



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

03 FEB 1986

MEMORANDUM

SUBJECT: Jefferson County APCD's Request for an Opinion on the Suitability of the EPA Reference Methods 24 and 24A as Enforcement Tools

FROM: Jack R. Farmer, Director *Jack R. Farmer*
Emission Standards and Engineering Division (MD-13)

TO: Edward E. Reich, Director
Stationary Source Compliance Division (EN-341)

This is in response to a letter of October 24, 1985, from Mr. Michael T. DeBusschere of the Air Pollution Control District of Jefferson County, Kentucky. He requested an opinion as to whether the EPA Reference Methods 24 and 24A are sufficiently reliable to be enforcement tools. His concern stems from a memo of October 15, 1985, by Mr. Dick Everhart, also of the Jefferson County District. Apparently, the measured volatile organic compound (VOC) content of a series of coatings tested by several laboratories exhibited a wide variability. The variability was particularly severe among waterborne coatings. Mr. Everhart recommended adopting the EPA's "Procedures for Certifying Quantity of Volatile Organic Compounds Emitted by Paint, Ink and Other Coatings," EPA-450/3-84-019, December 1984.

Mr. Gary McAlister and Mr. Dennis Crumpler of the Emission Standards and Engineering Division have studied Mr. DeBusschere's request and the memorandum by Mr. Everhart. They conclude that the procedure of repeatedly heating and reweighing the samples as described in Mr. Everhart's memorandum is clearly inconsistent with the procedure specified in Reference Method 24 (RM 24). The deviation could have contributed to the extreme variability obtained by the participating laboratories.

The RM 24 is a compilation of procedures developed by the American Society of Testing and Materials (ASTM). An ASTM representative has reported that in 100 percent of the complaints he has received regarding lack of reproducibility or poor precision of those procedures, the laboratories involved had deviated from the established procedures.

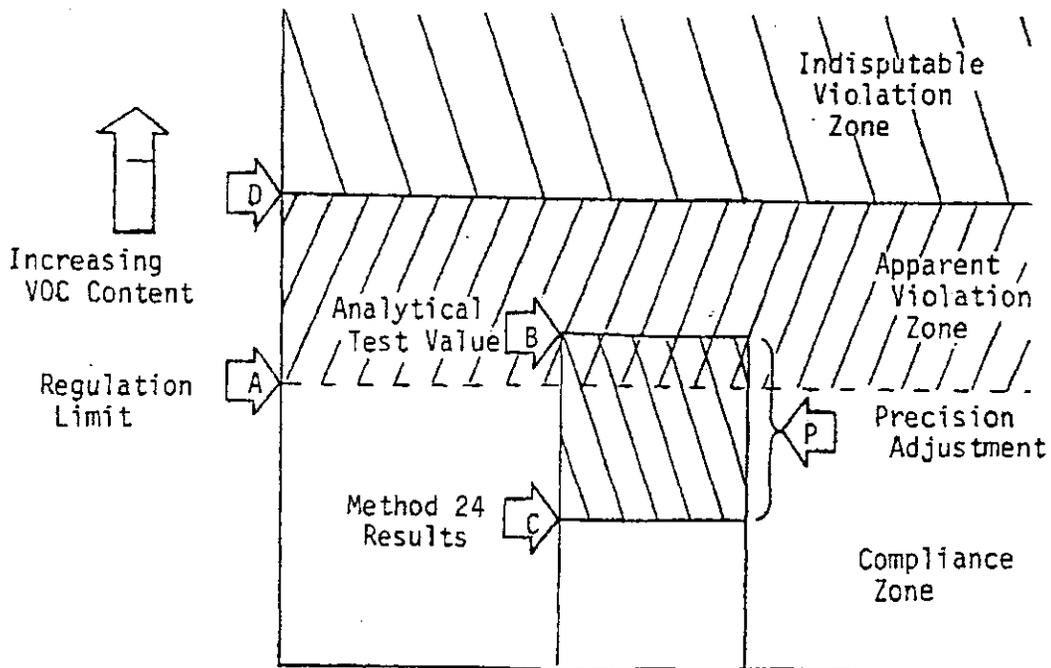
You should be aware that certification of a coating through use of the EPA's publication, "Procedures for Certifying Quantity of Volatile Organic Compounds...", does not avoid use of RM 24. The publication merely provides specific instructions and a set of data sheets for certifying the VOC content of a coating based on analysis by RM 24.

The VOC determination for a waterborne coating is inherently variable because it is essentially the difference between two independently measured values, the weight of total volatiles (water and VOC) and water content. If the water content is a large portion of the total volatiles, as one would expect in a waterborne coating, a small error in the measurement of water content will result in a relatively large error in the calculated VOC content. For example, if the total weight of volatiles is 8 grams and the water portion weighs 7 grams, a 10 percent error in the water analysis (i.e., 7.7 grams) would result in a threefold error in the indicated VOC content (an apparent VOC content of 0.3 instead of 1 gram). It was for this reason that the precision adjustment (which is based on the confidence limits calculated from ASTM's interlaboratory precision statement for the measured total volatiles and water content of waterborne coatings) was incorporated into RM 24. It safeguards against falsely citing a coater whose coatings are actually in compliance but measure in violation because of the uncertainty inherent in RM 24.

Figure 1 illustrates the system. Suppose a coating has a VOC content slightly less than "A," which is the level of the regulation the source is trying to comply with. Although in compliance, when tested the coating appears to have a VOC content of "B," an apparent violation. When the precision adjustment "P," is subtracted from the test value as required by RM 24, the VOC content as measured by RM 24 is "C." The coating complies with the regulation.

On the other hand, if RM 24, which includes the precision statement, indicates a coating is out of compliance, i.e., $(B-P) > A$, there is no doubt the coating violates the applicable regulation.

FIGURE 1.



If a truly noncomplying coating exhibits a VOC content anywhere within the apparent violation zone, it will not be found in violation after the precision adjustment is applied. As you can see, the analytical results of RM 24's constituent ASTM Methods (D 2369 and D 3792 or D 4017) would have to indicate a VOC content greater than "D" before the effect of the precision adjustment would no longer show the coating in compliance. Any criticism of the RM 24 would, therefore, focus on its inability to identify a coating that is barely out of compliance.

To overcome the inherent imprecision in RM 24, it would be necessary to measure VOC by an independent method. The EPA proposed another version of RM 24 with an additional step for this purpose. All who commented on the Federal Register proposal rejected the alternative version because the additional step would be too costly.

The "Procedures" publication was developed at the request of the coatings industry. Properly used, it could relieve the coating user from any requirement to analyze the coatings he uses. He could require his supplier (the manufacturer of the coating) to furnish the VOC content of the coating on the EPA data sheet. To use the data sheet, the instructions require the supplier to analyze by RM 24 and prohibit him from incorporating the precision adjustment. The supplier should not certify his coating as in compliance unless results of the analysis by RM 24 (without the precision adjustment) indicate compliance. The user of the coating can then, based on the certification from the supplier and his own dilution records, prepare a separate data sheet, certifying the VOC content of the diluted coating that is applied to his product. Again, he too is precluded from using the precision adjustment.

The inspector, upon visiting a plant, would normally review the certification data sheets. If they indicate compliance, the source would be presumed in compliance. Upon occasion, however, he likely will wish to take samples and analyze them with RM 24 to assure that the coater and suppliers are conducting their analytical tests properly. The Agency's analysis (prior to incorporating the precision adjustment) should not differ significantly from the results on the data sheet. If they do, the analytical work on which the certificate is based should be reviewed to determine the reason and to assure the proper procedures are being used and the coating is not being misrepresented. Before issuing a notice of violation, the enforcement agency would still be required to make the precision adjustment.

In conclusion, RM 24, even with its shortcomings, remains the best enforcement tool available for determining the VOC content of coatings. The inherent imprecision of determining the VOC content of waterborne coatings for enforcement purposes necessitates an adjustment of the analytical results based on confidence limits calculated from the precision statement established

for RM 24's constituent ASTM methods. Some waterborne coatings that are marginally out of compliance may be effectively immune from citation because of the precision adjustment. There is some consolation, however, in the fact that waterborne coatings, even if marginally out of compliance, provide a large emission reduction over their solvent borne predecessors.

I hope this explanation has been helpful. If you have additional questions related to the ASTM methods or RM 24, please contact Gary McAlister of the Emission Measurement Branch at (FTS) 629-2207. If there is some question about the VOC Data Sheets, please call Dennis Crumpler at (FTS) 629-5605.

Attachment

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