EXECUTIVE SUMMARY

Union Gas Limited ("Union Gas") retained ORTECH Consulting Inc. ("ORTECH") to complete an air assessment of the impact of the following proposed changes at the Bright Compression Station (the Facility) in 2017:

- addition of Plant C (46,000 hp turbine);
- installation of three (3) new emergency generators (each 725 kW, 4-stroke lean burn);
- installation of two (2) new redundant Firewater Pumps (each 129 kW, uncontrolled, diesel);
- installation of two (2) new redundant boilers/line heaters at Plant C Unit Control Building (each 1,800,000 BTU/hr) and two (2) new redundant boilers/line heaters at the Bright Administration Building (each 3,500,000 BTU/hr)
- replacement of an existing boiler (3,500,000 BTU/hr) with a new boiler at the 2nd Administration Building; and
- installation of three (3) new comfort heating units, a water heater and a heated pressure washer at the new Bright Operations Centre.

An updated Emission Summary and Dispersion Modelling ("ESDM") Report (ORTECH Report No. 91755-2-16 dated June 2, 2017) has been prepared as an update of the original ESDM Report for the Bright Compressor Station (ORTECH Report No. 90421-1 Bright ESDM Report dated January 25, 2008), which has assessed the modifications as part of the proposed Plant C expansion proposed by Union Gas in 2017.

During an internal review in 2018, Union Gas has identified that the emergency generator #1 (Source ID: EG1) had been removed in 2015. To address the administration change and addition of the source testing report for Turbine C, an updated ESDSM was prepared on August 21, 2018.

During a site inspection in 2019, Union Gas has identified the following as-built changes, which will be assessed in this ESDM report.

- The stack release type for each firewater pump is changed from vertical to horizontal;
- The stack height for each firewater pump is changed from 4.4m to 4.357 m above the ground;
- The stack inside diameter for each firewater pump is changed from 0.13 m to 0.152 m;
- The exhaust height for Turbine B is changed from 14 m to 19.57 m;
- All the scenarios amended to reflect that only one of two firewater pumps is operated at one time;
- Addition of catalytic converters to three emergency generators (EG4 to EG6).

This report reflects more up-to-date site plans, emission sources and parameters and maximum emission scenario information supplied by Union Gas and considers all sources of air emissions at the site, including emergency power equipment.

The Facility is used to compress natural gas for transmission and storage purposes. The NAICS Code applicable to the Facility is '486210 – Pipeline Transportation of Natural Gas'. Facilities described by this NAICS Code are not listed on Schedules 4 or 5 of Ontario Regulation 419/05 and are therefore, allowed to demonstrate air compliance using Schedule 2 standards until February 1, 2020. However, Union Gas has requested and received a Director's Notice (7353-7G6LPK) under s.20 (4) of O. Reg. 419/05 which requires nitrogen oxides (NO_X) emissions from compressor stations and storage pools to be assessed against Schedule 3 standards.

This ESDM Report follows the requirements of the Ontario Regulation 419/05 Air Pollution – Local Air Quality and the Ontario Ministry of the Environment and Climate Change (Ministry) publications "Procedure for Preparing an Emission Summary and Dispersion Modelling Report, March 2018, Version 4.1," (the Procedure) (PIBs #3614e04.1), and "Air Dispersion Modelling Guideline for Ontario, February 2017, Version 3.0" (the ADMGO) (PIBs #5165e03).

The ESDM report includes the quantification of emission rates for all significant sources of contaminants, specifically NO_X at the Facility and an estimation of the aggregate maximum 1-hour and 24-hour point-of-impingement (POI) concentrations for NO_X under the predictable worst case hour of operation as described below. The NO_X emission rates that have been estimated in this report are for maximum 1-hour and 24-hour operating scenarios as per O. Reg. 419/05 Schedule 3 regulatory requirements. Due to the underlying assumptions used for these scenarios, the emission rates cannot be realistically extrapolated to annual values and should not be used for such purposes.

Union Gas indicate that the Facility design including the proposed Plant C, the predicted worst case hour of operation could see up to three (3) of four (4) compressor plants operating at full load. In the existing state, three plants (A1, A2 and B) could operate simultaneously at full load whereas once Plant C enters service; a number of possible combinations of three plants will be possible (a total of 4 combinations). The dispersion modeling assessment presented in this report considered all possible combinations of three plants operating simultaneously at full load to ensure the Facility emissions meet the applicable limits.

In addition to three plants operating simultaneously, the predicted worst case hour of operation also conservatively considers simultaneous testing of all five (5) emergency generators (at full load) and testing of one (1) of two (2) redundant firewater pumps operating at full load (Note: the firewater pumps are redundant thus only one can operate at a given time). It is noted that the boiler/line heaters, comforting heating and other combustion equipment were deemed negligible and thus excluded from the dispersion modeling assessment.

As shown on Table 1, the predicted maximum NO_X Point of Impingement (POI) concentration resulting from the worst-case hour of operation consisting of three (3) plants (A1, A2, B) operating at full load only **(Scenario 1)** and the worst-case hour of operation consisting of three (3) plants (A1, A2, B) operating at full load **plus** five (5) emergency generators and one (1) firewater pump **(Scenario 2 or Scenario 3)** are below the corresponding Ministry POI limits.

This ESDM Report also includes an assessment of compliance with Ministry Guideline A-5: Atmospheric Emissions from Stationary Combustion Turbines for the proposed new turbine unit at Plant C. The primary requirement of Guideline A-5 is achieving designated maximum concentrations of NO_X, CO and SO_2 in the exhaust flow. To meet the requirement of Amended Environmental Compliance Approval (ECA) No. 2592-AQPSJ2, triplicate emission tests for combustion gases were conducted at Bright Compressor Station Unit C on January 18, 2018. As shown in the Emission Testing Report in Attachment E, the turbine compressor emissions and thermal efficiency met the performance requirement limits stated in the Amended ECA No. 2592-AQPSJ2.

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Table 1: Emission Summary Table

Scenario	Contaminant Name	Contaminant CAS#	Total Facility Maximum Emission Rate (g/s)	Air Dispersion Model Used (include version code)	Maximum POI Concentration ($\mu g/m^3$) [2]	Averaging Period (hr)	Ministry POI Limit ($\mu g/m^3$) [3]	Limiting Effect	Regulation Schedule # of Alternative	Maximum % of Ministry POI Limit
Scenario 1: All Significant Combustion Equipment (3 of 4 Turbine but excluding all emergency generators and firewater pump)	Nitrogen Oxides (as NO_2)	10102-44-0	18.26	AERMOD 16216r	78.5	1	400	Health	3	19.6%
					23.6	24	200	Health	3	11.8%
Scenario 2: All Significant Combustion Equipment (3 of 4 Turbines and including all emergency generators and firewater pump 1)	Nitrogen Oxides (as NO_2)	10102-44-0	24.26	AERMOD 16216r	595.5	1	1,570	Health	Ministry Emergency Generator Data Sheet[1]	37.9%
Scenario 3: All Significant Combustion Equipment (3 of 4 Turbines and including all emergency generators and firewater pump 2)	Nitrogen Oxides (as NO_2)	10102-44-0	24.26	AERMOD 16216r	595.0	1	1,570	Health	Ministry Emergency Generator Data Sheet[1]	37.9%

Note:

[1] Ministry ½-hour NO_X POI Limit of 1,880 $\mu g/m^3$, specific to natural gas-fired emergency generators at non-sensitive receptors, converted from ½-hour to 1-hour averaging period (1,880 $\mu g/m^3$ / 1.2 = 1,570 $\mu g/m^3$) as per the Procedure.

[2] Meteorological outliers have been removed from the results in accordance with Section 6.5 of the ADMGO.

[3] "Air Contaminants Benchmarks (ACB) List: Standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants, April 2018, Version 2.0" (Ministry POI Limits).