

Consumers Energy

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40 CFR Part 63 Subpart HHH Performance Test Report



EUGLYCDEHY

Consumers Energy Company
Overisel Compressor Station
4131 138th Avenue
Hamilton, Michigan 49419
SRN: N5792

Test Date: March 5, 2019

Test Performed by the Consumers Energy Company
Regulatory Compliance Testing Section
Air Emissions Testing Body
Laboratory Services Section
Work Order No. 34278170
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EXECUTIVE SUMMARY

On March 5, 2019, Consumers Energy Regulatory Compliance Testing Section (RCTS) conducted benzene, toluene, ethylbenzene, and xylene (BTEX) testing at the condenser and reboiler exhaust of the glycol dehydrator system, identified as EUGLYCDEHY, installed and operated at the Overisel Compressor Station in Hamilton, Michigan. The Overisel Compressor Station is a natural gas transmission compressor station facility where the EUGLYCDEHY system is used to remove water and impurities from stored natural gas prior to entering the distribution pipeline. The EUGLYCDEHY system is classified as an existing small glycol dehydrator at a major source of hazardous air pollutants.

The test program was conducted on March 5, 2019 to satisfy performance testing requirements and evaluate compliance with 40 CFR Part 63, Subpart HHH, "National Emissions Standards for Hazardous Air Pollutants (NESHAP) from Natural Gas Transmission and Storage Facilities" and State of Michigan air permit MI-ROP-N5792-2018 effective April 20, 2018.

Three, 60-minute test runs were conducted at the EUGLYCDEHY reboiler exhaust, following the procedures in United States Environmental Protection Agency (USEPA) Reference Methods (RM) 1, 2, 3A, 4 (ALT-008), and 18 in 40 CFR 60, Appendix A. There were no deviations from the approved stack test protocol or associated USEPA Reference Methods with the exception that USEPA Broadly Applicable Approved Alternative Test Method ALT-008 was used to measure flue gas moisture content in lieu of USEPA Method 4 as proposed in the test protocol.

The results of the EUGLYCDEHY testing indicate the BTEX emissions are compliant with applicable emissions limit. During testing, the EUGLYCDEHY condenser operated between 57°F and 64°F with an average exhaust temperature of 60°F, which will be used as the new maximum condenser exhaust gas operating temperature. The results of the emission testing are summarized in Table E-1.

Table E-1
Summary of Test Results

| Source Name | BTEX Compound Concentration (ppmvd) ¹ | BTEX Emission Rate (Mg/year) | BTEX Emission Limit (Mg/year) ² | Average Condenser Exhaust Gas Temperature (°F) |
|-------------------|--|------------------------------|--|--|
| EUGLYCDEHY | 0.16 | 0.01 | 4.2 | 60 |

¹ With the exception of benzene (all three runs) and xylene (run 1 only), the BTEX concentrations were below the laboratory's detectable limit. For these instances, the minimum detection limit (MDL) of these compounds were used to calculate the average compound concentrations for this test event. Additional information is presented in the Laboratory Report presented in Appendix C.

² BTEX emission limit was calculated as required per §63.1275(b)(1)(iii), Equation 1 – Refer to Appendix A

Detailed results are presented in Appendix Table 1. Sample calculations, field data sheets, and laboratory data are presented in Appendices A, B, and C. System operating data and supporting documentation are provided in Appendices D and E.

1.0 INTRODUCTION

This report summarizes the results of compliance air emissions testing conducted March 5, 2019 on EUGLYCDEHY system, installed and operated at the Consumers Energy Overisel Compressor Station in Hamilton, Michigan.

This document follows the Michigan Department of Environmental Quality (MDEQ) format described in the March 2018, Format for Submittal of Source Emission Test Plans and Reports. Reproducing only a portion of this report may omit critical substantiating documentation or cause information to be taken out of context. If any portion of this report is reproduced, please exercise due care in this regard.

1.1 IDENTIFICATION, LOCATION, AND DATES OF TESTS

On March 5, 2019, Consumers Energy Regulatory Compliance Testing Section (RCTS) conducted benzene, toluene, ethylbenzene, and xylene (BTEX) testing of the condenser and reboiler exhaust of the glycol dehydrator system, identified as EUGLYCDEHY, installed and operated at the Overisel Compressor Station in Hamilton.

A test protocol submitted to the MDEQ on December 19, 2018 was subsequently approved by Mr. David Patterson, MDEQ Environmental Quality Analyst, in a letter dated February 22, 2019. There were no deviations from the approved stack test protocol or associated USEPA Reference Methods with the exception that the USEPA Broadly Applicable Approved Alternative Test Method ALT-008 was used for determining flue gas moisture content in lieu of USEPA Method 4 as proposed in the test protocol.

1.2 PURPOSE OF TESTING

The test program was conducted on March 5, 2019 to satisfy performance testing requirements and evaluate compliance with 40 CFR Part 63, Subpart HHH, "National Emissions Standards for Hazardous Air Pollutants (NESHAP) from Natural Gas Transmission and Storage Facilities" and State of Michigan air permit MI-ROP-N5792-2018 effective April 20, 2018. The applicable emission limit is presented in Table 1-1.

**Table 1-1
Applicable Emission Limit**

| Parameter | 40 CFR 63.1275(b)(1)(iii) | | |
|--------------|--|--------------------------|--------------------------|
| | Throughput (scm/day) | $C_{i,BTEX}^1$ (ppmv) | EL_{BTEX} (Mg/year) |
| BTEX | 2,489,229 | 14.9 | 4.2 |
| scm/day | Standard cubic meters per day | | |
| $C_{i,BTEX}$ | Average annual BTEX concentration of natural gas at inlet of the glycol dehydration system | | |
| EL_{BTEX} | Unit-specific BTEX emission limit | | |
| Mg/year | Megagrams per year | | |

1.3 BRIEF DESCRIPTION OF SOURCE

The Overisel Compressor Station maintains the pressure of natural gas in order to move it in and out of storage reservoirs and along the pipeline system. When the natural gas is removed from underground storage reservoirs, a dehydration unit is typically used to remove water in order to meet pipeline gas quality specifications. The "wet" natural gas passes through a contact tower with counter-flowing "lean" triethylene glycol (TEG). The

TEG removes the water from the natural gas by physical absorption and this "rich" TEG is sent to the glycol regeneration system.

The glycol regeneration system removes entrained water from the glycol in a still column. The lean glycol is recirculated back to the contact tower. The vapor from the still column is routed to a condenser. The condensed liquids are collected in a storage tank. The gaseous emissions from the condenser are routed to the reboiler burner and burned as fuel.

1.4 CONTACT INFORMATION

Table 1-2 presents the names, addresses, and telephone numbers of the contacts for information regarding the test and the test report, and names and affiliation of personnel involved in conducting the testing.

**Table 1-2
Contact Information**

| Program Role | Contact | Address |
|--|---|--|
| State Regulatory Administrator | Ms. Karen Kajiya-Mills Technical Programs Unit Manager 517-335-4874 kajiya-millsk@michigan.gov | Michigan Department of Environmental Quality Technical Programs Unit 525 W. Allegan, Constitution Hall, 2nd Floor S Lansing, Michigan 48933 |
| State Technical Programs Field Inspector | Mr. David Patterson Technical Programs Unit Field Operations Section 517-284-6782 pattersond2@michigan.gov | Michigan Department of Environmental Quality Technical Programs Unit 525 W. Allegan, Constitution Hall, 2nd Floor S Lansing, Michigan 48933 |
| State Regulatory Inspector | Mr. Cody Yazzi Environmental Quality Analyst 269-567-3554 yazziec@michigan.gov | Michigan Department of Environmental Quality Kalamazoo District Office 7953 Adobe Road Kalamazoo, Michigan 49009-5025 |
| State Regulatory Inspector | Mr. Chance Collins Environmental Quality Analyst 269-254-7119 collinsc21@michigan.gov/air | Michigan Department of Environmental Quality Kalamazoo District Office 7953 Adobe Road Kalamazoo, Michigan 49009-5025 |
| Responsible Official | Mr. Gregory Baustian Executive Director-Natural Gas Compression and Storage 616-237-4009 gregory.baustian@cmsenergy.com | Consumers Energy Company Zeeland Generation 425 N. Fairview Road Zeeland, Michigan 49464 |
| Corporate Air Quality Contact | Ms. Amy Kapuga Senior Engineer 517-788-2201 amy.kapuga@cmsenergy.com | Consumers Energy Company Environmental Services Department 1945 West Parnall Road Jackson, Michigan 49201 |
| Field Environmental Coordinator | Ms. Janet Zondlak Senior Environmental Analyst 616-738-3702 Janet.zondlak@cmsenergy.com | Consumers Energy Company L&D Training Center 17010 Crowell Street West Olive, Michigan 49460 |
| Test Facility | Mr. Leslie Bradshaw Gas Field Leader III 269-751-3042 leslie.bradshaw@cmsenergy.com | Consumers Energy Company Overisel Compressor Station 4131 138 th Avenue Hamilton, Michigan 49419 |
| Test Team Representative | Mr. Gregg Koteskey, QSTI Engineering Technical Analyst 616-738-3712 gregg.koteskey@cmsenergy.com | Consumers Energy Company L&D Training Center 17010 Crowell Street West Olive, Michigan 49460 |

2.0 SUMMARY OF RESULTS

2.1 OPERATING DATA

Operating data collected during the test runs included condenser exhaust gas temperature, along with flash tank level, temperature, and pressure. Refer to Attachment D for detailed operating data.

2.2 APPLICABLE PERMIT INFORMATION

The Overisel Compressor Station has State of Michigan Registration Number (SRN) N5792 and operates in accordance with air emissions permit MI-ROP N5792-2018. EUGLYCDEHY is an emission unit source identified in the permit. Incorporated within the permit are the applicable federal requirements of 40 CFR Part 63, Subpart HHH.

2.3 RESULTS

The results of the EUGLYCDEHY testing indicate the BTEX emissions are compliant with applicable emissions limit. Refer to Table 2-1 for the summary of test results.

Detailed results are presented in Appendix Table 1. A discussion of the results is presented in Section 5.0. Sample calculations, field data sheets, and laboratory results are presented in Appendices A, B, and C. Operating data and supporting information are provided in Appendices D and E.

**Table 2-1
Summary of Test Results**

| Source Name | BTEX Compound Concentrations (ppmvd) ¹ | BTEX Emission Rate (Mg/year) | BTEX Emission Limit (Mg/year) ² | Average Condenser Exhaust Gas Temperature (°F) |
|-------------|---|------------------------------|--|--|
| EUGLYCDEHY | 0.16 | 0.01 | 4.2 | 60 |

¹ With the exception of benzene (all three runs) and xylene (run 1 only), the BTEX component concentrations were below the laboratory's detectable limit. For these instances, the minimum detection limit (MDL) of these compounds were used to calculate the average compound concentrations for this test event. Additional information is presented in the Laboratory Report presented in Appendix C.

² BTEX emission limit was calculated as required per §63.1275(b)(1)(iii), Equation 1 – Refer to Appendix A

3.0 SOURCE DESCRIPTION

EUGLYCDEHY is a glycol dehydration system equipped with a condenser (vapor recovery device), used to condense the glycol vapors into liquid. The condensed liquids are routed to a storage tank. The gaseous emissions from the condenser and flash tank are routed to the reboiler burner where they are burned. The VOC destruction efficiency of the condenser is at least 95%.

3.1 PROCESS

The Overisel Compressor Station maintains the pressure of natural gas to transport the gas in and out of storage reservoirs and along the pipeline system. The glycol dehydration unit installed at the Overisel Compressor Station is used to remove water from the natural gas withdrawn from underground storage reservoirs in order to meet pipeline gas quality specifications.

3.2 PROCESS FLOW

The water removal process of the dehydrator involves flowing lean, water-free triethylene glycol (TEG) into the top of a contact tower. As the TEG flows downward, it contacts wet natural gas flowing upward, thereby removing water through physical absorption. The dry natural gas exits the top of the absorption column and into the pipeline distribution system. The water-rich TEG exits the bottom of the absorption column and enters a flash vessel upstream of the regeneration system where entrained water is removed using a still column, condenser, and reboiler. The condensed liquids are routed to a storage tank. All gaseous emissions from the condenser and flash vessel are routed to the reboiler burner where they are burned. Detailed operating data recorded during testing are provided in Appendix D.

3.3 MATERIALS PROCESSED

EUGLYCDEHY processes "wet" natural gas that is withdrawn from underground storage reservoirs.

3.4 RATED CAPACITY

EUGLYCDEHY system is rated to process up to 400 million standard cubic feet per day (MMscfd) of "wet" natural gas. The typical natural gas flow rate that the EUGLYCDEHY system processes is 200 MMscfd. Refer to Appendix D for operating data recorded during testing.

3.5 PROCESS INSTRUMENTATION

Dehydration system processes are monitored by continuous parameter monitor systems (CPMS); data collected during each test run included the condenser exhaust gas temperature, flash tank level, flash tank pressure, and flash tank temperature. The preceding data was logged at least once every 5 minutes and then averaged to determine the per-test run values. Refer to Appendix D for operating data.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

Consumers Energy RCTS tested for BTEX, flow, moisture, and oxygen (O₂) concentrations using the United States Environmental Protection Agency (USEPA) test methods presented in Table 4-1. The sampling and analytical procedures associated with each parameter are described in the following sections.