LoReed and RC Stray

Emission Test and LDAR Assessment of Small Glycol Dehydration Units

ANR Pipeline Company
Reed City Compressor Station

7677 230th Avenue
Reed City, Michigan

State Registration No. B3721

TransCanada
In business to deliver

Prepared for
TransCanada
Houston, Texas

March 31, 2015

Bureau Veritas Project No. 11015-000004.00

BUREAU VERITAS

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MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

RENEWABLE OPERATING PERMIT REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name: ANR Storage Company, Reed City Compressor Station — County: Osceola

Source Address: 7677 230th Avenue — City: Reed City

AQD Source ID (SRN): B3721 — ROP No.: MI-ROP-B3721-2014 — ROP Section No.: C and D

Please check the appropriate box(es):

☐ **Annual Compliance Certification (Pursuant to Rule 213(4)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, this source was in compliance with **ALL** terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, **EXCEPT** for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

☐ **Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, **ALL** monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.

☐ 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, **EXCEPT** for the deviations identified on the enclosed deviation report(s).

☒ **Other Report Certification**

Reporting period (provide inclusive dates): From _____ To _____

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

Test Report evaluating compliance with 40 CFR 63, Subpart HHH for the existing small glycol dehydration units. This form shall certify that the testing was conducted in accordance with the approved test plan and that the facility operating conditions were in compliance with permit requirements or at maximum routine operating conditions.

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

ANTHONY KORNAGA	DIRECTOR, FIELD OPERATIONS	(248) 205-7465
Name of Responsible Official (print or type)	Title	Phone Number
Signature of Responsible Official		4/1/2015 Date

* Photocopy this form as needed.

EQP 5736 (Rev 11-04)

Executive Summary

TransCanada retained Bureau Veritas North America, Inc. to evaluate the closed-vent systems and test air emissions at the ANR Pipeline Company (ANR) Reed City Compressor Station located at 7677 230th Avenue in Reed City, Michigan. TransCanada stores natural gas in underground reservoirs and transports gas via pipelines to other companies and end-users after the gas is processed through glycol dehydration units. Testing was conducted on the LoReed and RC Stray glycol dehydration units. The purpose of the testing was to:

- Evaluate the glycol dehydration units' closed-vent systems for leaks.
- Measure benzene, toluene, ethylbenzene, and xylenes (BTEX) emissions from the glycol dehydration units' thermal oxidizer exhaust stacks.
- Evaluate compliance with 40 CFR Part 63, National Emissions Standards for Hazardous Air Pollutants for Source Categories, Subpart HHH, "National Emissions Standards for Hazardous Air pollutants for Natural Gas Transmission and Storage Facilities," incorporated in Michigan Department of Environmental Quality (MDEQ) Renewable Operating Permit (ROP) MI-ROP-B3721-2014.

The glycol dehydration systems are defined as "existing small glycol dehydration units" in accordance with 40 CFR 63, Subpart HHH, and subject to:

- Leak Detection and Repair (LDAR) standards.
- Control device BTEX, total organic compound (TOC), or total hazardous air pollutants (HAPs) emission standards.

The testing was completed in accordance with United States Environmental Protection Agency (USEPA) Reference Methods 1 through 4, 18, and 21. The testing was conducted on February 5 and 6, 2015, and consisted of completion of the LDAR assessments and three 60-minute test runs for each source to measure BTEX.

Leak Detection and Repair

Detailed results of the LDAR assessments are presented in Tables 3.2 and 3.3. Documentation of each LDAR assessment was recorded on LDAR Recordkeeping and Field Inspection Forms, which are included in Appendix C of this report. The results of the LDAR assessments are summarized in the following table.

LDAR Assessment Results

Date (2015)	Glycol Dehydration Unit	Number of Components Evaluated	Number of Readings Below Leak Criterion of 500 ppmv	Number of Readings Exceeding Leak Criterion of 500 ppmv	Comment
Feb 5	LoReed	27	27	0	No leaks detected
Feb 6	RC Stray	30	29	1	Detected leak was repaired on February 7, 2015, and retesting on February 9, 2015, indicated no leak.

ppmv; part per million by volume

Only one location (i.e., the flange at the outlet of the still column on the RC Stray unit) exceeded the criterion of a leak (i.e., 500 part per million by volume [ppmv]). The volatile organic compound (VOC) reading of 650 ppmv was measured at the location of Tag Number 54 on the RC Stray unit. On February 7, 2015, TransCanada repaired the component with the LDAR exceedance and retesting on February 9, 2015 indicated the component was no longer classified as leaking (the measurement was 19 ppmv—less than the leak criterion of 500 ppmv).

Performance Testing

The emission testing was conducted to evaluate compliance with the emission limit of the thermal oxidizers, which control air emissions from the glycol dehydration systems.

Detailed results of the testing are presented in Tables 1 and 2 after the Tables Tab of this report. The results of the testing are summarized in the following table.

BTEX Emission Results
Compared to Permit Emission Limits

Date (2015)	Glycol Dehydration Unit	Emission Unit	Parameter	Units	Average Result[1]	Emission Limit[2]
LoReed						
Feb 5	LoReed	EURCO15	Benzene†	lb/hr	<0.00034	NA
			Toluene†		<0.00070	NA
			Ethylbenzene†		<0.00074	NA
			Total xylenes†		<0.0014	NA
			Mass rate of BTEX	lb/hr	<0.0032	NA
				Mg/yr	<0.0053	48.96
RC Stray						
Feb. 6	RC Stray	EURC024	Benzene†	lb/hr	<0.00035	NA
			Toluene†		<0.00072	NA
			Ethylbenzene†		<0.00075	NA
			Total xylenes†		<0.0014	NA
			Mass rate of BTEX	lb/hr	<0.0033	NA
				Mg/yr	<0.0054	6.92

† Corrected for spike recovery following USEPA Method 18.
[1] Based on typical maximum operating hours for the total withdrawal season.
[2] Based on annual average daily throughput rates from 2009 through 2013.
lb/hr: pound per hour
Mg/yr: megagrams per year
NA: not applicable
BTEX: benzene, toluene, ethylbenzene, total xylenes

The BTEX measurements demonstrate that estimated annual air emissions from the thermal oxidizers controlling the glycol dehydration units are within the allowable limit.

1.0 Introduction

1.1 Summary of Test Program

TransCanada retained Bureau Veritas North America, Inc. to evaluate the closed-vent systems and test air emissions at the ANR Pipeline Company (ANR) Reed City Compressor Station located at 7677 230th Avenue in Reed City, Michigan. TransCanada stores natural gas in underground reservoirs and transports gas via pipelines to other companies and end-users after the gas is processed through glycol dehydration units. Testing was conducted on the LoReed and RC Stray glycol dehydration units. The purpose of the testing was to:

- Evaluate the glycol dehydration units' closed-vent systems for leaks.
- Measure benzene, toluene, ethylbenzene, and xylenes (BTEX) emissions from the glycol dehydration units' thermal oxidizer exhaust stacks.
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The glycol dehydration systems are defined as "existing small glycol dehydration units" in 40 CFR 63, Subpart HHH, and subject to:

- Leak Detection and Repair (LDAR) standards.
- Control device BTEX, total organic compound (TOC), or total hazardous air pollutants (HAPs) emission standards.

Leak Detection and Repair

The LDAR assessments were conducted following the LDAR plan that Bureau Veritas prepared which outlined procedures to detect volatile organic compound (VOC) leaks from equipment components of the closed-vent system and identify necessary repairs as required by 40 CFR 60, Subpart HHH and MDEQ MI-ROP- B3721-2014.

When compliance with the emission standard is achieved using a control device or combination of control devices, the closed-vent system shall have no detectable emissions. A potential leak interface is evaluated to operate with no detectable organic emissions if the organic concentration is less than 500 parts per million by volume (ppmv).

Bureau Veritas conducted the following LDAR activities:

- Identified, tagged, and listed the components to be monitored and those that are difficult to inspect.
- Established procedures if the leak criterion is exceeded.
- Monitored components through initial visual inspection and LDAR monitoring following United States Environmental Protection Agency (USEPA) Method 21 guidelines.
- Communicated findings to TransCanada for leak repair (if applicable) and reporting by TransCanada.
- Reported the initial inspection findings.

Documentation of each LDAR assessment was recorded on LDAR Recordkeeping and Field Inspection Forms, which are included in Appendix C of this report.

Performance Testing

The emission testing was conducted to evaluate compliance with the emission limit of the thermal oxidizers, which control air emissions from the glycol dehydration systems.

The thermal oxidizers are subject to the following emission limit:

Unit-specific BTEX emission limit in megagrams (Mg) per year, calculated using Equation 1 of the regulation (40CFR63.1275(b)(1)(iii)):

$$EL_{BTEX} = 3.10x10^{-4} \times \text{Throughput} \times C_{i,BTEX} \times 365 \frac{\text{day}}{\text{yr}} \times \frac{1\ \text{Mg}}{1x10^{6}\ \text{gram}}$$

Where:

EL_{BTEX}	=	Unit-specific BTEX emission limit, megagrams per year
$3.10x10^{-4}$	=	BTEX emission limit, grams BTEX/standard cubic meter-ppmv
Throughput	=	Annual average daily natural gas throughput, standard cubic meters
$C_{i,BTEX}$	=	Annual average BTEX concentration of the natural gas at the inlet to the glycol dehydration unit, ppmv

The throughput values were measured at the custody transfer meter and based on annual average daily throughput rates from 2009 through 2013.

The testing was completed in accordance with USEPA Reference Methods 1 through 4, 18, and 21 identified in §63.1282 of Subpart HHH of 40 CFR Part 63—Test Methods, Compliance Procedures, and Compliance Demonstrations. Measurement of BTEX concentrations following USEPA Method 18 incorporates the analytical procedures of Occupational Health and Safety Administration (OSHA) 7 and USEPA SW-846 Method 8260.

On February 5 and 6, 2015, Bureau Veritas conducted the following:

- The LDAR assessment
- Three 60-minute test runs at the exhaust of each unit to measure BTEX concentrations

Table 1-1
Sources Tested, Parameters, and Test Dates

Source	Test Parameter	Test Date
LoReed		
LoReed thermal oxidizer exhaust	BTEX	February 5, 2015
Closed vent system joints	VOC leaks	
RC Stray		
RC Stray thermal oxidizer exhaust	BTEX	February 6, 2015
Closed vent system joints	VOC leaks	

BTEX: benzene, toluene, ethylbenzene, total xylenes
VOC: volatile organic compound

1.2 Key Personnel

Key personnel involved in this test program are listed in Table 1-2. Mr. Thomas Schmelter, Senior Project Manager with Bureau Veritas, led the emission testing program under the direction of Dr. Derek Wong, Director and Vice President with Bureau Veritas.

Mr. Jeff Punjak, Controls Specialist, Plant Reliability with TransCanada; Mr. Pedro Amieva, US Plant Reliability with TransCanada; Ms. Melinda Holdsworth, Environmental Air Emissions and GHG Advisor with TransCanada; and others coordinated with Bureau Veritas and arranged for process data to be recorded.

Portions of the testing were witnessed by Mr. Tom Gasloli, Environmental Quality Analyst, and Kurt Childs, Environmental Quality Analyst, with MDEQ.

Figures 2-1, 2-2, and 2-3 depict the natural gas withdrawal and small glycol dehydration unit processes for LoReed and RC Stray.

The small glycol dehydration units were tested when natural gas was being processed at the maximum routine operating conditions. The natural gas throughput rate was measured at the custody transfer meter and control equipment data recorded during testing are included in Appendix F. Table 2-1 summarizes the process and control equipment data.

Table 2-1
Summary of Process Operating Parameters

Parameter	Units	Run 1	Run 2	Run 3	Average
LoReed (EURCO15)					
Natural gas throughput rate during testing	MMCFH	3.63	3.59	3.58	3.60
Thermal oxidizer combustion temperature	°F	1,451	1,500	1,500	1,484
Glycol recirculation rate	GPM	4	4	4	4
RC Stray (EURC024)					
Natural gas throughput rate during testing	MMCFH	5.07	4.88	4.56	4.84
Thermal oxidizer combustion temperature	°F	1,406	1,398	1,408	1,404
Glycol recirculation rate	GPM	4	4	4	4

MMCFH: million cubic feet per hour
GPM; gallon per minute
Notes
1. The throughput values were measured at the custody transfer meter.
2. As provided by TransCanada, the maximum facility throughput rate for LoReed is 16.7 MMCFH.
3. As provided by TransCanada, the maximum facility throughput rate for RC Stray is 12.5 MMCFH.