natural gas (dual-fuel). This permit addresses only diesel fueled or dual-fueled generator engines.

5. DEQ has assessed the level of emissions of all air pollutants from these facilities and determined that facilities complying with the operational limits and monitoring requirements of this permit have emission levels below the established levels of concern stated in Tables 2 and 3 of OAR 340-200-0020.

6. The worst-case pollutant from generators is NO_x. NO_x emissions have been estimated at three levels (or tiers), roughly representing the following: older technology engines; engines that have been modified to reduce NO_x emissions; and engines that have been

designed or modified to reduce NO_x emissions even further. To ensure that NO_x emissions do not exceed the Plant Site Emission Limit of 39 tons per year, the hours of operation of each generator must be limited. The operational limits are a function of the generator size and NO_x emission tier. The method of determining the limits is described below.

7. NO_x emission factors from AP-42 for large diesel and dual-fuel engines were used to define each tier. The AP-42 NO_x emission factors are 0.024 pounds per horsepower-hour (lb/hp-hr) for uncontrolled engines, and 0.013 lb/hp-hr for controlled engines (control being fuel injection retard). In order to account for variability among engines, these emission factors were increased by 20 percent, to 0.029 and 0.016. Tier 1 operating limits were calculated using the higher emission factor (0.029), and Tier 2 operating limits were calculated using the lower emission factor (0.016). A third tier was added to account for newer (perhaps future) better-controlled engines. An emission factor of 0.008 lb/hp-hr was assumed for Tier 3.

8. It is possible to calculate the maximum number of operating hours for various horsepower ratings and emission factors to ensure that NO_x emissions do not exceed 39 tons.

   39 tons x 2000 lb/ton = (engine horsepower) x (hours of operation) x (emission factor, lb/hp-hr).

   Engine horsepower can be estimated from the generator capacity by converting megawatts to horsepower, and assuming a 12.5 percent loss due to energy conversion inefficiency (i.e., converting the mechanical power of the engine to electricity).

   1 hp/0.0007457 mW x 1.125 = 1,509 hp/mW, rounded to 1,500.

   allowed hours = (39 tons x 2000 lb/ton)/[(emission factor, lb/hp-hr) x (generator capacity, mW) x (1500 hp/mW)]

   This table tabulates the allowed operating hours for each Tier for a 1 mW generator:

Tier	Emission factor, lb/hp-hr	Allowed hrs
1	0.029	1,793
2	0.016	3,250
3	0.008	6,500

9. This calculation was repeated for generators ranging from 0.5 megawatt to 25 megawatts capacity, and included in the permit as Table A. The permittee must determine which NO_x Tier their generators are in, as well as the maximum generating capacity, and must then limit their hours of operation to the value specified in Table A.

10. All generators are assumed to be Tier 1, unless source testing shows them to be in Tier 2 or Tier 3.

11. DEQ also calculated the worst-case emissions of CO, SO_2, PM and VOC. Tier 3 represents the worst case, since Tier 3 allows the greatest hours per mW of generator capacity. The calculation is as follows:

    emissions, tons per year = (emission factor, lb/hp-hr) x (hours of operation) x (generator capacity, mW) x (1500 hp/mW)/2000 lb/ton.

12. In each tier, (hours of operation) x (generator capacity) x (1500 hp/mW)/2000 lb/ton) is a constant. The constants are:

    Tier 1: 1345
    Tier 2: 2438
    Tier 3: 4875

13. Emission factors and calculated emissions are tabulated below. All emission factors are from AP-42. The Tier 3 constant of 4875 was used to determine worst-case emissions. None of the calculated emissions exceed the Significant Emission Rate for each pollutant.

Pollutant	Emission factor (lb/hp-hr)	Emissions (tons/year)	Significant Emission Rate (tons/year)
CO	0.0055	26.8	100
SO_2	0.00404 *	19.7	40
PM/PM_{10}	0.0007	3.4	25 (PM)/15 (PM_{10})
VOC	0.000705	3.4	40

* The SO_2 emission factor in AP-42 is 0.00809 x (sulfur content). The maximum allowed sulfur content is 0.5 percent, thus the emission factor is 0.00404.

SPECIFIC AIR PROGRAM APPLICABILITY

14. Facilities assigned to this General Permit are subject to the general visible emissions standards, nuisance requirements (control of fugitive dust and odors), particulate matter standards, and fuel sulfur limits in OAR Chapter 340, Divisions 208, 226, and 228. The permit contains requirements and limitations to ensure compliance with these standards.

15. Although not currently a requirement, most power generators use only highway grade diesel that contains less than 0.05% sulfur by weight. Since this fuel is readily available, DEQ believes this should be a requirement for all power generators and is considering establishing the lower sulfur limits by rule. In the interim, the low sulfur limit is included in this General ACDP. In addition, DEQ is requiring add-on controls, such as catalytic converters, for PM, CO, and VOC.

16. Facilities assigned to this General Permit are subject to 40 CFR Part 63, Subpart ZZZZ.

This subpart contains federal standards for hazardous air pollutants from the operation of a Reciprocal Internal Combustion Engine (RICE). There are notification and reporting requirements to be submitted to the EPA with copies sent to DEQ.

17. An Air Quality Discharge Permit (ACDP) is not required for non-road engines as defined in 40 CFR 1068.30, unless the engine(s) were to have annual emissions of 10 or more tons per year of any single criteria pollutant at one location. The following provides information on making a stationary or non-road engine determination: If an engine operates in the same location for more than 12 months (can be shorter for seasonal sources), it will not be considered a non-road engine and could be subject to ACDP requirements. An engine located at a seasonal source is an engine that remains at a seasonal source during the full annual operating period of the source. A seasonal source is a stationary source that remains in a single location on a permanent basis (i.e., at least two years) and operates at that single location approximately three months (or more) each year. If the engine(s) do not qualify as non-road engine(s), then permitting the engine(s) must be considered.

COMPLIANCE ASSURANCE

18. Permittees are required to maintain records of hours of operation of each generator, the sulfur content of diesel fuel used, upset conditions, and complaints received at the facility. These items are reported to DEQ annually.

19. DEQ staff members perform site inspections of the permitted facilities on a routine basis, and more frequently if complaints are received.

REVOCATION OF ASSIGNMENT

20. Any facility that fails to demonstrate compliance, generates complaints, or fails to conform to the requirements and limitations contained in the permit may have its assignment to the General Permit revoked. The facility would then be subject to a higher, more stringent level of permitting.

PUBLIC NOTICE

21. General Air Contaminant Discharge Permits are incorporated into the Oregon Administrative Rules by reference and are part of the State Implementation Plan. As part of the rulemaking process, the public will be provided at least 30 days to submit written comments. DEQ will review any comments and may modify the permits in response to the comments. The final permits will be issued as orders signed by the DEQ air quality administrator.