Appendix C:
Concept Paper for Changes to Rule 9-1: Refinery Fuel Gas Sulfur Limits

Rules to Be Amended or Drafted

Regulation of refinery fuel gas (RFG) requires amendments to Air District Regulation 9, Rule 1, *Sulfur Dioxide*.

Goals

The goal of this rulemaking is to achieve technically feasible and cost-effective sulfur dioxide (SO_2) emission reductions from RFG systems at Bay Area refineries.

Background

The lightest components of crude oil separated by a refinery's atmospheric fractionator are methane and ethane, which are also the primary components of natural gas. At petroleum refineries, these products are not produced in marketable quantities, but are used as fuel in the numerous onsite steam generators and process heaters. When produced at a refinery, this product is called refinery fuel gas (RFG). Pipeline natural gas may be used as a supplemental fuel when needed to enhance the quality of RFG or when there is not enough RFG available. Unlike, pipeline natural gas, refinery fuel gas often contains significant quantities of sulfur that occur naturally in crude oil. When burned, these sulfur compounds are converted to SO_2.

Process and Source Description

RFG can contain between a few hundred and a few thousand parts per million-volume (ppmv) sulfur in the form of hydrogen sulfide (H_2S), carbonyl sulfide (COS), and organic sulfur compounds, such as mercaptans. During combustion, the sulfur in all of these compounds will oxidize to form SO_2, which is a criteria air pollutant and a precursor to particulate matter. Scrubbing with an amine or caustic solution can be effective at removing H_2S and some acidic sulfur containing compounds, but is generally ineffective at removing nonacidic sulfur compounds. Hydrotreating, a catalytic chemical process, converts these sulfur compounds to hydrogen sulfide which can then be removed by scrubbing.

All five Bay Area refineries maintain RFG collection and treatment systems. Four of the five refineries use a combination of hydrotreating and scrubbing to remove fuel sulfur from RFG; the Phillips 66 Refinery uses amine scrubbing alone.

Regulatory History and Context

On July 18, 1990, the Air District adopted Section 9-1-313.2, requiring all refineries that process more than 20,000 barrels per day of crude oil to operate a sulfur removal and recovery system that removes and recovers, on a refinery wide basis, 95 percent of the H_2S from RFG. The Rule does not specify an averaging period, test method, or monitoring criteria, but the Air District's Manual of Procedures does contain procedures for monitoring H_2S in RFG.

On March 15, 1978, U.S. Environmental Protection Agency (EPA) promulgated 40 CFR part 60, subpart J, *Standards of Performance for Petroleum Refineries (Subpart J)*. Subpart J applies to affected facilities at petroleum refineries that have been constructed or modified between June 11, 1973 and May 13, 2007.

Subpart J limits the H_2S content of RFG to 230 milligrams per dry standard cubic meter (mg/dscm). (40 CFR 60.104(a)(1))

On June 24, 2008, EPA promulgated 40 CFR part 60, subpart Ja, *Standards of Performance for Petroleum Refineries for which Construction, Reconstruction, or Modification Commenced after May 14, 2007 (Subpart Ja).* This regulation maintains the H_2S limit previously established in Subpart J, expressed as 162 parts per million by volume (ppmv) as a three hour rolling average. EPA allows an equivalent SO_2 emission limit from combustion units. (40 CFR 60.102a(g))

Review of the title V permits for the five Bay Area petroleum refineries did not reveal any facility-wide case-by-case fuel sulfur limits or SO_2 emission limit determinations for RFG in the Bay Area. There are a few limits that apply to individual pieces of equipment or subsets of equipment at individual refineries; but these vary regarding the species regulated (H_2S or total sulfur), the averaging period (24-hour up to 365-day rolling), and the numerical limit (45 ppmv up to 100 ppmv).

Emissions

The following table shows the magnitude of SO_2 emissions in pounds per day (rounded to the nearest hundred) from combustion of RFG:

Table C1: Refinery Fuel Gas SO_2 emissions

Facility	SO_2 Emissions from RFG Combustion (lb/day)
Chevron Products	500
Phillips 66	1,800
Shell Martinez	1,800
Tesoro Refining	300
Valero Refining	100
Total	**4,500**

Regulatory Concepts and Proposed Regulations

Air District staff identified regulatory concepts in two possible model regulations: EPA's *Standards of Performance for Petroleum Refineries* (40 CFR part 60, subparts J and Ja) and South Coast Air Quality Management District (SCAQMD) Rule 431.1, *Sulfur Content of Gaseous Fuels*.

1. U.S. EPA's *Standards of Performance for Petroleum Refineries (40 CFR part 60, subparts J and Ja)*

   The performance standards in these regulations that apply to RFG (limiting H_2S in RFG or SO_2 from combustion units) have already been discussed above.

   Refiners that chose to comply with the H_2S concentration limits are required to install, operate, calibrate, and maintain instruments that continuously monitor H_2S concentration in RFG prior to combustion. The subpart specifies performance standards, test methods, and quality assurance procedures for the monitor.

Similarly, if the refiner chooses to comply with the SO_2 emission limits, a continuous emission monitoring system (CEMS) is required and performance standards, test methods, and quality assurance procedures from 40 CFR part 60 are specified.

The regulations also contains the monitoring, recordkeeping, and reporting requirements typical of standards in part 60 that are easily incorporated into title V permits.

2. SCAQMD Rule 431.1 *Sulfur Content of Gaseous Fuels*

   SCAQMD limits the sulfur content of RFG, calculated as H_2S, to 40 ppmv, four-hour average. The initial compliance date was May 4, 1994 for large refineries and May 4, 1996 for small refineries. SCAQMD allows facilities to demonstrate equivalent SO_2 emission reductions within the facility, provided alternative plans have been approved by the Executive Officer in writing.

   Facilities burning gaseous fuels other than exclusively natural gas (e.g., RFG) are required to have continuous fuel gas monitoring systems (CFGMS) to determine the sulfur content of fuel prior to burning and upstream of mixing with natural gas, propane, or other fuels, or a CEMS to determine SO_2 emissions after burning. SCAQMD's requirements for CFGMS and CEMS, which are less detailed than EPA's performance standards, are included as an attachment to the Rule.

After reviewing these model rules, staff proposes limiting total fuel sulfur, as in SCAQMD's Rule 431.1, rather than H_2S, as in U.S. EPA's NSPS Ja, because all fuel sulfur oxidizes to SO_2 when burned.

Staff further proposes limiting RFG fuel sulfur to 40 ppmv. In November of 2010, SCAQMD prepared a report reviewing oxides of sulfur (SO_x) limits at several classes of emission units, including RFG systems, as part of its RECLAIM program. SCAQMD staff recommended retaining the 40 ppmv limit.

After reviewing Bay Area refinery RFG systems, staff found that four of the five refineries are already meeting this limit. However, staff recommends establishing a three-hour averaging period to be consistent with Volume V of the Air District's Manual of Procedures and 40 CFR subpart Ja

Thus, Air District staff is proposing:

1. <u>RFG Fuel Sulfur Limit:</u> 40 ppmv, three-hour average, measured as H_2S. Fuel sulfur is defined as the sum of hydrogen sulfide, carbonyl sulfide, and all other compounds that thermally oxidize to sulfur dioxide. At this time, an alternative SO_2 emission limit is not being proposed. Considering the large number of combustion units at the refineries and the difficulty related to monitoring them, an alternative SO_2 limit appears to be impractical.

2. <u>Proposed Monitoring Requirements:</u> Refiners must install, operate, calibrate, and maintain instruments that continuously monitor fuel sulfur concentration prior to combustion. Monitoring equipment shall comply with the Air District's Manual of Procedures.

Air District staff is also proposing a time frame of 24 months from promulgation of the rule until the initial compliance date to allow affected sources to obtain permits and install the necessary equipment.

Control Mechanisms

Staff expects that four of the five Bay Area refineries will be able to meet the RFG fuel sulfur limit with existing hydrotreating and scrubbing equipment. The Phillips 66 Refinery is expected to need a hydrotreating system for their RFG system.

Costs and Emissions Reductions

The four refineries already meeting the RFG fuel sulfur limit would not see any emissions reductions, but may incur some minor initial costs if their current fuel sulfur monitoring systems do not meet the requirements of the draft Rule.

Staff conservatively estimated that installation of a hydrotreating system at the Phillips 66 Refinery would cost approximately $20 million with about $1 million in operating costs. Phillips 66 reports average fuel sulfur concentration in RFG of 374.8 ppmv in the period from August 2010 until July 2013. A reduction to 40 ppmv results in the emission reduction in the following table.

Table C2: SO2 Emission Reductions and Control Costs

Facility	Emission Reduction (lbs/day)	Emission Reduction (tpy)	Total Annualized Cost ($)
Phillips 66	1594	291	$ 3,000,000

Appendix D:
Concept Paper for Rule 9-1: Limiting Sulfur Dioxide Emissions from Sulfuric Acid Plants

Rules to Be Amended or Drafted

Regulation of sulfuric acid plants requires amendment to Air District Regulation 9, Rule 1, *Sulfur Dioxide*.

Goals

The goal of this rulemaking is to achieve technically feasible and cost-effective sulfur dioxide (SO_2) emission reductions from acid plants at Bay Area refineries.

Background

After removing sulfur-containing compounds from process streams, oil refineries can either produce pure, elemental sulfur or sulfuric acid, which are both marketable products. A sulfuric acid plant (acid plant) utilizes a chemical process that converts sulfur into marketable sulfuric acid. At refineries, acid plants have the added benefit of regenerating spent acid used in refinery process units.

The production of sulfuric acid is never 100 percent efficient and results in emissions of SO_2 to the atmosphere. Currently, only a few sulfuric acid plants in the country (none in the Bay Area) have add-on SO_2 controls.

There are three acid plants associated with Bay Area refineries. The Tesoro Refinery in Martinez operates an acid plant; Eco Services in Martinez operates an acid plant as a support facility for the Shell and Valero refineries on a regular basis and serves as a backup facility for the Tesoro Refinery when Tesoro's acid plant is shut down; and Chemtrade West in Richmond operates an acid plant as a support facility for Chevron Products.

Process and Source Description

Acid plants are chemical process units that convert either naturally occurring sulfur or sulfur generated as a waste at a petroleum refinery, metal smelter, or other industrial facility into sulfuric acid. There are three basic steps to this process. First, sulfur or sulfur containing compounds, such as hydrogen sulfide, are oxidized to form SO_2. Then, SO_2 reacts with oxygen in a packed catalyst bed to form sulfur trioxide (SO_3). Finally, SO_3 reacts with water in an absorption column to form a sulfuric acid solution.

$$S_{(s)} + O_{2(g)} \rightarrow SO_{2(g)}$$
$$2SO_{2(g)} + O_{2(g)} \leftrightarrow 2SO_{3(g)}$$
$$SO_{3(g)} + H_2O_{(l)} \rightarrow H_2SO_{4(aq)}$$

Because the reaction between SO_2 and oxygen is reversible, the process is never 100 percent efficient. To improve yields, the process is generally carried out in at least two stages where as much sulfuric acid as possible is removed between the stages. In addition, each stage can have more than one catalyst bed. Installing heat exchangers between pairs of catalyst beds and using catalysts that operate at lower temperatures can further improve yields as the second (equilibrium) reaction generates a great deal of heat.

At petroleum refineries, sulfuric acid is used as a catalyst in alkylation units. Over time, small amounts of heavy hydrocarbons (heavier than gasoline) build up in the acid and have to be removed. Refiners feed this spent acid into the acid plant to burn off the hydrocarbons and mix the recoverable acid with the freshly produced acid.

Regulatory History and Context

On July 25, 1977, the U.S. Environmental Protection Agency (EPA) promulgated 40 CFR part 60, subpart H, *Standards of Performance for Sulfuric Acid Plants*. The regulation limits SO_2 emissions to 4 pounds per ton of acid produced and limits sulfuric acid mist emissions to 0.15 pounds per ton of acid produced.[1] The federal regulation also contains a 10 percent opacity limit.

The regulation requires use of a continuous emission monitoring system (CEMS) for SO_2 and development of a conversion factor to convert monitored SO_2 concentrations to the emission limit on an eight-hour basis. It also requires periodic testing for sulfuric acid mist.

On May 20, 1992, the Air District amended Section 9-1-309, establishing an SO_2 emission limit of 300 parts per million-volume (ppmv) for sulfuric acid plants, calculated at 12 percent oxygen. Volume IV of the Air District's Manual of Procedures specifies two test methods, ST-19A and ST-19B, which can be used to quantify emissions of SO_2 in stack gases. Volume V of the Manual of Procedures specifies how a CEMS will be used to monitor compliance at acid plants at all times, including during startup and shutdown.

In 2007, Rhodia, Inc. entered into a consent decree with EPA and the United States Department of Justice limiting SO_2 emissions from the acid plant (now operated by Eco Services) to 2.2 pounds per ton of 100 percent sulfuric acid produced, 365-day average, and 3.0 pounds per ton of 100 percent sulfuric acid produced, three-hour average.

There are no other case-by-case SO_2 emission limit determinations for acid plants in the Bay Area.

Emissions

Table D1: Acid Plant SO_2 Emissions

Facility	SO_2 Emissions from Acid Plant (lbs/day)
Tesoro Refinery	1,300
Eco Services	1,984
Chemtrade West	696
Total	**3,980**

From 2013 BAAQMD Emissions Inventory

Regulatory Concepts and Proposed Regulations

Air District staff did not find any recent rules related to acid plants more stringent than EPA's 1977 *Standards of Performance* and the Air District's 1992 Section 9-1-309.

[1] In the Regulation, production is expressed as "100 percent H_2SO_4," or pure sulfuric acid, not accounting for water.

A review of EPA's RACT/BACT/LAER Clearinghouse[2] (RBLC) revealed a 2006 synthetic minor permit from New Jersey with an SO_2 limit of 0.2 lbs per ton of acid produced and a 2012 PSD permit from Indiana with an SO_2 BACT limit of 0.25 lbs per ton of acid produced, 24-hour average.

The New Jersey Department of Environmental Protection provided the Air District with two recent source test reports for the facility in Union County, New Jersey with the 0.2 pound per tons limit. The State of New Jersey confirmed that the facility was in compliance with its emission limits.

In their November, 2010, RECLAIM Report, SCAQMD recommended a 0.14 lbs per ton of acid produced BARCT limit, which they equated to 10 ppmv. However, because this is a cap-and-trade program, none of the acid plants in the SCAQMD air basin are required to meet this limit directly. Instead, operators are assigned allowable total allowable emissions (a "cap") based on this emission rate and can then purchase reduction credits from other sources[3] to make up for any emissions above the cap, thus maintaining compliance with the program.

Based on this review of regulated sources, Air District staff is proposing an emission limit that has been achieved in practice.

1. Proposed Acid Plant SO_2 Limit: 0.20 pounds of SO_2 per ton of acid produced, eight-hour average, consistent with the 9-year-old permit limit from New Jersey.

2. Proposed Monitoring Requirements: Owners and operators of acid plants shall install, operate, calibrate, and maintain CEMS that continuously monitor SO_2 emissions and a data acquisition system to track CEMS readings, acid production and stack flowrates and to calculate emission rates in the units of the limit.

Air District staff is also proposing a timeframe of 36 months from promulgation of the rule until the initial compliance date to allow affected sources time to obtain permits and install the necessary equipment.

Control Mechanisms

The proposed rule does not require a specific control technology. The emission limit can be met using a caustic scrubber, a regenerative amine (CANSOLV) scrubber, or a peroxide scrubber. The facility in New Jersey uses a peroxide scrubber. Staff used cost information based on a caustic scrubber.

Costs and Emissions Reductions

Cost estimates were provided by MECS, Inc., a firm that designs acid plants and control systems, for two caustic scrubbing systems: a relatively large (75,000 scfm) system approximately sized for Eco Services

[2] The RBLC is a national database of case-by-case emission limitations made by permitting authorities when authorizing new sources of air pollution.

[3] Emission reduction credits (ERC) must be permanent, quantifiable, and surplus. For example, ERCs can be purchased from operations that have been shut down or from owners of the equipment who have taken a verifiable limit on emissions by adding control equipment or curtailing operations.

and a relatively small (25,000 scfm) system approximately sized for Tesoro and Chemtrade Logistics. The results appear in the following table.

Table D2: Estimated Emission Reductions and Costs

Facility	Emission Reduction (lbs/day)	Emission Reduction (tpy)	Total Annualized Cost ($)
Tesoro Refinery	1,233.0	225.0	$421,753
Eco Services	1,848.7	337.4	$815,797
Chemtrade West	648.5	118.3	$421,753

REGULATION 9
INORGANIC GASEOUS POLLUTANTS
RULE 1
SULFUR DIOXIDE

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9-1-600 MANUAL OF PROCEDURES

REGULATION 9
INORGANIC GASEOUS POLLUTANTS
RULE 1
SULFUR DIOXIDE

9-1-100 GENERAL

9-1-101 Description: This Rule establishes emission limits for sulfur dioxide from all sources including ships, and limits ground level concentrations of sulfur dioxide.

9-1-110 Conditional Exemption, Area Monitoring: The 300 ppm limitation of Section 9-1-302 shall not apply to a person who meets the requirements of subsections 9-1-110.1 and 110.2, provided such person has complied with those requirements prior to January 1, 1980.

110.1 A person shall be subject to the monitoring, records and reporting requirements contained in Regulation 1, including Sections 1-510, 530, 540, 542, 543, and 544.

110.2 A person shall not emit sulfur dioxide in quantities which result in ground level concentrations of sulfur dioxide in excess of the limits specified in Section 9-1-301. This subsection shall not apply to ground level concentrations occurring on the property from which such emission occurs, provided such property, from the emission point to the point where the excess occurs, is physically secured against public access by the person responsible for the emission. (Amended May 20, 1992)

9-1-200 DEFINITIONS

9-1-201 Deleted May 20, 1992

9-1-202 Deleted May 20, 1992

9-1-203 Deleted May 20, 1992

9-1-204 Start-up: For the purposes of Section 9-1-605, start-up begins at the time the feed stock is introduced into the process and may proceed for a period not to exceed four consecutive hours. (Amended May 20, 1992)

9-1-205 Fresh Fruit Sulfuring Operation: Any operation where freshly cut fruit is placed in a sulfur house in order to come into contact with sulfur dioxide. (Adopted February 16, 1983)

9-1-206 Sulfur Removal and Recovery System: A set of process units which remove H_2S from refinery gas streams and the reduced sulfur compounds and ammonia from process water streams. The reduced sulfurous compounds are recovered as sodium hydrosulfide (NaSH), elemental sulfur, sulfuric acid, or other sulfate compounds. The sulfurous compounds are recovered as elemental sulfur or as sulfuric acid. The process units consist of a sour water stripper, regenerative gas treatment system, and a sulfur recovery plant, a sulfuric acid plant, or other process units and facilities which achieve removal efficiencies as required by Section 9-1-313.2. (Adopted July 18, 1990; Amended March 15, 1995)

9-1-207 Sour Water Stripper: A process unit which removes reduced sulfur compounds from process water using a distillation (stripping) process. (Adopted July 18, 1990)

9-1-208 Regenerative Gas Treatment System: A regenerative process system that removes H_2S from refinery gas streams and recovers the H_2S as H_2S or sulfur. (Adopted July 18, 1990)

9-1-209 Sulfur Recovery Plant: A process unit which processes sulfur and ammonia containing material and produces a final product of elemental sulfur. (Adopted July 18, 1990)

9-1-210 Sulfuric Acid Plant: A process unit which processes sulfur containing material and produces a final product of sulfuric acid or oleum. (Adopted July 18, 1990)

9-1-211 Shutdown: For the purposes of Section 9-1-605, shutdown begins at the time the feed stock is discontinued. (Adopted May 20, 1992)

9-1-212 **Refinery Fuel Gas:** Any gas which is generated at a petroleum refinery and combusted to generate heat or power. Refinery fuel gas includes any proportion of natural gas combined with gas generated at a refinery.

9-1-300 STANDARDS

9-1-301 **Limitations on Ground Level Concentrations:** A person shall not emit from sources other than ships, sulfur dioxide in quantities which result in ground level concentrations in excess of 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours. This section shall not apply to ground level concentrations occurring on the property from which such emission occurs, provided such property, from the emission point to the point where the excess occurs, is physically secured against public access by the person responsible for the emission. (Amended May 20, 1992)

9-1-302 **General Emission Limitation:** A person shall not emit from any source, other than a ship, a gas stream containing sulfur dioxide in excess of 300 ppm (dry). This section shall not apply to the following sources:

302.1 Any source which is subject to any of the limitations in Sections 9-1-304 through 9-1-312.

302.2 Any source which satisfies the conditions in Sections 9-1-110.

(Amended February 16, 1983)

9-1-303 **Emissions from Ships:** A person shall not emit a gas stream containing sulfur dioxide in excess of 2000 ppm from any ship, except when the ship is entering the port from outside the District. Emissions resulting only from the combustion of liquid fuel with a sulfur content less than or equal to 3.34% by weight shall be considered in compliance with this Section.

9-1-304 **Fuel Burning (Liquid and Solid Fuels):** A person shall not burn any liquid fuel having a sulfur content in excess of 0.5% by weight, or solid fuel of such sulfur content as would result in the emission of a gas stream containing more than 300 ppm (dry) of sulfur dioxide. This section shall not apply to:

304.1 The burning of sulfur, hydrogen sulfide, acid sludge or other compounds used in the manufacture of sulfur compounds;

304.2 The use of liquid or solid fuels to propel any motor vehicle, aircraft, missile, boat or ship;

304.3 The use of liquid or solid fuels which do not result in the emission of a gas stream containing more than 300 ppm (dry) of sulfur dioxide.

9-1-305 **Deleted May 20, 1992**

9-1-306 **Deleted May 20, 1992**

9-1-307 **Emission Limitations for Sulfur Recovery Plants:** A person shall not emit, from any source in a sulfur recovery plant, effluent process gas containing sulfur dioxide in excess of 250 ppm by volume (dry) calculated at zero percent oxygen. Plants which emit less than 45 kg (100 lbs.) per day of sulfur dioxide shall not be subject to this limitation. (Amended February 16, 1983; May 20, 1992)

9-1-308 **Deleted May 20, 1992**

9-1-309 **Emission Limitations for Sulfuric Acid Plants:** ~~A person shall not emit, from any source in a sulfuric acid plant, effluent process gas containing sulfur dioxide in excess of 300 ppm by volume calculated at 12% oxygen.~~

309.1 A person shall not emit, from any source in a sulfuric acid plant, effluent process gas containing sulfur dioxide in excess of 300 ppm by volume calculated at 12% oxygen.

309.2 Effective DATE, no person shall operate a sulfuric acid plant unless the 8-hour rolling average sulfur dioxide (SO_2) emissions from the acid plant do not exceed 0.20 pounds per ton of acid produced, the production expressed as 100 percent H_2SO_4.

(Amended February 16, 1983; May 20, 1992;)

9-1-310 **Emission Limitations for Fluid Catalytic Cracking Units, Fluid Cokers, and Coke Calcining Kilns:**

310.1 A person shall not emit, from any source in a fluid catalytic cracking unit or fluid coker, effluent process gas containing sulfur dioxide in excess of 1,000 ppm by volume.

310.2 A person shall not emit, from any coke calcining kiln, effluent process gas containing sulfur dioxide in excess of 400 ppm by volume or in excess of 113 kg (250 pounds) per hour, whichever is more restrictive.

310.3 A person subject to subsections 9-1-310.1 or 310.2 shall comply with the requirements in subsections 9-1-110.1 and 110.2.

9-1-311 Emission Limitations for Catalyst Manufacturing Plants:

311.1 Deleted May 20, 1992

311.2 A person shall not emit, from any source in a catalyst manufacturing plant, effluent process gas containing sulfur dioxide in excess of 22 kg (50 pounds) per hour. (Adopted May 21, 1980; Amended May 20, 1992)

9-1-312 Emission Limitations for Fresh Fruit Sulfuring Operations:

312.1 A person shall not operate any fresh apricot sulfuring operation which uses greater than 4.5 kg (10 pounds) of elemental sulfur or 9.0 kg (20 pounds) of gaseous SO_2 per 9.0 metric ton (1 short ton) of fresh apricots.

312.2 A person shall not operate any fresh peach sulfuring operation which uses greater than 5.5 kg (12 pounds) of elemental sulfur or 10.9 kg (24 pounds) of gaseous SO_2 per 9.0 metric ton (1 short ton) of fresh peaches.

312.3 A person shall not operate any fresh pear sulfuring operation which uses greater than 6.8 kg (15 pounds) of elemental sulfur or 13.6 kg (30 pounds) of gaseous SO_2 per 9.0 metric ton (1 short ton) of fresh pears.

(Adopted February 16, 1983; Amended May 20, 1992)

9-1-313 Sulfur Removal Operations at Petroleum Refineries: Effective September 1, 1990, a person shall not operate a petroleum refinery processing more than 20,000 barrels per stream day of crude oil unless one of the following is met:

313.1 The sulfur content of the crude oil does not exceed 0.10 percent by weight, or

313.2 There is a sulfur removal and recovery system that removes and recovers, on a refinery wide basis, 95% of the H_2S from the refinery fuel gas, that removes and recovers, on a refinery wide basis, 95% of the H_2S from the process water streams, and removes 95% of the ammonia from the process water streams, provided, however, any refinery which removes sulfurous compounds containing sulfur equivalent of 16.5 tons or more of elemental sulfur in any one day shall install a sulfur recovery plant or a sulfuric acid plant.

313.3 A binding, legally enforceable agreement or court order exists which mandates the construction of a sulfur removal and recovery system pursuant to a schedule set forth therein; provided, however, that the sulfur removal and recovery system must be constructed by October 1, 1993, unless, in the judgment of the Air Pollution Control Officer, failure to complete construction by that date results from circumstances beyond the reasonable control of the refinery operator in which case the Air Pollution Control Officer may grant a reasonable extension of the October 1, 1993 deadline. The Air Pollution Control Officer may grant such extension, however, only if the refinery operator has made substantial progress in completing construction of its sulfur removal and recovery system by October 1, 1993.

(Adopted July 18, 1990; Amended March 15, 1995)

9-1-314 Refinery Fuel Gas Sulfur Limit: Effective [DATE], no person shall burn any refinery fuel gas having a fuel sulfur content in excess of 40 ppmv, calculated as H_2S, on a 3-hour rolling average basis.

9-1-400 ADMINISTRATIVE REQUIREMENTS

9-1-401 Deleted May 20, 1992

9-1-402 Deleted May 20, 1992
9-1-403 Deleted May 20, 1992
9-1-404 Deleted May 20, 1992

9-1-500 MONITORING AND RECORDS

9-1-501 Area Monitoring Requirements: Upon request of the APCO, a person subject to Section 9-1-301 shall comply with the monitoring, maintenance, records, and reporting requirements of Regulation 1, including Sections 1-510, 1-530, 1-540, 1-542, 1-543 and 1-544.

9-1-502 Emission Monitoring Requirements: A person subject to Section 9-1-304, 307, 309 or 310 (with the exception of coke calcining kilns), shall comply with the monitoring requirements of 1-520 and 522. (Amended March 17, 1982; May 20, 1992)

9-1-503 Fresh Fruit Sulfuring Recordkeeping Requirements: Any persons subject to Section 9-1-312 of this Rule shall record the daily weight of elemental sulfur burned or gaseous SO_2 used per unit weight of fresh fruit for each sulfuring operation. Records of the weights used shall be kept for the length of the specific fruit season and shall be made available to the APCO upon request. (Adopted February 16, 1983)

9-1-504 Emission Monitoring Requirements for Sulfuric Acid Plants: Effective DATE, a person subject to Section 9-1-309.2 shall provide, properly install, maintain in good working order, and operate the following monitoring equipment:

504.1 Continuous Emissions Monitoring: a continuous emissions monitoring system (CEMS) to continuously measure sulfur dioxide emissions from the acid plant. The CEMS shall meet the requirements of Section 1-522 and the District Manual of Procedures, Volume V, Continuous Emission Monitoring, Policies and Procedures.

504.2 Parametric Monitoring: suitable instruments to monitor continuously, at the acid plant stack, flowrate temperature, pressure, and moisture content to accurately convert CEMS concentrations to mass emission rates. The parametric monitors shall comply with the requirements of Section 1-523 and the applicable requirements in the appendices of 40 CFR part 60.

504.3 Acid Production Monitoring: suitable instruments to accurately monitor the production of pure H_2SO_4 on an hourly basis.

504.4 Data Acquisition System: an automated system to convert the data collected by the CEMS, parametric monitoring system and acid production monitoring system to the units of the emission limit in Section 9-1-309.2.

9-1-505 Monitoring Requirements for Refinery Fuel Gas: Effective DATE, a person subject to Section 9-1-314 shall provide, properly install, maintain in good working order and operate (per BAAQMD Manual of Procedures, Volume V) a continuous emissions monitoring system (CEMS) to monitor reduced sulfur compounds, as defined in Section 1-237, in refinery fuel gas prior to combustion. The CEMS shall meet the requirements of Section 1-522.

9-1-600 MANUAL OF PROCEDURES

9-1-601 Sampling and Analysis of Gas Streams: The method of sampling and analysis of gas streams of sulfur dioxide concentrations is described in the Manual of Procedures, Volume IV, ST-19 A or B. (Amended March 17, 1982)

9-1-602 Sulfur Content of Fuels: The sulfur content of solid and liquid fuels shall be determined as specified in the Manual of Procedures, Volume III, Method 10. (Amended March 17, 1982)

9-1-603 Averaging Times: The averaging times for production determination and emission analysis are specified in the Manual of Procedures, Volume IV. (Amended March 17, 1982)

9-1-604 Ground Level Monitoring: The monitoring requirements for ground level concentrations of sulfur dioxide, including siting procedures and instrument specifications, calibration and maintenance procedures, are described in the Manual of Procedures, Volume VI, Section 1. (Amended March 17, 1982)

9-1-605 **Emission Monitoring:** The emission monitoring requirements, including instrument placement, specifications, calibration, and maintenance procedures are described in the Manual of Procedures, Volume V. (Amended March 17, 1982).

9-1-606 **Analysis of Gas Streams for H_2S:** The method for analyzing refinery fuel gas streams for H_2S before and after control shall be as prescribed in the Manual of Procedures, Volume III, LAB 32 or equivalent method approved by the APCO.
Adopted July 18, 1990; Amended May 20, 1992)

9-1-607 **Analysis of Water Streams for H_2S:** The method for analyzing refinery process water streams for H_2S before and after control shall be as prescribed in the Manual of Procedures, Volume III, LAB 32 or equivalent method approved by the APCO.
(Adopted July 18, 1990; Amended May 20, 1992)

9-1-608 **Analysis of Water Streams for NH_3:** The method for analyzing refinery process water streams for NH_3 before and after control shall be as prescribed in the Manual of Procedures, Volume III, LAB 1 or equivalent method approved by the APCO.
Adopted July 18, 1990; Amended May 20, 1992)

9-1-609 **Analysis of Sulfur Content of Crude Oil:** The method for analyzing the sulfur content of the crude oil shall be as prescribed in the Manual of Procedures, Volume III, Method LAB 10 or equivalent method approved by the APCO.
(Adopted July 18, 1990; Amended May 20, 1992)