

Technical Support Document for Revision to State Implementation Plan – Consent Order No. 20463, Algonquin Gas Transmission, LLC

The Commissioner of the Department of Energy and Environmental Protection (“Department”) intends to issue Consent Order (“CO”) No. 20463 to Algonquin Gas Transmission, LLC (“Algonquin”) to establish an enforceable limitation on the emission of volatile organic compounds (“VOC”) from the facility at 40 Woodruff Hill Rd, Oxford, Connecticut, pursuant to Regs., Conn. State Agencies § 22a-174-32(c)(1).

This State Implementation Plan (“SIP”) action is proposed to satisfy applicable requirement of Regs., Conn. State Agencies § 22a-174-32. The order will be presented to the Administrator of the U.S. Environmental Protection Agency (“EPA”) for approval in accordance with the provisions of Title 42, U.S. Code (“USC”), Section 7401, *et seq.*

I. Background

The Algonquin pipeline is the largest natural gas pipeline in New England. Natural gas is compressed along the 1,129-mile system at several compressor stations¹ on the pipeline. Algonquin owns and operates three compressor stations in Connecticut, in Chaplin, Cromwell, and Oxford. Each of these compressor stations operates under a Title V permit issued by the Department and is located in a serious (Chaplin) or severe (Oxford and Cromwell) ozone nonattainment area. At issue in this action, Algonquin’s Oxford compressor station (hereinafter referred to as the “Oxford facility”), which is located at 40 Woodruff Hill Rd, Oxford, New Haven County, Connecticut, is a major source of nitrogen oxides (“NOx”), carbon monoxide (“CO”), and volatile organic compounds (“VOC”) and operates under Department-issued Title V permit no. 144-0032-TV.

As Connecticut is in nonattainment of various National Ambient Air Quality Standards (“NAAQS”) for ozone and is located in the Ozone Transport Region, the Department is required under Clean Air Act (“CAA”) §§ 182 and 184 (42 USC §§ 7511a and 7511c) to implement a reasonably available control technology (“RACT”) program for major sources of ozone precursor pollutants NOx and VOC and for certain minor VOC sources covered by an EPA Control Techniques Guidelines (“CTG”) document. NOx RACT is codified at Regs., Conn. State Agencies § 22a-174-22e for most fuel-burning source categories and at Regs., Conn. State Agencies § 22a-174-38 for municipal waste combustors; major source VOC RACT is codified at Section 22a-174-32 of the Regulations, and VOC RACT for CTG sources is codified at Section 22a-174-20 of the Regulations. RACT, in the context of Connecticut’s rules, is “the lowest emission limitation that a particular stationary source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.”²

Algonquin maintains and operates both combustion and non-combustion sources of air pollution at its compressor stations. The Oxford facility, in particular, includes the following natural gas-

¹ Except where otherwise noted, any reference to “compressor station” herein applies to a compressor station in the natural gas transmission and storage segment, not to an upstream/production or midstream/processing compressor station.

² See: Regs., Conn. State Agencies § 22a-174-1(98)

fired combustion sources: four turbines, each of which operates under a New Source Review (“NSR”) permit and drives a centrifugal compressor; an emergency generator; and multiple small, ancillary fuel-burning units, including boilers and process heaters. Non-combustion sources at the Oxford facility include the four aforementioned centrifugal compressors; multiple organic liquids storage tanks and vessels; organic liquids truck loading; fugitive emissions from piping components; pneumatic controllers; compressor unit blowdowns; station blowdowns; and a parts washer.

With the exception of the parts washer, these non-combustion sources constitute “nonexcludable” emission sources for the purposes of major source VOC RACT applicability under Regs., Conn. State Agencies § 22a-174-32. The combustion sources and parts washer, on the other hand, are considered “excludable” emission sources and are not counted toward VOC RACT applicability under Regs., Conn. State Agencies § 22a-174-32. Most often, excludable emissions are those that result from fuel combustion or are subject to a Best Available Control Technology (“BACT”) or Lowest Achievable Emission Rate (“LAER”) limitation in an NSR permit; the National Emission Standard for Hazardous Air Pollutants (“NESHAP”) at Title 40, Code of Federal Regulations (“CFR”), Part 63; or one of Connecticut’s CTG RACT rules.

In general, VOC RACT is triggered under Regs., Conn. State Agencies § 22a-174-32 when potential nonexcludable emissions exceed the applicable major source threshold for VOC, identified at Regs., Conn. State Agencies § 22a-174-32(b)(1)(A) and (B).³

II. Applicability of VOC RACT to Oxford facility

On October 7, 2022, pursuant to CAA § 181(b)(2) (42 USC §§ 7511(b)(2)), EPA issued a final rule (87 Federal Register [“FR”] 60926) to reclassify three Southwest Connecticut counties from “serious” to “severe” nonattainment for the 2008 NAAQS for ground-level ozone. This rule became effective on November 7, 2022. The redesignated nonattainment area (“NAA”) includes Middlesex, New Haven, and Fairfield Counties. EPA’s reclassification of the Southwest Connecticut NAA area from serious to severe nonattainment reduced the major source thresholds for NO_x and VOC in such NAA from 50 to 25 tons per year (“tpy”) on a premises-wide potential-to-emit (“PTE”) basis.

Based on the federal reclassification of the three aforementioned counties, on November 13, 2023, the Department revised the definition of “severe non-attainment area for ozone” at Regs., Conn. State Agencies § 22a-174-1(106) to incorporate 43 additional towns, including Oxford. Prior to this revision, Oxford was included in Connecticut’s serious nonattainment area for ozone, and the applicable major source threshold for VOC was 50 tpy. With the revision, the major source threshold in Oxford decreased to 25 tpy-VOC. This definition is incorporated by reference in Connecticut’s major source VOC RACT rule at Regs., Conn. State Agencies § 22a-174-32(b)(1)(B).

³ RACT applicability under Regs., Conn. State Agencies § 22a-174-32 is defined separately for the wood furniture manufacturing and aerospace manufacturing and rework source categories and is not necessarily tied to the applicable major source threshold in these cases; see: Regs., Conn. State Agencies § 22a-174-32(b)(1)(C) and (D).

Potential nonexcludable VOC emissions at the Oxford facility exceed the 25 tpy-VOC major source threshold. Specifically, Algonquin indicated that the Oxford facility has potential nonexcludable VOC emissions of approximately 43 tpy. Consequently, with the promulgation of the aforementioned regulatory amendment to Regs., Conn. State Agencies § 22a-174-1(106), the Oxford facility became subject to major source VOC RACT under Regs., Conn. State Agencies § 22a-174-32.⁴

Under Connecticut’s major source VOC RACT rule, the owner or operator of an affected source must submit a VOC RACT compliance plan within six months of becoming subject to the provisions of such rule. Furthermore, the owner or operator of an affected source must implement RACT no later than one year after becoming subject to the provisions of such rule. Alternatively, pursuant to Regs., Conn. State Agencies § 22a-174-32(c)(1), the Department may issue a permit or order limiting potential premises-wide VOC emissions below the relevant applicability threshold at Regs., Conn. State Agencies § 22a-174-32(c)(1), provided that actual VOC emissions from the premises have not exceeded the applicable threshold in any year after December 31, 1995, in lieu of requiring implementation of RACT. The actual emission cap includes emissions that are otherwise excludable for the purposes of determining RACT applicability.

On May 9, 2024, Algonquin submitted a written request to the Department for a CO to limit premises-wide VOC emissions to less than 25 tons per year, pursuant to Regs., Conn. State Agencies § 22a-174-32(c)(1). This submission is included in Appendix A to this Technical Support Document (“TSD”).

III. Historical VOC emissions from Oxford facility

Pursuant to Regs., Conn. State Agencies § 22a-174-32(c)(2), an entity that is seeking a permit or order to limit premises-wide VOC emissions below the applicable threshold in lieu of implementing a RACT method must demonstrate that historical VOC emissions have not exceeded such threshold since December 31, 1995. The regulation further provides that “[t]he commissioner may require the submittal of documentation of actual emissions from another period of time in order to determine representative actual emissions.”

According to Department records, the Oxford facility was constructed in 2008 and became subject to Title V permitting in 2019. Historical premises-wide VOC emissions since the Oxford facility became a Title V source are shown in Table 1.

Table 1: Oxford facility historical premises-wide VOC emissions

Year	Premise-wide actual VOC emissions (tons)
2019	13.47
2020	12.07
2021	12.82
2022	12.49
2023	12.70
2024	12.46

⁴ See: Regs., Conn. State Agencies § 22a-174-32(b)(1)(B)

Emissions from 2019 through 2023 were reported by Algonquin for the purposes of this action and are corroborated by Title V annual emission statements previously submitted to and accepted by the Department. Emissions from 2024 were likewise reported in Algonquin's Title V annual emission statement, as submitted to the Department on February 28, 2025.

Prior to becoming a Title V source, the Oxford facility operated under Registration No. 144-0022-General Permit to Limit Potential Emissions ("GPLPE"), a synthetic minor general permit that has since expired. Over the course of the Oxford facility's coverage under the GPLPE, average annual VOC emissions from the facility were 3.425 tons, with 2018 being the highest-emitting calendar year at 4.99 tons of VOC.

Because historical premises-wide VOC emissions have not exceeded 25 tpy, the Oxford facility is eligible to operate under a CO limiting premises-wide VOC emissions below 25 tpy in lieu of implementing a RACT method identified at Regs., Conn. State Agencies § 22a-174-32(e)(1).

IV. Other administrative requirements for emission limitation

Pursuant to Regs., Conn. State Agencies § 22a-174-32(c)(2), an entity that is seeking a permit or order to limit premises-wide VOC emissions below the applicable threshold in lieu of implementing a RACT method must submit the information required at § 22a-174-32(d)(2)(B) through (E), including a description of each piece of VOC-emitting equipment at the premises; the maximum rated capacity of each such piece of equipment; potential VOC emission data; and a certification of truth, accuracy, and completeness. Algonquin's submissions to this effect are included in Appendices B and C to this TSD and were provided to the Department on May 10, 2024, and January 24, 2025, respectively.

V. Premises-wide VOC emission limitation

Pursuant to Regs., Conn. State Agencies § 22a-174-32(c)(3): "If the commissioner issues an individual permit, general permit or order pursuant to this subsection, such permit or order shall require that the emissions of VOCs from a premises not exceed the VOC emissions levels set forth in subdivision (1) of this subsection or a level established by the Administrator in a final CTG... The commissioner shall require a permittee or any person subject to an order of the commissioner under this subdivision to make and keep records, as may be necessary, to demonstrate compliance with the emission limitations set forth in subdivision (1) of this subsection."

To this end, proposed CO No. 20463 would establish a premises-wide annual VOC emission limitation at the Oxford facility of 24 tpy. The order would require that Algonquin make records necessary to calculate actual VOC emissions from each emission unit on site, calculate monthly and annual VOC emissions from each emission unit and from the premises, and submit annual emission reports to the Department.

The order would not absolve Algonquin of its responsibility to comply with any applicable CTG rule at Regs., Conn. State Agencies § 22a-174-20. Furthermore, the 2016 oil and gas CTG⁵ does not contain presumptive RACT standards for natural gas compressor stations; it focuses, instead, on more VOC-intensive segments of the oil and gas sector, such as oil and natural gas production and processing. No CTG or combination of CTGs would provide for a premises-wide emission limitation below the applicable major source and VOC RACT applicability threshold.

Described below is the mathematical methodology that Algonquin has used to calculate historical VOC emissions from each category of emission unit at the Oxford facility:

- (a) In general, for its turbines⁶ in steady-state operation as well as for its emergency engine, boilers, and process heaters, Algonquin scales the relevant AP-42 VOC emission factor to the ratio of the manufacturer-guaranteed TOC emission factor to the AP-42 TOC emission factor, using the following equation:

$$EF_{\text{VOC-scaled}} = (EF_{\text{VOC-AP42}})(EF_{\text{TOC-MFG}}/EF_{\text{TOC-AP42}})$$

Turbine startup, shutdown, transient, and other emission factors are based on Product Information Letter data.

- (b) Algonquin calculates volatile organic liquids storage and loading emissions using the relevant chapters of AP-42 in conjunction with EPA's TANKS model, as applicable.
- (c) Algonquin calculates emissions from compressor seals, pneumatic controllers, compressor unit blowdowns, and station blowdowns based on engineering estimates with respect to the volume of gas vented or otherwise released, tailored to the tested physical properties and VOC content of the natural gas in the Algonquin system.
- (d) Algonquin calculates fugitive emissions from piping components based on emission factors from EPA's Protocol for Equipment Leak Emission Estimates, Table 2-4, Oil & Gas Operations, tailored to the tested physical properties and VOC content of the natural gas in the Algonquin system.
- (e) Algonquin calculates emissions from the parts washer based on solvent usage and solvent VOC content.

The order would require that VOC emissions be calculated as follows:

- (f) Stationary gas turbines (combustion): If available, site-specific data based on direct measurement shall be used for emission calculations. If such data are not available, emissions shall be calculated based on vendor emission data in conjunction with Environmental Protection Agency ("EPA") AP-42 emission factors, as warranted.
- (g) Natural gas-fired reciprocating engines (combustion): If available, site-specific data based on direct measurement shall be used for emission calculations. If such data are not available, emissions shall be calculated based on vendor emission data in conjunction with EPA AP-42 emission factors, as warranted.
- (h) Boilers and process heaters: If available, site-specific data based on direct measurement shall be used for emission calculations. If such data are not available, emissions shall be

⁵ See: https://www3.epa.gov/airquality/ctg_act/2016-ctg-oil-and-gas.pdf

⁶ The turbine identified as "EU-4" in Title V permit no. 144-0032-TV and operating under NSR permit no. 144-0029 is subject to stack testing for VOC; the steady-state emission factor is, therefore, based on test results.

calculated based on vendor emission data in conjunction with EPA AP-42 emission factors, as warranted.

- (i) Organic liquids storage vessels: If available, site-specific data based on direct measurement shall be used for emission calculations. If such data are not available, emissions shall be calculated using good engineering principles based on EPA AP-42 in conjunction with generally accepted tank emission simulation software as well as flash analysis, as warranted.
- (j) Organic liquids loading: If available, site-specific data based on direct measurements shall be used for emission calculations. If such data are not available, emissions shall be calculated using good engineering principles based on EPA AP-42 in conjunction with generally accepted tank emission simulation software, as warranted.
- (k) Compressor seals: If available, site-specific data based on direct measurements shall be used for emission calculations. If such data are not available, emissions shall be calculated based on good engineering principles, tailored to the tested physical properties and VOC content of the natural gas in the Algonquin system.
- (l) Piping components: If available, site-specific data based on direct measurements shall be used for emission calculations. If such data are not available, emissions shall be calculated based on EPA's Protocol for Equipment Leak Emission Estimates, tailored to the tested physical properties and VOC content of the natural gas in the Algonquin system.
- (m) Pneumatically actuated controllers: If available, site-specific data based on direct measurements shall be used for emission calculations. If such data are not available, emissions shall be calculated based on good engineering principles, tailored to the tested physical properties and VOC content of the natural gas in the Algonquin system..
- (n) Blowdowns and other gas release events: Emissions shall be calculated per event based on direct measurement or estimation of the amount of natural gas vented in conjunction with the tested physical properties and VOC content of the natural gas.
- (o) Parts washer: Emissions shall be calculated based on material balance.
- (p) Emissions from any other category of emission unit shall be calculated based on direct measurement or, if such data are not available, good engineering principles.

VI. Conclusion

Proposed CO No. 20463 would limit premises-wide annual VOC emissions at the Oxford facility to 24 tons.

The draft, unsigned order and the SIP revision to incorporate such order, if executed, will be publicly noticed for 30 days pursuant to the provisions to 42 USC 7401, *et seq.*, with an opportunity for a public hearing if one is so requested. The administrative record for the SIP revision will include a copy of the draft order, this TSD, and copies of Algonquin's request for said order and supporting technical information and documentation furnished by Algonquin in response to the Department's inquiries.