

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Preliminary Draft Staff Report

Proposed Rule 1495 – Commodity Fumigation

September 2026

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
Mike Morris

Author: Areio Soltani – Program Supervisor (WOC)

Contributors:

Jason Aspell – Deputy Executive Officer
Chelsie Ceballos – Senior Air Quality (AQ)
Engineer
Ranil Dhammapala, Ph.D. – Senior
Meteorologist
Scott Epstein, Ph.D. – Planning and Rules
Manager
Alberto Jasso – Program Supervisor
Shannon Lee, P.E. – Senior AQ Engineering
Manager
Jason Low, Ph.D. – Deputy Executive
Officer
Kevin Ni – Program Supervisor
David Ono – Senior AQ Engineering
Manager

Olga Pikelnaya, Ph.D. – Implementation
Manager
Barbara Radlein – Planning and Rules
Manager
Amanda Sanders – Senior Enforcement
Manager
Nico Schulte, Ph.D. – Program Supervisor
William Senga – Air Quality Specialist
Vanessa Tanik – Program Supervisor
Xian-Liang (Tony) Tian, Ph.D. – Program
Supervisor
Monna Trinh – Principal AQ Chemist
Victor Yip – Assistant Deputy Executive
Officer
Yifan Yu – Program Supervisor

Reviewed By: Karin Manwaring – Senior Deputy District Counsel
Charlene Nguyen, Ph.D. – Program Supervisor
Isabelle Shine – Program Supervisor

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WAYNE NASTRI

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EXECUTIVE SUMMARY

Proposed Rule 1495 (PR 1495) will reduce toxic air contaminant (TAC) emissions associated with commodity fumigation. Commodity fumigation is the process of using a gaseous pesticide in an enclosed area to eradicate one or more target pests from goods such as fresh fruits and vegetables like table grapes, raw materials such as timber, or finished products like flooring, furniture, or automobiles. The purpose of commodity fumigation is to ensure the food or product is safe to eat or use and to protect markets from foreign pests spreading through a domestic industry.

Rule development for PR 1495 was initiated due to findings from ambient air monitoring of the commodity fumigant methyl bromide in the West Long Beach area. Finalized in 2021, the Multiple Air Toxics Exposure Study V (MATES V) West Long Beach monitoring site detected elevated levels of methyl bromide relative to the other monitoring sites. In 2023, the California Air Resources Board (CARB) began special air monitoring at the urging of a local community activist, the late Jesse Marquez. CARB special air monitoring confirmed elevated levels of methyl bromide during the spring months, when commodity fumigation activity is at its highest. In January 2025, facilities near the CARB special monitoring site agreed to additional permit conditions that were effective at reducing ambient methyl bromide concentrations by as much as 65%, as confirmed by special monitoring.

PR 1495 will protect public health from commodity fumigation by ensuring facilities operate at an acute and chronic hazard index (HI) less than one by establishing emission limits, identifying best management practices effective for all fumigants, and implementing source testing and parametric monitoring requirements for air pollution capture and control equipment. PR 1495 is expected to impact the 22 facilities reporting recent usage of fumigants in the South Coast AQMD jurisdiction. One-time capital costs associated with PR 1495 are projected to be \$342,000 combined for all facilities with annual recurring costs of \$20,000 per year.

PR 1495 was developed through a public process. Three (3) Working Group Meetings were held on January 8, 2026, May 14, 2026, and July 31, 2026. A Public Workshop will be held on October 1, 2026.

CHAPTER 1: BACKGROUND

INTRODUCTION

WEST LONG BEACH INVESTIGATION

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FUMIGANTS IDENTIFIED AS TACS

PUBLIC PROCESS

INTRODUCTION

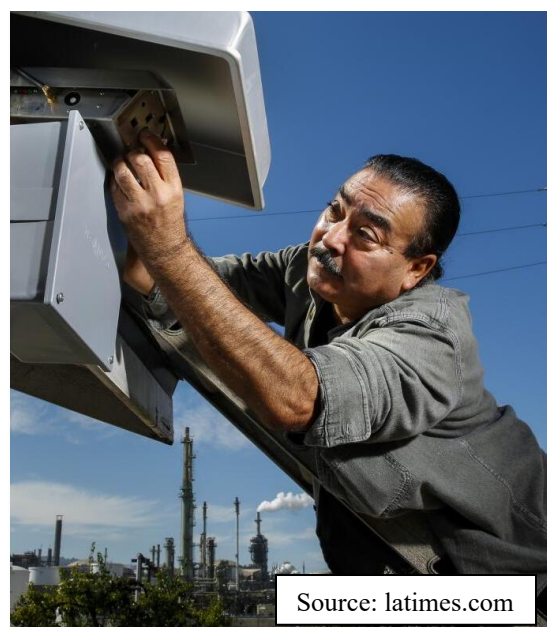
Proposed Rule 1495 (PR 1495) will reduce toxic air contaminant (TAC) emissions associated with commodity fumigation. This action was triggered by findings from ambient monitoring of the fumigant methyl bromide in the West Long Beach area. PR 1495 is expected to impact 22 commodity fumigation facilities with recent activity in South Coast AQMD that hold active Restricted Material Permits (RMPs) with their local County Agricultural Commissioner (CAC).

WEST LONG BEACH INVESTIGATION

The first ambient air monitoring of a commodity fumigant in South Coast AQMD was for monitoring and evaluating methyl bromide (bromomethane) as part of the Multiple Air Toxics Exposure Study V (MATES V), conducted at 10 monitoring locations throughout the South Coast Air Basin. Methyl bromide is a TAC not previously studied under MATES I through IV. Under MATES V, methyl bromide was studied at all 10 locations and methyl bromide concentrations at West Long Beach were identified to be substantially higher than all other monitoring stations but at levels less than pre-established health risk thresholds.¹ The Final MATES V Report, approved by the South Coast AQMD Governing Board in 2021 and broadly disseminated to the public, noted that there was a commodity fumigation facility located a few hundred feet to the west of the West Long Beach MATES station and that localized emissions could have influenced the ambient concentration of methyl bromide.

Following the release of the MATES V Report, the elevated measurement of methyl bromide at the West Long Beach monitoring station drew the attention of local community activist Jesse Marquez, who urged air quality regulators to investigate the source(s) of ambient methyl bromide concentrations in the West Long Beach area. In 2023, the California Air Resources Board (CARB) began special air monitoring using a continuous real-time ambient air monitor capable of providing hourly average concentrations of methyl bromide.² This was a novel application of automated gas chromatography (GC), or auto GC. Under MATES V, ambient air samples were collected over 24-hour time periods, then later analyzed with GC in laboratory settings, providing validated daily data weeks or months later. Using auto GC, data was rapidly produced on an hourly basis, providing the ability to compare ambient levels against facility operations.

Figure 1 - Jesse Marquez, Local Community Activist



¹ <https://www.aqmd.gov/docs/default-source/planning/mates-v/mates-v-final-report-9-24-21.pdf>

² <https://ww2.arb.ca.gov/capp/cst/ch2/wcwlb/methyl-bromide>

Figure 2 - West Long Beach Monitoring



CARB monitored ambient methyl bromide concentrations in West Long Beach for approximately one year to validate the data and the technology. The monitoring detected elevated levels of methyl bromide during the spring months, when commodity fumigation activity is at its highest. Fresh fruit from South America, particularly table grapes, account for the bulk of commodity fumigation and are imported primarily from late January through May³. In 2024, CARB convened an interagency working group which included the South Coast AQMD to assess the potential risk to the community and address sources of methyl bromide. In January 2025, CARB hosted a public meeting to brief the community⁴ and South Coast AQMD hosted a follow-up meeting in March 2025.⁵

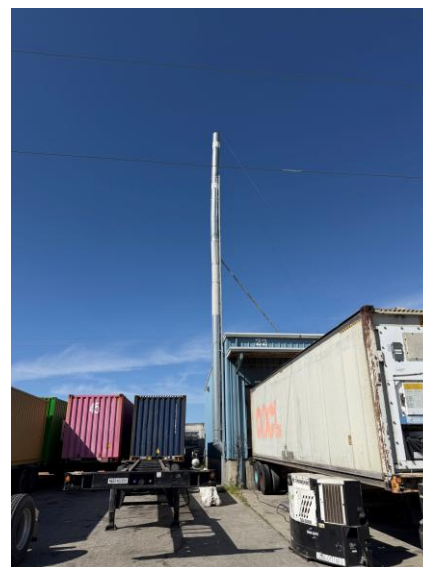
In January 2025, two facilities located nearest to the CARB monitoring site agreed to additional conditions in their RMPs

issued by the Los Angeles CAC to reduce ambient methyl bromide concentrations in the West Long Beach area. Those changes included: 1) raising their stack heights from 10 feet above the height of the roof to at least 50 feet above ground level; and 2) ensuring that there was not concurrent methyl bromide aeration at the two (2) facilities. A case study⁶ of the ambient air monitoring results before and after these changes were implemented confirmed that they were effective in reducing ambient methyl bromide concentrations by as much as 65%. Also in May 2025, CARB transferred the primary responsibilities for conducting monitoring and reporting data at the West Long Beach special monitoring station to South Coast AQMD.⁷

PROCESS DESCRIPTION

Commodity fumigation is the process of using a gaseous pesticide in an enclosed area to eradicate one or more target pests from goods. Goods can include fresh fruits and vegetables, raw materials like timber, finished products such as bamboo flooring, mattresses, or furniture, or even highly complex traded goods like automobiles. The purpose of commodity fumigation is to ensure the food or product is safe to eat or use and to protect markets from foreign

Figure 3 - Raised Emission Stack



³ <https://www.freshfruitportal.com/news/2025/08/05/california-table-grapes-trends/>

⁴ <https://ww2.arb.ca.gov/capp/cst/ch2/wwlb/methyl-bromide>

⁵ <https://www.aqmd.gov/home/news-events/community-investigations/fumigation-facilities>

⁶ <https://www.aqmd.gov/docs/default-source/rule-book/proposed-rules/1495/final-pr1495-wgm2.pdf>

⁷ <https://www.aqmd.gov/home/news-events/community-investigations/fumigation-facilities>

pests spreading through a domestic industry. Commodities are typically fumigated because of one of the following:

CONDITION OF ENTRY

Condition of entry means that a certain commodity must be fumigated before entering a territory. In some situations, the condition of entry only applies if coming from certain other territories. An example commodity under a condition of entry are table grapes from Chile, because of the pest *Lobesia botrana*, commonly referred to as European grapevine moth. *Lobesia botrana* is prevalent in certain areas of the world, including the country of Chile. However, it is not prevalent in North America, including California which also produces a large amount of table grapes and wine grapes. If *Lobesia botrana* were to reach and spread through California, such as on table grapes imported from Chile, it could require the destruction of billions of dollars of established table and wine grape vines and more use of agricultural pesticides to control its population. In order to prevent that scenario, as a condition of entry into the United States, all table grapes from Chile must be treated for *Lobesia botrana*. The fumigant methyl bromide is one of the few treatments available that is effective against all stages of the lifecycle of *Lobesia botrana*.

ACTIONABLE PEST

For other commodities that are not required to be treated as a condition of entry, goods are inspected and if actionable pests are detected, the commodity is held in quarantine until the pest is eradicated. The fumigant methyl bromide is commonly used for this purpose as it is broadly effective against many different kinds of pests including insects, rodents, nematodes, and others.

CONCURRENT STRUCTURAL FUMIGATION

As part of the maintenance of grain silos, shipping vessels, and other commodity storage structures, fumigation with sulfuryl fluoride is commonly used to eradicate any pests that may be present. In some situations, the fumigation takes place with the commodity present in the structure.

PROCESS OVERVIEW

The process of commodity fumigation consists of at least three discrete steps: 1) pretreatment; 2) treatment; and 3) aeration.

Figure 4 - Pretreatment



PRETREATMENT

Pretreatment is the preparation of the commodity and the confined area where the commodity will be treated with the fumigants. Examples of pretreatment include raising the temperature of the commodity to the ideal temperature range of the fumigant, inspecting and testing enclosures, containers, or chambers for leaks, arranging palletized material carefully to maximize air flow, installing gas lines, sampling tubes, and safety signage, and performing administrative duties such as calculating fumigant dosages for the given volume or making notifications to regulatory agencies.

TREATMENT

Treatment is the application of the desired fumigant in a confined space to eradicate one or more target pests from the commodity. The most common form of treatment in South Coast AQMD is referred to as Tarpaulin Fumigation. Using a rigid frame, commodities are confined within a tarpaulin enclosure, with sand snakes sealing the tarp down. A fumigant is introduced into the enclosure and held at a specified concentration for a period of time. Treatment using methyl bromide, sulfuryl fluoride, and phosphine typically take three hours while other treatments may take longer: carbon dioxide can take 24 hours, cold treatment requires multiple days, and other gases like nitrogen or argon can take weeks. Methyl bromide is the most commonly used fumigant in South Coast AQMD followed by sulfuryl fluoride and phosphine.

Figure 5 - Treatment



Figure 6 - Product After Aeration



AERATION

After chemical treatment, the fumigant must be removed before the commodity can be accessed. Within South Coast AQMD, most facilities are equipped with exhaust systems and emission stacks. Floor fans that were used to increase fumigant mixing are also used for accelerating the aeration process and off-gassing. Currently, used gaseous fumigant is released to ambient air. If using a solid fumigant that converts to a gas, such as phosphide salts that convert to phosphine gas, residual dust must be properly disposed; although non-toxic this dust is potentially flammable. Once the fumigant

concentration is less than the target concentration, the commodity may be released and transported to its next location in the supply chain.

REGULATORY BACKGROUND

The following is a summary of the regulations and other legal precedents that affect the commodity fumigation industry.

FEDERAL PROGRAMS

U.S. Environmental Protection Agency (U.S. EPA)

Under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), manufacturers of restricted use pesticides (RUPs) must register their products with U.S. EPA and include studies on impacts to human health and the environment. Manufacturers must also submit a “label” for review and approval. The “label” is a detailed document that lists the requirements for safe use including application procedures, required personal protective equipment (PPE), any buffer zones, and training and certification requirements. At least every 15 years, U.S. EPA performs “reevaluation” of each RUP for impacts on human health and the environment, which includes searches for new research and published literature. Iterative drafts throughout the reevaluation process are posted to

the federal docket for public comment and review and may lead to additional risk mitigation and label changes.

U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Services (APHIS)

USDA APHIS maintains a manual of approved treatments for commodities to prevent the movement of pests into and within the U.S. Referred to as the Treatment Manual, it has schedules and procedures for use of a variety of treatments, both chemical and nonchemical, and includes proper PPE and monitoring requirements. The amount of fumigant needed to eradicate a target pest on a specific commodity has been established by field and laboratory testing and is published in the Treatment Manual.⁸ USDA APHIS inspectors are also present at all treatments to ensure the procedures are followed.

STATE PROGRAMS

California Department of Pesticide Regulation (DPR)

DPR reviews and approves federal RUPs for use in California as state restricted materials (RMs). DPR publishes studies, performs risk evaluations, develops health screening values, and produces mitigation documents for commodity fumigants and other RMs. These RMs are under continuous evaluation to ensure safety after fumigants are approved and may include ambient air monitoring and additional restrictions. DPR also receives usage reports from local counties and compiles a statewide report on pesticide use. DPR works closely with local counties to enforce statewide regulations and maintains testing and certification programs for applicators.

Office of Environmental Health Hazardous Assessment (OEHHA)

OEHHA is responsible for developing and providing risk managers in state and local government agencies with toxicological and medical information relevant to decisions involving public health. The U.S. EPA and OEHHA employ the best available scientific evidence and rationale (which includes extrapolations, computer simulations, and safety factors) at that point in time to establish health values. Both agencies will occasionally revise their health values as better data becomes available. South Coast AQMD staff uses the risk assessment health values prepared by the OEHHA, when available, for regulatory purposes such as risk analysis, rulemaking, permitting, public notice, and risk reduction.

LOCAL PROGRAMS

County Agricultural Commissioner (CAC)

At the local level, CACs issue to applicators RMPs, which specify allowable pesticides and quantities, approved work site plans, and equipment to be used, such as emission stacks. CACs also require a permittee interview to discuss alternatives to chemical fumigants. CACs receive a Notice of Intent 24 hours prior to fumigation and have the authority to inspect fumigations. CACs may also require additional permit conditions such as hours of operation, aeration schedules, and other process requirements.

CASE LAW

Harbor Fumigation Inc v. County of San Diego Air Pollution Control District (APCD)

In 1992, Harbor Fumigation Inc. began treating imported fruit with methyl bromide within the Port of San Diego. The local air district, San Diego APCD requested that Harbor Fumigation Inc. obtain

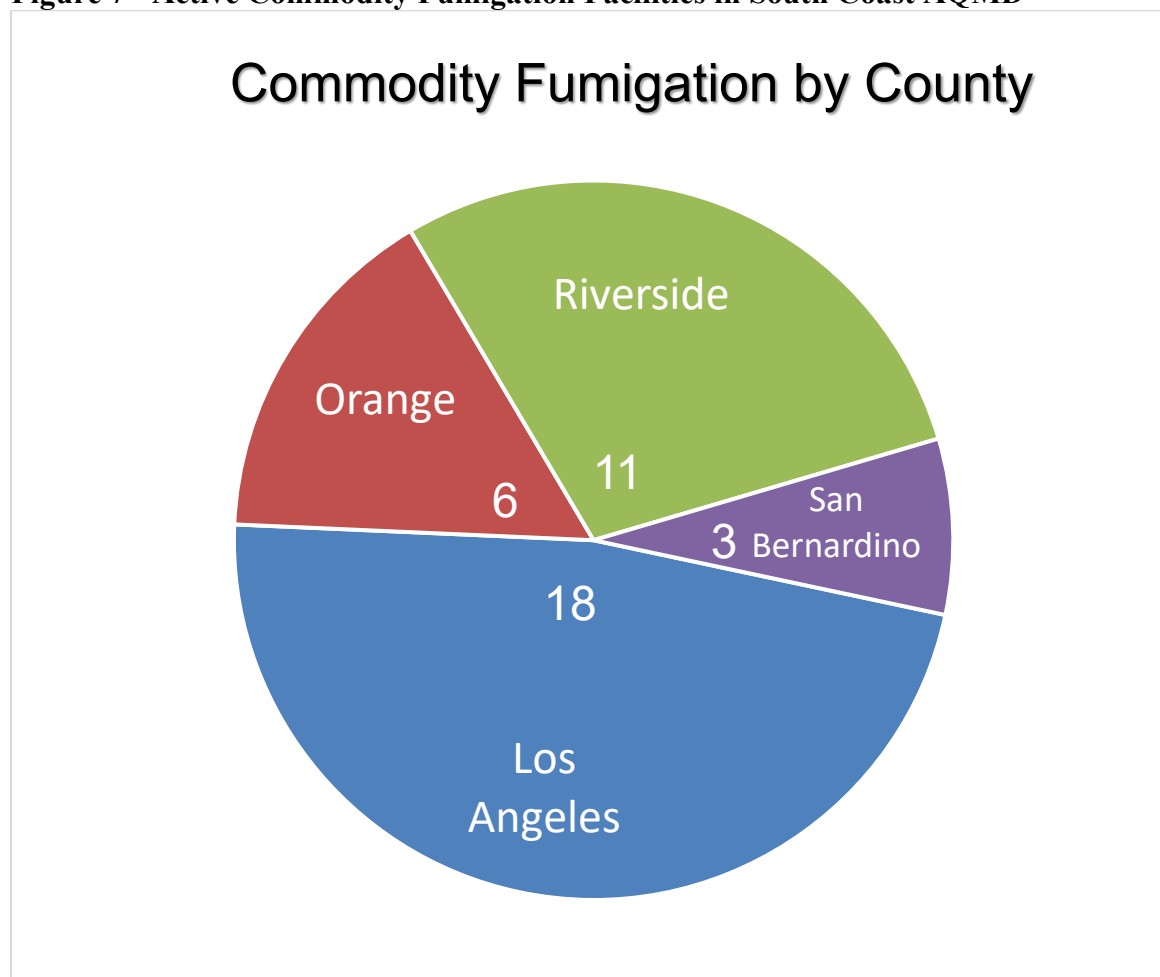
⁸ <https://acir.aphis.usda.gov/s/treatment-hub>

an air quality permit and install controls. In 1993, Harbor Fumigation Inc. sought relief seeking a court determination that San Diego APCD had no jurisdiction to regulate commodity fumigation. The court found in 1993 and upheld in 1996 after appeal⁹ that San Diego APCD had jurisdiction to regulate emissions associated with the use of methyl bromide while DPR had jurisdiction to regulate methyl bromide use.

AFFECTED FACILITIES

PR 1495 affects approximately 38 facilities within the South Coast AQMD with active RMPs based on data provided by the four CACs within South Coast AQMD jurisdiction, distributed by county as shown in the following figure.

Figure 7 - Active Commodity Fumigation Facilities in South Coast AQMD



Commodity fumigation facilities, while present in all four counties in South Coast AQMD jurisdiction, appear to be clustered in two areas in particular: the AB 617 community of Wilmington, Carson, West Long Beach (WCWLB), servicing imported and exported products from the Ports of Long Beach and Los Angeles and the AB 617 community of Eastern Coachella Valley (ECV), operating at dried fruit operations for export.

⁹ *Harbor Fumigation, Inc. v. County of San Diego Air Pollution Control Dist.* (1996) 43 Cal.App. 4th 854.

Figure 8 - Active Commodity Fumigation Facilities in South Coast AQMD

Of these 38 facilities, 22 facilities used one or more fumigants at their commodity fumigation facility in calendar year 2024. The remaining 16 potential community fumigation facilities could be characterized as dormant.

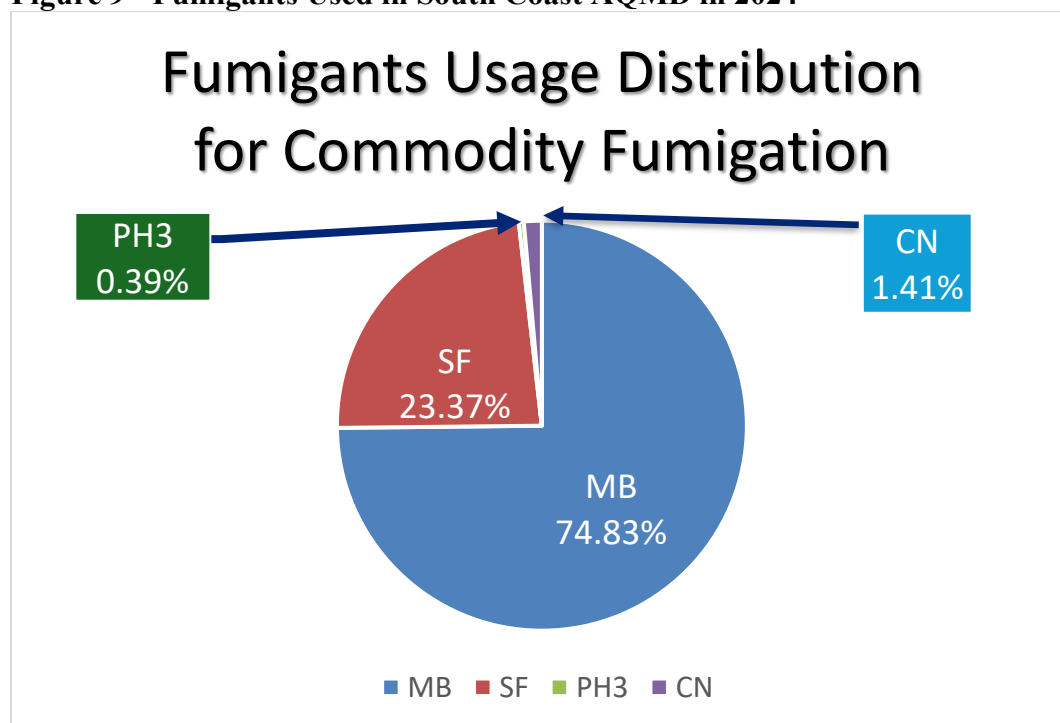
FUMIGANTS IDENTIFIED AS TACs

In 2024, the following fumigants were used when conducting commodity fumigation within South Coast AQMD, as reported by CACs and confirmed with individual commodity fumigation facilities:

Table 1 - Distribution of Fumigants Used in South Coast AQMD in 2024

Fumigant	Symbol	Quantity (lbs)
Methyl Bromide	MB	88,268
Sulfuryl Fluoride	SF	27,568
Cyanide*	CN	1,665
Phosphine	PH ₃	458

*Note: Cyanide is no longer actively used as a commodity fumigant within South Coast AQMD as of 2026.

Figure 9 - Fumigants Used in South Coast AQMD in 2024

Methyl Bromide

Methyl bromide, the most common commodity fumigant used within South Coast AQMD, accounts for 75 percent of the total commodity fumigant tonnage used in 2024. Methyl bromide, an odorless (at lower concentrations) and colorless gas at ambient pressure, is effective

Figure 10 - Methyl Bromide Container

against eradicating many pests including fungi, weeds, insects, roundworms, and rodents from various commodities. For example, methyl bromide is used for treatment of table grapes, asparagus, citrus, kiwifruit, lumber, and many other commodities. Methyl bromide was identified as a TAC by OEHHA and a hazardous air pollutant by U.S. EPA. Methyl bromide is also identified as a stratospheric ozone-depleting substance under the Montreal Protocol. Regarding acute health effects, methyl bromide is associated with shortness of breath, headaches, dizziness, lung irritation, chest pain, coughing, and nasal irritation. OEHHA has established a health screening value of

3,900 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) (equivalent to 1,000 parts per billion or ppb) at which no adverse acute health effects are anticipated over one hour, even accounting for sensitive groups.¹⁰ Regarding chronic health effects, methyl bromide is associated with circulatory system damage, renal failure, and reproductive harm and OEHHA's chronic health screening value is five $\mu\text{g}/\text{m}^3$ (1.28 ppb) over one year.¹¹

¹⁰ <https://oehha.ca.gov/media/downloads/cnr/appendixd2final.pdf>

¹¹ <https://oehha.ca.gov/media/downloads/cnr/appendixd3final.pdf>

Sulfuryl Fluoride

Sulfuryl fluoride accounts for almost one-quarter of the commodity fumigant tonnage within South Coast AQMD. Sulfuryl fluoride is a colorless and odorless gas under ambient pressure and is used as a commodity and structural fumigant. Sulfuryl fluoride is effective against insects and rodents for treatment of grains, dry fruit, nuts, and pet food. In 2004, OEHHA identified sulfuryl fluoride as a TAC in response to a risk characterization document prepared by DPR, but it is not defined as a hazardous air pollutant by the U.S. EPA at the present time. Sulfuryl fluoride is also identified as a potent greenhouse gas. Additionally, sulfuryl fluoride breaks down to fluoride ion (F^-) over time and may lead to excessive fluoride ion levels downwind. OEHHA has not established health screening values at the present time. According to research by DPR, sulfuryl fluoride has an acute health screening value of 750 ppb over a 24-hour period.¹² Sulfuryl fluoride is associated with eye and skin irritation, headaches, chest pain, fatigue, dry throat, coughing, and extreme thirst in the short term. DPR's chronic health screening value is 12 ppb over one year and is linked to damage to bones, teeth, and respiratory system.¹³

Figure 11 - Sulfuryl Fluoride Container



Source: vikanefumigant.com

Phosphine

Figure 12 – Phosphine as Phosphide Salt



Source: indfumco.com

Phosphine accounts for less than one-half of one percent of tonnage within South Coast AQMD. While available as a gas premixed with carbon dioxide (CO_2), its most commonly used form is solid phosphide salts (aluminum phosphide, magnesium phosphide, or zinc phosphide) in the form of tablets or plates. Phosphide salts react with air to form phosphine gas, effective against insects and rodents for treatment of dry goods like corn meal, flour, spices, or rice. Phosphine has been identified as a TAC by OEHHA and a hazardous air pollutant by U.S. EPA. Phosphine is highly toxic to humans, and, for safety reasons, requires a long aeration time following treatment. In the short term, phosphine is linked to respiratory, neurological, and gastrointestinal effects and in the long term, damage to respiratory system, central nervous system, liver, kidneys, and bones. OEHHA has not established a health screening value for acute health effects at the present time. DPR's research has identified an acute health screening value of 50 ppb over a 24-hour period.¹⁴ OEHHA completed an assessment for chronic effects and established a health screening value of $0.8 \mu g/m^3$ or 0.6 ppb over one year.¹⁵

PUBLIC PROCESS

Development of PR 1495 was conducted through a public process. Three Working Group meetings were held on January 29, 2026, May 21, 2026, and August 6, 2026. The Working Group is

¹² https://www.cdpr.ca.gov/wp-content/uploads/2024/11/final_rcd_vol1.pdf

¹³ https://www.cdpr.ca.gov/wp-content/uploads/2024/10/sulfuryl-fluoride_addendum.pdf

¹⁴ <https://www.cdpr.ca.gov/wp-content/uploads/2024/10/phosphine.pdf>

¹⁵ <https://oehha.ca.gov/media/downloads/cnr/appendixd3final.pdf>

composed of representatives from businesses, environmental groups, public agencies, and consultants. The purpose of the Working Group meetings is to discuss proposed concepts and work through the details of South Coast AQMD's proposal. Additionally, a Public Workshop will be held on October 1, 2026. The purpose of the Public Workshop is to present the proposed rule language to the general public and stakeholders, and to solicit comments. Staff also conducted multiple site visits as part of this rule development process.

CHAPTER 2: SUMMARY OF PROPOSALS

INTRODUCTION

PROPOSED RULE STRUCTURE

PROPOSED RULE 1495

INTRODUCTION

Proposed Rule 1495 (PR 1495) establishes emission limits for TACs from commodity fumigation facilities, based on the distance to the nearest receptor location. In some cases, owners or operators may install capture and control equipment to reduce fumigant emissions to atmosphere to be less than threshold levels. For others, owners or operators may adopt best management practices and possibly limit throughput. PR 1495 also contains requirements for initial performance testing and periodic source testing of control equipment, parametric monitoring of capture and control equipment, recordkeeping, and maintenance of a public facing website.

PROPOSED RULE STRUCTURE

PR 1495 will contain the following subdivisions:

- (a) **Purpose**
- (b) **Applicability**
- (c) **Definitions**
- (d) **Requirements**
- (e) **Control Equipment**
- (f) **Source Testing**
- (g) **Parametric Monitoring**
- (h) **Notifications and Public Meetings**
- (i) **Recordkeeping**
- (j) **Exemption**

PROPOSED RULE 1495 (PR 1495)

Purpose – Subdivision (a)

The purpose of PR 1495 is to limit the release of TACs from commodity fumigation facilities currently in use, in particular methyl bromide, sulfuryl fluoride, and phosphine, to less than acute and chronic health screening values. These fumigants commonly used in South Coast AQMD have all been found to have impacts on human health, both in the short term, known as acute exposure, and in the long term, known as chronic exposure.

Applicability – Subdivision (b)

PR 1495 will apply to owners and operators of commodity fumigation operations, defined in rule language. There are many agents that operate in cooperation with one another during commodity fumigation. For instance, commodities such as fresh fruit are commonly imported via ship to the Ports of Los Angeles or Long Beach. After they are unloaded but before they enter the fresh fruit supply chain at a cold storage facility, some commodities, as a condition of entry, must be fumigated. Fumigation may occur at the port of entry, at the storage facility, or at an intermediate location. Fumigation is performed by a certified applicator, licensed and trained in fumigation. PR 1495 is not applicable to commodity owners, port owners, lease holders, or shipping contractors, unless they are also the owner or operator of the commodity fumigation operation as the certified applicator. PR 1495 also does not apply to soil fumigation of pre-harvest agricultural products, medical sterilization subject to Rule 1405 – Control of Ethylene Oxide Emission from Sterilization

and Related Operations, or structural fumigation. However, PR 1495 would apply during structural fumigation if the structure contained stored post-harvest agricultural products or trade products during fumigation.

Definitions – Subdivision (c)

PR 1495 includes definitions to clarify and explain key concepts.

- **Aeration** - After chemical treatment, the fumigant must be released from the enclosed area before the commodity can be accessed. Within South Coast AQMD, commodity fumigation facilities are equipped with exhaust fans and emission stacks that vent directly to atmosphere. Once the fumigant concentration is below the target concentration in the enclosed area, the commodity may be released and transported to its next location in the supply chain.
- **Commodity Fumigation** – The definition has been crafted to limit the scope of this rule development and distinguish the regulated activities covered by PR 1495 from other forms of gaseous pesticide treatment such as soil fumigation, medical sterilization, or structural fumigation. Treatment and aeration of products typically occur when products cross state or federal boundaries to protect domestic markets, such as when table grapes enter the United States from Chile or when citrus fruit leaves California for Arizona. In other cases, as part of routine maintenance of storage silos or shipping vessels, these structures are fumigated with commodity products present.
- **Control Equipment** – While not currently in use within South Coast AQMD, equipment to reduce or eliminate fumigant emissions have been used in California, the United States, and other parts of the world. This definition is needed to accurately describe and establish requirements for control equipment operations. Examples of control equipment used for commodity fumigation are regenerative and non-regenerative carbon bed-based control equipment, further explained in Chapter 3.
- **Daylight Hours** – This definition, consistent with DPR regulations¹⁶, is needed to describe some forms of aeration. Sunlight makes the atmosphere less stable, diluting and dissipating the fumigant much more rapidly relative to more stable nighttime conditions.
- **Emergency Fumigation** – This definition is needed to define certain circumstances in accordance with Section 18 of FIFRA, under order from authorities, when commodities must be treated with a gaseous pesticide to eradicate an invasive pest, to protect human health, or to address another crisis situation. PR 1495 recognizes the severe and rare circumstances associated with emergencies by providing an exemption.
- **Fumigant** – Currently there are three gaseous pesticides which have been approved by both U.S. EPA and DPR for use on commodities and that are TACs in active use in the South Coast AQMD jurisdiction: methyl bromide (CAS# 74-83-9), sulfuryl fluoride (CAS# 2699-79-8), and phosphine (CAS# 7803-51-2). However, there are other approved fumigant TACs not currently in use, such as cyanide, that could be used again in the future and there are new, emerging fumigants, such as ethyl formate, that may be used by the commodity fumigation industry and that may be identified as TACs in the future.

¹⁶ https://www.cdpr.ca.gov/wp-content/uploads/2025/01/volume_3_append_g.pdf

- **Fumigant Aeration System** – This definition was added to accurately describe the prevailing method of aeration.
- **Non-Business Hours** – This definition describes a best management practice observed by several commodity fumigation operations to minimize impacts on offsite receptors.
- **Permanent Total Enclosure** – Also known as a PTE, this definition was added to accurately describe this equipment to ensure 100% capture of potential fugitive emissions. This definition is consistent with other South Coast AQMD rules including Rule 1405 regarding medical sterilization using ethylene oxide which both include slight modification to clarify that the Executive Officer of the South Coast AQMD would be considered the “Administrator” for the purposes of evaluation of U.S. EPA Method 204 criteria.
- **Receptor Location** – This term is defined to identify where individuals may be present when commodity fumigation may occur and be exposed to fumigants. It does not include public roadways or other public rights-of-way, as the general public is expected to be at those locations for only a few seconds. Further, some commodity fumigation facilities operate exclusively during non-business hours, beginning aerating between 9:00 PM to 5:00 AM For those types of facilities, nearby businesses should not be considered receptor locations. Residences, however, should be considered receptor locations in that example. Refer to Attachment 1 – *Determination of Distance* for additional guidance.
- **Tarpaulin Fumigation** – This definition was added to describe the prevailing method of capture of Fumigants within South Coast AQMD.
- **Toxic Air Contaminant** – This definition, consistent with other South Coast AQMD rules, ensures the protections of PR 1495 are implemented only when needed, and not for non-toxic fumigants, such as carbon dioxide (CO₂), nitrogen (N₂), or argon (Ar).
- **Treatment** – After pretreatment, which involves bringing products to the ideal temperature as part of preparing the enclosed area, treatment introduces the gaseous pesticide at a specific concentration and duration to ensure the eradication of pests in egg, larva, pupa, and adult forms from the commodity.

Requirements – Subdivision (d)

PR 1495 establishes requirements for aeration at commodity fumigation operations within South Coast AQMD. However, at all times, owners and operators of commodity fumigation operations should comply with CAC RMPs, DPR Pesticide Use Enforcement Program Standards Compendium Volume 3, *Restricted Materials and Permitting*, Appendix G – *Commodity Fumigation*, the USDA APHIS treatment manual, and approved U.S. EPA pesticide labels. Nothing in PR 1495 should be construed as an administrative variance from local, state, or federal commodity fumigation requirements.

Each fumigant used at a commodity fumigation operation must have emission limits on a South Coast AQMD Permit to Operate. At the time of rule adoption, existing Permits to Operate are not expected to have emission limits and owners and operators are required to submit complete permit applications to add the applicable emission limit. In addition, owners and operators must submit applications to modify limits within 30 days of knowing of new receptor locations. The Executive Officer may request an owner or operator submit a permit application to modify an emission limit in the case of a change in distance to the nearest receptor location. For example, vacant land near

a commodity fumigation operation redeveloped into residences would likely result in a request to submit a permit application to modify the emission limits, if a permit application was not already submitted by the facility.

Facilities will be required to capture emissions within an enclosure of overlapping floor-to-ceiling plastic strips free of rips and holes, otherwise known as the tarpaulin fumigation. Alternatively, emissions may be captured within a permanent total enclosure or with both. Permanent total enclosures are considered equipment subject to air quality permitting and require a South Coast AQMD Permit to Construct prior to construction and a Permit to Operate prior to operating. These methods minimize fugitive emissions during the fumigation process. The process of releasing fumigant, known as aeration, must be conducted using fans or mechanical device to force air to emission stacks, referred to as a fumigant aeration system, or controlled released using control equipment, or both. PR 1495 also requires exhaust stacks to vent fumigant in an upward direction and not horizontally or downward.

The proposed rule also establishes emission limits for methyl bromide and other toxic fumigants. Among the three most common fumigants, methyl bromide makes up approximately 75% of the tonnage used within South Coast AQMD and is separately identified. Sulfuryl fluoride, accounting for about one-quarter of usage, is also separately identified. Lastly, phosphine limits are identified as “all others”. Using South Coast AQMD’s Health Risk Assessment Tool and AERMOD-ready meteorological data files¹⁷, the health risk associated with methyl bromide was assessed using the tarpaulin fumigation method and state DPR minimums of performance, specifically an exhaust stack at least 15 feet (4.6 meters) above the ground and an exit velocity of at least 600 feet per minute (3.0 meters per second).¹⁸ In addition, while some fumigant is inevitably lost due to chemical degradation, adsorption, or fugitive loss, staff assumed 100% of fumigant used for treatment was emitted from exhaust stacks, building the most health protective model possible. Using those parameters and modeling acute and chronic risk at varying distances using each of the 26 South Coast AQMD and airport meteorological stations across the region, the most health-protective value at each distance was selected for Table 1 – *Fumigant Emission Limits*. Both the daily and annual emission limits in Table 1 are well below typical usage levels. Most facilities will need to operate control equipment to comply with Table 1 emission limits. Alternatively, facilities may adopt best management practices, including operating exclusively during non-business hours, and subsequently be subject to the emission limits in Table 2, or adopt best management practices, including operating exclusively during daylight hours, and subsequently comply with the requirements of aeration for Table 3. The distance to the nearest receptor may be different for each of these schedules as detailed in Attachment 1.

Some facilities utilize more than one fumigant when performing commodity fumigation. Tables 1 through 3 provide emission limits for methyl bromide, sulfuryl fluoride, and separately for all other fumigants. Facilities using more than one fumigant will comply with the methyl bromide emission limits for their methyl bromide usage, sulfuryl fluoride limits for their sulfuryl fluoride usage, and the “all other fumigant” limits for phosphine or other fumigants from either Table 1, Table 2, or Table 3 based on the facility configuration and operational schedule.

¹⁷ https://www.aqmd.gov/assets/aermet/AERMET_files_And_HRA_Tool.html

¹⁸ https://www.cdpr.ca.gov/wp-content/uploads/2025/01/volume_3_append_g.pdf

For Table 2 – *Fumigant Best Management Practices Emission Limits (Non-Business Hours)*, and Table 3 – *Fumigant Best Management Practices Emission Limits (Daylight Hours)*, different stack parameters were selected, based on industry-leading practices. While the state DPR minimum stack height is 15 feet above ground, stack heights within South Coast AQMD are typically much higher:

Table 2 - Distribution of Commodity Fumigation Stack Heights in South Coast AQMD

Stack ID	Stack Height (ft)	Stack Height (m)
A	70	21.3
B	60	18.3
C	44	13.4
D	43	13.1
E	39	11.9
F	35	10.7
G	35	10.7

Similarly, while state DPR minimum stack exit velocity is 600 feet per minute, exit velocities within South Coast AQMD are also higher:

Table 3 - Distribution of Commodity Fumigation Stack Exit Velocities in South Coast AQMD

Stack ID	Exit Velocity (fpm)	Exit Velocity (m/s)
A	2,754	14.0
B	1,750	8.9
C	2,545	12.9
D	2,539	12.9
E	1,132	5.8
F	1,220	6.2
G	457	2.3

Observing a natural break at a stack height of 60 feet (18.3 meters) and exit velocity of 2,500 feet per minute (12.7 meters per second), this configuration was modeled against each of the 26 meteorological stations, with the most health-protective value at each distance selected.

Also observed was that many of these operations begin aeration exclusively between 9:00 PM and 5:00 AM, outside of normal business hours. For this group of commodity fumigation owners and operations, Table 2 – *Fumigant Best Management Practices Emission Limits (Non-Business Hours)*, is established. When evaluating receptor location distance as explained in Attachment 1 – *Determination of Distance*, some potential receptors may be excluded because they would not be present during aeration.

Some facilities aerate fumigants only during daylight hours ensuring effective dispersion and protection to receptors locations in the surrounding community. For this group of commodity fumigation owners and operations, Table 3 – *Fumigant Best Management Practices Emission Limits (Daylight Hours)*, is established.

If a facility were to aerate fumigants outside of non-business hours and daylight hours (i.e., early evening prior to 9:00 PM) then the facility would be subject to the limits in Table 1.

Control Equipment – Subdivision (e)

PR 1495 establishes schedules for operation of control equipment, demonstration of initial and ongoing performance through source testing, and parametric monitoring of control equipment for commodity fumigation. Staff has identified two vendors that have achieved capture and control of methyl bromide emissions in practice.

Once operated, owners or operators will have 60 days to demonstrate the performance of control equipment with a source test and must redemonstrate performance with a reoccurring source test every 24 months (two years).

Owners and operators also must parametrically monitor the performance of their control equipment with the use of various gauges and meters as approved by the Executive Officer in a Permit to Operate. Additionally, control equipment conditions during the source test must be recorded and the control equipment must perform at all times similarly to source testing conditions within manufacturer's specifications. Recordkeeping is required to record control equipment conditions each operating day to ensure optimal performance.

Source Testing – Subdivision (f)

PR 1495 establishes standards and procedures for initial performance and ongoing compliance source testing, consistent with recent South Coast AQMD rulemaking projects including Rule 1405 regarding medical sterilization using ethylene oxide. Those using control equipment to comply with PR 1495 must demonstrate at least 86% or better overall control efficiency, consistent with a South Coast AQMD Best Available Control Technology determination¹⁹, and provide access for source testing with sampling ports. PR 1495 also identifies several test methods for source testing, or other methods approved by the Executive Officer. Prior to testing, a test plan, called a source test protocol, must be submitted to South Coast AQMD for review and approval at least 60 days prior to source testing. In some circumstances, such as if the control equipment is modified, a new or updated source test protocol may be requested for review and approval. When approved, the source test protocol must be followed and the final report must be submitted to South Coast AQMD within 60 days of the source test.

Parametric Monitoring – Subdivision (g)

PR 1495 establishes parametric monitoring to ensure effective aeration of fumigants. As discussed earlier, in addition to stack height, stack exit velocity is also important for effective aeration. By ensuring exhaust fans are working properly and with performance monitored, this subdivision establishes a parametric method by monitoring electrical usage. The owner or operator must monitor the voltage, current, or power draw across the stack emission fan or other mechanical device with an installed voltmeter, ammeter, or power consumption monitor prior to initiating aeration. If the fan begins to fail and rotational speed decreases, there is a decrease in electrical usage across the fan. By observing fan electrical draw, fan performance can be parametrically monitored, ensuring adequate dispersion of fumigants.

Notifications and Public Meetings – Subdivision (h)

PR 1495 establishes requirements for notification of certain activities and rule violations to South Coast AQMD and/or to the surrounding community. Notification prior to source testing is required for South Coast AQMD staff to be able to witness source testing and is consistent with other South Coast AQMD rules regarding source testing including Rule 1405 regarding medical sterilization with ethylene oxide. Notification is also required at least 24 hours prior to commodity fumigation; this is an existing statewide DPR requirement between fumigation applicators and county agricultural commissioners and is expected to have minimal administrative burden.

PR 1495 also requires commodity fumigation operations to maintain a website listing completed commodity fumigation activity, notifying the Executive Officer after its creation. Stakeholders had

¹⁹ https://www.aqmd.gov/docs/default-source/bact/bact-guidelines/bact-guidelines-2022/part-b---guadalupe-cooling_5299_methylbromide.pdf

expressed an interest to know when fumigation had occurred for research purposes, and this is consistent with the concept of DPR's SprayDays website.²⁰

PR 1495 also contains a series of escalating public outreach based on repeated violations detected by South Coast AQMD staff. Violations are documented by South Coast AQMD staff by issuing a Notice of Violation (NOV). In the event an NOV is issued for violations of Rule 1495, owners and operators are required to mail or hand-deliver notice to the surrounding community. If repeated NOVs are issued within 12 months, additional public outreach is required: for three in 12 months, published notice in a newspaper and for six in 12 months, a public meeting with notice to a newspaper and by mail or hand-deliver to the surrounding community. In addition to these actions, owners and operators receiving NOVs would also be subject to civil penalties and may face additional legal actions through an Order for Abatement issued by the South Coast AQMD Hearing Board.

Recordkeeping – Subdivision (i)

PR 1495 contains recordkeeping provisions to demonstrate compliance with other subdivisions. In order to demonstrate that throughput limits and operating schedules are observed, records of pounds of fumigant used and start and end times of aeration are required. To demonstrate compliance with control equipment and fumigant aeration parametric monitoring, monitoring records each operating day are also required. Approved source test protocols and reports must also be retained. Records of notifications to South Coast AQMD and, in the case of NOVs, records of notification to receptor locations or local newspapers are required. Lastly, if performing emergency fumigation, records from local, state, or federal authorities establishing the emergency must be retained. All these records are required to be maintained onsite for at least five years, consistent with recent U.S. EPA guidance, and made available upon request to demonstrate compliance with PR 1495.

Exemption – Subdivision (j)

PR 1495 contains an exemption to align with Section 18 of FIFRA to allow for emergency pesticide use, including gaseous pesticides for commodity fumigation use, for reasons of quarantine, public health, or other crises.

Determination of Distance – Attachment 1

To provide guidance within rule language to owners, operators, and regulators, Attachment 1 contains additional explanation of determining distance to receptor locations. Attachment 1 explains special consideration for fumigation during non-business hours in accordance with best management practices to eliminate impacts to potential offsite worker receptor locations.

²⁰ <https://spraydays.cdpr.ca.gov/>

CHAPTER 3: IMPACT ASSESSMENTS

INTRODUCTION

AFFECTED SOURCES

EMISSIONS IMPACT

COSTS

SOCIOECONOMIC IMPACT ASSESSMENT

CALIFORNIA ENVIRONMENTAL QUALITY ACT

DRAFT FINDINGS UNDER HEALTH & SAFETY CODE SECTION 40727

COMPARATIVE ANALYSIS

INTRODUCTION

An impact assessment was conducted as part of PR 1495 rule development to assess the environmental and socioeconomic implications. These impact assessments include costs, socioeconomic impacts, and a California Environmental Quality Act (CEQA) analysis. Staff prepared draft findings and will prepare in the future a comparative analysis pursuant to Health and Safety Code Sections 40727 and 40727.2, respectively.

AFFECTED SOURCES

Based on information requests with the four County Agricultural Commissioners within South Coast AQMD jurisdiction and surveys with potentially affected facilities, 38 facilities were identified with active RMPs with the potential to use fumigants for commodity fumigation. Of these 38 facilities, 22 commodity fumigation facilities had used fumigants as recently as 2024 while the remaining 16 potential community fumigation facilities could be characterized as dormant.

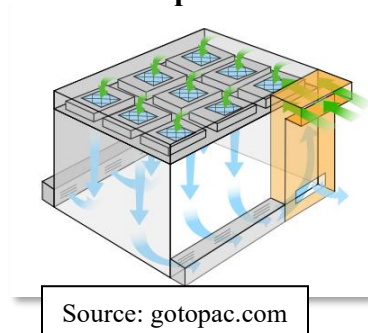
EMISSIONS IMPACT

Stack emissions will be reduced through a combination of throughput limits, implementation of best management practices to reduce risk, or installation and operation of control equipment. Most sites are likely to comply with the rule by incorporating best management practices to comply with emission limits. While the amount of fumigants used are unlikely to change, the concentrations of TACs will be greatly reduced, as demonstrated with special monitoring in the West Long Beach area by as much as 65% after stack heights and fan speeds were increased. By incorporating the best management practices, facilities will operate at a hazard index (HI) less than 1 against acute and chronic health impacts. Health impacts are not expected at an HI less than 1.

COSTS

Staff identified a variety of capture and control strategies to reduce TACs from commodity fumigation from a variety of sources including vendor and facility quotes and other approved rulemaking projects in other regions. Capital costs are one-time costs that cover the components required to assemble a project. These costs include equipment, installation, permitting, consulting, and testing. Recurring costs are costs required to operate equipment. These costs include operating and maintenance (O&M) costs such as electricity, monitoring, testing, and costs for consumables. A cost analysis for each technology or strategy identified is provided below.

Figure 13 - Diagram of Example PTE



Permanent Total Enclosure (PTE)

PTE is a capture technology when an entire building or portion of a building is under continuous negative pressure, in accordance with U.S. EPA Method 204 which requires a demonstration of average facial velocity of 200 feet per minute and limits natural draft opening to ensure 100% capture. PTE ensures that fugitive emissions from a facility are minimized as all pollutants can be routed through stacks or emission control equipment. The cost to upgrade an existing 80,000 cubic foot building is expected to be approximately \$500,000 and annual recurring costs to operate at

\$26,500, as identified in Rule 1405 regarding ethylene oxide sterilization, which was amended in 2023.²¹

Regenerative Control Equipment

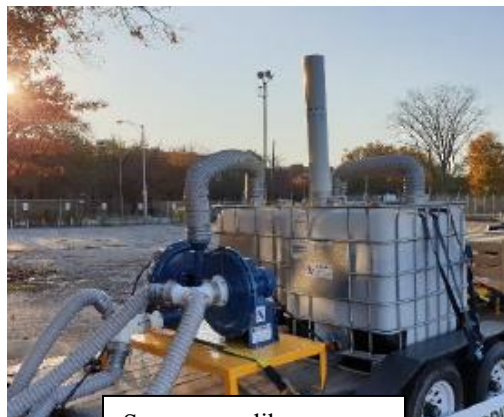
Two-stage control equipment that regenerates a specialized activated carbon has been used in California and in Florida to control methyl bromide emissions. The first stage consists of a carbon bed with carbon derived from superheated coconut shells. The second stage desorbs the methyl bromide and chemically destroys the TAC, achieving 95% control under source testing. Capital costs are expected to be in the range of \$100,000 to \$500,000, depending on size, with annual recurring costs ranging from \$10,000 to \$20,000 per year. One-time performance testing and periodic source testing of control equipment is expected to cost \$10,000 per source test.

Figure 14 - Regenerative Control Equipment



Source: valuercovery.net

Figure 15 - Non-Regenerative Control Equipment



Source: nordiko.com.au

Non-Regenerative Control Equipment

A different variant of the same specialized activated carbon described earlier, this type of control equipment does not regenerate the carbon and instead periodically requires carbon replacement. Installations using this type of control equipment are located in New York, Maryland, Australia, and New Zealand. Testing has demonstrated the ability to capture more than 99% of methyl bromide emissions, but the high cost of the specialized carbon limits widespread adoption of this technology. To capture one pound of methyl bromide requires at least 10 pounds of specialized carbon and the specialized carbon is priced at \$5 per pound. Upfront capital costs range from \$100,000 to \$200,000, but recurring costs typically exceed capital costs. Capture of methyl bromide is

expected to cost at least \$100,000 per year per ton methyl bromide. Also, the cost of disposal of hazardous waste (10 tons of methyl bromide-contaminated carbon per ton of methyl bromide) is estimated at approximately \$10,000 per ton of methyl bromide captured, based on vendor documentation of hazardous waste disposal cost at \$1,000 per ton.

²¹ <https://www.aqmd.gov/docs/default-source/agendas/governing-board/2023/2023-dec1-025.pdf>

Best Management Practices

PR 1495 identified several best management practices that reduced ambient fumigant concentrations. One best management practice was to extend stack heights. While the state DPR minimum stack height is 15 feet above ground, several operators raised their stack heights to 60 feet or higher. Extending stack height to 60 feet is reported to cost approximately \$10,000 per stack. There may be higher recurring costs for periodic inspection and maintenance of these taller stacks as well. Another less effective best management practice is to increase the exhaust stack exit velocity above the state DPR minimum of 600 cubic feet per minute. Upgraded exhaust fans rated at 2,500 cubic feet per minute or higher for fumigant aeration systems are priced at less than \$1,000 per unit. Annual recurring costs of conducting inspections and maintenance associated with the upgraded exhaust fans are expected to be consistent with the existing equipment but with marginally higher electricity usage to the increased rating of the fans.

Figure 16 - Raised Exhaust Stacks



Projected Facility Costs

According to the operational and throughput records, equipment configurations, aerial photography, and satellite imagery of each of the 22 commodity fumigation facilities that used fumigant in 2024, one facility is no longer in operation and a second facility reported that the vast majority of fumigation is now occurring in the country of origin instead of in South Coast AQMD, reducing that facility's throughput. Two other facilities had exhaust fans with blowers that were not capable of achieving the 2,500 feet per minute best management practice and three facilities had exhaust stacks at heights of less than 60 feet. One facility conducted aeration during daylight hours and non-business hours and, as currently operated, would require control equipment to comply with emission limits. Based on these data, PR 1495 is expected to result in: 1) upgrading two exhaust fans; 2) increasing the height of three existing stacks; and 3) installing control equipment at one facility to reduce the emissions to less than the prescribed emission limits. The remaining facilities were determined to have limited throughput and already have emissions that are less than the Table 1 limits. Costs to conduct one-time performance testing (\$10,000) and periodic source testing, annualized over two years (\$5,000), are also included. Using an average of costs, one-time capital costs to implement PR 1495 are expected to be \$342,000 with annual recurring costs at \$20,000 per year.

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 PR 1495, which is scheduled for December 4, 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 (PR 1495) 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 HEALTH & SAFETY CODE SECTION 40727***Requirements to Make Findings***

Health and Safety Code Section 40727 requires that the Governing Board make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the public hearing and in the staff report. In order to determine compliance with Health and Safety Code Section 40727, Health and Safety Code Section 40727.2 requires a written analysis comparing the proposed rule with existing regulations, if the rule meets certain requirements.

Necessity

PR 1495 is needed to reduce emissions of TACs from commodity fumigation operations.

Authority

The South Coast AQMD obtains its authority to adopt, amend, or repeal rules and regulations pursuant to Health and Safety Code Sections 39002, 39650 et. seq., 39666, 40000, 40001 40440, 40441, 40702, 40725 through 40728, 41508, 41700, and 42300 et. seq.

Clarity

PR 1495 is written or displayed so that its meaning can be easily understood by the persons directly affected by it.

Consistency

PR 1495 is in harmony with and not in conflict with or contradictory to existing statutes, court decisions, or state or federal regulations.

Non-Duplication

PR 1495 will not impose the same requirements as any existing state or federal regulations. The proposed rule is necessary and proper to execute the powers and duties granted to, and imposed upon, the South Coast AQMD.

Reference

By adopting PR 1495, the South Coast AQMD Governing Board will be implementing, interpreting or making specific the provisions of the provisions of Assembly Bill 617, Health and Safety Code Sections 40001 (rules to achieve and maintain ambient air quality standards) and 41700 (nuisance), and Federal Clean Air Act Section 112 (Hazardous Air Pollutants) and Section 116 (Retention of State authority).

COMPARATIVE ANALYSIS

Health and Safety Code Section 40727.2 requires a comparative analysis of the proposed rule requirements with those of any Federal or South Coast AQMD rules and regulations applicable to the same equipment or source category. The comparative analysis will be conducted and released in the draft staff report at least 30 days prior to the South Coast AQMD Governing Board Hearing on PR 1495, which is anticipated to be held on December 4, 2026 (subject to change).

APPENDIX A: MODELING AND ANALYSIS

Rule Development: Methyl Bromide Usage for Fumigation

Modeling and analysis conducted by:

Ranil Dhammapala, Senior Meteorologist, PRDI

With input and support from:

Areio Soltani, Program Supervisor, PRDI

Vanessa Tanik, Program Supervisor, AB 2588

Nico Schulte, Program Supervisor, PRDI

Scott Epstein, Planning and Rules Manager, PRDI

Background

To derive Methyl Bromide (MB) emission limits (screening levels) for Fumigation facilities, air dispersion modeling was conducted with the AERMOD model. These limits are based on fumigant emission rates required to keep ambient MB concentrations from exceeding an acute and chronic Hazard Index (HI) of one at various downwind distances. For MB, the HI is the ratio of the acute or chronic concentration to the reference exposure level developed by California Office of Environmental Health Hazards Assessment (OEHHA). Sulfuryl Fluoride (SF) is also released from these facilities, but instead of OEHHA health values, SF has acute (daily) and chronic (annual) Reference Concentrations (RfC) issued by the California Department of Pesticide Regulation (DPR)²². For this assessment, RfCs were treated like OEHHA's Reference Exposure Level (RELs) to calculate HIs and derive emission limits. These are shown in Table A-1.

Table A-1: RELs and RfCs Used

	Acute exposure (1- hour maximum)	Daily average	Chronic exposure (annual average)
Methyl Bromide, µg/m ³	3900	-	5
Sulfuryl Fluoride, µg/m ³	-	3128 (750 ppb)	50 (12 ppb)

Fumigation facilities' stack heights, exit-velocities and building configurations were examined and three common scenarios (Table A-2) were identified for modeling.

²² Sulfuryl Fluoride Addendum to the 2006 Risk Characterization Document Update of the Toxicology and Reference Concentrations available at https://www.cdpr.ca.gov/wp-content/uploads/2024/10/sulfuryl-fluoride_addendum.pdf

Table A-2: Different Fumigation Facility Emission Points Modeled

Stack characteristic	Configuration 1	Configuration 2-daytime	Configuration 2-nighttime
Emission rate, lb/hr	1	2*	3*
Release Height above ground, ft	15	60	60
Diameter, ft	0.98		
Exit velocity, ft/min	600	2500	2500
Temperature	Ambient		
Operating hours	Anytime	7AM- 6PM	9 PM to 5AM

* Due to reduced operating hours, these multipliers are needed to keep the total daily emissions consistent with Configuration 1.

Model configuration

- The same model setup and options were used as were used in the development of South Coast AQMD's Health Risk Assessment tool.²³ The latest AERMOD version (v26135) was used.
- Used radial receptors (Figure A-1) at discrete distances from 25m- 1km downwind.

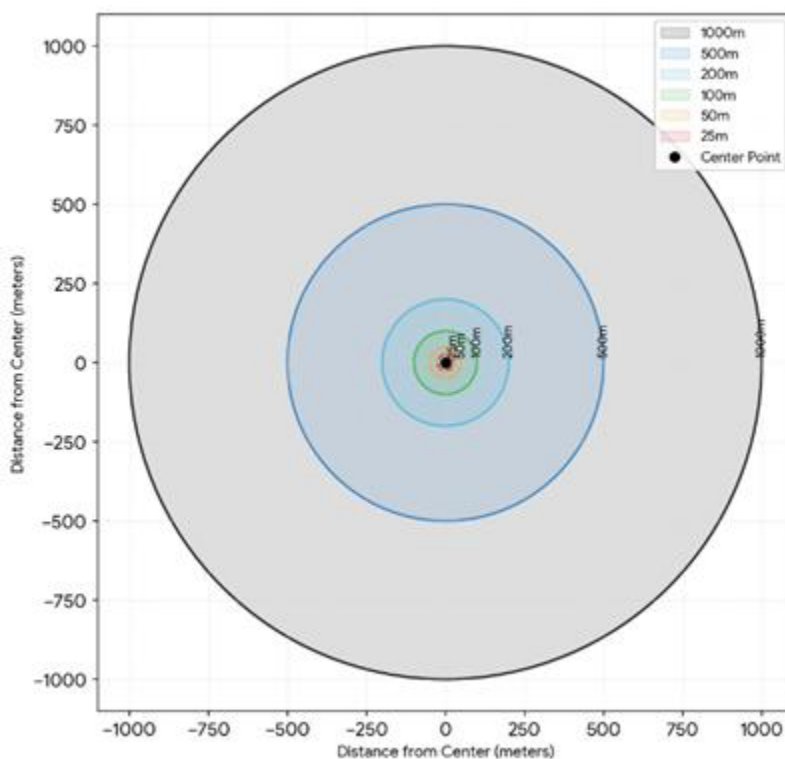


Figure A-1: AERMOD radial receptor grid

²³ https://www.aqmd.gov/assets/aermet/AERMET_files_And_HRA_Tool.html

- Since most fumigation operations happen in a building, downwash from a 4m tall, 30m x 20m rectangular building was modeled as in the South Coast AQMD Health Risk Assessment Tool (Figure A-2). Note that modeled concentrations within and close to the building cavity are very sensitive to stack and building dimensions.

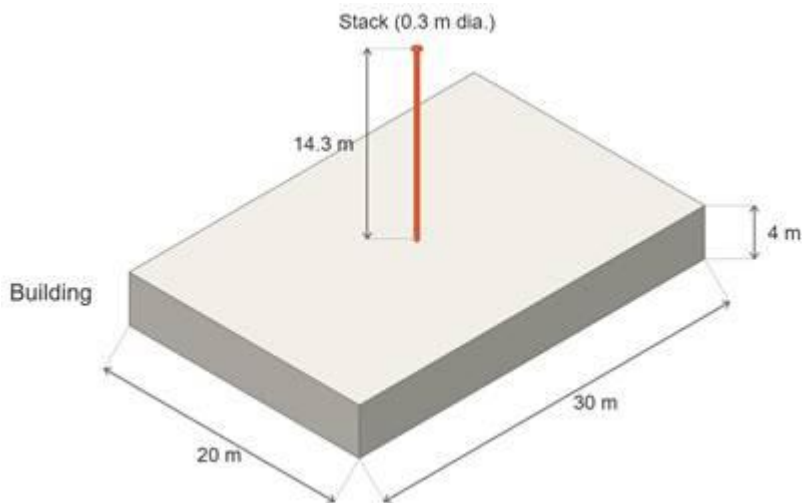


Figure A-2: Source and building orientation. The stack height in this example corresponds with Configuration 2.

- Variable emissions profiles in Figure A-3 were used to account for Configuration 2 schedules separately during the day and night. This assumes that emissions may occur randomly at any hour within the specified time window, while ensuring daily total emissions are equal to continuous operations for mass consistency.

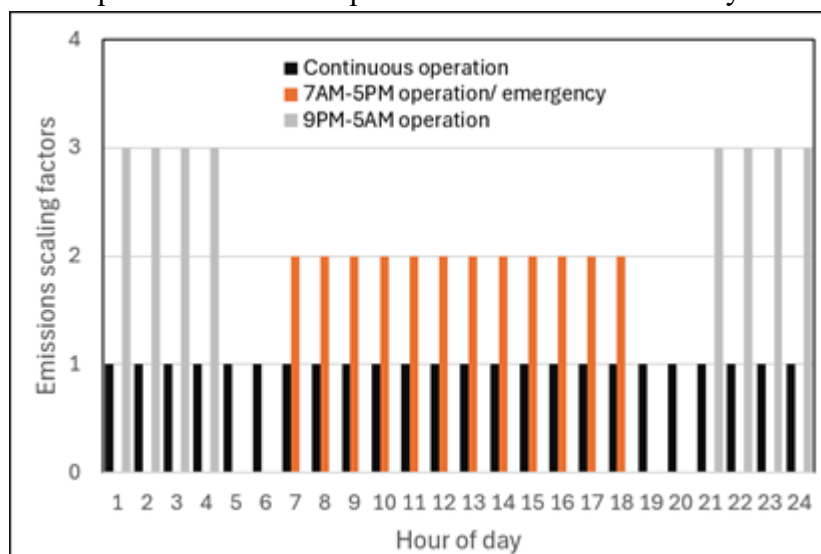


Figure A-3: Emissions scaling factors (EMISFACT and HROFDY keywords) used in AERMOD to account for different operating schedules.

- The model was configured to output hourly maximum concentrations, daily means and annual means at each receptor.

Meteorology

South Coast AQMD-processed meteorological files for all 26 sites across the South Coast Air Basin²⁴ were used. AERMOD was run for each configuration, for a total of $26 \times 3 = 78$ times.

Post-processing

- Maximum concentrations for each averaging period at each radial distance (caused by worst-case meteorological dispersion at each downwind distance) were identified. A different meteorological station could be responsible for the maximum at different downwind distances, directions and stack configurations. This is a conservative estimate.
- The hourly maximum concentrations were divided by the hourly emission scaling factors of 2 for Configuration 2 daytime and 3 for Configuration 2 nighttime. This is needed to undo the scaling factors described in Table A-2 and Figure A-3, as they only apply to daily and annual averaging.
- Modeled hourly maxima (or daily averages for SF) were compared against the acute REL (or daily RfC for SF), while modeled annual means were compared against the chronic REL. The screening level ($HI = 1$) is calculated by dividing the REL by the modeled concentration at each distance. See Tables A-3 and A-4.

It must be noted that screening levels in the following tables will not apply to sources operating outside the bounds of the modeled parameters.

Table A-3 shows Configuration 2 daytime emission limits are lower than the corresponding nighttime limits. This comparison is based on the hours with the worst dispersion. For nighttime emissions, the maximum occurred on a spring night with winds of 0.9 mph and stable atmospheric conditions with a mixing height of 38m. Emissions from the tall stack are likely able to partially escape the shallow building cavity during such conditions, leading to lower impacts.

The daytime maxima occurred during a winter morning when the wind was also 0.9 mph but the mixing height was 278m and the atmosphere was mildly unstable. The plume would be subject to more turbulent downward mixing and remain entrapped within the building cavity, resulting in higher concentrations.

Since some fumigation facilities with tall stacks only operate between January and April, a model sensitivity experiment was conducted by limiting the entire year's emissions to that third of the year. AERMOD's "MHRDOW" keyword was used with scaling factors shown in Figure A-3 multiplied threefold for annual mass consistency. While Jan-Apr based hourly and daily screening

²⁴ <https://www.aqmd.gov/home/air-quality/meteorological-data/data-for-aermod>

levels remain unchanged, annual screening levels were marginally lower, making this a conservative evaluation.

Table A-3: Methyl Bromide Screening Levels from Fumigation Facilities

Distance to Nearest Receptor Location, m	Hourly screening level for Configuration 1, lb/hr	Hourly screening level for Configuration 2_night, lb/hr	Hourly screening level for Configuration 2_day, lb/hr	Annual screening level for Configuration 1, lb/yr	Annual screening level for Configuration 2_night, lb/yr	Annual screening level for Configuration 2_day, lb/yr
25	2.0	61.7	62.6	83.1	35,498.8	19,319.9
50	5.7	104.0	103.9	282.6	9,058.0	10,368.1
75	7.5	170.4	137.3	445.6	7,117.4	10,765.4
100	9.7	210.7	136.4	642.7	6,464.1	12,288.0
200	24.4	202.5	148.4	2,308.4	7,434.9	18,382.4
300	58.6	242.4	189.5	6,523.2	10,715.8	31,298.9
500	171.7	354.6	298.0	16,840.7	17,708.5	73,313.8
1000	448.3	705.3	648.0	49,850.4	33,222.6	254,517.7

Table A-4: Sulfuryl Fluoride Screening Levels from Fumigation Facilities

Distance to Nearest Receptor Location, m	Sulfuryl Fluoride Daily screening level for Configuration 1, lb/hr	Sulfuryl Fluoride Daily screening level for Configuration 2_night, lb/hr	Sulfuryl Fluoride Daily screening level for Configuration 2_day, lb/hr	Sulfuryl Fluoride Annual screening level for Configuration 1, lb/yr	Sulfuryl Fluoride Annual screening level for Configuration 2_night, lb/yr	Sulfuryl Fluoride Annual screening level for Configuration 2_day, lb/yr
25	2.3	120.5	173.2	830.6	354,987.6	193,199.4
50	7.8	93.3	193.4	2,826.5	90,579.7	103,680.7
75	11.7	141.1	277.6	4,456.3	71,174.4	107,654.2
100	16.2	191.9	337.7	6,426.7	64,641.2	122,880.3
200	43.9	206.9	515.6	23,084.0	74,349.4	183,823.5
300	102.5	266.7	757.9	65,231.6	107,158.2	312,989.0
500	269.8	319.7	1,293.0	168,406.9	177,085.2	733,137.8
1000	746.5	543.1	2,896.0	498,504.5	332,225.9	2,545,176.9