

1. Method 311 is used to measure volatile hazardous air pollutant content (VOHAP or vHAP) of surface coatings for purposes of evaluating compliance with various regulations (including surface coating NESHAP (National Emissions Standards for Hazardous Air Pollutants) or MACT (Maximum Achievable Control Technology) standards). What if the Method 311 test results for a surface coating are higher than the paint manufacturer's HAP content information (i.e., from the Material Safety Data Sheet (MSDS))?

If high results (the measured amount of HAP) are seen, the testing entity must be wary that these results may be an artifact of the way the test was run. U.S. EPA and industry are aware of the concerns with the inter-laboratory and intra-laboratory variability of measurement outcomes that can occur when testing the same source material.

As with any analytical method, there are two broad sources of variability:

- the natural scatter in outcomes and uncertainty of data associated with any method, dependent on the underlying precision of the method;
- measurement errors and confounding factors -- Method 311 is particularly prone to errors arising from misapplication of the method to attempt to measure parameters it is not designed to quantitate accurately, and for which it is ill-suited. Results may also need confirmation by further analysis before conclusions are drawn (e.g., an inaccurately high reading, due to co-elution of more than one substance).

2. What are examples of data scatter due to measurement imprecision?

All methods, no matter how carefully performed, have some imprecision associated with them. Precision is generally characterized by the standard deviation of the method. Any one measurement is not a conclusive demonstration of anything. All that can be said is that if one took many measurements, 95% would fall within + or - 2.8 standard deviations of the mean value. More concretely, if the standard deviation were 1, and the "true" HAPS level were 15, there is a 95% chance an accurately performed measurement would fall somewhere between 12.2 and 17.8. Round robin testing of method 311 suggests it may have a standard deviation of 1 or more.

3. How can one reduce the error from imprecision in the method?

The only way to effectively reduce this error is through multiple measurements of the sample. One should never draw conclusions from a single unreplicated measurement. In addition, in light of the issue of laboratory variability, taking additional reserve test samples at the same time from the same test materials may be advisable for both the Agency and the coating users.

4. What are examples of error, confounding factors, and other limitations that can arise with Method 311?

There are several common sources of errors:

1. Trace quantities. Method 311 is not designed to accurately measure trace quantities: Method 311 is intended only to measure those vHAPS reported on the MSDS at levels required under the OSHA Hazard Communication Standard at 29 CFR Part 1910.1200 (i.e., equal to or greater than 1% for non-carcinogens, 0.1% for carcinogens). Only those vHAPS that appear in the "hazardous components" section on the MSDS should be counted toward the vHAPs total. The Material Safety Data Sheet (MSDS) (or vendor product specification sheet, if available) should be the definitive reference as to which listed chemicals, as volatile HAP, should be quantitated using Method 311. Only those vHAPS that appear in the hazardous components section on the MSDS should be counted toward the vHAPs total.

2. Co-elution: It will often be the case that a vHAP and a non-HAP volatile will have the same retention time on a column. Overlapping peaks will make the vHAPs concentration appear to be larger than it actually is. If a vHAPs concentration appears larger than reported by the coatings manufacturer, or a co-elutant is suspected or present, the value should be confirmed by increasing separation of the co-elutants with use of a different column, or use of an alternative detection method such as a mass spectrometer to establish that only the vHAP is being quantitated. For some coatings vHAPS not present in the coating per se may evolve post-application upon cure of the coating and may also appear as peaks when the coating is tested by Method 311 (e.g. formaldehyde or methanol). It is common for many paint manufacturers to identify the potential for the evolution of the specific vHAPS in the cure process, but peaks representing cure volatiles should not be counted toward the vHAPs total.

For all these reasons, the coatings user should be given an opportunity to present evidence to rebut high values for the HAP in this instance.

5. What considerations should EPA, state agencies, and industry coating users observe when evaluating the outcome of Method 311 testing for compliance?

In some coating standards, EPA has included a "rebuttable presumption" that would apply to Agency compliance determinations based on Method 311 test results, which would provide industry the opportunity to show other information about coating content beyond just the Method 311 results. It is EPA policy that this "rebuttable presumption" provision should apply to all standards that rely on Method 311 for enforcement, not just those where this provision is explicitly mentioned.

6. What if the MSDS only provides the concentration of the HAPS in range?

MSDSs are a tool for communicating potential exposure and risk information to individuals who may become exposed to a chemical substance. Manufacturers will often provide chemical component information in ranges. Prior to making a determination concerning compliance based on a single, unconfirmed result from Method 311, EPA or the State or local Agency, and the affected coating user should consult with the coating supplier/manufacturer to discuss questions about "ranges" of HAP content on the MSDS, and also the test outcomes.