Bay Area Air Quality Management District

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San Francisco, CA 94109
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Permit Evaluation
and
Statement of Basis
for
MAJOR FACILITY REVIEW PERMIT

for

Tesoro Refining and Marketing Company
Facility B2758 & B2759

Facility Addresses:

Facility #B2758
Avon Refinery
150 Solano Way
Martinez, CA 94553

Facility #B2759
Amorco Terminal
Waterfront Road
Martinez, CA 94553

Mailing Address:

Avon Refinery 150 Solano Way
Martinez, CA 94553

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Title V Statement of Basis

A. Background

The facilities are subject to the Operating Permit requirements of Title V of the federal Clean Air Act, Part 70 of Volume 40 of the Code of Federal Regulations (CFR), and BAAQMD Regulation 2, Rule 6, Major Facility Review because it is a major facility as defined by BAAQMD Regulation 2-6-212. It is a major facility because it has the "potential to emit," as defined by BAAQMD Regulation 2-6-218, of more than 100 tons per year of a regulated air pollutant.

Major Facility Operating permits (Title V permits) must meet specifications contained in 40 CFR Part 70 as contained in BAAQMD Regulation 2, Rule 6. The permits must contain all applicable requirements (as defined in BAAQMD Regulation 2-6-202), monitoring requirements, recordkeeping requirements, and reporting requirements. The permit holders must submit reports of all monitoring at least every six months and compliance certifications at least every year.

In the Bay Area, state and District requirements are also applicable requirements and are included in the permit. These requirements can be federally enforceable or non-federally enforceable. All applicable requirements are contained in Sections I through VI of the permit.

Each facility in the Bay Area is assigned a facility number that consists of a letter and a 4-digit number. This facility number is also considered to be the identifier for the permit.

B. Facility Description

The Title V permit includes the Avon refinery and the Amorco Terminal.

The refinery is an intermediary between crude oil and refined petroleum products. It takes dirty, low-value oil from the ground and distills it under atmospheric pressure into its primary components: gases (light ends), gasolines, kerosene and diesels (middle distillates), heavy distillates, and heavy bottoms. The heavy bottoms go on to vacuum distillation processing to be distilled again, this time under a vacuum, to salvage any light ends or middle distillates that did not get separated under atmospheric pressure; the heaviest bottoms may continue on to a coker unit.

Other product components are processed by downstream units to be cleaned (hydrotreated), cracked (catalytic or hydrocracking), reformed (catalytic reforming), or alkylated (alkylation) to form gasolines and high-octane blending components, or to have sulfur or other impurities removed to make over-the-road diesel (low sulfur) or off-road diesel (higher sulfur). Depending on the process units in a refinery and the crude oil input, an oil refinery can produce a wide range of salable products: many different grades of gasoline and gasoline blend stocks, several grades of diesel, kerosene, jet and aviation fuel, fuel oil, bunker fuels, waxes, solvents, sulfur, coke, asphalt, and chemical plant feedstocks.

A more detailed description of petroleum refinery processes and the resulting air emissions may be found in Chapter 5 of EPA's publication AP-42, Compilation of Air Pollutant Emission Factors. This document may be found at:

http://www.epa.gov/ttn/chief/ap42/ch05/

The principal sources of air emissions from refineries are:

- Combustion units (furnaces, boilers, and cogeneration facilities)
- FCC (Fluidized Catalytic Cracking)
- Storage tanks
- Fugitive emissions from pipe fittings, valves, pumps, and compressors
- Sulfur plants
- Wastewater treatment facilities

Combustion unit emissions are generally controlled through the use of burner technology, steam injection, or selective or non-selective catalytic reduction. Emissions from the FCCU are controlled through the use of improved catalyst regeneration, CO boilers, electrostatic precipitators, hydrotreating the feed, and use of catalysts to remove impurities. Storage tank emissions may be controlled through the use of add on control and or fitting loss control. Fugitive emissions may be controlled through the use of add-on abatement equipment, increased inspection and maintenance frequency. Sulfur plants are equipped with tail gas units to reduce emissions. Wastewater treatment facilities may be controlled by covering units, gasketing covers, and add on controls such as, carbon canisters.

C. Permit Content

The legal and factual basis for the permit follows. The permit sections are described in the order that they are presented in the permit.

I. Standard Conditions

This section contains administrative requirements and conditions that apply to all facilities. If the Title IV (Acid Rain) requirements for certain fossil-fuel fired electrical generating facilities or the accidental release (40 CFR § 68) programs apply, the section will contain a standard condition pertaining to these programs. Many of these conditions derive from 40 CFR § 70.6, Permit Content, which dictates certain standard conditions that must be placed in the permit. The language that the District has developed for many of these requirements has been adopted into the BAAQMD Manual of Procedures, Volume II, Part 3, Section 4, and therefore must appear in the permit.

The standard conditions also contain references to BAAQMD Regulation 1 and Regulation 2. These are the District's General Provisions and Permitting rules.

Condition J 1 has been added to clarify that the capacity limits shown in Table II-A and Table II C are enforceable limits.

II. Equipment

This section of the permit lists all permitted or significant sources. Each source is identified by an "S" and a number (e.g., S24 or S-24).

Permitted sources are those sources that require a BAAQMD operating permit pursuant to BAAQMD Rule 2-1-302.

Significant sources are those sources that have a potential to emit of more than 2 tons of a "regulated air pollutant," as defined in BAAQMD Rule 2-6-222, per year or 400 pounds of a "hazardous air pollutant," as defined in BAAQMD Rule 2-6-210, per year.

All abatement (control) devices that control permitted or significant sources are listed. Each abatement device whose primary function is to reduce emissions is identified by an "A" and a number (e.g., A-24). If a source is also an abatement device, such as when an engine controls VOC emissions, it will be listed in this table but will have an "S" number. An abatement device that is also a source (such as a thermal oxidizer that burns fuel) will have an "A" number.

The equipment section is considered to be part of the facility description. It contains information that is necessary for applicability determinations, such as fuel types, contents or sizes of tanks, etc. This information is part of the factual basis of the permit.

Each of the permitted sources has previously been issued a permit to operate pursuant to the requirements of BAAQMD Regulation 2, Permits. These permits are issued in accordance with state law and the District's regulations. The capacities in this table are the maximum allowable capacities for each source, pursuant to Standard Condition J 1 and Regulation 2-1-403.

The Avon refinery and the Amorco Terminal are included in the permit though they are not on properties that are contiguous. The Amorco Terminal is a support facility to the refinery in that it receives crude oil that is processed (refined) at the refinery.

Following are explanations of the differences in the equipment list between the time that the facility originally applied for a Title V permit and the permit proposal date:

Devices Removed from Service Since Application was Submitted:

The following sources, including exempt sources, that were listed in the application permitted source list, have been removed from service and are not addressed in the proposed permit:

Plant #B2758: S20, S23, S43, S48, S49, S50, S51, S52, S53, S54, S55, S199, S200, S201, S202, S203, S302, S356, S434, S435, S456, S486, S491, S830, S839, S852, S857, S-859, S862, S940, and S1453.

Plant #B2759: S1, S3, S20, S23, S31, S41, S42, S43, S51, and S52.

The following abatement device listed in the abatement device list of the application, has been removed from service and is not addressed in the proposed permit:

Plant #B2758: A-25.

Plant #B2759: none.

Devices Permitted Since Application was Submitted:

The following sources, NOT listed in the permitted source list in Part 3 of the application because they were not yet permitted, are now permitted and are addressed in the proposed permit.

Plant #B2758: S1461, S1462, S1463, S1464, S1465, S1470.

Plant #B2759: None.

The following abatement devices, NOT listed in the list of abatement devices, because they were not yet permitted, are now permitted and are addressed in the proposed permit.

None.

Devices with Changed Permit Status:

Cold cleaners S-857, S-858, S-859, S-860, S-861, S-1455, S-1456, S-1457, and S-1458 were previously exempt from permit requirements and have since been issued permits to operate as required by changes to Regulation 2, Rule 1 and Regulation 8, Rule 16. The exemption in Regulation 2-1-118.7, has been changed to require a low VOC content as the exemption criteria. These cold cleaners did not meet the new exemption criteria and required permits.

Internal combustion engines S952, S953, S954, S955, S956, S957, S958, S959, and S960 were previously exempt from permitting but have been issued permits to operate consistent with Regulation 2, Rule 1.

<u>District permit applications not included in this proposed permit</u>
This facility sends a large number of permit applications to the District every year. Review of the following permit applications was not completed in time to include the results in this Title V permits. The Title V permit will be revised periodically to incorporate these applications as permit revisions following the procedures in Regulation 2, Rule 6, Major Facility Review.

Application #	Project Description
2298	Replacement Storage Tank

2508	Clean Fuels/MTBE Removal
2741	Modification of Tank 531
2750	Coke Transfer Project
3447	Fugitive Components at Alkylation Unit
3778	Quench Valve at 3 HDS
4113	Flare Project
4198	Storage Tanks
4389	Loss of Exemption IC Engines

III. Generally Applicable Requirements

This section of the permit lists requirements that generally apply to all sources at a facility including insignificant sources and portable equipment that may not require a District permit. If a generally applicable requirement applies specifically to a source that is permitted or significant, the standard will also appear in Section IV and the monitoring for that requirement will appear in Sections IV and VII of the permit. Parts of this section apply to all facilities (e.g., particulate, architectural coating, odorous substance, and sandblasting standards). In addition, standards that apply to insignificant or unpermitted sources at a facility (e.g., refrigeration units that use more than 50 pounds of an ozone-depleting compound) are placed in this section.

Unpermitted sources are exempt from normal District permits pursuant to an exemption in BAAQMD Regulation 2, Rule 1. They may, however, be specifically described in a Title V permit if they are considered a significant source pursuant to the definition in BAAQMD Rule 2-6-239.

IV. Source-Specific Applicable Requirements

This section of the permit lists the applicable requirements that apply to permitted or significant sources. These applicable requirements are contained in tables that pertain to one or more sources that have the same requirements. The order of the requirements is:

- District Rules
- SIP Rules (if any) listed following the corresponding District Rules. SIP rules are District rules that have been approved by EPA into the California State Implementation Plan. SIP rules are "federally enforceable" and a "Y" (yes) indication will appear in the "Federally Enforceable" column. If the SIP rule is the current District rule, separate citation of the SIP rule is not necessary and the "Federally Enforceable" column will have a "Y" for "yes". If the SIP rule is not the current District rule, the SIP rule or the necessary portions of the SIP rule are cited separately after the District rule. The SIP portions will be federally enforceable; the non-SIP versions will not be federally enforceable, unless EPA has approved them through another program.
- Other District requirements, such as the Manual of Procedures, as appropriate.
- Federal requirements (other than SIP provisions)
- BAAQMD permit conditions. The text of BAAQMD permit conditions is found in Section VI of the permit.

- Federal permit conditions. The text of Federal permit conditions, if any, is found in Section VI of the permit.

Section IV of the permit contains citations to all of the applicable requirements. The text of the requirements is found in the regulations, which are readily available on the District's or EPA's websites, or in the permit conditions, which are found in Section VI of the permit. All monitoring requirements are cited in Section IV. Section VII is a cross-reference between the limits and monitoring requirements. A discussion of monitoring is included in Section C.VII of this permit evaluation/statement of basis.

Complex Applicability Determinations:

Facility Tanks:
The facility has hundreds of storage tanks with different characteristics (fixed roof, external floating roof, internal floating roof), storing different materials (varying vapor pressures, toxicity), with different initial dates of operation, and subject to different regulatory requirements (NESHAPS, NSPS). To minimize the size of the Title V permit application and to increase the permit's usefulness as a compliance assurance tool, this proposed Title V permit has clustered the tanks in groups to reflect similar applicable requirements. Specific requirements are triggered by various criteria, which include: tank size, tank construction date, vapor pressure of the tank contents, toxicity of the tank contents, tank roof design (floating roof versus fixed roof) and whether or not the tank is vented to a control device. For example, the fewest requirements apply to tanks which are relatively old and therefore are not subject to the federal New Source Performance Standard (NSPS), and which store low-vapor pressure materials and therefore are not subject to District Regulation 8, Rule 5. Such tanks are shown in sub-table IV-BB and VII-BB. More requirements apply to newer tanks, and those that store high vapor-pressure materials.

Regulation 8, Rule 2, Miscellaneous Operations
The District has determined that the definition of "miscellaneous operation" in Regulation 8-2-201 excludes sources that are in a source category regulated by another rule in Regulation 8, even if they are exempt from the other rule. This is because such sources limited by the terms of the exemption. Thus, for example, a hydrocarbon storage tank that stores liquids with a vapor pressure less than 0.5 psia is exempt form Regulation 8, Rule 5, Storage of Organic Liquids
(8-5-117), and is not subject to Regulation 8, Rule 2, Miscellaneous Operations.

The policy justification for this determination is that the Board considered appropriate controls for the source category when it adopted the rule governing that category. Part of the consideration includes determination of sources and activities that are not subject to controls.

V. Schedule of Compliance

A schedule of compliance is required in all Title V permits pursuant to BAAQMD Regulation 2-6-409.10 which provides that a major facility review permit shall contain the following information and provisions:

"409.10 A schedule of compliance containing the following elements:

10.1 A statement that the facility shall continue to comply with all applicable requirements with which it is currently in compliance;

10.2 A statement that the facility shall meet all applicable requirements on a timely basis as requirements become effective during the permit term; and

10.3 If the facility is out of compliance with an applicable requirement at the time of issuance, revision, or reopening, the schedule of compliance shall contain a plan by which the facility will achieve compliance. The plan shall contain deadlines for each item in the plan. The schedule of compliance shall also contain a requirement for submission of progress reports by the facility at least every six months. The progress reports shall contain the dates by which each item in the plan was achieved and an explanation of why any dates in the schedule of compliance were not or will not be met, and any preventive or corrective measures adopted."

Because the District has not determined that the facility is out of compliance with an applicable requirement, the schedule of compliance for this permit only contains elements 2-6-409.10.1 and 2-6-409.10.2.

The BAAQMD Compliance and Enforcement Division has conducted a review of compliance over the past year and has no records of compliance problems at this facility. The compliance report is contained in Appendix A of this permit evaluation and statement of basis.

VI. Permit Conditions

During the Title V permit development, the District has reviewed the existing permit conditions, deleted the obsolete conditions, and as appropriate, revised the conditions for clarity and enforceability. Some conditions have been deleted because they reiterate an applicable requirement that is now contained in Section IV, Source-Specific Applicable Requirements. Each permit condition is identified with a unique numerical identifier, up to five digits.

Where necessary to meet Title V requirements, additional monitoring, recordkeeping, or reporting has been added to the permit.

All changes to existing permit conditions are clearly shown in "strike-out/underline" format in the proposed permit. When the permit is issued, all 'strike-out" language will be deleted; all "underline" language will be retained, subject to consideration of comments received.

The existing permit conditions are generally derived from previously issued District Authorities to Construct (A/C) or Permits to Operate (P/O). It is also possible for permit conditions to be imposed or revised as part of the annual review of the facility by the District pursuant to California Health and Safety Code (H&SC) § 42301(e), through a variance pursuant to H&SC § 42350 et seq., an order of abatement pursuant to H&SC § 42450 et seq., or as an administrative revision initiated by District staff. After issuance of the Title V permit, permit conditions will be revised using the procedures in Regulation 2, Rule 6, Major Facility Review.

The District has reviewed and, where appropriate, revised or added new annual and daily throughput limits on sources so as to help ensure compliance with District rules addressing preconstruction review.

The applicability of preconstruction review depends on whether there is "modified source" as defined in District Rule 2-1-234. Whether there is a modified source depends in part on whether there has been an "increase" in "emission level." 2-1-234 defines what will be considered an emissions level increase, and takes a somewhat different approach depending on whether a source has previously permitted by the District.

Sources that were modified or constructed since the District began issuing New Source Review permits will have permits that contain throughput limits, and these limits are reflected in the Title V permit. These limits have previously undergone District review, and are considered to be the legally binding "emission level" for purposes of 2-234.1 and 2-1-234.2. By contrast, for older sources that have never been through preconstruction review (commonly referred to as "grandfathered" sources), an "increase" in "emission level" is addressed in 2-1-234.3. A grandfathered source is not subject to preconstruction review unless its emission level increases above the highest of either: 1) the design capacity of the source, 2) the capacity listed in a permit to operate, or 3) highest capacity demonstrated prior to March 2000. However, if the throughput capacity of a grandfathered source is limited by upstream or downstream equipment (i.e., is "bottlenecked"), then the relaxing of that limitation ("debottlenecking") is considered a modification.

The District has written throughput limits into the Title V permit for grandfathered sources. As discussed above, these limits are written for the purpose of determining whether an increase in emission levels has occurred. The purpose of these limits is to facilitate implementation of preconstruction review program. If these limits are exceeded, the facility would be expected to report the exceedence, and the District would treat the reported exceedence as presumptively establishing the occurrence of a modification. The facility would then be expected to apply for a preconstruction permit addressing the modification and the District would consider whether an enforcement action was appropriate.

It is important to note the presumptive nature of throughput limits for grandfathered sources that are created in the Title V permit. These limits are generally based upon the District's review of information provided by the facility regarding the design capacity or highest documented capacity of the grandfathered source. To verify whether these limits reflect the true design, documented, or "bottlenecked" capacity (pursuant to 2-1-234.1) of each source is beyond the resource abilities of the District in this Title V process. Moreover, the District cannot be completely confident that the facility has had time or resources necessary to provide the most accurate information available in this regard. Creating throughput limits in the Title V permit for grandfathered sources is not required by either Part 70 or the District's Major Facility Review rules. Despite the lack of such a requirement, and despite the resource and information challenges presented in the Title V process, the District believes that writing presumptive limits for grandfathered sources into the Title V permit will provide a measure of predictability regarding the future applicability of the preconstruction review program, and that this increased predictability is universally beneficial.

It follows from the presumptive nature of these throughput limits for grandfathered sources that exceedence of these limits is not per se a violation of the permit. *Failure to report an exceedence would be a permit violation.* However, if an exceedence occurs, the facility would have an opportunity to demonstrate that the throughput limit in fact did not reflect the appropriate limit for

purposes of 2-1-234.3. If the facility can demonstrate this, no enforcement action would follow, and the permit would be revised at the next opportunity. It also follows that compliance with these limits is not a "safe harbor" for the facility. If evidence clearly shows that a grandfathered source has undergone a "modification" as defined in 2-1-234.3, the District would consider that a preconstruction review-triggering event, notwithstanding compliance with the throughput limit in the Title V permit. In other words, the protection afforded the facility by complying with the throughput limit in the Title V permit is only as strong as the information on which it was based. There is no Title V "permit shield" associated with throughput limits for grandfathered sources.

Conditions that are obsolete or that have no regulatory basis have been deleted from this permit.

Conditions have also been proposed for deletion due to the following:
- Redundancy in record-keeping requirements.
- Redundancy in other conditions, regulations and rules.
- The condition has been superseded by other regulations and rules.
- The equipment has been taken out of service or is exempt.
- The event has already occurred (i.e. initial or start-up source tests).

The regulatory basis has been referenced following each condition. The regulatory basis may be a rule or regulation. The District is also using the following codes for regulatory basis:
- BACT: This code is used for a condition imposed by the Air Pollution Control Officer (APCO) to ensure compliance with the Best Available Control Technology in Regulation 2-2-301.
- Cumulative Increase: This code is used for a condition imposed by the APCO which limits a source's operation to the operation described in the permit application pursuant to BAAQMD Regulation 2-1-403.
- Offsets: This code is used for a condition imposed by the APCO to ensure compliance with the use of offsets for the permitting of a source or with the banking of emissions from a source pursuant to Regulation 2, Rules 2 and 4.
- PSD: This code is used for a condition imposed by the APCO to ensure compliance with a Prevention of Significant Deterioration permit issued pursuant to Regulation 2, Rule 2.
- TRMP or toxics: This code is used for a condition imposed by the APCO to ensure compliance with limits that arise from the District's Toxic Risk Management Policy.
- Bubble: This code is used for a condition imposed by the APCO to ensure compliance with emission limits imposed on a group of sources.

Abatement device operating parameter monitoring has been added for each abatement device.

Additional monitoring has been added, where appropriate, to assure compliance with the applicable requirements.

Applicability Determinations:
Per BAAQMD Regulation 2-1-234.3, throughput limits are proposed to be added for the majority of sources to facilitate determining the applicability of District preconstruction review permitting requirements. The following table illustrates the hourly or daily and annual limits based on either design maximum capacities or historical maximum throughputs.

VII. Applicable Limits and Compliance Monitoring Requirements

This section of the permit is a summary of numerical limits and related monitoring requirements that apply to each source. The summary includes a citation for each monitoring requirement, frequency, and type. The applicable requirements for monitoring are completely contained in Sections IV, Source-Specific Applicable Requirements, and VI, Permit Conditions, of the permit.

The tables below contain only the limits for which there is no monitoring or inadequate monitoring in the applicable requirements. The District has examined the monitoring for other limits and has determined that monitoring is adequate to provide a reasonable assurance of compliance. Calculations for potential to emit will be provided when no monitoring is proposed due to the size of a source. In all other cases, the column will have "N/A", meaning "Not applicable".

Monitoring decisions are typically the result of a balancing of several different factors including: 1) the likelihood of a violation given the characteristics of normal operation, 2) degree of variability in the operation and in the control device, if there is one, 3) the potential severity of impact of an undetected violation, 4) the technical feasibility and probative value of indicator monitoring, 5) the economic feasibility of indicator monitoring, and 6) whether there is some other factor, such as a different regulatory restriction applicable to the same operation, that also provides some assurance of compliance with the limit in question.

These factors are the same as those historically applied by the District in developing monitoring for applicable requirements**.** It follows that, although Title V calls for a re-examination of all monitoring**,** there is a presumption that these factors have been appropriately balanced and incorporated in the District's prior rule development and/or permit issuance. It is possible that, where a rule or permit requirement has historically had no monitoring associated with it, no monitoring may still be appropriate in the Title V permit if, for instance, there is little likelihood of a violation**.** Compliance behavior and associated costs of compliance are determined in part by the frequency and nature of associated monitoring requirements. As a result, the District will generally revise the nature or frequency of monitoring only when it can support a conclusion that existing monitoring is inadequate**.**

A summary of all monitoring is contained in Section VII, Applicable Limits and Compliance Monitoring Requirements, of the permit. The summary includes a citation for each monitoring requirement, frequency, and type. The applicable requirements for monitoring are completely contained in Sections IV, Source-Specific Applicable Requirements, and VI, Permit Conditions, of the permit.

NOX Sources			
S# & Description	**Federally Enforceable Limit Citation**	**Federally Enforceable Limit**	**Monitoring**
none			

NOx Discussion:

Every source at the refinery that is subject to a NOx limit is also subject to NOx monitoring. These monitoring requirements come either from Regulation 9-10, existing permit conditions, or both. For more detailed information on this matter, see Table VII. Sources that are subject to this rule are found in the tables in Section VII Applicable Limits and Compliance Monitoring Requirements of the permit.

BAAQMD Regulation 9, Rule 10 "Inorganic Gaseous Pollutants: NOx and CO from Boilers, Steam Generators and Process heaters in Petroleum Refineries"

Regulation 9-10-502 requires continuous emission monitoring systems (CEMS) or "equivalent" verification systems to demonstrate compliance with Regulation 9, Rule 10. A BAAQMD Policy Memorandum, dated June 23, 2000, outlines in detail emission monitoring requirements for petroleum refinery heaters, furnaces, and boilers that are subject to the rule. Exact monitoring requirements for NOx are dependent upon emission control devices in use, firing rate, and source test results. The District Policy is contained in Appendix B. Sources that are subject to this rule are found in the tables in Section VII Applicable Limits and Compliance Monitoring Requirements of the permit.

CO Sources			
S# & Description	**Federally Enforceable Limit Citation**	**Federally Enforceable Limit**	**Monitoring**
none			

CO Discussion:

Every source at the refinery that is subject to a CO limit is also subject to CO monitoring. These monitoring requirements come either from Regulation 9-10, existing permit conditions, or both. For more detailed information on this matter, see Table VII. Sources that are subject to this rule are found in the tables in Section VII Applicable Limits and Compliance Monitoring Requirements of the permit.

BAAQMD Regulation 9, Rule 10 "Inorganic Gaseous Pollutants: NOx and CO from Boilers, Steam Generators and Process heaters in Petroleum Refineries"

Regulation 9-10-502 requires continuous emission monitoring systems (CEMS) or "equivalent" verification systems to demonstrate compliance with Regulation 9, Rule 10. A BAAQMD Policy Memorandum, dated June 23, 2000, outlines in detail, emission monitoring requirements for petroleum refinery heaters, furnaces, and boilers that are subject to the rule. Exact monitoring requirements for CO are dependent upon emission control devices in use, firing rate, and source test results. The District Policy is contained in Appendix B. Sources that are subject to this rule are found in the tables in Section VII Applicable Limits and Compliance Monitoring Requirements of the permit.

SO_2 Sources			
S# & Description	**Federally Enforceable Limit Citation**	**Federally Enforceable Limit**	**Monitoring**
<sources permitted to burn liquid fuels>	BAAQMD 9-1-304	Sulfur content of liquid fuel ≤ 0.5% by weight	Fuel Certification (Note 1)
Facility	BAAQMD 9-1-301	GLC of 0.5 ppm for 3 min. or 0.25 ppm for 60 min. or 0.05 ppm for 24 hours	Area Monitoring (Note 2)
Facility	BAAQMD 9-1-302	General emission standard: < 300 ppm SO2 (applies only to gas-fired equipment when GLMs are not functioning)	None (Note 3)
	BAAQMD 9-1-313.2	Removal and recovery of 95%of H2S in refinery fuel gas and 95% of H2S in process water streams on a refinery wide basis	Annual Source test for S-4227-9 (Note 4)
S1401 Sulfur Plants	BAAQMD Regulation 6-330	0.08 grain/dscf exhaust concentration of SO3 and H2SO4, expressed as 100% H2SO4	(Note 5)
	BAAQMD 9-1-313.1	Sulfur content of crude oil shall not exceed 0.10% by wt, or	Daily crude sampling, when sulfur plant is down. (Note 6)

Note 1: Per CAPCOA/ARB/EPA Agreement, certification by fuel supplier for each fuel delivery. California Diesel Fuel shall not exceed a sulfur content of 0.05 %, by weight. Certification may be provided once for each purchase lot, if records are also kept of the purchase lot number of each delivery.

Note 2: All facility combustion sources are subject to the SO2 emission limitations in District Regulation 9, Rule 1 (ground-level concentration and emission point concentration). Area monitoring to demonstrate compliance with the ground level SO2 concentration requirements of Regulation 9-1-301 has been required by the APCO (per BAAQMD Regulation 9-1-501). No monitoring is required for BAAQMD regulation 9-1-302 because it only applies when the ground level monitors (GLMs) are not operating, which is infrequent.

Note 3: All facility combustion sources are subject to the SO2 emission limitations in District Regulation 9, Rule 1 (ground-level concentration and emission point concentration). In EPA's June 24, 1999 agreement with CAPCOA and ARB, "Periodic Monitoring Recommendations for Generally Applicable Requirements in SIP", EPA has agreed that gaseous-fueled combustion sources do not need additional monitoring to verify compliance with Regulation 9, Rule 1, since violations of the regulation are unlikely. Therefore, no monitoring is necessary for this requirement.

Note 4: Sulfur plant (S-1401) will require annual source testing to demonstrate compliance with 9-1-313.2. This H2S and ammonia removal standard is more of a design standard than a performance standard. The entire removal system is designed to achieve the required removal. The District has determined that annual testing will assure compliance by verifying that the system continues to operate as designed. In addition, other monitored parameters (e.g., sulfur plant SO2 emissions and refinery fuel gas sulfur content) will alert the operator if the system is not functioning properly.

The likelihood of undetected non-compliance is low. The tests required to demonstrate compliance are cumbersome, expensive, and dangerous (because of the nature of the sources). Direct measurement is not feasible. As a result, compliance must be demonstrated by source test. The cost of more frequent tests is not justified by the incremental improvement in compliance assurance.

Note 5: Sulfur plant (S1401) will require annual source testing to demonstrate compliance with 6-330. More frequent monitoring is not required, because the system will exceed the standard only under upset conditions. The monitors and alarms that alert the operator to abnormal conditions are adequate to ensure that upsets are detected and corrected. The cost of more frequent tests is not justified by the incremental improvement in compliance assurance.

Note 6: In the unlikely event that the refinery continues to operate while the sulfur recovery plants are down, daily crude sampling is necessary to demonstrate compliance with Regulation 9-1-313.1.

PM Sources			
S# & Description	**Federally Enforceable Limit Citation**	**Federally Enforceable Limit**	**Monitoring**

PM Sources			
S# & Description	**Federally Enforceable Limit Citation**	**Federally Enforceable Limit**	**Monitoring**
S659, S660, S806, S808, S820 Coke Generation /Processing	BAAQMD 6-301	Ringelmann No. 1	No monitoring is proposed because these coke generating/processing sources are enclosed, the coke is handled as a wet slurry, transfer points are abated by an electrostatic precipitator and because particulate emissions are expected to be negligible.
S810, S821 Coke Loading and Coke Pile	BAAQMD 6-301	Ringelmann No. 1	No monitoring is proposed because the coke is a wet slurry material and particulate emissions are expected to be negligible
S823, S824, Heat Exchanger Cleaning	BAAQMD 6-304	tube cleaning, Ringelmann No. 2	Visual inspection during tube cleaning (Note 4)
S902, S905, S923 Start-up Heaters	BAAQMD 6-304	tube cleaning, Ringelmann No. 2	Visual inspection during tube cleaning (Note 4)
S908, S909, S912, S913, S915, S916, S919, S920, S921, S922 Furnaces	BAAQMD 6-304	tube cleaning, Ringelmann No. 2	Visual inspection during tube cleaning (Note 4)
S659, S660, S806, S808, S810, S820, S821, S823, S824	BAAQMD 6-305	prohibition of visible particulate fallout	No monitoring is proposed for the property belonging to others

PM Sources			
S# & Description	**Federally Enforceable Limit Citation**	**Federally Enforceable Limit**	**Monitoring**
S903	BAAQMD 6-310.3	0.15 grain/dscf @ 6% O2	No monitoring is proposed because emissions are expected to be negligible
S659, S660, S802, S806, S808, S810, S820, S821	BAAQMD 6-311	4.10 $P^{0.67}$ lb/hr particulate, where P is process weight rate in ton/hr	No monitoring is proposed because emissions are expected to be negligible
Flares	BAAQMD 6-301	Ringelmann 1 for more than 3 minutes in any hour	Visual Inspection (Note 5)
Baghouses	BAAQMD 6-310.3	0.15 grain/dscf @ 6% O2	Differential Pressure Gauges (Note 6)

Note 1: Gaseous Fuels: BAAQMD Regulation 6-301 limits visible emissions to no darker than 1.0 on the Ringelmann Chart (except for periods or aggregate periods less than 3 minutes in any hour). Visible emissions are normally not associated with combustion of gaseous fuels, such as natural gas. No monitoring is required for sources that burn gaseous fuels exclusively, per the EPA's June 24, 1999 agreement with CAPCOA and ARB titled "Summary of Periodic Monitoring Recommendations for Generally Applicable Requirements in SIP".

Note 2: No monitoring recommended because these sources will be used for emergencies and reliability testing only.

Note 3: Liquid Fuels: Per CAPCOA/ARB/EPA Agreement, adequate monitoring for combustion of liquid fuels is a visible emissions inspection after every 1 million gallons diesel combusted, to be counted cumulatively over a 5 year period. If a visible emissions inspection documents opacity, a method 9 evaluation shall be completed within 3 working days, or during the next scheduled operating period if the unit ceases firing on diesel fuel within the 3 working day time frame. This frequency was selected by balancing the likelihood of undetected significant non-compliance with the expense of more frequent inspections. The cost of more frequent monitoring is not justified for sources with liquid fuel usage that is infrequent or small. The cost of conducting method 9 evaluations is not justified unless a less formal inspection indicates that the source is emitting smoke.

Note 4: Tube cleaning is periodically performed on furnaces that burn liquid fuels, to remove built-up soot from the outside of furnace tubes. If improperly performed, it can result in visible emissions. Hourly observation of the stack during tube cleaning will ensure that improper tube cleaning performance is detected and corrected.

Note 5: Visual inspection of flares shall occur as soon as possible after a release begins. Hourly observation of the flare during operation will ensure that improper flare operation is detected and corrected

Note 3: Differential pressure gauges are required on these baghouses to detect either clogged or broken filter bags. A properly functioning baghouse (all bags intact) cannot exceed the standard, and the differential pressure gauges allow such malfunctions to be detected. The frequency of gauge checks (monthly) was selected by balancing the likelihood of undetected significant non-compliance with the expense of more frequent inspections.

POC Sources

S# & Description	Emission Limit Citation	Federally Enforceable Emission Limit	Monitoring
S103 Gasoline Dispensing Facility	BAAQMD Regulation 8-7-313.1	Fugitives $\leq$ 0.42 lb/1000 gallons	None

POC Discussion:

S103 Vehicle Service Station

The standard District POC emission factor for uncontrolled aboveground tanks is 1.52 lb POC/1000 gallon pumped. Based on this emission factor, the maximum estimated POC emissions from this source are:

(540,000 gallon/year) x (1.52 lb/1000 gallon) = 821 lb POC/year = 0.41 ton POC/yr

The potential to emit is low. Therefore, additional monitoring of this source is not required.
Regulation 8, Rule 7, Gasoline Dispensing Facilities requires records of throughput.
Regulation 8, Rule 7, Section 313 requirements are requirements to install CARB-certified equipment; the standards are not performance standards.

VIII. Test Methods

This section of the permit lists test methods that are associated with standards in District or other rules. It is included only for reference. In most cases, the test methods in the rules are source test methods that can be used to determine compliance but are not required on an ongoing basis. They are not applicable requirements.

If a rule or permit condition requires ongoing testing, the requirement will also appear in Section VI of the permit.

IX. Permit Shield:

The District rules allow two types of permit shields. The permit shield types are defined as follows: (1) A provision in a major facility review permit that identifies and justifies specific federally enforceable regulations and standards which the APCO has confirmed are not applicable to a source or group of sources, or (2) A provision in a major facility review permit that identifies and justifies specific federally enforceable applicable requirements for monitoring, recordkeeping and/or reporting which are subsumed because other applicable requirements for monitoring, recordkeeping, and reporting in the permit will assure compliance with all emission limits.

The second type of permit shield is allowed by EPA's White Paper 2 for Improved Implementation of the Part 70 Operating Permits Program. The District uses the second type of permit shield for all streamlining of monitoring, recordkeeping, and reporting requirements in Title V permits. The District's program does not allow other types of streamlining in Title V permits.

Compliance with the applicable requirement contained in the permit automatically results in compliance with any subsumed (= less stringent) requirement.

This permit contains only the second type of permit shield.

Table IX B – 1
Permit Shield for Subsumed Requirements
S707 – Tank A-707, S706 – Tank A-706, S709 – Tank A-709,

Subsumed Requirement Citation	**Title or Description**	**Streamlined Requirements**	**Title or Description**
BAAQMD Regulation 8, Rule 5	**Organic Compounds – Storage of Organic Liquids**		
8-5-501	**Records:** Subsumed into the Refinery MACT recordkeeping requirements.	**Section 63.654**	Notification of Compliance Status report

Table IX B – 2
Permit Shield for Subsumed Requirements
S705 – Tank A-705, S33 – Tank A-033, S638 – Tank A-638, S692 – Tank A-692, S708 – Tank A-708, S21 (12759) – Tank B-021, S50 (12759) – Tank B-050, S21 (12759) – Tank B-021, S50 (12759) – Tank B-050, S639 – Tank A-639, S664 – Tank A-664, S1461 – Tank A-866, S1463 – Tank A-867, S1464 – Tank A-868, S1465 – Tank A-869, S490 – Tank A-490, S631 – Tank A-631, S690 – Tank A-690,
S19 (12759) – Tank B-019, S30 (12759) – Tank B-030, S49 (12759) – Tank B-049, S642 – Tank A-642, S31 (12759) – Tank B-031, S26 – Tank A-026, S641 – Tank A-641, S640 – Tank A-640, S710 – Tank A-710, S711 – Tank A-711, S637 – Tank A-637, S702 – Tank A-702, S217 – Tank A-217, S134 – Tank A-134, S135 – Tank A-135, S428 – Tank A-428, S696 – Tank A-696, S697 – Tank A-697, S612 – Tank A-612, S619 – Tank A-619

Subsumed Requirement Citation	Title or Description	Streamlined Requirements	Title or Description
BAAQMD Regulation 8, Rule 5	**Organic Compounds – Storage of Organic Liquids**		
8-5-501	**Records:** Subsumed into the Refinery MACT recordkeeping requirements.	**Section 63.654**	Notification of Compliance Status report
40 CFR Part 60 Subpart Kb	**Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984**		
60.115b(b)	**Reporting and Recordkeeping for EFRTs.** Subsumed into the Refinery MACT requirements.	**Section 63.654**	Notification of Compliance Status report
60.116b (a)-(c)	**Additional Recordkeeping.** Subsumed into the Refinery MACT requirements.	**Section 63.654**	Notification of Compliance Status report

D. Alternate Operating Scenarios:

No alternate operating scenario has been requested for this facility.

E. Compliance Status:

The Compliance and Enforcement Division has prepared an Annual Compliance Report for 2001. This report is a summary of District enforcement activities at the Ultramar refinery during the Calendar Year 2001. A copy of the report is attached as Appendix A.

The information contained in the compliance report has been evaluated during the preparation of the Statement of Basis for the proposed Major Facility Review Permit. The main purpose of this evaluation is to identify ongoing or recurring problems that should be subject to a schedule of compliance. No such problems have been identified. A second purpose of this evaluation is to identify activities that require additional monitoring to assure compliance. No such activities have been identified.

There were 17 notices of violation issued during calendar year 2001. Five were for excess SO2 emissions detected by continuous emission monitoring. Four were for excess visible emissions, 3 were associated with storage tanks, and of the remaining 5 violation notices, 2 were issued for administrative violations, 1 was for internal combustion engine NOx emissions, 1 was for excess hydrogen sulfide emissions detected by ground level monitoring, and 1 was for open burning. Fourteen violation notices have been issued during calendar year 2002 and each is without a final disposition.

As part of the permit application, the responsible official certified on July 24, 1996, that all equipment was operating in compliance.

F. Differences between the Application and the Proposed Permit:

On July 24, 1996, Tosco Corporation submitted the single Title V permit application to the District for the Avon refinery and Amorco Terminal. This version is the basis for constructing the proposed Title V permit. At the time of permit application submittal, Tosco Corporation owned and operated both facilities. On September 1, 2000, Ultramar Diamond Shamrock took ownership of both facilities and operated them as Ultramar, Inc. In January of 2002, Valero purchased the Avon refinery and Amorco Terminal. After the purchase, both facilities continued to operate as Ultramar, Inc. Effective May 17, 2002, Tesoro Petroleum Companies, Inc. obtained ownership of both facilities and operates them under Tesoro Refining and Marketing Company. The proposed Title V permit is to be issued to Tesoro Refining and Marketing Company, the current owner-operator of the Avon refinery and Amorco Terminal.

Differences related to sources and abatement devices included in the application are explained in Section C.II of this evaluation.

Throughput limits (identified by a basis of Regulation 2-1-234.3) have been added to all sources with no existing throughput or emission limits. Tables of these permitted sources may be found in Section VI of this Statement of Basis. Other condition changes are also summarized in Section VI of this Statement of Basis.

Source and abatement device lists have been revised since the application was first submitted, because of the removal from service of sources and the permitting of new sources and abatement devices. All new sources have been evaluated in accordance with District New Source Review regulations.

APPENDIX A
BAAQMD COMPLIANCE REPORT

APPENDIX B

BAAQMD Policy Memorandum:
NOx, CO, and O2 Monitoring Compliance with Regulation 9, Rule 10

APPENDIX C
GLOSSARY

ACT
Federal Clean Air Act

APCO
Air Pollution Control Officer

API
American Petroleum Institute

ARB
Air Resources Board

BAAQMD
Bay Area Air Quality Management District

BACT
Best Available Control Technology

BARCT
Best Available Retrofit Control Technology

Basis
The underlying authority that allows the District to impose requirements.

Bubble
An emission limit imposed on a group of sources.

C5
An Organic chemical compound with five carbon atoms

C6
An Organic chemical compound with six carbon atoms

CAA
The federal Clean Air Act

CAAQS
California Ambient Air Quality Standards

CAPCOA
California Air Pollution Control Officers Association

CEC
California Energy Commission

CEQA
California Environmental Quality Act

CEM
A "continuous emission monitor" is a monitoring device that provides a continuous direct measurement of some pollutant (e.g. NOx concentration) in an exhaust stream.

CFP
Clean Fuels Project

CFR
The Code of Federal Regulations. 40 CFR contains the implementing regulations for federal environmental statutes such as the Clean Air Act. Parts 50-99 of 40 CFR contain the requirements for air pollution programs.

CO
Carbon Monoxide

CO2
Carbon Dioxide

Cumulative Increase
The sum of permitted emissions from each new or modified source since a specified date pursuant to BAAQMD Rule 2-1-403, Permit Conditions (as amended by the District Board on 7/17/91) and SIP Rule 2-1-403, Permit Conditions (as approved by EPA on 6/23/95). Used to determine whether threshold-based requirements are triggered.

DAF
A "dissolved air flotation" unit is a process vessel where air bubbles injected at the bottom of the vessel are used to carry solids in the liquid into a froth on the liquid surface, where it is removed.

DWT
Dead Weight Ton

District
The Bay Area Air Quality Management District

DNF
Dissolved Nitrogen Flotation (See DAF)

dscf
Dry Standard Cubic Feet

dscm
Dry Standard Cubic Meter

E 6, E 9, E 12
Very large or very small number values are commonly expressed in a form called scientific notation, which consists of a decimal part multiplied by 10 raised to some power. For example, 4.53 E 6 equals (4.53) x (10^6) = (4.53) x (10 x 10 x 10 x 10 x 10 x 10) = 4,530,000. Scientific notation is used to express large or small numbers without writing out long strings of zeros.

EFRT
An "external floating roof tank" minimizes VOC emissions with a roof with floats on the surface of the liquid, thus preventing the formation of a VOC-rich vapor space above the liquid surface as the level in the tank drops. If such a vapor space were allowed to form, it would be expelled when the tank was re-filled. On an EFRT, the floating roof is not enclosed by a second, fixed tank roof, and is thus described as an "external" roof.

EPA
The federal Environmental Protection Agency.

ETP
Effluent Treatment Plant

Excluded
Not subject to any District Regulations.

FCC
Fluid Catalytic Cracker

Federally Enforceable, FE
All limitations and conditions which are enforceable by the Administrator of the EPA including those requirements developed pursuant to 40 CFR Part 51, subpart I (NSR), Part 52.21 (PSD), Part 60 (NSPS), Part 61 (NESHAPs), Part 63 (HAP), and Part 72 (Permits Regulation, Acid Rain), and also including limitations and conditions contained in operating permits issued under an EPA-approved program that has been incorporated into the SIP.

FP
Filterable Particulate as measured by BAAQMD Method ST-15, Particulate.

FR
Federal Register

FRT
Floating Roof Tank (See EFRT and IFRT)

GDF
Gasoline Dispensing Facility

GLM
Ground Level Monitor

grains
1/7000 of a pound

Graphitic
Made of graphite.

HAP

Hazardous Air Pollutant. Any pollutant listed pursuant to Section 112(b) of the Act. Also refers to the program mandated by Title I, Section 112, of the Act and implemented by 40 CFR Part 63.

H2S
Hydrogen Sulfide

H2SO4
Sulfuric Acid

Hg
Mercury

HHV
Higher Heating Value. The quantity of heat evolved as determined by a calorimeter where the combustion products are cooled to 60F and all water vapor is condensed to liquid.

IFRT
An "internal floating roof tank" minimizes VOC emissions with a roof with floats on the surface of the liquid, thus preventing the formation of a VOC-rich vapor space above the liquid surface as the level in the tank drops. If such a vapor space were allowed to form, it would be expelled when the tank was re-filled. On an IFRT, the floating roof is enclosed by a second, fixed tank roof, and thus is described as an "internal" roof.

ISOM
Isomerization plant

LHV
Lower Heating Value. Similar to the higher heating value (see HHV) except that the water produced by the combustion is not condensed but retained as vapor at 60F.

Lighter
"Lightering" is a transfer operation during which liquid is pumped from an ocean-going tanker vessel to a smaller vessel such as a barge. Like any liquid transfer operation, lightering of organic liquids produces organic vapor emissions.

Long ton
2200 pounds

Major Facility
A facility with potential emissions of: (1) at least 100 tons per year of regulated air pollutants, (2) at least 10 tons per year of any single hazardous air pollutant, and/or (3) at least 25 tons per year of any combination of hazardous air pollutants, or such lesser quantity of hazardous air pollutants as determined by the EPA administrator.

MDEA
Methyl Diethanolamine

MFR

Major Facility Review. The District's term for the federal operating permit program mandated by Title V of the Act and implemented by District Regulation 2, Rule 6.

Mo Gas
Motor gasoline

MOP
The District's Manual of Procedures

MOSC
Mobil Oil Sludge Conversion (licensed technology)

MSDS
Material Safety Data Sheet

MTBE
methyl tertiary-butyl ether

NA
Not Applicable

NAAQS
National Ambient Air Quality Standards

NESHAPs
National Emission Standards for Hazardous Air Pollutants. See in 40 CFR Parts 61 and 63.

NMHC
Non-methane Hydrocarbons

NMOC
Non-methane Organic Compounds (Same as NMHC)

NOx
Oxides of nitrogen.

NSPS
Standards of Performance for New Stationary Sources. Federal standards for emissions from new stationary sources. Mandated by Title I, Section 111 of the Act, and implemented by 40 CFR Part 60 and District Regulation 10.

NSR
New Source Review. A federal program for pre-construction review and permitting of new and modified sources of air pollutants for which the District is classified "non-attainment". Mandated by Title I of the Clean Air Act and implemented by 40 CFR Parts 51 and 52 as well as District Regulation 2, Rule 2. (Note: There are additional NSR requirements mandated by the California Clean Air Act.)

O2

The chemical name for naturally-occurring oxygen gas.

Offset Requirement
A New Source Review requirement to provide federally enforceable emission offsets at a specified ratio for the emissions from a new or modified source and any pre-existing cumulative increase minus any onsite contemporaneous emission reduction credits. Applies to emissions of POC, NOx, PM10, and SO2.

Phase II Acid Rain Facility
A facility that generates electricity for sale through fossil-fuel combustion and is not exempted by 40 CFR 72 from Titles IV and V of the Clean Air Act.

POC
Precursor Organic Compounds

PM
Total Particulate Matter

PM10
Particulate matter with aerodynamic equivalent diameter of less than or equal to 10 microns

PSD
Prevention of Significant Deterioration. A federal program for permitting new and modified sources of air pollutants for which the District is classified "attainment" of the National Air Ambient Quality Standards. Mandated by Title I of the Act and implemented by both 40 CFR Part 52 and District Regulation 2, Rule 2.

Regulated Organic Liquid
"Regulated organic liquids" are those liquids which require permits, or which are subject to some regulation, when processed at a liquid-handling operation. For example, for refinery marine terminals, regulated organic liquids are defined as "organic liquids" in Regulation 8, Rule 44.

RFG
Refinery Fuel Gas

RMG
Refinery Make Gas

SCR
A "selective catalytic reduction" unit is an abatement device that reduces NOx concentrations in the exhaust stream of a combustion device. SCRs utilize a catalyst, which operates at a specific temperature range, and injected ammonia to promote the conversion of NOx compounds to nitrogen gas.

SIP
State Implementation Plan. State and District programs and regulations approved by EPA and developed in order to attain the National Air Ambient Quality Standards. Mandated by Title I of the Act.

SO2
Sulfur dioxide

SO2 Bubble
An SO2 bubble is an overall cap on the SO2 emissions from a defined group of sources, or from an entire facility. SO2 bubbles are sometimes used at refineries because combustion sources are typically fired entirely or in part by "refinery fuel gas" (RFG), a waste gas product from refining operations. Thus, total SO2 emissions may be conveniently quantified by monitoring the total amount of RFG that is consumed, and the concentration of H2S and other sulfur compounds in the RFG.

SO3
Sulfur trioxide

THC
Total Hydrocarbons (NMHC + Methane)

therm
100,000 British Thermal Unit

Title V
Title V of the federal Clean Air Act. Requires a federally enforceable operating permit program for major and certain other facilities.

TOC
Total Organic Compounds (NMOC + Methane, Same as THC)

TPH
Total Petroleum Hydrocarbons

TRMP
Toxic Risk Management Plan

TRS
"Total reduced sulfur" is a measure of the amount of sulfur-containing compounds in a gas stream, typically a fuel gas stream, including, but not limited to, hydrogen sulfide. The TRS content of a fuel gas determines the concentration of SO2 that will be present in the combusted fuel gas, since sulfur compounds are converted to SO2 by the combustion process.

TSP
Total Suspended Particulate

TVP
True Vapor Pressure

VOC
Volatile Organic Compounds

Units of Measure:

bbl	=	barrel of liquid (42 gallons)
bhp	=	brake-horsepower
btu	=	British Thermal Unit
C	=	degrees Celcius
F	=	degrees Farenheight
f^3	=	cubic feet
g	=	grams
gal	=	gallon
gpm	=	gallons per minute
hp	=	horsepower
hr	=	hour
lb	=	pound
in	=	inches
max	=	maximum
m^2	=	square meter
min	=	minute
M	=	thousand
Mg	=	mega-gram, one thousand grams
µg	=	micro-gram, one millionth of a gram
MM	=	million
mm	=	millimeter
MMbtu	=	million btu
mm Hg	=	millimeters of Mercury (pressure)
MW	=	megawatts
ppmv	=	parts per million, by volume
ppmw	=	parts per million, by weight
psia	=	pounds per square inch, absolute
psig	=	pounds per square inch, gauge
scfm	=	standard cubic feet per minute
yr	=	year

Symbols:

<	=	less than
>	=	greater than
≤	=	less than or equal to
≥	=	greater than or equal to