



State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF AIR QUALITY
Bryce C. Bird
Director

DAQ-036-17

M E M O R A N D U M

TO: Air Quality Board

THROUGH: Bryce C. Bird, Executive Secretary

FROM: Joel Karmazyn, Environmental Scientist

DATE: May 23, 2017

SUBJECT: PROPOSE FOR PUBLIC COMMENT: Amend R307-343. Emissions Standards for Wood Furniture Manufacturing Operations.

Staff is proposing amendments to R307-343 that will help further reduce volatile organic compound (VOC) emissions from wood manufacturing operations. R307-343 will be part of the upcoming Serious PM_{2.5} State Implementation Plans (SIPs). The changes are summarized below:

- The applicability threshold is reduced from 2.7 tons per year (tpy) potential to emit to the use of a combined 20 gallons or more of coating products and solvents combined. The new applicability level will discriminate between homeowners and hobbyists who conduct coating operations from commercial/industrial sources. Using an activity level threshold will also make it easier for sources and compliance inspectors to determine source applicability and simplify compliance verification.
- The definition of a coating is removed from the rule and added to the definitions in R307-101, General Requirements.
- The coating categories are updated to current types of coatings used in the industry. We are also separating out the types of polyurethanes that currently fall under the topcoat or sealer category.

The VOC limits for the two component polyurethanes are being slightly elevated from 0.9 to 1.0 lb VOC/lb solids because of the difficulty of transferring these viscous coatings to the wood surface under the current VOC limits. Staff has worked with the coating industry to derive the lowest workable VOC limits for these categories. The American Coating Association has concurred on this proposal. However, CCI Finishworks, a coating manufacturer, believes that a VOC limit below 1.2 lb/lb solids for the polyurethanes limits the product performance. Staff is proposing to specially

request comments on the lowest technically feasible VOC limit for polyurethanes that does not alter product performance.

Section 110(l) of the Clean Air Act prohibits EPA from approving a SIP revision that would “interfere with any applicable requirement concerning attainment....” Despite the fact that this amendment slightly increases the content limit for two component polyurethanes, it does not violate Section 110(l). The increase in VOC emissions from polyurethanes will be mitigated by lowering the rule applicability from 2.7 tpy to 20 gallons/year. We estimate that 75 sources are currently subject to R307-343. Reducing the applicability to 20 gallons/year will include an additional 191 sources with estimated VOC emissions of 116 tpy. The overall air quality benefit of this amendment is documented in the 110(l) demonstration attached to this proposal.

- Canned aerosol coating products that are less than 22 fluid ounce and used exclusively for touch-up or repair are exempt. Adding this exemption is in response to requests received from sources since the last rule revision. EPA guidance recommends this exemption, and it is included in other comparable state rules.

Changing the Form of the Cleaning Solvent Limit

R307-343-7(3) contains a cleaning solvent VOC limit of 0.21 lb/gallon. This limit was adopted from certain California air district rules for the Moderate PM_{2.5} SIP in an aggressive attempt to attain the standard. This extreme VOC content limit for cleaning solutions precludes the use of any organic solvent but acetone. Acetone is not a universal solvent and is incompatible with many coating formulations. That is to say that acetone does not uniformly dissolve all coating materials; therefore, it does not meet all types of cleaning requirements. An example of this limitation is explained in EPA’s guidance (EPA 453/R-07-003) for coating on paper, film and foil, where EPA states that “little information is available regarding the types of low-VOC or VOC-free cleaning materials that could be used in the paper, film, and foil surface coating industry.” Similarly, EPA states in its miscellaneous metals and plastic coating guidance (EPA-453/R-08-003), “Cleaning materials with low VOC content would generate less VOC emissions than materials with high VOC content, but may not be feasible with the broad range of coatings used in the miscellaneous metal product and plastic parts surface coating facilities.”

Additional concerns have been raised regarding possible equipment damage, such as rusting caused by the use of aqueous based solutions. The most serious concern is the fire hazard caused by the extremely low flash point of acetone. Related to this is the rapid evaporation of acetone that limits its use in many cleaning operations.

Setting a solvent cleaning limit based on vapor pressure is more appropriate than a density based approach and is consistent with options offered in EPA guidance documents. Vapor pressure is a measure of the tendency of particles to escape from the liquid form of a chemical to an airborne vapor at room temperature. It is an indicator of a liquid’s evaporation rate. Substances with a high vapor pressure readily release vapors into the air. Consequently, it is desirable for sources to use chemicals with low vapor pressure when possible in order to reduce VOC emissions. The advantages of low vapor pressure solvent formulations include:

- Low solvent evaporation rate reduces product wastage. Surface cleaning solvents are only effective in their liquid state. This means that the more they evaporate, the more solvent is needed to complete the task. Using less solvent saves cost.
- Low solvent evaporation reduces emissions to air.
- Low solvent evaporation reduces emissions in the work place which improves worker safety.

- Using low vapor pressure solvent formulations avoids the use of hazardous air pollutant chemicals like methylene chloride.

A Vapor Pressure Limit Provides More Cleaning Options

Excellent cleaning solvents like xylene have a high vapor pressure. If the vapor pressure of a xylene solution can be suppressed, xylene could be used for cleaning while reducing emissions. This can be done by applying a physical-chemical phenomenon known as Raoult's Law. Raoult's Law states that when a substance is dissolved in a solution, the vapor pressure of the solution will decrease. Finding ways to formulate salts (the substance) for example, into a xylene solution, will dramatically reduce the vapor pressure of the solution. Changing the form of the limit will permit formulation chemists to come up with more cleaning options while reducing VOC emissions.

Selecting the Vapor Pressure Limit

EPA approved R307-343 as part of the PM_{2.5} SIP. Therefore, revisions to the rule must not be relaxed. Consequently, the 0.21 lb/gallon VOC cleaning limit must be converted to a comparable vapor pressure.

EPA determined that the “cleaning materials with VOC composite vapor pressure less than 10 millimeters of mercury (mm Hg) at 20°C when used in conjunction with good work practices achieve a comparable emission reduction to cleaning materials containing 30 weight percent VOC (EPA-453/R-06-002, pg.12).” This ratio means that the 0.21 lb/gal is comparable to 1 mm Hg as follows:

Assuming VOC average solution weights 7 lb/gal, 0.21 lb/gal is equal to 3% VOC;

If 10 mm Hg vapor pressure is equal to 30% VOC, then 1 mm Hg is equal to 3% VOC.

The solvent cleaning limit in R307-343-7(3) has been revised to “a VOC composite vapor pressure up to 1 mm Hg or less at 20 degrees Celsius.”

Notice of Proposed Rulemaking

The American Coatings Association and major coatings manufacturers were sent advanced notice of proposed rulemaking on April 28, 2016. Subsequent stakeholder meetings and contacts were held leading to this proposal.

Cost

The rule implementation cost presented in the Moderate SIP has been updated to account for inflation (2016) – \$2,616/ton VOC removed.

Recommendation: Staff recommends that the Board propose the amendments to R307-343 for a 45-day public comment period.