COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

In the Matter of	)	**OADR Docket Nos. 2019-008 - 2019-013**
	)	**DEP File No.: Air Quality Application**
	)	**No. SE-15-027**
Algonquin Gas Transmission, LLC	)	**Weymouth, MA**

PRE-FILED DIRECT TESTIMONY OF L. BARRY GOODRICH

I, L. Barry Goodrich, hereby state as follows:

1. I am a Senior Engineer in the Air Permitting group at Enbridge, Inc. ("Enbridge"). My business address is 5400 Westheimer Court, Houston, TX 77056. I am providing this testimony on behalf of the Applicant, Algonquin Gas Transmission, LLC ("Algonquin").[1/]

2. I have a Bachelor of Science and a Master of Science in Biological and Agricultural Engineering from Texas A&M University in College Station, Texas.

3. I have worked for Enbridge since 2011. I am responsible for overseeing air permitting for the northern portion of Enbridge's gas transmission system, which spans 17 states, and includes the Algonquin system. I am responsible for obtaining air permits for capital projects, maintenance projects and renewals.

4. As part of my responsibilities, and consistent with my knowledge and experience, I routinely direct and conduct analyses of the best available (air pollution) control technology

1/ Algonquin is a subsidiary of Enbridge.

("BACT") for compressor stations.

5. Pursuant to the Massachusetts Department of Environmental Protection ("MassDEP") Commissioner Suuberg's June 12, 2020 and June 24, 2020 Orders, Algonquin submitted on July 24, 2020 an Addendum to its Non-major Comprehensive Plan Application (the "Addendum") with respect to the construction and operation of a natural gas-fired compressor station and associated facilities in Weymouth, Massachusetts (the "Facility"). The Addendum demonstrates that an electric motor drive ("EMD") alternative is not BACT for the Taurus 60 turbine element of the Facility. I personally participated in and directed the completion of the Addendum and determined that the substance of the Addendum was accurate and appropriate for the purpose of making this demonstration.

6. As a condition of issuing an Air Quality Plan Approval for a Non-Major Comprehensive Plan Application ("NMCPA") under 310 CMR 7.02(5), MassDEP determines the BACT for the Facility that is the subject of the application. An applicant may provide, among other things: (a) a Top-Down, case-by-case analysis of BACT; or (b) a Top Case BACT (BACT as defined by the level of control from the most recent plan approval or other action issued by the Department). *See* BACT Guidance (June 2011), https://www.mass.gov/files/documents/2016/08/oo/bactguid.pdf.

7. Prepared with my participation and direction, the Addendum includes a Top Case BACT Analysis in Section 3.1. As specified at 310 CMR 7.02(8)(a)(2)(a), Algonquin identifies lean premix or dry low NOx combustion technology with an oxidation catalyst as the "level of control from the most recent plan approval or other action issued by the Department" for a natural gas fired stationary combustion turbine and, therefore, the appropriate Top Case BACT.

8. In Section 3.2, the Addendum demonstrates that MassDEP's regulations and Top Case BACT Guidelines confirm that an EMD is properly excluded from Top Case BACT, thus precluding the need for any top-down analysis.

9. Alternatively, and as an additional ground for excluding EMD as BACT, the Addendum details Algonquin's top-down BACT analysis in Section 4 demonstrating that EMD is not BACT for two independent reasons: (1) in Step 1 of the top-down BACT analysis, EMD would improperly substitute or redefine the source under Massachusetts regulations and guidance; and (2) under Step 4 of the top-down BACT analysis, EMD is not a cost-effective control and would have other significant energy and environmental impacts.

10. The Top Case BACT analysis and Step 1 of the top-down BACT analysis are discussed in the testimony of Wendy Merz, our Project Manager at Trinity Consultants, who prepared the NMCPA for the Facility as well as subsequent submittals related to that application.

11. I provide testimony herein concerning Step 4 of the top-down BACT Analysis of an EMD alternative, which includes the evaluation of economic, environmental and energy impacts of the EMD alternative, and which I participated in or directed.

12. The environmental, energy, and economic impacts associated with the EMD alternative, as compared to the proposed natural gas-fired turbine, are presented in Section 4.4 of the Addendum.

13. Before Step 4 economic impacts can be estimated, system design parameters must be specified. It is important that the parameters used, such as upper bound operating data, are consistent when comparing the cost effectiveness and environmental impacts of control options.

Therefore, for the purposes of this BACT analysis, Algonquin has estimated the economic and environmental impacts of the EMD alternative based on the previously permitted upper bound operating conditions and design parameters for the Taurus 60 turbine, as suggested by the New Source Review ("NSR") Workshop Manual. NSR Workshop Manual, October 1990, pg. B.38-B.39, available here: https://www.epa.gov/sites/production/files/2015-07/documents/1990wman.pdf. For comparing cost effectiveness, the same realistic upper boundary assumptions should be used for both the source in question and other sources (or source categories) that will later be compared during the BACT analysis.

14. Table 4-1 of the Addendum provides the upper bound operating parameters for the EMD used to evaluate the energy, environmental, and economic impacts of the EMD alternative based on the operating parameters presented in Section 4.4 of the Addendum. I participated in or directed the development of Table 4-1 and Section 4.4 of the Addendum and determined that the substance of Table 4-1 and Section 4.4 of the Addendum are accurate and appropriate for this purpose.

15. Energy impacts associated with the use of an EMD are presented in Section 4.4.1 of the Addendum. An EMD must rely on external electric generating capacity that must be transmitted to the location of the EMD. Table 4-2 estimates the electricity distribution losses associated with transmission of electricity to the site. I participated in or directed the development of Table 4-2 of the Addendum and determined that the substance of section 4.4.1 and Table 4-2 of the Addendum are accurate and appropriate for this purpose. The calculations are based on the Environmental Protection Agency's ("EPA's") Emissions & Generation Resource Integrated Database (eGRID) 2018 data, released January 2020 and revised in March 2020, available here: https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid

16. Environmental impacts associated with an EMD are presented in Section 4.4.2 of the Addendum. Because the EMD would be reliant on the electric grid for power, it would result in an increase in emissions from the power plants supplying that power. I participated in or directed the development of Section 4.4.2 of the Addendum and determined that the substance of Section 4.4.2 is accurate and appropriate for this purpose. To estimate indirect emissions resulting from replacement of the Compressor Station's natural gas-fired Taurus turbine with an EMD, we used the most recent output-based emission rates from EPA's eGRID for the NPCC New England eGRID Subregion (NEWE), https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid, which are reflected in Table 4-3 of the Addendum. I also participated in or directed the development of Table 4-3 of the Addendum and determined that the substance of Table 4-3 of the Addendum is accurate and appropriate for this purpose. This emission factor basis was selected since it best represents the geographical location of the Compressor Station.

17. According to my review of data provided in "2018 ISO New England Electric Generator Air Emissions Report," May 2020, the 2018 annual average generator emission rates in the Commonwealth of Massachusetts for NOx (0.48 lb/MWh) were significantly higher than the regional average reflected in the eGRID data, while the SO_2 emission rate (0.12 lb/MWh) was slightly lower than the regional average. *See* https://www.iso-ne.com/static-assets/documents/2020/05/2018_air_emissions_report.pdf

18. The eGRID emission factors in Table 4-3 were multiplied by the maximum electricity required to power the EMD, which is derived in Table 4-2 from the maximum mechanical output specified for the Solar Taurus 60 natural gas turbine in the NMCPA, to estimate indirect emissions from the operation of an EMD alternative. Table 4-4 of the Addendum presents a comparison of the proposed natural gas-fired turbine potential emissions to the emissions

generated offsite for powering an equivalent EMD, which are further described in Section 4.4.2. I participated in or directed the development of Table 4-4 of the Addendum and determined that the substance of Table 4-4 is accurate and appropriate for this purpose.

19. Section 4.4.2 also identifies increased land disturbance and visual impacts that would be associated with an EMD alterative.

20. Section 4.4.3 of the Addendum provides our Economic Feasibility Analysis, which compares total costs (capital and operating) for an EMD alternative to the proposed SoLoNOx Taurus 60 turbine. I participated in or directed the development of Section 4.4.3 of the Addendum and determined that the substance of Section 4.4.3 of the Addendum is accurate and appropriate for this purpose. Capital costs include the initial cost of the components intrinsic to the complete control system. Annual operating costs include the costs to operate the control system on an annual basis and include, maintenance, and utilities.

21. Our analysis quantifies the total cost of the SoLoNOx Taurus 60 turbine compressor driver option and the total cost of the EMD compressor driver option; the cost differential between these options is then used to evaluate the economic impact. The cost analyses that formed the basis of this evaluation are included in Appendix C of the Addendum. I participated in or directed the development of Appendix C of the Addendum and determined that the substance of Appendix C is appropriate for this purpose.

22. The first step of the Economic Feasibility Analysis was to specify the control system battery limits. Consistent with the NSR Workshop Manual (p. B33) and EPA's OAQPS Cost Control Manual, the battery limits for this analysis include the prime mover (*i.e.*, EMD or gas-fired Taurus 60 turbine) and compressor package as well as any additional infrastructure required

for the operation of the prime mover. *See* EPA Air Pollution Control Cost Manual, Section 1, Chapter 2: Cost Estimation: Concepts and Methodology, US EPA OAQPS, November 2017, https://www.epa.gov/sites/production/files/2017-12/documents/epaccmcostestimationmethodchapter_7thedition_2017.pdf. The costs considered for the natural gas-fired turbine and the EMD alternative are categorized in Section 4.4.3 of the Addendum.

23. The analysis presented in Section 4.4.3 is intended to ensure that the costs for both the natural gas-fired turbine and the EMD alternative were analyzed on a comparable or equivalent basis. For example, as illustrated in Table 4-2 of the Addendum, the maximum annual quantity of electricity required at the Compressor Station to power the EMD alternative is derived from the maximum annual mechanical output to the pipeline compressor specified for the Solar Taurus 60 natural gas turbine in the NMCPA, which is the basis for calculating the maximum annual quantity of natural gas consumed for the Taurus 60 turbine option.

24. The costs of electricity vs. natural gas are based on Algonquin-specific data from the same time period, calendar year 2019. According to EPA Air Pollution Control Cost Manual, Chapter 2 – SCR (June 2019), when estimating direct annual operating costs, current price of these commodities should be used and industrial plants should use prices from their latest utility bills.

25. The Total Capital Investment ("TCI"), is described in Section 4.4.3.1 of the Addendum.

26. Table 4-6 of the Addendum provides a comparison of the total capital costs associated with both an EMD and SoLoNOx Turbine. I participated in or directed the development of Table 4-6 of the Addendum and determined that the substance of Table 4-6 is appropriate for

this purpose. With the exception of certain costs addressed herein, the cost estimates that are the basis for the cost comparisons are the subject of the testimony of John Heintz, the Project Manager for the Atlantic Bridge Project, which testimony was filed with the Addendum.

27. As set forth in Table 4-6 of the Addendum, there are $12,242,077 of additional capital costs associated with the EMD over and above the capital costs associated with the SoLoNOx turbine.

28. The Total Annual Costs are the expenses associated with the annual operation of the different compressor driver options and are the sum of direct annual costs and indirect annual costs.

29. Algonquin's Direct Annual Costs (Operating Costs) are discussed in Section 4.4.3.2.1 of the Addendum and include maintenance costs as well as utility costs.

30. The costs associated with the natural gas used to fuel the gas turbine are based on an average price representative of the costs that Algonquin incurred for gas combusted throughout 2019, and are the subject of the testimony of Christopher Harvey, Director, Rates and Certificates, Regulatory Affairs, for Enbridge, which testimony was filed with the Addendum.

31. To estimate the cost of electricity for the EMD alternative, we multiplied the maximum annual electricity requirements by the average industrial rate in Massachusetts for 2019 based on EIA data, which is available here: https://www.eia.gov/electricity/data/browser/#/topic/7?agg=0,1&geo=002&endsec=i&freq=A&start=2001&end=2019&ctype=linechart&ltype=pin&rtype=s&maptype=0&rse=0&pin=.

32. Solar Turbines provided an estimate of the additional annual maintenance costs for

a gas turbine driver which are over and above the annual maintenance costs for an EMD driver of $207,403 per year. A copy of Solar's July 23, 2020 letter to B.Goodrich is attached hereto as Ex. 1.

33. A comparison of the direct annual costs associated with an EMD compressor driver vs. a SoLoNOx Taurus Turbine compressor driver is shown in Table 4-7. I participated in or directed the development of Table 4-7 of the Addendum and determined that the substance of Table 4-7 is appropriate for this purpose.

34. Algonquin's indirect annual costs are independent of the level of production (*i.e.*, they are "fixed" costs) and include categories such as administrative charges, property taxes, insurance, administrative charges including permitting costs and capital cost amortized into capital recovery. Because indirect annual costs associated with property taxes, insurance and the administration costs associated with the operation of each option do not vary significantly, these costs were not included in the economic evaluation.

35. Indirect annual costs also include annualized capital costs. To annualize capital costs, an interest rate and project life must be estimated to determine the capital recovery factor ("CRF"). This is used to convert capital cost estimates into equivalent annualized costs, and, therefore, it is included in our assessment of annual costs. When the CRF is multiplied by the total capital investment, the product is the uniform end-of-year payment necessary to repay the investment in a defined amount of years. Our CFR calculation is described in Section 4.4.3.2.2 of the Addendum. A 10.137% after tax interest rate was selected for this evaluation as OAQPS Cost

Control Manual recommends applying a nominal interest rate, which is the rate firms actually face.[2/] Algonquin's rate of return is the subject of Christopher Harvey's testimony, filed with the Addendum. Total annual costs are then calculated by summing together the direct annual cost of replacing the proposed SoLoNOx Taurus 60 turbine with an EMD (derived in Table 4-7) and the annual capital recovery on the total capital investment (derived in Table 4-6) to determine a single annualized cost estimate as shown in Table 4-8. I participated in or directed the development of Table 4-8 of the Addendum and determined that the substance of Table 4-8 is appropriate for this purpose.

36. In addition to cost, the economic feasibility of a control option depends on the amount of pollutant removed. This component of the equation is directly related to assumed baseline emissions. For the reasons presented in section 4.4.3.3.1. of the Addendum, the Solar Taurus 60 gas turbine using SoLoNOx technology provides the baseline emissions here.

37. The administrative record includes the baseline emissions rate for the SoLoNox Taurus 60 gas turbine, which are reflected in Table 4-9 of the Addendum. I participated in or directed the development of Table 4-9 of the Addendum and determined that the substance of Table 4-9 is appropriate for this purpose.

38. Average cost effectiveness is calculated as the total annualized cost of the control divided by the annual emissions reductions, or the difference between the baseline emission rate and the controlled emission rate. The formulas that Algonquin used to calculate average cost

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2/ *EPA Air Pollution Control Cost Manual*, *Chapter 2*, Nov. 2017, pg 15, available here: https://www.epa.gov/sites/production/files/2017-12/documents/epaccmcostestimationmethodchapter_7thedition_2017.pdf

effectiveness are set forth in Section 4.4.3.3.2 of the Addendum.

39. As shown in Table 4-10 of the Addendum, the cost effectiveness of the EMD alternative is beyond what MassDEP considers economically feasible (defined in MassDEP's BACT Guidance as between $11,000 and $13,000 for NOx and VOC and $4,000 to $6,000 for SO_2, CO, and $PM_{10/2.5}$). I participated in or directed the development of Table 4-10 of the Addendum and determined that the substance of Table 4-10 is appropriate for this purpose.

40. As shown in Table 4-11 of the Addendum, the multipollutant cost effectiveness of and EMD is also above what MassDEP considers economically feasible. I participated in or directed the development of Table 4-11 of the Addendum and determined that the substance of Table 4-11 is appropriate for this purpose.

41. As an alternative, Algonquin evaluated other emissions information for lean premix technology to determine a more conservative upper bound for this type of turbine design. For this alternative baseline analysis, Algonquin references the lean premix emission rates in the EPA's AP-42: Compilation of Air Emissions Factors, Chapter 3.1, Stationary Gas Turbines which were published in 2000, and available here: https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s01.pdf. Specifically, for NOx, the lean premix emission rate is 9.9 x 10-2 lbs/MMBTU, which is approximately 25 ppm NOx for the proposed unit.

42. According to Solar Turbines, Solar offers the Taurus 60 7802S with three different emissions levels for natural gas pipeline applications in the U.S.: 25, 15 and 9 ppm NOx @15% O2. A copy of Solar's July 16, 2020 letter to B. Goodrich is attached hereto as Ex. 2.

43. While the New Source Performance Standard ("NSPS") KKKK NOx emission limit for this turbine is 25 ppm, 40 CFR Part 60 Subpart KKKK, the AP-42 emission rate (published in 2000) is independent from and predates the NSPS limit (71 FR 38497, July 6, 2006, Docket No. EPA-HQ-OAR-2004-0490, available here https://www.epa.gov/stationary-sources-air-pollution/stationary-gas-and-combustion-turbines-new-source-performance). A review of the NSPS KKKK docket suggests that this limit was set to the level achievable by modern lean premix gas combustion turbines. As such, the proposed alternative baseline emissions are not limited by the NSPS, but rather the EPA established the NSPS at the rate that was achieved by uncontrolled lean premix turbines at its time of promulgation.

44. To ensure conservatism, Algonquin has undertaken an alternative cost effectiveness calculations assuming that Solar's advancements of SoLoNOx are not taken into account, and the generic and "uncontrolled" capability of lean premix units is applied at approximately 25 ppm NOx.

45. This is consistent with a technical deficiency letter issued by MassDEP on July 24, 2018 related to the permitting of a Mars 100 natural gas-fired turbine for the Hopkinton LNG Plant, in which the Department asked for the following:

> *Explanation of whether the proposed SoLoNOx combustors for the proposed BACT emissions of nitrogen oxides is an add-on optional feature or an integral part of the turbine. If it is an add-on optional feature, then you will need to recalculate the cost-effectiveness of selective catalytic reduction (SCR) for nitrogen oxides (NOx), based on a starting point of 25 parts per million (ppm) of NOx being reduced to the level of control achievable by a combination of SoLoNOx burners and SCR.*

A copy of MassDEP's July 24, 2018 letter is attached here to as Ex. 3.

46. Section 4.4.3.3.4 of the Addendum explains how we calculated the alternative baseline emissions. The alternative baseline annual emission rates for a natural gas turbine are

shown in Table 4-12 of the Addendum. I participated in or directed the development of Table 4-12 and determined that the substance of Table 4-12 is appropriate for this purpose.

47. As shown in Tables 4-13 and 4-14 of the Addendum, the cost effectiveness of the EMD alternative using the alternative baseline is beyond that which MassDEP considers economically feasible. I participated in or directed the development of Tables 4-13 and 4-14 of the Addendum and determined that the substance of Tables 4-13 and 4-14 are appropriate for this purpose.

48. Section 4.4.3.3.5 of the Addendum provides a cost effectiveness sensitivity analysis to test cost effectiveness. The cost effectiveness sensitivity analysis demonstrates that even when considering the co-benefits from other pollutant reductions, the use of EMD at the facility is not economically feasible. As explained in that section, Algonquin determined the baseline emissions would have to exceed 558.4 tpy to reach the maximum cost effectiveness thresholds of $13,000 per ton (NOx and VOC) and $6,000 per ton (CO, SO_2, and $PM_{10/2.5}$).

49. There is no reasonable basis for concluding that the appropriate baseline emissions level for calculating average cost effectiveness here would exceed 558.4 tpy. Furthermore, even if the appropriate baseline for calculating average cost effectiveness exceeded 558.4 tpy, that would indicate that an incremental-cost-effectiveness analysis, rather than an average-cost-effectiveness analysis, is appropriate. MassDEP's BACT guidance provides that "[i]ncremental control cost differences can be used" when "comparing two control techniques or technologies with very similar levels of reduction for the same air contaminant." If the applicable NOx baseline emission levels exceeded 558.4 tpy, the over 98% level of reduction achieved by SoLoNOx (*i.e.*, reduction to 10.03 tpy of NOx) would be "very similar" to an EMD's 100% level of reduction. Under those

circumstances, an incremental cost analysis would be appropriate, and the results of that incremental analysis would be the same as the cost-effectiveness analysis presented in Section 4.4.3.3.2. *See* NSR Workshop Manual at B.41 (formula for calculating incremental cost effectiveness).

Signed under the pains and penalties of perjury on July 23, 2020.

L. Barry Goodrich

EXHIBIT 1

Solar Turbines

A Caterpillar Company

Solar Turbines, Inc.
10203 Sam Houston Park Dr
Suite 300
Houston, Texas 77064

Date 7-23-2020

To: Mr. Barry Goodrich

Re: 3W102-HO15-0023-Weymouth-Technical Proposal-160201

Dear Mr. Goodrich,

For Annual Maintenance Costs, based on operating 8760 hrs per year, including condition-based overhauls, the estimated cost difference between the T60-C33 Compressor Set and the Spartan Electric Motor Drive Compressor Set is $207,403.11 per year with the Motor Drive being less.

Thank you for your consideration.

Best Regards,
Mike Clay
Account Manager
Solar Turbines Inc.

EXHIBIT 2

Solar Turbines Incorporated

9330 Sky Park Court
San Diego, CA 92123
Tel: (858) 694-1616

Submitted Electronically

July 16, 2020

Barry Goodrich
Barry.Goodrich@enbridge.com

RE: Weymouth Compressor Station
Taurus 60 Options

Dear Mr. Goodrich:

Solar Turbines offers the Taurus 60 7802S with three different emissions levels for natural gas pipeline applications in the U.S.: 25, 15 and 9 ppm NOx @15% O_2.

Outside of the U.S., the Taurus 60 7802S is also commercially available at a 38 ppm NOx level for natural gas pipeline applications. This option has not been newly applied in the U.S. since February 18, 2005.

For different fuels and applications that are not compatible with the natural gas pipeline offerings, Solar Turbines offers a Taurus 60 with an inherently different combustion system to accommodate the different applications.

Please feel free to contact me at 858.694.6609 if you have any questions or need any additional information.

Sincerely,
Solar Turbines Incorporated
Leslie Witherspoon
Manager Environmental Programs
witherspoon_leslie_h@solarturbines.com

EXHIBIT 3

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
Central Regional Office • 8 New Bond Street, Worcester MA 01606 • 508-792-7650

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

July 24, 2018

Miguel Rodriguez
Hopkinton LNG Corp.
157 Cordaville Road
Southborough, MA 01772

City/Town: Hopkinton
Re: **Technical Deficiency**
Program Identifier: FMF No. 130904
ePlace Application #17-AQ02/03F-000006-APP
Facility Name: Hopkinton LNG Corp.
Authorization Type: Comprehensive Plan Approval

Dear Mr. Rodriguez:

The Central Regional Office of the Massachusetts Department of Environmental Protection ("MassDEP") has completed its Technical Review of the application for the above-referenced authorization and determined that, based on information presently in the record, the application is technically deficient.

The additional information required by MassDEP is listed below:

1. Further justification of the proposed Best Available Control Technology (BACT) for the proposed Solar Mars 100 combustion turbine, including the following:

   A. Additional justification for why an add-on oxidation catalyst for control of carbon monoxide and organic compounds is not technically feasible and/or cost effective, given that similar combustion turbines have currently had such add-on oxidation catalyst installed and operated successfully.

   B. Explanation of whether the proposed SoLoNox combustors for the proposed BACT emissions of nitrogen oxides is an add-on optional feature or an integral part of the turbine. If it is an add-on optional feature, then you will need to recalculate the cost-effectiveness of selective catalytic reduction (SCR) for nitrogen oxides (NOx), based on a starting point of 25 parts per million (ppm) of NOx being reduced to the level of control achievable by a combination of SoLoNox burners and SCR.

2. Air dispersion modeling results demonstrating that potential emissions from the proposed equipment will not cause exceedances of National Ambient Air Quality Standards

(NAAQS) or MassDEP Allowable Ambient Levels (AALs). In order to properly perform the dispersion modeling, first you will need to address the comments on your first dispersion modeling protocol dated July 2, 2018, sent to you under separate cover by our Boston office modeling group, and resubmit the modeling protocol.

3. The application contains in Table 5-1 an analysis of applicability of Prevention of Significant Deterioration (PSD) to this project, which concludes that all criteria pollutants potential to emit are below PSD thresholds. However, revised calculations from your consultant, most recently dated June 11, 2018, show total NOx emissions at 27.8, which exceeds the PSD threshold of 25.0 tons per year. Please submit a revised PSD analysis showing how this project complies with PSD requirements.

4. The application does not demonstrate how 310 CMR 7.00 Appendix A requirements will apply to this project. As noted in point 3., the revised NOx emissions total is 27.8 tons per year, which exceeds the Appendix A significant emissions increase level of 25 tons NOx per year. Please submit a demonstration that either the net NOx emission increase from the project will be less than 25 tons per year, or that the project emissions achieve the Lowest Achievable Emission Rate (LAER). Include a demonstration of how all criteria pollutants at the facility will be affected by this project (net emissions increase or decrease).

5. Please submit an analysis of how 40 CFR Subpart OOOOa, Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced after September 18, 2015, applies to this project, and a demonstration that the project will comply with all applicable requirements contained therein.

6. Please submit a supplemental form for Afterburner/Oxidizer for the proposed EU18 thermal oxidizer. This may be either the online electronic form or the paper form BWP AQ Oxidizer. In addition to the form, include a full characterization of the exhaust stream to be oxidized, including a description of how the process generates the exhaust stream, flow rate, temperature, and composition (especially what, if any, volatile organic compounds (VOC) and/or hazardous air pollutants (HAP) are expected to be present).

7. Please submit estimates of the quantities of methane, VOC and HAP that will be emitted from equipment leaks and venting.

8. Please submit an estimate of how frequently the combustion turbine is expected to startup and shutdown based on comparison to historical data from the existing LNG liquefaction compressors.

In addition to providing the above items, MassDEP has identified a number of smaller changes or edits that need to be made in the application. MassDEP will send the list of other changes and edits under separate cover.

In accordance with 310 CMR 4.00, you have 180 days from the date of this letter to submit the additional information. However, MassDEP requests that you submit the information as quickly as possible to insure completion of the review in a timely manner. If you fail to submit the additional information within the timeframe above, MassDEP will issue a final decision that your application is deemed withdrawn. You must reapply if you still wish to seek authorization. You will not receive a refund as a result of this action. MassDEP may, at its option, agree to a written request for an extension of the time allowed to submit the additional information, if the request is received within the time specified above.

Should the application, based on submittal of the additional information still be deemed inadequate, MassDEP may request additional information during the course of the Supplemental Technical Review in accordance with 310 CMR 4.04 (2) (b) 3 b.

Further, within 45 days, you may elect in writing to proceed on the application and all supporting materials submitted to date. If you decide to proceed in this manner, you may not modify the application and supporting materials in any way. Following MassDEP's receipt of the request to review the materials without modification, a decision will be issued to grant or deny the permit within 45 days, subject to any adjustment in the schedule according to 310 CMR 4.04 (2) (d) 2, or 4.04 (2) (d) 3 a.

Please submit the additional information requested above with the enclosed Supplemental Transmittal Form as a cover sheet to the submittal to Paul Dwiggins at the letterhead address. Following receipt of the above-mentioned information, MassDEP has 72 days to complete a Supplemental Technical Review.

If you have any questions or comments regarding this matter, please feel free to contact Paul Dwiggins at (508) 767-2760 or paul.dwiggins@state.ma.us.

Sincerely,

Roseanna E. Stanley
Permit Chief
Bureau of Waste Prevention

ec: ERM Consulting