

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Preliminary Draft Staff Report

Proposed Amended Rule 1106 – Marine and Pleasure Craft Coatings

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Deputy Executive Officer

Planning, Rule Development, and Implementation
Sarah L. Rees, Ph.D.

Assistant Deputy Executive Officer

Planning, Rule Development, and Implementation
Michael Krause

Planning and Rules Manager

Planning, Rule Development, and Implementation
Heather Farr

Authors: Christopher Bradley – Air Quality Specialist

Contributors: Sarady Ka – Program Supervisor
George Illes – Senior Engineering Manager
Hemang Desi – Supervising Air Quality Engineer
Bradley McClung – Program Supervisor
Xian-Liang (Tony) Tian, Ph.D. – Program Supervisor
Albert Ochoa – Air Quality Specialist
Sergio Torres-Callejas – Air Quality Specialist
Chris Yu – Assistant Air Quality Specialist
Sina Taghvae, Ph.D. – Air Quality Specialist

Reviewed By: Heather Farr – Planning and Rules Manager
Michael Morris – Planning and Rules Manager
Barbara Baird – Chief Deputy Counsel
Sheri Hanizavareh – Principal Deputy District Counsel
Ryan Mansell – Principal Deputy District Counsel
Grace Leblanc – Deputy District Counsel
Nathan Wong – Deputy District Counsel
Barbara Radlein – Planning and Rules Manager
Kevin Ni – Program Supervisor

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WAYNE NASTRI

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EXECUTIVE SUMMARY

Rule 1106 – Marine and Pleasure Craft Coatings (Rule 1106) was adopted in November 1988 to limit Volatile Organic Compound (VOC) emissions from marine coatings formulated for use in the marine environment. Since its adoption, the rule has been amended multiple times to lower VOC content limits, expand rule applicability and coating categories, update definitions and test methods, and support the South Coast Air Quality Management District’s (South Coast AQMD) ongoing efforts to reduce VOC emissions from marine and pleasure craft coatings. Rule 1106 was last amended in January 2023 to correct a State Implementation Plan (SIP) deficiency. Prior to the January 2023 amendment, Rule 1106 was amended in May 2019 to combine the requirements of Rule 1106 and Rule 1106.1 – Pleasure Craft Coating Operations (Rule 1106.1) into one rule and rescind Rule 1106.1 to align with the U.S. Environmental Protection Agency (U.S. EPA) Marine Coatings Control Techniques Guidelines (CTG) for Shipbuilding and Ship Repair Operations (Surface Coating), which will be referred to as the U.S. EPA Marine Coating CTG in this staff report. Rule 1106 regulates marine coatings applied to boats, ships, and vessels, their appurtenances, and structures such as piers, docks, buoys and oil drillings rigs intended for the marine environment, and for pleasure craft.

As manufacturers reformulated coatings to comply with increasingly stringent VOC requirements, many transitioned to the use of VOC-exempt solvents such as para-Chlorobenzotrifluoride (pCBtF; Chemical Abstracts Service Registration Number (CAS RN): 98-56-6) and tert-Butyl Acetate (t-BAc; CAS RN: 540-88-5). Subsequent toxicological evaluations conducted by the California Office of Environmental Health Hazard Assessment (OEHHA) identified toxic endpoints for these compounds, including cancer potency values comparable to or exceeding those of chemicals already restricted under other South Coast AQMD rules. In response to these findings, the South Coast AQMD staff has been assessing pCBtF and t-BAc usage within the South Coast AQMD to develop an approach to reduce exposure to these compounds. PAR 1106 also partially implements 2022 Air Quality Management Plan (AQMP) Control Measure CTS-01 – Further Emission Reductions from Coatings, Solvents, Adhesives, and Lubricants.

To better understand the scope of the industry’s pCBtF and t-BAc usage for coatings sold within South Coast AQMD, staff distributed a survey to coating manufacturers. Due to the relatively small volume of marine and pleasure craft coatings sold for use within the South Coast AQMD, staff received only a few responses. Survey responses identified a number of coating categories that currently rely on pCBtF and/or t-BAc to varying extents in their formulations. Survey responses appeared to indicate that the marine and pleasure craft coating industry rely on pCBtF and t-BAc to a much lesser extent compared to other coating industries and indicated potential for VOC limit decreases in a number of coating categories.

Staff’s proposed changes have two primary goals: 1) provide a timeline for prohibition and a phase-out of pCBtF and t-BAc, and 2) reduce VOC emissions where feasible. The proposed amendments to the rule include:

- Prohibiting the sale and use of pCBtF and t-BAc containing coatings within South Coast AQMD with future effective prohibition dates that vary by coating category;
- Revising name of “pleasure craft coatings” to include “marine structure” for clarity;
- Prohibiting the possession of non-compliant marine coatings and pleasure craft and marine structure coatings;

- Alternative Product Weighted-Maximum Incremental Reactivity (PW-MIR) VOC limits for pre-treatment wash primers and wood coatings;
- Basic recordkeeping and labeling requirements;
- Updating rule structure, adding new definitions, and removing outdated rule provisions;
- Consolidation of Marine Coating categories to Align with U.S EPA's Marine Coating CTG and other South Coast AQMD Rules;
- Revision of Pleasure Craft and Marine Structure coating categories to align with other California Air District rules; and
- Addition of new biocide-free antifoulant category.

The pCBtF and t-BAc prohibition is expected to occur by January 1, 2027, for most coatings, with four additional years allowed for antifoulant coatings. The expected emissions reductions for the rule are approximately 23.9 pounds per day of VOC.

CHAPTER 1: BACKGROUND

INTRODUCTION

REGULATORY HISTORY

2022 AIR QUALITY MANAGEMENT PLAN

AFFECTED INDUSTRIES

PUBLIC PROCESS

Introduction

Rule 1106 – Marine and Pleasure Craft Coatings is a source-specific rule adopted on November 4, 1988, to reduce VOC emissions from the use of marine and pleasure craft coatings formulated for use in the marine environment. Rule 1106 establishes VOC content limits, coating application restrictions, and recordkeeping requirements. The rule applies to any person or facility that manufactures, supplies, sells, solicits, or applies marine and/or pleasure craft coatings within South Coast AQMD.

Later rule amendments expanded the scope of the rule to apply to pleasure craft coatings, which were previously regulated under Rule 1106.1. Rule 1106 was amended in May 2019 to combine the requirements of Rule 1106 and Rule 1106.1 into one rule and rescind Rule 1106.1 to align with the U.S. EPA Marine Coatings CTG. Rule 1106 regulates marine coatings applied to boats, ships, and vessels, their appurtenances, and structures such as piers, docks, buoys and oil drillings rigs intended for the marine environment, and for pleasure craft, within South Coast AQMD.

As VOC limits became more stringent, coating manufacturers increasingly relied on exempt and partially exempt solvents, most notably pCBtF, and t-BAc, because their use does not contribute to the calculated total VOC content of a coating. In April 2017, the South Coast AQMD Stationary Source Committee recommended a precautionary approach when considering exempt compounds with potential toxic endpoints, prioritizing reductions in toxic exposure over further reductions in VOC emissions. OEHHA has identified toxic endpoints for both pCBtF and t-BAc. In response, South Coast AQMD has been working to phase out or minimize the use of these exempt compounds across all VOC rules. For Rule 1106, the current rule development has two primary goals: (1) phase out the use of pCBtF and t-BAc in marine and pleasure craft coatings, and (2) reduce VOC emissions where feasible.

2022 Air Quality Management Plan

The 2022 AQMP adopted on December 2, 2022, set forth a path for improving air quality and meeting federal air pollution standards by striving for zero-NO_x emission technologies across all sectors and lower VOC emissions where feasible. The 2022 AQMP includes Control Measure CTS-01 Further Emission Reductions from Coatings, Solvents, Adhesives, and Lubricants (CTS-01), which seeks to address the toxicity concerns of pCBtF and t-BAc and assess opportunities for VOC emission reductions. PAR 1106 partially implements the 2022 AQMP Control Measure CTS-01 by prohibiting the use of solvent cleaning materials that contain pCBtF and t-BAc.

U.S. EPA Marine Coatings CTG for Shipbuilding and Ship Repair Operations (Surface Coating)

The Federal Clean Air Act (CAA) requires areas designated as being in non-attainment with federal ozone National Ambient Air Quality Standards (NAAQS) to adopt reasonably available control measures (RACM), including reasonably available control technology (RACT), to achieve emission reductions. RACT is defined as the lowest emission limit that a source is capable of meeting by using reasonably available technology.

The U.S. EPA develops CTGs that are used to determine RACT level of controls. The CAA requires states to submit RACT regulations for sources of VOC emissions that are covered by a CTG that was issued after the amendment of the CAA in 1990, but prior to the time of attainment. States that have existing marine coating regulations must be at least as stringent as the CTG limits

or otherwise must be determined to meet RACT. The U.S. EPA has issued a CTG for control of VOC emissions from surface coating operations in the shipbuilding and ship repair industry to assist states in analyzing and determining RACT for the industry.

Regulatory History

Rule 1106 was adopted on November 4, 1988, and has since been amended nine times. The rule was initially adopted to limit VOC emissions from marine coatings applied on vessels used for commercial purposes and national defense, and their appurtenances, and to buoys and oil drilling rigs intended for the marine environment.

Rule 1106.1 was adopted on May 1, 1992, to limit VOC emissions from coatings applied to pleasure craft, or their parts and components, for the purpose of refinishing, repairing, modifying, or manufacturing such craft. The rule defined pleasure craft as any vessel manufactured or operated primarily for recreational purposes, or leased, rented, or chartered to a person or business for recreational purposes. Many of the then-existing coating categories in Rule 1106 were not representative of the pleasure craft coating industry. Consequently, South Coast AQMD adopted Rule 1106.1 with the intent of identifying the special categories of coatings applied to pleasure craft.

One of the key objectives of the 2019 amendment to Rule 1106 was to combine the requirements of Rule 1106 and Rule 1106.1 into one rule and rescind Rule 1106.1. This was done to alleviate industry confusion regarding the applicability of each rule and to be consistent with other California air districts. The second key objective was to align VOC content limits and establish marine coating categories consistent with the U.S. EPA Marine Coatings CTG.

Rule 1106 was most recently amended in January 2023 to correct a California SIP deficiency raised by the U.S. EPA. The basis of the deficiency was the reference to ASTM D7767-11, “Standard Test Method to Measure Volatiles from Radiation Curable Acrylate Monomers, Oligomers, and Blends and Thin Coatings Made from Them” (ASTM D7767). U.S. EPA stated that because ASTM D7767 was not a U.S. EPA-approved test method, it could not be used to enforce a SIP-approved rule. U.S. EPA also recommended removing two product categories to improve Rule 1106, as those categories are not listed in the 1996 U.S. EPA Marine Coatings CTG. The amendment removed “Elastomeric Adhesives,” which are now subject to Rule 1168 – Adhesives and Sealants, and “Metallic Heat Resistant Coatings,” which are now subject to the “Heat Resistant Coating” VOC limit.

Background on pCBtF and t-BAc

In 1994, the U.S. EPA exempted pCBtF from the federal definition of a VOC due to its negligible photochemical reactivity. South Coast AQMD mirrored this exemption in 2014 by adding pCBtF to the list of exempt VOC compounds established in Rule 102 – Definition of Terms (Rule 102). When a compound is listed as exempt, the compound is not considered a VOC for any application in the South Coast AQMD unless otherwise specified in a South Coast AQMD rule.

In 2004, the U.S. EPA exempted t-BAc from the federal definition of a VOC; however, South Coast AQMD did not grant a full exemption under Rule 102 due to toxicity concerns. Instead, t-BAc was granted limited exemptions through source-specific Rules 1113 and 1151; t-BAc has never been granted a VOC exemption for marine and pleasure craft coatings subject to Rule 1106.

In 2013, the Rule 1113 amendment included a resolution that directed staff to review the limited exemption for t-BAc due to renewed toxicity concerns. In 2017, staff drafted a white paper study

regarding the toxicity and limited exemption of t-BAC and presented the preliminary findings to the South Coast AQMD Stationary Source Committee (SSC), who in turn directed staff to remove the limited exemptions for t-BAC following the completion and results of OEHHA's health risk assessment of t-BAC.

OEHHA finalized their health risk assessment of t-BAC in 2018, concluding that its cancer risk is higher than previously estimated. Based on OEHHA's findings and staff recommendations, the SSC directed staff to remove existing t-BAC exemptions in Rules 1113 and 1151 when rules are amended and request OEHHA to review the potential toxicity of pCBtF and remove the exemption if pCBtF is deemed a potential carcinogen. In 2020, OEHHA finalized their health risk assessment of pCBtF and concluded that pCBtF is a potential carcinogen.

The SSC recommended a precautionary approach to prioritize reducing the use of compounds with a known or suspected toxic endpoint over reducing VOC emissions. Based on that recommendation, staff is working to amend each VOC rule by considering each category and the best approach to reduce the toxicity of coatings and solvents used within the South Coast AQMD. Staff has taken action to phase out and prohibit the use of t-BAC and pCBtF through amendments to Rule 1168 in 2022, Rule 1151 in 2024, Rules 1171 and 1107 in 2025, and Rules 1124, 1136, and 1144 in 2026 and in the rule development process for Rules 1113, 1143, and 1130 to address pCBtF and t-BAC.

Affected Industries

Rule 1106 is applicable to any person who supplies, sells, offers for sale, markets, manufactures, blends, packages, repackages, possesses or distributes any Marine or Pleasure Craft Coating, and any associated solvent used with a Marine or Pleasure Craft Coating for use within the South Coast AQMD jurisdiction, as well as any person who uses, stores at a worksite, or solicits the application of any Marine or Pleasure Craft Coating and any associated solvent used with a Marine or Pleasure Craft Coating within the South Coast AQMD jurisdiction. The affected industries include shipyards, docks, boatyards, marinas, repair and refinishing facilities.

These facilities range from small family-owned facilities to large operations. Staff identified thirty-seven facilities with active permits subject to Rule 1106.

Process Description

Rule 1106 is intended to apply to operations that manufacture, refinish, or maintain marine vessels and/or pleasure craft and their appurtenances, as well as docks, buoys, and oil drilling rigs exposed to marine or freshwater environments using marine and/or pleasure craft coatings. Marine and pleasure craft coatings perform essential functions, such as marine fouling prevention, sealing, priming, filling, and finishing to achieve required aesthetic and fouling resistance characteristics. Marine and pleasure craft coatings are formulated to meet performance needs including adhesion, hardness, clarity, durability, minimal fuel efficiency impact, and resistance to marine fouling.

Below is a general overview of the coating types and application methods:

Coatings for Vessels:

Water-going vessels have coatings specifically designed for the two main portions: top side and bottom side. With the vessel at rest, anything above the waterline is considered top side and anything below the waterline is considered bottom side.

Top Side:

The top side of the vessel is the visual portion from the waterline up. Coatings applied to the top side not only protect the substrate in a marine environment but also have aesthetic purposes. The substrates can include wood of various types, fiberglass and composites, steel, stainless steel, aluminum, brass, and bronze. These coatings can be applied by hand, usually with a paint brush or roller, or using atomized spray equipment. There are several top-side coating categories which are included in Rule 1106 such as wood finishes, primers, and topcoats.

Bottom Side:

The bottom side of the vessel is the portion below the waterline (the “hull”). The most common types of coatings applied to the bottom side of a vessel are primers and antifoulant coatings. A vessel that is docked or moored in both freshwater and seawater is susceptible to marine fouling, which is the growth of biological organisms on water-immersed surfaces. Marine fouling is typically broken down into hard growth such as barnacles, mussels, or shipworms, and soft growth such as algae and grass. If unabated, this growth would continue and cause excessive drag on the vessel during operation. It could also cause severe damage to the hull substrate via corrosion of steel and aluminum hulls and shipworms boring into wooden hulls. Finally, fouling also poses a potential threat to the environment by transporting harmful marine organisms to other waterways. The solution to fouling is an antifoulant coating, which is used to inhibit the growth of foulant and/or prevent foulant from adhering to the bottom of the boat. There are two different categories for antifoulant coatings: a hard bottom paint and an ablative bottom paint.

Hard Antifoulant Coatings:

Hard antifoulant coatings are generally epoxy-type coatings formulated with copper, organotin compounds (an organic compound with one or more tin atoms in its molecules), and other biocides and pesticides. Copper is used to deter hard growth such as mussels and barnacles, whereas biocides and pesticides are used to control soft growth such as algae and other marine organisms like ship worms. Most hard antifoulant coatings control marine growth by releasing substances slowly from the pores of the coating while in the water; other types of hard antifoulant coatings utilize Teflon® and silicone which make the coating surface too slick for adherence of marine growth. Hard antifoulant coatings are typically used for vessels that spend long periods of time at rest in the water. These coatings are regulated in Rule 1106 as “Antifoulant Coatings.”

Ablative Antifoulant Coatings:

Ablative antifoulant coatings are specially formulated as a partly sacrificial coating that slowly wears away during a vessel’s operation. As the coating wears, it exposes a new layer with fresh antifoulant compounds. This process is similar to hand washing, where the bar of soap continuously erodes during each washing operation while remaining effective in subsequent washings. These coatings are regulated in Rule 1106 as “Any Other Coating Type” as they are not formulated with biocides or pesticides.

Metal-free Antifoulant Coatings:

Metal-free antifoulant coatings can be ablative or hard, but without copper, organotin, or metal compounds to prevent fouling. Metal-free antifoulant coatings can prevent fouling by instead using hydrogel polymers. These polymers absorb water and create a hydrated, slippery surface that mimics natural, biological anti-adhesive surfaces in nature (e.g. fish mucus). Metal-free antifoulants can also prevent fouling with non-metal biocides, such as Tralopyril (ECONEA™), a pharmaceutical grade biocide that creates a living surface similar to the mucoprotein protective slime-coat that covers the scales and skin of a fish. These coatings are regulated in Rule 1106 as “Antifoulant Coatings.”

Biocide-free Antifoulant Coatings:

Biocide-free antifoulant coatings can be ablative or hard, but without biocides, copper, or organotin compounds in their formulations. Biocide-free antifoulant coatings can prevent fouling using hydrogel polymers. These polymers absorb water and create a hydrated, slippery surface that mimics natural, biological anti-adhesive surfaces in nature (e.g. fish mucus). These coatings are regulated in Rule 1106 as “Any Other Coating Type” as they are not formulated with biocides or pesticides.

Thermoplastic Foul Deterrent Coating:

Thermoplastic foul deterrent coating, a subset of Biocide-free antifoulant coatings, is a newly proposed category, that requires slightly higher VOC limits because of the thermoplastic resin system.

Application Methods:*HVLP Spray Equipment:*

Sprayed coatings are applied using high-volume, low-pressure (HVLP) spray equipment. HVLP spray equipment is defined as “spray application equipment designed to atomize 100 percent by air pressure only and is operated between 0.1 and 10 pounds per square inch gauge when measuring air atomizing pressure dynamically at the center of the air cap and at the air horns.” HVLP spray guns have a transfer efficiency of 65%, meaning 65% of the paint that is sprayed will adhere to the intended substrate. For comparison, standard non-HVLP spray guns are typically high pressure and, due to the excessive spraying pressure, result in paint bounce-back: a condition where the paint hits the target and a small percent bounces back off the target and into the atmosphere. These types of spray guns can have a transfer efficiency as low as 25%.

Other Application Methods:

Brush and roller coatings are applied directly from the paintbrush bristles or the roller to the substrate and have a very high coating-to-substrate transfer efficiency. Dip coatings are applied by dipping an object into a container filled with a coating, providing very high coating-to-substrate transfer efficiency. Brush, roller, and dip coating processes can have efficiencies of up to 100%, not allowing for spillage.

Marine and Pleasure Craft Coatings and VOC Control

Marine and pleasure craft coatings generally rely on solvent-based formulations. During application and curing, various solvents evaporate and emit VOCs. Therefore, marine and pleasure craft coating operations are a source of VOC emissions within South Coast AQMD and are subject to regulatory requirements.

Rule 1106 primarily controls emissions by establishing VOC content limits for marine and pleasure craft coatings. While some source categories regulated under other rules require add-on air pollution control equipment, compliance with Rule 1106 has been achieved predominantly through material reformulation, improved application practices, and the use of compliant coating technologies.

As VOC limits under Rule 1106, and now-rescinded Rule 1106.1, became more stringent through successive amendments, coating manufacturers reformulated products to maintain performance while reducing regulated VOC content. t-BAC is not considered an exempt compound for Rule 1106 and therefore is counted toward the VOC content of the coating of marine and pleasure craft coatings. However, t-BAC is fully exempted by the U.S. EPA and is still used in some marine and pleasure craft coating formulations.

VOC emissions resulting from the application of marine and pleasure craft coatings are primarily controlled by two methods. First, the end-user can improve work practices (e.g., keeping coating containers tightly sealed or by properly cleaning coating application equipment). Second, the chemistry of the coatings can be modified to reduce the VOC content. This second approach is generally performed at the manufacturer or supplier level. VOC content of marine and pleasure craft coatings can be reduced via reformulation by transitioning to a high-solids formulation, manufacturing with low-VOC solvent mixtures, or utilizing exempt solvents. The predominant method for controlling VOC emissions from marine and pleasure craft coatings is to formulate with exempt compounds or solvents, such as acetone or pCBtF, since they do not count towards the VOC content the coating.

While the use of exempt solvents facilitated compliance with mass-based VOC limits, subsequent toxicological evaluations determined that pCBtF and t-BAC are potent carcinogens. These findings prompted a shift in regulatory focus from solely controlling ozone precursor emissions to also addressing potential toxic exposure risks associated with exempt solvent use.

Marine and Pleasure Craft Coating Operations

Based on previous staff reports and industry feedback, the majority of the operators in the marine coating and pleasure craft coating industry are non-permitted facilities and therefore not inspected as frequently by South Coast AQMD inspectors.

Staff visited two marina boatyards to gather information on the type of work facilities perform and the types of coatings used. During these visits, staff observed that both mechanical repair and refinishing services were offered. Mechanical repair services typically included engine work, drive unit work, and work that did not include the application of coatings. Refinishing services included preparation of substrates for coating and the application of coatings to marine and pleasure craft vessels. Coatings applied by the marinas are formulated for both top-side and bottom-side application. Staff found only a small number of marinas offered top-side coating services. Marinas

without top-side coating services sub-contract to persons who perform the coating services at the site. Most marinas offer bottom-side coating services, typically involving antifoulant coatings. The average vessel is re-coated with antifoulant coatings every two years, and requires two rolled-on coats with a third coat applied only along the waterline level of the hull. South Coast AQMD staff found application of antifoulant coatings to be the main coating operation conducted at the marina boatyards.

Public Process

The rule amendment process began in July 2025. Staff conducted three working group meetings and multiple individual meetings with industry stakeholders and representatives. Table 1-1 summarizes the key topics discussed at each of the Working Group Meetings and included presentations that are posted on the South Coast AQMD's website.¹

Table 1-1: Summary of Public Meetings

Meeting title	Date	Highlights
Working Group Meeting #1	August 12, 2025	• Rule background • Key amendment objectives • Exempt solvent background • Preliminary technology assessments
Working Group Meeting #2	March 19, 2026	• Summary of WGM #1 • Amendment progress update • Rule background • Manufacturer survey summary • Initial rule concepts
Working Group Meeting #3	June 2, 2026	• Summary of WGM#2 • Amendment progress update • Rule Concepts
Public Workshop	Scheduled for August 28, 2026	• Rule background • Proposed Rule Amendments • Draft Rule Language • Emissions Impact • Socioeconomic Impact Assessment • CEQA

¹ <https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/proposed-rules/rule-1106>

CHAPTER 2: TECHNOLOGY ASSESSMENT

TECHNOLOGY ASSESSMENT FOR MARINE AND PLEASURE CRAFT
COATINGS

REFORMULATION COST ASSESSMENT

MARINE AND PLEASURE CRAFT PCBTF AND T-BAC PROHIBITION
AND PHASE OUT TIMELINE

pCBtF and t-BAc Use in Marine and Pleasure Craft Coatings

The main objective of PAR 1106 is to phase out the use of two exempt and partially exempt compounds that have been determined to have toxic endpoints: pCBtF and t-BAc. Rule 1106 regulates sixteen main categories of marine coatings, four main categories of pleasure craft coatings, and various related sub-categories. Staff assessed seven coating categories, which includes main categories and sub-categories, reportedly sold for use in South Coast AQMD and concluded that, because the reported coatings contained low concentrations of pCBtF and t-BAc, and many coatings were formulated below the existing VOC content limits, there is potential for VOC limit decreases in some coating categories. Furthermore, staff concluded that a prohibition of pCBtF and t-BAc can take effect relatively quickly due to the relatively low levels of pCBtF and t-BAc and availability of lower-VOC coatings that do not contain pCBtF or t-BAc.

Marine and Pleasure Craft Coating Manufacturer pCBtF and t-BAc Survey

During development for PAR 1106, in August 2025, staff conducted a survey of marine and pleasure craft coating manufacturers to further understand the extent of pCBtF and t-BAc usage in coating formulations sold within the South Coast AQMD. Staff used the survey results to evaluate VOC content limits, VOC emissions, and possible prohibition timelines for coatings containing pCBtF and/or t-BAc. The table below lists the main survey questions.

Table 2-1: August 2025 Coating Manufacturer Survey Questions

Requested Information	
1.	Company name, contact person, and an email address
2.	Product name and code
3.	Product category and application type (marine or pleasure craft)
4.	VOC content (regulatory and actual)
5.	Percent content by weight of pCBtF and t-BAc
6.	Annual volume sold of each reported product

In total, less than five marine and pleasure craft coating manufacturers responded to the survey. The following summarizes the main findings of the survey:

- Seven total coating categories and subcategories reported;
- 39 percent of the reported coatings contain pCBtF;
- 14 percent of the reported coatings contain t-BAc;
- Three percent of the reported coatings contain both pCBtF and t-BAc;
- 44 percent of the reported coatings do not contain pCBtF or t-BAc;
- All but one of the reported coatings are solvent-based;
- Products in four of the seven reported coating categories contain pCBtF;
- Products in two of the seven reported coating categories contain t-BAc;
- Three of the seven reported coating categories as a whole do not contain pCBtF or t-BAc;

- Reported pCBtF and t-BAc contents ranged from approximately one to ten percent by weight, depending on coating category and formulation;
- The remaining categories were not reported in the survey.

Based on survey data submitted, pCBtF is used in the following three coating categories:

- Antifoulant coatings (formulated for application to Non-Aluminum substrates)
- Finish Primer Surfacer
- High Gloss Topcoats

Based on survey data submitted, t-BAc is used in the following three coating categories:

- Antifoulant coatings (formulated for application to Non-Aluminum substrates)
- Antifoulant coatings (formulated for application to Aluminum substrates)
- Finish Primer Surfacer

These categories represent most of the reported product sales and form the basis for staff's evaluation of reformulation feasibility under PAR 1106.

The tables below display the manufacturer-reported coating categories in Tables 1 and 2 of Rule 1106, and indicate which coating categories were reported to contain pCBtF and/or t-BAc. Please note, since t-BAc is not counted as exempt for coatings subject to Rule 1106, any t-BAc in the reported coatings would count toward the VOC content. Replacing t-BAc with a similar solvent would not impact the VOC content of the coating.

Table 2-2: Marine Coatings Survey Data Summary

Coating Category	VOC Content Limits (Less Water and Exempts)		Survey Response Data		
	Baked (g/L)	Air Dried (g/L)	Reported (Y/N)	pCBtF Reported	t-BAC Reported
Antenna Coating		340	N		
Antifoulant Coatings:					
Aluminum Substrates		560	Y		✓
Other Substrates		400	Y	✓	✓
Inorganic Zinc Coating		340	N		
Low Activation Interior Coating		420	N		
Mist Coating		610	N		
Navigational Aids Coating		340	N		
Nonskid Coating		340	N		
Organic Zinc Coating		340	N		
Pre-treatment Wash Primer	420	420	N		
Repair and Maintenance Thermoplastic Coating		340	N		
Sealant for Wire-Sprayed Aluminum		610	N		
Special Marking Coating		420	N		
Specialty Coatings:			N		
Heat Resistant Coating	360	420	N		
High Temperature Coating		500	N		
Tack Coating		610	N		
Topcoats:					
Extreme High Gloss Coating	420	490	N		
High Gloss Coating	275	340	Y	✓	
Undersea Weapons Systems Coating	275	340	N		
Any Other Coating Type	275	340	Y	✓	

Table 2-3: Pleasure Craft Coatings Survey Data Summary

Coating Category		Survey Response Data			
		VOC Content Limit (g/L)	Reported (Y/N)	pCBtF Reported	t-BAC Reported
Antifoulant Coatings:					
Aluminum Substrates	560	Y		✓	
Other Substrates		330	Y	✓	✓
Clear Wood Coatings:					
Sealers		550	N		
Varnishes	490	Y			
Primers:					
Finish Primer Surfacer	420	Y	✓	✓	
High Build Primer Surfacer		340	Y		
Marine Deck Sealant Primer	760	Y			
Pretreatment Wash Primer		780	N		
Teak Primer	775	N			
Topcoats:					
Extreme High Gloss Coating	490	N			
High Gloss Coating		420	Y	✓	
Any Other Coating Type	420	N			

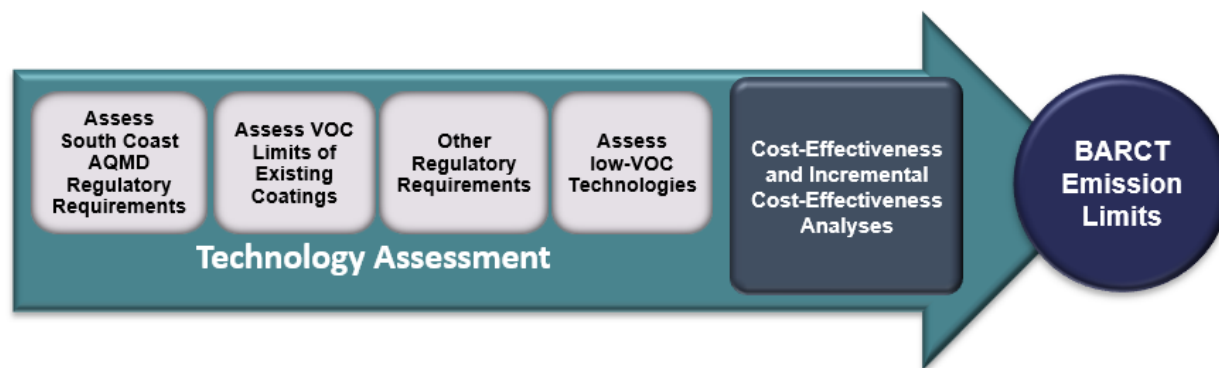
BARCT Assessments Approach

In addition to the pCBtF and t-BAC phase out, staff identified several coatings where there is potential for VOC limit reductions, which require a best available retrofit control technology (BARCT) assessment. The purpose of a BARCT assessment is to assess potential VOC control options to establish future-effective emission limits for each marine and pleasure craft coating category. Under Health and Safety Code Section 40406, BARCT is defined as:

“an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source.”

The BARCT assessment follows a framework through the rule development process and includes public participation. Figure 2-1 shows the overall BARCT assessment approach.

Figure 2-1: BARCT Assessment Approach



21 Technology Assessment

Staff conducted a BARCT assessment to evaluate the marine coating categories that are proposed to have a VOC limit reduction. This consists of four steps: the assessment of South Coast AQMD requirements, a complete assessment of emission limits of existing coatings, review of other regulatory requirements, and assessment of available VOC control technologies. The purpose of the BARCT assessment focuses on establishing that the proposed limits are achievable given coatings currently on the market and with reformulation timelines. Here, staff focused on three coating categories identified as having potential for lower VOC limits: 1) Antifoulant Coatings, 2) Primer/Finishers, and 3) Wood Coatings. The assessment also considers the categorization and subcategorization of the coatings. The BARCT assessment will be detailed below for each applicable coating category.



Cost-Effectiveness and Incremental Cost-Effectiveness Analysis

As the final step of the BARCT assessment, the South Coast AQMD conducts cost-effectiveness analyses that result in the reduction of criteria pollutants (NO_x, SO_x, VOC, PM, and CO). The analysis is used as a measure of relative effectiveness of a proposal. It is generally used to compare and rank rules, control measures, or alternative means of emissions control relating to the cost of purchasing, installing, and operating control equipment to achieve the projected emission reductions. The major components of the cost-effectiveness analysis are the initial capital investments, recurring cost, discount rate, present value factor, emission reductions, and equipment life.

- **Initial Capital Investments:** Increased capital investment is the increased cost to transition to lower-VOC coating formulations or, more simply, the cost difference between the higher- and lower-VOC coatings. Due to the availability of existing lower-VOC coatings, staff anticipates that marine and pleasure craft coating operations will transition from higher- to lower-VOC coatings. Therefore, the analysis will identify the initial capital investment between the existing higher- and lower-VOC coatings by evaluating the cost

difference per gallon of coating multiplied by the annual gallons of coating used for each coating category.

- **Recurring Cost:** Recurring cost is the associated annual cost over the course of the control technology, such as recurring operation and maintenance costs. Since the proposed amended rule does not require changes to coating equipment or affect coating service life staff does not anticipate any difference in recurring costs associated with using higher-VOC coatings compared with the lower-VOC coatings. Therefore, staff will assume zero recurring cost associated with the transition from higher to lower VOC products.
- **Discount rate:** The discount rate uses a real interest rate of four percent to calculate the present value factor. The discount rate should not be confused with an interest rate, which represents the percentage charged or earned on money over time. The discount rate is used to determine the present value of future cash flows and takes into account the average real interest rate in the U.S. over the last thirty years and its fluctuation over time. For this evaluation, the discount rate will be zero because there are no recurring annual costs associated with using higher-VOC coatings compared with the lower-VOC coatings.
- **Present Value Factor (PVF):** The formula, as described below, is a function of the time of the coating and discount rate used. For this evaluation, the PVF will be zero because there are no recurring annual costs associated with using higher-VOC coatings compared with the lower-VOC coatings.
- **Emission Reduction:** Emission reduction is the total VOC reduction from the higher VOC limit to the lower VOC limit over the lifetime of the coating. The emission reduction will be realized once the operator switches to the lower VOC coatings.
- **Equipment life:** Equipment life is the timeframe at which the cost difference between the higher VOC coatings and lower VOC coatings and emission reductions are evaluated. For this evaluation, staff is considering annual costs with no recurring costs, so the cost effectiveness will be based on annual emission reductions.

The cost-effectiveness for PAR 1106 was completed using the discounted cash flow method, as explained in the next section.

Discounted Cash Flow (DCF)

The DCF method converts all present and future costs required to comply with the proposed rule, to present value. Conceptually, it is as if calculating the number of funds that would be needed at the beginning of the initial year to finance the initial capital investments and would be set aside to pay off the annual costs as they occur in the future. The funds that are set aside are assumed to be invested and generates a rate of return at the discount rate chosen. The final cost-effective measure is derived by dividing the present value of total costs by the total emissions reduced over the equipment life or timeframe. The following equation is used for calculating cost-effectiveness with DCF:

$$\text{Cost – effectiveness} = \frac{\text{Initial Capital Investments} + (\text{Annual O\&M Costs} \times \text{PVF})}{\text{Annual Emission Reductions} \times \text{Years of Equipment Life}}$$

Where:

$$PVF = \frac{(1 + r)^N - 1}{r * (1 + r)^{(N-1)}}$$

Where

r = real interest rate (discount rate); and

N = years of equipment life.

The present-value factor (PVF) converts a constant stream of payments made for N years into its single present-value equivalent.

Based on the assumptions stated earlier, there are no anticipated changes in annual recurring costs for the transition to a lower VOC coating; therefore, the cost-effectiveness equation can be simplified to the following equation.

Simplified cost effectiveness calculation for coating reformulations:

$$\text{Cost} - \text{effectiveness} = \frac{\text{Annual Capital Investments}}{\text{Annual Emission Reductions}}$$

The annual capital investment in the above equation is the cost difference between the higher VOC coating and the lower VOC coating based on current price for similar sized containers. The annual emission reduction is the emission reductions from transitioning from the higher VOC coating to the lower VOC coating based on the estimated annual volume reported or sold for the specific coating category. The annual volumes are estimated based on the emission inventory estimates in the section.

Finally, Health and Safety Code Section 40920.6(a)(3) states that an incremental cost-effectiveness assessment shall be performed on one or more identified potential control options that meet emission reduction objectives. To determine the incremental cost-effectiveness under this paragraph, South Coast AQMD calculates the difference in the dollar costs divided by the difference in the emission reduction potentials between each progressively more stringent potential control option as compared to the next less expensive control option. Once the BARCT assessment is complete and VOC limits are established, staff considers incrementally more stringent options to demonstrate that the VOC limit represents the “maximum degree of reduction achievable by each class or category.” The equation for incremental cost-effectiveness is as follows:

$$I - CE \left(\$ / \text{tons VOC reduced} \right) = \frac{\text{Incremental Difference in Cost (Present Worth Value)}}{\text{Incremental Difference in Emission Reductions (Lifetime Reductions)}}$$

Summary of Cost-Effectiveness Analysis and Incremental Cost-Effectiveness Analysis

To determine cost-effectiveness for the proposed lower VOC limits for the three categories, cost information and estimates for existing coatings were obtained. Staff conducted online searches and met with multiple coating manufacturers, vendors, distributors, and stakeholders to gather cost data and estimates for various types of coatings. The cost difference between the higher VOC and lower VOC products will be used in the cost-effectiveness analysis. The South Coast AQMD

Governing Board established a cost screening threshold of \$36,000 per ton of VOC removed in the 2022 Air Quality Management Plan. That value increases with the Consumer Price Index and is currently \$42,675 in 2025 dollars per ton of VOC emissions reduced.

Emission Inventory

To estimate the VOC emissions inventory for PAR 1106, staff reviewed the Standard Industrial Classification (SIC) codes and Emissions Inventory Categories (EIC) codes related to marine and pleasure craft coating operations within South Coast AQMD included in the emission inventory for facilities within South Coast AQMD. Three SIC facility types were evaluated: boat building and repairing facilities, marina boatyard facilities, and boat dealership facilities. EIC codes are associated with emissions from marine coatings and related process solvents. The facilities evaluated are primarily engaged in building and repairing boats, operating marinas, performing incidental repairs, and transportation. Staff then ran a query of Annual Emissions Reporting (AER) SIP inventory for compliance year 2025 using the SIC and EIC codes. Based on the evaluation, PAR 1106 area sources account for approximately 0.142 tons per day; the main contributor to baseline VOC emissions. Manufacturer survey data indicates that both pCBtF and t-BAc are commonly used in marine and pleasure craft coating formulation, and that pCBtF is relied on, though not heavily relative to other coating industries, to meet current VOC content limits in a number of coating categories. Less than five coating manufacturers responded to the distributed survey, in which a total of 95 products were reported. Approximately half of the reported coatings contain pCBtF and/or t-BAc, with a large majority of the volume of coatings sold for use within South Coast AQMD containing pCBtF. However, the concentration of pCBtF in the coatings was relatively low (less than 10 percent). Based on the data submitted in the surveys, the following six categories reported had the highest usage volumes: 1) antifoulants for aluminum substrates, 2) antifoulant coatings for aluminum and non-aluminum substrates, 3) finish primers surfacers, 4) high-build primer surfacers, 5) high gloss topcoats, and 6) clear wood varnish. Total volume reported was approximately 11,500 gallons which equates to approximately 17.7 tons per year or 0.0485 tons per day, with antifoulants coatings accounting for approximately 60 percent of all marine and pleasure craft coatings. A comparison of the emissions from the survey and SIP inventory indicates that the volumes of coatings reported in the survey were 33 percent underreported of the total SIP baseline of 0.142 tons per day. As a result, staff adjusted the reported volumes in the survey by a factor of three to reflect actual potential VOC emissions from marine and pleasure crafts. The six categories reported accounted for approximately 95 percent of the total volume whereas the remaining coating categories only accounted for 5 percent or approximately 1,600 pounds of VOC.

Table 2-4: Coating Category Percentage of Total Emissions and Adjusted Estimated VOC Annual Emissions

Category	Coating Category Percentage of Total VOC Emissions	Adjusted Estimated VOC Annual Emissions (lbs)
Aluminum Antifoulant	5	~1,800
Non-Aluminum Antifoulant	55	~18,000
Finish Primer/Surfacer	20	~8,000
High-Build Primer/Surfacer	6	~1,900
High-Gloss Topcoat	3	~1,000
Clear Wood Varnish	4	~1,200
Other Coating Categories	5	~1,600

Proposed Emission Reductions

As part of the BARCT assessment, staff will evaluate the cost-effectiveness for coatings that will be consolidated into similar categories which will either maintain the lower VOC limit of the categories being combined or be subject to a lower proposed BARCT limit based on similar coating types currently available on the market. For marine coatings, staff is proposing to align the limits with the U.S. EPA Marine Coatings CTG for Shipbuilding and Ship Repair Operations to ensure the marine coating VOC limits in PAR 1106 align with RACT requirements. Aligning VOC limits with RACT will not require a cost-effectiveness analysis since those VOC limits are currently achievable with available coatings. For all other categories where the limits are proposed to be lowered, staff will conduct a cost-effectiveness analysis by comparing the cost of the higher VOC coating with the cost of the lower VOC coating. In addition, any marine or pleasure craft coating category reliant on pCBtF or t-BAc will be analyzed for potential cost impacts due to reformulation efforts due to the prohibition and phase-out of pCBtF or t-BAc. There are currently 10 categories that will be consolidated into five categories, with two categories for marine coatings and eight categories for pleasure crafts. The following table summarizes the category consolidation and associated limits along with whether the coating contains pCBtF or t-BAc based on the manufacturer submitted survey.

Table 2-5: Consolidated Categories and Limits

Original Coating Category	Consolidated Coating Category	VOC Content Limits (g/L)		Contains pCBtF or t-BAC
		Proposed BARCT Limit	Original VOC Limit	
Marine Coatings				
Aluminum Substrate Antifoulant Coating	Antifoulant	400 (RACT)	560	n/a*
Extreme High Gloss	High Gloss	275(baked)/ 340 (air)	420(baked)/ 490(air)	n/a*
Pleasure Craft Coatings				
Aluminum Substrate	Antifoulant	330	560	Y
Extreme High Gloss	High Gloss	420	490	n/a*
Finish Primer/Surfacer	Primer	275	420	Y
High Build Primer/Surfacer	Primer	275	340	N
Marine Deck Sealant Primer	Wood Sealers	275	760	N
Teak Primer	Wood Sealers	275	775	n/a*
Sealers	Wood Sealers	275	550	n/a*
Varnishes	Wood Topcoats	275	490	N

*Not reported in the manufacturer survey.

Antifoulant Coatings

Rule 1106 subcategorizes antifoulant coatings, for both marine and pleasure craft application, based on the substrate they are formulated to be applied to: aluminum or non-aluminum substrates. Staff received coating manufacturer survey data for both substrate formulations. All reported antifoulant coatings formulated for non-aluminum substrates were reported for pleasure craft application and all contain either pCBtF or t-BAc. The applicable pleasure craft VOC limit for these coatings is 330 g/L. The reported coatings contain VOC ranging from 300 to 330 g/L and

appear to rely on pCBtF to comply with the applicable pleasure craft VOC limit. All reported antifoulant coatings formulated for aluminum substrates were also reported for pleasure craft application. None of the reported coatings contain pCBtF; however, a number did contain t-BAC which is considered a VOC for these coatings. The current VOC limit for both marine and pleasure craft application is 560 g/L and the reported coatings contain VOC ranging from 374 to 379 g/L. Antifoulant coatings formulated for aluminum substrates were given a high VOC limit in the past due to greater solvent needs at the time resulting from zinc-containing resin systems needed to adhere to aluminum substrates. However, resin system and formulation advances have been made since then that allow for the development of antifoulant coatings that are suitable for application to a wider range of multiple substrate materials, including aluminum, while complying with the more stringent VOC limit applicable to non-aluminum antifoulant coatings. Reported antifoulant coatings formulated for aluminum substrates do not appear to rely on pCBtF to comply with the applicable VOC content limit. Antifoulants account for approximately 60 percent of the total VOC emissions at approximately 20,000 pounds of VOC per year which is equivalent to approximately 60 percent of the total volume of marine and pleasure craft coatings sold in South Coast. Aluminum substrate-based antifoulants account for less than 5 percent of all antifoulants sold with total emissions of approximately 1,800 pounds of VOC per year.

As stated in Chapter 1, because our region is designated as an extreme nonattainment area of air quality standards, South Coast AQMD must adopt limits that represent RACT/RACM. The marine CTG represents RACT and does not include a higher VOC limit for antifoulant coatings applied to aluminum substrates; therefore, Rule 1106 cannot include a higher VOC limit. Staff is proposing to collapse the two antifoulant coating subcategories into one category, removing the aluminum-substrate antifoulant coating subcategory which currently has a higher VOC limit. Aluminum-substrate antifoulant coatings with higher VOC content will be allowed until a future effective date of January 1, 2031, to align with the pCBtF phase out date, with sell-through and use-through periods allowed for coatings manufactured prior to that date. This will allow time for the coatings to be reformulated without pCBtF and transition to the lower VOC limit.

Staff is also proposing to add a category for non-biocide foulant deterrent coatings, with a VOC limit aligned with the CTG for both marine vessels and pleasure craft titled Thermoplastic Foulant Deterrent Coatings. The marine coating industry expressed interest in moving away from biocide-containing antifoulant coatings to protect marine life and water quality. The VOC limit for the new subcategory aligns with the CTG, and therefore represents RACT, and the slightly higher VOC limit than the proposed for traditional, biocide-containing antifoulant coatings will help the industry to transition to coatings more protective of marine life and improve water quality.

Removing the aluminum antifoulant category for marine coatings is needed to demonstrate RACT and align with the U.S. EPA Marine Coatings CTG for Shipbuilding and Ship Repair Operation. However, staff will need to demonstrate that lowering the VOC limits for aluminum antifoulants formulated for pleasure craft to align it with non-aluminum antifoulants represents BARCT.

*BARCT Assessment for Pleasure Craft Antifoulant Coatings***Assess South Coast AQMD Regulatory Requirements*****Assessment of South Coast AQMD Regulatory Requirements***

Staff reviewed existing South Coast AQMD VOC coating regulations for similar categories and to assess potential technology transfer. Antifoulant coatings are unique coatings; there are no applicable coatings that can compare to marine coatings applied to the bottom-side of a boat to prevent growth of algae or other marine organisms. The only comparable categories are the other substrate types of antifoulant coatings in Rule 1106. As demonstrated in Table 2-6; the VOC limits range from 560 – 330 g/L with the 330 g/L limit being for pleasure crafts that are not uniquely formulated for aluminum substrates. Based on staff's evaluation, nothing precludes the non-aluminum antifoulant from being applied to aluminum pleasure craft. At the federal level, the marine coatings CTG does not include a higher limit for aluminum substrates; therefore, antifoulant coatings for aluminum vessels do not necessarily need a higher VOC limit to properly function.

Assess VOC Limits of Existing Coatings***Assess VOC Limits of Existing Coatings***

The manufacturer-submitted survey data was used to evaluate existing VOC levels for each coating category. Based on the survey, the reported antifoulants for aluminum coatings contain VOC ranging from 374 to 379 g/L and do not appear to rely on pCBtF to comply with the applicable VOC content limit. The VOC content is well below the 560 g/L VOC limit currently in the rule. The following table summarizes the VOC levels of the reported coatings.

Table 2-6: VOC Levels of Reported Pleasure Craft Antifoulant Coatings

Category	VOC limit (g/L-Regulatory)	Coating VOC Range Reported (g/L-Regulatory)
Aluminum	560	374 - 379
Non-Aluminum	330	300 - 330

The table highlights that existing coatings are below proposed 400 g/L VOC content limit for marine coatings and the proposed 330 g/L VOC content limit for pleasure craft coatings, thus indicating that regardless of substrate type, lower VOC antifoulant coatings are readily available or can be formulated to meet the proposed limit of 330 g/L. Staff found no real differences between marine antifoulants and pleasure craft antifoulants in the market.

Other Regulatory Requirements**Other Regulatory Requirements**

This step of the BARCT assessment identifies and compares other regulatory requirements for the same source type or category. The evaluation ensures that the proposed requirements are consistent with, conform to, or are more stringent than existing standards. The assessment evaluated California air districts that have similar marine coatings rules and the U.S. EPA Marine Coatings CTG for Shipbuilding and Ship Repair Operations. The comparison includes both marine and pleasure craft coatings; however, the BARCT assessment is only for reducing the VOC limit for aluminum antifoulant coatings applied to pleasure craft coatings. For marine coatings, staff is

merely consolidating the categories into one category while retaining the lower VOC limit of 400 g/L. Reducing the VOC limit for aluminum antifoulant coatings for marine vessels is based on RACT.

Table 2-7: Other Antifoulant Coating Limits

Category	South Coast AQMD Rule 1106 (g/L)	CTG (g/L)	Bay Area AQMD – Rule 43 (g/L)	San Diego County APCD – Rule 67.20 (g/L)	San Joaquin Valley APCD – Rule 4603 (g/L)	Ventura County APCD ¹ (g/L)
Antifoulant Marine Coatings						
Aluminum	560	400	400	N/A	N/A	560
Non-Aluminum	400	400	400	400	N/A	400
Antifoulant Pleasure Craft Coatings						
Aluminum	560	N/A	N/A	N/A	560	560
Non-Aluminum	330	N/A	N/A	330	330	330

1. Rule 74.24 - Marine Coating Operations and Rule 74.24.1 - Pleasure Craft Coating and Commercial Boatyard Operations.

The table shows that many other air districts include a higher VOC limit for aluminum antifoulant coatings; however, San Diego County APCD does not include a higher VOC limit for those coatings. San Diego County has a significant number of marine and pleasure craft coating operations, demonstrating the lower VOC limit is technically feasible.

Assess low-VOC Technologies

Assess Low-VOC Technologies

The next step of the BARCT assessment is researching commercially available low VOC control technologies and seeking information on any emerging VOC control technology. As part of this assessment, staff met with several of the major marine and pleasure craft coating manufacturers to discuss the status and development of low VOC products. Manufacturers currently offer lower VOC antifoulant coatings that are formulated for a wide variety of substrates, including aluminum. During individual meetings, marine and pleasure craft coating manufacturers said they prefer to formulate antifoulant coatings that can be used on a wide variety of substrates, instead of more narrowly for aluminum substrate-based vessels. The following table lists VOC content of several antifoulant coatings and their associated substrates. The information in the table was compiled from the manufacturer survey and staff's research.

Table 2-8: Low VOC Antifoulant Coatings Currently Available

Antifoulant Coating	Substrates	VOC Content (g/L)
Sea Hawk Islands 44 TF ¹	Non-Aluminum	308-316
Pettit Black Widow ¹	Non-Aluminum	330
Pettit Odyssey HD	Non-Aluminum	327
Pettit Odyssey Triton ¹	Non-Aluminum	330
Pettit Trinidad	Non-Aluminum	324-330
Pettit Vivid ¹	Non-Aluminum	327-330
Pettit Colorkote	Aluminum	338-342
Interlux Micron CSC	Non-Aluminum	370
Interlux Trilux 33	Aluminum	390
Interlux Ultra	Non-Aluminum	327
Sea Hawk Cukote ¹	Non-Aluminum	330
Sea Hawk Smart Solution ¹	Aluminum	328

1. Formulated for application to non-aluminum substrates, but safe to apply to aluminum substrates with proper primer.

The table demonstrates it is technically feasible for antifoulant coatings, formulated for multiple substrates, to meet the proposed limits of 400 g/L and 330 g/L.

Cost-Effectiveness and Incremental Cost-Effectiveness Analyses

Cost-Effectiveness and Incremental Cost-Effectiveness

The lower VOC antifoulant coatings identified are all existing products offered for sale. To determine the cost effectiveness, staff evaluated the cost of the higher VOC antifoulant coatings formulated for aluminum only compared to the lower VOC antifoulant coatings formulated for any substrate. Staff evaluated the respective unit cost of various antifoulant coatings formulated for application to aluminum and non-aluminum substrates. Staff found antifoulant coatings to be commercially available that were formulated primarily for non-aluminum substrates but are also safe to be applied to aluminum substrates as long as the proper primers are applied beforehand. This is consistent with manufacturer feedback received during discussions held during the rule development process.

Staff also found the coatings that are suitable for application to aluminum substrates have an average cost of \$390 per gallon, while those that are only suitable for application to non-aluminum substrates to have an average cost of \$325 per gallon. The following table lists antifoulant coatings and typical cost based on a one-gallon container size; with several coatings classified as safe for both aluminum and non-aluminum substrates which are denoted below. The corresponding price

per gallon is provided to evaluate the potential cost impacts associated with transitioning to lower VOC formulations. Staff determined that the lower VOC formulations are not expected to result in increased costs to end-user as the costs for lower VOC products were nearly equivalent or slightly lower in cost than the higher VOC formulations. Therefore, consolidating the antifoulant category into a single category while retaining the lower VOC limit of 330 g/L pleasure craft coatings is cost-effective. An incremental cost-effectiveness was not conducted because staff could not identify additional stringent low VOC technologies for pleasure craft antifoulant coatings.

Table 2-9: Cost Comparison Summary

Coating	Substrate	VOC Content (g/L)	Cost (\$/gal)
Sea Hawk Islands 44 TF	Non-Aluminum	308-316	\$425
Pettit Black Widow ¹	Non-Aluminum	330	\$410
Pettit Odyssey HD	Non-Aluminum	327	\$300
Pettit Odyssey Triton ¹	Non-Aluminum	330	\$460
Pettit Trinidad	Non-Aluminum	324-330	\$300
Pettit Vivid ¹	Non-Aluminum	327-330	\$370
Pettit Colorkote	Aluminum	338-342	\$410
Interlux Micron CSC	Non-Aluminum	370	\$350
Interlux Trilux 33	Aluminum	390	\$390
Interlux Ultra	Non-Aluminum	327	\$260
Sea Hawk Cukote	Non-Aluminum	330	\$310
Sea Hawk Smart Solution	Aluminum	328	\$295

1. Formulated for application to non-aluminum substrates, but safe to apply to aluminum substrates with proper primer.

The following table summarizes the RACT and BARCT assessment for antifoulant coatings:

Table 2-10: Antifoulant Coating Summary and Proposed Limits

Category	Current VOC Limit (g/L-Coatings)		Proposed VOC Limits (g/L-Coatings)	
	Pleasure Craft	Marine Vessels	Pleasure Craft	Marine Vessels
Aluminum	560	560	BARCT	RACT
Non-Aluminum	330	400	330	400

The proposed VOC content limit of 400 g/L for marine antifoulant coatings is based on RACT which is currently being achieved, and replacement products are commercially available. Since staff is maintaining the lower of the two limits which aligns with U.S. EPA's CTG for marine operations, a cost-effectiveness evaluation for the lower VOC limit of 400 g/L marine antifoulant coatings is not required. However, for pleasure craft antifoulant coatings, staff evaluated the cost-effectiveness of the proposed lower 330 g/L VOC limit. The average cost of an antifoulant coating formulated only for aluminum substrates was approximately \$390 per gallon, and a more general antifoulant coating formulated for multiple substrates, including aluminum, is approximately \$325 per gallon. This equates to a cost savings of \$65 per gallon of coating for the reformulated lower-VOC general antifoulant coating. Since the cost of the general antifoulant coatings are equivalent or less, staff determined that it is cost-effective to lower the VOC limit to 330 g/L. The estimates emission reduction for the category is 1.4 pounds per day. Therefore, staff determined the proposed VOC content limit of 330 g/L for the consolidated antifoulant pleasure craft coating category to be cost-effective at a cost of \$0 per ton of VOC emissions reduced.

Since some antifoulant coatings contain pCBtF in their formulations, staff anticipates the manufacturer will need to reformulate their coatings and any potential reformulation costs will be passed onto end-users and increase product prices by approximately ten percent. The average unit price for aluminum-substrate formulate antifoulants would increase the cost by approximately forty dollars per gallon. Since many of the cost of low VOC antifoulant coatings identified are below the cost of the higher VOC antifoulants, the price impacts should be equivalent to current prices. The reformulation cost is discussed later in the reformulation section.

Similar to the proposal for marine aluminum antifoulant coatings, pleasure craft aluminum-substrate antifoulant coatings with a higher VOC content will be allowed until a future effective date of January 1, 2031, to align with the pCBtF phase out date, with an additional one year sell-through and use-through periods allowed for coatings manufactured prior to the prohibition effective date, to allow time for the coatings to transition to the lower limit.

Primers

Primers are applied for the purpose of providing corrosion resistance, adhesion for subsequent coatings, a moisture barrier, or promoting a uniform surface necessary for filling in surface imperfections. Primers can be applied to both the top side and bottom side of a vessel. Finish primer surfacers were reported in the coating manufacturer survey for both marine and pleasure craft application. Rule 1106 currently subcategorizes primer surfacers for pleasure craft application into finish primer surfacers and high-build primer surfacers, which only differ in definition based on the applied wet film thickness. Because finish primer surfacers and high-build primer surfacers have differing VOC content limits, enforcement of these limits would require measurement of applied *wet* film thickness which poses a significant enforcement challenge. Furthermore, staff confirmed that many technical data sheets for primer surfacers marketed for pleasure craft use recommend ranges of applied wet film thickness that span both defined thickness ranges. Therefore, staff no longer finds the need for the distinction between the coating subcategories to be valid. Almost all reported finish primer surfacers contain pCBtF, and a small number contain t-BAC. The average VOC content of the reported finish primer surfacers for marine vessel application was 250 g/L. Rule 1106 currently does not have an established coating category or subcategories for primers for marine application. Therefore, all primers used for marine application fall under the "All Other Coating Type" category and are subject to a VOC content

limit of 340 g/L. Finish primer surfacers used for pleasure craft application have a VOC content limit of 420 g/L. High build primer surfacers used for pleasure craft application also have a VOC content limit of 340 g/L. Based on the survey responses received, it is unclear whether finish primer surfacers rely on pCBtF to comply with the applicable VOC content limits and to what extent; however, pCBtF is commonly used in finish primer surfacer formulations. High build primer surfacers were only reported in the coating manufacturer survey for pleasure craft application. None of the reported contain pCBtF or t-BAC. Based on manufacturer reported survey data, primers account for approximately 26 percent of the total VOC emissions.

Staff is proposing to add a marine coating category for “Primers” with a VOC limit consistent with the “All Other Coating Type” VOC limit of 340 g/L. This new category would be for clarification purposes intended to reduce confusion regarding applicable VOC limits by end users. Staff is also proposing to collapse the pleasure craft coating subcategories “Finish Primer Surfacer” and “High Build Primer Surfacer” into a more general “Primer” category. The difference between finish surfacer primers and high build surface primers is that the former is applied at less than 10 mils and the latter at greater than 10 mils. Based on the survey data and online searches, marine and pleasure craft primers application instructions do not specify applying less than or greater than 10 mils. The distinction no longer appears valid. Staff is proposing to collapse the categories into a new category for Primers with a VOC limit of 340 g/L.

**Assess South
Coast AQMD
Regulatory
Requirements**

Assessment of South Coast AQMD Regulatory Requirements

Staff reviewed existing South Coast AQMD VOC coating regulations for similar categories and to assess potential technology transfer. Primer surfacers are commonly used across various industries and serve similar purposes. The following table lists comparable primer coating categories in different rules which include similar primer categories.

Table 2-11: Other South Coast AQMD VOC Limits for Primers

Rule Number	Name	Category	VOC limit (g/L-Coating)
1106	Marine and Pleasure Craft Coatings	Finish primer surfacers	420
		High build primer surfacers	340
1124	Aerospace Assembly and Component Manufacturing Operations	General Primers	350
1151	Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operation	Primer Sealers and Primer Surfacer	250
		Epoxy Primers	340

The majority of marine and pleasure craft primers are epoxy formulations, making the epoxy primer category in Rule 1151 the most similar to those in Rule 1106. A comparison of other South Coast AQMD rules also shows the 420 g/L VOC limit to be an outlier.

**Assess VOC
Limits of
Existing
Coatings**
Assess VOC Limits of Existing Coatings

The manufacturer-submitted survey data was used to evaluate existing VOC levels for each coating category. Based on the survey, the reported primers for pleasure craft application contain VOC ranging from 298 to 486 g/L and appear to rely on pCBtF to comply with the applicable VOC content limits. The 486 g/L coating reported in the manufacturer survey may be incorrect since it is higher than the Rule 1106 VOC limit for primers; staff is following up with the manufacturer to verify.

Table 2-12: VOC Levels of Existing Pleasure Craft Primers

Category	VOC limit (g/L-Regulatory)	Coating VOC Range Reported (g/L-Regulatory)
Finish Primer Surfacer	420	330 - 486
High-Build Primer Surfacer	340	298 -422

The survey data indicates that there are existing finish primer surfacers that meet the lower VOC limit of the high build primer surfacer category.

**Other
Regulatory
Requirements**
Other Regulatory Requirements

The assessment evaluated California air districts that have similar marine and pleasure craft coatings rules, and the U.S. EPA Marine Coatings CTG for Shipbuilding and Ship Repair Operations. The comparison includes both marine and pleasure craft coatings; however, the BARCT assessment is only for reducing the VOC limit of finish primer surfacers applied to pleasure craft vessels. The following table shows a comparison of the VOC limit for primers.

Table 2-13: Other Primer Surfacer Limits

Category	South Coast AQMD Rule 1106 (g/L)	CTG	Bay Area AQMD – Rule 43 (g/L)	San Diego County APCD – Rule 67.20 (g/L)	San Joaquin Valley APCD – Rule 4603 (g/L)	Ventura County APCD ¹ (g/L)
Marine						
Finish Primer Surfacer	275 (Baked)/ 340 (Air Dry) ²	340	340	340	N/A	340
High-Build Primer Surfacer	275 (Baked)/ 340 (Air Dry) ²	340	340	340	N/A	340
Pleasure Craft						
Finish Primer Surfacer	420	N/A	N/A	N/A	420	420
High-Build Primer Surfacer	340	N/A	N/A	N/A	340	340

1. Rule 74.24 - Marine Coating Operations and Rule 74.24.1 - Pleasure Craft Coating and Commercial Boatyard Operations.
2. VOC Limits listed are for Any Other Coating type as Rule 1106 currently does not include a VOC limit for primers.

The comparison shows that for other jurisdictions with rules that limit the VOC emissions of Finish Primer Surfacer used for pleasure craft, those limits align with Rule 1106. However, primers used for marine vessels (Finish Primer Surfacer and High-Build Primer Surfacer) have similar properties and performance requirements and other jurisdictions' VOC limits for primers used on marine vessels align with the proposed 340 g/L VOC limit for primers.

Assess low-VOC Technologies

Assess Low-VOC Technologies

The next step is to research the commercially available low VOC control technologies and seek information on any emerging VOC control technology. As part of this assessment, staff met with several of the major marine and pleasure craft coating manufacturers to discuss the status and development of low VOC products. Manufacturers stated that there are no fundamental formulation needs or differences with respect to VOC content between what are currently categorized as high-build primer surfacers and finish primer surfacers. Staff confirmed the following finish primer surfacers that meet the lower VOC content limit of 340 g/L without the use of pCBtF to be commercially available.

Table 2-14 Low VOC Finish Primer Surfacers Currently Available

Finish Primer Surfacers	VOC Content (g/L)
Axalta 18513S Epoxy Primer	323
Cardinal 7760-GRE15955 Epoxy Primer	334
Cardinal 7M60-10 Epoxy Primer	335

**Cost-Effectiveness
and Incremental
Cost-Effectiveness
Analyses**

Cost-Effectiveness and Incremental Cost-Effectiveness

The lower VOC finish primer surfacers identified are all existing products being offered for sale and currently available. To determine the cost effectiveness, staff assessed the cost of the higher VOC finish primer surfacers and compared to the lower VOC finish primer surfacers. The products in the following table are representative of primer surfacers regulated under Rule 1106. The corresponding price per gallon is provided to evaluate the potential cost impacts associated with transitioning to lower VOC formulations.

Table 2-15: Cost Comparison Summary

Primer Name	Type	Price (\$/gal)	VOC Content (g/L)
Pettit Rustlok 6980	Finish	\$160	475
Pettit Aluma Protect 4400	Finish	\$150	486
Pettit EZ Prime 6149	High-Build	\$130	422
Pettit Protect 4800	High-Build	\$150	304
Interlux Interprotect HS YPA401	High-Build	\$160	289

Staff found that the cost for the identified primers that meet the proposed VOC content limit of 340 g/L without pCBtF or t-BAC were similar in cost to the primer surfacers complying with the current VOC limit 420 g/L. The costs in the table above are rounded to the nearest whole dollar and the actual cost difference between them is less than five dollars; with the actual cost for the lower VOC product was slightly cheaper, resulting in cost savings. The lower VOC formulations are not expected to result in a significant impact to the end-user costs. Since the lower VOC primer options meet the proposed 340 g/L limit, are commercially available, and are sold at slightly lower cost of approximately five dollars less, staff determined that the proposed 340 g/L limit for all pleasure craft primers to be cost-effective. An incremental cost-effectiveness was not conducted because staff could not identify additional stringent low VOC technologies for pleasure craft finish primer surfacer coatings.

The proposed VOC content limit of 340 g/L for the subsumed primer coating category is technologically feasible based the BARCT assessment conducted. Staff is proposing a future effective date of January 1, 2029, to allow time for the market to adjust and/or reformulate coatings to comply with the proposed VOC content limit. Based on online research, staff found the average price per gallon of the higher-VOC containing finish primer surfacers to be approximately \$160, and the average price per gallon of the lower-VOC containing high-build primer surfacers to be about \$155 per gallon. The estimated emission reduction for the primer category is 17 pounds per day. Therefore, staff determined the proposed VOC content limits of 340 g/L for the subsumed primer coating category to be cost-effective at a cost of \$0 per ton of VOC emissions reduced.

High Gloss and Extreme High Gloss Coatings

High gloss coatings are generally applied to the top side of a vessel and are used to protect the substrate in a marine environment and for aesthetic purposes. High-gloss coatings are a subcategory of Topcoats in Rule 1106, for both marine and pleasure craft coatings, along with Extreme High-gloss coatings. High-gloss coatings were reported in the coating manufacturer survey for both marine and pleasure craft application, while no extreme high-gloss coatings were reported. These coatings differ by a measure of reflectance, with extreme high-gloss coatings having a greater reflectance than high-gloss coatings. The current pleasure craft coating VOC limits for these coatings are 490 g/L and 420 g/L for extreme high-gloss coatings and high-gloss coatings respectively. The reported coatings contain VOC ranging from 369 to 412 g/L and do *not* appear to rely on pCBtF to comply with the applicable VOC content limits. The current marine coating VOC limits for these coatings are 340 g/L and 490 g/L for high-gloss coatings and extreme high-gloss coatings respectively. The reported high-gloss coatings for marine vessel application contain an average VOC content of 340 g/L and appear to rely on pCBtF to comply with the applicable VOC content limit.

As previously stated, because our region is designated as an extreme nonattainment area of air quality standards, South Coast AQMD must adopt limits that represent RACT/RACM. The marine CTG represents RACT and does not include a higher VOC limit for extreme high-gloss coatings. Therefore, Rule 1106 cannot include a higher VOC limit. Staff is proposing to collapse the two coating subcategories into one category, removing the extreme high-gloss coating subcategory which currently has a higher VOC limit. Extreme high-gloss coatings with higher VOC content will be allowed until a future effective date of January 1, 2029, with sell-through and use-through periods allowed for coatings manufactured prior to that date; this will allow time for the coatings to be reformulated without pCBtF and transition to the lower VOC limit.

Removing the extreme high-gloss coating category for marine coatings is needed to demonstrate RACT and align with the U.S. EPA Marine Coatings CTG for Shipbuilding and Ship Repair Operations. However, staff will need to demonstrate that lowering the VOC limits for extreme high-gloss coatings formulated for pleasure craft application to align it with high-gloss coatings represents BARCT, as evidenced in the sections below.

**Assess South
Coast AQMD
Regulatory
Requirements**

Assessment of South Coast AQMD Regulatory Requirements

Staff reviewed existing South Coast AQMD VOC coating regulations for similar categories and to assess potential technology transfer. High-gloss and extreme high-gloss topcoats are commonly used across various industries and serve similar purposes. The following table lists comparable gloss coating categories in different rules which include similar coating categories:

Table 2-16: Other South Coast AQMD VOC Limits for Gloss Coatings

Rule Number	Name	Category	VOC limit (g/L-Coating)
1106	Marine and Pleasure Craft Coatings	High-Gloss Coatings	340 & 420
		Extreme High-Gloss Coatings	490
1107	Coating of Metal Parts and Products	Extreme High-Gloss Coatings	340
1151	Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operation	Clear Coatings	250

The proposed limits for gloss coatings would also align Rule 1106 with similar categories in other rules. A comparison of other South Coast AQMD rules also shows the 490 g/L VOC limit to be an outlier.

**Assess VOC
Limits of
Existing
Coatings**

Assess VOC Limits of Existing Coatings

The manufacturer-submitted survey data was used to evaluate existing VOC levels for each coating category. Based on the survey, the reported high-gloss coatings for marine vessel application contain an average VOC content of 340 g/L and appear to rely on pCBtF to comply with the applicable VOC content limit, while reported high-gloss coatings for pleasure craft application contain VOC ranging from 369 to 412 g/L and do *not* appear to rely on pCBtF to comply with the applicable VOC content limits. Extreme High Gloss products were not reported in the survey or identified in online searches. No extreme high-gloss coatings were reported in the coating manufacturer survey. However, staff confirmed that there are existing extreme high-gloss coatings that are commercially available that meet the lower VOC limit for high gloss pleasure craft coatings. Therefore, the category is proposed to be removed from PAR 1106 and combined with the High Gloss Category.

Table 2-17: VOC Levels of Existing Pleasure Craft Gloss Topcoats

Category	VOC limit (g/L-Regulatory)	Coating VOC Range Reported (g/L)
Extreme High-Gloss Coating	490	N/A
High-Gloss Coating	420	369 - 412

The survey data indicates that extreme high-gloss coatings may not have been sold for use within South Coast AQMD during the previous calendar year. However, staff confirmed that extreme high-gloss coatings are commercially available for use within South Coast AQMD. See the table below for product information:

Table 2-18: VOC Levels of Existing Pleasure Craft Extreme High-Gloss Topcoats

Coating	Category	VOC limit (g/L-Regulatory)	Coating VOC Range Reported (g/L)	pCBtF and/or t-BAc?
Pro-Line 4600	Extreme High-Gloss Coating	490	<420	N/N

The confirmed commercially available extreme high-gloss coating indicates that there are existing extreme high-gloss coatings that meet the lower VOC limit of the high-gloss coating category.

Other Regulatory Requirements

Other Regulatory Requirements

This step of the BARCT assessment identifies and compares other regulatory requirements for the same source type or category. The evaluation ensures that the proposed requirements are consistent with, conform to, or are more stringent than existing standards. The assessment evaluated California Air Districts that have similar marine and pleasure craft coatings rules, and the U.S. EPA Marine Coatings CTG for Shipbuilding and Ship Repair Operations. The comparison includes both marine and pleasure craft coatings; however, the BARCT assessment is only for reducing the VOC limit for high-gloss topcoats applied to pleasure craft vessels. Consolidating the higher VOC limit for extreme high-gloss topcoats with high gloss coating for marine coatings is based on RACT.

Table 2-19: Other Gloss Topcoat Limits

Category	South Coast AQMD Rule 1106 (g/L)	CTG	Bay Area AQMD – Rule 45 (g/L)	San Diego County APCD – Rule 67.20 (g/L)	San Joaquin Valley APCD – Rule 4603 (g/L)	Ventura County APCD ¹ (g/L)
Marine						
Extreme High-Gloss Coating	420 (Baked)/ 490 (Air dry)	N/A	490	N/A	N/A	N/A
High-Gloss Coating	275 (Baked)/ 340 (Air Dry)	420	340	420	N/A	420
Pleasure Craft						
Extreme High-Gloss Coating	490	N/A	N/A	N/A	490	490
High-Gloss Coating	420	N/A	N/A	N/A	420	420

1. Rule 74.24 - Marine Coating Operations and Rule 74.24.1 - Pleasure Craft Coating and Commercial Boatyard Operations.

Cost-Effectiveness and Incremental Cost-Effectiveness Analyses

Cost-Effectiveness and Incremental Cost-Effectiveness

The lower VOC gloss topcoats identified all are existing products being offered for sale and currently available. To determine the cost effectiveness, staff determined that the evaluated the cost of extreme high gloss transitioning to the lower VOC limit of high gloss coatings. However, extreme high gloss coatings serve the same purpose as high gloss coatings but with a higher VOC limit. The U.S. EPA CTG does not include a higher VOC limit carve out for extreme high gloss coatings applied to marine vessels, therefore staff is proposing to consolidate the extreme high gloss with the high gloss coating into a single high gloss category while maintaining the lower 340 g/L limit of the two limits for the consolidated category. Staff is also proposing to also remove the higher VOC carve out for extreme high gloss coatings applied to pleasure craft and maintain the lower high gloss coating limit of 420 g/L.

High gloss coatings were reported in the coating manufacturer survey for both marine and pleasure craft applications. Those reported for marine application all contain pCBtF and appear to rely on pCBtF to comply with the applicable VOC content limit of 340 g/L. Those reported for pleasure

craft application do not contain pCBtF and therefore do not appear to rely on pCBtF to comply with the applicable VOC content limit of 420 g/L.

The following table shows representative gloss topcoats regulated under Rule 1106. The corresponding price per gallon is provided to evaluate the potential cost impacts associated with transitioning to lower VOC formulations. Staff determined that the lower VOC formulations are not expected to result in significant increases to end-user costs.

Table 2-20: Cost Comparison Summary

Gloss Topcoat Name	Type	Price (\$/gal)	VOC Content (g/L)
Pettit EZpoxy	High-Gloss Coating	\$200	369-412
Interlux Yacht Enamel	High-Gloss Coating	\$120	412
Pettit EZBilge	High-Gloss Coating	\$150	388
Pro-Line 4600	Extreme High-Gloss Coating	\$120	<420

Staff found that the cost for the identified gloss topcoats that meet the proposed pleasure craft coating VOC content limit of 420 g/L without pCBtF or t-BAc were similar in cost to the extreme high-gloss coating complying with the current VOC limit of 420 g/L. The costs in the table above are rounded to the nearest whole dollar. Notably, the cost of the extreme high-gloss coating that complies with the proposed lower VOC limit is slightly cheaper. The lower VOC formulations are not expected to result in a significant impact to the end-user costs. Since the lower VOC extreme high-gloss coating meets the proposed 420 g/L limit and is commercially available and at slightly lower cost, staff determined that the proposed 420 g/L limit for all pleasure craft gloss topcoats to be cost-effective. An incremental cost-effectiveness analysis was not conducted because staff could not identify additional stringent low VOC technologies for pleasure craft gloss topcoats.

Based on the BARCT assessment conducted, staff confirmed that the proposed VOC content limit of 340 g/L and 420 g/L for the subsumed high-gloss coating category is technologically feasible, with a future effective date of January 1, 2029. Reformulated coatings were assumed to comply at the new proposed limit of 340 g/L for marine coatings and 420 g/L for pleasure craft coatings. However, staff identified comparable high gloss products with VOC contents at or below the proposed limit. Staff does not anticipate any impacts to emissions as staff is not aware of any existing, commercially available extreme high gloss coatings sold for use in South Coast AQMD. An incremental cost-effectiveness was not conducted because staff could not identify additional stringent low VOC technologies for pleasure craft high-gloss coatings.

The proposed removal of the higher VOC content limit for extreme high-gloss coatings applied to marine vessels is based on RACT which is currently being achieved and replacement products are commercially available. Staff is just maintaining the lower of the two limits which aligns with U.S. EPA's CTG for marine operations; therefore, a cost-effectiveness analysis for the lower VOC limit of marine extreme high-gloss coatings is not required. However, for the pleasure craft extreme high-gloss coatings, staff evaluated the cost-effectiveness of the proposed lower 420 g/L VOC limit. The average cost of extreme high-gloss coating for application to pleasure craft was approximately \$120 per gallon, and high-gloss coatings is approximately \$160 per gallon. This equates to a cost savings of \$45 per gallon of coating for the lower VOC extreme high-gloss coating. Since the cost of the gloss topcoats are equivalent or less, staff determined that it is cost-effective to lower VOC limit to 420 g/L. The estimates emission reduction for the category is 0.81 pounds per day. Therefore, staff determined the proposed VOC content limits of 420 g/L for the subsumed high-gloss coating category to be cost-effective at a cost of \$0 per ton of VOC emissions reduced.

Since some gloss topcoats contain pCBtF in their formulations, staff anticipates the manufacturer will need to reformulate their coatings and any potential reformulation costs will be passed onto end-users and increase product prices by approximately ten percent. The average unit price for extreme high-gloss coatings would increase the cost by approximately twelve dollars per gallon. Since the extreme high-gloss coating identified is below the cost of the high-gloss coatings, the price impacts and resulting higher unit price should be equivalent or similar to current prices of gloss topcoats. The reformulation cost is discussed later in the reformulation section.

Similar to the proposal for other subsumed coating categories, extreme high-gloss coatings with a higher VOC content will be allowed until a future effective date of January 1, 2029, with an additional one year sell-through and use-through periods allowed for coatings manufactured prior to the prohibition effective date, to allow time for the coatings to transition to the lower limits.

Clear Wood Coatings

Clear wood coatings are used to provide a transparent or translucent film on wood substrates. Varnishes are a type of wood coating that can be clear or pigmented and are applied for aesthetic purposes and protect against water, heat, abrasion, and UV damage. Marine deck sealant primers are used to enhance the bonding surface for sealants applied to wooden marine decks. Teak primers are used specifically on teak wood, which are intended to enhance the bonding surface for sealants applied to wooden marine decks. No teak primers were reported in the coating manufacturer survey responses received. In the manufacturer survey, all wood coatings were reported as clear wood varnishes and marine deck sealant primers for pleasure craft applications. Marine deck sealant primers accounted for less than one percent of all wood coatings reported in the survey, with clear wood varnishes accounting for the majority of reported wood related coatings. In addition, none of the reported clear wood varnishes or marine deck sealant primers reported contain pCBtF or t-BAC, and clear marine varnishes did not contain VOC greater than 420 g/L which is below the VOC content limit of 490 g/L. Similarly, the reported VOC content for marine deck sealant primer is 35 g/L, well below the applicable VOC content limit of 760 g/L. No products for the clear wood sealers category were reported in the manufacturer survey. Since the reported wood coatings do not appear to rely on pCBtF or t-BAC to comply with the applicable VOC content limits, there appears to be potential for a VOC content limit reduction. Staff is proposing to restructure and

align the clear wood coating category with similar wood coating categories in other South Coast AQMD rules, such as Rule 1136 – Wood Coating Operations and Rule 1113 – Architectural Coatings. Both Rule 1136 and Rule 1113 limit clear wood topcoats coatings and clear wood sealers to a maximum VOC content of 275 g/L. As part of the restructuring, staff is also proposing to lower the VOC limit for wood sealers and varnishes in Rule 1106 from 550 /L and 490 g/L to 275 g/L.

Staff is proposing to restructure the clear wood coatings category by subcategorizing into four new proposed subcategories: clear wood sealers, pigmented wood sealers, clear wood topcoats, and pigmented wood topcoats. Rule 1106 sealers and varnishes are defined as topcoats and would fall under the topcoat subcategory based on whether it is clear or pigmented, with a new subcategory included to address wood primers/sealers. Coating manufacturers have requested that South Coast AQMD align VOC limits for different substrates across rules for ease of reformulation. Aligning the VOC limits also removes the potential for rule circumvention where marine varnishes are used for architectural applications.

Assess South Coast AQMD Regulatory Requirements

Assessment of South Coast AQMD Regulatory Requirements

Staff reviewed existing South Coast AQMD VOC coating regulations for similar categories and to assess potential technology transfer. Clear Wood Coatings and Varnishes are commonly used across various industries and serve similar purposes. The following table lists comparable gloss coating categories in different rules which include similar coating categories:

Table 2-21: Other South Coast AQMD VOC Limits for Wood Topcoats

Rule Number	Name	Category	VOC limit (g/L-Coating)
1136	Wood Products and Coatings	Clear Topcoats	275
1113	Architectural Coatings	Clear Topcoats	275

The proposed limits for the newly restructured Wood Sealers and Topcoats coating category are consistent with similar categories in other rules and would align Rule 1106 with similar categories in other rules. A comparison of other South Coast AQMD rules shows Rule 1106's current VOC limits to be outliers.

Assess VOC Limits of Existing Coatings

Assess VOC Limits of Existing Coatings

The manufacturer-submitted survey data was used to evaluate existing VOC levels for each coating category. Based on the survey, the reported Clear Wood Topcoats coatings for pleasure craft application contain an average VOC content of 401 g/L. While limited products are under the proposed limit of 275 g/L, similar wood coatings in Rules 1136 and 1113 are found to be under the proposed limit. The proposed alternative MIR limit for Clear Topcoats would also provide flexibility when reformulating to the proposed limit of 275 g/L. A similar process was done for the remaining Wood Coating categories: Pigmented Wood Topcoats, Clear Wood Sealers and Pigmented Wood Sealers.

Staff conducted an online search of Marine Deck Sealant Primers and similar wood coating types from Rule 1136 and Rule 1113. Staff found the following products:

Table 2-22: Marine Wood Coatings and Similar Wood Coating from Other South Coast AQMD Rules VOC and Exempts Content

Coating	VOC Content (g/L-Regulatory)	Contains pCBtF	Contains t-BAC
Awlgrip Awlwood Clear Primer	500	No	No
Awlgrip 545 Epoxy Primer	519	No	No
Sea Hawk Tuff Stuff Low VOC Primer	280	Yes	No
Pettit Protect High-Build Epoxy Primer	340	No	No
Rust-Oleum Marine Wood & Fiberglass Primer	457	No	No
Pacific Polymers Deck-Thane Primer	59	No	No
Interlux Primekote Epoxy Primer	407	No	No
McCloskey Man O_War Marine Spar Varnish Semi-Gloss	212	No	No
Bona Mega ONE Extra Matte	120	No	No
Cabot Gold	229	No	No
DuraSeal Fast Dry Sanding Sealer	63	No	No
Luster Lac Water White Lacquer Sanding Sealer	275	No	No
Finisher's Choice Clear Lacquer Sealer	203	No	No

Many of the current marine and pleasure craft coatings are higher than the proposed limit of 275 g/L; however, similar coatings for wood substrates subject to Rule 1136 and Rule 1113 are formulated at or below the proposed limit of 275 g/L. Manufacturers will likely have to reformulate to meet the lower proposed limits of 275 g/L and to remove the pCBtF. However, they are currently reformulating to phase out of pCBtF for Rule 1136 and soon will have to reformulate Rule 1113 wood coatings and requested consistency amongst rules with similar coating types. The cost-effectiveness will be based on expected reformulation cost.

**Other
Regulatory
Requirements**

Other Regulatory Requirements

Staff reviewed the VOC limits for Clear Wood Coatings and Varnishes in other California air district marine and pleasure craft rules and found that most limits in other air districts are lower than the current VOC limit of 550 g/L for wood sealers and 490 g/L for wood topcoats. In the larger air districts, many of the wood coatings fall under the default category with a VOC limit of 340 g/L which is higher than the proposed limit of 275 g/L. However,

wood sealers and topcoats subject to Rule 1113 – Architectural Coatings can comply with the 275 g/L VOC content limit.

Table 2-23: Wood Coating VOC Limits

Air District	Rule	Category	Limit (g/L-Regulatory)
Bay Area Air District	8 – 43 – Surface Preparation and coating of Marine Vessels	Default	340 (Air Dry)
San Diego County APCD	Rule 67.18 - Marine Coating Operations	Default	340 (Air Dry)
South Coast AQMD	1106 – Marine and Pleasure Craft	Clear Wood Coatings Sealers	550
		Varnishes	490
	1113 – Architectural Coatings	Wood Coatings	275
	Rule 1136 – Wood Coatings	Clear and Pigmented Topcoats and Primers	275

The VOC limits for wood coatings in Rule 1106 are high outliers. Due to technology transfer, staff believe the lower-VOC wood coating technology and formulations can be applied to Rule 1106 wood coatings.

Cost-Effectiveness and Incremental Cost-Effectiveness Analyses

Cost-Effectiveness and Incremental Cost-Effectiveness

To determine the cost effectiveness, staff evaluated the cost of the higher VOC woods sealers and topcoats and compared to the lower VOC counterparts to determine cost-effectiveness of similar wood coating categories. Staff determined the cost by using the submitted manufacturer surveys and reviewing available product data sheets of similar wood coating categories in South Coast AQMD rules. Staff adjusted sales volume according to estimated use at marina boat yards throughout South Coast. The adjustment to sales volume was also determined using the VOC emission baseline for the category in Rule 1106.

The following products represent wood coatings regulated under other South Coast AQMD rules that serve similar applications. The corresponding price per gallon is provided to evaluate the potential cost impacts associated with transitioning to lower VOC formulations. Staff determined that the lower VOC formulations are not expected to result in increase in costs. Many of the similar coatings from Rule 1136 and Rule 1113 were lower in cost than those specially labeled for marine

applications. The cost of similar lower VOC wood substrate coatings were approximately \$50 to \$60 cheaper than their marine counterparts. Staff identified one marine wood varnish or topcoat coating that was reported under Rule 1113 that had a VOC limit below the proposed 275 g/L limit; that marine wood coating was also lower in cost than higher-VOC marine and pleasure craft wood coatings. Therefore, it is technically feasible and cost-effective to achieve the proposed limit of 275 g/L. However, since some identified wood coatings for marine and pleasure craft applications do not currently comply with proposed 275 g/L VOC limit, some manufacturers will need to undergo some reformulation efforts. Staff acknowledge that reformulation activities may increase the cost of the final reformulated product. For the purpose of the cost effectiveness analysis, based on manufacturer feedback staff assumed a ten percent increase in the price per gallon to the current 1106 products to account for reformulation costs.

Table 2-24: Clear Wood Coatings Products Comparative Analysis

Product	Comparable 1106 Coating Category	Applicable South Coast AQMD Rule	VOC Content (g/L)	Average Price per Gallon
McCloskey Man O_War Marine Spar Varnish Semi-Gloss	Clear Wood Topcoats	1113	212	\$150
Bona Mega ONE Extra Matte	Clear Wood Topcoats	1113	120	\$90
Cabot Gold	Clear Wood Topcoats	1113	229	\$65
DuraSeal Fast Dry Sanding Sealer	Clear Wood Sealers	1113	63	\$59
Luster Lac Water White Lacquer Sanding Sealer	Clear Wood Sealers	1136	275	\$50
Finisher's Choice Clear Lacquer Sealer	Clear Wood Sealers	1136	203	\$133

Staff estimated the cost-effectiveness for the coating categories subject to lower VOC content limits by comparing the sales-weighted average cost and VOC content of reported coatings with estimated values for reformulated compliant coatings. The estimated reformulation cost assumes the ten percent increase in product cost, while compliant coatings were assumed to be reformulated to the VOC content limit of 275 g/L. As shown in the following tables, the estimated cost-effectiveness for reformulating clear and pigmented wood sealers and wood topcoats is approximately \$32,001 per ton and \$40,936 per ton of VOC reduced, respectively.

Table 2-25: Estimated Cost per Ton of VOC Reduced – Clear and Pigmented Wood Sealers

Coating Category	Wood Sealers
Average Cost of Reported Coatings (per gal)	\$168
Average Cost of Reformulated Coating (per gal)	\$185
Sales Weighted Average VOC of Current	401 g/L
Estimated Weighted Average VOC of Compliant	275 g/L
Estimated Emissions Reductions (pounds per day)	0.80
Cost per ton	\$32,001

Table 2-26: Estimated Cost per Ton of VOC Reduced – Clear and Pigmented Wood Topcoats

Coating Category	Wood Topcoats
Average Cost of Reported Coatings (per gal)	\$215
Average Cost of Reformulated Coating (per gal)	\$237
Sales Weighted Average VOC of Current	399 g/L
Estimated Weighted Average VOC of Compliant	275 g/L
Estimated Emissions Reductions (pounds per day)	3.78
Cost per ton	\$40,936

Based on the technical assessment, it was determined that transitioning wood sealers from a VOC content limit of 550 g/L and wood topcoats from 490 g/L to 275 g/L is cost-effective and technically feasible. The cost-effectiveness for both categories are well below the cost-effectiveness threshold of \$42,675 in 2025 dollars per ton of VOC emissions reduced. An incremental cost-effectiveness was not conducted because staff did not identify more stringent VOC technology.

The South Coast AQMD is in extreme noncompliance and cannot have VOC limits higher than other California air districts. Further, having higher VOC limits in Rule 1106 and Rule 1113 leads to rule circumvention where a homeowner or contractor can purchase high-VOC wood coatings from a marine shop to use on their home. Manufacturers have also asked to align the VOC limits whenever possible. As such, staff recommends aligning the VOC limits in Rule 1106 with Rule 1113 and include the alternative Product Weighted Maximin Incremental Reactivity VOC limits that were recently adopted for Rule 1136. The following table lists the proposed PW-MIR limits for the restructured wood sealers and topcoats category.

Table 2-27: Proposed Alternative PW-MIR VOC Content Limits

Coating Category	g O ₃ /g Product
Wood Coatings	
Clear Wood Sealers	0.53
Pigmented Wood Sealers	0.60
Clear Wood Topcoats	0.53
Pigmented Wood Topcoats	0.46

Any Other Coatings

Both Tables 1 and 2 in Rule 1106 contain a “catch-all” coating category for any coatings used that meet either the definition of a marine coating or a pleasure craft coating, but do not meet the definition of any of the defined coating categories of either table. This category also serves the purpose of limiting emissions from any commercially available coatings that staff may not be aware of, that meet the definition of marine and/or pleasure craft coating and are subject to Rule 1106, but do not meet the definition of any established marine and/or pleasure craft coating category. The catch-all category for marine coatings in Table 1 has a VOC content limit of 340 g/L while the pleasure craft counterpart in Table 2 has a VOC content limit of 420 g/L.

Staff did not identify any reported coatings that would continue to fall under a catch-all category in the proposed amendments to Rule 1106. Further, staff has not identified any technical justification for having a higher “catch-all” VOC limit for pleasure craft coatings than marine coatings. Therefore, staff is proposing to align the “catch-all” VOC limits for both marine and pleasure craft coatings to 340 g/L.

Summary of Cost-Effectiveness and Incremental Cost-Effectiveness

Many marine and pleasure craft coatings that meet the proposed VOC limits identified by staff generally have a lower cost or are equivalent in cost to existing coatings that meet the current limits. As a result, the cost-effectiveness for antifoulants, primers, and wood sealers and topcoats are cost-effective and below the cost-effectiveness threshold of \$42,675 in 2025 dollars. For categories where the VOC limits are being aligned with U.S. EPA’s CTG or other air district with lower VOC limits for the same category, a cost-effective analysis was not conducted since those coatings should be commercially available for purchase. However, staff does acknowledge there will be some reformulation efforts needed to meet the proposed lower VOC limits; staff will provide additional time to address the reformulation efforts. The reformulation process will have some associated cost which can potentially be passed on to the end user in the form of a price increase for the respective coating; staff estimates the increase to be approximately 10 percent of the current coating price. The overall emission reduction expected for PAR 1106 is approximately 23.9 pounds per day. Staff does not anticipate a VOC emissions increase or impact from raising the VOC limit for the pretreatment wash primer category. No pretreatment wash primers were reported in the manufacturer submitted survey. The VOC limit was raised to align with other recently adopted South Coast AQMD rules and U.S. EPA CTG for the coating category. Raising the VOC limit also ensures pCBtF and t-BAC free formulations are not introduced into the region.

A summary of the cost-effectiveness and expected emissions impact is shown in the following table.

Table 2-28: Cost-Effectiveness Summary and Emissions Impact

Category	Current VOC Limit (g/L-Regulatory)	Proposed VOC Limit (g/L-Regulatory)	Cost-Effectiveness (\$ per ton)²	Emissions Impact (pounds per day)
Antifoulant Coatings (Marine)	560	400	RACT	0
Aluminum Substrate Antifoulant Coatings (Pleasure Craft)	560	330	\$0	(1.47)
Primers (Pleasure Craft)	340/420	340	\$0	(17.11)
High Gloss Coating (Marine)	340	420	\$0	(0.80)
High Gloss Coating (Pleasure Craft)	490	420	\$0	0
Clear/Pigmented Wood Topcoats	550	275	\$32,001	(0.8)
Clear/Pigmented Wood Topcoats	490	275	\$40,936	(3.78)
Any Other Coating Type ¹ (Pleasure Craft)	420	340	\$0	0
Overall Emission Reduction	23.9 pounds per day			

1. Staff not aware of any pleasure craft coating which fall into category “Any Other Coating Type”
2. Cost effectiveness is based on cost of low-VOC coatings versus high-VOC coatings. For each category evaluated, the lower-VOC coatings were lower cost; therefore, staff zeroed out the costs. Staff is considering formulations costs for the phase out of pCBtF which is evaluated below.

Reformulation Costs Associated with Transitioning from pCBtF and t-BAc

Reformulating coatings to phase out pCBtF and t-BAc is expected to require manufacturer resources primarily associated with research and development, formulation adjustments, product testing, validation, and qualification activities. These costs may include both initial reformulation efforts and follow-up adjustments as products are optimized to meet performance specifications and compliance requirements. Similar to other South Coast AQMD VOC rules that phased out pCBtF and t-BAc, reformulation costs are expected to vary depending on coating category, existing formulations, and the extent to which pCBtF and t-BAc are currently used. Survey responses indicated that t-BAc is used in antifoulant coatings and finish primer surfacers applied to pleasure craft, while pCBtF was reported in high-gloss coatings and finish primer surfacers for marine vessel application, as well as finish primer surfacers applied to pleasure craft and antifoulant coatings formulated for non-aluminum substrates applied to pleasure craft.

For the cost assessment and impacts of reformulation, based on manufacturer feedback staff estimated that reformulation activities would increase final product costs by ten percent. Reformulated coatings were assumed to comply with the new proposed VOC limits for their respective categories; however, staff identified many comparable products with VOC contents at or below the proposed limits. The difficulty and cost of reformulations are anticipated to differ among coating categories.

Furthermore, based on manufacturer feedback, reformulation time and cost may be lower when working towards complying with the alternative PW-MIR VOC limits. The additional formulation flexibility provided by the PW-MIR compliance option, combined with the lower cost of traditional solvents compared to pCBtF, could substantially reduce or offset potential increases in products costs. Proposed category consolidation provisions are also expected to reduce and simplify reformulation efforts for manufacturers and simplify rule implementation for similar coating categories.

Based on prior experience with VOC rule amendments, staff anticipate that compliance costs associated with PAR 1106 will be incurred primarily by coating manufacturers, most of which are located outside the South Coast AQMD jurisdiction, and that these costs will be recovered over time through product sales. Staff estimated the cost impacts for each subject coating category by comparing the average sales cost and VOC content of reported coatings with estimated cost for reformulated compliant coatings which assumes a 10 percent increase in product cost. Despite these reformulation costs, staff identified several lower-VOC products that comply with the proposed lower VOC limits and are comparable in performance to products currently complying with the higher VOC limits. In addition, the costs of the lower VOC comparable products are typically lower than the higher VOC products, therefore, staff expects the overall reformulation cost associated with PAR 1106 to have minimal overall impacts. Furthermore, based on manufacturer feedback, reformulation time and cost may be lower when working towards complying with the alternative PW-MIR VOC limits. The additional formulation flexibility provided by the PW-MIR compliance option, combined with the lower cost of traditional solvents compared to pCBtF, could substantially reduce or offset potential increases in products costs. The lower VOC formulations are not expected to result in significant increases to the end-user costs.

In general, coatings formulated with relatively low concentrations of pCBtF or t-BAc are expected to require less reformulation efforts and lower associated costs than coatings containing larger quantities of these solvents. Staff also expects that reformulation costs may decrease over time as manufacturers gain experience transitioning away from pCBtF and t-BAc and take advantage of economies of scale. Additionally, transitioning from pCBtF to lower-cost solvents can yield long-term cost savings, particularly in high-solvent formulations. The following Table summarizes the estimated cost impacts from reformulation.

Table 2-29: Estimated Reformulation Cost Increase Per Gallon by Category

Category	pCBtF or t-BAc Percentage Reported in Survey	Percentage of Marine Coatings	pCBtF or t-BAc Reformulation Needed	Estimated Reformulation Cost Increase per Gallon (\$/gal)
Antifoulant Coatings (Marine)	n/a	Not Reported	YES	n/a*
Aluminum substrate Antifoulant Coatings (Pleasure Craft)	~5.8-6.5%	~12%	YES	\$40
Primers (Pleasure Craft)	~3-22%	~5%	YES	\$13
High Gloss Coating (Marine)	~11%	~4%	YES	\$0
High Gloss Coating (Pleasure Craft)	0%	~1%	NO	\$13
Clear/Pigmented Wood Sealers	n/a	n/a	NO	\$17
Clear/Pigmented Wood Topcoats	0%	<1%	YES	\$22
Average Overall Estimated Reformulation Cost Increase per Gallon				\$17.5

Additionally, PAR 1106 includes sell-through and use-through allowances for products that contain pCBtF and/or t-BAc that were manufactured prior to the prohibition effective date. The sell-through and use-through provisions are expected to minimize stranded inventory concerns and allow manufacturers, distributors, and end users sufficient time to transition to coatings that do not contain pCBtF and/or t-BAc. This will also help minimize cost impacts to the end-user.

Marine and Pleasure Craft Coating pCBtF and t-BAc Prohibition and Phase Out Timeline

The use of pCBtF in marine and pleasure craft coatings is common; however, its use is to a considerably lesser extent compared to other industries and coatings regulated under separate but similar South Coast AQMD rules. t-BAc is not exempted under South Coast AQMD Rule 102 nor is it exempted in Rule 1106. The U.S. EPA does exempt t-BAc, and the VOC content limits in Rule 1106 are largely aligned with those in the U.S. EPA Marine Coatings CTG. Therefore, the use of t-BAc in marine and pleasure craft coatings is relatively common.

During staff meetings with marine and pleasure craft coating industry stakeholders, manufacturers indicated they rely on pCBtF to a certain extent to meet certain U.S. EPA Marine Coatings CTG and Rule 1106 VOC limits and there is currently no suitable drop-in replacement solvent. Therefore, staff is proposing a phase-out approach for the usage of pCBtF and t-BAc in marine and pleasure craft coatings that includes sell-through and use-through periods for marine and pleasure craft coatings to provide sufficient time for coating manufacturers to develop suitable replacement products that will meet the lower future limits without the use of pCBtF and t-BAc. The prohibition timeline will also prevent stranded assets associated with existing product inventory already in the supply chain.

Based on coating manufacturer survey data received and evaluation of commercially available coatings, as well as similar coating categories in other South Coast AQMD rules, staff has proposed varying prohibition timelines for different coating categories. The varying timelines are intended to accommodate category-specific needs and reformulation challenges and take into account varying extents of reliance on pCBtF and t-BAc.

Staff is proposing a separate, extended pCBtF and t-BAc prohibition timeline for antifoulant coatings to address the reformulation time needed to phase out the use of pCBtF and t-BAc, and to accommodate for any additional time needed to obtain external regulatory approval for reformulated products. Antifoulant coatings contain biocides, which require EPA certification, a process that can add an additional 12 – 24 months. Due to that extra certification process, staff is proposing a longer phase out schedule than for other marine or pleasure craft coatings.

Staff is also proposing a separate, extended pCBtF and t-BAc prohibition timeline for wood coatings and colorants. Though the reported wood coatings do not contain pCBtF or t-BAc, the reported coatings were formulated to comply with higher VOC content limits compared to similar coating categories in other South Coast AQMD rules. Based on past rule developments taken to prohibit and phase out the use of pCBtF and t-BAc, staff acknowledges that current commercially available wood coatings formulated to comply with VOC limits of 275 g/L or lower rely on pCBtF to do so. After discussions with coating manufacturers, staff determined the proposed prohibition timeline to be sufficient in allowing enough time for these coatings to be reformulated to meet the VOC content limit of 275 g/L without the use of pCBtF. The proposed timeline is also consistent with the pCBtF and t-BAc prohibition timelines for similar coatings in other South Coast AQMD rules.

Staff is also proposing a separate, expedited pCBtF and t-BAc prohibition timeline for all primers, for both marine and pleasure craft application. Because reported primer surfacers either do not contain pCBtF or t-BAc or do not appear to be heavily reliant on pCBtF to comply with the current

applicable VOC content limit, staff believes these coatings can more quickly transition away from pCBtF and t-BAc. After discussions with coating manufacturers, staff determined the proposed prohibition timeline to be sufficient in allowing enough time for these coatings to be reformulated.

Reformulating coatings to phase out toxic exempt solvents and comply with the proposed VOC limits is expected to require manufacturer resources primarily associated with research and development, formulation adjustments, product testing, validation, and qualification activities. These costs may include both initial reformulation efforts and follow-up adjustments as products are optimized to meet performance specifications and compliance requirements. Similar to other South Coast AQMD VOC rules that phased out pCBtF and t-BAc, reformulation costs are expected to vary depending on coating category, existing formulations, and the extent to which pCBtF and t-BAc are currently used. Survey responses indicated that t-BAc is used in antifoulant coatings and finish primer surfacers applied to pleasure craft, while pCBtF was reported in high-gloss coatings and finish primer surfacers for marine vessel application, as well as finish primer surfacers applied to pleasure craft and antifoulant coatings formulated for non-aluminum substrates applied to pleasure craft.

For the cost-effectiveness analysis, staff estimated that reformulation activities would increase final product costs by ten percent. For emissions calculations, reformulated coatings were assumed to comply with the new proposed VOC limits; however, staff identified comparable products with VOC contents below the proposed limits.

The cost of reformulation is dependent on the coating category and will differ based on availability of comparable products with low VOC content. In general, coatings that are heavily reliant on pCBtF or t-BAc for compliance will require greater reformulation efforts and typically need a longer timeline to transition. Coatings that are formulated with low concentrations of pCBtF and t-BAc generally require less time to reformulate which helps minimize overall cost.

Proposed category consolidation provisions are also expected to reduce overall compliance burden. PAR 1106 consolidates several existing coating categories into broader categories while providing sell-through and use-through allowances for products manufactured to comply with the original category limits. These consolidations are intended to simplify rule implementation, reduce the number of unique formulations manufacturers must maintain, and provide manufacturers with additional formulation flexibility while continuing to achieve VOC emission reductions. The sell-through and use-through provisions are also expected to minimize stranded inventory concerns and allow manufacturers, distributors, and end users sufficient time to transition.

The sell-through and use-through end dates apply to any marine and pleasure craft coating that is manufactured prior to the proposed prohibition effective date(s) in the following table.

Table 2-30: Summary of pCBtF and t-BAc Prohibition Timeline

Category	Prohibition Effective Date	Sell-Through End Date	Use-Through End Date
Antifoulant Coatings	January 1, 2031	January 1, 2032	January 1, 2033
Colorants and Wood Coatings	January 1, 2030	January 1, 2031	January 1, 2032
Primers	June 1, 2027	June 1, 2028	June 1, 2029
All Other Coating Categories	January 1, 2028	January 1, 2029	January 1, 2030

CHAPTER 3: SUMMARY OF PROPOSALS

INTRODUCTION

PROPOSED AMENDED RULE STRUCTURE

PROPOSED AMENDED RULE 1106

Introduction

The main objective of the proposed amendments to Rule 1106 is to phase out the use of pCBtF and t-BAc in marine and pleasure craft coatings, as directed by the South Coast AQMD's Stationary Source Committee, due to toxicity concerns.

In addition to the prohibition of pCBtF and t-BAc, staff is also proposing to revise the pleasure craft coating title to include marine structures. This revision is intended to clarify rule applicability and maintain alignment with the U.S. EPA CTG with regard to marine coatings, which is not applicable to docks and offshore oil and gas drilling platforms.

Staff is proposing the following amendments to Rule 1106. The proposed amendments primarily pertain to the prohibition of pCBtF and t-BAc use in the regulated products, revised coating categories and associated VOC content limits, introduction of alternative reactivity-based limits, and lowering of volumetric usage limits for touch up repair. Other amendments are for rule clarification or streamlining. The proposed revised rule structure and key provisions are discussed in the following sections.

Proposed Amended Rule Structure

- (a) *Purpose*
- (b) *Applicability*
- (c) *Definitions*
- (d) *Requirements*
- (e) *Alternative Compliance Options*
- (f) *Prohibition of Possession, Specification and Sale*
- (g) *Administrative and Recordkeeping Requirements*
- (h) *Test Methods*
- (i) *Rule 442 Applicability*
- (j) *Exemptions*

Proposed Amended Rule 1106

Purpose [Subdivision (a)]

The purpose of this rule is to reduce emissions of VOCs and toxic emissions from marine and pleasure craft and marine structure coatings.

Staff added the reduction of toxic emissions to the purpose subdivision of Rule 1106 to be consistent with the primary purpose of the rule amendment; many recent VOC rule amendments focused on prohibiting the use of pCBtF and t-BAc. This addition to the purpose aligns with other recently adopted South Coast AQMD VOC rules that regulate emissions from coatings. No significant revisions were made to this subdivision.

Applicability [Subdivision (b)]

PAR 1106 applies to any person that supplies, sells, offers for sale, markets, manufactures, blends, packages, repackages, possesses, or distributes any marine or pleasure craft and marine structure coating, marine or pleasure craft and marine structure coating component, colorant, or associated solvent for use within the South Coast AQMD, as well as any person who uses, applies, or solicits the use or application of any marine or pleasure craft and marine structure coating, marine or

pleasure craft and marine structure coating component, or associated solvent within the South Coast AQMD.

Staff capitalized defined terms as proper nouns to indicate that definitions for the associated terms can be found in subdivision (c). Revisions were made to the definitions in subdivision (c) and reflected in subdivision (b) to help clarify the interpretation of Marine Coating and what the term “exposure” signifies when applying to a vessel or structure due to potential overlap with other coatings rule such as coatings used in architectural coatings or metal surfaces. Three new definitions were added and modifications of two existing definitions in subdivision (c) are needed to help clarify and align with the original intent of the rule applicability. In subdivision (c), the definitions, Vessel, Marine Vessel, and Appurtenance were added, and the definitions of Pleasure Craft, Pleasure Craft and Marine Structure Coatings and Marine Coatings were modified to align with the three newly added definitions. The change helps clarify when a coating becomes subject to Rule 1106, Rule 1113, or Rule 1107, and helps prevent any rule circumvention. The proposed changes clarify that when a coating is applied to vessels and their appurtenances, docks, navigational aids, buoys, or offshore platforms, it becomes subject to the limits and prohibitions of Rule 1106. Though bridges, elevated piers, coastal homes, and permanently docked ships are near or adjacent to the marine or freshwater environments, coatings used on these structures would not be subject to Rule 1106 and would be considered architectural coatings subject to Rule 1113 since they are stationary structures; this also better aligns with other air districts that do not include structures such as piers in their marine coating rules.

Definitions [Subdivision (c)]

To provide clarity, definitions are used in the proposed amended rule as a proper noun to better distinguish defined terms from common terms. Refer to PAR 1106 for a complete list of definitions. New definitions were added to align with the consolidation of several coating categories and clarify applicability. Consolidated categories are discussed later in subdivision (d).

The following are new and modified definitions for PAR 1106. For all definitions, refer to the preliminary draft of PAR 1106 released with the Staff Report. Accordingly, the following definitions will be added:

APPURTENANCE in paragraph (c)(5), which means:

“a fixed, structural, or semi-permanent attachment or accessory that extends beyond the hull or superstructure of a Vessel. Temporary equipment, including but not limited to, fishing nets, trailers, or portable generators, are not Appurtenances.”

CHEMICAL ABSTRACTS SERVICE REGISTRATION NUMBER or CAS RN in paragraph (c)(7), which means:

“a unique numerical identifier assigned by the Chemical Abstract Service to a single chemical substance to ensure unambiguous identification.”

CLEAR WOOD SEALERS in paragraph (c)(8), which means:

“Coatings containing Resins, but not opaque pigments, which seals wood prior to application of the subsequent Coatings.”

CLEAR WOOD TOPCOATS in paragraph (c)(9), which means:

“a final Coating which contains Resins, but not opaque pigments, and is specifically formulated to form a transparent or translucent solid protective film.”

COATING in paragraph (c)(10), which means:

“a material that is applied to a surface and forms a film in order to beautify, preserve, repair, or protect such a surface.”

COLORANT in paragraph (c)(11), which means:

“a solution of dyes or suspension of pigments sold or supplied as a separate component that an owner or operator of a Facility mixes with Marine Coatings or Pleasure Craft or Marine Structure Coatings on site.”

EXECUTIVE OFFICER in paragraph (c)(13), which means:

“is as defined in Rule 102 – Definition of Terms.”

EXTREME HIGH GLOSS in paragraph (c)(15), which means:

“any Coating that registers a gloss of 95 or greater on a 60 degree (°) meter according to ASTM Test Method D-523 – Standard Test Method for Specular Gloss (ASTM Test Method D-523).”

LOW SOLIDS COATING in paragraph (c)(25), which means:

“a Coating containing one pound or less of solids per gallon of material, where the solids content is determined pursuant to ASTM D 2369 – Standard Test Method for Volatile Content of Coatings.”

MARINE COATING in paragraph (c)(26), which means:

“any Coating applied or intended for application to Marine Vessels, and their Appurtenances, Navigational Aids, or dredges.”

MARINE DECK SEALANT PRIMER in paragraph (c)(27), which means:

“any Primer intended to be applied to a substrate, prior to the application of a sealant, to enhance the bonding surface, which is formulated and labeled to be applied to wooden marine decks.”

MARINE STRUCTURE in paragraph (c)(28), which means:

“a dock or offshore platform.”

MARINE VESSEL in paragraph (c)(29), which means:

“any Vessel that is not a Pleasure Craft.”

MAXIMUM INCREMENTAL REACTIVITY (MIR) in paragraph (c)(30), which means:

“the measure of the photochemical reactivity of a VOC, which estimates the weight of ozone produced from a weight of VOC expressed as gram of ozone per gram of VOC (g O₃/g VOC). MIR for individual VOCs are specified in Title 17, California Code of Regulations, Sections 94700 and 94701.”

NAVIGATIONAL AID in paragraph (c)(32), which means:

“any external device, marker, or guidance equipment, such as a buoy or other U.S. Coast Guard waterway marker, that is used to aid in nautical navigation.”

NAVIGATIONAL AIDS COATING in paragraph (c)(33), which means:

“any Coating applied to a Navigational Aid that is recoated and returned to the water for navigational use.”

PERSON in paragraph (c)(36), which means:

“is as defined in Rule 102.”

PIGMENTED WOOD SEALER in paragraph (c)(37), which means:

“an opaque Coating which contains Resins and colored pigments formulated to hide the wood surface, that is applied prior to the Topcoat to provide a firm bond, level the surface, or seal the wood.”

PIGMENTED WOOD TOPCOAT in paragraph (c)(38), which means:

“a final opaque Coating which contains Resins and colored pigments and is specifically formulated to hide the wood surface and form a solid protective film.”

PLEASURE CRAFT in paragraph (c)(39), which means:

“are Vessels manufactured or operated primarily for recreational purposes, or are leased, rented, or chartered to a Person or business for recreational purposes. Pleasure Craft are also Vessels operated in amusement theme parks solely for the purpose of an amusement park attraction.”

PLEASURE CRAFT AND MARINE STRUCTURE COATING in paragraph (c)(40), which means:

“any coating, applied or intended for application to Pleasure Crafts and their Appurtenances, and Marine Structures.”

PRIMER in paragraph (c)(42), which means:

“any coating specifically formulated, labeled, and applied for the purpose of providing corrosion resistance, adhesion for subsequent coatings, a moisture barrier, or promotes a uniform surface necessary for filling in surface imperfections.”

PRODUCT-WEIGHTED MIR (PW-MIR) in paragraph (c)(43), which means:

“the sum of all weighted-MIR for all ingredients in a coating or material. The PW-MIR is the total product reactivity expressed to hundredths of a gram of ozone formed per gram of product (excluding container and packaging).”

RESIN in paragraph (c)(45), which means:

“a non-volatile polymeric organic material which forms the surface film of a coating.”

SEALANT FOR WIRE-SPRAYED ALUMINUM in paragraph (c)(46), which means:

“a Coating formulated, labeled, and applied to seal pores, voids, and cracks in Wire-Sprayed Aluminum Coatings.”

SOUTH COAST AQMD TEST METHOD in paragraph (c)(49), which means:

“a test method included in the manual “Laboratory Methods of Analysis for Enforcement Samples”, which can be found on the South Coast AQMD website and are referenced in subdivision (h).”

TEAK PRIMER in paragraph (c)(52) was moved to subparagraph (d)(6)(E), which means:

“a Coating applied to teak wood or previously oiled teak wood decks in order to improve the adhesion of a seam sealer.”

THERMOPLASTIC RESIN in paragraph (c)(53), which means:

“a polymer that cures through solvent evaporation and not chemical reaction.”

THERMOPLASTIC FOUL DETERRENT COATING in paragraph (c)(54), which means:

“a Coating formulated with a Thermoplastic Resin, applied to the underwater portion of Vessels to prevent or reduce the attachment of biological organisms without the use of chemical substances such as pesticides or biocides.”

TRANSFER EFFICIENCY in paragraph (c)(56), which means:

“the ratio of the weight or volume of Coating solids that adheres to the object to the total weight or volume, respectively, of Coating solids used in the application process, expressed as a percentage.”

VESSEL in paragraph (c)(58), which means:

“any watercraft exposed to a marine or freshwater environment, including but not limited to, ships, boats, submersibles, or submarines.

WIRE SPRAYED ALUMINUM COATING in paragraph (c)(60), which means:

“a protective molten aluminum coating made by melting and atomizing aluminum wire that is applied to steel substrates to protect from corrosion.”

WOOD COATING in paragraph (c)(61), which means:

“any Coating applied to wood substrates. For the purpose of this rule Wood Coatings includes Clear Wood Sealers, Clear Wood Topcoats, Pigmented Wood Sealers, and Pigmented Wood Topcoats”.

Requirements [Subdivision (d)]

This subdivision contains the provisions for any person that applies any marine or pleasure craft and marine structure coating as part of an operation associated with the manufacture, finishing, refinishing, or maintenance of marine vessels or pleasure craft, their appurtenances, and/or marine structures, and for any person who sells, offers for sale, markets, blends, distributes, packages, repackages, or supplies marine or pleasure craft and marine structure coatings.

Paragraph (d)(1) - PAR 1106 Marine Coatings VOC Content Limits

PAR 1106 establishes VOC content limits for marine coatings by category, as summarized in PAR 1106 Table 1 – Table of Standards for Marine Coatings. The following table provides a summary of the proposed VOC content limits.

Staff is proposing to collapse the antifoulant coating subcategories into a single antifoulant coating category, with a VOC content limit of 400 g/L, the lower limit of the two current subcategories. Doing so would bring the antifoulant coating category and associated VOC content limit in line with the U.S. EPA Control Technique Guidelines (CTG), which does not contain the current substrate-based subcategories, and prevent the rule from being less stringent than the U.S. EPA CTG. The consolidated antifoulant category is also now reclassified as a subcategory of Fouling Deterrent Coatings. Thermoplastic Foul Deterrent Coating is a new subcategory to the Fouling Deterrent Coatings category.

Staff is also proposing to add a primer marine coating category and subcategories into PAR 1106 Table 1. Currently, primers intended for marine application fall under the “Any Other Coating Type” category, while primers intended for pleasure craft application have an established pleasure craft coating category in Table 2 of the rule with differing VOC content limits than the “Any Other Coating Type” category in Table 1. Therefore, the addition of a primer marine coating category and subcategories would reduce confusion regarding applicable VOC content limits for primers.

Pre-Treatment Wash Primers would become a primer subcategory in Table 1 and the VOC content limit will be increased to 780 g/L similar to the VOC limit for pleasure craft in Table 2 of the rule. Pre-Treatment Wash Primers are low-solids coatings that are heavily reliant on exempt compounds

to comply with the existing VOC limit of 420 g/L. Additionally, an alternative PW-MIR limit of 1.80 is provided in Table 4 to provide formulation flexibility. The volume used annually for the category is low and cannot be disclosed due to confidentiality related to the limited number of manufacturers reporting in the survey.

The Topcoat subcategories will be consolidated into a single category in Table 1 for Marine applications while maintaining the lower VOC limit of 340 g/L. The consolidated category will be named “High-Gloss Coating”. This change is to align with U.S. EPA’s CTG which does not include a category for “Extreme High-Gloss Coating.” Similarly, for pleasure craft coatings in Table 2, the Topcoat subcategories will also be consolidated into a single category while retaining the lower limit of 420 g/L. The future effective date of the limit will be January 1, 2029, providing time for coating manufacturers to reformulate. The proposed date is based on industry feedback that a three-year period is needed for product reformulation. The 340 g/L effective date can be found in Table 5 – Subsumed Categories and Timelines in the rule under category sunset effective date column.

Based on the future effective phase out dates, marine coatings will be prohibited from containing pCBtF or t-BAc.

Table 3-1: Summary of Marine Coating VOC Content Limits

Marine Coating Category	Regulatory VOC Content Limits (g/L Coating)	
	Baked Coatings	Air Dried Coatings
Antenna Coating		340
Fouling Deterrent Coatings:		
Antifoulant Coating		400
Thermoplastic Foul Deterrent Coating		400
Inorganic Zinc Coating		340
Low Activation Interior Coating		420
Mist Coating		610
Navigational Aids Coating		340
Nonskid Coating		340
Organic Zinc Coating		340
Undercoaters:		
Primer	275	340
Pre-Treatment Wash Primer		780
Repair and Maintenance Thermoplastic Coating		340
Sealant for Wire-Sprayed Aluminum Coatings		610
Special Marking Coating		420
Specialty Coatings:		
Heat Resistant Coating	360	420
High Temperature Coating		500
Tack Coating		610
Topcoats:		
High Gloss Coating	275	340
Undersea Weapons Systems Coating	275	340
Any Other Coating Type	275	340

Staff moved the restrictions on the possession, sale, and use of marine coatings that contain VOC in excess of applicable limits, from subdivision (e) to paragraph (d)(1), preceding Table 1, to be consistent with recently amended VOC rule formatting and to streamline the rule language.

Paragraph (d)(2) – PAR 1106 Pleasure Craft and Marine Structure Coating VOC Content Limits

PAR 1106 establishes VOC content limits for pleasure craft and marine structure coatings by category, as summarized in PAR 1106 Table 2 – Table of Standards for Pleasure Craft and Marine Structure Coatings.

Similar to Table 1 for Marine Coatings, staff is proposing to collapse the antifoulant coating subcategories into a single antifoulant coating category, with a VOC content limit of 330 g/L, the lower limit of the two current subcategories. The consolidated antifoulant category is also now reclassified as a subcategory of Fouling Deterrent Coatings. Thermoplastic Foul Deterrent Coating is a new subcategory to the Fouling Deterrent Coatings category to reflect the newest type of antifoulant coating coming into the market.

Similar to Table 1, staff is also proposing to convert the Primer pleasure craft and marine structure coating category into a subcategory of a new Undercoaters category. Pre-treatment wash primers would also become a Primer subcategory and provide an alternative PW-MIR limit of 1.80 which can be found in Table 4 of the rule; the alternative limit will provide formulation flexibility to manufacturers. The volume used annually for the category is low and not disclosed due to confidentiality related to the limited number of manufacturers reporting in the survey. Additionally, Marine Deck Primers and Teak Primers are now classified as part of the updated Wood Coatings category in Table 2 of the rule. Wood Coatings are now classified as either clear or pigmented and as an undercoat (sealer) or topcoat. Marine Deck Primers and Teak Primers are two types of coatings traditionally used as an undercoat or sealer on wood substrates, so if it pigmented, it would fall under the subcategory of Pigmented Wood Sealers. Similarly, existing Sealers and Varnishes would be consolidated with the new clear or pigmented Sealers and Topcoats subcategories. The categorization depends on if the coatings are pigmented or non-pigmented and coatings will be categorized as Sealers if they are specified to be applied to bare wood, requiring a subsequent coat and as a Topcoat if they are specified to be the final coating on a wood substrate. This proposed change aligns with the wood coating categories found in Rule 1136 – Wood Coating Operations.

Table 3-2: Summary of Pleasure Craft and Marine Structure Coating VOC Content Limits

Pleasure Craft and Marine Structure Coating Category	Regulatory VOC Content Limits (g/L Coating)	
	Current Limit	Limit Effective 1/1/2029
Fouling Deterrent Coatings:		
Antifoulant Coating	330	
Thermoplastic Foul Deterrent Coating	400	
Wood Coatings:		
Clear Wood Sealer	550	275
Pigmented Wood Sealer	550	275
Clear Wood Topcoat	490	275
Pigmented Wood Topcoat	490	275
Undercoaters:		
Primer	340	
Pretreatment Wash Primer	780	
Topcoats:		
High Gloss Coating	420	
Any Other Coating Type	420	340

Staff moved the restrictions on the possession, sale, and use of pleasure craft and marine structure coatings that contain VOC in excess of applicable limits, from subdivision (e) to paragraph (d)(2), preceding Table 2, to be consistent with recently amended VOC rule formatting and to streamline the rule language.

Paragraph (d)(3) – PAR 1106 Low-Solids Coatings VOC Content Limit

Staff moved the restrictions on the possession, sale, and use of low-solids marine and pleasure craft coatings that contain VOC in excess of applicable limits, from subdivision (e) to paragraph (d)(3), preceding Table 3, to be consistent with recently amended VOC rule formatting and to streamline the rule language.

Paragraph (d)(4) – Alternative PW-MIR VOC Content Limits

To help facilitate the transition away from toxic solvents and provide formulation flexibility for challenging categories, an alternative reactivity-based PW-MIR limit is being provided to manufacturers of marine and pleasure craft and marine structure coatings. The alternative PW-MIR limits in Table 4 of the rule become effective upon rule adoption and manufacturers may elect to comply with the PW-MIR limits rather than the VOC content limits in Table 1 or Table 2 of the rule. The alternative PW-MIR limits provided in Table 4 of the rule are consistent with the alternative PW-MIR limits for similar categories in other South Coast AQMD rules.

Table 3-3: Alternative PW-MIR VOC Content Limits

Coating Category	Current Limit
Pretreatment Wash Primers	1.80
Wood Coatings:	
Clear Wood Sealer	0.53
Pigmented Wood Sealer	0.60
Clear Wood Topcoat	0.53
Pigmented Wood Topcoat	0.46

Paragraph (d)(5) – Sell-Through and Use-Through Provisions for Future Effective VOC Limit Reductions

This provision allows coatings that are subject to a future effective VOC content limit lower than the current applicable limit to continue to be sold and used for respective periods of 12 and 24 months after the applicable future effective date, as long as they were manufactured prior to the applicable future effective date.

Paragraph (d)(6) – Subsumed Coating Categories

This provision specifies marine and pleasure craft and marine structure coating categories that were consolidated into new categories, and that they may continue to be possessed, stored at a worksite, applied or solicited for use in the South Coast AQMD if it has a VOC content of less than or equal to the applicable Current Regulatory VOC Content Limit (g/L-Coating) in Table 3-4 below.

Paragraph (d)(7) – Sell through and Use Through Provisions for Subsumed Coating Categories

This provision allows coatings that were consolidated into new categories, and which are now subject to a lower VOC content limit in Table 1 or Table 2, to be sold for up to 12 months and used up to 24 months after the applicable effective date. The coatings can be sold at the higher original VOC limit prior to consolidation and cannot be higher than the original VOC limit. This provision contains an added table for additional clarity, which lists each coating being proposed to be consolidated, its former applicable VOC content limit and the period during which that VOC content limit will remain effective, the proposed new consolidated coating category, sell-through and use-through periods, and the date on which the proposed VOC content limits for the consolidated coating category would become effective.

Table 3-4: Former Coating Categories and Schedule

Former Coating Category	Consolidated Coating Category	Former VOC Limit Effective Until January 1, 2029 (g/L-Coating) ¹	Sell-Through End Date ²	Use-Through End Date ²	Consolidated Category VOC Limit Effective on and after January 1, 2029 (g/L-Coating) ²
Marine Coatings					
Antifoulant Coatings for Aluminum Substrates	Antifoulant Coatings	560	January 1, 2030	January 1, 2031	400
Extreme High Gloss Coating	High Gloss Coating	420			340
Pleasure Craft and Marine Structure Coatings					
Antifoulant Coatings for Aluminum Substrates	Antifoulant Coatings	560	January 1, 2030	January 1, 2031	400
Extreme High Gloss Coating	High Gloss Coating	490			420
Finish Primer/Surfacer	Primers	420			340
Marine Deck Sealant Primer	Clear or Pigmented Wood Sealers	760			275
Teak Primer		775			
Sealers		550			
Varnishes	Clear or Pigmented Wood Topcoats	490			275

Paragraph (d)(8) – Most Restrictive VOC Limit

This subdivision specifies that if a marine coating meets the definition of, is recommended for use, or is suitable for use for more than one marine coating category, then the more restrictive VOC content limit in Table 1 shall apply. The subdivision also specifies that if a pleasure craft and marine structure coating meets the definition of, is recommended for use, or is suitable for use for more than one pleasure craft and marine structure coating category, then the more restrictive VOC content limit in Table 2 shall apply.

Paragraph (d)(9) – Application Equipment Transfer Efficiency

Staff reformatted the coating application transfer equipment requirements to be consistent with recently amended VOC rule formatting and streamline the rule language.

Alternative Compliance Options [Subdivision (e)]

This subdivision contains the provisions for any person that chooses to comply with the provisions of paragraphs (d)(1), (d)(2), (d)(3), and/or (d)(6) by using an approved alternative emission control plan.

This subdivision also outlines and specifies the requirements for any marine and/or pleasure craft and marine structure coating supplier of coatings to any facility using an approved alternative emission control plan pursuant to requirements in Rule 108 – Alternative Emissions Control Plan.

Prohibition of Possession, Specification and Sale [Subdivision (f)]

This subdivision contains the prohibitions that no person shall apply, possess, solicit the use or application of, supply, sell, offer for sale, market, blend, package, repackage or distribute marine coatings, pleasure craft and marine structure coatings, or colorants for use within the South Coast AQMD that contain toxic chemicals or compounds that can be detrimental to human health.

Paragraph (f)(1) – Exempt Compounds

Paragraph (f)(1) was restructured to streamline the rule and group all provisions that include prohibitions together in the same subdivision.

Original paragraph (d)(7) prohibits the manufacturing of regulated products for use in South Coast AQMD in which cadmium, nickel, lead, or hexavalent chromium is introduced as a pigment or as an agent to impart any property or characteristic of a marine or pleasure craft coating, while paragraph (d)(6) prohibits the use of any marine or pleasure craft coating that contain any Group II exempt compounds other than cyclic, branched, or linear, completely methylated siloxanes (VMS).

The original paragraphs (d)(6) and (d)(7) of Rule 1106 have been restructured, combined, and respectively relocated to paragraph (f)(1) and (f)(3) of PAR 1106. The amended language includes a prohibition for VMS, but at higher concentration limit of 0.1 percent to account for potential trace levels of VMS in certain coatings. VMS are found in small, but non-negligible, amounts in some silicone-based coatings. Staff is not aware of any coatings subject to Rule 1106 that are currently formulated with VMS; therefore, the prohibition will go into effect upon rule adoption.

The prohibition of the manufacturing, supplying, selling, marketing, blending, distribution, packaging, and repackaging of coatings and colorants in which cadmium, nickel, lead, or

hexavalent chromium is introduced as a pigment or as an agent to impart any property or characteristic of a marine coating, pleasure craft and marine structure coating, or colorant intended for use within South Coast AQMD was moved to its own paragraph.

In addition, PAR 1106 prohibits the use of marine and pleasure craft coatings that contain pCBtF or t-BAc, with an upper concentration limit of 0.01 weight percent effective on the prohibition dates listed in Table 3-5 below for the respective categories.

Paragraph (f)(2) – Sell-Through and Use-Through Provision

Paragraph (f)(2) clarifies the periods in which marine coatings, pleasure craft and marine structure coatings, and colorants that contain pCBtF or t-BAc, and that were manufactured prior to the applicable prohibition effective date listed in Table 3-5, can continue to be sold and used. The sell-through and use-through periods are intended to prevent stranded assets of marine coatings, pleasure craft and marine structure coatings, and colorants that are already in the supply chain on the prohibition effective date, and allow time to transition and reformulate away from pCBtF and t-BAc.

Manufacturers can continue to sell and use marine coatings, pleasure craft coatings, and colorants containing pCBtF and t-BAc manufactured prior to the applicable prohibition effective date within the South Coast AQMD until the applicable sell-through and use through end date listed.

The following table provides a summary of the proposed prohibition effective date and sell-through and use-through dates.

Table 3-5: pCBtF and t-BAc Prohibition Timelines

Category	Prohibition Effective Date	Sell-Through End Date	Use-Through End Date
Antifoulant Coatings	January 1, 2031	January 1, 2032	January 1, 2033
Colorants and Wood Coatings	January 1, 2030	January 1, 2031	January 1, 2032
Primers	June 1, 2027	June 1, 2028	June 1, 2029
All Other Coating Categories	January 1, 2028	January 1, 2029	January 1, 2030

PAR 1106 includes a longer phase-out period for antifoulant coatings for both marine and pleasure craft application to allow for any additional time that may be needed to obtain any potential new pesticide registration required by the U.S. EPA and California Department of Pesticide Regulation.

Paragraph (f)(3) – Carcinogenic Materials

Paragraph (f)(3) prohibits the manufacturing, supplying, selling, marketing, blending, distribution, packaging, and repackaging of coatings and colorants in which cadmium, nickel, lead, or hexavalent chromium is introduced as a pigment or as an agent to impart any property or characteristic of a marine coating, pleasure craft and marine structure coating, or colorant intended for use within South Coast AQMD. These prohibitions were moved to their own standalone paragraph.

Administrative and Recordkeeping Requirements [Subdivision (g)]

Subdivision (g) outlines recordkeeping requirements pursuant to Rule 109 – Recordkeeping for Volatile Organic Compound Emissions for any person who supplies for use or uses marine coatings and pleasure craft and marine structure coatings within South Coast AQMD.

Staff added basic recordkeeping criteria for rule enforceability purposes. The added criteria is not required in Rule 109 daily recordkeeping requirements and would therefore close a regulatory gap.

Subdivision (g) also outlines proposed labeling requirements pursuant to Rule 443.1 – Labeling of Materials Containing Organic Solvents added for manufacturers of marine coatings and pleasure craft and marine structure coatings for use within South Coast AQMD. Staff added additional basic labeling requirements for rule enforceability purposes.

Paragraph (g)(1) – Recordkeeping Requirements

Paragraph (g)(1) specifies the information and documentation to be maintained for each marine coating, pleasure craft and marine structure coating, and colorant used.

Staff added basic recordkeeping criteria for rule enforceability purposes. The added criteria is not required in Rule 109 daily recordkeeping requirements and would therefore close a regulatory gap.

The documents must be made available upon request and maintained for two years with the following information: Product name and manufacturer, applicable coating category, whether the product is intended for Marine or Pleasure Craft use, or both, or Marine Structure use, and purchase records.

Subparagraphs (g)(2)(A), (g)(2)(B), and (g)(2)(C) – Labeling Requirements

Subparagraphs (g)(2)(A), (g)(2)(B), and (g)(2)(C) specify the information required to be included on product labels for marine coatings, pleasure craft and marine structure coatings, and colorants sold for use within South Coast AQMD. Information required to be included on product labels includes product manufacture date, applicable coating category, and application type. This ensures that product information necessary for compliance determination is readily available.

Staff added basic labeling criteria for rule enforceability purposes. The added criteria is not required in Rule 443.1 labeling requirements and would therefore close a regulatory gap.

Subparagraph (g)(2)(D) – PW-MIR Labeling Requirements

Subparagraph (g)(2)(D) requires any manufacturer of a pretreatment wash primer or wood coating who elects to comply with the PW-MIR limit in paragraph (d)(4) in lieu of mass limit in grams of VOC per liter in paragraph (d)(4), shall display the PW-MIR VOC content on the product label.

Test Methods [Subdivision (h)]

This provision specifies the approved test methods for determining the VOC content of marine coatings and pleasure craft and marine structure coatings, amounts of exempt perfluorocarbon compounds in marine coatings and pleasure craft and marine structure coatings, metal content of marine and pleasure craft coatings, acid content of pretreatment wash primers, gloss determination of marine coatings and pleasure craft and marine structure coatings, viscosity determination of marine coatings and pleasure craft and marine structure coatings, and transfer efficiency of alternative marine coatings and pleasure craft marine structure coatings application methods.

Minor changes to the subdivision include restructuring and re-numbering for streamlining purposes, and the correction of a referenced test method name.

Staff added a paragraph outlining the required approval for equivalent test methods to those listed in subdivision (h).

Paragraph (h)(8) – Viscosity Determination

Paragraph (h)(8) specifies the approved test methods for determining the viscosity of marine coating and/or pleasure craft and marine structure coating. The test method is to clarify how a manufacturer would demonstrate their coating qualified for the transfer efficiency requirement in paragraph (j)(3).

Paragraph (h)(10) – Equivalent Test Methods

Paragraph (h)(8) specifies the regulatory bodies whose approval is required in addition to the South Coast AQMD Executive Officer before the use of any equivalent test method to those listed in subdivision (h).

Rule 442 Applicability [Subdivision (i)]

Subdivision (i) specifies that any marine coating or pleasure craft and marine structure coating that is exempt pursuant to subdivision (j) from all or a portion of the VOC limits of subdivision (d) shall comply with Rule 442 – Usage of Solvents. This subdivision was not changed other than to capitalize defined terms and amend a reference that changed.

Exemptions [Subdivision (j)]

This subdivision provides conditional exemptions to various provisions of PAR 1106. Staff reformatted and streamlined existing exemptions to be consistent with formatting of other recently adopted rules and proposed additional conditional exemptions to various provisions of PAR 1106.

Subparagraph (j)(2)(B) – Spot Repairs

Subparagraph (j)(2)(B) specifies any marine coating or pleasure craft and marine structure coating that is supplied, sold, offered for sale, marketed, manufactured, blended, packaged, or repackaged for use within the South Coast AQMD in half-pint or smaller containers used to cover minor imperfections or mechanical damage incurred prior to initial use is not subject to the provisions of paragraphs (d)(1), (d)(2), (d)(3), and (d)(6). The purpose of this exemption is to replace the current exemption which exempts any volume of touch-up coatings used, as previously defined, and provide a narrower exemption that only applies to small amounts of marine coatings and pleasure craft and marine structure coatings used for small surface areas of coating application.

Subparagraph (j)(2)(C) – Research and Development Exemption

Subparagraph (j)(2)(C) specifies that the provisions of paragraphs (d)(1), (d)(2), (d)(3), and (d)(6) do not apply to laboratories that apply materials to test specimens for purposes of research, development, quality control, or testing related to production operations. This exemption was added to address industry concerns related to ongoing research activities.

Subparagraph (j)(4)(B) – Unsaturated Polyester Resin or Fiberglass Coatings

Subparagraph (j)(4)(B) specifies that the provisions of PAR 1106 do not apply to unsaturated polyester resin or fiberglass coatings. These coatings are subject to Rule 1162 – Polyester Resin Operations. These coatings are currently exempted by the defined terms of marine coating and pleasure craft coating.

Subparagraph (j)(4)(C) – Coatings Applied to Piers, Bridges, and Permanently Docked Vessels

Subparagraph (j)(4)(C) specifies that the provisions of PAR 1106 do not apply to coatings applied to piers and bridges. These coatings are subject to Rule 1113 – Architectural Coatings. Staff removed language including coatings applied to piers and bridges from the definition of marine coating for clarity and consistency with the U.S. EPA CTG and past South Coast AQMD compliance advisories issued by staff.

Subparagraph (j)(4)(C) also specifies that the provisions of PAR 1106 do not apply to coatings applied to the above-waterline portions of permanently docked vessels that are serving as a stationary business. These coatings are subject to Rule 1113 – Architectural Coatings. To clarify, this exemption shall not apply to any fouling deterrent coatings, as defined, or any additional associated coatings necessary to apply a fouling deterrent coating. Staff added this exemption for clarity and consistency with other California air district rules.

Paragraph (j)(5) – Prohibition of Possession and Repackaging Exemption

Paragraph (j)(5) clarifies that the prohibitions of possessing and repackaging marine coatings and pleasure craft and marine structure coatings in paragraphs (d)(1), (d)(2), (d)(3), (d)(6), and (f)(1) do not apply to marine coatings and pleasure craft and marine structure coatings that are shipped into the South Coast AQMD solely for reformulation or repackaging for sale and use outside the District, or that are temporarily stored at a facility and clearly marked for use outside South Coast

AQMD jurisdiction. This clarification addresses concerns regarding the treatment of in-transit materials.

CHAPTER 4: IMPACT ASSESSMENT

EMISSIONS IMPACT

COST-EFFECTIVENESS AND INCREMENTAL COST-EFFECTIVENESS

SOCIOECONOMIC IMPACT ASSESSMENT

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

COMPARATIVE ANALYSIS

Emission Impacts

To estimate the VOC emissions inventory for PAR 1106, staff relied on the manufacturer submitted survey and reviewed the Standard Industrial Classification (SIC) codes and Emissions Inventory Categories (EIC) codes related to marine and pleasure craft coating operations within South Coast AQMD and included in the emission inventory for facilities within South Coast AQMD. Three SIC facility types were evaluated: boat building and repairing facilities, marina boatyard facilities, and boat dealership facilities, while the EIC codes used are associated with emissions from marine coatings and related process solvents. The facilities evaluated are primarily engaged in building and repairing boats, operating marinas, performing incidental repairs, and transportation. Staff then ran a query of Annual Emissions Reporting (AER) SIP inventory for compliance year 2025 using the SIC and EIC codes. Based on the evaluation, PAR 1106 area sources account for approximately 0.142 tons per day. To adjust for the potentially underreported coating volumes, staff adjusted the manufacturer survey emissions by a factor of three to help obtain a more accurate emissions reductions estimate. The following table shows the estimated emissions for each marine coating category and percentage of Total VOC emissions.

Table 4-1: Coating Category Percentage of Total Emissions and Adjusted Estimated VOC Annual Emissions

Category	Coating Category Percentage of Total VOC Emissions	Adjusted Estimated VOC Annual Emissions (lbs)
Aluminum	5	~1,800
Non-Aluminum	55	~18,000
Finish Primer/Surfacer	20	~8,000
High-Build Primer/Surfacer	6	~1,900
High-Gloss Topcoat	3	~1,000
Clear Wood Varnish	4	~1,200
Other Coating Categories	5	~1,600

Control Technology

Compliance with PAR 1106 is expected to be met through manufacturers reformulating regulated products by substituting certain chemicals with other chemicals that contain less VOCs and less or no toxic compounds. Coating manufacturers will have flexibility to use any compliant alternative reformulation to meet the VOC content limits in PAR 1106. Some end-users may comply with the rule using alternative options such as control devices (e.g., emission collection systems or thermal oxidizer). The latter options may be cost prohibitive for most facilities, so it is

anticipated that most will comply with existing and proposed new VOC limits with existing products or commercially available replacement products.

Emission Reductions

Based on the technology assessment, which includes staff discussions with stakeholders and analyzing the South Coast AQMD marine and pleasure craft coating manufacturer survey data as well as product data sheets, staff is proposing updated VOC content limits for two existing marine coating categories, one proposed new marine coating category, eight existing pleasure craft coatings categories, and one proposed new pleasure craft coating category. Staff is proposing an effective date of January 1, 2029, for all updated VOC content limits to provide the necessary time to reformulate these coatings to meet the proposed updated VOC content limits. The estimated emission reductions for PAR 1106 are approximately 23.9 pounds per day. Staff does not anticipate a VOC emissions increase or impact from raising the VOC limit for the pretreatment wash primer category. No pretreatment wash primers were reported in the manufacturer submitted survey. The VOC limit was raised to align with other recently adopted South Coast AQMD rules and U.S. EPA CTG for the coating category. The raising of the VOC limit also ensures pCBtF and t-BAC free formulations are not introduced into the region. The following table highlights the proposed emission reductions or impacts from the proposed restructuring and changes to the VOC content limits and coating category consolidation.

Table 4-2 –Emissions Impact and Reduction

Category	Current VOC Limit (g/L-Regulatory)	Proposed VOC Limit (g/L-Regulatory)	Emissions Impact (pounds per day)
Antifoulant Coatings (Marine)	560	400	0
Aluminum Substrate Antifoulant Coatings (Pleasure Craft)	560	330	(1.47)
Primers (Pleasure Craft and Marine Structure)	420/760	340	(17.11)
Extreme High Gloss Coating (Pleasure Craft and Marine Structure)	490	420	(0.80)
Extreme High Gloss Coating (Marine)	340	340	0
Clear/Pigmented Wood Sealers	550	275	(0.8)
Clear/Pigmented Wood Topcoats	490	275	(3.78)
Any Other Coating Type (Pleasure Craft and Marine Structure)	420	340	0
Overall Emission Reduction	23.9 pounds per day		

Cost-Effectiveness and Incremental Cost-Effectiveness

Cost-Effectiveness

Staff gathered costs from various sources which included meetings with manufacturers, online research, and product surveys. Certain coating categories such as the wood coatings will have their limits changed to align with the VOC limits and alternative MIR limits for similar wood coating categories in Rule 1136. For categories where costs are not available, staff assumed a ten percent increase in cost to account for reformulation costs. This difference in cost is used in the cost-effectiveness analysis.

Table 4-3: Reformulation Unit Cost of Updated Categories for Marine and Pleasure Craft and Marine Structure Coatings

Category	Current VOC Limit (g/L-Regulatory)	Proposed VOC Limit (g/L-Regulatory)	Cost-Effectiveness (\$ per ton)	Reformulation Cost Increase Per Gallon (\$/gal)
Antifoulant Coatings (Marine)	560	400	RACT	Currently Available
Antifoulant Coatings (Pleasure Craft)	560	330	\$0	\$20
Primers (Pleasure Craft)	420/760	340	\$0	\$7-10
Extreme High Gloss Coating (Marine)	420	340	\$0	\$0
Extreme High Gloss Coating (Pleasure Craft)	490	420		\$9-10
Clear/Pigmented Wood Sealers	550	275	\$0	\$8-11
Clear/Pigmented Wood Topcoats	490	275	\$0	\$11-14
Any Other Coating Type (Pleasure Craft)	420	340	\$0	N/A ¹

1. Staff not aware of any pleasure craft coating which fall into category “Any Other Coating Type”

Despite these reformulation costs, staff identified lower-VOC products that comply with the proposed lower VOC limits and are comparable in performance to products currently complying with existing VOC limits. In addition, the costs of the lower VOC comparable products are typically lower than the higher VOC products, therefore, staff expects the overall reformulation cost associated with PAR 1106 to have minimal impacts.

Socioeconomic Impact Assessment

A socioeconomic impact assessment will be conducted and released for public review and comment at least 30 days prior to the South Coast AQMD Governing Board Hearing for PAR 1106, which is scheduled for November 6, 2026 (subject to change).

California Environmental Quality Act (CEQA)

Pursuant to CEQA and South Coast AQMD's certified regulatory program (Public Resources Code Section 21080.5, CEQA Guidelines Section 15251(l), and South Coast AQMD Rule 110), the South Coast AQMD, as lead agency, is currently reviewing the proposed project (PAR 1106) to determine if it will result in any potential adverse environmental impacts. Appropriate CEQA documentation will be prepared based on the analysis.

Draft Findings Under the Health and Safety Code

Health and Safety Code Section 40727 requires that prior to adopting, amending, or repealing a rule or regulation, the South Coast AQMD Governing Board shall make findings of necessity, authority, clarity, consistency, nonduplication, and reference, as defined in that section, based on relevant information presented at the Public Hearing, this written analysis, and the rulemaking record. The draft findings are as follows:

Necessity – PAR 1106 is needed to phase out two exempt compounds, pCBtF and t-BAC, to address their toxic risk as by proposed by 2022 AQMP Control Measure CTS-01.

Authority - The South Coast AQMD Governing Board obtains its authority to adopt, amend, or repeal rules and regulations from Health and Safety Code Sections 39002, 40000, 40001, 40440, 40441, 40702, 40725 through 40728.5, 40920.6, and 41508.

Clarity - PAR 1106 is written and displayed so that the meaning can be easily understood by persons directly affected by it.

Consistency - PAR 1106 is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or federal and state regulations.

Nonduplication - PAR 1106 does not impose the same requirement as any existing state or federal regulation, and the proposed amendments are necessary and proper to execute the powers and duties granted to, and imposed upon, the South Coast AQMD.

Reference - In amending Rule 1106, the South Coast AQMD Governing Board references the following statutes which the South Coast AQMD hereby implements, interprets, or makes specific: Health and Safety Code Sections 39002, 40000, 40001, 40406, 40702, 40440(a), 40725 through 40728.5, 40920.6, 41508 and federal Clean Air Act Sections 110, 172, and 182(e).

Comparative Analysis

Under Health and Safety Code Section 40727.2, the South Coast AQMD is required to perform a comparative analysis when adopting, amending, or repealing a rule or regulation. The comparative analysis is relative to existing federal requirements and existing or proposed South Coast AQMD rules and air pollution control requirements and guidelines which are applicable to VOC regulations for marine and pleasure craft coating operations. A comparative analysis will be prepared and released at least 30 days prior to the South Coast AQMD Governing Board Hearing on PAR 1106, which is anticipated to be heard on November 6, 2026.