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.

AP42 Section:	11.27
Background Chapter	4
Reference:	6
Title:	Air Pollution Emission Test, International Minerals and Chemical Company: Spruce Pine, NC, EMB Report 76-NMM-1, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 1976.

Project No. 76-NMM-1

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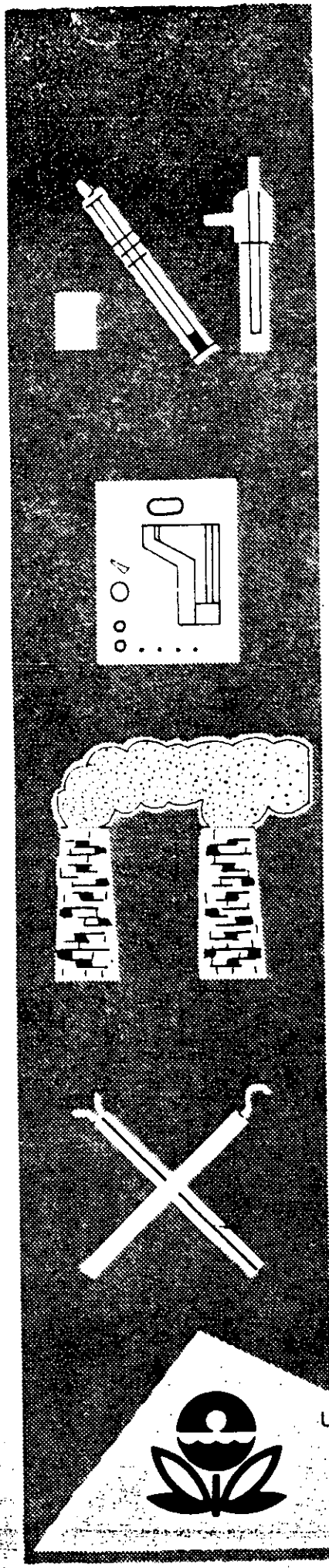
AP-42 Section 11.27
Reference
Report Sect. 4
Reference 6



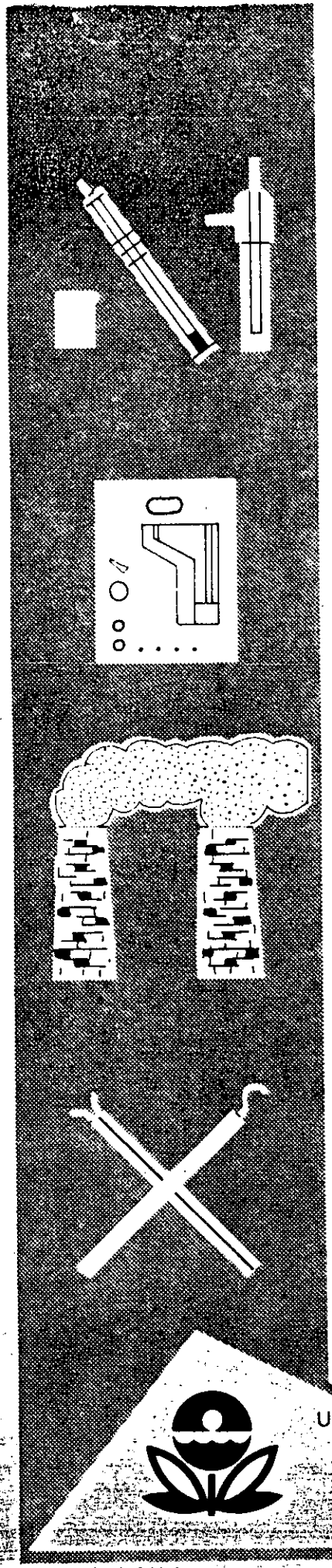
AIR POLLUTION EMISSION TEST

INTERNATIONAL MINERALS AND
CHEMICAL COMPANY
SPRUCE PINE, N. C.

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

Project No. 76-NMM-1

EMB File Copy



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Emission Measurement Branch
Research Triangle Park, North Carolina

EMISSION STUDY

at a

FELDSPAR CRUSHING AND GRINDING FACILITY

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

Prepared for the

U.S. Environmental Protection Agency

by

Clayton Environmental Consultants, Inc.
25711 Southfield Road
Southfield, Michigan 48075

Project NMM-1

Task 25

Contract No. 68-02-1408

TABLE OF CONTENTS

		Page
I.	Introduction	1
II.	Summary and Discussion of Results	2
III.	Process Description and Operation	30
IV.	Location of Sampling Ports	31
V.	Sampling and Analytical Procedures	36

FIGURES

FIGURE 1	Location of Visible Emissions Observers Feldspar Mine, September 27, 1976	5
FIGURE 2	Location of Visible Emissions Observers Final Milling Plant, September 28-29, 1976	6
FIGURE 3	Particle Size Distribution, No. 2 Mill Baghouse North Inlet	28
FIGURE 4	Particle Size Distribution, No. 2 Mill Baghouse South Inlet	29
FIGURE 5	Schematic Diagram of Baghouse Inlet and Outlet Ducts, No. 2 Mill Baghouse	32
FIGURE 6	Schematic Diagram of Sampling Point Locations No. 2 Mill Baghouse Outlet	33
FIGURE 7	Schematic Diagram of Sampling Point Locations No. 2 Mill Baghouse North Inlet	34
FIGURE 8	Schematic Diagram of Sampling Point Locations No. 2 Mill Baghouse South Inlet	35
FIGURE 9	Schematic Diagram of Particulate Sampling Train, No. 2 Mill Baghouse Outlet	37
FIGURE 10	Schematic Diagram of Particulate Sampling Train, No. 2 Mill Baghouse North and South Inlets	38
FIGURE 11	Schematic Diagram of Particle Size Sampling Train, No. 2 Mill Baghouse	39

Page

TABLES

TABLE I Summary of Particulate Emissions (English Units), No. 2 Mill Baghouse 3

TABLE II Summary of Particulate Emissions (Metric Units), No. 2 Mill Baghouse 4

TABLE III Summary of Visible Emissions 8

TABLE IV Particle Size Distribution 26

APPENDICES

APPENDIX A Project Participants

APPENDIX B EPA Draft Method 17

APPENDIX C Particulate Field Data Sheets

APPENDIX D Particle Sizing Field Data Sheets

APPENDIX E Visible Emissions Field Data Sheets

APPENDIX F Sampling Summary Sheets

APPENDIX G Particulate Weight Data

APPENDIX H Calibration Data

APPENDIX I Example Calculations

I. INTRODUCTION

The U.S. Environmental Protection Agency (EPA) retained Clayton Environmental Consultants, Inc. to conduct a series of emission tests at the International Minerals and Chemicals Corporation facility located at Spruce Pine, North Carolina. The purpose of this study was to provide the Environmental Protection Agency with data for the establishment of source performance standards for the non-metallic mineral-processing industry. This study was commissioned as Project NMM-1 of Task 25; Contract No. 68-02-1408.

The International Minerals and Chemicals Corporation facility is a feldspar crushing, grinding, and milling operation. Fugitive dust generated at each step in the crushing and grinding operation is collected by means of a system of dust recovery hoods and routed through separate exhaust ventilation systems leading to two baghouses for capture and recovery of feldspar dust.

Source sampling was performed on the No. 2 Baghouse at the final milling plant where feldspar powder is produced by a ball mill. Particulate and particle sizing samples were taken at the baghouse inlet ducts and the outlet stack by personnel from Clayton Environmental Consultants, Inc. U.S. EPA personnel made opacity readings of the baghouse outlet stack as well as the fugitive dust generated at several locations within the plant at feldspar crushing and grinding operations. In addition, EPA personnel observed the source testing activities and monitored process operations.

This study was conducted during the week of September 26, 1976. Appendix A lists the project participants.

II. SUMMARY AND DISCUSSION OF RESULTS

Particulate Sampling Results

Tables I and II summarize the results of the particulate sampling at the baghouse inlet and outlet in English and metric units, respectively. Both filterable and total particulate emission rates measured at the outlet averaged 0.16 pound per hour for the three tests and ranged from 0.14 to 0.18 pound per hour. The north and south inlet loadings were 140 pounds per hour and 14.6 pounds per hour, respectively, for both filterable and total particulate.

A comparison of the average total inlet and outlet volumetric flowrates measured during particulate testing indicates that the average outlet flowrate is significantly higher, 3960 dry standard cubic feet per minute (DSCFM), than the total inlet flowrate of 2980 DSCFM. Since the baghouse was under negative static pressure, this difference implies the possibility of air leakage into the baghouse, possibly through the collection hopper beneath the baghouse. The suspicion of air leakage into the baghouse is further supported by the initial velocity traverse data which indicated a total inlet airflow of 3260 DSCFM and an outlet flowrate of 4180 DSCFM.

Visible Emissions Observations

Opacity measurements were taken during the study by two certified opacity readers provided by the U.S. EPA. Measurements were taken at several locations at the feldspar mine on September 27, as shown in Figure 1. Readings were taken at the final milling plant at the sites shown in Figure 2 on September 28 and 29 in conjunction with source testing activities.

TABLE I

SUMMARY OF PARTICULATE EMISSIONS (ENGLISH UNITS)
NO. 2 MILL BAGHOUSE

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

Sampling Location	Test No.	1976 Date	Stack Gas Conditions			Particulate Concentration				Particulate Emission Rate (lbs/hr)	
			Temp (°F)	Flowrate		Filterable		Total			
				ACFM	DSCFM	gr/ACF	gr/DSCF	gr/ACF	gr/DSCF	Filterable	Total
Baghouse Outlet	1	9/28	105	5070	4210	0.004	0.005	0.004	0.005	0.17	0.17
	2	9/28	115	4830	3940	0.004	0.005	0.004	0.005	0.18	0.18
	3	9/29	103	4470	3720	0.004	0.004	0.004	0.004	0.14	0.14
	AVERAGE		108	4790	3960	0.004	0.005	0.004	0.005	0.16	0.16
Baghouse North Inlet	1	9/28	103	1520	1260	10.7	12.9	10.7	12.9	140	140
Baghouse South Inlet	2	9/28	103	2070	1720	0.823	0.989	0.823	0.989	14.6	14.6

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TABLE II

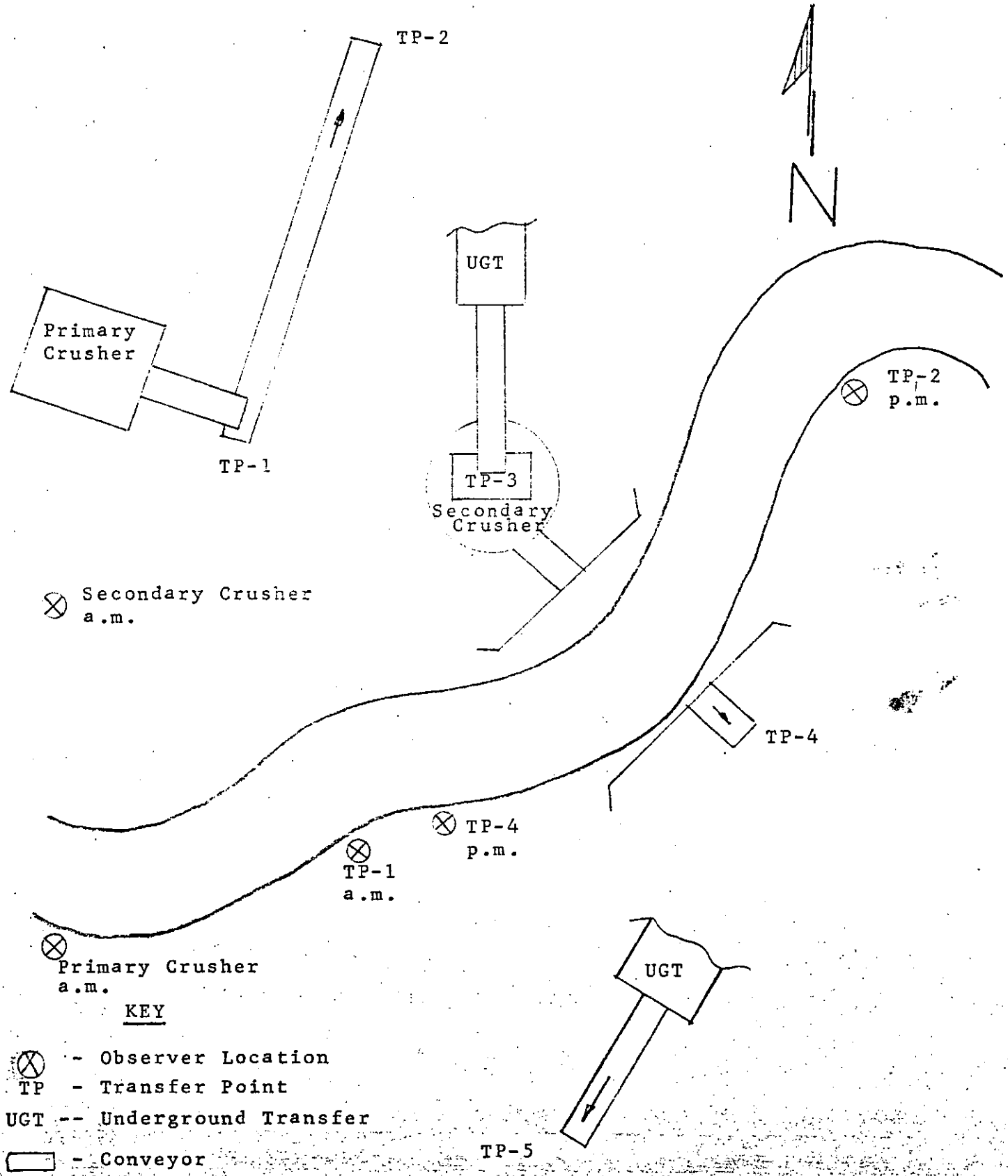
SUMMARY OF PARTICULATE EMISSIONS (METRIC UNITS)
NO. 2 MILL BAGHOUSE

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

Sampling Location	Test No.	1976 Date	Stack Gas Conditions			Particulate Concentration				Particulate Emission Rate (kg/hr)	
			Temp (°C)	Flowrate		Filterable		Total			
				$\frac{Am^3}{min}$	$\frac{DSm^3}{min}$	mg/Am^3	mg/DSm^3	mg/Am^3	mg/DSm^3	Filterable	Total
Baghouse Outlet	1	9/28	41	144	119	9	11	9	11	0.08	0.08
	2	9/28	46	137	112	10	12	10	12	0.08	0.08
	3	9/29	39	127	105	8	10	8	10	0.06	0.06
	AVERAGE		42	136	112	9	11	9	11	0.07	0.07
Baghouse North Inlet	1	9/28	39	43	36	24,600	29,600	24,600	29,600	63.3	63.3
Baghouse South Inlet	2	9/28	39	59	49	1880	2260	1880	2260	6.61	6.61

LOCATION OF VISIBLE EMISSIONS OBSERVERS
FELDSPAR MINE
SEPTEMBER 27, 1976

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina



KEY

⊗ - Observer Location
TP - Transfer Point
UGT -- Underground Transfer
▭ - Conveyor

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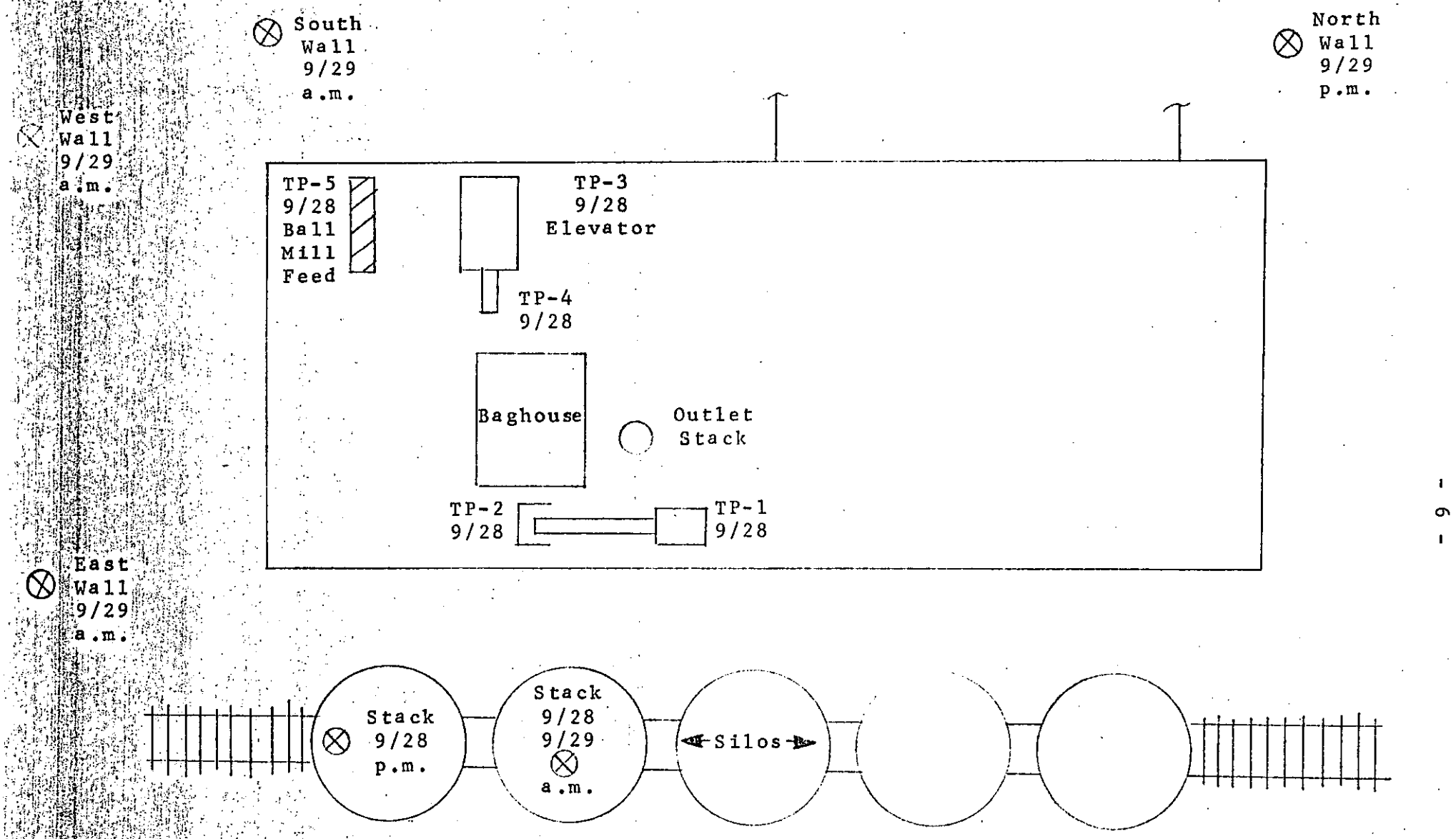


FIGURE 2

LOCATION OF VISIBLE EMISSIONS OBSERVERS
FINAL MILLING PLANT
SEPTEMBER 28-29, 1976

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

KEY

⊗ - Observer Location

TP - Transfer Point

▭ - Conveyor

Clayton Environmental Consultants, Inc.

Each observer took a reading once every 15 seconds during the observation period. Readings were summed and averaged for each six-minute period and plotted versus time. The series of six-minute averages and the corresponding plots are presented for each site in Tables III-1 through III-17.

Tables III-1 through III-6 represent measurements taken at various sites within the mining and crushing operation. These sites, depicted in Figure 1, included the primary crusher, the secondary crusher, and conveyor transfer points TP-1, TP-2, and TP-4.

No visible emissions were detected in this area except at the primary crusher site, and these positive values comprised only four to six percent of the measurements taken at the primary crusher site. As presented in Tables III-1 and III-2, these positive measurements contributed to the two positive six-minute average values that, in both cases, were less than one percent. The maximum reading recorded by either observer at this site was five percent.

Tables III-7 through III-17 apply to milling plant operations. Opacity readings were taken at the following locations shown in Figure 2: baghouse outlet stack, roof and four plant building walls (fugitive), feldspar loading silos, and five product transfer points within the milling plant, labeled TP-1 through TP-5.

No visible emissions were observed from the baghouse outlet stack, the in-plant transfer points, or the plant building walls. All visible emissions generated at the feldspar loading silos were of five percent opacity or less. A white-grey fugitive plume of

TABLE III-1

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/27/76
Type of Plant: IMC Feldspar
Type of Discharge: Primary Crusher
Location of Discharge: Primary Crusher
Height of Point of Discharge: 10-30'
Description of Sky: Partly Cloudy
Wind Direction: NE
Wind Velocity: 0-10 mi/hr
Color of Plume: No visible plume
Detached Plume: N/A
Observer No.: 1
Duration of Observation: 1 hr.
Distance from Observer to Discharge Point: approx. 100'
Direction of Observer from Discharge Point: S
Height of Observation Point: Ground level
Description of Background: Quarry wall and equipment structures

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	09:30	09:36	N	N	21				
2	09:36	09:42	N	N	22				
3	09:42	09:48	N	N	23				
4	09:48	09:54	N	N	24				
5	09:54	10:00	N	N	25				
6	10:00	10:06	N	N	26				
7	10:06	10:12	N	N	27				
8	10:12	10:18	N	N	28				
9	10:18	10:24	5	0.2	29				
10	10:24	10:30	N	N	30				
11					31				
12					32				
13					33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

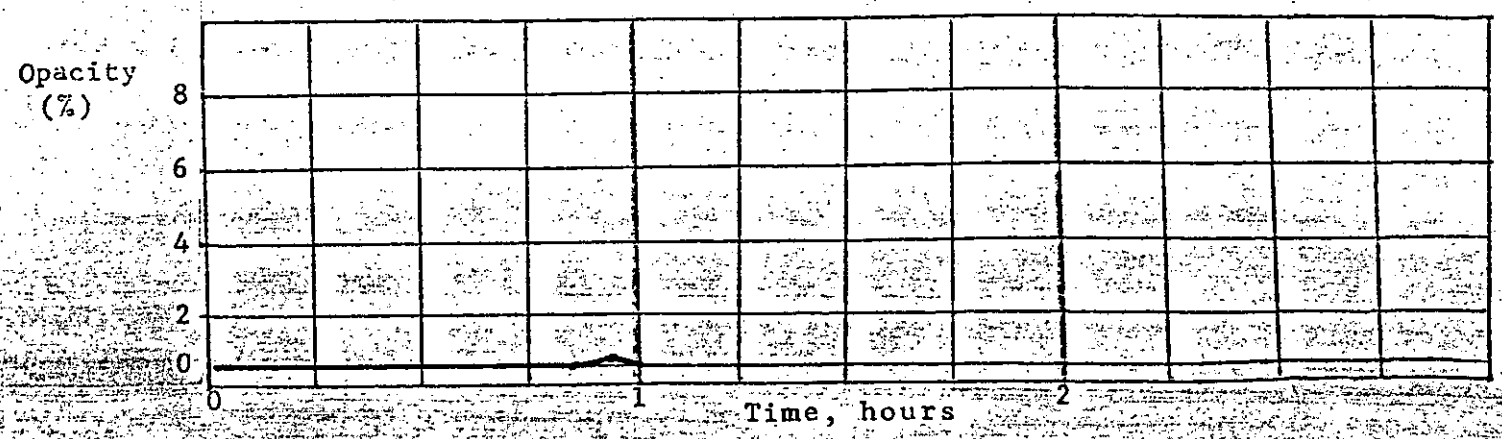


TABLE III-2

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/27/76
Type of Discharge: Primary Crusher
Height of Point of Discharge: 10-30'
Wind Direction: NE
Color of Plume: No visible plume
Observer No.: 2

Type of Plant: IMC Feldspar
Location of Discharge: Primary Crusher
Description of Sky: Partly Cloudy
Wind Velocity: 0-7 mi/hr
Detached Plume: N/A
Duration of Observation: 1 hr.

Distance from Observer to Discharge Point: approx. 100'
Direction of Observer from Discharge Point: 100' SSE
Height of Observation Point: Ground level
Description of Background: Equipment structure

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	09:32	09:37	N	N	21				
2	09:38	09:43	N	N	22				
3	09:43	09:49	N	N	23				
4	09:50	09:55	N	N	24				
5	09:56	10:01	N	N	25				
6	10:02	10:07	N	N	26				
7	10:08	10:13	N	N	27				
8	10:14	10:19	N	N	28				
9	10:20	10:25	15	0.6	29				
10	10:26	10:30	N	N	30				
11					31				
12					32				
13					33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

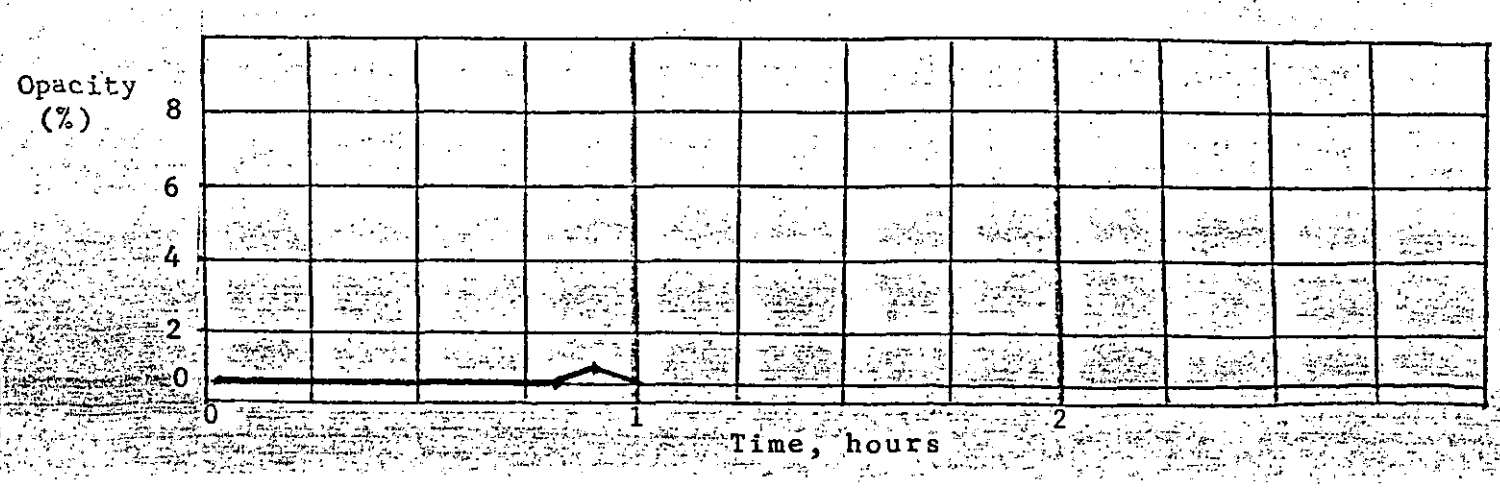


TABLE III-3

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/27/76
Type of Plant: IMC Feldspar
Type of Discharge: Secondary Crusher
Location of Discharge: Secondary Crusher
Height of Point of Discharge: 10-20'
Description of Sky: Partly Cloudy-Cloudy
Wind Direction: NW
Wind Velocity: 0-7 mi/hr
Color of Plume: No visible plume
Detached Plume: N/A
Observer No.: 2
Duration of Observation: 1 hr.
Distance from Observer to Discharge Point: approx. 75'
Direction of Observer from Discharge Point: approx. 75' SSE
Height of Observation Point: Ground level
Description of Background: Equipment Structure

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	10:41	10:46	N	N	21				
2	10:47	10:52	N	N	22				
3	10:53	10:58	N	N	23				
4	11:45	11:50	N	N	24				
5	11:51	11:56	N	N	25				
6	11:57	12:02	N	N	26				
7	12:03	12:08	N	N	27				
8	12:09	12:14	N	N	28				
9	12:15	12:20	N	N	29				
10	12:21	12:26	N	N	30				
11	12:27	12:32	N	N	31				
12	12:33	12:38	N	N	32				
13	12:39	12:44	N	N	33				
14	12:45	12:50	N	N	34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

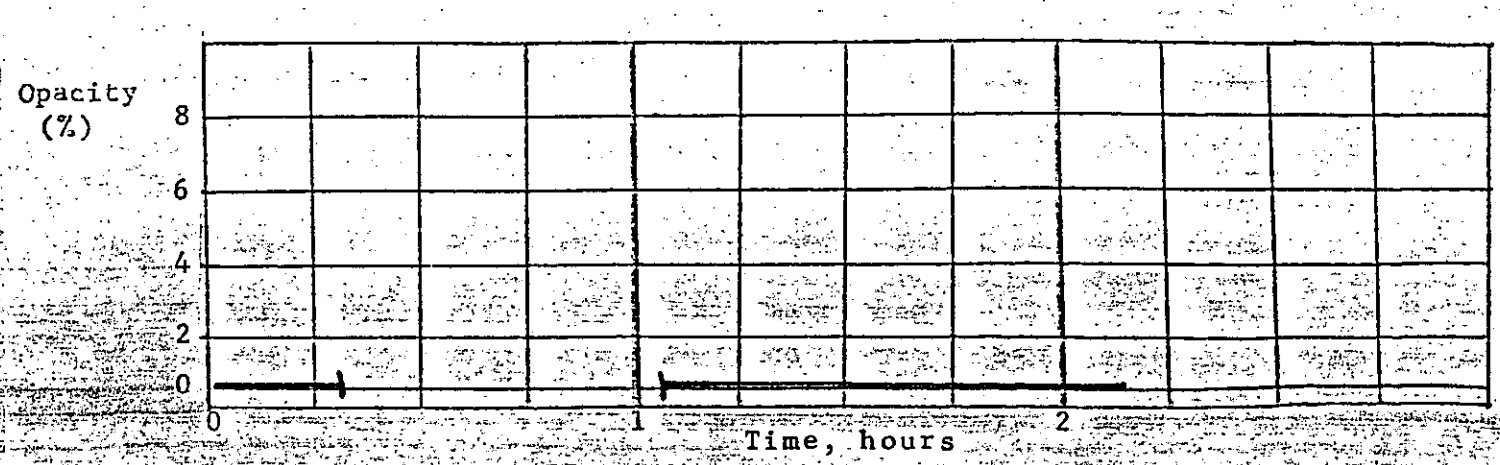


TABLE III-4

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/27/76
Type of Plant: IMC Feldspar
Type of Discharge: Conveyor Transfer
Location of Discharge: TP-1
Height of Point of Discharge: 10'
Description of Sky: Overcast
Wind Direction: NE
Wind Velocity: 0-5 mi/hr
Color of Plume: No visible plume
Detached Plume: N/A
Observer No.: 1
Duration of Observation: approx. 1-1/4 hrs.
Distance from Observer to Discharge Point: approx. 50'
Direction of Observer from Discharge Point: SE
Height of Observation Point: Ground level
Description of Background: Quarry Wall

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	10:41	10:47	N	N	21				
2	10:47	10:53	N	N	22				
3	11:45	11:51	N	N	23				
4	11:51	11:57	N	N	24				
5	11:57	12:03	N	N	25				
6	12:03	12:09	N	N	26				
7	12:09	12:15	N	N	27				
8	12:15	12:21	N	N	28				
9	12:21	12:27	N	N	29				
10	12:27	12:33	N	N	30				
11	12:33	12:39	N	N	31				
12	12:39	12:45	N	N	32				
13	12:45	12:50	N	N	33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

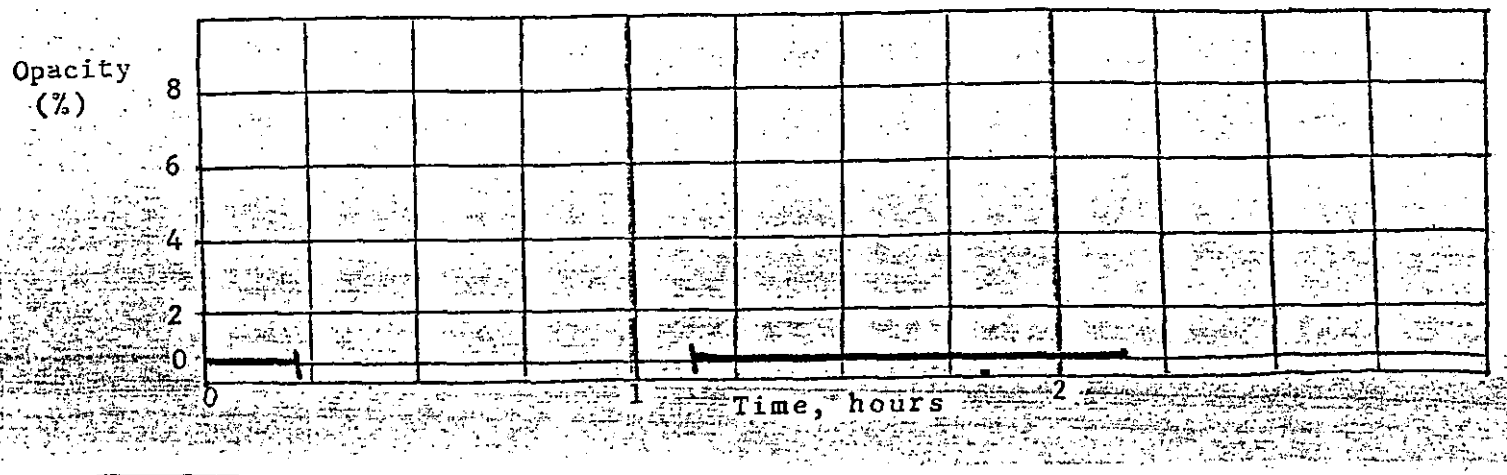


TABLE III-5

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/27/76
Type of Discharge: Conveyor Transfer
Height of Point of Discharge: 40'
Wind Direction: NNW
Color of Plume: No visible plume
Observer No.: 1
Type of Plant: IMC Feldspar
Location of Discharge: TP-2
Description of Sky: Partly Cloudy-Overcast
Wind Velocity: 0-10 mi/hr
Detached Plume: N/A
Duration of Observation: approx. 1-1/2 hrs.
Distance from Observer to Discharge Point: approx. 50'
Direction of Observer from Discharge Point: SE
Height of Observation Point: Ground level
Description of Background: Quarry wall

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	13:17	13:23	N	N	21				
2	13:23	13:29	N	N	22				
3	13:29	13:35	N	N	23				
4	13:35	13:41	N	N	24				
5	13:41	13:47	N	N	25				
6	13:47	13:52	N	N	26				
7	14:08	14:14	N	N	27				
8	14:14	14:20	N	N	28				
9	14:20	14:26	N	N	29				
10	14:26	14:32	N	N	30				
11	14:32	14:38	N	N	31				
12	14:38	14:44	N	N	32				
13	14:44	14:50	N	N	33				
14	14:50	14:56	N	N	34				
15	14:56	15:00	N	N	35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

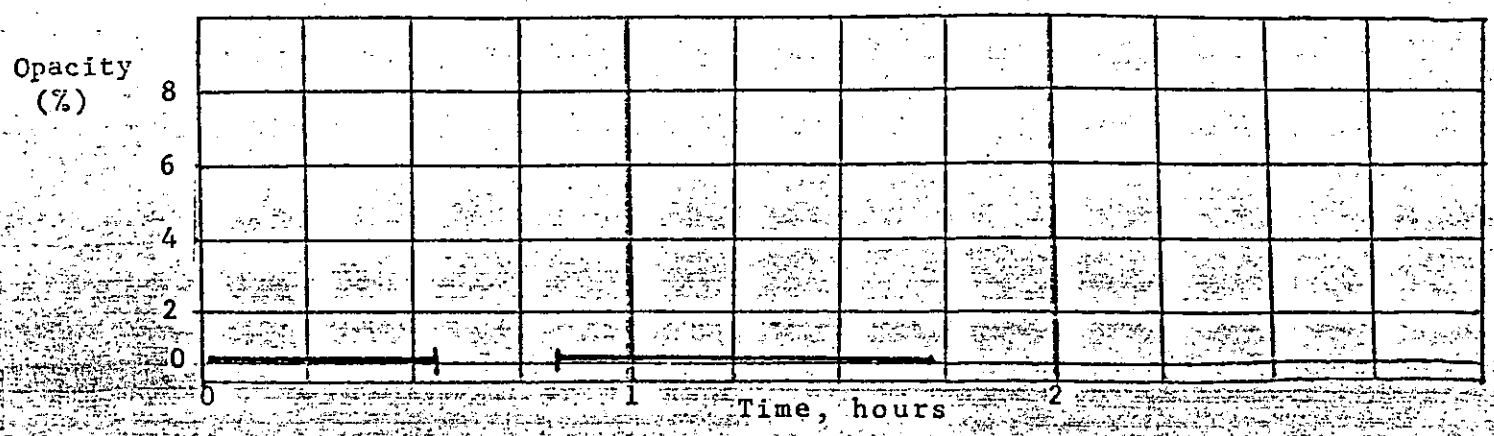


TABLE III-6

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/27/76
Type of Discharge: Conveyor Transfer
Height of Point of Discharge: 10'
Wind Direction: N
Color of Plume: No visible plume
Observer No.: 2
Type of Plant: IMC Feldspar
Location of Discharge: TP-4
Description of Sky: Cloudy
Wind Velocity: 0-7 mi/hr
Detached Plume: N/A
Duration of Observation: approx. 1 hr.
Distance from Observer to Discharge Point: approx. 75'
Direction of Observer from Discharge Point: approx. 75' SE
Height of Observation Point: Ground level
Description of Background: Cliffor Wall

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	13:18	13:23	N	N	21				
2	13:24	13:29	N	N	22				
3	13:30	13:35	N	N	23				
4	13:36	13:41	N	N	24				
5	13:42	13:47	N	N	25				
6	13:48	13:51	N	N	26				
7	14:11	14:16	N	N	27				
8	14:17	14:22	N	N	28				
9	14:23	14:28	N	N	29				
10	14:29	14:34	N	N	30				
11	14:35	14:40	N	N	31				
12	14:41	14:46	N	N	32				
13	14:47	14:52	N	N	33				
14	14:53	14:58	N	N	34				
15	14:59	15:01	N	N	35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

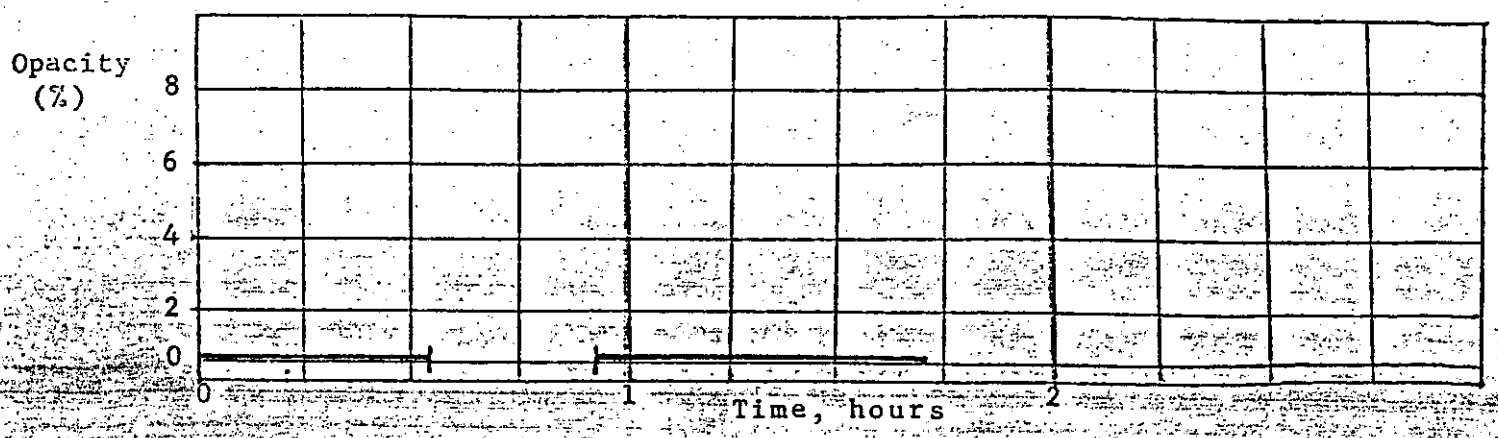


TABLE III-7

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/28/76
Type of Plant: IMC Feldspar
Type of Discharge: Outlet Stack
Location of Discharge: No. 2 Mill Baghouse
Height of Point of Discharge: 100'
Description of Sky: Overcast
Wind Direction: NW
Wind Velocity: 0-10 mi/hr
Color of Plume: No visible plume
Detached Plume: N/A
Observer No.: 1
Duration of Observation: 2-1/4 hrs.
Distance from Observer to Discharge Point: approx. 40'
Direction of Observer from Discharge Point: E
Height of Observation Point: approx. 100'
Description of Background: trees on hillside

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	09:48	09:54	N	N	21	11:48	11:54	N	N
2	09:54	10:00	N	N	22	11:54	12:00	N	N
3	10:00	10:06	N	N	23	12:00	12:06	N	N
4	10:06	10:12	N	N	24				
5	10:12	10:18	N	N	25				
6	10:18	10:24	N	N	26				
7	10:24	10:30	N	N	27				
8	10:30	10:36	N	N	28				
9	10:36	10:42	N	N	29				
10	10:42	10:48	N	N	30				
11	10:48	10:54	N	N	31				
12	10:54	11:00	N	N	32				
13	11:00	11:06	N	N	33				
14	11:06	11:12	N	N	34				
15	11:12	11:18	N	N	35				
16	11:18	11:24	N	N	36				
17	11:24	11:30	N	N	37				
18	11:30	11:36	N	N	38				
19	11:36	11:42	N	N	39				
20	11:42	11:48	N	N	40				

Sketch Showing How Opacity Varied With Time:

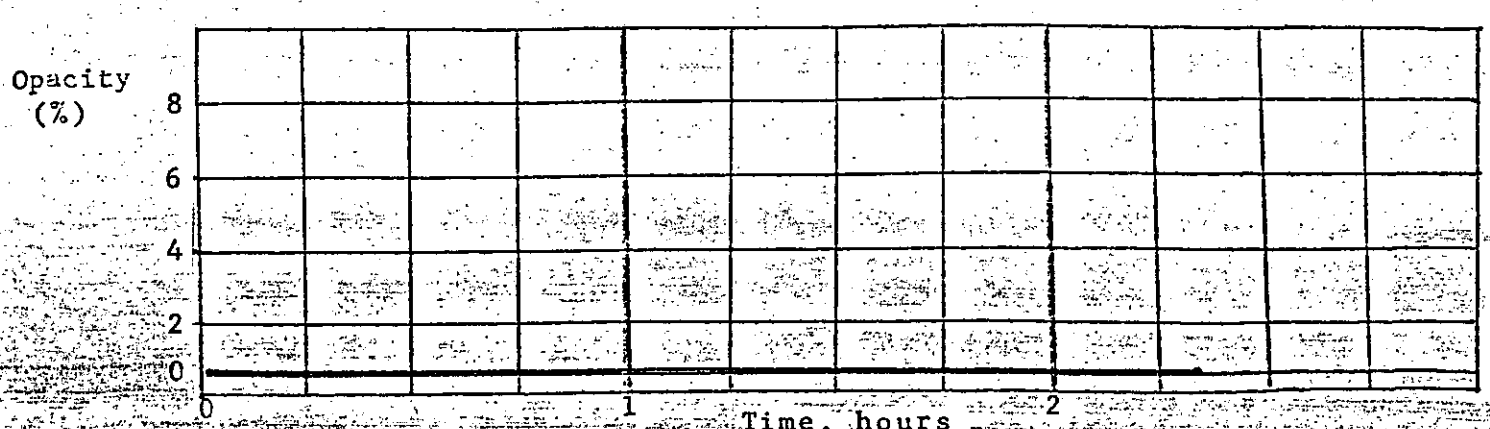


TABLE III-8

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/28/76
Type of Discharge: Outlet Stack
Height of Point of Discharge: 100'
Wind Direction: NW
Color of Plume: No visible plume
Observer No.: 1
Type of Plant: IMC Feldspar
Location of Discharge: No. 2 Mill Baghouse
Description of Sky: Partly cloudy
Wind Velocity: 0-15 mi/hr
Detached Plume: N/A
Duration of Observation: approx. 2-1/4 hrs.
Distance from Observer to Discharge Point: approx. 40'SE
Direction of Observer from Discharge Point: SE
Height of Observation Point: approx. 100'
Description of Background: grassy hillside

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	14:48	14:54	N	N	21	16:48	16:54	N	N
2	14:54	15:00	N	N	22	16:54	17:00	N	N
3	15:00	15:06	N	N	23				
4	15:06	15:12	N	N	24				
5	15:12	15:18	N	N	25				
6	15:18	15:24	N	N	26				
7	15:24	15:30	N	N	27				
8	15:30	15:36	N	N	28				
9	15:36	15:42	N	N	29				
10	15:42	15:48	N	N	30				
11	15:48	15:54	N	N	31				
12	15:54	16:00	N	N	32				
13	16:00	16:06	N	N	33				
14	16:06	16:12	N	N	34				
15	16:12	16:18	N	N	35				
16	16:18	16:24	N	N	36				
17	16:24	16:30	N	N	37				
18	16:30	16:36	N	N	38				
19	16:36	16:42	N	N	39				
20	16:42	16:48	N	N	40				

Sketch Showing How Opacity Varied With Time:

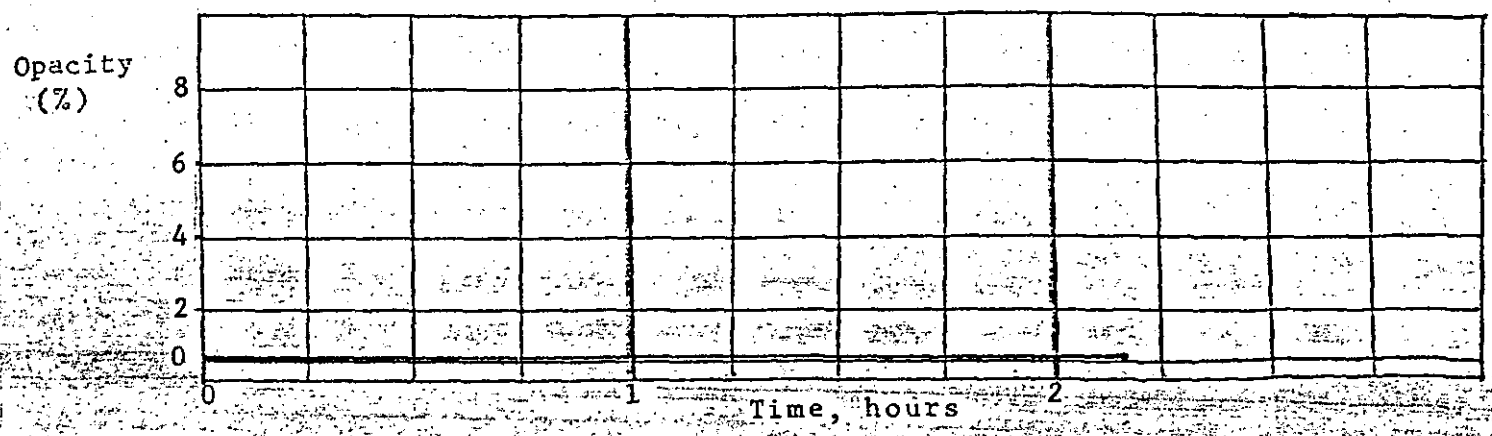


TABLE III-9

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/29/76
Type of Plant: IMC Feldspar
Type of Discharge: Outlet Stack
Location of Discharge: No. 2 Mill Baghouse
Height of Point of Discharge: 100'
Description of Sky: Cloudy
Wind Direction: NE
Wind Velocity: 0-5 mi/hr
Color of Plume: No visible plume
Detached Plume: N/A
Observer No.: 2
Duration of Observation: 2 hrs.
Distance from Observer to Discharge Point: approx. 50'
Direction of Observer from Discharge Point: same level as discharge
Height of Observation Point: hillside with trees
Description of Background:

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	08:35	08:40	N	N	21	10:35	10:37	N	N
2	08:41	08:46	N	N	22				
3	08:47	08:52	N	N	23				
4	08:53	08:58	N	N	24				
5	08:59	09:04	N	N	25				
6	09:05	09:10	N	N	26				
7	09:11	09:16	N	N	27				
8	09:17	09:22	N	N	28				
9	09:23	09:28	N	N	29				
10	09:29	09:34	N	N	30				
11	09:35	09:40	N	N	31				
12	09:41	09:46	N	N	32				
13	09:47	09:52	N	N	33				
14	09:53	09:58	N	N	34				
15	09:59	10:04	N	N	35				
16	10:05	10:10	N	N	36				
17	10:11	10:16	N	N	37				
18	10:17	10:22	N	N	38				
19	10:23	10:28	N	N	39				
20	10:29	10:34	N	N	40				

Sketch Showing How Opacity Varied With Time:

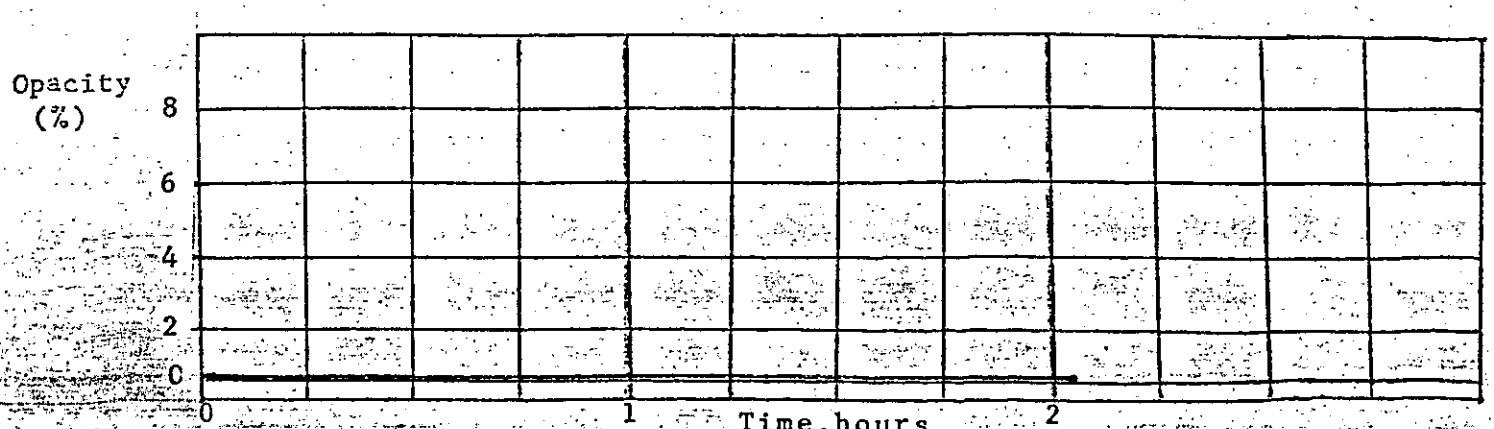


TABLE III-10

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/28/76
Type of Plant: IMC Feldspar
Type of Discharge: Feldspar loading
Location of Discharge: Truck & Frt. Car
Height of Point of Discharge: 15'
Description of Sky: N/A
Wind Direction: N/A
Wind Velocity: N/A
Color of Plume: N/A
Detached Plume: N/A
Observer No.: 2
Duration of Observation: approx. 3/4 hr.
Distance from Observer to Discharge Point: approx. 25'
Direction of Observer from Discharge Point: E
Height of Observation Point: Ground level
Description of Background: Building Wall

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	09:03	09:09	N	N	21				
2	09:09	09:15	0	0	22				
3	12:09	12:15	0	0	23				
4	12:15	12:21	5	0.21	24				
5	12:21	12:27	30	1.25	25				
6	12:27	12:33	30	1.25	26				
7	12:33	12:39	40	1.67	27				
8					28				
9					29				
10					30				
11					31				
12					32				
13					33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

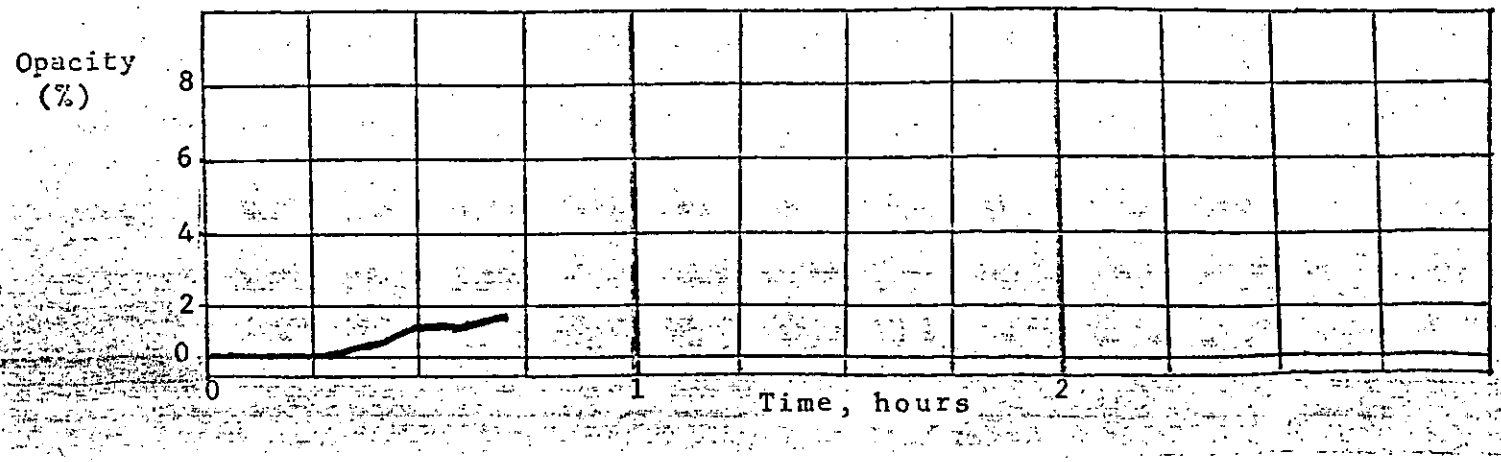


TABLE III-11

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/28/76 Type of Plant: IMC Feldspar
Type of Discharge: Indoor Transfer Pts. Location of Discharge: TP-1, TP-2, TP-3
Height of Point of Discharge: Variable Description of Sky: N/A
Wind Direction: N/A Wind Velocity: N/A
Color of Plume: No visible plume Detached Plume: N/A
Observer No.: 2 Duration of Observation: 3 hrs.
Distance from Observer to Discharge Point: 6'-35'
Direction of Observer from Discharge Point: N/A
Height of Observation Point:
Description of Background: Building walls and equipment structures

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average	Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	13:45	13:51	N	N	21	16:00	16:06	N	N
2	13:51	13:57	N	N	22	16:06	16:12	N	N
3	13:57	14:03	N	N	23	16:12	16:18	N	N
4	14:03	14:09	N	N	24	16:18	16:24	N	N
5 TP-3	14:09	14:15	N	N	25 TP-4	16:24	16:30	N	N
6	14:15	14:21	N	N	26	16:30	16:36	N	N
7	14:21	14:27	N	N	27	16:36	16:42	N	N
8	14:27	14:33	N	N	28	16:42	16:48	N	N
9	14:33	14:39	N	N	29	16:48	16:54	N	N
10	14:39	14:45	N	N	30	16:54	17:00	N	N
11	15:00	15:06	N	N	31				
12	15:06	15:12	N	N	32				
13	15:12	15:18	N	N	33				
14	15:18	15:24	N	N	34				
15	15:24	15:30	N	N	35				
16 TP-2	15:30	15:36	N	N	36				
17	15:36	15:42	N	N	37				
18	15:42	15:48	N	N	38				
19	15:48	15:54	N	N	39				
20	15:54	16:00	N	N	40				

Sketch Showing How Opacity Varied With Time:

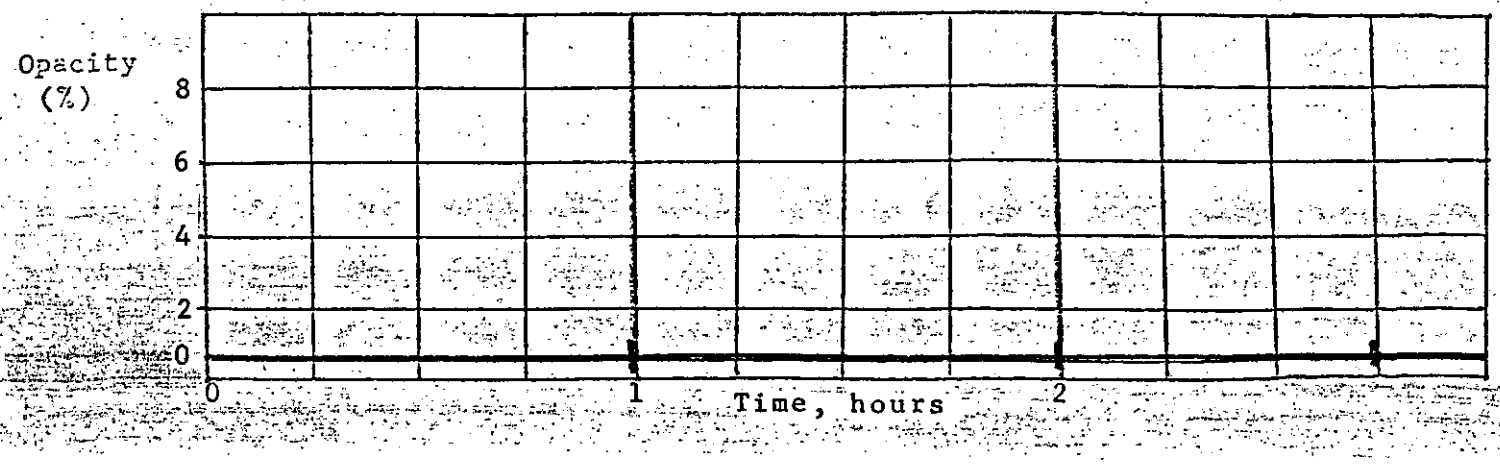


TABLE III-12

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/28/76
Type of Discharge: Conveyor Transfer
Height of Point of Discharge: 20'
Wind Direction: N/A
Color of Plume: No visible plume
Observer No.: 2
Distance from Observer to Discharge Point: 35'
Direction of Observer from Discharge Point: N/A
Height of Observation Point:
Description of Background: Building and equipment structures

Type of Plant: IMC Feldspar
Location of Discharge: TP-4, TP-5
Description of Sky: N/A
Wind Velocity: N/A
Detached Plume: N/A
Duration of Observation: 2 hrs.

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average	Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	09:30	09:36	N	N	21				
2	09:36	09:42	N	N	22				
3	09:42	09:48	N	N	23				
4	09:48	09:54	N	N	24				
5	09:54	10:00	N	N	25				
6 TP-5	10:00	10:06	N	N	26				
7	10:06	10:12	N	N	27				
8	10:12	10:18	N	N	28				
9	10:18	10:24	N	N	29				
10	10:24	10:30	N	N	30				
11	10:51	10:57	N	N	31				
12	10:57	11:03	N	N	32				
13	11:03	11:09	N	N	33				
14	11:09	11:15	N	N	34				
15 TP-4	11:15	11:21	N	N	35				
16	11:21	11:27	N	N	36				
17	11:27	11:33	N	N	37				
18	11:33	11:39	N	N	38				
19	11:39	11:45	N	N	39				
20	11:45	11:50	N	N	40				

Sketch Showing How Opacity Varied With Time:

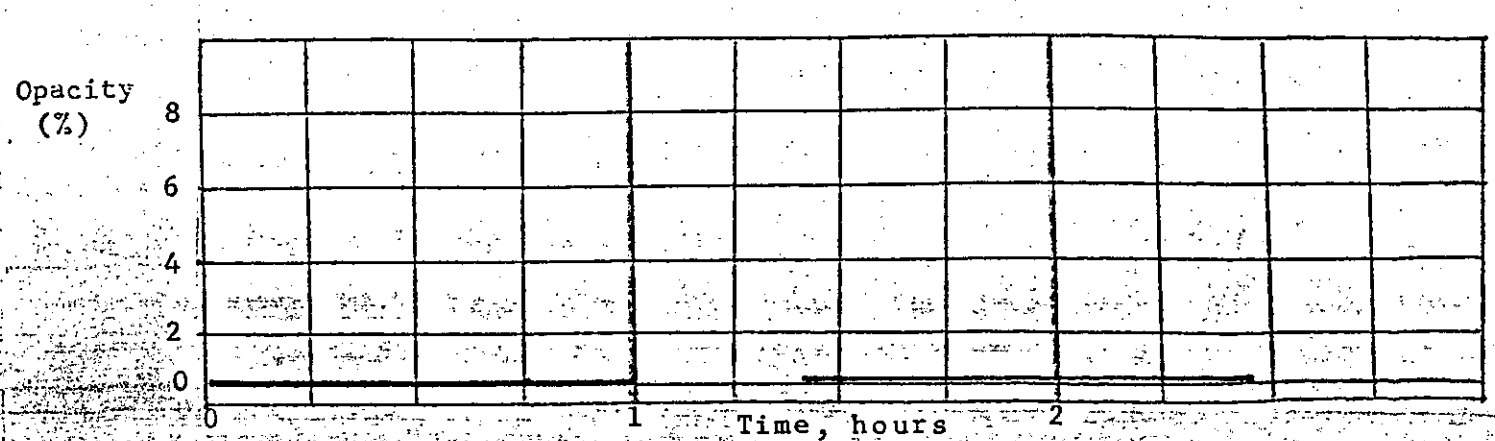


TABLE III-13

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/29/76
Type of Plant: IMC Feldspar
Type of Discharge: Fugitive Emissions
Location of Discharge: W. Building Wall
Height of Point of Discharge: 0-90'
Description of Sky: Overcast
Wind Direction: E
Wind Velocity: 0-5 mi/hr
Color of Plume: No visible plume
Detached Plume: N/A
Observer No.: 1
Duration of Observation: 1 hr.
Distance from Observer to Discharge Point: approx. 75'*
Direction of Observer from Discharge Point: S
Height of Observation Point: Ground level
Description of Background: Sky and building exterior. All windows and door open
* Two windows at ground level. One door at upper level.

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	08:45	08:51	N	N	21				
2	08:51	08:57	N	N	22				
3	08:57	09:03	N	N	23				
4	09:03	09:09	N	N	24				
5	09:09	09:15	N	N	25				
6	09:15	09:21	N	N	26				
7	09:21	09:27	N	N	27				
8	09:27	09:33	N	N	28				
9	09:33	09:39	N	N	29				
10	09:39	09:45	N	N	30				
11					31				
12					32				
13					33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

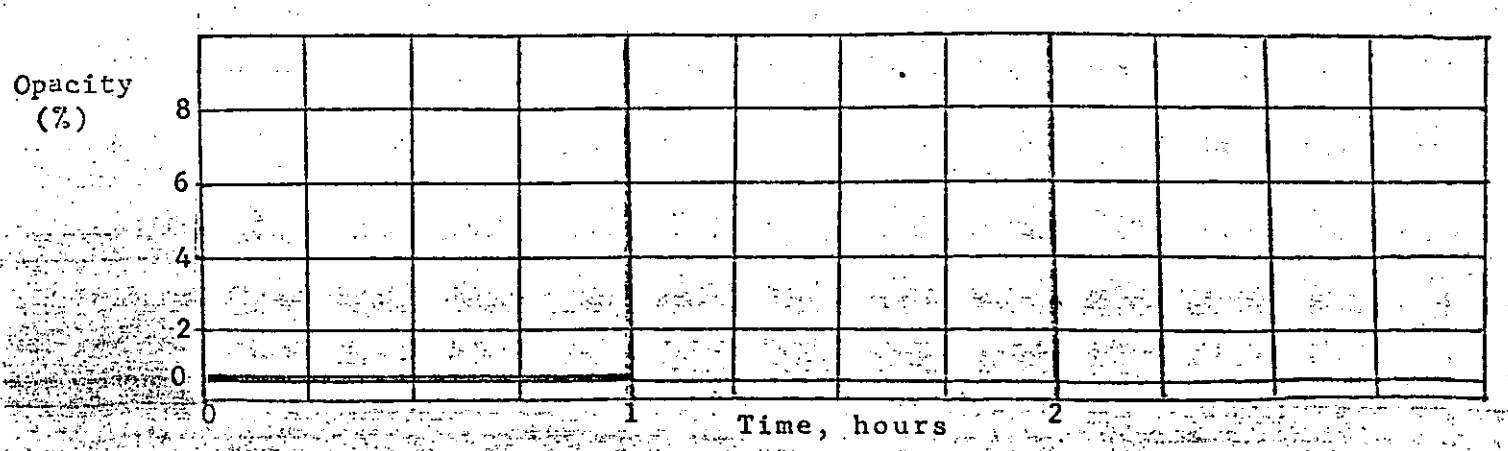


TABLE III-14

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/29/76
Type of Plant: IMC Feldspar
Type of Discharge: Fugitive Emissions
Location of Discharge: E. Building Wall
Height of Point of Discharge: ____
Description of Sky: Overcast
Wind Direction: E-NE
Wind Velocity: 0-5 mi/hr
Color of Plume: No visible plume
Detached Plume: N/A
Observer No.: 1
Duration of Observation: 1 hr.
Distance from Observer to Discharge Point: approx. 75'*
Direction of Observer from Discharge Point: S
Height of Observation Point: Ground level
Description of Background: Sky, trees on hillside

* Four windows, three upper, and one ground level. Two doors at upper level

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	09:50	09:56	N	N	21				
2	09:56	10:02	N	N	22				
3	10:02	10:08	N	N	23				
4	10:08	10:14	N	N	24				
5	10:14	10:20	N	N	25				
6	10:20	10:26	N	N	26				
7	10:26	10:32	N	N	27				
8	10:32	10:38	N	N	28				
9	10:38	10:44	N	N	29				
10	10:44	10:50	N	N	30				
11					31				
12					32				
13					33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

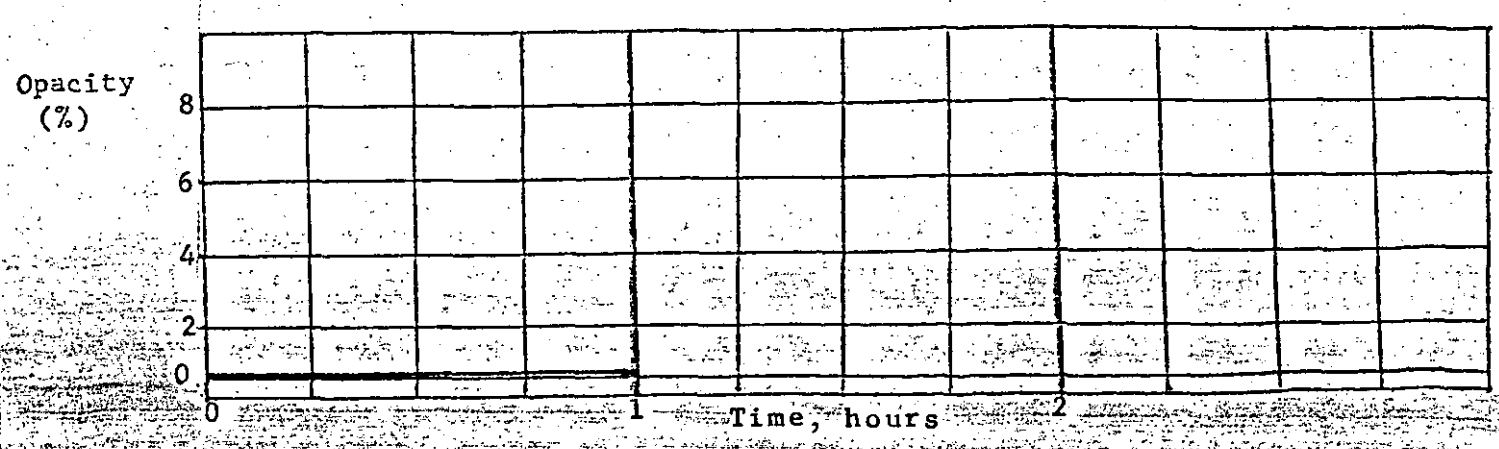


TABLE III-15

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/29/76
Type of Plant: IMC Feldspar
Type of Discharge: Fugitive Emissions
Location of Discharge: S. Building Wall
Height of Point of Discharge: 0-90'
Description of Sky: Overcast
Wind Direction: NE
Wind Velocity: 0-5mi/hr
Color of Plume: No visible plume
Detached Plume: N/A
Observer No.: 1
Duration of Observation: 1 hr.
Distance from Observer to Discharge Point: approx. 75'*
Direction of Observer from Discharge Point: W
Height of Observation Point: approx. 40'
Description of Background: Sky and trees

*Four windows on upper level. One window, one large and one small door at ground level. All windows and doors are open.

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	10:55	11:01	N	N	21				
2	11:01	11:07	N	N	22				
3	11:07	11:13	N	N	23				
4	11:13	11:19	N	N	24				
5	11:19	11:25	N	N	25				
6	11:25	11:31	N	N	26				
7	11:31	11:37	N	N	27				
8	11:37	11:43	N	N	28				
9	11:43	11:49	N	N	29				
10	11:49	11:55	N	N	30				
11					31				
12					32				
13					33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

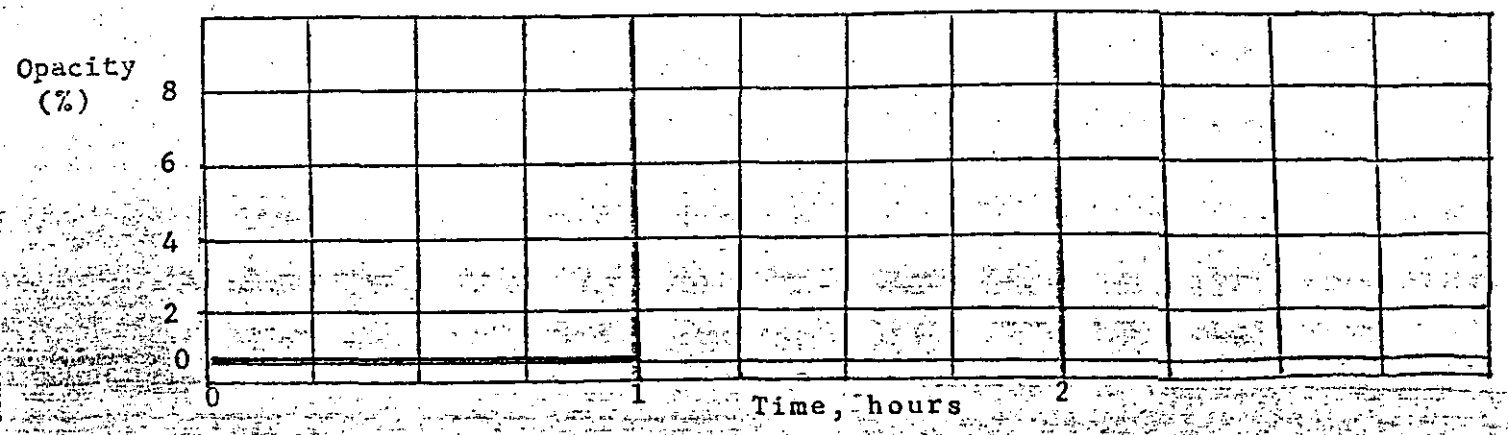


TABLE III-16

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/29/76
Type of Plant: IMC Feldspar
Type of Discharge: Fugitive Emissions
Location of Discharge: N. Building Wall
Height of Point of Discharge: 0-90'
Description of Sky: Overcast
Wind Direction: NE
Wind Velocity: 0-10 mi/hr
Color of Plume: No visible plume
Detached Plume: N/A
Observer No.: 1
Duration of Observation: 1 hr.
Distance from Observer to Discharge Point: approx. 100'*
Direction of Observer from Discharge Point: W
Height of Observation Point: approx. 20'
Description of Background: Sky, trees, gray storage silo

* Four open windows at upper level

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	14:00	14:06	N	N	21				
2	14:06	14:12	N	N	22				
3	14:12	14:18	N	N	23				
4	14:18	14:24	N	N	24				
5	14:24	14:30	N	N	25				
6	14:30	14:36	N	N	26				
7	14:36	14:42	N	N	27				
8	14:42	14:48	N	N	28				
9	14:48	14:54	N	N	29				
10	14:54	15:00	N	N	30				
11					31				
12					32				
13					33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:

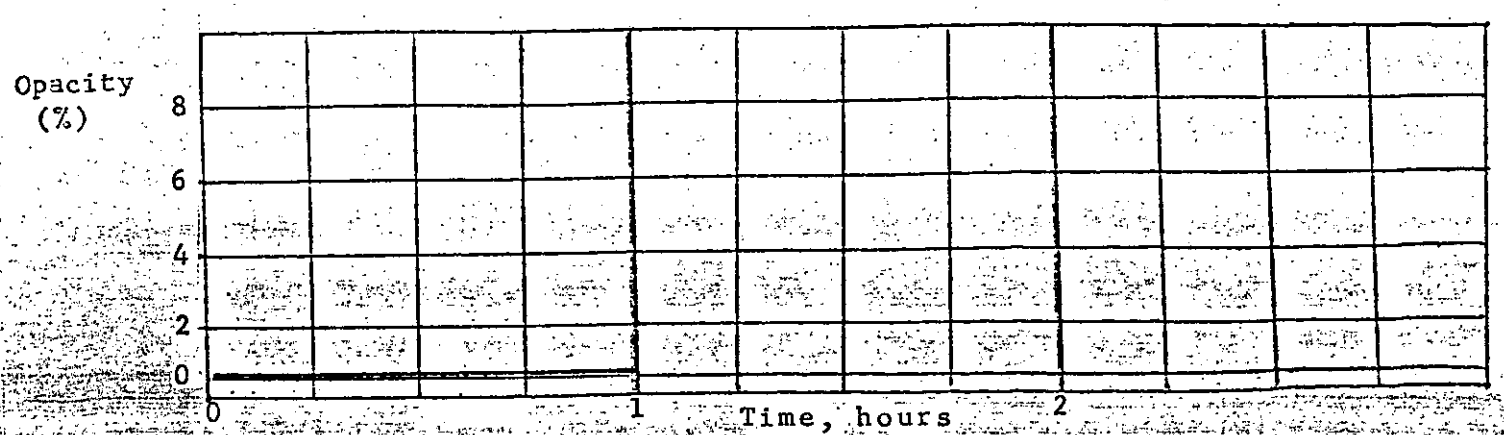


TABLE III-17

SUMMARY OF VISIBLE EMISSIONS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina

Date: 9/29/76
Type of Discharge: Fugitive Dust
Height of Point of Discharge: 100-125'
Wind Direction: NE
Color of Plume: White-grey
Observer No.: 2

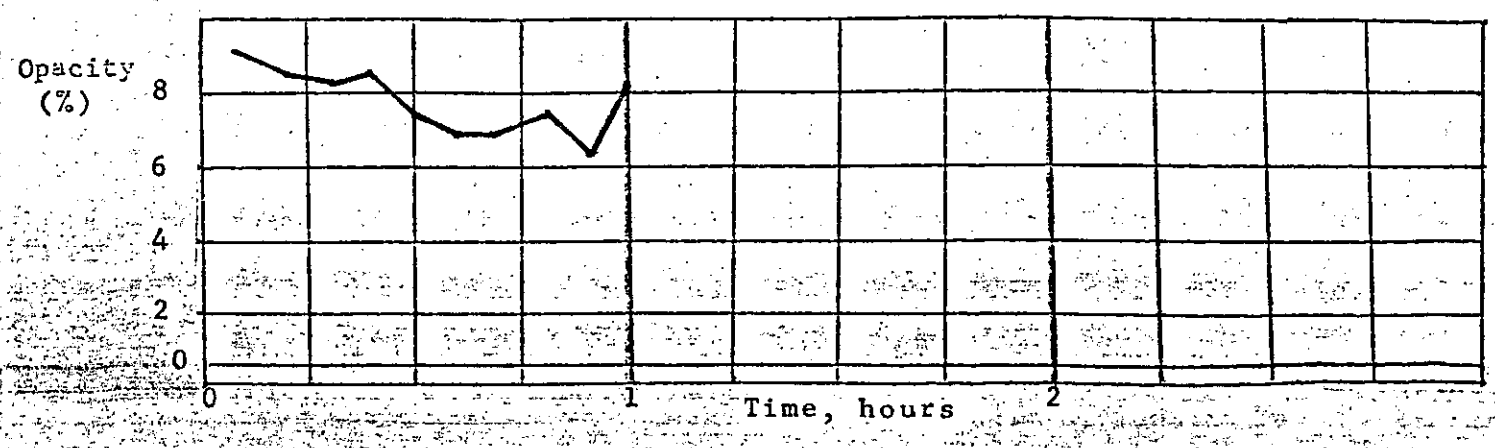
Type of Plant: IMC Feldspar
Location of Discharge: Entire Roof
Description of Sky: Cloudy
Wind Velocity: 0-5 mi/hr
Detached Plume: N/A
Duration of Observation: 58 mins.

Distance from Observer to Discharge Point: approx. 300'
Direction of Observer from Discharge Point: E. of discharge point
Height of Observation Point: Eye-level with discharge pt.
Description of Background: Hillside with trees

SUMMARY OF AVERAGE OPACITY

Set Number	Time		Opacity		Set Number	Time		Opacity	
	Start	End	Sum	Average		Start	End	Sum	Average
1	11:00	11:05	230	9.6	21				
2	11:06	11:11	205	8.5	22				
3	11:12	11:17	200	8.3	23				
4	11:18	11:23	205	8.5	24				
5	11:24	11:29	185	7.7	25				
6	11:30	11:35	170	7.1	26				
7	11:36	11:41	170	7.1	27				
8	11:42	11:47	185	7.7	28				
9	11:48	11:53	150	6.3	29				
10	11:54	11:57	130	8.1	30				
11					31				
12					32				
13					33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:



from five to 15 percent opacity was observed emanating from the building roof. The six-minute average opacities for the roof ranged from 6.3 to 9.6 percent.

Opacity measurements taken for the baghouse outlet stack were simultaneous with the three, two-hour particulate tests taken at the baghouse outlet. The absence of visible emissions at this site correlates well with the low measured emission rates.

Particle Size Sampling Results

Tables IV-1 and IV-2 present the results of the combination of microsieve analysis and electronic particle counting for the particle size samples taken at the North and South Baghouse Inlets, respectively. Figures 3 and 4 present graphical representations of these two distributions. Figure 3 indicates that approximately 73 percent of the particulate weight was attributable to particles greater than 10 microns in diameter at the North Inlet, while Figure 4 shows that at the South Inlet, approximately 63 percent of the particles (by weight) was greater than 10 microns in diameter.

TABLE IV-1

PARTICLE SIZE DISTRIBUTION
NO. 2 MILL BAGHOUSE NORTH INLET

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

Characteristic Diameter of Particles (microns)	Weight (gm)	Size Distribution by Weight	
		Percent	Cumulative Percent
>45	11.400	34.2	100.0
30 - 45	4.175	12.5	65.8
20 - 30	3.345	10.0	53.3
10 - 20	7.834	23.5	43.3
8.0 - 10	0.147	0.4	19.8
6.3 - 8.0	0.405	1.2	19.4
5.0 - 6.3	0.710	2.1	18.2
4.0 - 5.0	0.666	2.0	16.1
3.2 - 4.0	0.841	2.5	14.1
2.5 - 3.2	1.028	3.1	11.6
2.0 - 2.5	0.902	2.7	8.5
1.6 - 2.0	0.621	1.9	5.8
1.3 - 1.6	0.349	1.1	3.9
1.0 - 1.3	0.401	1.2	2.8
0.5 - 1.0	0.396	1.2	1.6
<0.5	0.119	0.4	0.4
TOTAL	33.339	100.0	—

TABLE IV-2

PARTICLE SIZE DISTRIBUTION
NO. 2 MILL BAGHOUSE SOUTH INLET

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

Characteristic Diameter of Particles (microns)	Weight (gm)	Size Distribution by Weight	
		Percent	Cumulative Percent
>45	0.366	25.7	100.0
30 - 45	0.271	19.1	74.3
20 - 30	0.233	16.4	55.2
10 - 20	0.141	9.9	38.8
5.0 - 10	0.094	6.6	28.9
4.0 - 5.0	0.006	0.4	22.3
3.2 - 4.0	0.016	1.1	21.9
2.5 - 3.2	0.030	2.1	20.8
2.0 - 2.5	0.040	2.8	18.7
1.6 - 2.0	0.044	3.1	15.9
1.3 - 1.6	0.036	2.5	12.8
1.0 - 1.3	0.034	2.4	10.3
0.5 - 1.0	0.073	5.1	7.9
<0.5	0.039	2.8	2.8
TOTAL	1.423	100.0	—

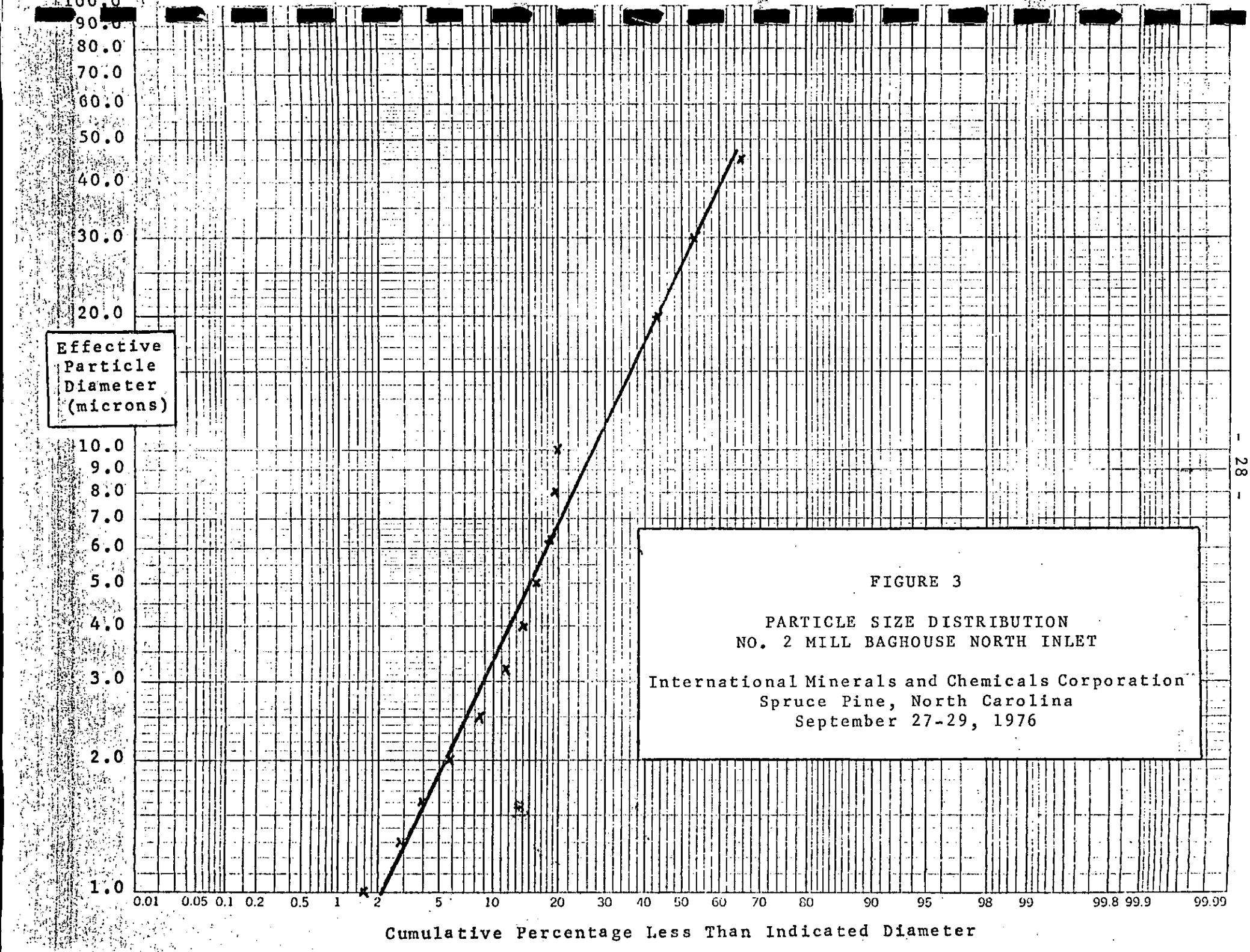


FIGURE 3

PARTICLE SIZE DISTRIBUTION
NO. 2 MILL BAGHOUSE NORTH INLET

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

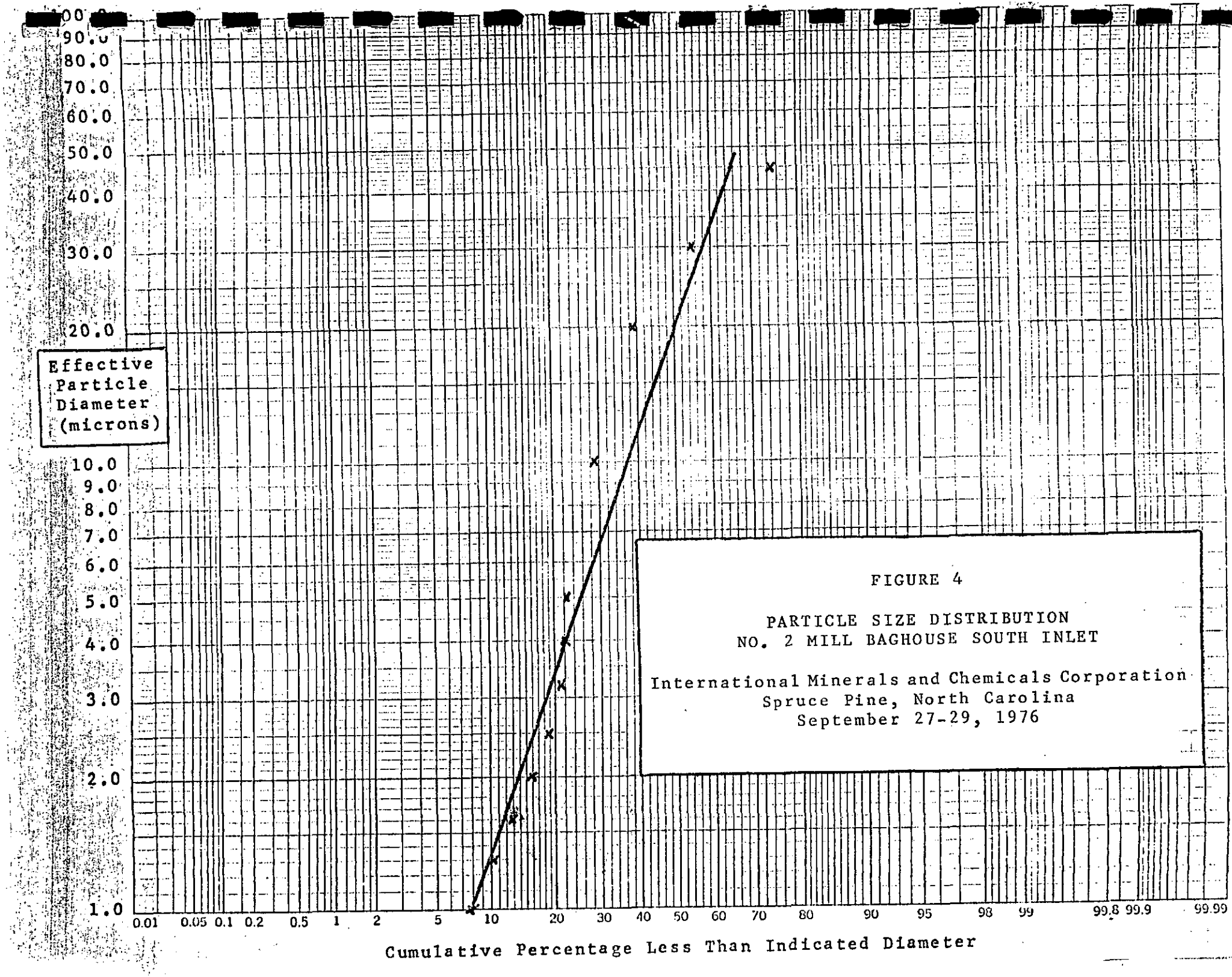


FIGURE 4

PARTICLE SIZE DISTRIBUTION
NO. 2 MILL BAGHOUSE SOUTH INLET

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

III. PROCESS DESCRIPTION AND OPERATION

(To be supplied by EPA)

IV. LOCATION OF SAMPLING POINTS

Figure 5 depicts the positions of the ports used to sample the baghouse vertical outlet stack and the two horizontal inlet ducts. Each inlet and outlet duct is of cylindrical construction and thus each was sampled from two ports separated by 90 degrees, as required by EPA Method 1.

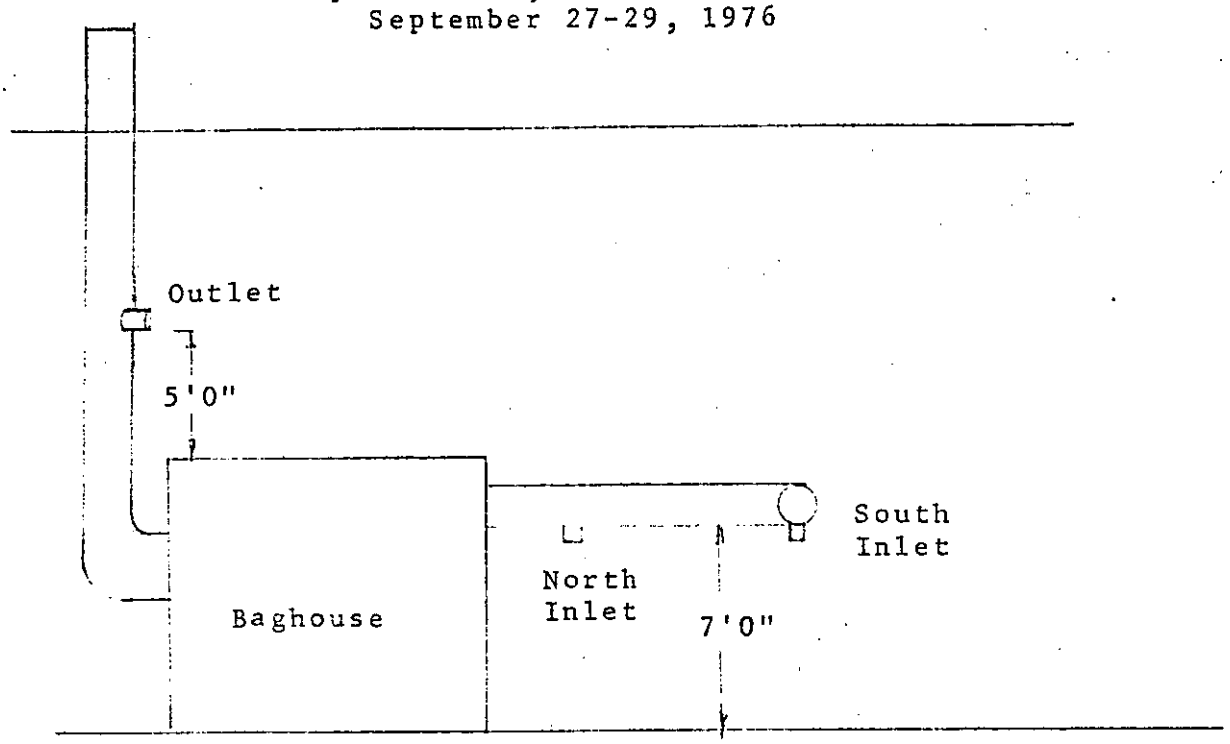
Figure 6 is a diagram of the sampling points used in sampling the 19-inch diameter vertical baghouse outlet duct. The duct was divided into equal annular areas and 24 points were sampled.

Figures 7 and 8 depict the sampling points on the north and south inlets, respectively. Again, each duct was divided into equal annular areas and a total of 24 points was sampled at each location.

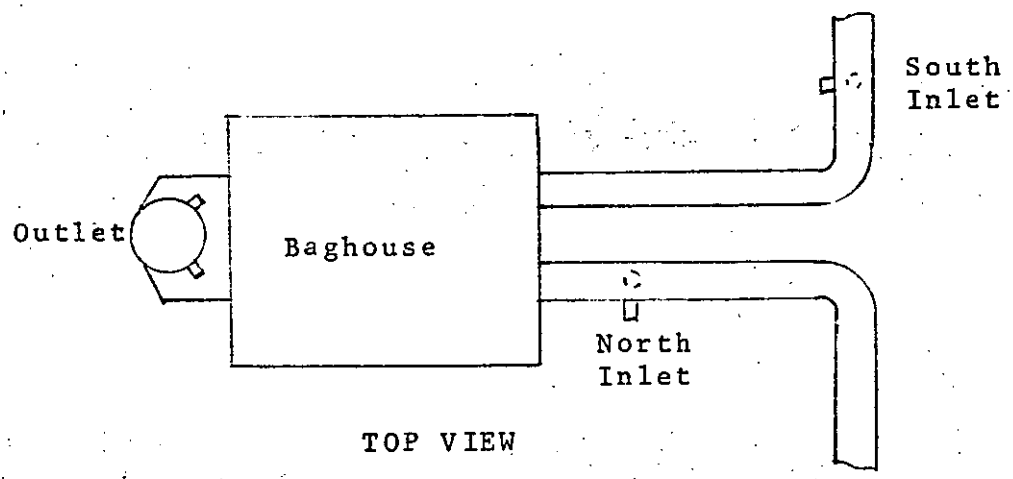
FIGURE 5

SCHEMATIC DIAGRAM OF BAGHOUSE INLET AND OUTLET DUCTS
NO. 2 MILL BAGHOUSE

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976



WEST SIDE VIEW



TOP VIEW

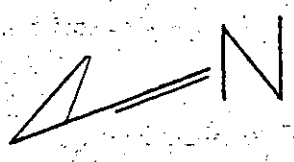
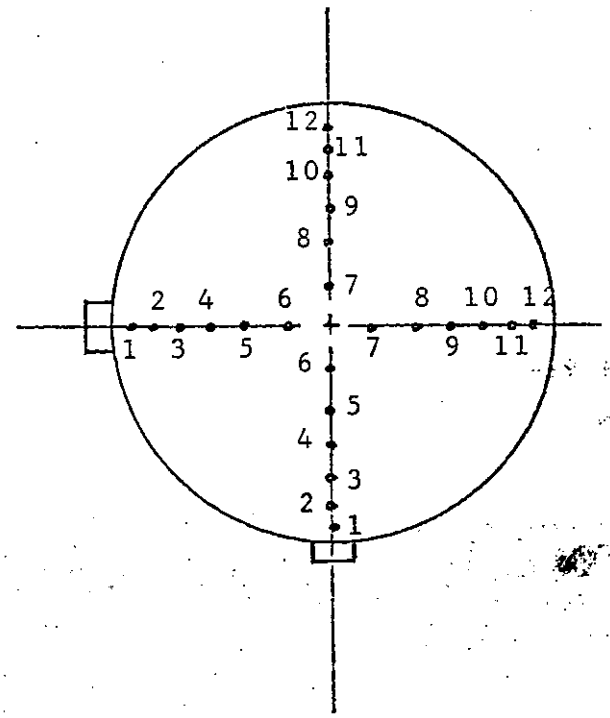


FIGURE 6

SCHEMATIC DIAGRAM OF SAMPLING POINT LOCATIONS
NO. 2 MILL BAGHOUSE OUTLET

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

Position	Distance (Inches)
1	0.38
2	1.27
3	2.24
4	3.36
5	4.75
6	6.73
7	12.27
8	14.25
9	15.64
10	16.76
11	17.73
12	18.62



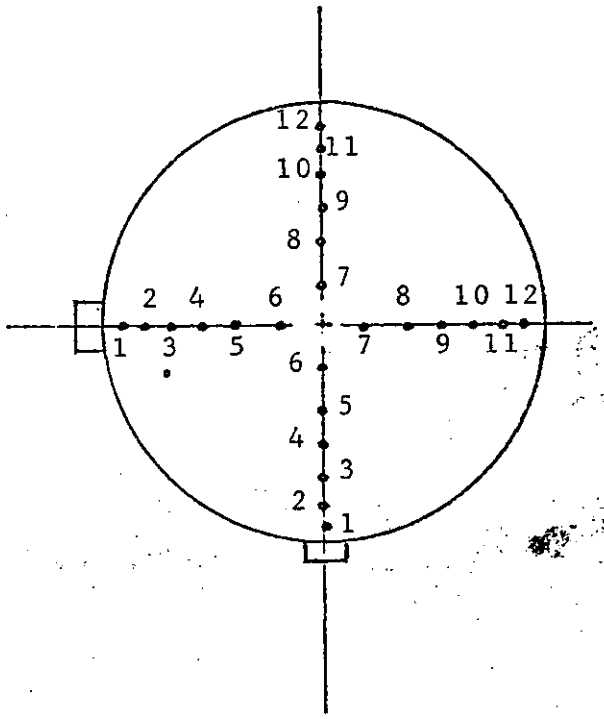
Duct Diameter: 19"

FIGURE 7

SCHEMATIC DIAGRAM OF SAMPLING POINT LOCATIONS
NO. 2 MILL BAGHOUSE NORTH INLET

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

Position	Distance (Inches)
1	0.25
2	0.80
3	1.42
4	2.12
5	3.00
6	4.26
7	7.74
8	9.00
9	9.88
10	10.58
11	11.20
12	11.75



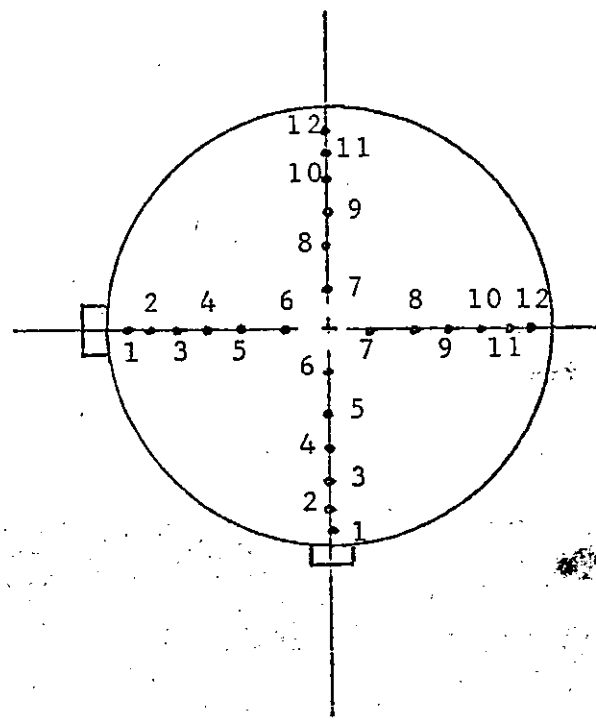
Duct Diameter: 12"

FIGURE 8

SCHEMATIC DIAGRAM OF SAMPLING POINT LOCATIONS
NO. 2 MILL BAGHOUSE SOUTH INLET

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

Position	Distance (Inches)
1	0.32
2	1.00
3	1.77
4	2.66
5	3.75
6	5.32
7	9.68
8	11.25
9	12.34
10	13.23
11	14.00
12	14.68



Duct Diameter: 15"

Clayton Environmental Consultants, Inc.

V. SAMPLING AND ANALYTICAL PROCEDURES

All samples obtained at the baghouse outlet duct followed the procedures outlined in EPA draft Method 17 (see Appendix B). In this instance, a 47-millimeter Gelman filter holder was employed for in-stack filtration, as shown in Figure 9.

The inlet test procedure was a modification of EPA Method 17. The in-stack filter holder was replaced by a section of teflon probe leading from the sampling nozzle out of the stack to a 110-millimeter stainless steel filter holder, as shown in Figure 10. Field data sheets for all particulate sampling are presented in Appendix C.

Particle size sampling at both inlet ducts employed an alundum thimble connected to the nozzle by a 12-inch section of stainless steel probe followed by a 47-millimeter type SGA filter contained in a stainless steel Gelman filter holder. This sampling train is shown in Figure 11. Only the contents of the thimble were retained for laboratory analysis by microsieving at the Clayton Environmental Consultants laboratory. The portion of the microsieve analyte found to be less than five microns was sent to Battelle Columbus Laboratories for further particle size determination by electronic particle counter methods. Field data sheets for all particle size sampling are presented in Appendix D.

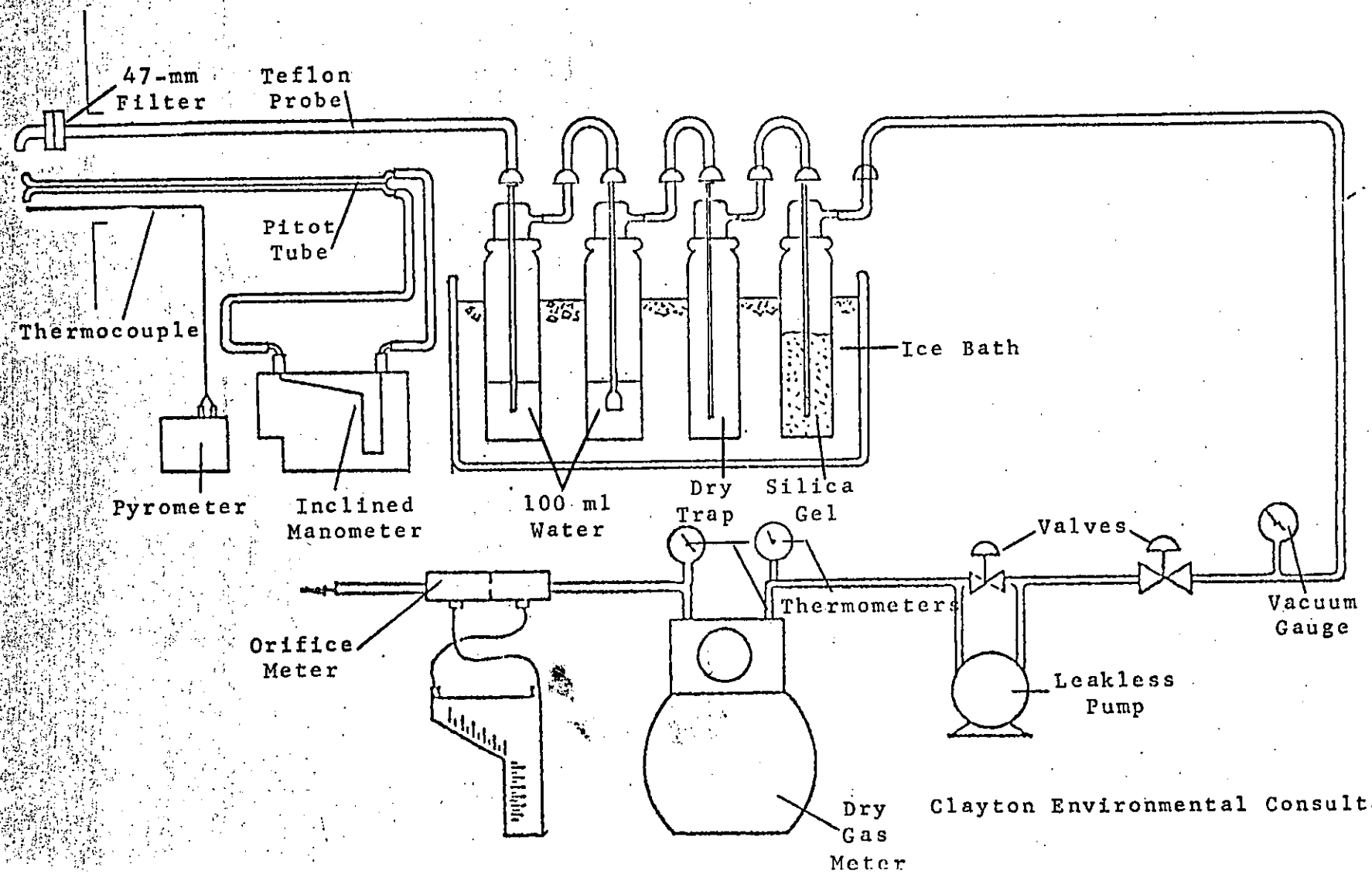
All opacity data were obtained according to EPA Method 9. Field data sheets for all visible emissions observations are included in Appendix E.

Appendix F contains the sampling summary sheets. Appendices G and H present the particulate weight data and the calibration data, respectively. Appendix I presents example calculations.

FIGURE 9

SCHEMATIC DIAGRAM OF PARTICULATE SAMPLING TRAIN
NO. 2 MILL BAGHOUSE OUTLET

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

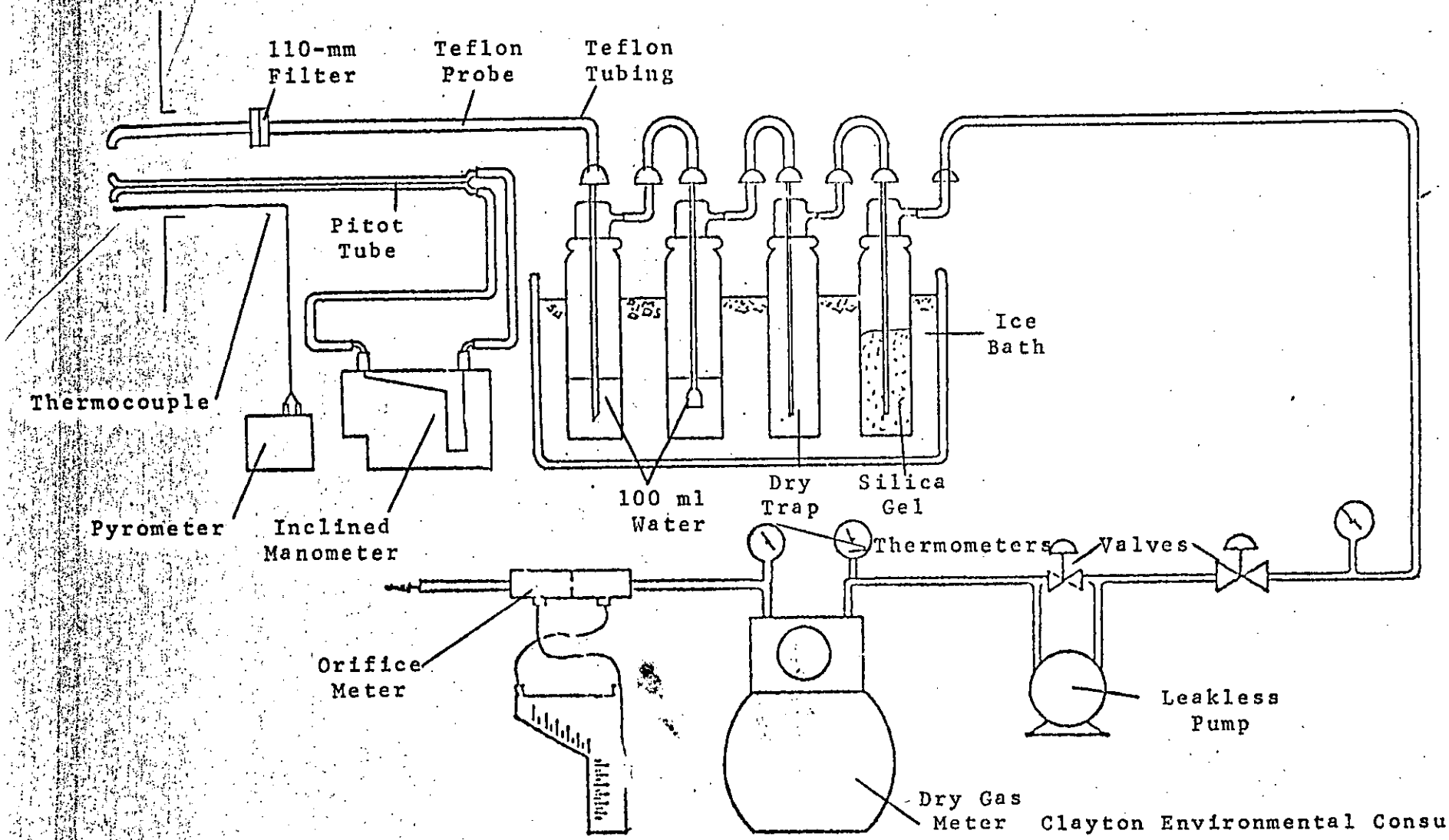


Clayton Environmental Consultants, Inc.

FIGURE 10

SCHEMATIC DIAGRAM OF PARTICULATE SAMPLING TRAIN
NO. 2 MILL BAGHOUSE NORTH AND SOUTH INLETS

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

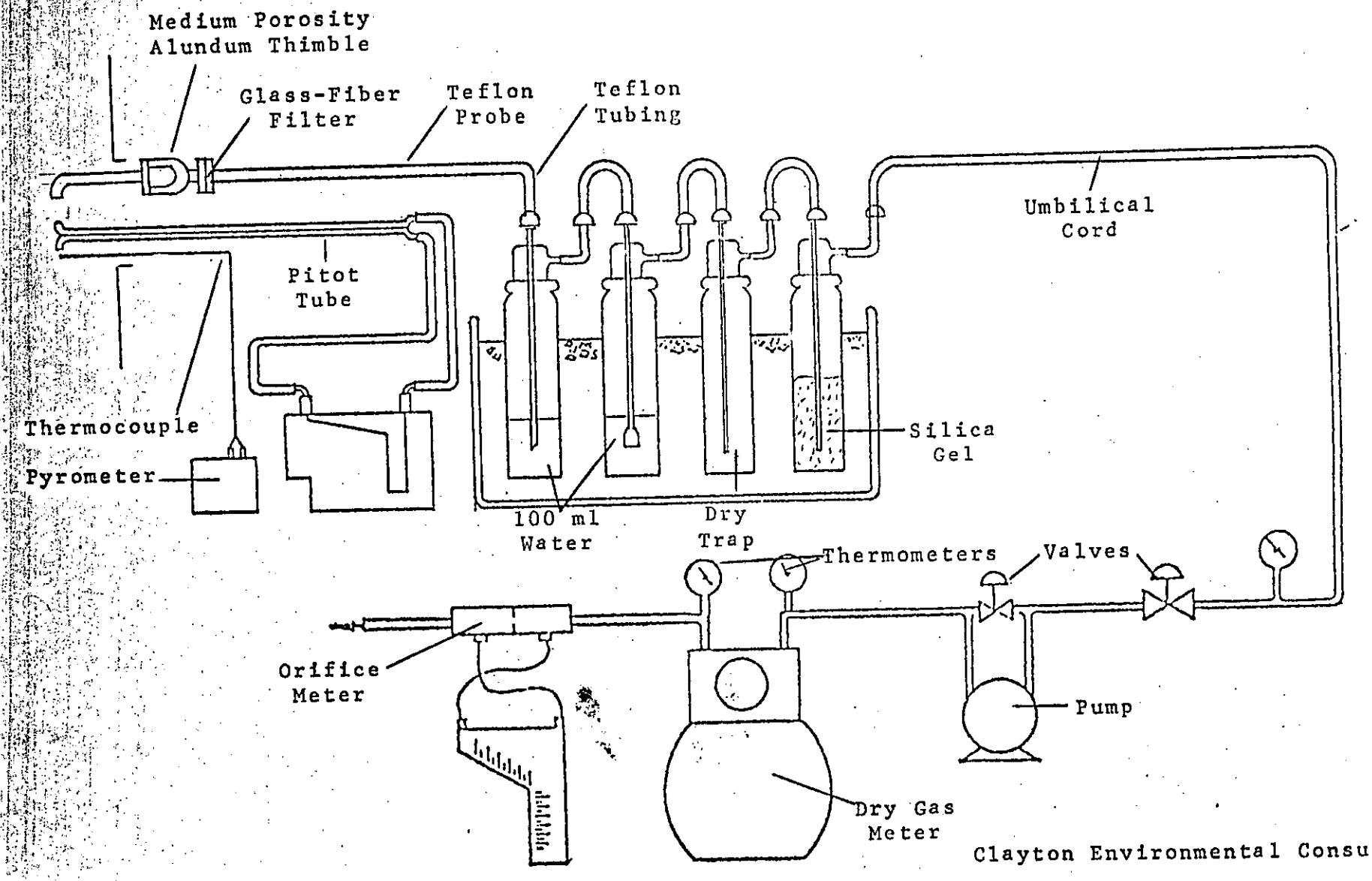


Clayton Environmental Consultants, Inc

FIGURE 11

SCHEMATIC DIAGRAM OF PARTICLE SIZE SAMPLING TRAIN
NO. 2 MILL BAGHOUSE

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976



APPENDIX A
PROJECT PARTICIPANTS

Clayton Environmental Consultants, Inc.

Victor W. Hanson	Project Leader
Harold P. Flood	Field Team Sampler, Data Processing
Gerald E. Hawkins	Field Team Sampler
Thomas R. Julien	Field Team Sampler
Richard G. Keller	Field Team Sampler
Helene M. Hysko	Data Processing
Janet L. Vecchio	Data Processing
David L. Holmberg	Assistant Laboratory Director
Mary L. Fegan	Laboratory Technician
James M. McClain	Chemist
John E. Mutchler, P.E.	Contract Manager

U.S. Environmental Protection Agency

Robert Martin	Project Officer
Jim Eddinger	Process Engineer
John Brown	Visible Emissions Observer
Dennis Holzschuh	Visible Emissions Observer

International Minerals and Chemicals Corporation

Jeff Van Jnke	Environmental Engineer

APPENDIX B

EPA DRAFT METHOD 17

METHOD 17. DETERMINATION OF PARTICULATE EMISSIONS FROM STATIONARY SOURCES (IN-STACK FILTRATION METHOD)

Introduction

Particulate matter is not an absolute quantity; rather it is a variable which is a function of temperature and pressure. For this reason, particulate matter emission regulations and/or associated test methods must define or take cognizance of the temperature and pressure at which particulate matter is to be measured. If temperature is not defined, and if the effect of temperature upon the quantity of particulate in an effluent gas is unknown, then the particulate emission regulation may be variable. The range of pressures which exist from source to source is of negligible importance.

In Method 5, 250°F is established as a nominal reference temperature. Thus, where Method 5 is specified in an applicable subpart of the standards, particulate matter is defined with respect to temperature. In order to maintain this indicated temperature, Method 5 includes a heated glass sample probe and a heated filter holder. This equipment is cumbersome and requires care in its operation. Therefore, where particulate matter concentrations (over the normal range of temperature associated with a specified source category) are known to be independent of temperature, it is desirable to eliminate the glass probe and heating systems, and sample at stack temperature.

This method describes an in-stack sampling system and sampling procedures for use in such cases. It is intended to be used only when specified by an applicable subpart of the standards, and only within the applicable temperature limits (if specified), or when otherwise approved by the Administrator.

1. Principle and applicability.

1.1 Principle. Particulate matter is withdrawn isokinetically from the source and collected on glass fiber filter maintained at stack temperature. The particulate mass is determined gravimetrically after removal of uncombined water.

1.2 Applicability. This method applies to the determination of particulate emissions from stationary sources for determining compliance with new source performance standards, only when specifically provided for in an applicable subpart of the standards. This method is not applicable to stacks which are saturated with water vapor. In addition, this method shall not be used as written, if the projected cross sectional area of the probe extension-filter holder assembly (when inserted halfway into the stack) covers more than 3% of the stack cross-sectional area (see Section 4.1.2).

2. Apparatus.

2.1 Sampling train. A schematic of the sampling train used in this method is shown in Figure 17-1. Construction details for many, but not all, of the train components are given in APTD-0581; for changes from the APTD-0581 document and for allowable modifications to Figure 17-1, consult with the Administrator.

The operating and maintenance procedures for many of the sampling train components are described in APTD-0576. Since correct usage is important in obtaining valid results, all users should read the APTD-0576 document and adopt the operating and maintenance procedures outlined in it, unless otherwise specified herein.

2.1.1 Probe nozzle--Stainless steel (316) with sharp, tapered leading edge. The angle of taper shall be $\leq 30°$ and the taper shall be on the outside to preserve a constant internal diameter. The probe nozzle shall be of the button-hook or elbow design, unless otherwise approved by the Administrator. The nozzle shall be constructed from seamless stainless steel tubing. Other configurations and construction material may be used subject to approval from the Administrator.

A range of sizes suitable for isokinetic sampling should be available, e.g., 0.32 cm (1/8 in.) up to 1.27 cm (1/2 in.) (or larger if higher volume sampling trains are used) inside diameter (ID) nozzles in increments of 0.16 cm (1/16 in.). Each nozzle shall be calibrated according to the procedures outlined in the calibration section.

2.1.2 Filter Holder. The in-stack filter holder shall be constructed of borosilicate or quartz glass or stainless steel; if a gasket is used, it shall be made of silicone rubber, teflon, or stainless steel. Other holder and gasket materials may be used with approval from the Administrator. The filter holder shall be

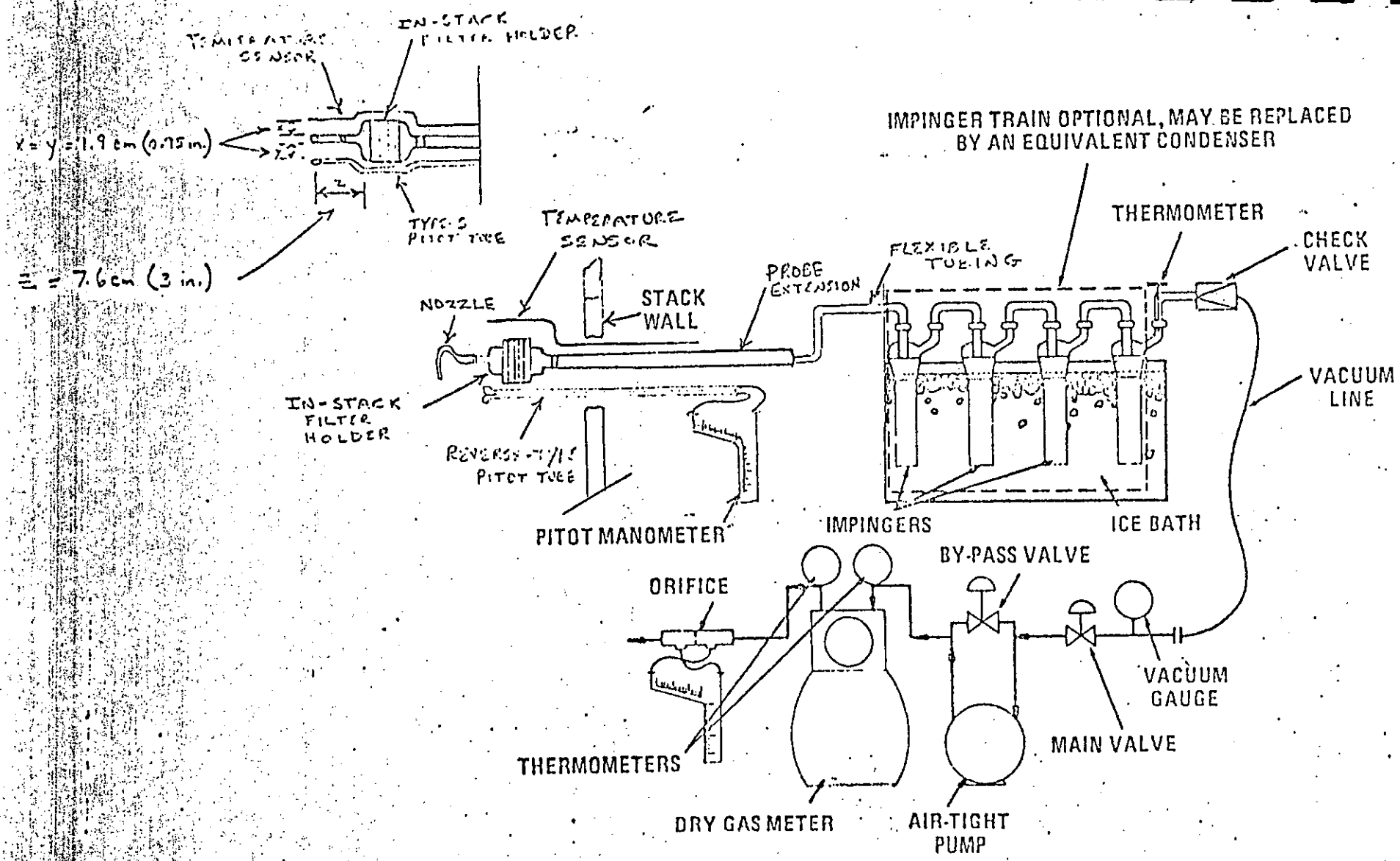


Figure 17-1. Particulate-sampling train, equipped with in-stack filter.

designed to provide a positive seal against leakage from the outside or around the filter.

2.1.3 Probe Extension--Any suitable rigid probe extension may be used after the filter holder. Flexible tubing may also be used between the probe extension and the condenser.

2.1.4 Pitot tube--Type S, or other device approved by the Administrator, attached to probe extension to allow constant monitoring of the stack gas velocity. The face openings of the pitot tube and the probe nozzle shall be adjacent and parallel to each other, not necessarily in the same plane, during sampling. The free space between the nozzle and pitot tube (see Figure 17-1) shall be at least 1.9 cm (0.75 in.). The free space shall be set based on a 1.3 cm (0.5 in.) ID nozzle. If the sampling train is designed for sampling at higher flow rates than that described in APTD-0581, thus necessitating the use of larger sized nozzles, the largest sized nozzle shall be used to set the free space. In addition, to minimize aerodynamic interactions between the pitot tube and filter holder, there shall be a distance of at least 3 inches between the center line of the pitot tube impact openings and the leading edge of the filter holder (see Figure 17-1).

The pitot tube must meet the criteria specified in Method 2, and be calibrated separately (i.e., apart from its assembly configuration) according to the procedures outlined in that method for the calibration of isolated Type S pitot tubes.

2.1.5 Differential pressure gauge--Inclined manometer capable of measuring velicity head to within 10% of the minimum measured value or ± 0.013 mm (0.0005 in.), whichever is greater. Below a differential pressure of 1.3 mm (0.05 in.) water gauge, micromanometers with sensitivities of 0.013 mm (0.0005 in.) should be used. However, micromanometers are not easily adaptable to field conditions and are not easy to use with pulsating flow. Thus, methods or other devices acceptable to the Administrator may be used when conditions warrant.

2.1.6 Condenser--Any system that cools the sample gas stream (e.g., impingers connected in series, as in Method 5) and allows measurement of both the water condensed and the moisture leaving the condenser, each to within 1 ml or 1 g. The moisture leaving the condenser can be measured either by: (1) monitoring the temperature and pressure at the exit of the condenser and using Dalton's law; or (2) passing the sample gas stream through a silica gel trap with exit gases kept below 20° C (68° F) and determining the weight gain.

If means other than silica gel are used to determine the amount of moisture leaving the condenser, it is recommended that silica gel still be used between the condenser system and pump to prevent moisture condensation in the pump and metering devices.

2.1.7 Metering system--Vacuum gauge, leak-free pump, thermometers capable of measuring temperature to within 3° C (5.4° F), dry gas meter with 2% accuracy, and related equipment, or equivalent, as required to

maintain an isokinetic sampling rate and to determine sample volume. Sampling trains utilizing metering systems designed for higher flow rates than that described in APTD-0581 or APTD-0576 may be used provided that the specifications in section 2 of this method are met. When the metering system is used in conjunction with a pitot tube, the system shall enable checks of isokinetic rates.

2.1.8 Barometer--Mercury, aneroid, or other barometers capable of measuring atmospheric pressure to within 2.5 mm Hg (0.1 in. Hg). In many cases, the barometric reading may be obtained from a nearby weather bureau station, in which case the station value (which is the absolute barometric pressure) shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be applied at a rate of minus 2.5 mm Hg (0.1 in. Hg) per 30 m (100 ft) elevation increase or vice versa for elevation decrease.

2.1.9 Gas density determination equipment--Temperature and pressure gauges and gas analyzer as described in Methods 2 and 3.

2.1.10 Temperature and pressure gauges--If Dalton's law is used, to monitor temperature and pressure at condenser outlet. The temperature gauge shall have an accuracy of 1° C (2° F). The pressure gauge shall be capable of measuring pressure to within 2.5 mm Hg (0.1 in. Hg). If silica gel is used in the condenser system the temperature and pressure must be measured before the silica gel component.

2.2 Sample recovery.

2.2.1 Probe nozzle brush--Nylon bristles with stainless steel wire handle. The brush shall be properly sized and shaped to brush out the probe nozzle.

2.2.2 Glass wash bottles--Two.

2.2.3 Glass sample storage containers--Chemically resistant, borosilicate glass bottles, for acetone washes, 500 ml or 1,000 ml. Screw cap closures shall be teflon rubber-backed liners or of such construction so as to be leak free and prevent chemical attack from the acetone. (Narrow mouth glass bottles have been found to be less prone to leakage.) Other types of containers must be approved by the Administrator.

2.2.4 Petri dishes--For filter samples; glass or polyethylene, unless otherwise specified by the Administrator.

2.2.5 Graduated cylinder and/or balance--To measure condensed water to within 1 ml or 1 g. Graduated cylinders shall have subdivisions no greater than 2 ml. Most laboratory balances are capable of weighing to the nearest 0.5 g or less. Any of these balances are suitable for use here and in section 2.3.4.

2.2.6 Plastic storage containers--Air tight containers to store silica gel.

2.2.7 Funnel and rubber policeman--To aid in transfer of silica gel to container; not necessary if silica gel is weighed in the field.

2.3 Analysis.

2.3.1 Glass weighing dishes.

2.3.2 Desiccator.

2.3.3 Analytical balance--To measure to within 0.1 mg.

2.3.4 Balance--To measure to within 0.5 g.

2.3.5 Beakers--250 ml.

2.3.6 Hygrometer--To measure the relative humidity of the laboratory environment.

2.3.7 Temperature gauge--To measure the temperature of the laboratory environment.

3. Reagents

3.1 Sampling.

3.1.1 Filters--The in-stack filters shall be glass mats or thimble fiber filters, without organic binders, and shall exhibit at least 99.95% efficiency (≤ 0.05% penetration) on 0.3 micron dioctyl phthalate smoke particles. The filter efficiency tests shall be conducted in accordance with ASTM standard method D 2986-71. Test data from the supplier's quality control program is sufficient for this purpose.

3.1.2 Silica gel--Indicating type, 6-16 mesh. If previously used, dry at 175° C (350° F) for 2 hours. New silica gel may be used as received.

3.1.3 Crushed ice.

3.1.4 Stopcock grease--Acetone insoluble, heat stable silicone grease. This is not necessary if screw-on connectors with teflon sleeves, or similar, are used.

3.2 Sample recovery.

3.2.1 Acetone--Reagent grade, ≤ 0.001% residue, in glass bottles. Acetone from metal containers generally has a high residue blank and should not be used. Sometimes, suppliers transfer acetone to glass bottles from metal containers. Thus, acetone blanks shall be run prior to field use and only acetone with low blank values (≤ 0.001%) shall be used.

3.3 Analysis.

3.3.1 Acetone--Same as 3.2.1.

3.3.2 Desiccant--Anhydrous calcium sulfate, indicating type.

4. Procedure

4.1 Sampling. The sampling shall be conducted by competent personnel experienced with this test procedure.

4.1.1 Pretest preparation. All the components shall be maintained and calibrated according to the procedure described in APTD-0576, unless otherwise specified herein.

Weigh approximately 200-300 g of silica gel in air tight containers to the nearest 0.5 g. Record the total weight, both silica gel and container, on each container. Larger portions of silica gel may be used, but care should be taken during sampling that the gel is not entrained and carried out of its holder. As an alternative, the silica gel may be weighed directly in its impinger or sampling holder just prior to train assembly.

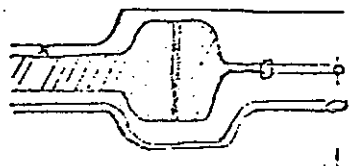
Check filters visually against light for irregularities and flaws or pinhole leaks. Label filters of proper size on the back side near the edge using numbering machine ink. As an alternative,

label the shipping containers (glass or plastic petri dishes) and keep the filters in these containers at all times except during sampling and weighing.

Desiccate the filters at 20 ± 5.6° C (68 ± 10° F) and ambient pressure for at least 24 hours and weigh at 6 or more hour intervals to a constant weight, i.e., ≤ 0.5 mg change from previous weighing, and record results to the nearest 0.1 mg. During each weighing the filter must not be exposed to the laboratory atmosphere for a period greater than 2 minutes and a relative humidity above 50%.

4.1.2 Preliminary determinations. Select the sampling site and the minimum number of sampling points according to Method 1 or as specified by the Administrator. Make a projected area model of the probe extension-filter holder assembly, with the pitot tube impact openings positioned along the centerline of the stack, as shown in Figure 17-2. If the estimated cross-section blockage, calculated as shown in Figure 17-2, exceeds 3 percent of the duct cross sectional area, then either one of the following shall be done: (1) a suitable out-stack filtration method can be used instead of in-stack filtration; or (2) a special in-stack assembly, designed to minimize blockage effects, can be used. For details concerning the latter approach, consult with the Administrator.

Determine the stack pressure, temperature, and the range of velocity heads using Method 2; determine the moisture content using Approximation Method 4 or its alternatives for the purpose of making



$$\text{ESTIMATED CROSS-SECTION BLOCKAGE (\%)} = \left[\frac{\text{Shaded Area}}{\text{Duct Area}}\right] \times 100$$

Figure 17-2. Projected-area model of cross-section blockage (approximate average for a sample traverse), caused by in-stack filter holder-probe extension assembly.

isokinetic sampling rate calculations. Estimates may be used. However, final results will be based on actual measurements made during the test.

Select a nozzle size based on the range of velocity heads such that it is not necessary to change the nozzle size in order to maintain isokinetic sampling rates. During the run, do not change the nozzle size. Ensure that the differential pressure gauge is capable of measuring the minimum velocity head value to within 10%, or as specified by the Administrator.

Select a probe extension length such that all traverse points can be sampled. Consider sampling from opposite sides for large stacks to reduce the length of probes.

Select a total sampling time greater than or equal to the minimum total sampling time specified in the test procedures for the specific industry such that the sampling time per point is not less than 2 min. (or some greater time interval if specified by the Administrator) and the sample volume taken will exceed the required minimum total gas sample volume specified in the test procedures for the specific industry. The latter is based on an approximate average sampling rate. Note also that the minimum total sample volume is corrected to standard conditions.

It is recommended that half-integral or integral numbers of minutes be sampled at each point in order to avoid timekeeping errors.

In some circumstances, e.g., batch cycles, it may be necessary to sample for shorter times at the traverse points and to obtain

smaller gas sample volumes. In these cases, the Administrator's approval must first be obtained.

4.1.3 Preparation of collection train. During preparation and assembly of the sampling train, keep all openings where contamination can occur covered until just prior to assembly or until sampling is about to begin.

If impingers are used to condense stack gas moisture, prepare them as follows: place 100 ml of water in each of the first two impingers; leave the third impinger empty; and transfer approximately 200-300 g or more, if necessary, of preweighed silica gel from its container to the fourth impinger; alternatively, if a balance is available in the field, the silica gel can be weighed out in a tared impinger, and its weight gain determined in the field. Place the silica gel container in a clean place for later use in the sample recovery. If some means other than impingers is used to condense moisture, prepare the condenser (and, if appropriate, silica gel for condenser outlet) for use.

Using a tweezer or clean disposable surgical gloves, place a labeled (identified) and weighed filter in the filter holder. Be sure that the filter is properly centered and the gasket properly placed so as not to allow the sample gas stream to circumvent the filter. Check filter for tears after assembly is completed. Mark the probe extension with heat resistant tape or by some other method to denote the proper distance into the stack or duct for each sampling point.

Unless otherwise specified by the Administrator, attach a temperature sensor to the probe extension so that the sensor extends beyond the leading edge of the probe extension and does not touch any metal. The sensor should be positioned at least 1.9 cm (0.75 in.) from both the pitot tube and probe nozzle to avoid interference with the gas flow (see Figure 17-1).

Assemble the train as in Figure 17-1, using (if applicable) a very light coat of silicone grease on all ground glass joints and greasing only the outer portion (see APTD-0576) to avoid possibility of contamination by the silicone grease. Place crushed ice around the impingers (if applicable).

4.1.4 Leak check procedure--After the sampling train has been assembled, a leak check of the filter holder shall be conducted as follows: Plug the inlet to the probe nozzle with a material that will be able to withstand the stack temperature; alternatively, the probe nozzle can be removed and the inlet to the filter holder plugged. Insert the holder into the stack and wait approximately 5 minutes (or longer, if necessary) to allow the system to come to equilibrium with the temperature of the stack gas stream. Turn on the pump and draw a vacuum of at least 380 mm Hg (15 in. Hg). Determine the leakage rate, if any. A leakage rate in excess of 4% of the average sampling rate or 0.00057 m^3/min. (0.02 cfm), whichever is less, is unacceptable.

The following leak check instructions for the sampling train described in APTD-0576 and APTD-0581 may be helpful. Start the pump

with by-pass valve fully open and coarse adjust valve completely closed. Partially open the coarse adjust valve and slowly close the by-pass valve until 380 mm Hg (15 in. Hg) vacuum is reached. Do not reverse direction of by-pass valve. If 380 mm Hg (15 in. Hg) is exceeded, either leak check at this higher vacuum or end the leak check as shown below and start over.

When the leak check is completed, first slowly remove the plug from the inlet to the probe nozzle and immediately turn off the vacuum pump. This prevents the water in the condenser from being forced backward and keeps silica gel from being entrained backward.

Leak checks shall be conducted as described whenever the train is disengaged, e.g., for silica gel or filter changes during the test, prior to each test run, and at the completion of each test run. If leaks are found to be in excess of the acceptable rate, the test will be considered invalid. To reduce lost time due to leakage occurrences, it is recommended that leak checks be conducted between port changes at the highest vacuum reading drawn during that sampling traverse.

4.1.5 Particulate train operation--During the sampling run, maintain the isokinetic sampling rate to within 10% (unless otherwise specified by the Administrator) of true isokinetic.

For each run, record the data required on the example data sheet shown in Figure 17-3. Be sure to record the initial dry gas meter reading. Record the dry gas meter readings at the beginning and end of each sampling time increment, when changes in flow rates

PLANT _____

LOCATION _____

OPERATOR _____

DATE _____

RUN NO. _____

SAMPLE BOX NO. _____

METER BOX NO. _____

METER $\Delta H@$ _____

C FACTOR _____

PITOT TUBE COEFFICIENT, C_p _____

SCHEMATIC OF STACK CROSS SECTION

MOI[redacted] EMP[redacted]URE [redacted]

BAROMETRIC PRESSURE _____

ASSUMED MOISTURE, % _____

PROBE LENGTH, m (ft) _____

NOZZLE IDENTIFICATION NO. _____

AVERAGE CALIBRATED NOZZLE DIAMETER, cm (in.) _____

PROBE HEATER SETTING _____

LEAK RATE, m^3/min (cfm) _____

PROBE LINER MATERIAL _____

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE mm Hg (in Hg)	STACK TEMPERATURE (T_S) °C (°F)	VELOCITY HEAD (ΔP_S), mm(in.)H_2O	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER mm H_2O (in. H_2O)	GAS SAMPLE VOLUME m^3 (ft^3)	GAS SAMPLE TEMPERATURE AT DRY GAS METER		FILTER HOLDER TEMPERATURE, °C (°F)	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER, °C (°F)
							INLET °C (°F)	OUTLET °C (°F)		
TOTAL							Avg.	Avg.		
AVERAGE							Avg.			

17-3.

Figure 52. Particulate field data.

are made, and when sampling is halted. Take other data point readings at least once at each sample point during each time increment and additional readings when significant changes (20% variation in velocity head readings) necessitate additional adjustments in flow rate. Level and zero the manometer.

Clean the portholes prior to the test run to minimize the chance of sampling the deposited material. To begin sampling, remove the nozzle cap and verify that the pitot tube and probe extension are properly positioned. Position the nozzle at the first traverse point with the tip pointing directly into the gas stream. Immediately start the pump and adjust the flow to isokinetic conditions. Nomographs, which aid in the rapid adjustment of the isokinetic sampling rate without excessive computations, are available for use whenever the Type S pitot tube coefficient is 0.85 ± 0.02, and the stack gas equivalent density (molecular weight) is 29 ± 4. APTD-0576 details the procedure for using these nomographs. If C_p and M_d are outside the above stated ranges, do not use the nomograph unless appropriate steps (see Reference 7.7) are taken to compensate for the deviations.

When the stack is under significant negative pressure (height of impinger stem), take care to close the coarse adjust valve before inserting the probe into the stack. If necessary, the pump may be turned on with the coarse adjust valve closed.

When the probe is in position, block off the openings around the probe and porthole to prevent unrepresentative dilution of the gas stream.

Traverse the stack cross section, as required by Method 1 or as specified by the Administrator, being careful not to bump the probe nozzle into the stack walls when sampling near the walls or when removing or inserting the probe extension through the port-holes, to minimize chance of extracting deposited material.

During the test run, take appropriate steps (e.g., adding crushed ice to the impinger ice bath) to maintain a temperature of less than 20° C (68° F) at the condenser outlet; this will prevent excessive moisture losses. Also, periodically check the level and zero of the manometer.

If the pressure drop across the filter becomes too high, making isokinetic sampling difficult to maintain, the filter may be replaced in the midst of a sample run. It is recommended that another complete filter holder-nozzle assembly be used rather than attempting to change the filter itself. After the new filter holder-nozzle assembly is installed, conduct a leak check. The particulate weight shall include the summation of all filter assembly catches.

A single train shall be used for the entire sample run, except for filter and silica gel changes. However, if approved by the Administrator, two or more trains may be used for a single test run when there are two or more ducts or sampling ports. The results shall be the total of all sampling train catches.

At the end of the sample run, turn off the pump, remove the probe extension-filter holder-nozzle assembly from the stack, and record the final dry gas meter reading. Perform a leak check at a

vacuum equal to or greater than the maximum reached during sampling. Calculate percent isokinetic (see calculation section) to determine whether another test run should be made. If there is difficulty in maintaining isokinetic rates due to source conditions, consult with the Administrator for possible variance on the isokinetic rates.

4.2 Sample recovery. Proper cleanup procedure begins as soon as the probe extension-filter holder-nozzle assembly is removed from the stack at the end of the sampling period. Allow the assembly to cool.

When the assembly can be safely handled, wipe off all external particulate matter near the tip of the probe nozzle and place a cap over it to prevent losing or gaining particulate matter. Do not cap off the probe tip tightly while the sampling train is cooling down as this would create a vacuum in the filter holder, and force condenser water backward.

Before moving the sample train to the cleanup site, disconnect the filter holder-probe nozzle assembly from the probe extension; cap the open inlet of the probe extension. Be careful not to lose any condensate, if present. Remove the umbilical cord from the condenser outlet and cap the outlet. If a flexible line is used between the first impinger or condenser and the probe extension, disconnect the line at the probe extension and let any condensed water or liquid drain into the impingers or condenser. After wiping off the silicone grease (if applicable) cap off the condenser

inlet. Ground glass stoppers, plastic caps, or serum caps (whichever are appropriate) may be used to close these openings.

Transfer both the filter holder-probe nozzle and condenser assemblies to the cleanup area. This area should be clean and protected from the wind so that the chances of contaminating or losing the sample will be minimized.

Save a portion of the acetone used for cleanup as a blank. Place about 200 ml of this acetone taken directly from the wash bottle being used in a glass sample container labeled "acetone blank."

Inspect the train prior to and during disassembly and note any abnormal conditions. Treat the samples as follows:

Container No. 1. Carefully remove the filter from the filter holder and place in its identified petri dish container. Use a pair of tweezers and/or clean disposable surgical gloves to handle the filter. If it is necessary to fold the filter, do so such that the particulate cake is inside the fold. Quantitatively remove any particulate matter and/or filter which adheres to the filter holder gasket by carefully using a dry nylon bristle brush and/or a sharp-edged blade and place into this container. Seal the container.

Container No. 2. Taking care to see that dust on the outside of the probe nozzle or other exterior surfaces does not get into the sample, quantitatively recover particulate matter or any condensate from the probe nozzle, fitting, and front half of the filter holder by washing these components with acetone and placing the wash into a glass container in the following manner; note that distilled water may be used instead of acetone when approved by the Administrator

or shall be used when specified by the Administrator; in these cases, save a water blank and follow Administrator's directions on analysis;

Carefully remove the probe nozzle and clean the inside surface by rinsing with acetone from a wash bottle and brushing with a nylon bristle brush. Brush until acetone rinse shows no visible particles, after which make a final rinse of the inside surface with acetone.

Brush and rinse with acetone the inside parts of the fitting in a similar way until no visible particles remain. A funnel may be used to aid in transferring liquid washes to the container. Rinse the brush with acetone and quantitatively collect these washings in the sample container. Between sampling runs, keep brushes clean and protected from contamination.

After ensuring that all joints are wiped clean of silicone grease (if applicable), clean the inside of the front half of the filter holder by rubbing the surfaces with a nylon bristle brush and rinsing with acetone. Rinse each surface three times or more if needed to remove visible particulate. Make a final rinse of the brush and filter holder. After all acetone washings and particulate matter are collected in the sample container, tighten the lid on the sample container so that acetone will not leak out when it is shipped to the laboratory. Mark the height of the fluid level to determine whether or not leakage occurred during transport. Label container to clearly identify its contents.

Container No. 3. Note color of indicating silica gel to determine if it has been completely spent and make a notation of its

condition. Transfer the silica gel back to its original container and seal. A funnel may make it easier to pour the silica gel without spilling, and a rubber policeman may be used as an aid in removing the silica gel. It is not necessary to remove the small amount of dust particles that may adhere to the walls and are difficult to remove. Since the gain in weight is to be used for moisture calculations, do not use any water or other liquids to transfer the silica gel. If a balance is available in the field, follow the procedure under "Analysis."

Condenser water. Treat the condenser or impinger water as follows: make a notation of any color or film in the liquid catch. Measure the condensate to within ± 1 ml by using a graduated cylinder or, if available, to within ± 0.5 g by using a balance. Record the condensate volume or weight. This information is required to calculate the moisture content of the effluent gas. Discard the liquid after measuring and recording the volume or weight.

4.3 Analysis. Record the data required on the example sheet shown in Figure 17-4. Handle each sample container as follows:

Container No. 1. Leave in shipping container or transfer the filter and any loose particulate from the sample container to a tared glass weighing dish and desiccate for 24 hours in a desiccator containing anhydrous calcium sulfate. Weigh to a constant weight and report the results to the nearest 0.1 mg. For purposes of this section 4.3, the term "constant weight" means a difference of no more than 0.5 mg or 1% of total weight less tare weight, whichever is greater, between two consecutive weighings, with no less than 6

Plant _____

Date _____

Run No. _____

Relative Humidity _____

Amount liquid lost during transport _____

Acetone blank volume, ml _____

Acetone wash volume, ml _____

Acetone blank concentration, mg/mg (equation 5-4) _____

Acetone wash blank, mg (equation 5-5) _____

CONTAINER NUMBER	WEIGHT OF PARTICULATE COLLECTED, mg		
	FINAL WEIGHT	TARE WEIGHT	WEIGHT GAIN
1			
2			
TOTAL			
	Less acetone blank		
	Weight of particulate matter		

	VOLUME OF LIQUID WATER COLLECTED		
	IMPINGER VOLUME, ml	SILICA GEL WEIGHT, g	
FINAL			
INITIAL			
LIQUID COLLECTED			
TOTAL VOLUME COLLECTED		g*	ml

CONVERT WEIGHT OF WATER TO VOLUME BY DIVIDING TOTAL WEIGHT INCREASE BY DENSITY OF WATER (1g/ml).

$$\frac{\text{INCREASE, g}}{1\ \text{g/ml}} = \text{VOLUME WATER, ml}$$

Figure 17-4. Analytical data.

hours of desiccation time between weighings and no more than 2 minutes exposure to the laboratory atmosphere (must be less than 50% relative humidity) during weighing.

Container No. 2. Note level of liquid in container and confirm on analysis sheet whether or not leakage occurred during transport. Measure the liquid in this container either volumetrically to ± 1 ml or gravimetrically to ± 0.5 g. Transfer the contents to a tared 250 ml beaker, and evaporate to dryness at ambient temperature and pressure. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

Container No. 3. Weigh the spent silica gel to the nearest 0.5 g using a balance. This step may be conducted in the field.

"Acetone Blank" Container. Measure acetone in this container either volumetrically or gravimetrically. Transfer the acetone to a tared 250 ml beaker and evaporate to dryness at ambient temperature and pressure. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 mg.

5. Calibration

Maintain a laboratory log of all calibrations.

5.1 Probe nozzle. Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in.). Make 3 separate measurements using different diameters each time and obtain the average of the measurements. The difference between the high and low numbers shall not exceed 0.1 mm (0.004 in.).

When nozzles become nicked, dented, or corroded, they shall be reshaped, sharpened, and recalibrated before use.

Each nozzle shall be permanently and uniquely identified.

5.2 Pitot tube. The pitot tube shall be calibrated separately (i.e., apart from its assembly configuration) according to the procedures outlined in Method 2 for calibration of isolated Type S pitot tubes.

5.3 Dry gas meter and orifice meter. Both meters shall be calibrated according to the procedure outlined in APTD-0576. When a diaphragm pump is used, assure that there is no leak.

5.4 Temperature gauges. Calibrate dial and liquid filled bulb thermometers and thermocouple-potentiometer systems against mercury-in-glass thermometers. Ice bath and boiling water (corrected for barometric pressure) are acceptable reference points. For other devices, check with the Administrator.

6. Calculations

Carry out calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after final calculation.

6.1 Nomenclature

A_n = Cross sectional area of nozzle, m^2 (ft^2)

B_{ws} = Water vapor in the gas stream, proportion by volume

C_a = Acetone blank residue concentration, mg/g

c_s = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, g/dscm (g/dscf)

v_s = Stack gas velocity, calculated by Method 2, Equation 2-7 using data obtained from Method 17, m/sec (ft/sec)

W_a = Weight of residue in acetone wash, mg

ΔH = Average pressure differential across the orifice meter (see Figure 17-3), mm H_2O (in. H_2O)

ρ_a = Density of acetone, mg/ml (see label on bottle)

ρ_w = Density of water, 1 g/ml (0.00220 lb/ml)

θ = Total sampling time, min.

13.6 = Specific gravity of mercury

60 = sec/min

100 = Conversion to percent

6.2 Average dry gas meter temperature and average orifice pressure drop. See data sheet (Figure 17-3).

6.3 Dry gas volume. Correct the sample volume measured by the dry gas meter to standard conditions (20° C, 760 mm Hg or 68° F, 29.92 in. Hg) by using Equation 17-1.

$$V_{m(std)} = V_m \left(\frac{T_{std}}{T_m}\right) \left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{P_{std}}\right] = K\, V_m \left[\frac{P_{bar} + \Delta H/13.6}{T_m}\right]$$

Equation 17-1

where:

K = 0.3855 °K/mm Hg for metric units

= 17.65 °R/in. Hg for English units

I = Percent of isokinetic sampling

m_n = Total amount of particulate matter collected, mg.

M_w = Molecular weight of water, 18 g/g-mole (18 lb/lb-mole)

m_a = Mass of residue of acetone after evaporation, mg

P_{bar} = Barometric pressure at the sampling site, mm Hg (in. Hg)

P_s = Absolute stack gas pressure, mm Hg (in. Hg)

P_{std} = Standard absolute pressure, 760 mm Hg (29.92 in. Hg)

R = Ideal gas constant, 0.06236 mm Hg-$m^3/^oK$-g-mole (21.83 in. Hg-$ft^3/^oR$-lb-mole)

T_m = Absolute average dry gas meter temperature (see Figure 17-3 ^oK (^oR)

T_s = Absolute average stack gas temperature (see Figure 17-3), ^oK (^oR).

T_{std} = Standard absolute temperature, 293° K (528° R)

V_a = Volume of acetone blank, ml

V_{aw} = Volume of acetone used in wash, ml

V_{lc} = Total volume of liquid collected in condenser and silica gel (see Figure 17-4), ml.

V_m = Volume of gas sample as measured by dry gas meter, dcm (dcf)

$V_{m(std)}$ = Volume of gas sample measured by the dry gas meter corrected to standard conditions, dscm (dscf).

$V_{w(std)}$ = Volume of water vapor in the gas sample corrected to standard conditions, scm (scf).

6.4 Volume of water vapor.

$$V_{w(std)} = V_{lc} \left(\frac{\rho_w}{M_w}\right)\left(\frac{RT_{std}}{P_{std}}\right) = K\ V_{lc} \qquad \text{Equation 17-2}$$

where

$K = 0.00134\ m^3/ml$ for metric units

$= 0.0472\ ft^3/ml$ for English units

6.5 Moisture content.

$$B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}} \qquad \text{Equation 17-3}$$

6.6 Acetone blank concentration.

$$C_a = \frac{m_a}{V_a\ \rho_a} \qquad \text{Equation 17-4}$$

6.7 Acetone wash blank.

$$W_a = C_a\ V_{aw}\ \rho_a \qquad \text{Equation 17-5}$$

6.8 Total particulate weight. Determine the total particulate catch from the sum of the weights obtained from containers 1 and 2 less the acetone blank (see Figure 17-4).

6.9 Particulate concentration.

$$c_s = (0.001\ g/mg)\ (m_n/V_{m(std)}) \qquad \text{Equation 17-6}$$

6.10 Conversion factors:

From	To	Multiply by
scf	m^3	0.0283
g/ft^3	gr/ft^3	15.4
g/ft^3	lb/ft^3	2.205×10^{-3}
g/ft^3	g/m^3	35.31

6.11 Isokinetic variation.

6.11.1 Calculations from raw data.

$$I = \frac{100 \; T_s \; [K \, V_{lc} + (V_m/T_m) \, (P_{bar} + \Delta H/13.6)]}{60 \; \Theta \; v_s \; P_s \; A_n}$$

Equation 17-7

where:

$K = 0.00346$ mm Hg-m^3/ml-^oK for metric units

$= 0.00267$ in. Hg-ft^3/ml-^oR for English units

6.11.2 Calculations from intermediate values.

$$I = \frac{T_s \; V_{m(std)} \; P_{std} \; 100}{T_{std} \; v_s \; \Theta \; A_n \; P_s \; 60 \; (1-B_{ws})}$$

$$= K \; \frac{T_s \; V_{m(std)}}{P_s \; v_s \; A_n \; \Theta \; (1-B_{ws})}$$

Equation 17-8

where:

$K = 4.323$ for metric units

$= 0.0944$ for English units

APPENDIX C

PARTICULATE SAMPLING FIELD DATA SHEETS

GEORGE D. CLAYTON & ASSOCIATES
EXHAUST GAS VELOCITY AND FLOW RATE

PROJECT TMC EPA TAG 2-1 CREW AAF GEH

Sampling Station OUTLET Date 9-28-76 Time 12:00

Test No. PRELIMINARY Pitot Tube No. 112 Manometer No. GDC-3

Sampling Point	Velocity Pressure (In.H_2O)	DB Temp (°F)	Uncorrected Velocity (Ft/sec)	Sampling Point	Velocity Pressure (In.H_2O)	DB Temp (°F)	Uncorrected Velocity (Ft/sec)
W-12	0.45	95	45.8	S-12	0.40	95	43.2
11	0.50	95	48.3	11	0.43	95	44.8
10	0.58	95	52.0	10	0.44	95	45.3
9	0.61	95	53.4	9	0.47	95	46.8
8	0.59	95	52.5	8	0.42	95	44.3
7	0.54	95	50.2	7	0.44	95	45.3
6	0.45	95	45.8	6	0.49	95	47.8
5	0.46	95	46.3	5	0.46	95	46.3
4	0.44	95	45.3	4	0.45	95	45.8
3	0.44	95	45.3	3	0.49	95	47.8
2	0.44	95	45.3	2	0.47	95	46.8
1	0.42	95	44.3	1	0.37	95	41.6
				avg = 0.47			

Stack Wet Bulb Temperature, (°F) 72 Stack Dimensions 19" ID

A. Barometric Pressure, (In.Hg) 27.2

B. Static Pressure of Stack Gases, (In.H_2O) -2.1

C. Pitot Tube Correction Factor 0.839

D. Specific Gravity of Stack Gases Relative to Dry Air 1.0

E. Absolute Pressure of Stack Gases = A + (B/13.6), (In.Hg) 27.0

F. Average Uncorrected Velocity, (ft/sec) 46.868 or 60 * F, (ft/min) 2809

G. Corrected Velocity = F * C $\sqrt{\frac{29.92}{E} * \frac{1.00}{D}}$, (ft/min) 2474

H. Area of Stack, (ft^2) 1.969

I. Actual Gas Flow Rate = G * H, (ACFM) 4871

J. Average Stack Temperature, (°F) 95

K. Standard Gas Flow Rate = I * $\left(\frac{T_{std} + 460}{J + 460}\right) * \left(\frac{E}{29.92}\right)$, (SCFM) 4182

where Tstd = standard temperature, 68 °F

GDC-2

GEORGE D. CLAYTON & ASSOCIATES
EXHAUST GAS VELOCITY AND FLOW RATE

PROJECT _____ CREW HPF, GEH

Sampling Station OUTLET Date 9- Time 11:30

Test No PRELIMINARY TEST Pitot Tube No. 10 Manometer No. DAC-3

Sampling Point	Velocity Pressure (In.H_2O)	DB Temp (°F)	Uncorrected Velocity (Ft/sec)	Sampling Point	Velocity Pressure (In.H_2O)	DB Temp (°F)	Uncorrected Velocity (Ft/sec)
W 12	0.57	96		S 12			
11	0.64	96		11			
10	0.60	96		10			
9	0.67	96		9			
8	0.67	96		8			
7	0.66	96		7			
6	0.60	96		6			
5	0.52	96		5			
4	0.47	96		4			
3	0.46	96		3			
2	0.45	96		2			
1	0.39	96		1			

Stack Wet Bulb Temperature, (°F) 72 Stack Dimensions _____

A. Barometric Pressure, (In.Hg) _____

B. Static Pressure of Stack Gases, (In.H_2O) _____

C. Pitot Tube Correction Factor _____

D. Specific Gravity of Stack Gases Relative to Dry Air _____

E. Absolute Pressure of Stack Gases = A + (B/13.6), (In.Hg) _____

F. Average Uncorrected Velocity, (ft/sec) _____ or 60 * F, (ft/min) _____

G. Corrected Velocity = $F * C\sqrt{\frac{29.92}{E} * \frac{1.00}{D}}$, (ft/min) _____

H. Area of Stack, (ft^2) _____

I. Actual Gas Flow Rate = G * H, (ACFM) _____

J. Average Stack Temperature, (°F) _____

K. Standard Gas Flow Rate = $I * \left(\frac{T_{std} + 460}{J + 460}\right) * \left(\frac{E}{29.92}\right)$, (SCFM) _____

where T_{std} = standard temperature, _____ °F

GDC-2

.012 CFM

GEORGE D. CLAYTON & ASSOCIATES
EXHAUST GAS VELOCITY AND FLOW RATE

PROJECT EPA 25 CREW EGK/TJ

Sampling Station North Inlet (IMC) Date 9/27/76 Time 11:05-11:35

Test No. Traverse Pitot Tube No. 23 Manometer No.

Sampling Point	Velocity Pressure (In.H_2O)	DB Temp (°F)	Uncorrected Velocity (Ft/sec)	Sampling Point	Velocity Pressure (In.H_2O)	DB Temp (°F)	Uncorrected Velocity (Ft/sec)
6 1	.10	85	21.4	5 1	.11	85	22.5
2	.17	85	27.9	2	.11	85	22.5
3	.18	85	28.7	3	.17	85	27.9
4	.19	85	29.5	4	.15	85	28.7
5	.21	85	31.0	5	.17	85	27.9
6	.19	85	29.5	6	.17	85	27.9
7	.22	85	32.5	7	.16	85	27.1
8	.23	85	34.5	8	.20	85	30.3
9	.27	85	35.2	9	.21	85	31.0
10	.27	85	35.2	10	.20	85	30.3
11	.23	85	34.5	11	.19	85	29.5
12	.20	85	30.3	12	.20	85	30.3
	2.52/12				2.07		
	.21				.1725		
	.19125		29.61				

Stack Wet Bulb Temperature, (°F) 69 Stack Dimensions 12" ID

A. Barometric Pressure, (In.Hg) 27.21

B. Static Pressure of Stack Gases, (In.H_2O) -2.3

C. Pitot Tube Correction Factor .838

D. Specific Gravity of Stack Gases Relative to Dry Air 1

E. Absolute Pressure of Stack Gases = A + (B/13.6), (In.Hg) 27.04

F. Average Uncorrected Velocity, (ft/sec) 29.42 or 60 * F, (ft/min) 1765

G. Corrected Velocity = F * C $\sqrt{\frac{29.92}{E} * \frac{1.00}{D}}$, (ft/min) 1556

H. Area of Stack, (ft^2) 0.785

I. Actual Gas Flow Rate = G * H, (ACFM) 1220

J. Average Stack Temperature, (°F) 85

K. Standard Gas Flow Rate = I * $\left(\frac{T_{std} + 460}{J + 460}\right) * \left(\frac{E}{29.92}\right)$, (SCFM) 1070

where T_{std} = standard temperature, 68 °F

GDC-2 Elevation ~2700 ft MSL

579
730

GEORGE D. CLAYTON & ASSOCIATES
EXHAUST GAS VELOCITY AND FLOW RATE

PROJECT EPA 25 CREW RGK / TJ

Sampling Station South Inlet (IMC) Date 9/27/76 Time 11:45 - 12:00

Test No. [illegible] Pitot Tube No. 12 Manometer No.

Sampling Point	Velocity Pressure (In.H_2O)	DB Temp (°F)	Uncorrected Velocity (Ft/sec)	Sampling Point	Velocity Pressure (In.H_2O)	DB Temp (°F)	Uncorrected Velocity (Ft/sec)
B 1	.30	85	37.1	S 1	.28	85	35.8
2	.38	85	41.7	2	.28	85	35.8
3	.40	85	42.8	3	.30	85	37.1
4	.36	85	40.6	4	.29	85	36.5
5	.35	85	40.1	5	.25	85	33.9
6	.35	85	40.1	6	.26	85	34.5
7	.33	85	38.9	7	.32	85	38.3
8	.34	85	39.5	8	.35	85	40.1
9	.34	85	39.5	9	.38	85	41.7
10	.31	85	37.7	10	.38	85	41.7
11	.29	85	36.5	11	.39	85	42.3
12	.25	85	33.9	12	.33	85	38.9
	4.00/12				3.81		
	.333	85	38.62		.318		
	.3254	~~85~~ 85	~~37.3~~ 38				

Stack Wet Bulb Temperature, (°F) 69 Stack Dimensions 15" ID

A. Barometric Pressure, (In.Hg) 27.21

B. Static Pressure of Stack Gases, (In.H_2O) -2.6

C. Pitot Tube Correction Factor .834

D. Specific Gravity of Stack Gases Relative to Dry Air 1

E. Absolute Pressure of Stack Gases = A + (B/13.6), (In.Hg) 27.02 ~~27.05~~

F. Average Uncorrected Velocity, (ft/sec) ~~[illegible]~~ 38.5 or 60 * F, (ft/min) ~~[illegible]~~

G. Corrected Velocity = $F * C\sqrt{\frac{29.92}{E} * \frac{1.00}{D}}$, (ft/min) ~~[illegible]~~ 2036

H. Area of Stack, (ft^2) ~~[illegible]~~ 1.227

I. Actual Gas Flow Rate = G * H, (ACFM) ~~[illegible]~~ 2499

J. Average Stack Temperature, (°F)

K. Standard Gas Flow Rate = $I * \left(\frac{T_{std} + 460}{J + 460}\right) * \left(\frac{E}{29.92}\right)$, (SCFM) 2110

where T_{std} = standard temperature, 68 °F

GDC-2

SAMPLING TRAIN DATA

Company: EPA TASK 25, IMC
Source Designation: BAGHOUSE OUTLET
Date: 9-28-76
Test Number: P-1
Field Person: GEH
Filter Number: SGA-267-32
Barometric Pressure ("Hg): 27.23
Stack Static Pressure ("H_2O): -1.6
Stack Dimensions: 19" ID
Plume Appearance: —
Ambient Temperature (°F): 85
Record all Data Every 5 Minutes

Filter Heater Setting: —
Probe Heater Setting: —
Nozzle Number: 1/4, Dia. (in.): 0.250
Pitot Tube No. 10, Corr. Factor: 0.838
Meter Box No. 3, Corr. Factor: 1.026
Meter Isokinetic Factor: 1710
Assumed Moisture (%): 1.22
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0.01 CFM at 15 "Hg

4.50 Tm/Ts H or 4.77H WB/DB 70/105

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
W 11	0	10:00	0.54	105	25.584	92	92	2.37	—	80	3.0
11	5	10:05	0.62	105	29.98	104	96	2.77	—	76	3.0
10	10	10:10	0.73	105	34.67	112	98	3.29	—	70	3.5
9	15	10:15	0.69	105	39.77	118	102	3.13	—	70	3.5
8	20	10:20	0.64	105	44.78	121	103	2.92	—	72	3.3
7	25	10:25	0.63	105	49.67	123	106	2.88	—	72	3.3
6	30	10:30	0.52	105	54.50	124	108	2.39	—	72	3.0
5	35	10:35 / 10:41	0.46	105	58.985	126	112	2.18	—	80	2.8
DOWN 4	40	10:53	0.42	105	63.19	121	113	1.93	—	70	2.5
3	45	10:58	0.33	105	67.23	124	114	1.52	—	72	2.0
2	50	11:03	0.30	105	70.84	126	116	1.39	—	72	2.1
2	55	11:09	0.30	105	74.28	126	116	1.39	—	72	2.0
	60	11:13			77.712						
AVERAGE (TOTAL)					( )						

M I M M

DRYTRAP, 100 ml H2O 100 ml H2O 200g

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA TASK 25 IMC
Source Designation: BAGHOUSE OUTLET
Date: 8-28-76
Test Number: P-1 Cont.
Field Person: [illegible] GEH
Filter Number: SGA-267-32
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O): -1.6
Stack Dimensions: 19" ID
Plume Appearance: —
Ambient Temperature (°F):
Record all Data Every 5 Minutes

Filter Heater Setting: —
Probe Heater Setting: —
Nozzle Number: ____, Dia. (in.): 0.339
Pitot Tube No. 10, Corr. Factor: 0.838
Meter Box No. RAC-3, Corr. Factor: 1.020 1.005
Meter Isokinetic Factor: 1.710
Assumed Moisture (%): 1.22
Condensate Volume (ml): 7
Silica Gel Weight Gain (g): 25
Leak Rate 0.005 CFM at 5 "Hg
0.0

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
S 11	60	11:22	0.55	105	77.712	125	117	2.55	—	83	3.0
11	65	11:27	0.50	105	82.28	124	118	2.31	—	72	3.0
10	70	11:32	0.55	105	86.74	129	119	2.56	—	72	3.2
9	75	11:37	0.54	105	91.39	130	120	2.52	—	74	3.2
8	80	11:42	0.56	105	96.02	130	120	2.61	—	74	3.2
7	85	11:47	0.52	105	100.74	132	120	2.43	—	76	3.2
6	90	11:52	0.55	105	105.35	132	120	2.57	—	76	3.4
5	95	11:57	0.52	105	109.98	132	120	2.43	—	76	3.4
4	100	12:02	0.49	105	114.53	132	120	2.29	—	76	3.2
3	105	12:07	0.45	105	118.97	132	120	2.10	—	76	3.0
2	110	12:12	0.35	105	123.17	131	119	1.63	—	76	2.8
2	115	12:17	0.35	105	126.95	131	119	1.63	—	77	2.8
	120	12:22			130.689						
					$\Sigma F - \Sigma I = X$ 105 105						
			0.51 ~~0.50~~		CF=1.005 105 105	2975	2975				
AVERAGE (TOTAL)				105 105	✓ (105.631)	124	✓ 113	✓ 2.32	—	✓ 74	3.0 ✓

119 ✓

SAMPLING TRAIN DATA

Company: EPA TASK 25 IMC
Source Designation: BAGHOUSE OUTLET
Date: 9-28-76
Test Number: P-2
Field Person: WPL GEH
Filter Number: SGA-267-33
Barometric Pressure ("Hg): 29.23
Stack Static Pressure ("H_2O): -1.6
Stack Dimensions: 19" ID
Plume Appearance: —
Ambient Temperature (°F): 95
Record all Data Every 5 Minutes

Filter Heater Setting: —
Probe Heater Setting: —
Nozzle Number: 1/4, Dia. (in.): 0.250
Pitot Tube No. 10, Corr. Factor: 0.838
Meter Box No. RAC-3, Corr. Factor: 1.020
Meter Isokinetic Factor: 1710
Assumed Moisture (%): 1.22
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate 0.01 CFM at 15 "Hg

4.5 T_m/T_s H

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
W 11	0	14:54	0.55	110	131.637	110	110	2.48	—	80	3.2
11	5	14:59	0.55	115	136.24	122	113	2.49	—	70	3.2
10	10	15:04	0.52	115	140.83	128	116	2.37	—	72	3.2
9	15	15:09	0.56	115	145.34	131	118	2.56	—	73	3.2
8	20	15:14	0.54	115	149.87	133	120	2.48	—	74	3.2
7	25	15:19	0.59	115	154.52	134	121	2.71	—	74	3.5
6	30	15:24	0.48	115	159.31	135	122	2.21	—	74	3.2
5	35	15:29	0.42	115	163.71	136	124	1.94	—	74	3.0
4	40	15:34	0.37	115	167.77	136	124	1.71	—	74	2.5
3	45	15:39	0.31	115	171.62	135	125	1.43	—	76	2.5
2	50	15:44	0.28	115	175.19	134	125	1.29	—	76	2.2
2	55	15:49	0.26	115	178.58	134	124	1.20	—	76	2.2
	60	15:54			181.838						
			0.45								
AVERAGE (TOTAL)				115	( )						

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA TASK IMC
Source Designation: BAGHOUSE OUTLET
Date: 9-28-76
Test Number: P-2 Cont
Field Person: JPJ GEH
Filter Number: SGA-267-33
Barometric Pressure ("Hg): 27.23
Stack Static Pressure ("H_2O): -1.6
Stack Dimensions: 19" ID
Plume Appearance: —
Ambient Temperature (°F): 95
Record all Data Every 5 Minutes

Filter Heater Setting: —
Probe Heater Setting: —
Nozzle Number: 1/4, Dia. (in.): 0.250
Pitot Tube No. 10, Corr. Factor: 0.838
Meter Box No. RAC-3, Corr. Factor: 1.020
Meter Isokinetic Factor: 1710
Assumed Moisture (%): 1.22
Condensate Volume (ml): 14
Silica Gel Weight Gain (g): 20
Leak Rate 0.01 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
S 11	60	16:05	0.46	115	181.838	126	126	2.11	—	90	3.0
11	65	16:10	0.45	115	186.04	130	126	2.09	—	76	3.0
10	70	16:15	0.43	115	190.23	134	128	1.99	—	76	3.0
9	75	16:20	0.48	115	194.36	136	126	2.22	—	74	3.2
8	80	16:25	0.44	115	198.75	138	128	2.04	—	74	3.2
7	85	16:30	0.49	115	202.89	138	128	2.27	—	74	3.5
6	90	16:35	0.57	115	207.31	138	128	2.65	—	74	3.8
5	95	16:40	0.53	115	212.03	138	128	2.46	—	74	4.0
4	100	16:45	0.44	115	216.64	138	128	2.04	—	74	3.6
3	105	16:50	0.37	115	220.87	138	128	1.72	—	74	3.2
2	110	16:55	0.32	115	224.69	136	128	1.48	—	74	3.0
2	115	17:00	0.34	115	228.28	134	126	1.57	—	74	3.2
	120	17:05			231.983						
			0.45	114.79	100.346		127.7			75.04	
AVERAGE (TOTAL)				115	31.7-0.05 (100.798)	133	127	2.06	—	75	3.1

100-875 — 127

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA TASK IMC.
Source Designation: BAGHOUSE OUTLET
Date: 98-29-76
Test Number: P-3
Field Person: [illegible] GEH
Filter Number: [illegible]
Barometric Pressure ("Hg): 27.22
Stack Static Pressure ("H_2O): -1.6
Stack Dimensions: 19" ID
Plume Appearance: —
Ambient Temperature (°F): 90
Record all Data Every 5 Minutes

Filter Heater Setting: —
Probe Heater Setting: —
Nozzle Number: 1/4, Dia. (in.): 0.250
Pitot Tube No. 10, Corr. Factor: 0.838
Meter Box No. RAC-3, Corr. Factor: 1.020
Meter Isokinetic Factor: 1710
Assumed Moisture (%): 1.22
Condensate Volume (ml): 19
Silica Gel Weight Gain (g): 18
Leak Rate 0.01 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
W 11	0	8:35	0.51	100	232.408	94	94	2.27	—	86	2.8
11	5	8:40	0.51	100	236.77	104	96	2.30	—	70	2.6
10	10	8:45	0.49	100	241.16	112	99	2.23	—	68	2.5
9	15	8:50	0.51	100	245.48	116	101	2.33	—	67	2.8
8	20	8:55	0.46	100	249.79	119	102	2.[illegible]	—	66	2.4
7	25	9:00	0.52	105	254.11	122	106	2.38	—	66	2.8
6	30	9:05	0.51	105	258.48	123	109	2.34	—	66	3.0
5	35	9:10	0.43	105	262.95	124	110	1.98	—	66	2.5
4	40	9:15	0.32	105	267.07	124	118	1.48	—	66	2.0
3	45	9:20	0.27	105	270.61	122	112	1.24	—	66	2.0
2	50	9:25	0.20	100	273.90	122	112	0.93	—	68	1.8
2	55	9:30	0.18	100	276.17	122	112	0.82	—	68	1.5
	60	9:35			279.368						
AVERAGE (TOTAL)					( )						

SAMPLING TRAIN DATA

Company: EPA TASK IMC
Source Designation: BAGHOUSE OUTLET
Date: 9-29-76
Test Number: R-3 Cont.
Field Person: [illegible] CEH
Filter Number:
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O): -1.6
Stack Dimensions: 19" ID
Plume Appearance:
Ambient Temperature (°F):
Record all Data Every 5 Minutes

Filter Heater Setting: —
Probe Heater Setting: —
Nozzle Number: ____, Dia. (in.): ____
Pitot Tube No. 10, Corr. Factor: 0.838
Meter Box No. RAC-3, Corr. Factor: 1.020
Meter Isokinetic Factor: 1710
Assumed Moisture (%): 1.22
Condensate Volume (ml): 19
Silica Gel Weight Gain (g): 18
Leak Rate 0.01 CFM at 15 "Hg

WB/DB 72/105

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
S 11	60	9:37	0.35	100	279.368	118	112	1.62	—	70	2.2
11	65	9:42	0.37	100	283.09	120	114	1.72	—	68	2.2
10	70	9:47	0.39	100	287.09	123	114	1.88	—	66	2.4
9	75	9:52	0.42	100	290.82	123	114	1.95	—	68	2.8
8	80	9:57	0.42	100	294.89	124	115	1.96	—	67	2.9
7	85	10:02	0.40	105	298.96	125	115	1.85	—	68	2.8
6	90	10:07	0.52	105	302.93	125	115	2.40	—	68	3.2
5	95	10:12	0.49	105	307.41	126	116	2.27	—	67	3.0
4	100	10:17	0.43	105	311.81	127	116	1.99	—	68	3.0
3	105	10:22	0.31	105	315.93	127	117	1.44	—	68	2.5
2	110	10:27	0.23	105	319.47	125	117	1.06	—	70	2.0
2	115	10:32	0.23	105	322.48	124	116	1.06	—	70	2.0
	120	10:37			325.496						
				102.5	=93.05%						
			.39		CF = 1.005						
AVERAGE (TOTAL)				103	(93.553)	120.5	110.5	1.817	—	68.5	2.487

115.5

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: GPA-25
Source Designation: IMC North Inlet
Date: 9/28/76
Test Number: P-1
Field Person: RGK
Filter Number: 564-267-21
Barometric Pressure ("Hg): 27.25
Stack Static Pressure ("H_2O): -3
Stack Dimensions: 12" ID
Plume Appearance: 85
Ambient Temperature (°F):
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: ____, Dia. (in.): 1/4 (.250)
Pitot Tube No. 23, Corr. Factor: .838
Meter Box No. RAC-2, Corr. Factor: 0.936
Meter Isokinetic Factor: 1693
Assumed Moisture (%): 1.5
Condensate Volume (ml): (8)
Silica Gel Weight Gain (g): 19.4
Leak Rate .008 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
5 3	0	1002	.42	103	895.677	100	95	1.7		82	<1
3	5		.38	103	899.6	118	109	1.7		80	<1
3	10		.42	103	903.4	118	109	1.9		75	1.5
4	15		.32 ~~.29~~	103	907.3	118	109	1.5		69	1.5
5	20		.31	103	910.8	119	109	1.5		69	1.5
6	25		.26	103	914.2	120	109	1.2		69	1.5
7	30		.34	103	917.5	120	109	1.4		70	2.0
8	35	1037 ~~1049~~	.31	103	920.762	117	110	1.4		75	1.5
9	40		.32	103	924.4	120	110	1.5		75	2.0
10	45		.35	103	927	122	111	1.6		69	3.0
10	50		.40	103	931	122	112	1.8		69	4.0
10	55		.37	103	935.1	122	112	1.7		69	4.5
	60				938.742						
AVERAGE (TOTAL)					( )						

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA 25
Source Designation: EMC Inlet (North)
Date: 9/28/76
Test Number: P-1 cont'd
Field Person: RCK
Filter Number: SGA-267-71
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O):
Stack Dimensions:
Plume Appearance:
Ambient Temperature (°F):
Record all Data Every _____ Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: ____, Dia. (in.): .250
Pitot Tube No. ____, Corr. Factor:
Meter Box No. ____, Corr. Factor:
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml): 8 ml
Silica Gel Weight Gain (g): 685.2 / 704.6 (19.4)
Leak Rate _____ CFM at _____ "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
B 10	60	1124	.33	103	938.742	120	113	1.5		80	3.0
10	65		.36	103	942.3	122	114	1.6		75	4.0
10	70		.32	103	945.9	123	114	1.5		75	4.8
9	75		.40	103	949.5	129	114	1.8		76	7
8	80		.48	103	953.4	129	115	2.2		76	8
7	85		.25	103	957.7	130	116	1.1		76	6
6	90		.17	104	961	130	117	.77		78	5.5
5	95		.19	104	963.6	130	117	.86		78	5.8
4	100		.19	104	966.4	130	117	.86		80	6
3	105		.17	104	969.2	130	120	.77		81	6
3	110		.17	104	971.9	130	120	.77		81	6
3	115		.17	104	974.5	130	120	.77		81	6
	120	1224			977.118						
					C.F. = .986						
			.307	103.25	81.441	122.6	112.5				4.14
			.307		80.301	117	115	1.395		75.3	
AVERAGE (TOTAL)				103	(80.301)	118		1.4		75	4.14

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA - 25
Source Designation: EMC South Point
Date: 9/28/72
Test Number: P-1 (1)
Field Person: RGK
Filter Number: 56A-267-22
Barometric Pressure ("Hg): 29.25
Stack Static Pressure ("H_2O): -2.5
Stack Dimensions: 15' ID
Plume Appearance:
Ambient Temperature (°F): 105
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: ____, Dia. (in.): .313
Pitot Tube No. 12, Corr. Factor: .839
Meter Box No. RAC, Corr. Factor:
Meter Isokinetic Factor: 1693
Assumed Moisture (%): 2.5
Condensate Volume (ml): (13)
Silica Gel Weight Gain (g): 686.1 / 710.1 (24)
Leak Rate .002 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
B 11	0	1455	.29	104	977.352	112	109	3.2		90	1
11	5		.29	104	982.5	117	110	3.2		80	1
10	10		.28	104	988	124	112	3.0		80	1
9	15		.27	104	992.8	129	114	3.0		80	2
8	20		.22	104	997.8	131	116	2.4		80	2
7	25		.19	104	002.5	132	118	2.1		80	1.5
6	30		.19	104	006.8	132	116	2.1		80	1.5
5	35		.17	100	011.6	134	120	1.89		80	1.5
4	40		.17	100	014.8	134	122	1.89		80	1.5
3	45		.19	100	019.1	135	124	2.1		80	1.7
2	50		.20	100	023.3	137	125	2.2		80	2
2	55		.21	100	027.4	138	125	2.3		80	2
	60				031.947						
AVERAGE (TOTAL)					( )						

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA-25

Source Designation: IMC South Inlet

Date: 9/27/76

Test Number: P-2 cont'd

Field Person: RGK

Filter Number:

Barometric Pressure ("Hg):

Stack Static Pressure ("H_2O):

Stack Dimensions:

Plume Appearance:

Ambient Temperature(°F):

Record all Data Every _____ Minutes

Filter Heater Setting:

Probe Heater Setting:

Nozzle Number: ____, Dia.(in.):

Pitot Tube No. ____, Corr.Factor:

Meter Box No. ____, Corr.Factor:

Meter Isokinetic Factor:

Assumed Moisture(%):

Condensate Volume(ml): 13

Silica Gel Weight Gain(g):

Leak Rate _____ CFM at _____ "Hg

Traverse Point No.	Time		Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter			Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
	Sampling (min)	Clock			Volume (ft^3)	Temp (°F) Inlet	Temp (°F) Outlet				
5 11	60	1605	.28	100	031.947	130	125	3.1		78	3.0
11	65		.30	100	036.9	133	125	3.3		78	3.5
10	70		.27	105	042.2	136	125	3.0		77	3.5
9	75		.24	107	047.4	137	125	2.7		77	3.5
8	80		.19	107	052.3	138	125	2.1		77	3
7	85		.19	103	056.7	138	125	2.1		77	3
6	90		.13	105	61.0	[illegible]	125	1.4		79	3
5	95		.16	105	64.6	136	126	1.8		79	3
4	100		.17	105	68.5	136	125	1.9		79	3
3	105		.22	105	72.4	136	125	2.4		80	3.5
2	110		.20	105	76.9	136	125	2.2		80	3.5
2	115		.20	105	81.5	136	125	2.2		82	3.5
	120	1705			085.807						
					108.455						
			.217	103.3	2.6[illegible].96[illegible]	132.71	121.42	2.39		79.7	2.445
AVERAGE (TOTAL)					(106.937)	127		2.4		80	2.4

Clayton Environmental Consultants, Inc.

APPENDIX D

PARTICLE SIZE SAMPLING FIELD DATA SHEETS

85.2 9/30

SAMPLING TRAIN DATA

Company: EPA-25
Source Designation: EMC South Inlet
Date: 9/27/76
Test Number: PS-1
Field Person: RLK
Filter Number: SGA-267-28/ET-268-72
Barometric Pressure ("Hg): 27.21
Stack Static Pressure ("H_2O): -2.6
Stack Dimensions: 15" ID
Plume Appearance:
Ambient Temperature (°F): 105
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: ____, Dia. (in.): .2502
Pitot Tube No. 12, Corr. Factor: .835
Meter Box No. RAC-2, Corr. Factor:
Meter Isokinetic Factor: 1.693
Assumed Moisture (%): 2
Condensate Volume (ml): 4
Silica Gel Weight Gain (g): 11.2
Leak Rate .008 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
S 11	0	1644	.26	105	858.252	100	98	1.2		92	3
11	5		.25	105	861.3	109	100	1.2		83	3.5
10	10		.24	105	86.45	116	103	1.1		80	3.7
9	15		.21	105	867.6	118	105	.96		83	3.7
8	20		.17	105	870.5	122	109	.78		86	3.3
7	25		.17	105	873.3	122	110	.78		87	3.5
6	30		.11	105	876.0	123	113	.50		87	3.0
5	35		.17	102	878.2	124	114	.78		86	3.7
4	40		.17	102	880.8	124	115	.78		84	3.8
3	45		.13	102	883.5	125	116	.59		83	3.3
2	50		.18	95	886.0	125	117	.82		83	4.0
2	55		.18	94	888.5	125	117	.82		83	4.0
	60	1744			891.230						
					End of Test						
AVERAGE (TOTAL)					( )						

ml condensate

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA TASK - IMC
Source Designation: INLET TO BAG HOUSE (N)
Date: 9-27-96
Test Number: PS-1
Field Person: [illegible]
Filter Number: FT-265-04 SCA-202-27
Barometric Pressure ("Hg): 27.21
Stack Static Pressure ("H_2O): ~~-2.3~~ 3.2
Stack Dimensions: 12" ID
Plume Appearance: —
Ambient Temperature (°F): 95°
Record all Data Every 5 Minutes

Filter Heater Setting: —
Probe Heater Setting: —
Nozzle Number: 5/16, Dia. (in.): 0.310
Pitot Tube No. 23, Corr. Factor: 0.835
Meter Box No. PK-3, Corr. Factor: 1.020
Meter Isokinetic Factor: 1710
Assumed Moisture (%): 2
Condensate Volume (ml): -11
Silica Gel Weight Gain (g): 23
Leak Rate 0.01 CFM at 15 "Hg

AFTER CONC RATE 0.01 CFM @ 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
H-10	0	16:38	0.28	105	969.843	116	116	3.00	—	84	6.0
10	5	16:43	0.25	105	974.79	126	118	2.71	—	76	6.2
10	10	16:48	0.27	105	979.49	132	122	2.95	—	90	8.0
9	15	16:53	0.23	105	984.43	135	120	2.52	—	92	8.2
8	20	16:58	0.30	105	988.95	135	120	3.28	—	96	11.0
7	25	17:03	0.28	105	994.17	138	122	3.05	—	97	12.6
6	30	17:08	0.20	105	999.16	140	122	2.20	—	97	12.0
5	35	17:13	0.23	105	1003.45	138	122	2.53	—	95	13.0
4	40	17:18	0.21	105	1008.08	138	122	2.31	—	95	15.0
3	45	17:23	0.21	105	1012.48	139	123	2.31	—	95	16.0
3	50	17:28	0.20	105	1016.93	139	123	2.20	—	93	18.0
3	55	17:33	0.19	105	1021.22	138	124	2.09	—	93	18.6
	60	17:38			1025.356						
					55.513						
AVERAGE (TOTAL)				105	( )	135	121	2.60	—	92	12.0

SAMPLING TRAIN DATA

Company: EPA - 25
Source Designation: IMC North Inlet
Date: 9/29/76
Test Number: PS-3
Field Person: RGK
Filter Number: SGA-267-38
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O): -3
Stack Dimensions: 12" ID
Plume Appearance:
Ambient Temperature (°F): 95
Record all Data Every 5 Minutes

Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: ____, Dia. (in.): .2502
Pitot Tube No. 23, Corr. Factor: .838
Meter Box No. RAC-2, Corr. Factor:
Meter Isokinetic Factor: 1693
Assumed Moisture (%): 1.5
Condensate Volume (ml): ~~185.4~~ 7ml
Silica Gel Weight Gain (g): 13.9
Leak Rate .016 CFM at 15 "Hg

Traverse Point No.	Time: Sampling (min)	Time: Clock	Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter: Volume (ft^3)	Dry Gas Meter: Temp (°F) Inlet	Dry Gas Meter: Temp (°F) Outlet	Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
5 10	0	0909	.22	100	086.006	96	92	1.0		85	2
10	5		.21	100	89.0	95	93	.95		80	2
10	10		.20	100	92	102	99	.90		77	2
9	15		.20	100	94.7	105	96	.90		76	2
8	20		.17	100	97.9	108	97	.77		76	2
7	25		.16	100	100.1	110	99	.72		76	2
6	30		.13	100	102.6	114	103	.59		76	2
5	35		.11	100	105	114	105	.50		76	2
4	40		.15	100	107.2	116	106	.68		76	2
3	45		.13	100	109.6	116	108	.59		76	2
3	50		.13	100	112.0	117	109	.59		76	2
3	55		.13	100	114.3	119	111	.59		76	2
	60				116.573						
AVERAGE (TOTAL)					( )						

Clayton Environmental Consultants, Inc.

SAMPLING TRAIN DATA

Company: EPA-25
Source Designation: EMC North Inlet
Date: 9/29/76
Test Number: PS-3 cont'd
Field Person: RGK
Filter Number:
Barometric Pressure ("Hg):
Stack Static Pressure ("H_2O):
Stack Dimensions:
Plume Appearance:
Ambient Temperature (°F):
Record all Data Every _____ Minutes

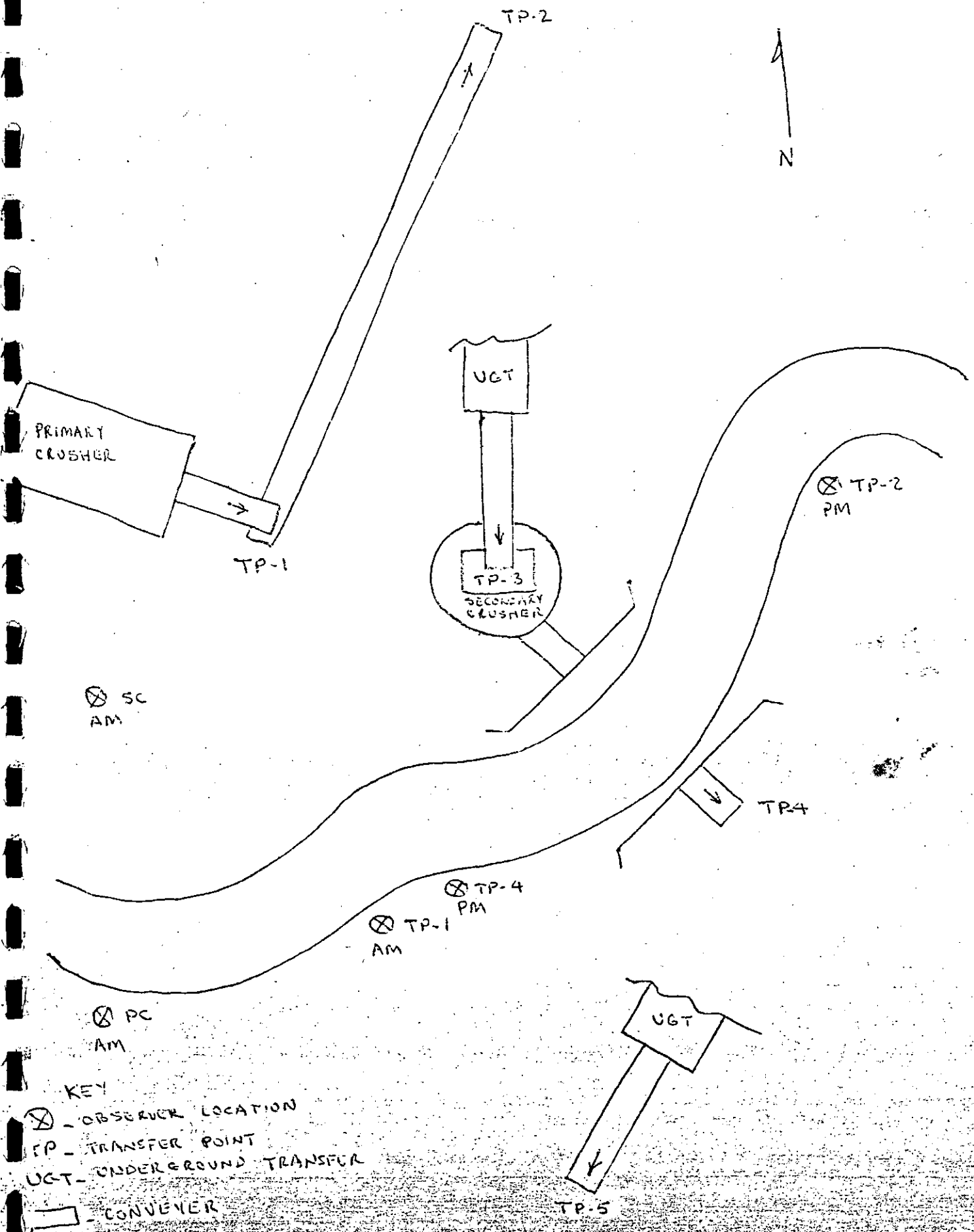
Filter Heater Setting:
Probe Heater Setting:
Nozzle Number: ____, Dia. (in.):
Pitot Tube No. ____, Corr. Factor:
Meter Box No. ____, Corr. Factor:
Meter Isokinetic Factor:
Assumed Moisture (%):
Condensate Volume (ml):
Silica Gel Weight Gain (g):
Leak Rate _____ CFM at _____ "Hg

Traverse Point No.	Time		Velocity Pressure ("H_2O)	Stack Temp (°F)	Dry Gas Meter			Orifice Pressure Differential ("H_2O)	Filter Box Temp (°F)	Last Imp. Gas Temp (°F)	Sampling Train Static Pressure ("Hg)
	Sampling (min)	Clock			Volume (ft^3)	Temp (°F) Inlet	Temp (°F) Outlet				
B 10	60	10:15	.24	100	116.573	117	110	1.1		86	2.5
10	65		.25	103	119.7	119	113	1.1		82	2.5
10	70		.25	103	122.7	120	114	1.1		76	3.0
9	75		.23	102	125.8	122	114	1.0		76	3.0
8	80		.24	100	128.9	123	115	1.1		77	3.5
7	85		.17	100	132	123	115	.77		77	3.5
6	90		.12	100	134.6	123	116	.54		78	3.0
5	95		.12	100	137.0	123	116	.54		78	3.0
4	100		.15	100	139.2	123	116	.68		78	4.0
3	105		.12	100	141.5	123	116	.54		78	4.0
3	110		.12	100	143.8	123	117	.54		79	4.0
3	115		.12	100	146.1	123	117	.54		79	4.0
	120	1115			148.302						
AVERAGE (TOTAL)					( )						

Clayton Environmental Consultants, Inc.

APPENDIX E

VISIBLE EMISSIONS FIELD DATA SHEETS



IMC MINE 9-27-76

FACILITY

Summary of Visible Emissions

Date: 9-27-76

Type of Plant: Feldspar crushing (IMC)

Type of Discharge: Primary Crusher

Distance from Observer to Discharge Point: ~100'

Location of Discharge: "

Height of Observation Point: Ground level

Height of Point of Discharge: ~ 10' - 30'

Direction of Observer from Discharge Point:

Description of Background: Quarry wall and equipment structures

Description of Sky: Partly cloudy

Wind Direction: NE

Wind Velocity: 0 - 10

Color of Plume: No plume

Detached Plume: N/A

Duration of Observation: 1 Hour

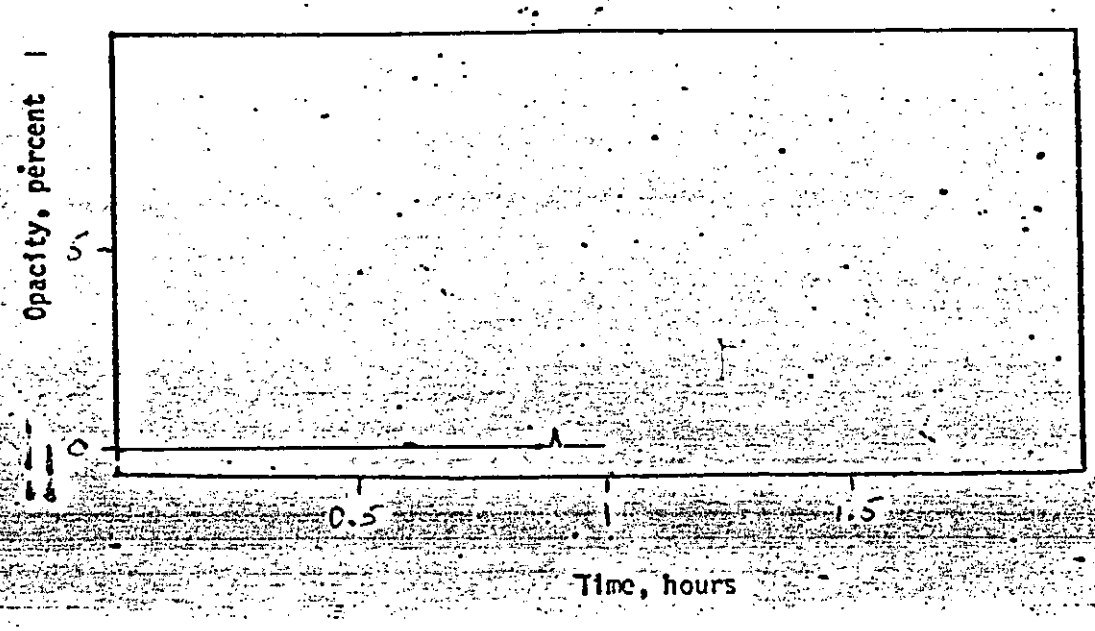
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	09:30	09:36	0	0
2	09:36	09:42	0	0
3	09:42	09:48	0	0
4	09:48	09:54	0	0
5	09:54	10:00	0	0
6	~~10:00~~	10:06	0	0
7	10:06	10:12	0	0
8	10:12	10:18	0	0
9	10:18	10:24	5	0.208
10	10:24	10:30	0	0
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



(1)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-27-76

Plant Address Spruce Pine, N.C.

Observer J.W. Brown

Stack Location Primary Crusher

Observer's Location ~100's

Weather Conditions Partly Cloudy, Wind 0-5 NE

N = no visible emission

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
09	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	Truck Dumps
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	Truck Dumps
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	Truck Dumps
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	Truck Dumps
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	Truck Dumps
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

(2)

Company Name IMC

Date 10-27-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location Primary Crusher

Observer's Location ~100' S

Weather Conditions Partly Cloudy, Wind 0-10 N

N = no visible emissions

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
10	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	Truck Dump
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	Truck Dump
	11	N	N	N	N	
	12	N	N	O	N	Light dust from crusher discharge
	13	O	O	N	N	Truck Dump
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	Sky becoming overcast
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	Truck Dump
	21	O	O	N	N	
	22	S	N	N	N	
	23	O	O	O	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	Truck Dump
	29	N	N	N	N	

Summary of Visible Emissions

Date:

Type of Plant: Kelsper Crushing

Type of Discharge: Primary Crusher

Distance from Observer to Discharge Point: approx. 100'

Location of Discharge: Primary

Height of Observation Point: ground level

Height of Point of Discharge: 10'-30'

Direction of Observer from Discharge Point: 100' ft South Southeast of operation

Description of Background: Equipment Structure

Description of Sky: Partly Cloudy

Wind Direction:

Wind Velocity: 0-7 mph

Color of Plume: No Visible Plume

Detached Plume:

Duration of Observation: 1 hr

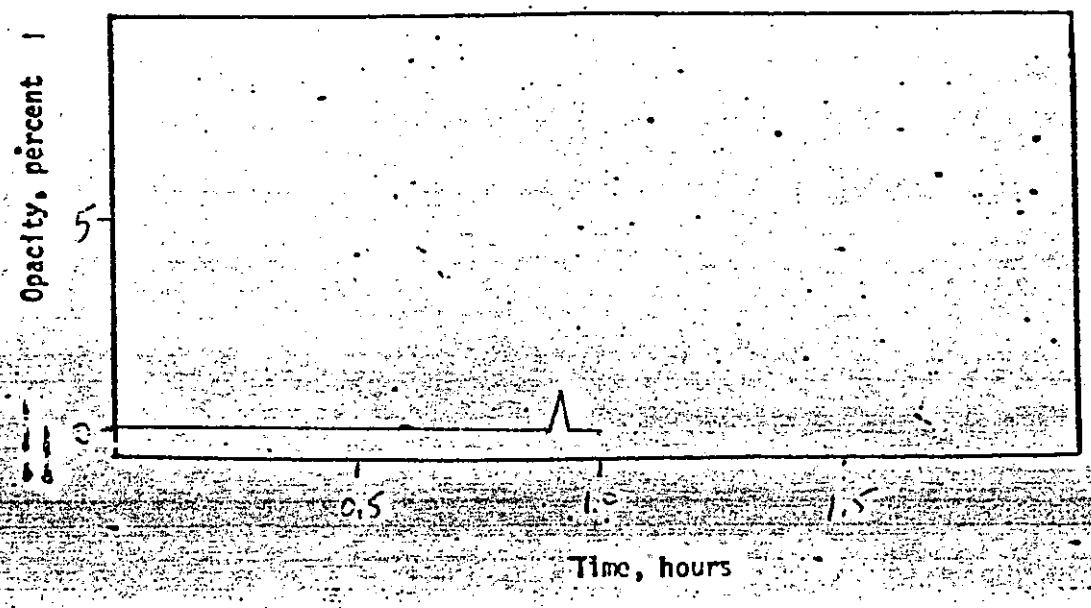
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	09:32	09:37	N	N
2	09:38	09:43	N	N
3	09:43	09:49	N	N
4	09:50	09:55	N	N
5	09:56	10:01	N	N
6	10:02	10:07	N	N
7	10:08	10:13	N	N
8	10:14	10:19	N	N
9	10:20	10:25	15	0.25
10	10:26	10:30	N	N
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

Company Name: I M C.

Date: 9/27/74

Plant Address: Spruce Pines, NC

Observer: D. P. Hofgesang

Stack Location: Crushing operation (primary)

Observer's Location: 100' S SE of crusher

Weather Conditions: Partly cloudy

9:32

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30					
	31					
09:32	32	N	N	N	N	Truck dumped
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	Truck Dumped
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	Truck dumped
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	Truck dumped
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	Truck Dumped
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name I.M.C. Date 9/20/76

Plant Address Spruce Pines, N C Observer D.P. Holschuh

Stack Location Crushing Operation (Primary) Observer's Location 100' S.S.E. of Crusher

Weather Conditions Partly Cloudy

HR	MIN	SECONDS 00	15	30	45	COMMENTS
10:00	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	Truck dumped
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	Truck Dumped
	11	N	N	N	N	
	12	N	N	N	O	
	13	O	O	N	N	Truck Dumped
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	Truck Dumped
	21	N	5	O	N	
	22	5	5	O	O	
	23	O	O	O	O	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	Truck Dumped
	29	N	N	N	N	

FACILITY

Summary of Visible Emissions

Date: 9-27-76

Type of Plant: IMC Felispar

Type of Discharge: Conveyor Transfer

Distance from Observer to Discharge Point: ~50'

Location of Discharge: TP-1

Height of Observation Point: Ground level

Height of Point of Discharge: ~10'

Direction of Observer from Discharge Point: SE

Description of Background: Quarry wall

Description of Sky: Overcast

Wind Direction: NE

Wind Velocity: 0-5

Color of Plume: No plume

Detached Plume: N/A

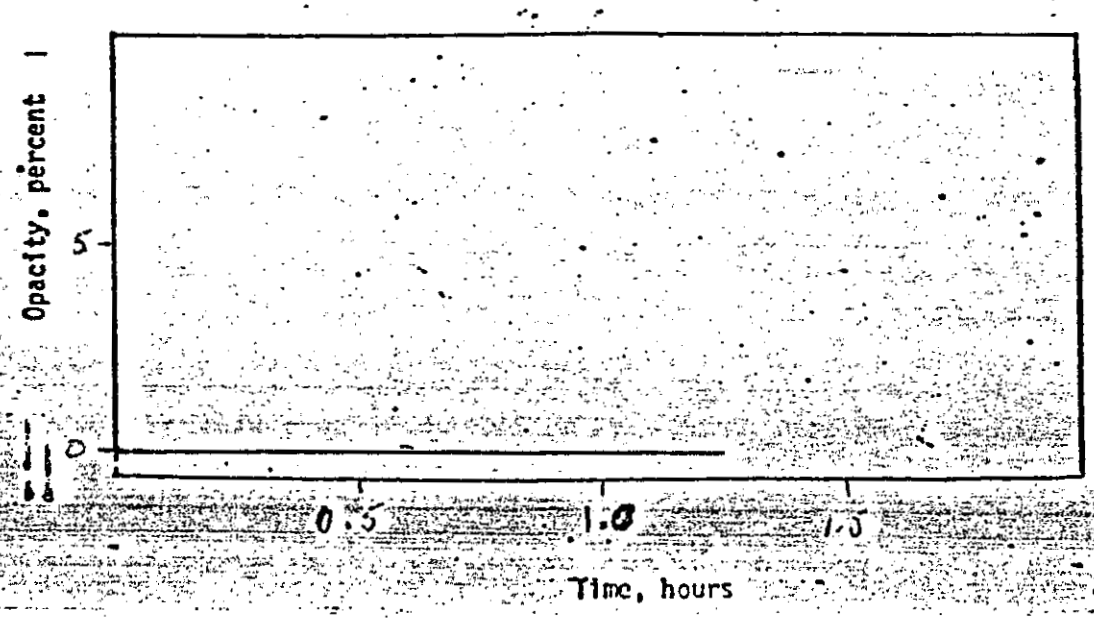
Duration of Observation: ~1 1/4 Hours

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average	Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	10:41	10:47	0	0	21				
2	10:47	10:53	0	0	22				
3	11:45	11:51	0	0	23				
4	11:51	11:57	0	0	24				
5	11:57	12:03	0	0	25				
6	12:03	12:09	0	0	26				
7	12:09	12:15	0	0	27				
8	12:15	12:21	0	0	28				
9	12:21	12:27	0	0	29				
10	12:27	12:33	0	0	30				
11	12:33	12:39	0	0	31				
12	12:39	12:45	0	0	32				
13	12:45	12:50	0	0	33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

SUMMARY OF AVERAGE OPACITY

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-27-76

Plant Address Spencer Pine, N.C.

Observer J. W. Brown

Stack Location Mine TP-1

Observer's Location ~ 50' SE

Weather Conditions Overcast, Wind 0-5

N = no visible emissions

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
10	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41	N	N	N	N	Start
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	Conveyor empty
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	Conveyor empty
	55	N	N			Plant stops for lunch
	56					
	57					
	58					
	59					

(2)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-27-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location Mine TP-1

Observer's Location ~50' SE

Weather Conditions Partly Cloudy, Wind 0-5

N = no visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
11	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41					
	42					
	43					
	44					
	45	N	N	N	N	Restart
	46	N	N	N	N	Conveyor empty
	47	N	N	N	N	↓
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	Conveyor empty
	58	N	N	N	N	↓
	59	N	N	N	N	

(3)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-27-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location Mine TP-1

Observer's Location ~50' SE

Weather Conditions Overcast, Wind 0-5

N = no visible emissions

HR	MIN	SECONDS 00	15	30	45	COMMENTS
12	00	N	N	N	N	Conveyer empty
	01	N	N	N	N	↓
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	Conveyer empty
	11	N	N	N	N	↓
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	Conveyer empty
	28	N	N	N	N	↓
	29	N	N	N	N	

(4)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-27-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location Mine TP-1

Observer's Location ~50' SE

Weather Conditions Overcast, Wind 0-5

N = no visible emission

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
12	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	Conveyer empty
	47	N	N	N	N	↓
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	Complete TP-1 readings
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

FACILITY

Summary of Visible Emissions

Date: 9-27-76 IMC

Type of Plant: IMC Fertilizer

Type of Discharge: Cinder Transfer

Distance from Observer to Discharge Point: ~50'

Location of Discharge: TP-2

Height of Observation Point: Ground level

Height of Point of Discharge: ~40'

Direction of Observer from Discharge Point: SE

Description of Background: Quarry wall

Description of Sky: Partly cloudy - Overcast

Wind Direction: N - NW

Wind Velocity: 0-10

Color of Plume: No plume

Detached Plume: N/A

Duration of Observation: ~1 1/2 hours

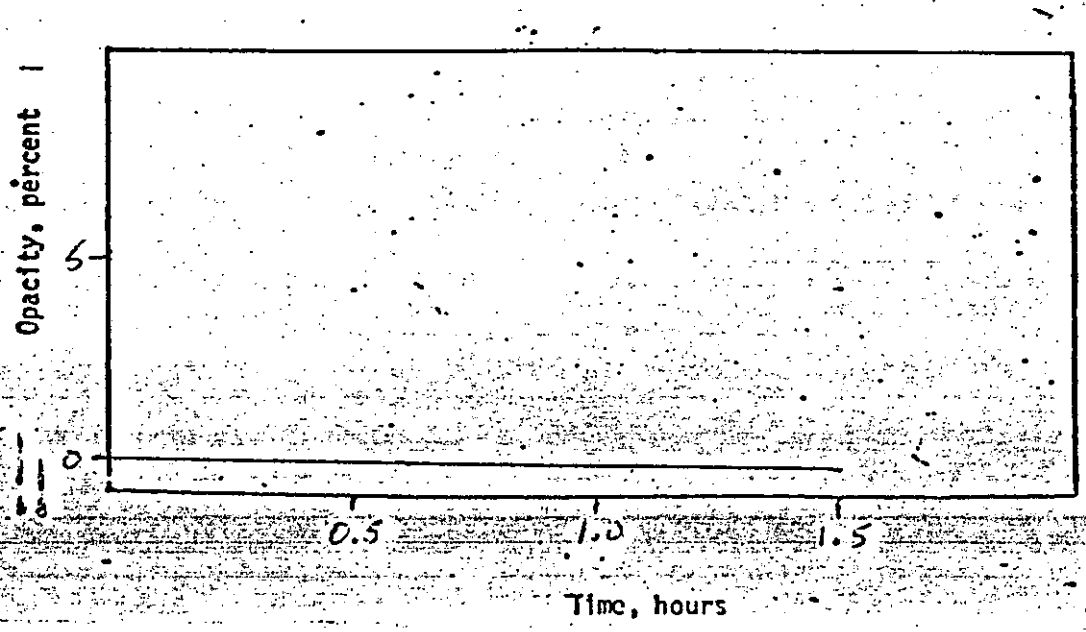
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	13:17	13:23	0	0
2	13:23	13:29	0	0
3	13:29	13:35	0	0
4	13:35	13:41	0	0
5	13:41	13:47	0	0
6	13:47	13:52	0	0
7	14:08	14:14	0	0
8	14:14	14:20	0	0
9	14:20	14:26	0	0
10	14:26	14:32	0	0
11	14:32	14:38	0	0
12	14:38	14:44	0	0
13	14:44	14:50	0	0
14	14:50	14:56	0	0
15	14:56	15:00	0	0
16				
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



(1)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-27-76

Plant Address Spruce Pine, N.C.

Observer J. W. Bram

Stack Location Mine TP-2

Observer's Location ~ 50' SE

Weather Conditions Partly Cloudy, Wind 0-5

N = no visible emission

HR	MIN	SECONDS 00	15	30	45	COMMENTS
13	00					Processing delayed due to jam at
	01					primary crusher
	02					
	03					
	04					
	05					
	06					
	07					
	08					
	09					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17	N	N	N	N	start
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	25	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	Conveyer empty
	29	N	N	N	N	

(2)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-27-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location Mine TP-2

Observer's Location ~ 50' SE

Weather Conditions Partly Cloudy, Wind 0-10

N = no visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
13:00	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	Conveyer empty
	40	N	N	N	N	↓
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	Conveyer empty
	50	N	N	N	N	↓
	51	N	N	N	N	
	52					from primary crusher
	53					
	54					
	55					
	56					
	57					
	58					
	59					

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-27-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location Mine Tp-2

Observer's Location ~50' SE

Weather Conditions Overcast, Wind 0-10

N = no visible emissions

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
14.	00					
	01					
	02					
	03					
	04					
	05					
	06					
	07					
	08	N	N	N	N	Jam cleared
	09	N	N	N	N	
	10	N	N	N	N	Conveyor empty
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	Conveyor empty
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-27-76

Plant Address Spruce Pine, N.C

Observer J.W. Brown

Stack Location Mine TP-2

Observer's Location ~50' SE

Weather Conditions Overcast, Wind 0-5

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
14	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	Conveyer empty
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	Conveyer empty
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	Conveyer empty
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	Conveyer empty
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	Complete TP-2 readings

FACILITY

Summary of Visible Emissions

Date:

Type of Plant: Felspar Crushing

Type of Discharge: Secondary Crusher

Distance from Observer to Discharge Point: approx. 75'

Location of Discharge:

Height of Observation Point: Ground level

Height of Point of Discharge: 10'-20'

Direction of Observer from Discharge Point: 75' S.S.E. of Secondary Crusher

Description of Background: Equipment Structure

Description of Sky: Cloudy to Partly Cloudy

Wind Direction:

Wind Velocity: 0-7 mph

Color of Plume: No Visible Plume

Detached Plume:

Duration of Observation: 1 hr.

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	10:41	10:46	N	N
2	10:47	10:52	N	N
3	10:53	10:55	N	N
4	Down for Lunch			
5				
6	14:45	14:50	N	N
7	14:51	14:56	N	N
8	14:57	12:02	N	N
9	12:03	12:08	N	N
10	12:09	12:14	N	N
11	12:15	12:20	N	N
12	12:21	12:26	N	N
13	12:27	12:32	N	N
14	12:33	12:38	N	N
15	12:39	12:44	N	N
16	12:45	12:50	N	N
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:

RECORD OF VISIBLE EMISSIONS

Company Name: [illegible]

Date: 9/27/76

Plant Address: Spruce Pines NC

Observer: D. P. Holeschuh

Stack Location: Secondary Crusher

Observer's Location: 75' South of Stack

Weather Conditions: Cloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
10:47	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
10:41	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N				Crusher operation shut down for
	56					lunch
	57					
	58					
	59					

RECORD OF VISIBLE EMISSIONS

Company Name: I MC

Date: 9/27/76

Plant Address: Spruce Pines N.C.

Observer: D. P. Holzschuh

Stack Location: Secondary Crusher

Observer's Location: 75' S East of Crusher (secondary)

Weather Conditions: Cloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	~~N~~	~~N~~	~~N~~	~~N~~	
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41					
	42					
	43					
	44					
11:45	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name: IMC

Date: 9/27/76

Plant Address: Spruce Pines N.C.

Observer: D. P. Helzschoh

Stack Location: Secondary Crusher

Observer's Location: 75' S. E. of Crusher

Weather Conditions: Cloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
12:00	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Plant Address SPRUCE Pines, NC

Stack Location Screening Crusher

Weather Conditions Cloudy

Date [illegible]

Observer [illegible]

Observer's Location 75' S.E. of Crusher

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
10:30	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N		
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

FACILITY

Summary of Visible Emissions

Date: 9-27-76

Type of Plant: Felspar Crushing

Type of Discharge: Transfer Pt. #4

Distance from Observer to Discharge Point: Approx. 75

Location of Discharge:

Height of Observation Point: Ground Level

Height of Point of Discharge: approx. 10' ft

Direction of Observer from Discharge Point: 75' S.E. of Transfer pt. #4

Description of Background: Cliff or Wall

Description of Sky: Cloudy

Wind Direction: out of South

Wind Velocity: 0-7 mph

Color of Plume: No Visible Plum

Detached Plume:

Duration of Observation: 1 hr. plus

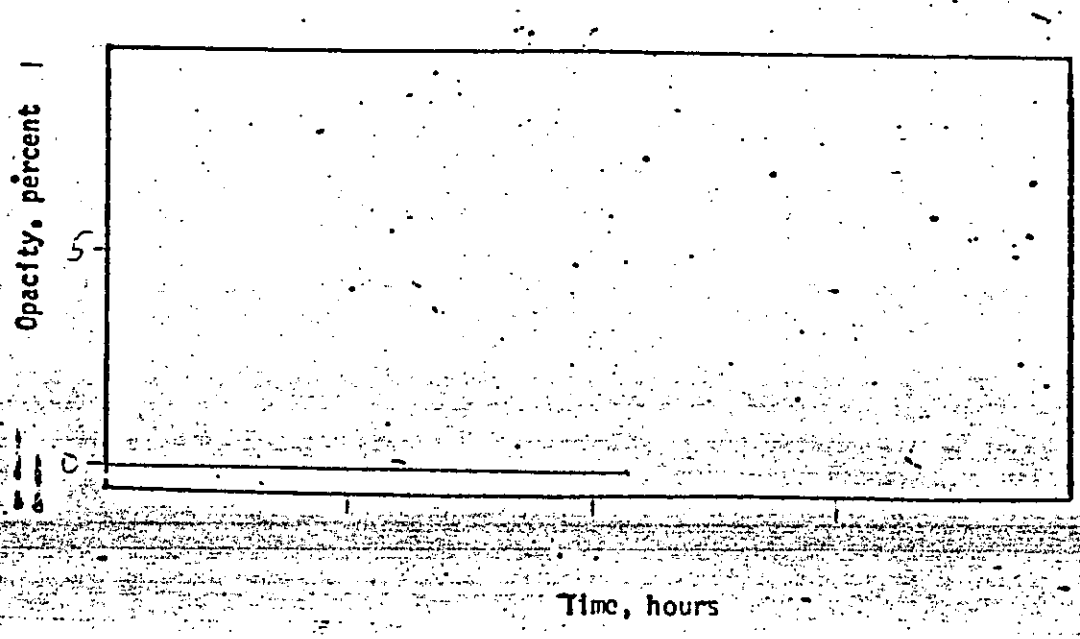
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	13:18	13:23	N	N
2	13:24	13:29	N	N
3	13:30	13:35	N	N
4	13:36	13:41	N	N
5	13:42	13:47	N	N
6	13:48	13:51	N	N
7	shut down Crusher clogged			
8				
9	14:11	14:16	N	N
10	14:17	14:22	N	N
11	14:23	14:28	N	N
12	14:29	14:34	N	N
13	14:35	14:40	N	N
14	14:41	14:46	N	N
15	14:47	14:52	N	N
16	14:53	14:58	N	N
17	14:59	15:01	N	N
18	shut down for the day			
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

Company Name: I.M.C. Date: 9/27/76

Plant Address: Spruce Pines, N.C. Observer: D.P. Hodgesdy

Stack Location: Transfer pt # 4 Observer's Location: 75' SE of Transfer Pt

Weather Conditions: Partly Cloudy

	HR	MIN	SECONDS 00	15	30	45	COMMENTS
		00					
		01					
		02					
		03					
		04					
		05					
		06					
		07					
		08					
		09					
		10					
		11					
		12					
		13					
		14					
		15					
		16					
		17					
1	18	18	N	N	N	N	
		19	N	N	N	N	
		20	N	N	N	N	
		21	N	N	N	N	
		22	N	N	N	N	
		23	N	N	N	N	
		24	N	N	N	N	
		25	N	N	N	N	
		26	N	N	N	N	
		27	N	N	N	N	
		28	N	N	N	N	
		29	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name: I. M. C.

Date: 9/27/76

Plant Address: Spruce Pines NC

Observer: D. P. Hodgdon

Stack Location: Transfer Pt. #1

Observer's Location: 75' South of transfer pt.

Weather Conditions: Partly Cloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
1:30	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	shut down temporarily
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

RECORD OF VISIBLE EMISSIONS

Company Name: IMC

Date: 8/27/76

Plant Address: Spruce Pines NC

Observer: D.P. Holzschuh

Stack Location: Transfer PT #4

Observer's Location: 75' SE of PT

Weather Conditions: Cloudy

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
	00					
	01					
	02					
	03					Rock Clog
	04					
	05					
	06					
	07					
	08					
	09					
	10					
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name L.M.C. Date 9/29/76

Plant Address Spruce Pine NC Observer E. L. Hodgson

Stack Location Transfer Pt 4 Observer's Location 25' S E of Pt.

Weather Conditions Cloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
2:30	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name / MC

Date 9/20/76

Plant Address Lenoir Rhyne NC

Observer D. P Hetzfeld

Stack Location [illegible] PT # 4

Observer's Location 75' SE of pt.

Weather Conditions Cloudy

	HR	MIN	SECONDS 00	15	30	45	COMMENTS
3:00 pm		00	N	N	N	N	
		01	N	N			
		02					
		03					
		04					
		05					
		06					
		07					
		08					
		09					
		10					
		11					
		12					
		13					
		14					
		15					
		16					
		17					
		18					
		19					
		20					
		21					
		22					
		23					
		24					
		25					
		26					
		27					
		28					
		29					

AM 9-29

PM 9-29

WEST WALL

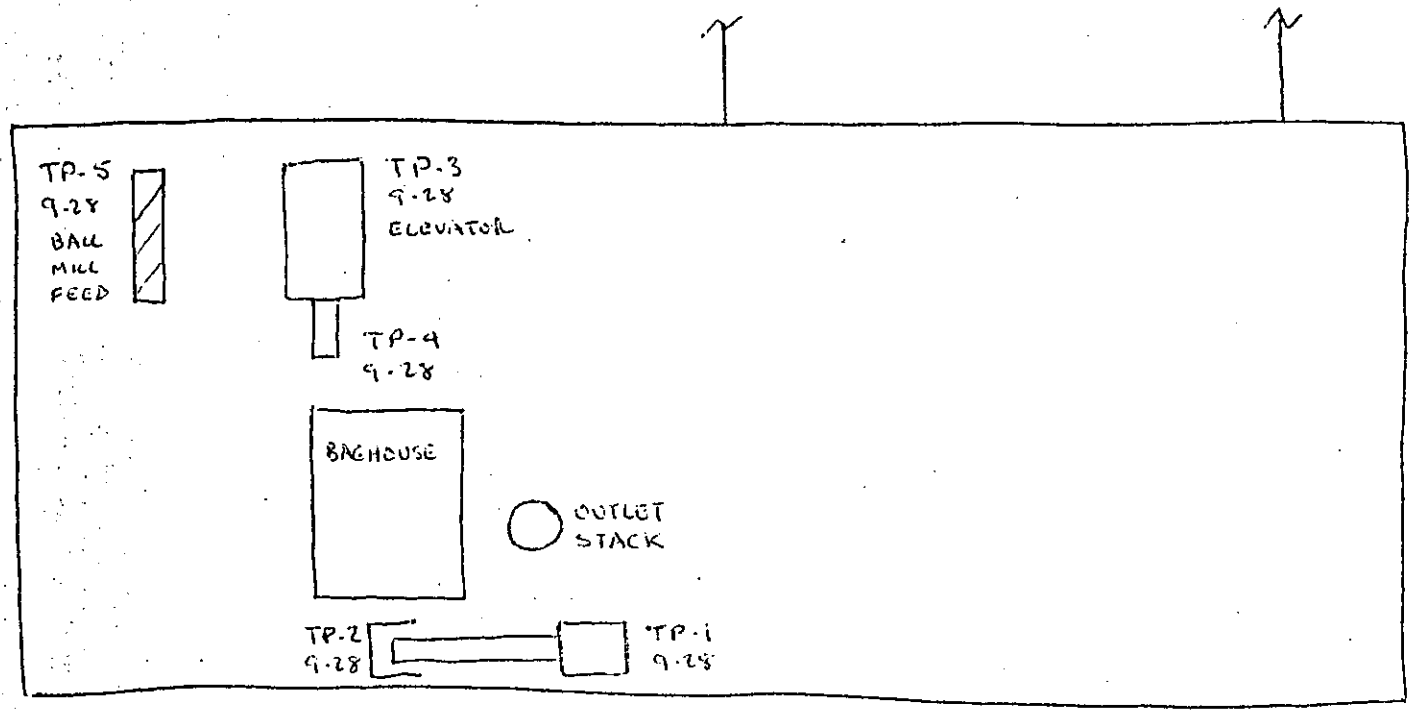
⊗ 9-29

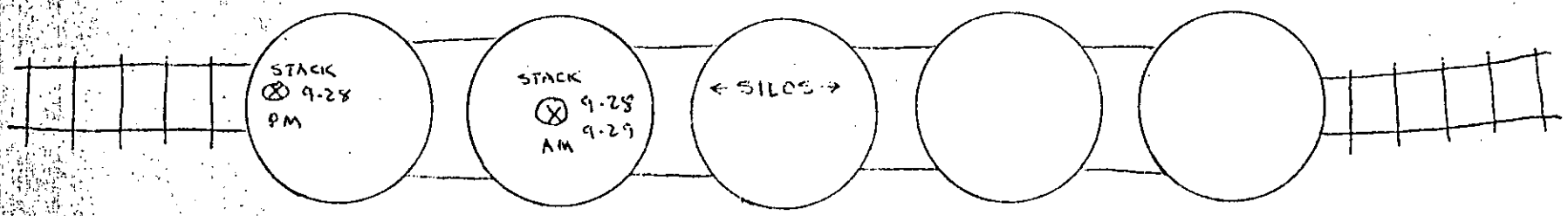
AM

EAST WALL

⊗ 9-29

AM





Z

KEY

⊗ - OBSERVER LOCATION

TP - TRANSFER POINT

⇦ - CONVEYER

LOADING

⊗ 9-29

IMC PROCESSING PLANT 9-28,29,-76

Summary of Visible Emissions

Date: 9-28-76

Type of Plant: IMC Fertilizer

Type of Discharge: Fertilizer loading

Distance from Observer to Discharge Point: ~25'

Location of Discharge: Truck truck & freight car

Height of Observation Point: Ground level

Height of Point of Discharge: ~ 15'

Direction of Observer from Discharge Point: E

Description of Background: Building Wall

Description of Sky: N/A

Wind Direction: N/A

Wind Velocity: N/A

Color of Plume: N/A

Detached Plume: N/A

Duration of Observation: ~ 3/4 hour

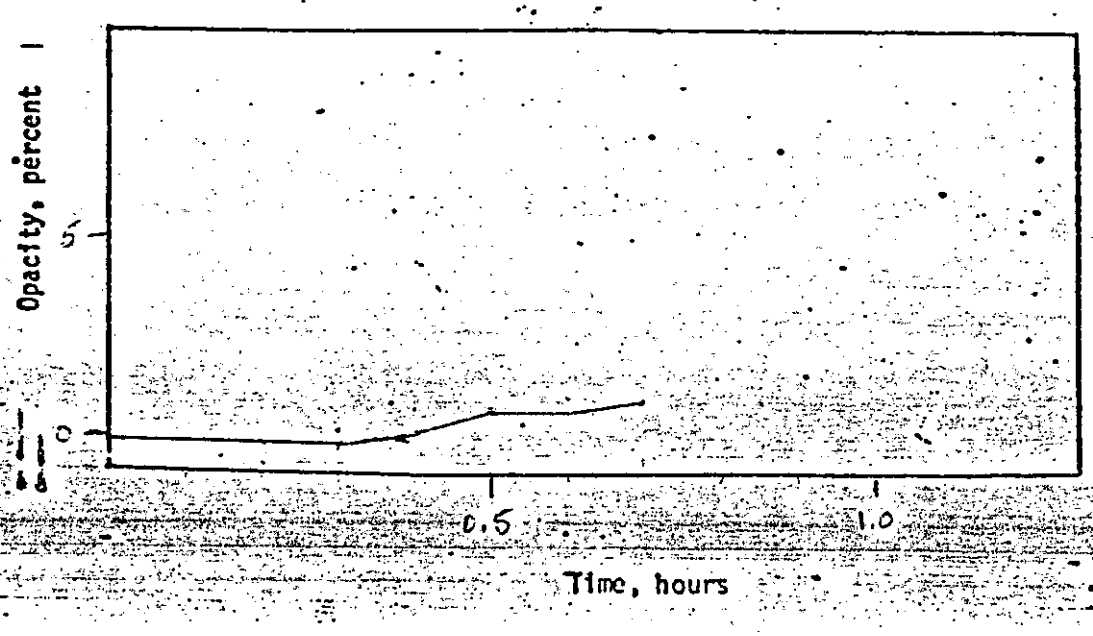
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1 Truck	09:03	09:09	0	0
2	09:09	09:15	0	0
3	12:09	12:15	0	0
4 RR	12:15	12:21	5	0.208
5	12:21	12:27	30	1.25
6 Car	12:27	12:33	30	1.25
7	12:33	12:39	40	1.67
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

Company Name I.M.C. Date 9/28/76

Plant Address Spruce Pines NC Observer D.P. Hyatt

Stack Location Transfer Pit (Truck loading) Observer's Location 30'

Weather Conditions N/A

	TIME					COMMENTS
	HR	MIN	SECONDS 00	15	30	45	
09:00		00	N	N	N	N	
		01					
		02					
9:03		03	N	N	N	N	
		04	N	N	N	N	
		05	N	N	N	N	
		06	N	N	N	N	
		07	N	N	N	N	
		08	N	N	N	N	
		09	N	N	N	N	
		10	N	N	N	N	
		11	N	N	N	N	
		12	N	N	N	N	
		13	N	N	N	N	
		14	N	O	N	N	
		15					
		16					
		17					
		18					
		19					
		20					
		21					
		22					
		23					
		24					
		25					
		26					
		27					
		28					
		29					

RECORD OF VISIBLE EMISSIONS

Company Name I.M.C. Date 9/28/76

Plant Address Spruce Pines NC Observer D P Hobgood

Stack Location Railroad Car filling Observer's Location 25' from Railroad

Weather Conditions Cloudy

HR	MIN	SECONDS 00	15	30	45	COMMENTS
	00					
	01					
	02					
	03					
	04					
	05					
	06					
	07					
	08					
P:09	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	O	N	N	
	14	N	N	N	N	
	15	O	N	O	O	
	16	N	O	O	O	
	17	O	N	N	N	
	18	N	N	N	O	
	19	N	O	N	N	
	20	N	N	5	O	Overflow or spillage
	21	N	N	N	N	
	22	N	N	O	5	Removing filler hose
	23	O	5	O	O	Changed to different
	24	5	O	5	O	
	25	O	O	O	5	
	26	5	O	N	O	
	27	N	5	O	N	
	28	N	5	5	5	
	29	N	N	O	O	

RECORD OF VISIBLE EMISSIONS

Company Name: JBC

Date: 9/28/76

Plant Address: Spruce Pines, NC

Observer: D P Hofgschal

Stack Location: Railroad

Observer's Location: 25'

Weather Conditions: Cloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
1230	30	5	5	0	0	
	31	0	0	N	N	
	32	0	N	N	0	
	33	N	5	5	0	Lifted Vaccum Hose out of
	34	N	N	5	5	Car
	35	5	0	5	5	Fugitive dust escaping from another opening
	36	0	5	0	N	in car
	37	N	N	N	N	Changed to another opening for additional filling
	38	N	0	N	N	
	39	N	N	0	5	
	40	0	0	0	0	Finished
	41					
	42					
	43					
	44					
	45					
	46					
	47					
	48					
	49					
	50					
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

FACILITY

Summary of Visible Emissions

Date: 9-28-76

Type of Plant: IMC Fertilizer

Type of Discharge: Stack

Distance from Observer to Discharge Point: ~40'

Location of Discharge: Baghouse

Height of Observation Point: ~100'

Height of Point of Discharge: ~100'

Direction of Observer from Discharge Point: E

Description of Background: Trees on hillside

Description of Sky: Overcast.

Wind Direction: NW

Wind Velocity: 0-10

Color of Plume: No visible plume

Detached Plume: N/A

Duration of Observation: ~ 2¼ hours

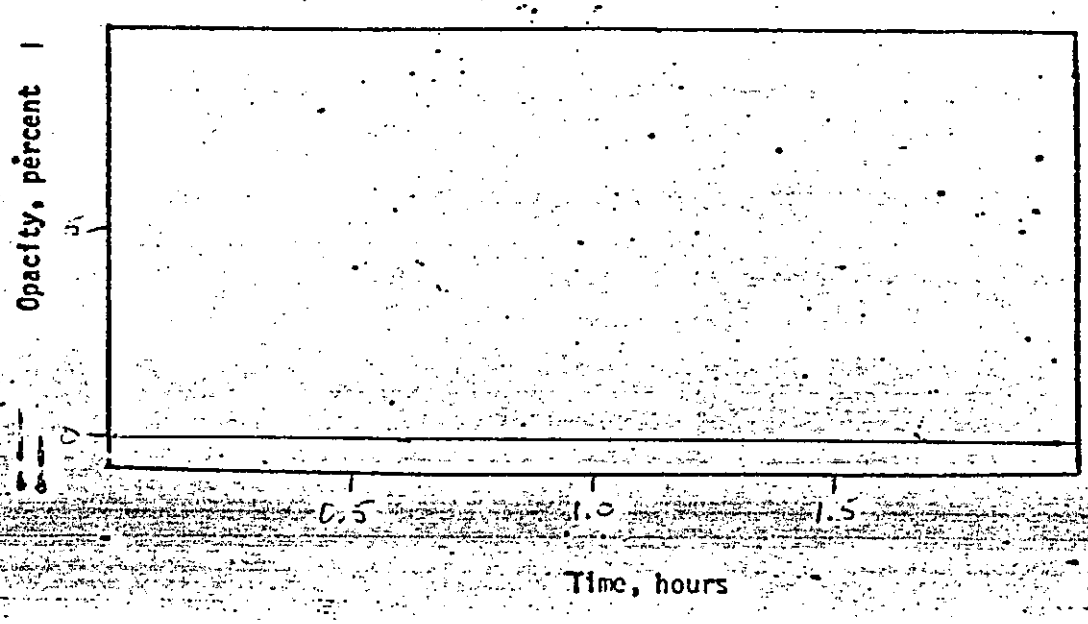
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	09:48	09:54	0	0
2	09:54	10:00	0	0
3	10:00	10:06	0	0
4	10:06	10:12	0	0
5	10:12	10:18	0	0
6	10:18	10:24	0	0
7	10:24	10:30	0	0
8	10:30	10:36	0	0
9	10:36	10:42	0	0
10	10:42	10:48	0	0
11	10:48	10:54	0	0
12	10:54	11:00	0	0
13	11:00	11:06	0	0
14	11:06	11:12	0	0
15	11:12	11:18	0	0
16	11:18	11:24	0	0
17	11:24	11:30	0	0
18	11:30	11:36	0	0
19	11:36	11:42	0	0
20	11:42	11:48	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	11:48	11:54	0	0
22	11:54	12:00	0	0
23	12:00	12:06	0	0
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



(1)

RECORD OF VISIBLE EMISSIONS

Company Name LMC

Date 9-28-76

Plant Address Sparrows Point, M.C.

Observer J. L. Brown

Stack Location Blast Furnace Stack

Observer's Location ~40'E

Weather Conditions Overcast, Wind 0-5 NW

N = no visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
09	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41					
	42					
	43					
	44					
	45					
	46					
	47					
09	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	Sampling started
	59	N	N	N	N	

(2)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-28-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location Baghouse stack

Observer's Location ~40' E

Weather Conditions Overcast, Wind 0-10

N = no visible emissions

TIME						COMMENTS
HR	MIN	SECONDS 00	15	30	45	
10:	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name LMC

Date 9-28-76

Plant Address Spruce Pine, N.C.

Observer [illegible]

Stack Location Baghouse Stack

Observer's Location ~40' E

Weather Conditions Overcast, Wind 0-5

N = no visible emissions

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
10	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

(4)

RECORD OF VISIBLE EMISSIONS

Company Name: IMC

Date: 9-23-76

Plant Address: Source Rock, N.C.

Observer: J. W. Brown

Stack Location: Baghouse stack

Observer's Location: ~40' E

Weather Conditions: Overcast, high 0-5

N = no visible emissions

TIME						COMMENTS
HR	MIN	SECONDS 00	15	30	45	
11	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

(5)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-28-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location Baghouse stack

Observer's Location ~90' E

Weather Conditions Sunny, wind 0-5

N = no visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
11:[illegible]	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

(6)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-23-76

Plant Address Spring Grove, Pa.

Observer J. W. Brown

Stack Location Baghouse Stack

Observer's Location ~ 40' E

Weather Conditions Overcast, Wind 0-

N = no visible emissions

TIME					COMMENTS
HR	MIN	SECONDS 00	15	30	45	
1033	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	~~Sample completed~~
	07					
	08					
	09					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					
	21					
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					

FACILITY

Summary of Visible Emissions

Date: 7/09/76

Type of Plant: Tobacco Plant

Type of Discharge: Transfer Pt. (going into separator) TP-4, TP-5

Distance from Observer to Discharge Point: 35'

Location of Discharge: Going into separator

Height of Observation Point:

Height of Point of Discharge: 20' off of Floor

Direction of Observer from Discharge Point: N/A

Description of Background: Building & equipment structure

Description of Sky: N/A

Wind Direction: N/A

Wind Velocity: N/A

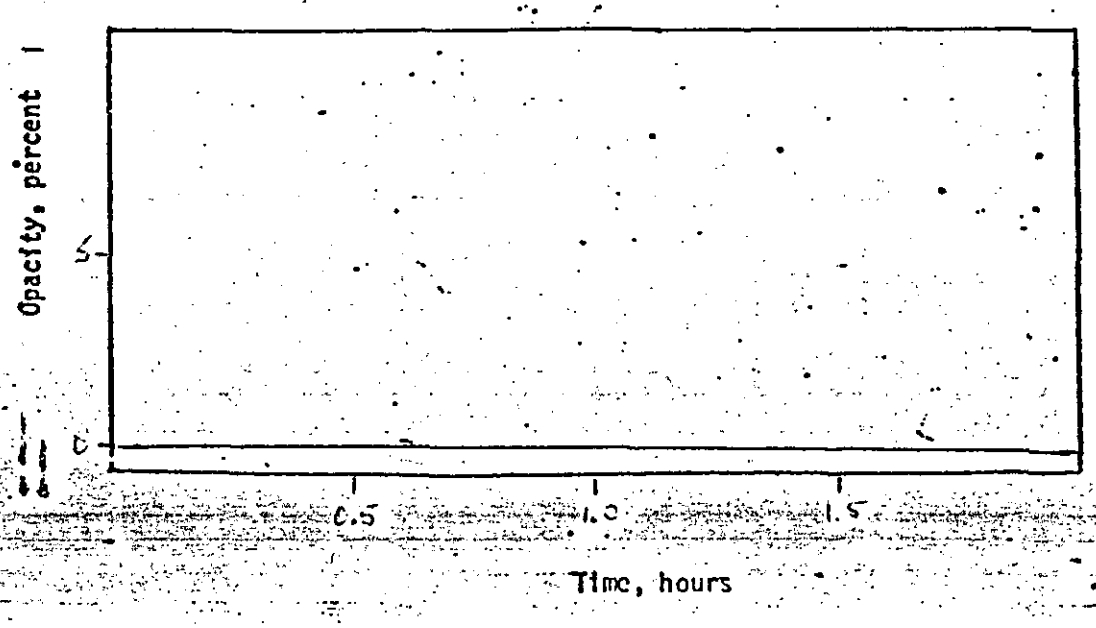
Color of Plume: No visible plume

Detached Plume: N/A

Duration of Observation: 1 hr. ea.

	SUMMARY OF AVERAGE OPACITY					SUMMARY OF AVERAGE OPACITY				
	Time		Opacity			Time		Opacity		
Set Number	Start	End	Sum	Average	Set Number	Start	End	Sum	Average
1	09:30	09:36	0	0	21				
2	09:36	09:42	0	0	22				
3	09:42	09:48	0	0	23				
4	09:48	09:54	0	0	24				
5 TP-5	09:54	10:00	0	0	25				
6	10:00	10:06	0	0	26				
7	10:06	10:12	0	0	27				
8	10:12	10:18	0	0	28				
9	10:18	10:24	0	0	29				
10	10:24	10:30	0	0	30				
11	10:51	10:57	0	0	31				
12	10:57	11:03	0	0	32				
13	11:03	11:09	0	0	33				
14	11:09	11:15	0	0	34				
15	11:15	11:21	0	0	35				
16 TP-4	11:21	11:27	0	0	36				
17	11:27	11:33	0	0	37				
18	11:33	11:39	0	0	38				
19	11:39	11:45	0	0	39				
20	11:45	11:50	0	0	40				

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

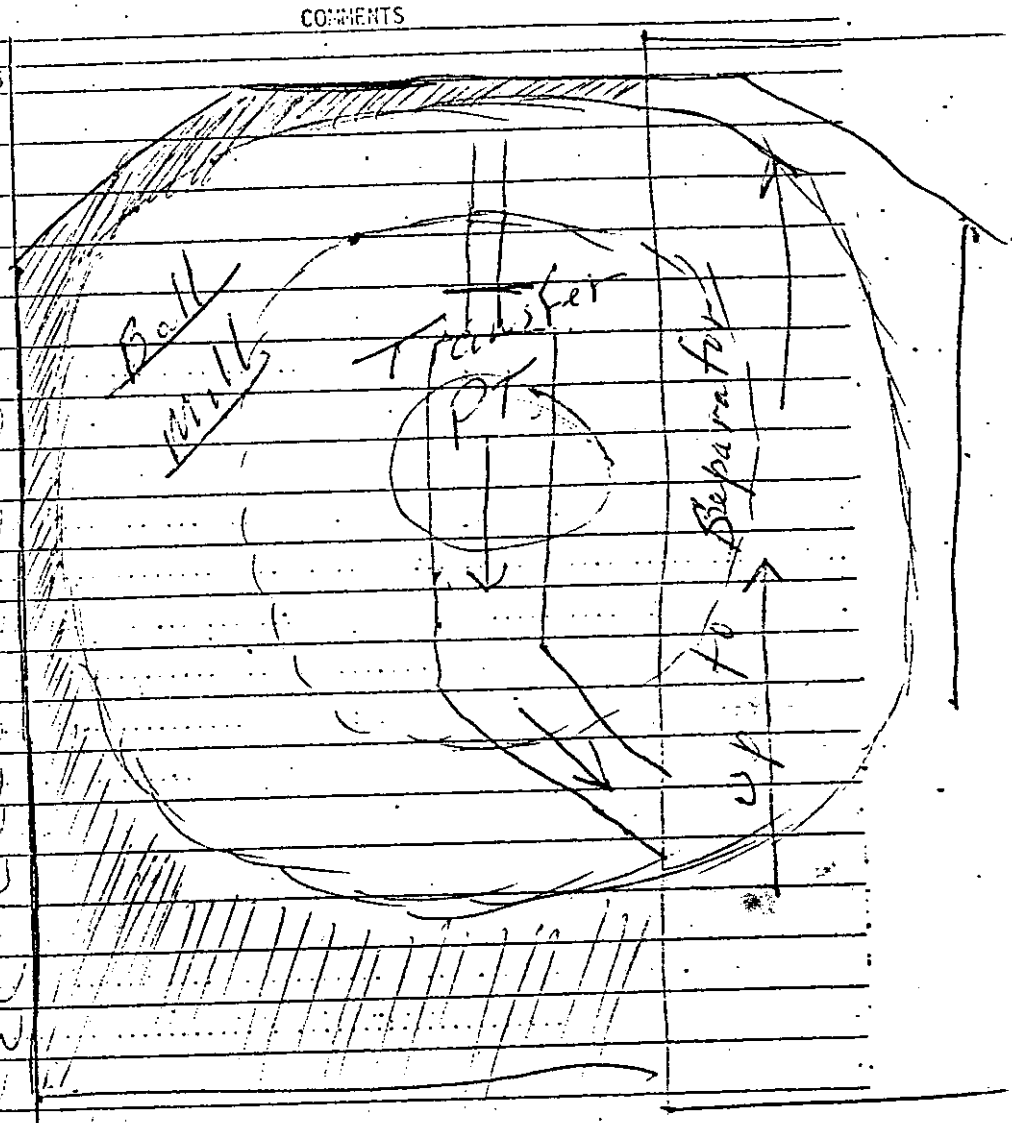
Company Name I.M.C. Date 9/28/76

Plant Address Spruce Pines N.C. Observer D. P. Hedgecoth

Stack Location Transfer Pt. (Conveyor) Observer's Location 30'

Weather Conditions N/A

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
09:30	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	



Tip

RECORD OF VISIBLE EMISSIONS

Company Name: I. M. C.

Date: 9/28/76

Plant Address: Spruce Pines NC

Observer: O. P. Hofschulz

Stack Location: Transfer Pt

Observer's Location: 30'

Weather Conditions: N/A.

HR	MIN	SECONDS 00	15	30	45	COMMENTS
10.00	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name I.M.C.

Plant Address Spruce Pines NC

Stack Location Transfer Pt

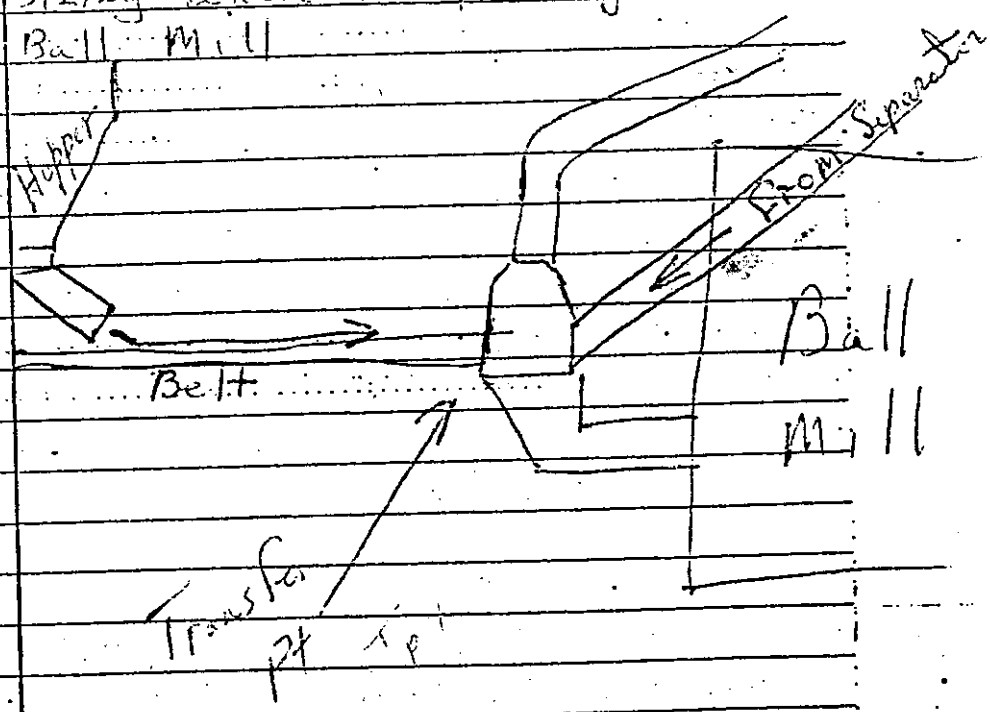
Weather Conditions N/A

Date 9/28/76

Observer D. P. Hofbachek

Observer's Location 5' from pt.

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30					
	31					
	32					
	33					
10:34	34	N	N			Belt Stopped going into Ball Mill (total Time 16 min)
	35					
	36					
	37					
	38					
	39					Transfer Pt is final sizing where Felspar goes into Ball Mill
	40					
	41					
	42					
	43					
	44					
	45					
	46					
	47					
	48					
	49					
	50					
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	



RECORD OF VISIBLE EMISSIONS

Company Name: I MC

Date: 9/28/76

Plant Address: Spruce Pines NC

Observer: D. P. Holzschuh

Stack Location: Transfer Pt. (going into Ballmill)

Observer's Location: 5' from Pt

Weather Conditions: N/A

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
11:00	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name: I M C

Date: 9/28

Plant Address: Spruce Pines NC

Observer: D. P. Hedgecock

Stack Location: Trees for Pt (Bearing rail Ball Acl)

Observer's Location: 5' from Pt

Weather Conditions: N/A

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
11:30	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

FACILITY

Summary of Visible Emissions

Date: 9-28-76

Type of Plant: IMC Fertilizer

Type of Discharge: Indirect Through Points

Distance from Observer to Discharge Point: 6'-35'

Location of Discharge: TP-1, TP-2, TP-3

Height of Observation Point:

Height of Point of Discharge: Variable

Direction of Observer from Discharge Point: N/A

Description of Background: Building walls and equipment structures

Description of Sky: N/A

Wind Direction: N/A

Wind Velocity: N/A

Color of Plume: No visible plume

Detached Plume: N/A

Duration of Observation: 1 hour each

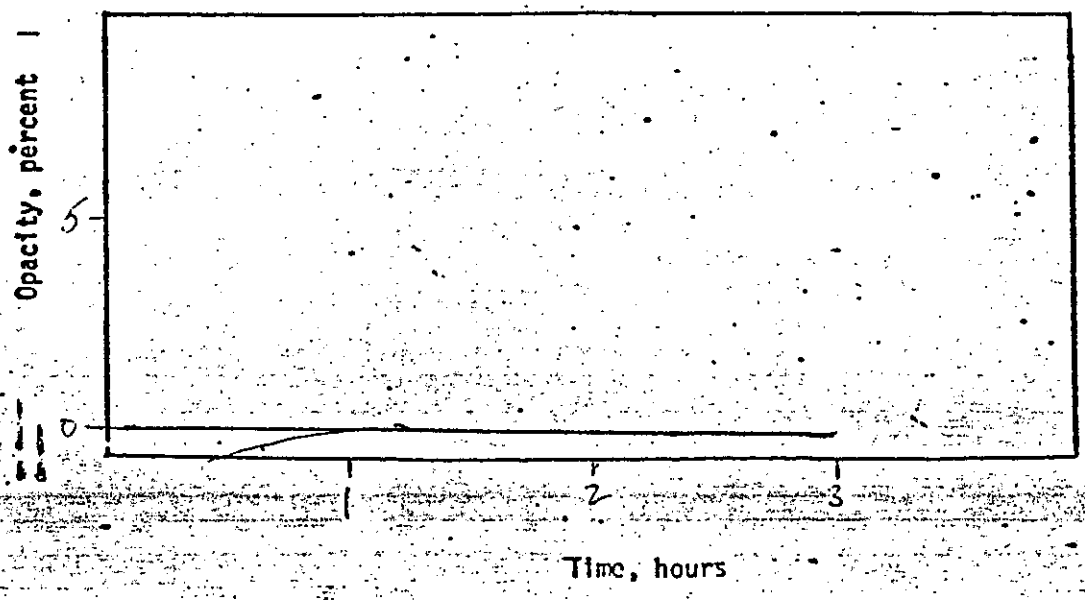
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1 (TP-3)	13:45	13:51	0	0
2	13:51	13:57	0	0
3	13:57	14:03	0	0
4	14:03	14:09	0	0
5	14:09	14:15	0	0
6	14:15	14:21	0	0
7	14:21	14:27	0	0
8	14:27	14:33	0	0
9	14:33	14:39	0	0
10	14:39	14:45	0	0
11 (TP-2)	15:00	15:06	0	0
12	15:06	15:12	0	0
13	15:12	15:18	0	0
14	15:18	15:24	0	0
15	15:24	15:30	0	0
16	15:30	15:36	0	0
17	15:36	15:42	0	0
18	15:42	15:48	0	0
19	15:48	15:54	0	0
20	15:54	16:00	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21 (TP-1)	16:00	16:06	0	0
22	16:06	16:12	0	0
23	16:12	16:18	0	0
24	16:18	16:24	0	0
25	16:24	16:30	0	0
26	16:30	16:36	0	0
27	16:36	16:42	0	0
28	16:42	16:48	0	0
29	16:48	16:54	0	0
30	16:54	17:00	0	0
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

Company Name: I. M. C.

Date: 9/28/76

Plant Address: Spruce Pines, N.C.

Observer: C. P. Holzschuh

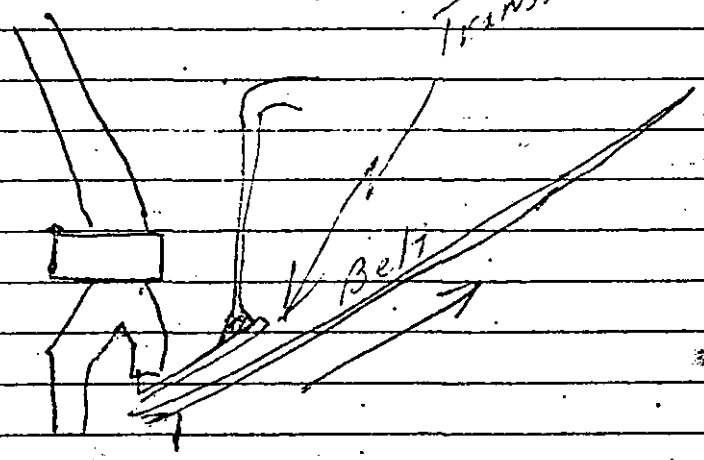
Stack Location: Transfer Pt TP 1

Observer's Location: Transfer Pt 6'

Weather Conditions: N/A

HR	MIN	TIME SECONDS 00	15	30	45
16:00	00	N	N	N	N
	01	N	N	N	N
	02	N	N	N	N
	03	N	N	N	N
	04	N	N	N	N
	05	N	N	N	N
	06	N	N	N	N
	07	N	N	N	N
	08	N	N	N	N
	09	N	N	N	N
	10	N	N	N	N
	11	N	N	N	N
	12	N	N	N	N
	13	N	N	N	N
	14	N	N	N	N
	15	N	N	N	N
	16	N	N	N	N
	17	N	N	N	N
	18	N	N	N	N
	19	N	N	N	N
	20	N	N	N	N
	21	N	N	N	N
	22	N	N	N	N
	23	N	N	N	N
	24	N	N	N	N
	25	N	N	N	N
	26	N	N	N	N
	27	N	N	N	N
	28	N	N	N	N
	29	N	N	N	N

COMMENTS



RECORD OF VISIBLE EMISSIONS

Company Name: I M C

Date: 9/28/76

Plant Address: Spruce Pines NC

Observer: E W P Holzenthal

Stack Location: Transfer Pt

Observer's Location: 60' From Transfer Pt

Weather Conditions: N/A

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
16:30	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

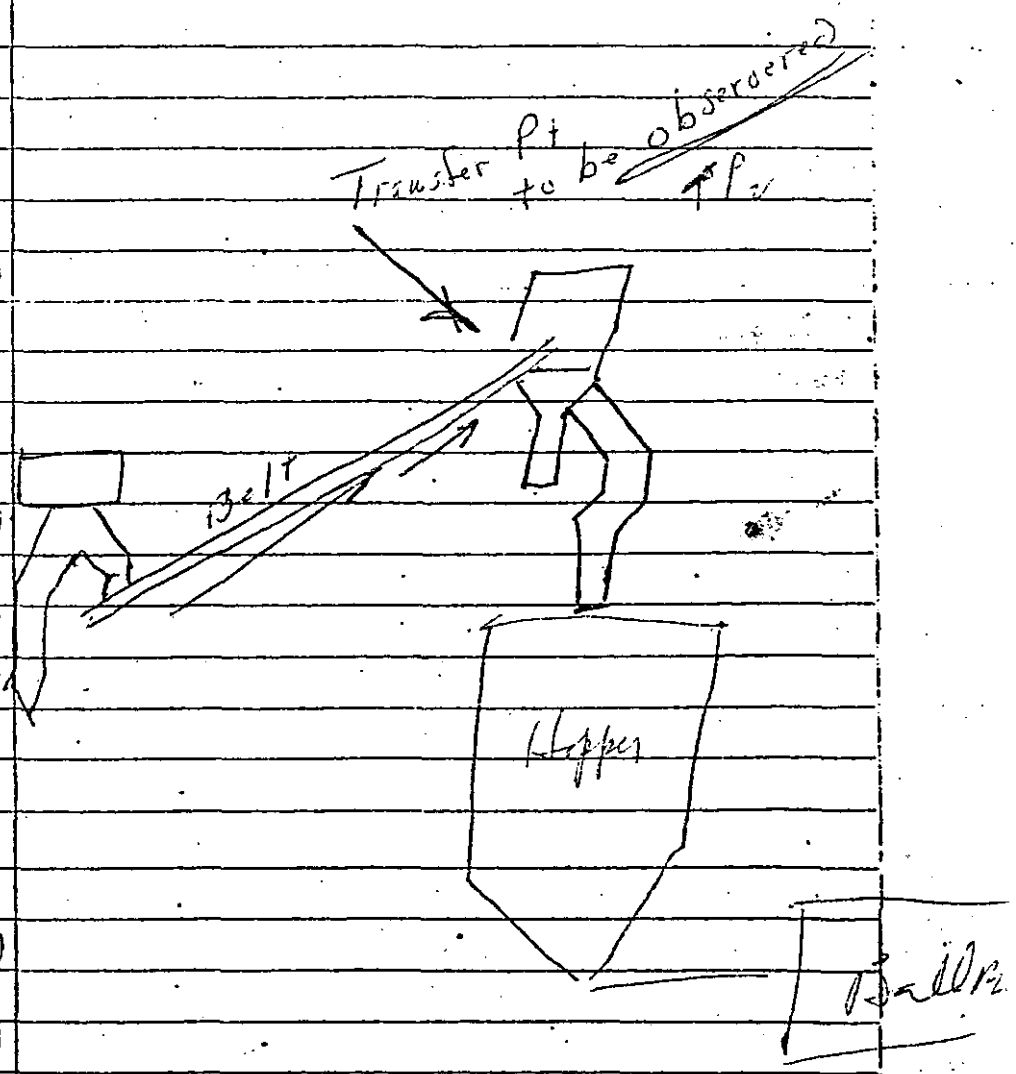
Company Name I.M.C. Date 9/28/76

Plant Address Spruce Pines NC Observer A. P. Holzenbach

Stack Location Transfer Pt going to Hopper Observer's Location Transfer Pt 15'

Weather Conditions N/A

HR	MIN	SECONDS 00	15	30	45	COMMENTS
15:00	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	



RECORD OF VISIBLE EMISSIONS

Company Name: IMC

Date: 9/28/76

Plant Address: Spruce Pines, N.C.

Observer: D P Hofgesang

Stack Location: Transfer Pt

Observer's Location: 15' from Pt

Weather Conditions: N/A

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
15:30	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

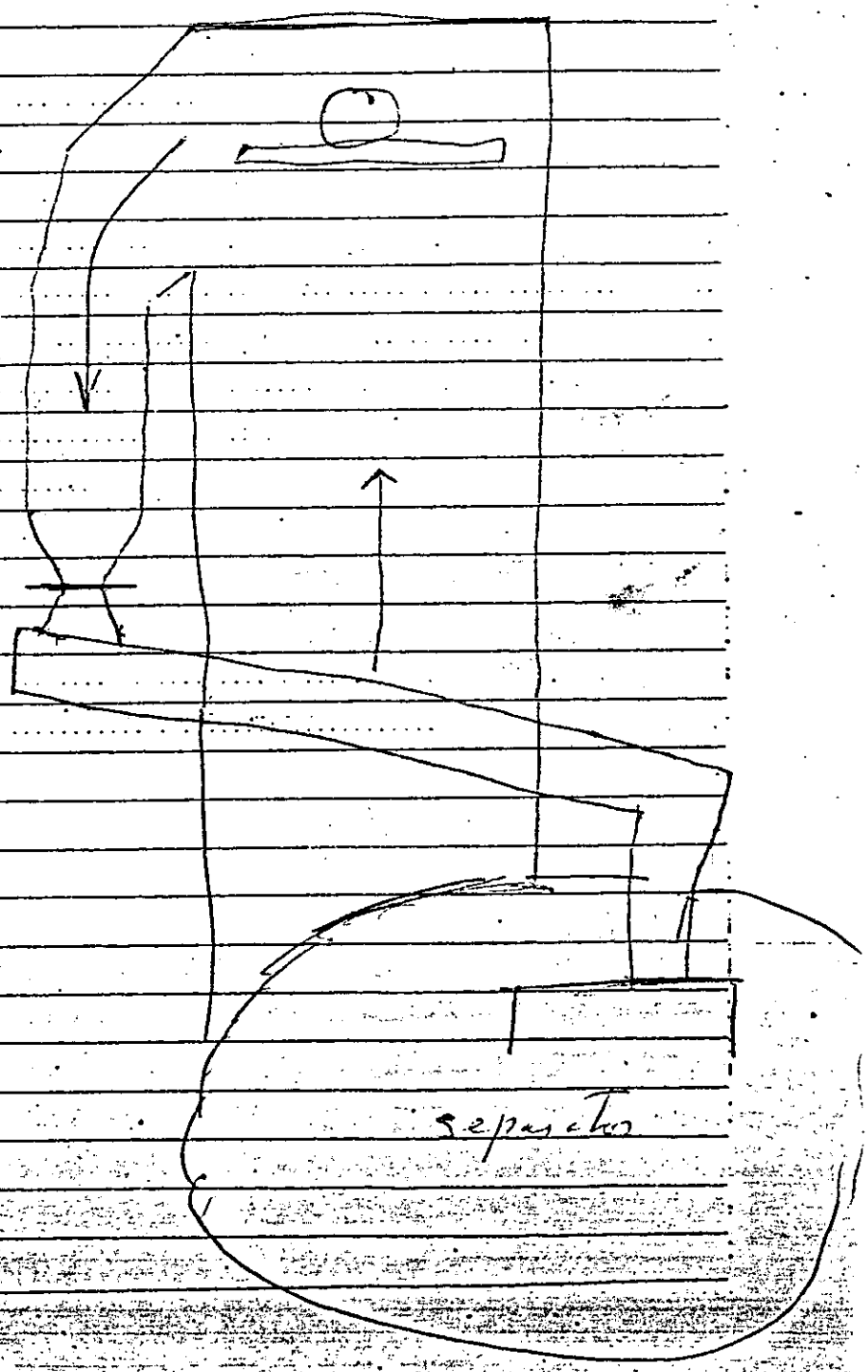
Company Name: I.M.C.r Date: 9/28/76

Plant Address: Spruce Pines NC Observer: D.P. Hofgachly

Stack Location: Trans Line PH going into Separator Observer's Location: 35' from PT

Weather Conditions: N/A

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41					
	42					
	43					
	44					
13:45	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	



RECORD OF VISIBLE EMISSIONS

Company Name I.M.C. Date 9/28/76

Plant Address Spruce Pines NC Observer D. P. Holzschuh

Stack Location Transfer Pt. (from Ball mill going into Separator) Observer's Location 35' from Pt.

Weather Conditions N/A

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
14:00	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name: I M C

Date: 9/28/76

Plant Address: Spruce Pines, NC

Observer: D P Hdaschuh

Stack Location: Transfer Pt

Observer's Location:

Weather Conditions: N/A

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
14:30	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	Finished 1 hr of Readings CPH
	45					
	46					
	47					
	48					
	49					
	50					
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

FACILITY

Summary of Visible Emissions

Date: 9-28-76

Type of Plant: IMC Feldspar

Type of Discharge: Stack

Distance from Observer to Discharge Point: ~40' SE

Location of Discharge: Baghouse

Height of Observation Point: ~100'

Height of Point of Discharge: ~100'

Direction of Observer from Discharge Point: SE

Description of Background: Grassy hillside

Description of Sky: Partly cloudy

Wind Direction: NW

Wind Velocity: 0-15

Color of Plume: No visible plume

Detached Plume: N/A

Duration of Observation: ~2 1/4 Hours

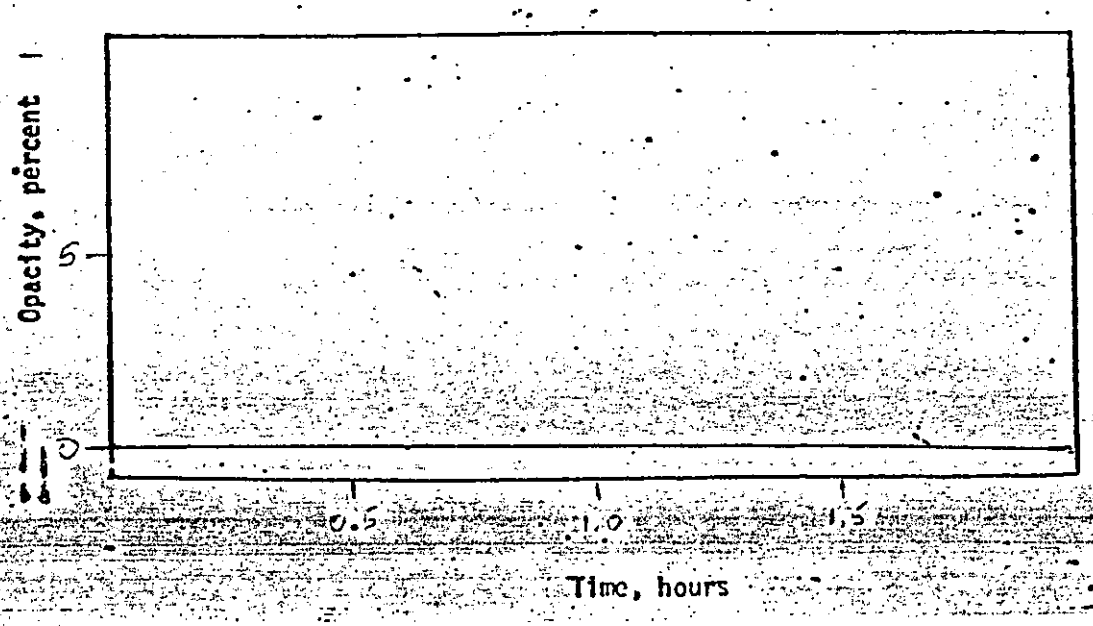
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	14:48	14:54	0	0
2	14:54	15:00	0	0
3	15:00	15:06	0	0
4	15:06	15:12	0	0
5	15:12	15:18	0	0
6	15:18	15:24	0	0
7	15:24	15:30	0	0
8	15:30	15:36	0	0
9	15:36	15:42	0	0
10	15:42	15:48	0	0
11	15:48	15:54	0	0
12	15:54	16:00	0	0
13	16:00	16:06	0	0
14	16:06	16:12	0	0
15	16:12	16:18	0	0
16	16:18	16:24	0	0
17	16:24	16:30	0	0
18	16:30	16:36	0	0
19	16:36	16:42	0	0
20	16:42	16:48	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	16:48	16:54	0	0
22	16:54	17:00	0	0
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



(1)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-28-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location Baghouse stack

Observer's Location ~40' SE

Weather Conditions Partly Cloudy, Wind 0-10

N = no visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
14:	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41					
	42					
	43					
	44					
	45					
	46					
	47					
14:	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	Sampling started
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

(2)

RECORD OF VISIBLE EMISSIONS

Company Name HRC

Date 9-28-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location Baghouse stack

Observer's Location ~40' SE

Weather Conditions Partly cloudy, wind 0-10

N = no visible emissions

TIME						COMMENTS
HR	MIN	SECONDS 00	15	30	45	
15	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

(3)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-28-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location Baghouse Stack

Observer's Location ~40' SE

Weather Conditions Partly Cloudy Wind 0-15

N = no visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
15	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-28-76

Plant Address Spruce Pine, N.C.

Observer L.W. Brown

Stack Location Baghouse Stack

Observer's Location ~45' SE

Weather Conditions Partly cloudy, Wind 0-10

N= No visible emissions

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
16	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name: I.M.C.

Date: 9-28-76

Plant Address: Spruce Pine, N.C.

Observer: J. W. Brown

Stack Location: Peakers Stack

Observer's Location: ~ 40' SE

Weather Conditions: Partly Cloudy, Wind 0-10

N = no visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
1GT	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

Summary of Visible Emissions

Date: 9-29-76

Type of Plant: IMC Fertilizer

NOTE: Two windows at ground level
One open door at upper level

Type of Discharge: Fugitive emissions

Distance from Observer to Discharge Point: ~75' S

Location of Discharge: West wall of building

Height of Observation Point: Ground level

Height of Point of Discharge: 0-~40'

Direction of Observer from Discharge Point: S

Description of Background: Sky and building exterior. All windows and door open

Description of Sky: Overcast

Wind Direction: E

Wind Velocity: 0-5

Color of Plume: No visible plume

Detached Plume: N/A

Duration of Observation: 1 hour

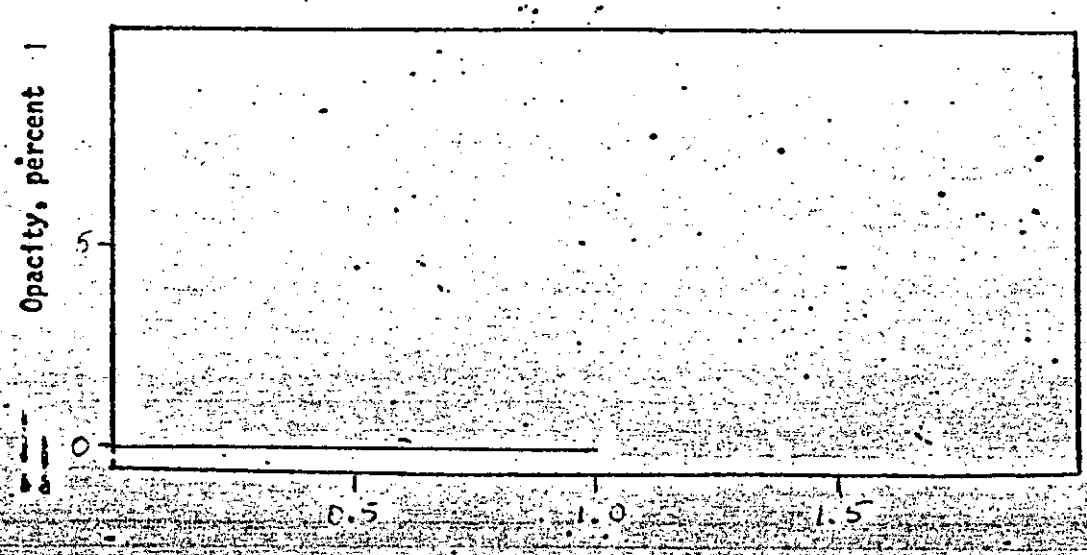
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	08:45	08:51	0	0
2	08:51	08:57	0	0
3	08:57	09:03	0	0
4	09:03	09:09	0	0
5	09:09	09:15	0	0
6	09:15	09:21	0	0
7	09:21	09:27	0	0
8	09:27	09:33	0	0
9	09:33	09:39	0	0
10	09:39	09:45	0	0
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

(1)

Company Name IMC

Date 9-29-72

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location West Building Roof

Observer's Location ~75' S

Weather Conditions Overcast Wind 0

N = No visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
0857	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41					
	42					
	43					
	44					
0857	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-29-76

Plant Address Spring Park, N.C.

Observer A.W. Brown

Stack Location West Building Vent

Observer's Location ~ 75' S

Weather Conditions Overcast, Wind S E

N: no visible emissions

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
C9:	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

APPENDIX I

EXAMPLE CALCULATIONS

(3)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-29-76

Plant Address Source Pine, N.C.

Observer [illegible]

Stack Location West Building N.E.

Observer's Location ~ 75' S

Weather Conditions Overcast, Wind 0-0

N = no visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
2PM	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45					
	46					
	47					
	48					
	49					
	50					
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

FACILITY

Summary of Visible Emissions

Date: 8-29-74

Type of Plant: IMC Fieldgrain

NOTE: From windows, 5 upper, 1 ground. Two floors of upper levels.

Type of Discharge: Fugitive emissions

Distance from Observer to Discharge Point: ~75'

Location of Discharge: East wall of building

Height of Observation Point: Ground level

Height of Point of Discharge:

Direction of Observer from Discharge Point: S

Description of Background: Sky; Trees on hillside

All windows and doors open

Description of Sky: ~~Sky~~ Overcast

Wind Direction: E - NE

Wind Velocity: 0 - 5

Color of Plume: No visible emissions

Detached Plume: N/A

Duration of Observation: 1 hour

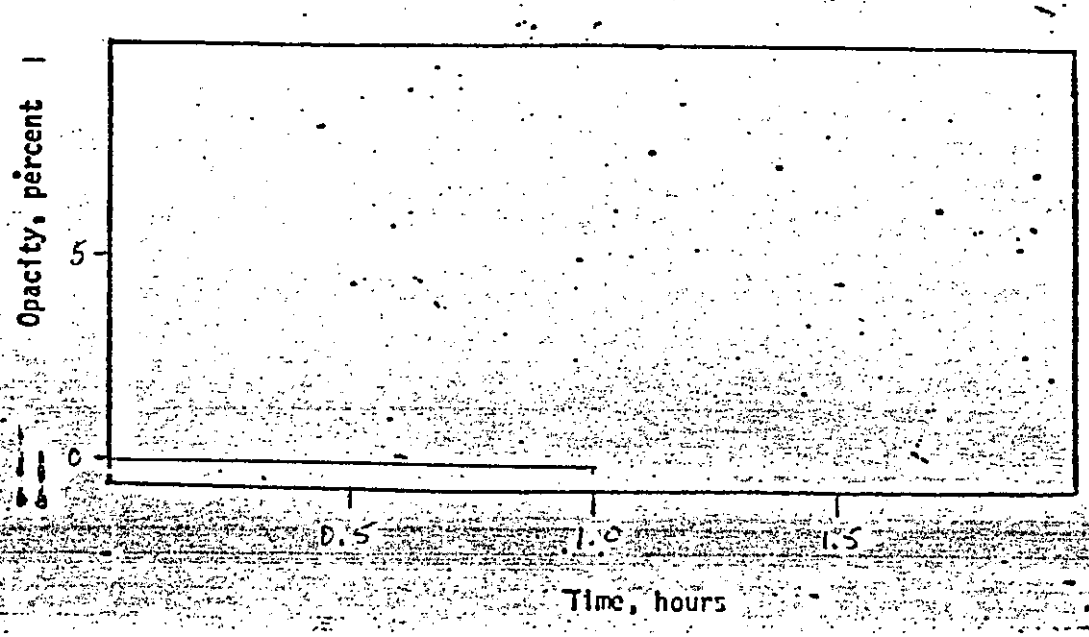
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	09:50	09:56	0	0
2	09:56	10:02	0	0
3	10:02	10:08	0	0
4	10:08	10:14	0	0
5	10:14	10:20	0	0
6	10:20	10:26	0	0
7	10:26	10:32	0	0
8	10:32	10:38	0	0
9	10:38	10:44	0	0
10	10:44	10:50	0	0
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

Company Name LMC

Date 9-20-76

Plant Address Spruce Pine, N.C.

Observer [illegible]

Stack Location [illegible]

Observer's Location ~75' S

Weather Conditions Overcast, Wind 0-5

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
09	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41					
	42					
	43					
	44					
	45					
	46					
	47					
	48					
	49					
09	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

(2)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-29-76

Plant Address Source Plant, K.S.

Observer J.W. Brown

Stack Location East Building Roof

Observer's Location ~75' S

Weather Conditions Overcast Wind 0-5

N = no visible emissions

HR	MIN	SECONDS 00	15	30	45	COMMENTS
01	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

(3)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-29-76

Plant Address Spruce Pine, N.C.

Observer J.W. Brown

Stack Location East Building Wall

Observer's Location ~75' S

Weather Conditions Overcast, Wind 0

N = no visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
10	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50					
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

FACILITY

Summary of Visible Emissions

Date: 9-29-76

Type of Plant: IMC Fertilizer

Type of Discharge: Fugitive emissions

Location of Discharge: South wall of building

Height of Point of Discharge: 0 - ~90'

Description of Background: Sky, Trees

Description of Sky: Overcast.

Wind Direction: NE

Color of Plume: No visible plume

Duration of Observation: 1 hour

NOTE: Four windows in upper level, two windows, one large and one small door at ground level

Distance from Observer to Discharge Point: ~75'

Height of Observation Point: ~ 40'

Direction of Observer from Discharge Point: W

All windows and doors open.

Wind Velocity: 0-5.

Detached Plume: N/A

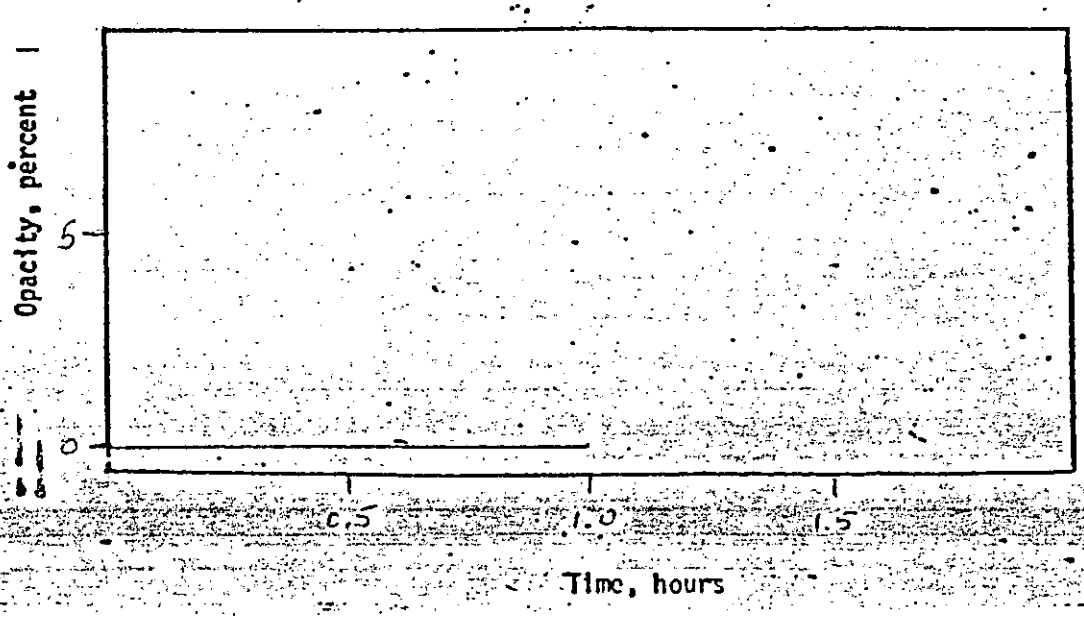
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	10:55	11:01	0	0
2	11:01	11:07	0	0
3	11:07	11:13	0	0
4	11:13	11:19	0	0
5	11:19	11:25	0	0
6	11:25	11:31	0	0
7	11:31	11:37	0	0
8	11:37	11:43	0	0
9	11:43	11:49	0	0
10	11:49	11:55	0	0
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-29-76

Plant Address Spruce Pine, N.C.

Observer [illegible]

Stack Location Textile Building [illegible]

Observer's Location ~ 75' W

Weather Conditions Overcast, Wind 0-5

N = no visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
10	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41					
	42					
	43					
	44					
	45					
	46					
	47					
	48					
	49					
	50					
	51					
	52					
	53					
	54					
10	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

(2)

RECORD OF VISIBLE EMISSIONS

Company Name IPC

Date 9-29-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location South building, W.H.

Observer's Location ~75' W!

Weather Conditions Overcast, Wind 0-5

N= no visible emission

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
11	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

(3)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-29-76

Plant Address Spruce Pine, N.C.

Observer J. W. Brown

Stack Location South Building Wall

Observer's Location ~75' W

Weather Conditions Overcast, Wind ~ 5

N = no visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
11	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	1	Light single puffs
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55					
	56					
	57					
	58					
	59					

Summary of Visible Emissions

Date: 9-27-76

Type of Plant: IMC Fertilizer

NOTE: Four open windows on upper levels

Type of Discharge: Fugitive emissions

Distance from Observer to Discharge Point: ~ 100'

Location of Discharge: North wall of building

Height of Observation Point: ~ 20'

Height of Point of Discharge: 0 - ~30'

Direction of Observer from Discharge Point: W

Description of Background: Sky, Trees, grey storage silo

Description of Sky: Overcast.

Wind Direction: NE

Wind Velocity: 0-10

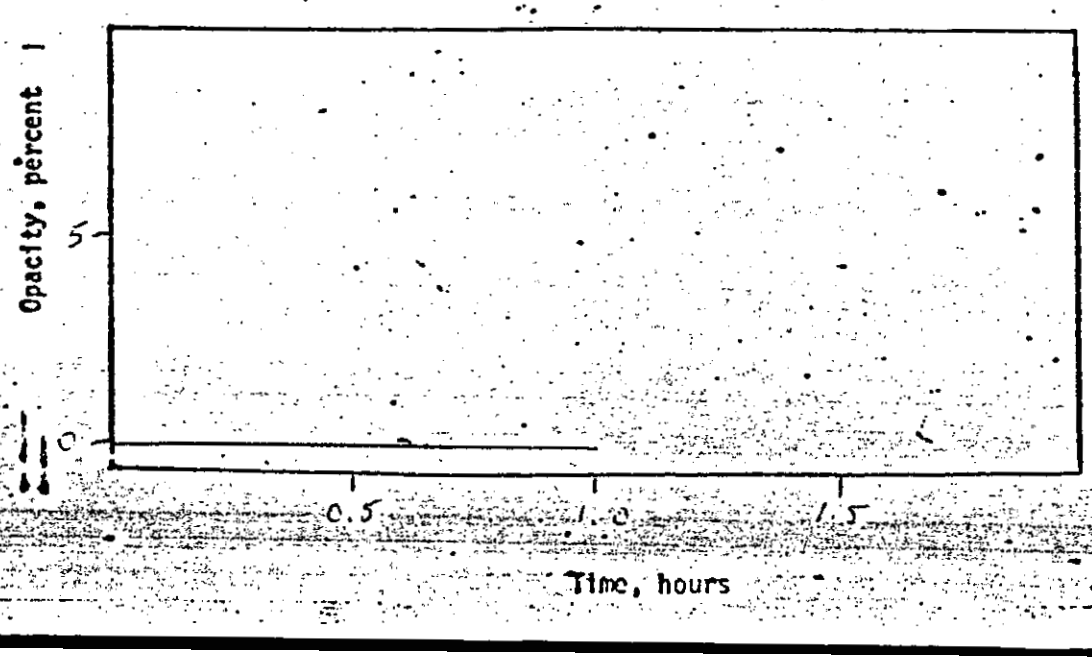
Color of Plume: No visible plume

Detached Plume: N/A

Duration of Observation: 1 hour

SUMMARY OF AVERAGE OPACITY					SUMMARY OF AVERAGE OPACITY				
	Time		Opacity			Time		Opacity	
Set Number	Start	End	Sum	Average	Set Number	Start	End	Sum	Average
1	14:00	14:06	0	0	21				
2	14:06	14:12	0	0	22				
3	14:12	14:18	0	0	23				
4	14:18	14:24	0	0	24				
5	14:24	14:30	0	0	25				
6	14:30	14:36	0	0	26				
7	14:36	14:42	0	0	27				
8	14:42	14:48	0	0	28				
9	14:48	14:54	0	0	29				
10	14:54	15:00	0	0	30				
11					31				
12					32				
13					33				
14					34				
15					35				
16					36				
17					37				
18					38				
19					39				
20					40				

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

(1)

Company Name IMC

Date 9-29-76

Plant Address Spruce Pine, N.C.

Observer D. D. Brown

Stack Location Kettle Building, N.W.

Observer's Location ~100' W

Weather Conditions Overcast, Wind 0-10

N = no visible emissions

HR	MIN	SECONDS 00	15	30	45	COMMENTS
14	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	Light drizzle
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	Drizzle stopped
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

(2)

RECORD OF VISIBLE EMISSIONS

Company Name IMC

Date 9-29-76

Plant Address Spruce Pine, N.C.

Observer J.W. Brown

Stack Location Twitty Building Wind

Observer's Location ~100' W

Weather Conditions Overcast, Wind 0-5

N = No visible emissions

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
14	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name: I. M. C Date: 9/29/76

Plant Address: Spruce Pines, NC Observer: D P Holzschuh

Stack Location: outlet of Dryer Cone Observer's Location: Top of Silo Approx. 50' from stack

Weather Conditions: Cloudy Looks like Rain

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30					
	31					
	32					
	33					
	34					
8.35	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

FACILITY

Summary of Visible Emissions

Date: 9-29-76

Type of Plant: Felspar

Type of Discharge: outlet stack

Distance from Observer to Discharge Point: approx 50'

Location of Discharge: on Roof coming from Dryer

Height of Observation Point: Same Level as discharge

Height of Point of Discharge: approx 100' from ground level

Direction of Observer from Discharge Point: E

Description of Background: Contrasting (side of hill with tree cover)

Description of Sky: cloudy

Wind Direction:

Wind Velocity: 0-5 mph

Color of Plume: No Visible Plume

Detached Plume: N/A

Duration of Observation: 2 hrs.

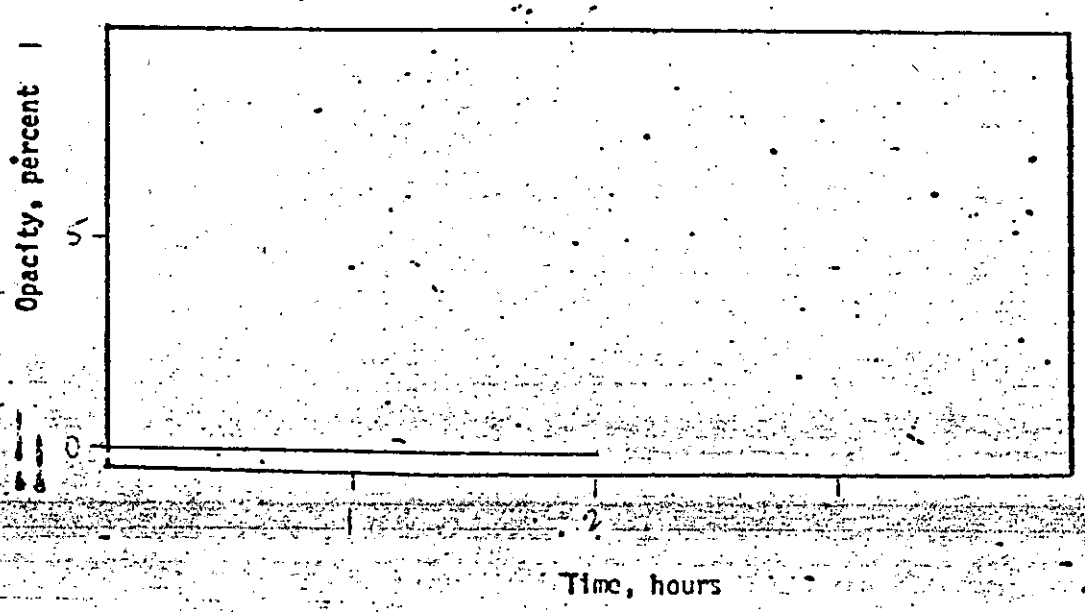
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	8:35	8:40	0	0
2	8:41	8:46	0	0
3	8:47	8:52	0	0
4	8:53	8:58	0	0
5	8:59	9:04	0	0
6	9:05	9:10	0	0
7	9:11	9:16	0	0
8	9:17	9:22	0	0
9	9:23	9:28	0	0
10	9:29	9:34	0	0
11	9:35	9:40	0	0
12	9:41	9:46	0	0
13	9:47	9:52	0	0
14	9:53	9:58	0	0
15	9:59	10:04	0	0
16	10:05	10:10	0	0
17	10:11	10:16	0	0
18	10:17	10:22	0	0
19	10:23	10:28	0	0
20	10:29	11:34	0	0

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21	11:35	11:37	0	0
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

Company Name: PMC

Date: 9/28/76

Plant Address: Spruce Pine NC

Observer: D. P. Holzschuh

Stack Location: Out Det Dynacture

Observer's Location: Top of Silo Approx. 50' From Stack

Weather Conditions: Cloudy

	HR	MIN	SECONDS 00	15	30	45	COMMENTS
	9:00	00	N	N	N	N	
		01	N	N	N	N	
		02	N	N	N	N	
		03	N	N	N	N	
		04	N	N	N	N	
		05	N	N	N	N	
		06	N	N	N	N	
		07	N	N	N	N	
		08	N	N	N	N	
		09	N	N	N	N	
		10	N	N	N	N	
		11	N	N	N	N	
		12	N	N	N	N	
		13	N	N	N	N	
		14	N	N	N	N	
		15	N	N	N	N	
		16	N	N	N	N	
		17	N	N	N	N	
		18	N	N	N	N	
		19	N	N	N	N	
		20	N	N	N	N	
		21	N	N	N	N	
		22	N	N	N	N	
		23	N	N	N	N	
		24	N	N	N	N	
		25	N	N	N	N	
		26	N	N	N	N	
		27	N	N	N	N	
		28	N	N	N	N	
		29	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name I.M.C. Date 9/29/76

Plant Address [illegible] Pines NC Observer D. P. Holeschuh

Stack Location Outlet Dryer Cone Observer's Location Top of Silo Approx. 50' from Stack

Weather Conditions Cloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
09:30	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N	N	N	
	38	N	N	N	N	
	39	N	N	N	N	
	40	N	N	N	N	
	41	N	N	N	N	
	42	N	N	N	N	
	43	N	N	N	N	
	44	N	N	N	N	
	45	N	N	N	N	
	46	N	N	N	N	
	47	N	N	N	N	
	48	N	N	N	N	
	49	N	N	N	N	
	50	N	N	N	N	
	51	N	N	N	N	
	52	N	N	N	N	
	53	N	N	N	N	
	54	N	N	N	N	
	55	N	N	N	N	
	56	N	N	N	N	
	57	N	N	N	N	
	58	N	N	N	N	
	59	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name I.M.C. Date 9/29/76

Plant Address Spruce Pines Observer D.P. Holoschuk

Stack Location Outlet Observer's Location Top of Silo (Approx. 50' from stack)

Weather Conditions Cloudy

HR	MIN	TIME SECONDS 00	15	30	45	COMMENTS
10:00	00	N	N	N	N	
	01	N	N	N	N	
	02	N	N	N	N	
	03	N	N	N	N	
	04	N	N	N	N	
	05	N	N	N	N	
	06	N	N	N	N	
	07	N	N	N	N	
	08	N	N	N	N	
	09	N	N	N	N	
	10	N	N	N	N	
	11	N	N	N	N	
	12	N	N	N	N	
	13	N	N	N	N	
	14	N	N	N	N	
	15	N	N	N	N	
	16	N	N	N	N	
	17	N	N	N	N	
	18	N	N	N	N	
	19	N	N	N	N	
	20	N	N	N	N	
	21	N	N	N	N	
	22	N	N	N	N	
	23	N	N	N	N	
	24	N	N	N	N	
	25	N	N	N	N	
	26	N	N	N	N	
	27	N	N	N	N	
	28	N	N	N	N	
	29	N	N	N	N	

RECORD OF VISIBLE EMISSIONS

Company Name: IMC

Date: 9/29/76

Plant Address: Spruce Pines NC

Observer: D. P. Hofgarth

Stack Location: Outlet Dynacline

Observer's Location: Top of Silo Apron. 50' from Stack

Weather Conditions: Cloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
10:30	30	N	N	N	N	
	31	N	N	N	N	
	32	N	N	N	N	
	33	N	N	N	N	
	34	N	N	N	N	
	35	N	N	N	N	
	36	N	N	N	N	
	37	N	N			Test over 10:37 AM
	38					NPH
	39					
	40					
	41					
	42					
	43					
	44					
	45					
	46					
	47					
	48					
	49					
	50					
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

FACILITY

Summary of Visible Emissions

Date: 9/24/76

Type of Plant: Felspar Plant

Type of Discharge: Fugitive dust from Roof

Distance from Observer to Discharge Point: approx 100 yds

Location of Discharge: Entire Roof

Height of Observation Point: eye level with discharge pt

Height of Point of Discharge: approx. 100-125'

Direction of Observer from Discharge Point: East of Discharge pt.

Description of Background: All with Fuco Gyps contrast

Description of Sky: cloudy

Wind Direction:

Wind Velocity: 0-5 mph

Color of Plume: white - gray

Detached Plume: N/A

Duration of Observation: 58 min

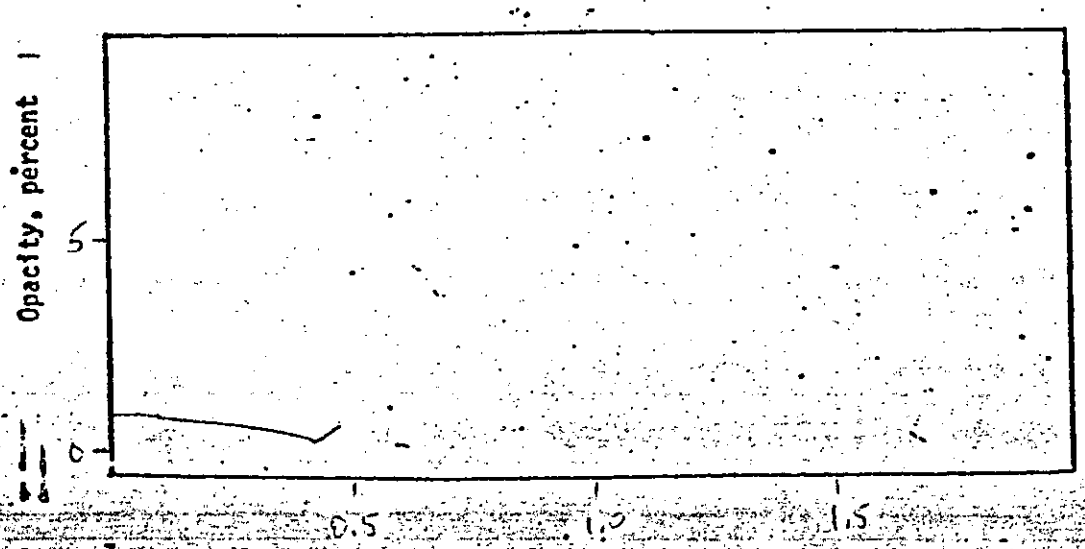
SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
1	11:00	11:05	230	.958
2	11:06	11:11	205	.854
3	11:12	11:17	200	.833
4	11:18	11:23	205	.854
5	11:24	11:29	185	.771
6	11:30	11:35	170	.708
7	11:36	11:41	170	.708
8	11:42	11:47	185	.771
9	11:48	11:53	150	.625
10	11:54	11:57	130	.813
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start	Time End	Opacity Sum	Opacity Average
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Sketch Showing How Opacity Varied With Time:



RECORD OF VISIBLE EMISSIONS

Company Name: IMC

Date: 9/29/76

Plant Address: Spruce Pines, NC

Observer: D P Holzschuh

Stack Location: Roof for Furnace

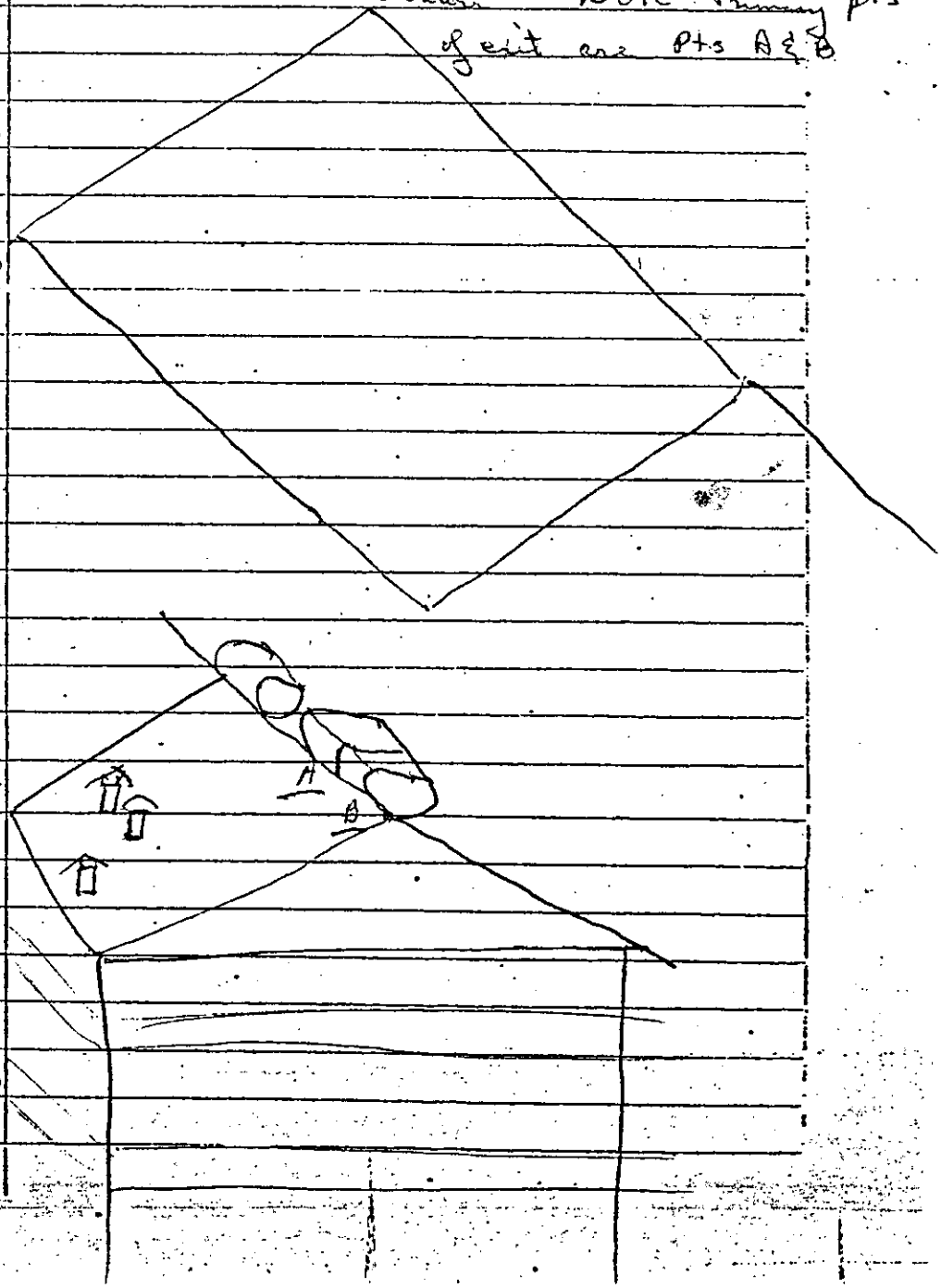
Observer's Location: Approx 100 yds @ eye level

Weather Conditions: Cloudy

HR	MIN	SECONDS 00	15	30	45
11:00	00	5	10	10	5
	01	5	10	10	10
	02	10	10	10	10
	03	10	10	10	10
	04	5	10	15	10
	05	10	15	10	10
	06	10	10	10	10
	07	5	5	5	5
	08	5	5	5	10
	09	10	10	10	10
	10	10	10	10	10
	11	10	10	10	10
	12	10	10	10	10
	13	10	10	10	5
	14	5	5	10	10
	15	10	10	10	10
	16	10	10	5	5
	17	10	5	5	5
	18	10	10	10	10
	19	10	10	5	5
	20	5	10	5	5
	21	10	10	10	10
	22	10	10	5	5
	23	10	10	10	10
	24	10	5	5	5
	25	5	5	5	5
	26	5	10	10	5
	27	5	5	10	10
	28	10	10	10	10
	29	10	10	10	10

COMMENTS

Attempting to read Roof less than elevation. Note Primary pts of exit are Pts A & B



RECORD OF VISIBLE EMISSIONS

Company Name: IMC

Date: 9/29/76

Plant Address: Sprucepines N.C.

Observer: D P Hofgrefe

Stack Location: Roof Synthetic dust

Observer's Location: 100 yds.

Weather Conditions: Cloudy

TIME HR	MIN	SECONDS 00	15	30	45	COMMENTS
	30	10	10	5	5	
	31	5	5	5	5	
	32	5	5	5	5	
	33	5	5	5	5	
	34	10	10	10	10	
	35	10	10	10	10	
	36	5	5	5	5	
	37	5	5	5	5	
	38	5	10	10	10	
	39	10	10	10	10	
	40	10	10	10	5	
	41	5	5	5	5	
	42	5	5	10	10	
	43	5	5	5	5	
	44	5	5	5	5	
	45	5	10	10	10	
	46	10	10	10	10	
	47	10	10	10	10	
	48	10	5	5	5	
	49	5	10	5	10	
	50	10	10	10	5	
	51	5	5	5	5	
	52	5	5	5	5	
	53	5	5	5	5	
	54	5	5	5	5	
	55	10	10	10	10	
	56	10	10	10	10	
	57	5	5	10	10	
	58					
	59					

APPENDIX F

SAMPLING SUMMARY SHEETS

SAMPLING SUMMARY SHEET

Plant International Minerals and Chemicals Corporation Location Spruce Pine, North Carolina

Sampled Source No. 2 Mill Baghouse Outlet

Run	Date	N_p	p_m	p_b	V_m	T_m	$V_{m_{std}}$	V_w	$V_{w_{gas}}$	%M	M_d
P-1	9/28/76	20	2.32	27.23	105.631	119	88.228	32	1.507	1.68	0.98
P-2	9/28/76	20	2.06	27.23	100.848	129	82.743	34	1.601	1.90	0.98
P-3	9/29/76	20	1.82	27.22	93.553	116	78.404	37	1.743	2.17	0.98

Run	MW_d	MW	P_{st}	P_s	C_p	$\sqrt{\Delta P_s X (T_s+460)}^{c}$	V_s	T_s	T_t	D_n	%I
P-1	29	28.78	-0.12	27.11	0.839	16.767	2579	105	120	0.25	100.1
P-2	29	28.78	-0.12	27.11	0.839	15.948	2453	115	120	0.25	100.5
P-3	29	28.78	-0.12	27.11	0.839	14.738	2267	103	120	0.25	100.8

$$V_{m_{std}} = \frac{17.65 \times V_m \left(P_b + \frac{P_m}{13.6}\right)}{(T_m + 460)}$$

$$V_{w_{gas}} = 0.0471 \times V_w$$

$$MW_d = (\%CO_2 \times \tfrac{44}{100}) + (\%O_2 \times \tfrac{32}{100}) + (\%CO + \%N_2) \times \tfrac{28}{100}$$

$$MW = MW_d \times M_d + 18 (1 - M_d)$$

$$P_s = P_b \pm P_{st}$$

$$V_s = 5120.8 \times Cp \times \sqrt{\Delta P_s \times (T_s + 460)} \left[\frac{1}{P_s \times MW}\right]^{1/2}$$

$$\%I = \frac{1.032 \times (T_s + 460) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2}$$

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

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

N_p Total No. of Sampling Points

P_m Average Orifice Pressure Drop, in. H_2O

P_b Barometric Pressure, in. Hg. Absolute

V_m Volume of Dry Gas at Meter Conditions, DCF

T_m Average Meter Temperature, °F

$V_{m_{std}}$ Volume of Dry Gas at STP, DSCF[a]

V_w Total H_2O Collected in Impingers and Silica Gel, ml

$V_{w_{gas}}$ Volume of Water Vapor Collected at STP, SCF[b]

%M % Moisture by Volume

M_d Mole Fraction of Dry Gas

$\%CO_2$ Volume % Dry

$\%O_2$ Volume % Dry

%CO Volume % Dry

$\%N_2$ Volume % Dry

MW_d Molecular Weight of Stack Gas, Dry Basis

MW Molecular Weight of Stack Gas, Wet Basis

P_{st} Static Pressure of Stack Gas, in. Hg

P_s Stack Gas Pressure, in. Hg Absolute

C_p Pitot Tube Coefficient

V_s Stack Gas Velocity at Stack Conditions, fpm.

T_s Average Stack Temperature °F

T_t Net Time of Test, Min.

D_n Sampling Nozzle Diameter, in

%I Percent Isokinetic

[a] Dry standard cubic feet at 68°F, 29.92 in. Hg.

[b] Standard conditions at 68°F, 29.92 in. Hg.

[c] $\sqrt{\Delta P_s \times (T_s + 460)}$ is determined by averaging the square root of the product of the velocity head (ΔP_s) and the absolute stack temperature from each sampling point.

SAMPLING SUMMARY SHEET

Plant International Minerals and Chemicals Corporation Location Spruce Pine, North Carolina

Sampled Source No. 2 Mill Baghouse North Inlet

Run	Date	N_p	P_m	P_b	V_m	T_m	$V_{m_{std}}$	V_w	$V_{w_{gas}}$	%M	M_d
P-1	9/28/76	16	1.4	27.25	80.301	118	67.065	27	1.272	1.86	0.98

Run	MW_d	MW	P_{st}	P_s	C_p	$\sqrt{\Delta P_s X (T_s+460)}$ [c]	V_s	T_s	T_t	D_n	%I
P-1	29	28.78	-0.22	27.03	0.838	12.996	2000	103	120	0.250	98.1

$$V_{m_{std}} = \frac{17.65 \times V_m \left(P_b + \frac{P_m}{13.6}\right)}{(T_m + 460)}$$

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

$$V_{w_{gas}} = 0.0471 \times V_w$$

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

$$MW_d = (\% CO_2 \times \tfrac{44}{100}) + (\% O_2 \times \tfrac{32}{100}) + (\% CO + \% N_2) \times \tfrac{28}{100}$$

$$MW = MW_d \times M_d + 18 (1 - M_d)$$

$$P_s = P_b \pm P_{st}$$

$$V_s = 5120.8 \times Cp \times \sqrt{\Delta P_s \times (T_s + 460)} \left[\frac{1}{P_s \times MW}\right]^{1/2}$$

$$\% I = \frac{1.032 \times (T_s + 460) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2}$$

N_p Total No. of Sampling Points

P_m Average Orifice Pressure Drop, in. H_2O

P_b Barometric Pressure, in. Hg. Absolute

V_m Volume of Dry Gas at Meter Conditions, DCF

T_m Average Meter Temperature, °F

$V_{m_{std}}$ Volume of Dry Gas at STP, DSCF[a]

V_w Total H_2O Collected in Impingers and Silica Gel, ml

$V_{w_{gas}}$ Volume of Water Vapor Collected at STP, SCF[b]

% H % Moisture by Volume

M_d Mole Fraction of Dry Gas

% CO_2 Volume % Dry

% O_2 Volume % Dry

% CO Volume % Dry

% N_2 Volume % Dry

MW_d Molecular Weight of Stack Gas, Dry Basis

MW Molecular Weight of Stack Gas, Wet Basis

P_{st} Static Pressure of Stack Gas, in. Hg

P_s Stack Gas Pressure, in. Hg Absolute

C_p Pitot Tube Coefficient

V_s Stack Gas Velocity at Stack Conditions, fps.

T_s Average Stack Temperature °F

T_t Net Time of Test, Min.

D_n Sampling Nozzle Diameter,

% I Percent Isokinetic

[a] Dry standard cubic feet at 68°F, 29.92 in. Hg.

[b] Standard conditions at 68°F, 29.92 in. Hg.

[c] $\sqrt{\Delta P_s \times (T_s + 460)}$ is determined by averaging the square root of the product of the velocity head (ΔP_s) and the absolute stack temperature from each sampling point.

SAMPLING SUMMARY SHEET

Plant International Minerals and Chemicals Corporation Location Spruce Pine, North Carolina

Sampled Source No. 2 Mill Baghouse South Inlet

Run	Date	N_p	P_m	P_b	V_m	T_m	$V_{m_{std}}$	V_w	$V_{w_{gas}}$	%M	M_d
P-2	9/28/76	20	2.4	27.25	106.937	127	88.198	37	1.743	1.94	0.98

Run	MW_d	MW	P_{st}	P_s	C_p	$\sqrt{\Delta P_s X (T_s+460)}$ [c]	V_s	T_s	T_t	D_n	%I
P-2	29	28.78	-0.18	27.07	0.837	11.004	1690	103	120	0.313	97.2

$$V_{m_{std}} = \frac{17.65 \times V_m \left(P_b + \frac{P_m}{13.6}\right)}{(T_m + 460)}$$

$$V_{w_{gas}} = 0.0471 \times V_w$$

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

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

$$MW_d = (\%CO_2 \times \tfrac{44}{100}) + (\%O_2 \times \tfrac{32}{100}) + (\%CO + \%N_2) \times \tfrac{28}{100}$$

$$MW = MW_d \times M_d + 18 (1 - M_d)$$

$$P_s = P_b \pm P_{st}$$

$$V_s = 5120.8 \times Cp \times \sqrt{\Delta P_s \times (T_s + 460)} \left[\frac{1}{P_s \times MW}\right]^{1/2}$$

$$\%I = \frac{1,032 \times (T_s + 460) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2}$$

N_p Total No. of Sampling Points

P_m Average Orifice Pressure Drop, in. H_2O

P_b Barometric Pressure, in. Hg. Absolute

V_m Volume of Dry Gas at Meter Conditions, DCF

T_m Average Meter Temperature, °F

$V_{m_{std}}$ Volume of Dry Gas at STP, DSCF[a]

V_w Total H_2O Collected in Impingers and Silica Gel, ml

$V_{w_{gas}}$ Volume of Water Vapor Collected at STP, SCF[b]

% M % Moisture by Volume

M_d Mole Fraction of Dry Gas

$\% CO_2$ Volume % Dry

$\% O_2$ Volume % Dry

% CO Volume % Dry

$\% N_2$ Volume % Dry

MW_d Molecular Weight of Stack Gas, Dry Basis

MW Molecular Weight of Stack Gas, Wet Basis

P_{st} Static Pressure of Stack Gas, in. Hg

P_s Stack Gas Pressure, in. Hg Absolute

C_p Pitot Tube Coefficient

V_s Stack Gas Velocity at Stack Conditions, fpm.

T_s Average Stack Temperature °F

T_t Net Time of Test, Min.

D_n Sampling Nozzle Diameter, in

% I Percent Isokinetic

[a] Dry standard cubic feet at 68°F, 29.92 in. Hg.

[b] Standard conditions at 68°F, 29.92 in. Hg.

[c] $\sqrt{\Delta P_s \times (T_s + 460)}$ is determined by averaging the square root of the product of the velocity head (ΔP_s) and the absolute stack temperature from each sampling point.

APPENDIX G

PARTICULATE WEIGHT DATA

SUMMARY OF PARTICULATE WEIGHT FRACTIONS
NO. 2 MILL BAGHOUSE OUTLET

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

Test No.	Fraction	Final Weight (gm)	Tare Weight (gm)	Weight of Particulate (gm)	Applicable Blank Value (gm)	Blank-Corrected Particulate (gm)
1	Water Probe Rinse	98.0907	98.0860	0.0047	<0.0001	0.0047
	Filter	0.1482	0.1258	0.0224	<0.0001	0.0224
	Front-Half Total	—	—	—	—	0.0271
	Impinger Contents & Back-Half Water Rinse	87.3930	87.3885	0.0045	0.0114	<0.0001
	Total Particulate	—	—	—	—	0.0271
2	Water Probe Rinse	93.2040	93.2021	0.0019	<0.0001	0.0019
	Filter	0.1628	0.1369	0.0259	<0.0001	0.0259
	Front-Half Total	—	—	—	—	0.0278
	Impinger Contents & Back-Half Water Rinse	91.5397	91.5367	0.0030	0.0096	<0.0001
	Total Particulate	—	—	—	—	0.0278
3	Water Probe Rinse	95.7591	95.7548	0.0043	<0.0001	0.0043
	Filter	0.1434	0.1261	0.0173	<0.0001	0.0173
	Front-Half Total	—	—	—	—	0.0216
	Impinger Contents & Back-Half Water Rinse	88.8569	88.8516	0.0053	0.0072	<0.0001
	Total Particulate	—	—	—	—	0.0216

Clayton Environmental Consultants, Inc.

SUMMARY OF PARTICULATE WEIGHT FRACTIONS
NO. 2 MILL BAGHOUSE NORTH INLET

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

Test No.	Fraction	Final Weight (gm)	Tare Weight (gm)	Weight of Particulate (gm)	Applicable Blank Value (gm)	Blank-Corrected Particulate (gm)
1	Water Probe Rinse	96.3448	94.8061	1.5387	<0.0001	1.5387
	Filter	1.1162 148.6669	0.7889 94.3484	0.3273 54.3185	0.0005 —	0.3268 54.3185
	Front-Half Total	—	—	—	—	56.1840
	Impinger Contents & Back-Half Water Rinse	101.7626	101.7594	0.0032	0.0073	<0.0001
	Total Particulate	—	—	—	—	56.1840

APPENDIX H

CALIBRATION DATA

SUMMARY OF PARTICULATE WEIGHT FRACTIONS
NO. 2 MILL BAGHOUSE SOUTH INLET

International Minerals and Chemicals Corporation
Spruce Pine, North Carolina
September 27-29, 1976

Test No.	Fraction	Final Weight (gm)	Tare Weight (gm)	Weight of Particulate (gm)	Applicable Blank Value (gm)	Blank-Corrected Particulate (gm)
2	Water Probe Rinse	92.1401	91.6736	0.4665	<0.0001	0.4665
	Filter	5.9924	0.8068	5.1856	0.0005	5.1851
	Front-Half Total	—	—	—	—	5.6516
	Impinger Contents & Back-Half Water Rinse	94.7524	94.7497	0.0027	0.0076	<0.0001
	Total Particulate	—	—	—	—	5.6516

METER AND ORIFICE CALIBRATION

Date: SEPT. 21, 1976 Calibrator: G.E. HAWKINS Meter Box Number: RAC TRAIN #2

Barometric Pressure Pb ("Hg): ~~29.73~~ 29.10 Gas Meter Number: #2

FROM DETROIT EDISON #4636

	Orifice Manometer Setting, Δm (in. H_2O)	Gas Volume Wet Test Meter V_w (ft^3)	Gas Volume Dry Gas Meter V_d (ft^3)	Temperature: Wet Test Meter t_w (°F)	Temperature: Dry Gas Meter Inlet t_{di} (°F)	Temperature: Dry Gas Meter Outlet t_{do} (°F)	Temperature: Dry Gas Meter Average t_d (°F)	Vacuum Wet Test Meter P_w (in. H_2O)	Time θ (min)	Meter Correction Factor (γ)	K_m
Stop	(0.5) 0.5	5670.00	809.995		80	70	75°		12.70	1.010	0.1306
Start	0.5	5685.00	805.000	69	80	68	74°	.05	12:42		
Average	0.5	(5) 5.00	4.995		80	69	74.5				
Stop	(1.0) 1.0	5695.00	815.205		84	74	80		9.08	0.992	0.1292
Start	1.0	5690.00	809.995	69	80	70	75°	.05	9:05		
Average	1.0	(5) 5.00	5.210		82	72	77.0				
Stop	(2.0) 2.0	5705.00	825.490		92	78	85		13.08	0.992	0.1288
Start	2.0	5695.00	815.205	69	86	74	80	.05	13:05		
Average	2.0	(10) 10.00	10.285		89	76	82.5				
Stop	(3.0) 3.0	5715.00	835.832		98	82	90		10.75	0.991	0.1255
Start	3.0	5705.00	825.490	70	92	78	85	.05	10:45		
Average	3.0	(10) 10.00	10.342		95	80	87.5				
Stop	(4.0) 4.0	5725.00	846.193		98	83	90.5		9.35	0.992	0.1253
Start	4.0	5715.00	835.832	70	98	82	90	.05	9:21		
Average	4.0	(10) 10.00	10.361		98	82.5	90.25				
Stop	(5.0) 5.0	5735.00	856.550		100	84	92		8.37	0.992	0.1258
Start	5.0	5725.00	846.193	70	98	83	90.5	.05	8:22		
Average	5.0	(10) 10.00	10.357		99	83.5	91.25				
										AVERAGE	0.992	0.1272

$$P_w = P_b - \frac{p_w}{13.6} \qquad P_d = P_b + \frac{\Delta m}{13.6} \qquad K_m = \frac{V_w}{\theta}\sqrt{\frac{P_w}{T_w\,\Delta m}}$$

$$\gamma = \frac{V_w\,P_w\,(t_d + 460)}{V_d\,P_d\,(t_w + 460)}$$

Isokinetic Factor (ISO) $= \frac{27.40}{(K_m)^2} = \frac{27.40}{(\quad)^2} =$ 1693

METER AND ORIFICE CALIBRATION

Date 10/7/76 Calibrator G E Hawkins Meter Box Number

Barometric Pressure Pb ("Hg) 29.62 Gas Meter Number RAC #2

	Orifice Manometer Setting, Δm (in. H_2O)	Gas Volume Wet Test Meter V_w (ft^3)	Gas Volume Dry Gas Meter V_d (ft^3)	Temperature: Wet Test Meter t_w (°F)	Temperature: Dry Gas Meter Inlet t_{di} (°F)	Temperature: Dry Gas Meter Outlet t_{do} (°F)	Temperature: Dry Gas Meter Average t_d (°F)	Vacuum Wet Test Meter P_w (in. H_2O)	Time θ (min)	Meter Correction Factor (γ)	K_m
Stop	(0.5)	5805.00	232.432		82	73	77.5				
Start		5800.00	227.300	73	80	72	76	.05	12.77	0.980	0.1305
Average		(5) 5.00	5.132				77		12:46		
Stop	(1.0)	5810.00	237.610		85	76	82				
Start		5805.00	232.432	73	82	73	77	.05	9.18	0.975	0.1284
Average		(5) 5.00	5.178				79.5		9:11		
Stop	(2.0)	5820.00	248.996		96	81	88.5				
Start		5810.00	237.610	73	88	76	82	.05	13.35	0.980	0.1249
Average		(10) 10.00	10.386				85		13:21		
Stop	(3.0)	5830.00	258.428		98	83	90.5				
Start		5820.00	247.996	73	96	81	88.5	.05	10.87	0.981	0.1252
Average		(10) 10.00	10.432				89.5		10:52		
Stop	(4.0)	5840.00	268.872		100	85	92.5				
Start		5830.00	258.428	73	98	83	90.5	.05	9.50	0.981	0.1241
Average		(10) 10.00	10.444				91.5		9:30		
Stop	(5.0)	5850.00	279.315		102	86	94				
Start		5840.00	268.872	73	100	85	92.5	.05	8.52	0.981	0.1237
Average		(10) 10.00	10.443				93		8:31		
									AVERAGE	0.980	0.1261

$$P_w = P_b - \frac{P_w}{13.6} \qquad P_d = P_b + \frac{\Delta m}{13.6} \qquad K_m = \frac{V_w}{\theta}\sqrt{\frac{P_w}{T_w\,\Delta m}}$$

$$= \frac{V_w\,P_w\,(t_d + 460)}{V_d\,P_d\,(t_w + 460)}$$

$$\text{Isokinetic Factor (ISO)} = \frac{27.40}{(K_m)^2} = \frac{27.40}{(\quad)^2} = 1723$$

METER AND ORIFI CALIBRATION

ate Aug 13, 1976 Calibrator G.E. Hawkins Meter Box Number

Gas Meter Number RHC #3

arometric Pressure Pb ("Hg) 29.33

	Orifice Manometer Setting, Δm (in. H_2O)	Gas Volume Wet Test Meter V_w (ft^3)	Gas Volume Dry Gas Meter V_d (ft^3)	Temperature: Wet Test Meter t_w (°F)	Temperature: Dry Gas Meter Inlet t_{di} (°F)	Temperature: Dry Gas Meter Outlet t_{do} (°F)	Temperature: Dry Gas Meter Average t_d (°F)	Vacuum Wet Test Meter P_w (in. H_2O)	Time θ (min)	Meter Correction Factor (γ)	K_m
top	(0.5)	5305.00	920.886		82	74	78		12.87	1.018	0.1275
tart		5300.00	915.900	70°	80	74	77	.10	12:52		
erage		(5) 5.00	4.986				77.5				
top	(1.0)	5310.00	925.902		90	80	85		9.28	1.016	0.1257
tart		5305.00	920.886	70	82	74	78	.10	9:17		
erage		(5) 5.00	5.016				81.5				
top	(2.0)	5320.00	935.945		96	84	90		13.15	1.023	0.1265
tart		5310.00	925.902	70	90	80	85	.10	13:09		
erage		(10) 10.00	10.043				87.5				
top	(3.0)	5330.00	946.026		98	84	91		10.75	1.022	0.1263
tart		5320.00	935.945	70	96	84	90	.15	10:45		
erage		(10) 10.00	10.081				90.5				
top	(4.0)	5340.00	956.066		96	84	90		9.30	1.022	0.1263
tart		5330.00	946.026	71	98	84	91	.15	9:18		
erage		(10) 10.00	10.040				90.5				
top	(5.0)	5350.00	966.110		100	84	92		8.42	1.020	0.1248
tart		5340.00	956.066	71	96	84	90	.18	8:25		
erage		(10) 10.00	10.044				91				
									AVERAGE	1.020	0.1266

$$P_d = P_b - \frac{P_w}{13.6} \qquad P_d = P_b + \frac{\Delta m}{13.6} \qquad K_m = \frac{V_w}{\theta}\sqrt{\frac{P_w}{T_w\,\Delta m}}$$

$$= \frac{V_w\,P_w\,(t_d + 460)}{(t_w + 460)}$$

Isokinetic Factor (ISO) $= \frac{27.40}{(K_m)^2} = \frac{27.40}{(\quad)^2} =$ 1710

METER AND ORIFICE CALIBRATION

Date: OCT 7, 1976 Calibrator: G.E. HAWKINS Meter Box Number: _____

Barometric Pressure Pb ("Hg): 29.65 Gas Meter Number: RACT #3

	Orifice Manometer Setting, Δm (in. H_2O)	Gas Volume Wet Test Meter V_w (ft^3)	Gas Volume Dry Gas Meter V_d (ft^3)	Temperature: Wet Test Meter t_w (°F)	Temperature: Dry Gas Meter Inlet t_{di} (°F)	Temperature: Dry Gas Meter Outlet t_{do} (°F)	Temperature: Dry Gas Meter Average t_d (°F)	Vacuum Wet Test Meter P_w (in. H_2O)	Time θ (min)	Meter Correction Factor (γ)	K_m
Stop	(0.5)	5755.00	393.906		90	84	87		13.02		
Start		5750.00	388.7.00	72	90	84	87	.05	13:01	0.986	0.1282
Average		(5) 5.00	5.206				87				
Stop	(1.0)	5760.00	399.110		94	86	90		9.42		
Start		5755.00	393.906	72	90	84	87	.05	9:25	0.988	0.1253
Average		(5) 5.00	5.204				88.5				
Stop	(2.0)	5770.00	409.529		94	88	91		13.35		
Start		5760.00	399.110	72	94	86	90	.05	13:21	0.988	0.1250
Average		(10) 10.00	10.419				90.5				
Stop	(3.0)	5780.00	419.945		100	90	95		10.92		
Start		5770.00	409.529	72	94	88	91	.05	10:55	0.991	0.1248
Average		(10) 10.00	10.416				93				
Stop	(4.0)	5790.00	430.375		104	90	97		9.60		
Start		5780.00	419.945	72	100	90	95	.05	9:36	0.992	0.1230
Average		(10) 10.00	10.430				96				
Stop	(5.0)	5800.00	440.805		104	90	97		8.63		
Start		5790.00	430.375	72	104	90	97	.05	8:38	0.991	0.1273
Average		(10) 10.00	10.430				97				
									AVERAGE	0.989	0.1248

$$P_w = P_b - \frac{P_w}{13.6} \qquad P_d = P_b + \frac{\Delta m}{13.6} \qquad K_m = \frac{V_w}{\theta}\sqrt{\frac{P_w}{T_w\,\Delta m}}$$

$$\gamma = \frac{V_w\,P_w\,(t_d + 460)}{V_d\,P_d\,(t_w + 460)}$$

Isokinetic Factor (ISO) $= \frac{27.40}{(\overline{K}_m)^2} = \frac{27.40}{(\quad)^2} =$ 1759 1.00

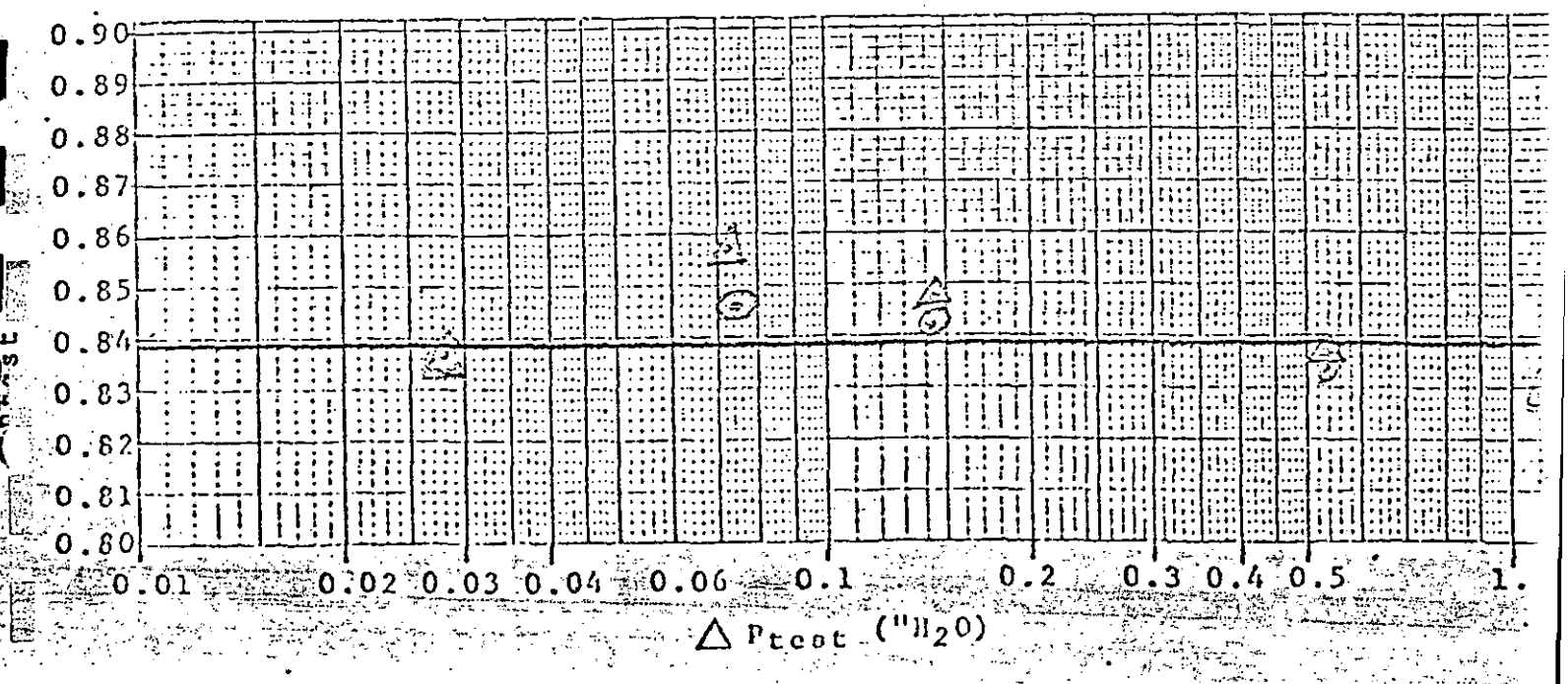
$C_{ptest} = 0.99\sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$

Pitot Tube Type S Pitot Tube No. #10

Standard Pitot Tube No. _____

Calibrator: G.E.H. Date: 9/21/71 Client: FROM DETROIT EDISON #4636

Anticipated ΔP_{std}	ΔP_{std}	A ⊙		B 4	
		ΔP_{test}	ΔC_{ptest}	ΔP_{test}	ΔC_{ptest}
0.02	0.020	0.028	0.837	0.028	0.837
0.04	0.	0.	0.	0.	0.
0.06	0.054	0.074	0.846	0.072	0.857
0.08	0.	0.	0.	0.	0.
0.10	0.104	0.144	0.841	0.142	0.847
0.12	0.	0.	0.	0.	0.
0.16	0.	0.	0.	0.	0.
0.20	0.	0.	0.	0.	0.
0.30	0.378	0.534	0.833	0.530	0.836
0.50	0.	0.	0.	0.	0.
0.70	0.	0.	0.	0.	0.
0.80	0.1.054	0.1.504	0.829	0.1.496	0.831



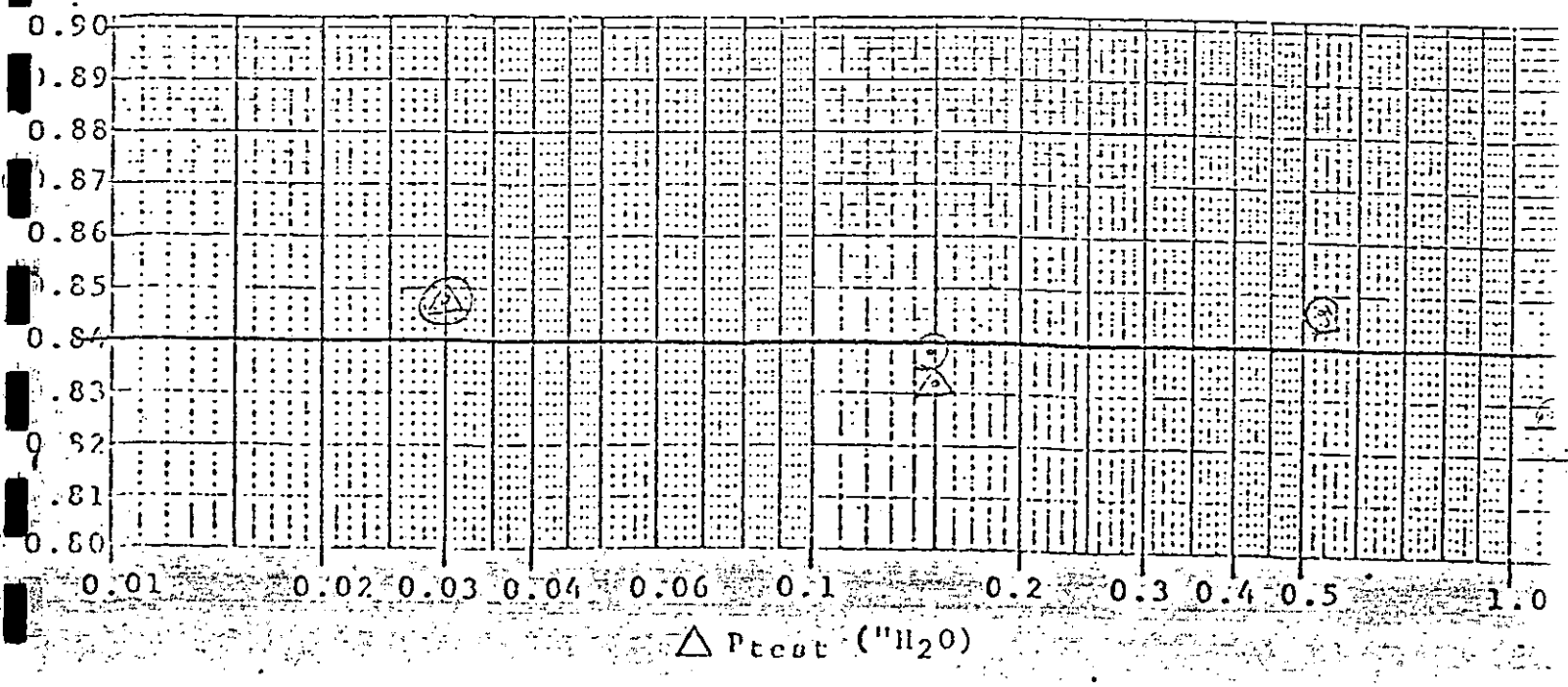
$C_{ptest} = 0.99 \sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$

Pitot Tube Type S Pitot Tube No. 10

Standard Pitot Tube No. _____

Calibrator: G.E.H. Date: 10/6/76 Client: From EPA-Task #25

Anticipated ΔP_{std}	ΔP_{std}	A △		B ⊙	
		ΔP_{test}	ΔC_{ptest}	ΔP_{test}	ΔC_{ptest}
0.02	0.022	0.030	0.848 ✓	0.030	0.848
0.04	0.	0.	0.	0.	0.
0.06	0.	0.	0.	0.	0.
0.08	0.	0.	0.	0.	0.
0.10	0.106	0.150	0.832 ✓	0.148	0.838 ✓
0.12	0.	0.	0.	0.	0.
0.16	0.	0.	0.	0.	0.
0.20	0.	0.	0.	0.	0.
0.30	0.392	0.578	0.845 ✓	0.536	0.847 ✓
0.50	0.	0.	0.	0.	0.
0.70	0.	0.	0.	0.	0.
0.80	0.1.036	0.1.476	0.829 ✓	0.1.476	0.829 ✓



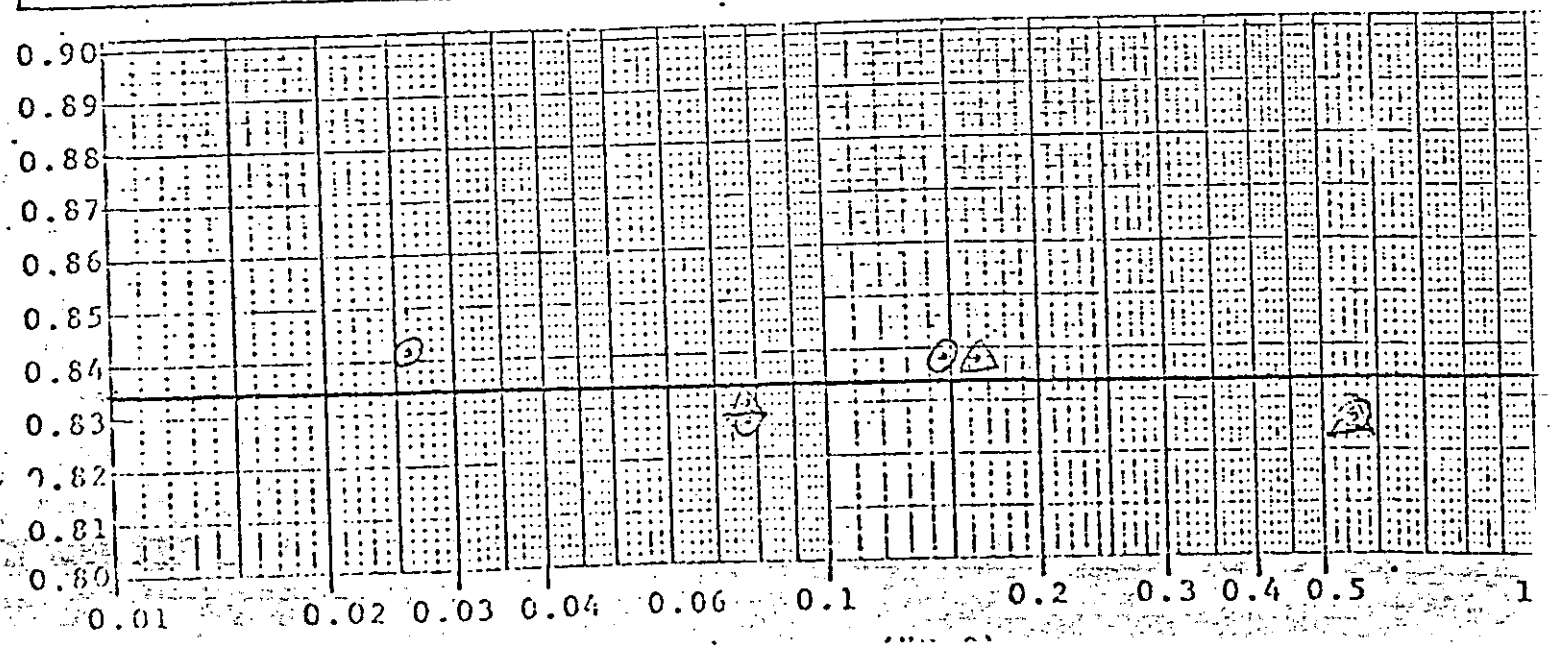
$C_{ptest} = 0.99 \sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$

Pitot Tube Type S Pitot Tube No. 12

Standard Pitot Tube No. —

Calibrator: MCR Date: 16 Sep 7_ Client: Kaiser Aluminum (Return)

Anticipated ΔP_{std}	ΔP_{std}	A ⊙		B △	
		ΔP_{test}	ΔC_{ptest}	ΔP_{test}	ΔC_{ptest}
0.02	0.0185	0.0260	0.842	0.	0.
0.04	0.	0.	0.	0.	0.
0.06	0.0542	0.0776	0.827	0.0772	0.830
0.08	0.	0.	0.	0.	0.
0.10	0.	0.	0.	0.	0.
0.12	0.1048	0.1464	0.838	0.1464	0.838
0.16	0.	0.	0.	0.	0.
0.20	0.	0.	0.	0.	0.
0.30	0.	0.	0.	0.	0.
0.50	0.3816	0.5486	0.826	0.5498	0.825
0.70	0.	0.	0.	0.	0.
0.80	0.0714	0.4980	0.837	0.	0.



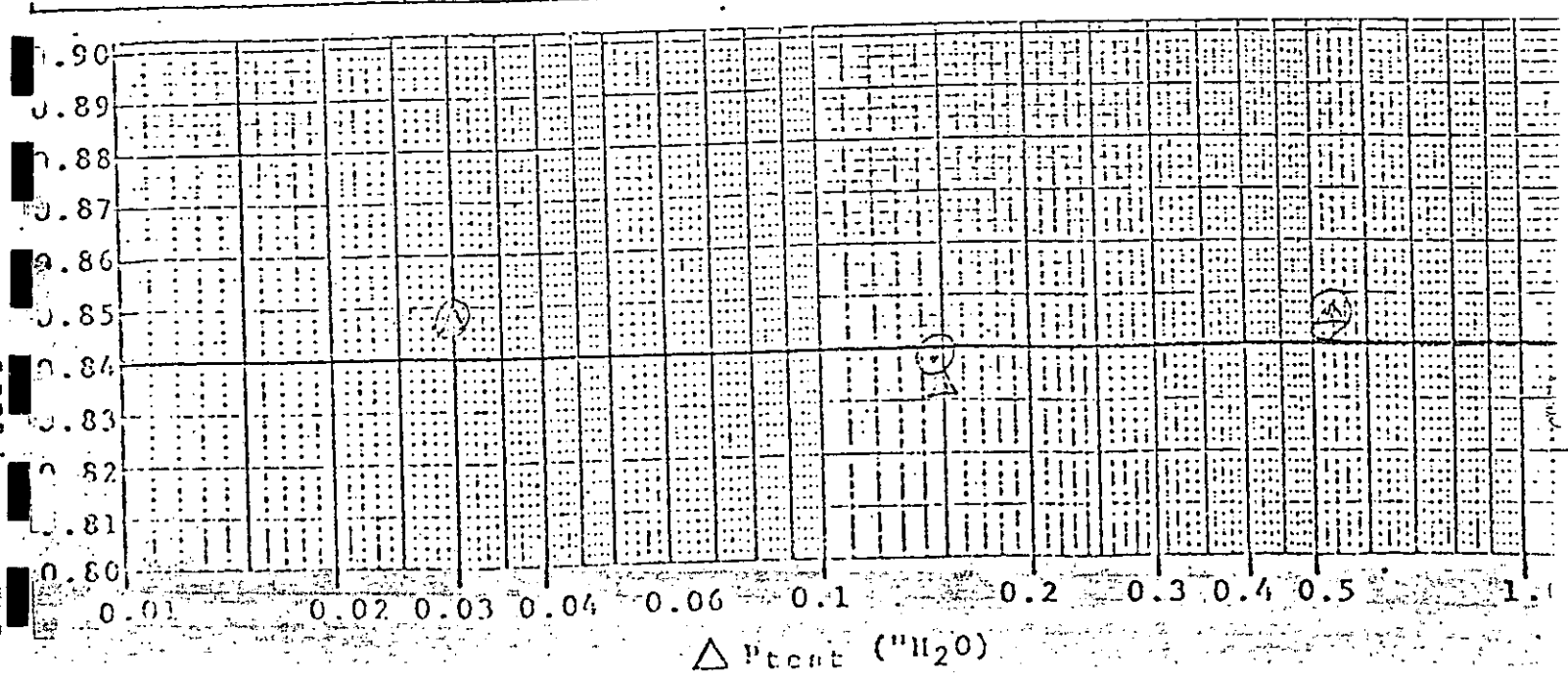
$$C_{ptest} = 0.99\sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$$

Pitot Tube Type 5 Pitot Tube No. 12

Standard Pitot Tube No. _____

Calibrator: C.E.H. Date: 10/6/76 Client: FROM EPA TASK 25

Anticipated ΔP_{std}	ΔP_{std}	A		B	
		ΔP_{test}	ΔC_{ptest}	ΔP_{test}	ΔC_{ptest}
0.02	0.022	0.030	0.848	0.030	0.848
0.04	0.	0.	0.	0.	0.
0.06	0.	0.	0.	0.	0.
0.08	0.	0.	0.	0.	0.
0.10	0.106	0.150	0.832	0.148	0.838
0.12	0.	0.	0.	0.	0.
0.16	0.	0.	0.	0.	0.
0.20	0.	0.	0.	0.	0.
0.30	0.392	0.538	0.845	0.536	0.847
0.50	0.	0.	0.	0.	0.
0.70	0.	0.	0.	0.	0.
0.80	0.1.036	0.1.476	0.829	0.1.476	0.829



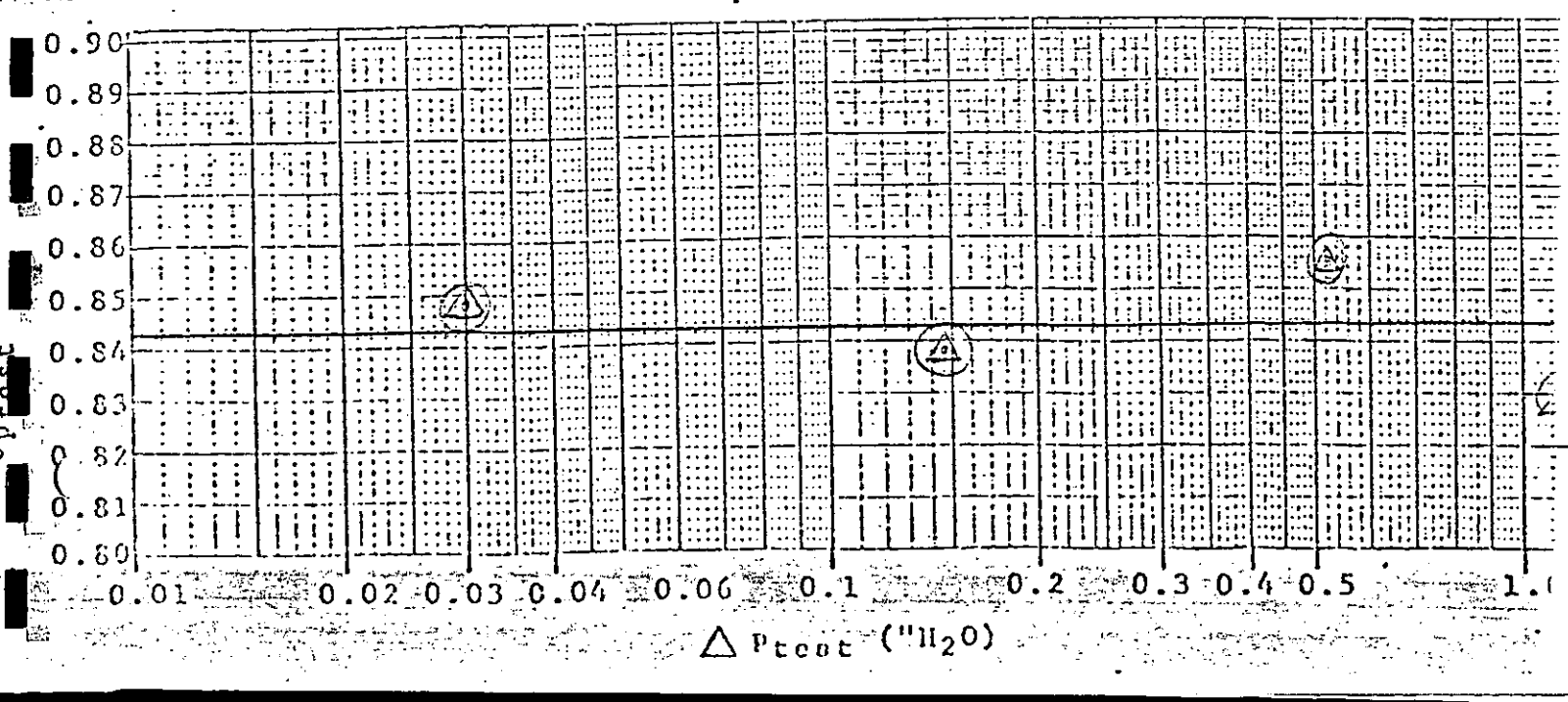
$C_{ptest} = 0.99\sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$

Pitot Tube Type S Pitot Tube No. 19

Standard Pitot Tube No.

Calibrator: GEH. Date: 10/6/76 Client: FROM EPA TASK #25

Anticipated ΔP_{std}	ΔP_{std}	A △		B ⊖	
		ΔP_{test}	ΔC_{ptest}	ΔP_{test}	ΔC_{ptest}
0.02	0.022	0.030	0.848	0.030	0.848
0.04	0.	0.	0.	0.	0.
0.06	0.	0.	0.	0.	0.
0.08	0.	0.	0.	0.	0.
0.10	0.106	0.148	0.838	0.148	0.838
0.12	0.	0.	0.	0.	0.
0.16	0.	0.	0.	0.	0.
0.20	0.	0.	0.	0.	0.
0.30	0.392	0.526	0.855	0.526	0.855
0.50	0.	0.	0.	0.	0.
0.70	0.	0.	0.	0.	0.
0.80	0.1.036	0.1.476	0.829	0.1.474	0.830



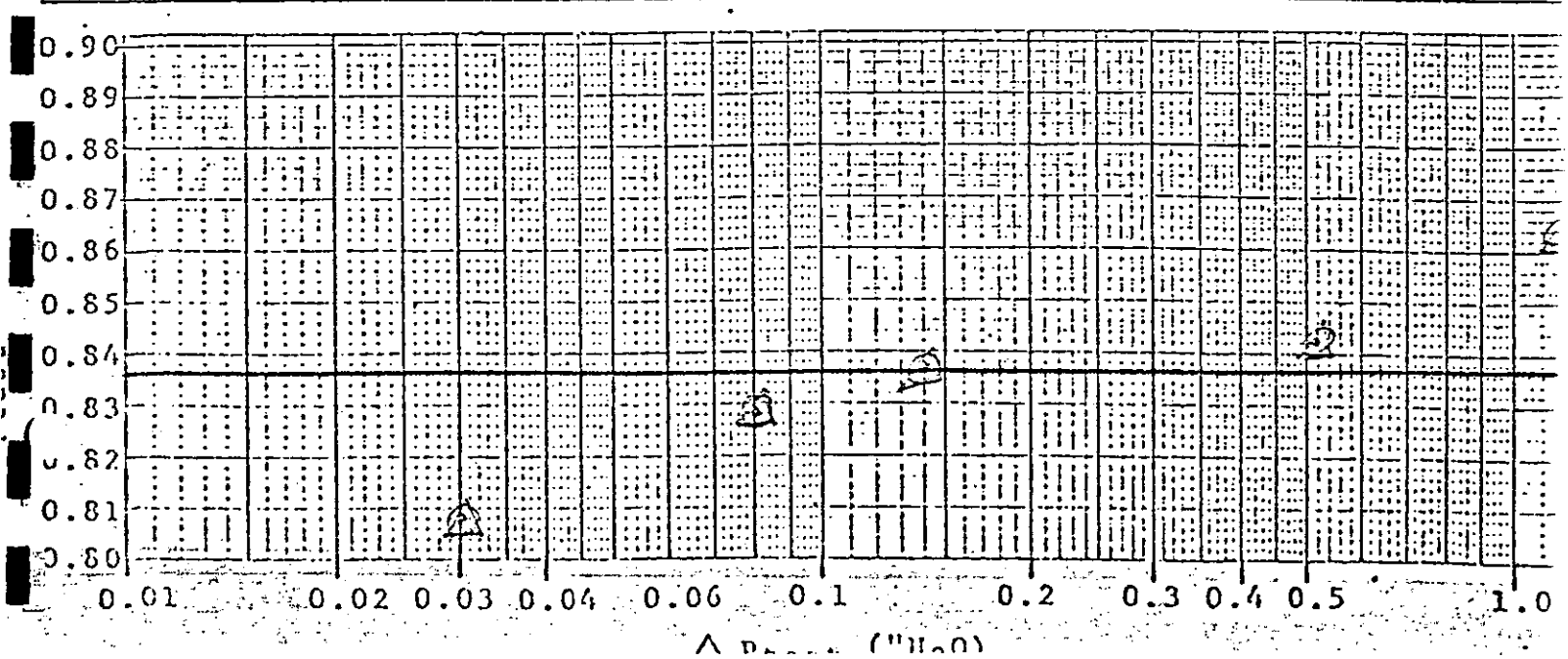
$C_{ptest} = 0.99 \sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$

Pitot Tube Type S Pitot Tube No. #19

Standard Pitot Tube No. _____

Calibrator: G.E.H. Date: 9/22/76 Client: _____

Anticipated ΔP_{std}	ΔP_{std}	A ⊙		B △	
		ΔP_{test}	ΔC_{ptest}	ΔP_{test}	ΔC_{ptest}
0.02	0.020	0.030	0.808	0.030	0.808
0.04	0.	0.	0.	0.	0.
0.06	0.056	0.080	0.828	0.080	0.828
0.08	0.	0.	0.	0.	0.
0.10	0.100	0.140	0.837	0.140	0.837
0.12	0.	0.	0.	0.	0.
0.16	0.	0.	0.	0.	0.
0.20	0.	0.	0.	0.	0.
0.30	0.370	0.512	0.842	0.512	0.842
0.50	0.	0.	0.	0.	0.
0.70	0.	0.	0.	0.	0.
0.80	0.1.104	0.1.450	0.864	0.1.450	0.864



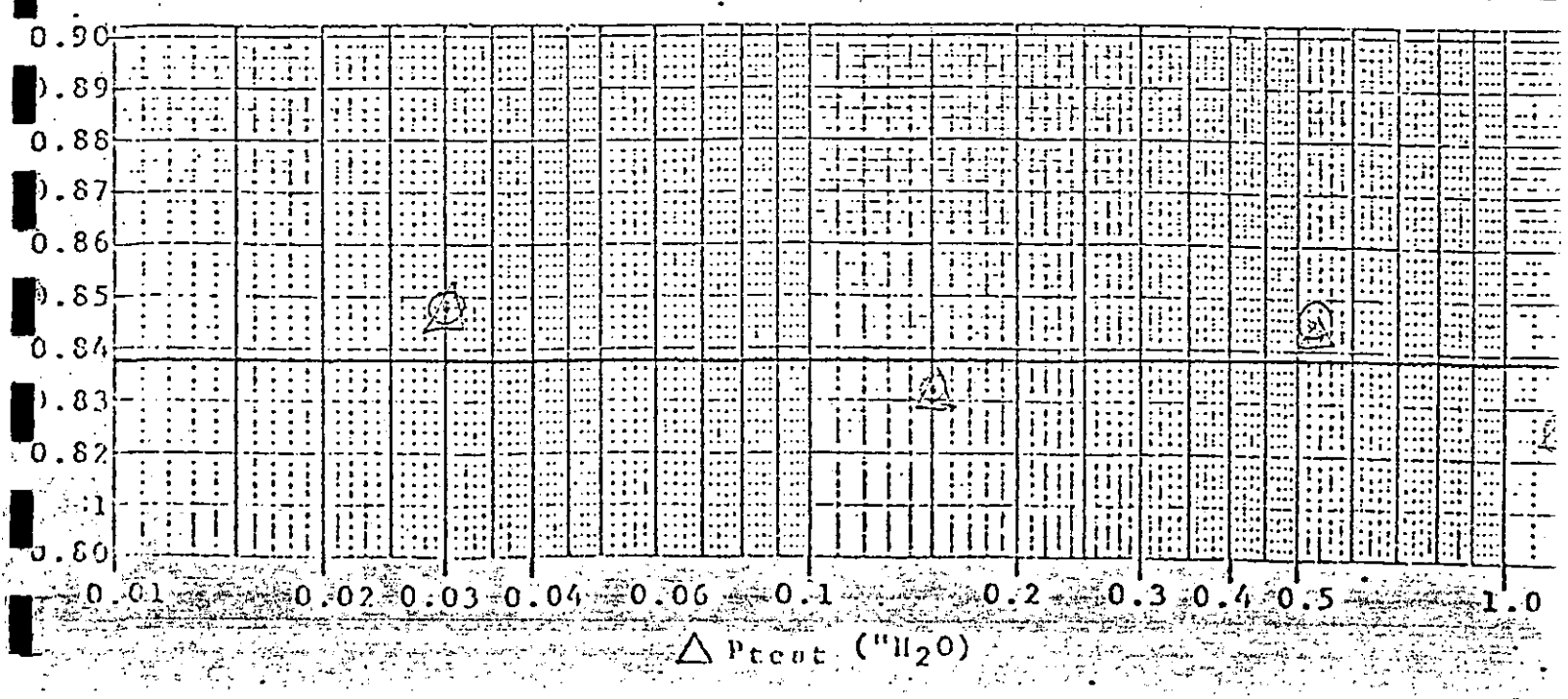
$C_{ptest} = 0.99 \sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$

Pitot Tube Type 5 Pitot Tube No. 25

Standard Pitot Tube No.

Calibrator: GEK Date: 10/6/76 Client: FROM EPA-TASK #25

Anticipated ΔP_{std}	ΔP_{std}	A △		B ⊙	
		ΔP_{test}	ΔC_{ptest}	ΔP_{test}	ΔC_{ptest}
0.02	0.022	0.030	0.848	0.030	0.848
0.04	0.	0.	0.	0.	0.
0.06	0.	0.	0.	0.	0.
0.08	0.	0.	0.	0.	0.
0.10	0.106	0.150	0.832	0.150	0.832
0.12	0.	0.	0.	0.	0.
0.16	0.	0.	0.	0.	0.
0.20	0.	0.	0.	0.	0.
0.30	0.392	0.540	0.843	0.538	0.845
0.50	0.	0.	0.	0.	0.
0.70	0.	0.	0.	0.	0.
0.80	0.1.036	0.1.492	0.825	0.1.490	0.826



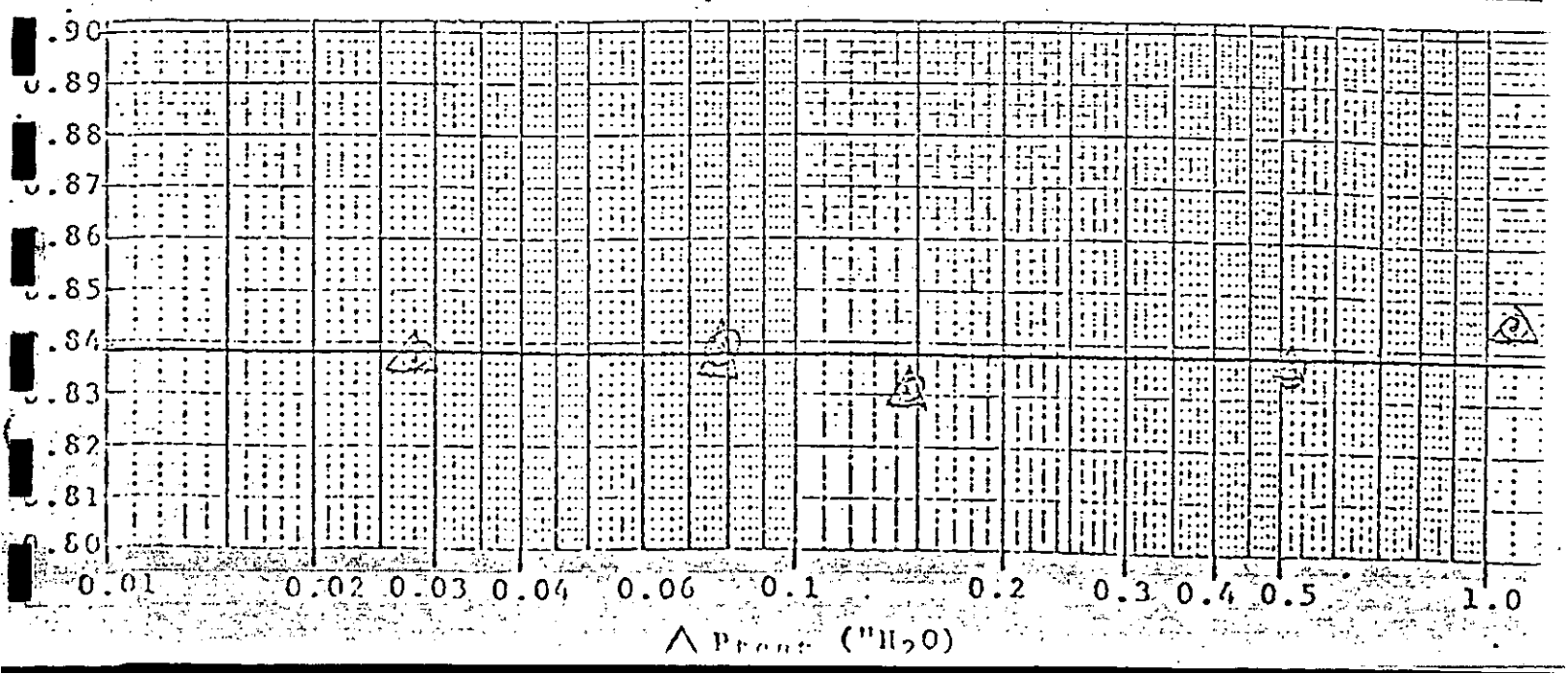
$C_{ptest} = 0.99\sqrt{\frac{\Delta P_{std}}{\Delta P_{test}}}$

Pitot Tube Type S Pitot Tube No. 23

Standard Pitot Tube No. _____

Calibrator: G.E.H. Date: 9/22/76 Client: _____

Anticipated ΔP_{std}	ΔP_{std}	A ⊙		B △	
		ΔP_{test}	ΔC_{ptest}	ΔP_{test}	ΔC_{ptest}
0.02	0.020	0.028	0.837 ✓	0.028	0.837 ✓
0.04	0.	0.	0.	0.	0.
0.06	0.056	0.078	0.839 ✓	0.078	0.839 ✓
0.08	0.	0.	0.	0.	0.
0.10	0.100	0.142	0.831 ✓	0.142	0.831 ✓
0.12	0.	0.	0.	0.	0.
0.16	0.	0.	0.	0.	0.
0.20	0.	0.	0.	0.	0.
0.30	0.370	0.520	0.835 ✓	0.518	0.837 ✓
0.50	0.	0.	0.	0.	0.
0.70	0.	0.	0.	0.	0.
0.80	0.1.104	0.1.512	0.846 ✓	0.1.510	0.847 ✓



GEORGE D. CLAYTON & ASSOCIATES

POTENTIOMETER CALIBRATION

Instrument No.-Pyrotest 73090015 Minimite MODLE # 31101

Scale-Pyrotest J Minimite MODLE - 87753-4

METER STANDARDIZATION					
Calibrated By	G.E.H				
Date	10/7/76				
Cold Junc.Temp.	72°				
Client	FROM EPA. TASK #25				
Pyrotest Reading	Minimite Reading				
°F	°F	°F	°F	°F	°F
100	100				
200	200				
300	300				
400	400				
500	500				
600	600				
700	700				
800	800				
900	900				
1000	1000				
1100	1100				
1200	1200				
1300	1300				
1400	1400				
1500	1500				
1600	1600				
1700	1700				
1800					

GEORGE D. CLAYTON & ASSOCIATES

POTENTIOMETER CALIBRATION

Instrument No.-Pyrotest 73090015 Minimite MODEL 3110 1

Scale-Pyrotest _____ Minimite SER- 69500-3

METER STANDARDIZATION					
Calibrated By	G.E.H.				
Date	10/7/76				
Cold Junc. Temp.	74°				
Current	FROM EPA TASK #25				
Pyrotest Reading	Minimite Reading				
°F	°F	°F	°F	°F	°F
100	100				
200	200				
300	300				
400	400				
500	500				
600	600				
700	700				
800	800				
900	900				
1000	1000				
1100	1100				
1200	1200				
1300	1300				
1400	1405				
1500	1505				
1600	1605				
1700	1705				

APPENDIX I

EXAMPLE CALCULATIONS

Nomenclature

A_s = Stack area, inches^2

C_f = Front half (probe & filter) particulate concentration, gr/DSCF

C_p = Pitot tube correction factor, dimensionless

C_t = Total particulate concentration, gr/DSCF

CM_f = Front half (probe & filter) particulate concentration, mg/DSm^3

CM_t = Total particulate concentration, mg/DSm^3

D_n = Sampling nozzle diameter, inches

ER_f = Emission rate of front half particulate, lb/hr

ER_t = Emission rate of total particulate, lb/hr

ERM_f = Emission rate of front half particulate, kg/hr

ERM_t = Emission rate of total particulate, kg/hr

M_d = Mole fraction of dry gas, g/g-mole

MW = Molecular weight of wet stack gas

MW_d = Molecular weight of dry stack gas

P_b = Barometric pressure, inches mercury

P_m = Average orifice pressure drop, inches water

P_s = Absolute stack gas pressure, inches mercury

P_{st} = Static pressure of stack gas, inches mercury

Q_s = Dry stack gas flowrate at standard conditions, DSCFM

SW_f = Front half sample weight, mg

SW_t = Total sample weight, mg

T_m = Average meter temperature, °F

T_s = Stack temperature, °F

T_t = Net time of test, minutes

V_m = Volume of dry gas at meter conditions, ft^3

$V_{m_{std}}$ = Volume of dry gas at standard conditions, DSCF

V_s = Stack gas velocity at stack conditions, fpm

V_w = Total condensate collected in sampling train, ml

$V_{w_{gas}}$ = Volume of water vapor at standard conditions, SCF

ΔP_s = Velocity pressure, inches water

%I = Percent of isokinetic variation, dimensionless

%M = Percent moisture, dimensionless

Calculation of Particulate Emissions

The dry volume of sampled gas corrected to standard conditions of 20°C and 760 mm Hg (29.92 in. Hg) is calculated as follows:

$$V_{m_{std}} = \frac{17.65 * V_m * P_b + \left(\frac{P_m}{13.6}\right)}{T_m + 460} .$$

The sampled volume for the first particulate test taken on the No. 2 Mill Baghouse Outlet at the International Minerals and Chemicals Corporation is:

$$V_{m_{std}} = \frac{17.65\ (105.631)\left(27.23 + \frac{2.32}{13.6}\right)}{(119 + 460)}$$

$$= 88.230$$

The dry stack gas flowrate corrected to standard conditions is calculated using the following set of equations sequentially:

$$V_{w_{gas}} = 0.0471 * V_w$$

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

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

$$MW_d = (\%CO_2 * 44/100) + (\%O_2 * 32/100) + \left[(\%CO + \%N_2)*28/100\right]$$

$$MW = (MW_d * M_d) + 18(1 - M_d)$$

$$P_s = P_b + P_{st}$$

$$V_s = 5120.8 * C_p * \sqrt{\Delta P_s * (T_s + 460)} * \sqrt{\frac{1}{P_s * MW}}$$

$$Q_s = \frac{0.1225 * V_s * A_s * M_d * P_s}{T_s + 460}$$

The calculations for determining the flowrate for the first particulate test on the No. 2 Mill Baghouse Outlet follow. This sampling location has a 19-inch interior diameter.

$$V_{w_{gas}} = 0.0471\ (32)$$
$$= 1.507$$

$$\%M = \frac{100 * 1.507}{88.230 + 1.507}$$
$$= 1.68$$

$$M_d = \frac{100 - 1.68}{100}$$
$$= 0.98$$

MW_d = 29 (Because this is not a combustion source, MW_d is assumed to be the molecular weight of air.)

$$MW = (29 * 0.98) + 18(1 - 0.98)$$
$$= 28.78$$

$$P_s = 27.23 - 0.12$$
$$= 27.11$$

$$V_s = 5120.8\ (0.839)\ (16.767) \sqrt{\frac{1}{27.11\ (28.78)}}$$
$$= 2579$$

$$Q_s = \frac{0.1225\ (2579)\ (283.5)\ (0.98)\ (27.11)}{(105 + 460)}$$

$$= 4210$$

The equation employed to determine percent of isokinetic variation is:

$$\%I = \frac{1032 * (T_s + 460) * V_{m_{std}}}{V_s * T_t * P_s * M_d * (D_n)^2}$$

For the first particulate test taken at the No. 2 Mill Baghouse Outlet,

$$\%I = \frac{1032\ (105 + 460)\ (88.228)}{(2579)\ (120)\ (27.11)\ (0.98)\ (0.25)^2}$$

$$= 100.1$$

To determine the concentration of particulate matter in grains per dry standard cubic foot (gr/DSCF), one of the following equations is used:

$$C_f = 0.01543 * \frac{SW_f}{V_{m_{std}}} \quad \text{and}$$

$$C_t = 0.01543 * \frac{SW_t}{V_{m_{std}}} .$$

When metric units are desired, the concentration is calculated in milligrams per dry normal cubic meter (mg/DSm^3) as follows:

$$CM_f = \frac{SW_f}{(0.02832)(V_{m_{std}})} \quad \text{and}$$

$$CM_t = \frac{SW_t}{(0.02832)(V_{m_{std}})} .$$

Front half particulate concentrations are obtained by summing the weight of particulate matter collected on the filter and all portions of the train preceding it. Total particulate concentration includes, in addition, any particulate matter collected in the impingers.

The first particulate test taken at the No. 2 Mill Baghouse Outlet yielded the following concentrations of filterable and total particulate:

$$C_f = 0.01543 * \frac{27.1}{88.2}$$

$$= 0.0047$$

$$C_t = 0.01543 * \frac{27.1}{88.2}$$

$$= 0.0047$$

$$CM_f = \frac{27.1}{(0.02832)(88.2)}$$

$$= 10.8$$

$$CM_t = \frac{27.1}{(0.02832)(88.2)}$$

$$= 10.8$$

The emission rate of particulate matter can be calculated from the filterable or total particulate concentration using one of the following equations:

$$ER_f = 0.00857 * C_f * Q_s \quad \text{and}$$

$$ER_t = 0.00857 * C_t * Q_s \quad .$$

For metric units,

$$ERM_f = (1.70 * 10^{-6}) * CM_f * Q_s \quad \text{and}$$

$$ERM_t = (1.70 * 10^{-6}) * CM_t * Q_s \quad .$$

To avoid rounding errors it is preferable to carry out the calculation of concentration and emission rate in one operation.

The emission rates of front half and total particulate matter for the first test taken at the No. 2 Mill Baghouse Outlet are calculated as follows:

$$ER_f = 0.00857\ (0.0047)\ (4210)$$
$$= 0.17$$

$$ER_t = 0.00857\ (0.0047)\ (4210)$$
$$= 0.17$$

$$ERM_f = (1.70 * 10^{-6})\ (10.8)\ (4210)$$
$$= 0.08$$

$$ERM_t = (1.70 * 10^{-6})\ (10.8)\ (4210)$$
$$= 0.08$$

NO PROCESS DESCRIPTION!
NO PROCESS RATES!
CANNOT USE THIS REPORT
WITHOUT THIS INFORMATION.

DRAFT/WP
d3006-4/971130
03/30/92 1

Emission Test Report
Review Checklist

Reviewer: Brian Shrager
Review Date: 8/20/92

A. Background Information

1. Facility name: International Minerals and Chemicals Corporation

   Location: Spruce Pine, NC.

2. Source category: Feldspar Processing

3. Test date: September 27-29, 1976

4. Test sponsor: EPA/EMB

5. Testing contractor: Clayton Environmental Consultants

6. Purpose of test: Provide data for the establishment of source performance standards for the non-metallic mineral processing industry.

7. Pollutants measured

   (PM) PM-10 CO SO_2 NO_x VOC Pb CO_2

   Others (list): PS

8. Process overview: On an attached page provide a block diagram of the unit operations and associated air pollution control systems at the facility. Identify process tested with letters from the beginning of the alphabet (A, B, C, etc.) and APC systems with letters from end of alphabet (V, W, X, etc.). Also identify test locations with Arabic numerals (1,2,3, ...). Using the ID symbols from that sketch complete the table below that identifies processes or unit operations tested.

Test ID	Process	Process ID	Emissions tested		APCD (controlled emissions only)
			Uncontrolled	Controlled	
1	Ball Mill	A	✓		
2	Ball Mill			✓	Fabric filter

B. Process Information

1. Provide a brief narrative description of the process. With as much detail as possible, (e.g., if a furnace or conveyor system is used, identify the type of unit) describe the equipment used for those operations tested. (Note: If process description provided in test report is adequate, attach copy or reproduce here.)

No process description provided in test report.
Says "~~will be provided~~ To be supplied by EPA"

2. For each process tested list feedstock materials and products. Indicate if activity factors are for feed (F) rate or product (P) rate.

Process ID	Feedstock materials	Products	Basis for activity factor	F/P
A				

Basis for data: _____
(Indicate page/table Nos. in test report)

3. For each process or operation tested and each test run note process capacity and operating rate during test.

Process ID	Capacity	Units	Test run	Process rate	Units
			1		
			2		
			3		
			4		
			1		
			2		
			3		
			4		
			1		
			2		
			3		
			4		
			1		
			2		
			3		
			4		

Basis for data: _____

C. Air Pollution Control Systems Tested

1. For each air pollution control system pollution control system identified in A.8, note the following

ID	Type of APCD	Manufacturer	Model No.

Note: Be as specific as possible in identifying APCD. For example, indicate "pulse jet fabric filter" rather than simply "fabric filter."

2. For each system identified above, provide a narrative description. For fugitive systems describe capture techniques as well as the removal techniques (use a separate page if necessary)

3. Using the attached parameter list for guidance complete the table below. (Use additional pages as needed.)

APCD ID	Parameter	Units	Readings			
			Run 1	Run 2	Run 3	Run 4
Type of APCD:						
Type of APCD:						
Type of APCD:						

D. Sampling and Analysis Methods

1. Complete the following table

Test location	Pollutant	S & A method	Reference/ conditional method	Deviations noted
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N

2. If a method used was not a reference or conditional method, provide a narrative discussion including any data manipulation needed to make results correspond to reference or conditional method results.

3. Describe any deviations identified above.

E. Emission Data Documentation

1. Tabulate the following stack gas data from the test report. (Use additional pages as needed.)

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
	Stack temperature					
	Moisture					
	Oxygen					
	Volumetric flow, actual					
	Volumetric flow, standard					
	Percent isokinetic					
	Pollutant concentration:					
	Stack temperature					
	Moisture					
	Oxygen					
	Volumetric flow, actual					
	Volumetric flow, standard					
	Percent isokinetic					
	Pollutant concentration:					
	Stack temperature					
	Moisture					
	Oxygen					
	Volumetric flow, actual					
	Volumetric flow, standard					
	Percent isokinetic					
	Pollutant concentration:					

2. Tabulate pollutant mass flux rates

Test ID	Pollutant	Units	Mass flux rates			
			Run 1	Run 2	Run 3	Run 4

3. Present example emission factor calculations below.

4. Tabulate emission factors

Process	Pollutant	Units	Average emission factor	
			Uncontrolled	Controlled