

To: John Vasquez, Chair
and Members of the Board of Directors

From: Mat Ehrhardt, P.E., Executive Director/APCO *ME*

Date: October 14, 2020

Subject: **Approve Addendum to Expedited Best Available Retrofit Control Technology (BARCT) Schedule**

Recommended Action

Approve the Addendum to the Expedited BARCT Schedule

Background

At the October 10, 2018 meeting, the Board held a public hearing and adopted the District's Expedited BARCT Schedule as required by Assembly Bill 617. Assembly Bill 617 (AB 617), which was approved July 26, 2017, amends California Health and Safety Code section 40920.6., and requires each air district that is a nonattainment area for one or more air pollutants to adopt, by January 1, 2019, an expedited schedule for implementation of best available retrofit control technology (BARCT) by the earliest feasible date, but no later than December 31, 2023.

BARCT Schedule

The proposed addendum will remove the commitment made by the District to revise Rule 2.32 – Internal Combustion Engines in 2020, on the basis that the subject engines already meet BARCT.

Affected Sources

California Resources Production Corporation (CRPC) is the source that operates prime-powered internal combustion engines that is subject to the BARCT Schedule. Under the proposed addendum, CRPC would not be required to retrofit their internal combustion engines.

Budget Impacts

None.

Attachment: Addendum to Expedited BARCT Schedule



YOLO-SOLANO
AIR QUALITY MANAGEMENT DISTRICT

**Yolo-Solano Air Quality Management District
1947 Galileo Court, Suite 103
Davis, CA 95618
(530)757-3650
www.ysaqmd.org**

**ADDENDUM TO EXPEDITED BARCT SCHEDULE
FOR INDUSTRIAL FACILITIES SUBJECT TO CAP AND TRADE**

October 14, 2020

Prepared by: Andres Perez
Reviewed By: Benjamin Beattie

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I. EXECUTIVE SUMMARY

In the “Expedited BARCT Schedule for Industrial Facilities Subject to Cap and Trade” approved by the Yolo-Solano Air Quality Management District (YSAQMD or District) Board of Directors on October 10, 2018, District staff proposed to amend District Rule 2.32 – Stationary Internal Combustion Engines – in calendar year 2020 to require Best Available Retrofit Control Technology (BARCT) for industrial sources subject to Cap and Trade by December 31, 2023.

California Resources Production Corporation (CRPC) was identified as the only facility subject to the BARCT requirements to employ prime-powered, rich-burn natural gas-fired internal combustion engines. After a review of emissions standards, control technologies, and cost-effectiveness, the District has determined that the engines operated by CRPC currently meet BARCT levels for nitrogen oxides (NO_x) and, therefore, an amendment to District Rule 2.32 is not necessary at this time to meet the requirements of Assembly Bill 617.

II. BARCT EVALUATION

A. Review of Emissions Standards

CRPC currently operates three internal combustion engines subject to the requirements of District Rule 2.32. All three engines are rich-burn, turbocharged, natural gas engines with non-selective catalytic reduction systems and air-fuel ratio controllers added for emissions control. District Rule 2.32 currently limits emissions from rich-burn natural gas-fired engines to no more than 90 ppmv NO_x at 15% O₂. However, the permitted NO_x emission limits for the three engines range from 14 ppmv at 15% O₂ to 22 ppmv at 15% O₂.

Table 1 presents a comparison of BARCT determinations from six air districts for rich-burn natural-gas fired internal combustion engines. As currently permitted, the CRPC engines would meet the BARCT determination levels of five of these air districts.

Table 1. Comparison of BARCT limits in selected districts

| Source | Standard (ppmvd @ 15% O ₂) |
|--------------------------------------|---|
| | NO _x |
| SLOAPCD (2019), Schedule* | <50 |
| BAAQMD (2007), Rule 9-8 [^] | 25 |
| SBAPCD (2018), Schedule | 25 |
| FRAQMD (2020), Rule 3.22 | 25 |
| SDAPCD (2020), Rule 69.4.1 | 25 |
| SCAQMD (2019), Rule 1110.2 | 11 |
| YSAQMD CRPC Permits | 14¹ 22² 15³ |

* Limit from a SLOAPCD-permitted natural gas-fired ICE that it declared to meet BARCT

^ BAAQMD adopted an ICE rule in 2007 and declared that rule to meet BARCT limits.

¹P-98-03(a); ²P-46-95(a3); ³P-10-13;

B. Available Control Technologies

The rich-burn natural gas engines operated by CRPC employ air/fuel controllers and non-selective catalytic reduction (NSCR) retrofits to reduce emitted criteria pollutants. Regular tune-ups and other preventative maintenance allow the catalyst and engine to operate within allowable emissions limits.

Ultera engine retrofits sold by cogeneration system manufacturer, Tecogen, Inc., offer additional control technology that would serve to further reduce engine emissions, with published emissions less than 5 ppmv NO_x (measured at 15% O₂). The retrofit would operate in series with an engine's existing NSCR catalyst and would require external power to run a cooling unit for the engine exhaust.

C. Cost-Effectiveness

Amending Rule 2.32 to reflect the published NO_x emission concentrations of the Ultera engine retrofits would result in a reduction in actual emissions from only one of the engines operated by CRPC, as source test data shows that two of the three engines typically operate under 5 ppmv NO_x at 15% O₂. To determine the actual emission reduction from this single engine, the average of the past three source tests were used to determine the actual emissions over the past three years. The average annual NO_x emissions over this time was 0.20 tons per year of NO_x. If equipped with the Ultera engine retrofit, the engine would be assumed to achieve 5 ppmv NO_x at 15% O₂, resulting in annual actual emissions averaging 0.13 tons per year NO_x over the same timeframe. This would result in an actual emission reduction of 0.07 tons per year of NO_x.

Installation of the Ultera retrofit would incur installation costs of roughly \$440/bhp and operation and maintenance costs of \$0.013/bhp-hr. For the 800 bhp engine operated by CRPC, this would result in equipment costs of \$352,000 and annual costs of \$21,213. Assuming a 20-year lifespan, the total annualized cost of the retrofit would be \$38,813 and its total cost-effectiveness would be \$554,471 per ton of NO_x abated.

III. CONCLUSION

A BARCT determination for rich-burn, prime-powered, natural-gas fired engines was performed using NO_x emission limits found from a survey of 6 air districts. The determination, which was undertaken to comply with AB 617 requirements, found that the

only industrial source subject to Cap and Trade, and therefore AB 617 BARCT analysis, had permitted NOx limits that met all but one of the surveyed district's BARCT limits.

Because the CRPC engine could not achieve the lowest published BARCT NOx limit (SCAQMD's limit of 11 ppmv at 15% O₂) without additional controls, and the retrofit control system available was shown to not be cost-effective, the District has determined that the three CRPC rich-burn, natural gas-fired engines meet BARCT levels as currently permitted.

As the engines' permitted limits already meet BARCT, no amendments to the District's internal combustion engine rule, Rule 2.32, would be required for the purposes of AB 617.

IV. REFERENCES

Rule 9-8 Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines, BAAQMD, (2007), pg. 9-8-5

AB 617 BARCT Rule Development Schedule (2018), SBAPCD, pg. 8

AB 617 BACT/BARCT Implementation Plan - Community Update (2019), SLOAPCD, pg. D-3-8

Rule 69.4.1. Stationary Reciprocating Internal Combustion Engines (2020), SDAPCD, pg. 8

Rule 1110.2, Emissions from Gaseous and Liquid-Fueled Engines (2019), SCAQMD, pg. 5

Rule 1110.2 Staff Report (2019), SCAQMD

Staff Report Rule 3.22: Stationary Internal Combustion Engines (2020), FRAQMD, pg. 5

Communication with SCAQMD Air Quality Specialist Rodolfo Chacon (2020)