BTEC Inc.

THROX Exhaust Stack Flow RATA Test Report

Prepared for:

Dow Corning Corporation

Dow Corning Corporation
3901 S. Saginaw Rd.
Midland, MI 48640

Project No. 13-4444.00
October 1, 2013

BT Environmental Consulting, Inc.
4949 Fernlee Avenue
Royal Oak, Michigan 48073
(248) 548-8070

BTEC Inc.

EXECUTIVE SUMMARY

BT Environmental Consulting, Inc. (BTEC) was retained by Dow Corning Corporation (Dow) to conduct a Relative Accuracy Test Audit (RATA) of the THROX exhaust stack flowrate monitor at the Dow facility in Midland, Michigan. The emissions test program was conducted on August 20, 2013.

Testing of throx exhaust consisted of eleven flowrate measurements. The emissions test program was required by MDEQ Air Quality Division Permit No. 91-07D. The relative accuracy THROX Exhaust stack flowrate monitor is 9.7%. The overall results of the emissions test program are detailed by Table 2.

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1. Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by Dow Corning Corporation (Dow) to conduct a Relative Accuracy Test Audit (RATA) of the THROX exhaust stack flowrate monitor at the Dow facility in Midland, Michigan. The emissions test program was conducted on August 20, 2013. The purpose of this report is to document the results of the test program.

AQD has published a guidance document entitled "Format for Submittal of Source Emission Test Plans and Reports" (February 2008). The following is a summary of the emissions test program and results in the format suggested by the aforementioned document.

1.a Identification, Location, and Dates of Test

Sampling and analysis for the emission test program was conducted on August 20, 2013 at the Dow Corning facility located in Midland, Michigan. The test program included evaluation of flowrates from the THROX Exhaust.

1.b Purpose of Testing

Dow Corning was experiencing periodic flow spikes suspected to be due to the THROX flowrate monitor pitot tube being located too close to the wall of the stack (about 2" from the far wall). The pitot tube was relocated 21" from the far wall just prior to the test. The purpose of the test program was verify the accuracy of the THROX flowrate monitor after it was relocated.

1.c Source Description

The emission unit is a thermal oxidizer followed in series by a quench, a caustic scrubber, and two ionizing wet scrubbers.

1.d Test Program Contacts

The contact for the source and test report is:

Mr. Michael Gruber, II
Environmental Manager
Dow Corning Corporation
P.O. Box 995, Mail#065
Midland, Michigan 48686
(989) 496-5539

Names and affiliations for personnel who were present during the testing program are summarized by Table 1.

Table 1
Test Personnel

Name and Title	Affiliation	Telephone
Mr. Michael Gruber, II Environmental Manager	Dow Corning Corporation P.O. Box 995, Mail#065 Midland, Michigan 48686	(989) 496-5539
Mr. Jeff Peitzsch Staff Environmental Engineer	BTEC 4949 Fernlee Royal Oak, MI 48073	(248) 548-8070
Mr. Kenny Felder Environmental Technician	BTEC 4949 Fernlee Royal Oak, MI 48073	(248) 548-8070

2. Summary of Results

Sections 2.a through 2.d summarize the results of the emissions compliance test program.

2.a Operating Data

Process operating data collected during the emissions test program is included in Appendix C.

2.b Applicable Permit

The Dow facility is covered by Permit No. MI-ROP-A4043-2008.

The emissions test program was required by AQD Permit No. 91-07D.

2.c Results

The relative accuracy THROX Exhaust stack flowrate monitor is 9.7%. The overall results of the emissions test program are detailed by Table 2.

3. Source Description

Sections 3.a through 3.e provide a detailed description of the process.

3.a Process Description

The emission unit is a thermal oxidizer followed in series by a quench, a caustic scrubber, and two ionizing wet scrubbers.

3.b Process Flow Diagram

Due to the simplicity of the process, a process flow diagram is not necessary.

3.c Raw and Finished Materials

The raw materials include natural gas and process operations exhaust gas.

3.d Process Capacity

The FGTHROX has a 99.9% destruction efficiency for hydrocarbons and is nominally rated for approximately 95 MMBTU/hr heat input.

3.e Process Instrumentation

Process instrumentation is summarized by the operating data provided in Appendix C.

4. Sampling and Analytical Procedures

Sections 4.a through 4.d provide a summary of the sampling and analytical procedures used.

4.a Sampling Train and Field Procedures

Sampling and analysis procedures utilized the following test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations:

- Method 1 - *"Sample and Velocity Traverses for Stationary Sources"*
- Method 2 - *"Determination of Stack Gas Velocity and Volumetric Flowrate"*
- Method 3 - "Gas Analysis for the Determination of Dry Molecular" Weight"*(Fyrite Analysis Procedure)*
- Method 4 - *"Determination of Moisture Content in Stack Gases"*

Stack gas velocity traverses were conducted in accordance with the procedures outlined in Methods 1 and 2. A cyclonic flow evaluation was conducted at the sampling location. An S-type pitot tube and thermocouple assembly calibrated in accordance with Method 2, Section 4.1.1 was used to measure exhaust gas velocity pressures and temperatures during testing. Because the pitot tube dimensions outlined in Sections 2.6 through 2.8 were within

the specified limits, the baseline pitot tube coefficient of 0.84 (dimensionless) will be assigned for this testing.

Molecular weight determinations were conducted according to Method 3A using a Fyrite for analysis.

For Method 4, BTEC's Nutech® Model 2010 modular isokinetic stack sampling system consisted of (1) a stainless-steel probe, (2) a set of four Greenburg-Smith (GS) impingers with the first and third modified and the second a standard GS impinger, the first two containing 100 ml of deionized water, the third empty, and a fourth modified GS impinger containing approximately 300 g of silica gel desiccant, (3) a length of sample line, and (4) a Nutech® control case equipped with a pump, dry gas meter, and calibrated orifice.

4.b Recovery and Analytical Procedures

This test program did not include laboratory samples, consequently, sample recovery and analysis is not applicable to this test program.

4.c Sampling Ports

A diagram of the stack indicating traverse point locations and stack dimensions is included as Figure 1.

4.d Traverse Points

A diagram of the stack indicating traverse point locations and stack dimensions is included as Figure 1.

5. Test Results and Discussion

Sections 5.a through 5.k provide a summary of the test results.

5.a Results Tabulation

The relative accuracy of the THROX exhaust stack flowrate monitor is 9.7%. The overall results of the emissions test program are detailed by Table 2.

5.b Discussion of Results

The relative accuracy of the THROX exhaust stack flowrate monitor is 9.7% which is less than the corresponding limit of 20%.

5.c Sampling Procedure Variations

There were no variations in the sampling procedures from that specified by the emissions test plan.

5.d Process or Control Device Upsets

No upset conditions occurred during testing.

5.e Control Device Maintenance

There was no non-routine control equipment maintenance performed immediately prior to the emissions test program.

5.f Re-Test

The emissions test program was not a re-test.

5.g Audit Sample Analyses

No audit samples were collected as part of the test program.

5.h Calibration Sheets

Relevant equipment calibration documents are provided in Appendix C.

5.i Sample Calculations

Sample calculations are provided in Appendix D.

5.j Field Data Sheets

Field documents relevant to the emissions test program are presented in Appendix B.

5.k Laboratory Data

There are no laboratory results for this test program.

TABLE 2

Summary of Throx Flow RATA Results

August 20, 2013

Dow Corning

Throx Exhaust Stack

Flow Relative Accuracy

Relative Accuracy: 9.7

Run #	BTEC Time	Dow Time	RM SCFM	CEM SCFM	Diff	%Diff
1	14:35-14:40	13:26-13:31	17,149	18,600	-1450.89	-8.46%
2	14:54-14:59	13:45-13:50	14,288	15,800	-1512.28	-10.58%
3	15:40-15:45	14:01-14:06	14,901	16,000	-1098.94	-7.37%
4	15:26-15:31	14:17-14:22	14,680	16,100	-1420.33	-9.68%
5	15:43-15:48	14:34-14:39	13,656	15,100	-1444.40	-10.58%
6	**15:53-15:57**	**14:44-14:49**	**15,417**	**17,000**	**-1582.78**	**-10.27%**
7	**16:08-16:13**	**14:59-15:04**	**16,033**	**18,000**	**-1967.39**	**-12.27%**
8	16:20-16:25	15:11-15:16	16,081	17,500	-1419.07	-8.82%
9	16:42-16:47	15:33-15:38	14,732	15,800	-1067.57	-7.25%
10	16:54-16:58	15:45-15:50	14,045	14,800	-755.19	-5.38%
11	17:04-17:08	15:55-16:00	14,327	15,400	-1073.27	-7.49%
12					**0.00**	**#DIV/0!**
			14873.1	16122.2	-1249.105	-0.084
			Sdev	259.0115		
			CC	199.0939		
	RA (based on Ref. Meth.)			**9.7%**		
	Bias Test Pass/Fail			**Pass**		
	Bias Adjustment Factor			**1.000**		

Confidence Coefficient =

n=9

t = 2.306

$$CC = t_{0.975}\frac{S_d}{\sqrt{n}}$$

P.S. 2 Equation 2-5

Standard Deviation =

$$S_d = \left[\frac{\sum_{i=1}^{n} d_i^2 - \frac{(\sum_{i=1}^{n} d_i)^2}{n}}{n-1}\right]^{1/2}$$

P.S. 2 Equation 2-4

Figures

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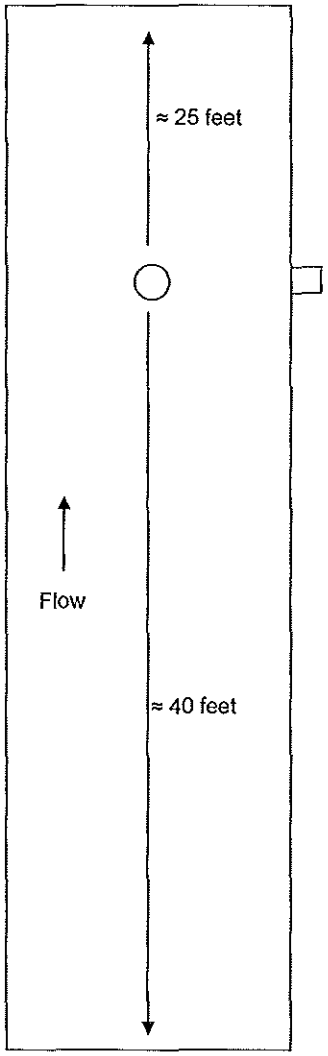
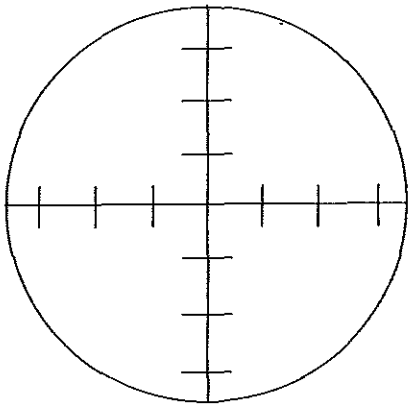
diameter = 54 inches





Not to Scale

Points	Distance "
1	2.4
2	7.9
3	16.0
4	38.0
5	46.1
6	51.6

Figure No. 1

Site: **THROX Exhaust** **Dow Corning** **Midland, Michigan**	**Sampling Date:** **August 20, 2013**	**BT Environmental Consulting, Inc.** **4949 Fernlee Avenue** **Royal Oak, Michigan 48073**

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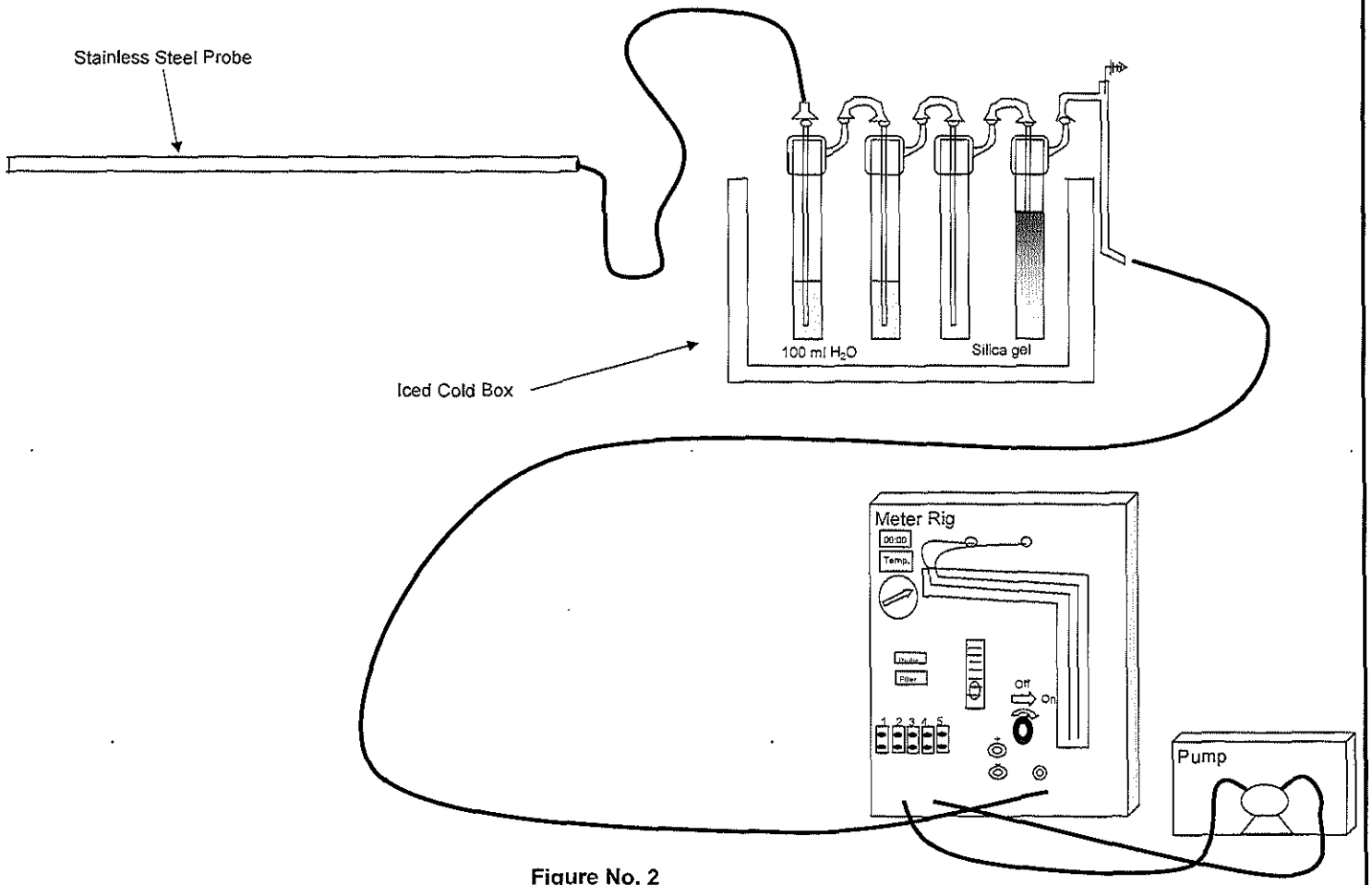

Figure No. 2

Site:	Sampling Date:	
USEPA Method 4 Dow Corning Midland, Michigan	August 20, 2013	BT Environmental Consulting, Inc. 4949 Fernlee Avenue Royal Oak, Michigan 48073