

CHAPTER 2

Description of the Proposed Rule

2.1 INTRODUCTION

The proposed project consists of a new rule to control sulfur dioxide (SO₂), particulate matter (PM), and particulate matter less than 2.5 microns equivalent aerodynamic diameter (PM_{2.5}) from coke calcining facilities in the Bay Area. The proposed project would implement Regulation 9, Rule 14: Petroleum Coke Calcining Operations, and regulate emissions of SO₂, which can also lead to the secondary formation of PM_{2.5}.

2.2 OBJECTIVES

The primary objective of the proposed rule is to reduce SO₂ and particulate matter formation from petroleum coke calcining facilities in the Bay area. The Bay Area and neighboring regions are not in attainment of State and federal particulate matter standards and further reductions in PM emissions are needed. PM emission reductions can be achieved by abatement from mobile sources, point sources, fugitive capture enhancement, and pollution prevention practices.

The U.S. EPA has set primary national ambient air quality standards for air pollutants to define the levels considered safe for human health. The California Air Resources Board (CARB) has also set California ambient air quality standards. The Bay Area is a non-attainment area for particulate matter of 10 microns or less (PM₁₀) or for PM_{2.5}. Under State law, non-attainment areas must prepare plans showing how they will attain the state standards. The BAAQMD has prepared, approved and is currently implementing, the 2010 Clean Air Plan (CAP) which provides a plan to show how the Air District will meet applicable air quality standards.

2.3 BACKGROUND

Currently, five petroleum refineries are located in the Bay Area within the jurisdiction of the Air District (see Figure 2.6-1):

- Chevron Products Company (Richmond),
- Phillips 66 Company – San Francisco Refinery (Rodeo),
- Shell Martinez Refinery (Martinez),
- Tesoro Refining and Marketing Company (Martinez), and
- Valero Refining Company – California (Benicia).

Petroleum refineries convert crude oil into a wide variety of refined products, including gasoline, aviation fuel, diesel and other fuel oils, lubricating oils, and feed stocks for the petrochemical industry. Crude oil consists of a complex mixture of hydrocarbon compounds with smaller amounts of impurities including sulfur, nitrogen, oxygen and metals (e.g., iron, copper, nickel, and vanadium).

The refining process also produces coke, which is comprised of primarily carbon. Refineries typically produce green coke, which is coke that contains some amount of remnant impurities. In order to make a more marketable product, green coke can be purified through a process known as coke calcining. Rule 9-14 aims to address SO₂ emissions from the coke calcining process. In the BAAQMD jurisdiction there is one coke calcining facility, the Phillips 66 Carbon Plant located at 2101 Franklin Canyon Road, Rodeo, CA 94572.

Air pollutants are categorized and regulated based on their properties and there are three primary categories of regulated air pollutants: (1) criteria pollutants; (2) toxic air contaminants; and (3) greenhouse gas emissions. Additional categories of air pollutants include odorous compounds and visible emissions.

Criteria pollutants are emissions for which Ambient Air Quality Standards (AAQS) have been set and include: (1) carbon monoxide (CO); (2) nitrogen dioxide (NO₂) and oxides of nitrogen (NO_x); (3) PM₁₀; and PM_{2.5}; (4) volatile organic compounds (VOC); and (5) SO₂. Each of these criteria pollutants are emitted by petroleum refineries.

TACs are emissions for which AAQS have generally not been established, but may result in human health risks. The state list of TACs currently includes approximately 190 separate chemical compounds, and groups of compounds. TACs emitted from petroleum refineries include volatile organic TACs, semi-volatile and non-volatile organic TACs, metallic TACs, and other inorganic TACs.

Climate pollutants (e.g., greenhouse gases, or GHGs) are emissions that include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and three groups of fluorinated compounds (i.e., hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆)), and are the major anthropogenic GHGs. GHGs emitted from petroleum refineries include CO₂, CH₄ and N₂O.

2.4 PROPOSED NEW RULE

The proposed project consists of a new rule aimed to control criteria emissions and their precursors, from the Phillips 66 petroleum coke calcining facility.

Petroleum coke, often referred to as “green coke,” is a black solid residue from various petroleum refining processes. In a calcining operation, green coke is sent through a heated rotary kiln to drive off contaminants in order to produce a purer form of carbon. Green coke tends to contain sulfur in addition to other contaminants. As the heat in the calcining process drives off contaminants from the coke, gaseous emissions are produced including SO₂. Phillips 66 is the only petroleum coke calciner within the jurisdiction of the Bay Area and this facility is commonly referred to as the Phillips 66 Carbon Plant. The Carbon Plant operates two rotary kilns in its calcining operation and produces approximately 3.4 tons of SO₂ per day.

The BAAQMD is proposing to implement new Rule 9-14 to limit SO₂ emissions from the thermal processing of petroleum coke through improvements to the emission control system. Proposed Rule 9-14 would limit SO₂ emissions to 1,050 tons per year from the Phillips 66 Carbon Plant. The facility currently uses Continuous Emission Monitors (CEMs) to measure SO₂ emissions from each kiln of the petroleum coke calcining operation. The facility will also be subject to an hourly SO₂ emission limit. Combined, the SO₂ emissions from both kilns shall not exceed 320 lbs/hr. Effective one year from the date of adoption of this rule, the owner or operator shall make emission monitoring records available to the Air Pollution Control Officer (APCO) and maintain those records for a period of 5 years. The owner or operator shall monitor each kiln to demonstrate compliance with the provision of this rule for SO₂ emissions. The CEMs shall meet the requirements of the District Manual of Procedures, Volume V, Continuous Emission Monitoring, Policy and Procedures. Each CEMS shall complete a minimum of one cycle of operation sampling, analyzing, and data recording for each successive fifteen (15) minute period.

Gaseous emissions generated from coke calcining operations are typically minimized by using one of three types of scrubbing control systems: wet scrubbers, semi-dry scrubbers, or dry scrubbers. A dry scrubber, also called dry sorbent injection is the technology currently used at the Phillips 66 Carbon Plant. In this process, the flue gas containing SO₂ is contacted with an alkaline material (sodium bicarbonate) to produce a dry waste product for disposal. The facility injects sodium bicarbonate sorbent material into the flue acid-gas stream after exiting a heat recovery system. The SO₂/sodium bicarbonate mixture is then filtered from the acid-gas stream via a pulse-jet baghouse. The Phillips Carbon Plant SO₂ control system currently reduces SO₂ emissions by 37 to

47 percent. Newer and more efficient dry sorbent injection systems achieve control efficiencies ranging from 50 to up to 80 percent, with state-of-the-art systems.

The District expects that the Phillips 66 Carbon Plant will upgrade its current dry sorbent injection system to meet the proposed new regulatory SO₂ limits as that would be the most cost-effective control method.

2.5 ESTIMATED REDUCTIONS

The BAAQMD has identified opportunities for SO₂ reductions through better dry sorbent injection rates. The implementation of Rule 9-14 would limit SO₂ emissions to 1,050 tons per year. SO₂ emissions have ranged from about 1,142 tons per year to 1,519 tons per year over the last five years. The implementation of Rule 9-14 is estimated to reduce SO₂ emissions by an average of approximately 430 tons per year.

2.6 AFFECTED AREA

BAAQMD proposes to regulate SO₂ from the Phillips 66 Carbon Plant. The equipment affected by the proposed project is located within the jurisdiction of the Bay Area Air Quality Management District (see Figure 2.6-1). The BAAQMD jurisdiction includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties and portions of southwestern Solano and southern Sonoma counties (approximately 5,600 square miles). The San Francisco Bay Area is characterized by a large, shallow basin surrounded by coastal mountain ranges tapering into sheltered inland valleys. The combined climatic and topographic factors result in increased potential for the accumulation of air pollutants in the inland valleys and reduced potential for buildup of air pollutants along the coast. The Basin is bounded by the Pacific Ocean to the west and includes complex terrain consisting of coastal mountain ranges, inland valleys, and bays.

