Southwest Clean Air Agency

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CATALYTIC/THERMAL OXIDIZERS - COMBUSTORS

APPLICANT: _____ **NOC#** _____

EXHAUST STREAM CONTAMINANTS TO BE TREATED (list all contaminants)

CAS#	Name	Weight %	Concentration (ppm)	Flowrate (lbs/hr)	Test Results Available
71-43-2	Benzene				☐ Yes ☐ No
108-88-3	Toluene				☐ Yes ☐ No
100-41-4	Ethyl Benzene				☐ Yes ☐ No
1330-20-7	Xylene				☐ Yes ☐ No
74-82-8	Methane				☐ Yes ☐ No
127-18-4	Perchloroethylene				☐ Yes ☐ No
79-01-6	Trichloroethylene				☐ Yes ☐ No
75-09-2	Methylene Chloride				☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No
					☐ Yes ☐ No

(use additional sheets as necessary)

Inlet Process Flowrate: _____ ft^3/min (ACFM)

Inlet Stream VOC to Reaction Chamber: _____ lbs/hr _____ ppm VOC Discharge from the Reaction Chamber: _____ lbs/hr _____ ppm

System Fan Manufacturer: _____ Model: _____ Rating: _____ HP Diameter: _____ inches

Fan Design Flowrate: _____ ft^3/min (ACFM) @ pressure drop of _____ inches water column

REACTION CHAMBER

Manufacturer: _____ Model: _____ Rated Overall Efficiency: _____ %

Maximum Design Flowrate: _____ ft^3/min (ACFM) Expected Operating Flowrate: _____ ft^3/min (ACFM)

Type of Supplemental Heat: ☐ Electric ☐ Natural Gas ☐ Other _____ Heat Up Time: _____ minutes (from cold start)

Dimensions: Length: _____ inches Diameter: _____ inches or Width: _____ inches Height: _____ inches Volume: _____ ft^3

Shell Material: ☐ Stainless Steel ☐ Carbon Steel ☐ Other _____

Type of Catalyst: ☐ Precious Metal ☐ Ceramic ☐ Base Metal ☐ Other _____

Heat Exchanger Inlet Temp: _____° F Heat Exchanger Outlet Temp: _____ ° F Oxidizer Inlet Temp: _____° F Oxidizer Outlet Temp: _____° F

Normal Operating Temperature: _____ ° F Maximum Operating Temperature: _____ ° F Minimum Operating Temperature: _____ ° F

Catalyst Chamber Residence Time: _____ seconds @ _____ft^3/min (ACFM) Gas Hourly Space Velocity: _____ hrs^{-1}

Thermal Chamber Residence Time: _____ seconds @ _____ft^3/min (ACFM) Gas Hourly Space Velocity: _____ hrs^{-1}

Supplemental Fuel Required: ☐ No ☐ Yes If yes, type and maximum flowrate: _____ ft^3/min (ACFM) Heating Value: _____ Btu/ft^3

Temperature Rise Across Catalyst: _____ ° F Number of Layers or Beds of Catalyst: _____ Efficiency: _____ %/layer

Expected Life of Catalyst: _____ days or months Volume of Catalyst: _____ft^3/layer Relief Panel for Explosion: ☐ Yes ☐ No

Fuel Consumption / Power Requirements: _____ Btu/hr or Watts Flame Arrestor: ☐ Yes ☐ No

HEAT EXCHANGER

Manufacturer: _____ Model: _____ Efficiency: _____%

Type: ☐ Shell & Tube ☐ Air to Air ☐ Single Pass Construction Material: ☐ Stainless Steel

☐ Other _____ ☐ Air to Liquid ☐ Dual Pass ☐ Carbon Steel

☐ Parallel Flow (co-current) ☐ Liquid to Liquid ☐ Bypass Dampers ☐ Other _____

☐ Counter Flow (x-current)

Shell Maximum Design Flowrate: _____ ft^3/min (ACFM) Normal Operating Flowrate: _____ ft^3/min (ACFM)

Tube Maximum Design Flowrate: _____ ft^3/min (ACFM) Normal Operating Flowrate: _____ ft^3/min (ACFM)

INSTRUMENTATION & CONTROLS

HX Inlet Temperature	☐ continuously monitored	☐ continuously recorded	☐ continuously indicated	☐ sample port	☐ N/A
HX Outlet Temperature	☐ continuously monitored	☐ continuously recorded	☐ continuously indicated	☐ sample port	☐ N/A
Oxidizer Inlet Temperature	☐ continuously monitored	☐ continuously recorded	☐ continuously indicated	☐ sample port	☐ N/A
Oxidizer Outlet Temperature	☐ continuously monitored	☐ continuously recorded	☐ continuously indicated	☐ sample port	☐ N/A
Stack Outlet Temperature	☐ continuously monitored	☐ continuously recorded	☐ continuously indicated	☐ sample port	☐ N/A
Inlet Flowrate	☐ continuously monitored	☐ continuously recorded	☐ continuously indicated	☐ sample port	☐ N/A
Outlet Flowrate	☐ continuously monitored	☐ continuously recorded	☐ continuously indicated	☐ sample port	☐ N/A
Inlet Concentration	☐ continuously monitored	☐ continuously recorded	☐ continuously indicated	☐ sample port	☐ N/A
Outlet Concentration	☐ continuously monitored	☐ continuously recorded	☐ continuously indicated	☐ sample port	☐ N/A

Power Indication: ☐ Yes ☐ No Natural Gas Flowrate Totalizer: ☐ Yes ☐ No

Burner Flame Out Indication: ☐ Yes ☐ No Remote Operations Provisions: ☐ Yes ☐ No

EXHAUST STACK

Diameter: _____ inches Flowrate:_____ ft^3/min (ACFM) Velocity: _____ ft/sec Height: _____ ft above ground level

INSTRUCTIONS FOR CATALYTIC/THERMAL OXIDIZERS - COMBUSTORS

Use of this form will assist in receiving approval for equipment or processes used in the treatment of soil or ground water contaminated with volatile organic compounds (VOC) and other processes emitting VOCs. 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

1. The maximum and average VOC in parts per million, by volume, as methane, in the gas 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. Drawings to show the location of the blower and duct system and how the contaminated gas will be delivered from the contaminated soil or water to the emission control device and the ultimate discharge of water or soil and emissions to the atmosphere.
5. Calculations to show how the blower was sized to deliver the amount of flow in item 3 above.
6. A process and instrumentation diagram showing the type and locations of the meters, gauges, feedback controllers, regulators and recorders, etc...
7. A plot plan showing the location and neighborhood of the proposed project including distance to adjacent property lines and elevation of discharge stack.
8. The discharge stack shall not have a rain cap or cover that inhibits vertical discharge from the stack.
9. A copy of the Operations and Maintenance (O&M) Manual for all control equipment.
10. The method of indicating and recording hours of operation.
11. Provisions for shut down of the inlet gaseous stream if the oxidizer - combustor shuts down should be explained.

for Thermal Oxidizers

a) A process flow sheet or drawings to show the locations of the oxidizer, thermocouples, temperature controllers, heat exchangers and blowers, etc...
b) Drawings to show the internal configuration and dimensions of the oxidizer including the burner size or entrance area where the combustion occurs.
c) 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.
d) Engineering design calculations for choosing the size and capacity of the oxidizer. (Show Your Work)
e) The calculations in d) must include the determination of maximum gas flow rate through the oxidizer, residence time for the gas flow at the temperature in c), and the heat required to oxidize the amount of inlet hydrocarbons.
f) The instrumentation to maintain and control the temperature in the oxidizer.

for Catalytic Oxidizers

a) The same information as listed for thermal oxidizers above.
b) The type, amount, name of supplier, and the expected life of catalyst.
c) The preheat temperature of the gas stream before entering the catalyst.
d) The temperature increase across the catalyst bed as a function of inlet VOC concentrations.
e) Drawings to show the mechanism and instrumentation to measure, record, and maintain the temperatures in the catalyst and the preheater.
f) The efficiency of the catalyst based on manufacturer's specifications.

for Internal Combustion (I.C.) Engines

a) Process flow sheets and drawings to show the locations of the blower, engine, catalyst beds, filters, dehumidifiers, and air-to-fuel ratio controller.
b) A description on how the engine operates i.e., constant RPM, how the fuel to the engine will be regulated as the hydrocarbon concentration in the inlet gas decreases.
c) Specifications of the engine including the horsepower and catalysts.
d) A description of the how the catalyst system functions and specifically which engine operating parameters can affect its performance.
e) Engineering calculations based on which the system in a) was chosen and how adequate the catalyst beds are for venting the engine exhaust.
f) 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.
g) Drawings to show the mechanism and instrumentation to control and regulate the operating parameters which can affect the efficiency of the system; such as the air-to-fuel ratio, fuel or air flowrates, and inlet hydrocarbon concentration.