AIR POLLUTION CONTROL DISTRICT
COUNTY OF SAN DIEGO

NOTICE OF WORKSHOP

FOR DISCUSSION OF PROPOSED RULE 69 ELECTRICAL GENERATING BOILERS, REPLACEMENT UNITS AND NEW UNITS

The San Diego County Air Pollution Control District will hold a public meeting to consider proposed new Rule 69 - Electrical Generating Steam Boilers, Replacement Units and New Units. Comments regarding the proposed rule may be submitted in writing before, or made at the workshop, which is scheduled as follows:

DATE: **June 3, 1993, Thursday**

TIME: **1:00 pm to 4:00 pm**

PLACE: **Air Pollution Control District**
Conference Room 139
9150 Chesapeake Drive
San Diego, CA 92123

Rule 69 is a proposed new rule designed to limit emissions of oxides of nitrogen (NOx) from electrical generating steam boilers and gas turbines. The rule would set new NOx emission limits for all electrical generating steam boilers with heat input ratings equal to or greater than 100 million Btu's per hour. The rule would also set annual NOx emissions caps for all utility electrical generating boilers, replacement units and new units, including boilers and such units operated by entities in which a utility has a controlling interest. In addition, the rule would limit fuel oil burning to days when exceedance of the state ambient air quality standard for ozone is not expected, except during periods of force majeure natural gas curtailments.

This will be the third workshop to consider proposed Rule 69. Previous workshops were held late 1990 and mid-1991. The proposed rule has been rewritten in response to the state disapproval of the proposed merger between SDG&E and Southern California Edison, and new information developed in conjunction with the CPUC and CEC regarding the future capacity needs and operations of the SDG&E system.

Revised Rule 69 includes:

Section (a) - Applicability, has been modified to specify that equipment subject to Rule 69 will also remain subject to the requirements and exemptions of Rule 68.

Section (c) - Definitions, has been modified to include clarification of megawatt-hour, force majeure natural gas curtailments and startups/shutdowns, and to add definitions for replacement units, new units, capacity factor and other terms made necessary by rule proposal modifications.

Section (d) - Standards, has been modified. The emission standard for large boilers fired on natural gas is proposed to be 0.15 pounds NOx per megawatt-hour (lbs/MW-hr). The NOx emission standard (gas) for other boilers has been lowered to 0.18 lbs/MW-hr. The NOx emission standard for boilers fired on fuel oil is proposed to be 0.40 lbs/MW-hr. Less stringent emission limits have been added for boilers that operate at capacity factors below 15 percent and below 10 percent. Emission limits will be determined based on a calendar day average. Annual aggregate NOx emission caps for utility emissions will be set at 2100 tons, effective 1997 and 800 tons effective 2001. Provisions for emission offsets in the event an annual emission standard would be exceeded have been added. A standard for emissions of ammonia is proposed. The duration of startups and shutdowns has been limited.

Section (e) - Compliance Schedule, has been modified to require that at least one electrical generating boiler be brought into compliance each calendar year beginning three years after rule adoption, with all boilers to be in compliance by January 1, 2001, except boilers scheduled to be replaced before January 1, 2003. All new and replacement units would need to be in compliance upon initial startup. Limitations on oil burning would go into effect upon rule adoption. Compliance Plans/Reports would be required annually beginning six months after rule adoption.

Section (f) - Recordkeeping has been expanded to clarify the requirements for continuous monitors.

Section (g) - Test Methods has been expanded to include measurement methods for megawatt-hours produced and to clarify the methods for determining calendar day NO_x emissions and emissions rate.

If you would like a copy of proposed Rule 69, please call Juanita Ogata at (619) 694-8851. If you have any questions concerning the proposed rule, please call Michael Lake at (619) 694-3313 or me at (619) 694-3303.

Richard J. Smith

RICHARD J. SMITH
Deputy Director

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04/30/93

Proposed new Rule 69 is to read as follows:

RULE 69 ELECTRICAL GENERATING STEAM BOILERS, REPLACEMENT UNITS AND NEW UNITS

(a) APPLICABILITY

(1) Except as provided in Section (b), this rule is applicable to all electrical generating steam boilers, including any auxiliary boiler used in conjunction with an electrical generating boiler, and to replacement units and new units.

(2) Equipment subject to this rule shall also comply with the emission limitations and exemptions set forth in Rule 68.

(b) EXEMPTIONS

(1) The provisions of Section (d) shall not apply to:

(i) Any electrical generating steam boiler with a maximum heat input capacity of less than 100 million Btu's per hour.

(ii) Boilers which generate steam used exclusively for space heat or process heat and not used for electrical generation.

(2) The provisions of Subsection (d)(9) shall not apply to boilers, replacement units and new units, operated by other than a utility or a company in which a utility has a controlling interest.

(c) DEFINITIONS

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

(1) **"Boiler"** means any combustion equipment fired with solid, liquid and/or gaseous fuels and used to produce steam, excluding electrical generating gas turbines.

(2) **"Calendar Day"** means the 24-hour period starting on the 00:00 hour and ending on the 24:00 hour.

(3) **"Calendar Year"** means the consecutive twelve-month period beginning January 1 and ending December 31.

(4) **"Capacity Factor"** means the fraction of an electrical generating steam boiler's, replacement unit's or new unit's maximum electrical generating capacity that is actually utilized during a calendar year. The maximum electrical generating capacity shall be determined by multiplying the maximum rated capacity of a boiler, replacement unit or new unit, in megawatts, by 8760 maximum operating hours per year (8784 hours for a leap year).

(5) **"Clock Hour"** means every 60-minute period starting on the hour.

(6) **"Electrical Generating Steam Boiler"** means any boiler used to produce steam to be expanded in a turbine generator used for the generation of electric power.

(7) **"Electrical Generating Gas Turbine"** means any combustion turbine fired with solid, liquid and/or gaseous fuels and used to provide direct shaft work for the generation of electric power.

(8) **"Force Majeure Natural Gas Curtailment"** means an interruption in natural gas service such that the daily fuel needs of a boiler or replacement unit subject to this rule cannot be met with the natural gas available due to:

(i) Unforeseeable natural disaster or other cause resulting in the failure or malfunction of natural gas supply, delivery or storage system facilities, not resulting from an intentional or negligent act or omission on the part of an owner or operator of a boiler, a new unit or a replacement unit, or

(ii) A supply restriction resulting from a California Public Utilities Commission priority allocation ruling, or

(iii) Delivery restrictions due to pipeline capacity limitations of the natural gas supplier or upstream transports or within a utility's delivery system.

(9) **"Heat Input"** means the heat derived from combustion of fuel in an electrical generating unit and does not include the heat input from preheated combustion air, recirculated flue gases, or exhaust gases from other sources, such as gas turbines, internal combustion engines, kilns, etc. The maximum heat input rating means the lesser of the steady state heat input capacity of an electrical generating unit, as limited by its design and construction or as limited by an Authority to Construct or Permit to Operate.

(10) **"Megawatt-hour (MW-hr)"** means the total electrical energy generation of a boiler, new unit or replacement unit subject to this rule.

(11) **"New Unit"** means any electrical generating steam boiler or gas turbine for which the first Authority to Construct is issued on or after (*date of adoption*).

(12) **"Replacement Unit"** means any electrical generating steam boiler or gas turbine which permanently replaces or augments, on or after (*date of adoption*), an existing electrical generating steam boiler subject to this rule. For purposes of this rule, a replacement unit need not be limited to the same electrical generating capacity as the existing boiler being replaced.

(13) **"Startup"** means the period of time during which a boiler, replacement unit or new unit, and associated emissions control device(s) are being heated to the minimum functional operating temperatures of the emission control device(s), or when electrical generation equals or exceeds 25 percent of rated capacity, whichever is sooner.

(14) **"Shutdown"** means the period of time during which a boiler, replacement unit or new unit, and its associated emissions control device(s) are allowed to cool from the minimum functional operating temperatures of the emission control device(s) or when electrical generation drops below 25 percent of rated capacity, whichever is later.

(15) **"Utility"** means any person, company, corporation, partnership, municipality or other government agency that produces, purchases, distributes and/or sells electrical energy and which is regulated by the California Public Utilities Commission.

(d) **STANDARDS**

A person shall not operate an electrical generating steam boiler, replacement unit or new unit subject to this rule unless only natural gas, alternative fuel and/or fuel oil is burned and the following requirements are met. If an alternative fuel is burned, the operator shall have previously demonstrated to the satisfaction of the Air Pollution Control Officer that the emissions of oxides of nitrogen (NOx) per megawatt-hour of electricity generated is not greater than would be the emissions from the burning of natural gas in the same boiler, replacement unit or new unit.

(1) Except as provided in Subsections (d)(2) through (d)(6), a person shall not operate an electrical generating steam boiler with a maximum heat input rating of less than 2100 milion Btu's per hour unless:

(i) The emissions of oxides of nitrogen, expressed as nitrogen dioxide, from the boiler do not exceed 0.18 pounds per megawatt-hour, and

(ii) The person has met the compliance schedule specified in Section (e).

(2) Except as provided in Subsections (d)(3), (d)(4) and (d)(5), a person shall not operate an electrical generating steam boiler with a maximum heat input rating of equal to or greater than 2100 million Btu's per hour unless:

(i) The emissions of oxides of nitrogen, expressed as nitrogen dioxide, from the boiler do not exceed 0.15 pounds per megawatt-hour, and

(ii) The person has met the compliance schedule specified in Section (e).

(3) The provisions of Subsection (d)(2) shall not apply and the provisions of Subsection (d)(1) shall apply if the capacity factor of an electrical generating boiler with a maximum heat input rating of equal to or greater than 2100 million Btu's per hour is not greater than 0.15 over each calendar year.

(4) Fuel Oil Firing NOx Emission Rate Limits

A person shall not operate an electrical generating steam boiler when burning fuel oil unless:

(i) The requirements of Subsection (d)(1), (d)(2) or (d)(3), as applicable, are met by the operator of an affected boiler when burning natural gas exclusively in that boiler, and

(ii) The emissions of oxides of nitrogen, expressed as nitrogen dioxide, from an affected boiler do not exceed 0.40 pounds per megawatt-hour when burning fuel oil exclusively in that boiler, and

(iii) The emissions of oxides of nitrogen, expressed as nitrogen dioxide, from the boiler when fired on a mixture of fuel oil and natural gas do not exceed the limits prescribed in Subsections (d)(2)(i) and (d)(2)(ii), prorated for the relative heat input from fuel oil and natural gas, as follows:

$$EL = \frac{[(Lo)(Qo)(HHVo)] + [(Lg)(Qg)(HHVg)]}{(Qo)(HHVo) + (Qg)(HHVg)}$$

where,

EL = Emission limit, pounds per megawatt-hour

Lo	=	0.40 pounds per megawatt-hour
Qo	=	Quantity of fuel oil burned, barrels per hour
HHVo	=	Higher heating value of fuel oil, Btu's per barrel
Lg	=	0.15 or 0.18 pounds per megawatt-hour, as applicable
Qg	=	Quantity of natural gas burned, scf per hour
HHVg	=	Higher heating value of natural gas, Btu per scf,

and

(iv) The Air Pollution Control Officer has determined that an exceedance of the state ambient air quality standard for ozone is not predicted at any location expected to be impacted by the boiler emissions at any time during the fuel oil burning. This paragraph shall not apply when burning of fuel oil is required due to a force majeure natural gas curtailment.

(5) Low Capacity Factor Boiler NOx Emission Rate Limits

The provisions of Subsections (d)(1)(i), (d)(2)(i) and (d)(4)(i), (ii) and (iii), shall not apply to the operation of an electrical generating steam boiler provided:

(i) The capacity factor for the boiler, over each calendar year, does not exceed 0.10, and

(ii) The emissions of oxides of nitrogen, expressed as nitrogen dioxide, do not exceed 0.60 pounds per megawatt-hour when burning natural gas and 1.20 pounds per megawatt-hour when burning fuel oil, and

(iii) The emissions of oxides of nitrogen, expressed as nitrogen dioxide, from the boiler when fired on a mixture of fuel oil and natural gas do not exceed the limits prescribed in Subsection (d)(5)(ii) above, prorated for the relative heat input from fuel oil and natural gas, as follows:

$$EL = \frac{[(Lo)(Qo)(HHVo)] + [(Lg)(Qg)(HHVg)]}{(Qo)(HHVo) + (Qg)(HHVg)}$$

where,

EL	=	Emission limit, pounds per megawatt-hour
Lo	=	1.20 pounds per megawatt-hour
Qo	=	Quantity of fuel oil burned, barrels per hour
HHVo	=	Higher heating value of fuel oil, Btu's per barrel

Lg = 0.60 pounds per megawatt-hour

Qg = Quantity of natural gas burned, scf per hour

HHVg = Higher heating value of natural gas, Btu per scf,

and

(iv) The Air Pollution Control Officer has determined that an exceedance of the state ambient air quality standard for ozone is not predicted at any location expected to be impacted by the boiler emissions at any time during the fuel oil burning. This paragraph shall not apply when burning of fuel oil is required due to a force majeure natural gas curtailment. Prior to January 1, 1997, this paragraph shall not apply to not more than one boiler owned or operated by a utility on days when fuel oil burning is needed to meet peak electrical generation demand.

(6) Compliance with the standards of Subsections (d)(1) through (d)(5) shall be based on emissions of oxides of nitrogen from an affected boiler averaged over each calendar day of operation, or portion thereof, excluding periods of startups and shutdowns.

(7) Startups and Shutdowns

The provisions of Subsections (d)(1)(i), (d)(2)(i), (d)(3), (d)(4) and (d)(5) shall not apply to electrical generating steam boilers during periods of startup or shutdown provided the startup or shutdown does not exceed fifteen hours.

(8) Replacement Units and New Units NOx Emission Rate Limits

Notwithstanding the requirements of Subsections (d)(1) through (d)(7), no person shall operate a replacement unit or new unit subject to this rule unless such unit has been built with, and is operated in conjunction with, Best Available Control Technology as defined in Rule 20.1 for emissions of oxides of nitrogen. In no case shall emissions of oxides of nitrogen from any replacement unit or new unit be greater than the emission rate limit of Subsection (d)(2)(i).

(9) Aggregate NOx Emission Limit for Utilities

Except as provided in Subsection (d)(10), a utility shall not operate any electrical generating steam boiler, replacement unit or new unit subject to this rule unless the utility has demonstrated that the aggregate emissions of oxides of nitrogen, expressed as nitrogen dioxide, from all boilers, replacement units and new units, located in San Diego County and owned or operated by any utility, and any boilers, replacement units and new units that

are owned or operated by a company in which any utility has a controlling interest, are not greater than:

(i) On and after January 1, 1997, twenty-one hundred tons during every calendar year.

(ii) On and after January 1, 2001, eight-hundred tons during every calendar year.

The annual oxides of nitrogen emission limits specified in this subsection shall be adjusted to account for fuel oil burning that results from a force majeure natural gas curtailment or is due to compliance emissions testing. The adjustment shall be made by adding to the applicable limit the product of the megawatt-hours generated by each boiler, replacement unit, or new unit during such fuel oil burning and the difference between the applicable oxides of nitrogen emission rate limits for fuel oil burning and natural gas burning in that boiler, replacement unit or new unit. The adjustment shall be prorated for the relative heat inputs of fuel oil and natural gas when co-firing both fuels.

(10) Exceedances of an Aggregate NOx Emission Limit

A utility may operate its electrical generating steam boilers, replacement units and new units when aggregate oxides of nitrogen emissions exceed the calendar year limits specified in Subsection (d)(9) provided:

(i) The utility has demonstrated, to the satisfaction of the Air Pollution Control Officer, that the exceedance is due to an unforeseen event, such as a forced outage of one or more generating units or a disruption in the supply of imported power, and is not due to an intentional or negligent act or omission on the part of the utility, and

(ii) The Air Pollution Control Officer has approved the exceedance in advance and has issued modified permits to operate for the affected equipment adding conditions that establish a new, enforceable calendar year aggregate emission limit, and

(iii) The utility has provided offsetting emission reductions, on an annual basis and at a 1.3 to 1.0 offset ratio, for all emissions of oxides of nitrogen in excess of the calendar year limits specified in Subsection (d)(9).

The new calendar year aggregate oxides of nitrogen emission limit established pursuant to Subsection (d)(10)(ii) above, shall be based on the maximum expected calendar

year emissions in compliance with this rule. The quantity of offsetting emission reductions required shall be 1.3 times the difference between the new calendar year aggregate oxides of nitrogen emission limit and the applicable calendar year limit specified in Subsection (d)(9). Offsetting emission reductions shall conform to the criteria for emission offsets specified in Rule 20.1.

(11) Emission Standards for Ammonia

The emissions of ammonia from any electrical generating steam boiler, replacement unit or new unit subject to the requirements of this rule, or from any emissions control device used to achieve compliance with this rule, shall not be greater than the lowest emission rate achievable, consistent with the requirements of this rule, taking into consideration the costs of achieving that emission rate and the potential public health impacts associated with such emissions.

(12) Banking of Excess Emission Reductions

No person shall be eligible to obtain emission reduction credits for emissions of oxides of nitrogen below the limits specified in this Section (d).

(e) COMPLIANCE SCHEDULE

(1) Increments of Progress

A person subject to the provisions of Section (d) shall comply with the following increments of progress:

(i) Any electrical generating steam boiler returning to service after being out of service for at least twelve months, any replacement unit or any new unit shall be in compliance with the applicable requirements of Section (d) on and after initial startup.

(ii) Not later than *(3 years after date of adoption)*, be in compliance with the applicable requirements of Section (d) for not fewer than one electrical generating steam boiler, replacement unit or new unit and each calendar year thereafter bring into compliance a minimum of one additional boiler, replacement unit or new unit owned or operated by such person.

(iii) Except as provided in Subsection (e)(1)(iv) below, on and after January 1, 2001, be in compliance with the requirements of Section (d) for all

operating electrical generating steam boilers, replacement units and new units owned or operated by such person.

(iv) Be in compliance with Section (d) by January 1, 2003, or upon initial startup, whichever is sooner, for all replacement units, and associated boiler(s), scheduled for initial startup between January 1, 2001 and January 1, 2003.

(2) Compliance Plan/Report

(i) The owner or operator of any equipment subject to the provisions of this rule shall submit by (*six months after date of adoption*) a Compliance Plan describing the actions, and contingencies, which are proposed by the owner or operator to meet the requirements of Section (d) and Subsection (e)(1). The Compliance Plan shall contain, at a minimum, the following applicable information for each electrical generating steam boiler, replacement unit and new unit subject to this rule:

- District Permit to Operate number.
- Equipment location.
- Manufacturer.
- Model number.
- Maximum permitted heat input rating.
- Primary and backup fuels to be used.
- Proposed method to measure and record megawatt-hours generated and watt transducer calibration method with supporting documentation.
- Maximum hourly, daily and annual pre-controlled NOx emission rates.
- Method and type of emission controls to be used.
- Expected performance of the emission controls.
- Proposed schedule for applications for Authorities to Construct, issuing purchase orders for emission controls, commencing construction, completing construction, conducting compliance tests and demonstrating compliance with the provisions of this rule.

The initial Compliance Plan submittal need not contain detailed information regarding emission control specifications, performance and schedules, but must contain at least preliminary information regarding the type of control equipment and the anticipated final compliance date for each affected unit. A copy of the Compliance Plan shall be kept at each affected site and shall be made available for District inspection upon request. Adherence to a Compliance Plan does not relieve the owner or

operator from complying with any other provisions of this rule. The Compliance Plan shall be updated annually.

(ii) The owner or operator of any equipment subject to the provisions of this rule shall submit by the submittal date in 1997 of the Emissions Statement Form(s) required by Rule 19.3, and each year thereafter, a Compliance Report which describes the measures taken in the preceding calendar year to achieve compliance with the requirements of Section (d) and Subsection (e)(1). The Compliance Report shall contain, at a minimum, the following information for the preceding calendar year for each electrical generating steam boiler, replacement unit and new unit subject to Section (d) of this rule:

- District Permit to Operate number.
- Number of hours of operation.
- Types and amounts of fuels consumed, and the number of hours on each fuel type.
- Dates and times of any force majeure natural gas curtailments that occurred.
- Mass emissions of oxides of nitrogen for each calendar day and for the calendar year.
- Megawatt-hours generated each calendar day and for the calendar year.
- Indication of whether the unit is on schedule to meet the Compliance Plan(s) submitted pursuant to Subsection (e)(1).
- Identification of each exceedance of the applicable requirements of Section (d).

The Compliance Report shall also contain any proposed revisions to the Compliance Plan. These revisions shall include the justification for the changes and a demonstration that the changes will ensure compliance with the requirements of Section (d) and Subsection (e)(1).

Documentation and calculations used to prepare the material presented in the Compliance Report shall be maintained by the owner or operator for at least two years and shall be made available to the District upon request.

(f) RECORDKEEPING

(1) On and after January 1, 1997, a utility shall not operate any electrical generating steam boiler, replacement unit or new unit subject to this rule unless such boiler or unit is equipped with continuous emission monitors which record and preserve, on a daily basis

and in the manner and form prescribed by the Air Pollution Control Officer, all of the information needed to demonstrate compliance with Subsections (d)(9) and (d)(10) of this rule, including but not limited to:

(i) The daily emissions, in pounds, of oxides of nitrogen from each boiler, replacement unit or new unit.

(ii) The aggregate daily emissions, in pounds, of oxides of nitrogen from all such boilers, replacement units or new units.

(iii) The cumulative annual emissions, in tons, of oxides of nitrogen, commencing with January 1 of the current calendar year, for each such boiler, replacement unit or new unit, and

(iv) The cumulative annual emissions, in tons, of oxides of nitrogen, commencing with January 1 of the current calendar year, for the aggregate of all such boilers, replacement units or new units.

(2) On and after the final compliance date specified in the Compliance Plan, a person shall not operate any electrical generating steam boiler, replacement unit or new unit subject to this rule unless such boiler or unit is equipped with continuous monitors, approved by the Air Pollution Control Officer, which record and preserve all of the information needed to determine compliance with Subsections (d)(1) through (d)(5) and (d)(7), including but not limited to:

(i) The hours of operation of the unit.

(ii) The emission concentration of oxides of nitrogen, calculated as parts per million by volume (ppmv) of nitrogen dioxide at three percent oxygen on a dry basis, averaged over every clock hour of operation, or portion thereof. The emission concentration shall be measured at equally spaced intervals, not to be less frequent than once every five minutes, and averaged up to each clock hour, or portion thereof. Only the clock hour average data must be recorded and preserved.

(iii) The unit exhaust flue gas flow rate, calculated as cubic feet per hour at standard conditions and at three percent oxygen on a dry basis, averaged over every clock hour of operation, or portion thereof. The exhaust flue gas flow rate shall be measured at the same interval as emission concentration measurements. If unit exhaust flue gas flow rate is not measured directly but instead calculated from fuel

flow rate or other operating parameter, such parameter shall be measured at the specified concentration measurement interval, the parameter measurement shall be recorded, and the exhaust flue gas flow rate shall be calculated for each such interval. The exhaust flue gas flow rate measurements shall be averaged up to each clock hour, or portion thereof. Only the clock hour average data must be recorded and preserved.

(iv) The emissions of oxides of nitrogen shall be calculated, as pounds of nitrogen dioxide, during every interval of emission concentration measurement using the emission concentration and exhaust flue gas flow rate measurements required in Subsections (f)(2)(ii) and (f)(2)(iii) above. The emissions of oxides of nitrogen during every clock hour of operation, or portion thereof, shall be calculated by summing the emissions calculated for each measurement interval, following the methods described in Subsection (g)(5), and shall be recorded.

(v) The megawatt-hours of electrical energy generated by the unit during every clock hour of operation, or portion thereof shall be measured and recorded.

(vi) The cumulative emissions of oxides of nitrogen, expressed as pounds of nitrogen dioxide; the total megawatt-hours of electrical energy generated; and, the average emission rate of oxides of nitrogen, expressed as pounds of nitrogen dioxide per megawatt-hour of energy generated, for every calendar day of operation, or portion thereof, shall be calculated and recorded.

The records required by this section shall be retained on site for at least three years and shall be made available to the District upon request. Records of aggregate daily emissions required by Subsection (f)(1)(ii) shall be available within two working days of a request. Records of cumulative annual emissions required by Subsections (f)(1)(iii) and (f)(1)(iv) shall be available within twenty working days of a request.

(g) **TEST METHODS**

The following methods shall be used to determine compliance with the requirements of this rule:

(1) Oxides of nitrogen emissions shall be measured utilizing District modified Method 20, as it exists on *(date of adoption)*. This method shall not apply to continuous emission monitors required by Subsections (f)(1) and (f)(2).

(2) Total energy generation in megawatt-hours shall be measured using watt transducers calibrated according to methods approved by the Air Pollution Control Officer.

The methods shall be submitted by the owner or operator of a boiler or unit as part of the compliance plan required by Subsection (e)(2), and shall include a description of the principal of measurement, the frequency of measurement and basis therefore, and the calculations used to determine the megawatt hours (MW-hr) generated. The method shall also include the techniques and procedures used to calibrate each measurement device. Each measurement device shall be calibrated against standards which are based on the National Institute of Standards and Technology (NIST) standards or equivalent if no NIST standards exist. The calibration accuracy tolerance of each measurement device shall be (+/-) 0.5 percent of each measured value.

(3) The oxides of nitrogen (NOx) emission rate, in pounds per megawatt-hour, for each clock hour of operation, or portion thereof, for each boiler subject to the requirements of Subsections (d)(1) or (d)(2), shall be calculated as follows:

$$NOx_{lb/MW\text{-}hr} = \frac{NOx_{lb}}{MW\text{-}hr_{Total}}$$

where,

$NOx_{lb/MW\text{-}hr}$ = NOx emission rate in lb/MW-hr, for each clock hour of operation, or portion thereof.

NOx_{lb} = NOx emissions in pounds during each clock hour, as calculated in Subsection (g)(4) below.

$MW\text{-}hr_{Total}$ = Total megawatt-hours generated for each clock hour.

(4) The emissions of oxides of nitrogen (NOx) for each applicable unit during each clock hour, or portion thereof, shall be calculated as follows:

$$NOx_{lb} = \sum_{i=1}^{n} NOx_i$$

where,

NOx_{lb} = Emissions of oxides of nitrogen, in pounds, during each clock hour of operation.

NOx_i = Emission of oxides of nitrogen, in pounds, calculated for each five minute or shorter time interval within each clock hour, or portion thereof.

n = Number of valid data points during each clock hour of operation, or portion thereof. There shall not be fewer than 10 valid data points during each clock hour.

Emissions occuring during periods of no electrical generation shall not be included when calculating oxides of nitrogen emissions per megawatt-hour but shall be included when calculating aggregate oxides of nitrogen emissions for a calendar year.