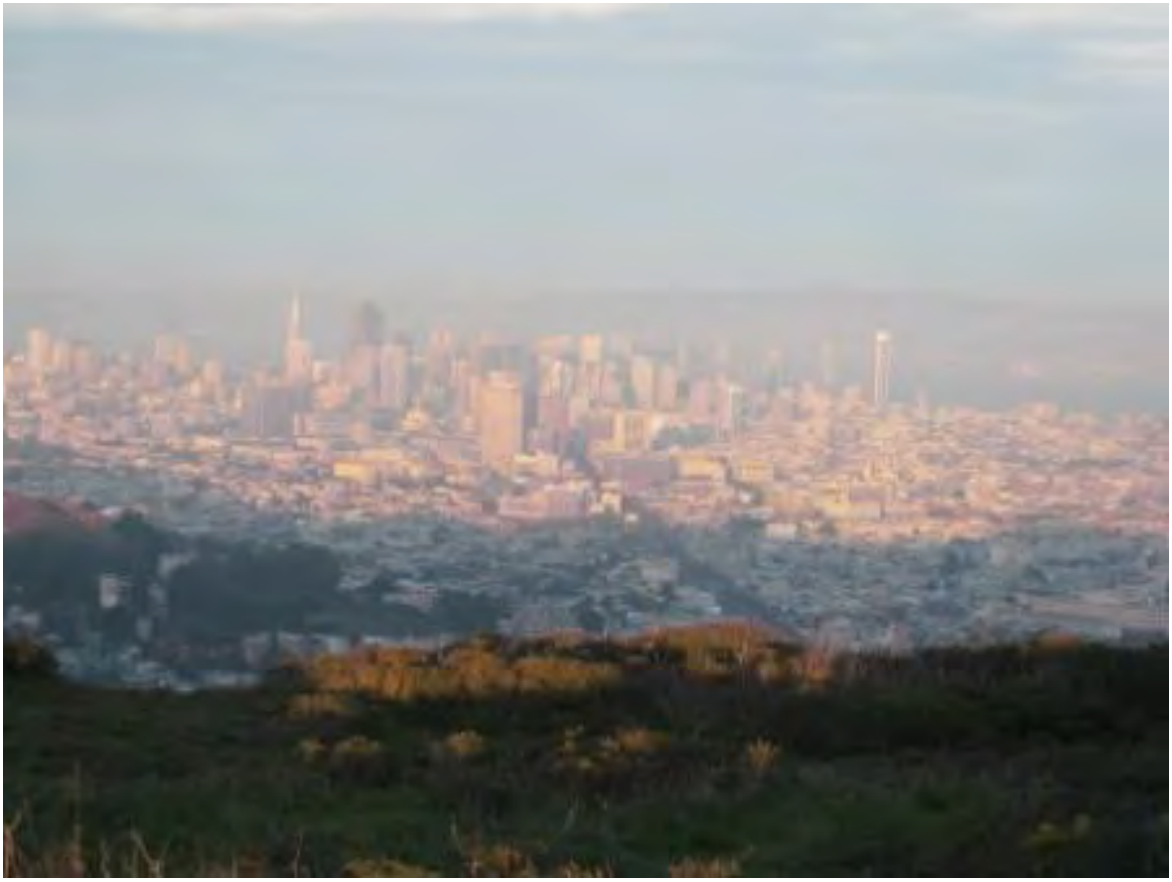
BAY AREA AIR QUALITY MANAGEMENT DISTRICT

STAFF REPORT – PARTICULATE MATTER

Proposed Amendments to Regulation 6, Rule 1: General Requirements

2017 Clean Air Plan, Control Measure SS31



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STAFF REPORT

Regulation 6, Rule 1: General Requirements

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I. EXECUTIVE SUMMARY

The Bay Area Air Quality Management District (Air District) staff is proposing amendments to Regulation 6, Rule 1: General Requirements (Rule 6-1), the Air District's general particulate matter emissions limitation rule. This Staff Report has been developed to provide the information supporting the proposed amendments to Rule 6-1 and is intended to provide the public with information on draft amendments to Rule 6-1 in advance of Public Hearing the Air District will hold in Spring 2018.

The Air District is also proposing a new over-arching regulation for Particulate Matter, Regulation 6: Common Definitions and Test Methods (Reg 6) to accompany revisions to Rule 6-1. The new proposed Regulation 6 would provide common definitions and test methods that apply to existing Regulation 6 rules and other source-specific particulate matter rules as they are developed in the future.

The proposed amendments to Rule 6-1 are part of a rule-making process to fulfill a commitment by the Air District's Board of Directors to review Regulation 6, Rule 1, identified as Stationary Source Measure SS31 in the Air District's 2017 Clean Air Plan. Since the 2010 Clean Air Plan originally identified amending Rule 6-1 as a Stationary Source Control Measure, Air District staff further committed to taking steps to address the Bay Area's particulate matter challenges in a November 2012 report entitled *Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area*. These draft amendments to Regulation 6, Rule 1 begin to fulfill these important commitments to reduce particulate matter emissions and improve public health.

Staff proposes amendments to Rule 6-1 because the amendments are needed to ensure the Bay Area standards are as health-protective as possible; other air districts in California have more stringent particulate matter standards; and the Air District's general requirement particulate standards have not been updated in decades. Control technology is available that facilities can use to comply at a reasonable cost. Staff found no facilities with PM emissions quantified by source test that are affected by the amendments to Rule 6-1. As mid-sized and smaller particulate matter sources begin to conduct source tests, some may find a need to install controls. However, most of these sources currently have more stringent permit limits than those being proposed. Staff estimates no emission reductions from these sources.

In the workshop phase of this rule development effort, Air District staff drafted a new regulation to control particulate matter, Regulation 6, Particulate Matter, Rule 8: Bulk Material Storage and Handling (Rule 6-8). Draft new Rule 6-8 would focus on fugitive dust from bulk material storage and handling operations, a large source of particulate matter and a moderate source of fine particulates ($PM_{2.5}$). Fugitive dust is dust that is generated from active operations such as vehicle traffic, loading and unloading solid materials; grinding, screening, or transporting solids using conveyors; and wind erosion on solids during storage and/or handling operations.

Rather than continue to the separate development of draft new Rule 6-8, staff recognized that fugitive dust control requirements from bulk material storage and handling facilities best fits within general requirements, and has incorporated these requirements into the proposed amendments to Rule 6-1. The new section proposed for Rule 6-1 addresses fugitive dust from active operations and from wind erosion of storage piles, disturbed surfaces, and any other activities where the solids can be exposed to the wind by setting limits on any allowable fugitive dust plume, and by prohibiting any visible emissions of fugitive dust from traveling or carrying beyond the site property. In addition, significant bulk material spills must be cleaned up so they do not become a source of fugitive dust. Bulk materials include coke and coal storage and handling. Coke and coal are particularly troublesome solids because the dust from these products is black, visible, and particularly annoying if any particles fall onto adjoining property.

This proposed new section of Rule 6-1 will affect approximately 120 facilities that store and handle bulk materials, ten of which handle petroleum coke, and three facilities that store and handle coal. Approximately 40 of these facilities already have controls for fugitive dust, mostly water sprays. Wind breaks are a very effective method to control wind erosion that initiates fugitive dust plumes, particularly when bulk materials are actively conveyed from one place to another. Costs for wind screens and improvements to watering systems are relatively minor. Emission reductions are estimated to be 0.37 tons per day (tpd) of particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}), with approximately 0.03 tpd of emissions being $PM_{2.5}$. Complaints from neighbors are expected to be reduced significantly. The new rule would reduce emissions of particulate matter in the Bay Area in a technically feasible and cost-effective manner, thereby improving public health and reducing nuisance dust deposited on nearby neighbors' property.

The Air District is proposing these amendments to Rule 6-1 as part of three proposals addressing fine particulate pollution. The three proposals include (i) a new Regulation 6 providing common definitions, expectation of monitoring emissions to remain in compliance, and test methods that apply generally to all of the particulate matter Rules under Regulation 6; (ii) amendments to Rule 6-1; and (iii) a new Rule 6-6: Prohibition of Trackout. More information about these related proposals can be found in their respective staff reports, which are being published concurrently with this report.

This Staff Report describes the review that staff has undertaken to analyze the various source categories addressed by Rule 6-1 and determine any significant emission reductions. Following this introduction and summary, Section II, Background refers to the parallel section in the Regulation 6 staff report supplemented with additional information regarding bulk material storage and handling. Section III, Proposed Requirements describes the specific requirements and emission limits, and rationale supporting each. Section IV, Emissions and Emission Reductions describes the expected emissions impacts. Section V provides estimated costs for implementation of Rule 6-1; assesses cost effectiveness of the emission reductions; summarizes the Socioeconomic Impacts on the affected industries, jobs market, and local economy; and covers the implementation impacts for the Air District. Section VI provides a discussion on how this rule fits into the existing structure of state and federal regulatory requirements. Section VII summarizes the environmental impacts, and references the California Environmental Quality Act analysis conducted for the amendments to Rule 6-1, in combination with new Regulation 6, and new Regulation 6, Rule 6: Prohibition of Trackout. A Negative Declaration is proposed as a result of the CEQA review. Section VIII describes the rule development and public participation process used to ensure all affected and interested parties participated in this rulemaking project. Section IX summarizes the findings required by the California Health and Safety Code to adopt an amended regulation, summarizes the staff conclusions, and lists the staff recommendations to the Board regarding Rule 6-1, and the Negative Declaration from the CEQA analysis. References are provided, and the associated CEQA Analysis, Socio-economic Analysis and Response to Comments are appendices to this staff report.

Staff recommends the Board of Directors adopt the proposed amendments to Regulation 6, Rule 1, and approve the associated CEQA Analysis Negative Declaration at the Public Hearing scheduled for Spring 2018.

The Air District invites all interested members of the public to review the proposed amendments to Rule 6-1 and this Staff Report, to provide comments on this proposal, and to participate in the Public Hearing. Air District staff will accept written comments, will respond to all comments received, and will present final proposals to the Air District's Board of Directors for their consideration. For further information in advance of the Public Hearing, please contact Guy Gimlen, Principal Air Quality Engineer, (415) 749-4734, ggimlen@baaqmd.gov.

II. BACKGROUND

Refer to the Background section of the staff report for new proposed Regulation 6, Section A for the broad review of all particulate matter sources in the Bay Area, including bulk material storage and handling. This background information provided the basis for the amendments to Rule 6-1, and discusses the recognition that most sources currently have more restrictive permit limits, so the more restrictive particulate matter standards result in very few if any emission reductions. That review also lead directly to the new section of Rule 6-1 addressing control of fugitive dust from bulk materials, including petroleum coke and coal storage and handling. Supplemental background information on petroleum coke and coal storage and handling is included here.

A. Industry / Source Description

There is potential for fugitive dust being emitted from any location that produces, handles or stores solid material, particularly where heavy truck and vehicle traffic are part of producing and selling these bulk materials. Bulk material is defined as any unpackaged sand, soil, gravel, aggregate, solid construction material, solid industrial chemical or other solid product less than two inches in length or diameter. Petroleum coke and coal handling facilities are included with bulk material sites.

1. Bulk Material Storage and Handling

Wind erosion at bulk material storage and handling facilities can create significant dust emissions, particularly when handling fine solids like gypsum, or even gravel and sand from rock quarries. Background on bulk material storage and handling is found in the Regulation 6 staff report, Section II.A.7: Opportunities for PM Emission Reductions. In addition, the Air District has received numerous complaints about coke dust and coal dust. Coke and coal loading / unloading and stockpiles are unique in that fugitive dust from these products is black and highly visible other more typical forms of dust.

PM Emissions from Petroleum Coke and Coal

Petroleum coke is a product of the oil refining process, converting residuum (the heavy asphaltic material from crude oil) into lighter gas oils and solid coke. Three of the five Bay Area refineries produce solid coke. The solid coke is formed in a large vessel called a coke drum, and removed from the drum with high pressure water. The solid coke usually falls into a pit, where it is scooped up, crushed to a manageable size, and conveyed to storage on a conveyor belt. Each refinery conveys, loads, and stores coke in stockpiles (either on-site or off-site). The solid coke may be loaded directly onto a truck and transported to a customer. Most petroleum coke is burned for fuel. One refiner also calcines a portion of their coke to produce a specialty product called calcined coke. One other refiner produces “fluid” coke, which has the consistency of black sand.

One cement manufacturer in Cupertino burns petroleum coke as fuel. Coke is transported to this facility by truck, offloaded via conveyor to a storage pile, and then fed into the process stream. Most of the coke produced in the Bay Area is shipped overseas. There are three coke shipping facilities, one located in the Richmond harbor, one in Pittsburg, and one in Benicia. Each of these shipping facilities receives solid coke by truck, off-loads it, conveys and stores it, then loads it onto ships. The facility in Richmond stores the coke in an open stockpile. The facility in Pittsburg is a state of the art facility, with enclosed off-loading, enclosed conveyors, and enclosed storage. The facility in Benicia is partially enclosed and handles fluid coke.

The Bay Area has two foundries that use coal as a raw material in the manufacturing process. One is in Oakland and the other is in Union City. Coal is received from out of state by railcar at each facility. One facility off-loads and conveys the coal to open storage, then scoops up coal as

needed to supply the manufacturing process. The other off-loads and conveys the coal to a series of silos where the coal is stored until used in the manufacturing process.

Coal dust is a concern throughout the transportation and handling process. Coal contains 2-5 wt. % silt (particles smaller than 70 microns), and the silt can create dust from wind erosion if not kept moist. Coal dust can be emitted from the open tops on railcars in transit. Additional silt is formed as coal jostles in the railcar but most of the coal dust silt is emitted from the railcar in the first few miles of travel. The Air District does not have authority to regulate rail transportation.

In addition, coal dust is a concern when off-loading the railcar into a hopper and conveyor system. Staff observed coal dust coming out of the top of the railcar during unloading, and coal dust surrounding the receipt hopper below the railcar. In addition, the facility that scoops up the coal to feed into the manufacturing processes had issues with coal spills into the vehicle path used to deliver the coal to the process equipment.

2. Pollutants and Emissions Sources

The pollutants of concern from bulk material sites are fugitive dust from the any of the solid materials being handled and stored, and any dust from vehicle traffic on unpaved roads within the site. Rock quarries, asphalt plants, construction sites, equipment storage yards that are not paved, landfills, and any industrial facility that handles solids has the potential to create dust that can add to the particulate load in the air, and that can impact neighbors.

3. Current Emissions Control Technology and Methods

As described in Background section of the staff report for new draft Regulation 6, Section A, the conventional controls for fugitive dust from bulk material storage sites include water trucks spraying water on stockpiles and roads, covers for stockpiles, limiting vehicles speeds on internal haul roads, water sprays for crushers, screens and conveyor belts, and cleanup of any spills.

B. Regulatory History

Refer to the Background section of the staff report for new draft Regulation 6, Section B for the broad review of Regulatory History.

C. Technical Review of Control Technologies

Refer to the Background section of the staff report for new draft Regulation 6, Section C for the broad review of control technologies. There are no new innovative technologies used for controlling fugitive dust from bulk material sites, but there are control technologies that are very effective that are currently under-utilized and can impact dust generation significantly. Wind screens are very effective, often more effective than using water to control dust. Staff strongly encourages use of wind screens rather than watering to control dust, particularly with the semi-constant drought that persists throughout California.

1. Wind Screens are Effective Dust Controls

Prevention of wind erosion for bulk materials, including coke and coal, is very similar to that needed for geologic fugitive dust:

- Minimize the surface area being exposed to wind erosion;
- Establish windbreaks, and limit work on windy days;
- Apply dust suppression measures including water fog or mist when needed;
- Limit traffic on surfaces with dusty silt, and limit vehicle speeds; and

- Prevent dirt, mud, and solids spills; and clean up any spills that have the potential to create dust immediately.

Staff observed the following areas of opportunity for better bulk material dust control:

- Protect locations where bulk materials are handled from wind erosion:
    - Unloading from a railcar or truck into a hopper that feeds a conveyor;
    - Unloading from a ship (this is seldom done, but uses a clamshell style scoop when it is done);
    - Conveyors are often up in the air and more susceptible to winds;
    - Conveyor transfer points (the transitions from the end of one conveyor onto another conveyor, or crusher or screening device);
    - Stockpiles; and
    - Loading onto trucks, railcars and ships.
- Reduce drop heights at conveyor transfer points, and drop heights onto stockpiles where the material is exposed to the wind;
- Prevent and cleanup spills that are subject to wind erosion; and
- Prevent bulk materials from migrating into vehicle traffic areas where it can be pulverized into silt, and entrained into the air from the turbulence of the vehicle traffic.

Staff visited most bulk material handling sites, and found each site (except the petroleum coke shipping facility in Pittsburg) needed improvements in a least two of the areas listed above.

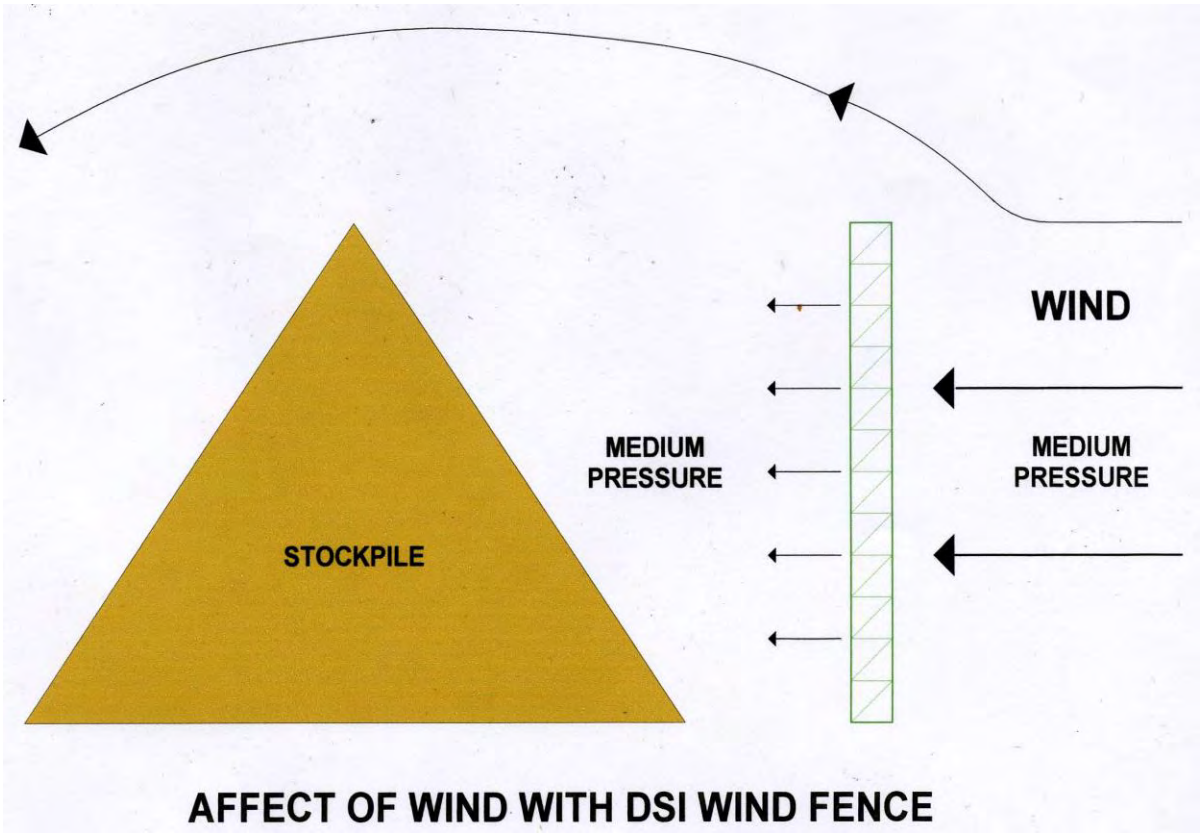
Figure II-1: Typical Wind Screen - constructed to protect a down-wind stockpile.

Wind barriers are very effective at reducing wind velocity and controlling wind erosion. Research on wind barrier design finds that the most effective designs[1] have 50 percent porosity (i.e. allows about half of the wind to blow through the wind screen), and the height of the windbreak should

[1] Windbreak Effectiveness for Storage-Pile Fugitive-Dust Control, Billman and Ayra, Department of Marine, Earth and Atmospheric Sciences, North Carolina State University.

be as high as the bulk material handling operation or stockpile that it protects. The windbreak should be placed a distance no more than its height upwind from the potential dust source. Wind screens are estimated to be 70 percent effective at reducing fugitive dust. Figure II-2 shows the impact a wind barrier has on wind velocity. This example is provided by Dust Solutions, Inc., a company that provides a wide variety of dust solutions, including water misters and wind barriers. Wind screens with porosity allow enough wind to blow through the screen preventing a low-pressure area on the downwind side that can create eddy currents the aggravate wind erosion.

Figure II-2: Wind Barrier – from Dust Solutions, Inc.



Dust controls are similar during active dust generating operations. Dust control measures for active bulk material handling include:

- Provide wind barriers to prevent / minimize wind erosion, or enclose dusty material handling and storage areas.

Figure II-3: Wind Barrier surrounding a transfer point

Windbreaks on conveyors can be built or attached to the support structure for the conveyor, with adequate clean-out openings to accommodate conveyor spills. Conveyors may also need catch-pans to catch any small spills from conveyor operation. These catch-pans, however, are often difficult to retrofit onto an existing conveyor because the mechanical structure must be designed for the weight of the catch-pan plus any spills that may collect. Staff is not proposing to require catch-pans on conveyors because of this retrofit problem.

Fugitive dust from wind erosion is estimated based on wind speed above what is known as "the friction threshold velocity" (the wind speed required to get the first particle of fugitive dust into the air). Use of a wind screen reduces wind velocity by 50%. Average wind speed in the Bay Area during the dry summer season is typically about 10 mph with peak wind speed seldom over 20 mph, so wind screens can be up to 85% effective at controlling fugitive dust. Staff estimates that a combination of windscreens and judicious use of water fog and misting systems can control more than 90% of fugitive dust. However, since about one-third of bulk material handling facilities already use some combination of wind screens and water sprays, staff estimates that enhanced effort to control dust, particularly using wind screens, will be approximately 70% effective.

2. Judicious Water Use to Control Dust

In addition to wind screens, judicious use of water is the next most effective way to control dust. Water sprays and dust suppressants continue to be the most effective way to control dust from stockpiles and unpaved, unstabilized haul roads. Covers for stockpiles, and a low-silt gravel base for unpaved haul roads are effective and reduce water use.

In situations where active operations occur and fugitive dust is being generated, water fog and water mist are more effective at reducing dust. Rather than spraying significant volumes of water, fog and mist systems create small water droplets that are more effective at contacting small dust

particles. Most estimates of water fog and water mist systems indicate they are 10 – 20 times more effective at reducing fugitive dust per gallon of water. During this recurring drought in California, staff recommends water fog or mist systems, and recommends converting existing water spray systems to water fog/mist systems. These water fog systems can also be even more effective when a surfactant (typically a soap) is used to help the water contact and adhere to the solid particles of dust more easily.

Figure II-4: Use water fog or mist to control dust during active handling operations.

Figure II-5: Spray water fog and mist to keep disturbed surfaces damp during bulk material moving operations.

Staff estimates that water spray systems can control approximately 50 percent of fugitive dust generation, and water fog or water mist systems can be equally effective using less than 25 percent of the water used by water sprays.

Note the obvious concern about excessive use of water to control fugitive dust emissions, especially with the persistent recurring drought being experienced in California. This concern about water use drives the recommendation to use wind screens as a first approach to dust control, and to take advantage of the better effectiveness of water fog and water mist systems, rather than water sprays, water hoses, and water trucks. A complication of water fog and mist systems is that the fog or mist must be protected from the wind by an enclosure or a wind screen, because the fog or mist will be affected by the wind patterns.

3. Vehicle Traffic Controls

At many bulk material sites, vehicle traffic is the largest source of fugitive dust. Staff recommends the following control methods to prevent, and reduce dust from vehicles:

- Limit vehicle traffic to paved or stabilized surfaces;
- Limit vehicle speeds to less than 15 mph;
- Use barricades or barriers to prevent erosion of bulk materials onto the vehicle pathways where vehicles can pulverize the solids into fine particles; and
- Prevent dirt, mud and other solids from being tracked out or spilled onto paved roadways.

Staff has specifically not required these specific controls in the proposed rule language, because it is up to each bulk material site to use the controls that best fit their operations, as needed to prevent significant dust plumes and to prevent any visible dust plumes from being carried beyond the property line where the dust can impact neighbors.

III. PROPOSED AMENDMENTS

A. Purpose

This regulation limits the quantity of PM in the atmosphere by establishing limits on emission rates and concentrations from facilities with stacks and by establishing visible emission limits, including opacity standards for any source, including fugitive dust from bulk material storage and handling facilities.

B. Applicability

This is a general requirements rule, so it would apply to all sources of PM in the Bay Area. In addition, the general provisions in Regulation 1, and the common definitions and source test methods in Regulation 6 also apply to Rule 6-1 as cited in the rule. A proposed new section addresses fugitive dust from bulk material sites.

C. Exemptions

Rule 6-1 provides exemptions for sources that are subject to other source-specific rules addressing those operations. Section 6-1-110.1 exempts temporary sandblasting operations because they are currently subject to the provisions of Regulation 12, Rule 4. Section 6-1-110.2 exempts outdoor fires because they are currently subject to the provisions of Regulation 5. Section 6-1-110.3 exempts wood-burning devices because they are currently subject to the

provisions of Regulation 6, Rule 3. Section 6-1-110.4 exempts metal recycling and shredding operations because they are currently subject to the provisions of Regulation 6, Rule 4.

Section 6-1-111 provides a limited exemption for explosive blasting operations that have been permitted by the State of California Department of Industrial Relations, Division of Occupational Safety and Health (and other applicable local permitting authorities). It is very difficult to control dust during blasting operations. Staff has observed significant pre-watering of a blast site (for approximately 12 hours), yet there was very little impact on the resulting fugitive dust from the blast. This exemption applies to the blasting operations only. The storage and handling of bulk materials remain subject to the requirements of this rule.

Section 6-1-112 provides a limited exemption from new Section 307 regarding fugitive dust from bulk material handling, because Regulation 9-13-304 requires specific fugitive dust mitigation control measures. This section also provides a limited exemption to Section 6-1-310 (particulate matter concentration limits) and Section 6-1-311 (particulate matter weight limits) for Portland Cement manufacturing because these sources are subject to the specific requirements of Regulation 9, Rule 13.

Section 6-1-113 provides a limited exemption from the proposed more stringent amendments to Section 6-1-310 (particulate matter concentration limits), the proposed more stringent amendments to Section 6-1-311 (particulate matter weight limits), and from compliance testing required in Section 6-1-504 for commercial cooking, because these sources are subject to the provisions of Regulation 6, Rule 2. Similarly, salt processing operations are proposed to be exempt because pure (greater than 99 weight percent) salt air emissions to not have health consequences. Material Safety Data Sheet (MSDS) for salt cites no specific health impact limits.[2]

Staff considered a similar exemption for sugar processing operations, but found that the National Institute for Occupational Safety and Health (NIOSH) recommends no more than 5 mg/m^3 of exposure to sugar dust, so the limited exemption was not included in the rule language.

Section 6-1-114 also provides a limited exemption from the proposed more stringent amendments to Section 6-1-310 (particulate matter concentration limits) and the proposed more stringent amendments to Section 6-1-311 (PM weight limits), for combustion from fuel fired indirect heat exchangers (furnaces, heaters, boilers, etc.) and gas-fuel fired control devices that control only gaseous emissions. Particulates from fuel combustion are generally the result of incomplete combustion, and the most practical method to control particulates is to install an oxidation system (either catalytic oxidation or afterburner) in the flue gas stream. Oxidation systems are currently Best Available Control Technology for new installations, but represent a significant alteration to an existing combustion flue gas stream, and can affect draft so induced draft fans are often necessary. Installation of any oxidation system is site specific and furnace/boiler specific, so beyond the scope of this general particulate control rulemaking project. Best Available Retrofit Control Technology that applies to these sources is “good combustion practice.” In addition, gas-fuel fired indirect heat exchangers are exempt from compliance testing required in Section 6-1-504. Liquid- and solid-fuel fired indirect heat exchangers remain subject to compliance testing required in Section 6-1-504 so additional information can be developed on these sources.

Section 6-1-115 provides a delayed compliance date for the more stringent TSP concentration limits in Section 6-1-310.2 for one specific facility. This facility is a sewage treatment plant that currently incinerates sludge. Source test data indicate the sludge incinerator may occasionally have difficulty meeting the more stringent TSP concentration limits. A delayed compliance date

[2] Morton Salt Safety Data Sheet: CAS Number 7647-14-5, MSDS Code 100

will give this facility time to identify controls that both satisfy the TSP limit and also address toxic emissions requirements in Rule 11-18.

Section 6-1-116 exempts two specific sources at one facility from the more stringent TSP limits in Section 6-1-310.2 and 6-1-311.2. These sources are abated by a wet scrubber that has an Air District Permit to Operate, and the wet scrubber constitutes best available control technology (BACT) for particulates emitted from these sources.

Section 6-1-117 provides a delayed compliance date for the more stringent TSP limits in Section 6-1-310.2 and 6-1-311.2 for one specific facility. This facility plans to install additional control equipment based on the requirements of Regulation 9, Rule 14: Petroleum Coke Calcining Operations. This equipment will not be installed and in operation until late 2019. This limited exemption delays the more stringent PM requirements for two additional years, until January 1, 2022, to provide time needed for tuning this control equipment.

One limited exemption that was considered and rejected was for situations where wind gusts exceed 25 mph. Fugitive dust is very difficult to control in high wind situations, and facilities can implement all feasible control measures to limit fugitive dust and still have visible emissions that can travel or carry beyond the property line. Rather than provide a specific exemption for such situations, staff proposes using the current method of allowing Compliance and Enforcement personnel to use their collective judgement and discretion regarding the degree to which the Air District enforces Section 6-1-307 during high wind situations. Enforcement inspectors currently, and will continue to consider the background level of dust upwind of any specific source, and whether the owner/operator has a written dust control contingency plan and has implemented the dust control measures in the contingency plan. Potential dust control measures are identified in the Staff Report for Regulation 6, Attachment 1-5.

D. Definitions

The common definitions in Regulation 6 apply to Rule 6-1. In addition, Rule 6-1 provides definitions for “Exhaust Gas Volume” and “Process Weight Rate.” These two definitions are used in setting PM emission limits.

“Exhaust Gas Volume” is defined as the volume of gas discharged from an emission point, adjusted to standard conditions (defined in Reg. 1-228) excluding any water vapor or steam.

“Particle” is defined because it is used in Section 6-1-305. It is defined as a minute quantity of solid matter or liquid droplet.

“Process Weight” is defined as total weight of all material going into a process operation, including solid fuels and any process air needed (generally for cooling), but excluding:

- Any liquid or gas fuels,
- Air that is not consumed as a reactant, or not critical to the process,
- Air that is used only for dilution, and
- Combustion air.

This definition of process weight is designed to include the volume of gases needed by the process, but excluding combustion products and excluding any dilution air.

“Regulated Bulk Material” site is defined as a bulk material site that produces, handles, loads, unloads, stores or uses more than 10 tons per year of bulk materials; and is subject to an authority to construct and/or permit to operate specifically for bulk material storange and handling issued by the Bay Area Air Quality Management District. New draft more stringent limits on fugitive dust will apply regulated bulk material sites.

A stockpile is defined as a storage pile of bulk material that is open or unenclosed, external to any barns, pit or silo.

E. Emission Limits

Currently, Regulation 6, Rule 1: General Requirements Sections 6-1-301 and 302 establish a visible emissions limit from any source of no more than Ringelmann 1, or 20 percent opacity for no more than three minutes in any hour observation period (five percent of the time), using EPA Method 9. This requirement applies to all sources, except for those outlined in Sections 6-1-303 and 304. Other aspects of Sections 6-1-301 to 306 include minor edits for clarity. Reference to opacity sensing devices is deleted, because those references are now included in Regulation 6-602.

Staff considered altering the language defining the opacity observation period from "any hour" to "any sixty-minute period." However, regarding facilities with Continuous Emissions Monitors (CEMs), the District Manual of Procedures, Volume V, Section 8.3.2 specifically identifies "clock hour" when determining any excess emission. Staff received feedback after the workshops indicating that several facilities rely on this interpretation in control of soot-blowing functions, and in calculations of CEM monthly summaries and excesses. Staff recommends leaving the opacity observation period definition as "any hour."

Section 6-1-307 requires Regulated Bulk Material Sites to meet a more stringent fugitive dust plume requirement of no more than 10% opacity (equivalent to Ringelmann 0.5), that does not linger in the air for more than a cumulative three minutes in any 60-minute observation period (five percent of the time) and that is not larger than five feet long, five feet high, or five feet wide. This significance threshold is designed to allow a reasonable or small dust plume that may occur from vehicle traffic, some active operation on solid materials, or minor puffs of dust from the wind. However, if the plume becomes taller than a person or wider than a car, the 10 percent opacity and three minutes in any 60-minute observation period limits apply.

In addition, Section 6-1-307 prohibits any visible dust plume from traveling or being carried by the wind beyond the property line of the site. Visible emissions are determined by EPA Method 22, which is based on whether the particulate plume is visible or not. This limit is established to be sure dust is not leaving the site and impacting neighbors.

Section 6-1-307 also requires any bulk material spill that is more than 12 inches high or covers an area of more than 25 square feet must be cleaned up by the end of the workday, unless the spill is stabilized or protected by a wind screen to prevent fugitive dust. Cleanup activities must meet a 20 percent opacity limit for no more than three minutes in any sixty-minute period.

Section 6-1-310 establishes Total Suspended Particle (TSP) concentration limits that apply to facilities with a stack or vent with sufficiently regular geometry so that both flow volume and contaminant concentrations can be measured.

Section 6-1-310.1 retains the current limit of 343 milligrams/dry standard cubic meter (0.150 grains/dry standard cubic foot (gr/dscf)).

Section 6-1-310.2 establishes emission limits for any source where the Potential to Emit (defined in Regulation 2-1-217) is greater than 1,000 kilograms/year (approximately six lbs per day). Emission limits are provided in a table, ranging from 0.150 to 0.0100 gr/dscf, depending on volume of Exhaust Gas Rate. These emission limits are equal to limits currently in place in the South

Coast Air Quality Management District (South Coast) Rule 404, and have been achieved in practice. Section 6-1-310.2 goes into effect July 1, 2020.

Section 6-1-310.3 defines adjustments needed to standardize emissions concentrations, namely 12 volume percent carbon dioxide (CO_2) for incinerators and salvage operations, or six volume percent oxygen (O_2) for heat transfer operations.

Section 6-1-311 establishes TSP weight limits that apply to facilities with a stack or vent with sufficiently regular geometry so that both flow volume and contaminant concentrations can be measured.

Section 6-1-311.1 retains the current table of limits, but clarifies the exact range of process weight for each emission limit. Limits range from 1.8 to 40 lbs per hour.

Section 6-1-311.2 establishes emission limits for any source where the Potential to Emit (defined in Regulation 2-1-217) is greater than 1,000 kilograms per year(kg/yr) (approximately six lbs per day). Emission limits are provided in a table, ranging from 1.0 to 30 lbs per hour depending on process weight rate. These emission limits are equal to limits currently in place in the South Coast Rule 405, and have been achieved in practice. Similarly, Section 6-1-311.2 goes into effect July 1, 2020.

Sulfuric acid manufacturing plant acid mist emissions were not studied in the scope of this rule development project. Section 6-1-320 for Sulfuric Acid Manufacturing Plans has minor clarifications. TSP limits in Sections 6-1-310 and 311 continue to apply to sulfuric acid manufacturing plants. Review of sulfuric acid manufacturing plant source tests indicates these plants easily meet these emissions limits.

Sulfur recovery unit acid mist emissions were not studied in the scope of this rule development project. Section 6-1-330 for Sulfur Recovery Units has minor revisions for clarification. TSP limits in Section 6-1-310 and 311 continue to apply to sulfuric recovery units. Review of sulfur recovery unit source tests indicate these units easily meet these emissions limits.

F. Administrative Requirements

The monitoring requirement in Regulation 6-102 applies.

Section 6-1-402 provides an Alternate Source Test Frequency from the source testing requirements in Section 6-1-504 and 505. The APCO will consider applications for reducing source test frequency based on actual test results if three consecutive results are in compliance with the applicable standard.

G. Monitoring and Records

Sections 6-1-501 – 503 have minor clarifications.

Section 6-1-504 defines TSP compliance testing requirements, based on the extent of the TSP emissions. Compliance testing is required for any source with a District Permit to Operate and TSP emissions greater than 2,000 kilograms per year (approximately 12 lbs per day). Testing frequency ranges from annually for facilities emitting more than 16,000 kg/yr to once every five years for facilities emitting 2,000 – 8,000 kg/yr. Inactive sources do not require testing until they operate for more than 90 days.

Similarly, Section 6-1-505 defines sulfur trioxide (SO_3) / acid mist compliance testing requirements, based on the extent of the acid mist emissions. Compliance testing is required for any source with a District Permit to Operate and acid mist emissions greater than 2,000 kg/yr (approximately 12 lbs per day). Testing frequency ranges from annually for facilities emitting more than 16,000 kg/yr to once every five years for facilities emitting 2,000 – 8,000 kg/yr. Inactive sources do not require testing until they operate for more than 90 days.

Section 6-1-506 establishes the requirements for regulated bulk material site monitoring of fugitive dust visible emissions. These facilities are not expected to have a person certified to assess plume opacity; but they are expected to establish a management system to monitor sources and operations with the potential to generate fugitive dust, and take corrective actions if there is any indication that fugitive dust is becoming significant. These sites are not asked to make a "compliance determination." Rather, they are asked to pay attention to the potential for fugitive dust, and take corrective actions if fugitive dust appears to become significant.

Each regulated bulk material site is required to monitor sources and active operations for fugitive dust visible emissions when the potential for dust is high due to wind conditions and/or work activities as follows:

- Monitor the nature and extent of fugitive dust visible emissions from each potential source or operation using simple observation of the emission, with the sun (or artificial light) positioned behind the observer:
    - Observe each source with the potential to generate fugitive dust that is located within 1,000 feet of the site property line on a workday when the wind is blowing from the source toward the property line – at least twice each such workday; and
    - Observe all sources with the potential to generate fugitive dust at least once each workday.
    - Petroleum coke, calcined coke and coal operations are required to monitor during daylight hours only, since black dust is virtually impossible to see at night.
- The APCO may specify the monitoring and frequency of monitoring if needed.
- Document the sources and operations monitored each workday.
- Maintain records in electronic, paper hard copy or log book format for two years and make these records and any other photographic or video records of fugitive dust the site may have available to the Air District upon request.
- Air District enforcement will occur through the normal process of site visits including visual observations and records reviews, and may be adjusted based on conditions found.

Monitoring is required during active operations regardless of when the workday starts or ends. Visible emission limits are in effect day and night, and subject to enforcement action by the District. Lighting at each facility varies, so monitoring at night is more difficult.

Any individual that monitors fugitive dust plumes is not expected to be proficient in either EPA Method 9 or EPA Method 22. However, when observing sources with the potential to create fugitive dust, they are expected to position themselves with the sun (or artificial light) behind them, as this is the positioning required in EPA Method 9.

H. Manual of Procedures

Section 6-1-601 affirms that the common test methods in Regulation 6 apply to this rule, including the test methods used to assess fugitive dust visible emissions.

Section 6-1-602.1 defines the test method for TSP as EPA Method 5 or an approved alternate method as described in Regulation 6-603. Source tests are not required if the sampling facilities are not adequate to conduct the source test as required by the test method. The Air District reserves the right to require modification of the sampling facilities as needed (when possible) per Regulation 1, Section 501 so that a proper source test can be conducted.

Section 6-1-602.2 defines the test method for acid mist as EPA Method 8 or an approved alternate. Source tests are not required if the sampling facilities are not adequate to conduct the source test as required by the test method. The Air District reserves the right to require modification of the sampling facilities as needed (when possible) per Regulation 1, Section 501 so that a proper source test can be conducted.

I. Comparative Analysis

Proposed amendments to Rule 6-1 bring it up to date with the most stringent regulations in California. TSP concentration and weight limits meet or exceed the most stringent in South Coast, San Joaquin Valley, and Sacramento Metro air districts.

Requirements for regulation bulk material storage and handling are analogous and more stringent that South Coast Rule 403 and Rule 403.1, and San Joaquin Valley Unified Air Pollution Control District (San Joaquin Valley) Rule 8031. Section 6-1-307 is performance based requiring plumes no greater than 10 percent opacity, where the South Coast and San Joaquin Valley rules require specific particulate control plans or specific control measures provided as options to control fugitive dust to less than 20 percent opacity (Ringelmann 1).

Acid mist limits for sulfuric acid manufacturing and sulfur recovery units equal those in the other air districts. Draft compliance testing requirements strengthen this rule. Source test methods are clarified.

IV. EMISSIONS and EMISSIONS REDUCTIONS

Table IV-1 summarizes the emissions and emission reductions anticipated from the draft amendments to Rule 6-1.

Table IV-1: Estimated Emissions Reductions from Draft Amendments to Rule 6-1:

Source Categories	TSP (tpd)	PM_{10} (tpd)	$PM_{2.5}$ (tpd)
Current Emissions: Other Industrial / Commercial Processes	16.7	9.83	5.78
Estimated Emission Reductions	0.45	0.37	0.03
Percent Reduction	2.7%	3.8%	0.5%

Current PM emissions estimates from the 2011 Emission Inventory total 174.2 tons per day (tpd) of TSP, 105.6 tpd PM_{10}, and 46.31 tpd $PM_{2.5}$. The emissions addressed by these proposed amendments are from the target category of “Other Industrial / Commercial Processes.”

A. Summary of Estimated Emission Reductions

The proposed more stringent TSP limits will impact only one moderate source of PM emissions. Most Bay Area source’s PM limits have been established through permit conditions when the source was installed or modified. The general nature of the TSP limits in Rule 6-1 require that they apply to all PM sources, so they are less restrictive than the permit conditions that may be

applied to any specific source. As a result, no emission reductions are expected to be realized from the proposed more stringent TSP limits.

One source, the Central Contra Costa Sanitary District sludge incinerator, is expected to install controls to address toxic air contaminant (TAC) emissions within the next several years to meet the requirements in Rule 11-18. These controls will also reduce TSP emissions by approximately 16 lb/day (three tons per year). However, such controls are not cost effective for a relatively minor three tons per year TSP reduction. In addition, the timeframe required for most public owned treatment works to install controls is a total of six years for budgeting, financing, design, installation and startup. Section 6-1-114 provides this facility a delayed compliance period of seven years from adoption to give the facility adequate time to address toxics and TSP emissions.

While developing possible amendments for Rule 6-1, staff identified Bay Area Rapid Transit (BART) four maintenance yards that each have BART car-cleaning facilities as having potential for significant PM emission reductions. However, staff discovered that the existing abatement systems (roto-clone wet scrubbers) were not accounted for in the existing emissions inventory. BART car-cleaning facilities are currently in compliance with the more restrictive emission limits in Rule 6-1.

The proposal contains more stringent TSP limits that may also impact two additional facilities: a bottle manufacturing facility in Oakland, and a facility in Santa Rosa that manufactures paper tape used to join and smooth two sections of wallboard. The glass manufacturing facility in Oakland is shut down with no plans to re-open. The current emissions performance from the paper tape manufacturer is estimated, with no supporting source test information available. Additional source tests are needed to determine whether additional controls will be required, and whether those controls would be cost effective. Based on these uncertainties, no emission reductions from these two facilities are included in this summary.

As affected facilities perform compliance source testing, some additional sources may be affected by the amendments to Rule 6-1. Cost effective control options are available for almost all types of sources.

Bulk Material Sources with more than six lbs per day TSP emissions

There are 72 facilities with 134 sources of more than six lbs per day of TSP emissions. Forty- four of these sources are already equipped with water spray systems, and the other 90 of these sources do not currently appear to have any dust controls. Staff estimates that the 44 sources may elect to upgrade their existing water sprays to water fog or water mist systems to reduce water use, but this will not significantly reduce emissions. Staff estimates that the remaining 90 sources will be controlled with wind screens, transfer point shrouds, and loading / unloading chutes. Some judicious use of water fog and water mist systems may be necessary in locations where it is difficult to fit wind screens or shrouds. Staff expects that less than half of the 90 sources will require supplemental water fog or sprays along with wind screens. In addition, staff estimates that only half of these sources will actually install controls, because the facilities will be able to improve their operations to meet the 10 percent opacity requirements. Emissions reductions are estimated based on only 45 sources adding additional emissions control. Staff assumes wind screens/shrouds and loading chutes are 70 percent effective, resulting in emission reductions of 0.37 tpd of PM_{10}, and 0.03 tpd of $PM_{2.5}$.

Bulk Material Sources with two to six lbs per day TSP emissions

There are 72 facilities with 123 sources of TSP emissions ranging from two to six lbs. per day (some of these facilities also have sources with greater than 6 lbs per day of TSP emissions). Forty of these sources are already equipped with water spray systems, and the other 83 of these sources do not currently appear to have any dust controls. Staff estimates that some of the 40 sources with water sprays may be upgraded to water fog or water mist systems to reduce water

use, but will not significantly reduce emissions. Staff estimates that the remaining sources will likely not be controlled with wind screens, transfer point shrouds, and loading/unloading chutes. Current emissions of two – six lbs per day may be small enough to meet the visible emissions performance objective of ten percent opacity without installing additional controls. Staff assumes no additional emissions reductions from these sources.

V. ECONOMIC IMPACTS

A. Cost Effectiveness

Proposed amendments to Rule 6-1 TSP concentration limits, and TSP weight limits are consistent with the requirements and emission limits that have been demonstrated in practice, as South Coast, San Joaquin Valley, and Sacramento Metro air districts have had similar regulations in place for several years. Control technologies that have been "achieved in practice" can be required as best available control technology (BACT) without having to make a cost effectiveness determination.[3] In addition, since these more stringent TSP limits do not appear to trigger installation of any emission controls, no cost effectiveness analysis is required.

Central Contra Costa Sanitary District solid sludge incinerator is the only facility that would be required to meet the more stringent TSP concentration limits. An improved wet scrubber is estimated to cost $17,000,000 in capital cost, and $2,200,000 annualized costs including capital amortization, operating and maintenance costs. Emission reductions are only three tons per year, so any controls required specifically for PM do not appear to be cost effective. CCC Sanitary District staff indicate that they anticipate installing controls to address TAC emissions and expect PM emission reductions to be a side-benefit. Staff has excluded PM emission reductions from CCC Sanitary District because they are not a direct result of amendments to Rule 6-1.

The proposed more stringent TSP limits may also affect a facility in Santa Rosa that manufactures paper tape used to join and smooth two sections of wallboard. The current emissions performance from the paper tape manufacturer is estimated at 117 lbs per day. If these emissions are verified with a source test, additional controls are cost effective in reducing emissions. Staff estimates that a baghouse could be added downstream from the existing cyclone, reducing PM emissions by at least 90 percent and resulting in emission reductions of 105 lbs per day. A baghouse is estimated to cost $315,000 in capital cost, amortized to $45,000 per year plus additional utility and maintenance costs of $50,000 per year. Total annual costs of $95,000 per year for a reduction in 13.7 tons per year of PM results in a cost effectiveness of $6,900 per ton of reduced TSP. This is well within the normal range for cost effectiveness.

Staff found no additional facilities with PM emissions quantified by source test that are affected by the amendments to Rule 6-1. As mid-sized and smaller particulate matter sources begin to conduct source tests, some may find a need to install controls. However, most of these sources currently have more stringent permit limits than those being proposed. Staff estimates no emission reductions from these sources.

Proposed new Section 6-1-307 will affect 72 facilities, with 134 sources with PM emissions currently estimated to exceed 6 lbs per day of TSP. Eighteen of these facilities already have water spray abatement in place, so staff assumes each facility will make minor improvements to the existing systems and be able to meet the requirements of this draft new requirement. Fifty-four of these facilities, with 90 sources may require controls. The sources have a wide range of scale for processing and handling bulk materials. The scope of the controls is directly set by the specific

[3] BAAQMD Engineering Procedure: New or Updated BACT Determinations, December 19, 2006

bulk handling operation involved, and the size of the bulk material handling facilities. Section 6-1-307 may affect another 72 facilities with 123 sources with PM emissions currently estimated to range from two to six lbs per day of TSP. However, staff estimates PM emissions less than six lbs per day will not exceed the draft opacity limit.

Attachment 2, Table 2-1 describes each of the 90 sources that will potentially require controls. Emission reduction estimates assume half of these 90 sources will find ways to meet the opacity limit and other requirements without having to install significant controls. Staff assumes that only half of the facilities will actually install the controls shown in Table 2-1. Total estimated costs to control 45 sources is $866,000 in capital costs, and $206,000 in annual costs. Expected emission reductions are 747 lbs per day of PM_{10} (136 tons per year).

Water Use and Cost

Five water fog systems are recommended in Table 2-1. Each of these water fog systems is anticipated to use 624,000 gallons of water per year, totaling 3,120,000 gallons of incremental water use. Thirty-four water mist systems are recommended in the table above. Each of these water mist systems is anticipated to use 312,000 gallons per year, totaling 10,608,000 gallons of incremental water use. Total incremental water use for the proposed wind screens, and judicious use of water is 13,728,000 gallons per year. Staff assumes all five of these water fog systems will be installed. Total cost for 13,728,000 gallons of water at $0.01 per gallon is $137, 280 per year.

Total costs to control fugitive dust visible emissions from bulk material handling is estimated to be $206,000 + $137,280 = $343,280 per year. Emission reductions are estimated to be 136 tons per year. Cost effectiveness for these controls is estimated to be $2524 per ton of reduced PM_{10}. The poorest cost effectiveness is found for two controls: $13,968 per ton for a water fog system at a quarry operation, and $10,303 per ton for a stockpile windscreen at a second quarry operation. These cost effectiveness levels are within normal acceptable ranges for PM reductions.

Source Test Costs

Proposed amendments to Rule 6-1 explicitly require compliance testing of permitted sources ranging from annually to once every five years, depending on the extent of the emissions. The estimated cost to conduct an appropriate compliance source test is $3,000 – 5,000. The estimated costs to modify sample ports to conduct these tests, if necessary, are estimated to cost less than $10,000. Staff estimates approximately 50 sources will require source testing annually, 60 sources will require source testing biennially, and 250 sources will require source testing every five years. Staff estimates no more than 50 sources will require sample port modifications.

B. Incremental Cost Effectiveness

There are no controls required directly from amendments to the TSP concentration limits and TSP weight limits proposed for Rule 6-1, so no cost effectiveness analysis, and no incremental cost effectiveness analysis are required.

Each regulated bulk material storage and handling site will determine what controls are needed to limit fugitive dust plumes to meet the 10 percent opacity for significant plumes (greater than five feet high, five feet long, five feet wide). The next more stringent requirement would be to require any fugitive dust plume to meet the 10 percent opacity requirement. This requirement would include any small dust plume (from a wind current on a stockpile, or from the wheel of a truck driving down an unpaved road). Staff did not recommend this limit because of the concern that the more stringent limit would cause many facilities to use excessive water to control dust. The degree of stringency is based on concern about water use rather than a concern about incremental cost effectiveness.

C. Socioeconomic Impacts

The Air District contracts with an independent consultant to conduct a Socioeconomic Analysis of potential economic impacts from the proposed amendments to Rule 6-1. After staff received additional input during the workshop process, a final draft proposal and staff report have been used to finalize the Socioeconomic Analysis. The Socioeconomic Analysis is included in the final proposal, posted for public review and comment at least 30 days before the Public Hearing. At the Public Hearing, the Air District Board of Directors will consider the final proposal, and public input before taking any action on the amendments to Rule 6-1.

The Socioeconomic Analysis concludes that control costs are less than significant, will not impact small businesses, and will not lead to job reductions.

D. District Impacts

An exemption for small stationary sources with potential to emit either TSP or PM_{10} emissions at less than 1,000 kg per year may create additional work for Air District permit engineers. Facilities that have permitted sources currently estimated to have emissions less than 2,000 kg per year may wish to take advantage of the proposed exemption by challenging the current estimating techniques and/or EPA AP-42 Emission Factors used. Permit engineers may be asked to review the current PM emissions factors, which can take approximately one hour of engineering time for each source.

Air District Meteorology and Measurement Division resources will be needed to consult with each permitted source to ensure each source has the proper sample ports, equipment and access facilities needed to conduct the required source test. Staff anticipates the source test section will fit this work into their normal day-to-day work, with no impact on personnel requirements or costs.

Compliance and Enforcement inspectors will not see any increase in workload because they currently have responsibility for inspecting regulated bulk material sites. Compliance and Enforcement currently conducts planned inspections of bulk material sites and permitted disturbed surface sites as part of their annual coverage of all permitted facilities.

Compliance and Enforcement has trained its inspectors to use an existing physical object, or traffic cone or other device of a known size to establish a frame of reference when assessing whether a plume is larger than five feet. The inspectors will likely take a picture of the plume to document its size, while conducting the opacity assessment to determine opacity. Inspectors have been equipped with tape measures to measure the area of a bulk material spill. Costs for these tape measures totaled $700 at $10 each for 70 inspectors.

Compliance and Enforcement will need to determine to what extent, and when they may want to implement EPA ALT-082, the digital camera technique that can be used to measure opacity as an alternate to EPA Test Method 9.

VI. REGULATORY IMPACTS

Regulatory impact analysis is required by H&SC Section 40727.2, comparing the proposal to other Air District, State and federal rules addressing the same sources. The following table provides this regulatory impact analysis.

Amendments to Regulation 6, Rule 1: H&SC Section 40727.2 Regulatory Analysis

Section	**Description** (paraphrased)	Comparable State or Air District Provision	Comparable Federal Provision	Discussion
101	Description / Purpose	Consistent with SCAQMD 401 SCAQMD 1157, 1158 SJVUAPCD 4101 SMAQMD 401		
102	Applicability of General Provisions	From Regulation 6		
110	Exemption: Activities Subject to Other Rules	Consistent with Non-duplication requirements		
111	Limited Exemption: Blasting Operations	Consistent with SCAQMD 1157 SJVUAPCD 8021		
112	Limited Exemption: Portland Cement Manufacturing	Consistent with Non-duplication requirements		
113	Limited Exemption: TSP Concentration and Weight Limits	Consistent with non-duplication for commercial cooking, Unique exemption for pure salt and sugar, No controls readily available for combustion		Pure sugar and salt are readily adsorbed into humans, with very little health impact. Combustion controls out of scope for this rule-making.
114	Limited Exemption: TSP Concentration Limit	Unique situation for one specific facility		Delayed compliance date.
200	Definitions	Consistent with SCAQMD 102, 401 SJVUAPCD 1020, 4101 SMAQMD 101, 401		
300	Standards / Emission Limits			
301-306	Visible Emissions Limits	Consistent with SCAQMD 401 SJVUAPCD 4101 SMAQMD 401		20% opacity or Ringelmann 1 is consistent throughout California
307	Regulated Bulk Material Site fugitive dust visible emissions limits	SCAQMD Rule 403 SCAQMD Rule 1157 SCAQMD Rule 1158 SJVUAPCD Rule 8011		Consistent with Regulation 6 control measures cited in Reg 6 Staff Report, Attachment 1-5.

		SJVUAPCD Rule 8031		SCAQMD Rule 1157 requires no visible emissions > 100 feet which could be more stringent, or less stringent than the limit of the property line.
310	PM Concentration Limits	Consistent with SCAQMD 404 SJVUAPCD 4201 SJVUAPCD 4203 SMAQMD 404		Equal to most stringent in California
311	PM Weight Limits	Consistent with SCAQMD 405 SJVUAPCD 4202 SMAQMD 405		Equal to most stringent in California
320	Sulfuric Acid Manufacturing	Consistent with BAAQMD 12-6 SCAQMD 469 SJVUAPCD Rule 4802	40 CFR Part 60: Subpart H EPA-450/2-77-019	Acid mist controls out of scope for this rule-making.
330	Sulfur Recovery Units	Consistent with BAAQMD 9-1 SCAQMD 468	NSPS 40 CFR 60 Subpart J, Ja	Acid mist controls out of scope for this rule-making.
400	Administrative Requirements	Monitoring from Regulation 6		Monitoring required to ensure compliance.
500	Monitoring and Records	Consistent with BAAQMD Reg 1 SCAQMD 404, 405 SJVUAPCD 4201, 4202 SMAQMD 404, 405 SJVUAPCD Rule 8011		Demonstration of compliance requirements added. Consistent monitoring and records requirements.
600	Manual of Procedures	Consistent with EPA Source Test Methods 5, 8, 9, 22, 201a, 202, 203a,b,c	Consistent with EPA Source Test Methods 5, 8, 9, 22, 201a, 202, 203a,b,c	Source test methods added.

VII. ENVIRONMENTAL IMPACTS

A. Review of Potential Environmental Impacts Under CEQA

The Air District contracts with an independent consultant to conduct a California Environmental Quality Act (CEQA) analysis of potential environmental impacts of the new Regulation 6, and draft amendments to Rule 6-1. The consultant has made an initial assessment of any environmental impacts based on proposed new Regulation 6 and proposed amendments to Rule 6-1, and this staff report. In addition, the CEQA analysis has also been conducted on the proposed new Rule 6-6: Prohibition of Trackout. The CEQA analysis, attached as Appendix B, combines the analysis to review all impacts of the proposed new Regulation 6, proposed amendments to Rule 6-1 and Rule 6-6 together all as one project, so that the cumulative impact of these proposals can be considered.

The CEQA analysis shows that no significant environmental impacts are expected, and a Negative Declaration has been prepared. The CEQA Negative Declaration will be included with the final proposals, posted for public review and comment at least 30 days before the Public Hearing. At the Public Hearing, the Air District Board of Directors will consider the final proposals, and public input before taking any action on the new Regulation 6, amendments to Rule 6-1, and new Rule 6-6.

VIII. RULE DEVELOPMENT / PUBLIC PARTICIPATION PROCESS

A. Rule Development Process

The Air District's 2010 Clean Air Plan addressed PM, including significant health impacts associated with PM, and was approved on September 15, 2010. The 2010 Clean Air Plan included Stationary Source Measure SSM 6: General Particulate Matter Emission Limitation. In addition to developing amendments to Rule 6-1 to satisfy SSM 6, staff started work on this rule-making project in April 2010 by reviewing the entire inventory of PM emissions and identified source categories where PM (particularly $PM_{2.5}$) emissions are significant, the Air District has authority, and potential for substantial PM reductions are available.

The proposed amendments to Rule 6-1 are part of a rule-making process that began with the 2010 Clean Air Plan and continues to address a commitment by the Air District's Board of Directors to review Regulation 6, Rule 1, identified as Stationary Source Measure SS31 in the Air District's 2017 Clean Air Plan. Since the 2010 Clean Air Plan originally identified Rule 6-1 as a Stationary Source Control Measure, Air District staff further committed to taking steps to address the Bay Area's PM challenges in a November 2012 report entitled *Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area*. These proposed amendments to Regulation 6, Rule 1 begin to fulfill these important commitments to reduce PM emissions and improve public health.

Staff based the proposed amendments to Rule 6-1 on the 2011 emissions inventory. Staff identified the source categories to be considered during review of potential amendments, and identified the largest sources in each category. Staff selected 55 of the largest permitted stationary sources, and visited each one to more fully understand each facility's business, each unique emissions source, and discuss potential control techniques

available to reduce PM emissions. In addition, concerns about the lack of information regarding particle size distribution, possible sources of condensable PM, and potential secondary PM formation were discussed. Staff visited eight facilities that store and handle petroleum coke and coal to ensure the unique issues with these solids were incorporated into the rule development process. Staff used the information from these visits to develop the proposed amendments to Rule 6-1, an overarching Regulation 6 that applies to all Regulation 6 rules, and new draft Rule 6-6: Prohibition of Trackout; and to estimate the emission reductions that could be achieved by implementing these draft rule changes.

Staff conducted eight workshops throughout the Bay Area from January 30 – February 8, 2017. These workshops were conducted in parallel with open house forums for the 2017 Clean Air Plan. Many stakeholders voiced concern that the PM workshops were diminished by being scheduled with the Clean Air Plan Open Houses, and the combined open house / workshop format prevented staff from making a formal presentation regarding the preliminary drafts of each rule or engaging in direct questions / answers. Others felt the personal interaction with staff regarding the preliminary drafts for each rule provided better opportunity for genuine discussion, including questions / answers.

Comments received after the workshops provided additional input regarding the process used for outreach to the wide variety of affected parties. Many indicated that they had not heard about the workshops at all, or only at the last minute. Since some stakeholders considered the Public Outreach and Consultation process described below in Section B less effective than a workshop focused specifically on the rules, staff will mail Public Hearing notices to each Air District permitted facility with any significant PM emissions, and mail Public Hearing notices to additional facilities with similar Standard Industrial Classification (SIC) codes or North American Industry Classification System (NAICS) codes from a business database used by the Socioeconomic Analysis contractor called InfoUSA, including construction firms.

Proposed new Regulation 6 will provide the foundational regulation for current PM rules, and potential future source specific PM rules. Proposed new Regulation 6 rule language, proposed amendments to Rule 6-1 and this accompanying staff report are the next step in the rule development process to further address PM emissions. Staff anticipates that proposed new Regulation 6, and proposed amendments to Rule 6-1 will be considered together at a Public Hearing in Spring 2018. Proposed new Rule 6-6: Prohibition of Trackout and its associated staff report may also be considered at that Public Hearing.

A CEQA Analysis has conducted on the proposed new Regulation 6, proposed amendments to Rule 6-1, and proposed new Rule 6-6 as one project, so that cumulative impact of these three rule development projects can be considered. The Socioeconomic Analyses for each project were done separately.

B. Public Outreach and Consultation

In analyzing the inventory of PM emissions and source categories where PM (particularly $PM_{2.5}$) emissions are significant, where the Air District has authority, and the potential for substantial PM reductions, staff consulted with the following interested and affected parties:

Businesses	Governmental Agencies
Morton Salt – Newark	CALTRANS District 4 - Oakland
Cargill – Newark	Bay Area Regional Water Quality Board - Oakland

Criterion Catalysts - Pittsburg	North Coast Regional Water Quality Board – Santa Rosa
CertainTeed Gypsum – Napa	Bay Area Rapid Transit – Richmond Maintenance Yard
Maxwell House – San Leandro	Alameda County
C & H Sugar – Crockett	Contra Costa County
Con Agra – Oakland	Marin County
CEMEX – Oakland	Napa County
CEMEX – Clayton	Santa Clara County
Strategic Materials – San Leandro	San Francisco City & County
Dutra Materials – San Rafael	San Mateo County
Superior Supplies – Santa Rosa	Solano County
Granite Rock – Redwood City	Sonoma County
Hanson Aggregates – Clayton	Central Contra Costa Sanitary District
Bodean / Mark West Quarry – Santa Rosa	City of Hayward
PABCO Gypsum – Redwood City	City of Napa
Georgia Pacific Gypsum - Antioch	City of Oakland
Syar – Napa	City of San Jose
Syar – Santa Rosa	City of San Rafael
Syar – Vallejo	City of Santa Rosa
Soiland Quarry - Cotati	
Langley Hill Quarry - Woodside	**Industry Associations**
Granite Construction – Santa Clara	Association of Building Contractors
Granite Construction – San Jose	Associated Roofing Contractors of the Bay Area Counties
Willowbrook Feeds – Petaluma	California Asphalt Pavement Association
Hunt & Behrens – Petaluma	Construction Industry Air Quality Coalition
Owens-Corning – Santa Clara	Northern California Engineering Contractors
Owens-Brockway - Oakland	
Waste Management – San Leandro	
Zanker Road Material Processing – San Jose	
Waste Management - Altamont	
Redwood Landfill	
Guadalupe Landfill	
Ox Mountain Landfill – Half Moon Bay	
Clover Flat / Upper Valley Resources	
Potrero Hills Landfill	
Stavin	
McGuire & Hester Construction - Oakland	
Ghilotti Bros. Construction – San Rafael	
Universal Building Services – Richmond	
Statewide Sweeping – Milpitas	
Levin Richmond Terminal	
Lehigh Cement	
Phillips 66 Coker	
Phillips 66 Coke Calciner	
Shell Coker	
Tesoro Coker	

Valero Fluid Coker	
APS West	
Carbon Inc.	

These discussions led to a review of the Storm Water Pollution Prevention Plan (SWPPP) Best Management Practices, and the suggestion that any proposed requirements should be consistent with SWPPP requirements.

As described above, feedback indicates that outreach was could be been more robust. In light of this, Public Hearing notices will be mailed to all Air District permitted facilities with significant PM emissions and to all entities with similar Standard Industrial Classification (SIC) codes or North American Industry Classification System (NAICS) codes from a business database used by the Socioeconomic Analysis contractor called InfoUSA, including construction firms.

Public Hearings are the next step in these rulemaking processes. Air District staff will publish the Public Hearing package for proposed new Regulation 6: Common Definitions and Test Methods; and proposed amendments to Regulation 6, Rule 1: General Requirements. Air District staff will accept written comments, will respond to all comments received, and will present final proposals to the Air District's Board of Directors for consideration. Response to comments is included as Appendix A of this staff report.

IX. CONCLUSION / RECOMMENDATIONS

Pursuant to the California Health and Safety Code section 40727, before adopting, amending, or repealing a rule the Board of Directors must make findings of necessity, authority, clarity, consistency, non-duplication and reference. This section addresses each of these findings.

A. Necessity

"'Necessity' means that a need exists for the regulation, or for its amendment or repeal, as demonstrated by the record of the rulemaking authority." H&SC section 40727(b)(1).

Proposed amendments to Regulation 6, Rule 1: General Requirements are needed to update emission limits that have not been reviewed for more than two decades, and to clarify compliance testing requirements and test methods. Proposed new Section 6-1-307 applies to bulk material storage and handling that are currently permitted by the Air District, and is needed to address the significant PM emissions from the source category of Other Industrial and Commercial Processes. Bulk Material Storage and Handling addresses a broad cross-section of these sources. Section 6-1-307 requires more stringent control of fugitive dust visible emissions, specific monitoring, and cleanup actions if fugitive dust is excessive. The Bay Area is not yet in attainment for either PM_{10} or $PM_{2.5}$ California Ambient Air Quality Standards.

B. Authority

"'Authority' means that a provision of law or of a state or federal regulation permits or requires the regional agency to adopt, amend, or repeal the regulation. H&SC section 40727(b)(2)."

The Air District has the authority to adopt this rule under Sections 40000, 40001, 40702, and 40725 through 40728.5 of the California Health and Safety Code.

C. Clarity

"'Clarity' means that the regulation is written or displayed so that its meaning can be easily understood by the persons directly affected by it." H&SC Section 40727(b)(3)

Proposed amendments to Regulation 6, Rule 1 are written so that their meaning can be easily understood by the persons directly affected by them. Further details in the staff report clarify the proposals, affected emission sources, compliance options, and administrative requirements for the industries subject to this rule.

D. Consistency

"'Consistency' means that the regulation is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations." H&SC Section 40727(b)(4)

The proposed new rule and amendments to the existing rule are consistent with other Air District rules, and not in conflict with state or federal law.

E. Non-Duplication

"'Nonduplication' means that a regulation does not impose the same requirements as an existing state or federal regulation unless a district finds that the requirements are necessary or proper to execute the powers and duties granted to, and imposed upon, a district." H&SC Section 40727(b)(5)

Amendments to Rule 6-1 are non-duplicative of other statutes, rules or regulations. To the extent duplication exists, such duplication is appropriate for execution of powers and duties granted to, and imposed upon the Air District.

F. Reference

"'Reference' means the statute, court decision, or other provision of law that the district implements, interprets, or makes specific by adopting, amending, or repealing a regulation." H&SC Section 40727(b)(6)

Implementing, interpreting or making specific the provisions of the California Health and Safety Code Sections 40000, 40001, 40702 and 40727.

The proposed rules have met all legal noticing requirements, have been discussed with the regulated community and other interested parties, and reflect consideration of the input and comments of many affected and interested stakeholders.

G. Recommendations

Air District staff recommends adoption of amendments to Regulation 6, Rule 1: General Requirements and adoption of the CEQA Negative Declaration.

REFERENCES

1. BAAQMD 2010 Clean Air Plan, September 15, 2010
2. BAAQMD Regulation 5: Open Burning
3. BAAQMD Regulation 6, Rule 2: Commercial Cooking Equipment
4. BAAQMD Regulation 6, Rule 3: Wood Burning Devices
5. BAAQMD Regulation 12, Rule 4: Sandblasting
6. BAAQMD Board Resolution 1390
7. BAAQMD Advisory Council, Ultrafine Particles: Ambient Monitoring and Field Studies presentation, 2/8/2012
8. BAAQMD Advisory Council, Ultrafine Particles: Ambient Monitoring and Field Studies presentation, Philip M. Fine, SCAQMD, 2/8/2012
9. BAAQMD Advisory Council, Concentrations of Ultrafine Particles and Related Air Pollutants on and Near Roadways and Other Urban Microenvironments presentation, Eric Fujita, Desert Research Institute, Reno, NV, 2/8/2012
10. EPA Stationary Source Control Techniques Document for Fine Particulate Matter, October 1998
11. EPA Test Methods 5, 5B, 5F, 9, 17, 22
12. EPA Test Methods 201A, 202, 203A, 203B, 203C
13. EPA RACT/BACT/LAER Clearinghouse
14. EPA AP42, Fifth Edition, Volume 1, Chapter 13: Miscellaneous Sources, 13.2
15. EPA, Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures; EPA-450-92-004; September 1992.
16. California Health and Safety Code, §41700
17. California Health and Safety Code, §40000, §40001, §40702, §40725 - 40728,
18. California Air Resources Board - CALIFORNIA EMISSION INVENTORY AND REPORTING SYSTEM (CEIDARS), Particulate Matter (PM) Speciation Profiles, 7/28/2009
19. South Coast Air Quality Management District, Rules 401, 403, 403-1, 404, 405, 444, 445, 1105-1, 1112-1, 1133-1, 1137, 1155, 1156, 1157, 1158, 1186, 1186-1
20. San Joaquin Valley Air Pollution Control District, Rules 4101, 4103, 4106, 4201, 4202, 4203, 4303, 4901, 8011, 8021, 8031, 8041, 8051, 8061, 8071, 8081
21. San Joaquin Valley Air Pollution Control District, Draft Staff Report, BACM Amendments to Regulation VIII (Fugitive PM_{10} Prohibitions), 9/27/2001
22. San Joaquin Valley Air Pollution Control District, Draft Staff Report – Appendix C, Cost Effectiveness Analysis of Regulation VIII (Fugitive PM_{10} Prohibitions), 9/27/2001
23. Sacramento Air Quality Management District, Rules 401, 403, 404, 405, 406, 407, 409, 417, 421
24. Maricopa County, Arizona Regulation III, Rule 310: Fugitive Dust from Dust-Generating Operations
25. Maricopa County, Arizona Quick Reference Dust Control Guide
26. Northeast States for Coordinated Air Use Management, Assessment of Control Technology Options for BART-Eligible Sources, March 2005
27. California Water Resources Control Board, Construction Storm Water Program, http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml

28. 2009-0009-DWQ Construction general permit *(effective July 1, 2010)*
29. California Storm Water Quality Association, Storm water Best Management Practice Handbook Portal: Construction

Attachment 1: Cost Estimates for Various Dust Controls
Attachment 2: Cost Estimates for Specific Bulk Material Storage and Handling Facilities

APPENDICES

A. Comments and Responses
B. Socioeconomic Analysis
C. CEQA Documents

Attachment 1: Cost Estimates for Various Dust Controls

Costs of Controls for Bulk Material Handling

Wind screens can be used to shield almost any bulk material stockpile, handling equipment, or loading/unloading operations. Wind screens around stockpiles are most effective if they are at least as high as the pile, and extend beyond each edge of the pile. Wind screens can also be used to protect bulk material handling equipment (crushers, conveyors, transfer points, screen, and loading facilities from wind erosion. The following provide the cost estimates for various wind screen equipment:

- Wind Screens for stockpiles
  - 100-foot section of 10-foot high fencing estimated to cost $15 - $40 / foot, or $3,000 capital[1]
  - Slats or nylon mesh to provide proper porosity costs up to $5/foot[2]
  - Estimated costs for construction and foundations equals double the cost of materials
  - Total capital for 100 feet of 10-foot high wind screen is $70/foot, equaling $7,000 capital, amortized to $1,050 per year
  - Estimated cost for 100-foot section of 20-foot high wind screen is $140 / foot, equaling $14,000 capital, amortized to $2,100 per year
  - Estimated cost for 100-foot section of 30-foot high wind screen is $280 / foot, equaling $28,000 capital, amortized to $4,200 per year
  - Can control erosion down-wind for approximately eight – 10 times the height of the barrier.
  - Total cost for a 10 feet tall stockpile requires 100 feet of windscreen – with capital costs of $7,000, amortized to $1,575 per year
  - Total cost for a 20 feet tall stockpile requires 200 feet of windscreen – with capital costs of $28,000, amortized to $4,200 per year
  - Total cost for a 30 feet tall stockpile requires 300 feet of windscreen – with capital costs of $84,000, amortized to $12,600 per year
- Wind Screens for conveyors
  - Typical conveyor is about 100-foot long
  - Must erect a wind screen on at least one side (preferably the upwind side) of the conveyor
  - Design check to be sure structural integrity is adequate - $2,000
  - Materials costs for stainless steel wire mesh screen - $1,500[3]
  - Additional structural steel to reinforce stainless mesh - $500[4]
  - Labor to install – roughly equal to materials costs - $2,000
  - Total costs – $6,000 capital, amortized to $900 per year
- Wind Screens for conveyor transfer points
  - 4-sided 4ft X 4ft stainless steel mesh for wind screen - $250
  - 4 sided 4ft X 4ft plastic shrouds - $150

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[1] An 8'-12' tall commercial-grade chain-link fence to enclose a residential tennis or basketball court can cost $15-$40 or more a foot. Production Fence Works in Georgia estimates average cost for an 8' high, 60'x100' fence around a single tennis court with a single walk-in gate at $9,200.

[2] Because of its open weave, a chain-link fence is transparent. To make it more opaque, metal, wood or vinyl privacy slats can be woven into the mesh. The slats can be purchased separately, at a cost of $1-$2 or more per foot of fencing, or a chain link fence with built-in privacy or a fabric screen can cost $6-$40 a foot ($600-$4,000 for 100'; $1,800-$12,000 for 300') depending on the type of materials, whether installation in included, and the height, gauge and mesh of the fence.

[3] http://www.twpinc.com/wire-mesh-material/stainless-steel/16-mesh-t316-stainless-35

[4] https://www.onlinemetals.com/merchant.cfm?pid=2&step=4&showunits=inches&id=3&top_cat=1

    - Structural steel supports – $200
    - Labor to install – roughly equal to materials costs – $600
    - Total cost for each transfer point shroud – $1,200 capital, amortized to $180 per year
- Wind Screens for crushers, screening equipment, and loading and unloading facilities
    - Three-sided 4 ft. X 10 ft. stainless steel mesh for wind screen – $500
    - Structural steel supports - $400
    - Labor to install – roughly equal to materials costs – $900
    - Total cost for each transfer point shroud - $1,800 capital, amortized to $270 per year

Loading and unloading bulk materials usually involved a front-end loader or a clamshell style scoop. Wind screens are useful during these operations, but additional efforts are needed to control the dust during the drop of material from the front-end loader or clamshell. Dropping more slowly helps, but a delivery chute to control the fall of the material is very effective, combined with a shroud around the chute to protect it from wind. The following are the estimated costs for these facilities:

- Portable Solids Transfer Chutes and Shrouds
    - Very similar to wind screen for crushers and screening equipment, but must be portable to adjust to wind direction and loading requirements.
    - Cost of portable loading chute with adjustable base – $10,000, amortized to $1,500 per year.
    - Cost of shroud with portable base to shelter loading/unloading operations – $5,000, amortized to $750 per year.

Two other control methods are useful in preventing dust plumes – control vehicle traffic within the facility, and clean up any spills. The following are the estimated costs for these facilities:

- Truck Traffic Control
    - Signs restricting traffic to certain areas – less than $5,000 capital
    - Speed limit signs – less than $5,000 capital
    - Barriers to prevent erosion of bulk material into traffic lanes – less than $10,000 capital
    - Management time needed to enforce speed limits – normally no incremental costs.
- Bulk Material Spill Cleanup
    - Manual cleanup – $75/hour for worker and hand-tools. One hour per day, 200 dry workdays - $15,000 per year
    - Regenerative PM_{10} efficient street sweeper - $400,000 capital, amortized to $60,000 per year, plus $150,000 per year for fuel and operator.

Capital is amortized based on 7 percent interest, 15-year life, 1 percent taxes, 1 percent insurance, and typical 2 percent maintenance costs – resulting in an approximate15 percent annual cost of capital.

Estimated costs of water fog, and water misting systems is as follows:

- Water
    - Cost of water - $4-$7 per 100 cubic feet (758 gallons) equates to approximately $0.01per gallon
    - Water Mist systems (Micro-Cool) is an industrial version of those used to cool Palm Springs open air patios:

        - $15,000 for pump, filters and piping system
        - Plastic tubing to deliver mist to desired locations - $1,000
        - Portable water supply – 1-inch galvanized piping at $10 per foot[5] - $5,000
        - Amortized capital costs - $3,150 per year
        - Water use ~ 100 gallons per hour – say 60 hours per week, 52 weeks per year = 312,000 gallons per year at a cost of $3,120
        - Total costs to provide mist for a typical conveyor belt system - $6,270 per year
    - Water Fog systems for a stockpile
        - (Dust Boss, or Buffalo Monsoon) are large air blowers with air mist systems surrounding the flow of air:
        - $25,000 for pump, filters and piping system
        - Portable water supply – 1-inch galvanized piping at $10 per foot - $5,000
        - Amortized capital costs - $4,500 per year
        - Power – 5 HP - use 2 hours per day, 5 days per week, 52 weeks per year = 9,698 kWh = $2,242.50 per year
        - Water use ~ 20 gallons per minute – use 2 hours per day, 5 days per week, 52 weeks per year = 624,000 gallons per year at a cost of $6,240.00 per year
        - Total cost - $12,992.50 per year

For reference, below are estimated costs for the typical watering system currently used at most construction sites, landfills, and bulk material handling facilities:

- Water Spray systems for a stockpile
    - Similar to golf course sprinkler systems[6]
    - $15,000 for 150 feet of piping, 4 sprinklers, and controller
    - $10,000 for installation and infrastructure
    - Amortized costs - $3,750 per year
    - Water use approximately 10,000 gallons per day – 5 days per week, 52 weeks per year = 2,600,000 gallons per year at a cost of $26,000.00
    - Total cost - $29,7250 per year
- Firehose for watering specific locations
    - 1 ½" firehose – approximately 40 gpm[7]
    - Cost of firehose and nozzle – $300
    - Worker to direct the firehose – $25/hour, 2 hours per day, 5 days per week, 52 weeks per year = $13,000
    - Water use approximately 40 gallons per minute – use 2 hours per day, 5 days per week, 52 weeks per year = 1,248,000 gallons per year at a cost of $12,480 per year
    - Total costs – $25,480 per year
- Water truck for roads and can be used to water stockpiles:
    - Truck - $150,000 amortized to $22,500 per year
    - Truck operator and fuel – $75,000 per year
    - Water – 5,000-gallon truck, 2 deliveries per day to keep roadways stabilized – use 5 days per week, 52 weeks per year = 2,600,000 gallons per year at a cost of $26,000 per year

[5] http://www.discountsteel.com/items/Galvanized_Steel_Pipe.cfm?item_id=172&size_no=11
[6] http://store.rainbird.com/sprinklers.html?impact_inlet=166
[7] http://www.elkhartbrass.com/files/aa/downloads/catalog/catalog-f6-T.pdf

        - Total costs – $123,500 per year
- Dust Suppressants
    - Costs for surfactants are much higher than water.
    - However, surfactants are assumed competitive with water when the stockpile or disturbed area will be left stabilized for an extended period.

Attachment 2: Cost Estimates for Specific Facilities

Table 2-1: Estimated Cost of Bulk Material Handling Facilities controls

Facility	Source	Material	Throughput Tons per year	PM_{10} Emissions lb per day	Recommended Controls	$ Capital	$ Annualized	Potential PM_{10} Reductions lb per day
Granite Rock	MINERL> Storage, contained, Rock	Stone			Wind screen or shroud for storage PLUS Water mist system			
United States Pipe & Foundry	MTGL/SEC> Storage, Slag, 5 days/wk.	Slag			Wind screen for stock pile			
Berkeley Asphalt	MINERL> Storage, contained, Gravel/sand	Sand/gravel			Wind screen or shroud for storage			
Syar Industries, Inc	MINERL> Screening, Gravel/sand	Sand/gravel			Wind screen for screener			
Syar Industries, Inc	MINERL> Screening, Gravel/sand	Sand/gravel			Wind screen for screener			
Syar Industries, Inc	MINERL> Screening, Gravel/sand	Sand/gravel			Wind screen for screener PLUS Water mist system			
Syar Industries, Inc	MINERL> Screening, Gravel/sand	Sand/gravel			Wind screen for screener PLUS Water mist system			
PABCO Gypsum	MINERL> Grinding, Gypsum, 8 tons/hr max	Gypsum			Wind screen for grinder PLUS Water mist system			
ConAgra, Inc	FOOD/AG> Shipping & receiving	Wheat - grain			Wind screen or shroud for loading/unloading			
Granite Rock	MINERL> Storage, contained, Rock	Stone			Wind screen or shroud for storage			

Facility	Source	Material	Throughput Tons per year	PM_{10} Emissions lb per day	Recommended Controls	$ Capital	$ Annualized	Potential PM_{10} Reductions lb per day
CEMEX Construction Materials	MINERL> Screening, Rock, 340 tons/hr max	Stone			Wind screen for screener PLUS Water mist system			
CEMEX Construction Materials	MINERL> Mining/quarry, stockpiling	Stone			Wind screen for stock pile			
CEMEX Construction Materials	MINERL> Mining/quarry, Rock	Stone			Water fog system			
Hanson Aggregates	MINERL> Storage, open, Rock	Stone			Wind screen for stock pile			
Levin Richmond Terminal	MISC-HDLG> Material handling	Other Materials - other/not spec			Wind screen and shroud for handling			
Levin Richmond Terminal	MISC-HDLG> Material handling	Other Materials - other/not spec			Wind screen and shroud for handling			
Levin Richmond Terminal	MINERL> Storage, open, Multi-material	Coke			Wind screen for stock pile			
Levin Richmond Terminal	MISC-HDLG> Material handling	Iron ore			Wind screen and shroud for handling PLUS Water mist system			
Levin Richmond Terminal	MISC-HDLG> Material handling	Iron ore			Wind screen and shroud for handling PLUS Water mist system			
Levin Richmond Terminal	MINERL> Storage, open, Multi-material	Iron ore			Wind screen for stock pile			
Levin Richmond Terminal	MISC-HDLG> Material handling	Iron ore			Wind screen and shroud for handling			
Levin Richmond Terminal	MISC-HDLG> Material handling	Coke			Wind screen and shroud for handling			

Facility	Source	Material	Throughput Tons per year	PM_{10} Emissions lb per day	Recommended Controls	$ Capital	$ Annualized	Potential PM_{10} Reductions lb per day
Levin Richmond Terminal	MISC-HDLG> Material handling	Coke			Wind screen and shroud for handling			
Brenntag Pacific	MISC-HDLG> Storage, Potash, 5 days/wk.	Potash			Wind screen for stock pile			
Right Away Redy Mix	MINERL> Conveying, Gravel/sand	Sand/gravel			Wind screen for conveying and transfer points PLUS Water mist system			
Redwood Landfill	MISC-HDLG> Grinding, 80 tons/hr max	Wood - other/not spec			Wind screen for grinder PLUS Water mist system			
Superior Supplies	MINERL> Storage, contained, Concrete	Concrete			Wind screen or shroud for storage PLUS Water mist system			
Superior Supplies	MINERL> Storage, contained, Concrete	Concrete			Wind screen or shroud for storage PLUS Water mist system			
Soiland Co	MINERL> Mining/quarry, stockpiling	Stone			Wind screen for stock pile			
Hunt And Behrens	FOOD/AG> Conveying/transferring	Grains - feed			Wind screen for conveying and transfer points			
Hunt And Behrens	FOOD/AG> Conveying/transferring	Grains - feed			Wind screen for conveying and transfer points PLUS Water mist system			

Facility	Source	Material	Throughput Tons per year	PM_{10} Emissions lb per day	Recommended Controls	$ Capital	$ Annualized	Potential PM_{10} Reductions lb per day
Hunt And Behrens	FOOD/AG> Conveying/transferring	Grains - feed			Wind screen for conveying and transfer points PLUS Water mist system			
Hunt And Behrens	FOOD/AG> Conveying/transferring	Grains - feed			Wind screen for conveying and transfer points PLUS Water mist system			
Central Concrete Supply	MINERL> Loading/unloading, Concrete	Concrete			Portable shroud and chute for loading/unloading			
Central Concrete Supply	MINERL> Storage, contained, Gravel/sand	Sand/gravel			Wind screen or shroud for storage PLUS Water mist system			
Central Concrete Supply	MINERL> Conveying, Gravel/sand	Sand/gravel			Wind screen for conveying and transfer points PLUS Water mist system			
Marin Sanitary Service	MISC-HDLG> Material handling	Waste material - other/not spec			Wind screen and shroud for handling PLUS Water mist system			
Syar Industries Inc	MINERL> Conveying, Rock, 160 tons/hr max	Stone			Wind screen for conveying and transfer points PLUS Water mist system			

Facility	Source	Material	Throughput Tons per year	PM_{10} Emissions lb per day	Recommended Controls	$ Capital	$ Annualized	Potential PM_{10} Reductions lb per day
Syar Industries Inc	MINERL> Loading, feed/surge/weigh bins	Sand/gravel			Wind screen and shroud for loading PLUS Water mist system			
Syar Industries Inc	MINERL> Screening, Gravel/sand	Sand/gravel			Wind screen for screener			
Syar Industries Inc	MINERL> Screening, Gravel/sand	Sand/gravel			Wind screen for screener PLUS Water mist system			
Syar Industries Inc	MINERL> Screening, Gravel/sand	Sand/gravel			Wind screen for screener PLUS Water mist system			
City of Berkeley, Dept. of Public Works	Misc. MINERL, 560 tons/hr max, 7 days/wk.	Waste material - other/not spec			Water fog system			
Sugar City Building Materials	Misc. MINERL, Gravel/sand	Sand/gravel			Wind screen and shroud for handling			
CEMEX Construction Materials	MINERL> Storage, contained, Gravel/sand	Sand/gravel			Wind screen or shroud for storage PLUS Water mist system			
CEMEX Construction Materials	MINERL> Concrete batching, Concrete	Concrete			Wind screen and shroud for handling PLUS Water mist system			
Davis Street SMART	MISC-HDLG> Material handling	Waste material - other/not spec			Wind screen and shroud for handling PLUS Water mist system			

Facility	Source	Material	Throughput Tons per year	PM_{10} Emissions lb per day	Recommended Controls	$ Capital	$ Annualized	Potential PM_{10} Reductions lb per day
CEMEX Construction Materials	MTGL/SEC> Storage, Cement, 5 days/wk.	Cement			Wind screen and shroud for handling			
Langley Hill Quarry	MINERL> Mining/quarry, stockpiling	Stone			Wind screen for stock pile			
Langley Hill Quarry	Misc. MINERL, Rock, 200 tons/hr max	Stone			Water fog system			
CEMEX Construction Materials	MINERL> Storage, contained, Gravel/sand	Sand/gravel			Wind screen or shroud for storage PLUS Water mist system			
CEMEX Construction Materials	Truck Loadout	Sand/gravel			Portable shroud and chute for loading/unloading			
Oldcastle Precast (Pleasanton)	MINERL> Conveying, Cement	Cement			Wind screen for conveying and transfer points			
CEMEX Construction Materials	MINERL> Conveying, Gravel/sand	Sand/gravel			Wind screen for conveying and transfer points			
Hydro Conduit Corporation	Misc. MINERL, Gravel/sand, 20 tons/hr max	Sand/gravel			Wind screen and shroud for handling			
Associated Concrete Co	MINERL> Storage, contained, 35 min/batch	Cement - dry process mfg.			Wind screen or shroud for storage PLUS Water mist system			
Sonoma Compost	MISC-HDLG> Material handling	Fertilizer - other/not spec			Wind screen and shroud for handling			
Mission Trail Waste Systems	MISC-HDLG> Material handling	Waste material - other/not spec			Wind screen and shroud for handling			

Facility	Source	Material	Throughput Tons per year	PM_{10} Emissions lb per day	Recommended Controls	$ Capital	$ Annualized	Potential PM_{10} Reductions lb per day
Vulcan Materials/Calmat Company	MINERL> Storage, contained, Gravel/sand	Sand/gravel			Wind screen or shroud for storage PLUS Water mist system			
Vulcan Materials/Calmat Company	MINERL> Screening, Rock, 407 tons/hr max	Stone			Wind screen for screener			
RC Ready Mix Co	MINERL> Storage, contained, Cement	Cement			Wind screen or shroud for storage			
Concrete Ready Mix, Inc	MINERL> Conveying, Concrete	Concrete			Wind screen for conveying and transfer points			
Willowbrook Feeds	FOOD/AG> Storage, Feed grains, 5 days/wk.	Grains - feed			Wind screen or shroud for storage			
Willowbrook Feeds	FOOD/AG> Conveying/transferring	Grains - feed			Wind screen for conveying and transfer points			
Willowbrook Feeds	FOOD/AG> Shipping & receiving	Grains - feed			Portable shroud and chute for loading/unloading			
Allied Waste Services of North	MISC-HDLG> Material handling	Waste material - other/not spec			Wind screen and shroud for handling			
Right Away Redy Mix	MINERL> Storage, contained, Cement	Cement			Wind screen or shroud for storage PLUS Water mist system			
Feed Sources, Inc	FOOD/AG> Pressing, Barley, feed	Barley - feed			Wind screen for presser			
Soiland Co, Inc	MINERL> Mining/quarry, crushing, Rock	Stone			Water fog system, wind screen for crusher			
Quikrete Northern California	MINERL> Loading, feed/surge/weigh bins	Sand/gravel			Portable shroud and chute for loading/unloading			

Facility	Source	Material	Throughput Tons per year	PM_{10} Emissions lb per day	Recommended Controls	$ Capital	$ Annualized	Potential PM_{10} Reductions lb per day
Quikrete Northern California	MINERL> Loading, feed/surge/weigh bins	Sand/gravel			Portable shroud and chute for loading/unloading			
San Jose Concrete Pipe Co Inc	MINERL> Concrete batching, Gravel/sand	Sand/gravel			Wind screen and shroud for handling			
CEMEX Construction Materials	MINERL> Conveying, Limestone	Sand/gravel			Wind screen for conveying and transfer points			
Shell Chemical LP	MISC-HDLG> Material handling	Heterogeneous catalyst			Wind screen and shroud for handling			
Tyco Electronics Corporation	MISC-HDLG> Mixing, 4.5 min/batch	Other Materials - other/not spec			Wind screen for mixer PLUS Water mist system			
Central Concrete Supply, Inc	MINERL> Conveying, Gravel/sand	Sand/gravel			Wind screen for conveying and transfer points PLUS Water mist system			
BoDean Company	MINERL> Mining/quarry, stockpiling	Sand/gravel			Wind screen for stock pile			
Tesoro Refining & Marketing Co	MISC-HDLG> Material handling, Coke	Coke			Wind screen and shroud for handling PLUS Water mist system			
Napa Recycling & Waste Service	MISC-HDLG> Material handling	Waste material - other/not spec			Wind screen and shroud for handling PLUS Water mist system			
Recall North America	MISC-HDLG> Material handling, Paper	Paper			Wind screen and shroud for handling PLUS			

Facility	Source	Material	Throughput Tons per year	PM_{10} Emissions lb per day	Recommended Controls	$ Capital	$ Annualized	Potential PM_{10} Reductions lb per day
					Water mist system			
CEMEX Pacific Holdings, LLC	MINERL> Loading, feed/surge/weigh bins	Sand/gravel			Wind screen for loading bins			
CEMEX	Wet Plant Aggregate bin system: 10 bins	Sand/gravel			Wind screen for bins			
South Bay Recycling, LLC (SBR)	Solid Waste Transfer Station	Waste material - other/not spec			Water fog system			
G3 Minerals, Byron Plant	Coarse Waste Sand Stockpile	Sand/gravel			Wind screen for stock pile			
G3 Minerals, Byron Plant	No. 1 Dryer Feed Bin	Sand/gravel			Wind screen for dryer			
G3 Minerals, Byron Plant	No. 2 Dryer Feed Bin	Sand/gravel			Wind screen for dryer			
G3 Minerals, Byron Plant	Quarry Operation	Sand/gravel			Water fog system			
Phillips 66 Carbon Plant	Portable Conveyor	Coke			Wind screen for conveying and transfer points			
Phillips 66 Carbon Plant	Portable Conveyor	Coke			Wind screen for conveying and transfer points			
Phillips 66 Carbon Plant	Stockpile Fugitive Emissions; Including All Transfers	Coke			Wind screen for stock pile			
					Totals	$1,722,600	$412,640	1,493.2 #/day

Staff expects only half of these potential control measures to be implemented, and expects to accrue only half of the emission reductions, based on some facilities and sources may be able to achieve the opacity limit currently, or through other minor improvements to their existing operation.

Expected capital investment for control measure to be approximately $866,000 capital, with resulting annual operating expenses of $206,000. Emission reductions are estimated to be 747 lbs per day of PM_{10}, or 136 tons per year. Average cost effectiveness is $206,000 / 136 = $1,515 per ton. The poorest cost effectiveness is found for two controls: $13,968 per ton for a water fog system at a quarry operation, and $10,303 per ton for a stockpile windscreen at a second quarry operation. These cost effectiveness levels are within normal acceptable ranges for particulate emission reductions.

Water Use

Five water fog systems are recommended in the table above. Each of these water fog systems is anticipated to use 624,000 gallons per year, totaling 3,120,000 gallons of incremental water use. Staff assumes all five will be installed.

Thirty-four water mist systems are recommended in the table above. Each of these water mist systems is anticipated to use 312,000 gallons per year, totaling 10,608,000 gallons of incremental water use. Staff assumes all 34 will be installed.

Total incremental water use for the proposed wind screens, and judicious use of water is 13,728,000 gallons per year, or 37,611 gallons per day.
Water is conservatively estimated to cost $7.48 per 100 cubic feet =748 gallons, equaling $0.01 per gallon.
13,728,000 gallons per year cost $137,280 per year

The CEQA threshold for housing development water use is based on water use needed for 500 dwelling units. Water use is estimated for 225 – 400 gallons per day for each dwelling unit, so the threshold ranges from 41,000,000 – 74,000,000 gallons of water.

The proposed particulate controls will use 33% of the CEQA threshold for incremental water use. If twice as many bulk material handling facilities opt to use water rather than wind screens, water use would be no more than 66% of the CEQA water consumption threshold

Typical urban water use is 8 million acre-feet of water per year = equaling 2.6 trillion gallons per year. 13.728 million gallons of proposed water use equals 5.3 millionths of the typical water supply. The threshold of 41 million gallons of water equals about 16 millionths of the typical water supply.

Attachment 1: Background Research on Bay Area PM Emissions

Attachment 1-1: 2011 Particulate Emissions Inventory[1] - tons per day

Source Categories	TSP	PM_{10}	$PM_{2.5}$
Petroleum Refining Subtotal	**0.38**	**0.27**	**0.16**
Other Industrial / Commercial Processes			
Chemical Manufacturing	0.43	0.39	0.38
Cooking	2.81	2.81	1.80
Other Food and Agricultural Processes	0.63	0.44	0.26
Metallurgical Foundries & Forging	0.98	0.61	0.46
Metal Recycling and Shredding	0.14	0.10	0.07
Wood Products Manufacturing	0.15	0.10	0.06
Cement Manufacturing	0.12	0.11	0.08
Asphalt Concrete Plants	0.55	0.22	0.18
Concrete Batching	1.21	1.11	0.75
Glass & Related Products	0.71	0.69	0.68
Stone, Sand & Gravel	0.86	0.43	0.06
Sand Blasting	0.35	0.17	0.01
Landfills	6.35	1.56	0.22
Waste Management - other	0.35	0.34	0.32
Other Industrial / Commercial	1.07	0.75	0.45
Subtotal	**16.71**	**9.83**	**5.78**
Combustion – Stationary Sources			
Domestic Combustion - space heating	0.70	0.70	0.70
Domestic Combustion - water heating	0.47	0.47	0.47
Wood Stoves	2.59	2.42	2.33
Fireplaces	8.88	8.31	8.00
Gas Turbines	0.89	0.88	0.88
Petroleum Refinery Combustion	2.51	2.51	2.45
Landfill Flares	0.11	0.11	0.11
Other Natural Gas Combustion	1.41	1.41	1.41
Planned Fires (prunings, crops, weeds, etc.)	0.32	0.29	0.27
Subtotal	**17.88**	**17.10**	**16.62**
Off-Road Mobile Sources			
Lawn & Garden Equipment - Gasoline	0.21	0.21	0.21
Refrigeration Units - Diesel	0.19	0.18	0.17
Agricultural Equipment - Diesel	0.33	0.32	0.31
Construction & Mining Equipment - Gasoline	0.11	0.11	0.11
Construction & Mining Equipment - Diesel	0.59	0.56	0.55
Industrial Equipment - Diesel	0.10	0.10	0.09
Light Commercial Equipment - Gasoline	0.34	0.34	0.34
Light Commercial Equipment - Diesel	0.34	0.32	0.31
Locomotive Operations - Diesel	0.20	0.20	0.19
Ships In Transit - Diesel	0.29	0.29	0.28
Ships In Transit – Fuel Oil	0.73	0.73	0.71
Commercial Harbor Craft	0.75	0.75	0.75
Recreational Boats - Gasoline	1.39	1.39	1.38
Commercial Aircraft	0.12	0.12	0.12
General Aviation Aircraft	0.14	0.14	0.14
Subtotal	**5.83**	**5.76**	**5.66**
On-Road Motor Vehicles			
Light Duty Passenger Vehicles - Exhaust	0.29	0.28	0.26
Light Duty Passenger Vehicles - Tire Wear	0.83	0.83	0.21

[1] Base Year 2011 Bay Area Emissions Inventory, August 2013

Light Duty Passenger Vehicles - Brake Wear	3.88	3.81	1.63
Light Duty Trucks I - Exhaust	0.09	0.09	0.08
Light Duty Trucks I - Tire Wear	0.10	0.10	0.02
Light Duty Trucks I - Brake Wear	0.45	0.44	0.19
Light Duty Trucks II - Exhaust	0.10	0.09	0.09
Light Duty Trucks II - Tire Wear	0.27	0.27	0.07
Light Duty Trucks II - Brake Wear	1.27	1.24	0.53
Medium Duty Trucks - Exhaust	0.09	0.08	0.08
Medium Duty Trucks - Tire Wear	0.20	0.20	0.05
Medium Duty Trucks - Brake Wear	0.94	0.92	0.40
Light Heavy Duty Trucks I - Exhaust	0.13	0.13	0.12
Light Heavy Duty Trucks I - Brake Wear	0.34	0.34	0.15
Medium Heavy Duty Trucks - Exhaust	0.67	0.67	0.62
Medium Heavy Duty Trucks – Brake Wear	0.31	0.30	0.13
Heavy Heavy Duty Trucks - Exhaust	1.60	1.60	1.47
Heavy Heavy Duty Trucks – Tire Wear	0.13	0.13	0.03
Heavy Heavy Duty Trucks – Brake Wear	0.23	0.22	0.09
Urban Buses - Exhaust	0.19	0.19	0.17
Urban Buses – Brake Wear	0.50	0.49	0.21
Other Buses - Exhaust	0.09	0.09	0.09
Subtotal	**12.70**	**12.51**	**6.69**
Miscellaneous			
Construction Operations - Residential	5.09	2.49	0.25
Construction Operations - Commercial	4.99	2.44	0.24
Construction Operations - Institutional	5.02	2.46	0.25
Construction Operations - Industrial	2.34	1.14	0.11
Construction Operations - Roads	6.00	2.94	0.29
Subtotal	**23.44**	**11.47**	**1.14**
Farming Operations - Land Preparation	2.27	1.03	0.15
Farming Operations - Harvest	1.21	0.55	0.08
Subtotal	**3.48**	**1.58**	**0.23**
Accidental Fires - structural	0.21	0.21	0.19
Accidental Fires - all vegetation	1.18	1.04	1.01
Subtotal	**1.39**	**1.25**	**1.20**
Entrained Road Dust – Paved Freeways	12.81	5.86	0.88
Entrained Road Dust – Paved Major Roads	15.49	7.08	1.06
Entrained Road Dust – Paved Collectors	3.13	1.43	0.21
Entrained Road Dust – Paved Local Streets	21.50	9.83	1.47
Entrained Road Dust – Unpaved Forest/Park Roads	5.95	3.53	0.35
Entrained Road Dust – Unpaved Farm Roads	0.54	0.32	0.03
Subtotal	**59.42**	**28.05**	**4.00**
Animal Waste - Dairy Cattle	1.07	0.52	0.06
Animal Waste - Range Cattle	1.80	0.87	0.10
Animal Waste - Broilers	5.05	2.43	0.28
Animal Waste - Layers	3.76	1.81	0.21
Animal Waste - Turkeys	2.43	1.17	0.13
Animal Waste - Sheep	0.92	0.44	0.05
Animal Waste - Horses	0.21	0.10	0.01
Animal Waste - Other	3.81	1.83	0.21
Subtotal	**19.05**	**9.17**	**1.05**
Wind Blown Dust - Agricultural Land	9.81	4.90	0.98
Wind Blown Dust - Other	0.59	0.35	0.05
Subtotal	**10.40**	**5.25**	**1.03**
Cigarette/Tobacco Smoking	0.61	0.54	0.52
Various other minor PM sources	2.91	2.85	2.23
Total	**174.20**	**105.63**	**46.31**

Note: Source categories shown with more than 0.10 tpd TSP emissions. Resulting sub-totals are slightly less than total PM emissions inventory.

Attachment 1-2: Significant PM Emissions Source Categories

A. Air District PM Emissions Inventory

The first step in developing the draft amendments was to identify PM source categories with the potential for significant emission reductions. Staff used the Air District's 2011 Emissions Inventory as the basis for this review. The 2011 Emissions Inventory provides a comprehensive estimate of the total amount of PM emitted within the Bay Area, sub-divided into estimates of Total Suspended Particulates (TSP), PM_{10}, and $PM_{2.5}$. The total estimated 2011 emissions are as follows:

TSP:	174 tons per day (tpd)
PM_{10}:	106 tpd
$PM_{2.5}$:	46 tpd

The Emissions Inventory breaks down the Bay Area's total PM emissions into multiple source categories. Staff reviewed each source category where PM emissions were estimated to exceed 0.1 tons per day. The contribution of each major grouping of source categories to total emissions of TSP, PM_{10}, and $PM_{2.5}$ are shown in Figures 1-2.1 through 2.3 below. These figures provide a graphic illustration of the contribution of each "Summary Category," or grouping of related source categories, to the region's PM emissions inventory.

Figure 1-2.1: 2011 Emissions Inventory – TSP Summary Categories

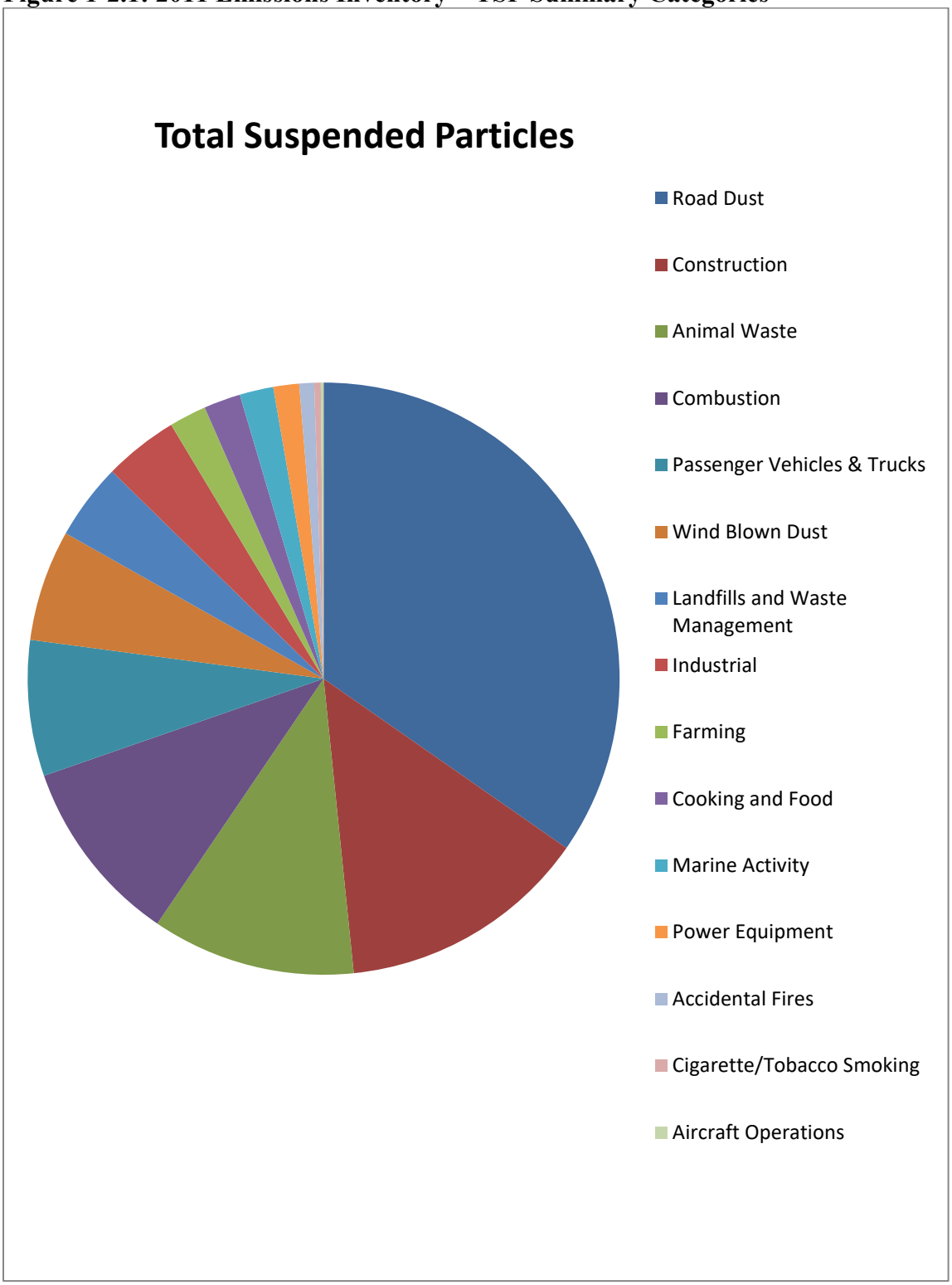
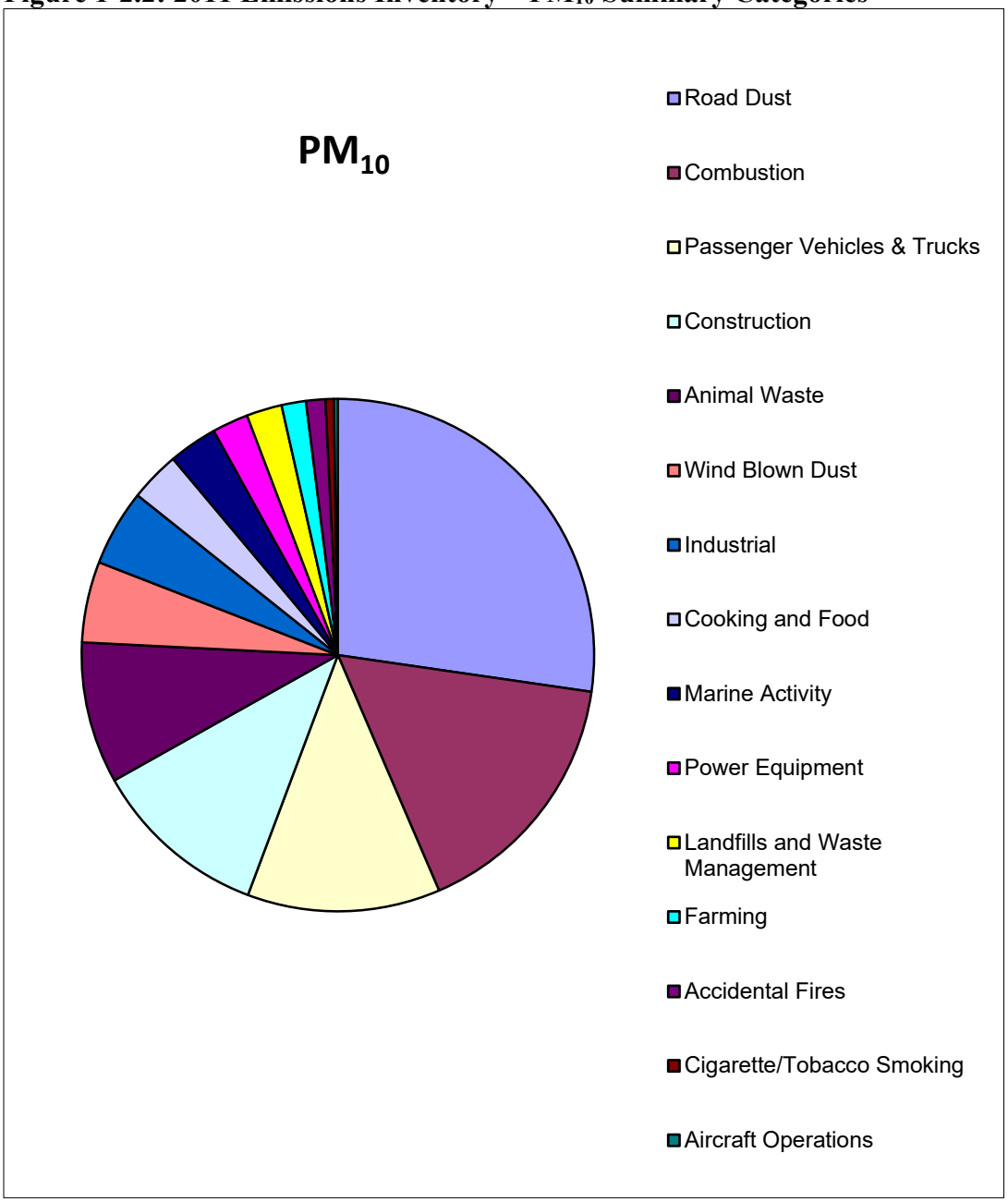


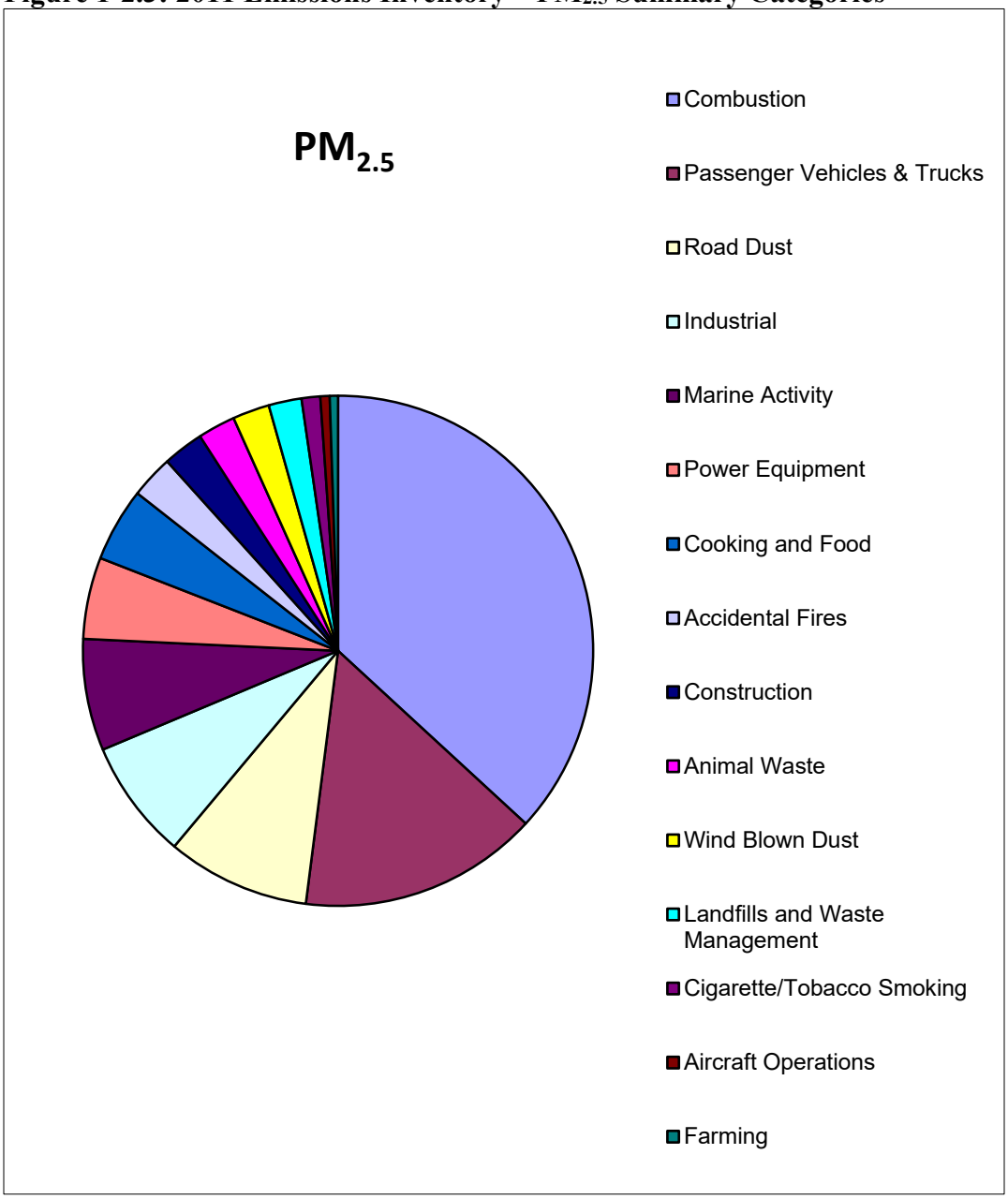
Figure 1-2.2: 2011 Emissions Inventory – PM_{10} Summary Categories



As these figures show, the conclusions for TSP (Figure 1-2.1) and PM_{10} (Figure 1-2.2) are similar - the most significant Summary Categories of emissions are the same six categories:

Summary Category	**% of Total TSP**	**% of Total PM_{10}**
Road Dust	34.7	27.3
Combustion of fuel from various sources	10.2	16.2
Passenger Vehicles & Trucks	7.4	12.2
Construction	13.7	11.2
Animal Waste	11.1	8.9
Wind Blown Dust	6.1	5.1

Figure 1-2.3: 2011 Emissions Inventory – $PM_{2.5}$ Summary Categories



The conclusions for $PM_{2.5}$ are somewhat different. The first three most significant $PM_{2.5}$ Summary Categories are the same as those for TSP and PM_{10}:

Summary Category	**% of Total $PM_{2.5}$**
Combustion of fuel from various sources	36.8
Passenger Vehicles & Trucks	15.2
Road Dust	9.1

However, the next three most significant $PM_{2.5}$ Summary Categories are:

Summary Category	**% of Total $PM_{2.5}$**
Industrial sources	7.6
Marine Activity	7.1
Power Equipment	5.2

B. PM Emissions from Combustion

As discussed above in describing PM controls, there are very few effective ways to control PM from natural gas or refinery fuel gas combustion. CARB has developed requirements for control of diesel fuel combustion. Control of jet fuel combustion is outside the authority of the Air District, since no gas turbines in the district currently burn liquid fuels. Control of PM from combustion of solid fuels (specifically petroleum coke) require site-specific analysis.

C. Identification of Source Categories with Potential for Significant PM Reductions

The purpose of draft rule amendments to Rule 6-1 is to significantly reduce PM_{10} and $PM_{2.5}$ emissions. The 2011 Emissions Inventory has been used as the basis for this analysis, and each source category with emissions of greater than 0.10 ton per day for TSP, PM_{10}, or $PM_{2.5}$ was considered. There are 88 source categories that capture 95 – 98 percent of total estimated PM emissions, and represent all significant emissions where reductions may be feasible.

Each of the 88 source categories are shown in Attachment 1. Draft amendments to Rule 6-1 are proposed for each source category where a significant quantity of emissions (especially $PM_{2.5}$) is emitted and where potential control can yield significant PM reductions. Several source categories are excluded from this rule development project based on the following criteria:

- There is a current rule in place for the source category, or other recent rule amendments that are not yet fully implemented; or
- Other rulemaking is currently underway or included in the 2017 Clean Air Plan; or
- The source category is outside of Air District jurisdiction; or
- No control methods are currently available that can have significant impact on emissions from the source category.

Future rulemaking to reduce PM emissions will reconsider these categories to identify the sources with greatest opportunity for improvement. Future PM rules will most likely be focused on specific source categories and specific sources, with specific control techniques and specific emission limits.

Twenty-two of the 88 source categories are being considered for possible control and emissions reductions. These categories include 43 percent of the total estimated PM_{10} emissions, and 19 percent of the total estimated $PM_{2.5}$ emissions. The largest of these categories are Construction Dust and Entrained Road Dust. Proposals to control Construction Dust and Entrained Road Dust (summarized as Fugitive Dust) were considered when developing the potential draft amendments for Rule 6-1.

Table 1-2.1: Source Categories considered for Rule 6-1 amendments

Source Category	PM_{10}	$PM_{2.5}$
Petroleum Refinery Processing[e]	0.27 tpd	0.16 tpd
Chemical Manufacturing	0.39	0.38
Other Food and Agricultural Processes	0.44	0.26
Wood Products Manufacturing	0.10	0.06
Asphaltic Concrete Plants	0.22	0.18
Concrete Batching	1.11	0.75
Glass & Related Products	0.69	0.68
Stone, Sand & Gravel	0.43	0.06
Landfills	1.56	0.22
Waste Management – other	0.34	0.32
Other Industrial / Commercial	0.75	0.45
Construction – 5 source categories	11.47	1.14
Entrained Road Dust – 6 source categories	28.05	4.00
Total:	45.82	8.66

[e] excluding refinery combustion

D. Source Categories Not Being Considered for Additional Regulatory Requirements

Of the 88 source categories identified in the 2011 Emissions Inventory with PM emissions of over 0.10 ton per day, only 22 are being considered for additional emissions controls. The other 66 were excluded from consideration for various reasons, as discussed below.

Six source categories have rules in place, or recent rule amendments (including state Air Toxic Control Measures) that are not yet fully implemented. These six categories are not currently being considered for potential amendments to Rule 6-1. Three of these source categories are significant sources of both PM_{10} and $PM_{2.5}$ emissions: cooking, wood stoves and fireplaces collectively represent 22 percent of the PM_{10} and 41 percent of the $PM_{2.5}$ emissions. The other three source categories have much lower emissions.

Table 1-2.2: Source Categories with existing or partially implemented rules

Source Category	PM_{10}	$PM_{2.5}$
• Cooking	2.81 tpd	1.80 tpd
• Sand Blasting	0.17	0.01
• Domestic Combustion – water heating	0.47	0.47
• Wood Stoves	2.42	2.33
• Fireplaces	8.31	8.00
• Gas Turbines	0.88	0.88
Total	15.06	13.49

Eight categories are not being considered for potential amendments to Rule 6-1 because they are addressed by new rules that have recently been approved, or are included in the stationary source measure in the 2017 Clean Air Plan. Some of these sources are currently regulated and the other sources are the subject of Further Study Measures currently included in the 2017 Clean Air Plan. Petroleum Refinery Combustion is also a significant

source of PM. Regulation 9, Rule 10 was recently amended to address these sources' NO_X emissions, and include a provision for CO monitoring as an indicator for complete combustion. Additional research is needed to better control PM emissions from refinery process gas combustion. These eight source categories represent five percent of the PM_{10} and nine percent of the $PM_{2.5}$ emissions.

Table 1-2.3: Source Categories with new rules recently approved, or included in the 2017 CAP

Source Category	PM_{10}	$PM_{2.5}$
• Metallurgical Foundries and Forging	0.61 tpd	0.46 tpd
• Metal Recycling and Shredding	0.10	0.07
• Cement Manufacturing	0.11	0.08
• Domestic Combustion – space heating	0.70	0.70
• Petroleum Refinery Combustion	2.51	2.45
• Planned Fires (prunings, crops, weeds)	0.29	0.27
• Animal Waste - Dairy Cattle	0.52	0.06
• Animal Waste - Range Cattle	0.87	0.10
Total	5.71	4.19

Thirty-eight source categories are not within the jurisdiction of the Air District, so are not being considered for potential amendments to Rule 6-1. These 38 source categories represent 18 percent of the PM_{10} and 28 percent of the $PM_{2.5}$ emissions.

Table 1-2.4: Source Categories outside the jurisdiction of the Air District

Source Category	PM_{10}	$PM_{2.5}$
• Lawn & Garden Equipment	0.21 tpd	0.21 tpd
• Refrigeration Units – Diesel	0.18	0.17
• Agricultural Equipment - Diesel	0.32	0.31
• Construction & Mining Equipment – Gasoline	0.11	0.11
• Construction & Mining Equipment – Diesel	0.56	0.55
• Industrial Equipment – Diesel	0.10	0.09
• Light Commercial Equipment – Gasoline	0.34	0.34
• Light Commercial Equipment – Diesel	0.32	0.31
• Locomotive Operations – Diesel	0.20	0.19
• Ships in Transit – Diesel	0.29	0.28
• Ships in Transit – Fuel Oil	0.73	0.71
• Commercial Harbor Craft	0.75	0.75
• Recreational Boats – Gasoline	1.39	1.38
• Commercial Aircraft	0.12	0.12
• General Aviation Aircraft	0.14	0.14
• Light Duty Passenger Vehicles – Exhaust	0.28	0.26
• Light Duty Passenger Vehicles – Tire Wear	0.83	0.21
• Light Duty Passenger Vehicles – Brake Wear	3.81	1.63
• Light Duty Trucks I – Exhaust	0.09	0.08
• Light Duty Trucks I – Tire Wear	0.10	0.02
• Light Duty Trucks I – Brake Wear	0.44	0.19

• Light Duty Trucks II - Exhaust	0.09	0.09
• Light Duty Trucks II – Tire Wear	0.27	0.07
• Light Duty Trucks II – Brake Wear	1.24	0.53
• Medium Duty Trucks - Exhaust	0.08	0.08
• Medium Duty Trucks – Tire Wear	0.20	0.05
• Medium Duty Trucks – Brake Wear	0.92	0.40
• Light Heavy Duty Trucks I - Exhaust	0.13	0.12
• Light Heavy Duty Trucks I – Brake Wear	0.34	0.15
• Medium Heavy Duty Trucks - Exhaust	0.67	0.62
• Medium Heavy Duty Trucks – Brake Wear	0.30	0.13
• Heavy Heavy Duty Trucks - Exhaust	1.60	1.47
• Heavy Heavy Duty Trucks – Tire Wear	0.13	0.03
• Heavy Heavy Duty Trucks – Brake Wear	0.22	0.09
• Urban Buses – Exhaust	0.19	0.17
• Urban Buses – Brake Wear	0.49	0.21
• Other Buses – Exhaust	0.09	0.09
• Cigarette/Tobacco Smoking	0.54	0.52
Total	**18.81**	**12.87**

Staff proposes omitting fourteen source categories from consideration for possible control and emission reductions. Staff is not considering these source categories based on:

i) their current emissions are relatively small,
ii) current rulemaking will provide a basis for future work (regarding control of PM from dairy cattle / range cattle on other types of animals),
iii) additional study is needed to address farming operations, or
iv) control techniques are not currently available to address these categories.

These 14 source categories represent 17 percent of the total PM_{10} and 11 percent of the total $PM_{2.5}$ emissions.

Table 1-2.5 – Source Categories with relatively small PM emissions, without practical controls, or where current work will help develop future control strategies

Source Category	PM_{10}	$PM_{2.5}$
• Landfill Flares	0.11 tpd	0.11 tpd
• Other Natural Gas Combustion	1.41	1.41
• Farming Operations – Land Preparation	1.03	0.15
• Farming Operations – Harvest	0.55	0.08
• Accidental Fires – structural	0.21	0.19
• Accidental Fires – all vegetation	1.04	1.01
• Animal Waste – Broilers	2.43	0.28
• Animal Waste – Layers	1.81	0.21
• Animal Waste – Turkeys	1.17	0.13
• Animal Waste – Sheep	0.44	0.05
• Animal Waste – Horses	0.10	0.01
• Animal Waste – Other	1.83	0.21
• Wind Blown Dust – Agricultural Land	4.90	0.98

• Wind Blown Dust – Other	0.35	0.05
Total	**17.38**	**4.87**

Combustion sources of all types are a cumulative large source of particulates, yet each individual source is a relatively small source of particulate matter. Combustion is a large contributor to the generation of fine PM. Particulates emissions from diesel and fuel oil combustion are common and readily visible. Combustion of natural gas can create ultrafine PM in addition to the small amounts of larger PM. Gas turbines that burn natural gas have been source tested often, and most of the time very little PM is found due to the large volume of exhaust flow. Emission rates of $PM_{2.5}$ can be significant even when the PM concentration is very dilute. Source test results for these sources indicate PM emissions are 0.0006 grains PM_{10}/dscf or lower. The control technology used for this type of source is "good combustion practice," which means ensuring that combustion is as complete as possible. Low CO concentrations in flue gas are an indication of complete combustion. There are no practical controls to reduce particulates beyond "good combustion practice" available for these stationary sources. The 2017 Clean Air Plan stationary source control measure entitled "combustion strategy" will review all sources of combustion with the intent of identifying efficiency measures that will reduce the amount of fuel consumed, and will also consider impact on neighbors.

Attachment 1-3: Analysis of Potential PM Controls on Affected Facilities

A. Source Categories Identified for Potential Emission Reductions Through PM Controls

Twenty-two source categories were reviewed as initial steps to reduce PM emissions. In those 22 source categories there are 2455 permitted stationary sources with particulate matter emissions. These sources were screened to focus on the largest of these facilities, 55 of which have more than 90 lb/day of particulate emissions. These 55 large sources represent slightly more than 2.2 percent of the permitted sources and approximately 85 percent of the total emissions from these categories.

Facilities in some of these 22 source categories may be affected by the more stringent TSP concentration and mass emissions limits. Staff visited each of these 55 facilities to assess the current situation, and understand what impact PM controls would have on these operations. Background information and potential for reduced PM emissions are discussed for each of these categories below. These assessments provide the basis for estimated PM emissions reductions, and estimated costs for these facilities to comply with the draft amendments.

Basic Refining Processes

Four of the large sources of PM are refinery fluid catalytic cracking (FCC) units. Flue gas from the regenerator contains catalyst dust, and is controlled with cyclones and electro-static precipitators (ESP) to limit particulate emissions. These refining processes and the associated control equipment are very sophisticated, and they currently achieve relatively low emissions of filterable PM (typical filterable PM concentrations range from 0.001 – 0.01 grains of PM/dry standard cubic foot).

These sources also contain condensable PM and ammonia, which is a PM precursor. Regulation 6, Rule 5: Particulate Emissions from Refinery Fluidized Catalytic Cracking Units was recently adopted to address the ammonia emissions and optimize ammonia levels in the effluent to minimize particulate emissions from the ESP's.

These facilities are already equipped with Best Available Control Technology for the solid (filterable) particulates. Implementation of Rule 6-5 will address the condensable particulates. No other general or source specific regulations are recommended at this time.

Chemical Manufacturing

One of the large sources of PM in the Bay Area is a petroleum coke calciner. Particulate emissions come from the transportation and storage of green coke, the calcining process, and storage and transportation of the calcined coke product. The primary opportunity for improvement appears to be control of fugitive dust from the storage and handling of the calcined coke product. Regulation 9, Rule 14: Petroleum Coke Calcining Operations was

recently adopted to address significant SO_2 emissions, which is a PM precursor. In addition, Rule 9-14 directly addresses particulate matter emissions by requiring a dust control plan, so this facility is exempted from the draft proposed new requirements.

One of the large sources of PM is a facility that manufactures catalysts used in oil refining. These catalysts are made from alumina powder that is shipped in by rail. The manufacturing facility is contained within buildings, and has baghouses on the process drying streams and on the ventilation from each of the buildings. There does not appear to be significant opportunity for additional cost effective emission reductions at this time.

Other Food and Agricultural Processes

Two large facilities make salt. Salt dust is contained by ducting surrounding the solids handling systems, and wet mechanical scrubbers (known as roto-clones) are used to control salt emissions. There are several baghouses and one water scrubber used as control devices as well. Wet mechanical scrubbers have relatively poor control effectiveness, but since salt particles are absorbed by the body, these particles may not create the same health impacts as other fine particulates. The Morton Salt Material Safety Data Sheet shows no specific health impacts from exposure to salt dust emissions. Staff recommends an exemption from more stringent PM requirements for salt manufacturing.

One large facility is a sugar refinery. Their solids handling processes are abated with wet mechanical scrubbers, and baghouses. One system uses char to absorb color bodies from the raw sugar, and is abated with a baghouse. There does not appear to be significant opportunity for additional cost effective emission reductions at this time. Staff considered providing an exemption for sugar manufacturing similar to salt manufacturing. However, the National Institute for Occupational Safety and Health (NIOSH) recommends no more than 5 mg/m^3 of exposure to sugar dust, so the limited exemption was not included in the rule language. Source test studies for this facility show their emissions are well below the more stringent emission limits proposed in the amendments to Rule 6-1.

One of the large sources is a flour mill. The facility currently produces 1,000,000 lbs. of flour per year, and is in the process of expanding production. They have an extensive system of baghouses and are upgrading the baghouses involved in the expansion as required by Regulation 2, Rule 2. The expanded facilities must meet Best Available Control Technology (BACT) requirements. The facilities current emission limits are 0.02 gr/dscf, and new permit requirements for the expansion will reduce emission limits to the 0.002 – 0.004 gr/dscf range. Staff recommends no further analysis of flour manufacturing at this time, as there does not appear to be significant opportunity for additional cost effective emission reductions.

One large facility is a coffee roaster. There are many cyclone and baghouse combinations for bean and ground coffee handling. The coffee roasting is abated for NO_X and hydrocarbons, but is not abated for PM. There have been several source tests conducted on the coffee roasters – indicating PM emissions are 0.012 gr/dscf totaling approximately 0.2 lb/hr, with an additional 0.014 gr/dscf of condensable PM (also approximately 0.2 lb/hr). Staff recommends no further analysis of coffee roasting at this time, as there does not appear to be significant opportunity for additional cost effective emission reductions.

Two large facilities produce livestock feed from various grains. One facility has baghouses to control the grain conveyors and elevators, and the hammer-mill for grinding the grain. The other facility has cyclones to control these types of sources. The cyclones at the second facility are quite old, and estimated to be only 65 percent efficient. Since these cyclones are much less efficient than baghouses, this facility may be an area of opportunity for improvement. However, secondary abatement is seldom cost effective since more than half of the PM emissions are already removed by the cyclones. The grain unloading areas in both facilities are uncontrolled, although the dusting is relatively minor and occurs only during interim periods when the grain initially falls from the truck into the pit. Compliance testing requirements in draft amendments to Rule 6-1 will identify if further controls are needed for either of these facilities.

Asphaltic Concrete Plants

Five of the large facilities produce asphaltic concrete for road paving. The process for handling and drying aggregate for use in asphalt is controlled, including NO_x controls for the drier and a baghouse to control PM from the drier, handling and storage systems. The area of opportunity for asphaltic concrete facilities is where significant clouds of "blue smoke" occur each time a batch of asphalt mix is delivered from the storage bin into a delivery truck (called load-out). This smoke appears to be vaporized and possibly partially oxidized asphalt. The asphaltic concrete mixture for Warm Mix asphalt is kept at 235 – 275°F in storage, and is hot enough to create this "blue smoke" plume when dropped from the storage vessel into the truck. The asphaltic concrete mixture for Hot Mix asphalt is kept at 300 – 325°F in storage, and makes significantly more "blue smoke." The volume of the plume can be minimized by reducing the free-fall distance into the truck and possibly using a delivery chute.

The California Department of Transportation (CALTRANS) at times requires paving with "rubberized" asphalt. This rubberized asphaltic concrete includes crumb rubber from recycled tires. Rubberized asphaltic concrete is applied at temperatures from 325 – 375°F. These higher temperatures can cause sulfur in the crumb rubber to evolve as hydrogen sulfide (H_2S), an odorous chemical (smells like rotten eggs). In addition, the resulting asphalt mix is in the 300 – 325°F range, and creates significant quantities of "blue smoke."

"Blue smoke" abatement is installed on two of the five large facilities, and currently being added to a third facility. These systems include an enclosure around the truck-loading ramp, and use an induced draft fan to draw air surrounding the loading zone into an abatement device. This control system is estimated to capture 90 percent of the "blue smoke", and routes it to a filtration system that is estimated to recover 85 percent of the vaporized oil. While this appears to be an area of opportunity for asphalt concrete mix plants, the existing blue smoke abatement systems collect very little material. The blue smoke is deceiving – although it appears to be a significant volume of smoke, there are very few pounds of particles collected. Some blue smoke abatement systems only require cleaning monthly. Based on existing examples of blue smoke abatement, it does not appear to be cost effective to require installation of this equipment at these facilities to remove the minor amounts of $PM_{2.5}$ at this time.

An additional concern is that this blue smoke can occur a second time when the truck delivers its load of asphaltic concrete to the paver at the jobsite. The cloud of blue smoke

at the jobsite is usually much smaller because the asphaltic concrete is generally delivered by sliding the asphalt mix from the dump truck into the paver in a slower and more controlled manner. There does not appear to be a feasible method to control blue smoke at the paving jobsite.

Blue smoke also occurs when an asphaltic surface treatment (generally known as chip-seal paving) is used to seal cracks on an existing paved road, or when layered with fine aggregate to form a roadway that normally sees very low volume of motor vehicle traffic. Blue smoke occurs when hot liquid asphalt is sprayed on an existing paved roadway or aggregate. The cloud of blue smoke at the jobsite can be significant when the hot liquid asphalt includes recycled rubber. Abatement is currently available – a portable modular system similar to the blue smoke abatement systems used at asphalt plants. These systems include an enclosure around the liquid asphalt spray nozzles, and an induced draft fan to draw significant quantities of air surrounding the spray zone into an abatement device. This approach is estimated to capture 85 percent of the "blue smoke," and routes it to a filtration system that is estimated to recover 85 percent of the vaporized oil. This also appears to be an area of opportunity to reduce PM emissions, but the amount of asphalt recovered is very small, so staff does not recommend blue smoke abatement at this time.

Additional analysis of possible toxic impacts of blue smoke will be considered in future Health Risk Assessments of these sources.

Roofing Asphalt

Roofing asphalt is an area with potential for emission reductions. Roofing asphalt is typically heated to 450 – 500°F in small heating units called asphalt kettles, and pumped to the roof. Smoke and odors can emanate from the kettle (particularly if the asphalt is overheated), and from the asphalt as it is spread on the roof. Smoke and odors also occur when the kettle is opened to add additional asphalt. One manufacturer of roofing asphalt has now added a polymer that forms a skim-layer on the surface of the hot liquid asphalt in the kettle, and has been shown to reduce smoke and odors by up to 80 percent. This product, known as low-fuming roofing asphalt, appears to be an improvement in worker exposure to fumes, as well as a reduction in PM emissions and odors.

During the workshop process, staff received feedback that low-fuming roofing asphalt is available from only one supplier. Other suppliers provide a low-odor roofing asphalt, but the additive is only an odorant to make the fumes smell better, not reduce the evolution of the hot roofing asphalt fumes. In addition, the cost of low-fuming asphalt was found to be significantly more expensive (incremental $5 – 10 per 100 lb. plug) than anticipated. Low-fuming roofing asphalt no longer appears to be a cost-effective method to control roofing asphalt fumes.

The draft new regulation to address roofing asphalt is being withdrawn, and further study is needed to identify additional options for control of roofing asphalt.

Concrete Batching

Two of the large facilities are concrete batch mix plants. The cement and aggregate flow through a cylindrical chute into the receiving hopper on a delivery truck. An induced draft

fan is often used to draw air surrounding the loading zone into an abatement device. This approach is estimated to capture 90 percent of the cement and aggregate dust, and routes it to a baghouse that is estimated to recover 99 percent of the dust. Plastic flexible shrouds are often positioned around all four sides of the delivery chute to protect the delivery from the wind. Water is often sprayed on the outside of the shrouds to control any dust that may escape the induced draft fan suction during the delivery. Staff recommends no further analysis of concrete batching operations at this time, as there does not appear to be significant opportunity for additional cost effective emission reductions.

Glass & Related Products Manufacturing

One large facility is a glass recycling facility, that receives glass, sorts it into specific colors and types, and then delivers it to glass manufacturing facilities. Glass comes in via trucks and rail cars. The glass is dumped into piles, scooped up with a large front-end loader, and fed into a hopper / crusher / screening process. Plastic bottles and aluminum cans are removed by hand. A magnet is used to remove trash metals. Water sprays are used for abatement of the conveyors. Baghouses are used for abatement of the recycled glass loaded into trucks for delivery. Occasionally recycled glass is loaded directly into trucks using a large front-end loader. There does not seem to be a significant area of opportunity for additional cost effective emission reductions at this time because there is relatively little dust coming from the transportation and storage of the broken glass.

One facility manufactures fiberglass for insulation. Delivery trucks drop recycled glass into a hopper where it is conveyed to a storage silo. The entire recycled glass supply operation is abated with an induced draft fan and baghouse. Glass is melted with a "cold top" electric arc furnace. There appears to be very little PM emissions from this furnace. Molten glass is then spun into fiberglass abated by large induced draft fan and cyclones. Source test information finds the PM emissions from these sources range from 0.01 – 0.04 grains/dry standard cubic foot, and two to eight lbs/hr from each of four parallel fiberglass spinning heads. This spinning process seems to be a source of very fine (0.1 – 1.0 microns) particulates. The facility's corporate engineering group believes the $PM_{2.5}$ comes from volatilization of the molten glass during the spinning process. They have installed electrostatic precipitators (ESP's) at other corporate locations, and find them to be only 50 – 80 percent effective. Their cyclones could be upgraded to include baghouses or an ESP, but control efficiency is uncertain until particle size distributions are more clearly defined. The fiberglass is then coated with a binder, and this binder is a large source of PM emissions. A recent source test measured about 450 lbs. of PM_{10} per day (including condensable PM). However, this facility is in the process of converting to a different binder, so modification of their permit will drive any improvements needed to achieve BACT controls on the binder coating system. The fiberglass is cooled, formed into mats, and cut into finished sizes, all abated with induced draft fans, cyclones and high efficiency air filters. Source-specific rule making will be needed to address the very fine particulate matter coming from the fiberglass spinning process.

One facility manufactures glass containers; however, this facility is no longer a concern because it has recently shut down operations.

Stone, Sand & Gravel

Nine of the large facilities are rock quarries. In general, staff observed that those quarries that made efforts to control dust did a good job of preventing significant dust plumes. On the other hand, those quarries that made little or no effort to control dust had visible dust plumes from crushers, conveyors, stockpiles, and from vehicles on the unpaved roads.

The source and quality of rock from a quarry can vary significantly, so the final products and uses vary as well. However, most quarries have a similar production process: blasting, scooping up the rock with large front-end loaders, crushing the rock, transporting the rock via conveyors, screening the rock into various sizes, additional crushing if necessary, and conveying the various sized rock products to storage piles. Blasting at a quarry creates a significant plume of dust. If the wind is still, this dust can linger for quite some time. If the wind is strong, the wind can carry this dust off-site, and create a nuisance for neighbors. No pre-watering or other methods appear to be practical to prevent or control dust from blasting. Some quarries have a water wash facility to rinse dirt and sand from the various aggregate products.

Most quarries use water sprays as their only dust mitigation strategy. They spray water on the crushers and conveyors, and on the product stockpiles to control dust. Water fog and water misting systems are much more effective because they produce small water droplets that contact the small dust particles more effectively. Some water sprays appeared to be effective, while others needed additional spray nozzles or more regular maintenance of the existing spray nozzles. Almost all quarries load the finished product into trucks with a front-end loader. Loading the finished products into trucks can be a significant source of dust, depending on the time and care used in depositing the rock or aggregate into the truck. Those operators that drop the entire load into a truck quickly from a height of two to three feet create a significant dust plume. Those that slowly and gently slide the load of rock into the truck from a height of no more than one to two feet create a much more modest dust plume. A separate rulemaking for controlling fugitive dust from quarries and other facilities that store and handle bulk materials is being proposed.

Truck traffic on unpaved roads within a quarry can also be a significant source of PM emissions. Most quarries spray water on their unpaved roadways to prevent dust. However, water on unpaved roads can create mud that adheres to the truck tires and truck body, resulting in mud deposits on the paved roads at the exits from these quarries. This mud is known as “trackout” because the trucks and truck tires “track out” mud onto the paved roads. Most quarries have a set of widely spaced bars (known as “grizzlies) near the quarry exit that are designed to knock mud off the trucks, and flex the tire treads to be sure no mud adheres to the tire treads, thus preventing “trackout” onto the public roadway. These grizzly bar systems must also have a place to collect the mud, and the mud must be removed regularly to prevent it from building up to the point where it renders the system ineffective. Some quarries have truck wash stations to clean the trucks and wash mud from the tires before they leave the facility. Trackout can become a significant fugitive dust problem when allowed onto the public roads adjacent to the quarry. The mud can dry into fine silt and local traffic can entrain (and re-entrain) the silt into a localized dust plume. A separate rulemaking for prohibition of trackout will require about one-third of all quarries to improve control of trackout.

Landfills and Other Waste Management

Twelve landfills in the Bay Area are large sources of PM. Similar to quarries, staff observed that the landfills that made efforts to control dust did a good job of preventing significant dust plumes. On the other hand, those landfills that made little or no effort to control dust had visible dust plumes from vehicles on the unpaved roads.

Landfill particulate matter emissions parallel the emissions from construction sites and rock quarries. In addition, landfills may have a variety of other operations including tire recycling; paper, wood, plastic and glass recycling; and green waste recycling. Minor sources of dust are:

- dumping of municipal waste, and construction/demolition debris;
- cuts made in other parts of the landfill to provide cover soil;
- transfer and sorting of recyclables;
- recycling of concrete; and
- recycling and chipping wood.

Most landfills currently have stringent permit conditions in place to control PM emissions. The vast majority of dust at a landfill comes from vehicle traffic. All roads and the area next to the active fill site are normally kept wet to minimize fugitive dust. Landfill sites often use their own leachate as the water source for keeping the roads and active fill site wet. This leachate can have odor issues at times, but it seldom seems to create an odor problem when used to wet the landfill gravel and dirt roads. Landfills also have issues with "trackout" of mud that can accumulate on trucks from the wet gravel and dirt roads. Most landfills have a truck grizzly bar / rumble strip facilities to prevent trackout onto the public roadways. Some facilities have truck wash stations, and others have long paved roads that they either wash down or attempt to keep clean with street sweepers. The primary opportunity for cost effective emissions reductions appears to be more disciplined prevention of trackout onto public roads.

In addition, five other locations in the category of "other" waste management appear to be large sources of PM emissions. These are waste transfer stations, where waste is segregated into various recyclables: green waste, plastic, paper, wood, metals, tires, and concrete for example. Again, PM emissions come primarily from handling of the waste as it is separated into the various recycle streams, and from truck traffic in and out of the facility. Water spray from permanent spray nozzles, or manually from a fire hose is used to wet the waste before it is transferred to a conveyor belt for sorting. Fresh water or reclaimed water is normally used for these water sprays. Water fog or water mist systems are far more effective and use less water. Water sprays appear to be effective, and no significant PM emission reductions are expected. Water is used to control road dust on paved roads and any gravel roads at each facility. Trackout is generally less of a problem at waste transfer stations because most of the roadways are paved. Staff recommends no further analysis of other waste management operations at this time, as there does not appear to be significant opportunity for additional cost effective emission reductions.

Other Industrial & Commercial Processes

There are three gypsum related facilities in the Bay Area. Gypsum is used in fertilizer,

cement manufacturing, and is the primary component of wallboard. Gypsum is a soft, powdered mineral salt that is mined and transported as a dry material, and dust from gypsum is approximately 90 percent PM_{10}, and nearly 50 percent $PM_{2.5}$.

One of the facilities receives gypsum, conveys it to a large storage pile, and loads it into trucks as supply to a cement manufacturing facility. This facility has a baghouse on the receiving system, and water sprays on the conveyor system. The primary area of opportunity for cost effective emission reductions is fugitive dust from traffic in the area, particularly with a large skip loader used to load gypsum into the product delivery trucks. A second facility receives gypsum, conveys it to a large storage pile, and manufactures wallboard. This facility has baghouses on the gypsum receiving and storage facility, on the crushed gypsum and conveyor to the wallboard plant, and on the gypsum calcining operation within the plant. The area of opportunity for emission reduction is concentrated on fugitive dust from a recycled gypsum storage pile and the truck traffic within the facility. These two gypsum facilities will be affected by the draft rule for bulk material storage and handling.

A third facility manufactures the paper tape used to join and smooth out the interface between two sections of wallboard. This facility generates PM from the mechanical process used to texturize the paper tape so the wallboard joint compound will adhere to the paper tape. This facility has a cyclone to capture the paper dust created by texturizing the paper tape. A baghouse can provide more effective control than a cyclone, so there is an opportunity for reducing emissions by adding a baghouse to the discharge from the cyclone. The discharge of the cyclone appears clear with little residue on the discharge ducts, so no additional controls may be warranted. There are no source tests on this emission point, so the compliance testing required in the draft amendments to Rule 6-1 will determine whether this facility needs to install better control equipment.

Bay Area Rapid Transit Car Cleaning Facilities

Bay Area Rapid Transit (BART) has four maintenance yards that each have BART car cleaning facilities. Particulate matter from rail wear, electric motor wear, and brake pad wear accumulate under the BART cars, and can be emitted to the air during the cleaning process. These cleaning facilities are enclosed, and abated with wet mechanical scrubbers (roto-clones) that seem to work effectively – there is no tell-tale dust or stain on the discharge of the scrubbers. However, emissions from each of these wet scrubbers were incorrectly estimated to be more than 200 lb/day, so staff identified these facilities as an area of opportunity for PM controls. The actual emissions are much lower, so additional controls such as a baghouse or a wet electrostatic precipitator are not cost effective.

BART also has a rail-grinding car that is designed to smooth out the system's rails. This rail-grinding car has an induced draft fan to capture rail dust, and a baghouse to control the discharge of the fan. It appears to work effectively, and does not appear to have much potential for cost effective emission reductions.

Contra Costa County Sanitary District

The Contra Cost County Sanitary District has a sewage treatment facility in Martinez that incinerates solid sludge. It is currently equipped with a wet scrubber to control particulate

emissions. Source tests indicate this wet scrubber is effective most of the time, but occasionally the test results could exceed the more stringent limits included in the amendments to Rule 6-1. Staff from the Contra Costa County Sanitary District indicate that they intend to upgrade these wet scrubbers with more effective scrubbers, with the potential to include a wet Electro Static Precipitator (ESP) and a chloride removal system to address Toxic Air Contaminant (TAC) emissions. Installation of these enhanced controls is not cost effective for the relatively small PM emission reductions that can be gained.

CCC Sanitary District is part of a Publicly Owned Treatment Works group that has indicated they need 6 years to budget, fund, design, procure, construct and startup abatement equipment. Accommodation for this extended time period is included in the proposed amendments to Rule 6-1.

Smaller Sources

The remaining 2,400 permitted stationary sources emit significantly less than 90 pounds per day. They collectively account for the remaining 15 percent of the total emissions of the 22 source categories that are being considered for this first phase of PM emission reductions. They represent an array of sources similar to the larger stationary sources - just lower in emissions. Staff will work with these smaller sources during the workshop phase of the rule development process to discover any unique specific issues that may be raised by these smaller sources.

Construction Operations (Residential, Commercial, Institutional, Industrial, and Roads)

Construction is a large source of fugitive dust, and provides a significant opportunity for emission reductions. Construction dust is currently limited by the visible emission standard in Rule 6-1; and Air District Rule 11-14, Asbestos-Containing Serpentine and the California Air Resources Board Air Toxic Control Measures limit construction operations involving naturally occurring asbestos (known as serpentine rock) for Surfacing Applications and for Construction, Grading, Quarrying, and Surface Mining Operations. Construction dust is also limited by the Regional Water Quality Control Board requirements for Storm Water Pollution Prevention Plans (SWPPP). SWPPP's are required for any construction site over 1 acre.

PM emissions from construction operations are separated into five different categories in the emission inventory, as follows:

Source Category	TSP	PM_{10}	$PM_{2.5}$
Residential	5.09 tpd	2.49 tpd	0.25 tpd
Commercial	4.99	2.44	0.24
Institutional	5.02	2.46	0.25
Industrial	2.34	1.14	0.11
Roads	6.00	2.94	0.29
Total:	23.44	11.47	1.14

CARB guidelines indicate typical dust from construction and other disturbed surfaces is approximately 49 percent PM_{10}, and only approximately five percent $PM_{2.5}$. Staff is not

proposing any draft amendments for Rule 6-1 to address fugitive dust, or any new rules for general control of fugitive dust at this time. Instead, staff proposes to focus on trackout that creates road dust, and the potential for subsequent vehicle traffic to pulverize the trackout into silt and $PM_{2.5}$.

As mentioned previously, the State Regional Water Quality Control Board requires Storm Water Pollution Prevention Plans for large construction projects, and provides a variety of Best Management Practices to control silt in water runoff, wind erosion, and trackout onto paved roads. SWPPP Best Management Practices summarized in Attachment 1-5A of this workshop report.

Attachment 1-5B of this workshop report provides a summary of wind erosion and fugitive dust control methodologies, divided into various categories of potential dust generating activities. These categories are:

1. Bulk Materials – Onsite Handling / Processing Operations
    - Conveying
    - Crushing
    - Screening
    - Stockpiles
2. Bulk Materials – Onsite Hauling / Transporting
    - Loading
    - Unloading
    - Stacking
    - Hauling
    - Transporting
3. Bulk Materials – Offsite Hauling / Transporting
    - Crossing or using paved roads accessible to the Public
4. Concrete and Demolition Work
    - Clearing concrete forms
    - Mechanical and manual demolition
5. Disturbed Surface Areas
6. Earth-moving Activities
    - Earth cutting and filling,
    - Drilling,
    - Grading,
    - Leveling,
    - Clearing and/or grubbing,
    - Excavating,
    - Trenching,
    - Landscaping,
    - Road shoulder maintenance
    - Soil mulching
    - Landfill operations,
    - Weed abatement by discing or blading.
7. Open Area and Vacant Land
8. Stabilization Requirements
9. Trackout, Carryout, & Spillage, Erosion Requirements
10. Traffic in Unpaved Work Sites

11. Unpaved Parking Areas, Staging Areas, Material Storage Areas, and Unpaved Access Roads and Haul Roads
12. Other Potential Dust Generating Operations / Control Measures

The SWPPP BMP's and these fugitive dust control methodologies are provided here as a reference for the future when a new rule(s) for control of fugitive dust is developed.

Entrained Road Dust

Road dust is divided into six categories based on the estimated emissions from each type of road: Paved Freeways; Paved Major Roads; Paved Collectors; Paved Local Streets; Unpaved Forest/Park Roads; and Unpaved Farm Roads. Each road type accumulates dust from four primary sources:

- Erosion in the form of dirt and debris that blows from the side of the road onto the road by gusts of wind, or that is washed onto the roadway during heavy rains, floods, or irrigation system malfunctions;
- Dirt or other bulk materials that may blow out of a truck, or may leak or spill from a truck as it travels down the road (known as carryout);
- Dirt or mud that adheres to a vehicle's tires or undercarriage which then dries and falls onto the roadway (known as trackout); and
- Particles from the road surface itself that can be eroded by vehicle traffic. These particles are very small when eroded from a paved or concrete road.

Two other sources of particulate can accumulate near roadways - particles from tire wear and brake pad wear. However, they are considered separate categories in the emissions inventory. Staff has no recommendations on how to address either tire wear or break pad wear.

Any dirt that accumulates on a roadway can be pulverized into fine particles by vehicle tires, and entrained into the air by the turbulence from passing vehicles. Any larger particles (larger than PM_{10}) fall back to the earth quickly (typically within a 100 - 200 feet), while the smaller particles ($PM_{2.5}$) either fall back to earth more slowly or become dissipated with the surrounding air. A study of near freeway particulate measurements indicates diesel and other ultra-fine PM from freeways tend to reach background concentrations about 250 meters away from the freeway.[2] [3]

Entrained Road Dust is identified as six different categories in the emission inventory, as follows:

Source Category	TSP	PM_{10}	$PM_{2.5}$
Paved Freeways	12.81 tpd	5.86 tpd	0.88 tpd
Paved Major Roads	15.49	7.08	1.06
Paved Collectors	3.13	1.43	0.21

[2] Improving Air Quality and Health in Bay Area Communities, Community Air Risk Evaluation Program Retrospective and Path Forward (2004 – 2014), April 2014, page 76.

[3] Zhu, Y.F., W.C. Hinds, S. Kim, S Shen, C. Sioutas, 2002. Study of ultrafine particles near a major highway with heavy-duty diesel traffic. Atmospheric Environment, 36, 4323-4335. doi:10.1016/S1352-2310(02)00354-0.

Paved Local Streets	21.50	9.83	1.47
Unpaved Forest/Park Roads	5.95	3.53	0.35
Unpaved Farm Roads	0.54	0.32	0.03
Total:	59.42	28.05	4.00

CARB estimates of particle size distribution vary with the type of roadway. Paved road dust is estimated to be 46 percent PM_{10}, and seven percent $PM_{2.5}$, with the remainder being particles larger than ten microns. Unpaved road dust is estimated to be 59 percent PM_{10}, and 6 percent $PM_{2.5}$, with the remainder being particles larger than 10 microns.

Entrained road dust from paved roads can be limited by requiring prevention of trackout, carryout, and erosion onto paved roads. Dust and silt are not usually found in the travel lanes, but rather accumulate along the sides of the roads (either in gutters or road shoulders) and on median strips. In some air districts, the various Public Works Departments have paved road shoulders and median strips, but that approach has the disadvantage of creating impermeable surfaces, which can aggravate concerns about water runoff into nearby storm drains and silt deposition into groundwater. A better solution is to provide low-silt gravel or vegetation along road shoulders and median strips to reduce the impact of air turbulence.

There are typically three ways to mitigate road dust:

- Support vegetation on median strips and next to road shoulders to minimize wind erosion
- Water flush
- Mechanical sweeping or Vacuum sweeping

The vegetation strategy is best when built into the design of highways and freeways. Water flushing is effective, but creates the concern of flushing silt into the groundwater. Street sweeping is often the most practical, and has the advantage of removing trash, litter and other debris from the roadway. However, mechanical sweepers often create as much dust as they prevent.

Entrained road dust from unpaved city, county, forest, park, and farm roads with very light traffic are much more difficult to address. Control of PM emissions from unpaved roads is simple, through paving, covering the road with low silt gravel, or covering with a petroleum road emulsion. However, since unpaved roads are so widely distributed around the Air District's nine counties, only on rare occasions is there enough traffic to create significant entrained road dust and only then is control of unpaved road dust likely to be cost effective.

Bulk Material Storage and Handling, Including Coke and Coal Operations

Bulk material storage and handling are significant sources of PM emissions, and have also been a source of public complaints. Bulk materials are unpackaged solids less than two inches in length or diameter, such as soil, sand, gravel, aggregate, construction materials, coke and coal. Wind erosion from storage and handling of these materials can contribute to fine particulate matter pollution when bulk material dust gets carried into the atmosphere by the wind or by being handled in the open air. Coke and coal are particularly troublesome because the dust is black. Coke or coal dust is far more visible than typical geologic dust, and black residue on people's cars, windows and patio furniture is especially annoying. Black coke and coal dust also absorb sunlight, so they have a greater impact on climate

change than most typical dust sources.

The Air District has approximately 120 facilities that store and handle bulk materials, 10 of which handle petroleum coke, and three facilities that store and handle coal. Approximately 40 of these facilities already have controls for fugitive dust, mostly water sprays. Wind breaks are a very effective method to control wind erosion that initiates fugitive dust plumes, particularly when bulk materials are actively conveyed from one place to another. Costs for wind screens and improvements to watering systems are relatively minor. Neighbor complaints are expected to be reduced significantly. A separate rulemaking for controlling fugitive dust from bulk material storage and handling sites is proposed.

Attachment 1-4: Applicable Federal Standards

The United States Environmental Protection Agency has adopted the following New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) that address PM emissions:

Federal New Source Performance Standards (40 C.F.R. Part 60)

Source Category	Subpart and Section	Description
All	Subpart A, § 60.11	General Provisions
Sulfuric Acid Production Units	Subpart Cd, § 60.31d	Emissions Guidelines and Compliance Times
Fossil-Fuel-Fired Steam Generators	Subpart D, § 60.42	Standards of Performance
Electric Utility Steam Generating Units	Subpart Da, § 60.42Da	Standards of Performance
Industrial-Commercial-Institutional Steam Generating Units	Subpart Db; §§ 60.43b & 60.48b	Standards of Performance
Small Industrial-Commercial-Institutional Steam Generating Units	Subpart Dc, § 60.43c	Standards of Performance
Incinerators	Subpart E, § 60.52	Standards of Performance
Large Municipal Waste Combustors	Subpart Eb, § 60.55b	Standards of Performance
Standards of Performance for Hospital/Medical/Infectious Waste Incinerators	Subpart Ec, § 60.52c	Standards of Performance
Sulfuric Acid Plants	Subpart H, § 60.83	Standards of Performance
Hot Mix Asphalt Facilities	Subpart I, § 60.92	Standards of Performance
Petroleum Refineries	Subpart J, § 60.102; Subpart Ja, § 60.102a & § 60.105a	Standards of Performance
Secondary Lead Smelters	Subpart L, § 60.122	Standards of Performance
Secondary Brass and Bronze Production Plants	Subpart M, § 60.132	Standards of Performance
Primary Emissions from Basic Oxygen Process Furnaces Constructed after June 11, 1973	Subpart N, § 60.142	Standards of Performance
Secondary Emissions from Basic Oxygen Process Steelmaking Facilities Constructed after January 20, 1983	Subpart Na, § 60.142a	Standards of Performance
Sewage Treatment Plants	Subpart O, § 60.152	Standards of Performance
Glass Manufacturing Plants	Subpart CC, § 60.292	Standards of Performance
Grain Elevators	Subpart DD, § 60.302	Standards of Performance
Lime Manufacturing	Subpart HH, § 60.342	Standards of Performance
Metallic Mineral Processing Plants	Subpart LL, § 60.382	Standards of Performance
Phosphate Rock Plants	Subpart NN, § 60.402	Standards of Performance
Ammonium Sulfate Manufacture	Subpart PP, § 60.442	Standards of Performance
Asphalt Processing and Asphalt Roofing Manufacture	Subpart UU, § 60.472	Standards of Performance
New Residential Wood Heaters	Subpart AAA, § 60.532	Standards of Performance
Nonmetallic Mineral Processing Plants	Subpart OOO, § 60.672	Standards of Performance
Wool Fiberglass Insulation Manufacturing Plants	Subpart PPP, § 60.682	Standards of Performance
Calciners and Dryers in Mineral Industries;	Subpart UUU, § 60.732	Standards of Performance
Municipal Solid Waste Landfills	Subpart WWW, § 60.752	Standards of Performance

Federal National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 C.F.R. Part 63)

Source Category	Subpart and Section	Description
Petroleum Refineries	Subpart CC, § 63.642	National Emission Standards for Hazardous Air Pollutants
Mineral Wool Production	Subpart DDD, § 63.1178	National Emission Standards for Hazardous Air Pollutants
Hazardous Waste Combustors; Incinerators, Cement Kilns & Lightweight Aggregate Kilns (Interim Standards)	Subpart EEE, § 63.1203, § 63.1205, § 63.1219, § 63.1221	National Emission Standards for Hazardous Air Pollutants
Wool Fiberglass Manufacturing	Subpart NNN, § 63.1382	National Emission Standards for Hazardous Air Pollutants
Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units, and Bypass Lines	Subpart UUU, § 63.1564, § 63.1565, § 63.1566, § 63.1567, § 63.1568, § 63.1569, § 63.1570	National Emission Standards for Hazardous Air Pollutants
Lime Manufacturing Plants	Subpart AAAAA, § 63.7090	National Emission Standards for Hazardous Air Pollutants
Industrial, Commercial, and Institutional Boilers and Process Heaters	Subpart DDDDD, § 63.7500	National Emission Standards for Hazardous Air Pollutants
Brick and Structural Clay Products Manufacturing	Subpart JJJJJ, § 63.8405	National Emission Standards for Hazardous Air Pollutants
Clay Ceramics Manufacturing Emission Limitations and Work Practice Standards	Subpart KKKKK, § 63.8555	National Emission Standards for Hazardous Air Pollutants
Asphalt Processing and Asphalt Roofing Manufacturing Emission Limitations	Subpart LLLLL, § 63.8684	National Emission Standards for Hazardous Air Pollutants
Refractory Products Manufacturing Emission Limitations and Work Practice Standards	Subpart SSSSS, § 63.9788	National Emission Standards for Hazardous Air Pollutants
Secondary Nonferrous Metals Processing Area Sources Standards, Compliance, and Monitoring Requirements	Subpart TTTTTT, § 63.114655	National Emission Standards for Hazardous Air Pollutants
Asphalt Processing and Asphalt Roofing Manufacturing Standards and Compliance Requirements	Subpart AAAAAAA, § 63.11561	National Emission Standards for Hazardous Air Pollutants
Chemical Preparations Industry Standards and Compliance Requirements	Subpart BBBBBBB, § 6311581	National Emission Standards for Hazardous Air Pollutants
Prepared Feeds Manufacturing Standards, Monitoring, and Compliance Requirements	Subpart DDDDDDD, § 63.11621	National Emission Standards for Hazardous Air Pollutants

ATTACHMENT 1-5: Examples of Control Measures / Best Management Practices for Dust Control

Fugitive Dust Control Measure: A technique, practice, equipment or procedure used to prevent, minimize or mitigate the generation, emissions, entrainment, suspension, and/or airborne transport of fugitive dust. For the purposes of this rule, Storm Water Pollution Prevention Plan (SWPPP) Best Management Practices (BMP), and other dust prevention techniques used to meet CEQA mitigation requirements or local ordinances are considered control measures. Control measures also include:

1 Application of water and dust suppressants;
2 Application of low-silt gravel, asphaltic emulsion, and vegetative or synthetic cover;
3 Physical restriction of fugitive dust, soil erosion and motive forces of fugitive dust (wind and water), including curbing, paving, wind breaks, chutes, shrouds, enclosures, buildings; and
4 Work practice standards including restricting vehicle speeds, controlling drops of bulk materials, using wash down pads, and keeping cargo beds in good repair and covered.

Attachment 1-5A

Applicable Storm Water Pollution Prevention Plan – Relevant Best Management Practices

Source Category	Best Management Practices
Erosion Control	EC-1 Scheduling EC-2 Preservation of Existing Vegetation EC-3 Hydraulic Mulch EC-4 Hydro seeding EC-5 Soil Binders EC-6 Straw Mulch EC-7 Geotextiles & Mats EC-8 Wood Mulching EC-15 Soil Preparation / Roughening EC-16 Non-Vegetative Stabilization
Sediment Control	SE-7 Street Sweeping and Vacuuming
Wind Erosion Control	WE-1 Wind Erosion Control
Tracking Control	TC-1 Stabilized Construction Entrance/Exit TC-2 Stabilized Construction Roadway TC-3 Entrance/Outlet Tire Wash
Non-Storm Water Management	NS-3 Paving and Grinding Operations NS-13 Concrete Finishing NS-16 Temporary Batch Plants
Waste Management & Materials	WM-1 Material Delivery and Storage WM-2 Material Use WM-3 Stockpile Management WM-4 Spill Prevention and Control WM-5 Solid Waste Management WM-8 Concrete Waste Management

Attachment 1-5B

Example Control Measures / Best Management Practices

Source Category	Control Measure	Guidance	Records
1.0 Bulk Materials – Onsite Handling / Processing Operations	**<u>During Active Operations</u>**		
• Conveying • Crushing • Screening • Stockpiles	1.1 Stabilize material before, during, and after conveying, crushing, or screening to prevent visible dust plumes.	1.1.1 Stabilize bulk material with water mist/fog or spray, or chemical/organic dust suppressant.	1.1.1 Establish records indicating stabilization methods and actions for each potential dust source.
	1.2 Use water misting/fogging systems or water sprays, to mitigate fine dust.		1.2.1 Monitor and log key operating parameters of abatement systems.
	1.3 Stabilize material on stockpiles with any indication of windblown visible dust emissions.	1.3.1 Maintain stockpiles to avoid steep sides or faces.	1.3.1 Monitor and record visible dust emissions observations.
	1.4 Use water spray trucks or water spray systems as necessary. Water truck / water spray system must cover entire stockpile.		1.4.1 Monitor and record visible dust emissions observations.
	1.5 Assess operational status of water misting/fog/spray abatement systems regularly and record status.		1.5.1 Monitor and log key operating parameters of abatement systems.
	1.6 Limit stockpiles within 100 yards of an occupied building to less than 8 feet in height.		1.6.1 Monitor and record visible dust emissions observations.
	1.7 Stabilize areas surrounding material stockpiles and conduct housekeeping to ensure materials remain consolidated in storage areas and away from vehicle travel paths.	1.7.1 Stabilize surrounding areas with water, silt free gravel, or dust suppressant.	1.7.1 Monitor and log housekeeping actions, and any cleanup necessary.
	1.8 Incorporate wind breaks, enclosures, or area covers as needed.	1.8.1 Wind barrier with no more than 50% porosity upwind of stockpiles and processing facilities. Height of the wind barrier equals the height of the pile. Distance of the barrier from the pile no more than twice the height of the pile.	
	1.9 Use transfer chutes and shrouds to mitigate dusting from the energy of solids handling and solids falling into and out of delivery trucks, and into processing equipment and onto conveyor belts.		1.9.1 Monitor and record visible dust emissions observations.

	1.10 Record stabilization methods, actions and results.	1.10.1 Document stabilization status in records.	1.10.1 Monitor and log key operating parameters of abatement systems.
	1.11 Clean up any spilled materials that could create dust plumes with wet vacuum or HEPA filter equipped vacuum system.		1.11.1 Record any cleanup necessary.
	1.12 If wind gusts exceed 25 mph, apply water to the stockpile a minimum of twice per hour, or install temporary coverings.		1.12.1 Document wind gusts, and contingency actions taken.
	1.13 Consider water wash of bulk materials to remove PM less than 10 microns.		
	During Periods of Inactive Operations		
	1.14 When not loading, unloading or stacking operations: cover, or stabilize stockpile and maintain soil crust.	1.14.1 Maintain soil crust.	1.14.1 Document stabilization actions for inactive sources.
	1.15 If stockpiles are inactive for more than 14 days, cover with tarp/plastic/other suitable material.	1.15.1 Cover with tarp, plastic or other suitable material and anchor adequately to prevent wind erosion.	
2.0 Bulk Materials – Onsite Hauling / Transporting	**During Active Operations**		
• Loading • Unloading • Stacking • Hauling • Transporting	2.1 Pre-water material prior to loading.	2.1.1 Stabilize bulk material with water or chemical/organic dust suppressant.	2.1.1 Record stabilization methods and actions for each potential dust source.
	2.2 Stabilize material while loading, unloading, and stacking to prevent visible dust plumes.		2.2.1 Monitor and log key operating parameters of abatement systems.
	2.3 Use water misting/fogging systems or water sprays to mitigate fine dust.		2.3.1 Monitor and record visible dust emissions observations.
	2.4 Use water spray trucks or water spray systems as necessary. Water truck / water spray system must cover entire stockpile.		2.4.1 Monitor and log key operating parameters of abatement systems.
	2.5 Assess operational status of water misting/fogging/spray abatement systems regularly, and record status.		2.5.1 Monitor and log key operating parameters of

			abatement systems.
	2.6 Add or remove material from the downwind portion of the stockpile.	2.6.1 Maintain stockpiles to avoid steep sides or faces	
	2.7 Conduct housekeeping to ensure bulk materials remain consolidated onto stockpiles, and remain away from vehicle travel paths.		2.7.1 Monitor and log housekeeping actions, and any cleanup necessary.
	2.8 Incorporate wind breaks, enclosures, or area covers as needed		
	2.9 Use transfer chutes and shrouds to mitigate dusting from the energy of solids handling and solids falling into and out of delivery trucks, and into processing equipment and onto conveyor belts.		
	2.10 Fully enclose or shroud conveyors.		
	2.11 Inspect cargo compartments for holes and other openings to prevent spillage.	2.11.1 Check belly-dump truck seals regularly. 2.11.2 Remove any trapped rocks to prevent spillage	2.11.1 Document leak check inspections, and any corrections or cleanup necessary.
	2.12 Empty loader bucket slowly and minimize drop height from loader bucket to prevent dust plumes		
	2.13 Ensure minimum of 6 inches freeboard in haul truck.		2.13.1 Monitor and record freeboard.
	2.14 Maintain highest point of bulk material below the edges of the cargo container;		2.13.1 Monitor and record material height.
	2.15 Ensure empty cargo compartments are clean, or covered with a tarp or other suitable closure;	2.15.2 Use tarps or other suitable enclosures on haul truck.	
	2.16 If trucks are also used for offsite hauling, ensure they comply with California DMV Vehicle Code Section 23114.		
	2.17 Limit vehicle traffic to established haul routes and parking lots by installing traffic barriers as necessary;		2.17.1 Document traffic control actions.
	2.18 Conduct vehicle traffic counts to determine daily vehicle traffic (DVT).	2.18.1 Traffic control reduces stabilization requirements.	2.18.1 Document actual DVT.
	2.19 When Daily Vehicle Traffic (DVT) exceeds 75, or AADVT exceeds 50, or DVT exceeds 25 from vehicles with 3 or more axles, stabilize unpaved roads or unpaved traffic areas.	2.19.1 Stabilize by watering, uniform layer of low silt gravel, chemical dust suppressant, vegetative materials, paving, road mix, or other method demonstrated to be effective and approved by the	

		APCO.	
	2.20 Limit vehicle speed to no more than 15 mph.		2.20.1 Document speed limit control actions.
	2.21 Record stabilization methods, actions and results.		2.21.1 Monitor and log key operating parameters of abatement systems.
	2.22 Clean up any spilled materials that could create dust plumes with wet vacuum or HEPA filter equipped vacuum system.		2.22.1 Record any cleanup necessary.
	2.23 If wind gusts exceed 25 mph, discontinue truck loading operations, and stop all vehicle traffic or cover all haul vehicles.		2.23.1 Document wind gusts, and contingency actions taken.
3.0 Bulk Materials – Offsite Hauling /	**<u>During Active Operations</u>**		
Transporting, crossing or using paved roads and paved areas accessible to the Public	3.1 Stabilize material or cover cargo compartment before hauling to prevent visible dust plumes.	3.1.1 Stabilize bulk material with water or chemical/organic dust suppressant. 3.1.2 Use tarps or other suitable enclosures on haul trucks.	3.1.1 Record stabilization methods and actions for each potential dust source.
	3.2 Record stabilization methods and actions.		
	3.3 Inspect cargo compartments for holes and other openings to prevent spillage.	3.3.1 Check belly-dump truck seals regularly. 3.3.2 Remove any trapped rocks to prevent spillage.	3.3.1 Document leak check inspections, and any cleanup necessary.
	3.4 Ensure minimum of 6 inches freeboard in haul truck.		3.4.1 Monitor and record freeboard.
	3.5 Maintain highest point of bulk material below the edges of the cargo container.		
	3.6 Ensure empty cargo compartments are clean, or covered with a tarp or other suitable closure.		3.6.1 Monitor and log compartment cleanliness, covers.
	3.7 Limit vehicle traffic to established haul routes and parking lots by installing traffic barriers as necessary.	3.7.1 Traffic control reduces stabilization requirements.	3.7.1 Document traffic control actions.
	3.8 Comply with California DMV Vehicle Code Section 23114.		
	3.9 Conduct vehicle traffic counts to determine daily vehicle traffic (DVT).		3.9.1 Document actual DVT.
	3.10 Where Daily Vehicle Traffic (DVT) exceeds 75, or AADVT exceeds 50, or DVT exceeds 25 from vehicles with 3	3.10.1 Stabilize by watering, uniform layer of low silt gravel,	

	or more axles, stabilize unpaved roads or unpaved traffic areas.	chemical dust suppressant, vegetative materials, paving, road mix, or other method demonstrated to be effective and approved by the APCO.	
	3.11 Limit vehicle speed to no more than 15 mph.		3.11.1 Document vehicle speed control actions.
	3.12 Record stabilization methods, actions and results.		3.12.1 Monitor and record visible dust emissions observations.
	3.13 Clean up any spilled materials that could create dust plumes with wet vacuum or HEPA filter equipped vacuum system.		3.13.1 Document leak check inspections, and any cleanup necessary.
	3.14 If wind gusts exceed 25 mph, stop all vehicle traffic or cover all haul vehicles.		3.14.1 Document wind gusts, and contingency actions taken.
	3.15 Prevent trackout onto paved public roads, per Section 9.0.		
4.0 Concrete & Demolition Work	**Clearing Concrete Forms**		
• Clearing concrete forms • Demolition – mechanical & manual	4.1 Use sweeping and water spray to clear forms.	4.1.1 Do not use high pressure air to clear forms.	4.1.1 Record cleanup methods and actions for concrete forms.
	4.2 Use vacuum system equipped with HEPA filtration to clear forms.		
	Demolition		
	4.3 Divide demolition activities into phases to minimize the amount of demolition debris exposed at any one time.		
	4.4 Stabilize building exterior surfaces and other wind erodible surfaces.		4.4.1 Monitor and record visible dust emissions observations.
	4.5 Apply sufficient water fog or mist during demolition to prevent visible dust plumes.	4.5.1 Stabilize demolished material with water or chemical/organic dust suppressant.	4.5.1 Record stabilization methods and actions for each potential dust source.
	4.6 Stabilize surface soil where support equipment and vehicles will operate.		4.6.1 Monitor and record visible dust emissions observations.
	4.7 Stabilize loose soil and demolition debris within 100 ft. of demolition work site.		4.7.1 Monitor and record visible dust emissions observations.

	4.8 If a wind gust occurs (wind speed exceeds 25 mph), discontinue demolition.		4.8.1 Document wind gusts, and contingency actions taken.
	4.9 Apply water mist or fog, or dust suppressant after demolition to establish a crust and prevent wind erosion.	4.9.1 Stabilize demolished material with water or chemical/organic dust suppressant.	4.9.1 Monitor and record soil crust observations.
5.0 Disturbed Surface Areas	**Preparation Activity**		
	5.1 Divide creation of disturbed surfaces areas into phases to minimize the disturbed surface areas exposed at any one time.		
	5.2 Maintain live perennial vegetation where possible.		
	5.3 Pre-water surface areas to depths of planned cuts or land shaping, allowing time for penetration.		
	During Active Operations		
	5.4 Stabilize disturbed surface areas as they are being created.	5.4.1 Stabilize disturbed surfaces with water or chemical/organic dust suppressant.	5.4.1 Record stabilization methods and actions for each potential dust source.
	5.5 Stabilize disturbed soil throughout the construction site and between structures to prevent visible dust plumes.	5.5.1 Apply suitable dust suppressant to create a soil crust.	5.5.1 Monitor and record soil crust observations.
	5.6 Limit vehicular traffic on disturbed soil to the extent possible.		
	5.7 Incorporate furrows, compacting, wind breaks, enclosures, or area covers as needed to reduce wind soil erosion.	5.7.1 Construct wind barriers with no more than 50% porosity to control windblown fugitive dust. The distance from wind barrier to the disturbed area should be no more than twice the height of the wind barrier. Each 1 foot of wind barrier height will typically protect 8 – 10 feet of disturbed surface. 5.7.2 When interior block walls are planned, install as early as possible.	5.7.1 Record prevention measures and actions for erosion control.
	5.8 Utilize work practices and/or structural provisions to prevent wind and water soil erosion onto paved areas accessible to the public.		5.8.1 Record prevention measures and actions for erosion control.
	5.9 Stabilize disturbed surface areas upon completion; on the last day of active operations prior to a weekend or holiday, or if inactive for more than 14 days.		5.9.1 Monitor and record soil crust observations.
	5.10 Record stabilization methods and actions as required.	5.10.1 Maintain soil moisture content at least 12% as measured by	5.10.1 Monitor and record visible dust emissions

		ASTM D2216-05. For areas where optimum moisture content for compaction is less than 12%, maintain at least 70% of optimum soil moisture content.	observations.
	5.11 If wind gusts exceed 25 mph, apply water a minimum of every 8 hours. If there is any evidence of wind driven fugitive dust, increase watering frequency to a minimum of every 6 hours.		5.11.1 Document wind gusts, and contingency actions taken.
	<u>During Periods of Inactivity</u>		
	5.13 When dust generating operation is inactive for 30 days or more: i. Pave, apply low silt gravel, or apply a suitable dust suppressant; or ii. Establish sufficient vegetative ground cover; and iii. Restrict vehicle access to the area through use of fences, ditches, vegetation, berms, or other suitable barriers; iv. Restore area as described in Section 15.15.		5.13.1 Monitor and record soil crust observations.
	5.14 If work site is a Large Operation, apply requirements in 5.13 after 21 days.		5.14.1 Document timeliness of soil stabilization.
	5.15 Re-establish ground cover as soon as reasonably possible, but no longer than 90 days, in sufficient quantity and density to expose less than 30% of unstabilized ground. Use aggregates, berms, or wind screens in combination with seeding and watering, chemical stabilizers and ground cover such that in total, these actions apply to all the disturbed surface areas.		5.15.1 Document completion of soil stabilization.
6.0 Earth-moving activities	**<u>Preparation Activity</u>**		
Use of any equipment for any activity where soil is being disturbed, moved or uncovered that may generate fugitive dust emissions, and shall include but not limited to the following:	6.1 Phase work schedule to reduce the amount of disturbed surface area at any one time; and to allow for more effective interim watering and stabilization to minimize potential dust generation.	6.1.1 Grade each project phase separately, timed to coincide with construction. 6.1.2 Apply interim watering and stabilization to minimize potential for dust generation.	
• Earth cutting and filling, • Drilling, • Grading,	6.2 Pre-apply water and allow time for penetration to stabilize soil prior to earth-moving activities.	6.2.1 Apply mist/fog, water sprays, or chemical/dust suppressant to stabilize soil and backfill material.	6.2.1 Document stabilization methods and actions for each potential dust source.

• Leveling, • Clearing and/or grubbing, • Excavating, • Trenching, • Landscaping, • Road shoulder maintenance • Soil mulching • Landfill operations, • Weed abatement by discing or blading.			
	6.3 Maintain live perennial vegetation where possible.		
	During Active Operations		
	6.4 Dedicate water truck or high capacity water fog to work site.	6.4.1 Or dedicate water mist/fog equipment to work site and backfilling equipment.	
	6.5 Pre-water and maintain surface soils in stable condition where vehicles and support equipment operate.	6.5.1 Apply water or chemical dust suppressant to unpaved vehicle equipment traffic areas sufficient to limit visible dust emissions.	6.5.1 Monitor and record visible dust emissions observations.
	6.6 Pre-apply water to depth of proposed cuts; and allow time for penetration to stabilize soil prior to cutting, or trenching. For deep trenching, trench in 18 inches increments, then re-apply water.		6.6.1 Record prevention measures and actions.
	6.7 Apply water or chemical/organic dust suppressant in sufficient quantities to prevent visible dust.	6.7.1 Stabilize soil with water or chemical/organic dust suppressant.	6.7.1 Monitor and record soil crust observations.
	6.8 Re-apply water as necessary to maintain soils in a damp condition.		
	6.9 Stabilize cut and fill material during trenching and handling.		
	6.10 Stabilize cut and fill material when not actively handling.		
	6.11 Empty loader bucket slowly and minimize drop height from loader bucket to prevent dust plumes.		
	6.12 Stabilize soil during and immediately after clearing and grubbing activities;		6.12.1 Monitor and record soil crust observations.
	6.13 Record stabilization methods and actions as required.		
	6.14 Construct furrows, use compaction, or erect 3-5 foot high wind barriers or three-side barriers with no more than 50% porosity upwind of earthmoving activities to limit the impact	6.14.1 Construct wind barriers with no more than 50% porosity to control windblown fugitive dust.	

	of the wind.	The distance from wind barrier to the disturbed area should be no more than twice the height of the wind barrier. Each 1 foot of wind barrier height will typically protect 8 – 10 feet of disturbed surface. In instances where backfill material is piled, the wind barrier height should be equal to or greater than the height of the pile, and the distance from wind barrier to the pile should be no more than twice the height of the pile.	
	6.15 Wash mud and soil from equipment at completion of each task.		
	6.16 Restrict vehicles access and traffic during periods of inactivity to the extent possible.		6.16.1 Monitor and document traffic controls.
	6.17 Stabilize soils once earth-moving activities are complete.		
	6.18 Utilize work practices and/or structural provisions to prevent wind and water soil erosion onto paved areas accessible to the public.		6.18.1 Document actions taken to prevent trackout and erosion.
	6.19 Stabilize sloping surfaces using seeding and soil binders until vegetation or ground cover can effectively stabilize the slopes.		
	6.20 If wind gusts exceed 25 mph, discontinue/cease cut and fill operations, trenching, clearing and grubbing, road shoulder maintenance, and weed abatement operations.		6.20.1 Document wind gusts, and contingency actions taken.
	During Periods of Inactive Operations		
	6.22 Restrict access to vehicle traffic during periods of inactivity to the extent possible.		
	6.23 If area remains inactive for 14 days or more, apply water or chemical dust suppressant to create a stabilized surface.		6.23.1 Monitor and record soil crust observations.
	6.24 Apply chemical dust suppressants and/or low silt gravel to maintain a stabilized surface after completing road shoulder maintenance.	6.24.1 Installation of curbing and/or paving of road shoulders can reduce recurring maintenance costs. 6.24.2 Use of chemical dust suppressants can inhibit vegetation growth and reduce future road shoulder weed abatement and	6.24.1 Document timeliness of soil stabilization.

		maintenance costs.	
7.0 Open Area and Vacant land	7.1 Apply water or chemical/organic dust suppressant in sufficient quantities to prevent visible dust plumes.	7.1.1 Stabilize open areas with water or chemical/organic dust suppressant.	7.1.1 Document stabilization methods and actions for each potential dust source.
	7.2 Stabilize sloping surfaces using seeding and soil binders until vegetation or ground cover can effectively stabilize the open area.		7.2.1 Document stabilization methods and actions for sloping surfaces and open areas.
	7.3 Install barriers, curbs, fences, gates, posts, signs, shrubs, trees or other effective control measures to prevent motor vehicle traffic and off-road vehicle traffic on vacant land.		
8.0 Stabilization Requirements	**Unpaved roads, parking lots and material storage area:**		
	8.1 Stabilize for a centerline distance of at least 100 feet and a width of at least 20 feet to the point of intersection with any paved area accessible to the public.	8.1.1 Stabilizers must stand up to vehicle traffic.	8.1.1 Document stabilization methods and actions for each potential dust source.
	8.2 Cover with at least 3 inches base of gravel with less than 5% silt content. Ensure that unpaved road base silt loading remains less than 8% silt content, or less than 0.33 oz./ft^2.		8.2.1 Silt content is measured by ASTM Method C136-06. Silt is characterized as material less than 75 microns and can pass through a No. 200 sieve.
	8.3 Stabilize with petroleum emulsion.		
	8.4 Pave.		
	8.5 Keep adequately wetted.		
	8.6 Prevent trackout onto paved roads accessible to the public, per Section 9.0		
	Disturbed Surface Area		
	8.7 Stabilize with one of the following: i. Water; ii. Chemical stabilizers; iii. A synthetic cover; iv. Planted vegetative cover; v. Other equivalent methods or techniques.	8.7.1 Stabilize until permanent structure, or vegetation is in place.	8.7.1 Monitor and record soil stability observations.
	8.8 The owner/operator of any disturbed surface area on which no dust generating operation is occurring (a work site that is under construction, or temporarily or permanently inactive) shall be considered stabilized by meeting at least one of the	8.8.1 Sample and test stabilization as needed to ensure no visible dust emissions.	8.8.1 Document soil stability observations.

	following requirements: i. Maintain a visible soil crust. Crust is measured by test method cited in Attachment 6; ii. Maintain a wind erosion threshold friction velocity (TFV) for the area (corrected for non-erodible elements) of 100 cm/second or higher, as cited in Attachment 6; iii. Maintain at least 50% of the surface area in flat vegetative cover (i.e. rooted vegetation or unattached vegetative debris lying on the surface with a predominant horizontal orientation and not subject to movement by wind); iv. Maintain at least 30% of the surface area in standing vegetative cover (i.e. rooted vegetation with a predominant vertical orientation); v. Maintain at least 10% of the surface area in standing vegetative cover (i.e. rooted vegetation with a predominant vertical orientation), and where the threshold friction velocity (TFV) for the area (corrected for non-erodible elements) is 43 cm/second or higher; vi. Maintain at least 10% of the surface area in non-erodible elements such as rocks, stones, or hard-packed clumps of soil; or vii. Comply with an alternate test method, upon written approval from the APCO.		
	8.9 Should a disturbed surface area contain more than one type of visibly distinguishable stabilization, the owner/operator shall test each representative surface separately for stability using the appropriate test methods described in Section 8.7, and aggregate the results to determine compliance with the stability requirements.		8.9.1 Document soil stability observations and aggregate results.

9.0 Trackout, Carryout & Spillage, Erosion Requirements	9.1 Any owner/operator or agency with jurisdiction over unpaved areas with access to public paved roads shall prevent trackout, carryout, spillage and erosion onto these paved public roads.		9.1.1 Document monitoring of prevention processes, results, and corrective actions taken.
	9.2 Each owner/operator or agency shall monitor public paved roads adjacent to their unpaved areas to ensure no visible roadway dust accumulates on such public paved roads.	9.2.1 Monitor at least twice each workday to ensure prevention of dirt on public roadways.	9.2.1 Document monitoring of adjacent paved roads, results, and corrective

			actions taken.
	9.3 Each owner/operator or agency whose unpaved area is the source of visible roadway dust on public paved roads shall clean the public paved road.		9.3.1 Document any cleanup actions taken, and timeline for completion.
	Trackout Control		
	9.4 All vehicles and equipment owned or operated by a facility shall pass through trackout control device prior to exiting the facility onto public paved roads;	9.4.1 Route traffic to ensure all vehicles pass through trackout control.	
	9.5 Install, maintain and use a trackout control device that prevents and controls trackout by removing particulate matter from tires and the exterior surfaces of haul trucks and motor vehicles that exit the work site onto public paved roads.		
	9.6 Owner/operator shall prevent trackout by implementing at least one of the following: i. Pave at least 100 feet and a width of at least 20 feet to the point of intersection with the paved area accessible to the public. ii. Install a 100 feet long X 20 feet wide gravel pad comprised of at least 3 inches base of gravel with less than 5% silt content. Ensure that unpaved road base silt loading remains less than 8% silt content, or less than 0.33 oz./ft^2. iii. Install a grizzly/rumble grate that consists of raised dividers (rails, pipes, or grates) a minimum of three inches tall, six inches apart, and 20 feet long to create vibration that shakes particulate matter off the entire circumference of each wheel as the vehicle passes over the grizzly or rumble grate. iv. Install a wheel wash system at each exit onto paved areas accessible to the public.	9.6.1 Monitor paved public road to ensure no trackout or visible roadway dust. 9.6.2 Monitor critical parameters of trackout control to ensure proper operation.	9.6.1 Document monitoring and results of trackout control.
	Prevention of Carryout and Spillage		
	9.7 When loading haul vehicles, maintain at least 6 inches of freeboard.	9.7.1 Monitor loading periodically for freeboard.	9.7.1 Document checks for prevention of carryout and spillage.
	9.8 Maintain highest point of bulk material below the edges of the cargo container.	9.8.1 Monitor loading periodically for overfill.	
	9.9 Inspect cargo compartment for leaks or compromised seals to prevent spillage.	9.9.1 Monitor for potential leaks.	
	9.10 Ensure empty cargo compartments are clean, or covered with a tarp or other suitable closure.	9.10.1 Monitor for cleanliness, and adequate cover.	

	9.11 Comply with California DMV Vehicle Code Section 23114.		
	Prevention of Erosion		
	9.12 Monitor perimeter of facility, particularly near any paved areas accessible to the public to ensure no wind or water erosion deposits mud, dirt or visible road dust onto paved roads.	9.12.1 Monitor for erosion, and any visible road dust.	9.12.1 Document prevention of erosion and road dust.
	9.13 Utilize work practices and/or structural provisions to prevent wind and water soil erosion onto paved areas accessible to the public.		
	Cleanup of Trackout		
	9.14 Removal of any visible trackout, carryout or any visible roadway dust from any source on a paved public road shall be accomplished using wet sweeping (rotary brush or wet broom) with sufficient water, including but not limited to kick broom, steel bristle broom, Teflon broom, or a HEPA filter equipped vacuum device at the speed recommended by the manufacturer.	9.14.1 Cleanup any mud or visible roadway dust as required.	9.14.1 Document discovery of mud, dirt, or visible roadway dust, and timeliness of cleanup.
	9.15 Operate a PM_{10}-efficient street sweeper that has pickup efficiency of at least 80%, and equipped with rotary brush or wet broom with sufficient water, including but not limited to kick broom, steel bristle broom, Teflon broom, vacuum, at the speed recommended by the manufacturer.		
	9.16 Flush with water if curbs or gutters are not present and where the use of water will not result in residue remaining as further source of trackout, or result in adverse impact on storm water drainage systems.		
	9.17 Manually sweep up or vacuum up deposits with a vacuum equipped with a HEPA filter.		
	9.18 Use of blower devices or dry rotary brushes or brooms for removal from paved public roads is expressly prohibited. The removal of trackout from paved public roads does not exempt an owner/operator from obtaining state or local agency permits which may be required.		
	Cleanup Timeliness		
	9.19 Each owner/operator or agency whose operations or unpaved area is the source of visible roadway dust on public paved roads shall clean up trackout, spillage, and/or erosion from paved areas accessible to the public as required.		
10.0 Traffic in construction sites and on unpaved roads	10.1 Limit vehicle speed to less than 15 mph.		

and other unpaved surfaces			
	10.2 Post speed limit signs that meet State Department of Transportation standards at each unpaved road entrance and post at least every ¼ mile, with signs readable in both directions of travel.		
	10.3 Require construction traffic to use established haul routes. Use barriers to ensure vehicles use only established parking areas and haul routes.		
	10.4 Establish vehicle speed enforcement process that includes the following: • Customers or visitors found to be travelling in excess of the posted speed limit: 1) issue verbal warning; then 2) facility access to be limited; then 3) facility access to be denied. • Employees found to be travelling in excess of the posted speed limit: 1) issue verbal warning; then 2) progressive discipline up to and including termination. • Contractors and subcontractors found to be travelling in excess of the posted speed limit: 1) issue verbal warning; then 2) site removal and future facility access denied.	10.4.1 Monitor vehicle traffic speeds periodically.	10.4.1 Maintain records demonstrating compliance with the vehicle speed enforcement process.
11.0 Unpaved parking areas, staging areas, and material storage areas; and unpaved access road and haul roads.	11.1 Limit number and size of unpaved areas.		
	11.2 Limit number and size of entrances and exits to unpaved areas.		
	11.3 Stabilize unpaved roads, parking, staging, and material storage areas during use to prevent visible dust plumes.	11.3.1 With water, chemical dust suppressant, vegetative materials, paving, road mix, or low silt gravel, or other method demonstrated to be effective and approved by the APCO.	11.3.1 Document stabilization of unpaved roads, and other unpaved areas. 11.3.2 Monitor and document visible dust plumes from unpaved roads and unpaved areas.
	11.4 Consider paving.		

	11.5 Apply material with low silt content (i.e. asphalt, concrete, recycled road base, or gravel to a minimum depth of 3 inches.		
	11.6 Limit vehicle access to unpaved access roads and haul routes, parking areas, staging areas, and material storage areas with barriers.	11.6.1 Reduces stabilization requirements.	
	11.7 Limit vehicles trips to less than 20 per day.	11.7.1 Document daily vehicle trips past busiest locations, at least twice annually.	11.7.1 Document annual vehicle daily trip monitoring, and results.
	11.8 Limit vehicles speeds to less than 15 mph.		11.9 Document how vehicle speed limits are managed.
	11.10 If wind gusts exceed 25 mph, stop all vehicle traffic or apply water every 15 minutes during active operations.		11.10.1 Document actions taken during wind gusts.
	11.11 In areas not used for more than 14 days, stabilize exposed soil to prevent visible dust plumes.		
	11.12 Stabilize parking, staging, and material storage areas at project completion.	11.12.1 Soil stabilization, uniform layer of low silt gravel, or paving.	11.12.1 Document stabilization and test results.
12.0 Other Control Measures	12.1 Any other control measure approved by the APCO and U.S. EPA as equivalent to the methods described in this table.		

Attachment 1-6: Test Methods for Determining Soil Stabilization

Determination of Adequately Wetted: Field determination of "adequately wetted" shall be as follows:

- Sample at least one quart of solids from the top three inches of a road, bare area or surface of a stockpile.
- The sample shall be poured out from a height of four (4) feet onto a clean hard surface. The material shall be considered to be adequately wetted if there is no observable dust emitted when the material hits the hard surface.

Determination of Soil Moisture Content: Soil moisture content requirements shall be determined as follows:

- Apply water to maintain soil moisture content at a minimum of 12% as determined by ASTM Method D2216-05 or other equivalent method approved by the APCO.
- For areas that have an optimum moisture content for compaction of less than 12%, as determined by ASTM Method D1557-02e1 or other equivalent method approved by the APCO, maintain at least 70% of the optimum soil moisture content.

Determination of Surface Crusting: Measurement of the stability of surface crusting on horizontal surfaces shall be conducted in accordance with the following test method (reference - San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation 8011, Appendix B, Section 2):

- Where a visible crust exists, drop a steel ball with a diameter of 15.9 millimeters (0.625 inches) and a mass ranging from 16 to 17 grams from a distance of 30 centimeters (one foot) directly above (at a 90-degree angle perpendicular to) the ground surface. If blow sand (thin deposits of loose grains covering less than 50 percent of the surface that have not originated from the surface being tested) is present, clear the blow sand from the surfaces to be tested before dropping the steel ball.
- A sufficient crust is determined to exist if, when the ball is dropped according to Section 6-5-613.1, the ball does not sink into the surface so that it is partially or fully surrounded by loose grains and, upon removing the ball, the surface on which it was dropped has not been pulverized so that loose grains are visible.
- Drop the ball three times each in three representative test areas within a survey area measuring 1 foot by 1 foot that represents a random portion of the surface being evaluated. The test area shall be deemed to have passed if at least two of the three times the ball was dropped; the results met the criteria in Section 6-5-613.2. If all three test areas pass, the area shall be deemed to be "sufficiently crusted".

Determination of Threshold Friction Velocity (TFV): For disturbed surface areas that are not crusted or partially covered with vegetation, determine threshold friction velocity (TFV) in accordance with the following test method (reference - San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation 8011, Appendix B, Section 4):

- Obtain and stack a set of sieves with the following openings: 4 millimeters (mm), 2 mm, 1 mm, 0.5 mm, and 0.25 mm or obtain and stack a set of standard/commonly available sieves. Place the sieves in order according to size openings, beginning with the largest size opening at the top. Place a collector pan underneath the bottom (0.25 mm) sieve. Collect a sample of loose surface material from an area at least 30 cm by 30 cm in size to a depth of approximately 1 cm using a brush and dustpan or other similar device. Only collect soil samples from dry surfaces (i.e. when the surface is not damp to the touch). Remove any rocks larger than 1 cm in diameter from the sample. Pour the sample into the top sieve (4 mm opening) and cover the sieve/collector pan unit with a lid. Minimize escape of particles into the air when transferring surface soil into the sieve/collector pan unit. Move the covered sieve/collector pan unit by hand using a broad, circular arm motion in the horizontal plane. Complete twenty circular arm

movements, ten clockwise and ten counterclockwise, at a speed just necessary to achieve some relative horizontal motion between the sieves and the particles. Remove the lid from the sieve/collector pan unit and disassemble each sieve separately beginning with the largest sieve. As each sieve is removed, examine it for loose particles. If loose particles have not been sifted to the finest sieve through which they can pass, reassemble and cover the sieve/collector pan unit and gently rotate it an additional ten times. After disassembling the sieve/collector pan unit, slightly tilt and gently tap each sieve and the collector pan so that material aligns along one side. In doing so, minimize escape of particles into the air. Line up the sieves and collector pan in a row and visibly inspect the relative quantities of catch in order to determine which sieve (or whether the collector pan) contains the greatest volume of material. If a visual determination of relative volumes of catch among sieves is difficult, use a graduated cylinder to measure the volume.

- Estimate TFV for the sieve catch with the greatest volume using Table 1 of this attachment, which provides a correlation between sieve opening size and TFV.

Table 1. Determination of Threshold Friction Velocity

Tyler Sieve No.	ASTM 11 Sieve No.	Opening (mm)	TFV (cm/s)
5	5	4	135
9	10	2	100
16	18	1	76
32	35	0.5	58
60	60	0.25	43
Collector Pan	---	--	30

- Collect at least three soil samples which represent random portions of the overall conditions of the site, repeat the above TFV test method for each sample and average the resulting TFVs together to determine the TFV uncorrected for non-erodible elements. Non-erodible elements are distinct elements, in the random portion of the overall conditions of the site, that are larger than 1 cm in diameter, remain firmly in place during a wind gust, and inhibit soil loss by protecting disturbed surface from the shear stress of the wind. Non-erodible elements include stones and bulk surface material but do not include flat or standing vegetation. For surfaces with non-erodible elements, determine corrections to the TFV by identifying the fraction of the survey area, as viewed from directly overhead, that is occupied by non-erodible elements using the following procedure. For a more detailed description of this procedure, see Section 6 (Test Methods for Stabilization-Rock Test Method) of this attachment. Select a survey area of 1 meter by 1 meter that represents a random portion of the overall conditions of the site. Where many non-erodible elements lie within the survey area, separate the non-erodible elements into groups according to size. For each group, calculate the overhead area for the non-erodible elements according to the following equations:

Average Dimensions = (Average Length) x (Average Width) Eq. 1

Overhead Area = (Average Dimensions) x (Number of Elements) Eq. 2

Total Overhead Area = Eq. 3
Overhead Area of Group 1 + Overhead Area of Group 2 (etc.)

Total Frontal Area = Eq. 4
Total Overhead Area/2

Percent Cover of Non-Erodible Elements = Eq. 5
(Total Frontal Area/Survey Area) x 100

Note: Ensure consistent units of measurement (e.g., square meters or square inches when calculating percent cover).

Repeat this procedure on an additional two distinct survey areas that represent a random portion of the overall conditions of the site and average the results. Use Table 2 of this attachment to identify the correction factor for the percent cover of non-erodible elements. Multiply the TFV by the corresponding correction factor to calculate the TFV corrected for non-erodible elements.

Table 2. Correction Factors for Threshold Friction Velocity

Percent Cover of Non-Erodible Elements	Correction Factor
Greater than or equal to 10%	+ 5
Greater than or equal to 5% and less than 10%	+ 3
Less than 5% and greater than or equal to 1%	+ 2
Less than 1%	None

Determination of Flat Vegetative Cover: For disturbed surface areas with partial vegetative cover, determine the proportion of flat vegetative cover according to the test method in San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation 8011, Appendix B, Section 5.

Determination of Standing Vegetative Cover: For disturbed surface areas with partial vegetative cover, determine the proportion of standing vegetative cover according to the test method in San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation 8011, Appendix B, Section 6.

Determination of Non-Erodible Elements Cover: For disturbed surface areas with partial rock and other non-erodible elements cover, determine the proportion of non-erodibles according to the Rock Test method in San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation 8011, Appendix B, Section 7.