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Category: 5 – Surface Coating of Automobiles

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

DATE: JUL 31 1980

SUBJECT: Applicability of VOC Control Technique Guidelines (CTGs) to the Automobile Manufacturing Industry

FROM: Richard G. Rhoads, Director
Control Programs Development Division (MD-15)

TO: Director, Air and Hazardous Materials Division, Regions I - X

It has been brought to my attention that some confusion exists concerning the applicability of EPA-CTG, Vol. II, "Surface Coating of Automobiles and Light Duty Trucks" and EPA-CTG, Vol. VI, "Surface Coating of Miscellaneous Metal Parts and Products" in the automobile manufacturing industry. This memorandum clarifies the applicability of these two CTGs to the automobile manufacturing industry.

For the purposes of this discussion, metal coating operations in the automobile manufacturing industry can be separated to the following three distinct subdivisions:

I. Primer, guidecoat (surfacer), topcoat, and final repair coating of main body and front end sheet metal parts.

II. Application of coatings other than those in I above to main body and front end sheet metal parts.

III. Separate coating of metal parts other than main body and front end sheet metal parts.

Coating operations in I above are covered by the Automobile and Light-Duty Truck CTG. The recommended limits apply whether the main body front end sheet metal parts are coated as a single unit or separately as is done at some stamping plants and some assembly plants.

Contrary to two statements (pages viii and 6-5) in the Automobile and Light-Duty Truck CTG which indicate that all automotive metal coating operations are covered by this CTG, all operations in II and III above should be covered by the Miscellaneous Metal Parts CTG. This was noted in the attached April 18, 1980 memorandum from F.W. Giaccone, Region II to Don Goodwin, Director ESED.

The Miscellaneous Metal Parts CTG best takes into account the broad range of performance requirements for coatings in II above such as plastisols, striping, trunk spatter, and undercoatings; and for coatings applied to such varied parts in III as wheels, steering columns, brackets, and engine parts. The recommended emission limits in the Miscellaneous Metal Parts CTG are generally less stringent that the automobile and Light-Duty Truck CTG.

As is noted in the CTG for Miscellaneous Metal Parts, when reviewing regulations for these products, consideration should be given to the possibility that for some operations in II and III control to the level recommended in the Miscellaneous Metal Parts CTG may be technically infeasible or unreasonably costly. Such operations may be allowed to control to a less stringent level provided an adequate demonstration of technical infeasibility or unreasonable cost is made. Consideration might also be given to the utilization of alternative emission control strategies under the bubble policy (44 FR 71780, December 11, 1979) for those operations from II and III and thereby possibly exempting small (measured in terms of absolute mass emission) sources from control.

Please contact Bill Polglase (FTS 629-5251) or Tom Williams (FTS 629-5226) should you have any questions.

Attachment

cc: Chief, Air Programs Branch, Regions I-X
Del Rector, Michigan DNR

Attachment

Determination on Compliance by a Coating Operation
Which Controls Emissions with an Afterburner

Step 1. Determine the VOC emission rate from the process based on the VOC content of the coating and the rate of coating usage. (VOC content can be taken from the coating manufacturer's formulation or it can be determined by EPA Method 24.) Then calculate the solids content of the coating.

$$\left(\frac{\text{gal Coating}}{\text{hr}}\right) \times \left(\frac{\text{gal Coating less } H_2O}{\text{gal Coating}}\right) \times \left(\frac{\text{lbs VOC}}{\text{gal Coating less } H_2O}\right) = \left(\frac{\text{lbs VOC}}{\text{hr}}\right)$$

$$\begin{pmatrix}\text{Coating}\\ \text{Feed}\\ \text{Rate}\end{pmatrix} \times \begin{pmatrix}\text{Factor to Convert Water}-\\ \text{borne Coatings to Solvent}\\ \text{Borne Equivalent}\end{pmatrix} \times \begin{pmatrix}\text{Coatinag}\\ \text{Solvent}\\ \text{Content}\end{pmatrix} = \begin{pmatrix}\text{Actual Solvent}\\ \text{Emission Rate}\end{pmatrix} \quad \text{(Eq. 1)}$$

As an example, consider the case of a coater using 100 gal/hr of a conventional solvent borne coating containing 5 pounds VOC per gallon of coating. Since a solvent borne coating contains no measurable amount of water, the units "gal coating less "H2O" and "gal coating" are synonymous and equation 1 becomes:

$$100\left(\frac{\text{gal coating}}{\text{hr}}\right) \times 5\left(\frac{\text{lbs VOC}}{\text{gal coating}}\right) = 500\left(\frac{\text{lbs VOC}}{\text{hr}}\right) \quad \text{(Eq. 2)}$$

The solids content of this coating is then calculated by difference: (Assume the density of the solvent is 7.36 #/gal.)

$$5\left(\frac{\text{lbs VOC}}{\text{gal coating}}\right) \times \left(\frac{1.0 \text{ gal VOC}}{7.36 \text{ lbs VOC}}\right) = 0.68\left(\frac{\text{gal VOC}}{\text{gal coating}}\right) \quad \text{(Eq. 3)}$$

$$1.0 \text{ gal coating} - 0.68 \text{ gal VOC} = 0.32 \text{ gal solids} \quad \text{(Eq. 4)}$$

Step 2. Determine the allowable exhaust rate based on use of a complying coating and calculate its solids content. Assume the regulation contains an emission limitation of 2.5 in #VOC/gal coating less H2O which, if we use the same solvent density, is equivalent to:

$$2.5\left(\frac{\text{lbs VOC}}{\text{gal coating}}\right) \times \left(\frac{1.0 \text{ gal VOC}}{7.36 \text{ lbs VOC}}\right) = 0.34\left(\frac{\text{gal VOC}}{\text{gal coating}}\right) \quad \text{(Eq. 5)}$$

The solids content is again calculated by difference.

$$1.0\ \text{gal coating} - 0.34\ \text{gal VOC} = 0.66\ \text{gal solids} \qquad \text{(Eq. 6)}$$

If the facility used a complying coating with 66% solids instead of 32%, far fewer gallons of coating would be required to coat a specified article. Assuming both coatings are applied at the same transfer efficiency, the volume of complying coating required to coat at the same production rate would be:

$$100\left(\frac{\text{gal noncomplying coating}}{\text{hr}}\right) \times \left(\frac{0.32}{0.66}\right) = 49\left(\frac{\text{gal complying coating}}{\text{hr}}\right) \qquad \text{(Eq. 7)}$$

Therefore, the allowable emission rate is:

$$49\left(\frac{\text{gal complying coating}}{\text{hr}}\right) \times \left(\frac{2.5\ \text{lbs VOC}}{\text{gal complying coating}}\right) = 121\left(\frac{\text{lbs VOC}}{\text{hr}}\right) \qquad \text{(Eq. 8)}$$

Step 3. Determine the required VOC reduction.

(Actual emission rate) - (allowable rate) = (reduction required)

$$500\left(\frac{\text{lbs VOC}_{\text{actual}}}{\text{hr}}\right) - 121\left(\frac{\text{lbs VOC}_{\text{allowable}}}{\text{hr}}\right) = 379\left(\frac{\text{lbs VOC}_{\text{reduction}}}{\text{hr}}\right) \qquad \text{(Eq. 9)}$$

Step 4. Measure the mass flow rate of VOC to the incinerator using a flame ionization detector calibrated with the solvent in the coating feed to the coating line. If the measured VOC mass flow rate is less than or equal to 379 pounds per hour, the capture system is deficient and the source is not in compliance. (This presumes the control device could never achieve perfect control.)

Step 5. If the mass flow rate of VOC to the incinerator is greater than 379 pounds per hour, the destruction efficiency of the incinerator should be determined using the Total Gaseous Non-methane Organics detector (Reference Method 25). The incinerator must be efficient enough to destroy no less than 379 pounds per hour of VOC in order for the coater to be in compliance.