BTEC Inc.

Combustion Stack Flow Verification Test Report

Prepared for:

EES Coke Battery, LLC

River Rouge, Michigan

EES Coke Battery
P.O. Box 18309
River Rouge, Michigan 48218

Project No. 13-4472.00
12/23/2013

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

EXECUTIVE SUMMARY

BT Environmental Consulting, Inc. (BTEC) was retained by DTE EES Coke Battery, LLC (EES Coke) to evaluate volumetric flow rate from the No. 5 Coke Battery combustion exhaust stack at the EES Coke facility in River Rouge, Michigan. The testing was performed to demonstrate compliance with 40 CFR Part 60. The compliance test program was conducted on October 25th, 2013.

The results of the flow Verification test program are summarized by Table E-1.

Table E-1

Executive Summary Flow Verification Result Summary

Source	Flow Relative Accuracy Result
Combustion Stack	7.2%

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1. Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by DTE EES Coke Battery, LLC (EES Coke) to evaluate volumetric flow rate from the No. 5 Coke Battery combustion exhaust stack at the EES Coke facility in River Rouge, Michigan. The testing was performed to demonstrate compliance with 40 CFR Part 60. The compliance test program was conducted on October 25th, 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 report in the format suggested by the AQD test plan format guide.

1.a Identification, Location, and Dates of Test

Sampling and analysis for the emission test program was conducted on October 25th, 2013 at the EES Coke facility in River Rouge, Michigan. The test program included evaluation of volumetric flow rate from the No. 5 Coke Battery combustion exhaust stack.

1.b Purpose of Testing

EES Coke utilizes a flow monitor for the Combustion stack. All monitoring devices are to be certified by the manufacturer to be accurate to within ±20 percent compared to Method 2.

1.c Source Description

A diagram of the exhaust stack is presented as Figure 1.

1.d Test Program Contact

The contacts for the source are:

Mrs. Brenna Harden
Environmental Engineer
DTE Energy Services
EES Coke Battery, LLC
PO Box 18309
River Rouge, MI 48218
(313) 297-4183

1.e Testing Personnel

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
Matthew Young Project Manager	BTEC 4949 Fernlee Avenue Royal Oak, MI 48073	(586) 744-9133
Mr. Paul Draper Environmental Technician	BTEC 4949 Fernlee Avenue Royal Oak, MI 48073	(248) 548-8070
Mr. Andrew Lusk Environmental Technician	BTEC 4949 Fernlee Avenue Royal Oak, MI 48073	(248) 548-8070
Mrs. Brenna Harden Environmental Engineer	EES Coke Battery, LLC P.O. Box 18309 River Rouge, MI 48218	(313) 297-4183

2. Summary of Results

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

2.a Operating Data

Relevant operating data is available in Appendix A.

2.b Applicable Permit

Permit to Install: 51-08, effective 10/7/2008; and
Permit to Install: 71-13, effective 11/22/2013

2.c Results

The Combustion Stack passed the relative accuracy test audit (RATA). The overall results of the emission test program are summarized by Table 2 (see Section 5.a). Detailed results for each run can be found in Table 3.

2.d Emission Regulation Comparison

The results are summarized by table 2 (section 5.a).

3. Source Description

The EES Coke facility is located on Zug Island, River Rouge, Michigan. The No.5 coke battery consists of eighty-five six-meter high ovens for producing furnace coke. The process includes a "Combustion Stack" and a pushing emissions control system (PECS) baghouse, a"Pushing Stack".

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

Measurement of exhaust gas velocity and molecular weight were conducted using the following reference test methods codified at Title 40, Part 60, Appendix A of the Code of Federal Regulations (40 CFR 60, Appendix A):

- Method 1 - *"Location of the Sampling Site and Sampling Points"*
- Method 2 - *"Determination of Stack Gas Velocity and Volumetric Flowrate"*
- Method 3 - *"Determination of Molecular Weight of Dry Stack Gas"*
- Method 4 - *"Determination of Moisture Content in Stack Gas"*

Stack gas velocity traverses were conducted in accordance with the procedures outlined in Methods 1 and 2. Figure 1 presents the test ports and traverse/sampling point locations used. 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) was assigned for this testing.

Molecular weight determinations were conducted according to Method 3. The equipment used for this evaluation consisted of a one-way squeeze bulb with connecting tubing and a set of Fyrite® combustion gas analyzers. Moisture content was calculated using the

procedures in Method 4. A sampling pitot tube leak test was conducted before and after each test run.

4.b Recovery and Analytical Procedures

Recovery and analytical procedures were described in Section 4.a.

4.c Sampling Ports

Sampling ports are located on the stack and meet method 1 criteria.

4.d Traverse Points

Sampling port and traverse point locations are illustrated by 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 results of the emissions test program are summarized by Table 2.

Table 2

Executive Summary Flow Verification Result Summary

Source	Flow Relative Accuracy Result
Combustion Stack	7.2 %

Detailed data for each test run can be found in Table 3.

5.b Discussion of Results

The Combustion Stack tested passed the ±20% requirement. The results of the emissions test program are summarized by Table 2 (see section 5.a). Detailed results for each run are summarized by Tables 3.

5.c Sampling Procedure Variations

EES Coke has an Opacity monitor installed in the northwest port of the Combustion Stack. The monitor was not removed for this testing, instead flow determinations were made by sampling three ports. BTEC used eight points per traverse for a total of 24 sampling points.

5.d Process or Control Device Upsets

No upset conditions occurred during testing.

5.e Control Device Maintenance

No maintenance was performed during the test program.

5.f Audit Sample Analyses

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

5.g Calibration Sheets

Relevant equipment calibration documents are provided as Appendix B.

5.h Sample Calculations

Sample calculations are provided in Appendix D.

5.i Field Data Sheets

Combustion Stack flow data sheets are presented in Appendix C.

5.j Laboratory Data

The test program required no laboratory data.

Tables

Table 3
Summary of Volumetric Flow Rate RATA Results
October 25, 2013
EES COKE
Combustion Stack

Volumetric Flow Rate Relative Accuracy

Relative Accuracy: 7.2

Run #	Time	RM SCFM	EES COKE SCFM	Diff	%Diff
1	1026-1048	117,478	111,800	5677.95	4.83%
2	**1048-1059**	**123,746**	**102,700**	**21046.04**	**17.01%**
3	1126-1152	123,941	112,600	11341.49	9.15%
4	**1206-1214**	**127,210**	**111,400**	**15810.13**	**12.43%**
5	1215-1221	116,746	105,400	11346.30	9.72%
6	1226-1234	118,304	114,400	3903.93	3.30%
7	1258-1310	114,533	109,100	5432.82	4.74%
8	1311-1317	118,005	113,600	4404.74	3.73%
9	1317-1330	113,541	110,100	3440.63	3.03%
10	1506-1516	111,782	113,400	-1618.12	-1.45%
11	1516-1523	109,333	106,600	2733.06	2.50%
		115,963	110,778	5184.756	4.40%
		Sdev	4088.9415		
		CC	3143.0387		
		RA (based on Ref. Meth.)	7.2%		

Confidence Coefficient =
n=9
t = 2.306

$$cc = t_{0.975}\frac{s_d}{\sqrt{n}}$$

P.S. 2 Equation 2-5

Standard Deviation =

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

P.S. 2 Equation 2-4

Relative Accuracy =
RM=Reference Monitor

$$RA = \frac{|\bar{d}| + |cc|}{\overline{RM}} x100$$

P.S. 2 Equation 2-6

RA calculated as specified in Performance Specification 2, Appendix B, 40 CFR 60 - Equation 2-4

As specified in P.S. 2, subsection 8.4.4, three sets of test runs may be rejected, these rejected test runs are high-lighted in the table

Figures

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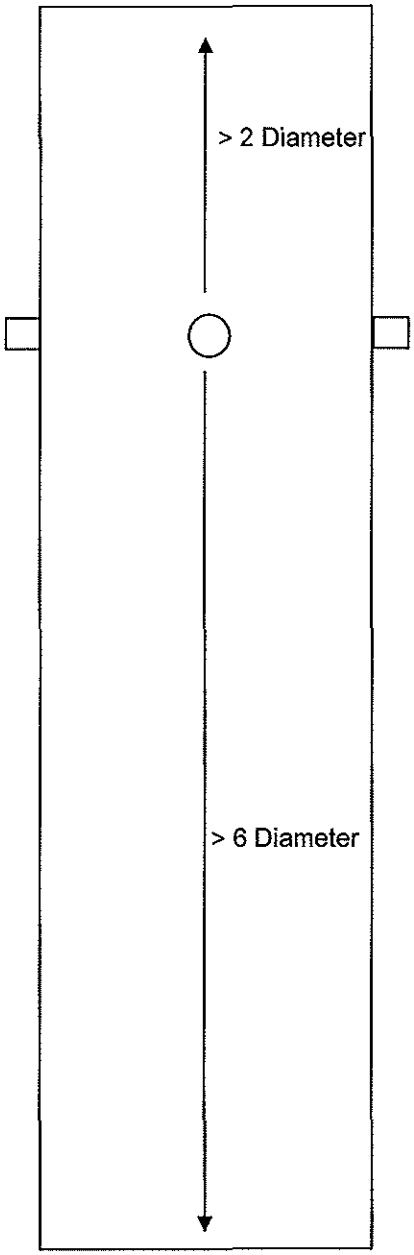
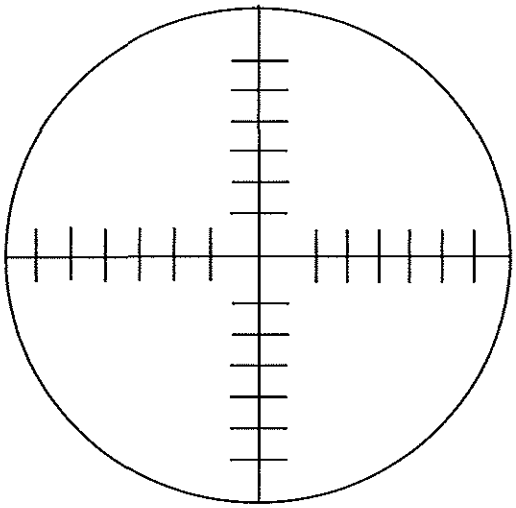
diameter = 220"





Not to Scale

Points	Distance "
12	4.6
11	14.7
10	26.0
9	38.9
8	55.0
7	78.3
6	141.7
5	165.0
4	181.1
3	194.0
2	205.3
1	215.4

Figure 1

Site: **EES Coke Battery, LLC** **River Rouge, MI** **Combustion Stack**	**Sampling Dates:** **10/25/2013**	**BT Environmental Consulting, Inc.** **4949 Fernlee Ave** **Royal Oak, Michigan**

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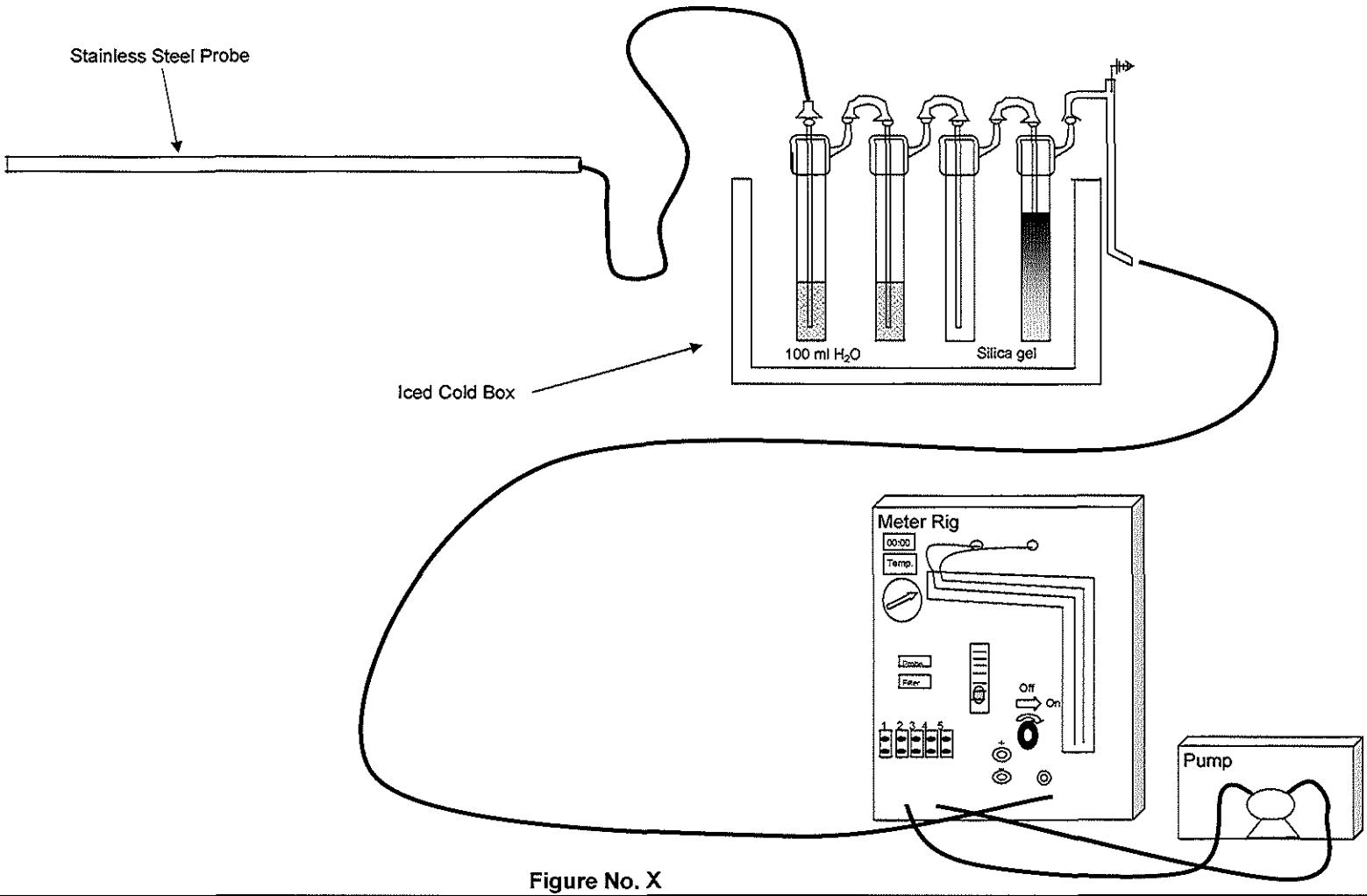

Figure No. X

Site: **USEPA Method 4** **EES Coke Battery, LLC** **River Rouge, MI**	**Sampling Date:** **October 25, 2013**	**BT Environmental Consulting, Inc.** **4949 Fernlee Avenue** **Royal Oak, Michigan 48073**