

# **DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

## **Standard Operating Permit Condition XII – SO<sub>2</sub> Material Balance Calculation**

**Permit Condition for Air Quality Permits  
Adopted by Reference in 18 AAC 50.346**

**April 1, 2002**

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# Standard Operating Permit Condition XII – SO<sub>2</sub> Material Balance Calculation

## Emission Unit or Stationary Source Categories This Condition Applies to:

Any fuel burning equipment using liquid fuel.

The department will use standard permit condition XII in any operating permit unless the department determines that emission unit or stationary source specific conditions more adequately meet the requirements of 18 AAC 50.

## Permit Wording:

### SO<sub>2</sub> Material Balance Calculation

If a fuel shipment contains more than 0.75 percent sulfur by weight, calculate the three-hour exhaust concentration of SO<sub>2</sub> using the following equations:

$$\begin{aligned}
 A &= 31,200 \times [\text{wt}\%S_{\text{fuel}}] = 31,200 \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \\
 B &= 0.148 \times [\text{wt}\%S_{\text{fuel}}] = 0.148 \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \\
 C &= 0.396 \times [\text{wt}\%C_{\text{fuel}}] = 0.396 \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \\
 D &= 0.933 \times [\text{wt}\%H_{\text{fuel}}] = 0.933 \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \\
 E &= B + C + D = \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \\
 F &= 20.9 - [\text{vol}\%_{\text{dry}}O_{2, \text{exhaust}}] = 20.9 - \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \\
 G &= [\text{vol}\%_{\text{dry}}O_{2, \text{exhaust}}] \div F = \underline{\hspace{2cm}} \div \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \\
 H &= 1 + G = 1 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \\
 I &= E \times H = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}
 \end{aligned}$$

$$\text{SO}_2 \text{ concentration} = A \div I = \underline{\hspace{2cm}} \div \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ PPM}$$

The **wt%S<sub>fuel</sub>**, **wt%C<sub>fuel</sub>**, and **wt%H<sub>fuel</sub>** are equal to the weight percents of sulfur, carbon, and hydrogen in the fuel. These percentages should total 100%.

The fuel weight percent (wt%) of sulfur is obtained pursuant to condition XI.2. The fuel weight percents of carbon and hydrogen are obtained from the fuel refiner.

The volume percent of oxygen in the exhaust (**vol%<sub>dry</sub>O<sub>2, exhaust</sub>**) is obtained from oxygen meters, manufacturer's data, or from the most recent analysis under 40 C.F.R. 60, Appendix A-2, Method 3, adopted by reference in 18 AAC 50.040(a), at the same engine load used in the calculation.

Enter all of the data in percentages without dividing the percentages by 100. For example, if  $\text{wt}\%S_{\text{fuel}} = 1.0\%$ , then enter 1.0 into the equations, not 0.01, and if  $\text{vol}\%_{\text{dry}}O_{2, \text{exhaust}} = 3.00\%$ , then enter 3.00, not 0.03.