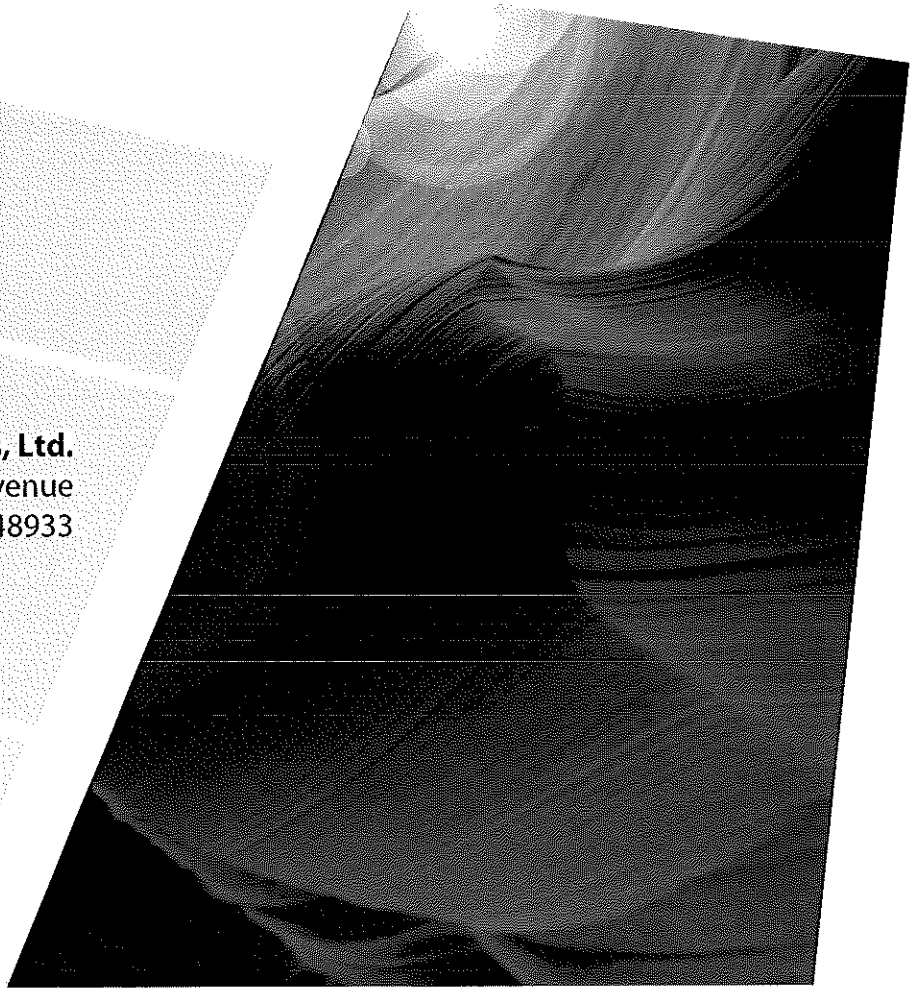
Report

Emissions Test

Test Date: December 17th, 2013

Otsego Paper, Inc.
320 N. Farmer Street
Otsego, Michigan 49078

NTH Project No. 73-130607-01
January 20, 2014



NTH Consultants, Ltd.
608 S. Washington Avenue
Lansing, MI 48933

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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: Otsego Paper, Inc — County: Allegan

Source Address: 320 North Farmer Street — City: Otsego

AQD Source ID (SRN): A0023 — ROP No.: MI-ROP-A0023-2013 — ROP Section No.: NA

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:

Emissions test report for CO & VOC, conducted at EUTURBINE1 and EUDUCTBURNER1

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

Henry Krell	Plant Manager	269-567-3554
Name of Responsible Official (print or type)	Title	Phone Number
Henry Krell		1/17/14
Signature of Responsible Official		Date

* Photocopy this form as needed.

EQP 5736 (Rev 11-04)

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ACEC MEMBER

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APPENDICES

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1.0 INTRODUCTION

NTH Consultants, Ltd. (NTH) has been retained by Otsego Paper, Inc. (Otsego Paper) to perform emissions testing on the turbine identified as EUTURBINE1 and turbine-duct burner identified as EUDUCTBURNER1 at the Otsego Paper facility in Otsego, Michigan. Testing was conducted for carbon monoxide (CO) and volatile organic compounds (VOCs) from the natural gas-fired combustion turbine (EUTURBINE1), with and without the associated heat recovery steam generators (HRSG) and natural gas-fired duct burner (EUDUCTBURNER1).

1.1 Purpose of Test

The purpose of the CO and VOC testing is to comply with specifications contained in Michigan Department of Environmental Quality (MDEQ) Renewable Operating Permit (ROP) MI-ROP-A0023-2013.

1.2 Test Date Requirement

Testing was completed December 17th, 2013.

1.3 Project Contact Information:

Location	Address	Contact
Test Facility	Otsego Paper, Inc. 320 North Farmer Street Otsego, Michigan 49078	Mr. Gary Roys (269) 384-6345 groys@usg.com
Test Company Representative	NTH Consultants, Ltd. 1430 Monroe Avenue NW, Suite 180 Grand Rapids, Michigan 49505	Ms. Lori Myott (517) 202-3295 lmyott@nthconsultants.com
State Representative	MDEQ 525 W. Allegan, Constitution Hall 3rd Floor Lansing, MI 48909	Mr. Nathaniel Hude (517) 284-6779 huden@michigan.gov

1.4 Summary of Results

Table 1-1: Summary of EUTURBINE1 Only Test Results

Run[1]	CO		VOC	
	Measured lb/hr	Permit lb/hr	Measured lb/hr	Permit lb/hr
Run 2	0.10		0.0	
Run 3	0.21		0.0	
Run 4	0.00		0.0	
Average	0.10	17	0.0	0.3

[1]Run 1 was voided due to an analyzer drift.

Table 1-2: Summary of EUTURBINE1 and EUDUCTBURNER1 Test Results

Run	CO		VOC	
	Measured lb/hr	Permit lb/hr	Measured lb/hr	Permit lb/hr
Run 5	1.30		0.04	
Run 6	1.06		0.00	
Run 7	1.07		0.00	
Average	1.14	8.5	0.01	2.2

2.0 PROCESS DESCRIPTION

The Otsego Paper facility produces electricity from a Mars T-15000 gas turbine, designated as EUTURBINE1, with a maximum heat input rate of 141.5 MMBtu/hr at low temperature operating conditions. Energy is generated at the combustion turbine by drawing in ambient air by means of burning fuel and expanding the hot combustion gases in the turbine. The hot exhaust gases are then directed to a multi-pressure ABCO heat recovery steam generator (HRSG) for steam production.

3.0 REFERENCE METHODOLOGIES

NTH performed the emissions testing using U.S. EPA approved test methods and procedures. Triplicate 60-minute test repetitions for CO and total VOC were conducted using the following U.S. EPA Reference Methods, in accordance with specifications stipulated in Appendix A to 40 CFR Part 60:

- **Method 1:** *Sample and Velocity Traverses for Stationary Sources* will be used to determine the locations of the sample/velocity traverse points and verify the absence of cyclonic flow.

- **Method 2:** *Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)* will be used to determine the exhaust gas velocity, volumetric flow rate, and stack temperature measurements (pitot tube equipped with a thermocouple).

- **Method 3A:** *Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)* will be used to determine the O_2 concentrations and calculate pollutant emission rates, as applicable.

- **Method 4:** *Determination of Moisture Content in Stack Gases* will be used in order to determine the moisture content.

- **Method 10:** *Determination of Carbon Monoxide Emissions from Stationary Sources* will be used to determine the CO concentrations.

- **Method 25A:** *Determination of Total Gaseous Organic Concentration using a Flame Ionization Analyzer* will be used to determine the VOC concentrations.

3.1 Location of Traverse Points

The number of traverse points was determined in accordance with U.S. EPA Reference Method 1. The cross-sectional inside diameter of the stack was measured, and based upon this value and the availability of access ports, traverse points were selected for measuring the exhaust gas velocity pressure, temperature and sampling. Schematics depicting traverse point locations and port locations are shown in Figure 2.

3.2 Velocity and Temperature

The exhaust gas velocities and temperatures were determined in accordance with U.S. EPA Reference Method 2. The exhaust gas velocity was measured using an S-Type pitot tube with an attached thermocouple probe. The Pitot tube was connected to an inclined water column manometer and checked for leaks at five inches of water. The exhaust gas temperature was measured using a calibrated K type thermocouple.

3.3 Molecular Weight

The exhaust gas composition was determined using U.S. EPA Reference Method 3A. The concentrations, taken and analyzed onsite, were used to determine exhaust gas composition and molecular weight.

3.4 Moisture

The exhaust gas moisture content was determined in accordance with U.S. EPA Reference Method 4. The sample was passed through a series of four impingers, with the first two containing deicing fluid (approved by DEQ), the third empty, and the fourth containing silica gel. The amount of water collected was measured gravimetrically to determine moisture content.

3.5 Carbon Monoxide

The CO concentrations were measured using a non-dispersive infrared analyzer (NDIR) following the guidelines of U.S. EPA Reference Method 10. The analyzer was calibrated at a minimum of three points: zero, mid-range (40-60 percent of span), and high range 90-100 percent of the span for the testing.

3.6 Total VOC

VOC concentrations were determined in accordance with U.S. EPA Method 25A. The FIA was used to measure and provide real-time analysis of total VOC. The analyzer was calibrated at three points: a zero gas (nitrogen), a low-range gas (25 to 35 percent of span), and a mid-range gas (45 to 55 percent of span), using propane gas standards. The analyzer was not calibrated at a high-range gas due to nearly negligible VOC concentrations.

3.7 Data Acquisition System

Information and data from each analog instrument signal output was collected with the STRATA® DAS. Calibration error, drift and bias corrections were calculated automatically. All gathered data was linked to spreadsheets that support dynamic data exchange (i.e. Microsoft Excel) for quick data reduction and report generation.

4.0 QUALITY ASSURANCE

Each promulgated U.S. EPA reference method described above is accompanied by a statement indicating that to obtain reliable results, persons using these methods should have a thorough knowledge of the techniques associated with each. To that end, NTH attempts to minimize any factors in the field that could increase error by implementing our quality assurance program into every testing activity segment.

The pitot tubes and thermocouples used to measure the exhaust gas during this test program were calibrated according to the procedures outlined in the *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods, Method 2, Type S Pitot Tube Inspection,* and Calibration Procedure 2E *Temperature Sensor.*

U.S. EPA Protocol No. 1 gas standards were used to calibrate the analyzers during the test program. These gases are certified according to the *U.S. EPA Traceability Protocol for Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997,* and are certified to have a total relative uncertainty of ±1 percent.

The DAS software in use during the testing was programmed to the specifications described in the applicable U.S. EPA Method in use during the test, and operated based on each pre-programmed analyzer span value. Calibration error, drift and bias corrections were calculated automatically. All gathered data was linked to spreadsheets that support dynamic data exchange for quick data reduction and report generation.

5.0 DISCUSSION OF RESULTS

Operations appeared normal throughout the testing event; however several minor issues occurred during the testing. The first run on EUTURBINE1 was voided due to an analyzer drift. The deionized water in the Method 4 impingers froze and was replaced with deicing fluid. Afterwards the moisture sample line began freezing, but was shortened to eliminate the issue. These issues were resolved and all tests were completed without further incident. Results indicate that the emissions are all under the limits. A complete summary of results can be found in Tables 1 and 2.

All calculations, results, and field and operational data are contained in Appendices B through E. Appendix F contains the QA/QC data.

TABLES

Table 1

Otsego Paper

EUTURBINE1 100% Load

Summary of CO and VOC Emissions

December 17, 2013

Run No.	2	3	4	Average
Test Date	December 17, 2013	December 17, 2013	December 17, 2013	
Moisture Run Time	1216-1253	1348-1431	1640-1715	
Analyzer Run Time	1144-1244	1259-1359	1631-1731	
Volumetric Flow Rates				
Actual Cubic Feet per Minute:	129,410	129,390	130,187	129,662
Standard Cubic Feet per Minute:	80,470	80,775	80,953	80,732
Dry Standard Cubic Feet per Minute:	75,082	75,367	76,505	75,651
Fixed Gases				
Oxygen, % by volume, dry:	12.23	12.23	12.23	12.23
Carbon dioxide, % by volume, dry:	4.55	4.55	4.55	4.55
Moisture, % by volume:	6.70	6.70	5.49	6.29

Run No.	2	3	4	Average
Concentration, (ppmvd):				
Carbon Monoxide:	0.30	0.63	0.00	0.31
Volatile Organic Compounds (as propane):	0.00	0.00	0.00	0.00
Emission Rate, (lb/hr):				
Carbon Monoxide:	0.10	0.21	0.00	0.10
Volatile Organic Compounds (as propane):	0.00	0.00	0.00	0.00
Emission Rate, (lb/MMBtu):				
Carbon Monoxide:	8.42E-04	1.77E-03	0.00E+00	8.69E-04
Volatile Organic Compounds (as propane):	0.00E+00	0.00E+00	0.00E+00	0.00E+00

ppmvd = parts per million by volume, dry
lb/hr = pounds per hour
lb/MMBtu = pounds per million British thermal units

Table 2

Otsego Paper

EUTURBINE1 and EUDUCTBURNER1 100% Load

Summary of CO and VOC Emissions

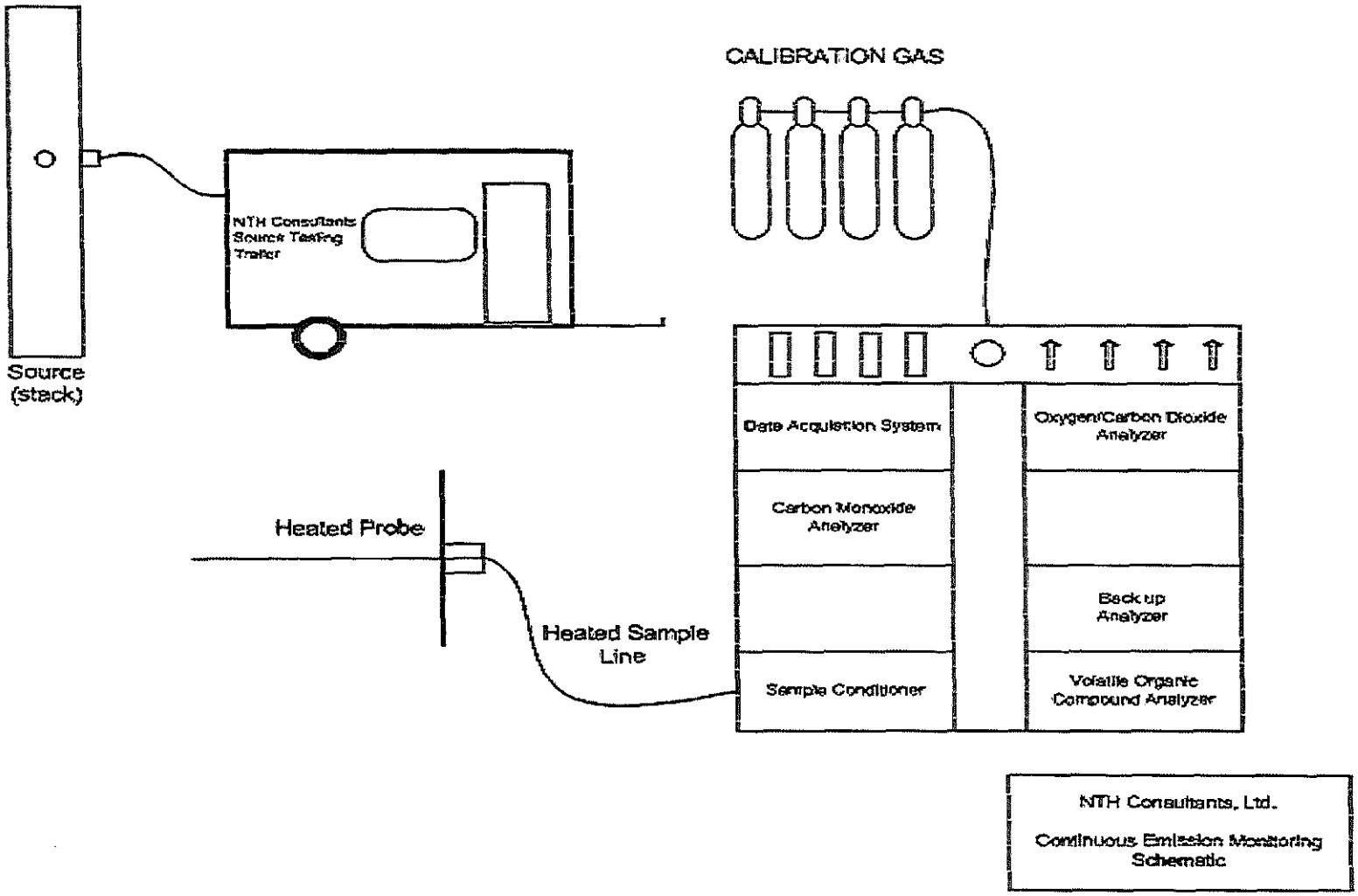
December 17, 2013

Run No.	5	6	7	Average
Test Date	December 17, 2013	December 17, 2013	December 17, 2013	
Moisture Run Time	1810-1847	1925-2000	2045-2119	
Analyzer Run Time	1802-1902	1917-2017	2031-2131	
Volumetric Flow Rates				
Actual Cubic Feet per Minute:	131,185	129,229	132,085	130,833
Standard Cubic Feet per Minute:	85,054	83,759	85,610	84,808
Dry Standard Cubic Feet per Minute:	77,034	75,729	77,373	76,712
Fixed Gases				
Oxygen, % by volume, dry:	12.23	12.23	12.23	12.23
Carbon dioxide, % by volume, dry:	4.55	4.55	4.55	4.55
Moisture, % by volume:	9.43	9.59	9.62	9.55
Run No.	5	6	7	Average
Concentration, (ppmvd):				
Carbon Monoxide:	3.86	3.19	3.16	3.40
Volatile Organic Compounds (as propane):	0.08	0.00	0.00	0.03
Emission Rate, (lb/hr):				
Carbon Monoxide:	1.30	1.06	1.07	1.14
Volatile Organic Compounds (as propane):	0.04	0.00	0.00	0.01
Emission Rate, (lb/MMBtu):				
Carbon Monoxide:	5.55E-03	4.57E-03	4.50E-03	4.87E-03
Volatile Organic Compounds (as propane):	1.85E-04	0.00E+00	0.00E+00	6.18E-05

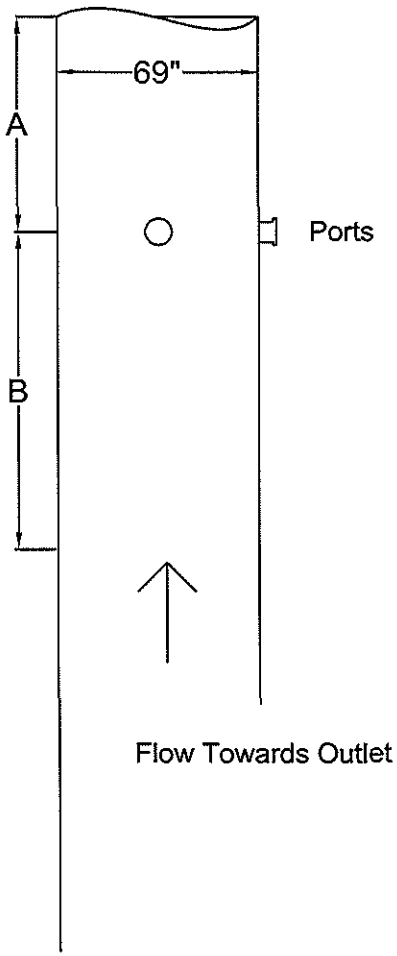
ppmvd = parts per million by volume, dry
lb/hr = pounds per hour
lb/MMBtu = pounds per million British thermal units

FIGURES

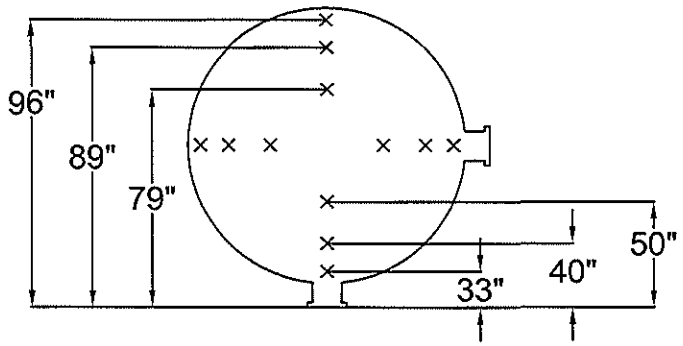
Figure 1. NTH CEMs/Referecne Method Set Up



Profile View



Plan View



Traverse Points

Notes

1. Traverse points mirrored for both ports
2. X denotes a traverse point
3. Port length 30 inches
4. Traverse point locations shown to the nearest inch

NTH	Drafted by: TH	Job Number: 73-130607	Client: Otsego Paper
	NTH Consultants, Ltd.	Approximate Duct Diameters Upstream (A): >2 Approximate Duct Diameters Downstream (B): >8	Figure 2