1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

DTE Energy - Belle River Power Plant (BRPP) (Facility ID: B2796) contracted Montrose Air Quality Services, LLC (Montrose) to perform a compliance test program on the EU-BOILER2-BR at the DTE Energy - BRPP facility located in China, Michigan. Testing was performed on July 8, 2021, for the purpose of satisfying the emission testing requirements pursuant to Michigan Department of Environment, Great Lakes, and Energy (EGLE) Renewable Operation Permit (ROP) No. MI-ROP-B2796-2015c.

The specific objectives were to:

- Verify the filterable particulate matter (FPM) emissions from the Exhaust Stack serving EU-BOILER2-BR
- Conduct the test program with a focus on safety

Montrose performed the tests to measure the emission parameters listed in Table 1-1.

TABLE 1-1
SUMMARY OF TEST PROGRAM

Test Date	Unit ID/ Source Name	Activity/ Parameters	Test Methods	No. of Runs	Duration (Minutes)
7/8/2021	EU-BOILER2-BR	Velocity/Volumetric Flow Rate	EPA 1 & 2	3	60
7/8/2021	EU-BOILER2-BR	O_2, CO_2	EPA 3A	3	5-9
7/8/2021	EU-BOILER2-BR	Moisture	EPA 4	3	60
7/8/2021	EU-BOILER2-BR	FPM	EPA 5	3	60

To simplify this report, a list of Units and Abbreviations is included in Appendix D.1. Throughout this report, chemical nomenclature, acronyms, and reporting units are not defined. Please refer to the list for specific details.

This report presents the test results and supporting data, descriptions of the testing procedures, descriptions of the facility and sampling locations, and a summary of the quality assurance procedures used by Montrose. The average emission test results are summarized and compared to their respective permit limits in Table 1-2. Detailed results for individual test runs can be found in Section 4.0. All supporting data can be found in the appendices.

The testing was conducted by the Montrose personnel listed in Table 1-3. The tests were conducted according to the Test Plan dated April 26, 2021, that was submitted to EGLE.

TABLE 1-2
SUMMARY OF AVERAGE COMPLIANCE RESULTS -
EU-BOILER2-BR
JULY 8, 2021

Parameter/Units	Average Results	Emission Limits
Filterable Particulate Matter (FPM)		
lb/hr	76.9	--
lb/MMBtu	0.012	0.10

1.2 KEY PERSONNEL

A list of project participants is included below:

Facility Information

Source Location:	DTE Energy - BRPP 4505 King Road China, MI 48054	
Project Contact:	Jason Roggenbuck	Jason Logan
Role:	Environmental Engineer	Environmental Specialist
Company:	DTE Energy - BRPP	DTE Energy
Telephone:	810-278-0282	734-548-2128
Email:	Jason.roggenbuck@dteenergy.com	Jason.logan@dteenergy.com

Agency Information

Regulatory Agency:	EGLE
Agency Contact:	Karen Kajiya-Mills
Telephone:	517-335-3122
Email:	Kajiya-millk@michigan.gov

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC	
Contact:	Matthew Young	David Trahan
Title:	District Manager	Field Project Manager
Telephone:	248-547-8070	248-547-8070
Email:	myoung@montrose-env.com	Dtrahan@montrose-env.com

Laboratory Information

Laboratory:	Montrose - Detroit
City, State:	Royal Oak, MI
Method:	EPA Method 5

Test personnel and observers are summarized in Table 1-3.

TABLE 1-3
TEST PERSONNEL AND OBSERVERS

Name	Affiliation	Role/Responsibility
David Trahan	Montrose	Field Project Manager, QI
David Koponen	Montrose	Field Technician
Jason Roggenbuck	DTE Energy - BRPP	Observer/Client Liaison/Test Coordinator

2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS DESCRIPTION, OPERATION, AND CONTROL EQUIPMENT

DTE Energy owns and operates the Belle River Power Plant in China, Michigan. Energy is produced by a coal fired boiler (EU-BOILER2-BR) which was in operation during this testing event.

2.2 FLUE GAS SAMPLING LOCATION

Information regarding the sampling location is presented in Table 2-1.

TABLE 2-1
SAMPLING LOCATION

Sampling Location	Stack Inside Diameter (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
EU-BOILER2-BR Exhaust Stack	306.0	4,920 / 16.1	1,920 / 6.3	Isokinetic: 12 (3/port)

The sampling location was verified in the field to conform to EPA Method 1. Acceptable cyclonic flow conditions were confirmed prior to testing using EPA Method 1, Section 11.4. See Appendix A.1 for more information.

2.3 OPERATING CONDITIONS AND PROCESS DATA

Emission tests were performed while the source/units and air pollution control devices were operating at the conditions required by the permit. The unit was tested when operating normally.

Plant personnel were responsible for establishing the test conditions and collecting all applicable unit-operating data. The process data that was provided is presented in Appendix B. Data collected includes the following parameters:

- Facility CEMS data associated with the 60-minute runs

3.0 SAMPLING AND ANALYTICAL PROCEDURES

3.1 TEST METHODS

The test methods for this test program were presented previously in Table 1-1. Additional information regarding specific applications or modifications to standard procedures is presented below.

3.1.1 EPA Method 1, Sample and Velocity Traverses for Stationary Sources

EPA Method 1 is used to assure that representative measurements of volumetric flow rate are obtained by dividing the cross-section of the stack or duct into equal areas, and then locating a traverse point within each of the equal areas. Acceptable sample locations must be located at least two stack or duct equivalent diameters downstream from a flow disturbance and one-half equivalent diameter upstream from a flow disturbance.

3.1.2 EPA Method 2, Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

EPA Method 2 is used to measure the gas velocity using an S-type pitot tube connected to a pressure measurement device, and to measure the gas temperature using a calibrated thermocouple connected to a thermocouple indicator. Typically, Type S (Stausscheibe) pitot tubes conforming to the geometric specifications in the test method are used, along with an inclined manometer. The measurements are made at traverse points specified by EPA Method 1.

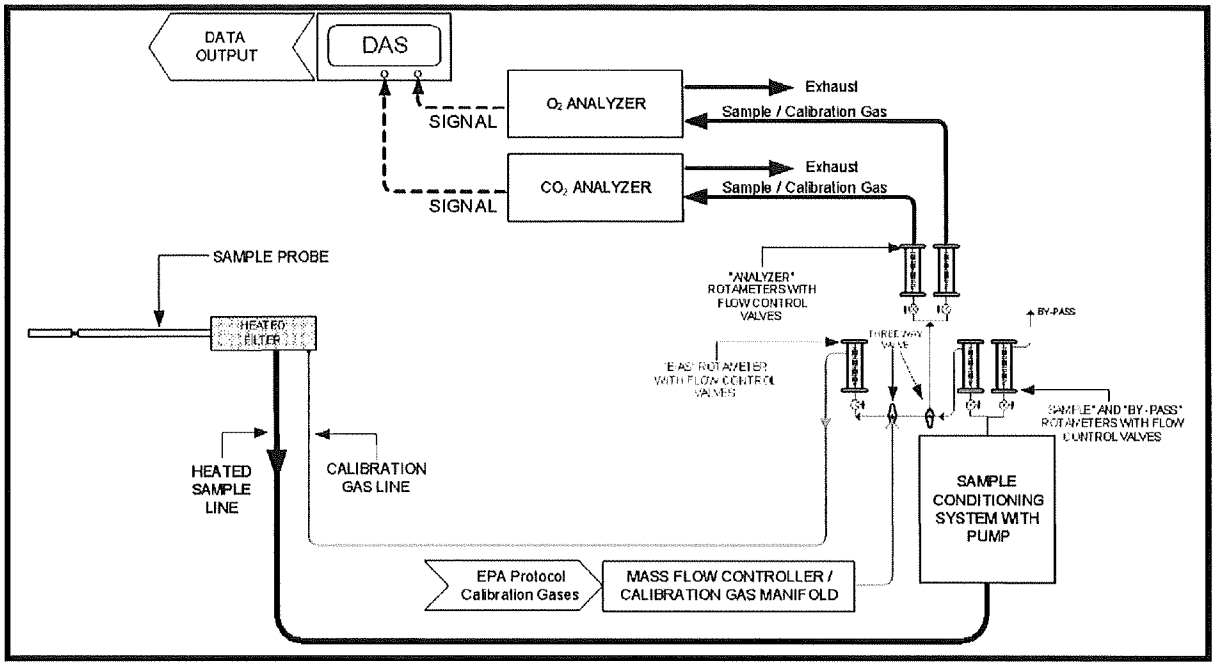
3.1.3 EPA Method 3A, Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)

EPA Method 3A is an instrumental test method used to measure the concentration of O_2 and CO_2 in stack gas. The effluent gas is continuously or intermittently sampled and conveyed to analyzers that measure the concentration of O_2 and CO_2. The performance requirements of the method must be met to validate data.

This method was modified by measuring the concentrations of O_2 and CO_2 using a continuous lung. The gas samples were analyzed for percent O_2 and CO_2 using an O_2/CO_2 analyzer.

The typical sampling system is detailed in Figure 3-1.

FIGURE 3-1
EPA METHOD 3A SAMPLING TRAIN



3.1.4 EPA Method 4, Determination of Moisture Content in Stack Gas

EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train. Moisture is removed using a series of pre-weighed impingers containing methodology-specific liquids and silica gel immersed in an ice water bath. The impingers are weighed after each run to determine the percent moisture.

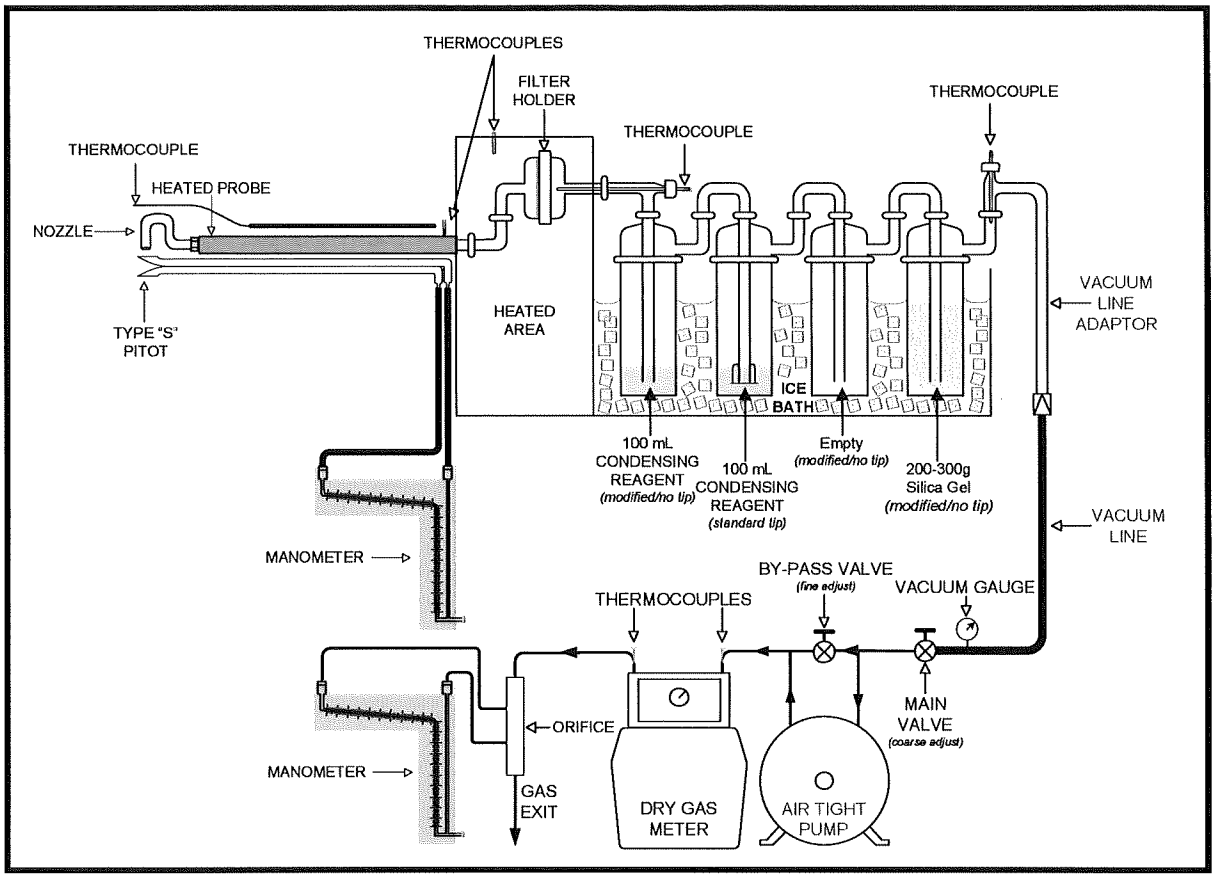
The typical sampling system is detailed in Figure 3-2.

3.1.5 EPA Method 5, Determination of Particulate Matter from Stationary Sources

EPA Method 5 is a manual, isokinetic method used to measure FPM emissions. The samples are analyzed gravimetrically. This method is performed in conjunction with EPA Methods 1 through 4. The stack gas is sampled through a nozzle, probe, filter, and impinger train. FPM results are reported in emission concentration and emission rate units.

The typical sampling system is detailed in Figure 3-2.

FIGURE 3-2
EPA METHOD 5 SAMPLING TRAIN



3.1.6 EPA Method 19, Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide, and Nitrogen Oxide Emission Rates

EPA Method 19 is used to calculate pollutant emission rates in units of lb/MMBtu. EPA Method 19, Table 19-2 contains a list of assigned fuel factors for different types of fuels, which can be used for these calculations. For this test, the F-Factor was calculated from analysis of a fuel sample collected on the test day.

3.2 PROCESS TEST METHODS

Process samples of coal were taken by DTE Energy personal and analyzed for Proximate and Ultimate fuel analysis.

4.0 TEST DISCUSSION AND RESULTS

4.1 FIELD TEST DEVIATIONS AND EXCEPTIONS

No field deviations or exceptions from the test plan or test methods occurred during this test program.

4.2 PRESENTATION OF RESULTS

The average results are compared to the permit limits in Table 1-2. The results of individual compliance test runs performed are presented in Table 4-1. Emissions are reported in units consistent with those in the applicable regulations or requirements. Additional information is included in the appendices as presented in the Table of Contents.

TABLE 4-1
FILTERABLE PM EMISSIONS RESULTS -
EU-BOILER2-BR

Run Number	1	2	3	Average
Date	7/8/2021	7/8/2021	7/8/2021	--
Time	8:40-9:51	10:20-11:34	12:00-13:17	--
Process Data				
Boiler Heat Input Rate, MMBtu/hr	6,093	6,216	6,218	6,175
Flue Gas Parameters				
O_2, % volume dry	9.02	8.41	8.53	8.65
CO_2, % volume dry	10.67	11.16	11.07	10.97
flue gas temperature, °F	307.8	308.3	309.6	308.5
moisture content, % volume	12.38	11.43	12.08	11.96
volumetric flow rate, dscfm	1,767,883	1,715,534	1,733,310	1,738,909
Filterable PM				
gr/dscf	0.0054	0.0050	0.0051	0.0052
lb/hr	81.7	72.9	76.2	76.9
lb/MMBtu	0.013	0.012	0.012	0.012

5.0 INTERNAL QA/QC ACTIVITIES

5.1 QA/QC AUDITS

The meter box and sampling trains used during sampling performed within the requirements of their respective methods. All post-test leak checks, minimum metered volumes, minimum sample durations, and percent isokinetics met the applicable QA/QC criteria.

EPA Method 3A calibration audits were not all within the measurement system performance specifications for the calibration drift checks, system calibration bias checks, and calibration error checks. See Section 5.2 for further detail.

EPA Method 5 analytical QA/QC results are included in the laboratory report. The method QA/QC criteria were met, except if noted in Section 5.2. An EPA Method 5 reagent blank was analyzed. The maximum allowable amount that can be subtracted is 0.001% of the weight of the acetone blank. The blank did not exceed the maximum residue allowed.

5.2 QA/QC DISCUSSION

The EPA Method 3A CO_2 analyzer calibration error checks for the Mid-Level and High-Level gases did not meet EPA Method 3A, Section 13.1 criteria which stipulates that the calibration error be within ±2% of the calibration span. Since the EPA Method 3A CO_2 data was used solely to calculate the molecular weight of the stack gas, it is the opinion of Montrose that the failed calibration error checks had little to no effect on reported emission results.

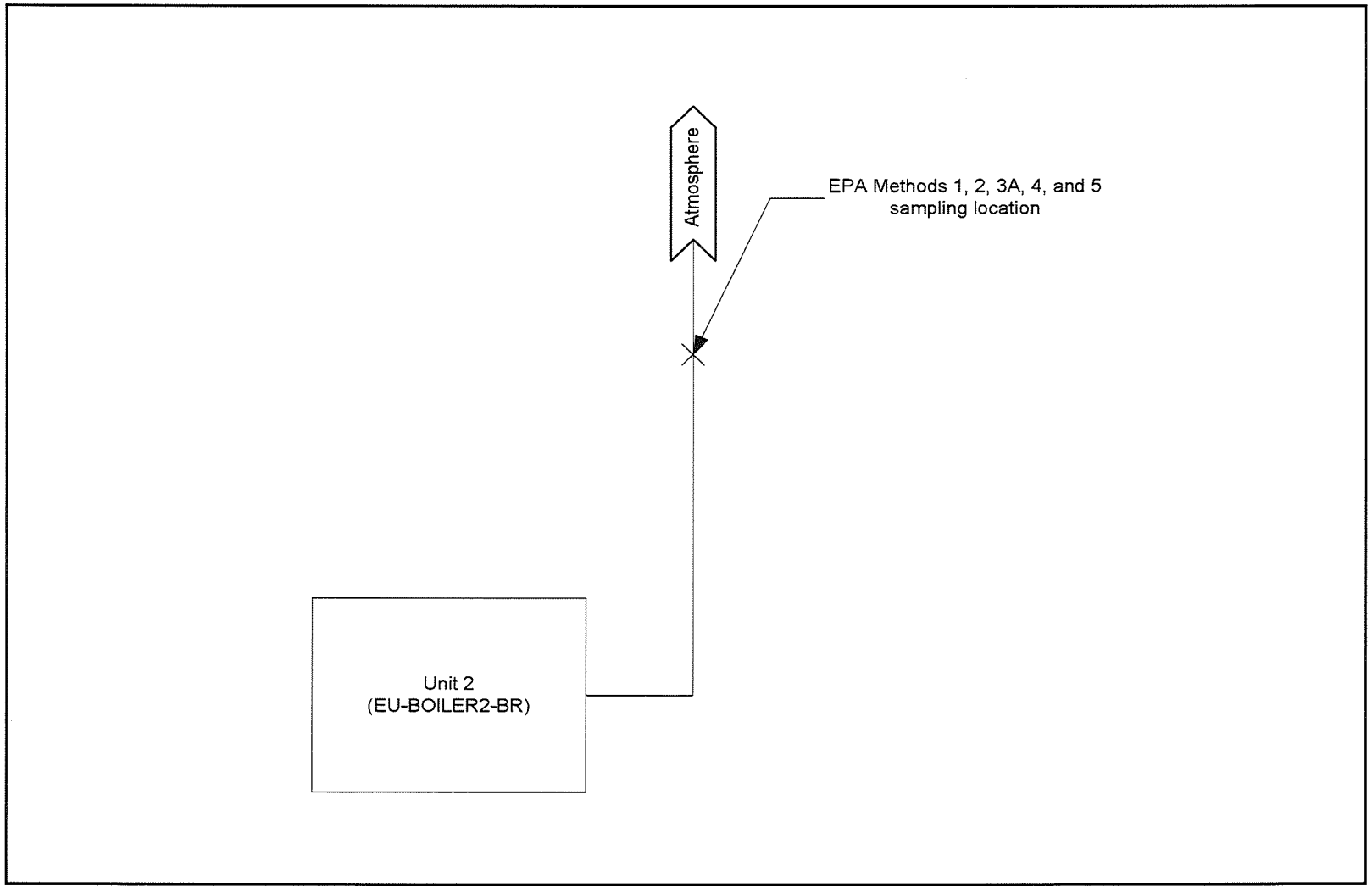
5.3 QUALITY STATEMENT

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is included in the report appendices. The content of this report is modeled after the EPA Emission Measurement Center Guideline Document (GD-043).

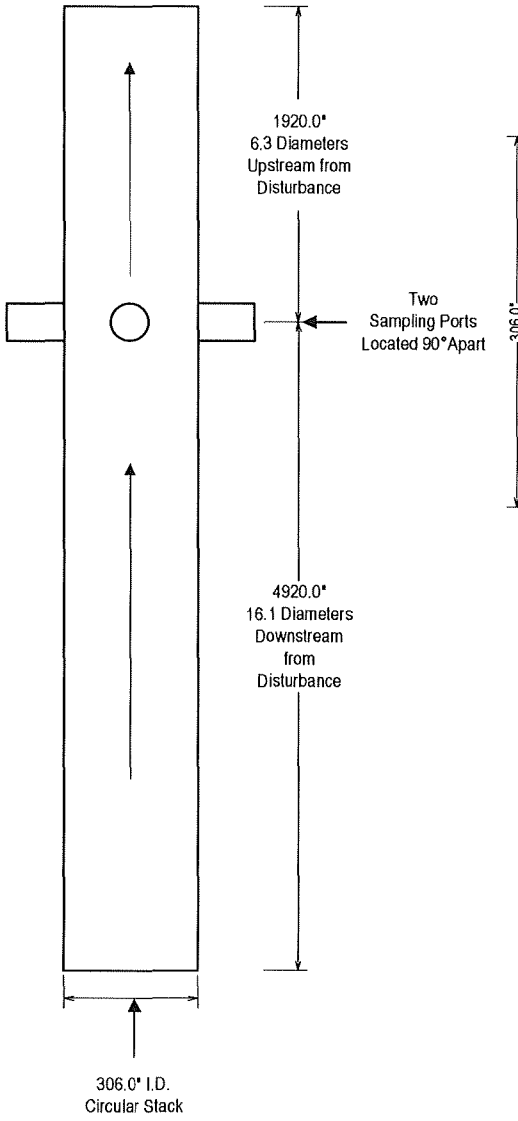
APPENDIX A
FIELD DATA AND CALCULATIONS

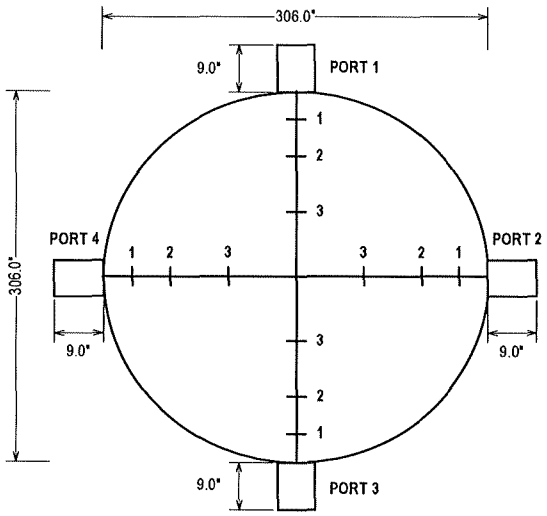
Appendix A.1
Sampling Locations

EU-BOILER2-BR PROCESS AND SAMPLING LOCATION SCHEMATIC



EU-BOILER2-BR EXHAUST TRAVERSE POINT LOCATION DRAWING





Point	% of Stack Depth	Distance from Inside Wall (in.) PORTS 1 & 3	Distance from Inside Wall (in.) PORTS 2 & 4
1	4.4	13.5	13.5
2	14.6	44.7	44.7
3	29.6	90.6	90.6