

3.8 Internal Combustion Sources

3.8.1 General Description of Source Category

LANL maintains and operates more than 200 stationary and portable electrical generators with design capacities ranging from less than 1 kW to 1600 kW. Stationary generators are used on standby (emergency) status to provide power to critical systems at LANL during power outages. The stationary generators are fueled by natural gas, propane, gasoline, or diesel. Portable generators are used for temporary operations requiring remote power or to provide emergency backup power during power outages at various sites. The portable generators are fueled by gasoline and diesel. LANL also operates diesel-fired engines that are used on drill rigs. Finally, LANL operates one stationary generator that supports process-related activities. This generator is permitted under 20.2.72 NMAC. Table 3-8-1 summarizes the categories of internal combustion equipment at LANL.

Stationary Standby Generators – LANL maintains a pool of approximately 45 stationary standby generators at various locations throughout the Laboratory. All of these generators meet the definition of standby equipment under 20.2.70 NMAC and are used solely to provide emergency backup power for less than 500 hours annually. Therefore they are defined as insignificant sources under NMED Exemption #7 and are exempt from Title V operating permit program. Even though these stationary generators are exempt from permitting, LANL is including emissions from these sources as part of the proposed facility-wide limits discussed in Chapter 2.

Stationary Process Generator – LANL operates one stationary generator that is used for process-related activities at TA-33. The unit is a 1500 kW diesel fired unit (derated for altitude). It will only be used periodically to support experimental research projects. This generator was permitted under 20.2.72 NMAC and specific operating limits are included in the permit. These operating limits will be included in the operating permit.

Table 3.8-1. Types of Internal Combustion Sources at LANL

Equipment Description	Approximate Total of design Rating for category (kW)	Fuel	Operational Status	Permitting Status
Stationary Standby Generators	10,355	Natural Gas Propane Gasoline Diesel	Standby, Emergency	Exempt-IEU ^(a) # 7
TA-33 Stationary Process Generator	1500 ^(b)	Diesel	Periodic for experimental research	20.2.72 NMAC Permit 2195-F
Portable Generators	3500	Gasoline Diesel	Emergency, Portable, Temporary	Exempt -Trivial Activity # 21, and IEU # 6 and 7
Engines for Drill Rigs	Varies	Diesel	Temporary	Trivial Activity # 31

(a) IEU = Insignificant Emission Unit

(b) Derated for altitude

Portable Generators – LANL maintains a pool of approximately 135 portable generators used for temporary power at remote locations and to provide emergency back-up power. Many of these portable generators qualify as trivial activities based on size. Trivial activity #21 exempts small portable generators that can be moved without the assistance of any motorized or non-motorized vehicle, conveyance, or device from one location to another.

Some of the portable generators do not qualify as trivial activities, but are considered insignificant emission units based on NMED’s Insignificant Activities # 6 and #7. Insignificant Activity # 6 is for portable engines with design capacity less than or equal to 200 horsepower if fueled by diesel or natural gas, and less than 500 horsepower if fueled by gasoline. Insignificant Activity # 7 exempts emergency generators used less than 500 hours per year.

These portable generators meet the EPA definition of nonroad engine at 40 CFR Parts 85 and 89. Specifically, the generators do not remain in any one location for more than 12 consecutive months. The definition of stationary source at Section 302 (z) of the 1990 CAAA excludes nonroad engines. Therefore, nonroad engines are not regulated under the federal new source review program, which includes the PSD permit requirements. Under the New Mexico Air Quality Control Act, the state PSD regulation cannot be more stringent than the federal program or include sources that are not subject to federal PSD. Thus, even though nonroad engines may be permitted by NMED under minor source construction permitting, they cannot be regulated for PSD purposes by the NMED. Therefore LANL has not included emissions from these units in the requested facility-wide limits discussed in Chapter 2 for PSD purposes.

No action is required for the exempt portable generators and other portable engines, and they are not discussed further in this section.

Drill Rig Engines – The diesel-fired drill rigs are used to drill sample cores for site characterization throughout the Laboratory. Equipment used to withdraw materials for analysis are exempt based on the NMED’s list of trivial activities (Trivial Activity #31). These drills are also used to drill holes for the installation of monitoring equipment; however, the operating permit is not intended to cover construction activities. No action is required for the exempt drill rig engines and other exempt engines, and they are not discussed further in this section.

3.8.2 Operating Schedule

Stationary Stand-by Generators – The stationary standby generators operate whenever commercially available power is not available. These engines are run periodically for testing and maintenance. Normally each generator is tested for approximately one hour per month. Each generator runs less than 500 hours per year. LANL is proposing a limit on operation of this pool of generators as part of our proposed facility-wide emission limits. The pool of generators will be limited to an average of approximately 168 hours per year. Past actual hours of operation for this pool of

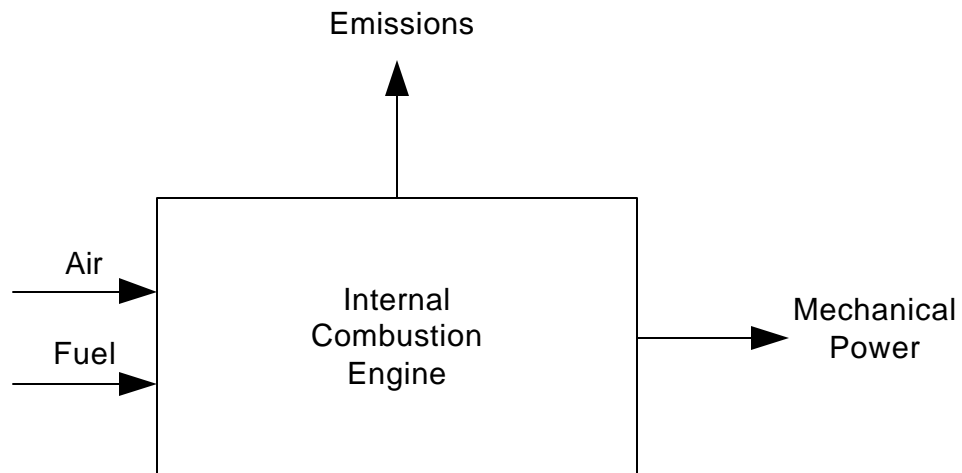
generators have typically been 40 to 50 hours per year. For the purpose of this application, the generators can operate at any time during the year.

Stationary Process Generator – The stationary process generator is permitted under 20.2.72 NMAC. The operating limits in the permit allow for operating a maximum of 12,000 kilowatt hours/day (kWh/day) and 1,350,000 kilowatt hours/year (kWh/year). The generator is also limited to operate at full capacity for eight hours a day between the hours of 7:00 a.m. and 5:00 p.m.

3.8.3 Process Flow Diagram

A general process flow diagram for an internal combustion unit is provided in Figure 3.8-1.

Figure 3.8-1. Process Flow Diagram for Internal Combustion Sources



3.8.4 Emissions

Emissions from internal combustion systems include the criteria pollutants (NO_x , CO, SO_2 , PM, and VOCs), and trace amounts of HAPs. The emission factors used to calculate criteria and HAP emissions from generators are summarized in Table 3.8-2. The criteria pollutant and HAP emission factors for the engines were obtained from AP-42, and in one case from the manufacturer.

The total kilowatts for the pool of stationary stand-by generators in each emission factor size range is as follows:

- natural gas-fired generators = 405 kW,
- diesel-fired generators <447 kW = 4650 kW, and
- diesel-fired generators >447 kW = 5300 kW.

These total power outputs were applied in conjunction with the proposed limit on annual hours of operation and the emission factors to estimate emissions for each generator type.

For the stationary process generator at TA-33 the allowable emissions are based on 20.2.72 NMAC permit conditions and are shown in Table 3.8-4.

Table 3.8-2. Internal Combustion Emission Factors For Stationary Generators

Air Pollutant	Natural Gas^(a) Emission Factors (g/kW-hr)	Diesel Engines <447 kW^(b) Emission Factors (g/kW-hr)	Diesel Engines >447 kW^(c) Emission Factors (g/kW-hr)	TA-33 Process Generator^(d) Emission Factors (g/kW-hr)
NO _x	4.91	18.8	14.6	12.2
CO	0.6	4.06	3.34	10.2
SO _x ^(e)	0.0009	1.25	1.67	1.67
PM	0.06	1.34	0.43	0.43
VOC	0.19	1.52	0.43	0.21
HAPs ^(f)	0.123	0.0097	0.0066	0.0066

(a) AP-42 Section 3.2: Natural Gas Fired Reciprocating Engines, July 2000. Table 3.2-1.

(b) AP-42 Section 3.3: Gasoline and Diesel Industrial Engines, October 1996. Tables 3.3-1 and 3.3-2.

(c) AP-42 Section 3.4: Large Stationary Diesel and All Stationary Dual Fuel Engines, October 1996. Tables 3.4-1, 3.4-3, and 3.4-4.

(d) Emission Factors for NO_x, CO, and VOC were obtained from the manufacturer. Emission factors for SO_x, PM, and HAPs are from AP-42, Section 3.4.

(e) The diesel fuel is assumed to have a 0.34% sulfur content.

(f) The total HAP emission factors are the sum of all the individual HAP emission factors listed in each applicable table of AP-42. Units were converted from lb/MMBtu to g/kW-hr.

The emission calculations for the stationary stand-by generators follow the general format shown below:

$$ER \left(\frac{\text{ton}}{\text{yr}} \right) = EF \left(\frac{\text{g}}{\text{kW-hr}} \right) * \text{Total Design Capacity (kW)} * 168 \left(\frac{\text{hr}}{\text{yr}} \right) * \left(\frac{\text{ton}}{9.07 \times 10^5 \text{ g}} \right)$$

Where:

ER = Emission Rate

EF = Emission Factor

The calculated emissions are shown in Table 3.8-3.

Table 3.8-3. Emissions Estimates for Internal Combustion Engines (ton/year)

Pollutant	Stationary Stand-by Generators			TA-33 Process Generator	Total Emissions (ton/year)
	Natural Gas Fired Generators	Diesel Fired Generators < 447kW	Diesel Fired Generators > 447kW		
NO _x	0.4	16.2	14.3	18.1	49.0
SO _x	0.00007	1.1	1.6	2.5	5.2
PM	0.005	1.2	0.4	0.6	2.2
CO	0.05	3.5	3.3	15.2	22.1
VOC	0.014	1.3	0.42	0.3	2.0
HAPs	0.009	0.008	0.01	0.01	0.04

3.8.5 Emissions Control Equipment

There are no air pollution controls on the internal combustion engines.

3.8.6 Applicable Requirements

The applicable requirements for LANL’s internal combustion units are shown below in Table 3.8-4.

Table 3.8-4. Applicable Requirements for Internal Combustion Units

Source	Applicable Requirements
Stationary Standby Generators	<ul style="list-style-type: none"> Limit operation of stationary standby generator pool to an average of 168 hr/year. (LANL proposed condition)

Source	Applicable Requirements									
TA-33 Generator	<p>Operating Requirements:</p> <ul style="list-style-type: none"> Limit operation of TA-33 generator to 12,000 kWh/day, and 1,350,000 kWh/year. (Condition 1.c of Permit 2195-F) Limit operation of the TA-33 generator at full capacity for eight hours a day between the hours of 7:00 am and 5:00 p.m. (Condition 1.d of Permit 2195-F) <p>Emission Limits:</p> <ul style="list-style-type: none"> Limit emissions from the TA-33 generator as shown below (Condition 2 of Permit 2195-F) 									
	PM/PM ₁₀		NO _x		CO		VOC		SO _x	
	lb/hr	ton/y r	lb/hr	ton/y r	lb/hr	ton/yr	lb/hr	ton/y r	lb/hr	ton/y r
	1.4	0.6	40.3	18.1	33.7	15.2	0.7	0.3	5.5	2.5

3.8.7 Proposed Monitoring, Recordkeeping, and Reporting

Recordkeeping is proposed as adequate monitoring to ensure that emissions from the generators stay below the proposed limits. Table 3.8-5 presents the proposed monitoring, recordkeeping, and reporting.

Table 3.8-5. Proposed Monitoring, Recordkeeping, and Reporting for Internal Combustion Engines

Source	Monitoring, Recordkeeping, and Reporting
Stationary standby generators	<p>Monitoring/Recordkeeping:</p> <ul style="list-style-type: none"> Track and record hours of operation for stationary standby generators on a semiannual basis. (LANL proposed condition) Track total kilowatts of pool of generators in each size, fuel type annually. (LANL proposed condition) <p>Reporting:</p> <ul style="list-style-type: none"> Submit semiannual report of any required monitoring within 45 days from the end of each reporting period. The reporting periods are January to June and July to December. (20.2.70.302(E)(1) NMAC)

Source	Monitoring, Recordkeeping, and Reporting
TA-33 Generator	<p><i>Monitoring/Recordkeeping:</i></p> <ul style="list-style-type: none"> • Track hourly kWh and annual kWh for the TA-33 generator. (Condition 4.a of Permit 2195-F) • Record hours of operation and the time operation begins and ends each day. (Condition 4.b of Permit 2195-F) <p><i>Reporting:</i></p> <ul style="list-style-type: none"> • Report the anticipated date of initial startup of the TA-33 generator not less than thirty (30) days prior to the date. (General Condition 1.a.i of Permit 2195-F) • Report the equipment serial number and the actual date of initial startup of the TA-33 generator within fifteen (15) days after the startup date. (General Condition 1.a.ii of Permit 2195-F) • Report the date when the TA-33 generator reaches the maximum production rate at which it will operate within fifteen (15) days after that date. (General Condition 1.a.iii of Permit 2195-F) • Report criteria pollutant and HAP emissions on a semiannual basis. (20.2.73.300 NMAC for criteria pollutants and LANL proposed condition for HAPs and semiannual basis) • Submit semiannual report of any required monitoring within 45 days from the end of each reporting period. The reporting periods are January to June and July to December. (20.2.70.302(E)(1) NMAC)