

Bay Area Air Quality Management District: Fine Particulate Matter Bay Area Emissions Summary - 2016 annual average, directly emitted PM2.5 emissions

Source Category	Contribution	Authority	Existing Air District Regulations/Incentives	Potential Additional Actions
Area Sources	34%	Bay Area Air Quality Management District		
Residential Wood Combustion	12%		Spare the Air Alerts; ban on fireplaces in new construction; funding for replacement of wood stoves & fireplaces; extension of No Burn Days for the Wildfire Air Quality Response Program (Rule 6-3).	Rule requiring that woodburning devices be disabled or replaced when properties are sold.
Other Fuel Combustion	8%		Rule limiting the emissions of nitrogen oxides from natural gas-fired water heaters and boilers, and furnaces (Rules 9-6 and 9-4).	Rule to improve the efficiency of water heaters and space heaters.
Commercial Cooking	8%		Rule to reduce emissions from commercial cooking equipment such as charbroilers (Rule 6-2).	Expand existing rule, depending on technology options and costs. Working with CARB on plan to use AB617 emissions reduction funding to help restaurants pay for air pollution control.
Other Area Sources	7%		Permitting required for gas stations and dry cleaners (Regulation 2).	Potential updates to permitting regulations and land use considerations.
Permitted Stationary Sources	23%	Bay Area Air Quality Management District		
Refineries	10%		Multiple regulations, include rules that address petroleum refining emissions tracking (Rule 12-15); fluid catalytic cracking units (Rule 6-5); equipment leaks (Rule 8-18); refinery flare monitoring (Rule 12-11); limit sulfur dioxide emissions at coke calcining facilities (Rule 9-14).	Consider amendments to Rule 9-1 to limit sulfur dioxide emissions.
Other Permitted Stationary Sources	13%		Multiple regulations, including rules to reduce emissions from metal foundries (Rule 12-13), shredding facilities (Rule 6-4), Portland cement kilns (Rule 9-13); and reduce population exposure to toxic air contaminants (Rule 11-18).	Consider incentives and additional regulations to further reduce emissions.

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Onroad Mobile Sources				
	27%	California Air Resources Board		
Road Dust	11%		Reducing road dust through funding for urban greenways and Climate Community Program, and incentivizing reduction of vehicle miles traveled.	Additional funding to improve transit and reduce vehicle miles traveled. Note - some interventions, such as stabilizing road shoulders, would fall under city/local government authority.
Brake & Tire Wear	10%		Reducing vehicle miles traveled through improvements to transit efficiency and use; ridesharing services & incentives; bicycle access improvements; voluntary employer-based trip reduction program.	Additional funding to improve transit, support bicycle and pedestrian facilities, and reduce vehicle miles traveled.
Vehicle Exhaust	5%		Reducing vehicle emissions through Diesel Free by '33; Vehicle Buy Back program; Plug-In Electric Vehicle program; Clean Cars for All program; bus service improvements.	Additional funding to improve transit, support bicycle and pedestrian facilities, and reduce vehicle miles traveled.
Nonroad Mobile Sources				
	18%	Various		
Commercial Marine Vessels	5%	California Air Resources Board	Funding to upgrade or replace diesel-powered marine engines, including tugboats.	Support stronger at-berth regulation for CARB to control emissions from ships that dock in ports and refineries. Air District is also seeking magnet source authority through the State Legislature.
Construction Activity	5%	City/Local Governments; CARB (mobile construction equipment & sites high in naturally-occurring asbestos); Air District (dust)	Rules setting limits on visible emissions past fencelines (Rule 6-1) and trackout (Rule 6-6).	Expand existing rule to address communities that are over-burdened and/or experience continuous construction.
Other Off-road Sources	6%	US Department of Transportation (trains)	Funding for electrification of Caltrain; funding to replace many Amtrak Capitol Corridor train engines.	Working to leverage Senate Bill 1 funding to replace switcher engines in East Bay. Air District is seeking magnet source authority through State Legislature to better assess toxicity of these sources.

Policy Approaches to Particulate Matter Gaps, Efforts Underway and Potential Approaches

Current Approaches to Regulate Particulate Matter:

Currently, the Bay Area Air Quality Management District regulates particulate matter (PM) as an air pollutant from two perspectives:

1. As a “criteria pollutant” that impacts air quality on a basin-wide or regional basis. The Air District has authority to regulate criteria or regional pollutants to meet state or federal ambient air quality standards.
2. As a toxic pollutant in the form of diesel particulate matter, which is regulated on a community level or sub-regional basis. Only diesel particulate matter (small subset of particulate matter) is currently characterized as toxic pollutant.

The current approaches do not address the localized health impacts associated with fine particulate matter.¹ The Air District has identified the following as key gaps in addressing these impacts:

1. **Characterization of fine particulate matter as toxic pollutant (“toxic air contaminant”)***
2. **Long-term goals for reductions in fine particulate matter***
3. **Legal authority to regulate magnet sources**

**Items 1 and 2 are further discussed below.*

Efforts Underway:

In parallel to pursuing potential approaches for expanded regulation of particulate matter in the Bay Area, the Air District is actively engaged in the following efforts to maximize the effectiveness of existing programs:

1. Continue to utilize existing authority to rules that ensure the greatest emission reductions that are feasible (best available retrofit control technology requirements (BARCT)) at sources of fine particulate matter.
2. Strengthen stationary source particulate matter rules.
3. Actively pursue legal authority to regulate magnet sources
4. Characterize particulate matter health benefit analyses in staff reports and rulemaking documentation to the extent possible for applicable rules.
 - a. The Air District intends to document our understanding of these impacts and potential benefits where rulemaking may result in particulate matter reductions even if gaps for more stringent implementation have not yet been closed.

Potential Approaches Going Forward:

In order to address the gaps identified above, the Air District identified two potential approaches to regulate health impacts of fine particulate matter. These are conceptual strategies at this stage.

¹ “Fine Particulate Matter” generally refers to particles less than 2.5 micrometer (micron) in diameter (one micron equals one-millionth of a meter, or 10^{-6} meter), and includes the very smallest particles.

1. Characterization of fine particulate matter as toxic pollutant (“toxic air contaminant”)

While the Air District does not have the specific authority to identify fine particulate matter as a toxic air contaminant via the process laid out in the California Health and Safety Code,² we can, however, consider the health impact associated with fine particulate matter, develop control measure and strategies based on those health impacts and advise our Board of Directors when they are considering adopting more stringent control requirements for fine particulate matter. Consideration of the health impact would involve the development of health-based evaluation tools for fine PM, such as community-level health exposure assessments and health benefits analyses, discussed below.

- a. Community-Level Health Exposure Assessments: The Air District can evaluate the health effects of particulate matter through the development of community-level health exposure assessments for fine particulate matter. This work is already underway. The Air District utilized the US Environmental Protection Agency’s Environmental Benefits Mapping and Analysis Program (BenMAP) and particulate matter health values recommended by the California Office of Environmental Health Hazard Assessment to assess the health impacts of fine particulate matter in West Oakland. This type of assessment could be used in other areas of the Air District to characterize the local health impacts associated with community-level exposure to fine particulate matter.
- b. Health-Benefit Analyses: With the ability to conduct community-level exposure assessment, we can then do an in-depth health-benefit analyses that would better inform not only the interested public and community member, but also the Air District Board of Director when deciding on whether to endorse a specific strategy or adopt new requirement to better control fine particulate matter. These analyses would also serve as a counterpoint to the required economic analyses that focus on cost of control, cost-effectiveness, and impacts to the economy by providing information on the cost-benefits due reduced illness and death and associated medical interventions.

2. Long-term goals for reductions of fine particulate matter

Implementation of this effort would require the development of an attainment strategy similar to that of a State Implementation Plan required for current national and state ambient air quality standards. This would involve:

- a. Establishing an air quality goal for particulate matter: The Air District could establish a health protective air quality goal for particulate matter. The establishment of this goal could stem from the discussions being held via the Particulate Matter Symposia hosted by the Advisory Council.
- b. Model how to get to that goal: We would compile an emissions inventory from all the known sources of particulate matter and model that inventory to determine what the ambient levels of particulate matter would be. This would also include particulate matter “transported” in from an upwind air basin. This modeling would indicate the best approaches to reduce the ambient levels of particulate matter in the Air District.
- c. Design a regulatory strategy that will achieve the goal: This strategy could include a suite of regulatory measures and economic incentives that would be geared toward reducing particulate matter emissions and reducing exposure both regionally and locally. Areas to focus on could include: combustion, wood-burning devices, construction activities, commercial cooking activities (restaurants), and road dust.

² California Health and Safety Code, Section 39660

**Existing Bay Area Air Quality Management District Rules Controlling Particulate Matter
(Page 1: Criteria Pollutants)**

2/11/2020

Rule	Name	Current Version	Pollutant Control						Types of Sources			
			Direct PM	SO _x	NO _x	VOC	NH ₃	TACs	Fugitive Dust	Combustion	Industrial Operations	Secondary Generation
Regulation 2	Permits	2018	X	X	X	X	X	X		X		
Regulation 5	Open Burning	2019	X		X					X		
Reg 6, Rule 1	General Requirements	2018	X						X			
Reg 6, Rule 2	Commercial Cooking Equipment	2007	X							X		
Reg 6, Rule 3	Wood-burning Devices	2019	X							X		
Reg 6, Rule 4	Metal Recycling and Shredding Operations	2013	X								X	
Reg 6, Rule 5	Particulate Emissions from Refinery Fluidized Catalytic Cracking Units	2018	X					X		X		
Reg 6, Rule 6	Prohibition of Trackout	2018	X						X			
Regulation 8	Organic Compounds	Varies				X						X
Reg 9, Rule 1	Sulfur Dioxide	1995		X								X
Reg 9, Rules 3, 4, 6	Nitrogen Oxides from Heat Transfer Operations, Residential Furnances and Water Heaters	1982			X							X
Reg 9, Rules 7-12	Nitrogen Oxides and Carbon Monoxide from Industrial, Institutional and Commercial Sources (Boilers, Steam Generators, Process Heaters, Engines, Turbines, Glass Melting Furnances) including equipment at petroleum refineries and electric power generation	2011			X							X
Reg 9, Rule 13	Nitrogen Oxides, Particulate Matter and Toxic Air Contaminants from Portland Cement Manufacturing	2016	X		X			X	X		X	
Reg 9, Rule 14	Petroleum Coke Calcining Operations	2016		X								X

Direct PM = Directly emitted Particulate Matter
NO_x = Nitrous Oxides
SO_x = Sulfuric Oxides

VOCs = Volatile Organic Compounds
NH₃ = Ammonia
TACs = Toxic Air Contaminants

**Existing Bay Area Air Quality Management District Rules Controlling Particulate Matter
(Page 2: Toxic Air Contaminants)**

2/11/2020

Rule	Name	Current Version	Pollutant Control						Types of Sources			
			Direct PM	SOx	NOx	VOC	NH3	TACs	Fugitive Dust	Combustion	Industrial Operations	Secondary Generation
Reg 11, Rule 1	Lead	1982	X					X			X	
Reg 11, Rule 2	Asbestos Demolition, Renovation and Manufacturing	1998	X					X	X			
Reg 11, Rule 3	Beryllium	1982	X					X		X	X	
Reg 11, Rule 4	Beryllium Rocket Motor Firing	1982	X					X		X		
Reg 11, Rule 5	Mercury	2018	X					X			X	
Reg 11, Rule 8	Hexavalent Chromium - Chrome Plating and Chromic Acid Anodizing Operations	1998	X					X			X	
Reg 11, Rule 10	Hexavalent Chromium Emissions from all Cooling Towers and Total Hydrocarbon Emissions from Petroleum Refinery Cooling Towers	2018	X					X			X	
Reg 11, Rule 13	Medical Waste Incinerators	1991	X					X		X		
Reg 11, Rule 14	Asbestos-Containing Serpentine	1991	X					X			X	
Reg 11, Rule 15	Emissions from Toxic Metals from Non-Ferrous Metal Melting	1994	X					X			X	
Reg 11, Rule 17	Limited Use Stationary Compression Ignition (Diesel) Engines in Agricultural Use	2011	X					X		X		
Reg 11, Rule 18	Reduction of Risk from Air Toxic Emissions at Existing Facilities		X					X		X	X	
Reg 12, Rule 13	Foundry and Forging Operations	2013	X								X	

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