EMISSION CALCULATIONS FOR THE VERMONT AIR EMISSIONS INVENTORY

FOR CRITERIA POLLUTANTS

From the data you supply on the emission inventory form the Air Pollution Division will calculate air pollution emissions for the Vermont Registration program and the Federal Clean Air Act requirements. The calculation procedures are described below.

Registration Calculations -

For the Registration Program annual emission totals are calculated for total particulate matter (PM), sulfur oxides (SO2), nitrogen oxides (NOX), hydrocarbons (HC), which have properties that allow them to volatilize to the atmosphere, and carbon monoxide (CO). For the three general source categories, COMBUSTION, PROCESS, AND VOC, separate calculation methods are necessary. See the Source Classification for the Emission Inventory sheet for descriptions of these categories. In general, if emissions test data is available and acceptable, it is used to calculate emissions. However, this data is usually not available unless testing has been necessary for other regulatory reasons. Then the emissions are calculated in the following manner -

For Combustion Sources – If some form of applicable test data is not available, the emissions are calculated by multiplying the annual fuel throughput in the units shown on the emission inventory forms by an EPA factor for each contaminant. Percent sulfur and percent ash are used in calculations for some fuels. For wood burning, combustion characteristics are associated with one of four descriptive categories as detailed on the insert for wood combustions then the appropriate factor applied.

Taking **SO2** emissions from fuel oil combustion for example, for an external combustion boiler with a heat input rating less than 100 MMBTU/HR, the emission factor is 144 lb/1000 gallon. The equation, therefore, would be as follows :

(144 lb SO2 emitted/1000 gal #2 fuel oil burned)*(122 thousand gal #2 fuel oil burned)*1.95 (sulfur content of the #2 fuel oil)= 17.1 tons **SO2** emitted

As another example, for **PM** emissions from a bark and wet wood fired external combustion boiler, the emission factor is 5 lb/ton of wood burned (including moisture content). The equation, therefore, would be as follows :

(5.0 lb PM emitted/tons green wood burned)*(24000 tons green wood burned)*(0.63 (centrifugal collector control device efficiency))= 37.8 tons **PM** emitted

For Process Sources - These emissions are calculated using one of three primary methods listed below in order of their preference - 1) a materials mass balance based on data supplied by the source, 2) a mass loading rate factor per volume of air emitted from a source which is determined by the division, or, 3) a standardized default EPA factor. Often an accurate material mass balance is impossible to estimate for an industrial process, so emissions are calculated using a mass loading rate.

(OVER)

For example, for **PM** emissions from a baghouse -

(0.01 grains/ft3)*(25000 ft3/min)*(2000 hrs/yr) = 2.1 tons **PM** emitted/year

In this example, 0.01 is the mass loading rate, where grains are a unit of mass, 25000 is the stack flowrate, and 2000 is the total hours of annual operation of the process. The necessary unit conversions have not been included in the example.

For VOC Sources - These emissions are typically calculated using either a mass balance or a standardized EPA factor. An example follows for a mass balance calculation.

(14.2 tons material * 84% VOC of material) - (1.6 tons waste recovered * 40% VOC of waste) = 10.9 tons **VOC** emitted

In this example, the material's usage is the total weight of compounds used in a process, the percent VOC of material is generally available from a material safety data sheet, and the percent VOC of waste recovered must allow calculation of that component of the VOC which is not emitted to the atmosphere (ie, it is in liquid phase).

Emissions Estimates for Federal Clean Air Act Requirements -

The Federal Clean Air Act Amendments of 1990 require emission calculations from stationary facilities which include both annual and typical summer day emissions. These emission calculations will be submitted to the Environmental Protection Agency every third year for all facilities which emit more than 10 tons of VOC or 100 tons of any of the other criteria pollutants annually. The typical summer day estimates will be submitted for volatile organic compounds (the Federal definition), and typical winter day estimates for carbon monoxide. The necessary data for your facility for these requirements is taken from the enclosed Air Pollutant Emission Inventory forms.

The annual estimates are the same ones calculated for the Registration program. The typical summer day estimates are intended to represent average emissions for a day in the June 1 to August 31 time period.
The summer day estimate utilizes the annual estimate and the summer percent annual throughput in the simple calculation scheme given below. The estimation method is the same for every kind of source at your facility.

(Annual emissions)*(% annual throughput June-Aug)/92 = *typical summer day emissions.*

(Annual emissions)*(% annual throughput Dec - Feb)/92 = *typical winter day emissions.*