Southwest Clean Air Agency

FURNACES, OVENS AND SMALL BOILERS	Page 1 of 5
AIR DISCHARGE PERMIT APPLICATION DATA SHEET	Application No:_____

Please provide the following information concerning the proposed equipment. SWCAA may require additional information after review of the submitted application. Please attach any information that might aid in SWCAA's review of the Air Discharge Permit Application Data Sheet. In addition to this application form, all sources are required to demonstrate that proposed equipment meets the requirements of Best Available Control Technology (BACT).

APPLICANT INFORMATION:

Applicant Name: _____

Mailing Address: _____
Street City State Zip

Facility Identification: _____

Facility Address: _____
Street City State Zip

Contact Name / Title: _____

EQUIPMENT DATA: (Check all that apply)

Type:
- ☐ Boiler
- ☐ Furnace
- ☐ Oven
- ☐ Reactor/Oxidizer
- ☐ Other _____

Use:
- ☐ Power Generation
- ☐ Steam Generation
- ☐ Reactor/Reformer/Oxidizer
- ☐ Drying-Baking Oven
- ☐ Other _____

Boiler:
Manufacturer: _____
Model No: _____
Serial No: _____

Burner:
Manufacturer: _____
Model No: _____
Serial No: _____

Date Produced: _____ Date Reconstructed (if applicable): _____
Boiler Configuration (fire tube, water tube, fluidized bed, etc.): _____

Primary fuel
Type: _____
Burner Manufacturer: _____
Burner Model No.: _____
Rated Heat Input Capacity: _____ MMBtu/hr
Fuel Consumption Rate: _____ ☐ gal/hr ☐ ft^3/min

Secondary fuel
Type: _____
Burner Manufacturer: _____
Burner Model No.: _____
Rated Heat Input Capacity: _____ MMBtu/hr
Fuel Consumption Rate: _____ ☐ gal/hr ☐ ft^3/min

Exhaust Flowrate: _____ ☐ acfm ☐ dscfm
Turn-down Ratio: _____ Bypass Capability: _____

Stack Height: Above ground level: _____ ☐ feet ☐ meters Above Roof Level: _____ ☐ feet ☐ meters
Stack Diameter: _____ ☐ inches ☐ feet
Stack Discharge Temperature: _____ °F **Only use approved rain caps that do not interfere with vertical discharge.**

Distance to:
Property Boundary: _____ ☐ feet ☐ meters Closest Residential Dwelling: _____ ☐ feet ☐ meters
Nearest Building: _____ ☐ feet ☐ meters Building Dimensions: _____

Southwest Clean Air Agency

FURNACES, OVENS AND SMALL BOILERS AIR DISCHARGE PERMIT APPLICATION DATA SHEET	Page 2 of 5 Application No:_____

OPERATIONAL DATA:

Use: ☐ Power Generation ☐ Reactor/Reformer/Oxidizer ☐ Other _____
☐ Steam Generation ☐ Drying-Baking Oven

Maximum Load Condition: _____ MMBtu/hr Average Load Condition: _____ MMBtu/hr
Steam generation: _____ lb/hr @ _____ PSIG & _____ °F

Process Equipment Served by Boiler: _____

_____

_____

_____

_____

Hours of Operation: Maximum: _____ hr/day, _____ days/wk, _____ weeks/yr
Average: _____ hr/day, _____ days/wk, _____ weeks/yr

OVEN/REACTOR/REFORMER DATA:

Process Description: _____

_____

Feed Stock: _____ Rate of Feed: _____
Inlet Temperature: _____ ☐ °F ☐ °C Outlet Temperature: _____ ☐ °F ☐ °C
Dimensions: H _____ W _____ D _____ Diameter _____ Length _____ ☐ feet ☐ inches
Capacity: _____ ☐ gal ☐ ft^3 Construction Material: _____

EMISSION CONTROL EQUIPMENT DATA:

Equipment Description	Controlled Pollutant	Performance Guarantee

EMISSION FACTORS/DATA:

Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source
Nitrogen Oxides (NO_x)			
Carbon Monoxide (CO)			
Volatile Organic Compounds (VOC)			
Particulate Matter (PM)			
Sulfur Dioxide (SO_2)			
Oxygen (O_2)			
Carbon Dioxide (CO_2)			

Use of this form will assist in receiving approval for equipment or processes used to control emissions of volatile organic compounds (VOC). The information requested on the reverse side of this form is necessary for SWCAA to evaluate whether your proposal can comply with federal, state, and local requirements. It does not necessarily mean the Notice of Construction (NOC) will be approved as submitted. Your NOC will be approved or denied only after submittal and evaluation of all required information. However, the time required to evaluate your application will be significantly shortened if the information you submit is complete.

General Information to be Submitted As Applicable

1. The maximum and average VOC in parts per million, by volume, as methane, in the exhaust stream, before and after control.
2. The concentration of toxics as identified in WAC 173-460, "Controls for New Sources of Toxic Air Pollutants" from VOCs identified in item 1 above must be listed.
3. The maximum and average flow rates of the contaminated gas streams in standard cubic feet per minute. Provide the basis and source of this information.
4. Calculations to show how the blower was sized to deliver the amount of flow in item 3 above.
5. A process and instrumentation diagram showing the type and locations of the meters, gauges, feedback controllers, regulators and recorders, etc...
6. A plot plan showing the location and neighborhood of the proposed project including distance to adjacent property lines and elevation of discharge stack.
7. The discharge stack shall not have a rain cap or cover that inhibits vertical discharge from the stack.
8. A copy of the Operations and Maintenance (O&M) Manual for all control equipment.
9. The method of indicating and recording hours of operation.
10. The horsepower of the blower, type of fuel, maximum Btu/hour rating and minimum temperature at which the gas flow will be maintained during oxidation.
11. The instrumentation to maintain and control the temperature in the oxidizer.
12. The preheat temperature of the gas stream before entering the catalyst.
13. The temperature increase across the catalyst bed as a function of inlet VOC concentrations.
14. The efficiency of the catalyst based on manufacturer's specifications.
15. A description on how the generator/compressor operates i.e., constant RPM, how the fuel to the engine will be regulated as the hydrocarbon concentration in the inlet gas decreases.
16. A description of the how the catalyst system functions and specifically which engine operating parameters can affect its performance.
17. Engineering calculations based on which the system in a) was chosen and how adequate the catalyst beds are for venting the engine exhaust.
18. The calculations in e) must include the maximum flowrate of gas through the engine, chemical compositions (NOx, CO, O2, CO2, and non-methane hydrocarbons) in the exhaust gas from the engine, and from each stage of the catalyst.

FUEL DATA:

Use No. 2 Diesel Fuel, if equipment is diesel fueled. Sulfur Content: 0.0015 percent (15 ppm) maximum allowed for diesel.
Density : 7.206 lb/gal (#2 diesel) 8.212 lb/gal (#6 fuel oil) 0.04491 lb/ft^3 (natural gas)
Heating Values: #2 diesel = 19,404 Btu/lb (141,000 Btu/gal) #6 oil = 18,245 Btu/lb (150,000 Btu/gal) natural gas = 22,410 Btu/lb (1006 Btu/ft^3)

EMISSION FACTORS: (for information and reference only)

#2 Diesel Fuel: from Air Pollution Engineering Manual Fuel Oil Combustion Table 2 Page 248 (uncontrolled factors)

(k = thousand) heat input	Utility\large industrial unit (>100 million Btu/hr)	Small industrial unit (10 to 100 million Btu/hr)	Commercial unit (0.3 to <10 million Btu/hr)	Residential unit (<0.3 million Btu/hr)
Oxides of Nitrogen (NOx)	: NA lb/k gal	: 20.0 lb/k gal	: 20.0 lb/k gal	: 18.0 lb/k gal
Carbon Monoxide (CO)	: NA lb/k gal	: 5.0 lb/k gal	: 5.0 lb/k gal	: 5.0 lb/k gal
Volatile Organic Compounds (VOC)	: NA lb/k gal	: 0.2 lb/k gal	: 0.34 lb/k gal	: 0.713 lb/k gal
Filterable Particulate Matter [1]	: NA lb/k gal	: 2.0 lb/k gal	: 2.0 lb/k gal	: 2.5 lb/k gal
Condensible Particulate Matter [2]	: NA lb/k gal	: NA lb/k gal	: NA lb/k gal	: NA lb/k gal
Sulfur Dioxide (SO_2)	: NA lb/k gal	: 142S [3] lb/k gal	: 142S lb/k gal	: 142S lb/k gal

Note: VOCs are nonmethane component

#6 Fuel Oil: from AP-42, Tables 1.3-2,3,4 (uncontrolled factors)

(k = thousand) heat input	Utility\large industrial unit (>100 million Btu/hr)	Small industrial unit (10 to 100 million Btu/hr)	Commercial unit (0.3 to <10 million Btu/hr)	Residential unit (<0.3 million Btu/hr)
Oxides of Nitrogen (NOx)	: 67.0 lb/k gal	: 55.0 lb/k gal	: 55.0 lb/k gal	: 18.0 lb/k gal
Carbon Monoxide (CO)	: 5.0 lb/k gal	: 5.0 lb/k gal	: 5.0 lb/k gal	: 5.0 lb/k gal
Total Organic Compounds (TOC)	1.04 lb/k gal	: 1.605 lb/k gal	: 0.475 lb/k gal	: 2.493 lb/k gal
Filterable Particulate Matter [1]	: (9.19 + 3.22) lb/k gal	: (9.19S + 3.22) lb/k gal	: (9.19S + 3.22) lb/k gal	: 0.3 lb/k gal
Condensible Particulate Matter [2]:	NA	: 7.5 lb/k gal	: 7.5 lb/k gal	: 11.0 lb/k gal
Sulfur Dioxide (SO_2)	: 157S lb/k gal	: 157S lb/k gal	: 157S lb/k gal	: 142S lb/k gal

Natural Gas: from AP-42, Tables 1.4-1,2,3 (uncontrolled factors)

(M = million) heat input	Utility\large industrial unit (>100 million Btu/hr)	Small industrial unit (10 to 100 million Btu/hr)	Commercial unit (0.3 to <10 million Btu/hr)	Residential unit (<0.3 million Btu/hr)
Oxides of Nitrogen (NOx)	: 550.0 lb/M ft^3	: 140.0 lb/M ft^3	: 100.0 lb/M ft^3	: 94.0 lb/M ft^3
Carbon Monoxide (CO)	: 40.0 lb/M ft^3	: 35.0 lb/M ft^3	: 21.0 lb/M ft^3	: 40.0 lb/M ft^3
Total Organic Compounds (TOC):	1.7 lb/M ft^3	: 5.8 lb/M ft^3	: 8.0 lb/M ft^3	: 11.0 lb/M ft^3
Filterable Particulate Matter [1]	: 5.0 lb/M ft^3	: 6.2 lb/M ft^3	: 4.5 lb/M ft^3	: 0.18 lb/M ft^3
Condensible Particulate Matter [2]:	NA lb/M ft^3	: 7.5 lb/M ft^3	: 7.5 lb/M ft^3	: 11.0 lb/M ft^3
Sulfur Dioxide (SO_2)	: 0.6 lb/M ft^3	: 0.6 lb/M ft^3	: 0.6 lb/M ft^3	: 0.6 lb/M ft^3

1. Filterable particulate matter (PM) is that particulate matter collected on or prior to the filter of an EPA Method 5 sampling train.
2. Condensable particulate matter (PM) is that particulate matter collected in the impinger portion of an EPA Method 5 sampling train.
3. S indicates that the weight percent of sulfur in the oil should be multiplied by the value given.

FURNACES, OVENS AND SMALL BOILERS AIR DISCHARGE PERMIT APPLICATION DATA SHEET	Page 4 of 5 Application No:_____

EMISSIONS CALCULATIONS

Emissions = Emission Factor X Fuel Consumption Rate X Specific Weight of Fuel X Fuel Heating Value X Usage Time X Ton Conversion

E = (lb/1,000 gal) X (gal/hr) X (hr/year) X (ton/2000 lb)

Example: E_{NOX} for diesel = (20.0 lb/1,000 gal) X (25.0 gal/hr) X (24 hr/day) X (7 days/wk) X (52 wk/yr) X (1 ton/2000 lb)

= 2.18 tons/yr

Note - If using other than No. 2 diesel for diesel applications, the emission factor may vary; see AP-42 for emission factors for other fuel types.

Calculate emissions for each criteria pollutant below as it applies to the proposed installation and summarize below.

E_{NOX} = _____ = _____ tons/yr

E_{CO} = _____ = _____ tons/yr

E_{VOC} = _____ = _____ tons/yr

E_{SOX} = _____ = _____ tons/yr

E_{PM} = _____ = _____ tons/yr

= = = = = = = = = = =

E_{TOTAL} = (E_{NOX} + E_{CO} + E_{VOC} + E_{SOX} + E_{PM}) **REGULATED EMISSIONS TOTAL = _____ tons/yr**

Additional emission considerations:

E_{PM10} = .96 (PM) = _____ tons/yr

E_{CO2} = _____ = _____ tons/yr

EXHAUST GAS FLOWRATE CALCULATION

(Conversion from acfm to dscfm)

The following equation converts a flowrate for a given condition noted as actual cubic feet per minute (acfm) to a flowrate in cubic feet per minute at dry standard temperature and pressure conditions (dscfm). The applicant should provide the actual flowrate in acfm, pressure in inches of mercury, moisture in percentage, and temperature in degrees Rankine to the following equation to make the conversion.

$$F_{dscfm} = F_{acfm} \, x \frac{T_{dscfm} \, x \, P_{acfm}}{T_{acfm} \, x \, P_{dscfm}} x \frac{1 - M}{100}$$

where:

F_{dscfm} = Exhaust flowrate at standard temperature and pressure in dry standard cubic feet per minute
F_{acfm} = Exhaust flowrate at measured temperature and pressure in actual cubic feet per minute
T_{dscfm} = Temperature at standard conditions in degrees Rankine (460 + 68 °F)
T_{acfm} = Temperature of actual exhaust discharge in degrees Rankine (460 + T °F)
P_{dscfm} = Pressure at standard conditions in inches of mercury (29.92 in Hg)
P_{acfm} = Pressure of actual exhaust discharge in inches of mercury (P_{acfm} in Hg)
M = Exhaust gas percent moisture as measured (decimal equivalent)

$$F_{dscfm} = \_\_\_\_ x \frac{530x\_\_\_\_}{\_\_\_\_ x 29.92} x \frac{1 - \_\_\_\_}{100}$$

Flowrate = _____ dscfm

EXHAUST GAS PARTICULATE CONCENTRATION (PC)

The following equation is used to calculate the particulate concentration (PC) in the exhaust gas stream. The applicant should provide the missing data for maximum pounds of particulate per hour in the exhaust gas stream and the flowrate of the exhaust stream in cubic feet per minute.

$$PC = \frac{R_1 \; lbPM/hr\,(\max) \, x \; 7000 \; grains \quad /lb}{F_1 \quad ft^3 \, x \; 60 \; \min \; /hr}$$

where:

PC = particulate concentration (grains/dscf)
R_1 = particulate mass emission rate (lb/hr)
F_1 = flowrate in dry standard cubic feet per minute (dscfm)

$$PC = \frac{\_\_\_\_ \; lb \, PM/hr\,(\max) \, x \; 7000 \; grains \quad /lb}{\_\_\_\_ \quad ft^3 \, x \; 60 \; \min \; /hr}$$

Particulate Concentration = _____ grains/dscf