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Complying with Periodic Emissions Monitoring Requirements

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Permitting Basics

- The Clean Air Act requires EPA to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants (also known as "criteria air pollutants"). These pollutants are found all over the U.S. They can harm your health and the environment.
- Criteria air pollutants are required to be listed in air pollution permits for stationary equipment.

Permitting Basics

- **Criteria Air Pollutants**
  - NOx
  - CO
  - SO2
  - VOC’s
  - Particulate Matter
  - Lead

Permitting Basics

- **Hazardous Air Pollutants**:
  - *also known as **toxic air pollutants** or **air toxics**, are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.*

Permitting Basics

- The maximum potential-to-emit must be determined and listed in permits
  - Worst case emissions at full load (lb/hr)
    - For example maximum gal/hr, scf/hr that equipment can handle
  - **How are emissions determined?**
    - Use manufacturer specifications
    - Use standard AP-42 emission factors
      - https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors
    - Use test data

Example Manufacturer Specifications Sheet

Emissions Data Top

Units Filter All Units

RATED SPEED POTENTIAL SITE VARIATION: 2100 RPM

ENGINE POWER		BHP	1,200	900	600	300	120
PERCENT LOAD		%	100	75	50	25	10
TOTAL NOX (AS NO2)		G/HR	3,961	1,880	1,278	944	471
TOTAL CO		G/HR	544	651	683	668	1,032
TOTAL HC		G/HR	106	116	156	134	245
PART MATTER		G/HR	59.8	50.2	57.2	83.5	62.5
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	1,521.7	850.8	857.4	1,126.0	960.6
TOTAL CO	(CORR 5% O2)	MG/NM3	205.5	291.2	451.2	788.8	2,087.3
TOTAL HC	(CORR 5% O2)	MG/NM3	34.8	45.4	89.8	137.5	429.4
PART MATTER	(CORR 5% O2)	MG/NM3	18.4	18.8	32.7	87.8	114.7
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	741	414	418	548	468
TOTAL CO	(CORR 5% O2)	PPM	164	233	361	631	1,670
TOTAL HC	(CORR 5% O2)	PPM	65	85	168	257	802
TOTAL NOX (AS NO2)		G/HP-HR	3.33	2.11	2.15	3.16	3.94
TOTAL CO		G/HP-HR	0.46	0.73	1.15	2.24	8.64
TOTAL HC		G/HP-HR	0.09	0.13	0.26	0.45	2.05
PART MATTER		G/HP-HR	0.05	0.06	0.10	0.28	0.52
TOTAL NOX (AS NO2)		LB/HR	8.73	4.15	2.82	2.08	1.04
TOTAL CO		LB/HR	1.20	1.43	1.51	1.47	2.28
TOTAL HC		LB/HR	0.23	0.26	0.34	0.30	0.54
PART MATTER		LB/HR	0.13	0.11	0.13	0.18	0.14

AP 42, Fifth Edition Compilation of Air Pollutant Emissions Factors, Volume 1: Stationary Point and Area Sources

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Permitting Basics

- Some equipment emissions will vary with time due to certain factors including:
  - age,
  - composition of fuel,
  - maintenance of the equipment
- Conducting periodic testing may be required to ensure that the equipment is operating properly and at the levels approved in the permit

Three Types of Emissions Monitoring

- **Periodic Emissions Monitoring**
  - Exceedance of emissions are usually not penalized
- **Stack Test**
  - Formal test of emissions where emissions exceedances result in violation
- **Continuous Emissions Monitoring (CEMS) and Continuous Opacity Monitoring (COMS)**
  - Continuous emissions monitors are placed on equipment and any emission exceedance is penalized

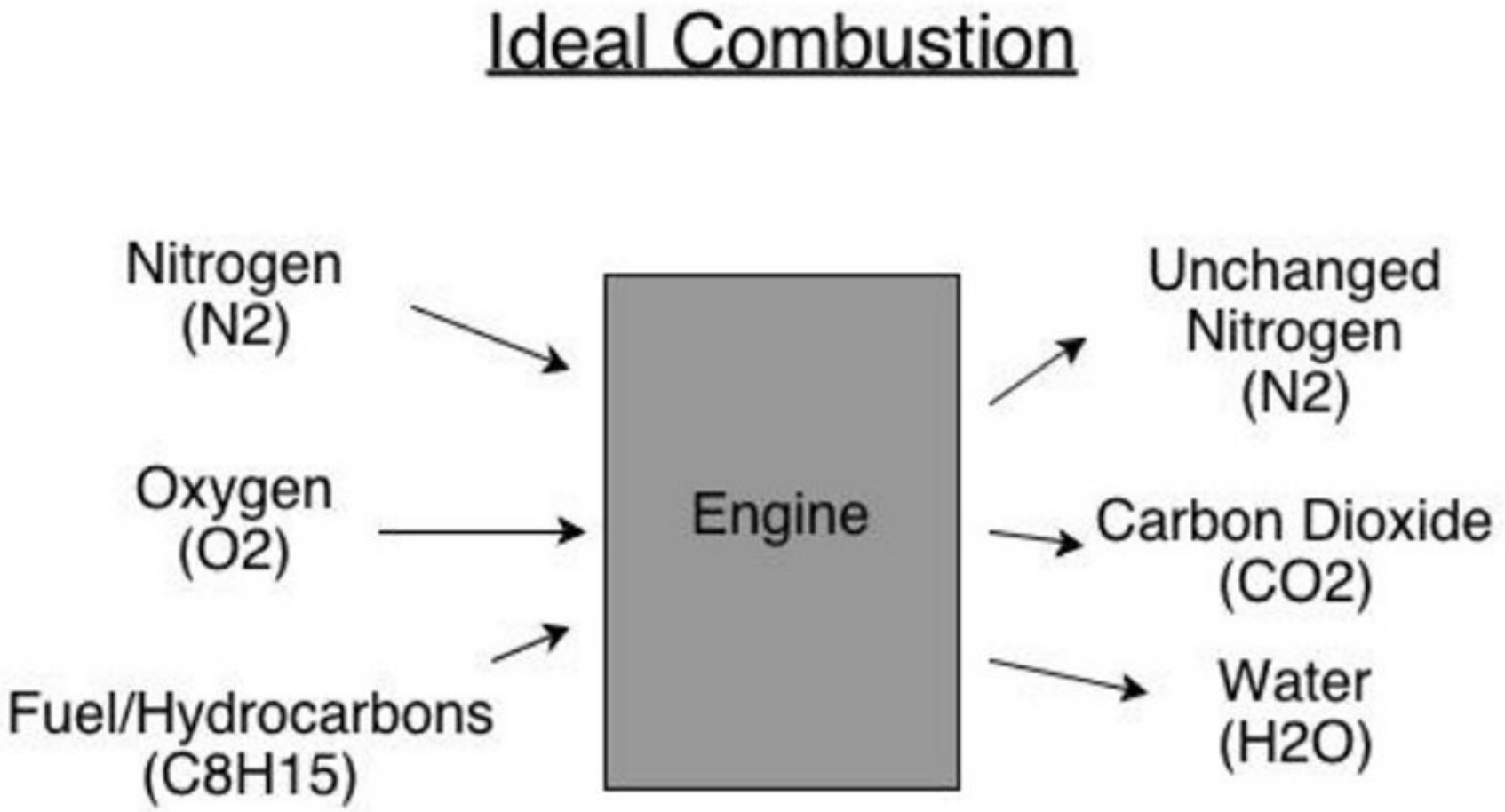
Periodic Emissions Monitoring

- For some permitted facilities with low air impact, the Department may require that emissions routinely be monitored periodically using non Reference Method procedures.
- Such monitoring is performed by the sources themselves or may be contracted out to consultants.

Equipment where Periodic Emissions Monitoring Requirements are Often Found

1. Waste Oil Heaters
2. Boilers (greater than 5 MMBtu/hr)
3. Stationary Engines

Why do I have to do a combustion adjustment and measure emissions?



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Products of Combustion

Carbon
Hydrogen
Nitrogen
Sulfur
Oxygen

Primary Pollutants

CO - Carbon Monoxide
CO_2 - Carbon Dioxide
SO_2 - Sulfur
NO_x - Nitrogen Dioxide
N_2O - Nitric Oxide

VOCs - Volatile Organic Compounds
or
HCs - Hydrocarbons

Particulate Matter

PM_{10} - Course Particles - less than 10 microns
$PM_{2.5}$ - Fine Particles - less than 2 microns

NH_3 - Ammonia

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WASTE OIL HEATERS

Waste Oil Heaters

- Adjust the combustion process within the first 24 hours of start-up and annually thereafter
  - Adjust the air to fuel ratio to manufacturer's standards
  - Clean and replace any components to minimize carbon monoxide (CO) emissions
  - Take an exhaust stream sample and analyze for CO and oxygen

Waste Oil Heaters – CO and O2 annual monitoring

- Monitoring may be done with a portable monitor
- Emissions may be no more than 100 parts per million by volume, dry basis, hourly average, corrected to seven percent oxygen.
  - Testing for less than one hour is permitted if the CO reading is no more than 100 parts per million by volume, dry basis, corrected to seven percent oxygen for five consecutive minutes of operation

Waste Oil Heaters Recordkeeping Requirement

- Record the manufacturer and model number of the portable monitor
  - The CO testing equipment shall be capable of measuring and recording the in-stack concentrations of CO, over a range of 0 to 500 parts per million by volume, with an accuracy of plus/minus five percent of the reading when measuring 100 parts per million by volume.
- Recording all adjustments made to the space heater, all parts replaced or cleaned, all carbon monoxide and oxygen readings, the determination of the presence of visible emissions, and the dates of each adjustment

Who can be hired to do this testing?

- http://www.state.nj.us/dep/bts/consult_list.html

List of Consultants

NOTE: The New Jersey Department of Environmental Protection does not certify, approve or recommend any consulting firm. The following is a list of consulting firms which claim to perform stack tests and is provided for informational purposes only.

List of consultants performing emission testing of stationary sources in New Jersey.(PDF)

Additionally, the USEPA maintains and updates a national database of testing firms that can be downloaded from the Emission Measurement Center Web site at the following address:

http://www.sesnews.org/index.php?q=Stack

If you have any questions please feel free to contact The Emission Measurement Section (formerly Bureau of Technical Services) at (609) 530-4041.

BOILERS

(GREATER THAN 5 MMBTU/HR)

Boilers Greater than 5 MMBtu/Hr

- Annual Combustion Adjustment (must be done in the same quarter each year)
  - Measure and record the concentration of CO, NOx and O2 before the adjustment
  - Inspect burner, flame pattern, clean and replace any components as necessary to minimize CO and NOx emissions
  - Inspect controller of air to fuel ratio
  - Measure and record the concentration of CO, NOx and O2 after the combustion adjustment

Boilers Greater than 5 MMBtu/hr

- Annual Combustion Adjustment Reporting Requirements
  - Record date, time and name of person conducting the adjustment
  - Measured concentrations of CO, NOx and CO
  - Record any adjustments made
  - Determine amounts of all fuel used in 12 months preceding the adjustment

Boilers Greater than 5 MMBtu/hr

- Electronic reporting to NJDEP is required within 45 days of date of adjustment
  - http://www.njdeponline.com/
  - The NJDEP online form will convert CO and NOx measurements adjusted from ppm to lb/MMBtu and correct for oxygen
  - Boilers greater than 25 MMBtu/hr must comply with NOx values of 0.05 lb/MMBTU (natural gas) and 0.08 lb/MMBtu (No. 2)

EPA Rule for Boilers: Industrial, Commercial & Institutional that Combust Oil 40; 63 JJJJJJ

- Regardless of size, boilers that combust oil must do a “tune up” every 5 years (every 2 years for boilers greater than 5 MMBtu/hr unless the unit has an oxygen trim system that adjusts the air to fuel ratio)
- Combustion adjustment procedures similar to NJDEP procedures with the exception that only CO needs to be measured
- Data recorded and maintained onsite

STATIONARY ENGINES

Periodic Monitoring Procedure (PMP) for Stationary Engines

- Includes non-emergency engines used in the production of electricity
- Can also include engines driving particular stationary equipment (i.e. tubgrinder)

Stationary Engines (Combusting Fuel Oil)

TESTING AND MONITORING RECOMMENDATIONS [1]
FOR EXISTING RECIPROCATING INTERNAL COMBUSTION ENGINES (Except Emergency Generators)

Diesel / #2 or Lighter Fuel Oil / Bio-Diesel

Size (Single engine)	Combustion Process Adjustment	Periodic Monitoring Procedure (PMP[2,5])	Stack Test[4, 6]
37 kW Power Output < 148 kW (50 HP Power Output < 200 HP)	**If used for generating electricity:** According to the manufacturer's recommended procedures and maintenance schedule.	CO and NOx, Annually	None[6]
148 kW Power Output < 370 kW (200HP Power Output <500 HP)	**If used for generating electricity:** According to the manufacturer's recommended procedures and maintenance schedule.	CO and NOx, Semiannually[3]	None[6]
370 kW Power Output <1480 kW (500HP Power Output < 2000 HP)	According to the manufacturer's recommended procedures and maintenance schedule.	CO and NOx, Quarterly[3]	CO, NOx, TSP, PM10, and $PM_{2.5}$ every 5 years.
Power Output 1480 kW (Power Output 2000 HP)	According to the manufacturer's recommended procedures and maintenance schedule.	CO and NOx, Quarterly[3]	CO, NOx, VOC, TSP, PM_{10}, $PM_{2.5}$, and SO_2, Ever

Stationary Engines (Combusting Landfill or Digester gas)

Size (Single engine)	Combustion Process Adjustment	Periodic Monitoring Procedure (PMP[2,6])	Stack Test[4,5]
37 kW Power Output < 148 kW (50 HP Power Output < 200 HP)	**If used for generating electricity:** According to the manufacturer's recommended procedures and maintenance schedule.	CO and NOx, Semiannually[3]	None
148 kW Power Output < 370 kW (200HP Power Output <500 HP)	**If used for generating electricity:** According to the manufacturer's recommended procedures and maintenance schedule.	CO and NOx, Quarterly[3]	None
370 kW Power Output <1480 kW (500HP Power Output < 2000 HP)	According to the manufacturer's recommended procedures and maintenance schedule.	CO and NOx, Monthly[3]	CO and NOx, Every 5 years.
Power Output 1480 kW (Power Output 2000 HP)	According to the manufacturer's recommended procedures and maintenance schedule.	CO and NOx, Monthly[3]	CO, NOx, VOC, and SO_2, Every 5 years.

Stationary Engines

- Periodic Combustion Adjustment
  - Measure and record the concentration of CO, NOx and O2 before the adjustment
  - Inspect burner, flame pattern, clean and replace any components as necessary to minimize CO and NOx emissions
  - Inspect controller of air to fuel ratio
  - Measure and record the concentration of CO, NOx and O2 after the combustion adjustment

Stationary Engines

- Periodic Combustion Adjustment Reporting Requirements
  - Record date, time and name of person conducting the adjustment
  - Measured concentrations of CO, NOx and O2
  - Record any adjustments made
  - Determine amounts of all fuel used in 12 months preceding the adjustment

Stationary Engines Reduction in Frequency of PMP testing Guidance

- A permit modification may be submitted to request a reduction in the frequency of PMP testing

Initial Frequency, from Testing and Monitoring Guidance	Minimum Duration between PMP Tests	Consecutive PMP Test Results Showing Compliance with Permit Limits	Reduced Frequency
Semiannually	90 calendar days	6 consecutive semiannual test results	Annually
Quarterly	45 calendar days	8 consecutive quarterly test results	Annually
Monthly	15 calendar days	12 consecutive monthly test results	Quarterly

Standard Procedures for Stack Testing

- Requirement
  - Stack emission testing once initially and every 5 years
- Submit a protocol
  - Within 90 days of the approved permit
  - Each protocol is site specific and is usually developed by the chosen stack testing agency that will submit on your behalf
  - Stack test must be conducted at a mutually accepted day and time within 90 days of the approved protocol

Standard Procedures for Stack Testing

- Conduct Stack Test
  - A minimum of three (3) valid test runs
  - A minimum sampling time of 60 minutes per run
  - NJDEP enforcement officer (possibly EPA enforcement officer) observes stack test
- Submit Results
  - the test report shall be submitted to BTS within thirty (30) calendar days, consistent with N.J.A.C. 7:27-8.4(f)5 for a PCP, or forty-five (45) calendar days, consistent with N.J.A.C. 7:27-22.18(e)3 for a BOP .

Violations

For the nonsubmittal of or the failure to maintain records of any smoke, opacity or emission data:

i. $2,000 for the first offense;

ii. $4,000 for the second offense;

iii. $10,000 for the third offense; and

iv. $30,000 for the fourth and each subsequent offense.

Violations

For the nonsubmittal of or the failure to maintain records of any stack or test data not included in (c)1 above:

i. $1,000 for the first offense;

ii. $2,000 for the second offense;

iii. $5,000 for the third offense; and

iv. $15,000 for the fourth and each subsequent offense.

Violations

Citation	Rule Summary	Type of Violation	First Offense	Second Offense	Third Offense	Fourth a Ea Subseque Offen
N.J.A.C. 7:27-8.3(e)	Emissions Detected by Stack Tests from Source Operation					
Class: Maximum Allowable Emissions						
Less than 0.5 pound per hour:						
1. Less than 25 percent over the allowable standard		NM	$500[4]	$1,000[4]	$2,500[4]	$7,50
2. From 25 through 50 percent over the allowable standard		NM	$1,000[4]	$2,000[4]	$5,000[4]	$15,00
3. Greater than 50 percent over the allowable standard		NM	$2,000[4]	$4,000[4]	$10,000[4]	$30,00
From 0.5 through 10 pounds per hour, or 0.5 through 2.5 pounds per hour for VOC and NO_x:						
1. Less than 25 percent over the allowable standard		NM	$2,000[4]	$4,000[4]	$10,000[4]	$30,00
2. From 25 through 50 percent over the allowable standard		NM	$4,000[4]	$8,000[4]	$20,000[4]	$50,00
3. Greater than 50 percent over the allowable standard		NM	$8,000[4]	$16,000[4]	$40,000[4]	$50,00
Greater than 10 through 22.8 pounds per hour, or greater than 2.5 through 5.7 pounds per hour for VOC and NO_x:						
1. Less than 25 percent over the allowable standard		NM	$6,000[4]	$12,000[4]	$30,000[4]	$50,00
2. From 25 through 50 percent over the allowable standard		NM	$8,000[4]	$16,000[4]	$40,000[4]	$50,00
3. Greater than 50 percent over the allowable standard		NM	$10,000[4]	$20,000[4]	$50,000[4]	$50,00
For greater than 22.8 pounds per hour, or greater than 5.7 pounds per hour for VOC and NO_x or air contaminants regulated pursuant to HAP (Table B)[6]:						
1. Less than 25 percent over the allowable standard		NM	$8,000[4]	$16,000[4]	$40,000[4]	$50,00
2. From 25 through 50 percent over the allowable standard		NM	$10,000[4]	$20,000[4]	$50,000[4]	$50,00
3. Greater than 50 percent over the allowable standard		NM	$10,000[4]	$20,000[4]	$50,000[4]	$50,00

Violations

Citation	Rule Summary	Type of Violation	First Offense	Second Offense	Third Offense	Fourth and Each Subsequent Offense
N.J.A.C. 7:27-8.4(f)1	Submit Source Specific Testing Protocol	M	$1,000	$2,000	$5,000	$15,000
N.J.A.C. 7:27-8.4(f)3	Conduct Source Specific Testing	M	$2,000	$4,000	$10,000	$30,000
N.J.A.C. 7:27-8.4(f)4	Provide Notice of Source Specific Testing	M	$300	$600	$1,500	$4,500
N.J.A.C. 7:27-8.4(f)5	Submit Test Report	M	$500	$1,000	$2,500	$5,000
N.J.A.C. 7:27-8.4(f)6	Certify Test Report	M	$300	$600	$1,500	$4,500
N.J.A.C. 7:27-8.4(n)	Submit Application for Renewal	M	$200	$400	$1,000	$3,000
N.J.A.C. 7:27-8.4(j)	Conduct Air Quality Impact Analysis	M	$2,000	$4,000	$10,000	$30,000
N.J.A.C. 7:27-8.15(a)	Submit Records	M	$500	$1,000	$2,500	$7,500
N.J.A.C. 7:27-8.15(b)	Submit Report	M	$500	$1,000	$2,500	$7,500
N.J.A.C. 7:27-8.15(c)	Certify Report	M	$300	$600	$1,500	$4,500
N.J.A.C. 7:27-8.15(d)	Submit Emission Report	M	$500	$1,000	$2,500	$7,500

Questions????

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