Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AP-42 Section Number: 12.15

Reference Number: 9

Title: Test Report- Sulfuric Acid Emissions from ESB Battery Plant Forming Room, Allentown, PA

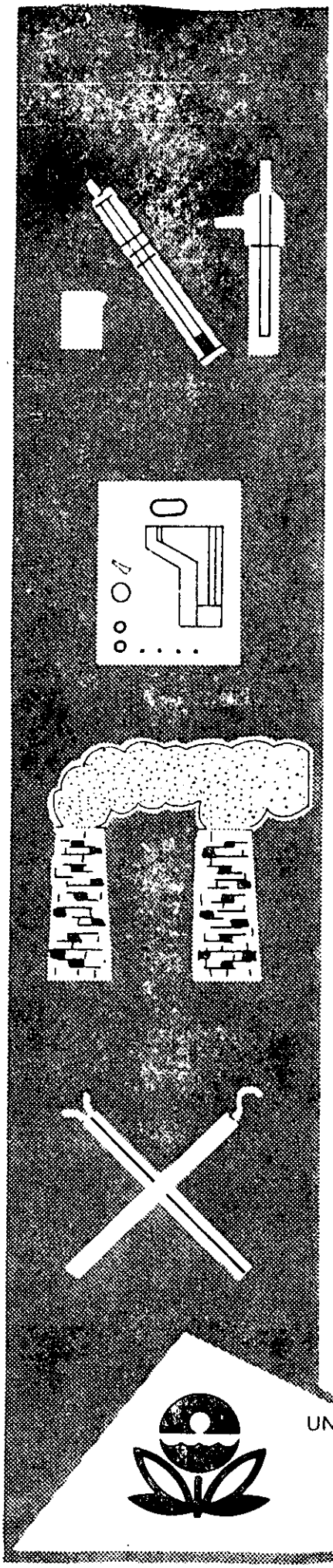
EPA-77-BAT-5

US EPA

1977

REPORT NO. 77-BAT-5

7.15



AIR POLLUTION EMISSION TEST

ESB, INCORPORATED

ALLENTOWN, PENNSYLVANIA

no lead emissions

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Emission Measurement Branch
Research Triangle Park, North Carolina

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

SUBJECT: Source Test Report

DATE: August 26, 1977

FROM: J. E. McCarley, Chief, Field Testing Section
Emission Measurement Branch, ESED (MD-13)

TO: See Below

The enclosed final source test report is submitted for your information. Any questions regarding the test should be directed to the Project Officer (telephone: 8/629-5243). Additional copies of this report are available from the ERC Library, Research Triangle Park, North Carolina 27711.

Industry: Lead Battery Manufacturing

Process: Formation

Company: ESB, Inc.

Location: Allentown, Pennsylvania

Project Report Number: 77-BAT-5

Project Officer: Dan Bivins

Enclosure

Addressees:
John Nader (MD-46)
Arch MacQueen (MD-14)
Director, Air & Hazardous Materials Division, Region III
(copy enclosed for State agency)
APTIC (MD-18)

Environmental Consultants

TEST REPORT

SULFURIC ACID EMISSIONS

from

ESB Battery Plant-Forming Room
Allentown, PA

by

Jonathan Gardner
York Research Corporation
One Research Drive
Stamford, Connecticut 06906

Contract No. 68-02-1401, Task 34
Project No. 77-BAT-5
YRC Job No. 4-8479-34

prepared for

Daniel Bivins
Environmental Protection Agency
Emission Measurement Branch
Research Triangle Park
North Carolina 27711

July 27, 1977

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SUMMARY OF TEST RESULTS

Tables S-1 through S-12 summarize the results of the sulfuric acid mist emission test program conducted on the Plate Forming Room at ESB, Incorporated in Allentown, Pennsylvania. Sulfuric acid mist, sulfur trioxide, and sulfur dioxide concentrations were measured at the inlet and outlet of a scrubber through which the fumes from the plate forming were vented. Tests were conducted during the forming cycle (1:00 PM to 5:00 AM); with and without a soapy foam covering the vats to reduce emissions.

The values designated as SO_3 represent sulfuric acid mist plus sulfur trioxide and the values presented as SO_2 represent only sulfur dioxide. Figures S-2 and S-3 summarize the with foam and without foam test data. The data points on all the graphs are the SO_3 concentration levels plotted at the time representing the midpoint of that particular test. The plots are the best fit lines derived by linear regression analysis. Figures S-4 through S-6 present the data from each day separately. Tables S-2 through S-6 present the data from each test day. The various problems encountered during the testing of this process are discussed in the text. Additional test data are provided in the computer data printouts in Appendix A.

TABLE S-1

TEST LOG

	INLET TEST NO./TIME	OUTLET TEST NO./TIME
Test Day 1	1/1930-2305	1/1930-2320
4/18, 19/77	2/0005-0505	2/0100-0427
With Foam		
Test Day 2	3/2119-2313	3/2105-2255
4/20/77	4/0100-0315	4/0055-0240
With Foam	5/0420-0522	5/0405-0450
Test Day 3	6/1311-1506	6/1325-1550
4/20,21/77	7/1615-1804	
Without Foam	8/1839-2023	7/1800-2125
	9/2100-2244	
	10/2310-0110	8/2230-0155
	11/0150-0445	9/0230-0500
Test Day 4	12/0130-0450	10/0170-0455
4/22/77		
With Foam		

FIGURE S-1

SO_3 REMOVAL EFFICIENCY vs TIME

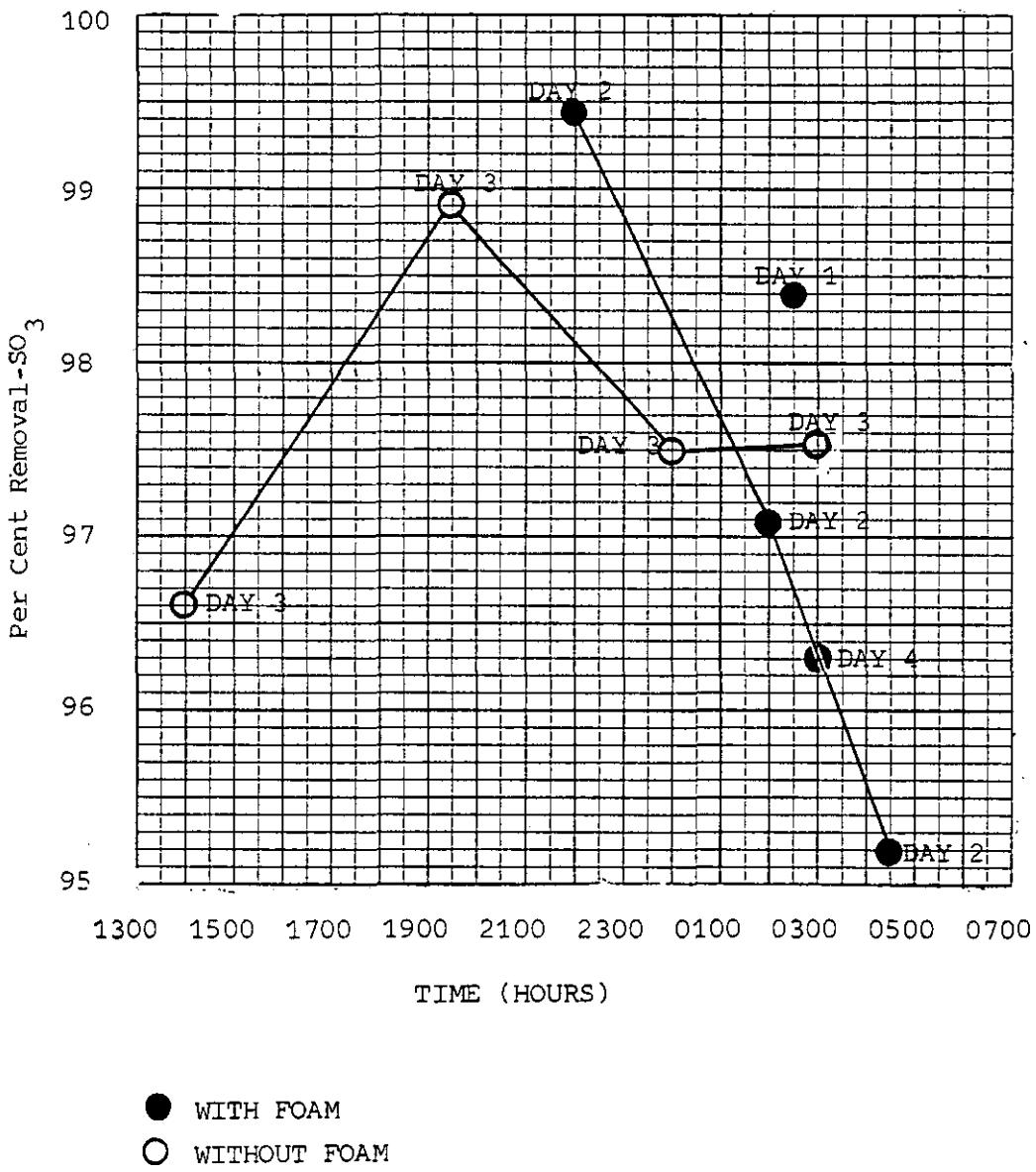


FIGURE S-2

WITH FOAM

Days 1, 2 and 4
□ - Inlet
○ - Outlet

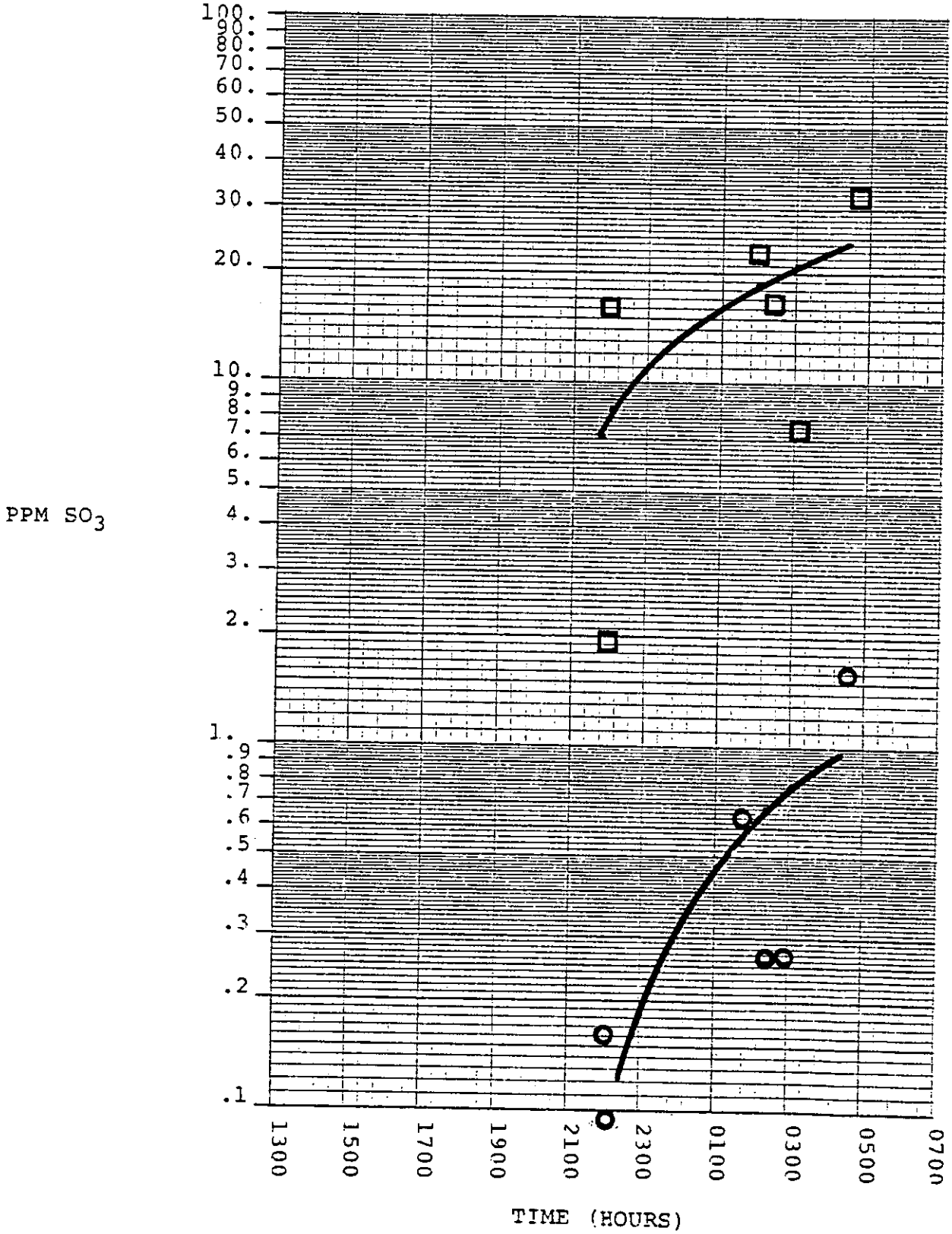


FIGURE S-3

WITHOUT FOAM

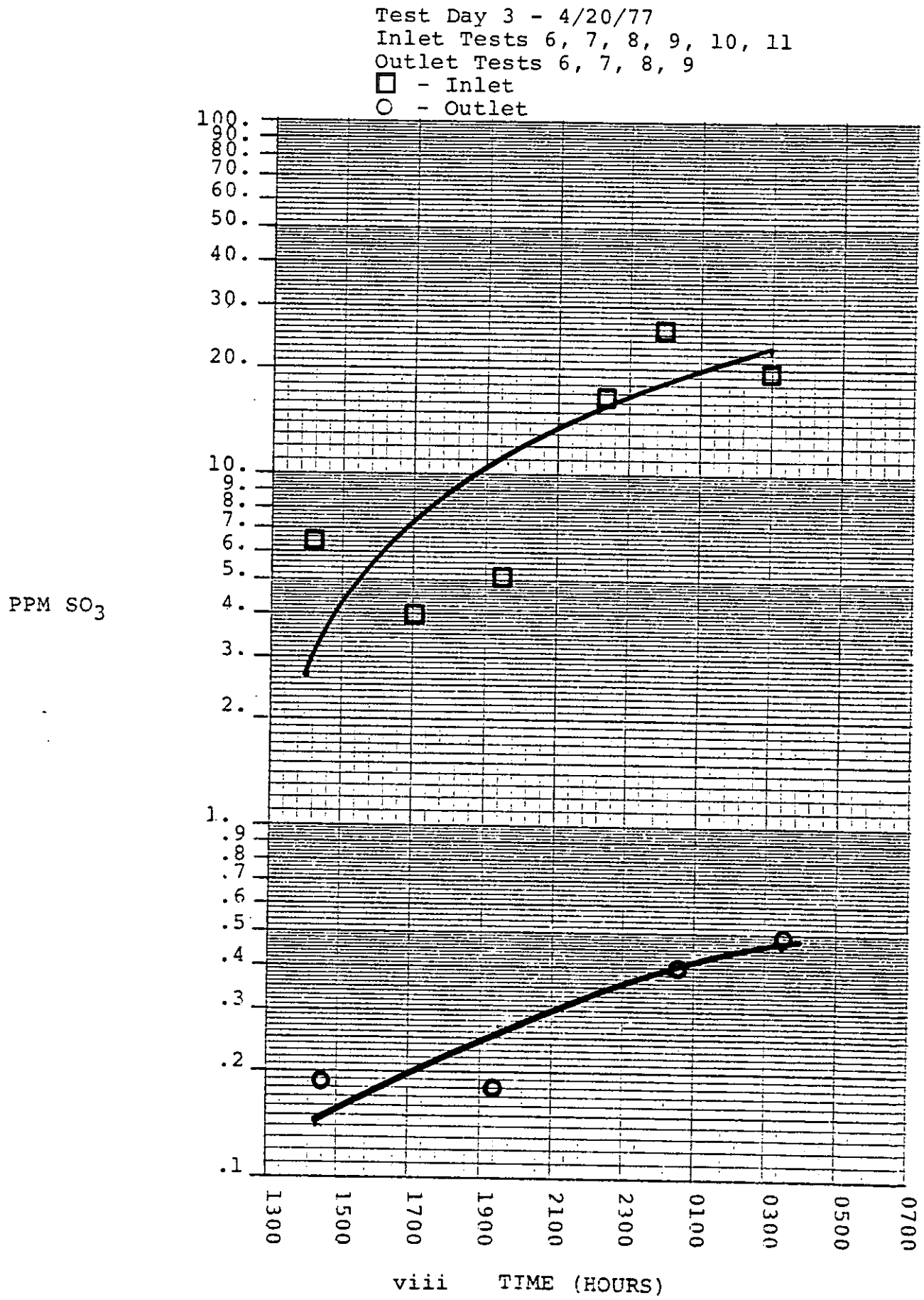


FIGURE S-4

WITH FOAM

Test Day 1 - 4/18,19/76
Tests 1, 2
□ - Inlet
○ - Outlet

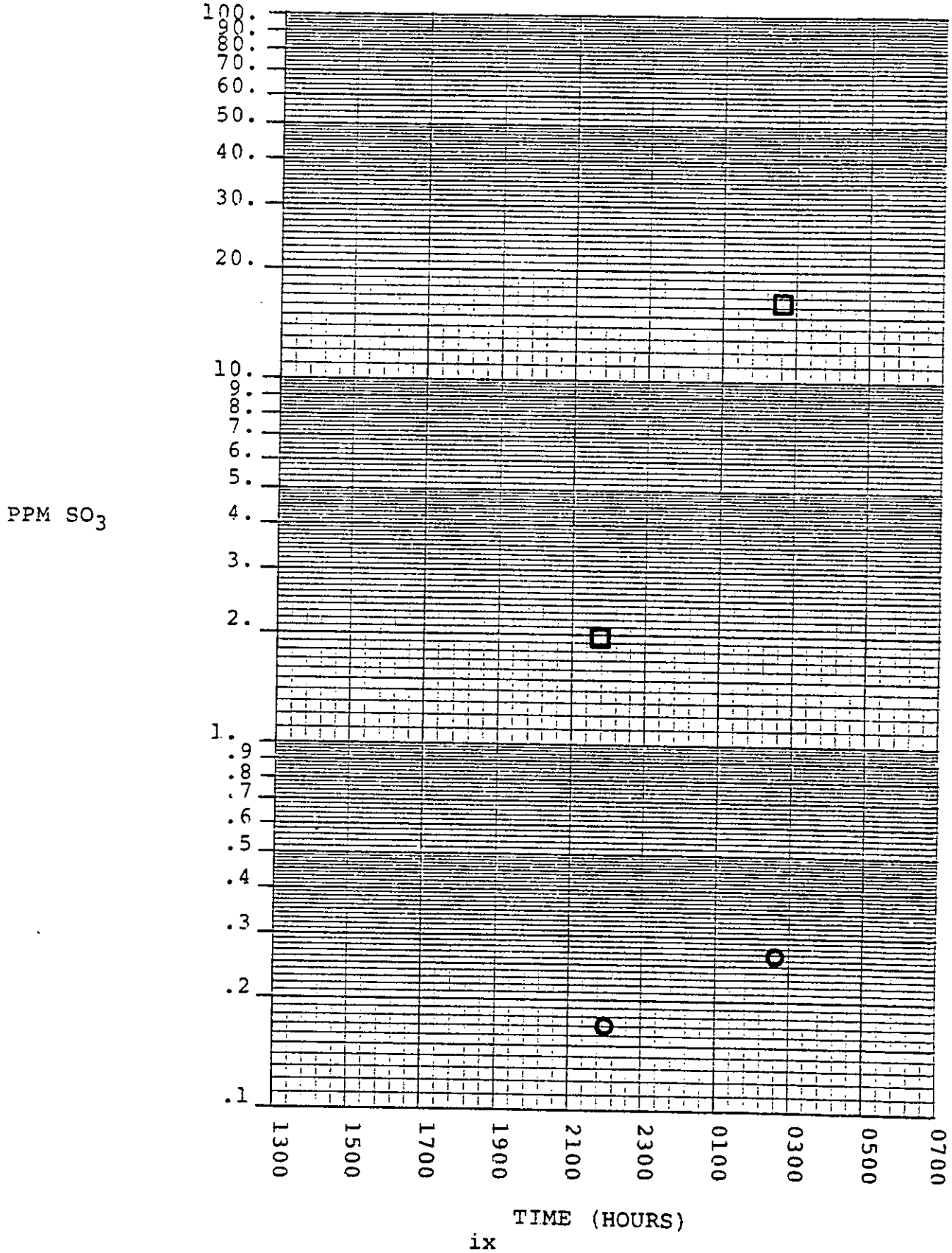


FIGURE S-5

WITH FOAM

Test Day 2 - 4/20/77
Tests 3, 4, 5
□ - Inlet
○ - Outlet

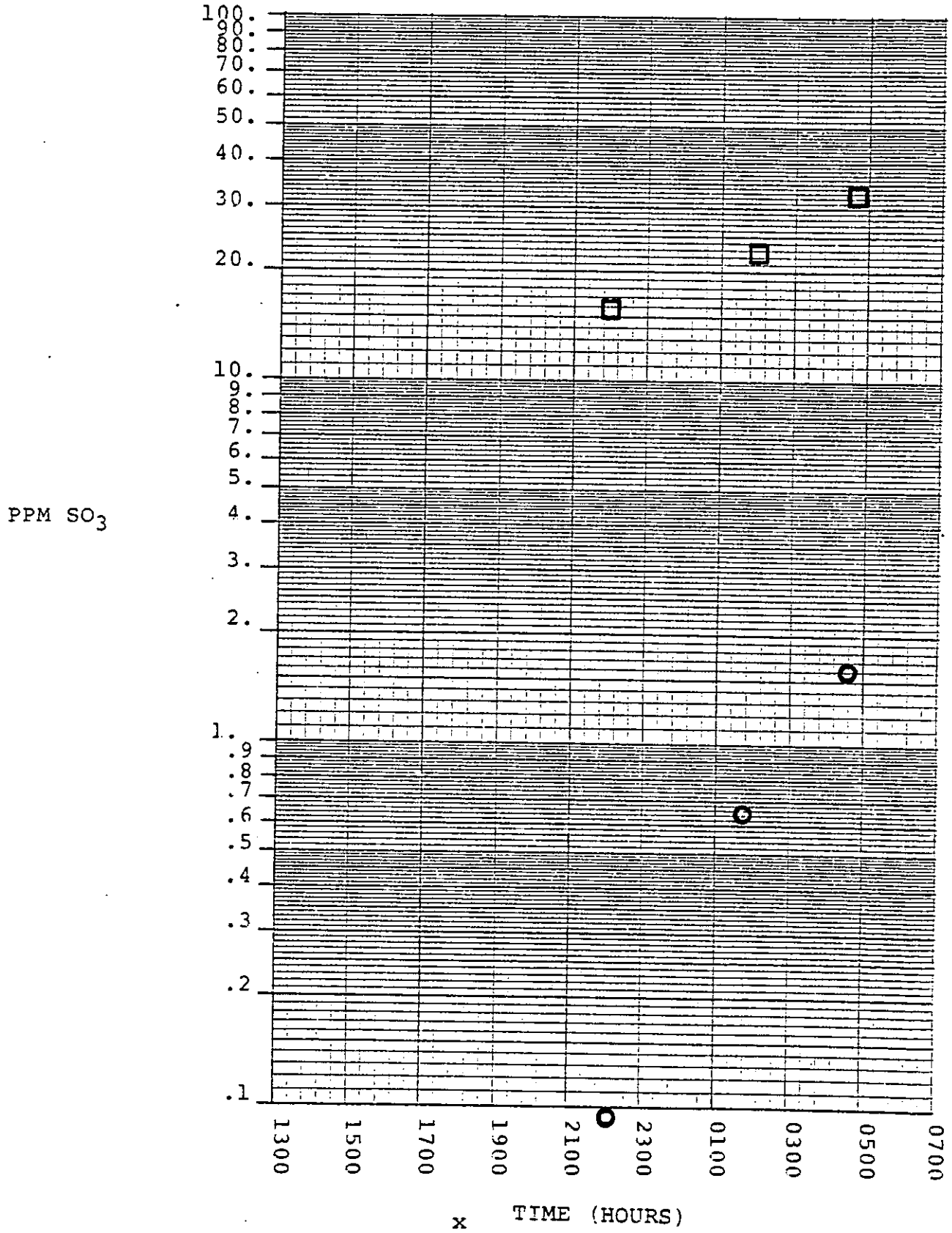


FIGURE S-6

WITH FOAM

Day 4 - 4/22/77
Inlet Test 12
Outlet Test 10
□ - Inlet
○ - Outlet

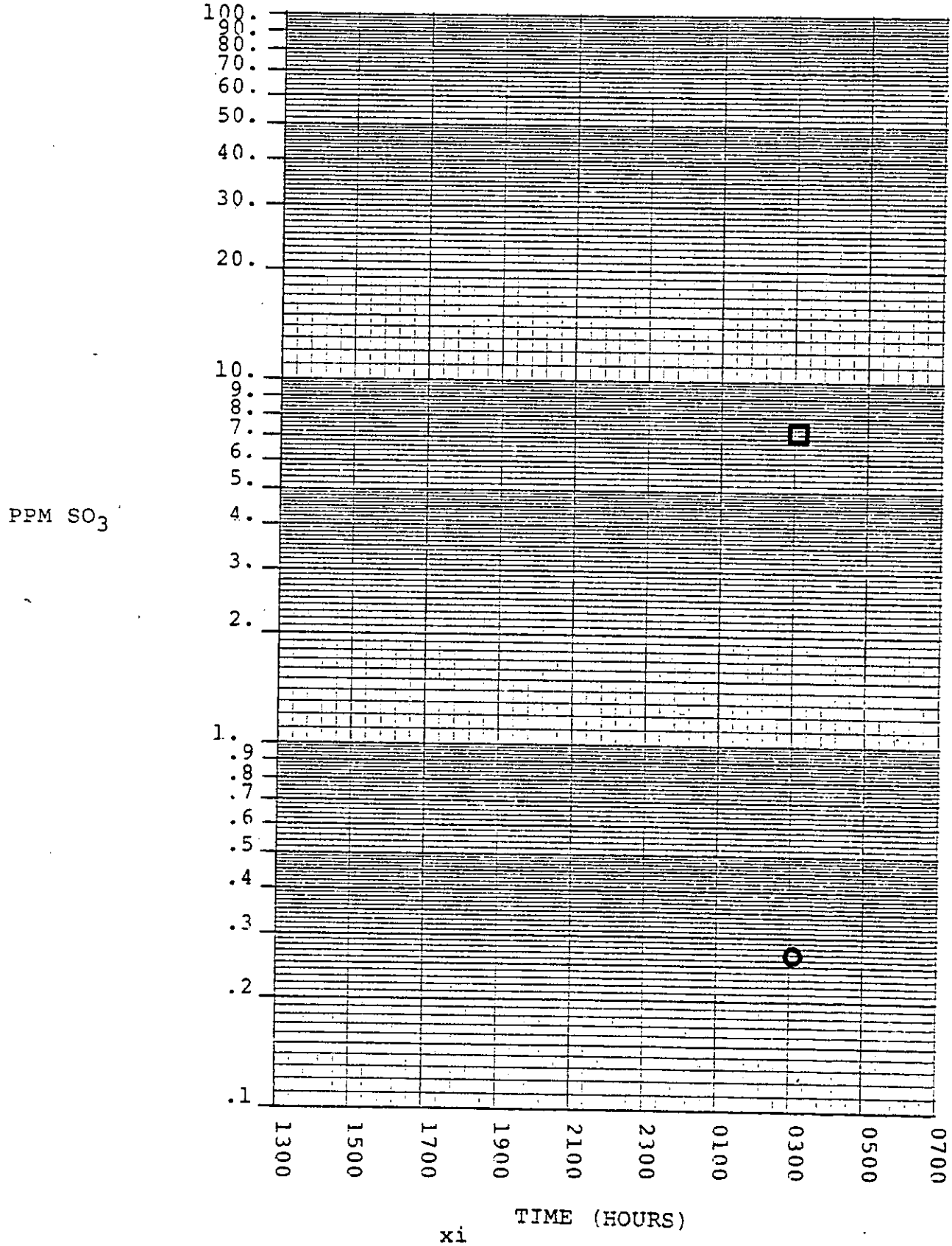


TABLE S-2. DAY 1 - WITH FOAM

INLET		
Test No.	1*	2
Time	1930-2305	0005-0505
ACFM	3094.0	2996.0
ACMM	87.56	84.79
SCFMD	2883.0	2775.0
DNCMM	81.59	78.53
SO_3 ppm	1.97	16.57
SO_3 lb/hr	0.070	0.57
SO_3 mg/cu.m	6.56	55.21
SO_2 ppm	0.12	0.066
SO_2 mg/cu.m	0.32	0.18
OUTLET		
Test No.	1*	2
Time	1930-2320	0100-0427
ACFM	4014.0	3418.0
ACMM	113.60	96.73
SCFMD	3794.0	3269.0
DNCMM	107.37	92.51
SO_3 ppm	0.17	0.26
SO_3 lb/hr	0.0080	0.011
SO_3 mg/cu.m	0.57	0.87
SO_2 ppm	0.010	0.0
SO_2 mg/cu.m	0.026	0.0

* Questionable results

TABLE S-3. DAY 2 - WITH FOAM

INLET

Test No.	3	4	5
Time	2119-2313	0100-0315	0420-0522
ACFM	3250.0	3078.0	3293.0
ACMM	91.98	87.11	93.19
SCFMD	2938.0	2784.0	2969.0
DNCMM	83.15	78.79	84.02
SO_3 ppm	16.01	22.86	32.86
SO_3 lb/hr	0.58	0.79	1.21
SO_3 mg/cu.m	53.34	76.17	109.49
SO_2 ppm	0.0	0.49	0.55
SO_2 mg/cu.m	0.0	1.31	1.47

OUTLET

Test No.	3	4	5
Time	2105-2255	0055-0240	0405-0450
ACFM	3290.0	3409.0	3521.0
ACMM	93.11	96.47	99.64
SCFMD	3079.0	3241.0	3338.0
DNCMM	87.14	91.72	94.47
SO_3 ppm	0.09	0.66	1.57
SO_3 lb/hr	0.0034	0.027	0.065
SO_3 mg/cu.m	0.30	2.20	5.23
SO_2 ppm	0.0	0.0	0.0
SO_2 mg/cu.m	0.0	0.0	0.0

TABLE S-4. DAY 3 - WITHOUT FOAM

INLET

Test No.	6	7	8
Time	1311-1506	1615-1804	1839-2023
ACFM	3273.0	2885.0	3126.0
ACMM	92.63	81.65	88.47
SCFMD	3005.0	2641.0	2861.0
DNCMM	85.04	74.74	80.97
SO_3 ppm	6.55	4.03	16.4
SO_3 lb/hr	0.24	0.13	0.58
SO_3 mg/cu.m	21.82	13.43	54.64
SO_2 ppm	0.54	0.17	0.034
SO_2 mg/cu.m	1.44	0.45	0.091

OUTLET

Test No.	6	7
Time	1325-1550	1800-2125
ACFM	3585.0	3800.0
ACMM	101.46	107.54
SCFMD	3390.0	3595.0
DNCMM	95.94	101.74
SO_3 ppm	0.19	0.18
SO_3 lb/hr	0.0080	0.0080
SO_3 mg/cu.m	0.63	0.60
SO_2 ppm	0.073	0.050
SO_2 mg/cu.m	0.19	0.13

TABLE S-5. DAY 3 - WITHOUT FOAM (CONT.)

INLET

Test No.	9	10	11
Time	2100-2244	2310-0110	0150-0445
ACFM	3032.0	3105.0	2957.0
ACMM	85.81	87.87	83.68
SCFMD	2775.0	2837.0	2697.0
DNCMM	78.53	80.29	76.33
SO_3 ppm	16.4	26.1	19.57
SO_3 lb/hr	0.56	0.92	0.66
SO_3 mg/cu.m	54.64	86.96	65.21
SO_2 ppm	0.0	0.0	0.0
SO_2 mg/cu.m	0.0	0.0	0.0

OUTLET

Test No.	8	9
Time	2230-0155	0230-0500
ACFM	3468.0	3342.0
ACMM	98.14	94.58
SCFMD	3286.0	3158.0
DNCMM	92.99	89.37
SO_3 ppm	0.41	0.48
SO_3 lb/hr	0.017	0.19
SO_3 mg/cu.m	1.37	1.60
SO_2 ppm	0.0	0.0
SO_2 mg/cu.m	0.0	0.0

TABLE S-6. DAY 4 - WITH FOAM

INLET	
Test No.	12
Time	0130-0450
ACFM	3067.0
ACMM	86.80
SCFMD	2744.0
DNCMM	77.66
SO_3 ppm	7.33
SO_3 lb/hr	0.25
SO_3 mg/cu.m	24.42
SO_2 ppm	0.0
SO_2 mg/cu.m	0.0
OUTLET	
Test No.	10
Time	0120-0455
ACFM	3114.0
ACMM	88.13
SCFMD	2905.0
DNCMM	82.21
SO_3 ppm	0.27
SO_3 lb/hr	0.0097
SO_3 mg/cu.m	0.90
SO_2 ppm	0.0
SO_2 mg/cu.m	0.0

1.0 INTRODUCTION

York Research Corporation was contracted by the Emissions Measurement Branch of the Environmental Protection Agency to perform a source emission survey on a lead acid battery plate forming room at ESB, Incorporated, located in Allentown, Pennsylvania. The objective of the test program was to measure the concentrations of H_2SO_4 mist vented to the atmosphere from the forming room.

The forming room operates between approximately 1300 hours and 0500 hours on a five day per week schedule. The battery plates are immersed in a sulfuric acid solution and an electrical current is applied. The process releases hydrogen bubbles through the solution, causing the emission of H_2SO_4 mist.

Emissions are controlled by two techniques:

- Covering the vats with a soapy foam to contain the mist.
- Venting the room through a scrubber to the atmosphere.

Tests were conducted during the week of April 18, 1977. The inlet and outlet of the scrubber were tested simultaneously during the forming cycle (with and without foam applied).

Those present during the test program were:

Lee Beck	U.S. EPA Emissions Standards and Engineering Division
Daniel Bivins	U.S. EPA Emissions Standards and Engineering Division
Jonathan Gardner	York Research Corporation
John Gale	York Research Corporation
Richard Keith	York Research Corporation
William Cesareo	York Research Corporation
Louis Millspaugh	York Research Corporation
Michael Ziskin	York Research Corporation
James Cassermere	York Research Corporation
Stephen Wahlig	York Research Corporation
Stephen Creaturo	York Research Corporation

2.0 TECHNICAL APPROACH

2.1 Test Locations

The inlet sampling ports were located in a horizontal section of ductwork connecting the forming room to the scrubber (Figure 2-1). Two ports (90° apart) were installed approximately 2 diameters upstream from the scrubber. The inside diameter of this duct measured 20¼ inches. Ten points were sampled per port resulting in a total of 20 separate points. The sampling time for each point varied as the test duration was changed.

The outlet sampling ports were located in the stack (ID 20½ inches) approximately two diameters from the exit. The two ports were 90° apart. Ten points were sampled per port simultaneously with the inlet test location.

2.2 EPA Method 8

Sulfuric acid mist, sulfur trioxide and sulfur dioxide concentrations were measured in accordance with EPA Method 8[1]. This method requires isokinetic sampling of the gas stream in order to collect a representative sample of sulfuric acid mist.

The sampling train consisted of a glass-lined heated probe, four Greenburg Smith impingers immersed in an ice bath, and a Pyrex glass filter holder. An umbilical cord connected the probe and impingers to the control console. The control console contained a vacuum pump, dry gas meter, calibrated orifice, and dual manometers. A Type "S" pitot tube and thermocouple were attached to the probe to provide gas stream pressure differential and temperatures at each point. Velocity pressure (ΔP) and the pressure drop across the orifice (ΔH) were observed from the dual manometer as inches of water.

Isokinetic sampling was maintained by the use of a nomograph which correlated velocity pressure (ΔP), and orifice pressure drop (ΔH).

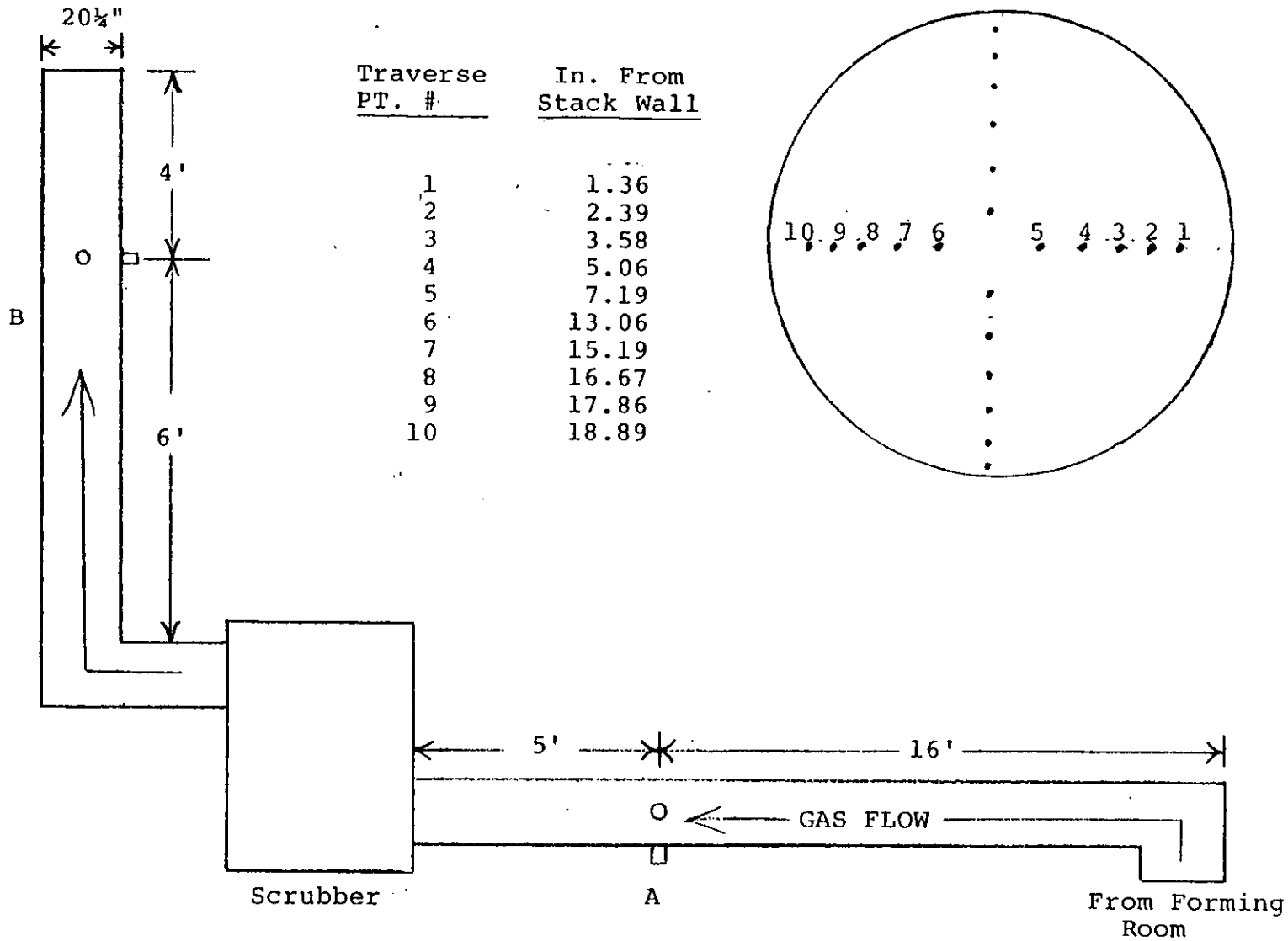
The front half of the train (probe, first impinger, and filter) removed sulfuric acid mist and sulfur trioxide from the gas sample. The first impinger (which was a Greenburg-Smith design) contained 100 ml of 80% isopropanol. Mist which was not collected in the isopropanol was trapped by the filter. At completion of the test, the isopropanol (with filter and wash of the front half) was placed in a glass sample jar for subsequent analysis. This sample was designated as the SO_3 sample.

The back half of the train consisted of the second and third impingers. Each contained 100 ml of 3% H_2O_2 to absorb sulfur dioxide from the gas sample. The contents of the two impingers, plus washes, were designated as the SO_2 sample.

The samples were analyzed at the test location titrametrically utilizing barium perchlorate. The percent moisture content in the sampled stream was determined by means of a separate moisture train because Method 8 proved unsuitable for measurement of moisture content.

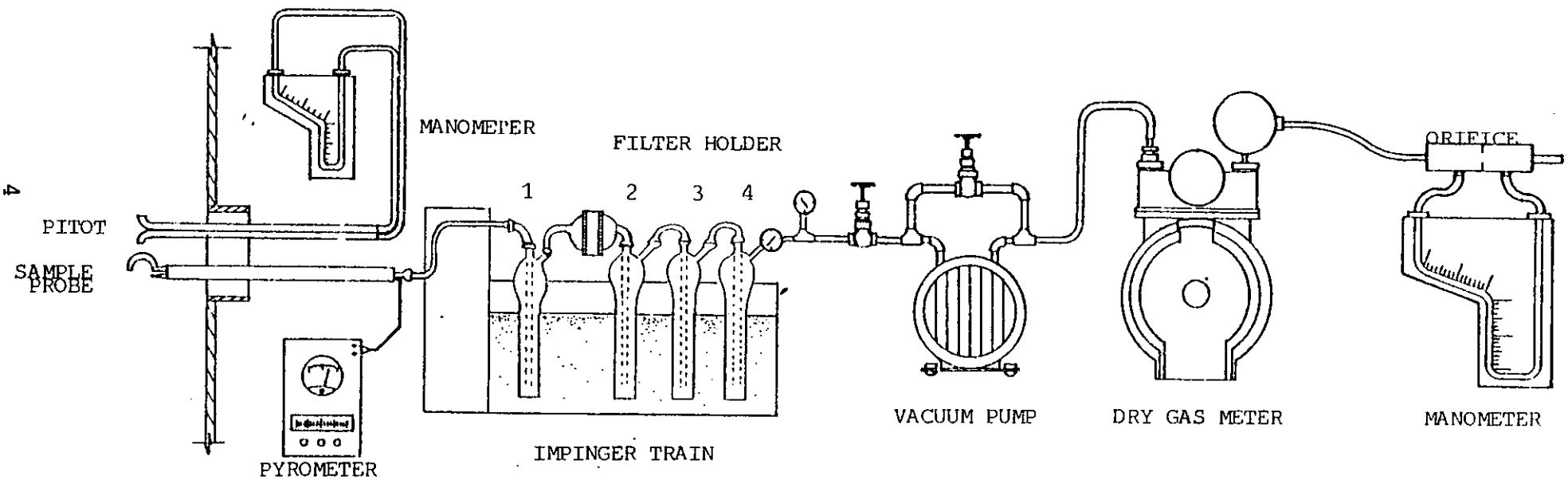
Two moisture tests were performed at each location, and the results averaged.

[1] Federal Register, Voo. 40; 36 FR 24876, Dec. 23, 1971



Traverse PT. #	In. From Stack Wall
1	1.36
2	2.39
3	3.58
4	5.06
5	7.19
6	13.06
7	15.19
8	16.67
9	17.86
10	18.89

FIGURE 2-1 - H_2SO_4 SCRUBBER SAMPLING POINTS A & B



EPA METHOD 8

SAMPLING TRAIN

FIGURE 2-2

Gas analysis was determined in accordance with EPA Method 3. An integrated gas sample was collected in a flexible Tedlar bag and analyzed with an Orsat Analyzer. The gas composition was found to be characteristic of ambient air.

3.0 DISCUSSION OF RESULTS

Various problems were encountered during the testing; some of which may affect the test results.

Upon completion of the first test run, it was apparent that most of the isopropanol had evaporated from the first impinger; leaving only 10-20 ml. A similar problem had been observed in previous testing, however to a lesser degree (only 10-20 ml had been lost). It was decided that the increased amount of isopropanol loss was due to the abnormally long test duration of four hours as compared with the usual one or two hour tests. The response to the evaporation difficulties was to add isopropanol whenever the level was in danger of exposing the impinger tip. Considering this circumstance, the results from Test No. 1 should be viewed with suspicion.

Another testing difficulty which resulted in a deviation from the prescribed method was related to the ambient concentrations of sulfuric acid mist. The forming rooms at ESB are located inside the general plant building. Acid mist leaking out of the various cracks and holes in the room under test, and out of the two other forming rooms in the building resulted in high ambient concentrations of acid mist which caused discomfort to the test engineers even when respirators were worn. When three test engineers on the first night shift (when the ambient concentrations were the worst) produced disturbing medical symptoms, it was decided to modify the inlet test procedure so that the test engineers would not have to remain in the high ambient concentrations of sulfuric acid mist. To accomplish this, the sample train was placed at a point of average velocity and operated for the designated test time, recording test data only at the beginning and end of the test. This allowed the engineers to stay in an uncontaminated area during the test period. The even gas flow conditions at the inlet permitted representative samples to be obtained with this modification, although the volumetric flow rates from these tests (8-12) should not be considered as accurate as those measured with a full traverse.

The concentrations of SO_3 measured, ranged from a maximum of 33 ppm at the inlet to a minimum of 0.1 ppm at the outlet. Method 8 was designed to measure higher concentrations, therefore, by extending the test duration (4 hours on the outlet) to obtain a larger sample volume, it was possible to measure very low SO_3 concentrations with this method.

Prepared by:

Jonathan B. Gardner
Project Director

Reviewed by:

Roger A. Kniskern
Manager Emissions Measurement

Approved by:

James W. Davison
Vice President Operations

APPENDIX A

DETAILED TEST DATA

DETAILED TEST DATA - INLET

Test No.	1	2	3	4
Date	4/18/77	4/18/77	4/18/77	4/19/77
Barometric Pressure	30.12	30.12	30.12	30.33
Absolute Stack Pressure	30.07	30.07	30.11	30.32
Stack Area (sq ft)	2.24	2.24	2.24	2.24
Net time of run(min)	275.0	275.0	100.0	105.0
Percent Isokinetic	76.0	109.9	92.2	108.7
Gas Data				
Average Velocity (FPS)	23.02	22.29	24.18	22.90
Average Temp. (^{o}F)	96.6	100.1	114.5	118.1
Actual Flow Rate (acfm)	3094.0	2996.0	3250.0	3078.0
Standard Dry Flow Rate (scfmd)	2883.0	2775.0	2938.0	2784.0
Molecular Weight - Dry	28.84	28.84	28.84	28.84
Molecular Weight	28.55	28.55	28.55	28.55
Mole Fraction - Dry	0.97	0.97	0.97	0.97
Gas Analysis(Dry Percent Basis)				
Carbon Dioxide	0.0	0.0	0.0	0.0
Oxygen	20.9	20.9	20.9	20.9
Nitrogen	79.1	79.1	79.1	79.1
Moisture	2.6	2.6	2.6	2.6
Sample Collection Data				
Volume Dry Gas - Actual	98.06	134.44	44.02	50.77
Volume Dry Gas - Standard	93.47	130.09	42.00	49.31
Average Gas Meter Temp.	100.6	92.2	100.1	94.0
Average Orifice Pressure Drop	0.73	0.70	0.76	0.72

DETAILED TEST DATA - INLET

Test No.	5	6	7	8
Date	4/19/77	4/20/77	4/20/77	4/20/77
Barometric Pressure	30.33	30.43	30.43	30.43
Absolute Stack Pressure	30.32	30.38	30.39	30.39
Stack Area (sq ft)	2.24	2.24	2.24	2.24
Net time of run(min)	41.0	100.0	100.0	100.0
Percent Isokinetic	112.4	107.2	101.9	101.5
Gas Data				
Average Velocity (FPS)	24.50	24.35	23.76	23.26
Average Temp. (^{o}F)	120.0	110.5	112.5	112.5
Actual Flow Rate (acfm)	3293.0	3273.0	2885.0	3126.0
Standard Dry Flow Rate (scfmd)	2969.0	3005.0	2641.0	2861.0
Molecular Weight - Dry	28.84	28.84	28.84	28.84
Molecular Weight	28.55	28.55	28.55	28.55
Mole Fraction - Dry	0.97	0.97	0.97	0.97
Gas Analysis(Dry Percent Basis)				
Carbon Dioxide	0.0	0.0	0.0	0.0
Oxygen	20.90	20.90	20.9	20.9
Nitrogen	79.1	79.1	79.1	79.1
Moisture	2.6	2.6	2.6	2.6
Sample Collection Data				
Volume Dry Gas - Actual	21.69	51.51	71.88	70.07
Volume Dry Gas - Standard	21.22	49.97	69.04	67.27
Average Gas Meter Temp.	90.2	96.7	103.5	103.6
Average Orifice Pressure Drop	0.81	0.82	1.74	1.67

DETAILED TEST DATA - INLET

Test No.	9	10	11	12
Date	4/20/77	4/20/77	4/20/77	4/22/77
Barometric Pressure	30.43	30.43	30.31	30.31
Absolute Stack Pressure	30.37	30.37	30.30	30.30
Stack Area (sq ft)	2.24	2.24	2.24	2.24
Net time of run(min)	104.0	120.0	170.0	200.0
Percent Isokinetic	113.0	99.24	92.03	110.1
Gas Data				
Average Velocity (FPS)	22.56	23.10	22.00	22.82
Average Temp. (^{o}F)	110.0	112.0	101.7	126.6
Actual Flow Rate (acfm)	3032.0	3105.0	2957.0	3067.0
Standard Dry Flow Rate (scfmd)	2775.0	2837.0	2697.0	2744.0
Molecular Weight - Dry	30.71	30.71	30.71	30.71
Molecular Weight	30.33	30.33	30.33	30.33
Mole Fraction - Dry	0.97	0.97	0.97	0.97
Gas Analysis(Dry Percent Basis)				
Carbon Dioxide	0.0	0.0	0.0	0.0
Oxygen	20.9	20.9	20.9	20.9
Nitrogen	79.1	79.1	79.1	79.1
Moisture	2.6	2.6	2.6	2.6
Sample Collection Data				
Volume Dry Gas - Actual	78.6	81.71	102.435	143.87
Volume Dry Gas - Standard	75.49	78.23	97.88	138.44
Average Gas Meter Temp.	103.0	105.0	101.7	99.8
Average Orifice Pressure Drop	1.68	1.78	1.59	1.71

DETAILED TEST DATA - OUTLET

Test No.	1	2	3	4
Date	4/18/77	4/19/77	4/19/77	4/20/77
Barometric Pressure	30.12	30.33	30.33	30.43
Absolute Stack Pressure	30.12	30.32	30.32	30.42
Stack Area (sq ft)	2.24	2.24	2.24	2.24
Net time of run(min)	200.0	230.0	100.0	100.0
Percent Isokinetic	94.0	109.8	113.9	108.2
Gas Data				
Average Velocity (FPS)	29.87	25.43	24.48	25.36
Average Temp. (^{o}F)	95.6	92.7	105.0	98.0
Actual Flow Rate (acfm)	4014.0	3418.0	3290.0	3409.0
Standard Dry Flow Rate (scfmd)	3794.0	3269.0	3079.0	3241.0
Molecular Weight - Dry	28.84	28.84	28.84	28.84
Molecular Weight	28.67	28.67	28.67	28.67
Mole Fraction - Dry	0.99	0.99	0.99	0.99
Gas Analysis(Dry Percent Basis)				
Carbon Dioxide	0.0	0.0	0.0	0.0
Oxygen	20.9	20.9	20.9	20.9
Nitrogen	79.1	79.1	79.1	79.1
Moisture	1.5	1.5	1.5	1.5
Sample Collection Data				
Volume Dry Gas - Actual	172.07	192.38	82.67	82.26
Volume Dry Gas - Standard	165.27	191.25	81.23	81.27
Average Gas Meter Temp.	98.9	83.5	89.6	88.3
Average Orifice Pressure Drop	2.62	2.44	2.20	2.1

DETAILED TEST DATA - OUTLET

Test No.	5	6	7	8
Date	4/20/77	4/20/77	4/20/77	4/20/77
Barometric Pressure	30.42	30.43	30.43	30.43
Absolute Stack Pressure	30.41	30.42	30.42	30.42
Stack Area (sq ft)	2.24	2.24	2.24	2.24
Net time of run(min)	42.0	200.0	200.0	200.0
Percent Isokinetic	104.4	101.3	102.6	102.7
Gas Data				
Average Velocity (FPS)	26.20	26.68	28.27	25.80
Average Temp. (^{o}F)	99.4	100.9	100.6	99.7
Actual Flow Rate (acfm)	3521.0	3585.0	3800.0	3468.0
Standard Dry Flow Rate (scfmd)	3338.0	3390.0	3595.0	3286.0
Molecular Weight - Dry	28.84	28.84	28.84	28.84
Molecular Weight	28.67	28.67	28.67	28.67
Mole Fraction - Dry	0.99	0.99	0.99	0.99
Gas Analysis(Dry Percent Basis)				
Carbon Dioxide	0.0	0.0	0.0	0.0
Oxygen	20.9	20.9	20.9	20.9
Nitrogen	79.1	79.1	79.1	79.1
Moisture	1.5	1.5	1.5	1.5
Sample Collection Data				
Volume Dry Gas - Actual	34.12	164.99	172.93	157.17
Volume Dry Gas - Standard	33.91	159.21	171.02	156.39
Average Gas Meter Temp.	84.9	101.6	88.4	84.5
Average Orifice Pressure Drop	2.24	2.32	2.6	2.17

DETAILED TEST DATA - OUTLET

Test No.	9	10
Date	7/20/77	7/21/77
Barometric Pressure	30.43	30.31
Absolute Stack Pressure	30.42	30.30
Stack Area (sq ft)	2.24	2.24
Net time of run(min)	145.0	200.0
Percent Isokinetic	104.9	103.5
Gas Data		
Average Velocity (FPS)	24.87	23.17
Average Temp. (^{o}F)	99.1	106.7
Actual Flow Rate (acfm)	3342.0	3114.0
Standard Dry Flow Rate (scfmd)	3158.0	2905.0
Molecular Weight - Dry	28.84	28.84
Molecular Weight	28.67	28.67
Mole Fraction - Dry	0.99	0.99
Gas Analysis(Dry Percent Basis)		
Carbon Dioxide	0.0	0.0
Oxygen	20.9	20.9
Nitrogen	79.1	79.1
Moisture	1.5	1.5
Sample Collection Data		
Volume Dry Gas - Actual	112.87	142.46
Volume Dry Gas - Standard	111.34	139.34
Average Gas Meter Temp.	86.8	91.1
Average Orifice Pressure Drop	2.05	1.73

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: INLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: INLET
FILTER NUMBERS: XXX

TEST NUMBER: 1 INLE
DATE: APR18,77
TEST COND: FOAM
BAR. PRESS-IN HG: 30.12
PITOT TUBE FACTOR: 0.810
TIME TEST STARTED: 1930

SAMPLE POINT —	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I -- —
STAR	0.	900.970								
A1	5.0	903.460	0.180	0.770	80.	78.	0.252	90.	23.511	104.4
1	10.0	905.940	0.180	0.770	88.	79.	0.252	90.	23.511	103.1
2	15.0	908.460	0.170	0.730	95.	81.	0.252	90.	22.848	106.9
2	20.0	910.940	0.180	0.770	101.	83.	0.252	95.	23.617	102.0
3	25.0	913.560	0.190	0.810	105.	85.	0.252	95.	24.265	104.3
3	30.0	915.960	0.180	0.770	108.	87.	0.252	95.	23.617	97.7
4	35.0	918.580	0.180	0.770	109.	89.	0.252	95.	23.617	106.4
4	40.0	921.240	0.200	0.860	111.	91.	0.252	95.	24.895	102.1
4	45.0	923.860	0.180	0.770	112.	92.	0.252	95.	23.617	105.8
5	50.0	926.360	0.180	0.770	113.	93.	0.252	95.	23.617	100.8
6	55.0	928.800	0.170	0.730	114.	94.	0.252	95.	22.952	101.0
6	60.0	931.220	0.170	0.730	114.	95.	0.252	95.	22.952	100.1
7	65.0	933.760	0.180	0.770	115.	95.	0.252	100.	23.724	102.5
7	70.0	936.260	0.170	0.730	115.	95.	0.252	100.	23.055	103.8
8	75.0	938.900	0.200	0.860	114.	96.	0.252	100.	25.007	101.1
8	80.0	941.580	0.200	0.860	115.	97.	0.252	100.	25.007	102.5
9	85.0	944.200	0.170	0.730	115.	98.	0.252	95.	22.952	108.0
9	90.0	946.460	0.150	0.650	117.	97.	0.252	95.	21.560	99.1
10	95.0	949.000	0.210	0.880	115.	97.	0.252	95.	25.510	94.3
10	100.0	951.628	0.170	0.730	115.	97.	0.252	90.	22.848	103.0
STAR	100.0	951.628								
B1	105.0	953.800	0.180	0.770	97.	94.	0.252	90.	23.511	88.4
1	110.0	956.480	0.190	0.810	98.	95.	0.252	95.	24.265	106.4
2	115.0	959.080	0.180	0.770	103.	95.	0.252	100.	23.724	106.1
2	120.0	961.560	0.180	0.770	107.	95.	0.252	100.	23.724	100.8
3	125.0	964.200	0.190	0.810	108.	94.	0.252	100.	24.374	104.5
3	130.0	966.840	0.190	0.810	109.	95.	0.252	100.	24.374	104.3
4	135.0	969.260	0.180	0.770	109.	95.	0.252	100.	23.724	94.2
4	140.0	971.600	0.190	0.810	109.	95.	0.252	100.	24.374	92.4
5	145.0	974.220	0.180	0.770	109.	95.	0.252	100.	23.724	106.5
5	150.0	976.820	0.180	0.770	110.	96.	0.252	100.	23.724	105.3
6	155.0	979.080	0.150	0.650	111.	97.	0.252	100.	21.657	100.1
6	160.0	981.260	0.140	0.610	110.	97.	0.252	100.	20.922	10[illegible].0
7	165.0	983.700	0.140	0.610	110.	97.	0.252	100.	20.922	111.9
7	170.0	985.820	0.130	0.550	108.	97.	0.252	100.	20.161	101.1
8	175.0	988.200	0.160	0.690	108.	97.	0.252	100.	22.367	102.3
8	180.0	990.800	0.160	0.690	108.	97.	0.252	100.	22.367	111.5
9	185.0	992.840	0.130	0.550	109.	97.	0.252	95.	20.071	95.7
9	190.0	995.000	0.130	0.550	108.	97.	0.252	95.	20.071	102.5
10	195.0	997.000	0.130	0.550	107.	95.	0.252	95.	20.071	93.2
10	200.0	999.027	0.130	0.550	107.	95.	0.252	95.	20.071	9[illegible].5

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: INLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: INLET
FILTER NUMBERS: XXX

TEST NUMBER: 2 INLE
DATE: APR18,77
TEST COND: FOAM
BAR. PRESS-IN HG: 30.12
PITOT TUBE FACTOR: 0.770
TIME TEST STARTED: 0205

SAMPLE POINT —	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I -- --
STAR	0.	7.000								
A1	5.0	9.530	0.210	0.820	83.	85.	0.252	100.	24.358	105.3
1	10.0	12.660	0.210	0.820	94.	86.	0.252	100.	24.358	124.4
2	15.0	14.690	0.200	0.790	99.	86.	0.252	100.	23.771	83.6
2	20.0	17.740	0.210	0.820	102.	88.	0.252	100.	24.358	122.0
3	25.0	19.820	0.210	0.820	102.	88.	0.252	100.	24.358	83.2
3	30.0	22.410	0.210	0.820	102.	88.	0.252	100.	24.358	103.6
4	35.0	24.990	0.210	0.820	102.	88.	0.252	100.	24.358	103.2
4	40.0	27.690	0.210	0.820	103.	88.	0.252	100.	24.358	107.9
5	45.0	30.200	0.210	0.820	103.	89.	0.252	100.	24.358	100.3
5	50.0	32.780	0.210	0.820	103.	90.	0.252	100.	24.358	103.0
6	55.0	35.350	0.200	0.790	103.	90.	0.252	100.	23.771	105.1
6	60.0	37.970	0.200	0.790	103.	90.	0.252	100.	23.771	107.1
7	65.0	40.350	0.190	0.750	103.	90.	0.252	100.	23.169	99.8
7	70.0	43.320	0.190	0.750	103.	90.	0.252	97.	23.106	124.3
8	75.0	45.140	0.160	0.640	102.	89.	0.252	97.	21.204	83.1
8	80.0	47.900	0.170	0.680	102.	89.	0.252	97.	21.857	122.3
9	85.0	49.630	0.140	0.560	101.	88.	0.252	97.	19.334	84.6
9	90.0	51.830	0.150	0.600	101.	88.	0.252	99.	20.567	104.1
10	95.0	53.960	0.140	0.560	101.	88.	0.252	99.	19.870	104.3
10	100.0	56.080	0.140	0.560	100.	88.	0.252	99.	19.370	103.9
B1	105.0	58.760	0.200	0.790	88.	87.	0.252	102.	23.813	111.6
1	110.0	61.680	0.200	0.790	104.	86.	0.252	102.	23.313	119.9
2	115.0	63.700	0.200	0.790	97.	36.	0.252	102.	23.313	87.5
2	120.0	66.280	0.210	0.820	99.	86.	0.252	102.	24.401	103.9
3	125.0	69.830	0.200	0.790	100.	87.	0.252	102.	23.313	146.2
3	130.0	71.870	0.200	0.790	100.	87.	0.252	102.	23.313	84.0
4	135.0	74.150	0.160	0.640	100.	87.	0.252	102.	21.299	104.9
4	140.0	76.480	0.170	0.680	99.	87.	0.252	102.	21.954	104.2
5	145.0	78.590	0.140	0.560	98.	86.	0.252	102.	19.923	104.1
5	150.0	80.610	0.140	0.560	98.	86.	0.252	102.	19.923	99.7
6	155.0	83.020	0.160	0.640	97.	86.	0.252	100.	21.251	111.1
6	160.0	85.270	0.150	0.600	97.	86.	0.252	100.	20.586	107.2
7	165.0	87.390	0.150	0.600	96.	86.	0.252	100.	20.586	101.1
7	170.0	89.570	0.150	0.600	96.	86.	0.252	100.	20.586	105.9
8	175.0	91.760	0.150	0.600	96.	85.	0.252	100.	20.586	104.6
8	180.0	93.940	0.150	0.600	96.	85.	0.252	100.	20.586	104.0
9	185.0	96.210	0.160	0.640	96.	85.	0.252	100.	21.241	104.9
9	190.0	98.480	0.160	0.640	96.	85.	0.252	100.	21.241	104.9
10	195.0	100.740	0.160	0.640	96.	85.	0.252	100.	21.241	104.4
10	200.0	110.740	0.160	0.640	96.	85.	0.252	100.	21.241	462.0
10	210.0	120.740	0.160	0.640	96.	85.	0.252	100.	21.241	231.0

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: INLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: INLET
FILTER NUMBERS: XXX

TEST NUMBER: 3 INLE
DATE: APR18,77
TEST COND: FOAM
BAR. PRESS-IN HG: 30.12
PITOT TUBE FACTOR: 0.790
TIME TEST STARTED: 2119

SAMPLE POINT	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I
STAR	0.	164.589								
A1	5.0	166.010	0.210	0.820	94.	91.	0.252	120.	25.419	56.6
2	10.0	167.950	0.220	0.860	98.	91.	0.252	120.	26.017	75.3
3	15.0	169.230	0.220	0.860	100.	92.	0.252	120.	26.017	51.5
4	20.0	170.460	0.210	0.820	100.	93.	0.252	110.	25.199	46.3
5	25.0	172.080	0.200	0.790	101.	93.	0.252	110.	24.591	65.0
6	30.0	174.620	0.190	0.750	102.	93.	0.252	110.	23.969	104.5
7	35.0	177.180	0.200	0.790	106.	94.	0.252	120.	24.806	103.1
8	40.0	179.690	0.190	0.750	109.	95.	0.252	115.	24.074	102.9
9	45.0	182.330	0.200	0.790	110.	95.	0.252	113.	24.656	105.2
10	50.0	184.770	0.190	0.750	111.	96.	0.252	113.	24.032	99.6
STAR	50.0	184.770								
B1	55.0	187.000	0.230	0.900	104.	96.	0.252	113.	26.441	83.3
2	60.0	189.780	0.240	0.950	104.	96.	0.252	113.	27.009	101.7
3	65.0	192.540	0.230	0.900	109.	96.	0.252	118.	26.556	103.1
4	70.0	195.230	0.210	0.820	111.	96.	0.252	113.	25.375	104.9
5	75.0	197.560	0.160	0.640	110.	97.	0.252	119.	22.168	104.2
6	80.0	199.640	0.140	0.560	109.	97.	0.252	118.	20.719	99.4
7	85.0	201.940	0.150	0.600	108.	97.	0.252	110.	21.297	105.5
8	90.0	204.060	0.160	0.640	108.	96.	0.252	110.	21.995	94.3
9	95.0	206.300	0.150	0.600	107.	96.	0.252	110.	21.297	105.0
10	100.0	208.610	0.160	0.640	108.	96.	0.252	110.	21.995	102.7

YORK RESEARCH CORPORATION
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

JOB NUMBER: 8479-34

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: INLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: INLET
FILTER NUMBERS: XXX

TEST NUMBER: 4 INLE
DATE: APR19,77
TEST COND: FOAM
BAR. PRESS-IN HG: 30.33
PITOT TUBE FACTOR: 0.770
TIME TEST STARTED: 0100

SAMPLE POINT --	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I -- --
STAR	0.	217.020								
B1	5.0	219.290	0.180	0.720	87.	80.	0.252	120.	22.858	102.2
2	10.0	221.730	0.180	0.720	89.	80.	0.252	120.	22.858	109.7
3	15.0	224.160	0.180	0.720	96.	82.	0.252	115.	22.759	107.9
4	20.0	226.710	0.210	0.820	100.	84.	0.252	115.	24.583	104.3
5	25.0	229.320	0.210	0.820	102.	85.	0.252	115.	24.583	106.4
6	30.0	231.950	0.220	0.860	104.	86.	0.252	115.	25.161	104.5
7	35.0	234.670	0.210	0.820	107.	88.	0.252	115.	24.583	110.1
8	40.0	236.810	0.150	0.600	108.	89.	0.252	115.	20.776	102.3
9	45.0	238.960	0.140	0.560	108.	90.	0.252	115.	20.072	106.3
10	50.0	240.600	0.130	0.520	108.	90.	0.252	115.	19.342	84.1
A	55.0	243.170	0.180	0.720	84.	86.	0.252	120.	22.858	115.4
1	60.0	245.710	0.200	0.790	91.	86.	0.252	120.	24.094	107.6
2	65.0	248.250	0.200	0.790	92.	86.	0.252	120.	24.094	107.5
3	70.0	250.860	0.210	0.820	100.	88.	0.252	120.	24.589	106.8
4	75.0	253.390	0.200	0.790	102.	89.	0.252	120.	24.094	105.8
5	80.0	255.940	0.200	0.790	104.	90.	0.252	120.	24.094	106.3
6	85.0	258.440	0.190	0.750	104.	91.	0.252	120.	23.484	106.8
7	90.0	260.930	0.190	0.750	104.	91.	0.252	120.	23.484	106.4
8	95.0	263.260	0.160	0.640	106.	92.	0.252	120.	21.551	108.2
9	100.0	265.370	0.130	0.520	106.	92.	0.252	120.	19.426	108.7
10	105.0	267.790	0.160	0.640	108.	93.	0.252	120.	21.551	112.1

YORK RESEARCH CORPORATION
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

JOB NUMBER: 8479-34

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: INLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: INLET
FILTER NUMBERS: XXX

TEST NUMBER: 5 INLE
DATE: APR19,77
TEST COND: FOAM
BAR. PRESS-IN HG: 30.33
PITOT TUBE FACTOR: 0.770
TIME TEST STARTED: 0420

SAMPLE POINT —	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I -- --
STAR	0.	275.860								
A1	3.0	277.420	0.210	0.820	80.	82.	0.252	120.	24.689	108.9
2	6.0	278.980	0.210	0.820	82.	83.	0.252	120.	24.689	108.6
3	9.0	280.590	0.230	0.900	89.	83.	0.252	120.	25.838	106.5
4	12.0	282.170	0.220	0.860	92.	84.	0.252	120.	25.270	106.4
5	15.0	283.740	0.220	0.860	95.	84.	0.252	120.	25.270	105.5
6	18.0	285.280	0.210	0.820	98.	84.	0.252	120.	24.689	105.6
7	21.0	286.770	0.190	0.750	99.	85.	0.252	120.	23.484	107.2
8	24.0	288.190	0.170	0.680	99.	85.	0.252	120.	22.214	108.0
9	27.0	289.690	0.190	0.750	100.	86.	0.252	120.	23.484	107.7
10	30.0	291.160	0.190	0.750	100.	86.	0.252	120.	23.484	105.6
B1	33.0	292.730	0.200	0.790	98.	87.	0.252	120.	24.094	110.0
2	36.0	294.340	0.220	0.860	100.	86.	0.252	120.	25.270	107.5
3	39.0	295.560	0.220	0.860	101.	86.	0.252	120.	25.270	81.4
4	41.0	297.550	0.220	0.860	103.	88.	0.252	120.	25.270	198.4

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: INLET
DUCT AREA: 2.2450.FT.
DUCT LOCATION: INLET
FILTER NUMBERS: XXX

TEST NUMBER: 6.INLE
DATE: APR20,77
TEST COND: W/O FOAM
BAR. PRESS-IN HG: 30.43
PITOT TUBE FACTOR: 0.770
TIME TEST STARTED: 1311

SAMPLE POINT --	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I --
STAR	0.	316.127								
A1	5.0	318.640	0.200	0.790	79.	77.	0.252	105.	23.756	107.3
2	10.0	321.180	0.200	0.790	89.	77.	0.252	105.	23.756	107.5
3	15.0	323.760	0.220	0.860	96.	79.	0.252	105.	24.915	103.2
4	20.0	326.320	0.230	0.900	100.	81.	0.252	105.	25.475	99.6
5	25.0	329.000	0.220	0.860	105.	83.	0.252	105.	24.915	106.0
6	30.0	331.620	0.220	0.860	109.	86.	0.252	110.	25.025	103.4
7	35.0	334.200	0.200	0.790	111.	87.	0.252	110.	23.861	106.5
8	40.0	336.800	0.200	0.790	113.	89.	0.252	110.	23.861	106.9
9	45.0	339.180	0.180	0.720	113.	91.	0.252	110.	22.636	103.0
10	50.0	341.548	0.160	0.640	113.	93.	0.252	110.	21.341	108.5
STAR	50.0	341.548								
B1	55.0	344.040	0.220	0.860	93.	92.	0.252	110.	25.025	99.2
2	60.0	346.500	0.210	0.820	96.	92.	0.252	110.	24.450	100.0
3	65.0	349.260	0.210	0.820	102.	92.	0.252	115.	24.557	112.1
4	70.0	351.800	0.230	0.900	105.	92.	0.252	115.	25.700	91.3
5	75.0	354.620	0.230	0.900	108.	92.	0.252	115.	25.700	108.9
6	80.0	357.400	0.230	0.900	110.	93.	0.252	115.	25.700	107.0
7	85.0	359.900	0.210	0.820	112.	93.	0.252	115.	24.557	100.5
8	90.0	362.500	0.210	0.820	112.	96.	0.252	115.	24.557	104.3
9	95.0	365.100	0.200	0.790	112.	96.	0.252	115.	23.965	106.8
10	100.0	367.640	0.190	0.750	113.	96.	0.252	110.	23.256	106.5

YORK RESEARCH CORPORATION
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

JOB NUMBER: 8479-34

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: INLET
DUCT AREA: 20.24SQ.FT.
DUCT LOCATION: INLET
FILTER NUMBERS: XXX

TEST NUMBER: 7 INLE
DATE: APR20,77
TEST COND: W/O FOAM
BAR. PRESS-IN HG: 30.43
PITOT TUBE FACTOR: 0.770
TIME TEST STARTED: 1615

SAMPLE POINT --	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I -- --
STAR	0.	376.052								
A1	5.0	379.380	0.170	1.500	87.	89.	0.308	110.	21.997	101.9
2	10.0	382.920	0.170	1.500	97.	90.	0.308	110.	21.997	107.3
3	15.0	386.320	0.180	1.580	105.	91.	0.308	110.	22.635	99.4
4	20.0	389.800	0.180	1.580	109.	92.	0.308	110.	22.635	101.3
5	25.0	393.400	0.190	1.680	113.	93.	0.308	110.	23.255	101.5
6	30.0	397.080	0.210	1.830	113.	95.	0.308	110.	24.449	98.6
7	35.0	400.600	0.210	1.830	114.	95.	0.308	110.	24.449	94.2
8	40.0	404.560	0.210	1.830	115.	97.	0.308	115.	24.556	106.2
9	45.0	407.900	0.180	1.580	115.	97.	0.308	110.	22.635	96.3
10	50.0	411.169	0.160	1.410	115.	97.	0.308	110.	21.340	99.9
STAR	50.0	411.169								
B1	55.0	415.100	0.250	2.190	101.	97.	0.308	110.	26.676	97.5
2	60.0	419.300	0.250	2.190	106.	97.	0.308	115.	26.792	104.1
3	65.0	423.450	0.260	2.290	113.	97.	0.308	115.	27.323	100.3
4	70.0	426.840	0.220	1.900	117.	98.	0.308	115.	25.133	83.6
5	75.0	430.380	0.220	1.900	117.	98.	0.308	115.	25.133	92.5
6	80.0	434.280	0.220	1.900	117.	98.	0.308	115.	25.133	101.9
7	85.0	437.800	0.180	1.580	117.	99.	0.308	115.	22.734	101.5
8	90.0	441.200	0.170	1.500	117.	99.	0.308	115.	22.094	100.9
9	95.0	444.600	0.170	1.500	117.	99.	0.308	115.	22.094	100.9
10	100.0	447.936	0.170	1.500	117.	99.	0.308	115.	22.094	99.0

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: INLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: INLET
FILTER NUMBERS: XXX

TEST NUMBER: 8 INLE
DATE: APR20,77
TEST COND: W/O FOAM
BAR. PRESS-IN HG: 30.43
PITOT TUBE FACTOR: 0.770
TIME TEST STARTED: 1839

SAMPLE POINT --	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT PDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I -- --
STAR	0.	459.063								
A1	5.0	462.540	0.180	1.580	93.	95.	0.308	110.	22.635	102.4
2	10.0	466.100	0.180	1.580	99.	95.	0.308	110.	22.635	104.3
3	15.0	469.640	0.180	1.580	107.	95.	0.308	110.	22.635	102.9
4	20.0	473.100	0.190	1.680	111.	95.	0.308	110.	23.255	97.6
5	25.0	476.680	0.190	1.680	111.	95.	0.308	110.	23.255	101.0
6	30.0	480.350	0.190	1.680	111.	95.	0.308	110.	23.255	103.8
7	35.0	483.700	0.180	1.580	113.	96.	0.308	110.	22.635	96.5
8	40.0	487.130	0.160	1.410	113.	96.	0.308	110.	21.340	105.1
9	45.0	490.240	0.190	1.680	113.	96.	0.308	110.	23.255	87.5
10	50.0	493.874	0.190	1.680	114.	97.	0.308	110.	23.255	102.1
STAR	50.0	493.874								
B1	55.0	497.690	0.200	1.780	106.	97.	0.308	115.	23.963	105.7
2	60.0	500.880	0.210	1.830	109.	97.	0.308	115.	24.555	96.0
3	65.0	504.300	0.210	1.830	111.	97.	0.308	115.	24.555	92.0
4	70.0	507.960	0.210	1.830	113.	97.	0.308	115.	24.555	93.3
5	75.0	511.490	0.200	1.780	114.	97.	0.308	115.	23.963	97.1
6	80.0	515.230	0.200	1.780	115.	97.	0.308	115.	23.963	102.8
7	85.0	518.890	0.210	1.830	115.	97.	0.308	115.	24.555	96.1
8	90.0	522.350	0.170	1.500	116.	98.	0.308	115.	22.093	102.9
9	95.0	525.810	0.180	1.580	115.	98.	0.308	115.	22.734	100.1
10	100.0	529.129	0.170	1.500	115.	98.	0.308	115.	22.093	98.7

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: OUTLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: OUTLET
FILTER NUMBERS: XXX

TEST NUMBER: 1 OUTL
DATE: APR18,77
TEST COND: FOAM
BAR. PRESS-IN HG: 30.12
PITOT TUBE FACTOR: 0.870
TIME TEST STARTED: 0730

SAMPLE POINT --	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I -- --
STAR	0.	95.515								
A1	5.0	98.880	0.300	2.600	100.	86.	0.308	99.	32.775	67.3
1	10.0	103.510	0.340	3.100	110.	88.	0.308	99.	34.892	86.2
2	15.0	106.830	0.250	2.300	115.	90.	0.308	99.	29.920	71.5
2	20.0	111.670	0.270	2.900	100.	89.	0.308	99.	31.093	101.9
3	25.0	115.970	0.230	2.500	110.	90.	0.308	99.	28.698	97.0
3	30.0	121.900	0.230	2.500	115.	90.	0.308	99.	28.698	133.2
4	35.0	125.270	0.200	2.200	117.	92.	0.308	99.	26.761	80.8
4	40.0	129.320	0.200	2.200	116.	92.	0.308	99.	26.761	97.2
5	45.0	133.360	0.220	2.400	116.	92.	0.308	99.	28.067	92.5
5	30.0	136.690	0.200	2.200	116.	92.	0.308	99.	0.	0.
6	55.0	141.630	0.250	2.300	115.	92.	0.308	99.	29.920	21.2
6	60.0	145.720	0.250	2.300	118.	92.	0.308	99.	29.920	87.7
7	65.0	149.890	0.250	2.300	117.	92.	0.308	99.	29.920	89.4
7	70.0	153.999	0.250	2.300	114.	92.	0.308	99.	29.920	88.4
8	75.0	158.120	0.250	2.300	112.	92.	0.308	99.	29.920	88.8
8	80.0	162.230	0.250	2.300	113.	90.	0.308	99.	29.920	88.6
9	85.0	166.370	0.250	2.300	113.	90.	0.308	99.	29.920	89.3
9	90.0	170.530	0.250	2.300	113.	90.	0.308	99.	29.920	90.8
10	95.0	174.960	0.250	2.700	114.	90.	0.308	99.	29.920	94.5
10	100.0	179.380	0.250	2.700	115.	90.	0.308	90.	29.678	94.3
STAR	100.0	179.857								
B1	105.0	183.400	0.290	3.200	86.	84.	0.308	90.	31.944	72.7
1	110.0	188.300	0.290	3.200	110.	86.	0.308	95.	32.109	98.6
2	115.0	195.500	0.240	2.600	112.	86.	0.308	95.	29.210	153.7
2	120.0	197.130	0.240	2.600	113.	86.	0.308	95.	29.210	35.9
3	125.0	201.900	0.195	2.200	112.	86.	0.308	95.	26.330	114.5
3	130.0	205.600	0.230	2.500	110.	86.	0.308	95.	28.595	85.4
4	135.0	209.200	0.180	1.850	108.	86.	0.308	95.	25.297	91.8
4	140.0	213.100	0.190	2.050	104.	86.	0.308	95.	25.990	97.2
5	145.0	217.300	0.180	1.850	102.	85.	0.308	95.	25.297	107.3
5	150.0	220.500	0.180	1.850	102.	85.	0.308	95.	25.297	82.1
6	155.0	224.300	0.260	2.700	104.	84.	0.308	95.	30.403	91.9
6	160.0	229.200	0.280	3.100	106.	84.	0.308	95.	31.351	90.6
7	165.0	233.500	0.280	3.100	108.	84.	0.308	95.	31.351	87.3
7	170.0	238.500	0.300	3.300	109.	85.	0.308	95.	32.658	92.1
8	175.0	243.300	0.300	3.300	109.	85.	0.308	95.	32.658	95.1
8	180.0	248.100	0.310	3.350	110.	85.	0.308	95.	33.198	95.5
9	185.0	253.400	0.320	3.450	109.	85.	0.308	95.	33.729	101.3
9	190.0	257.700	0.320	3.450	108.	85.	0.308	95.	33.729	82.4
10	195.0	263.300	0.290	3.200	108.	85.	0.308	80.	31.672	111.4
10	200.0	268.055	0.280	3.100	110.	86.	0.308	70.	30.332	95.3

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: OUTLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: OUTLET
FILTER NUMBERS: XXX

TEST NUMBER: 2 OUTL
DATE: APR19,77
TEST COND: FOAM
BAR. PRESS-IN HG: 30.33
PITOT TUBE FACTOR: 0.780
TIME TEST STARTED: 0100

SAMPLE POINT —	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I -- --
STAR	0.	78.091								
A1	5.0	82.310	0.240	2.550	69.	70.	0.308	97.	26.148	110.1
1	10.0	86.750	0.240	2.550	91.	78.	0.308	97.	26.148	112.7
2	15.0	90.790	0.220	2.300	92.	70.	0.308	98.	25.057	107.8
2	20.0	94.880	0.225	2.350	92.	70.	0.308	95.	25.272	107.6
3	25.0	98.840	0.200	2.100	91.	71.	0.308	95.	23.327	110.5
3	30.0	102.840	0.210	2.200	91.	72.	0.308	95.	24.415	108.8
4	35.0	106.630	0.180	1.900	98.	72.	0.308	95.	22.604	110.6
4	40.0	110.120	0.175	1.850	98.	72.	0.308	95.	22.288	103.3
5	45.0	113.740	0.180	1.900	98.	72.	0.308	95.	22.604	105.6
5	50.0	117.320	0.180	1.900	98.	72.	0.308	95.	22.604	104.5
6	55.0	121.350	0.210	2.200	92.	72.	0.308	85.	24.194	108.5
6	60.0	125.410	0.210	2.200	92.	72.	0.308	90.	24.305	109.9
7	65.0	129.450	0.220	2.300	94.	72.	0.308	90.	24.877	106.6
7	70.0	133.540	0.220	2.300	94.	72.	0.308	90.	24.877	108.0
8	75.0	137.880	0.240	2.550	97.	72.	0.308	90.	25.983	109.4
8	80.0	142.200	0.240	2.550	98.	72.	0.308	94.	26.077	109.2
9	85.0	146.610	0.250	2.700	99.	73.	0.308	94.	26.615	109.1
9	90.0	150.830	0.255	2.750	99.	73.	0.308	95.	26.904	103.5
10	95.0	155.380	0.240	2.550	100.	74.	0.308	93.	26.054	114.5
10	100.0	159.791	0.245	2.600	100.	74.	0.308	93.	26.324	109.9
11	105.0	163.390	0.270	2.900	91.	72.	0.308	99.	27.784	86.8
11	110.0	167.630	0.220	2.300	96.	73.	0.308	99.	25.080	112.5
12	115.0	171.650	0.190	2.050	97.	73.	0.308	99.	23.307	114.6

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: OUTLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: OUTLET
FILTER NUMBERS: XXX

TEST NUMBER: 3 OUTL
DATE: APR19,77
TEST COND: FOAM
BAR. PRESS-IN HG: 30.33
PITOT TUBE FACTOR: 0.780
TIME TEST STARTED: 2105

SAMPLE POINT	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I
STAR	0.	506.720								
A1	5.0	510.420	0.180	1.900	78.	74.	0.308	105.	22.806	110.7
2	10.0	514.140	0.170	1.800	96.	76.	0.308	105.	22.164	112.4
3	15.0	517.660	0.170	1.800	100.	78.	0.308	105.	22.164	105.8
4	20.0	521.830	0.230	2.400	102.	79.	0.308	105.	25.780	107.6
5	25.0	526.240	0.260	2.700	102.	80.	0.308	105.	27.410	107.0
6	30.0	530.640	0.270	2.850	102.	80.	0.308	105.	27.932	104.8
7	35.0	535.120	0.260	2.700	103.	81.	0.308	105.	27.410	103.5
8	40.0	539.620	0.280	2.950	103.	81.	0.308	105.	28.444	105.1
9	45.0	544.170	0.300	3.150	102.	81.	0.308	105.	29.443	102.8
10	50.0	548.670	0.300	3.150	103.	80.	0.308	105.	29.443	101.7
STAR	50.0	548.670								
B1	55.0	553.990	0.210	2.200	83.	79.	0.308	105.	24.634	145.2
2	60.0	557.060	0.190	2.000	100.	80.	0.308	105.	23.431	87.2
3	65.0	561.080	0.180	1.650	101.	80.	0.308	105.	22.806	117.1
4	70.0	565.100	0.170	1.800	101.	80.	0.308	105.	22.164	120.5
5	75.0	569.150	0.170	1.800	102.	80.	0.308	105.	22.164	121.3
6	80.0	573.180	0.170	1.800	101.	80.	0.308	105.	22.164	120.8
7	85.0	577.200	0.170	1.800	102.	80.	0.308	105.	22.164	120.4
8	90.0	581.270	0.170	1.800	103.	80.	0.308	105.	22.164	121.3
9	95.0	585.320	0.170	1.800	104.	81.	0.308	105.	22.164	121.0
10	100.0	589.390	0.180	1.900	103.	81.	0.308	105.	22.806	113.3

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: OUTLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: OUTLET
FILTER NUMBERS: XXX

TEST NUMBER: 4 OUTL
DATE: APR20,77
TEST COND: FOAM
BAR. PRESS-IN HG: 30.43
PITOT TUBE FACTOR: 0.780
TIME TEST STARTED: 0055

SAMPLE POINT	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT PDG (INH2O)	ORIFICE PDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I
STAR	0.	603.230								
B1	5.0	606.890	0.240	2.200	79.	70.	0.308	93.	26.126	94.8
2	10.0	610.830	0.220	2.050	88.	72.	0.308	93.	25.014	106.8
3	15.0	614.860	0.200	1.850	101.	76.	0.308	93.	23.350	109.9
4	20.0	618.840	0.180	1.650	101.	78.	0.308	93.	22.626	115.6
5	25.0	622.820	0.180	1.650	101.	78.	0.308	98.	22.626	115.6
6	30.0	626.810	0.220	2.050	101.	78.	0.308	93.	25.014	104.9
7	35.0	630.820	0.260	2.400	102.	73.	0.308	93.	27.193	97.0
8	40.0	634.310	0.260	2.400	102.	73.	0.308	93.	27.193	96.5
9	45.0	638.810	0.270	2.500	101.	78.	0.308	98.	27.711	95.0
10	50.0	643.595	0.260	2.400	102.	80.	0.308	98.	27.193	115.5
STAR	50.0	643.930								
A1	55.0	648.440	0.200	1.850	86.	76.	0.308	93.	23.350	126.3
2	60.0	652.460	0.190	1.750	100.	73.	0.308	93.	23.246	113.8
3	65.0	656.490	0.180	1.650	102.	78.	0.308	98.	22.626	116.9
4	70.0	660.510	0.180	1.650	102.	78.	0.308	98.	22.626	115.6
5	75.0	664.590	0.190	1.750	102.	73.	0.308	98.	23.246	115.3
6	80.0	668.590	0.190	1.750	102.	80.	0.308	93.	23.246	112.8
7	85.0	672.650	0.260	2.400	102.	80.	0.308	93.	27.193	97.0
8	90.0	676.670	0.290	2.650	102.	80.	0.308	93.	28.719	92.0
9	95.0	681.800	0.290	2.650	100.	80.	0.308	98.	28.719	117.6
10	100.0	685.830	0.300	2.750	101.	80.	0.308	98.	29.210	90.7

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: OUTLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: OUTLET
FILTER NUMBERS: XXX

TEST NUMBER: 5 OUTL
DATE: APR20,77
TEST COND: FOAM
BAR. PRESS-IN HG: 30.42
PITOT TUBE FACTOR: 0.780
TIME TEST STARTED: 0405

SAMPLE POINT —	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I — --
STAR	0.	694.830								
A4	3.0	697.170	0.180	1.650	86.	70.	0.308	98.	22.630	115.7
5	6.0	699.270	0.190	1.750	90.	71.	0.308	98.	23.250	100.6
6	9.0	701.910	0.250	2.300	96.	72.	0.308	98.	26.669	109.7
7	12.0	704.710	0.290	2.650	100.	72.	0.308	98.	28.724	107.7
8	15.0	707.380	0.300	2.750	101.	74.	0.308	100.	29.267	100.9
9	18.0	710.030	0.300	2.750	102.	74.	0.308	100.	29.267	100.1
10	21.0	712.750	0.310	2.900	102.	74.	0.308	100.	29.751	101.1
STAR	21.0	712.820								
B4	24.0	714.880	0.180	1.650	90.	73.	0.308	100.	22.670	101.4
5	27.0	716.960	0.180	1.650	94.	74.	0.308	100.	22.670	101.9
6	30.0	719.160	0.210	1.950	94.	74.	0.308	100.	24.487	99.8
7	33.0	721.570	0.240	2.200	97.	74.	0.308	100.	26.177	102.1
8	36.0	724.060	0.260	2.400	99.	75.	0.308	100.	27.246	101.1
9	39.0	726.530	0.250	2.300	100.	75.	0.308	100.	26.717	102.1
10	42.0	729.020	0.260	2.400	100.	75.	0.308	100.	27.246	101.0

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: OUTLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: OUTLET
FILTER NUMBERS: XXX

TEST NUMBER: 6 OUTL
DATE: APR20,77
TEST COND: W/O FOAM
BAR. PRESS-IN HG: 30.43
PITOT TUBE FACTOR: 0.780
TIME TEST STARTED: 1325

SAMPLE POINT —	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I -- --
STAR	0.	43.086								
A1	5.0	47.220	0.250	2.300	90.	80.	0.308	101.	26.739	103.2
1	10.0	51.380	0.250	2.300	104.	94.	0.308	102.	26.763	101.3
2	15.0	55.480	0.240	2.200	108.	85.	0.308	101.	26.199	102.2
2	20.0	59.480	0.230	2.100	109.	86.	0.308	101.	25.647	101.7
3	25.0	63.375	0.220	2.050	112.	88.	0.308	102.	25.106	100.9
3	30.0	67.250	0.220	2.050	110.	88.	0.308	102.	25.106	100.5
4	35.0	70.990	0.200	1.350	111.	90.	0.308	102.	23.937	101.4
4	40.0	74.690	0.200	1.850	110.	89.	0.308	102.	23.937	100.5
5	45.0	78.490	0.210	1.950	111.	90.	0.308	102.	24.529	100.6
5	50.0	82.290	0.210	1.950	112.	91.	0.308	102.	24.529	100.4
6	35.0	86.900	0.210	1.950	113.	91.	0.308	102.	0.	0.
6	60.0	89.880	0.210	1.950	110.	92.	0.308	102.	24.529	15.3
7	65.0	94.000	0.250	2.300	112.	92.	0.308	102.	26.763	99.3
7	70.0	98.130	0.250	2.300	113.	92.	0.308	102.	26.763	99.9
8	75.0	102.280	0.250	2.300	113.	92.	0.308	102.	26.763	100.4
8	80.0	106.430	0.250	2.300	114.	92.	0.308	103.	26.787	100.4
9	85.0	110.625	0.260	2.400	114.	92.	0.308	103.	27.317	99.5
9	90.0	114.980	0.270	2.500	115.	92.	0.308	103.	27.833	101.4
10	95.0	119.320	0.270	2.500	114.	92.	0.308	90.	27.514	99.9
10	100.0	123.680	0.280	2.600	114.	92.	0.308	85.	27.392	96.2
STAR	100.0	123.850								
B1	105.0	127.750	0.250	2.300	106.	90.	0.308	101.	26.739	95.1
1	110.0	131.830	0.250	2.300	110.	90.	0.308	101.	26.739	99.1
2	115.0	135.680	0.210	1.950	114.	92.	0.308	102.	24.529	101.5
2	120.0	139.460	0.210	1.950	112.	92.	0.308	102.	24.529	99.3
3	125.0	143.130	0.200	1.850	115.	93.	0.308	102.	23.937	100.3
3	130.0	146.910	0.200	1.850	113.	93.	0.308	102.	23.937	100.7
4	135.0	150.520	0.190	1.750	113.	93.	0.308	102.	23.331	100.0
4	140.0	154.130	0.190	1.750	112.	93.	0.308	102.	23.331	100.1
5	145.0	157.780	0.200	1.850	111.	93.	0.308	102.	23.937	99.7
5	150.0	161.565	0.210	1.950	110.	93.	0.308	102.	24.529	100.0
6	155.0	165.970	0.290	2.650	111.	92.	0.308	102.	28.325	99.2
6	160.0	170.450	0.300	2.750	111.	92.	0.308	102.	29.317	99.3
7	165.0	175.099	0.320	2.950	112.	92.	0.308	101.	30.252	99.6
7	170.0	179.810	0.330	3.050	114.	92.	0.308	101.	30.721	99.2
8	175.0	184.470	0.320	2.950	113.	93.	0.308	101.	30.252	99.2
8	180.0	189.150	0.320	2.950	108.	93.	0.308	101.	30.252	101.5
9	185.0	194.400	0.340	3.250	120.	94.	0.308	100.	31.155	103.1
9	190.0	198.925	0.340	3.250	118.	94.	0.308	99.	31.127	93.3
10	195.0	203.630	0.320	2.950	120.	95.	0.308	99.	30.198	99.6
10	200.0	208.250	0.320	2.950	118.	95.	0.308	99.	30.198	98.0

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: OUTLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: OUTLET
FILTER NUMBERS: XXX

TEST NUMBER: 7 OUTL
DATE: APR20,77
TEST COND: W/O FOAM
BAR. PRESS-IN HG: 30.43
PITOT TUBE FACTOR: 0.780
TIME TEST STARTED: 1800

SAMPLE POINT	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I
STAR	0.	14.732								
A1	5.0	18.880	0.250	2.300	84.	75.	0.308	102.	26.763	104.7
1	10.0	23.210	0.260	2.400	97.	77.	0.308	102.	27.293	105.7
2	15.0	27.300	0.250	2.300	105.	80.	0.308	102.	26.763	100.8
2	20.0	31.370	0.250	2.300	105.	80.	0.308	102.	26.763	100.3
3	25.0	35.315	0.230	2.100	105.	82.	0.308	103.	25.693	101.2
3	30.0	39.250	0.230	2.100	104.	82.	0.308	103.	25.693	101.0
4	35.0	43.030	0.210	1.950	102.	95.	0.308	103.	24.550	100.5
4	40.0	46.730	0.200	1.850	100.	82.	0.308	103.	23.959	102.2
5	45.0	50.480	0.210	1.950	100.	82.	0.308	102.	24.529	101.0
5	50.0	54.300	0.220	2.050	99.	82.	0.308	102.	25.106	100.6
6	55.0	58.610	0.280	2.600	102.	82.	0.308	100.	28.273	100.3
6	60.0	62.990	0.280	2.600	102.	82.	0.308	100.	28.273	102.0
7	65.0	67.340	0.280	2.600	103.	83.	0.308	102.	28.323	101.3
7	70.0	71.720	0.290	2.650	104.	82.	0.308	102.	28.825	100.2
8	75.0	76.100	0.290	2.650	104.	82.	0.308	102.	28.825	100.2
8	80.0	80.490	0.290	2.650	104.	82.	0.308	100.	28.773	100.2
9	85.0	85.130	0.330	3.100	102.	82.	0.308	102.	30.748	99.8
9	90.0	89.950	0.340	3.200	101.	82.	0.308	101.	31.183	102.1
10	95.0	94.790	0.370	3.400	103.	82.	0.308	101.	32.530	98.2
10	100.0	99.690	0.370	3.400	103.	82.	0.308	101.	32.530	99.4
STAR	100.0	100.370								
B1	105.0	104.490	0.260	2.400	86.	78.	0.308	101.	27.269	101.4
1	110.0	108.670	0.260	2.400	96.	79.	0.308	101.	27.269	101.8
2	115.0	112.750	0.250	2.300	97.	78.	0.308	101.	26.739	101.4
2	120.0	116.750	0.240	2.200	97.	78.	0.308	101.	26.199	101.4
3	125.0	120.610	0.220	2.050	95.	78.	0.308	100.	25.061	102.3
3	130.0	124.470	0.230	2.100	93.	77.	0.308	100.	25.624	100.3
4	135.0	128.310	0.220	2.050	92.	75.	0.308	100.	25.061	102.3
4	140.0	132.140	0.220	2.050	90.	75.	0.308	100.	25.061	102.2
5	145.0	136.000	0.230	2.100	90.	75.	0.308	100.	25.624	100.8
5	150.0	139.820	0.230	2.100	90.	75.	0.308	100.	25.624	99.7
6	155.0	144.410	0.340	3.150	90.	75.	0.308	100.	31.155	98.8
6	160.0	149.110	0.350	3.200	92.	74.	0.308	100.	31.610	99.6
7	165.0	153.880	0.360	3.300	94.	75.	0.308	98.	32.001	99.3
7	170.0	158.640	0.360	3.300	94.	74.	0.308	98.	32.001	99.1
8	175.0	163.550	0.380	3.500	95.	75.	0.308	98.	32.878	99.4
8	180.0	168.430	0.360	3.300	95.	75.	0.308	98.	32.001	101.5
9	185.0	173.320	0.340	3.100	96.	74.	0.308	98.	31.099	104.6
9	190.0	178.110	0.340	3.100	97.	75.	0.308	98.	31.099	102.2
10	195.0	183.190	0.340	3.100	102.	75.	0.308	98.	31.099	107.9
10	200.0	188.340	0.340	3.100	105.	76.	0.308	98.	31.099	109.0

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: OUTLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: OUTLET
FILTER NUMBERS: XXX

TEST NUMBER: 8 OUTL
DATE: APR20,77
TEST COND: W/O FOAM
BAR. PRESS-IN HG: 30.43
PITOT TUBE FACTOR: 0.780
TIME TEST STARTED: 2230

SAMPLE POINT —	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I —
STAR	0.	15.100								
A1	5.0	19.980	0.210	2.000	65.	65.	0.308	100.	24.485	137.7
1	10.0	22.710	0.210	1.950	80.	65.	0.308	100.	24.485	75.9
2	15.0	26.390	0.200	1.850	88.	67.	0.308	100.	23.895	103.9
2	20.0	30.100	0.200	1.850	90.	68.	0.308	100.	23.895	104.5
3	25.0	33.600	0.180	1.650	92.	70.	0.308	102.	22.709	103.6
3	30.0	36.960	0.180	1.650	93.	70.	0.308	102.	22.709	99.4
4	35.0	40.380	0.170	1.600	94.	72.	0.308	102.	22.069	103.8
4	40.0	43.800	0.180	1.650	92.	72.	0.308	102.	22.709	101.1
5	45.0	47.270	0.190	1.750	92.	73.	0.308	101.	23.311	99.7
5	50.0	50.770	0.190	1.750	93.	73.	0.308	101.	23.311	100.4
6	55.0	54.740	0.250	2.300	93.	73.	0.308	100.	26.715	99.3
6	60.0	58.860	0.250	2.300	95.	72.	0.308	100.	26.715	103.0
7	65.0	62.780	0.240	2.250	98.	75.	0.308	100.	26.176	99.5
7	70.0	66.920	0.240	2.250	98.	75.	0.308	100.	26.176	105.0
8	75.0	71.120	0.260	2.400	98.	75.	0.308	100.	27.244	102.4
8	80.0	76.770	0.260	2.400	98.	75.	0.308	100.	27.244	137.8
9	85.0	79.620	0.240	2.250	98.	75.	0.308	100.	26.176	72.3
9	90.0	83.690	0.240	2.250	98.	75.	0.308	100.	26.176	103.3
10	95.0	87.820	0.250	2.300	98.	74.	0.308	100.	26.715	102.8
10	100.0	91.970	0.750	2.300	100.	75.	0.308	100.	46.272	59.5
STAR	100.0	91.970								
B1	105.0	95.210	0.210	2.200	88.	72.	0.308	100.	24.485	88.9
1	110.0	99.090	0.210	2.200	98.	75.	0.308	100.	24.485	105.2
2	115.0	104.110	0.200	2.100	98.	75.	0.308	100.	23.895	139.5
2	120.0	107.850	0.200	1.850	99.	74.	0.308	100.	23.895	103.9
3	125.0	111.330	0.180	1.650	97.	74.	0.308	100.	22.669	102.0
3	130.0	114.270	0.180	1.650	95.	74.	0.308	100.	22.669	86.3
4	135.0	117.890	0.170	1.800	92.	73.	0.308	100.	22.030	109.8
4	140.0	121.560	0.170	1.800	92.	73.	0.308	100.	22.030	111.3
5	145.0	125.300	0.190	2.000	95.	73.	0.308	100.	23.290	107.1
5	150.0	128.190	0.190	2.000	95.	73.	0.308	100.	23.290	82.7
6	155.0	132.550	0.290	3.050	94.	72.	0.308	100.	28.773	101.5
6	160.0	137.180	0.310	2.900	102.	74.	0.308	98.	29.696	103.1
7	165.0	142.110	0.320	2.950	103.	75.	0.308	98.	30.171	107.8
7	170.0	146.340	0.320	2.950	102.	76.	0.308	98.	30.171	92.5
8	175.0	150.910	0.320	2.950	102.	76.	0.308	98.	30.171	100.0
8	180.0	155.530	0.330	3.050	101.	75.	0.308	98.	30.639	99.7
9	185.0	160.110	0.310	2.900	101.	75.	0.308	97.	29.669	101.9
9	190.0	165.130	0.310	2.900	102.	75.	0.308	97.	29.669	111.5
10	195.0	168.810	0.150	1.600	100.	88.	0.308	97.	20.638	116.0
10	200.0	172.275	0.150	1.600	100.	88.	0.308	97.	20.638	109.2

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: OUTLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: OUTLET
FILTER NUMBERS: XXX

TEST NUMBER: 9 OUTL
DATE: APR21,77
TEST COND: W/O FOAM
BAR. PRESS-IN HG: 30.31
PITOT TUBE FACTOR: 0.780
TIME TEST STARTED: 0225

SAMPLE POINT —	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I — —
STAR	0.	82.575								
A1	5.0	86.630	0.210	2.200	85.	75.	0.308	95.	24.422	110.6
1	10.0	90.310	0.210	2.200	92.	73.	0.308	100.	24.532	100.3
2	15.0	93.630	0.220	2.300	95.	74.	0.308	100.	25.109	88.1
2	20.0	97.780	0.220	2.300	98.	74.	0.308	100.	25.109	109.9
3	25.0	101.750	0.190	2.000	100.	76.	0.308	100.	23.334	112.6
3	30.0	105.470	0.190	2.000	100.	76.	0.308	100.	23.334	105.5
4	35.0	109.640	0.170	1.550	99.	77.	0.308	100.	22.072	124.9
4	40.0	113.450	0.180	1.650	100.	78.	0.308	100.	22.712	110.7
5	45.0	117.440	0.190	1.750	100.	78.	0.308	104.	23.417	113.3
5	50.0	121.390	0.180	1.650	99.	78.	0.308	104.	22.793	115.3
6	55.0	125.390	0.250	2.300	98.	78.	0.308	105.	26.885	99.4
6	60.0	129.380	0.240	2.200	98.	78.	0.308	105.	26.342	101.2
7	65.0	133.360	0.250	2.300	99.	78.	0.308	104.	26.862	98.8
7	70.0	137.410	0.250	2.300	99.	78.	0.308	102.	26.814	100.3
8	75.0	141.470	0.260	2.400	99.	78.	0.308	99.	27.272	98.4
8	80.0	145.650	0.270	2.500	100.	78.	0.308	99.	27.791	99.3
9	85.0	149.870	0.270	2.500	100.	79.	0.308	88.	27.517	99.2
9	90.0	154.060	0.270	2.500	100.	79.	0.308	82.	27.366	97.9
10	95.0	158.090	0.240	2.200	100.	79.	0.308	95.	26.108	101.0
10	100.0	162.070	0.240	2.200	99.	79.	0.308	99.	26.202	100.2
B1	105.0	166.740	0.230	2.100	89.	76.	0.308	99.	25.650	121.5
1	110.0	170.580	0.230	2.100	96.	77.	0.308	99.	25.650	99.2
2	115.0	174.240	0.200	1.850	97.	77.	0.308	99.	23.919	101.2
2	120.0	177.860	0.200	1.850	95.	77.	0.308	99.	23.919	100.3
3	125.0	181.430	0.190	1.750	94.	77.	0.308	99.	23.313	101.6
3	130.0	184.890	0.180	1.650	94.	77.	0.308	99.	22.692	101.1
4	135.0	188.350	0.180	1.650	93.	77.	0.308	100.	22.712	101.3
4	140.0	191.790	0.180	1.650	92.	77.	0.308	100.	22.712	100.8
5	145.0	195.440	0.210	1.950	92.	76.	0.308	100.	24.532	99.2

YORK RESEARCH CORPORATION JOB NUMBER: 8479-34
ONE RESEARCH DRIVE, STAMFORD, CONNECTICUT 06906

CLIENT: EPA
PLANT LOCATION: ALLENTOWN,PA
UNIT TESTED: SCRUBBER
DUCT NUMBER: OUTLET
DUCT AREA: 2.24SQ.FT.
DUCT LOCATION: OUTLET
FILTER NUMBERS: XXX

TEST NUMBER: 10 OUT
DATE: APR21,77
TEST COND: FOAM
BAR. PRESS-IN HG: 30.31
PITOT TUBE FACTOR: 0.780
TIME TEST STARTED: 0120

SAMPLE POINT —	ELAP TIME (MIN)	SAMPLE VOLUME (DCF)	PITOT RDG (INH2O)	ORIFICE RDG (INH2O)	METERTEMP (DEG.F) IN	OUT	NOZ DIA (IN)	STACK TEMP (DF)	STACK VEL (FPS)	%I —
STAR	0.	416.835								
B1	5.0	421.290	0.230	2.100	76.	73.	0.308	100.	25.671	117.8
1	10.0	425.140	0.220	2.050	100.	78.	0.308	110.	25.330	102.2
2	15.0	428.720	0.190	1.750	102.	80.	0.308	110.	23.540	101.8
2	20.0	432.480	0.200	1.850	100.	80.	0.308	110.	24.151	104.5
3	25.0	436.040	0.200	1.850	100.	81.	0.308	110.	24.151	98.8
3	30.0	439.520	0.180	1.650	100.	82.	0.308	110.	22.912	101.7
4	35.0	442.980	0.180	1.650	100.	82.	0.308	110.	22.912	101.1
4	40.0	446.320	0.160	1.500	101.	82.	0.308	110.	21.602	103.4
5	45.0	449.720	0.170	1.600	99.	84.	0.308	110.	22.266	102.1
5	50.0	453.010	0.160	1.500	99.	83.	0.308	108.	21.564	101.7
6	55.0	456.220	0.220	2.050	98.	83.	0.308	108.	25.286	84.8
6	60.0	460.670	0.220	2.050	98.	83.	0.308	100.	25.107	116.8
7	65.0	464.560	0.220	2.050	98.	83.	0.308	100.	25.107	102.1
7	70.0	468.430	0.220	2.050	100.	82.	0.308	100.	25.107	101.5
8	75.0	472.370	0.230	2.100	100.	82.	0.308	100.	25.671	101.1
8	80.0	476.280	0.230	2.100	100.	82.	0.308	100.	25.671	100.3
9	85.0	480.120	0.220	2.050	100.	82.	0.308	100.	25.107	100.7
9	90.0	484.080	0.220	2.050	100.	82.	0.308	100.	25.107	103.8
10	95.0	488.110	0.240	2.200	100.	82.	0.308	100.	26.223	101.2
10	100.0	492.110	0.240	2.200	100.	80.	0.308	100.	26.223	100.6
STAR	100.0	492.140								
A1	105.0	495.900	0.200	1.880	90.	82.	0.308	100.	23.939	104.3
1	110.0	500.320	0.200	1.880	100.	83.	0.308	110.	24.151	122.5
2	115.0	503.330	0.200	1.880	100.	85.	0.308	110.	24.151	83.3
2	120.0	506.610	0.150	1.400	100.	88.	0.308	110.	20.916	104.4
3	125.0	509.950	0.150	1.400	100.	80.	0.308	110.	20.916	107.0
3	130.0	513.180	0.150	1.400	105.	85.	0.308	110.	20.916	102.6
4	135.0	516.480	0.150	1.400	102.	85.	0.308	110.	20.916	105.1
4	140.0	519.090	0.150	1.400	102.	85.	0.308	110.	20.916	83.1
5	145.0	523.000	0.160	1.500	102.	85.	0.308	120.	21.790	121.6
5	150.0	526.330	0.160	1.500	102.	86.	0.308	115.	21.696	103.1
6	155.0	529.650	0.180	1.650	102.	85.	0.308	115.	23.012	97.0
6	160.0	532.930	0.180	1.650	103.	84.	0.308	115.	23.012	95.8
7	165.0	536.310	0.170	1.600	100.	84.	0.308	115.	22.364	101.9
7	170.0	540.010	0.170	1.600	100.	84.	0.308	120.	22.461	112.0
8	175.0	543.190	0.190	1.750	100.	84.	0.308	100.	23.332	89.5
8	180.0	546.660	0.180	1.650	100.	84.	0.308	100.	22.710	100.3
9	185.0	550.120	0.180	1.650	100.	84.	0.308	100.	22.710	100.0
9	190.0	553.710	0.180	1.650	100.	84.	0.308	101.	22.730	103.9
10	195.0	556.420	0.100	0.860	100.	84.	0.308	101.	16.942	105.0
10	200.0	559.320	0.120	1.100	98.	84.	0.308	102.	18.576	102.9

APPENDIX B

FIELD DATA SHEETS

50x #8

4-8479-54

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESB
DATE 4/18/77
SAMPLING LOCATION INLET
SAMPLE TYPE SOX METHOD 8
RUN NUMBER 1 (ONE)
OPERATOR LCM SUNDANCE
AMBIENT TEMPERATURE 80
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.62
FILTER NUMBER (s) FLS-4027
TARE .49905

300ml INITIAL
IMP#1 — 5 ml
IMP#2,3 — 237 ml
242

PROBE LENGTH AND TYPE 3' EPA GLASS
NOZZLE I.D. .252
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER —
METER BOX NUMBER S-1904
METER $\Delta H_@$ 1.92
C FACTOR 1.07
PROBE HEATER SETTING —
HEATER BOX SETTING 70
REFERENCE Δp .43

SCHEMATIC OF TRAVERSE POINT LAYOUT

PITOT -.81 YELLOW IN FLOW

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	$\sqrt{\Delta p}$ PTS
STAR	0	1930	900.970										
SIDE A 1	5	1935	903.46	.18	.77	.77	90	80	78	3	—	71	9.95
1	10	1940	905.94	.18	.77	.77	90	88	79	3	—	65	9.95
2	15	1945	908.46	.17	.73	.73	90	95	81	3	—	61	9.67
2	20	1950	910.94	.18	.77	.77	95	101	83	3	—	60	9.99
3	25	1955	913.56	.19	.81	.81	95	105	85	3	—	60	10.27
3	30	2000	915.96	.18	.77	.77	95	108	87	3	—	60	9.99
4	35	2005	918.58	.18	.77	.77	95	109	89	3	—	60	9.99
4	40	2010	921.24	.20	.86	.86	95	111	91	3	—	61	10.54
5	45	2015	923.86	.18	.77	.77	95	112	92	3	—	63	9.99
5	50	2020	926.36	.18	.77	.77	95	113	93	3	—	63	9.99
6	55	2025	928.80	.17	.73	.73	95	114	94	3	—	65	9.71
6	60	2030	931.22	.17	.73	.73	95	114	95	3	—	65	9.71
7	65	2035	933.76	.18	.77	.77	100	115	95	3	—	65	10.04
7	70	2040	936.26	.17	.73	.73	100	115	95	3	—	65	9.76
8	75	2045	938.90	.20	.86	.86	100	114	96	3	—	65	10.58
8	80	2050	941.58	.20	.86	.86	100	115	97	3	—	65	10.58
9	85	2055	944.20	.17	.73	.73	95	115	98	3	—	65	9.71
9	90	2100	946.46	.15	.65	.65	95	117	97	3	—	65	9.12
10	95	2105	949.00	.21	.88	.88	95	115	97	3	—	66	10.80
10	100	2110	951.628	.17	.73	.73	90	115	97	3	—	66	9.67
STAR	100	2125	951.628	—	—	—	—	—	—	—	—	—	
BOTTOM B 1	105	2130	953.80	.18	.77	.77	90	97	94	3	—	66	9.95
1	110	2135	956.48	.19	.81	.81	95	98	95	3	—	66	10.27

COMMENTS:

ES-041

TEST # 1 (CONT) 1-24-79 4 PM 8 NOON

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	
2	115	2140	959.08	.18	.77	.77	100	103	95	3	—	66	10:04
2	120	2145	961.56	.18	.77	.77	100	107	95	3	—	66	10:04
3	125	2150	964.20	.19	.81	.81	100	108	94	3	—	67	10:32
3	130	2155	966.84	.19	.81	.81	100	109	95	3	—	67	10:32
4	135	2200	969.26	.18	.77	.77	100	109	95	3	—	67	10:04
4	140	2205	971.60	.19	.81	.81	100	109	95	3	—	67	10:32
5	145	2210	974.22	.18	.77	.77	100	109	95	3	—	67	10:04
5	150	2215	976.82	.18	.77	.77	100	110	96	3	—	67	10:04
6	155	2220	979.08	.15	.65	.65	100	111	97	3	—	67	9:17
6	160	2225	981.26	.14	.61	.61	100	110	97	3	—	68	8:85
7	165	2230	983.70	.14	.61	.61	100	110	97	3	—	68	8:85
7	170	2235	985.82	.13	.55	.55	100	108	97	3	—	68	8:55
8	175	2240	988.20	.16	.69	.69	100	108	97	3	—	68	9:47
8	180	2245	990.80	.16	.69	.69	100	108	97	3	—	68	9:47
9	185	2250	992.84	.13	.55	.55	95	109	97	2	—	68	8:49
9	190	2255	995.00	.13	.55	.55	95	108	97	2	—	68	8:49
10	195	2300	997.00	.13	.55	.55	95	107	95	2	—	68	8:49
10	200	2305	999.027	.13	.55	.55	95	107	95	2	—	68	8:49
			PURGE	FOR	15	MIN	AMBIENT		AIR	AT	ΔH	OF .80	
	0	2308	999.027		.80	.80							
	15	2323	1006.628		.80	.80	97	101					9.74

92.057

$V_{m std}$ = 92.57

ΔH .73

P_H = 29.87

$\%_M$ = 3.76

M_d = .96

M_{wt} 28.84

M_s = 28.41

02946 — ISOP. & WASH & FILTER

02947 — H_2O_2 & WASH

02948 — S. G.

02949 — 80% ISOP. BLANK TEST 1 & 2

02950 — 3% H_2O_2 BLANK TEST 1 & 2

B_s = 21.67 V_s = 23.15 % I = 105.19 QS = 28.32

ES-042

4 8479 34

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ES13
DATE 04
SAMPLING LOCATION INLET
SAMPLE TYPE EPA 8
RUN NUMBER 2
OPERATOR Ziskin
AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.62
FILTER NUMBER (s) FL5-4033
TAIR - 0.49417

-200
70 mls. ISOP.
140 mls. ISOP LOST
IMP. #2 & 3 - 260 mls.
-200
60 mls collected

PROBE LENGTH AND TYPE
NOZZLE I.D. .252
ASSUMED MOISTURE, % 2%
SAMPLE BOX NUMBER S-1904
METER BOX NUMBER S-1904
METER $\Delta H_@$ 1.92
C FACTOR ~~.79~~ .99
PROBE HEATER SETTING —
HEATER BOX SETTING —
REFERENCE Δp ~~.77~~ .46
C_p = .77
GREEN INFLOW

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	~~SAMPLE BOX~~ TEMPERATURE, °F IMP.	~~IMPINGER TEMPERATURE, °F~~
	0	0005	007.0									
A 1	5	0010	009.58	.21	.82	.82	100	83	85	3.0	50	
1	10	0015	012.66	.21	.82	.82	100	94	86	3.0	50	
2	15	0020	014.69	.20	.79	.79	100	99	86	3.0	50	
2	20	0025	017.74	.21	.82	.82	100	102	88	3.0	50	
3	25	0030	019.82	.21	.82	.82	100	102	88	3.0	50	
3	30	0035	022.41	.21	.82	.82	100	102	88	3.0	~~50~~ 50	
4	35	1240	024.99	.21	.82	.82	100	102	88	3.0	~~50~~ 50	
4	40	1245	27.69	.21	.82	.82	100	103	88	3.0	50	
5	45	1250	30.20	.21	.82	.82	100	103	89	3.0	50	
5	50	1255	32.78	.21	.82	.82	100	103	90	3.0	50	
6	55	0100	35.35	.20	.79	.79	100	103	90	2.5	50	
6	60	0105	37.97	.20	.79	.79	100	103	90	3.0	50	
7	65	0110	40.35	.19	.75	.75	100	103	90	2.5	50	
7	70	0115	43.32	.19	.75	.75	97	103	90	2.5	50	
8	75	0120	45.14	.16	.64	.64	97	102	89	2.5	50	
8	80	0125	47.90	.17	.68	.68	97	102	89	2.5	50	
9	85	0130	49.63	.14	.56	.56	97	101	88	2.0	50	
9	90	0135	51.83	.15	.60	.60	99	101	88	2.0	50	
10	95	0140	53.96	.14	.56	.56	99	101	88	2.0	50	
10	100	0145	56.08	.14	.56	.56	99	100	88	2.0	50	
STAR	100	0150	056.30	—	—	—	—	—	—	—	—	—
B 1	105	0200	58.76	.20	.79	.79	102	88	88	3.5	50	
1	110	215	61.68	.20	.79	.79	102	104	86	3.5	50	

SIDE

NOTE: ADD 100 mls - ISOP.

COMMENTS:

ES-041

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
B 2	115	220	63.70	.20	.79	.79	102	97	86	3.0	—	50
2	120	225	66.28	.21	.82	.82	102	99	86	3.0	—	50
3	125	230	68.83	.20	.79	.79	102	100	87	3.0	—	50
3	130	235	71.87	.20	.79	.79	102	100	87	3.0	—	53
4	135	240	74.15	.16	.64	.64	102	100	87	2.5	—	56
4	140	245	76.48	.17	.68	.68	102	99	87	2.5	—	57
5	145	250	78.59	.14	.56	.56	102	98	86	2.0	—	58
5	150	255	80.61	.14	.56	.56	102	98	86	2.0	—	58
6	155	300	83.02	.16	.64	.64	100	97	86	2.5	—	58
6	160	305	85.27	.15	.60	.60	100	97	86	2.5	—	59
7	165	310	87.39	.15	.60	.60	100	96	86	2.5	—	59
7	170	315	89.57	.15	.60	.60	100	96	86	2.5	—	60
8	175	320	91.76	.15	.60	.60	100	96	85	2.5	—	60
8	180	325	93.94	.15	.60	.60	100	96	85	2.5	—	60
9	185	330	96.21	.16	.64	.64	100	96	85	2.5	—	60
9	190	335	98.48	.16	.64	.64	100	96	85	2.5	—	60
10	195	340	100.74	.16	.64	.64	100	96	85	2.5	—	60
10	275	345	141.445	.16	.64	.64	100	96	85	2.5	—	60
~~START~~	~~200~~	~~350~~	~~[illegible]~~									
B 2	~~200~~ 205	355		.19	.75	.75	100	89	84	3.0	—	
2	210	400		.19	.75	.75						
3	215	405		.22	.86	.86						
3	220	410		.22	.86	.86						
4	225	415		.22	.86	.86						
4	230	420			.86	.86						
5	235	425			.86	.86						
5	240	430			.86	.86						
6	245	435			.86	.86						
6	250	440			.86	.86						
7	255	445			.86	.86						
7	260	450										
8	265	455										
8	270	500										
9	275	505	141.445									
9	~~280~~	~~510~~										
10	285	515										
10	290	520										

To pt. 6

ES-042

FIELD DATA

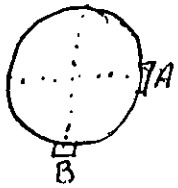
QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESR
DATE 4/19/77
SAMPLING LOCATION Inlet
SAMPLE TYPE EPA 8
RUN NUMBER 3
OPERATOR WAHLIG/Creaturo
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.18
FILTER NUMBER (s) FLS 40078

PROBE LENGTH AND TYPE
NOZZLE I.D. 1/4
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER
METER BOX NUMBER S-1904
METER $\Delta H_@$ 1.92
C FACTOR .99
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp .46

-46 ML. ISO.
+50 ML. H_2O_2

TARE WT. .49457



SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

C_p = .79 Green in Flow

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
Star	0	2119	164.589									
A 1	5	2123	166.01	.21	.82	.82	120	94	91	1.0	72	
2	10	2128	167.95	.22	.86	.86	120	98	91	1.0	72	
3	15	2133	169.28	.22	.86	.86	120	100	92	1.0	72	
4	20	2138	170.46	.21	.82	.82	110	100	93	1.0	73	
5	25	2143	172.08	.20	.79	.79	110	101	93	2.0	74	
6	30	2148	174.62	.19	.75	.75	110	102	93	2.0	75	
7	35	2153	177.18	.20	.79	.79	120	106	94	2.0	76	
8	40	2158	179.69	.19	.75	.75	115	109	95	2.0	76	
9	45	2203	182.33	.20	.79	.79	113	110	95	2.0	58	
10	50	2208	184.77	.19	.75	.75	113	111	96	2.0	58	
Star	50	2223	184.77	.23	.90	.90						
B 1	55	2228	187.00				113	104	96	2.0	58	
2	60	2233	189.78	.24	.95	.95	113	104	96	2.0	58	
3	65	2238	192.54	.23	.90	.90	118	109	96	2.0	58	
4	70	2243	195.23	.21	.82	.82	118	111	96	2.0	58	
5	75	2248	197.56	.16	.64	.64	119	110	97	1.0	59	
6	80	2253	199.64	.14	.56	.56	118	109	97	1.0	60	
7	85	2258	201.94	.15	.60	.60	110	108	97	2.0	60	
8	90	2303	204.06	.16	.64	.64	110	108	96	2.0	58	
9	95	2308	206.30	.15	.60	.60	110	107	96	1.0	58	
10	100	2313	208.61	.16	.64	.64	110	108	96	1.5	58	

COMMENT

02977 S.G.

02978 Front 1/2 Isoprop.

02979 H_2O_2

ES-041

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESB
DATE 4/19/77
SAMPLING LOCATION INLET
SAMPLE TYPE EPA 8
RUN NUMBER 4
OPERATOR CREATURO/WAHLIG
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.18
FILTER NUMBER (s) FL5-4023
TARE – 049092

PROBE LENGTH AND TYPE 3' EPA GLASS
NOZZLE I.D. 1/4 .31 .252
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER
METER BOX NUMBER 5-1904
METER $\Delta H_@$ 1.92
C FACTOR .99
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp .96

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

CP. = .8377 GREEN IN FLOW

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
START	0	1000	217.02									
B 1	5	0905	219.29	.18	.72	.72	120	87	80	2.0	64	
2	10	0910	221.23	.18	.72	.72	120	89	80	2.0	64	
3	15	0915	224.16	.18	.72	.72	115	96	82	2.0	62	
4	20	0920	226.71	.21	.82	.82	115	100	84	2.5	62	
5	25	0925	229.32	.21	.82	.82	115	102	85	2.5	62	
6	30	0930	231.95	.22	.86	.86	115	104	86	2.5	62	
7	35	0935	234.67	.21	.82	.82	115	107	88	2.5	62	
8	40	0940	236.81	.15	.60	.60	115	108	89	1.5	62	
9	45	0945	238.96	.14	.56	.56	115	108	90	1.5	62	
10	50	0950	240.60	.13	.52	.52	115	108	90	1.5	62	
~~START~~	~~50~~	~~0950~~	~~240.60~~									
A	55	0225	243.17	.18	.72	.72	120	84	86	2.0	58	
1	60	0230	245.71	.20	.79	.79	120	91	86	2.0	58	
2	65	0235	248.25	.20	.79	.79	120	92	86	2.0	58	
3	70	0240	250.86	.21	.82	.82	120	100	88	2.0	48	
4	75	0245	253.39	.20	.79	.79	120	102	89	2.5	48	
5	80	0250	255.94	.20	.79	.79	120	104	90	2.5	48	
6	85	0255	258.44	.19	.75	.75	120	104	91	2.0	48	
7	90	0300	260.93	.19	.75	.75	120	104	91	2.0	48	
8	95	0305	263.26	.16	.64	.64	120	106	92	2.0	48	
9	100	0310	265.37	.13	.52	.52	120	106	92	2.5	48	
10	105	0315	267.79	.16	.64	.64	120	108	93	2.0	48	

COMMENTS:

02983 S.C.

02982 FRONT 1/2 ISOPROP. -64 ML

02981 H_2O_2 +50 ML

ES-041

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESB
DATE 04/9/77
SAMPLING LOCATION INLET
SAMPLE TYPE EPA-8
RUN NUMBER 5
OPERATOR S CREATURO
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.18
FILTER NUMBER (s) EL-4507
TARE - 0.4996 g

RAN OUT OF TIME
CUT TEST SHORT
UNIT GOES OFF
AT 0505

PROBE LENGTH AND TYPE 3' EPA GLASS
NOZZLE I.D. 1/4 ~~.256~~ .252
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER
METER BOX NUMBER 5-1901
METER ΔH@ 1.92
C FACTOR .99
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp .46

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 3 MINUTES

Cp = .77 GREEN INFLOW

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
START	0	0420	275.86									
A1	3	0423	277.42	.21	.82	.82	120	80	82	2.0	56	
2	6	0426	278.98	.21	.82	.82	120	82	83	2.0	56	
3	9	0429	280.59	.23	.90	.90	120	89	83	2.5	56	
4	12	0432	282.17	.22	.86	.86	120	92	84	2.0	56	
5	15	0435	283.74	.22	.86	.86	120	95	84	2.0	56	
6	18	0438	285.28	.21	.82	.82	120	98	84	2.0	56	
7	21	0441	286.77	.19	.75	.75	120	99	85	2.0	56	
8	24	0444	288.19	.17	.68	.68	120	99	85	2.0	56	
9	27	0447	289.69	.19	.75	.75	120	100	86	2.0	56	
10	30	0450	291.16	.19	.75	.75	120	100	86	2.0	56	
~~START~~	~~32~~	~~0453~~	~~291.16~~									
B1	33	0455	292.73	.20	.79	.79	120	98	87	2.0	56	
2	36	0458	294.34	.22	.86	.86	120	100	86	2.0	56	
3	39	0501	295.56	.22	.86	.86	120	101	86	2.0	56	
4	41	0504	297.55	.22	.86	.86	120	103	88	2.0	56	
~~5~~	~~44~~	~~0507~~	End									
6	47	0510										
7	50	0513										
8	53	0516										
9	56	0519										
10	59	0522										

COMMENTS:

02988 5.6

02987 H_2O_2 436 ML

02986 FRONT 1/2 ISOPROP. -68 ML

ES-041

SOX 8 4 8479-34

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESB
DATE 4/20/77
SAMPLING LOCATION INLET
SAMPLE TYPE SOX - METHOD 8
RUN NUMBER 2 6 SIX
OPERATOR LCM SUNDANCE
AMBIENT TEMPERATURE 80
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.62
FILTER NUMBER (s) FLS-4030
TARE -.49671

400 ml INITIAL
IMP#1 - 128 ml
IMP#2,3 - 242 ml

PROBE LENGTH AND TYPE 4' EPA GLASS
NOZZLE I.D. .252
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER —
METER BOX NUMBER 5-1904
METER $\Delta H_@$ 1.92
C FACTOR .99
PROBE HEATER SETTING —
HEATER BOX SETTING —
REFERENCE Δp .46

SCHEMATIC OF TRAVERSE POINT LAYOUT → 370 (-30 collect)
PITOT - .77

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
START	0	1311	316.127									
A1	5	1316	318.64	.20	.79	.79	105	77	77	2.5	—	<70
2	10	1321	321.18	.20	.79	.79	105	89	77	2.5	—	<70
3	15	1326	323.76	.22	.86	.86	105	96	79	2.5	—	<70
4	20	1331	326.32	.23	.90	.90	105	100	81	2.5	—	<70
5	25	1336	329.00	.22	.86	.86	105	105	83	2.5	—	<70
6	30	1341	331.62	.22	.86	.86	110	109	86	3	—	<70
7	35	1346	334.20	.20	.79	.79	110	111	87	2.5	—	<70
8	40	1351	336.80	.20	.79	.79	110	113	89	2.5	—	<70
9	45	1356	339.18	.18	.72	.72	110	113	91	2.5	—	<70
10	50	1401	341.548	.16	.64	.64	110	113	93	2.5	—	<70
START	50	1416	341.548	—	—	—	—	—	—	—	—	—
B1	55	1421	344.04	.22	.86	.86	110	93	92	2.5	—	<70
2	60	1426	346.50	.21	.82	.82	110	96	92	3	—	<70
3	65	1431	349.26	.21	.82	.82	115	102	92	3	—	<70
4	70	1436	351.80	.23	.90	.90	115	105	92	3	—	<70
5	75	1441	354.62	.23	.90	.90	115	108	92	3	—	<70
6	80	1446	357.40	.23	.90	.90	115	110	93	3.5	—	<70
7	85	1451	359.90	.21	.82	.82	115	112	93	3	—	<70
8	90	1456	362.50	.21	.82	.82	115	112	96	3	—	<70
9	95	1501	365.10	.20	.79	.79	115	112	96	3	—	<70
10	100	1506	367.640	.19	.75	.75	110	113	96	3	—	<70
	PURGE FOR 15 MIN AT END											

→ PUT 100 ml ISOP. IN 1ST IMP.

COMMENTS:

TIME
START - 1510 367.640 @ ≈ .82 cfm
? - 1525 375.882

02951 : ISOP., FILTER & WASH
02952 - H_2O_2 & WASH
02953 - S.G.

ES-041

SOX - METHOD 8

4-8479-34

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESB
DATE 4/20/77
SAMPLING LOCATION INLET
SAMPLE TYPE SOX - METHOD 8
RUN NUMBER 7 (SEVEN)
OPERATOR LCM SUNDANCE
AMBIENT TEMPERATURE 80
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.58
FILTER NUMBER (s) FLS-4024

400 ml INITIAL
IMP#1 -140 ml
IMP#2,3 -254 ml
394
TARE -.48568

PROBE LENGTH AND TYPE 4' EPA GLASS
NOZZLE I.D. .308
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER —
METER BOX NUMBER 1904
METER $\Delta H_@$ 1.92
C FACTOR .99
PROBE HEATER SETTING —
HEATER BOX SETTING —
REFERENCE Δp .212
COST 6 ml.
+5.6

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

PITOT - .77

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
START	0	1615	376.052									
SIDE A1	5	1620	379.38	.17	1.50	1.50	110	87	89	4.5	—	<70
2	10	1625	382.92	.17	1.50	1.50	110	97	90	4.5	—	<70
3	15	1630	386.32	.18	1.58	1.58	110	105	91	5	—	<70
4	20	1635	389.80	.18	1.58	1.58	110	109	92	5	—	<70
5	25	1640	393.40	.19	1.68	1.68	110	113	93	5	—	<70
6	30	1645	397.08	.21	1.83	1.83	110	113	95	5.5	—	<70
7	35	1650	400.60	.21	1.83	1.83	110	114	95	5.5	—	<70
8	40	1655	404.56	.21	1.83	1.83	115	115	97	5.5	—	<70
9	45	1700	407.90	.18	1.58	1.58	110	115	97	5	—	<70
10	50	1705	411.169	.16	1.41	1.41	110	115	97	4	—	<70
START	50	1714	411.169	—	—	—	—	—	—	—	—	—
BOTTOM B1	55	1719	415.10	.25	2.19	2.19	110	101	97	6.5	—	<70
2	60	1724	419.30	.25	2.19	2.19	115	106	97	6.5	—	<70
3	65	1729	423.45	.26	2.29	2.29	115	113	97	6.0	—	<70
4	70	1734	426.84	.22	1.90	1.90	115	117	98	5.0	—	<70
5	75	1739	430.38	.22	1.90	1.90	115	117	98	5.5	—	<70
6	80	1744	434.28	.22	1.90	1.90	115	117	98	5.5	—	<70
7	85	1749	437.80	.18	1.58	1.58	115	117	99	4.5	—	<70
8	90	1754	441.20	.17	1.50	1.50	115	117	99	4.5	—	<70
9	95	1759	444.60	.17	1.50	1.50	115	117	99	4.5	—	<70
10	100	1804	447.936	.17	1.50	1.50	115	117	99	4.5	—	<70
			PURGE FOR 15 min. at 1.75 ΔH									

ADDED 100 ml ISOP.

COMMENTS:

	TIME	METER
START —	1805	447.936
STOP —	1820	458.654

02954 — ISOP., FILTER, & WASH
02955 — H_2O_2 & WASH
02956 — S.G.

ES-041

SOX - METHOD 8 4-8799-34

FIELD DATA

QUALITY CONTROLLED RESEARCH CORPORATION

PLANT ESB
DATE 4/20/77
SAMPLING LOCATION INLET
SAMPLE TYPE SOX - METHOD 8
RUN NUMBER 8 (EIGHT)
OPERATOR "THE KID"
AMBIENT TEMPERATURE 80
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.57
FILTER NUMBER (s) FLS-4028
TARE -.49653

400 ml INITIAL
IMP#1 -134 ml
IMP#2,3 -254 ml
388
-12 ml

PROBE LENGTH AND TYPE 4' EPA GLASS
NOZZLE I.D. .308
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER —
METER BOX NUMBER S-1904
METER $\Delta H_@$ 1.92
C FACTOR .99
PROBE HEATER SETTING —
HEATER BOX SETTING —
REFERENCE Δp .212

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

PITOT - .77

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
STAR	0	1839	459.063									
A 1	5	1844	462.54	.18	1.58	1.58	110	93	95	4	—	<70
2	10	1849	466.10	.18	1.58	1.58	110	99	95	4	—	<70
3	15	1854	469.64	.18	1.58	1.58	110	107	95	4	—	<70
4	20	1859	473.10	.19	1.68	1.68	110	111	95	4.5	—	<70
5	25	1904	476.68	.19	1.68	1.68	110	111	95	4.5	—	<70
6	30	1909	480.36	.19	1.68	1.68	110	111	95	4.5	—	<70
7	35	1914	483.70	.18	1.58	1.58	110	113	96	4.5	—	<70
8	40	1919	487.13	.16	1.41	1.41	110	113	96	3.5	—	<70
9	45	1924	490.34	.19	1.68	1.68	110	113	96	4.0	—	<70
10	50	1929	493.874	.19	1.68	1.68	110	114	97	4.0	—	<70
STAR	50	1933	493.874									
B 1	55	1938	497.69	.20	1.78	1.78	115	106	97	4.0	—	<70
2	60	1943	500.88	.21	1.83	1.83	115	109	97	4.5	—	<70
3	65	1948	504.30	.21	1.83	1.83	115	111	97	4.5	—	<70
4	70	1953	507.96	.21	1.83	1.83	115	113	97	4.5	—	<70
5	75	1958	511.49	.20	1.78	1.78	115	114	97	4.5	—	<70
6	80	2003	515.23	.20	1.78	1.78	115	115	97	4.5	—	<70
7	85	2008	518.89	.21	1.83	1.83	115	115	97	4.5	—	<70
8	90	2013	522.35	.17	1.50	1.50	115	116	98	4.0	—	<70
9	95	2018	525.81	.18	1.58	1.58	115	115	98	4.0	—	<70
10	100	2023	529.129	.17	1.50	1.50	115	115	98	4.0	—	<70
			PURGE FOR 15 min AT 1.85 ΔH									

SIDE

BOTTOM

added 100 ml isopro

COMMENTS:

	Time	meter
START	2024	529.129
STOP	2039	540.183

02958 - isop, filter & wash
02959 - H_2O_2 & wash
02960 - S.6.

ES-041

SOX METHOD 8

4-8179-24

FIELD DATA

PLANT ESB
DATE 4/20/77
SAMPLING LOCATION INLET
SAMPLE TYPE SOX METHOD 8
RUN NUMBER 9 (NINE)
OPERATOR SUNDANCE & "BAD WILLIE"
AMBIENT TEMPERATURE 80
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.72
FILTER NUMBER (s) FLS-4021

300 ml INITIAL

PROBE LENGTH AND TYPE 4' EPA GLASS
NOZZLE I.D. .308
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER —
METER BOX NUMBER 190Y
METER $\Delta H_@$ 1.92
C FACTOR .99
PROBE HEATER SETTING —
HEATER BOX SETTING
REFERENCE Δp .212

TARE -.49281

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

PITOT -.77

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
STAR	0	2100	540.400									
SIDE A 6	100			.19	1.68	1.68	110	97	97	5	—	<70
		2209	588.71	.19	1.68		110	118	100			
		2213	DOWN									
	add 100 ml isopropanol											
	100	2214	619.00	.19	1.68		110	110	98			

02961 — 150P & FILTER & WASH
02962 — H_2O_2 & WASH
02963 — S.G.

COMMENTS:

ES-041

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESS
DATE [illegible]
SAMPLING LOCATION INLET
SAMPLE TYPE EPA 8
RUN NUMBER 10
OPERATOR [illegible]
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.77
FILTER NUMBER (s)

PROBE LENGTH AND TYPE
NOZZLE I.D. .308
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$ 1.77
C FACTOR —
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp

Cp = .77

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
A6	2310	31.13									
		[illegible]	.20	1.78		[illegible]	108	98			
		56.86	.20	1.78		113	110	98			
		83.[illegible]	.2	[illegible]		113	110	95			
			.2								
						110	120	100			
		112.84									
	End 01:57										

COMMENTS:

ES-041

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ZB
DATE 4/21/77
SAMPLING LOCATION INLET
SAMPLE TYPE COA-8
RUN NUMBER 11
OPERATOR BUT
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.65
FILTER NUMBER (s)

PROBE LENGTH AND TYPE
NOZZLE I.D. .1308
ASSUMED MOISTURE, % 3
SAMPLE BOX NUMBER
METER BOX NUMBER .5180 4
METER $\Delta H_@$ 1.92
C FACTOR —
PROBE HEATER SETTING
HEATER BOX SETTING —
REFERENCE Δp

Cp = .77

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
A6	0150	120.965									
	[illegible]		.18	1.60		110	85	80			
	[illegible]	137.[illegible]									
	[illegible]	119.40	[illegible]	1.6		110	115	104			
	013	[illegible]	0.17	1.58	1.58	110	116	98			
	0145	816.55	[illegible]	1.58	1.58	110	116	96			
		823.40				111	111	[illegible]			

COMMENTS:

ES-041

FIELD DATA

PLANT ESB - ALLENTOWN
DATE 4-21-77
SAMPLING LOCATION INLET
SAMPLE TYPE EPA-8
RUN NUMBER 12
OPERATOR KEITH
AMBIENT TEMPERATURE 70°
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) +.6
FILTER NUMBER (s) FLS 4207

SO_2 - 02996
SO_3 - 02997
SO_4 - 02998

PROBE LENGTH AND TYPE 3'
NOZZLE I.D. .308
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER S-1404
METER BOX NUMBER
METER $\Delta H_@$ 1.92
C FACTOR
PROBE HEATER SETTING —
HEATER BOX SETTING
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
A B	0	0130	836.955	.20								
6	5	0135		.20	1.78	1.78	125	86	84	2		70
6	10	0140										
6	15	0145										
6	20	0150										
6	25	0155										
6	30	0200	57.84									
6	35	0205		.19	1.68	1.68	125	116	95	2		60
6	40	0210										
6	45	0215										
6	50	0220										
6	55	0225										
6	60	0230										
6	65	0235										
6	70	0240										
6	75	0245	90.47									
6	80	0250		.19	1.68	1.68	130	118	100	2		60
6	85	0255										
6	90	0300	101.33									
6	95	0305		.19	1.68	1.68						
6	100	0310										

COMMENTS:

ES-041

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	[illegible]										
	[illegible]										
	[illegible]										
	[illegible]										
		180.822									

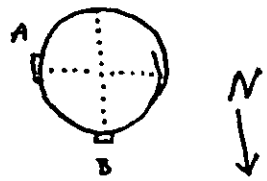
ES-042

1- SO2 - 02831
2- SO2 02832
3- SO2 - 02833

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESD STOWN PA.
DATE 4-18-77
SAMPLING LOCATION OUTLET
SAMPLE TYPE EPA METHOD 8
RUN NUMBER 1
OPERATOR KEITH
AMBIENT TEMPERATURE 70°F
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) .06
FILTER NUMBER (s) FL5-3976



SCHEMATIC OF TRAVERSE POINT LAYOUT

PROBE LENGTH AND TYPE 4'
NOZZLE I.D. 3/16 - 308 20.25
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER
METER BOX NUMBER 5-2165
METER $\Delta H_@$ 1.95
C FACTOR
PROBE HEATER SETTING 80
HEATER BOX SETTING
REFERENCE Δp .17

Cp - .87

~~.43~~ 3.58 15.19
1.36 5.06 16.67
2.39 7.19 17.86
13.06 18.89
~~18.82~~

READ AND RECORD ALL DATA EVERY 5 MINUTES

VELOCITY TRAVERSE	TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	STAR	0	0730	95.515									
	A 1	5	0735	98.88	.3	2.6	2.6	99	100	86	16	12.95	70
	1	10	0740	103.51	.34	3.1	3.1	98	110	88	16	13.79	70
	2	15	0745	106.83	.25	2.3	2.2	99	115	90	12	11.82	70
0800	2	20	[illegible]	111.67	.27	2.9	2.9	99	100	89	14	12.29	70
0805	3	25	07[illegible]	115.97	.23	2.5	2.5	99	110	90	13	11.34	70
0810	3	30	[illegible]05	121.9	.23	2.5	2.5	99	115	90	13	11.34	70
0815	4	35	08[illegible]10	125.27	.20	2.2	2.2	99	117	92	12	10.57	70
0820	4	40	08[illegible]15	129.32	.20	2.2	2.2	99	116	92	11	10.57	70
0825	5	45	08[illegible]20	133.36	.22	2.4	2.4	99	116	92	11	11.09	70
0830	5	50	08[illegible]25	136.69	.2	2.2	2.2	99	116	92	11	10.57	70
0835	6	55	08[illegible]30	141.63	.25	2.3	2.3	99	115	92	11	11.82	70
0840	6	60	08[illegible]35	145.72	.25	2.3	2.3	99	118	92	11	11.82	70
0845	7	65	08[illegible]40	149.89	.25	2.3	2.3	99	117	92	11	11.82	70
0850	7	70	0843	153.999	.25	2.3	2.3	99	114	92	11	11.82	70
0855	8	75	0850	158.12	.25	2.3	2.3	99	112	92	11	11.82	70
0900	8	80	0855	162.23	.25	2.3	2.3	99	113	90	11	11.82	70
0905	9	85	0900	166.37	.25	2.3	2.3	99	113	90	11	11.82	70
0910	9	90	0905	170.58	.25	2.3	2.3	99	113	90	11	11.82	70
0915	10	95	0910	174.96	.25	2.7	2.7	99	114	90	13	11.82	60
0920	10	100	1915	179.38	.25	2.7	2.7	90	115	90	13	12.75	60

COMMENTS:

ES-041

Page B Test 1 cont. Blue pitot tube faced into flow.

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F $\sqrt{\Delta P \times TS}$	IMPINGER TEMPERATURE, °F
STAR	100	0940	179.857									
B 1	105	945	183.40	.29	3.2	3.2	90	86	84	15	12.63	55
1	110	950	188.30	.29	3.2	3.2	95	110	86	15	12.69	55
2	115	955	195.50	.24	2.6	2.6	95	112	86	12	11.54	55
2	120	10.00	197.13	.24	2.6	2.6	95	113	86	12	11.54	55
3	125	10:05	201.9	.195	2.2	2.2	95	112	86	10	10.40	55
3	130	10:10	205.6	.23	2.5	2.5	95	110	86	10.5	11.30	55
4	135	10:15	209.2	.18	1.85	1.85	95	108	86	8	9.99	55
4	140	10:20	213.1	.19	2.05	2.05	95	104	86	9	10.77	55
5	145	10:25	217.3	.18	1.85	1.85	95	102	85	8	9.99	55
5	150	10:30	220.5	.18	1.85	1.85	95	102	85	8	9.99	55
6	155	10:35	224.8	.26	2.70	2.70	95	104	84	12.5	12.01	50
6	160	10:40	229.2	.28	3.1	3.1	95	106	84	15.0	12.47	50
7	165	10:45	233.5	.28	3.1	3.1	95	108	84	15.0	12.47	50
7	170	10:50	238.5	.30	3.3	3.3	95	109	85	15.5	12.90	50
8	175	10:55	243.3	.30	3.3	3.3	95	109	85	15.5	12.90	50
8	180	11:00	248.1	.31	3.35	3.35	95	110	85	15.5	13.12	50
9	185	11:05	253.4	.32	3.45	3.45	95	109	85	16.0	13.33	50
9	190	11:10	257.7	.32	3.45	3.45	95	108	85	17.0	13.33	50
10	195	11:15	263.3	.29	3.2	3.2	80	108	85	17.0	12.69	50
10	200	11:20	268.065	.28	3.1	3.1	70	110	86	15.0	12.47	50
			172.55		2.3		96	99.				
											11.84	
			$V_{m\,STD}$ = 164.39	M_d =	.96		p_s =	29.91				
				M_{wd} =	28.84							
				M_w =	26.41							
			V_s = 30.21'									
			% ~~I = 92 @~~	0.0 %M	95							

Isopropanol 80%
initial : 100 ml
final : 10 ml

Hydrogen Peroxide 3%
initial : 200
final : 341

ES-042

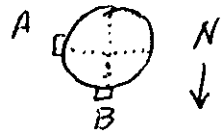
QS = 3708

T8477-32

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESB ALLENTOWN PA
DATE 11/19/77
SAMPLING LOCATION OUTLET
SAMPLE TYPE EPA Method 8
RUN NUMBER 2
OPERATOR WAHLIG / Creaturo
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.17
FILTER NUMBER (s) ~~FL 3976~~ FL 53909



PROBE LENGTH AND TYPE 4'
NOZZLE I.D. .308
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER
METER BOX NUMBER S-2165
METER $\Delta H_@$ 1.95
C FACTOR
PROBE HEATER SETTING 80
HEATER BOX SETTING
REFERENCE Δp -.175

170 ML H_2O_2
91 ML
261

Cp = .78

SCHEMATIC OF TRAVERSE POINT LAYOUT

~~TAIR~~ ~~[illegible]~~ 9:4930

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
Star	0	01:00	78.091									
A 1	5	01:05	82.31	.24	2.55	2.55	97	69	70	8	52	50
1	10	01:10	86.75	.24	2.55	2.55	97	91	78		50	50
2	15	01:15	90.79	.22	2.30	2.30	98	92	70		50	
2	20	01:20	94.88	.225	2.35	2.35	95	92	70		50	
3	25	01:25	98.84	.20	2.10	2.10	95	91	71		50	
3	30	0130	102.84	.21	2.20	2.20	95	91	72		50	
4	35	0135	106.63	.18	1.90	1.90	95	98	72		48	
4	40	0140	110.12	.175	1.85	1.85	95	98	72		49	
5	45	0145	113.74	.18	1.90	1.90	95	98	72		49	
5	50	0150	117.32	.18	1.90	1.90	95	98	72		49	
6	55	0155	121.35	.21	2.20	2.20	85	92	72		50	
6	60	0200	125.41	.21	2.20	2.20	90	92	72		50	
7	65	0205	129.45	.22	2.30	2.30	90	94	72		50	
7	70	0210	133.54	.22	2.30	2.30	90	94	72		50	
8	75	0215	137.88	.24	2.55	2.55	90	97	72	7	50	
8	80	0220	142.20	.24	2.55	2.55	94	98	72	7.5	50	
9	85	0225	146.41	.25	2.70	2.70	94	99	73	8	50	
9	90	0230	150.83	.255	2.75	2.75	95	99	73	8.5	58	
10	95	0235	155.38	.24	2.55	2.55	93	100	74	8.5	58	
10	100	0240	159.791	.245	2.60	2.60	93	100	74	9	58	
S ~~FAR~~												
~~13~~												
~~Cp~~												

COMMENTS:

ES-041

91

3

50

92 4-847732

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
Start	100	0247	159.799									
B11	105	0252	163.39	.27	2.90	2.90	99	91	72	9	50	
12	110	0257	167.63	.22	2.30	2.30	99	96	73	7	52	
12	115	0302	171.45	.19	2.05	2.05	99	97	73	7	52	
2	120	0307	75.48	.20	2.10	2.10	99	95	70	6.5	54	
3	125	0312	79.23	.18	1.90	1.90	99	94	74	6.0	54	
3	130	0317	82.95	.18	1.90	1.90	99	92	74	6.0	54	
4	135	0322	86.81	.20	2.10	2.10	95	92	73	6.5	55	
4	140	0327	90.75	.20	2.10	2.10	95	92	73	6.5	55	
5	145	0332	95.15	.25	2.70	2.70	95	94	72	8.0	56	
5	150	0337	99.55	.25	2.70	2.70	95	94	72	8.0	56	
6	155	0342	104.18	.28	3.00	3.00	95	94	72	9.0	58	
6	160	0347	108.51	.25	2.70	2.70	95	94	72	8.5	58	
7	165	0352	113.06	.27	2.90	2.90	95	96	73	9.0	58	
7	170	0357	117.62	.27	2.90	2.90	95	96	73	9.0	58	
8	175	0402	122.22	.28	2.90	2.90	95	96	73	9.0	50	
8	180	0407	127.05	.30	3.20	3.20	90	96	73	9.5	50	
9	185	0412	131.85	.30	3.20	3.20	85	96	73	10	50	
9	190	0417	136.67	.31	3.30	3.30	85	98	73	10	50	
10	195	0422	141.50	.32	3.40	3.40	85	99	73	10	50	
* 10	200	0427	146.484	.30	3.20	3.20	85	100	73	10	50	

Hydrogen Peroxide 3%
INITIAL: 200 ml.
FINAL: 61 ml/s

91
70

Isopropanol 80%
Initial: 100 ml. + 100 ml/s.
FINAL: - 70 ml/s

* ADDED 100 ml/s. Isopropanol

02836 S.G
02837 SO_2 WASH
02838 SO_3

51

ES-042

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESB
DATE 4/18/77
SAMPLING LOCATION OUTLET
SAMPLE TYPE EPA8
RUN NUMBER 5
OPERATOR WAHLIG/Creature
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s)
FILTER NUMBER (s) FCS-3409

P93

PROBE LENGTH AND TYPE 4'
NOZZLE I.D. .308
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER
METER BOX NUMBER S-2165
METER $\Delta H_@$ 1.95
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp .175

4-8479-32

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
Start	0	0435	446.956									
A1	5	0440	50.54	.22	2.30	2.30	85	83	71	6	48	
1	10	0445	54.64	.22	2.30	2.30	85	95	72	7	48	
2	15	0450	58.55	.20	2.10	2.10	85	98	73	7.5	48	
2	20	0455	62.46	.20	2.10	2.10	85	97	72	6.0	48	
3	25	0500	66.22	.18	1.90	1.90	87	97	73	6.0	48	
3	30	0505	70.47	.18	1.90	1.90	85	96	73	6.0	48	
4	35	0510		~~.17~~								
4	40	0515										
5	45	0520										
5	50	0525		.23								
6	55	0530										
6	60	0535										
7	65	0540										
7	70	0545										
8	75	0550										
8	80	0555										
9	85	0600										
9	90	0605										
10	95	0610										
10	100	0615										

COMMENTS:

ES-041

100 mLs (iso)
2200
115 mLs (iso.)
2300
~~200 mLs~~
Collected 50 M/s
in Phinder 1+2

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESD
DATE 041877
SAMPLING LOCATION OUTLET
SAMPLE TYPE EPA 8
RUN NUMBER 3
OPERATOR ZISKIN
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.15
FILTER NUMBER (s) FC5-4068
TMR-0.49311

PROBE LENGTH AND TYPE
NOZZLE I.D. .308
ASSUMED MOISTURE, % 3%
SAMPLE BOX NUMBER ~~S-2105~~
METER BOX NUMBER S-2105
METER $\Delta H_@$ 1.95
C FACTOR
PROBE HEATER SETTING —
HEATER BOX SETTING —
REFERENCE Δp .20
Pitot Factor = .78

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
STAR	0	2105	506.72									
A-1	5	2110	510.42	.18	1.9	1.9	105	78	74	5.0	—	58
2	10	2115	514.04	.17	1.8	1.8	105	96	76	5.0	—	50
3	15	2120	517.66	.17	1.8	1.8	105	100	78	5.0	—	50
4	20	2125	521.83	.23	2.4	2.4	105	102	79	7.5	—	50
5	25	2130	526.24	.26	2.7	2.7	105	102	80	7.5	—	50
6	30	2135	530.64	.27	2.85	2.85	105	102	80	7.5	—	50
7	35	2140	535.12	.26	2.7	2.7	105	103	81	7.5	—	50
8	40	2145	539.62	.28	2.95	2.95	105	103	81	7.5	—	50
9	45	2150	544.17	.30	3.15	3.15	105	102	81	8.0	—	50
10	50	2155	548.67	.30	3.15	3.15	105	103	80	8.0	—	50
STAR	50	2205	548.67	—	—	—	—	—	—	—	—	—
B-1	55	~~2210~~	553.99	.21	2.2	2.2	105	83	79	6.5		50
2	60	2215	557.06	.19	2.0	2.0	105	100	80	6.5		50
3	65	2220	561.08	.18	1.65	1.65	105	101	80	6.5		50
4	70	2225	565.10	.17	1.8	1.8	105	101	80	6.5		50
5	75	2230	569.15	.17	1.8	1.8	105	102	80	6.5		50
6	80	2235	573.18	.17	1.8	1.8	105	101	80	6.5		50
7	85	2240	577.20	.17	1.8	1.8	105	102	80	6.5		50
8	90	2245	581.27	.17	1.8	1.8	105	103	80	6.5		50
9	95	2250	585.32	.17	1.8	1.8	105	104	81	6.5		50
10	100	2255	589.39	.18	1.9	1.9	105	103	81	6.5		50

COMMENTS:

ES-041

STOPPED TIME AT 0235 — 70 mls ADDED AT 0235
STARTED TIME AT [redacted] 3 [redacted]

FIELD DATA

2ND + 3RD impin collect 35 mls (MINUS 96 mls of ISOP)

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT: ESB
DATE: 042077
SAMPLING LOCATION: OUTLET
SAMPLE TYPE: EPA 8
RUN NUMBER: 4
OPERATOR: ZISKIN
AMBIENT TEMPERATURE: 40
BAROMETRIC PRESSURE:
STATIC PRESSURE, (P_s): -.10
FILTER NUMBER (s): FC5-4055
TAM - 0.48714

PROBE LENGTH AND TYPE:
NOZZLE I.D.: .308
ASSUMED MOISTURE, %: 3.0
SAMPLE BOX NUMBER: —
METER BOX NUMBER: 5-2165
METER $\Delta H_@$: 1.95
C FACTOR:
PROBE HEATER SETTING:
HEATER BOX SETTING:
REFERENCE Δp: .20
Pitot tube = .78

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
START	0	0055	603.23									
0-1	5	0100	606.89	.24	2.20	2.20	98	79	70	6.0	—	50
2	10	0105	610.84	.22	2.05	2.05	98	88	72	6.0	—	50
3	15	0110	614.86	.20	1.85	1.85	98	101	76	6.0	—	50
4	20	0115	618.84	.18	1.65	1.65	98	101	78	6.0	—	50
5	25	0120	622.82	.18	1.65	1.65	98	101	78	6.0	—	50
6	30	0125	626.81	.22	2.05	2.05	98	101	78	6.0	—	50
7	35	0130	630.82	.26	2.40	2.40	98	102	78	6.0	—	50
8	40	0135	634.81	.26	2.40	2.40	98	102	78	6.0	—	50
9	45	0140	638.81	.27	2.50	2.50	98	101	78	6.0	—	50
10	50	0145	643.595	.26	2.40	2.40	98	102	80	6.0	—	50
START	50	0200	643.93	—	—	—	—	—	—	—	—	—
11-1	55	0200	648.44	.20	1.85	1.85	98	86	76	6.5	—	50
2	60	0205	652.46	.19	1.75	1.75	98	100	78	6.5	—	50
3	65	0210	656.49	.18	1.65	1.65	98	102	78	6.5	—	50
4	70	0215	660.51	.18	1.65	1.65	98	102	78	6.5	—	50
5	75	0220	664.59	.19	1.75	1.75	98	102	78	6.5	—	50
6	80	0225	668.59	.19	1.75	1.75	98	102	80	6.5	—	50
7	85	0230	672.65	.26	2.40	2.40	98	102	80	6.5	—	50
8	90	0235	676.67	.29	2.65	2.65	98	102	80	6.5	—	50
9	95	0240	681.80	.29	2.68	2.68	98	100	80	6.5	—	50
10	100	0245	685.83	.30	2.75	2.75	98	101	80	6.5	—	50

0244
0249

COMMENTS:

ES-041

Tm/s Collected impin #2 6 [redacted] " " 2x

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESB
DATE 04/20/77
SAMPLING LOCATION Outlet
SAMPLE TYPE EPA 8
RUN NUMBER 3
OPERATOR ZISKIN
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s)
FILTER NUMBER (s) FA5-395C
TAIR 0.5 0/40

PROBE LENGTH AND TYPE
NOZZLE I.D. .308
ASSUMED MOISTURE, % 3.0
SAMPLE BOX NUMBER —
METER BOX NUMBER 35-2165
METER $\Delta H_@$ 1.95
~~C FACTOR~~
PROBE HEATER SETTING —
HEATER BOX SETTING —
REFERENCE Δp .20

SCHEMATIC OF TRAVERSE POINT LAYOUT

Post Run = .78

READ AND RECORD ALL DATA EVERY 3 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
START	0	405	694.83									
A-4	3	408	697.17	.18	1.65	1.65	98	86	70	4.5	—	50
5	6	411	699.27	.19	1.75	1.75	98	90	71	5.0	—	50
6	9	414	701.41	.25	2.30	2.30	98	96	72	8.0	—	50
7	12	417	704.71	.29	2.65	2.65	98	100	72	8.5	—	50
8	15	420	707.38	.30	2.75	2.75	100	101	74	8.5	—	50
9	18	423	710.03	.30	2.75	2.75	100	102	74	8.5	—	50
10	21	426	712.75	.31	2.90	2.90	100	102	74	9.0	—	50
STOP	21	429	712.82	—	—	—	—	—	—	—	—	—
B-4	24	432	714.88	.18	1.65	1.65	100	90	73	5.0	—	50
5	27	435	716.96	.18	1.65	1.65	100	94	74	5.0	—	50
6	30	438	719.16	.21	1.95	1.95	100	94	74	6.0	—	50
7	33	441	721.57	.24	2.20	2.20	100	97	74	7.0	—	50
8	36	444	724.06	.26	2.40	2.40	100	99	75	7.5	—	50
9	39	447	726.53	.25	2.30	2.30	100	100	75	7.0	—	50
10	42	450	728.02	.26	2.40	2.40	100	100	75	7.5	—	50

* NOTE

COMMENTS:

* CONDENSATION — PROBE HEATER ON @ 280°F

ES-041

R[redacted] P[redacted]

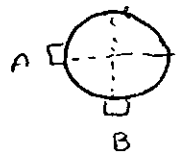
FACING INTO FLOW

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESB- ALLENTOWN, Pa
DATE 4/
SAMPLING LOCATION OUTLET
SAMPLE TYPE EPA METHOD 8
RUN NUMBER 6
OPERATOR KEITH / BILL
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.18
FILTER NUMBER (s) FL5-4082

TARE -0.49703



PROBE LENGTH AND TYPE 4'
NOZZLE I.D. .308
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER
METER BOX NUMBER S-2165
METER $\Delta H_@$ 1.95
C FACTOR
PROBE HEATER SETTING 100%
HEATER BOX SETTING
REFERENCE Δp .20

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

DITOT FACTOR - .28

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
STAR	0	1325	743.086	.25								
A 1	5	1330	47.22	.25	2.30	2.30	101	90	80	13.5		65
1	10	1335	51.38	.25	2.3	2.3	102	104	94	13.5		65
2	15	1340	55.48	.24	2.2	2.2	101	108	85	12		65
2	20	1345	59.48	.23	2.1	2.1	101	104	86	12.5		65
3	25	1350	63.375	.22	2.05	2.05	102	112	88	11		65
3	30	1355	67.25	.22	2.05	2.05	102	110	88	11		68
4	35	1400	70.99	.20	1.85	1.85	102	111	90	10		68
4	40	1405	74.69	.20	1.85	1.85	102	110	89	10		68
5	45	1410	78.44	.21	1.95	1.95	102	111	90	10		68
5	50	1415	82.29	.21	1.95	1.95	102	112	91	10		68
6	55	1420	86.90	.21	1.95	1.95	102	113	91	10		68
6	60	1425	89.88	.21	1.95	1.95	102	110	92	10		68
7	65	1430	94.00	.25	2.3	2.3	102	112	92	12		70
7	70	1435	98.13	.25	2.3	2.3	102	113	92	12		70
8	75	1440	102.28	.25	2.3	2.3	102	113	92	12		70
8	80	1445	106.43	.25	2.3	2.3	103	114	92	12		78
9	85	1450	110.625	.26	2.4	2.4	103	114	92	12		72
9	90	1455	114.98	.27	2.5	2.5	103	115	92	14		72
10	95	1500	119.32	.27	2.5	2.5	90	114	92	14		72
10	100	1505	123.68	.28	2.6	2.6	85	114	92	14		71

COMMENTS:

· MOISTURE

SO_2 -
SO_3 -
SO_4 -

02859

02856
02857
02858

ES-041

[redacted]

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
STAR	00	1410	123.75	.25								
B 1	05	1415	127.75	.25	2.3	2.3	101	106	90	10		70
1	10	1420	131.83	.25	2.3	2.3	101	110	90	10		72
2	15	1425	135.68	.21	1.95	1.95	102	114	92	10		72
2	20	1430	139.46	.21	1.95	1.95	102	112	92	10		72
3	25	1435	143.18	.20	1.85	1.85	102	115	93	10		70
3	30	1440	146.91	.20	1.85	1.85	102	113	93	9		70
4	35	1445	150.52	.19	1.75	1.75	102	113	93	9		70
4	40	1450	154.13	.19	1.75	1.75	102	112	93	9		70
5	45	1455	157.78	.20	1.85	1.85	102	111	93	9		70
5	50	1500	161.565	.21	1.95	1.95	102	110	93	9		68
6	55	1505	165.97	.29	2.65	2.65	102	111	92	9		68
6	60	1510	170.45	.30	2.75	2.75	102	111	92	14		68
7	65	1515	175.099	.32	2.95	2.95	101	112	92	16		68
7	70	1520	179.81	.33	3.05	3.05	101	114	92	16		68
8	75	1525	184.47	.32	2.93	2.95	101	118	93	16		68
8	80	1530	189.15	.32	2.95	2.95	101	118	93	16		68
9	85	1535	194.4	.34	3.25	3.25	100	120	94	17		68
9	90	1540	198.925	.34	3.25	3.25	99	118	94	18		68
10	95	1545	203.33	.32	2.95	2.95	99	120	95	16		68
10	200	1550	208.25	.32	2.95	2.95	99	118	95	16		65

Isopropanol
initial:
final:

Hydrogen Peroxide:
initial:
final:

ES-042

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESB - ALLENTOWN
DATE 4-20-77
SAMPLING LOCATION OUTLET
SAMPLE TYPE EPA - 8
RUN NUMBER 7
OPERATOR KEITH
AMBIENT TEMPERATURE 70°
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.18
FILTER NUMBER (s) FL5 - 4055

[redacted]

PROBE LENGTH AND TYPE 4'
NOZZLE I.D. .308
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER
METER BOX NUMBER S-2165
METER $\Delta H_@$ 1.95
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp 2.0

SO_2 02861
SO_3 02862
SG - 02863

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
STAR	0	1800	914.732	.25								
1	5	1805	18.88	.25	2.3	2.3	102	84	75	10		68
1	10	1810	23.21	.26	2.4	2.4	102	97	77	10		68
2	15	1815	27.30	.25	2.3	2.3	102	105	80	11		68
2	20	1820	31.37	.25	2.3	2.3	102	105	80	11		70
3	25	1825	35.315	.23	2.1	2.1	103	105	82	10		70
3	30	1830	39.25	.23	2.1	2.1	103	104	82	10		70
4	35	1835	43.03	.21	1.95	1.95	103	102	95	9		70
4	40	1840	46.73	.20	1.85	1.85	103	100	82	8.5		70
5	45	1845	50.48	.21	1.95	1.95	102	100	82	9		70
5	50	1850	54.30	.22	2.05	2.05	102	99	82	9		70
6	55	1855	58.61	.28	2.6	2.6	100	102	82	11.5		70
6	60	1900	62.99	.28	2.6	2.6	100	102	82	11.5		70
7	65	1905	67.34	.28	2.6	2.6	102	103	83	12		70
7	70	1910	71.72	.29	2.65	2.65	102	104	82	12		70
8	75	1915	76.10	.29	2.65	2.65	102	104	82	12		70
8	80	1920	80.49	.29	2.65	2.65	100	104	82	12		70
9	85	1925	85.13	.33	3.1	3.1	102	102	82	14		68
9	90	1930	89.95	.34	3.2	3.2	101	101	82	15		66
10	95	1935	94.79	.37	3.4	3.4	101	103	82	15		66
10	100	1940	99.69	.37	3.4	3.4	101	103	82	15		66

ADD
0 ML.
ALCOHOL

COMMENTS:

ES-041

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
START	100	1945	100.37	.26								
B 1	105	1950	104.49	.26	2.4	2.4	101	86	78	11		66
·	110	1955	108.67	.26	2.4	2.4	101	96	79	11		60
115 2	~~120~~	2000	112.75	.25	2.3	2.3	101	97	78	10		60
120 2	~~125~~	2005	116.75	.24	2.2	2.2	101	97	78	10		58
125 3	~~130~~	2010	120.61	.22	2.05	2.05	100	95	78	9		58
130 3	~~135~~	2015	124.47	.23	2.1	2.1	100	93	77	9		58
135 4	~~140~~	2020	128.31	.22	2.05	2.05	100	92	75	9		58
140 4	~~145~~	2025	132.14	.22	2.05	2.05	100	90	75	9		58
145 5	~~150~~	2030	136.00	.23	2.1	2.1	100	90	75	9		58
150 5	~~155~~	2035	139.82	.23	2.1	2.1	100	90	75	9		58
155 6	~~200~~	2040	144.41	.34	3.05	3.15	100	90	75	15		58
160 6	~~205~~	2045	149.11	.35	3.2	3.2	100	92	74	15		58
165 7	~~210~~	2050	153.88	.36	3.3	3.3	98	94	75	15		58
170 7	~~215~~	2055	158.64	.36	3.3	3.3	98	94	74	15		58
175 8	~~220~~	2100	163.55	.38	3.5	3.5	98	95	75	15		58
180 8	~~225~~	2105	169.43	.36	3.3	3.3	98	95	75	16		58
185 9	~~230~~	2110	173.32	.34	3.1	3.1	99	96	74	16		58
190 9	~~235~~	2115	178.11	.34	3.1	3.1	98	97	75	15		58
195 10	~~240~~	2120	183.19	.34	3.9	3.9	98	102	75	19		58
200 10	~~245~~	2125	188.34	.34	3.9	3.9	99	105	76	19		58

ES-042

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT ESB - ALLENTOWN
DATE 4-20-77
SAMPLING LOCATION OUTLET
SAMPLE TYPE EPA 8
RUN NUMBER 8
OPERATOR GARDNER
AMBIENT TEMPERATURE 60° F
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.18
FILTER NUMBER (s) FLS - 4079

PROBE LENGTH AND TYPE 4'
NOZZLE I.D. .1595
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER
METER BOX NUMBER S-2165
METER $\Delta H_@$ 1.85
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp 3.0

$C_p = .78$

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
STAR	0		15.10									
A 1	5		16.98	.21	2.0	2.0	100	65	65	10		50
1	10	2240	22.71	.20	1.5	1.5	100	80	65	10		50
2	15	2245	26.39	.20	1.85	1.85	100	88	67	8		51
2	20	50	30.10	.20	1.85	1.85	100	90	68	8.5		51
3	25	55	33.60	.18	1.65	1.65	102	92	70	8		51
3	30	2300	36.96	.18	1.65	1.65	102	93	70	8		51
4	35	05	40.38	.18	1.60	1.60	102	94	72	8		51
4	40	10	43.80	.18	1.65	1.65	102	92	72	8		52
5	45	15	47.27	.19	1.75	1.75	101	92	73	8		52
5	50	20	50.77	.19	1.75	1.75	101	93	73	8		
6	55	25	54.74	.25	2.3		100	93	73	8		
6	60	30	58.86	.25	2.3		100	95	72	8		
7	65	35	62.78	.24	2.25		100	98	75	8		
7	70	40	66.42	.24	2.25		100	98	75	8		
8	75	45	71.12	.26	2.4	2.4	100	98	75	12		60
8	80	50	76.77	.26	2.4		100	98	75	12		
9	85	55	79.02	.24	2.25		100	98	75	12		
9	90	2400	83.69	.24	2.25		100	98	75			
10	95	2405	87.82	.25	2.3		100	98	74	12		60
10	100	10	91.97	.25	2.3		100	100	75	10		

COMMENTS:

SO_2 02864
SO_3 02865
S.G. 02866

ES-041

60

[redacted] Page, [redacted], [redacted]

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
STAR	100	2415	91.97									
B 1	105	20	95.21	.21	2.2		100	88	72	10		55
1	110	25	99.69	.21	2.2		100	98	75	10		55
2	115	30	104.11	2.0 .20	2.1		100	98	73	10		55
2	120	35	107.85	.20	1.85		100	99	74	8.5		55
3	125	40	111.33	.18	1.65		100	97	74	8.5		55
3	130	45	114.27	.18	1.65		100	95	74	8		55
4	135	50	117.89	.17	1.8		100	92	73	8		51
4	140	55	121.56	.17	1.8		100	92	73	8		51
5	140 100	~~0100~~	125.30	.19	2.0		100	95	73	8		51
5	150	~~0105~~	128.19	.19	2.0		100	95	73	8		51
6	155	10	132.55	.29	3.05		100	94	72	8		50
6	160	15	137.18	.31	2.90		98	102	74	14		50
7	165	20	142.11	.32	2.95		98	103	75	14		49
7	170	25	146.34	.32	2.95		98	102	76	14		49
8	175	30	150.91	.32	2.95		98	102	76	14		49
8	180	35	155.53	.33	3.05		98	101	75	14		50
9	185	40	160.11	.31	2.90		97	101	75	14		50
9	190	45	165.13	.31	2.90		97	102	75	14		50
10	195	50 ~~0100~~	168.81	.15	1.6		97	100	88	10		
10	200	55 ~~0105~~	172.275	.15	1.6		97	100	75	10		50

ES-042

FIELD DATA

QUALITY CONTROLLED YORK RESEARCH CORPORATION

PLANT: EBG
DATE: 7/21/77
SAMPLING LOCATION: Outlet
SAMPLE TYPE: Form 8
RUN NUMBER: 9
OPERATOR: E-22 / John
AMBIENT TEMPERATURE:
BAROMETRIC PRESSURE:
STATIC PRESSURE, (P_s): -.42
FILTER NUMBER (s):

PROBE LENGTH AND TYPE: 3'
NOZZLE I.D.: .309
ASSUMED MOISTURE, %:
SAMPLE BOX NUMBER:
METER BOX NUMBER: 1-9 S2165
METER $\Delta H_@$: 1.95
C FACTOR:
PROBE HEATER SETTING:
HEATER BOX SETTING:
REFERENCE Δp: 2.0

$G_p = .78$

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
SCALE A			82.575									
1	5	0230	86.63	.21	2.2		95	85	75	15		
1	10	35	90.31	.21	2.2		100	92	73	15		
2	15	40	93.63	.22	2.3		100	95	74			
2	20	45	97.78	.22	2.3		100	98	74	13		(50)
3	25	50	101.75	.19	2.0		100	100	76	13		52
3	30	55	105.47	.19	2.0		100	100	76	12		54
4	35	0300	109.64	.17	1.85		100	99	77	12		54
4	40	05	113.45	.18	1.65		100	100	78	11.5		54
5	45	10	117.44	.19	1.75		104	100	78	12		54
5	50	15	121.39	.18	1.65		104	99	78	11.5		55
6	55	20	125.39	.25	2.30		105	98	78	12		55
6	60	25	129.38	.24	2.20		105	98	78	12		54
7	65	30	133.36	.25	2.30		104	99	78	12		54
7	70	35	137.41	.25	2.30		102	99	78	12		54
8	75	40	141.47	.26	2.40		99	99	78	12.5		54
8	[illegible]	45	145.65	.27	2.50		99	100	78	13		54
9	[illegible]	50	149.87	.27	2.50		88	100	79	13		53
9	[illegible]	55	154.06	.27	2.50		82	100	79	13		53
10	[illegible]	0400	158.09	.24	2.20		95	100	79	12		53
10	[illegible]	05	162.07	.24	2.20		99	99	79	12		53

COMMENTS:

SO_2 02867
SO_3 02868
S.G. 02869

ES-041

Page 2, test 9, [illegible]

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
STM 3			162.08									
1	105	0420	166.74	.23	2.10		99	89	76	11		49
1	110	25	170.58	.23	2.10		99	96	77	11		49
2	115	30	174.24	.20	1.85		99	97	77	10		50
2	120	35	177.86	.20	1.85		99	95	77	10		50
3	125	40	181.43	.19	1.75		99	94	77	9.5		50
3	130	45	184.89	.18	1.65		99	94	77	9		50
4	135	50	188.35	.18	1.65		100	93	77	9		50
4	140	55	191.79	.18	1.65		100	92	77	9		50
5	145	0500	195.44	.21	1.95		100	92	76	10		50
5												
6												
6												
7												
7												
8												
8												
9												
9												
10												
10												

ES-042

FIELD DATA

PLANT ESB INC.
DATE 042277
SAMPLING LOCATION OUTLET
SAMPLE TYPE EPA 8
RUN NUMBER 10 LAST
OPERATOR ZISKIND
AMBIENT TEMPERATURE 45°F
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) -.12
FILTER NUMBER (s)

PROBE LENGTH AND TYPE
NOZZLE I.D. .308
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER S-2165
METER BOX NUMBER -
METER ΔH@ 1.95
~~C FACTOR~~ Pitot Cpm: .78
PROBE HEATER SETTING -
HEATER BOX SETTING 280
REFERENCE Δp .20

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
SPMC	0	0120	416.835									
B-1	5	0125	421.29	.23	2.10	2.10	100	96	73	6.0	—	50
1	10	0130	425.14	.22	2.05	2.05	110	100	78	5.5	—	50
2	15	0135	428.72	.19	1.75	1.75	110	102	80	5.0	—	52
2	20	0140	432.48	.20	1.85	1.85	110	100	80	5.0	—	52
3	25	0145	436.04	.20	1.85	1.85	110	100	81	5.0	—	52
3	30	0150	439.52	.18	1.65	1.65	110	100	82	4.5	—	52
4	35	0155	442.98	.18	1.65	1.65	110	100	82	4.5	—	52
4	40	0200	446.32	.16	1.50	1.50	110	101	82	4.5	—	52
5	45	0205	449.72	.17	1.60	1.60	110	99	84	5.5	—	54
5	50	0210	453.01	.16	1.50	1.50	108	99	83	4.5	—	55
6	55	0215	456.22	.22	2.05	2.05	108	98	83	5.5	—	55
6	60	0220	460.67	.22	2.05		100	95	83	5	—	11
7	65	0225	464.56	.22	2.05		100	95	83	5	—	50
7	70	0230	468.43	.22	2.05		100	100	82	5	—	
8	75	0235	472.37	.23	2.00		100	100	82	5	—	
8	80	0240	476.28	.23	2.1		100	100	82		—	
9	85	0245	480.12	.22	2.05		100	100	82	5	—	50
9	90	0250	484.08	.22	2.05		100	100	82	5	—	50
10	95	0255	488.11	.24	2.2		100	100	82	5	—	50
10	100	0300	492.12	.24	2.2		100	100	80	5	—	
											—	

COMMENTS:

SO_2 = 02867
SO_3 = 02868

S.G. 02870

ES-041

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
START	[illegible]	0305	492.14									
A-1	105	0310	495.20	.20	1.85		100	90	82	4	—	50
1	110	15	500.32	.12	1.88		110	100	83	4	—	
2	115	20	503.33	.12	1.85		110	100	85	4	—	50
2	120	25	506.61	.15	1.4		110	100	84	4	—	
3	125	30	509.93	.15	1.4		100	100	86	5	—	
3	130	35	513.18	.15	1.4		110	105	85	5	—	
4	135	40	516.48	.15	1.41		100	102	85		—	
4	140	45	519.04	.15	1.4		110	102	85		—	
5	145	50	523.00	.16	1.5		120	102	85		—	62
5	150	55	526.33	.16	1.5		115	102	86	5	—	
6	155	0400	529.65	.18	1.65		115	102	85		—	
6	160	05	532.93	.18	1.65		115	103	84		—	
7	165	10	536.131	.17	1.60		115	100	84	4.5	—	58
7	170	15	540.01	.17	1.60		120	100	84	4.5	—	58
8	175	20	543.19	.19	1.75		100	100	84	5	—	58
8	180	25	546.66	.18	1.65		100	100	84	5	—	58
9	185	30	550.12	.18	1.65		100	100	84	5	—	57
9	190	35	553.71	.18	1.65		101	100	84	5	—	57
10	195	40	556.42	.10	0.86		101	100	84	2	—	57
10	200	45	559.32	.12	1.10		102	98	84	3.5	—	58

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APPENDIX C

ANALYTICAL DATA

Chemical Analytical Services

Environmental Consultants

SO_x Analysis

Job Number 4-8479-34

~~Originator~~ Test #1 & #2

Date Analyzed 4/18/77

Test #	Log Number	Milligrams SO_2	Milligrams SO_3
#1	02947 IN	0.87	—
"	02946 IN	—	17.32
"	02832 OUT	0.06	—
"	02831 OUT	—	2.65
#2	02972 IN	0.64	—
"	02973 IN	—	202.44
"	02837 OUT	-0.06	—
"	02838 OUT	—	4.64

Comments

Analysis Performed by [illegible]

Approved by

Chemical Analytical Services

Environmental Consultants

SO_x Analysis

Job Number 4-8479-34

~~Originator~~ Tests 3 4 5

Date Analyzed 4/20/77

Test #	Log Number	Milligrams SO_2	Milligrams SO_3
3	02979 In	0.00	—
"	02978 In	—	37.97
"	02845 Out	0.00	—
"	02844 Out	—	0.65
#4	02981 In	1.80	—
"	02982 In	—	105.89
"	02850 Out	0.00	—
"	02849 Out	—	5.00
#5	02987 In	0.87	—
"	02986 In	—	65.50
"	02853 Out	0.00	—
"	02852 Out	—	5.00

Comments

Analysis Performed by [signature]

Approved by

Chemical Analytical Services

Environmental Consultants

SO_x Analysis

Job Number 4-8479-34

~~Originator~~ Tests 6, 7

Date Analyzed 4/20/77

Test #	Log Number	Milligrams SO_2	Milligrams SO_3
#6	02952 In	2.03	—
"	02951 In	—	30.72
"	02856 Out	0.87	—
"	02857 Out	—	2.83
#7	02955 In	0.87	—
"	02954 In	—	26.01
"	02861 Out	0.64	—
"	02862 Out	—	2.83
#8	02959 In	0.17	—
"	02958 In	—	32.53
"	02864 Out	0.00	—
"	02865 Out	—	6.09

Comments

Analysis Performed by [illegible]

Approved by

Chemical Analytical Services

Environmental Consultants

SO_x Analysis

Job Number 4-8479-34

~~Originator~~ Tests 9

Date Analyzed

Test #	Log Number	Milligrams SO_2	Milligrams SO_3
#9	02962 In	0.00	—
"	02961 In	—	141.22
"	02840 Out	0.00	—
"	02839 Out	—	5.00
#10	02992 In	0.00	—
"	02991 In	—	191.93
"	02867 Out	0.00	—
"	02868 Out	—	3.55
#11	02965 In	0.00	—
"	02964 In	—	~~30~~ 177.44
#12	02996 In	0.00	—
"	02997 In	—	95.57

Comments samples 02991 and 02964, hard to determine exact endpoint.

Analysis Performed by [illegible]

Approved by

APPENDIX D

CALIBRATION DATA

#4-8479-34 OUTLET

PITOT CALIBRATION

ΔP_{std}	ΔP_s	$\frac{\Delta P_{std}}{\Delta P_s}$	F_s	ΔP_{std}	ΔP_s	$\frac{\Delta P_{std}}{\Delta P_s}$	F_s
.04	.06	.67	.82	.03	.05	0.6	.77
.16	.21	.76	.87	.17	.28	.61	.78
.49	.67	.73	.86	.47	.76	.62	.79
.91	1.2	.76	.87	.85	1.4	.61	.78
1.15	1.6	.72	.85	1.2	~~2.0~~	0.6	.77

F_s = .85

BLUE FLOW

FLOW RED

F_s = .78

$F_s = \sqrt{\frac{P_{std}}{P_s}}$

F_{std} = 1.00

Pitot Tube No. 4' EFF. EPA GLASS

CALIBRATED WITH 1/2" NOZZLE

Calibrated by: [signature]

DATE 4/13/77

#4-8479-34

PITOT CALIBRATION

ΔP_{std}	ΔP_s	$\frac{\Delta P_{std}}{\Delta P_s}$	F_s	ΔP_{std}	ΔP_s	$\frac{\Delta P_{std}}{\Delta P_s}$	F_s
.03	.05	0.6	.77	.03	.05	0.6	.77
.13	.20	.65	.81	.13	.22	.59	.77
.40	.60	.67	.82	.40	.65	.62	.78
.81	1.2	.68	.82	.86	1.25	.69	.83
1.15	1.8	.64	.80	1.2	1.9	.63	.79

F_s = .80

F_s = .79

YELLOW FLOW

FLOW GREEN

$F_s = \sqrt{\frac{P_{std}}{P_s}}$

$F_{std} = 1.00$

Pitot Tube No. 3' EFF. EPA GLASS
CALIBRATED WITH 1/2" NOZZLE

Calibrated by: [signature]

DATE 4/15/77

ORIFICE AND METER CALIBRATION

Date: 4-7-77 Box No. S-1904 P_b 30.30

Man. Orifice	CF_w	CF_d	T_w	IT_d	OT_d	T_d Ave.	Time t	$\Delta H@$	Y
.5	5	5.05	70	81	77	79	12.90	1.82	1.01
1.0	5	5.13	70	86	82	84	9.31	1.88	1.00
2.0	10	10.34	70	91	87	89	13.36	1.92	1.00
4.0	10	10.39	70	97	91	94	9.64	1.98	1.00
6.0	10	10.45	70	102	96	99	7.96	2.01	0.99
8.0	10	10.56	70	110	104	107	6.94	2.01	0.99

Tolerances: Y = .99-1.01 Ideal 100

$\Delta H@$ = 1.6-2.1 Ideal 1.84

RAC BOX CALIB.

BOX # S-1904 4-7-77

$$\frac{X}{P_B(OT_D+460)}\left(\frac{(T_W+460)\,T}{CFW}\right)^2 \qquad \frac{CFW\,P_B\,(T_D+460)}{CFD\,(P_B+X)\,(T_W+460)}$$

.5"	.01585	4"	.1268	.5"	.0368	4"	.294
1"	.0317	6"	.1902	1"	.0737	6"	.431
2"	.0634	8"	.2536	2"	.147	8"	.588

.5" $\frac{.01585}{30.30\times 537}\left(\frac{530\times 12.90}{5}\right)^2 \qquad \frac{5\times 30.30\times 539}{5.05\times 30.3368\times 530}$

1" $\frac{.0317}{30.30\times 542}\left(\frac{530\times 9.31}{5}\right)^2 \qquad \frac{5\times 30.30\times 544}{5.13\times 30.3737\times 530}$

2" $\frac{.0634}{30.30\times 547}\left(\frac{530\times 13.36}{10}\right)^2 \qquad \frac{10\times 30.30\times 549}{10.34\times 30.447\times 530}$

4" $\frac{.1268}{30.30\times 551}\left(\frac{530\times 9.64}{10}\right)^2 \qquad \frac{10\times 30.30\times 554}{10.39\times 30.594\times 530}$

6" $\frac{.1902}{30.30\times 556}\left(\frac{530\times 7.96}{10}\right)^2 \qquad \frac{10\times 30.30\times 559}{10.45\times 30.731\times 530}$

8" $\frac{.2536}{30.30\times 564}\left(\frac{530\times 6.94}{10}\right)^2 \qquad \frac{10\times 30.30\times 567}{10.56\times 30.888\times 530}$

REPLY TO: ( ) STAMFORD
( ) DENVER

ORIFICE AND METER CALIBRATION

Date: 4-7-77 Box No. S-2165 P_b 30.30

Man. Orifice	CF_w	CF_d	T_w	IT_d	CT_d	T_d Ave.	Time t	$\Delta H@$	Y
.5	5	5.14	70	94	84	89	12.73	1.75	1.01
1.0	5	5.26	70	102	92	97	9.36	1.87	1.00
2.0	10	10.60	70	111	96	103	13.57	1.95	1.00
4.0	10	10.65	70	113	101	107	9.72	1.98	0.99
6.0	10	10.64	70	115	103	109	8.05	2.03	0.99
8.0	10	10.64	70	118	106	112	7.03	2.05	0.99

Tolerances: Y = .99-1.01 Ideal 100

$\Delta H@$ = 1.6-2.1 Ideal 1.84

RAC BOX CALIB.

BOX # S-2165 4-7-77

$\frac{X}{P_B(OT_D+460)}$	$\left(\frac{(T_W+460)T}{CFW}\right)^2$	$\frac{CFW\,P_B(T_D+460)}{CFD(P_B+X)(T_W+460)}$	
.5" .01585	4" .1268	.5" .0368	4" .294
1" .0317	6" .1902	1" .0737	6" .431
2" .0634	8" .2536	2" .147	8" .588

5" $\frac{.01585}{30.30\times 544}\left(\frac{530\times 12.73}{5}\right)^2$ $\frac{5\times 30.30\times 549}{5.14\times 30.3368\times 530}$

1" $\frac{.0317}{30.30\times 552}\left(\frac{530\times 9.36}{5}\right)^2$ $\frac{5\times 30.30\times 557}{5.26\times 30.3737\times 530}$

2" $\frac{.0634}{30.30\times 556}\left(\frac{530\times 13.57}{10}\right)^2$ $\frac{10\times 30.30\times 563}{10.60\times 30.447\times 530}$

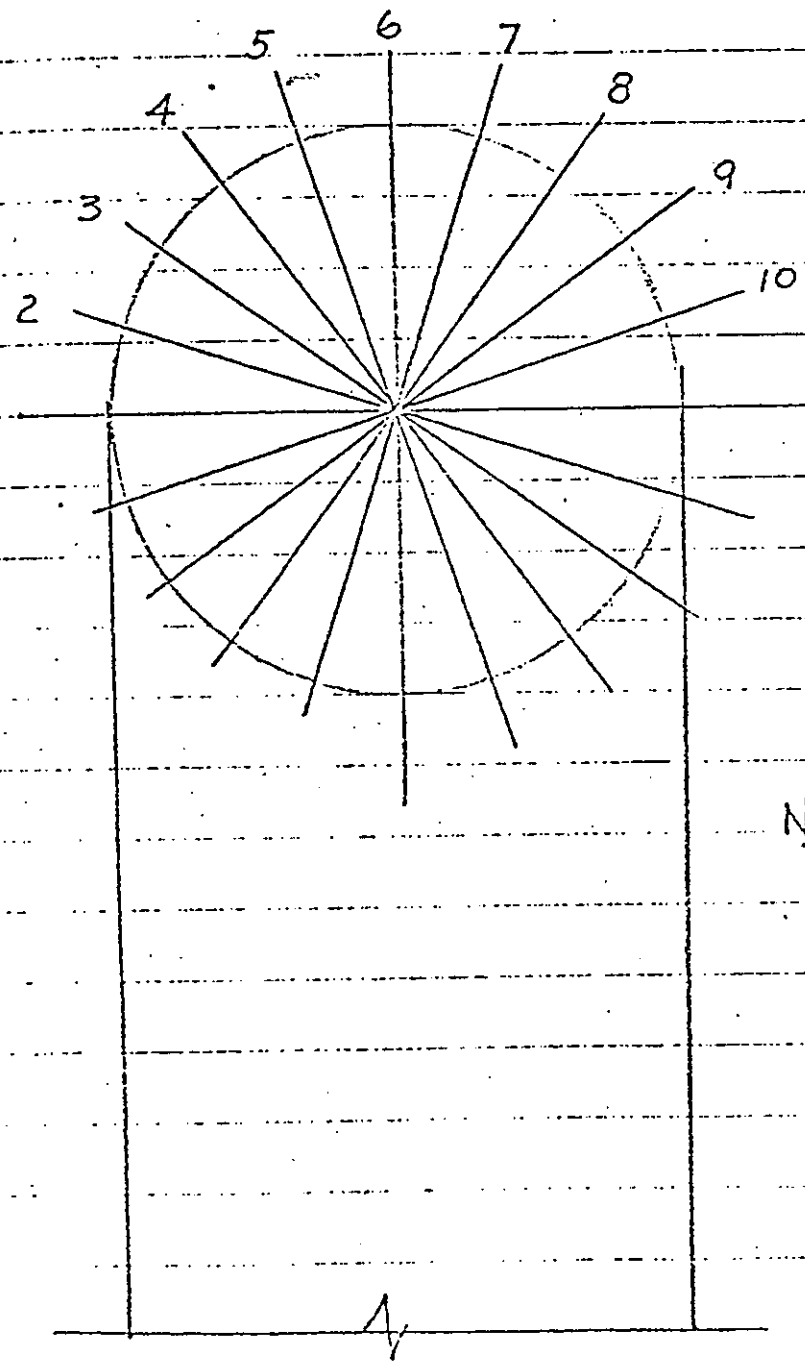
4" $\frac{.1268}{30.30\times 561}\left(\frac{530\times 9.72}{10}\right)^2$ $\frac{10\times 30.30\times 567}{10.65\times 30.594\times 530}$

6" $\frac{.1902}{30.30\times 563}\left(\frac{530\times 8.05}{10}\right)^2$ $\frac{10\times 30.30\times 569}{10.64\times 30.731\times 530}$

8" $\frac{.2536}{30.30\times 566}\left(\frac{530\times 7.03}{10}\right)^2$ $\frac{10\times 30.30\times 572}{10.64\times 30.888\times 530}$

REPLY TO: ( ) STAMFORD
( ) DENVER

NOZZLE MEASUREMENT



1.	.253
2.	.253
3.	.253
4.	.253
5.	.250
6.	.250
7.	.250
8.	.253
9.	.253
10.	.253

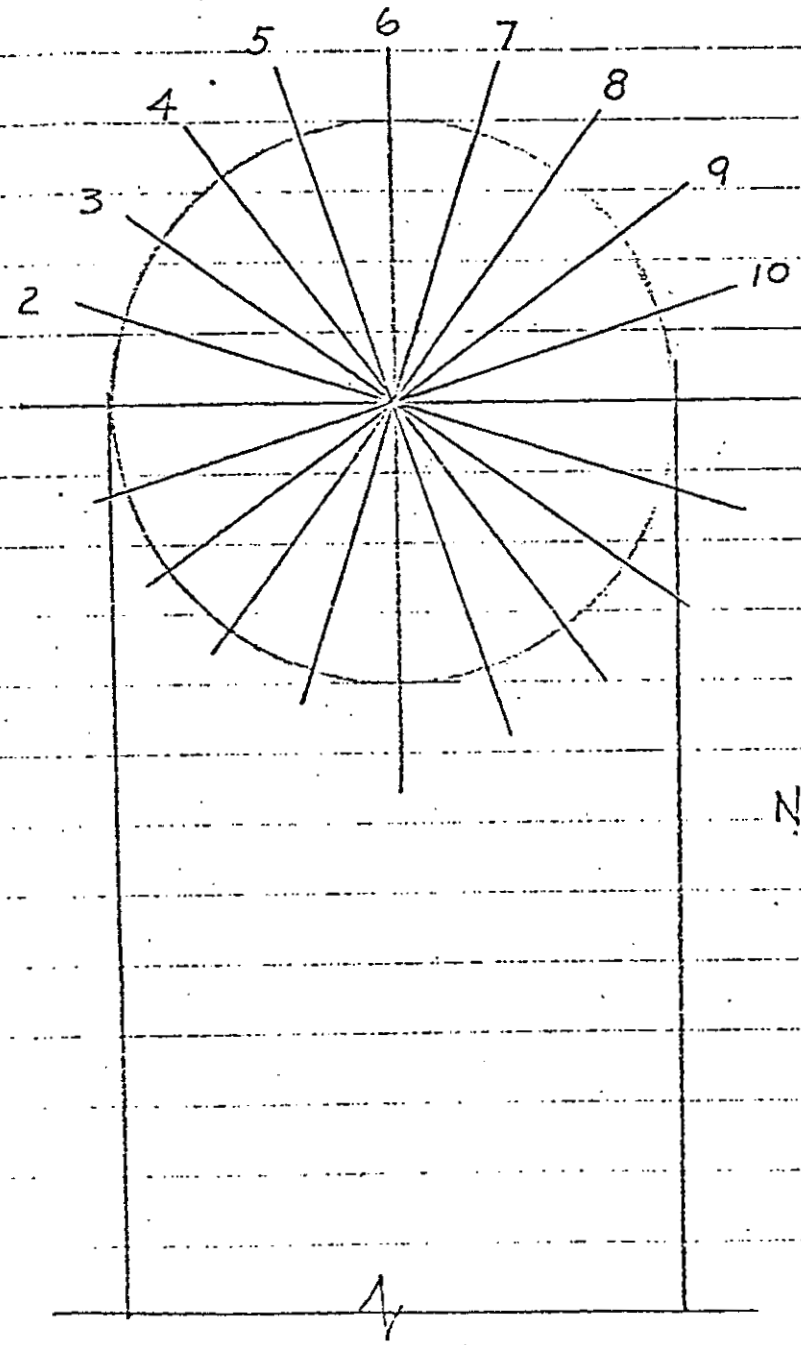
NOZZLE SIZE: 1/4

BY: [illegible]

DATE: 4/6/77

OUTLET

NOZZLE MEASUREMENT



1.	.309
2.	.309
3.	.309
4.	.310
5.	.310
6.	.310
7.	.303
8.	.303
9.	.309
10.	.309

NOZZLE SIZE = 5/16

BY [illegible]

DATE 12/23/76

APPENDIX E

STANDARD CALCULATIONS

PARTICULATE CALCULATIONS

The following are the basic equations used in calculating the data as found in the final summary.

1. Volume of dry gas sampled at standard conditions - 70°F, 29.92" Hg, ft.^{3}

$$V_{m_{std}} = \frac{17.7 \times V_m (P_b + \frac{P_m}{13.6})}{(T_m + 460)}$$

2. Volume of water vapor at 70°F and 29.92" Hg, ft.^{3}

$$V_{w_{gas}} = 0.0474 \times V_w$$

3. % Moisture in stack gas

$$\% M = \frac{100 \times V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}}$$

4. Mole fraction of dry gas

$$M_d = \frac{100 - \% M}{100}$$

5. Average molecular weight of dry stack gas

$$M W_d = (\% CO_2 \times .44) + (\% O_2 \times .32) + (\% N_2 \times .28) + (\% CO \times .28)$$

6. Molecular weight of stack gas

$$M W = (M W_d \times M_d) + 18 (1 - M_d)$$

7. Stack velocity at stack conditions, fps

$$V_s = 85.48 \times C_p \sqrt{\frac{\Delta P_s \times (T_s + 460)}{P_s \times MW}}$$

8. Stack gas flow rate, stack conditions, ACFM

$$Q_A = 60 \times V_s \times A_s$$

9. Stack gas flow rate, standard conditions, SCFMD

$$Q_s = \frac{1062.6 \times V_s \times A_s \times M_d \times P_s}{(T_s + 460)}$$

10. Percent isokinetic

$$\% I = \frac{17.24 \times (T_s + 460) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2}$$

11. Dry particulate concentration - Gr/SCFD

$$C = 0.01543 \times \frac{M_f}{V_{m_{std}}}$$

12. Dry particulate emissions - lb/hr

$$E = 0.008572 \times C \times Q_s$$

13. Particulate emissions by actual heat input - Lb/MMBtu

$$E_{HI} = \frac{E}{MMBtu/Hr}$$

14. % Excess air at sampling point

$$\% EA = \frac{100 \times (\% O_2 - 0.5\% CO)}{(0.264 \times \% N_2) - (\% O_2 - 0.5\% CO)}$$

15. F Factor

$$F = \frac{10^6 \ (3.64\%H) + (1.53\%C) + (.57\%S) + (.14\%N) - (.46\%O)}{GCV}$$

16. F_c Factor

$$F_c = \frac{321 \times 10^3 \ \%C}{GCV}$$

17. Emissions by F Factor (Lb/MMBtu)

$$E_F = \frac{CF}{7000} \left(\frac{20.9}{20.9 - \% \, O_2} \right)$$

18. Emissions by F_c Factor (Lb/MMBtu)

$$E_{F_c} = \frac{CF_c}{7000} \left(\frac{100}{\% \, CO_2} \right)$$

19. Prorated Emissions

$$E_p = E_n + (E_{sb} - E_n) \left(\frac{T_{sb}}{T} \right)$$

PARTICULATE CALCULATION KEY

A_s	= Stack area (ft^2)
C	= Dry particulate concentration - Gr/SCFD
CO_2, O_2, N_2, CO	= Percent by volume (dry basis) in flue gas
C_p	= Pitot tube correction factor
D_n	= Sample nozzle diameter (in.)
E	= Dry particulate emissions - lb/hr
% EA	= Percent excess air
E_F	= Emissions by F Factor - Lb/MMBtu
E_{F_c}	= Emissions by F_c Factor - Lb/MMBtu
E_{HI}	= Emissions by actual heat input - Lb/MMBtu
E_n	= Average normal emission rate (non-soot blow)
E_p	= Prorated emission rate
E_{sb}	= Emission rate during soot blow
F	= F Factor (SCFD/MMBtu)
F_c	= F_c Factor
GCV	= Gross caloric value of fuel fired (Btu/lb)
H, C, S, N, O	= Percent by weight of fuel fired
% I	= Sampling isokinetics
% M	= Percent moisture by volume in stack gas
M_d	= Mole fraction of dry gas
M_f	= Front half sample weight (milligrams)
MW	= Molecular weight of stack gas
MW_d	= Molecular weight of dry stack gas
P_b	= Barometric pressure ("Hg)
P_m	= Average orifice pressure drop ("H_2O)
P_s	= Stack pressure ("Hg absolute)

ΔP_s	= Velocity pressure ("H_2O)
Q_A	= Stack gas flow rate, stack conditions - ACFM
Q_s	= Stack gas flow rate, standard conditions - SCFMD
T	= Time unit in operation per day (hours)
T_m	= Average meter temperature (°F)
T_s	= Stack temperature (°F)
T_{sb}	= Time unit blows soot per day (hours)
T_t	= Test time (minutes)
V_m	= Volume of gas sampled at meter conditions - ft^3
$V_{m_{std}}$	= Volume of dry gas sampled at standard conditions - ft^3
V_s	= Stack gas velocity at stack conditions - fps
V_w	= Milliliters of water condensed in impingers
$V_{w_{gas}}$	= Volume of water vapor at 70°F and 29.92" Hg, ft^3

GASEOUS EMISSIONS CALCULATIONS

GENERAL EQUATIONS

A. Parts Per Million (ppm) by Volume Dry:

$$ppm = \frac{(48.15)(mg_{comp})(T_m + 460)}{(MW)(V_m)(P_m)}$$

$$ppm @ \underline{X} \% EA = ppm\ measured \times \frac{(Total\ Air @ meas'd.\ EA)}{(Total\ Air @ \underline{X} \% EA)}$$

Where: Total Air = 100 + EA (For O_2, equivalent Excess Air Used)

B. Pounds Per Hour (Lb./Hr.):

$$Lb./Hr. = \frac{(7.467 \times 10^{-6})(mg_{comp})(Q_s)(T_m + 460)}{(V_m)\ (P_m)}$$

Where:
- mg_{comp} = weight of component sampled (mg)
- T_m = Temperature of Meter (°F)
- MW = Molecular weight of Component
- V_m = Metered gas volume (ACF)
- P_m = Meter pressure (in. Hg absolute)
- Q_s = Stack gas flow (SCFMD)

SPECIFIC EQUATIONS

SO_2, Sulfur Dioxide (MW=64.1)

$$ppm = \frac{(.7512)(mg\ SO_2)(T_m + 460)}{(P_m)\ (V_m)}$$

SO_3, Sulfur Trioxide (MW=80.1)

$$ppm = \frac{(.6011)(mg\ SO_3)(T_m + 460)}{(P_m)\ (V_m)}$$

Hg, Mercury (MW=200.6)

$$ppm = \frac{(.2400)(mg\ Hg)(T_m + 460)}{(P_m)\ (V_m)}$$

F^-, Fluoride (MW=19.0)

$$ppm = \frac{(2.534)(mg\ F^-)(T_m + 460)}{(P_m)\ (V_m)}$$

Cl^-, Chloride (MW=35.5)

$$ppm = \frac{(1.356)(mg\ Cl^-)(T_m + 460)}{(P_m)\ (V_m)}$$

HCl, Hydrogen Chloride (MW=36.5)

$$ppm = \frac{(1.319)(mg\ HCl)(T_m + 460)}{(P_m)\ (V_m)}$$

NO_x, Oxides of Nitrogen as NO_2 (MW=46.0)

$$ppm = \frac{(1.047)(mg\ NO_2)(T_F + 460)}{(P_i - P_f)\ (V_F,\ CF)}$$

F denotes Flask
i denotes initial
f denotes final
V_F, CF = liters/28.32