Florida Department of
Environmental Protection

Memorandum

To: Bruce Mitchell

From: Charles Logan

Date: January 23, 1995

Subject: D-Graphics, Catalytic Oxidizer Destruction Efficiency (CODE)
AC 16-261912

For the purposes of providing in the subject permit criteria on which judgments could be made by an observer as to the proper/correct operating conditions (compliance with the minimum CODE of 95%)of the catalytic oxidizer (CO), the following is a brief overview of information which was obtained solely from the manufacturer (Demtrol Systems Division) of the CO.

The data needed to calculate catalytic oxidizers destruction efficiency (CODE) are as follow:

1. The volume of air flow (q)in standard cubic feet per minute (SCFM).
2. The mass rate of volatile organic compound (w_{VOC}) emissions being transported in pounds per hour (lbs/hr).
3. Inlet and outlet temperatures in degrees Fahrenheit (°F). With these values the rise in temperature or the ΔT can be calculated.
4. The heating value (HV) of the VOC's which will range between 12,000 and 17,000 British Thermal Units per pound of VOC's (Btu/lb).

The equation which utilizes the above data to calculate the CODE (%) is as follow:

$$q \times \Delta T \times 1.08 \cong CODE \times w_{VOC} \times HV$$

note - the 1.08 is a conversion of specific heat

Solving for the CODE the equation would be

$$CODE\ (\%) \cong \frac{q \times \Delta T \times 1.08}{w_{VOC} \times HV}$$

The value of q can be determined by converting the hertz value read from the gauge at the variable frequency forced air fan to units of SCFM. The amperage may also be used to determine the SCFM. This value will vary depending on whether one or both presses are being operated. The maximum value is ≈20,000 SCFM. The rise in temperature, ΔT, is recorded continually. The inlet temperature at the catalyst bed is maintained by an "inlet temperature controller" at 550°F by a heat exchanger and controlled burner modulation. The outlet temperature will range from a minimum of 550°F, if no VOC's are being transported, to a maximum of 850°F, at which temperature the CO will be shut down by the "high temperature controller". The mass rate of VOC's being forced across the flat bed catalyst (Maganese Dioxide) can be calculated at any time from the VOC loading of the press(s) and should be recorded daily. The heating value can be calculated from the composition of the VOC and for worst case scenarios 17,000 Btu/lb should be used.

It should be noted that the static pressure of the collection box of the CO should be recorded and maintained at -1.5 inches of water.