



Proposed Amended Rule 1168 – Adhesive and Sealant Applications

Working Group Meeting #3

July 21, 2022, 9:00 AM (PDT)

Join zoom meeting:

<https://scaqmd.zoom.us/j/98766362611>

Meeting ID: 987 6636 2611

Agenda

Background

Progress since Working Group Meeting #2

Technology Assessment

Exempt Solvents

t-BAc in Roofing Applications

Modeling Results

Opteon 1100

Next Steps

Staff Contact Information

Progress Since Working Group Meeting #2

Progress of Rule Development

Summary of Working Group Meeting #2 (04/12/2022)

- Provided background on Rule Development Process
- Continued technology assessment for five categories based on industry feedback
- Presented background on exempt solvents and pCBtF survey results
- Provided assessment of the risk associated with the t-BAc in roofing applications

Since last Working Group Meeting

- Staff continued meeting with stakeholders and trade groups
- Following up with the pCBtF survey
- Performed updated modeling for exempt solvents

Technology Assessment

Technology Assessment
Top and Trim

Recap from WGM #2 – Slide #8

Top and Trim Considerations

- Staff has been working with industry for 15 years to achieve lower emissions for Top and Trip adhesives

Since 2007

- Rule 1168 required a future effective VOC limit of 250 g/L
- Technical challenges prevented reformulations

2007 - 2019

- The 55 gallon/year exemption allowed very high VOC top and trim products to be sold (>600 g/L)

After 2019

- Products complying with the 540 g/L VOC have been commercialized, resulting in VOC emission reductions

- Based on stakeholder feedback, staff considering retaining the 250 g/L limit with a delayed effective date

Top and Trim – Staff Recommendations

Staff Proposal

- Retain 250 g/L limit
- Establish future effective date
 - Considering January 1, 2028 to allow an additional 5 years for reformulation

Delayed Emission Reductions

- ~ 0.1 tpd according to 2017/2018 QER
- Likely an overestimate since rule phased out the products with VOC greater than 600 g/L in 2019

Technology Assessment
Foam Sealants

Foam Sealant Categorization

- Stakeholders requested staff to consider the following to inform the Rule 1168 foam categorization and definitions
 - ASTM D717 – Standard Terminology of Building Seal and Sealants
 - U.S. EPA segmentation of foam sealants in their Significant New Alternatives Policy (SNAP) rule
 - One-Component Foam Sealant
 - High Pressure Two-Component Foam Sealant
 - Low Pressure Two-Component Foam Sealant

Proposed Definitions for Foam Sealants

Foam Sealant – *proposed revision includes ASTM C717 language*

- Is a sealant that expands in volume as it is dispensed from a container or containers to form a rigid or semi-rigid cellular mass used to fill and form a durable, airtight, water-resistant seal to common building substrates, such as wood, brick, concrete, foam board, and plastic

One-Component Foam Sealant – *new subcategory*

- Is a Foam Sealant packaged in aerosol cans and dispensed using propellant under pressure

High Pressure Two-Component Foam Sealant – *new subcategory*

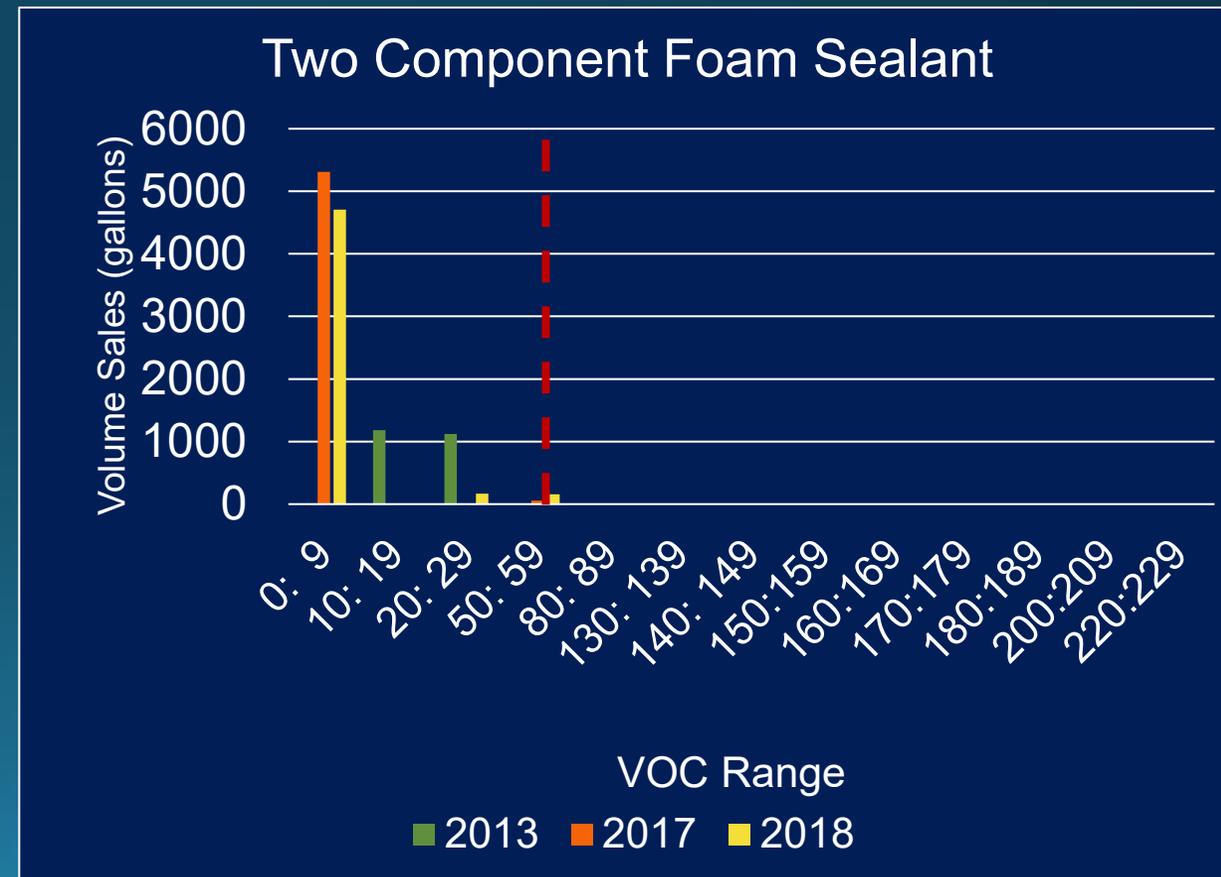
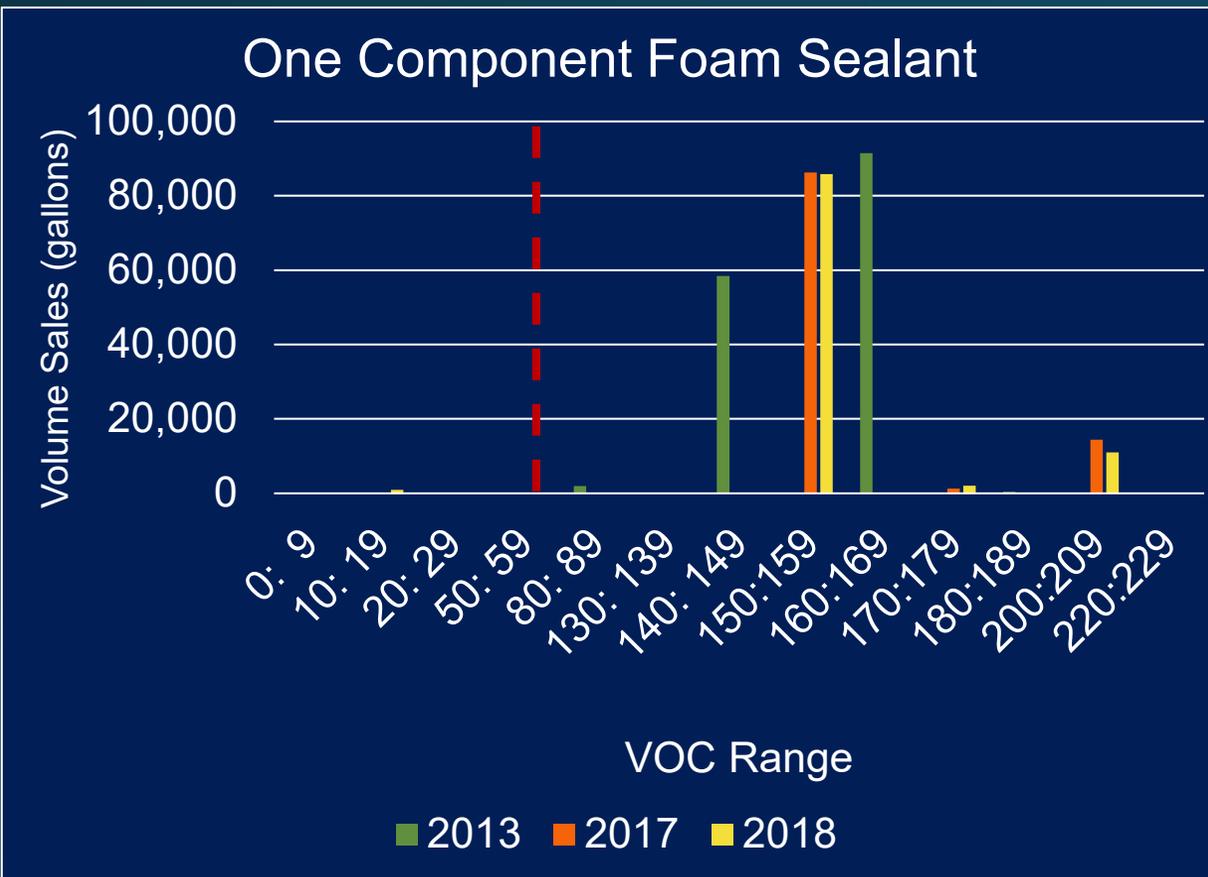
- Is a Foam Sealant packaged as two containers pressurized to greater than or equal to 250 psi

Low Pressure Two-Component Foam Sealant – *new subcategory*

- Is a Foam Sealant packaged as two containers pressurized to less than 250 psi

Establishing VOC limits for Foam Sealants

- One Component Foam Sealants do not meet the proposed 50 g/L VOC limit
- Two Component Foam Sealants, both high- and low-pressure meet the proposed 50 g/L VOC limit



Proposed VOC limits Foam Sealants

Foam Sealant

- No VOC limit, this is only a defined term

One-Component Foam Sealant – *new subcategory*

- 150 g/L Effective July 1, 2024

High Pressure Two-Component Foam Sealant – *new subcategory*

- 50 g/L Effective January 1, 2023

Low Pressure Two-Component Foam Sealant – *new subcategory*

- 50 g/L Effective January 1, 2023

Impact on VOC Emission Reductions

One-Component Foam Sealant

- Reducing limit from 250 g/L to 150 g/L
 - Emission Reductions: 0.01 tpd
- Removing the 50 g/L future effective limit
 - Foregone emission reductions: 0.11 tpd

Other Considerations

- Should we include Foam Adhesive definitions?
 - Foam Adhesive
 - One-Component Foam Adhesive
 - High Pressure Two-Component Foam Adhesive
 - Low Pressure Two-Component Foam Adhesive
- What should we establish as VOC limits?

Technology Assessment

Plastic Welding Cement



Feedback from Plastic Pipe and Fitting Association



Staff received a letter from Plastic Pipe and Fitting Association (PPFA)

PPFA expressed concerns regarding the proposed amendments to reduce VOC limits effective January 1, 2023

Concerns are more focused on the lower limit products ability to maintain the quality and to avoid field failures

Requested to maintain the VOC limits for ABS to PVC, PVC, and CPVC categories until the market proves the safety and reliability of lower VOC products

Feedback From Plastic Welding Cement Manufacturers



Manufacturers have reformulated most of their products to meet January 1, 2023 future effective VOC limit

Some manufacturers stated they need more time to reformulate and test some products

Consensus that there are technical challenges and high-cost associated with reformulating solvent cement for CPVC, especially for “life saving systems”

Staff is continuing discussions with manufacturers and will perform shelf surveys to assess the availability of compliant products

Staff Responses



Staff acknowledges the complexity involved in meeting the lower VOC limits, especially for CPVC

Manufactures have achieved lower VOC limits for PVC category

Most concerns were with CPVC lifesaving systems
Staff proposing to maintain 490 g/L limit for category

Considering creating subcategory for Industrial CPVC Adhesives for medium and heavy-duty CPVC as defined by ASTM F 493-14

Allow an additional 18 months to reformulate

CPVC Welding Cement for Life Saving Systems



Initial Suggested Definition

CPVC WELDING CEMENT FOR LIFE SAVING SYSTEM means Plastic Welding Cement with an increased resistance to high temperatures which is used for Life Saving Systems, including standalone and multipurpose fire sprinkler systems.

Potential VOC limits:

Maintain the 490 g/L limit

Potential foregone emissions ~0.01 tpd

Rule 1168 may require specific labeling requirements to distinguish these products from the lower-VOC CPVC cements

CPVC - Life Saving Systems Requirements



- To address potential rule circumvention, staff is proposing labeling requirements for products that are formulated for Life Saving Systems:
 - The labels of all CPVC solvent cement formulated for Life Saving Systems shall prominently display the statement
“For CPVC Solvent Cements for Life Saving Systems Only”
 - Staff will include a future effective date to allow time for manufacturers to relabel products

Industrial CPVC Welding Cement



Initial Suggested Definition

CPVC FOR INDUSTRIAL APPLICATION means Plastic Welding Cement with a viscosity greater than 500 centipoise as tested by ASTM F 493-14.

Potential VOC limit: 400 g/L limit

Effective date: July 1, 2024

Potential delayed emissions: TBD

Rule 1168 may require specific labeling requirements to distinguish these products from the lower-VOC CPVC cements

Industrial CPVC Welding Cement



- To address potential rule circumvention, staff is proposing labeling requirements for products that are formulated for industrial application
 - The labels of all industrial CPVC solvent cement shall prominently display if they are:
 - Medium duty
 - Heavy duty
 - Extra-heavy duty
- Staff may include a future effective date to allow time for manufacturers to relabel products
 - Most products already include labeling

Technology Assessment 

Roofing Adhesive and Sealants

Roofing Industry feedback



- Staff continued meetings and discussions with roofing industry representatives
 - Stakeholders provided recommendations for the preliminary roofing adhesive subcategorization and definitions that staff presented in WGM #2



Preliminary Recommendation on Asphalt Adhesive Categorization

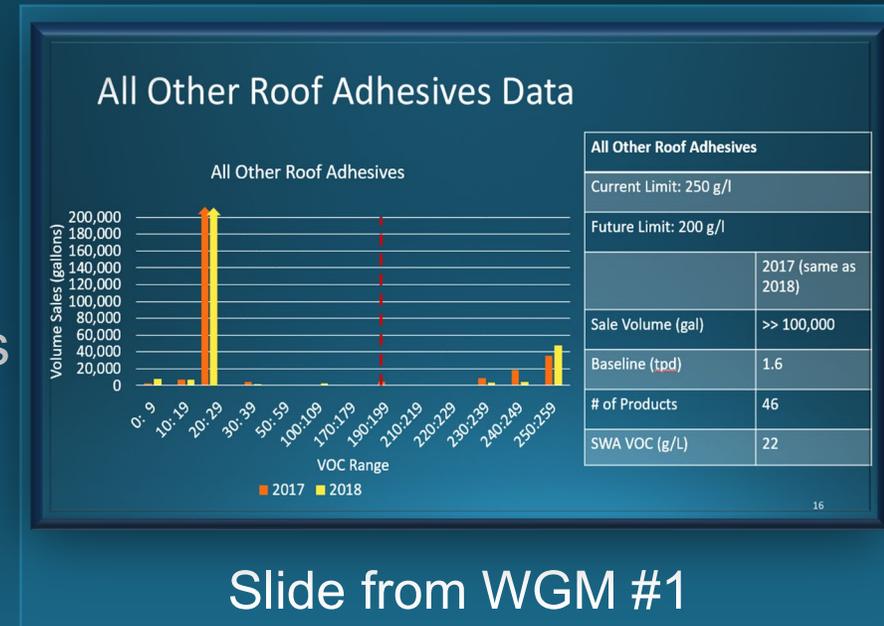


- In WGM #2 staff proposed two new asphaltic adhesive categories:

Two ply laminate sheet/shingles

Built-up Roofing Asphalt (BURA)

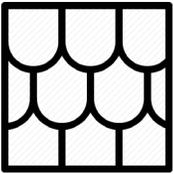
- Stakeholders asked about need for quantity and emission reporting (QER) requirements for asphaltic roofing products
 - Not all asphaltic products are roofing adhesive
 - VOCs are so low there is no value in reporting
- Staff sees value in QER for all categories
 - Manufacturers can estimate the volume of product used as an adhesive for products that have multiple uses
 - Knowing the volumes of low-VOC categories is useful for planning and emission estimates



Preliminary Definitions



- Preliminary definitions for the low-VOC asphalt adhesives
 - Staff is looking for feedback and guidance of the preliminary definitions



TWO PLY LAMINATE SHEET/SHINGLE ADHESIVE means an asphalt-based adhesive used to adhere laminate sheets or shingles when manufacturing two-ply laminate sheets or shingles



BUILT-UP ROOFING ASPHALT ADHESIVE means a solid asphalt adhesive that must be heated in order to be applied

Consider establishing the VOC limit at 30 g/L

Note: Rule 1168 will retain the “Single Ply Roof Membrane Adhesive” and “All Other Roof Adhesive” categories for the higher-VOC roofing products

Staff Preliminary Conclusions on Technology Assessment

Summary of Staff Proposal on Tech Assessment

Category	Potential Subcategorization	Preliminary Proposal	Effective Date
Top and Trim	N/A	250 g/L	1/1/2028
Foam Sealants	One Component	150 g/L	7/1/2024
	High Pressure Two Component	50 g/L	1/1/2023
	Low Pressure Two Component	50 g/L	1/1/2023
PVC	N/A	425 g/L	1/1/2023
CPVC	CPVC	400 g/L	1/1/2023
	CPVC – Life Saving Systems	Maintain 490 g/L	N/A
	CPVC – Industrial Applications	400 g/L	7/1/2024
All Other Roofing Adhesives	All Other Roofing Adhesives	TBD	TBD
	Two-Ply Laminate Sheet/Shingle Adhesive	30 g/L	1/1/2023
	Built-Up Roofing Asphalt Adhesive	30 g/L	1/1/2023
Single-Ply Roofing Membrane Adhesive	N/A	TBD	TBD
All Other Roofing Sealants	N/A	TBD	TBD
Single-Ply Roofing Membrane Sealants	N/A	TBD	TBD

Exempt Solvents

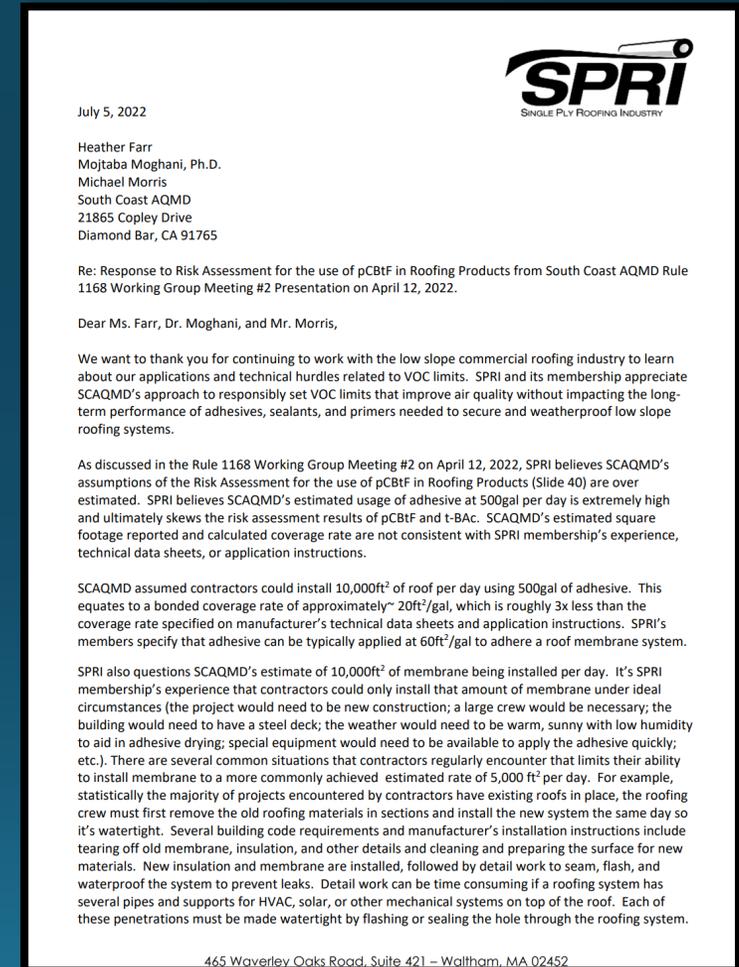
Exempt Solvents



t-BAc in Roofing Applications

SPRI Comment Letter

- On July 5, 2022, staff received a comment letter from Single-Ply Roofing Industry (SPRI)
 - Included updated assumptions for a typical roofing project
- Staff included new assumptions in risk assessment for using t-BAC in roofing adhesives
 - Also considered different locations and scenarios



2013 t-BAc Modeling Study for Roofing Project

- In 2013, South Coast AQMD performed a modeling study to assess the Acute Hazard Index (HI) of t-BAc used in a roofing project
- Modeling assumptions were provided by industry stakeholders:
 - Daily usage of 500 gallons per day
 - Total area covered each day 10,000 sq ft
 - 50% t-BAc content
 - Receptor was located at a 25 m distance
 - The Acute Reference Exposure Level (REL) for t-BAc was assumed to be 10,000 ug/m³ ¹
 - The release height was assumed to be 35 ft
- The Acute HI was calculated 17 which is >> 1
- Based on the modeling results staff concluded to moving forward without including a t-BAc exemption

¹ Based on CARB Environmental Impact Assessment Report



In WGM #2 stakeholders raised concerns about assumptions made for the previous t-BAc toxicity modeling assessment



Stakeholders provided updated daily usage estimates for a typical roofing project



Staff updated the source release height from 35 ft to 20 ft to reflect a two-story building



Staff will consider three level of solvent content to represent the wide variety of available products in the market

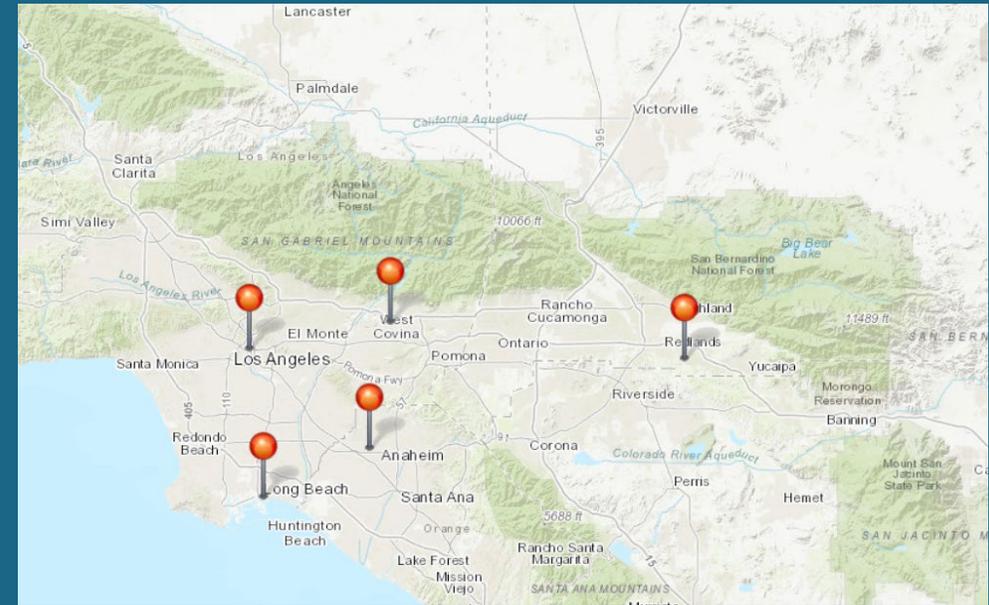
Stakeholders Input on AERMOD Model

Modeling assumptions

- Staff evaluated the acute risks associated with roofing projects
 - Roofing projects are conducted infrequently, so risks to nearby receptors is an acute risk, not a chronic risk

Methodology

- Staff performed an updated modeling for five meteorological stations at different locations in the South Coast AQMD
- Based on solvent daily usage and project coverage area provided by stakeholders, staff will provide two scenarios to assess the associated risks:
 - Scenario #1: Provided Firestone BP
 - Scenario #2: Provide by SPRI
 - Risk assessments generally focus on the worse-case scenario, but staff considered a range of scenarios



Meteorological stations at different locations in South Coast AQMD

Updated Modeling assumptions and Results

- Staff assessment includes two different scenarios for five locations and three t-BAc weight percent
 - 30 different cases were assessed

		SCENARIO #1			SCENARIO #2		
MODEL INPUTS	Daily Usage (gal)	140			85		
	Coverage Rate (sq ft / gal)	50			60		
	Total Covered Area (sq ft)	7,000			5,100		
	Source Release Height (ft)	20			20		
	Receptor Distance (m)	25			25		
	t-BAc content	25%	50%	75%	25%	50%	75%
	# of Roofing Project Locations	5			5		
MODEL RESULTS	Acute HI for range for all locations ¹	3.0 – 14.6			1.4 – 7.6		

1 Rule 1401 – New Source Review of Toxic Air Contaminants limits Acute HI of new projects to less than 1.0

Staff Recommendations

- Updated assumptions (e.g., 5100 sq ft total coverage area) provided by stakeholders likely underestimates a commercial or industrial roofing project
 - Even with updated assumptions, risk assessment demonstrates risk to offsite receptors (e.g., a nearby residence)
- OEHHA has not established an acute end point for pCBtF yet
- Governing Board directed staff to rely on the precautionary principle
 - Precautionary principle is to prioritize reducing toxic risk over VOC reductions
 - If the risk is unknown, use a precautionary approach
 - No acute end points, precautionary approach is to not allow exemption
- Staff could reconsider assessment more data on risks of pCBtF becomes available

Comparing t-BAc and pCBtF Toxicity to other Group II Compounds

Exempt Compounds in South Coast AQMD

- South Coast AQMD Rule 102 – Definitions lists the exempt compounds
- Group II compounds are those that are already restricted or will be restricted in future because they are either
 - Toxic
 - Potentially toxic
 - Upper atmosphere ozone depleters
 - Cause other environmental impacts

Rule 102 (Cont.)

(Amended January 10, 2020)

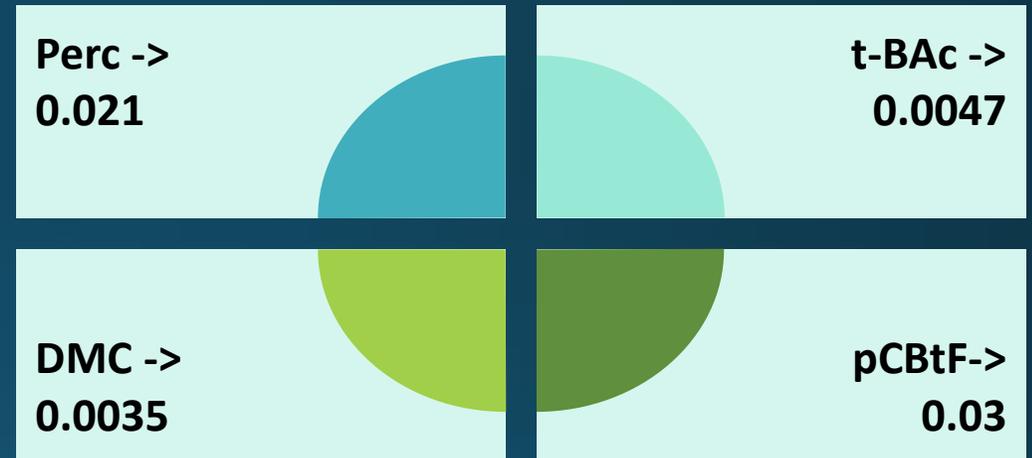
(B) Group II

methylene chloride (dichloromethane)
1,1,1-trichloroethane (methyl chloroform)
trichlorofluoromethane (CFC-11)
dichlorodifluoromethane (CFC-12)
1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113)
1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114)
chloropentafluoroethane (CFC-115)
cyclic, branched, or linear, completely methylated siloxanes (VMS)
tetrachloroethylene (perchloroethylene)
ethylfluoride (HFC-161)
1,1,1,3,3,3-hexafluoropropane (HFC-236fa)
1,1,2,2,3-pentafluoropropane (HFC-245ca)
1,1,2,3,3-pentafluoropropane (HFC-245ea)
1,1,1,2,3-pentafluoropropane (HFC-245eb)
1,1,1,3,3-pentafluoropropane (HFC-245fa)
1,1,1,2,3,3-hexafluoropropane (HFC-236ea)
1,1,1,3,3-pentafluorobutane (HFC-365mfc)
chlorofluoromethane (HCFC-31)
1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a)
1 chloro-1-fluoroethane (HCFC-151a)

The use of Group II compounds and/or carbon tetrachloride may be restricted in the future because they are either toxic, potentially toxic, upper-atmosphere ozone depleters, or cause other environmental impacts. By January 1, 1996, chlorofluorocarbons (CFC), 1,1,1-trichloroethane (methyl chloroform), and carbon

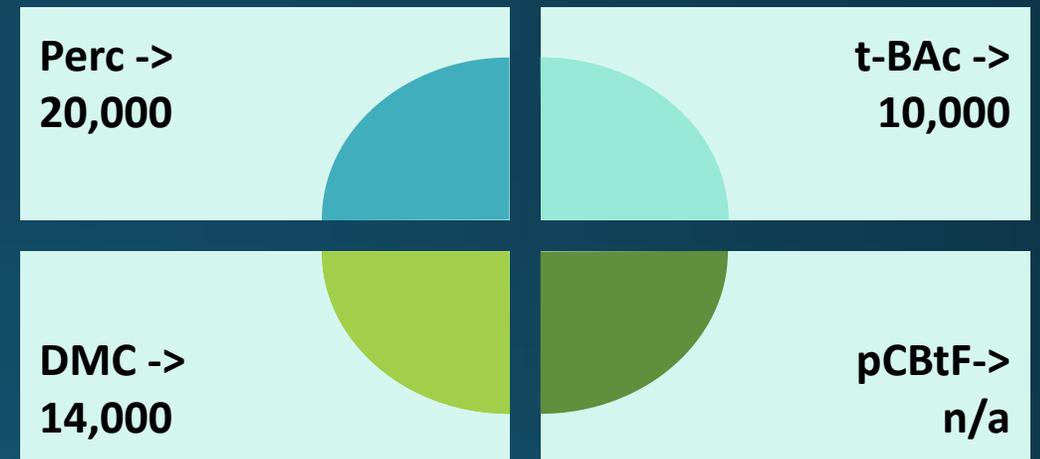
Cancer Potency Factor for Group II Compounds

- Five Group II compounds have a defined Cancer Potency Factor or Reference Exposure Level (REL)
- Cancer Potency Factor (Slope Factor) for four compounds is shown here
- pCBtF has the highest Cancer Potency Factor of all Group II exempt compounds (almost 50% more than perc)



Acute RELs for Group II Compounds

- Acute REL for Group II compounds is shown here
- Acute HI has an inverse correlation with REL
 - t-BAc has the lowest REL meaning the highest risk among Group II compounds
- Cancer Potency Factor for pCBtF is much higher than t-BAc, perc, and DMC, but there is no established Acute Reference Exposure Level (REL)



Preliminary Conclusions

Preliminary Conclusion on pCBtF and t-BAc

- Additional modeling supports the Stationary Source Committee's recommendation to remove the VOC exempt status of t-BAc
- OEHHA's assessment of t-BAc and pCBtF shows compounds to be as toxic as many chemicals currently prohibited
- Staff recommends prohibiting the use of t-BAc and pCBtF

Exempt Solvents

Follow up on the pCBtF Survey

pCBtF Survey Follow up

- Staff followed up with manufacturers submitted the pCBtF survey to gather more information on the percent usage of pCBtF in their products

Some manufacturers responded to staff's request

Only a small subset of Rule 1168 products indicated they use pCBtF

Average percent pCBtF reported for all reported categories was between 4.5% to 90%

Average percent pCBtF reported for roofing products was between 40% to 90%

The product categories were All Other Roof Sealants, All Other Sealants, Single Ply Roof Membrane Sealant, and All Other Adhesive Primers

Majority of the feedback staff received was from roofing products manufacturers

Survey Results for Clear, Paintable, and Immediately Water-Resistant Sealant

- Stakeholders raised concerns about the new 250 g/L limit which will be effective January 1, 2023
 - Manufacturers indicated they can only meet the proposed VOC limits using pCBtF – no other exempt solvents available
 - Only aromatic solvents are compatible with these products
 - Aromatics have toxicity concerns, e.g., as pCBtF, benzene, toluene
 - Products used by consumers, so toxicity is a significant concern
- The baseline emissions for this category is low 0.025 tpd but toxicity is a concern
- Staff evaluating if any other sealant can replace this product
 - Evaluating immediately waterproof aspect of sealant
 - Clear and paintable not a priority especially considering toxic risk of the product

Opteon 1100

Potential New Exempt Solvent

Background on Opteon 1100

2017

- Chemours reached out the South Coast AQMD regarding a possible VOC exemption for Opteon 1100 (HFO-1336mzz-Z, CAS number 692-49-9)
- South Coast AQMD does not exempt a compound unless it is exempted by the U.S. EPA

2019

- U.S. EPA revised the regulatory definition of VOC to exempt Opteon 1100 due to negligible contribution to the formation of tropospheric ozone
- Opteon 1100 is listed as an acceptable substitute by the U.S. EPA under the Significant New Alternatives Policy (SNAP) program for:
 - Foam Blowing Agents, Refrigeration and Air Conditioning, Cleaning Solvents, and Aerosol Solvent

2020

- South Coast AQMD reviewed available toxicology data for Opteon 1100 and did not find anything of concern

Precautionary Approach to Exempt Compounds

- As a result of the “t-BAc Assessment White Paper” published in 2017, the AQMD Governing Board adopted a precautionary approach to VOC exempt compounds
 - Governing board recommends OEHHA evaluate any chemical prior to the district exempting it
 - Will ensure that regulatory VOC reductions do not encourage the use of chemicals that have a known or suspected toxic profile
- A toxic profile is an air pollutant which may cause or contribute to an increase in mortality or serious illness, or which may pose a present or potential hazard to human health
- A compound has a known toxic profile if, for example, it has an established Cancer Potency Factor (CPF) or Reference Exposure Level (REL)

Opteon 1100

Opteon 1100 is an HFO

South Coast AQMD has exempted several HFOs in the past

There is a concern that HFOs can break down into PFAS through atmospheric degradation

PFAS (per- and polyfluoroalkyl substances) are organic substances that are persistent in the environment and can have serious health impacts on humans

OEHHA has not evaluated Opteon 1100

Board directed staff to adopt a precautionary approach to exempt VOC compounds

Staff Recommendation on Opteon 1100

Preliminary Conclusion on Opteon 1100

- At this time, staff does not recommend including Opteon 1100 as VOC exempt compound
- Conclusion could change pending OEHHA assessment

Potential Impacts of Exempt Solvents

Assessing the Impacts of Prohibiting t-BAc, pCBtF and not Exempting Opteon 1100

- Staff proposing to prohibit use of t-BAc and pCBtF
 - Manufacturers currently using these compounds to achieve lower VOC limits will be impacted
 - Manufacturers that planned to use these compounds to meet future effective limits will also be impacted
 - Staff understands the proposed limits and even some current limits, e.g., roofing adhesives, may need to be reassessed
 - Staff intends to have further discussions with impacted manufacturers
- Staff proposing not to exempt Opteon 1100 at this time
 - Not allowing exemption impacts the future effective VOC limits of 50 g/L for One Component Foam Sealant
 - Proposing to allow a 150 g/L VOC limit with 18-month implementation timeframe
 - Results in foregone or delayed VOC reductions of 0.11 tpd

Other Proposed Rule Amendments

Recent Rule Interpretation

- During the last rule amendment, the prohibition for certain toxic solvents (paragraph (g)(1)) was expanded to include Group II exempt solvents (paragraph (g)(2))
 - New prohibition included a 0.1% limit which was not included in original prohibition
 - Methylene Chloride was included in original prohibition and is also Group II exempt compound
- Stakeholder questioned if the new prohibition serves as an exception to the original prohibition to allow for 0.1% use of methylene chloride
- Legal interpretation stated that the plain language of the rule, legislative history, and statutory construction all verify that the new exemption is not an exception to the original prohibition of methylene chloride
- Inclusion of the 0.1% limit was intended to only allow for *trace amounts* of Group II exempt compounds and not to allow for prohibited compounds to be used as additives at levels of 0.1% or below

Proposed Amended Rule Language

- Staff proposes to change the trace levels allowance for prohibited compounds from 0.1 to 0.01 percent
 - Consistent with the California Air Resources Board Consumer Product Regulation¹
 - More realistic indication of a trace level contaminant
 - More health protective

▪ (gh) → Prohibition of Sales and Use¶

(1) → Except as provided in subdivision (i), no person shall use, supply, sell, or offer for sale a regulated product in the ~~District South Coast AQMD~~ that contains chloroform, ethylene dichloride, methylene chloride, perchloroethylene, ~~and~~ trichloroethylene, or Group II exempt compounds in quantities greater than 0.01 percent by weight. This provision does not apply to cyclic, branched, or linear, completely methylated siloxanes.¶

(2) → On and after ~~January 1, 2019~~ TBD, ~~except as provided in subdivision (i)~~, no person shall use, supply, sell, or offer for sale a regulated product in the ~~District South Coast AQMD~~ that contains ~~Group II exempt compounds~~ tertiary-Butyl Acetate or para-Chlorobenzotrifluoride ~~listed in Rule 102~~ in quantities greater than 0.01 percent by weight. ~~This provision does not apply to cyclic, branched, or linear, completely methylated siloxanes.~~¶

¹ California Consumer Products Regulations, Link [Here](#)

Next Steps



Continue Individual Meetings with Manufacturers

Seeking feedback on progress towards meetings future effective VOC limits and impact of pCBtF prohibition



Continue to Review Existing Products in the Market

Evaluate availability of future compliant products



Continue Rule Amendment

Report on initial findings and continue discussions

Staff Contacts

Michael Krause
Assistant DEO
mkrause@aqmd.gov
909.396.2706

Heather Farr
Planning and Rules Manager
hfarr@aqmd.gov
909.396.3672

Yanrong Zhu
Program Supervisor
yzhu1@aqmd.gov
909.396.3289

Mojtaba Moghani, Ph.D.
AQ Specialist
mmoghani@aqmd.gov
909.396.2527