VOC Rule Development

Working Group Meeting #1
August 12, 2025

Join Zoom Webinar Meeting

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Teleconference Dial-In: 1-669-900-6833
Webinar Meeting ID: 928 2318 5047

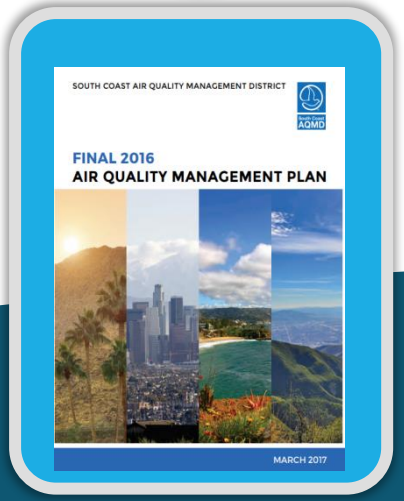
Agenda

- South Coast AQMD Background
- Rule Development Process
- VOC Emissions
- pCBtf and t-BAc Background
- Maximum Incremental Reactivity-Based VOC Limits
- VOC Rule Amendments
- Manufacturer Survey
- Next Steps

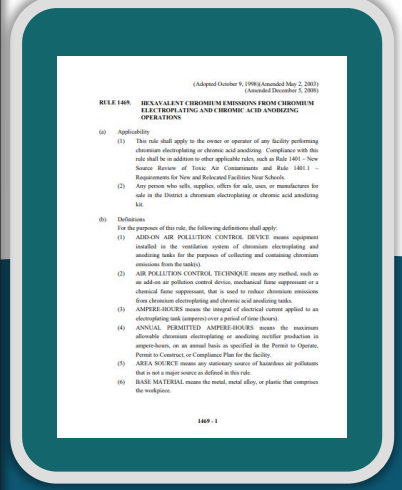
South Coast Air Quality Management District

- Local air pollution control agency
  - Largest of the 35 local air agencies in CA and in the U.S.
  - 10,743 square miles
  - 17 million residents
- Responsibilities
  - Regulate emissions from stationary sources
  - Develop and implement plans to meet National Ambient Air Quality Standards
  - Permit and inspect affected businesses
  - Administer incentive funding annually

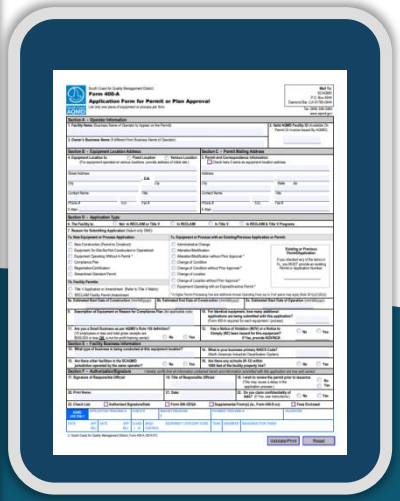
Key South Coast AQMD Activities



Develops the Air Quality Management Plan - blueprint for achieving compliance with federal and state clean air standards



Adopts air rules and regulations to reduce emissions from various sources



Issues permits for equipment that limits the amount of air emissions to ensure compliance with air quality rules

Conducts periodic inspections to ensure compliance with air quality requirements

Responds to air quality complaints from the public

Conducts ambient air quality monitoring, including special studies

Rule Development Process

Overview of Rule Development Process

Working Group Meetings

- Comprised of stakeholders and representatives from industry (regulated industry, equipment suppliers), community and environmental groups, labor associations, government agencies, and academia
- Working Group Meetings held throughout rule development process and open to the public
- Objectives:
  - Build consensus and work through challenges
  - Provide opportunities for early input
  - Implement requirements
- Assists staff in understanding:
  - Key issues and concerns
  - Industry terms, industry practices, etc.
  - Applicable technologies

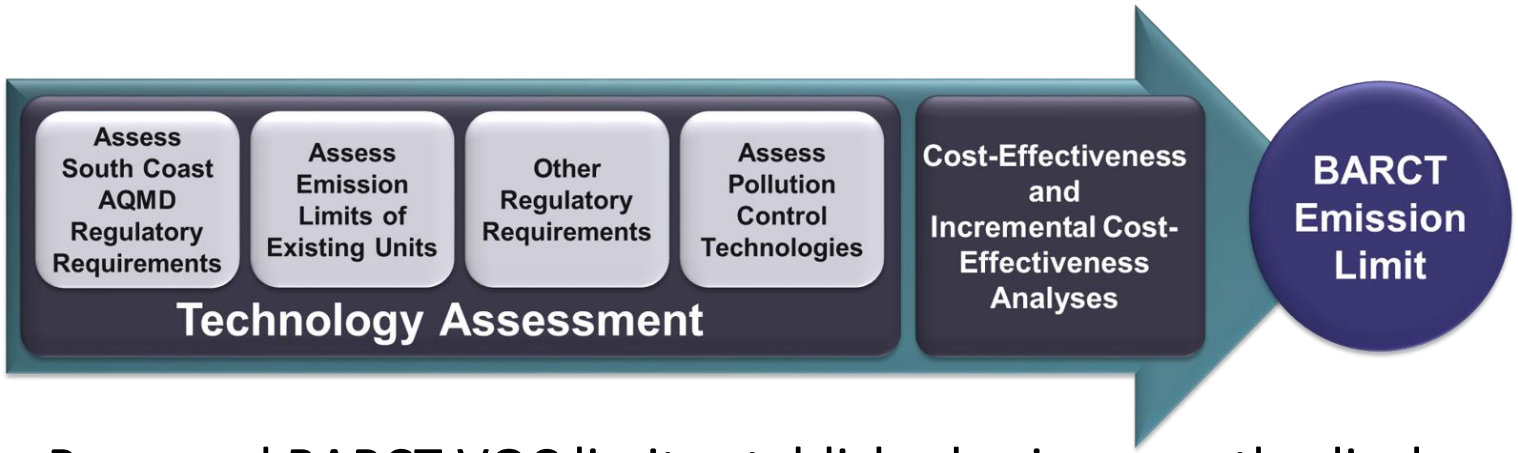
Stakeholder Input

- Stakeholders can provide input during working group meetings and throughout the rulemaking process
- Early input is strongly encouraged to help develop proposed rule amendments and to address issues
- Working Group Meetings, individual meetings, and site visits allow stakeholders to dialogue directly with staff to discuss individual issues

Information Gathering

- Staff gathers information from multiple sources:
  - Internet searches
  - Manufacturer meetings/surveys
  - Internal expertise and data
    - Facility permits, inspection reports, compliance history, previous rule files, other rule amendments
  - Product datasheets
  - Site visits
- Information includes types of products being used, volatile organic compound content, product cost, etc.
- Information used to inform staff recommendations

BARCT Assessment Approach



- Proposed BARCT VOC limit established using a methodical approach that meets state law
- BARCT is defined in the California Health and Safety Code §40406 as:
  "*…an emission limitation that is based on the maximum degree of reduction achievable by each class or category of source, taking into account environmental, energy, and economic impacts.*"

- VOC limits are designed to achieve maximum reductions taking into account economic impacts
- 2022 Final AQMP requires staff to present options for control when cost threshold is exceeded
- Cost-effectiveness threshold is $40,168/ton of VOC reduced (2024 dollars)

Key Objectives of Rule Amendments

Prohibition on use of *para*-Chlorobenzotrifluoride (pCBtF) and *tert*-Butyl Acetate (t-BAc)

Lower VOC Emissions where feasible

Technology Assessment

- Staff will:
  - Meet with manufacturers, end users, raw material suppliers, and other stakeholders to seek input
  - Review Manufacturer Survey, Product Data Sheets, and Safety Data Sheets to evaluate VOC levels and pCBtF/ t-BAc content
- Information will be used to evaluate VOC limits and pCBtF and t-BAc prohibition approach and timeline
- Initial findings will be discussed in Working Group Meetings
- A cost-effectiveness assessment will be conducted if VOC limit reductions are proposed

VOC Emissions

Volatile Organic Compounds (VOC)

- A VOC is any volatile compound made of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and exempt compounds
- Can be photochemically reactive and contribute to the formation of ground-level ozone (smog)
- South Coast AQMD controls VOC emissions by imposing VOC content limits

<u>Common Sources of VOC</u>

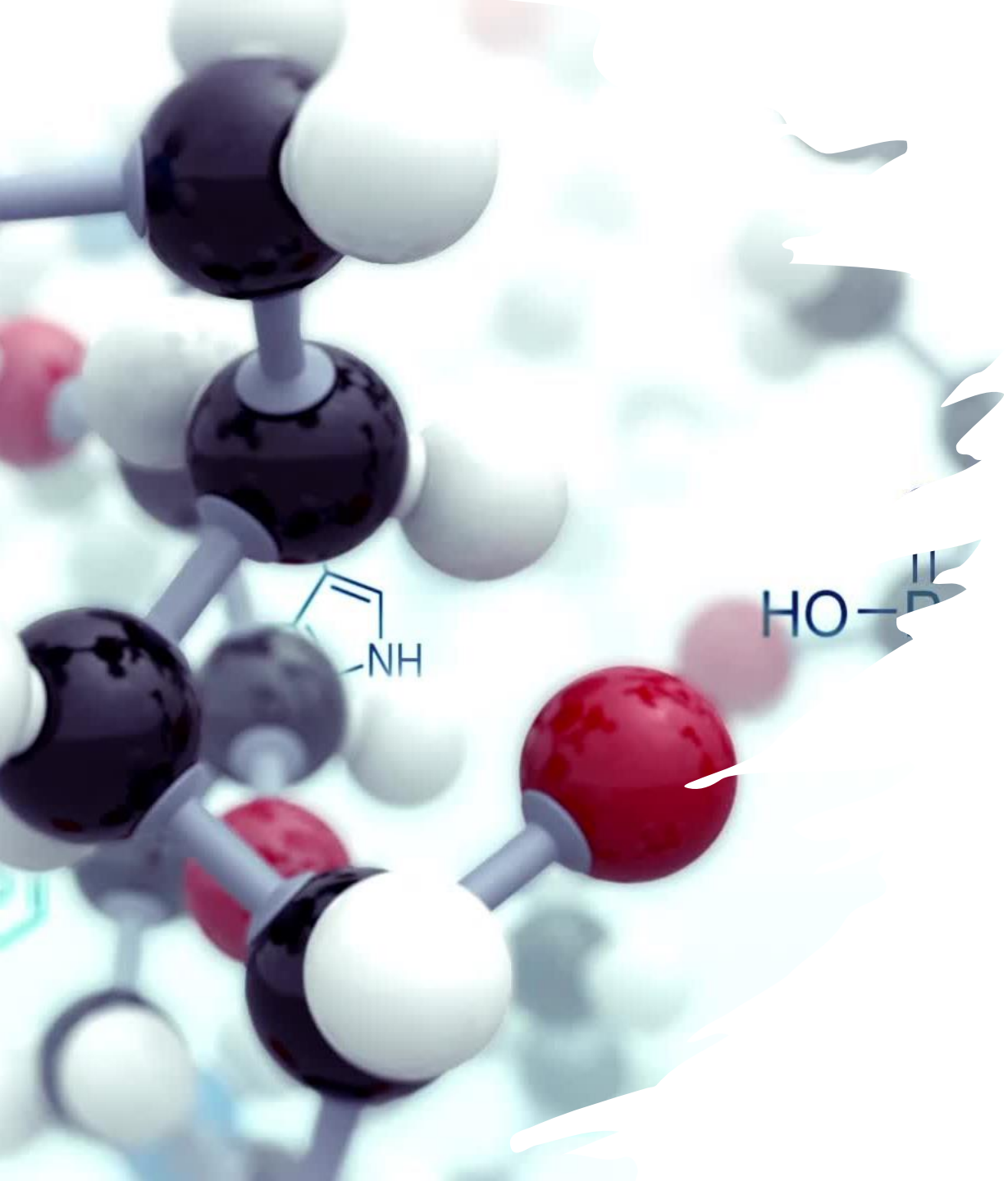
- Motor vehicles
- Coatings, paint, inks, and solvents
- Industrial processes
- Consumer products
- Biogenic (plants)

Comparison of VOC Emissions from 2016 AQMP to 2022 AQMP

Source Category	2016 AQMP	2022 AQMP	% Change	2016 AQMP	2022 AQMP	% Change
	VOC			NOx		
STATIONARY SOURCES						
Fuel Combustion	11.3	5.4	-52%	22.8	20.1	-12%
Waste Disposal	15.4	16.6	8%	2.5	1.5	-38%
Cleaning and Surface Coatings	42.3	38.1	-10%	0.1	0.0	-69%
Petroleum Production and Marketing	21.1	20.6	-2%	0.3	0.3	-10%
Industrial Processes	12.3	10.8	-12%	0.1	0.1	13%
Solvent Evaporation:						
Consumer Products	87.6	107.4	23%	0.0	0.0	0%
Architectural Coatings	11.5	10.6	-8%	0.0	0.0	0%
Others	2.7	2.3	-14%	0.0	0.0	0%
Misc. Processes	7.1	5.7	-20%	10.3	11.5	11%
RECLAIM Sources	0.0	0.0	0%	24.2	18.2	-25%
Total Stationary Sources	**211**	**218**	**3%**	**60**	**52**	**-14%**
MOBILE SOURCES						
On-Road Vehicles	93	81	-13%	167	156	-7%
Off-Road Vehicles	101	107	6%	139	143	3%
Total Mobile Sources	**194**	**188**	**-3%**	**306**	**299**	**-2%**
TOTAL	**405**	**406**	**0%**	**366**	**351**	**-4%**

- VOC emissions consist of both stationary and mobile sources
- Overall VOC emissions show no change from 2016 to 2022
- Area Sources major contributor to VOC emissions for region
  - Consumer products increase due to population growth
    - Majority are regulated by CARB
  - On-road mobile sources decreased
- VOC emissions from solvent evaporation such as coatings and cleaning processes decreased by approximately 10% or 5.5 tpd

para-Chlorobenzotrifluoride (pCBtF) CAS: 98-56-6
tert-Butyl Acetate (t-BAc) CAS: 540-88-5



Exempt Compounds

- Certain solvents are defined as exempt from the definition of a VOC by the U.S. EPA if they are negligibly photochemically reactive
  - Defined as less reactive than ethane
- Exempt compounds are not considered toward the VOC content of regulated materials
- U.S. EPA does not consider toxicity when making their designation

South Coast AQMD's Defined Exempt Compounds

- South Coast AQMD considers compounds designated as exempt by the U.S. EPA but also considers the toxicity, ozone depletion potential, or other environmental impacts
- Rule 102 – Definition of Terms, classifies exempt compounds into two groups
  - Group I: exempt compounds that are not expected to be restricted in the future
  - Group II: exempt compounds that are prohibited from use in many VOC rules because of toxicity or other environmental impacts
- South Coast AQMD sometimes includes limited exemption in source specific rules to address potential toxicity concerns

(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

Regulatory Timeline

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

2015
Office of Environmental Health Assessment (OEHHA) released draft Cancer Potency Factor for t-BAc – more toxic than previously believed

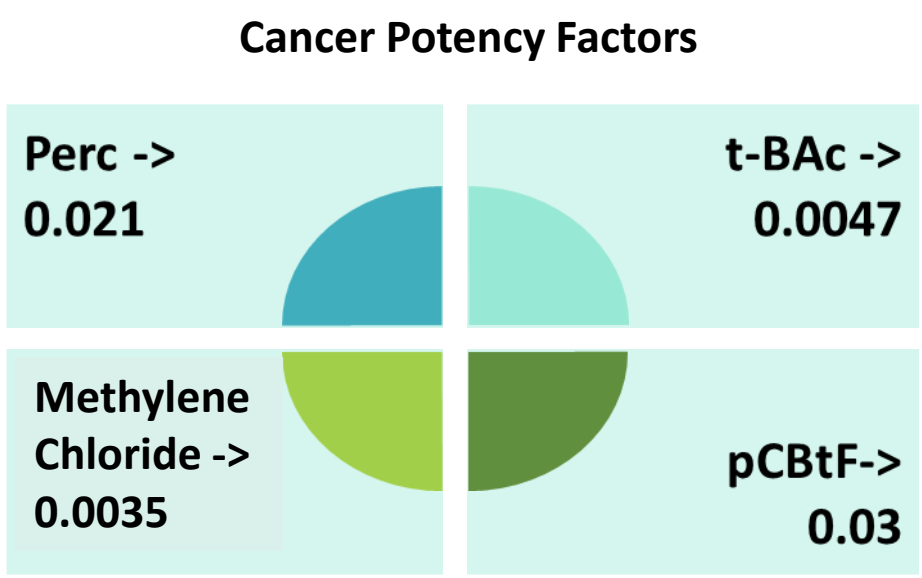
2017
South Coast AQMD staff drafted t-BAc white paper regarding partial exemption of t-BAc as a VOC and presented findings to the South Coast AQMD Stationary Source Committee, who directed staff to prioritize toxicity over VOC emission reductions if confirmed as a carcinogen

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

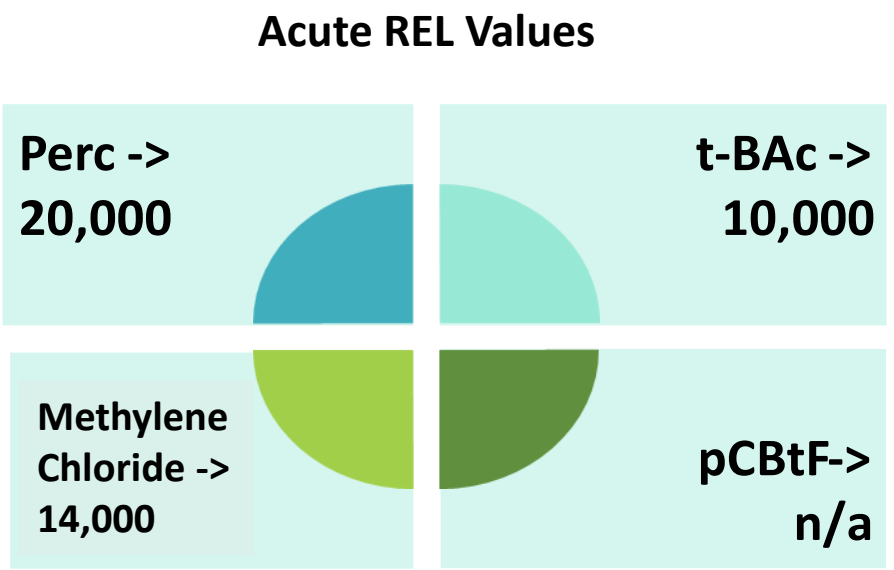
Cancer Potency Factor Comparison

- Cancer Potency Factors (Slope Factor) for four compounds with toxic endpoints are shown
- Cancer Potency Factor is a measure used to estimate the risk of cancer associated with exposure to a carcinogenic substance and represents the increased cancer risk per unit of exposure over a lifetime
- pCBtF has a higher Cancer Potency Factor than perchloroethylene (Perc), a prohibited Group II Exempt Compound



Reference Exposure Levels

- Reference Exposure Level (REL) is the maximum concentration level of a substance in the air not expected to have adverse health effects in humans over a specified exposure duration
  - RELs can be acute (short-term), 8-hour, or chronic (long-term)
  - Lower REL values indicate that lower concentrations of a substance have a greater risk of adverse health effects
- t-BAc has a lower REL than perchloroethylene (Perc), a prohibited Group II Exempt Compound
  - t-BAc can cause adverse health effects in humans at lower concentrations than perc



Staff's Conclusion

Additional modeling supported the Stationary Source Committee's recommendation to remove 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 recommended prohibiting the use of t-BAc and pCBtF

Actions taken to date by South Coast AQMD:

- Phase out of t-BAc and pCBtF conducted case-by-case assessment for each rule and product category to determine the best approach
- Amended Rule 1168 (adhesives) in 2022, Rule 1151 (automotive coatings) in 2024, and Rule 1171 (solvent cleaners) in 2025, to phase out pCBtF and t-BAc
- Currently amending three rules to address pCBtF and t-BAc toxicity
  - **Rule 1107 – Coating of Metal Parts and Products**
  - **Rule 1124 – Aerospace Assembly and Component Manufacturing Operations**
  - **Rule 1136 – Wood Products Coatings**

Phase Out Approach

- Rule 1168 – Adhesives and Sealants
  - Established future effective phase out date to give manufacturers time to reformulate (one to four year phase out, depending on category)
  - Set forth path to phase out and prohibit the use of t-BAc and pCBtF for VOC rules
- Rule 1151 – Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations
  - Allows temporary sale and use of higher-VOC products formulated to meet National VOC Emission Standard to quickly phase out of pCBtf and t-Bac
  - Established future effective lower VOC limits to reduce emissions (three to five year timeline)
  - Introduced some reactivity-based VOC limits to provide flexibility to manufacturers
- Rule 1171 – Solvent Cleaning Operations
  - pCBtF and t-BAc not commonly used for solvent cleaning and alternatives are readily available
  - Established future effective phase out dates (18 month phase out)

Maximum Incremental Reactivity-Based VOC Limits

Reactivity Based Standards

- Phasing out of t-BAc and pCBtF presents challenges for reducing VOC emissions
  - Many coatings rely on use of exempt compounds in their formulation to comply with existing mass-based VOC limits
  - No drop-in replacement exempt solvent with similar properties
- Staff is considering incorporating maximum incremental reactivity-based (MIR) VOC standards
  - MIR is a measure of the photochemical reactivity of a VOC, which estimates the weight of ozone produced from a weight of VOC
- MIR-based limits restrict the ozone-forming potential of materials by limiting the weighted averages of the MIR value of each solvent (Product-Weighted MIR; PW-MIR)
  - Provide flexibility to manufacturers while reducing air quality impacts
  - Recently adopted Rules 1151 and 1171 included several optional alternative MIR-based VOC limits

Mass-Based versus Reactivity limits

- Mass-based VOC limits treat all solvents equally other than water and exempts solvents which are not considered VOCs
- MIR-based limits are weighted averages based on the MIR value of each solvent*
- MIR-based limits can be particularly useful for specialty categories that do not have a strong pathway to lower limits, such as low-solids coatings and not readily converted to water-based
- CARB uses reactivity-based limits for aerosol coatings

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
benzaldehyde	0.00
acetone	0.36
pCBtF	0.13
methyl acetate	0.07
D4	0.00

* https://ww2.arb.ca.gov/sites/default/files/2020-12/cp_reg_mir-tables.pdf

VOC Rule Amendments

Rule Developments Initiated

- Initiating rule development for several VOC rules with shared goals of:
  - Phasing out the use of pCBtF and t-BAc
  - Evaluating the potential for VOC emission reductions
- Rule development timeline will be dependent on many factors, including how prevalent the use of pCBtF and t-BAc is in the coatings or solvents
  - Staff will allow time to properly assess materials subject to each rule
  - Striving to phase out of pCBtF and t-BAc as quickly as practicable
- Individual rule amendment projects may have additional amendment goals that are specific to that rule

Rule Development to Address pCBtF and t-BAc

- Staff preparing a manufacturer survey for rules to understand extent of pCBtF and t-BAc use
- After this kick-off meeting, rules will be addressed in separate Working Group Meetings once survey results are reviewed and complied
  - Based on survey results, some rules likely to be grouped together
- Sign-up for individual rules to receive future notices (instruction provided later)

- **Rule 1106** – Marine and Pleasure Craft Coatings
- **Rule 1113** – Architectural Coatings
- **Rule 1122** – Solvent Degreasers
- **Rule 1125** – Metal Container, Closure, and Coil Coating Operations
- **Rule 1126** – Magnet Wire Coating Operations
- **Rule 1128** – Paper, Fabric, and Film Coating Operations
- **Rule 1130** – Graphic Arts
- **Rule 1130.1** – Screen Printing Operations
- **Rule 1143** – Consumer Paint Thinners & Multi-Purpose Solvents
- **Rule 1144** – Metalworking Fluids and Direct-Contact Lubricants
- **Rule 1145** – Plastic, Rubber, Leather, and Glass Coatings
- **Rule 1162** – Polyester Resin Operations

Rule Development Approach

Prioritize rules with the most pCBtF and higher risk to the community

- Already amended or are working to amend several high priority rules (e.g., autobody coatings amended in 2024,

Potentially group rules that regulate similar products

- Coatings, solvents, inks, miscellaneous

Rule schedule and priority will be determined after survey results are evaluated

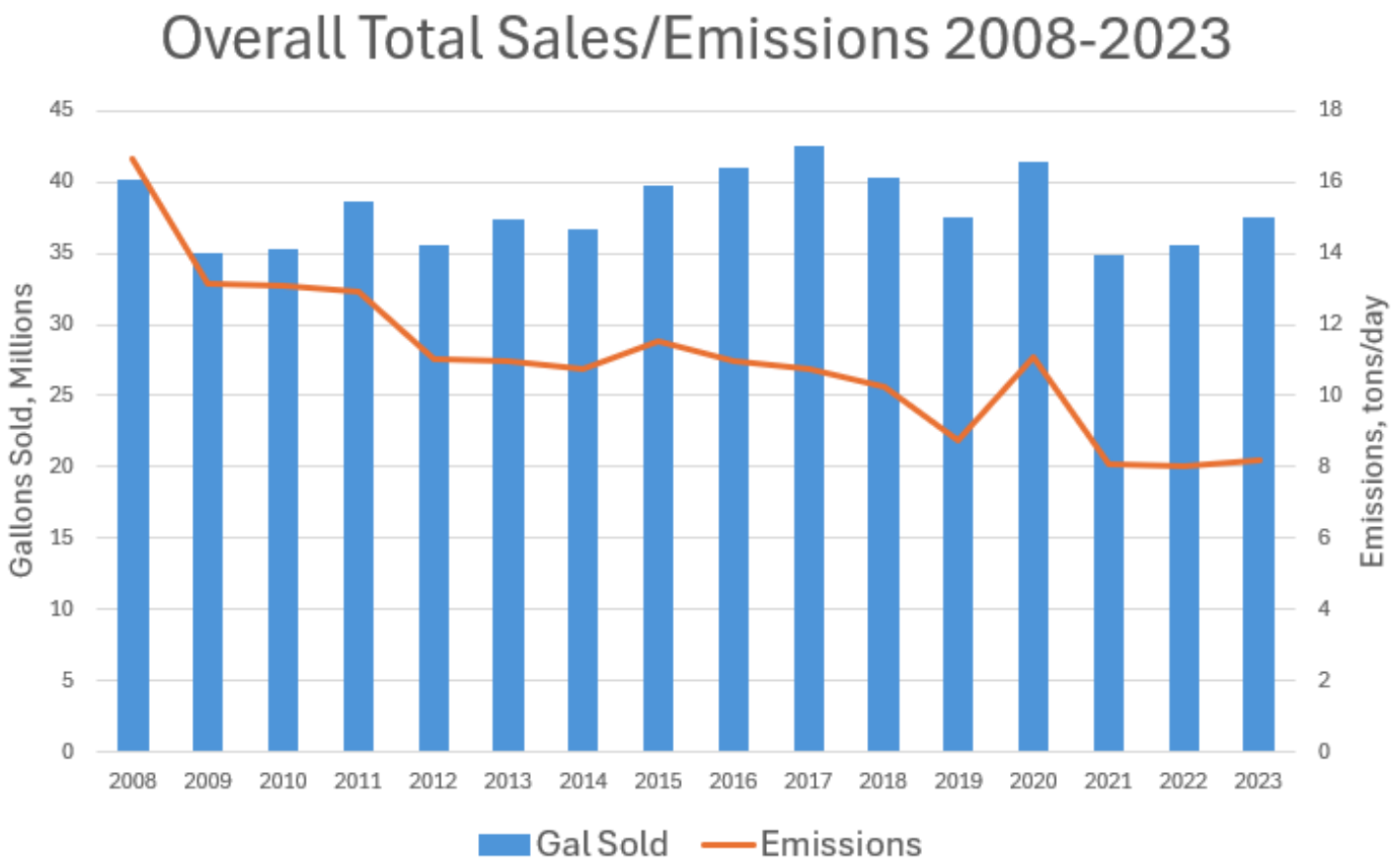
Background on Upcoming Rule Amendments

Rule 1113 – Architectural Coatings

- Adopted on September 2, 1977
- Last amended on February 5, 2016
- Purpose:
  - Establishes VOC limits for architectural and industrial maintenance coatings
- Applicability:
  - Manufacturers, distributors, specifiers, and end-users of architectural coatings
- One of the largest non-mobile sources of VOC emissions
- Rule 1113 currently has 57 coating categories with assigned VOC limits

Rule 314 Data

- Rule 314 is an architectural coating fee and reporting rule
  - Applies to ~200 architectural coatings manufacturers
  - Provides data and improves accuracy of emissions inventory
  - Incentivizes use low VOC products
- Overall trend shows decrease in VOC emissions



Rule 1130 – Graphic Arts

- Adopted in October 1980
- Last amended in May 2014
  - Administrative amendment
- Purpose:
  - Reduces VOC emissions from graphics art operations
- Applicability:
  - Any person performing graphic art operations or who supplies, sells, offers for sale, markets, manufactures, blends, repackages, stores, distributes, applies or solicits the application of graphic arts materials

Rule 1130.1 – Screen Printing Operations

- Adopted in August 1991
- Last amended in May 1996
  - Increased VOC limits for certain categories of inks
- Purpose:
  - Reduce VOC emissions from screen printing operations (under Rule 1130 before 1991)
- Applicability:
  - Any person performing screen printing operations or who sell, distribute, or require the use of screen printing materials

Rule 1128 – Paper, Fabric, and Film Coating Operations

- Adopted in May 1979
- Last amended in March 1996
  - Exempted aerosol coatings
- Purpose:
  - Limit VOC emissions from paper, fabric, and film coating operations
- Applicability:
  - Any person applying coatings or wash primers to paper, fabric, or film substrates

Rule 1145 – Plastic, Rubber, Leather, and Glass Coatings

- Adopted in July 1983
- Last amended in December 2009
  - Revised certain VOC limits and make administrative changes
- Purpose:
  - Limit VOC emissions from plastic, rubber, leather, and glass coatings
- Applicability:
  - Facilities that apply coatings to plastic, rubber, leather, or glass products

Rule 1106 – Marine and Pleasure Craft Coatings

- Adopted in November 1988
- Last amended in January 2023
  - Fix state implementation plan deficiency
- Purpose:
  - Limit VOC emissions from marine and pleasure craft coatings

Rule 1106 (Continued)

- Applicable to manufacturers, sellers, suppliers, and users of coatings used for:
  - Boats, ships, and vessels, their appurtenances, and structures such as piers, docks, buoys and oil drilling rigs intended for the exposure to either a marine or fresh water environment
  - Marine or fresh water vessels that are less than 20 meters in length and are manufactured or operated primarily for recreational purposes, or are leased, rented, or chartered to a person or business for recreational purposes

Rule 1162 – Polyester Resin Operations

- Adopted in March 1987
- Last amended in July 2005
  - Revised application method requirements for gel coats
- Purpose:
  - Limit VOC emissions from polyester resin operations
- Applicability:
  - Polyester resin operations that fabricate, rework, repair, or touch-up products

Rule 1122 – Solvent Degreasers

Adopted in March 1979	
Last amended in May 2009	
Purpose:	Limit VOC emissions from the use of solvents in solvent cleaning machines
Applicability:	All persons who own or operate specified systems that carry out solvent degreasing operations with a solvent containing VOCs or with a NESHAP halogenated solvent
	Operations include, but are not limited to, the removal of contaminants from parts, products, tools, machinery, and equipment

- Batch-loaded Cold Cleaners
- Open-top Vapor Degreasers
- All Types Of Conveyorized Degreasers
- Air-tight And Airless Cleaning Systems

Rule 1143 – Consumer Paint Thinners & Multi-Purpose Solvents

- Adopted in March 2009
- Last amended in December 2010
- Purpose:
  - Limit VOC emissions from consumer paint thinners and multi-purpose solvents
- Applicable:
  - Any person who supplies, sells, offers for sale, uses, solicits, or manufactures consumer paint thinners and multi-purpose solvents for sale
  - Commonly used in thinning of coating materials, cleaning of coating application equipment, and other solvent cleaning operations

Rule 1125 – Metal Container, Closure, and Coil Coating Operations

Adopted in April 1979

Last amended in March 2008

Added new VOC limits for certain inks, reduced VOC limits for food and beverage can sealing

Purpose: To limit VOC emissions from metal container, closure, and coil operations

Applicability: Coating operations of metal cans, drums, pails, lids, closures, sheets, strips, rolls, and coils

Rule 1126 – Magnet Wire Coating Operations

- Adopted in February 1979
- Last amended in January 1995
  - Administrative amendment
- Purpose:
  - Limit VOC emissions from magnet wire coating applications
- Applicability:
  - Magnet wire coatings

Rule 1144 – Metalworking Fluids and Direct-Contact Lubricants

Adopted in March 2009

Last amended in July 2010

Administrative amendment

Purpose:

Limit VOC emissions from metalworking fluids and direct-contact lubricants

Applicability:

Users, manufacturers, and suppliers of metalworking fluids and direct-contact lubricants at industrial facilities

Manufacturer Survey

Manufacturer Survey

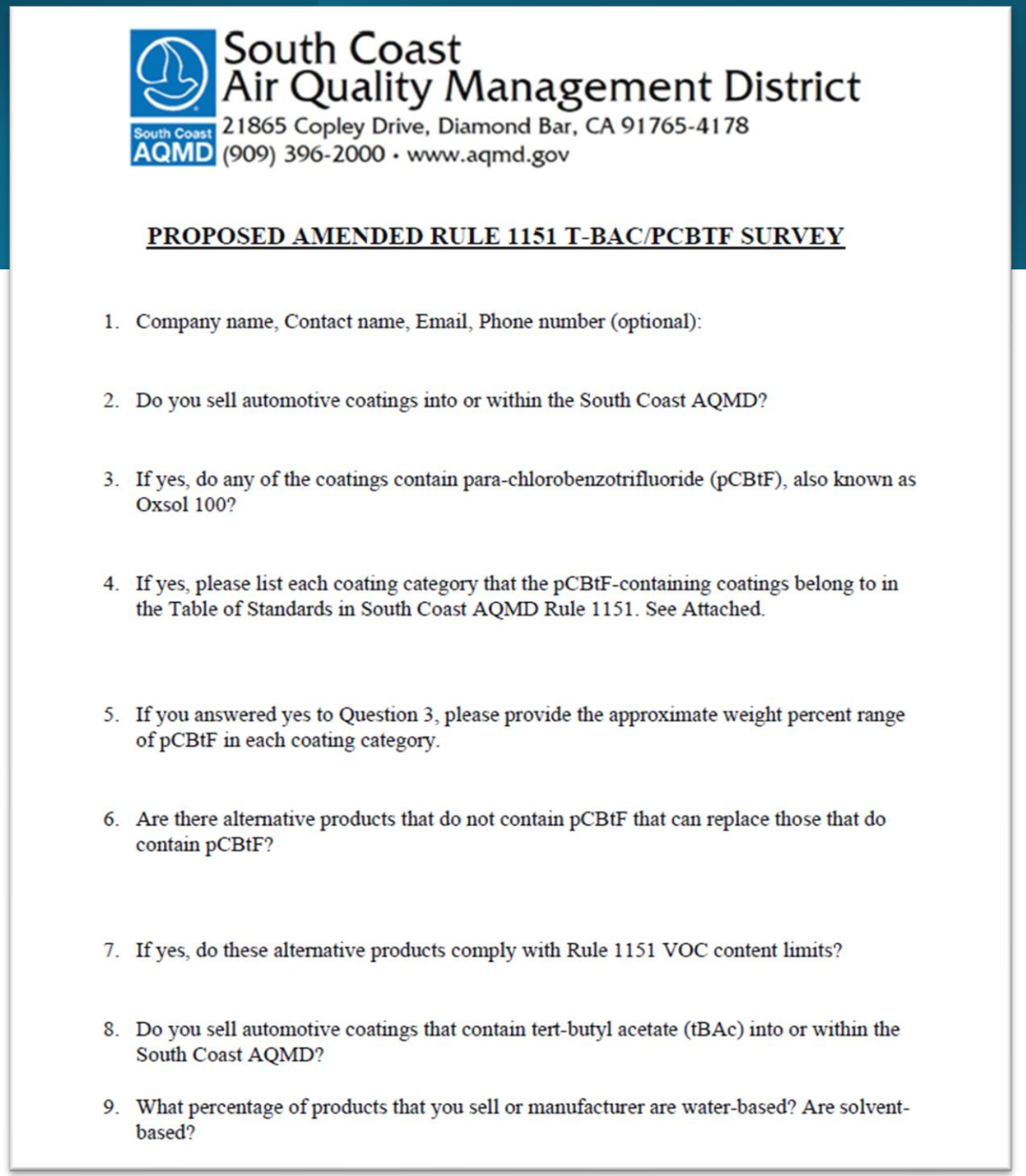
Staff will conduct a manufacturer survey

- Distributed to manufacturers prior to the next Working Group Meeting
  - Sent via email with instructions
  - Excel format with a spreadsheet for each rule

Survey feedback will help determine extent of pCBtF and t-BAc use

Manufacturer Survey

- Survey will help staff gain a clearer picture of:
  - VOC content, pCBtF and t-BAC ranges, and percent waterborne/solvent-based for each category
  - Share of market that contains pCBtF and/or t-BAC
  - Survey question shown subject to change



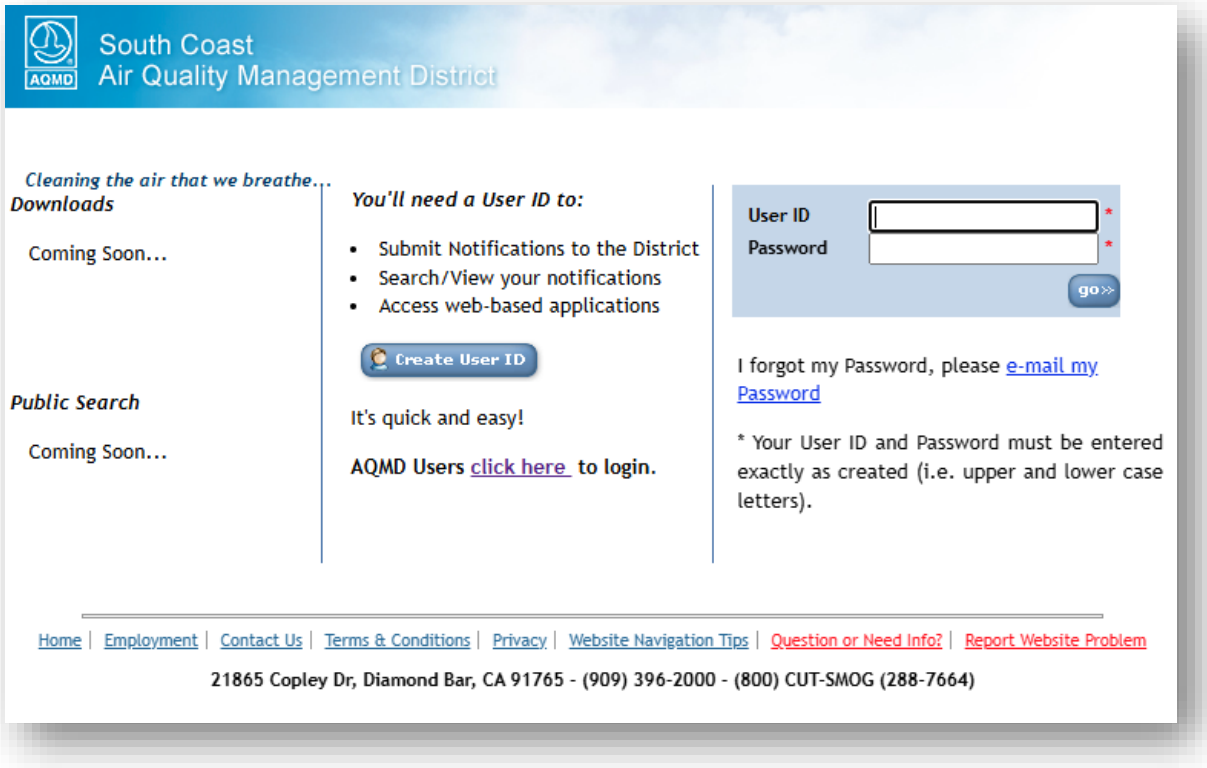
South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

PROPOSED AMENDED RULE 1151 T-BAC/PCBTF SURVEY

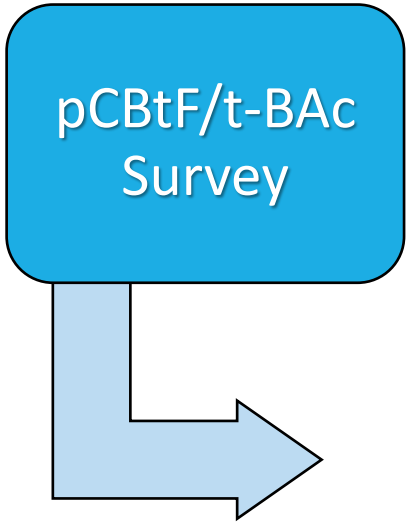
1. Company name, Contact name, Email, Phone number (optional):
2. Do you sell automotive coatings into or within the South Coast AQMD?
3. If yes, do any of the coatings contain para-chlorobenzotrifluoride (pCBtF), also known as Oxsol 100?
4. If yes, please list each coating category that the pCBtF-containing coatings belong to in the Table of Standards in South Coast AQMD Rule 1151. See Attached.
5. If you answered yes to Question 3, please provide the approximate weight percent range of pCBtF in each coating category.
6. Are there alternative products that do not contain pCBtF that can replace those that do contain pCBtF?
7. If yes, do these alternative products comply with Rule 1151 VOC content limits?
8. Do you sell automotive coatings that contain tert-butyl acetate (tBAc) into or within the South Coast AQMD?
9. What percentage of products that you sell or manufacturer are water-based? Are solvent-based?

Rule 1113 Manufacturer Survey

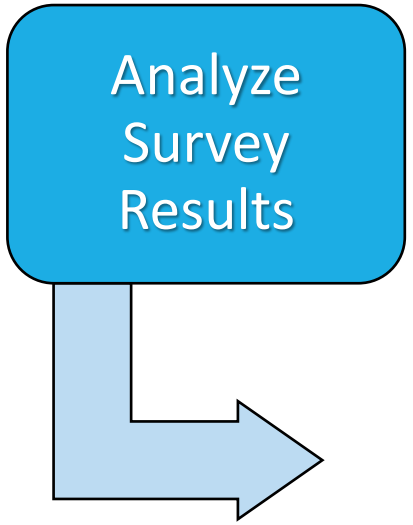
- Staff will use a different approach for Rule 1113 survey
  - Rule 314 already requires architectural coating manufacturers to report coating sales and VOC content
  - Percent pCBtF and/or t-BAc in coatings not reported
- Staff considering:
  - Email an initial questionnaire asking if manufacturer formulates architectural coatings with pCBtF and/or t-BAc
    - Follow up with those that respond affirmatively
  - Manufacturers or staff to download 2024 Rule 314 Report and add columns to report percent pCBtF and t-BAc



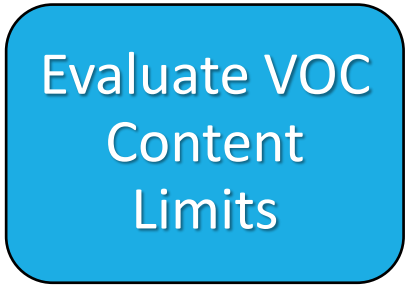
Manufacturer Survey



- Sent via email following Working Group Meeting (August 15th)



- Seeking responses by mid-October
- Staff will assess extent of pCBtF and t-BAc use to propose feasible prohibition timelines
- Prioritize rules and continue Working Group Meetings



- Assess if VOC reductions are feasible

Next Steps

Next Steps

Distribute and analyze manufacturer surveys

Prioritize and group rule projects based on pCBtF/t-BAc use

Continue to hold Working Group Meetings and stakeholder meetings

Continue to review existing products on the market

Anticipated Public Hearings 2026 through 2027

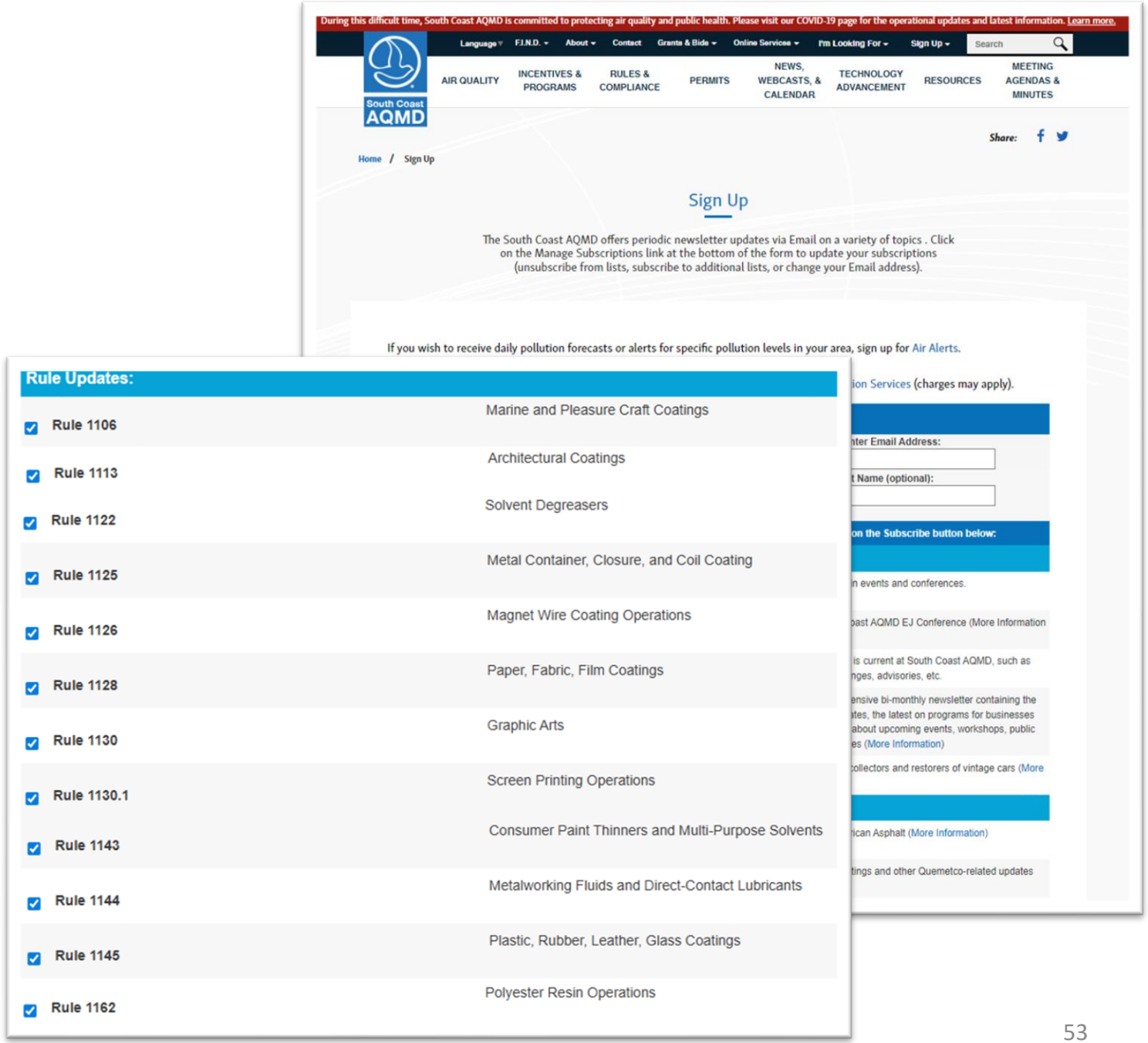
Receiving Updates for VOC-Rules

- To receive email updates, sign up at South Coast AQMD sign up page *http://www.aqmd.gov/sign-up*

  Enter email address and name

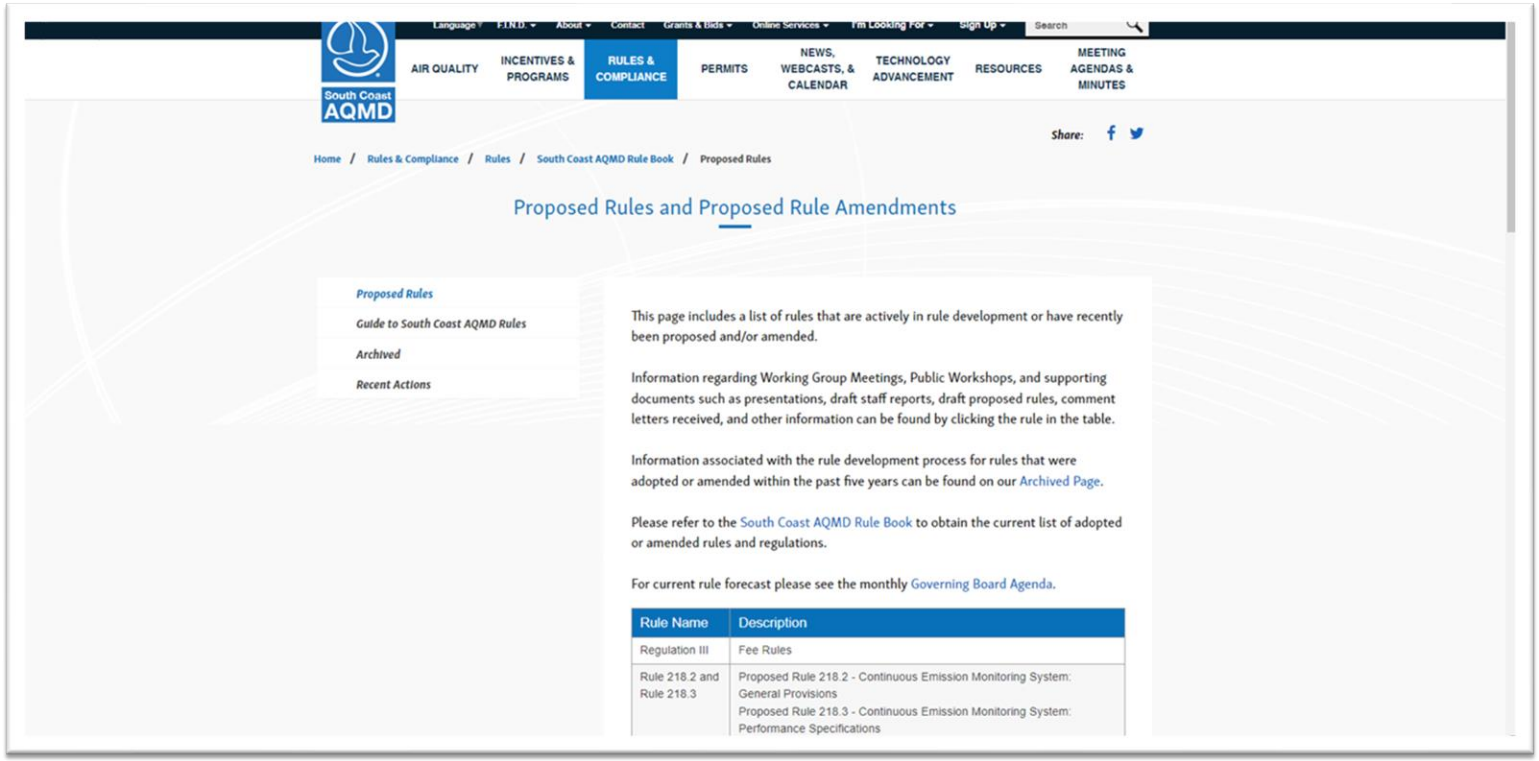
  Subscribe by scrolling down to "Rule Updates" and check the box for the rule of interest

  Future meeting notices, links to documents, and any updates will be sent via email



Working Group Materials

- Working group materials for each working group meeting will be made available at: https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules



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