



Emission Performance Test Report Ozone Season Monitoring  
R336.1818(4)(a)(ii)  
ANR Pipeline – Woolfolk Compressor Station (SRN: B7220)  
June 29, 2016

**ANR Pipeline Company**

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## **Emissions Test Report**

**Units EUWL001 to EUWL005,**  
**Five Ingersoll Rand KVG-103 Gas Fired Internal**  
**Combustion Reciprocating Engines and Units**  
**EUWL006 to EUWL009, Four Ingersoll Rand**  
**KVG-123 Gas Fired Internal Combustion**  
**Reciprocating Engines**

**Permit No.: MI-ROP-B7220-2012a**

**ANR Pipeline Company**  
**Woolfolk Compressor Station**  
**Big Rapids, Michigan**

**Date:** June 29, 2016  
**Prepared for:** Michigan Department of Environmental  
Quality - Air Quality Division  
**Prepared by:** Roy S. Cannon  
USGO Integrity Services (832) 320-5465

## 1. Introduction

1.1. The USGO Integrity Services Department of TransCanada's US Pipelines Central conducted monitoring at ANR Woolfolk Compressor Station (SRN: B7220) pursuant to the Compliance Plan ANR submitted to comply with R336.1818(3)(a). The Compliance Plan has been approved by the MDEQ.

1.2. The purpose of the monitoring was to comply with the ozone season monitoring requirement in the ANR Compliance Plan and is in accordance with R336.1818(4)(a)(ii)(A)(2). The monitoring demonstrates compliance with the projected NOx emission rate in the ANR Compliance Plan. As such, the following parameter was determined:

1.2.1. Woolfolk Units #20011 to #20099: **20.5 g/bhp-hr of NOx**

1.3. Facilities Information:

ANR Woolfolk Compressor Station  
11750 150<sup>th</sup> Avenue  
Big Rapids, MI 49307

Environmental Contact  
Melinda Holdsworth  
700 Louisiana Street  
Houston, TX 77002  
(832) 320-5665

## 2. Process Description

2.1. Woolfolk compressor station operates nine NOx SIP affected engines; 2001 through 2005 are Ingersoll-Rand KVG-103, 1,000 HP each and 2006 through 2009 are Ingersoll-Rand KVG-123, 1,320 HP each. All engines are natural gas fired, reciprocating internal combustion engine used in Natural Gas Transmission. More specifically, the engine is used in the compression of natural gas from an initial "suction" pressure to a final "discharge" pressure, which creates the pressure gradient necessary to transport natural gas through ANR Pipeline's interstate pipeline system

## 3. Methodology

3.1. American Society of Testing and Materials test method D6522-00: Standard Test Method for Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Concentrations in Emissions from Natural Gas-Fired Reciprocating Engines, Combustion Turbines, Boilers, and Process Heaters Using Portable Analyzers was employed for determination of compliance with Section 1.2.1.

## 4. Sample System

4.1. Sample system components, as outlined in Method D6522-00, were utilized for monitoring. These components include, but are not limited to, sample probe, heated sample line, sample transport lines, calibration assembly, moisture removal system, particulate filter, sample pump, sample flow rate control, gas analyzer, data recorder, and external interference gas scrubber.

## 5. Sample Location

5.1. Sampling location was selected as specified in sections 10.1.1 and 10.1.2 of Method D6522-00 at a location of five duct diameters downstream of any flow disturbance and three duct diameters upstream of the discharge to atmosphere.

5.2. All the stratification sampling for all the units showed a variance in concentration of less of 5%, therefore, as per section 10.1.4 of Method D6522-00, sampling was taken from a single point located in the center of the stack.

## 6. Sample Time

6.1. Monitoring was conducted during normal engine operation, i.e. not during periods of start-up, shutdown, or malfunction. Each engine was monitored at the maximum load achievable based upon pipeline and ambient conditions.

6.2. Each engine was sampled at three 30-minute test runs. Samples were taken at a frequency of once per minute.

## 7. Results

7.1. Results of the monitoring demonstrated that all units tested below the permitted levels of 20.5 g/BHP-hr. Detailed emissions summaries and calibration records can be found in the following pages.

# Test Summary

## General Information

Company: TransCanada US Pipelines  
 Station: ANR Woolfolk

## Unit Information

Unit No.: 2001 to 2005  
 Manufacturer: INGERSOLL RAND  
 Model: KVG-103  
 Rated BHP: 1,000  
 Rated RPM: 330

General Data					
Unit	2001	2002	2003	2004	2005
Test Date	6/14/16	6/16/16	6/14/16	6/15/16	6/15/16
Operating Data					
Horsepower	966	908	959	946	964
Speed	331	330	330	330	331
% Load	96.6%	90.8%	95.9%	94.6%	96.4%
% Torque	96.4%	90.8%	95.9%	94.6%	96.2%
Fuel Use (scfh)	9,003	8,443	8,742	9,502	8,832
Emissions Data					
NOx Limit	20.5 g/bhp-hr				
NOx (ppm)	1453.8	1398.3	1603.2	1851.4	1701.0
NOx (ppm@ 15% O <sub>2</sub> )	529.9	509.7	607.6	632.7	566.6
NOx (lb/hr)	18.6	16.7	20.7	23.3	19.5
NOx (g/bhp-hr)	8.7	8.4	9.8	11.2	9.2
NOx (TPY)	81.3	73.3	90.6	102.2	85.3
O <sub>2</sub> (%)	4.7	4.7	5.3	3.6	3.2

# Test Summary

## General Information

Company: TransCanada US Pipelines

Station: ANR Woolfolk

## Unit Information

Unit No.: 2006 to 2009

Manufacturer: NGERSOLL RAND

Model: KVG-123

Rated BHP: 1,320

Rated RPM: 330

### General Data

Unit	2006	2007	2008	2009
Test Date	6/15/16	6/15/16	6/16/16	6/16/16

### Operating Data

Horsepower	1,218	1,208	1,228	1,205
Speed	331	330	330	329
% Load	92.3%	91.5%	93.0%	91.3%
% Torque	91.9%	91.6%	93.0%	91.7%
Fuel Use (scfh)	11,688	11,465	11,261	11,512

### Emissions Data

NOx Limit	20.5 g/bhp-hr			
NOx (ppm)	898.8	811.7	1,358.3	1,130.0
NOx (ppm@ 15% O <sub>2</sub> )	332.4	306.9	500.2	415.2
NOx (lb/hr)	15.1	13.7	21.9	18.6
NOx (g/bhp-hr)	5.6	5.1	8.1	7.0
NOx (TPY)	66.0	59.8	95.9	81.4
O <sub>2</sub> (%)	5.0	5.3	4.9	4.8



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### 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 (RO) Permit 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 described in General Condition No. 22 in the RO Permit and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name ANR Pipeline Company, Woolfolk Compressor Station County Mecosta

Source Address 11039 150<sup>th</sup> Avenue City Big Rapids

AQD Source ID (SRN) B7220 RO Permit No. MI-ROP-B7220-2012a RO Permit Section No. 1

Please check the appropriate box(es):

**Annual Compliance Certification (General Condition No. 28 and No. 29 of the RO Permit)**

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 RO Permit, 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 RO Permit.

2. During the entire reporting period this source was in compliance with all terms and conditions contained in the RO Permit, 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 RO Permit, unless otherwise indicated and described on the enclosed deviation report(s).

**Semi-Annual (or More Frequent) Report Certification (General Condition No. 23 of the RO Permit)**

Reporting period (provide inclusive dates): From \_\_\_\_\_ To \_\_\_\_\_

1. During the entire reporting period, ALL monitoring and associated recordkeeping requirements in the RO Permit 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 RO Permit 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 5/1/2016 To 9/30/2016

Additional monitoring reports or other applicable documents required by the RO Permit are attached as described:  
Ozone Season Monitoring per R336.1818(4)(a)(ii)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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.

<u>Randall Schmidgall</u>	<u>Vice President US Ops.</u>	<u>(832) 320-5511</u>
Name of Responsible Official (print or type)	Title	Phone Number
		<u>7/8/2016</u>
Signature of Responsible Official		Date

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