

VENTURA COUNTY APCD

STAFF REPORT

Proposed Amendments to Rule 74.15, Boilers, Steam Generators and Process Heaters

October 2022

EXECUTIVE SUMMARY

The Ventura County Air Pollution Control District (District) is proposing revisions to District Rule 74.15, Boilers, Steam Generators and Process Heaters per USEPA comments received on September 22, 2022.

Rule 74.15 was last amended on November 10, 2020, to implement Every Feasible Measure as required by the California Clean Air Act, California Health and Safety Code (CHSC) Section 40914. Also, District's 2016 Air Quality Management Plan (AQMP) relied on adopting All Feasible Measures to help attain the state ambient ozone air quality standard. In addition, the adoption of amendments to this rule helped satisfy Assembly Bill (AB) 617, which was approved on July 26, 2017 by Governor Jerry Brown. AB 617 required each local air district that is nonattainment for one or more air pollutant(s) to adopt an expedited schedule for the implementation of Best Available Retrofit Control Technology (BARCT) for each industrial source that, as of January 1, 2017, was subject to a specified market-based compliance mechanism, the Cap and Trade Program, and gave highest priority to those permitted units that had not modified emissions-related permit conditions for the greatest period of time.

Staff is currently proposing to include additional language requested by USEPA along with minor editorial changes to Rule 74.15. If the revised rule is adopted as proposed, USEPA will add the revised Rule 74.15 to the State Implementation Plan (SIP) for Ventura County and allow the District to get the credit for the emissions reductions estimated in the November 10, 2020 amendments.

The changes requested by USEPA are summarized below:

1. Include in the rule's start-up provision requirements to minimize NOx emissions, including NOx limit, and recordkeeping.
2. Include an alternate NOx emission limit or an annual hourly limit on firing alternate fuels during natural gas curtailment.

3. Make editorial changes to Section B.4.a. and B.4.b. to state the limit SHALL NOT EXCEED" the specified limit as it was intended in the staff report dated September 2020.

EPA commended that Section C.2.a. allows for exemption from the NOx emission limits if the unit is operating under a natural gas curtailment. However, this requirement does not include an alternate NOx emission limit or an annual hourly limit on firing alternate fuels under natural gas curtailment. In response to EPA comment, staff has added language to Section 2.C.a. limiting NOx emission to less than or equal 150 ppmv or 0.215 pounds per million Btu of heat input when burning liquid fuel. There are only six facilities that are subject to this provision. Staff believes that the proposed change does not have any effect on the impacted facilities, as they are already in compliance with this limit when burning alternative fuel. This is because 5 of the facilities are using Distillate oil or Fuel Oil #2 as standby. NOx emissions from these facilities are estimated using the EPA AP-42 emission factor of 20 lb NOx/Mgal distillate oil which equates to 117 ppm NOx at 3% oxygen which is less than 150 ppm at 3% oxygen. One facility is using propane as standby fuel. To estimate NOx emissions for this facility, staff has used EPA AP-42 emission factor of 13 lb NOx/mgal propane (dated 07/2008), which equates to 118 ppm at 3% oxygen (< 150 ppm).

On May 22, 2015, the USEPA issued a final action to ensure states have plans in place that are fully consistent with the Clean Air Act and recent court decisions concerning startup, shutdown and malfunction (SSM) operations. Air pollution emitted during these periods may adversely affect the health of people in neighboring and downwind communities. EPA commented that the Rule 74.15 exempted facilities from the NOx limit requirements under Section B during start-up. Also, the provision doesn't have any procedures to minimize emissions during the start-up, does not provide any NOx emission limit and does not include any

recordkeeping. In response to this EPA comment, staff has updated Section C.4 by requiring use of control system **if feasible** during the start-up. It is also understood that limiting to the use of SCR would be based on infeasibility to achieve NOx limit before catalyst is at the required temperature. Staff have also proposed to include un-controlled NOx limit of 150 ppmv and recordkeeping requirement during the start-up to satisfy the EPA start-up requirements. Again this limit is based on EPA AP-42 uncontrolled emission factor. Staff is not proposing any compliance demonstration for this limit. However, the facility operator shall use the best available practice to minimize the emissions during the startup.

Additionally, Section B.4.a. and B.4.b. specify NOx and CO emissions limits for units that directs the

exhaust gases into a greenhouse as a means of supplementing carbon dioxide (CO2) to a crop. The words “SHALL NOT EXCEED” were left out by mistake. The September 2020 staff report clearly stated that the wording should be “shall not exceed” emission limits. The proposed changes include these excluded words.

Currently, there are 89 permitted units subject to the proposed lower NOx standards. In the November 10, 2020 amendment, the State Implementation Plan (SIP) creditable emission reductions obtained by implementing the proposed emission limits was estimated at 5.76 tons of NOx per year after 6 years, when the rule is fully implemented.

BACKGROUND

Introduction

Rule 74.15, Boilers, Steam Generators and Process Heaters applies to boilers, steam generators and process heaters (units) with a rated heat input equal to or greater than 5 MMBTU that operate on gaseous or liquid fuels. The main purpose of this rule is to limit NOx emissions which are precursors to ground-level ozone formation. Ventura County is currently designated as “serious” nonattainment for federal National Ambient Air Quality Standards and designated nonattainment for state Ambient Air Quality Standards for ground level ozone. Ventura County is required by the California Clean Air Act (California Health and Safety Code Section 40914) to adopt “every feasible measure” as an alternative requirement to reducing ozone precursor emissions by a minimum of five percent per year. The District considers this proposal a feasible measure that will reduce NOx emissions.

Regulatory History

Rule 74.15 was adopted in 1989 to satisfy Stationary Source Control Measure N-27 (Boilers, Steam Generators and Process Heaters) from the 1987 Air Quality Management Plan. However, the proposed rule went beyond the requirements outlined in Measure N-27 by implementing portions of two additional Further-Study Control Measures, N-2 (Thermally Enhanced Oil Recovery Steam Generators) and N-23 (External Combustion NOx Control). The initial adoption of Rule 74.15 included a NOx emission limit of 40 ppm which affected 155 units and reduced NOx emissions from this source category by 1.34 tons per day.

The rule was amended in 1991 to address deficiencies that Environmental Protection Agency found in review. It was last amended in 1994 to provide an alternative emission limit for two experimental boiler units at Rocketdyne which were unable to comply with the existing rule language.

Assembly Bill 617

On July 26, 2017, AB 617 was approved by Governor Jerry Brown and focuses on reducing criteria pollutants and toxic air contaminants from stationary sources. Among the requirements of AB 617 is an expedited schedule for implementing BARCT for each industrial source that, as of January 1, 2017, was subject to the Cap and Trade Program and gives highest priority to those permitted units that have not modified emissions-related permit conditions for the greatest period of time. The highest priority would be given to older, higher-polluting units that will need to install retrofit emission control technology.

BARCT Implementation

CHSC Section 40920.6(c), as amended by AB 617, requires that on or before January 1, 2019, each local air district that is nonattainment for one or more air pollutants must adopt an expedited schedule for the implementation of BARCT by the earliest feasible date. On December 11, 2018 the Board approved an expedited BARCT rule adoption schedule. This expedited schedule includes a tentative adoption date deadline of December 1, 2020 for amendments to Rule 74.15, Boilers, Steam Generators and Process Heaters.

Staff conducted an assessment of BARCT for this source category. BARCT is defined in the CHSC Section 40406 as “an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source.” Consistent with state law, BARCT emission limits take into consideration environmental impacts, energy impacts, and economic impact. In addition to NOx reductions sought in the amended rule, other potential environmental effects of the proposed rule were evaluated through the California Resource Code 21159 process.

BARCT emission limits for boilers, steam generators and process heaters were determined by examining the recently amended Rule 1146 of SCAQMD, recently amended Rule 342 of SBCAPCD, and comparing their newly established limits with permitted facilities in Ventura County.

All permitted units subject to Rule 74.15 which currently have permitted emission limits exceeding the proposed lower limits were reviewed for feasibility of emission reductions and cost-effectiveness in the rule development process.

NOx Emission Sources

Staff examined all permitted units subject to VCAPCD Rule 74.15. NOx emissions from boilers, steam generators and process heaters permitted prior to 1989 are regulated by VCAPCD’s current Rule 74.15. Under Rule 74.15, the NOx emission concentration limit is 40 ppmv and the CO emission concentration limit is 400 ppmv for these units. Emission limits for units installed after 1989 were established at the time of permitting as the Best Available Control Technology (BACT), which include concentration limits for NOx, CO and other criteria pollutants as applicable. Permitted units within the District include fire tube, water tube, and atmospheric designs. The status of VCAPCD permitted units are as follows: ten (10) units are shutdown or out of service, twenty (20) have NOx emission limits at or below 9 ppmv, forty-seven (47) units are operating below the 9 billion BTU annual throughput limit which has alternate requirements, and twenty-seven (27) units operate above the 9 billion BTU annual throughput limit and have NOx emission limits between 9 ppmv and 40 ppmv. All concentrations are referenced at 3% oxygen, dry, at standard atmospheric conditions. Table 1 lists a summary of all permitted units subject to Rule 74.15.

Table 1 Units subject to Rule 74.15

Rated Heat Input (MMBTU)	Number of Units				NOx Emissions Tons per Year
	Shutdown or Out of Service	NOx Emission Limit ≤ 9 ppmv	NOx Emission Limit ≥ 9 ppmv ≤ 40 ppmv	Operating ≤ 9 Billion BTU Annually	
5-9.9	2	9	10	13	3.40
10-19.9	5	3	4	15	3.29
20-29.9	0	6	6	14	3.52
30-49.9	0	1	5	5	4.66
50+	3	1	2	0	0.55
Total	10	20	27	47	15.42

BARCT Emission Limits and Other Considerations

The recommendations for the NOx BARCT emission limits are established using information gathered from existing VCAPCD regulations, existing permitted units in the District, regulatory requirements for other air districts, and the technology assessment. Both retrofit and new/replacement installations are considered. Once the initial limits are established, a cost-effectiveness determination is made at that initial limit. If the initial limit is not cost-effective, an alternative limit

may be recommended. Unique circumstances are taken into consideration to distinguish alternative limits, provide alternative means for emission reductions, or to create provisions in the rule to address equipment where retrofit or replacement would otherwise not be cost-effective.

Pre-Combustion NOx Emission Control Technologies

NOx emissions are formed by three different mechanisms: thermal NOx, fuel NOx, and prompt

NOx. Thermal NOx is formed by the reaction of nitrogen and oxygen at high temperatures. Fuel NOx is formed by the direct oxidation of organo-nitrogen compounds contained in the fuel, but this is not an issue for natural gas fuel. Prompt NOx is formed by the relatively fast reaction between nitrogen, oxygen, and hydrocarbon radicals, consisting of hundreds of reactions and dozens of chemical species. Prompt NOx becomes more important under fuel-rich conditions where more free radicalized hydrocarbons are generated.

Thermal NOx is the largest contributor of NOx emissions for gaseous-fueled boilers. Reduced flame temperature, shortened residence time, and an increased fuel-to-air ratio would all minimize thermal NOx formation. Units designed with ultra-low NOx burners can integrate all these strategies to result in NOx levels as low as 5 ppm, without any add-on controls or utilizing flue gas recirculation (FGR). Retrofitting existing units with ultra-low NOx burners has been able to achieve 7-9 ppm, as

demonstrated by retrofitted units in compliance with revisions to SJVAPCD Rule 4320.

Post-Combustion NOx Emission Control Technology

Selective Catalytic Reduction (SCR) is the primary post-combustion technology for NOx reduction and is used to control NOx emissions from boilers and other combustion equipment. SCR can reduce NOx emissions by 95% or greater. In many cases, the NOx reduction is limited by the release of other pollutants (ammonia and carbon monoxide), space constraints, consistent exhaust temperatures, or by reaching the practical limit of the NOx measuring device. Further reductions may be possible by increasing the surface area of the catalyst by adding catalyst modules with higher pore density. Most boilers, steam generators and process heaters in VCAPCD do not operate in a manner which allows an SCR system to be implemented. An SCR system is far too expensive to be cost effective on those few boilers physically able to be retrofitted with post-combustion control.

PROPOSED AMENDMENTS TO RULE 74.15

Applicability (Section A)

No changes are proposed for this section.

However, the amendments of November of 11, 2020 of Section A improved clarity of the rule applicability to units fired on gaseous or liquid fuels. Applicable gaseous fuels included natural gas, landfill gas, biogas, liquified petroleum gas (propane), and produced oilfield gas. In addition, the rule is applicable to both stationary and portable units. These changes aligned Rule 74.15 with 74.15.1.

Requirements (Section B)

The proposed changes add the words “SHALL NOT EXCEED” to Sections B.4.a. and B.4.b. as it was left out by mistake. The September 2020 staff report clearly stated that wording should be “shall not exceed” the emission limits.

The amendments of November of 11, 2020 of Section B sunseting dates to section B.1, requiring any unit subject to Rule 74.15 which was operating with an annual throughput greater than nine (9) billion BTU

comply with section B.2 when next modified or by January 1, 2026, whichever comes first. Additional language was also added to clarify existing requirements.

The amendments of November of 11, 2020 added Section B.2 and established new emission limits which reduced NOx concentrations from any modified, new or replacement boiler with an annual throughput greater than nine (9) billion BTU. Effective January 1, 2021 the new emission limits for applicable units was shown in Table 2. The limits and the sunseting date of 2026 were based on the District’s BARCT emission evaluation which included analysis of economic impacts. The deadline for these emission reductions were beyond the compliance deadline of AB617 due to cost considerations. Staff determined the only way for emission reductions to be cost effective was if implementation was at the time of next burner replacement, at the end of the fifteen-year expected lifespan of a burner unit, or upon replacement of a complete boiler unit.

Table 2 Emission Limits for Boilers, Steam Generators and Process Heaters

Fuel Type	NOx Limits (ppmv)	CO Limits (ppmv)
Boilers & Steam Generators operating on gaseous fuel, except landfill, or digester gas	9	400
Process Heaters operating on gaseous fuel, except landfill, or digester gas	12	400
Landfill Gas	25	400
Digester Gas	15	400
Liquid Fuel	40	400

Section B.3, formerly B.2, clarified requirements and applicability to existing units for the low-use alternative compliance options, such as documented regular tune-ups.

Section B.4 provided a separate requirement of 30 ppm NOx and 10 ppm CO for units that direct exhaust into greenhouses as a means of supplementing CO2 to a crop. The proposed changes clarify that the words “SHALL NOT EXCEED” were left out from Sections B.4.a. and B.4.b which are added.

Exemptions (Section C)

The proposed changes include additional requirements to Section C.4 to require use of emission control system to minimize emissions during the start-up, when feasible, and limit the NOx emissions to 150 ppmv during the start-up. These were added due to EPA’s Start-up, shutdown and malfunction requirements of May 2015. District staff believes that limiting to the use of SCR would be based on infeasibility to achieve NOx limit before catalyst is at the required temperature. Also, the NOx emissions limit of 150 ppmv was based on uncontrolled NOx emissions factors for boilers. District staff believes that the proposed changes have no impact on the subjected facilities.

The amendments of November of 11, 2020 of Sections C.2, C.3, and C.4 improved clarity of existing language. Section C.5 was deleted, which applied to two experimental boiler units at Santa Susana Field Laboratories which were no longer in operation or permitted.

Recordkeeping Requirements (Section D)

The proposed changes to Section D requires the facility operator/owner to keep a log to record the actions taken during start-up. It also requires that these records to be maintained for at least 5 years.

The amendments of November of 11, 2020 of Section D.1 required any unit subject to B.2 or B.3 requirements install a dedicated totalizing fuel meter. This improved District’s ability to enforce permit conditions and verify compliance.

Test Methods (Section E)

No changes are proposed for this section.

The amendments of November of 11, 2020 added Section E.2, included renumbering and additional language which improved clarity for emission test requirements.

Added Section E.3 required additional information be submitted with the emission compliance test report, this improved Districts ability to enforce permit conditions and verifying compliance with rule requirements. Additionally, this allowed monitoring of future changes to the units which might result in any physical change to an emissions unit which might alter the emissions of air contaminants.

Section E.4, formerly E.2, was renumbered.

Violations (Section F)

No changes are proposed for this section.

The amendments of November of 11, 2020 of Section F.2 included language which clarified requirements for units who exceed the annual heat input rate for units subject to B.3.

Definitions (Section G)

No changes are proposed for this section.

The amendments of November of 11, 2020 included additional eight new definitions to the Definitions (Section H) portion of Rule 74.15. The newly included definitions were as follows:

- “Alternate Fuel”: Any fuel that is permitted to be used due to natural gas curtailment by the natural gas supplier because of limited availability.
- “Digester Gas”: A gaseous mixture of methane and carbon dioxide produced by the bacterial decomposition of organic waste and used as a fuel, including, but not limited to gas generated in digesters.
- “Existing”: Any unit (as defined in this rule) that was installed and operating prior to January 1, 2021. If an existing unit is modified or replaced after January 1, 2021, even with a like-kind replacement, it is no longer considered an existing unit and is subject to all provisions of this rule as though it were new.
- “Gaseous Fuels”: A fuel which is gaseous at standard atmospheric conditions that includes natural gas, landfill gas, digester gas, liquified petroleum gas (LPG), and produced oilfield gas.
- “Landfill Gas”: Any gas derived through any biological process from the decomposition of waste buried within a waste disposal site.
- “Modified Unit”: For the purpose of this rule, any unit which has undergone physical change in, or any change in method of operation of, or addition to an existing stationary source or any change in hours of operation or production rate which would necessitate a change in permit description or conditions. A change in the method of operation of equipment, unless previously limited by federally

enforceable permit condition, shall not include:

- a. An increase in the production rate, unless such increase will cause the maximum design capacity of the equipment to be exceeded.
 - b. An increase in the hours of operation.
 - c. A change in operator or ownership of a facility.
- “New or Replacement Boiler, Steam Generator, or Process Heater”: Any applicable unit sold, offered for sale, or installed in Ventura County on or after January 1, 2021.
 - “Produced Oilfield Gas”: Any mixture of gaseous hydrocarbons and carbon dioxide produced in the oil field containing less than eighty (80) percent methane by volume, as determined using Standard Method ASTM D1945-03 (2010) or later revision.

Five additional definitions were amended to improve clarity, provide consistency with other District rules, or improve enforceability.

Equipment Tuning Procedure for Forced Draft Fired Equipment (Attachment 1)

Minor edits were made which clarified existing requirements.

Equipment Tuning Procedure for Natural Draft-Fired Equipment (Attachment 2)

Minor edits were made which clarified existing requirements.

IMPACTS OF THE PROPOSED RULE

NOx Emissions Impacts

Of the 104 permitted units subject to Rule 74.15, ten (10) are shut down or are out of service, twenty (20) have permitted emissions that meet the proposed new NOx standards, forty-seven (47) units have emissions that exceed

the proposed limits but would not be required to retrofit unless they exceed the annual heat input rate of nine (9) billion BTUs and twenty-seven (27) would need retrofits or adjustments in order to comply. The proposed changes have no impact on any of the facilities subject to this rule

Cost-Effectiveness

The proposed changes are considered mostly to be administrative changes in nature and have no cost impact to the subjected facilities.

Incremental Cost-Effectiveness Analysis

Not applicable.

Socio-Economic Impact

The proposed changes are considered mostly to be administrative changes in nature and have no socioeconomic impact.

ENVIRONMENTAL IMPACTS OF METHODS OF COMPLIANCE

California Public Resources Code Section 21159 requires the District to perform an environmental analysis of the reasonably foreseeable methods of compliance. The analysis must include the following information on proposed amendments to Rule 74.15

- (1) An analysis of the reasonably foreseeable environmental impacts of the methods of compliance.
- (2) An analysis of the reasonably foreseeable mitigation measures.
- (3) An analysis of the reasonably foreseeable alternative means of compliance with the rule or regulation.

The proposed changes are considered mostly to be administrative changes in nature and have no environmental impact.

References

“Near Zero NOx Burner”, California Energy Commission, July 2018.

“Proposed Amended Rule 1146 – Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters”, South Coast Air Quality Management District, November 2018.

“Draft Staff Report for Amended Rule 342. Boilers, Steam Generators, and Process Heaters (5 MMBTU/hr and greater)”, Santa Barbara County Air Pollution Control District, April 2019.

“Final Draft Staff Report Proposed New Rule 4320”, San Joaquin Valley Air Pollution Control District, October 2008.

“Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters”, California Air Resource Board, July 18, 1991.

“Staff Report for Rule 4306, 4307, and 4320”, San Joaquin Valley Unified Air Pollution Control District, October 16, 2008.