Rule 1168 – Adhesive and Sealant Applications

Working Group Meeting #1

July 8 2026, 9:00 AM (PST)

Join zoom meeting:
https://aqmd.zoomgov.com/j/1658914403
Meeting ID: 165 891 4403

Agenda

- Summary of Technology Check-In Meeting in November 2025
- Background on Rule and Exempt Compounds
- Reactivity Based VOC Limits
- Technology Check In
- Staff Proposals
- Next Steps

Background

Rule 1168

- Adopted in 1989, last amended in 2022, including pCBtF and t-BAc phase-out schedule
- Regulates VOC emissions from adhesives, adhesive primers, sealants, and sealant primers
- Includes quantity and emissions reporting requirement schedule for manufacturers

Summary of 2025 Technology Check-in

Public Meeting November 18, 2025 to Report on Technology Check-in

- Presented background on Rule 1168 and the results of Technology Check-In
- Provided a quick summary of the latest Quantity and Emission Reports (QERs)
- Concluded rule amendment likely needed to delay one upcoming pCBtF prohibition deadline

Since last Working Group Meeting

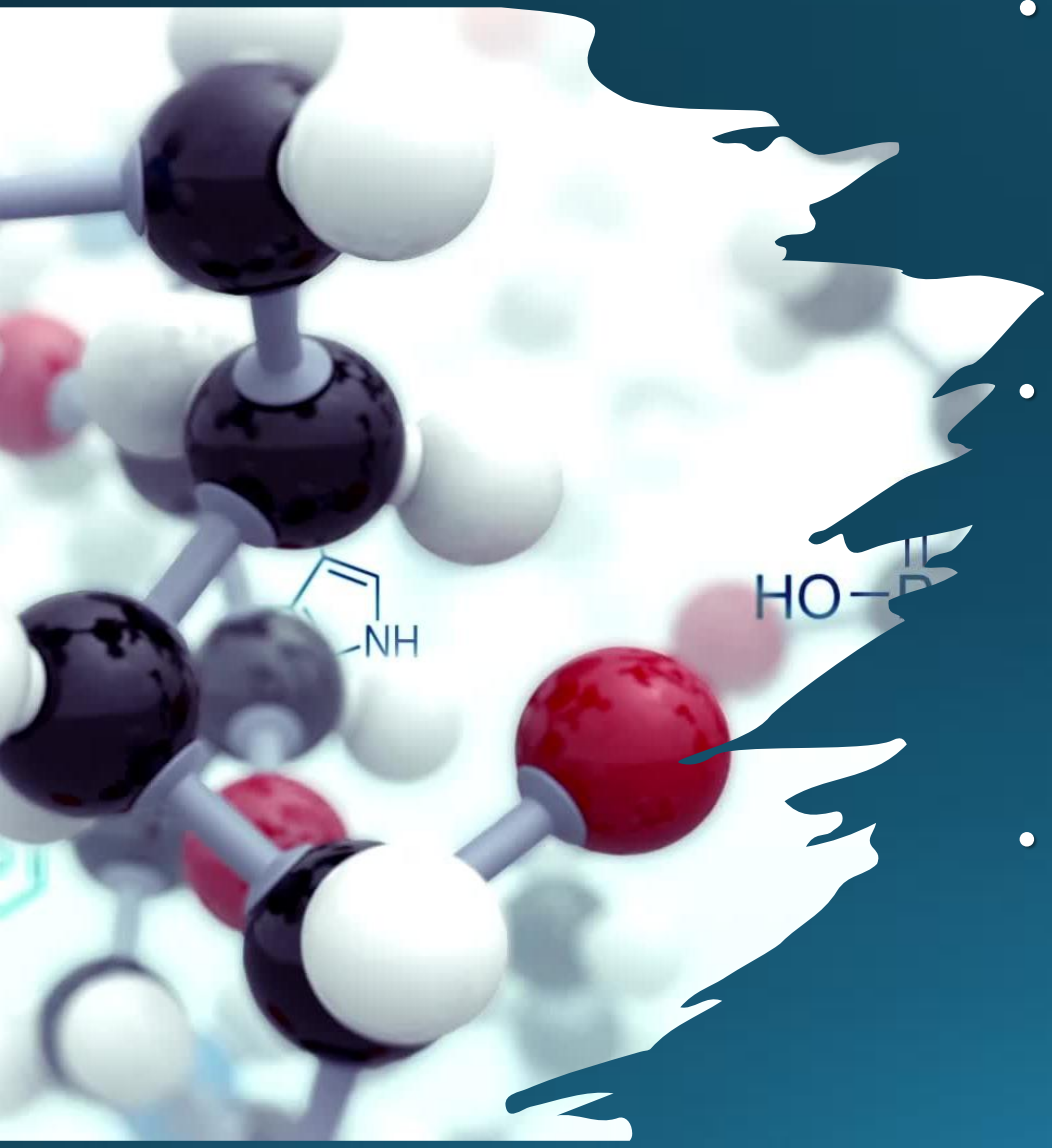
- Met with several stakeholders regarding upcoming rule prohibition deadlines and VOC limit reductions

Volatile Organic Compounds (VOC)*

- VOCs are photochemically reactive chemicals and major contributor to Ozone formation (smog)
  - South Coast AQMD is classified as an extreme non-attainment area for the 2015 Ozone National Ambient Air Quality Standards (NAAQS)
- VOCs emitted from different sources
  - Common sources of VOCs are mobile sources, industrial processes, biogenic (e.g., wildfires), coatings, adhesives, etc.

* Definition of VOC (per Rule 102): Carbon-based volatile compounds excluding: methane, CO, CO_2, carbonic acid, metallic carbides/carbonates, ammonium carbonate, and exempt compounds

Exempt Compounds



- U.S. EPA VOC Exemptions
  - Solvents with low photochemical reactivity (less than ethane)
  - Does not consider toxicity in exemptions
  - Key exempt compounds include acetone, pCBtF, and t-BAc
- South Coast AQMD Approach
  - Considers U.S. EPA exemptions plus toxicity, ozone depletion, and environmental impact
  - Rule 102 Exempt Compound Groups:
    - Group I: Not expected to be restricted
    - Group II: Often prohibited in VOC rules
- Special Exemptions
  - t-BAc has limited use exemption in:
    - Rule 1113 (Architectural Coatings) and Rule 1151 (Motor Vehicle Coatings)
    - Never considered an exempt compound in Rule 1168

pCBtF and t-BAc Background

1994	U.S. EPA exempted pCBtF as a VOC due to negligible photochemical reactivity
1995	South Coast AQMD exempted pCBtF as a VOC due to negligible photochemical reactivity
2004	U.S. EPA exempted t-BAc as a VOC due to negligible photochemical reactivity
2005 – 2006	South Coast AQMD included limited exemption for t-BAc in Rule 1151 and Rule 1113
2015	Office of Environmental Health Hazard Assessment (OEHHA) released draft Cancer Potency Factor for t-BAc, more toxic than previously believed
2017	Staff drafted t-BAc white paper and presented findings to the Stationary Source Committee, who directed staff to prioritize toxicity over VOC emission reductions
2018	OEHHA finalized t-BAc Cancer Potency Factor, concluding poses potential cancer risk to humans, South Coast AQMD requested OEHHA evaluate toxicity of pCBtF
2020	OEHHA finalized pCBtF Inhalation Cancer Potency Factor, concluding pCBtF poses greater cancer risk to humans than t-BAc

2022 Rule 1168 Amendment

- 2017 rule amendment required a technology check-in for several future effective VOC limit reductions
  - Staff identified the need to amend rule during the 2022 technology check-in
- Staff considered several approaches to address toxicity concerns for pCBtF and t-BAc
  - Remove the exemption but allow the use of the solvents
    - Approach would not necessarily reduce the use or toxic exposure of the solvents
  - Allow limited uses, e.g., outdoor applications
    - Modeling demonstrated the off-site health risk was too high
- Staff compared the toxicity of other solvents that are prohibited in VOC rules to the toxicity of pCBtF and t-BAc

Staff's Conclusions

Additional modeling supported the Stationary Source Committee's recommendation to remove the VOC exempt status of t-BAc

OEHHA's assessment of pCBtF and t-BAc shows compounds to be as toxic as chemicals currently prohibited

Staff recommended phasing out the use of pCBtF and t-BAc

Rule Amendments to Address pCBtF and t-BAc

- **Rule 1168 – Adhesive and Sealant Applications**
- **Rule 1151 – Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations**
- **Rule 1171 – Solvent Cleaning Operations**
- **Rule 1107 – Coating of Metal Parts and Products**
- **Rule 1124 – Aerospace Assembly and Component Manufacturing Operations**
- **Rule 1136 – Wood Products Coatings**

Rule 1168 Phase Out Approach

- Staff provided different timelines for categories that relied on pCBtF or t-BAc in formulations
- pCBtF use was more extensive in roofing categories
  - Provided longer time for categories with higher use
- t-BAc use was limited
  - Created separate phase out timeline
  - Applies to all regulated products

Table 3: pCBtF and t-BAc Prohibition Timeline

Category	Prohibition Effective Date	Sell-through End Date	Use-through End Date
	pCBtF Prohibition Effective Dates		
Cut Edge Single Ply Roof Membrane Sealant	January 1, 2027	January 1, 2028	January 1, 2028
EPDM/TPO Single Ply Roof Membrane Adhesive			
Roof Adhesive Primer			
Single Ply Roof Membrane Adhesive (Except EPDM/TPO)	January 1, 2025	January 1, 2028	January 1, 2028
Single Ply Roof Membrane Sealant (Except Cut Edge)			
All Other Roof Sealant			
Roof Sealant Primer			
Clear, Paintable, and Immediately Water-Resistant Sealant	January 1, 2026	January 1, 2028	January 1, 2028
All Regulated Products not listed above	January 1, 2024	January 1, 2027	January 1, 2028
	t-BAc Prohibition Effective Dates		
All Regulated Products	January 1, 2024	January 1, 2027	January 1, 2028

Reactivity Based VOC Limits

VOCs, Reactivity, and Ozone Formation

- VOCs are the solvents in coatings that evaporate when coatings dry
  - VOCs are one of the main ozone precursors
- Ozone at ground level can make it harder to breathe, especially for kids, elderly, or people with asthma
- Not all VOCs have equal ozone-formation potential
  - Some VOCs are more reactive, i.e., they create more ozone than others

Considerations for Alternative MIR Limits

Product Weighted Maximum Incremental Reactivity (PW-MIR) Limits

- Incorporated in several recently adopted South Coast VOC rules
- Alternative compliance option for challenging categories relying heavily on pCBtF and t-BAc

Alternative PW-MIR Limits for PAR 1168

- Potentially help manufacturers expedite compliance timelines
- Additional tool for manufacturers reformulating away from pCBtF or t-BAc
- Stakeholder feedback needed to assess feasibility

Maximum Incremental Reactivity (MIR)

- Reactivity-based limits would require manufacturers to choose solvents with lower MIR
  - Solvents with lower ozone forming potential
- Could allow formulators more flexibility
- Alternative option for compliance

MIR Values of Some Common Solvents

Compound	MIR
2-pentenes	10.47
o-xylene	7.64
butanal	5.97
toluene	4.00
ethanol	1.53
MEK	1.48
nonane	0.78
methanol	0.67
isopropyl alcohol	0.61
tert-Butyl alcohol	0.41
acetone	0.36
pCBtF	0.13
methyl acetate	0.07
D4	0.00

Mass-Based versus Reactivity-Based Limits

- Mass-based VOC limits treat all solvents equally other than water and exempts solvents which are not considered VOCs
- Reactively-based limits are weighted averages based on the MIR value of each solvent
- CARB uses reactivity-based limits for aerosol coatings

Table of Reactivity Limits
Product-Weighted MIR in Grams Ozone per Gram Product
(g O_3 / g product)

Aerosol Coating Category

General Coatings	**06/01/2002**	**01/01/2017**
Clear Coating	1.50	0.85
Flat Coating	1.20	0.80
Fluorescent Coating	1.75	1.30
Metallic Coating	1.90	1.25
Nonflat Coating	1.40	0.95
Primer	1.20	0.70
Specialty Coatings (A)	**01/01/2003**	**01/01/2017**
Auto Body Primer	1.55	0.95
Electrical/Electronic/Conformal Coating		2.00
Exact Match Finish:		
Automotive	1.50	0.95
Engine	1.70	0.95
Industrial	2.05	1.20
Flexible Coating		1.60
Ground Traffic/Marking Coating	1.20	0.85
Mold Release Coating		1.10
Two Component Coating		1.20
Uniform Finish Coating		1.30

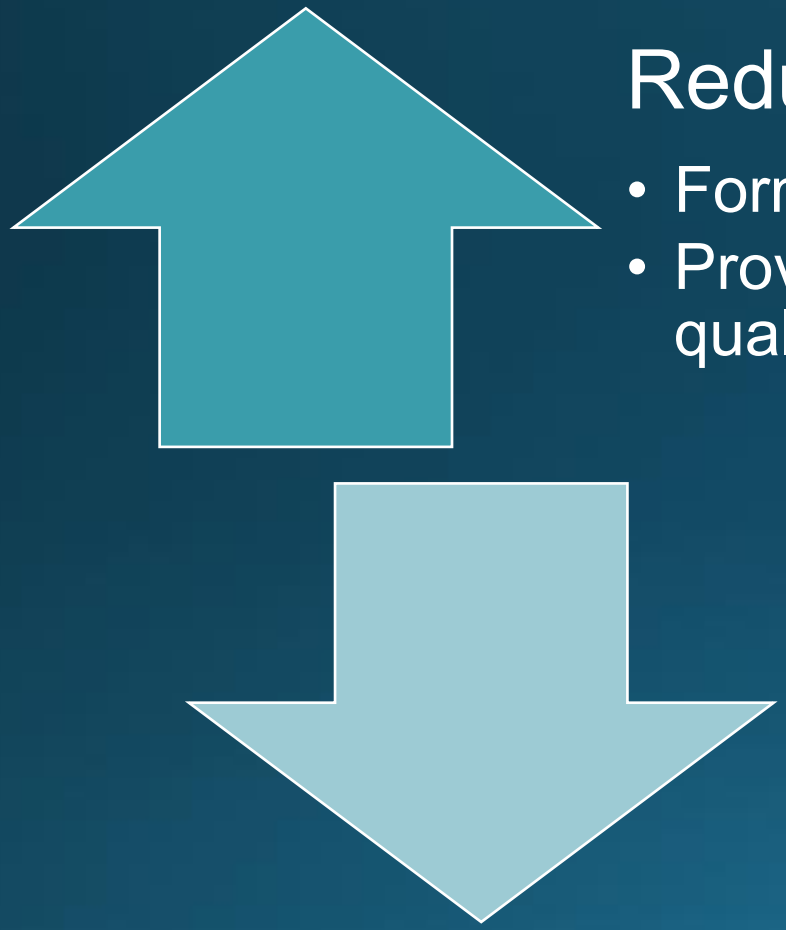
Impact of Reactivity

- Examples of solvent and solids impact on reactivity
- Second example generates more ozone than the first example

Compound	Weight Percent	MIR	Weighted Average
Acetone	50%	0.4	0.20
N-butyl Acetate	30%	0.8	0.24
Titanium oxide	20%	0	0
	100%		0.44

Compound	Weight Percent	MIR	Weighted Average
N-butyl Acetate	35%	0.8	0.28
Toluene	22%	4.0	0.88
Butanol	18%	2.9	0.52
Ethanol	10%	1.5	0.15
Formaldehyde	9%	9.5	0.86
Talc	6%	0	0
	100%		2.69

Pros and Cons



Reduce ozone

- Formulation flexibility
- Provide another tool to improve air quality

Might not be adopted widely

- Different metric just for South Coast AQMD
- More complicated than mass-based limits

Conclusions on PW-MIR

Staff is open to including PW-MIR VOC limits if it would be a useful tool for manufacturers

Limits would be designed to have equivalent ozone producing potential as the mass-based limits

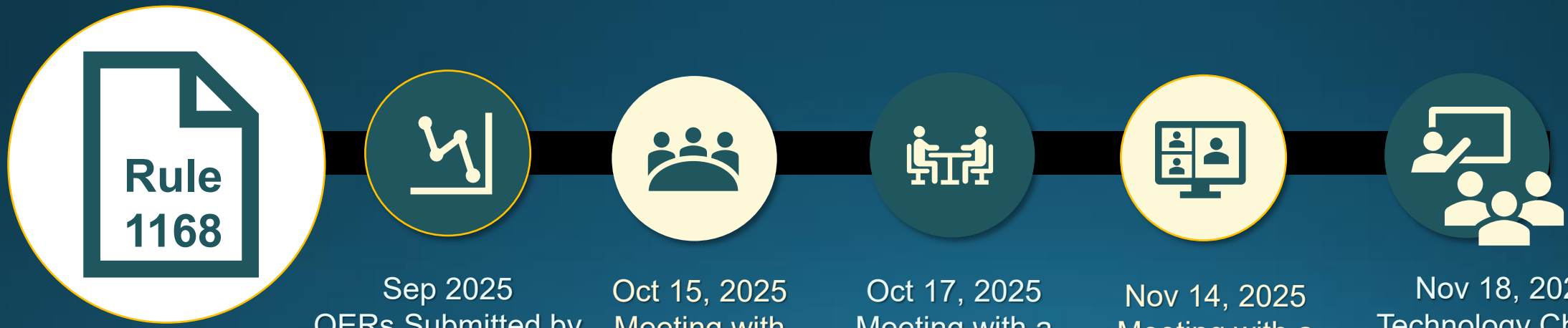
Would be optional, manufacturers could opt to meet mass-based limits or PW-MIR limits

Technology Check-in

Rule 1168 Technology Check-In

Technology Check-In

- During 2022 rule amendment, Governing Board directed staff to assess progress on pCBtF and t-BAc phaseout and to report back to the Stationary Source Committee
- Technology check-in included meeting with manufacturer and industry trade group
  - Reported data and feedback



Meeting with Stakeholders

Staff engaged with roofing industry stakeholders, including trade associations and manufacturers

Meetings were held with SPRI, Johns Manville, and Carlisle CCM, in October and November of 2025

Stakeholders did not raise phase-out concerns for most categories, except for Ethylene Propylene Diene Monomer (EPDM) roofing adhesive primers

For most products, the phase-out has already been implemented

- Remaining products are undergoing testing and validation prior to commercial release

EPDM Roofing Adhesive Primers

Background

- Low-use specialty coatings but a critical component to EPDM roofing systems
- Low-solids coatings with high percentage of pCBtF to meet current 250 g/L limit
- No reported EPDM Adhesive primer is formulated without pCBtF

Stakeholder Concern

- Concerned with ability to meet the January 1,2027 phase out deadline for pCBtF
- No suitable replacement will be available by deadline

Potential Rule Amendments

pCBtF Prohibition Date

- Considering need to extend deadline to provide additional time for EPDM Single-Ply Rood Membrane Adhesive

Upcoming VOC Limit Reductions

- Meeting with adhesive manufacturers with upcoming VOC reductions to assess reformulation efforts
  - Top and Trim, Rubber Vulcanization, and Clear, Paintable, and Immediately Water-Resistant Sealants

Considering Need for Delays

- Concerns and challenges
- Potential compliance timelines

Rule Amendment Process

Staff has met or will meet with manufacturers to assess reformulation progress

- Top and Trim Adhesives
- Rubber Vulcanization Adhesives
- Clear, Paintable, and Immediately Water-Resistant Sealants
- EPDM Roofing Adhesive Primers

Staff met with manufacturers from Top and Trim Adhesives and Rubber Vulcanization Adhesive on June 25, 2026

Will continue meetings including with other stakeholders

Top and Trim Adhesives Background

2007	• VOC limit reduced from 540 to 250 g/L • Technical challenges prevented reformulations • End users continued to use high-VOC products as allowed under 55 gal/year exemption
2017	• Staff reinstate the 540 g/L limit until 2023 • Manufacturer feedback indicated there had been progress toward achieving the 250 g/L limits
2019	• On January 1, 2019, 55-gal/year exemption expired for this category
2021 and 2022	• Technology assessment required to assess if 250 g/L is feasible by 2023 • Technology assessment concluded that a rule amendment is required for this category and extended the deadline to January 1, 2028

Top and Trim Adhesives

Met with Stakeholder on June 25, 2026

Initial Stakeholder feedback

- A low VOC water-based contact adhesive was successfully developed which performs well in many applications
  - However, it did not pass critical top and trim performance tests required for automotive use
  - Water-based systems cannot deliver the required high-heat-resistant properties
- Earliest feasible timeline: 2030–2031 for a compliant reformulation pathway

Next Steps

- Evaluate PW-MIR as an alternative compliance option
  - Evaluate product data and determine feasibility
- Will continue to meet to assess phase out process

Rubber Vulcanization Adhesive Background

Prior to 2017	• VOC limit set at 250 g/L, but most facilities complied using the 55-gallon exemption
2017	• 55-gallon exemption removed • VOC limit raised to 850 g/L to reflect existing product formulations • 250 g/L retained as a future effective limit to allow time for reformulation
2022	• Stakeholder requested reconsideration of the 250 g/L limit due to technical challenges • Retained 850 g/L as the current limit • Provided five additional years for reformulation

Rubber Vulcanization Adhesive

Met with Stakeholder on June 25, 2026

Initial Stakeholder feedback

- Rubber Vulcanization Adhesives are highly specialized and vary widely
  - Uniquely formulated for specific use case
- Due to an incident at the manufacturing plant product development was temporarily halted, slowing development
- Next-generation water-based technologies currently being evaluated and in early testing stage

Next Step

- Continue to work with stakeholder to determine if some additional time is needed

Clear, Paintable, and Immediately Water-Resistant Sealant Background

Before 2017, category was part of the “Architectural Sealant” category

- New Architectural Sealant subcategory, "Clear, Paintable, and Immediately Water-Resistant Sealant," with a 380 g/L VOC limit
- Stated product provides immediate water resistance, enabling rapid sealing during rain and snow conditions
  - Other “Architectural Sealants” that comply with the 250 g/L VOC limit are also immediately water resistant, they are just not “clear” and “paintable”

In 2017, stakeholder requested additional time to reformulate to the 250 g/L limit

In 2022, the stakeholder requested additional time and was extended until January 1, 2026, providing approximately eight years for reformulation

Clear, Paintable, and Immediately Water-Resistant Sealant

Staff identified comparable Architectural Sealants complying with 250 g/L VOC limit

- Lower VOC formulations are commercially available

January 1, 2026 reformulation deadline has passed, manufacturer requesting additional time

- Staff will meet with stakeholder to evaluate reformulation progress and determine an appropriate path forward

Other Considerations

55 Gallons per facility per calendar year exemption (j)(5)(c)	Facilities using or purchasing products under this exemption are required to submit an annual report to South Coast AQMD and maintain supporting records
	No annual reports have been received from facilities utilizing this exemption
	Staff are proposing to remove this exemption due to absence of reporting data and potential for rule circumvention

Other Considerations

Independent Distributor Exemption (j)(10)	The current exemption allows manufacturers and suppliers to meet their obligation by providing written notification to independent distributors that certain products may not be used within the South Coast AQMD
	Staff has found large amounts of non-compliant adhesives and sealants for sale in our jurisdiction
	Staff proposing to explore options to address this potential loophole

Next Steps

- Continue Working Group Meetings and discussions with Stakeholders
- Release preliminary draft documents on September 18, 2026
- Public Hearing December 2026

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