

**VOC Emissions**  
**Influence of VOC Measurement and Reporting Methods on  
Regulatory Policy and Emissions Estimations**

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## **1.0 ABSTRACT**

Individual pollutant emissions from a wide variety of industrial processes are measured by a limited number of source sampling methods. Volatile Organic Compounds (VOCs) present a particularly unique testing dilemma since there are a large number of different compounds defined as VOCs. The process of accurately and consistently measuring the quantity of total VOCs emitted is a concern to both industry and regulatory agencies.

The most commonly used methods for quantifying VOCs in gas streams are in the Code of Federal Regulations (40 CFR 60) Appendix A, Methods 18, 25, and 25A. Each method has advantages and disadvantages relative to the other methods. The choice of measurement and reporting techniques depends on the purpose that the data will serve. Due to differing analytical limitations for each of the VOC test methods, all sources may not be able to use the same test method and data manipulation procedures.

## **2.0 VOC EVALUATION REQUIREMENTS**

Many industrial facilities emit a pollutant termed Volatile Organic Compounds (VOCs). VOCs are an air quality concern primarily because they are a precursor for tropospheric ozone formation. The control of VOC costs industry millions of dollars a year. Measuring the effects of control as well as the quantification of total VOC emissions (tons/yr) is typically performed using emission measurement test methods commonly referred to as 'Stack Testing'. The possibility of error in VOC quantification due to the test methods or the reporting units could be a major concern for industry and regulatory agencies.

There are three primary mechanisms for evaluating VOC emissions:

- 1) Material Balance - A material balance estimates the outlet pollutant emissions based on the process inputs. Coating industries are the prevalent source category to use this mechanism. By manipulating data such as the VOC content of coatings, the quantity of coatings used per product, and the quantity of product produced over a period of time, the VOC emissions of a source can be estimated. If a source requests a reduction of the reported emissions due to control equipment, usually a reasonable control efficiency will be applied or a control efficiency test will be required.
- 2) Emission Factors - Overall, emission factors for VOCs are not widely used for permitting or compliance purposes in North Carolina. The use of the emission factors may be appropriate to determine if estimated emissions are significantly lower than regulatory limits, but otherwise a material balance or source test is employed.
- 3) Emissions Testing - Testing is typically the most preferred source of emissions data from a specific source. Test data is a good representation of emissions from the source if the test is performed correctly and the emissions are reported in the correct units.

### **2.1 Regulations**

Industrial facilities constantly test their air pollutant emissions. One of the primary reasons for emissions testing is to provide proof of compliance with applicable regulations. Sources are required to demonstrate compliance with VOC emission limits that may be expressed as a

concentration, a control efficiency, or a mass emission rate. The units for VOC emission limits will vary depending on the source category, the age of the source, the location of the source, and the regulating agency. Therefore, the requirements for VOC measurements, via testing, may include reporting the emissions on a mass rate. However, the VOC methods in 40 CFR 60 Appendix A, Methods 18, 25, and 25A (M18, M25, M25A), may not provide an accurate mass emission measurement as the methods are currently applied. Correctly defining the intentions of the measurement test, what pollutant group should be measured, and what pollutant group the methods can measure is crucial to the VOC measurement problem.

### **2.1.1 Concentration Limits**

A concentration based VOC standard is often listed as parts per million corrected to a percentage of diluent flue gas such as oxygen (i.e. ppm @7% O<sub>2</sub>). The standard has usually been defined by the same test method that will be used to prove compliance with the standard. This means that experimental data has been compiled that will help determine the limit or determine if the limit is measurable. The same methodology that was used to measure emissions for determining a limit will also be used to prove compliance with the limit.

### **2.1.2 Control Efficiency Limits**

Control efficiency is defined as the amount of pollutant that is created or that would be exhausted to the atmosphere uncontrolled in comparison to the amount of pollutant exhausted to the atmosphere after an air pollution control device (APCD). The determination of control efficiency will include the amount of capture for a control system. The capture efficiency is defined as the percentage of process gas that enters the APCD compared to the total amount of untreated process gas. By testing the flue gas, before and after the APCD, and considering the capture efficiency, the total control

$$\%TotalControl = \%Capture\ of\ VOCs * \%VOC\ Removal\ of\ APCD$$

efficiency can be calculated. (Rich, G.A., 1991)

### **2.1.3 Mass Emission Limits**

Mass emission reporting is most often stipulated in regulations such as Prevention of Significant Deterioration (PSD), State Implementation Plans (SIP), and for emissions inventories. A mass emission rate is typically reported in terms of pounds per hour (lb/hr) or some derivative of mass per time. For any pollutant emission, the mass emission can be determined by sampling the gas stream for a representative concentration of the pollutant. The concentration is then combined with the flow rate and the molecular weight (MW) of the pollutant to determine the mass emissions. The effluent flow rate is evaluated through other stack testing methods and the MW should be known for the pollutant. (An example is sulfur dioxide, SO<sub>2</sub>, with a MW of 64 lb/lbmol.) However, VOCs are defined in 40 CFR 51.100(s) as " any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions." 40 CFR 51 is the SIP / PSD section of the CFR and contains a list of the federally exempted VOCs. Based on this definition of VOCs, there are an innumerable amount of different VOCs, all with differing MWs. Therefore, no single MW can be used to fully characterize mass VOC emission rates.

### 3.0 VOC TERMINOLOGY

The terms and definitions used to describe organic compound emissions vary depending on the context in which they are used. The term Total Organic Compounds (TOC) would seem to indicate the quantification of all organic compounds in an effluent stream. However, even the EPA defines TOC differently dependent on which publications are cited. The emissions estimate manual, AP-42, defines TOC as all VOCs and all exempted VOC compounds. In contrast, certain New Source Performance Standard (NSPS) subparts dealing with the Synthetic Organic Chemical Manufacturing Industry (SOCMI) define TOC by the specific chemicals that may be present in that process or all compounds quantified by the measurement techniques, except that: "...those compounds which the Administrator has determined do not contribute appreciably to the formation of ozone are to be excluded." The apparent discrepancy with these definitions deals with the measurement techniques. The SOCMI subparts require a M18 which reports speciated VOC quantification in terms of the compound, 'as VOC'. M25 or M25A will generate total VOC emission rates usually in terms of carbon. Without speciation, the fraction of exempted VOCs in the TOC measurement is unknown.

AP-42 is the EPA document listing air pollutant emission estimates for industrial processes. This compilation of emission estimates was created through the use of testing data, operational information, mass balance and other sources. AP-42 defines VOCs under three broad headings: TOC, Total Non-Methane Organic Compounds (TNMOC), and individual speciated organic compound listings. The data presented in AP-42 can be analyzed to determine the procedure used to create the factor. In general, when a TOC rate is for all compounds, then the testing was most likely M25A. When the data is presented as TNMOC, due to the analytical steps, then the estimate is the result of M25 testing. When the data in AP-42 is presented as speciated compound rates, then the testing was likely performed by M18. In earlier editions of AP-42 the data for TOC is often presented 'as carbon' or 'as methane' which is a clear indicator that M25A was the origin of the data.

The correct determination of VOC emission rates is dependant on multiple factors. One factor is the ultimate purpose of the data. If testing is performed for regulatory purposes, then the regulating agency must define the pollutant and the reporting units. For PSD mass emission rate reporting, VOCs must be quantified as all organic compounds (except those listed in the 40CFR51 VOC definition) and the total weight of the molecules of the organic compounds. Although speciation and quantification of individual organic compounds is not required, more information about the gas stream will be necessary in order to use the correct methodology for testing. Possibly the most difficult factor is the sampling and analytical capability of the available methods. (Crumpler, D., 11/26/96)

## **4.0 VOC TEST METHODOLOGY**

A brief discussion of M18, M25, M25A should explain the positive and negative attributes of each method. The analytical capabilities will be influential in describing the appropriateness of each method. Each individual method has limits of performance and may not be as applicable as another method in particular circumstances.

### **4.1 Method 18**

M18 is the reference method for VOC analysis using a gas chromatograph (GC). The method is a guideline and a system of quality assurance checks (QA) for the VOC analysis rather than a rigorous, explicit manual for sampling. The method is flexible on the choice of collection media as long as the QA requirements are met. Often sampling is performed using NIOSH (National Institute of Occupational Safety and Health) methods or a Volatile Organic Sampling Train (VOST). A sample gas stream can be extracted from the source and then routed through a collection material upon which the VOCs will be deposited. Typical materials are Tenax tubes, or charcoal tubes. The gas stream may also be analyzed by direct interface with a GC. Moisture content (H<sub>2</sub>O) is a difficulty with most VOC methods due to the solubility of VOCs and other moisture induced problems. The GC analysis is performed by separating and identifying individual VOC compounds and then quantifying the compounds using a detector. The separation is performed by injecting the gas stream into a GC column. The elution times, the amount of time a specific compound takes to travel through the column, can be determined experimentally using organic compound calibration standards.

Once a compound in the gas stream can be identified, the compound is then quantified in the detector portion of the analyzer. A Flame Ionization Detector (FID), which will be thoroughly described in the M25A section, is common in GCs. For GC methods, standards are typically used to calibrate the instrument for the specific compound of interest. Due to the specific compound calibration, the pollutant quantification should be accurate. However, this requirement is also a negative for M18 since there is an implicit requirement to know what specific compounds are present in the sample and a rough estimate of their quantities. If testing is being performed on either a combustion process, a source with no previous process emission data, or a highly variable VOC process, then the sampling should be done in a two tier fashion. An initial test would perform a screen for identifiable VOCs, possibly using a GC/MS (mass spectrometry), and then the actual quantification test would be performed. Knowing the type of organic compounds present will dictate the correct sampling and analysis procedures.

M18 is ideal when the quantity of speciated organic compounds must be known. The M18 data may be reported as a concentration or on another basis using additional facility or effluent data. For the quantification of TOC from a source that does not have a VOC characterization, M18 can be time intensive and extremely costly. The possibility of multiple sampling scenarios is a concern. The analysis cost can easily escalate with multiple calibration standards and laboratory fees for each sample or compound quantification.

## 4.2 Method 25A

M25A is a derivative of M25, but will be discussed first in order to understand the analytical procedure. Method 25A was created in order to make VOC quantification easier, yield real-time results, and provide a method to compensate for the detection limits of M25. M25A also introduces extra biases and problems. The method details the sampling, analysis and calibration of the VOC test system. Sampling is accomplished by extracting a gas stream from the effluent and transferring it via heated non-reactive tubing to the analyzer. The sample line is heated in order to prevent any moisture in the effluent from condensing. Once the gas sample reaches the analyzer, it is injected into the FID under very controlled temperature and pressure conditions.

The FID analysis is a great concept, but creates reporting problems. The FID is composed of a chamber with electric current detecting plates and a flame. The flame is typically created through the combustion of hydrogen and oxygen. The detecting plates are oppositely charged in order to create a potential difference across them. By injecting a gas into the FID, the VOCs will be combusted by the flame. The chemistry that occurs in the flame is confusing, depends on the sample matrix and is not entirely understood. (Teco, 11/24/96) Most of the theory for FIDs comes from experimentation. Essentially, the carbon radicals in the flame have an ionization. The ionization is measured by the detector plates through a decrease or increase of amperage across the detector. (McAlister, G., 11/26/96)

The positive attributes for M25A include the ease of sampling and analysis, real time emission measurement, and lower cost. The M25A sampling system can deal with H<sub>2</sub>O in the effluent since the sample is transported above the condensation temperature. The FID can operate at levels of H<sub>2</sub>O up to approximately 40% prior to the flame being extinguished. (EPA, 6/1977)

The negative attributes of M25A are at the core of VOC reporting difficulties. The FID measures the quantity of carbon ions, and is typically calibrated by a standard of methane (CH<sub>4</sub>) or propane (C<sub>3</sub>H<sub>8</sub>). The FID will give a response relative to the calibration standard. The VOC stream quantified is then reported in terms of 'as carbon', 'as methane', or 'as propane'. This procedure will involve two errors: response factors and total VOC molecular weight.

The response factor is the ratio of the actual concentration of the VOC to the instrument reading. Response factors are dependent on the detector and on the sample gas matrix so it is difficult to actually determine correct response factors for all sampling situations. Without compensating for the response factor, the reported VOC concentration can be under or over quantified. Response factor difficulties typically arise when chlorine (Cl) or oxygen (O) atoms are present in the VOC molecule. It is theorized that the Cl and O atoms have a tendency to recombine with the carbon ions prior to ionization quantification or that the Cl and O atoms will alter the charge of the carbon atoms thereby suppressing the response. Other atoms may also affect the carbon ions in a similar manner. It is also possible that other radicals in the flame zone will have ionic charges and therefore register on the detector which would yield an increased response. (McAlister, G., 10/24/96) Published response factors exist for some compounds, however, response factors are unique to a FID.

Another negative attribute concerns the FID analysis and the reporting technique. Since a FID measures the quantity of carbon ions relative to a standard, the VOC compound is not identified. It is not a requirement that the individual VOCs be quantified, but in order to convert a concentration to

a mass rate, the MW of the compound must be known. An average molecular weight of the gas stream can be used, but in order to calculate an average MW, the relative concentrations of specific VOCs must be known. Without an average MW, the data is often reported on a mass basis 'as carbon' or in terms of another surrogate.

$$\frac{lb}{hr} ('as\ c'\ arbon) = \frac{60 * ppm * 12.01 * Qsd}{385.1 \times 10^6}$$

$$\frac{lb}{hr} (asVOC) = \frac{60 * ppm * \frac{MW\ VOC}{no.C} * Qsd}{385.1 \times 10^6}$$

Since M25A should measure the number of carbons in a compound, the MW of the compound should be divided by the number of carbons in the molecule to get a carbon weighted MW. However, since the individual VOC compounds often are not characterized, the relative percentages of VOCs and an average MW is not known.

As an example of the error introduced to the mass emission rate by the use of the MW for carbon, consider Propylene Glycol (CH<sub>3</sub>CH(OH)CH<sub>2</sub>OH). The MW for this compound is 76.10. The carbon weighted MW is 76.1/3=25.4. If we assume a concentration of 100ppm and a Qsd of 100,000dscfm then lb/hr 'as carbon'= 18.7 lb/hr. Assuming the same concentration and flow rate but using the MW normalized for carbon we get lb/hr 'as VOC'=39.57 lb/hr. An error in excess of 100% due only to MW.

M25A is a good method to use with low VOC concentrations. M25A is also an efficient method when proving compliance with a VOC concentration standard, provided the standard was defined by M25A, or when determining a control efficiency (CE). Since the mass rate is not required for CE, the APCD inlet and outlet concentrations can be used to determine CE. A concern with a M25A CE determination is the type of control device. A combustion device will change the composition of the effluent and possibly add new VOCs. Since FIDs may yield differing response factors before and after the combustion device, the results may be skewed. Also, a removal device may be more efficient in removing one specific type of VOC and also skew the results due to differing relative percentages of VOCs in the stream before and after the APCD and due to differing response factors. However, the effect of the control device is often ignored when measuring CE in favor of minimizing the necessary testing.

### 4.3 Method 25

Method 25 is used to determine the TNMOC concentration. It measures non-methane organics due to part of the analysis procedure. Sampling is performed using an evacuated stainless steel cylinder and a condensate trap. The condensate trap is utilized in order to prevent moisture from entering the cylinder. The sample must be conditioned properly prior to analysis and the actual sampling can be problematic due to the location and effluent conditions.

The sample is ultimately injected into a GC column which removes CH<sub>4</sub>, carbon monoxide (CO), and carbon dioxide (CO<sub>2</sub>) from the sample. The remainder of the sample, which should contain

the non-methane hydrocarbons, is oxidized to CO<sub>2</sub>. The CO<sub>2</sub> is then reduced to CH<sub>4</sub>. The CH<sub>4</sub> will then be measured by a FID. The purpose for the oxidation / reduction steps is to eliminate any response factor differential. The FID can be calibrated using methane and then quantify the sample stream in terms of methane.

One benefit of M25 is the absence of the response factor problem that plagues M25A. The negative attributes of M25 are numerous. The method is sensitive to H<sub>2</sub>O and CO<sub>2</sub> which can have combined effects. Typically if the percentage of CO<sub>2</sub> multiplied by the percentage of H<sub>2</sub>O is greater than 100, then M25 will not function very well. The method also has a high minimum detection limit (MDL) of 50ppm. Often testing companies and regulatory agencies accept 100 ppm as the MDL. This fact often eliminates the use of M25 for control efficiency testing since the outlet concentration of an APCD may be below 100ppm (McAlister 1/91). Due to the expertise required for accurate sampling and complicated analysis, the M25 test is often more expensive than a M25A test. There also appears to be difficulties with meeting the audit sample requirements. Two audit samples provided by the regulating agency should be analyzed within 20% of the audit sample concentration. Data suggests that the 20% error limit is often surpassed and may not be realistic. (Mitchell, 2/95)

Ultimately, the method still does not yield the mass weight rate of the VOCs. In order to report a mass emission rate, the MW of the VOC must be known. If the gas stream contains only one VOC, then the MW for that one VOC can be used for the mass calculation. If the gas stream contains multiple VOCs, which is the most common case, then the relative percentage of VOCs must be known in order to calculate an average MW. Again, knowing the relative percentages of individual VOCs is a problem when the gas stream is uncharacterized. The applicability section of Method 25 states: "Direct measurement of an effluent with a flame ionization detector (FID) analyzer may be appropriate with prior characterization of the gas stream and knowledge that the detector responds predictably to the organic compounds in the stream."

#### **4.4 VOC Method Summary**

In summary, the three most prominent methods for VOC testing are M18, M25, and M25A. M18 is excellent for speciating individual compounds, testing for Toxic Air Pollutants (TAPs) and Hazardous Air Pollutants (HAPs), for mass emission tests when there are only a few VOCs in the gas stream, and for characterizing a gas stream. M25 is useful for proving compliance with set concentration limits, such as the limits in several NSPS. M25 can be used for mass emissions when the prerequisites are satisfied. M25A is useful when the concentration of VOCs is below 100ppm and can also be used for mass emissions with the prerequisite VOC characterization and response factor compensation.

The concepts of method precision and accuracy are defined for M18. Duplicate analyses should be within 5% of their mean value while the accuracy of M18 should be within 10% of the actual value for a calibrated organic. M25 and M25A do not discuss precision and accuracy possibly due to the analytical limitations. Discussing precision and accuracy in terms of the concentration of carbon measured compared to the actual amount of VOCs emitted does not make sense. Beyond the precision and accuracy of the methods, the errors associated with response factors and incorrect molecular weight can greatly underestimate the emissions of VOCs. It would be difficult to determine

this amount of error due to a lack of published data, the variability of sources, and variable analytical responses. More testing, performing M18, M25 and M25A simultaneously as well as any other validated VOC test, needs to be done so that the data can be analyzed to determine source specific correction factors. The associated costs of such projects may be prohibitive.

An emerging technology that may someday eliminate the VOC testing and reporting problem is FTIR testing. FTIR (Fourier Transform Infrared) testing utilizes the identification of a chemical compound through the use of spectral patterns that are unique to the compound. While FTIR testing may one day be the reference, currently there is not an approved FTIR method. The cost from possibly having to validate a source specific test along with the associated costs of emerging technology has not allowed widespread use of FTIR. (Entropy, 11/20/96)

## **5.0 CURRENT VOC METHOD APPLICATIONS**

A review of environmental policy on the state level indicates that the intentions of VOC regulation in North Carolina have been to quantify and control VOCs on a mass emission 'as VOC' basis. While this policy may seem understandable and technically correct, the acceptance of emission data from tests has been prevalently 'as carbon'. The significance of this conclusion leads the author to believe that VOC testing and quantification has been significantly abused. The use of data known to be incorrect is a major concern. Methods and procedures exist to report VOCs more accurately and should be used when appropriate. The environmental affects of VOCs were considered during the promulgation of the rules and standards. Therefore, current policy should center on quantifying VOCs in terms of the standards.

The concepts of appropriateness and applicability stem from the test methods themselves. For most pollutants regulated by an NSPS the test method defines the pollutant. For VOCs the definition is a little more ambiguous and the methods do not necessarily define the pollutant. Therefore, different methods must be utilized when appropriate in order to satisfy regulatory requirements

The influence of Title V of the Clean Air Act Amendments (CAAA) of 1990 on VOC measurements has yet to be determined. Title V requires full operating permits for affected facilities. One part of the permit is the specification of test methods when a testing requirement exists. This situation will require different facilities to test for VOCs using different methods. This will be the ultimate test for consistent policy. All VOCs should be reported 'as VOC'. Some facilities may be able to measure 'as carbon' and then use additional information to convert to a VOC basis. Other facilities may be required to perform extensive characterization and quantification projects. The creation of consistent policy based on the technical merits of the test methods will need to be accepted, or at least acknowledged, by the regulated community. (Commerce Clearing House, 1990)

## **6.0 PROPOSED VOC TESTING POLICY**

VOC test methods, and testing data in general, should be reviewed for its specific purpose. A test approved for a compliance demonstration may not meet the requirements of an emission factor

test. Also, data provided to prove compliance with a performance standard may not satisfy the requirements of an emission inventory. Often facilities will use tests and data for purposes outside of the original acceptance criteria. Defining correct VOC test methodology and data acceptance criteria will aid agencies and industry in terms of consistency.

Based on the compilation of data presented in this paper and other information involving VOC methods and policy, the following proposal for VOC data shall be submitted.

### **6.1 NSPS Regulations**

If a source is required to perform specific tests due to NSPS regulations, the state agency must acknowledge and adhere to the regulation. Cases may exist where "equivalent methods" are acceptable. The equivalence of methods and source specific conditions should be considered on a case by case basis with EPA approval.

### **6.2 Concentration Based Standard**

If a facility must prove compliance with a concentration based standard, then the test method should be defined by the agency. Concentration standards are set for particular source categories and all facilities within the category use the same test method and reporting procedure. Typically a TOC concentration based standard will be less than 100ppm which would require M25A. Concentration based standards also exist for specific compounds which would require some derivative of a GC method. Again, the agency should dictate the method to be used when concentration standards are created.

### **6.3 Control Efficiency**

The determination of CE for a VOC APCD can be flexible in the choice of applicable test methods. CEs are often required for individual compounds, specifically HAPs and TAPs. When the CE for a speciated compound must be determined, the correct methodology would involve a GC. If the CE for TOC must be determined, then source specific data should be used to determine the correct methodology. When the post APCD TOC concentration is below 100ppm, the most appropriate procedure would be M25A. When the post APCD TOC concentration is above 100ppm, the applicability of M25 vs. M25A for that source will need to be determined. Factors should include the response factors for M25A and the possible error involved in M25. Several NSPS regulations require M25 for CE testing. However for SIP sources, if the analytical effects of response factors before and after the APCD are believed to be the same, so that the error would ultimately cancel out, then the use of M25A should be accepted. The VOC concentration exiting most APCD is usually below 100ppm and therefore M25A will be the most prevalent method for SIP and NSPS sources.

### **6.4 Mass Emission Measurements**

The EPA has stated that M25 and M25A should not be used for a mass emission rate determination without correcting for the VOC response factors and MW. However, there are no other methods currently being used that will yield mass rates of VOCs. Some sources will sum the speciated organic concentrations measured by M18 and use this data for mass rates. A tiered

approach has been suggested by the EPA where: 1) A facility emitting primarily one VOC should quantify that compound and report emissions in terms of the compound. 2) A facility emitting multiple compounds should estimate an equivalent mass and response factor to be used in conjunction with M25 or M25A data. 3) A facility that does not have a characterization of their VOCs would be allowed to report 'as carbon'. The first two situations should be adopted and could be easily implemented. Most facilities have an idea about the content of their emissions based on the process inputs. The third situation is unacceptable and promotes ignorance of the actual emissions. If a facility can report 'as carbon', the lowest VOC mass emission rate possible, then there is no incentive to correctly quantify emissions and will create inconsistency among the regulated community. This approach may also increase the amount of meaningless data submitted to the agency, reporting a larger emission rate of one individual organic compound than the total VOC emission rate 'as carbon'. It is impossible for one organic compound to be emitted from a source at a larger rate than all organic compound emissions, if the emissions are measured correctly. (NC DEHNR, 11/96)

Correctly reporting pollutant emissions is the responsibility of the regulated facility. For mass emission determinations from facilities that have not characterized their VOCs, several procedures are at the disposal of industry, as well as the agency, to correct or modify existing data. Some approaches will include the manipulation of M25 and M25A 'as carbon' emission rates with facility data to correct the emissions to a representative VOC MW. If a representative MW can not be determined, then the agency should have the option of reviewing the data on the basis of the heaviest organic molecule known to be present in the effluent. While this approach will create the most industry opposition, it will also be an incentive to approximate the correct emissions. A case specific determination of the effects of response factors can also be performed for M25A. Dependent on the major types of VOCs in the effluent, a response factor may be agreed upon for the data reporting. The case may be that the response factors will have a tendency to cancel one another out on the average. Other procedures may include the experimental determination of response and correction factors for FIDs. For example, the volatile content of a coating can be determined through gravimetric analysis of a sample. If the same sample is volatilized and injected into a FID, the FID's response can be correlated to the volatile weight percent. This would create a process specific correction factor for a FID.

Although the application of VOC test methods may be difficult in specific conditions, testing can be performed and an emission rate on a mass basis can be calculated.

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