State of California
AIR RESOURCES BOARD

Resolution 82-22

March 31, 1982

Agenda Item No.: 82-8-1

WHEREAS, the Air Resources Board (Board) and/or the federal Environmental Protection Agency have adopted ambient air quality standards for ozone (oxidant), nitrogen dioxide, particulate matter, and visibility, and these standards are consistently exceeded in several of the state's air basins, including notably the South Coast Air Basin;

WHEREAS, Health and Safety Code Sections 39003, 39500, 39602, and 41500 authorize the Board to coordinate, encourage, and review efforts to attain and maintain state and national ambient air quality standards;

WHEREAS, Health and Safety Code Sections 39600 and 39605 authorize the Board to act as may be necessary to execute the powers and duties granted to and imposed upon the Board and to assist local air pollution control districts;

WHEREAS, a suggested control measure for the control of emissions of oxides of nitrogen from boilers and process heaters in refineries was developed by the staffs of the Air Resources Board and the South Coast Air Quality Management District;

WHEREAS, the California Environmental Quality Act and Board regulations require that action not be taken as proposed if mitigation measures or alternatives exist which would substantially reduce any significant adverse environmental effects of the proposed action, and further require the Board to respond in writing to significant environmental issues raised;

WHEREAS, on November 18, 1981 and March 31, 1982, the Board held duly noticed public meetings to hear and consider the evidence and comments presented by the staff, affected industries, and other interested persons and agencies;

WHEREAS, the Board received testimony and evidence that the estimated cost of compliance at individual facilities varies widely from about $1.50 per pound to over $8.00 per pound considering various control methods, site specific costs, and substantial contingency factors; and that technologies exist which can achieve reductions at costs as low as $0.50 per pound for individual units; and

WHEREAS, the Board finds that:

Emissions of oxides of nitrogen (NOx) from boilers (including CO boilers) and process heaters in refineries contribute to the formation of ozone and contribute significantly to ambient concentrations of nitrogen dioxide (NO_2), total suspended particulate matter (TSP), and visibility reducing particles;

NOx emissions also contribute to the formation of acid deposition including acid rain, an issue of increasing concern in the South Coast Air Basin;

NOx emissions also contribute to the formation of peroxyacetyl nitrate, PAN, an air pollutant which is a potent eye-irritant to people and causes damage to vegetation, including leaf damage to certain crops;

The air quality management plan for the South Coast Air Basin has identified the control of NOx emissions from refinery boilers (including CO boilers) and process heaters as a measure which can help achieve the federal nitrogen dioxide standard, and other areas which may find it appropriate to adopt this suggested control measure to achieve and maintain federal and state ambient air quality standards include Ventura County, the San Francisco Bay Area, and Kern County;

With currently available and near future technology, it should be feasible and economically reasonable to reduce the refinery-wide average NOx emissions from boilers (including CO boilers) and process heaters in refineries to 0.10 pound per million British thermal units (Btu) of rated heat input when operated on gaseous fuel, and 0.22 pound per million Btu of rated heat input when operated on liquid fuel;

If refinery operators devise their compliance plans to achieve the most efficient and least costly NOx reductions, the proposed measure will be cost-effective and the costs of compliance are expected to be at the low end of the range of estimates presented in testimony, especially with the flexibility provided to each refinery operator to choose the units to be controlled and to select control technology from a number of available methods;

Implementation of the suggested control measure would reduce NOx emissions from these units by approximately 50 percent in the South Coast Air Basin alone; and

The October 1981 and March 1982 staff reports and the information presented at the November 18, 1981 and March 31, 1982 public meetings adequately address the environmental issues associated with this suggested control measure, and the Board concurs in the staff's finding that no significant adverse environmental effects are likely to result from the adoption and implementation of the suggested control measure.

NOW, THEREFORE, BE IT RESOLVED that the Board approves the suggested control measure for the control of emissions of oxides of nitrogen from boilers and process heaters in refineries, as set forth in Attachment A to this resolution.

BE IT FURTHER RESOLVED that the Executive Officer is directed to forward the suggested control measure to air pollution control and air quality management districts with the recommendation that they consider adopting the measure or a similar measure to the extent that such districts need further reductions in emissions of oxides of nitrogen to attain or maintain ambient air quality standards.

BE IT FURTHER RESOLVED that the Executive Officer is directed to provide assistance to any district requesting assistance in adopting, interpreting, or implementing the suggested control measure.

I certify that the above is
a true and correct copy of
Resolution 82-22, as adopted
by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ATTACHMENT A

SUGGESTED CONTROL MEASURE FOR THE CONTROL OF EMISSIONS OF OXIDES OF NITROGEN FROM BOILERS AND PROCESS HEATERS IN REFINERIES

(a) Definitions

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

(1) BOILER means any combustion equipment fired with liquid and/or gaseous fuel and used to produce steam, including a carbon monoxide boiler.

(2) PROCESS HEATER means any combustion equipment fired with liquid and/or gaseous fuel and which transfers heat from combustion gases to process fluids.

(3) REFINERY-WIDE RATE OF NITROGEN OXIDES EMISSIONS means the ratio of the total mass rate of discharge into the atmosphere of nitrogen oxides from units (subject to the rule) when firing at maximum rated capacity to the sum of the maximum rated capacities for those units.

(4) UNIT means any petroleum refinery boiler or process heater, as defined in subsections (1) and (2) of this section, with an authority to construct or a permit to operate as of (date of adoption of this rule).

(5) NITROGEN OXIDES means the sum of nitric oxide and nitrogen dioxide in the flue gas, collectively expressed as nitrogen dioxide and averaged over a period of three consecutive hours.

(6) COMBUSTION MODIFICATION means any modification of the burner, combustion air flow, or fuel flow system that reduces nitrogen oxides emissions.

(7) MAXIMUM RATED CAPACITY means maximum design heat input at the higher heating value of the fuel unless the boiler/process heater is limited by permit condition to a lesser heat input, in which case the limiting condition shall be used as the maximum rated capacity.

(8) EMISSIONS RATE means the ratio of the mass rate of discharge into the atmosphere of nitrogen oxides from a unit to the heat input for that unit.

(9) HEAT INPUT means the chemical heat released due to fuel combustion in a unit, using the higher heating value of the fuel. This does not include the sensible heat of incoming combustion air, except in the case of carbon monoxide boilers where the heat input includes the sensible heat of incoming gases and the chemical energy of the incoming carbon monoxide.

(b) Requirements

(1) The owner or operator of any petroleum refinery shall reduce emissions of nitrogen oxides from units subject to this rule so that if all such units were operated at their maximum rated capacity the refinery-wide rate of nitrogen oxides emissions from these units would not exceed:

(A) 0.10 pound of nitrogen oxides per million Btu of heat input when operated on gaseous fuel, or

(B) 0.22 pound of nitrogen oxides per million Btu of heat input when operated on liquid fuel, or

(C) The weighted average of the limits of subsections (b)(1)(A) and (b)(1)(B), when operated on both liquid and gaseous fuel.

(2) The owner or operator shall operate each unit subject to this rule such that the assigned maximum nitrogen oxides emissions rate for each unit (pound per million Btu heat input, expressed as nitrogen dioxide) is in accordance with the list approved by the Executive Officer/Air Pollution Control Officer pursuant to subsection (b)(6)(B).

(3) The owner or operator of any petroleum refinery which has units subject to this rule shall submit to the Executive Officer/Air Pollution Control Officer a control plan for installation of nitrogen oxides emissions control equipment to meet the requirements of subsection (b)(1). Such plan shall contain as a minimum:

(A) A list of all units with the maximum rated capacity for each unit,

(B) A list of units to be controlled and the type of control to be applied for all such units, including a construction schedule, and

(C) The method of calculation of the mass rate of nitrogen oxides emissions for each unit to achieve the refinery-wide emissions rates specified in subsection (b)(1).

(4) All units which are identified in the control plan of subsection (b)(3) shall be tested for nitrogen oxides emissions while firing gaseous fuel at the maximum rated capacity (or as nearly as practicable) and, where so equipped, while firing liquid fuel. Such tests shall be performed:

(A) Within 180 days after completion of modifications, but no later than _____, for units which are to be modified with nitrogen oxides control equipment, and

(B) By _____, for units which do not require modification. Tests conducted after January 1, 1980, upon approval by the Executive Officer/Air Pollution Control Officer, can be used to satisfy the requirements of this subsection.

(5) Total nitrogen oxides emissions (pounds per hour) and total heat input rates (million Btu per hour) during the tests required by subsection (b)(4), while firing gaseous fuel and while firing liquid fuel, shall be used for determination of initial compliance with the refinery-wide rate of emissions limits of subsection (b)(1).

(6) After verification of initial compliance with the limits of subsection (b)(1):

(A) The owner or operator shall assign to each unit subject to this rule the maximum nitrogen oxides emissions rates (pound per million Btu heat input, expressed as nitrogen dioxide), while firing gaseous fuel and/or liquid fuel, which are allowable for that unit under the requirements of subsection (b)(1).

(B) The owner or operator shall submit to the Executive Officer/ Air Pollution Control Officer for approval a list of the maximum allowable nitrogen oxides emissions rates identified

in subsection (b)(6)(A) above and a copy of the approved list shall be maintained for verification of continued compliance with the requirements of subsection (b)(2).

(C) Compliance with this rule shall be determined by source testing one or more units. No unit subject to this rule shall be operated at an emissions rate (pound per million Btu heat input, expressed as nitrogen dioxide) higher than that approved by the Executive Officer/Air Pollution Control Officer pursuant to subsection (b)(6)(B).

(c) Revision of Control Plan

A revised control plan may be submitted by the owner or operator. Such a plan must also meet the emissions limits and compliance dates of the rule.

(d) Exemptions

The requirements of Section (b) shall not apply to:

(1) Boilers or process heaters with maximum rated capacities equal to or less than 40 million Btu per hour heat input; but, at the applicant's option and upon approval by the Executive Officer/Air Pollution Control Officer, such units may be controlled in lieu of nonexempt units. In such cases, the refinery-wide rate of nitrogen oxides emissions shall be calculated from the total nitrogen oxides emissions from nonexempt units, less nitrogen oxides emissions reductions for controlled units with maximum rated capacities less than or equal to 40 million Btu per hour, and the total heat input rate for nonexempt units only.

(2) Sulfur plant reaction boilers.

(3) Gas turbines.

(4) Upon approval by the Executive Officer/Air Pollution Control Officer, units which are operated with a total heat input in a 12 month period of less than 10 percent of the maximum rated capacity for that period.

(e) Compliance Schedule

The owner or operator of a petroleum refinery having units subject to this rule shall fulfill the following increments of progress:

(1) By _____, submit a control plan pursuant to subsection (b)(3) of the rule.

(2) Within _____ years after approval of the control plan by the Executive Officer/Air Pollution Control Officer, install all combustion modification type control equipment, if any, as specified in the control plan.

(3) Within five years from the date of adoption of this rule, demonstrate final compliance with the rule.

State of California
AIR RESOURCES BOARD

Response to Significant Environmental Issues

Item: Public Meeting to Consider a Suggested Control Measure for the Control of Emissions of Oxides of Nitrogen from Boilers and Process Heaters in Refineries

Agenda Item No.: 82-8-1

Public Meeting Dates: November 18, 1981 and March 31, 1982

Response Date: March 31, 1982

Issuing Authority: Air Resources Board

Comment: No comments were received identifying any significant environmental issues pertaining to this item. The staff report identified no adverse environmental effects.

Response: N/A

CERTIFIED: Jarvel Holmes
Board Secretary

Date: 04/16/82