

Note: This is a reference cited in AP 42, *Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources*. AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

Background Report Reference

AP-42 Section Number: 2.4

Background Chapter: 4

Reference Number: 86

Title: Staff Report, Proposed Amended Rule
431.1, Sulfur Content of Gaseous
Fuels,

South Coast Air Quality Management
District

April 1990



South Coast
AIR QUALITY MANAGEMENT DISTRICT

21865 E. Copley Drive, Diamond Bar, CA 91765-4182 (909) 396-2000

SCAQMD Rule

LFG BTD
26 86

June 13, 1994

*Data Qual = 0
no back up
data.*

Ms. Susan Thorneloe
U.S. Environmental Protection Agency
Global Emissions & Control Division
Mail Drop 63
Research Triangle Park, NC 27711

Dear Ms. Thorneloe;

Thanks again for the information that you sent regarding sulfur removal in Denmark. I really appreciate your quick response to my request. Per our telephone conversation I have attached several test summaries of source tests conducted on landfill gas fired equipment in the South Coast area.

The three test results are for a landfill gas fired flare, turbine, and boiler. After review of these reports, it appears that Dioxin and Furan emissions are negligible from this equipment. However, I am still looking for a test report that indicated emissions from BKK were of significance and I will forward the results once that I've located it.

Also I have attached background information regarding Rule 431.1. Please note that this Rule is scheduled for amendments in the Fall of this year. Give me a call if I can be of further assistance in the future.

Sincerely yours,

Rodney W. Millican
Senior Engineer
Public Facilities Branch

RWM

attachments

**SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
RULE DEVELOPMENT DIVISION**

STAFF REPORT

**PROPOSED AMENDED RULE 431.1 -
SULFUR CONTENT OF GASEOUS FUELS**

**APRIL 10, 1990
(SR431-1)**

**Prepared by: Linda T. Basillo
A.Q. Engineer II**

**Anupom Ganguli, Ph.D.
Program Supervisor**

**Reviewed by: Michael D. Mills, P.E.
Air Quality Engineering Manager**

00006

GAS FLOW RATE = 67421 DSCFM

HEAT RATE = 1012 BTU/DSCF

⇒ 6.823×10^7 Btu/min

Calculation of toxic emission rates

	OUTLET (lb/hr)	Emission Rate lb/MMBtu
Vinyl Chloride	0.00135	3.30×10^{-7}
Dichloromethane	0.00635	1.55×10^{-6}
1,1 Dichloroethene	0.00105	2.56×10^{-7}
1,1 Dichloroethane	0.00105	2.56×10^{-7}
Trichloromethane	0.00125	3.05×10^{-7}
1,2 Dichloroethane	0.00105	2.56×10^{-7}
Tetrachloromethane	0.00165	4.03×10^{-7}
Trichloroethylene	0.0028	6.84×10^{-7}
Benzene	0.00085	2.08×10^{-7}
Tetrachloroethylene	0.0230	5.62×10^{-6}
Toluene	0.0196	4.79×10^{-6}
Chlorobenzene	0.0012	2.93×10^{-7}
Xylene	0.0294	7.18×10^{-6}
1,2 Dichloroethene	0.0041	1.00×10^{-6}
Ethylbenzene	0.0181	4.42×10^{-6}
1,1,2-Trichloroethane	0.0028	6.84×10^{-7}

NOx
CO
HCHO
HCl
H₂O
H₂O
H₂O

Calculation

$$\frac{\text{lb}}{\text{hr}} \times \frac{\text{hr}}{60 \text{ min}} = \frac{\text{lb}}{60 \text{ min}} \quad / \quad 6.823 \times 10^7 \text{ Btu/min} = \frac{\text{lb}}{\text{Btu}} \times 1 \times 10^6 = \frac{\text{lb}}{\text{MMBtu}}$$



South Coast
AIR QUALITY MANAGEMENT DISTRICT
9150 FLAIR DRIVE, EL MONTE, CA 91731 (818) 672-6200

April 5, 1990

South Coast Air Quality
Management District Board

Amend Rule 431.1 - Sulfur Content of Gaseous Fuels

Proposed Amended Rule 431.1 - Sulfur Content of Gaseous Fuels has been developed to further reduce emissions of sulfur compounds from the use of process gases, such as refinery-make gas, and landfill and sewage digester gases. It implements Control Measure #88-F-2 of the 1989 Air Quality Management Plan (AQMP). Such reductions in sulfur compound emissions derived from implementing the proposed amended rule are necessary to progress towards meeting the national PM₁₀ standards, in addition to reducing other particulate matter, odor, and acid rain. This proposal affects about 16 refineries, 33 landfills, and 20 sewage digester plants operating in the District. Staff has consulted with the affected public, regulated industries, and other agencies, whose input was carefully considered and integrated in this regulatory proposal.

Rule 431.1 currently requires a sulfur limit of 80 ppm by volume for gaseous fuel sold in the District, except for landfill and digester gases which have a limit of 250 ppm. Gases produced and burned on-site have a limit of 800 ppm. Staff is proposing a uniform limit of 40 ppm total sulfur, averaged over four hours, and calculated as hydrogen sulfide, for all gaseous fuels and facilities subject to this rule, except for natural gas. This limit is technologically and economically feasible. Reductions of hydrogen sulfides, mercaptans, and other sulfides and disulfides may be achieved by various available technologies, which include the amine process, the Merox process, caustic scrubbing, chemical addition, and the iron sponge process. A 16-ppm limit is also proposed for natural gas sold in the District, which is consistent with the Southern California Gas Company's limit with its suppliers. While emission reductions are not expected from natural gas, the proposed sulfur limits are intended to ensure that future sulfur level increases will not occur.

In order to assist with compliance verification, staff is proposing that continuous emission monitors be installed at refineries, landfills, and sewage digester plants for monitoring the total sulfur content of the gas before burning. Facilities will also be required to submit data on fuel usage, and the sulfur content of the fuel as determined by continuous emission monitors--to the District at specified intervals. Monitoring and recordkeeping will not be required for burning natural gas. Several exemptions have been deleted or reworded after extensive consultations with the affected industry, other agencies, and District staff. These exemptions were specifically crafted to address sources which are currently controlled by other District rules or which have little or no emissions of sulfur compounds. For example, the current de minimus exemption of 30 lb/day per equipment or source has been reduced to 5 lb/day per facility, excluding emissions from the burning of natural gas, in the staff proposal.

Implementation of this proposal is expected to reduce about 4 tons/day of SO₂ emissions--which is a greater reduction than the previous estimate of 1.4 tons/day in AQMP Control Measure #88-F-2. Greater reductions are attributed to an updated emissions inventory

April 5, 1990

and a more stringent compliance level in the staff proposal. The cost-effectiveness for the required controls varies from \$500 to \$8,300 per ton of SO₂ reduced, depending on the sulfur loading, volume of gas to be treated, chemical specification, and the control technique employed. The cost estimates include both capital and labor costs that may be incurred by the operators. A compliance date of May 4, 1992 has been proposed to allow a 24-month period for engineering, permitting, procurement, and construction of the control equipment. Staff has analyzed the socio-economic consequences of the implementation of Proposed Amended Rule 431.1, and found no associated adverse impacts. The District is estimated to require an additional 3.5 FTE for implementation purposes by 1992, mostly related to source testing activities.

An environmental analysis pursuant to the California Environmental Quality Act (CEQA) has been prepared for Proposed Amended Rule 431.1 and has been circulated for public review and comment. CEQA documentation for the Proposed Amended Rule includes a Notice of Preparation and Initial Study and a Draft Environmental Assessment (EA) (similar to an environmental impact report). Because the public comment period for the Draft EA ends April 27, 1990 a Final EA, which includes responses to any comments received, could not be prepared and attached to the Board package by the deadline for submitting Board packages. Therefore, the Final EA will be prepared and distributed to Board members prior to the Public Hearing on May 4, 1990. Others who wish to view the Final EA may do so in the District's Public Information Center.

It has been determined in the EA for this project that, in most cases, no significant adverse impacts to the environment will occur. In several areas it was determined that potentially significant environmental impacts may occur, but upon further analysis these impacts were determined to be insignificant or they could be mitigated to less than significant levels. Finally, a mitigation monitoring plan has been prepared, as is required by Public Resources Code, Section 21081.6, and appears as Attachment 1 of the Resolution for Proposed Amended Rules 431.1 and 431.2 prepared for the District's Governing Board.

The attached Rule Development Process flowchart shows the development schedule of the key components in this regulatory proposal.

THEREFORE, IT IS RECOMMENDED THAT YOUR BOARD

- Amend Rule 431.1 - Sulfur Content of Gaseous Fuels, as proposed, and approve the Environmental Assessment, in accordance with the attached Resolution.

Respectfully,

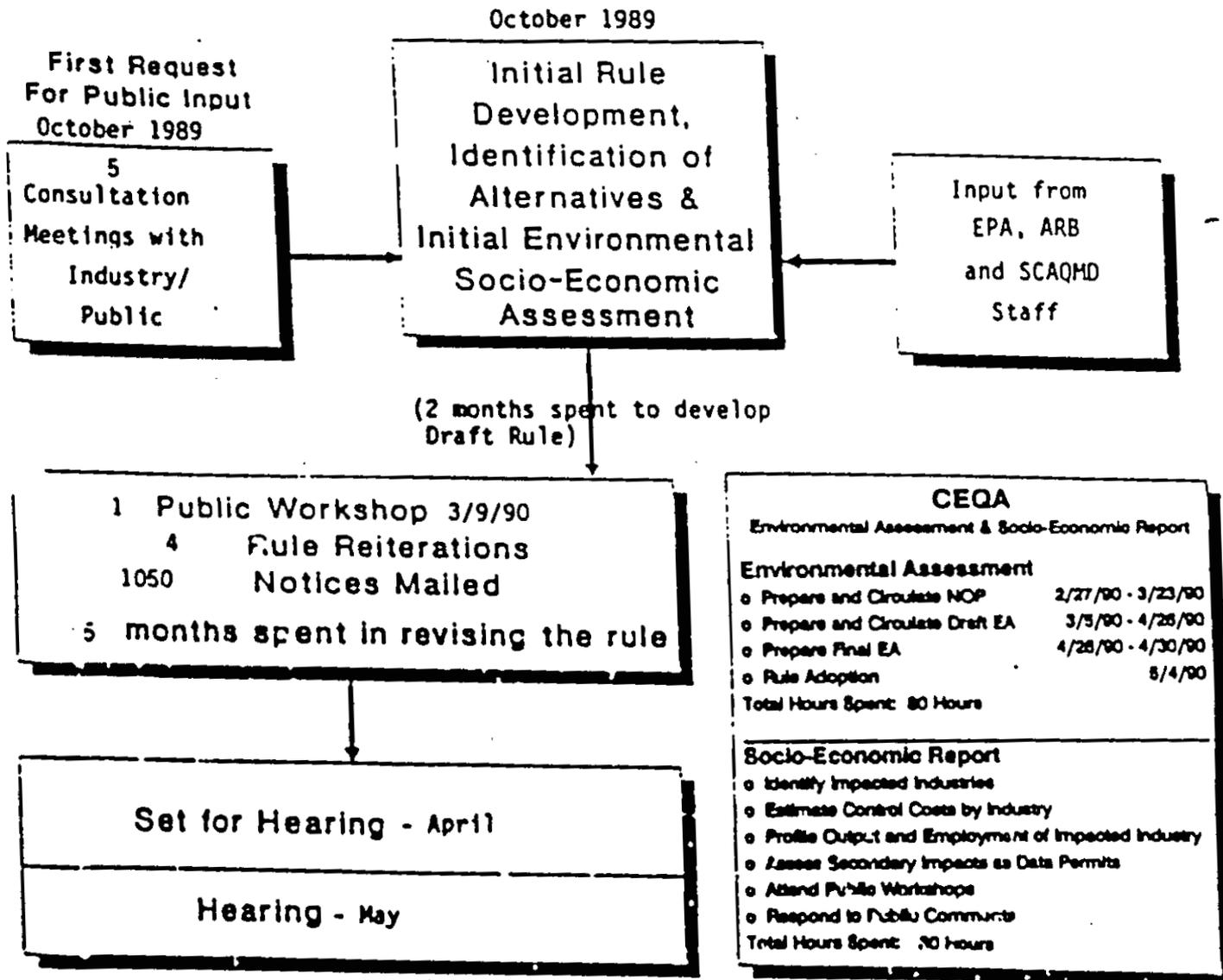


James M. Lenta, Ph.D.
Executive Officer

PN:MM:AG:LTB:ts
Attachments
(4/5/90)

Rule Development Process

Amend Rule 431.1 - Sulfur Content of Gaseous Fuels



**Total Time Spent in Rule Development
Pre-Board Hearing = 7 months**

ATTACHMENT #2

KEY CONTACT LIST

o INDUSTRY ORGANIZATIONS

Western States Petroleum Assn. - WSPA

Sanitation Districts

o COMPANIES

Arco Ref.

Chevron

Edgington

Fletcher

Golden West

Huntway

Mobil

Western MWD

LA County San. District

Orange County San. Dist.

LA City Bureau of San.

So. Calif. Edison

LA Dept. of Water & Power

Pacific Processes

Eastern Municipal Water District (MWD)

Paramount

Powerine

Shell

Texaco

Ultramar

Union

Newhall

o CIVIC ORG.

None

o ARB

Stationary Source Division

o EPA

None

RESOLUTION NO. 90 - _____

A resolution of the Governing Board of the South Coast Air Quality Management District certifying the Final Environmental Assessment prepared for the Proposed Amended Rule 431.1 - Sulfur Content of Gaseous Fuels.

A resolution of the South Coast Air Quality Management District Board Amending Rule 431.1 - Sulfur Content of Gaseous Fuels.

WHEREAS, the District Board finds and determines that the Proposed Amended Rule 431.1 - Sulfur Content of Gaseous Fuels is considered a "project" pursuant to the terms of the California Environmental Quality Act (CEQA); and

WHEREAS, it is necessary that the adequacy of the environmental document be determined by the District Board prior to its adoption; and

WHEREAS, it is necessary that the adequacy of responses to all comments received on the environmental document be determined by the District Board prior to its adoption; and

WHEREAS, the District has had its regulatory program certified pursuant to Public Resources Code, Section 21080.5 and is conducting CEQA review pursuant to such program; and

WHEREAS, District staff has prepared an Environmental Assessment (EA), pursuant to our certified regulatory program, setting forth the potential environmental consequences of further reducing sulfur content in gaseous fuels, and that the EA has received public comment to which staff has responded, such that it is now a Final Environmental Assessment; and

WHEREAS, the provisions of Public Resources Code 21081.6 (AB 3180) - Mitigation Monitoring and Reporting - require the preparation and adoption of implementation plans for monitoring and reporting measures to mitigate adverse environmental impacts identified in environmental documents pursuant to the District's Certified Regulatory Program (Rule 110) and Environmental Assessments; and

WHEREAS, District staff has prepared such a plan which sets forth the adverse environmental impacts, mitigation measures, methods, and procedures for monitoring and reporting mitigation measures, and agencies responsible for monitoring mitigation measures; and

WHEREAS, the District has yet to develop guidelines pursuant to Public Resources Code 21081.6, the monitoring of responsible agencies' tasks for the purpose of this bill will be reevaluated, if appropriate, upon the adoption of District guidelines for Mitigation, Monitoring and Reporting;

WHEREAS, the Board of the South Coast Air Quality Management District voting on this Resolution has reviewed and considered the EA and the Mitigation Monitoring and Reporting plan;

WHEREAS, the Board of the South Coast Air Quality Management District has determined that the socio-economic impact assessment of Rule 431.1 - Sulfur Content of

Gaseous Fuels, as proposed to be Amended, is consistent with the March 17, 1989 Board Socio-Economic Resolution for rule adoption; and

WHEREAS, the Board of the South Coast Air Quality Management District obtains its authority to adopt, amend, or repeal rules and regulations from Sections 40000, 40001, 40440, 40441, 40463, 40702, and 40725 through 40728 of the California Health and Safety Code; and

WHEREAS, the Board of the South Coast Air Quality Management District has determined that a need exists to Amend Rule 431.1 - Sulfur Content of Gaseous Fuels; and

WHEREAS, the Board of the South Coast Air Quality Management District has determined that Rule 431.1 - Sulfur Content of Gaseous Fuels, as proposed to be Amended, is written or displayed so that its meaning can be easily understood by the persons directly affected by it; and

WHEREAS, the Board of the South Coast Air Quality Management District has determined that Rule 431.1 - Sulfur Content of Gaseous Fuels, as proposed to be Amended, is in harmony with, and not in conflict with or contradictory to, existing statutes, court decisions, or state or federal regulations; and

WHEREAS, a public hearing has been properly noticed in accordance with the provisions of Health and Safety Code Section 40725; and

WHEREAS, the Board of the South Coast Air Quality Management District has held a public hearing in accordance with all provisions of law;

NOW, THEREFORE, BE IT RESOLVED, that the South Coast Air Quality Management District Board hereby certifies that the Final Environmental Assessment for Proposed Amended Rule 431.1 - Sulfur Content in Gaseous Fuels, responses to comments on the environmental document, and the Mitigation Monitoring and Reporting Plan were completed in compliance with the California Environmental Quality Act provisions, and that they are presented to the District Board, whose members reviewed and considered the information therein prior to acting on the Proposed Amended Rule 431.1.

NOW, THEREFORE, BE IT RESOLVED, that the Board of the South Coast Air Quality Management District does hereby Amend, pursuant to the authority granted by law, Rule 431.1 - Sulfur Content of Gaseous Fuels, as set forth in the attached and incorporated herein by this reference.

BE IT FURTHER RESOLVED, that for all identified impacts resulting from Proposed Rule 431.1, the mitigation measures identified in Attachment 1, attached hereto and incorporated by reference, have been incorporated into the proposal and will mitigate adverse environmental impacts to insignificant levels.

BE IT FURTHER RESOLVED that a Mitigation Monitoring and Reporting Plan as required by Public Resources Code, Section 21081.6 is set forth in Attachment 1, attached hereto and incorporated by reference;

BE IT FURTHER RESOLVED, that the South Coast Air Quality Management District has not prepared a statement of overriding considerations regarding impacts that cannot be mitigated to insignificance, because all adverse environmental impacts identified in the EA can be mitigated to insignificant levels through mitigation measures identified in Attachment I, previously incorporated herein by reference.

Attachments

DATE: _____

CLERK OF THE DISTRICT BOARD

ATTACHMENT I

MITIGATION MONITORING PLAN

Mitigation Monitoring Plan
Agencies Consulted for Mitigation Monitoring
Determination of Environmental Impacts
Air Quality Impacts
Water Impacts
Natural Resources
Risk of Upset
Energy
Utilities - Solid Waste and Disposal
Mandatory Findings of Significance
Economic Impacts
Conclusion

ATTACHMENT I: MITIGATION MONITORING

MITIGATION MONITORING PLAN

CEQA requires that for each identified significant environmental effect, findings be prepared on how the lead agency proposes to mitigate these impact(s), and whether any potential mitigation measures or project alternatives are considered infeasible. These findings are to be further supported by a mitigation monitoring program, required by AB 3180 (Cortese), which was recently enacted by the state legislature. Public Resources Code Section 21081.6 contains the following requirements:

Section 21081.6. When making the findings required by subdivision (a) of Section 21081 or when adopting a negative declaration pursuant to Paragraph (2) of subdivision (c) of Section 21080, the public agency shall adopt a reporting or monitoring program for the changes to the project which it has adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment. The reporting or monitoring program shall be designed to ensure compliance during project implementation. For those changes which have been required or incorporated into the project at the request of an agency having jurisdiction by law over natural resources affected by the project, that agency shall, if so requested by the lead or responsible agency, prepare and submit a proposed reporting or monitoring program.

This legislation requires follow-up monitoring for projects in which mitigation measures for these potential adverse environmental impacts have been identified. However, specific guidelines as to how this monitoring is to be performed have not yet been developed. The State Office of Planning and Research has indicated that a draft study is currently under review and monitoring guidelines will be included in the next CEQA revision (Ferguson, 1989). To fulfill the requirements of AB 3180, District staff has developed a monitoring plan for anticipated impacts resulting from implementation of Proposed Amended Rules 431.1 and 431.2.

This section discusses potentially significant environmental impacts identified in this environmental assessment and presents the proposed findings as defined in CEQA Guidelines Section 15091. This chapter also identifies

AMENDED RULES 431.1 & 431.2: EA

agencies responsible for performing follow-up monitoring as required by AB 3180.

AGENCIES CONSULTED FOR MITIGATION MONITORING

The following agencies were contacted in an effort to evaluate potential cross-media environmental impacts of Proposed Amended Rule 431.1 and 431.2. Their input has been included in the following mitigation monitoring section.

State of California, Office of Planning and Research

Los Angeles County Sanitation District

California Department of Health Services

California Occupational Safety and Health Administration

City of Los Angeles, Bureau of Sanitation (Class III landfill division)

City of Los Angeles, Bureau of Engineering (Wastewater Program)

Regional Water Quality Control Board, Santa Ana Region

Various Fire Departments of Los Angeles and Orange Counties

DETERMINATION OF ENVIRONMENTAL IMPACTS

The environmental assessment identifies the following categories of potential environmental impacts and mitigation measures: air quality, water quality, natural resources, risk of upset, energy, solid waste disposal. Agencies responsible for mitigation and monitoring have been identified and include the South Coast Air Quality Management District (SCAQMD), local sanitation districts, U.S. Environmental Protection Agency (EPA), California Air Resources Board (ARB), California Department of Health Services, California Occupational Safety and Health Administration, and the Regional Water Quality Control Board. Methods and procedures for monitoring

ATTACHMENT I: MITIGATION MONITORING

mitigation measures are outlined below. Specific monitoring recommendations will be submitted to the appropriate responsible agencies.

AIR QUALITY IMPACTS

IMPACT: The potential decrease in production of fuel oils or residual fuels (API less than 26) may result in increased production of diesel fuel or distillate fuels (API 26 or more) to compensate for the lack of fuel oil production. Construction of additional hydrogen units and hydrotreaters could potentially result in additional emissions of carbon monoxide, oxides of nitrogen, particulate matter and other air contaminants associated with the incomplete combustion of fuels. Also, if an owner or operator meets the requirements of the Proposed Amendments utilizing a non-compliant fuel, with add-on controls, incomplete combustion of the non-compliant fuel may produce additional emissions that may potentially produce a significant impact to air quality.

In addition, during the desulfurization of the gaseous fuels, hydrogen sulfide, mercaptans and other sulfur compounds may escape to the atmosphere. These chemicals can be strongly odorous and can become a source of public nuisance.

MITIGATION: It is unlikely that the Proposed Amendments will significantly increase emissions of criteria pollutants for several reasons. Many of the emission sources that may result from increased hydrodesulfurization are subject to other District's Rules regulating criteria pollutants. For example, new sources are subject to the District's New Source Review (Regulation XIII) process which includes best available control technologies and emission offsets. In addition, existing petroleum refining sources are subject to the following District Rules: Rule 1105 - Fluid Catalytic Cracking Units - Oxides of Sulfur; Rule 1109 - Emissions of Oxides of Nitrogen from Boilers and Process Heaters in Petroleum Refineries; 1110.1 - Emissions from Stationary Internal Combustion Engines; and Rule 1123 - Refinery Process Turnarounds. Some additional criteria pollutant control measures have also been identified as part of the Draft 1989 AQMP Revision (SCAQMD and SCAG, 1988).

AMENDED RULES 431.1 & 431.2: EA

If local production of fuel oil for use and sale in the Basin decreases as a result of implementing Proposed Rule 431.2 fuel oil users in the Basin would utilize a replacement fuel. Because of the relative ease to retrofit stationary sources that are presently burning fuel oil (specifically fuel oil number 6) to burn diesel fuel (fuel oil number 2), staff anticipates that fuel oil users will switch to diesel fuel. As previously discussed, the potential demand for diesel fuel may be fulfilled in a variety of ways that would not result in the construction of additional hydrogen units or hydrotreaters at local refineries. Increased demand for diesel fuel could be accommodated if local refineries having excess hydrotreating capacity increased their production of diesel fuel and expanded their fuel distribution capability to stationary sources. Alternatively, importing more diesel fuel for use and sale within the Basin could accommodate an increase in demand. In addition, some owner/operators may retrofit their stationary equipment to burn natural gas.

The odorous chemicals, such as hydrogen sulfide and mercaptans, that may potentially become a public nuisance are currently regulated under District Rule 402 - Nuisance. Rule 402 prohibits the discharge from any source of air contaminants or other materials which cause nuisance or annoyance to a considerable number of persons or to the public. Thus compliance with Rule 402 would minimize the potential for odorous chemicals to become a public nuisance. In addition to Rule 402, to minimize odorous chemicals, owners or plant operators can take additional precautions to control odors within the facility before odors become a nuisance to neighbors. Such added precautions could include establishing a protocol to respond, identify and control odors before they became a nuisance, or using chemical additions such as ferric chloride to clarifiers to reduce sulfurous odors.

RESPONSIBLE AGENCY: SCAQMD

MITIGATION MONITORING: Monitoring mitigation measures to reduce potential emissions will be the responsibility of the SCAQMD's Enforcement Division. SCAQMD staff will enforce Proposed Amended Rules 431.1 and 431.2 as they have enforced the current version of the rules in the past. Inspectors will receive a copy of the list of affected facilities, along with instructions to follow during regular enforcement duties. In addition, any process changes or additions, that may result from implementation of the Proposed Amended Rules that would require additional permitting, or changes in existing permits, must be approved by the SCAQMD's Engineering Division.

ATTACHMENT I: MITIGATION MONITORING

WATER IMPACTS

IMPACT: The major uses of water in petroleum refining are steam generation and heat transfer (EPA, 1980). In addition, wastewater streams from indirect cooling and heat transfer from hydrodesulfurization processes, sulfur recovery, cooling towers, steam generation, etc., also require large volumes of water. Thus, implementation of Proposed Amended Rule 431.2 could indirectly affect water demand if additional hydrotreaters and process changes occur as a result of increased diesel fuel production in the Basin.

If adopting Proposed Amended Rule 431.2 results in increased production of diesel fuel, the amine process used to treat the sulfur-containing gases associated with diesel fuel production may also increase. Additional amine processes, or increasing processing rates of the amine system, could affect water demands. In complying with hydrogen sulfide limits of sulfur-containing gases as required by the Proposed Amendments to Rule 431.1, refineries that produce diesel fuel in the Basin may indirectly affect water demands from wastewater treatment plants used for distillation, solidification or precipitation processes that are used when recovering elemental sulfur.

MITIGATION: To remain competitive, petroleum refining processes must utilize their resources, including water, in an effective manner. Effective uses of water would include minimizing its use or recycling it back into the processes. Waste streams from hydrodesulfurization processes, sulfur recovery, cooling towers, and steam generation are sent to the wastewater treatment plant. Wastewater treatment methods remove pollutants so that the water may be reused or discharged to a municipal sewer system or a waterway (EPA, 1980). In addition, condensers reclaim water from steam that is generated from process heaters.

Diesel fuel production is primarily limited by the hydrotreating capacity of the refinery. Alternatively, the amine process, which does not have the energy constraints of a hydrotreater, is capable of treating additional volumes of materials, with moderate process changes. An additional hydrodesulfurization unit would not be required in an additional amine system since multiple hydrodesulfurization units could feed into an existing amine system.

RESPONSIBLE AGENCIES: Local sanitation districts, Regional Water Quality Control Boards and EPA

AMENDED RULES 431.1 & 431.2: EA

MITIGATION MONITORING: The SCAQMD will coordinate with the Regional Water Quality Control Boards (RWQCBs) to establish a monitoring program. The RWQCBs will be notified of the affected facilities. The SCAQMD will coordinate with the RWQCBs to monitor excessive water demands.

If Proposed Amended Rules 431.1 and 431.2 are adopted, the SCAQMD staff will notify the local sanitation districts. The SCAQMD will submit a list of companies affected by the Proposed Amendments to the local sanitation districts and will request that sanitation district inspectors verify that the discharge treatment processes described in the permit are actually being fully implemented on-site.

NATURAL RESOURCES

Additional hydrodesulfurization of liquid fuels may increase demand for natural gas in the Basin to supply the needed hydrogen. The potential impacts, mitigation measures and mitigation monitoring is discussed in the "Energy" section.

RISK OF UPSET

IMPACT: Small sewage treatment plants and landfills may utilize the iron sponge process to comply with the 40 ppm sulfur limit of Proposed Amended Rule 431.1. After the wood shavings of the iron sponge are fully reacted, the iron sponge must be regenerated. As the spent sponge reacts with oxygen to reconvert the ferric sulfide to iron oxide to produce elemental sulfur, heat is liberated. During regeneration, the sponge can become ignitable if not adequately moistened.

Any expansion of hydrotreating capacities at local refineries resulting from adopting the Proposed Amendments may pose a risk of explosion because hydrotreaters utilize temperatures ranging from 600 to 800°F and pressures between 100 to 3,000 psig, and require handling of various hazardous materials. Construction of additional hydrodesulfurization units may potentially pose a risk of upset.

ATTACHMENT I: MITIGATION MONITORING

MITIGATION: The regeneration reaction liberates heat, but as long as the iron sponge is soaked with water, the heat can only vaporize moisture (VAREC, 1988). Thus, maintaining moisture in the iron sponge during regeneration minimizes the risk of fire or explosion. To prevent the additional risk of ignition of the spent iron sponges, operators are required to regenerate the spent sponges fully prior to disposal. In addition, water spray options are available on waste gas purifiers thereby providing a convenient method to ensure an adequate sponge moisture level during operation. (VAREC, 1988).

Hazardous materials are strictly regulated by the EPA, Occupational Safety and Health Administration (OSHA) and the Department of Transportation (DOT). OSHA specifies to workers the procedures required for safely using and storing hazardous materials in the 29 series of the Code of Federal Regulations (CFR) (see also NIOSH/OSHA, 1981). In accordance with OSHA requirements, operators should prohibit open flames, spark-producing procedures or cigarette smoking to occur near the regeneration process to minimize risk of explosion. For additional worker safety, when handling iron sponge material, NIOSH-approved dust masks, nonabsorbent safety gloves, and OSHA-approved glasses or goggles should be worn. As an additional safety measure, in the 49 CFR series, DOT requires that prior to transportation of spent iron sponges, the iron sponge must react with air for a minimum of ten (10) days to prevent accidental ignition of the spent sponge (49 CFR, Section 173.174, Part C).

The best assurance for avoiding accidents due to equipment failure or human error is to observe all rules and regulations for the construction and operation of required equipment (Benchley and Athey, 1981). Particularly important are performing preventative maintenance on equipment and observing proper safety practices in handling equipment and hazardous substances.

RESPONSIBLE AGENCIES: Local fire departments, OSHA and DOT

MITIGATION MONITORING: OSHA site inspections of affected facilities will ensure that owners and operators adhere to OSHA regulations. If the Proposed Amendments are adopted, the SCAQMD will submit a list of affected facilities to OSHA. In addition, local government agencies will be responsible for ensuring that proper safety procedures are being followed at all facilities using hazardous materials as a result of implementing the Proposed Amended Rules.

AMENDED RULES 431.1 & 431.2: EA

The SCAQMD will submit a list of the affected facilities to the local fire departments. The SCAQMD will coordinate with local fire departments to monitor upsets during the implementation of the Proposed Amended Rules.

ENERGY

IMPACT: Implementation of Proposed Amended Rule 431.2 could indirectly affect energy supplies if additional hydrotreaters are needed to accommodate potential diesel fuel production increases within the Basin. Processes that require high temperatures, specifically hydrotreaters, typically utilize process heaters to supply the specific quantity of heat needed for hydrodesulfurization. These process heaters, also referred to as process furnaces, direct-fired heaters, tube stills, or pipe stills, are used to generate steam used in the refinery as a heating medium, produce hydrogen using a process fluid, or to generate electricity (EPA, 1980). These heaters are capable of utilizing a wide variety of fuels, both gaseous and liquid. Thus, construction of hydrodesulfurization units or an increase in local diesel fuel production could potentially affect liquid fuel and natural gas supplies.

MITIGATION: One alternative to reduce reliance on natural gas would be to use an alternative clean fuel such as liquefied petroleum gas (LPG). LPG is often a mixture of petroleum gases that become liquid under pressure or at reduced temperatures. The gases are converted into the liquid state for ease of handling. LPG is not a widely-traded product and is used primarily where natural gas is not available. Approximately 20 billion gallons of LPG were produced in the United States in 1985 (DOE, 1988).

Because LPG is extracted in the normal refining process of the major hydrocarbon fuels, it requires no additional or new types of refining plants. The refining infrastructure is already in place. However, the infrastructure for supply and distribution of LPG is not well-developed and would require substantial capital investment (approximately \$7.5 billion) to establish a widespread distribution network. This is one of several reasons why LPG may be suitable for specific "niche markets," rather than for widespread distribution (DOE, 1988).

Recovery and recycling of the heat from equipment exhaust offers an alternative method to reduce the energy consumption of incinerators

ATTACHMENT I: MITIGATION MONITORING

(Taback, et al., 1983). Primary heat recovery is the simplest method of heat recovery, using the hot cleaned gases exiting the equipment to preheat the cooler incoming gases. Depending upon the design of the heat recovery system, heat recovery efficiency is from 35 to 90 percent (Taback, et al., 1983).

Secondary heat recovery systems use equipment exhaust from the primary heat recovery stage or directly from the equipment exhaust to replace energy usage elsewhere in the facility. Secondary heat recovery energy can be used for process heat requirements or for plant heating. The heat recovery efficiency of this type of system is from 70 to 80 percent, depending upon the

AMENDED RULES 431.1 & 431.2: EA

individual equipment (Taback, et al., 1983). Secondary heat recovery systems can significantly reduce the net energy requirements of a facility to "minimal" levels (Taback, et al., 1983).

In addition, recovery operations, such as sulfur and fuel gas recovery systems, are essential to petroleum refineries since many by-products can be recovered, sold, or utilized as fuel in other processes. While adding value to the overall refinery process, the recovery system also collects vapors (noncondensable gases) to produce refinery fuel, to burn in fired heaters and burners.

The refinery gas that is produced from the fuel gas plant is utilized in the process heaters and boilers. Refineries use fuel gas produced from their own refinery before they consume fuel from a source external to their refinery, such as natural gas.

Recovery operations at petroleum refineries mitigate the potential for fuel oils, or natural gas supplies to diminish significantly as a result of increased local production of diesel fuel for use in the Basin. As indicated, refinery fuel gas recovery is essential and an integral part of the petroleum refinery process. If diesel fuel production increased, diesel could be utilized in process heaters, and in turn, could be used to minimize natural gas demands. Thus, the above measures could be used to mitigate potentially significant natural gas impacts to insignificant levels.

RESPONSIBLE AGENCY: California Energy Commission

MITIGATION MONITORING: Energy conservation measures could be implemented to the extent that they do not disrupt the operation of control equipment. The SCAQMD will coordinate this mitigation measure with state agencies and electric utility companies to ensure it is implemented as part of ongoing load management efforts.

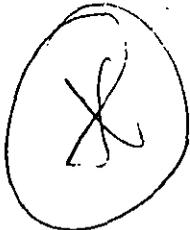
Solid Waste and Disposal

IMPACTS: Small sewage treatment plants and landfills may utilize the iron sponge process to comply with the 40 ppm sulfur limit (calculated as H₂S) as required in Proposed Amended Rule 431.1. If usage of the iron sponge process significantly increases, spent sponges may potentially increase. The sponge life in iron sponge processes is related to the inlet concentration of

ATTACHMENT I: MITIGATION MONITORING

hydrogen sulfide, the flow rate, the volume of the sponge and the method of regeneration. Utilizing manual regeneration, staff estimates that a 6-inch sponge, weighing approximately 1,600 pounds, with an inlet hydrogen sulfide concentration, would have a sponge life of 4 to 5 months. If this 6-inch iron sponge unit absorbs roughly 900 pounds of hydrogen sulfide, then staff estimates that 2,500 pounds per 4.5 months (or 6,700 pounds per year) of nonhazardous waste would be generated.

MITIGATION: An in-place regenerator that regenerates the iron sponge continuously can extend the sponge life up to five times that of manual regeneration (SCAQMD, 1989). Based upon the parameters given above, an in-place regeneration method can extend the sponge life to two years, thus reducing the waste generated from 6,700 pounds per year to approximately 2,500 pounds per year (VAREC, 1988). In addition, staff anticipates that sewage and digester plants will utilize a chemical pretreatment prior to the iron sponge process. The chemical pretreatment process captures hydrogen sulfide remaining in the liquid to reduce the sulfur content further, thus minimizing the amount of sulfur to be captured by the iron sponge process.



The spent material from the iron sponge contains iron oxide, elemental sulfur, wood fiber, water, soda ash, and limestone (VAREC, 1988). Title 22, California Code of Regulations, Section 66680 does not list any of the constituents of the spent material as hazardous. In addition, if the spent material, specifically the spent iron sponge, is regenerated, thus eliminating ignitability characteristics of the waste, the spent material can be classified as a nonhazardous waste.

RESPONSIBLE AGENCY: Local sanitation districts, U.S. EPA, Solid Waste Management Board, and the California Department of Health Services

MITIGATION MONITORING: The available capacity for disposal of spent material for the Basin will be confirmed periodically with the Department of Health Services.

If the Proposed Amended Rules are adopted, SCAQMD staff will notify the local sanitation districts and submit to them a list of companies affected by the Proposed Amendments. Since upon regeneration of spent iron sponges, the waste material can be disposed of as a non hazardous waste and utilizing an in-place regenerator can reduce the volume of spent material generated per year, there should be a minimal increase in the volumes of hazardous wastes transported to waste disposal facilities.

(Adopted November 4, 1977)(Amended September 1, 1978)
(Amended February 2, 1979)(Amended January 8, 1982)
(Amended May 6, 1983)

March 14, 1990
(PAR4311D)

PROPOSED AMENDED RULE 431.1 - SULFUR CONTENT OF GASEOUS FUELS

(a) Definitions:

~~For the purpose of this rule, the following definitions shall apply:~~

- ~~(4)~~(1) **BURNING** means the to combustion of any gaseous fuel, whether for useful heat or by incineration without heat recovery, except for flaring of emergency vent gases.
- ~~(4)~~(2) **GASEOUS FUELS** include, but are not limited to, any natural, process, synthetic, landfill, sewage digester, or waste gases with a gross heating value of 2670 kilogram calories per cubic meter (300 BTU per cubic foot) or higher, at standard conditions.
- ~~(3)~~(3) **LANDFILL GAS** is any gas derived through a natural process from the decomposition of organic waste buried within a waste disposal site, which consists mainly of methane and carbon dioxide.
- (4) **NATURAL GAS** is a mixture of gaseous hydrocarbons, with at least 80 percent methane, and of pipeline quality, such as the gas sold or distributed by any utility company regulated by the California Public Utilities Commission.
- ~~(3)~~(5) **SEWAGE DIGESTER GAS** is any gas derived from an anaerobic decomposition of organic sewage within its containment, which consists mainly of methane and carbon dioxide.

(b) Requirements:

(1) Until May 4, 1992:^{3/}

- (A) A person shall not sell any gaseous fuel containing sulfur compounds in excess of 80 ppm (parts per million) calculated as hydrogen sulfide except landfill gas or sewage digester gas.
- ~~(2)~~ (B) A person shall not sell landfill gas or sewage digester gas containing sulfur compounds in excess of 250 ppm calculated as hydrogen sulfide.
- (4) (C) A person shall not burn, nor discharge to any fuel gas system or vent gas disposal system, gaseous fuel containing sulfur compounds in

00001

excess of 800 ppm calculated as hydrogen sulfide, unless sulfur compounds in the stack gases are reduced to a level below that which would be emitted when using a fuel which complies with the requirements of this subsection subparagraph. For purposes of this subsection subparagraph, the 800 ppm limit shall apply to the gaseous fuel as vented from a process unit or, if applicable, as vented from a sulfur removal unit.

- (2) On and after May 4, 1992:
- (A) A person shall not sell natural gas containing sulfur compounds in excess of 16 ppm calculated as parts per million by volume hydrogen sulfide.
- (B) A person shall not burn, purchase, sell, or offer for sale any gaseous fuel containing sulfur compounds in excess of 40 ppm, averaged over any consecutive 4-hour period, and calculated as parts per million by volume hydrogen sulfide.
- (3) Notwithstanding Regardless of the provisions of subsections subparagraph (b)(1) or (b)(2) of this rule, a person may sell any gaseous fuel provided that:
- (A) The gaseous fuel is delivered directly to a sulfur removal unit which reduces the sulfur content to, ~~or below~~ no greater than the limits of specified in subsection subparagraph (b)(1) or (b)(2), as applicable, and
- (B) The seller notifies the Executive Officer prior to any such sale of the quantity, heat value, and composition of the gaseous fuel to be sold, and
- (C) The buyer has an approved Permit to Construct and/or Permit to Operate for the sulfur removal unit that will be used to treat the purchased gas.
- (4) No later than May 4, 1992, a person burning gaseous fuel other than natural gas in permitted stationary equipment shall install a continuous emission monitor approved by the Executive Officer, to determine the sulfur content of the gaseous fuel before burning. An application for approval of such a device shall be submitted to the Executive Officer no later than May 4, 1991.

- (B) ~~Combined exit-gases from an air-pollution control system for steam drive oil wells (Rule 1148), provided that gases from individual well vents comply with the requirements of this rule.~~
- (4) Gases vented during refinery turnaround pursuant to District Rule 1123.
- (5) Gases vented to a control system pursuant to District Rules 466 and 1173.
- (6) ~~Gaseous fuels from which the gaseous products of combustion are used as raw materials for other processes.~~
- (7)(6) Gases vented intermittently to fuel gas or waste gas disposal systems from pressure control valves, sight glasses, compressor bottles, sampling systems, and pump and compressor case vents.
- (8) ~~Vent gas streams, excluding coker blowdown, which have been connected to fuel gas or vent gas disposal systems (or are approved for such connection by Permit to Construct and/or Permit to Operate) prior to May 7, 1983, provided:~~
- (A) ~~A petition for such exemption, including details of volume, composition and source of the subject vent stream, is received by Executive Officer within 120 days from May 6, 1983; and~~
- (B) ~~Where the subject vent gas stream is not identified in a current Permit to Construct or Permit to Operate, an application for permit revision is received by the Executive Officer within 120 days from May 6, 1983. Such application shall be subject to the filing fee required by Rule 301(a)(1) and permit revision fee required by Rule 301(b)(2).~~
- (9)(7) Any source from facility which emits the total sulfur compounds in gaseous fuel is less than 20 5 pounds per day total sulfur compounds from gaseous fuels except natural gas, calculated as hydrogen sulfide.
- (d) Compliance Schedule:
- (1) ~~Unless new or modified equipment requiring a permit to construct is necessary for compliance with the requirements of section (b) this rule, such requirements shall be effective on May 6, 1983.~~
- (2) ~~When new or modified equipment requiring a permit to construct is necessary for compliance with the requirements of section (b) of this rule,~~

TABLE 2.4
BKK GAS TURBINE TEST RESULTS FOR VOLATILE ORGANIC COMPOUNDS

EQUIPMENT TESTED: TURBINE STACK & INLET TEST NO.: 586 SAMPLING DATE: 10/26/88
TIME START: 1000 TIME STOP: 1100 WATER INJECTION RATE (GPM): 2.0

A COMPOUND	B CHEMICAL FORMULA	C MOL. WT. LBS/MOLE	D	E	F	G	H	I
			BLANK CONC. PPM	INLET CONC. PPM	OUTLET CONCN. PPM	INLET MASS RATE LB/HR	OUTLET MASS RATE LB/HR	TURBINE EFF %
ACETONITRILE	C2H3N	41.1	< 0.075	< 14.0	<0.070	< 0.3495	< 0.0307	> 91.23
VINYL CHLORIDE ✓	C2H3Cl2	62.5	< 0.004	58.0	<0.004	2.2019	< 0.0027	> 99.88
1,2-DIBROMOETHANE	C2H4Br2	187.9	< 0.003	< 0.6	<0.003	< 0.0685	< 0.0060	> 91.23
DICHLOROMETHANE ✓	CH2Cl2	84.9	< 0.014	15.0	<0.014	0.7736	< 0.0127	> 98.36
1,3-BUTADIENE	C4H6	54.1	< 0.011	< 2.0	<0.011	< 0.0657	< 0.0063	> 90.35
ACRYLONITRILE	C3H3N	53.1	< 0.058	< 12.0	<0.058	< 0.3871	< 0.0328	> 91.52
1,1-DICHLOROETHENE	C2H2Cl2	97.0	< 0.002	3.6	<0.002	0.2121	< 0.0021	> 99.03
1,1-DICHLOROETHANE	C2H2Cl2	99.0	< 0.002	7.5	<0.002	0.4510	< 0.0021	> 99.53
TRICHLOROMETHANE ✓	CHCl3	119.4	< 0.002	1.0	<0.002	0.0725	< 0.0025	> 96.49
1,2-DICHLOROETHANE ✓	C2H4Cl2	99.0	< 0.002	5.6	<0.002	0.3368	< 0.0021	> 99.37
1,1,1-TRICHLOROETHANE ✓	C2H3Cl3	133.4	< 0.002	< 0.4	<0.002	< 0.0324	< 0.0028	> 91.23
TETRACHLOROMETHANE ✓	CCl4	153.8	< 0.002	0.4	<0.002	0.0374	< 0.0033	> 91.23
TRICHLOROETHYLENE ✓	C2HCl3	131.4	< 0.002	6.5	0.002	0.5188	0.0028	99.46
BENZENE ✓	C6H6	78.1	< 0.002	15.0	<0.002	0.7116	< 0.0017	> 99.77
TETRACHLOROETHYLENE ✓	C2Cl4	165.9	< 0.002	23.0	0.013	2.3178	0.0230	99.01
TOLUENE ✓	C7H8	92.1	< 0.002	47.0	0.020	2.6294	0.0196	99.25
CHLOROBENZENE	C6H5Cl	112.6	< 0.002	4.5	<0.002	0.3078	< 0.0024	> 99.22
TOTAL XYLENES ✓	C8H10	106.2	< 0.002	21.0	0.026	1.3547	0.0294	97.83
1,2-DICHLOROETHENE	C2H2Cl2	97.0	< 0.002	41.0	0.004	2.4158	0.0041	99.83
ETHYLBENZENE	C8H10	106.2	< 0.002	13.0	0.016	0.8386	0.0181	97.84
1,1,2-TRICHLOROETHANE	C2H3Cl3	133.4	< 0.002	1.0	<0.002	0.0810	0.0028	96.49
WEIGHTED HYDROCARBON BURN-UP EFFICIENCY						< 16.1639	< 0.2102	> 98.70

(1) INLET GAS FLOW RATE = 3842 DSCFM

(2) OUTLET GAS FLOW RATE = 67421 DSCFM

NOTES:

- (A) CHEMICAL COMPOUNDS AS REPORTED.
- (B) CHEMICAL FORMULAS FOR THE LISTED COMPOUNDS.
- (C) MOL. WT. = MOLECULAR WEIGHTS OF THE LISTED COMPOUNDS.
- (D) COMPOUND CONCENTRATION OF FIELD BLANK.
- (E) COMPOUND CONCENTRATION AT THE TURBINE INLET.
- (F) COMPOUND CONCENTRATION AT THE TURBINE OUTLET.
- (G) POUNDS PER HOUR INFLOW TO TURBINE = $60 \cdot C \cdot E \cdot (1) / (1000000 \cdot 379.5)$.
- (H) POUNDS PER HOUR EXHAUST FROM TURBINE = $60 \cdot C \cdot F \cdot (2) / (1000000 \cdot 379.5)$.
- (I) TURBINE EFFICIENCY ON MASS BASIS = $100 \cdot ((G-H) / (G))$.

PPM - PARTS PER MILLION BY VOLUME

CFM - CUBIC FEET PER MINUTE AIR FLOW

DSCFM - DRY STANDARD CUBIC FEET PER MINUTE (@ 60 DEGREES F, & 1 ATMOSPHERE PRESSURE)

< DENOTES LESS THAN. IN COLUMNS D, E & F < INDICATE BELOW DETECTION LIMIT VALUES.

> DENOTES GREATER THAN.

TABLE 2.3

BKK GAS TURBINE TESTS FOR
POLYCHLORINATED DIBENZO-P-DIOXINS (PCDD) AND
POLYCHLORINATED DIBENZOFURANS (PCDF)

Test Number:	11	12	13
Test Type:	CARB 428	CARB 428	CARB 428
Test Site:	Stack	Blank	Stack
Date:	10/27/88	10/27-28/88	10/28/88
Time Start:	13:21	---	08:37
Time Stop:	20:13	---	13:24
Test Duration (min):	240	---	240
Water Inj. Rate (gpm):	2.0	---	2.0
Flue Gas Temp. (°F):	1009	---	1004
Stack Area (sq.ft.):	27.28	---	27.28
Stack Velocity (ft/min):	7116	---	7563
Flue Gas Flows			
(WACFM):	194110	---	206325
(DSCFM):	63140	---	65015
Flue Gas Analysis			
CO ₂ (% dry):	5.3	---	5.6
O ₂ (% dry):	15.1	---	14.9
H ₂ O (%):	7.3	---	10.4
Sample Volume			
DSCF:	192.760	---	218.212
Isokinetics (%):	100.2	---	103.8
Concentration (ng/sample)			
Furans			
TCDF :	N.D.	N.D.	N.D.
PeCDF :	N.D.	N.D.	N.D.
HxCDF :	N.D.	N.D.	N.D.
HpCDF :	N.D.	N.D.	N.D.
OCDF :	N.D.	N.D.	N.D.
Dioxins			
TCDD :	N.D.	N.D.	N.D.
PeCDD :	N.D.	N.D.	N.D.
HxCDD :	N.D.	N.D.	N.D.
HpCDD :	N.D.	N.D.	N.D.
OCDD :	N.D.	N.D.	N.D.