REFERENCE 8

PM emission rate

Run #	Total PM (lb/hr)	Filt. (mg)	Cond. (mg)
1	4.16	13.5	23.2
2	1.657	18	5.1
3	1.084	12.3	3.1
4	1.725	15.9	7.2
5	1.561	11.5	8.9
6	1.801	10.2	13.3
7	1.058	8.6	1.8
8	1.373	10.2	3.8
9	1.248	9.3	3.6

Filt. PM (lb/hr)	Cond. PM (lb/hr)	Process rate (TPH feed)
1.53	2.63	7.81
1.29	0.37	
0.87	0.22	
1.19	0.54	7.66
0.88	0.68	
0.78	1.02	
0.87	0.18	7.81
1.00	0.37	
0.90	0.35	

Emission factors

	Filt. PM (lb/ton)	Cond. Inorg. PM (lb/ton)
RUN 1	0.47	0.41
RUN 2	0.37	0.29
RUN 3	0.36	0.12
Average	0.40	0.27

CALCIUM CARBIDE
MANUFACTURING
AP-42 Section 8.4
Reference Number
8

TEST REPORT:

PARTICULATE EMISSIONS - ELECTRIC CARBIDE FURNACE

MIDWEST CARBIDE CORPORATION
PRYOR, OKLAHOMA

April 1978

Job No. 78-0149

DOCUMENT PREPARED BY

STUEVER and ASSOCIATES
CONSULTING ENGINEERS
OKLAHOMA CITY, OKLAHOMA USA

TEST REPORT:

PARTICULATE EMISSIONS -
ELECTRIC CARBIDE FURNACE

MIDWEST CARBIDE CORPORATION
PRYOR, OKLAHOMA

Tests Performed for:

MIDWEST CARBIDE CORPORATION
PRYOR, OKLAHOMA

Tests Performed by:

Stuever & Associates
Consulting Engineers
Oklahoma City, Oklahoma

April 1978

Joseph H. Stuever, P.E.

Joseph H. Stuever, P.E.
Test Director

JHS
JOSEPH H.
STUEVER
5-5-78

Stuever & Associates CONSULTING ENGINEERS
5815 Melton Drive - Oklahoma City, Oklahoma 73132 - 405-721-1171

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Stuever & Associates CONSULTING ENGINEERS
5815 Melton Drive-Oklahoma City, Oklahoma 73132 -405-721-1171

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Stuever & Associates CONSULTING ENGINEERS
5815 Melton Drive-Oklahoma City, Oklahoma 73132 ·405·721·1171

TEST REPORT:

PARTICULATE EMISSIONS -
ELECTRIC CARBIDE FURNACE

1.0 Introduction.

The electric carbide furnace is owned and operated by the Midwest Carbide Corporation's Pryor Division. It is located about three miles east and two miles south of Pryor, Oklahoma, Mays County.

The organization performing the particulate emissions tests was Stuever & Associates, a consulting engineering firm who specializes in environmental pollution control and manufacturing process design. The tests were under the personal direction of Joseph H. Stuever, P.E.; he was assisted by E. Frank Stinson, Ph.D.; Mike Salva, Engineer, and Lawrence C. Thompson, Technician. Mr. Stuever has performed field tests such as this for the past five years and has over 20 years of field test experience in various fields of engineering. Dr. Stinson is a chemist of some 40 years experience, and was in charge of all samples from their acquisition to their final analysis.

The carbide manufacturing process was under the direct supervision of the plant manager, Merril L. Stott, and the production and process information as reported by him is enclosed as Appendix B.

It should be noted that the original data sheets and calculated data are enclosed in Appendix A. These have been summarized in Section 2.0 "Emission Summary" and Section 4.0 "General Data Summary(ies)."

The purpose of these tests was to ascertain that the particulate emissions did not exceed the allowable emissions as stated in Regulation #8, Oklahoma State Department of Health Bulletin 0550 dated July 1, 1976. This testing was also directed by EPA order of August 4, 1977.

The Environmental Protection Agency was represented by Mr. G. Willie Kelley, Environmental Engineer, Region VI, Dallas, Texas. The Oklahoma State Department of Health was represented by Mr. Grant C. Marburger, Oklahoma City, Oklahoma.

2.0 Summary.

2.1 Allowable Emissions.

In accordance with Regulation #8, OSDH Bulletin 0550, 1 July 1976, the allowable emissions are determined by the process flow rate in tons per hour. The formula that is used is

$$Ea = 4.10(P)^{.67}$$ where

Ea = allowable emissions in pounds per hour

P = process flow rate in tons per hour

From the data presented in Appendix B, Page B-4, the average process flow rate during the testing was 7.76 tons per hour. This gives an allowable emission of 16.18 pounds per hour.

2.2 Actual Emissions.

The particulate collection system consiste of three separate baghouses which control the total flow from the one electric carbide furnace. Figure 2.2.1 indicates the general flow arrangement. In order to determine the total particulate emissions, it was necessary to test the gas flow from each of the three baghouses. The emission rates found in each case are summarized in Table 2.2.1 below.

Table 2.2.1

Total Particulate Emissions(1)

Stack Location	Run #	Emission Rate (#/hr)	Stack Avg.(#/hr)	Total (#/hr)
A. Stack #1 Fuller (east stack)	1	4.160		
	2	1.657		
	3	1.084		
			2.300	
B. Stack #2 Fuller (middle)	4	1.725		
	5	1.561		
	6	1.801		
			1.696	
C. Stack #3 Wheelabrator (west)	7	1.058		
	8	1.373		
	9	1.248		
			1.226	
				5.222(2)

NOTE (1): This is a table of the total emissions from all 3 stacks as indicated, i.e., average of 3 test runs per stack.

(2): This actual rate of 5.222 #/hr is considerable less than the allowable rate of 16.18 #/hr indicated in Paragraph 2.1 above.

The details of the test results are included in Section 4.0 following and in the Appendices of the report.

3.0 <u>Details of Test Procedure</u>.

3.1 <u>Stack Description</u>.

The details of the stacks are included in Appendix D of this report. The stack used on the two Fuller Pulse Jet baghouses was a temporary stack installed for these tests and is dimensioned on the drawing in Appendix D. It is a horizontal rectangular duct about 32 feet long, 80 inches high, and 54 inches wide.

The Wheelabrator was tested on the suction side of the fan coming off the baghouse and before entry into a large plenum prior to the fan. This test point is shown in a sketch in Appendix D and a copy of a photograph of the site.

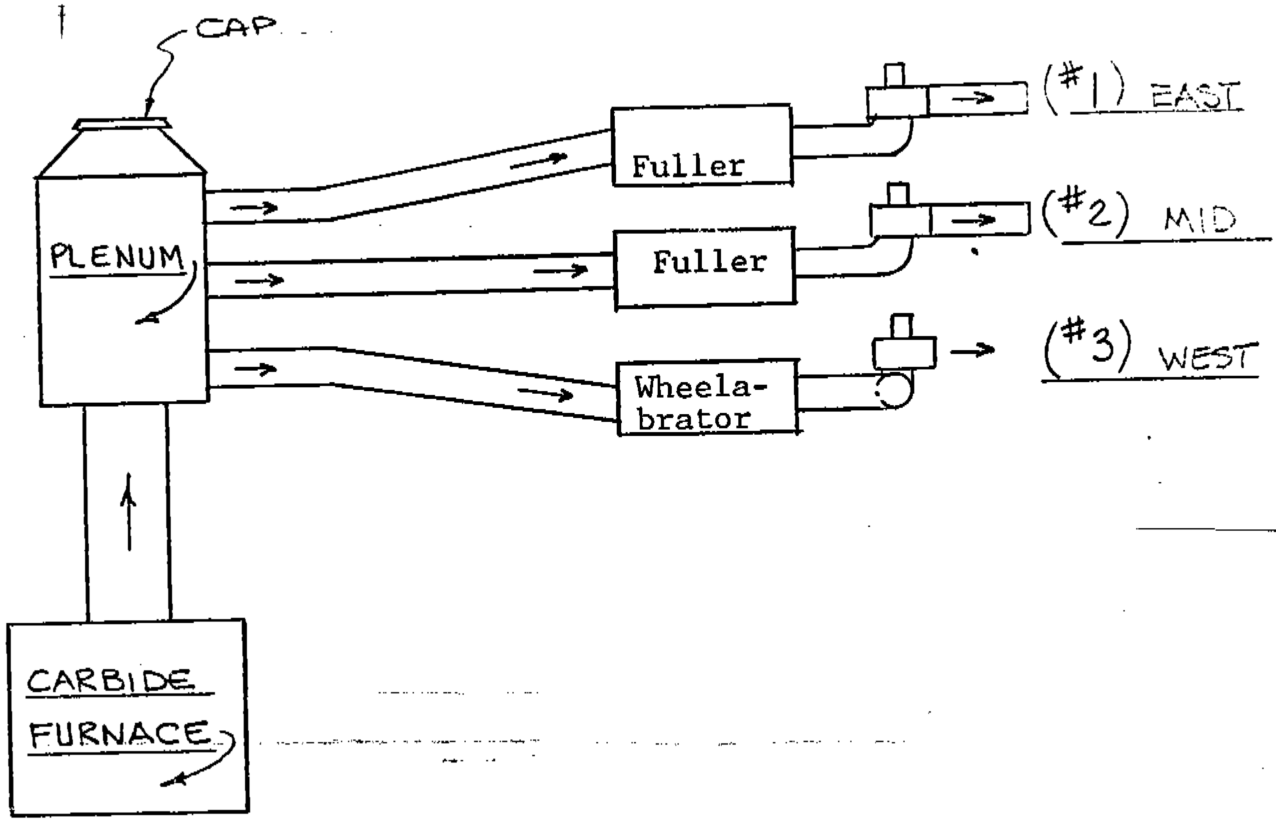
All three series of test points qualify to requirements of Method #1, 40 CFR Part 60, Appendix A.

3.2 <u>Process Description</u>.

The process has been described by Midwest Carbide Corporation in Appendix B of this report, partially quoted below:

> "...The process involved an electric furnace operation for production of calcium carbide.
>
> A weighed ratio of pebble lime and petroleum coke is charged into a circular three-phase furnace and heated to produce calcium carbide. This is in a molten stage as it is tapped from the furnace at periodic intervals, solidifies and is then crushed and sized.

Figure 2.2.1



CAP
PLENUM
Fuller
Fuller
Wheela-
brator
(#1) EAST
(#2) MID
(#3) WEST
CARBIDE
FURNACE

Emissions from the charge bed are collected by three baghouse collectors and these are composed of two Fuller plenum pulse and one Wheelabrator shaker collec~~tors~~.

The dust particulate collected by the baghouse is composed basically of lime and free carbon. This material has been certified by Oklahoma State University as suitable for use as agricultural lime. It is blended into our furnace charge and consumed.

The rating of an electric furnace is denoted by the electrical KW input. Our Pryor furnace has a maximum transformer rating of 18.5 MW. The normal maximum operating level is 15.0 - 15.5 MW and this was the actual operating level of the process during the tests..."

There is no hydrocarbon combustion in the process. Therefore, very little moisture is generated, the only moisture available being atmospheric moisture and moisture which is hygroscopically taken up by the lime feed prior to its introduction into the process.

There is some generation of CO in the process, which is burned to CO_2 above the process feed surface in the furnace. This reaction explains the CO_2 level in the exit gases.

3.3 Sampling Train.

The sampling train that was used is identical to that shown in Figure 5-1 Particulate-sampling train, with the following exceptions.

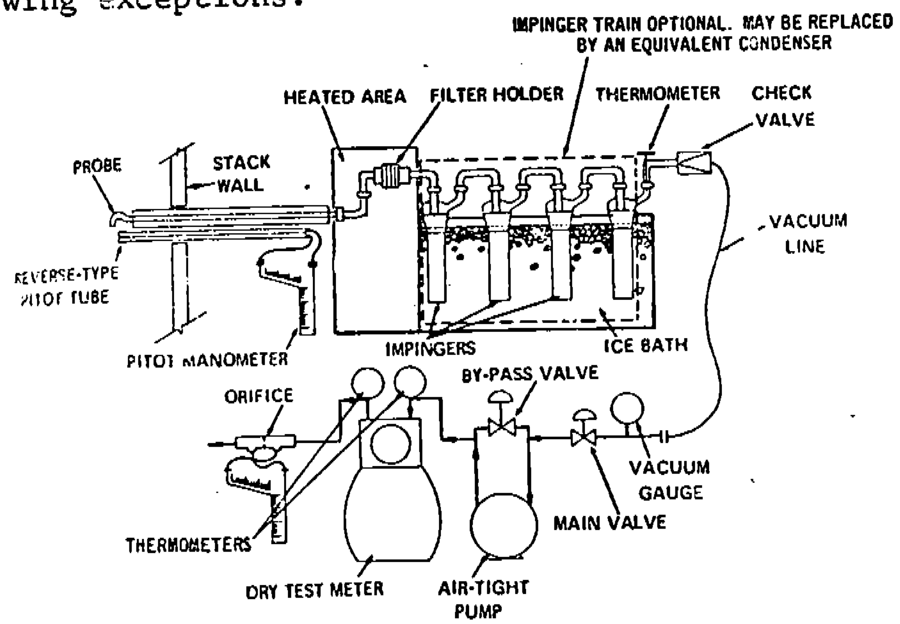


Figure 5-1. Particulate-sampling train.

(a) The check valve as shown was not used.

(b) The "in" and "out" temperature indicators have been replaced by a thermocouple(s) circuit which gives automatically the average of the two points.

(c) The temperature of the gas exiting the oven (filter area) was recorded.

A vacuum check was made for the entire sampling train at the beginning and end of each test run.

3.4 Laboratory Technique.

The train was disassembled after each run. The moisture gain was measured. The water from Impingers #1, #2 and #3 was retained for further analysis and determination of total solids gained. The filter was removed and placed in its individual plastic container for shipment to the laboratory. The entry side of the filter holder, the glass elbow (probe to filter holder) and the probe were washed with generous amounts of acetone. The probe was further rodded out with a clean nylon brush, emptying any particulate into the acetone container and the brush was washed with acetone into the container. The probe washings were held in a 300 ml glass stoppered bottle for transportation to the laboratory. Each impinger water sample was contained in a 500 ml high density polyethylene bottle for transport to the laboratory.

The samples were evaporated in 250 ml beakers at 100°C to 104°C in a ventilated area to dryness. The beakers were dessicated and weighed at approximately 530°R.

The filters were dessicated and weighed repeatedly, until no additional weight loss was observed, as was done to establish their tare weights.

3.5 Sample Calculations.

Run #1 sample calculations are shown in Appendix E. All other calculations followed the same procedure. Since Runs 7, 8 and 9 were at the negative side of the fan, the barometric pressure was adjusted downward for stack pressure. The barometric and stack pressures were assumed to be identical for Runs 1-6, since no back pressure on the stack existed.

4.0 Detailed Operational Test Data.

4.1 Introduction.

The following series of tables show details and significant data which was briefly summarized in Section 2.0. All of this data is available or shown in the data sheets in Appendix A.

4.2 Air Flow.

The total air flow of the system has always been of some interest to Midwest Carbide and is a great contributing factor to the emission rate calculation of this installation. It is summarized in Table 4.2.1 below.

Table 4.2.1

Air Flow Data

		Run #	ACFM	DSCFM	Total DSCFM
Baghouse #1		1	52,881	33,660	
Fuller		2	53,157	33,837	
East Fan		3	50,882	32,507	
	Average		52,307	33,334	
Baghouse #2		4	46,425	30,093	
Fuller		5	45,959	30,199	
Mid le Fan		6	44,668	29,022	
	Average		45,684	29,771	
Baghouse #3		7	68,012	43,621	
Wheelabrator		8	70,677	44,925	
West Fan		9	64,663	40,404	
	Average		67,784	76,318	139,423
			165,775		(8.365×10^6 DSCFH)

4.3 Moisture.

The emission gases contained very little moisture as indicated in the table below.

Table 4.3.1

Moisture Content: Emission Gas

Run #	Moisture Content % @ STP	Average
1.	2.06	
2.	2.16	
3.	1.72	
4.	1.45	
5.	1.17	
6.	1.27	
7.	1.47	
8.	1.43	
9.	1.55	1.59

4.4 Particulate Concentrations.

The particulate concentrations were extremely low, indicating a good performance by the baghouse collecting system. These concentrations are shown in Table 4.4.1 following. The concentrations have been expressed both in grains per dry standard cubic feet and in pounds per dry standard cubic feet. The latter number is directly related to the dry standard cubic feet per hour of total air flow.

Table 4.4.1

Particulate Emissions Concentration

Run No.		Concentration (gr/dscf)	Concentration (#/dscf x 10^{-6})	Average #/dscf
1.		~~0.0144~~	2.06	
2.		0.0057	0.81	
3.		0.00389	0.56	
	Average	0.0080	1.14	
4.		0.00669	0.96	
5.		0.00603	0.86	
6.		0.00724	1.03	
	Average	0.00665	0.950	
7.		0.00283	0.404	
8.		0.00357	0.510	
9.		0.00360	0.514	
	Average	0.00333	0.476	
Three-Stack Average:				0.855×10^{-6} #/dscf

4.5 Particulate Breakdown.

The particulate was accumulated from three basic areas of the test sampling train. The probe washing, the filter and the impinger water. This is in accordance with the directions of OSDH Regulation #8.

Table 4.5.1 contains the probe washing data. Table 4.5.2 contains the filter data. Table 4.5.3 contains the impinger water data.

Table 4.5.1

Probe Washings: Particulate

Run No.	Total Solid (milligrams)	Blank Weight[1] (milligrams)	Weight Gain (milligrams)
1.	13.19	1.2 (165)	12.7
2.	18.8	1.2 (178)	17.6
3.	8.8	1.2 (140)	7.6
4.	12.5	1.2 (156)	11.3
5.	5.4	0.8 (81)	4.6
6.	8.9	0.8 (83)	8.1
7.	8.6	0.4 (50)	8.2
8.	8.9	1.0 (125)	7.9
9.	8.0	1.0 (132)	7.0

(1) Based on a blank having a solids content of 7×10^{-6}g/l and amount of acetone (in ml) used for wash shown in ( ).

Table 4.5.2

Filters: Particulate

Run No.	Final Weight (mg)	Original Weight (mg)	Weight Gain (mg)
1.	738.1	737.3	0.8
2.	734.4	734.0	0.4
3.	748.0	742.3	4.7
4.	761.6	757.0	4.6
5.	754.8	747.9	6.9
6.	747.9	745.8	2.1
7.	727.4	727.0	0.4
8.	750.3	748.3	2.3
9.	750.3	748.3	2.3

Table 4.5.3

Impingers #1 and #2: Particulate

Run No.	Impinger #1 Total Weight (mg)	Impinger #1 Blank* Weight (mg)	Impinger #1 Weight Gain (mg)	Impinger #2 Total Weight (mg)	Impinger #2 Blank* Weight (mg)	Impinger #2 Weight Gain (mg)
1.	9.6	0.8 (140)	8.8	15.4	1.0 (172)	14.4
2.	4.6	1.0 (160)	3.6	2.4	0.9 (158)	1.5
3.	2.3	1.0 (160)	1.3	2.7	0.9 (153)	1.8
4.	5.3	0.9 (154)	4.4	3.7	0.9 (154)	2.8
5.	6.7	0.9 (152)	5.8	4.0	0.9 (154)	3.1
6.	7.5	0.9 (150)	6.6	6.6	0.9 (154)	6.7
7.	1.9	0.9 (150)	1.0	1.7	0.9 (157)	0.8
8.	3.8	0.9 (150)	2.9	1.8	0.9 (156)	0.9
9.	4.0	0.9 (151)	3.1	1.4	0.9 (157)	0.5

* The blank weight is based on a blank which had a total solids of 6×10^{-6} g/ml. The sample size is shown in ( ) in ml.

Table 4.5.4

Total Summary: Particulate

Run No.	Probe (mg)	Filter (mg)	Impinger (mg)	Total (mg)
1.	12.7	0.8	23.2	36.7
2.	17.6	0.4	5.1	23.1
3.	7.6	4.7	3.1	15.4
4.	11.3	4.6	7.2	23.1
5.	4.6	6.9	8.9	21.2
6.	8.1	2.1	13.3	24.3
7.	8.2	0.4	1.8	10.8
8.	7.9	2.3	3.8	14.0
9.	7.0	2.3	3.6	12.9

5.0 Chronological Chain of Events.

The test was conducted and analyses made in the following chronological order.

April 17, 1978.

0730 hours: Arrived on site and began set-up of equipment including velocity profile on East or #1 stack.

1300 hours: Started first test run on #1 stack; completed about 1646 hours. Cloudy and cool, very humid.

1757 hours: Started second run on #1 stack; interrupted by thunderstorm including downpour. Finished test at 2043 hours.

2151 hours: Started third test run on #1 stack, finishing about 2337 hours. Quit testing operations for this day.

April 18, 1978.

0730 hours: On site. (During night--2400 hours to 0730 hours--MWC had moved temporary stack to #2 (middle) stack.)

0931 hours: Started first test run on #2 stack, finishing about 1117 hours.

1247 hours: Started second test run on #2 stack, finishing about 1433 hours.

1558 hours: Started third test run on #2 stack, finishing about 1738 hours.

2030 hours: Had completed most of shift of equipment to #3 stack and called it a day for test operations.

April 19, 1978.

0730 hours: Arrived on site. Platforms to provide access to #3 (west) stack were inadequate; started to erect additional scaffolding.

May 19, 1978 (contd.)

1016 hours: Started first test run on #3 stack, finishing at 1236 hours.

1340 hours: Started second test run on #3 stack, finishing at 1532 hours.

1643 hours: Started third test run on #3 stack, finishing at 1827 hours. (Completed tear-down of equipment and loading about 2100 hours.)

1900 hours: Dr. Stinson left for Oklahoma City with samples, filters for laboratory work.

May 20, 21, 22, 1978.

The samples were processed through the laboratory phase and the analysis of test data was completed.

\# # #

Joseph H. Stuever, P.E.

Joseph H. Stuever, P.E.

JHS
JOSEPH H.
STUEVER
3125
5-5-78

APPENDIX A

Data Sheets and Calculations

DATE 4/17/78	RUN NO. 1	PORT IDENTIFICATION:	TEST METHOD: 5	NOZZLE DIAMETER: in.	STACK DIAMETER: in.

LINE	ΔP	$\sqrt{\Delta P}$	Meter Volume	ΔH	T_s	T_t	T_o	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O			"H_2O	°R	°R	°F	°F	°F	: :	0	
E1 1	.14	[illegible]	[illegible]								1	
E2 2	[illegible]									[illegible]	2	
E3 3	.14	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]	12	3	
E4 4	[illegible]		[illegible]							[illegible]	4	
E5 5	.12	[illegible]	[illegible]	[illegible]							5	
E6 6	.18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6	
F1 7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				27	7	
F2 8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				33	8	
F3 9	[illegible]	[illegible]								37	9	
F4 10	[illegible]	[illegible]		[illegible]						49	10	
F5 11	.18	[illegible]	[illegible]		[illegible]	[illegible]				93	11	
F6 12	.18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	06	12	Vm OK OK 15"
13											13	
14											14	
15											15	
16											16	
17											17	
18											18	
19											19	
20											20	
21											21	
22											22	
23											23	
24											24	
25		.4652		.1608	756	530					25	AVERAGE
26			42.3		°R	°R				108	26	TOTAL

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle		0
A_s	ft^2	Cross-sectional area of the stack		1
P_s	"HgABS	Absolute pressure in the stack		2
P_m	"HgABS	Absolute pressure at the dry gas meter		3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions		4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$		5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)		6
V_{lc}	ml	Total volume of liquid collected in impinger train		7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$		8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$		9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$		10
V_{ds}	ft^3	Sample volume wet basis stack conditions		11
MW	#/#MOL	Molecular weight of wet stack gas		12
V_s	ft/sec	Average stack velocity		13
V_n	ft/sec	Average gas velocity in probe nozzle		14
I	%	$V_n/V_s(100)$		15
Q_s	cfm	Actual volumetric flow in the stack		16
Q_{sc}	cfh	Stack volumetric at STP - dry basis		17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3		18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$		19
E_{apm}	#/hr	Allowable emission rate		20
				21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)	140	172	-0-	683.5
PRETEST WATER (ml)	150	150	-0-	678.0
TOTAL WATER (ml)	-10	22	-0-	5.5

17.5 ml

FILTER IDENTIFICATION		% CO_2	(44)·( )	.
BAROMETRIC PRESSURE		% O_2	(32)·( )	.
AMBIENT DRY BULB		% CO	(28)·( )	.
AMBIENT WET BULB		% N_2	(28)·( )	.
		% H_2O (Line 9)	(18)·( )	

STACK CROSS SECTION

COMMENTS: —

JOB NUMBER 76-0020
DRAWN BY JHS 6/4/76
APP Stuever 4/26/74

STUEVER and ASSOCIATES
CONSULTING ENGINEERS
OKLAHOMA CITY, OKLAHOMA USA

CLIENT MIDWEST CARBIDE CORP
PRYOR, OKLA

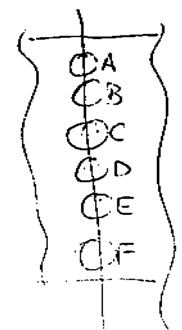
DRAWING TITLE
Stack Test Data
and Calculations

2 L

DATE: 9/17/75	RUN NO. 1	PORT IDENTIFICATION:	TEST METHOD: 5	NOZZLE DIAMETER: ~~[illegible]~~ .242 in.	STACK DIAMETER: 54X80 in.

LINE	ΔP	√ΔP	Meter Volume	ΔH	T_s	T_{F}	T_o'	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		[illegible]	"H_2O	°F	°F	°F	°F	°F	13:04:00	0	Vac Ck OK 15"
A1 1	.35	.5916	265.5	[illegible]	160	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]
A2 2	.42	[illegible]	266.1		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]
A3 3	.45	.6708	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3	
A4 4	.17	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]	4	
A5 5	.30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5	
A6 6	.32	.565	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6	[illegible]
B1 7	.21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	
B2 8	.24	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	8	
B3 9	.29	[illegible]	[illegible]			[illegible]			[illegible]	[illegible]	9	
B4 10	.20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	10	
B5 11	.22	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11	
B6 12	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]	[illegible]	12	[illegible]
C1 13	[illegible]		[illegible]		[illegible]	[illegible]			[illegible]	[illegible]	13	
C2 14	.10	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	14	
C3 15	.22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	15	
C4 16	.27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	16	
C5 17	.27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	17	
C6 18	.24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	18	[illegible]
D1 19	[illegible]	[illegible]			[illegible]			[illegible]	[illegible]		19	
D2 20	.21		[illegible]				[illegible]	[illegible]		[illegible]	20	
D3 21	.26	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	21	
D4 22	.28		[illegible]							[illegible]	22	
D5 23	[illegible]		[illegible]					[illegible]		[illegible]	23	
DC 24			[illegible]							[illegible]	24	
25		[illegible]									25	AVERAGE
26		[illegible]	[illegible]							[illegible]	26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)				
PRETEST WATER (ml)				
TOTAL WATER (ml)				
FILTER IDENTIFICATION		% CO_2	(44)·( )	
BAROMETRIC PRESSURE	27.92	% O_2	(32)·( )	
AMBIENT DRY BULB		% CO	(28)·( )	
AMBIENT WET BULB		% N_2	(28)·( )	
		% H_2O (Line 9)	(18)·( )	



STACK CROSS SECTION

COMMENTS:

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle	3.194 X 10⁻⁴	0
A_s	ft^2	Cross-sectional area of the stack	30.0	1
P_s	"HgABS	Absolute pressure in the stack	27.92	2
P_m	"HgABS	Absolute pressure at the dry gas meter	27.93	3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions	42.3	4
T_m	°R	Absolute temperature at meter $(Ti + To/2)$	530	5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)	39.47	6
V_{lc}	ml	Total volume of liquid collected in impinger train	17.5	7
V_{wc}	ft^3	Volume of water collected at STP $(Vwl = Vlc(0.0474))$	.83	8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$	2.06%	9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc}+V_{mc})$	40.30	10
V_{ds}	ft^3	Sample volume wet basis stack conditions	61.6	11
MW	#/#MOL	Molecular weight of wet stack gas	29.01	12
V_s	ft/sec	Average stack velocity	29.38	13
V_n	ft/sec	Average gas velocity in probe nozzle	29.76	14
I	%	$V_n/V_s(100)$	101.3	15
q_s	cfm	Actual volumetric flow in the stack	52,881	16
Q_{sc}	cfh	Stack volumetric at STP - dry basis	2,019,576	17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3 0.0144 gr/ft³	2.06 X 10⁻⁶ #/ft³	18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$	4.16 #/hr	19
E_{apm}	#/hr	Allowable emission rate	~~[illegible]~~	20
Mn	mg	Total Particulate	36.9	21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

JOB NUMBER 76-0020
DRAWN BY JHS 6/4/76
APP Stuever 4/26/74

STUEVER and ASSOCIATES
CONSULTING ENGINEERS
OKLAHOMA CITY, OKLAHOMA USA

CLIENT MIDWEST CARBIDE CORP
PRYOR, OKLA.

DRAWING TITLE
Stack Test Data
and Calculations

SCALE None
SHEET 1 of 1 Form [illegible]

DATE: 4/17/78	RUN NO. 2	PORT IDENTIFICATION:	TEST METHOD: 5	NOZZLE DIAMETER: in.	STACK DIAMETER: in.	.7

LINE	ΔP	√ΔP	Meter Volume	ΔH	T_s	T_1	T_o	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O			"H_2O	°F	°F	°F	°F	°F	17:57:	0	
A1	[illegible]	[illegible]	[illegible]	[illegible]				10	[illegible]	[illegible]	1	
A2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	210	[illegible]	[illegible]	19 01	2	
A3	[illegible]		3707		[illegible]					[illegible]	3	
A4	0.27	[illegible]		[illegible]						[illegible]	4	
A5	[illegible]		[illegible]	[illegible]						[illegible]	5	
A6	[illegible]	[illegible]		[illegible]						[illegible]	6	[illegible]
B1	[illegible]										7	
B2	[illegible]				[illegible]					[illegible]	8	
B3	[illegible]				[illegible]						9	
B4	0.23				[illegible]						10	
B5	[illegible]		[illegible]		[illegible]						11	
B6	[illegible]				[illegible]						12	[illegible]
C1	[illegible]		[illegible]							[illegible]	13	
C2	[illegible]		[illegible]							[illegible]	14	
C3	0.20	[illegible]	[illegible]	[illegible]	[illegible]						15	
C4	0.29	[illegible]	[illegible]		[illegible]					[illegible]	16	
C5	0.25	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	17	
C6	0.25	[illegible]	[illegible]		[illegible]		250	300	40	[illegible]	18	[illegible]
D1	0.25	[illegible]	37304								19	
D2	0.20		[illegible]								20	
D3	0.20		[illegible]								21	
D4	0.25	[illegible]	[illegible]		[illegible]						22	
D5	0.25	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	23	
D6	0.13	[illegible]	[illegible]		760	[illegible]				[illegible]	24	
25											25	AVERAGE
26											26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)				
PRETEST WATER (ml)				
TOTAL WATER (ml)				
FILTER IDENTIFICATION		% CO_2 4.2	(44)·( )	1.8081
BAROMETRIC PRESSURE	Shelf 27.50	% O_2 15.7	(32)·( )	4.7181
AMBIENT DRY BULB		% CO	(28)·( )	.1666
AMBIENT WET BULB		% N_2 79	(28)·( )	[illegible]
		% H_2O (Line 9)	(18)·( )	[illegible]

STACK CROSS SECTION

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle	7.46673-4	0
A_s	ft^2	Cross-sectional area of the stack	30.0	1
P_s	"HgABS	Absolute pressure in the stack	27.84	2
P_m	"HgABS	Absolute pressure at the dry gas meter	27.94	3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions	66.8	4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$	530	5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)	62.40	6
V_{lc}	ml	Total volume of liquid collected in impinger train	29.0	7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$	1.3746	8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$	2.16%	9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$	63.77	10
V_{ds}	ft^3	Sample volume wet basis stack conditions	98.02	11
MW	#/#MOL	Molecular weight of wet stack gas	29.0637	12
V_s	ft/sec	Average stack velocity	29.53	13
V_n	ft/sec	Average gas velocity in probe nozzle	30.39	14
I	%	$V_n/V_s(100)$	102.9	15
q_s	cfm	Actual volumetric flow in the stack	53,157	16
Q_{sc}	cfh	Stack volumetric at STP - dry basis	2,030203	17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3	0.0057	18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$	1.657	19
E_{apm}	#/hr	Allowable emission rate		20
M_n	mg	Total Particulate	23.1	21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

COMMENTS: Test delayed due to violent thunderstorm for approx 1 hour.

JOB NUMBER 76-0020	STUEVER and ASSOCIATES CONSULTING ENGINEERS OKLAHOMA CITY, OKLAHOMA USA
DRAWN BY JHS 6/4/76	
Stickler 4/5/78	CLIENT MIDWEST CARBIDE CORP PRYOR OKLA
REVISION	Stack Test Data and Calculations
	SHEET 2

DATE 9/17/78	RUN NO. 2	PORT IDENTIFICATION:	TEST METHOD: 5	NOZZLE DIAMETER: .270 in.	STACK DIAMETER: 54x80 in.	Cp = .7697

LINE	ΔP	$\sqrt{\Delta P}$	Meter Volume	ΔH	T_m	T_{in}	T_p	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		3701.0	"H_2O	°R	°R	°F	°F	°F	20:14:	0	
E1 1	0.17	.4123	3749.4	.9275	760	530	70	210	50	[illegible]	1	[illegible]
E2 2	0.19	.4357	375	1.0440	760	530	240	2.70	60	[illegible]	2	
E3 3	0.20	.4472	3752.7	1.1072	760	[illegible]	[illegible]	[illegible]	60	[illegible]	3	100.36
E4 4	0.22	.4690	3754.6	1.2318	750	530	[illegible]	[illegible]	[illegible]	[illegible]	4	
E5 5	0.18	0.4243	3756.2	1.0 [illegible]	760	530	260	[illegible]	60	[illegible]	5	
E6 6	0.15	.3873	3757.7	0.7872	760	530	260	300	60	20:26	6	100.47 20:31 [illegible]
F1 7	0.11	.3316	3759.0	0.5747	760	530	210	300	60	20:33	7	133.30
F2 8	0.11	.3316	3760.2	[illegible]	760	530	250	300	60	[illegible]	8	
F3 9	0.19	0.4359	3761.7	1.0577	760	530	260	300	60	20:37	9	100.06
F4 10	0.20	0.4472	3763.5	1.1017	760	530	260	300	60	20:39	10	
F5 11	0.20	0.4472	3765.2	1.1097	750	530	260	300	60	20:41	11	100.15
F6 12	0.15	0.3873	3767.8	0.9084	750	530	260	300	60	20:43	12	1018 / 1 eCk
13											13	
14											14	
15											15	
16											16	
17											17	
18											18	
19											19	
20											20	
21											21	
22											22	
23											23	
24											24	
25		0.4744		1.3099	758	530					25	AVERAGE
26			66.8		°R	°R				72 min	26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)	160	158	-0-	694.5
PRETEST WATER (ml)	150	150	-0-	683.5
TOTAL WATER (ml)	10	8	-0-	11.0

29 ml

FILTER IDENTIFICATION	113 .7340	% CO_2	(44)·( )	.
BAROMETRIC PRESSURE	end of test 27.78	% O_2	(32)·( )	.
AMBIENT DRY BULB		% CO	(28)·( )	.
AMBIENT WET BULB		% N_2	(28)·( )	.
		% H_2O (Line 9)	(18)·( )	.
			Kd =	

STACK CROSS SECTION

COMMENTS:

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle	7.46673×10^{-4}	0
A_s	ft^2	Cross-sectional area of the stack	30	1
P_s	"HgABS	Absolute pressure in the stack		2
P_m	"HgABS	Absolute pressure at the dry gas meter		3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions		4
T_m	°R	Absolute temperature at meter $(Ti + To/2)$		5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)		6
V_{lc}	ml	Total volume of liquid collected in impinger train		7
V_{wc}	ft^3	Volume of water collected at STP $(Vwl = Vlc(0.0474))$		8
B_{wo}	%	$V_{wc}/V_{wc} + V_{mc}(100)$		9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$		10
V_{ds}	ft^3	Sample volume wet basis stack conditions		11
MW	#/MOL	Molecular weight of wet stack gas		12
V_s	ft/sec	Average stack velocity		13
V_n	ft/sec	Average gas velocity in probe nozzle		14
I	%	$V_n/V_s(100)$		15
q_s	cfm	Actual volumetric flow in the stack		16
Q_{sc}	cfh	Stack volumetric at STP - dry basis		17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3		18
P_{mrc}	#/hr	Pollutant emission rate: $Cs(Qsc)/7000$		19
E_{apa}	#/hr	Allowable emission rate		20
				21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

JOB NUMBER 76-0020
DRAWN BY JHS 6/4/76
Shives 9/20/78

STUEVER and ASSOCIATES
CONSULTING ENGINEERS
OKLAHOMA CITY, OKLAHOMA USA

CLIENT MIDWEST CARBIDE CORP
PRYOR, OKLA.

DRAWING TITLE Stack Test Data and Calculations

SCALE None
SHEET 2 of 2
Form 6-4-76 JHS

LINE	ΔP	√ΔP	Meter Volume	ΔH	T_s	T_{in}	T_o	T_{box}	T_{out}	Time hr:min:sec	LINE	Test	Remarks
0	"H_2O		3769.0	"H_2O	°F	°F	°F	°F	°F	21:51	0		
A1 1	0.30	0.5477	3770.1	1.7404	760	520	150	210	50	21:53	1		
A2 2	0.32	.5656	3772.3	1.8684	760	520	200	280	50	21:55	2	103.1832	
A3 3	0.36	.6000	3774.5	2.120	760	520	220	300	50	21:57	3		
A4 4	0.39	0.6244	3776.8	2.3221	760	520	260	300	50	21:59	4	100.62	
A5 5	0.35	0.5916	3779.3	2.0617	760	520	260	300	50	22:01:00	5		
A6 6	0.32	0.5656	3781.4	1.8684	760	520	260	300	50	22:03:00	6	102.48 20.09	.5925 1.0479
B1 7	0.22	0.469	378	1.2376	760	520	260	300	50	22:10	7		
B2 8	0.24	.4899	3784.0	1.3619	760	520	260	300	50	22:12	8	101.95	
B3 9	0.28	.5291	3786.7	1.6134	760	520	260	300	50	22:14	9		
B4 10	0.28	.5291	3788.5	1.6134	760	520	260	300	50	22:16	10		
B5 11	0.30	.5477	3790.6	1.7404	760	520	260	300	50	22:18	11	99.4	
B6 12	0.36	0.6000	3793.0	2.1265	760	520	260	300	50	22:20	12	100.29 1.227	
C1 13	0.17	.4123	3794.9	0.9324	760	520	260	300	50	22:24	13		
C2 14	0.17	.4123	3796.4	0.9324	760	520	260	300	50	22:31	14		
C3 15	0.23	.4795	3798.2	1.2997	760	520	260	300	50	22:33	15		
C4 16	0.30	.5477	3800.0	1.7404	760	520	260	300	50	22:35	16	100.43	
C5 17	0.24	.4899	3802.0	1.3619	760	520	260	300	50	22:37	17		
C6 18	0.27	.5196	3804.0	1.5502	760	520	260	300	50	22:39	18	100.95 22.2494	.5952 1.0272
D1 19	0.12	.3464	3805.7	.6353	770	520	260	300	50	50	19		
D2 20	0.20	.4472	3807.0	1.1129	760	520	260	300	50	52	20		
D3 21	0.22	.4690	3808.6	1.2369	760	520	260	300	50	54	21	100.50	
D4 22	~~0.27~~	~~.5196~~	~~3810.4~~	1.6303	760	520	260	300	50	56	22		
D5 23	0.23	0.4795	3812.6	1.3639	760	520	260	300	50	58	23		
D6 24	.15	.3872	3814.6	.8125	760	520	260	300	50	2300	24	102.24	
25											25	AVERAGE	
26											26	TOTAL	

DATE: 9/17/78 RUN NO. 3 PORT IDENTIFICATION: See Margin TEST METHOD: 5 NOZZLE DIAMETER: 0.370 in. STACK DIAMETER: 54 x 80 in.

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)				
PRETEST WATER (ml)				
TOTAL WATER (ml)				

FILTER IDENTIFICATION		% CO_2 4.5	(44)·( )	.
BAROMETRIC PRESSURE		% O_2 15.7	(32)·( )	.
AMBIENT DRY BULB		% CO	(28)·( )	.
AMBIENT WET BULB		% N_2 79.8	(28)·( )	.
		% H_2O (Line 9)	(18)·( )	.
			M_s =	

STACK CROSS SECTION

COMMENTS:

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle		0
A_s	ft^2	Cross-sectional area of the stack		1
P_s	"HgABS	Absolute pressure in the stack		2
P_m	"HgABS	Absolute pressure at the dry gas meter		3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions		4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$		5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)		6
V_{lc}	ml	Total volume of liquid collected in impinger train		7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$		8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$		9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$		10
V_{ds}	ft^3	Sample volume wet basis stack conditions		11
MW	#/#MOL	Molecular weight of wet stack gas		12
V_s	ft/sec	Average stack velocity		13
V_n	ft/sec	Average gas velocity in probe nozzle		14
I	%	$V_n/V_s(100)$		15
Q_s	cfm	Actual volumetric flow in the stack		16
Q_{sc}	cfh	Stack volumetric at STP - dry basis		17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3		18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$		19
E_{apm}	#/hr	Allowable emission rate		20
				21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

Job number 76-0020
Drawn by JHS 6/4/76
App. Stuever 4/6/76

STUEVER and ASSOCIATES
CONSULTING ENGINEERS
OKLAHOMA CITY, OKLAHOMA USA

Client: MIDWEST CARBIDE CORP
PRYOR, OKLA.

Drawing title: Stack Test Data and Calculations

Scale: None
Sheet 1 of 2
Form 6-4-76 JHS

DATE: 4/17/78	RUN NO. 7	PORT IDENTIFICATION:	TEST METHOD: 5	NOZZLE DIAMETER: .370 in.	STACK DIAMETER: 54X80 in.	Cp = .7647

LINE	ΔP	$\sqrt{\Delta P}$	Meter Volume	ΔH	T_s	T_i	T_o	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		3968.0	"H_2O	°R	°R	°F	°F	°F	23:06:	0	
F1 1	.12	.3464	3815.9	[illegible]	760	520	250	300	50	23,08	1	
F2 2	.18	.4242	3817.3	.9928	760	520	250	300	50	23:[illegible]	2	102.12
F3 3	.20	.4472	[illegible]19.2	1.[illegible]	[illegible]	520	250	300	50	23:12	3	
F4 4	.20	.4472	3920.8	1.1147	760	520	250	300	50	23:14	4	
F5 5	.19	.4358	3922.5	1.0550	770	520	250	300	50	23:16	5	
F6 6	.13	.36[illegible]	3823.7	.6[illegible]	770	520	250	300	50	23:18	6	101.60 2225
F1 7	.15	.387[illegible]	[illegible]25.[illegible]	.8[illegible]	770	520	250	300	50	23:27	7	
F2 8	.15	.3872	3826.5	.8[illegible]	770	520	250	200	50	23:29	8	
F3 9	.20	.4472	3828.0	[illegible]	770	520	250	300	50	23:31	9	
F4 10	.15	.3872	3829.3	.8105	770	520	250	300	50	23:33	10	
F5 11	.18	.4243	3830.0	.9985	770	520				23:35	11	100.0567
F6 12	.13	.3605	3831.[illegible]	.6911	770	520				23:37	12	Vm CK OK
13											13	
14											14	
15											15	
16											16	
17											17	
18											18	
19											19	
20											20	
21											21	
22											22	
23											23	
24											24	
25		.4779		1.3817	763	520					25	AVERAGE
26			63.7		°R	°R				72 min	26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)	160	153	-0-	704.0
PRETEST WATER (ml)	150	150	-0-	694.5
TOTAL WATER (ml)	10	3	-0-	9.5

22.5 ml

FILTER IDENTIFICATION	14 C.7423	% CO_2 4.5	(44)·( )	1.9459
BAROMETRIC PRESSURE	28.00	% O_2 15.7	(32)·( )	4.9376
AMBIENT DRY BULB		% CO	(28)·( )	0.000
AMBIENT WET BULB		% N_2 79.8	(28)·( )	21.9541
		% H_2O (Line 9)	(18)·( )	0.3096
			Mw =	29.15

STACK CROSS SECTION

COMMENTS:

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle	7.4673X10^{-4}	0
A_s	ft^2	Cross-sectional area of the stack	30.0	1
P_s	"HgABS	Absolute pressure in the stack	28.00	2
P_m	"HgABS	Absolute pressure at the dry gas meter	28.13	3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions	63.7	4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$	520	5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)	61.05	6
V_{lc}	ml	Total volume of liquid collected in impinger train	22.5	7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$	1.067	8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$	1.72	9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$	62.12	10
V_{ds}	ft^3	Sample volume wet basis stack conditions	95.55	11
MW	#/MOL	Molecular weight of wet stack gas	29.15	12
V_s	ft/sec	Average stack velocity	28.27	13
V_n	ft/sec	Average gas velocity in probe nozzle	29.62	14
I	%	$V_n/V_s(100)$	104.8	15
Q_s	cfm	Actual volumetric flow in the stack	50,882	16
Q_{sc}	cfh	Stack volumetric at STP - dry basis	1,950,404	17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3	0.00389	18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$	1.084	19
E_{apm}	#/hr	Allowable emission rate		20
Mn	mg	Total Particulate	15.4	21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

THE INFORMATION CONTAINED HEREON IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE REPRODUCED WITHOUT WRITTEN CONSENT © Joseph H. Stuever	
JOB NUMBER 76-0020	STUEVER and ASSOCIATES CONSULTING ENGINEERS OKLAHOMA CITY, OKLAHOMA USA
DRAWN BY JHS 6/4/76	
APP. Stuever 4/20/78	CLIENT MIDWEST CARBIDE CORP. PRYOR, OKLA
REVISION	DRAWING TITLE Stack Test Data and Calculations
SCALE None	Form 6-4-76 JHS
SHEET 2 of 2	

DATE: 4/18/78	RUN NO. 4	PORT IDENTIFICATION:	TEST METHOD: 5	NOZZLE DIAMETER: .370 in.	STACK DIAMETER: 54 X 80 in.

LINE	ΔP	$\sqrt{\Delta P}$	Meter Volume	ΔH	T_s	T_m	T_{in}	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		3833.8	"H_2O	°R	°R	°F	°F	°F	9:30	0	
A1 1	0.48	.6928	3835.2	2.9007	750	530	100	230	55		1	
A2 2	0.40	.6324	3838.3	2.4188	750	530	130	280	50		2	
A3 3	0.32	.5656	3842.1	1.8928	750	530	130	280	50		3	
A4 4	0.37	.6082	3844.6	2.2202	750	530	170	280	50		4	
A5 5	0.40	.6324	3846.4	2.4188	750	530	200	290	50		5	111
A6 6	0.33	.5744	3848.8	1.9579	750	530	210	290	50	9-43	6	110.6
B1 7	0.26	.5099	3850.9	1.5016	750	530	210	290	50	56	7	
B2 8	0.20	.4472	3852.4	1.1292	750	530	200	290	50	58	8	
B3 9	0.18	0.4242	3853.7	1.0058	750	530	200	290	50	10:00	9	
B4 10	0.18	0.4242	3854.9	1.0058	750	530	200	290	50	02	10	
B5 11	0.15	0.3872	3856.2	.8232	750	530	200	290	50	10.04	11	
B6 12	0.15	0.3872	3857.5	.8232	750	530	200	290	50	.06	12	101.38 10:11 .5298 1.6752
C1 13	0.15	0.3872	3858.8	.8232	750	520	150	300	60	13	13	
C2 14	.14	.3741	3860.3	.7631	750	530	250	300	60	15	14	
C3 15	.15	.3872	3861.7	.8232	750	530	250	300	60	17	15	100.36
C4 16	.14	.3741	3863.2	.7631	750	530	260	290	55	19	16	
C5 17	.11	.3316	3864.4	.5854	750	530	220	290	50	21	17	
C6 18	.13	.3605	3865.7	.7034	750	530	220	290	50	23	18	98.76 10:30 [illegible] 1.3256
D1 19	.13	.3605	3867.1	.7034	750	530	200	300	60	32	19	
D2 20	.15	.3872	3868.[illegible]	.8226	760	530	215	300	55	34	20	
D3 21	.13	.3605	3869.9	.7024	760	530	230	300	55	36	21	
D4 22	.10	.3162	3871.4	.5261	760	530	250	300	55	38	22	
D5 23	.13	.3605	3872.7	.7016	760	520	260	300	60	40	23	
D6 24	.09	.3001	3873.8	.4671	760	530	200	300	60	42	24	100.24
25		0.4411		1.1524	752	[illegible]					25	AVERAGE
26			40.8		°R	°F					26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)				
PRETEST WATER (ml)	[illegible]			
TOTAL WATER (ml)				

FILTER IDENTIFICATION	#115 .7370	% CO_2 3.7	(44)·( )	.
BAROMETRIC PRESSURE	29.96	% O_2 16.5	(32)·( )	.
AMBIENT DRY BULB		% CO	(28)·( )	.
AMBIENT WET BULB		% N_2 79.8	(28)·( )	.
		% H_2O (Line 9)	(18)·( )	
			M_s =	

STACK CROSS SECTION

COMMENTS:

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle		0
A_s	ft^2	Cross-sectional area of the stack		1
P_s	"HgABS	Absolute pressure in the stack		2
P_m	"HgABS	Absolute pressure at the dry gas meter		3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions		4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$		5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)		6
V_{lc}	ml	Total volume of liquid collected in impinger train		7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$		8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$		9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$		10
V_{ds}	ft^3	Sample volume wet basis stack conditions		11
M_W	#/MOL	Molecular weight of wet stack gas		12
V_s	ft/sec	Average stack velocity		13
V_n	ft/sec	Average gas velocity in probe nozzle		14
I	%	$V_n/V_s(100)$		15
q_s	cfm	Actual volumetric flow in the stack		16
Q_{sc}	cfh	Stack volumetric at STP, dry basis		17
C_s	gr/ft^3	Concentration of particulate matter per dry std. ft^3		18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$		19
E_{apm}	#/hr	Allowable emission rate		20
				21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

Job number 76-0020	STUEVER and ASSOCIATES CONSULTING ENGINEERS OKLAHOMA CITY, OKLAHOMA USA
Drawn by JHS 6/4/76	
Stuever 4/2/76	Client: MIDWEST CARBIDE CORP PRYOR, OKLA
Revision	Drawing title: Stack Test Data and Calculations
Scale None	Drawing number
Sheet 1 of 2	Form 6-4-76 JHS

DATE: 4/18/78	RUN NO. R# 4	PORT IDENTIFICATION:	TEST METHOD: 5	NOZZLE DIAMETER: 0.370 in.	STACK DIAMETER: 54x80 in.	0.7647

LINE	ΔP	$\sqrt{\Delta P}$	Meter Volume	ΔH	T_s	T_{m}	T_c'	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		3873.0	"H_2O	°R	°R	°F	°F	°F	10:48:	0	
E1 1	0.12	.3464	3874.8	[illegible]	760	530	250	300	60	10 50	1	
E2 2	0.14	.3741	3876.1	.7641	760	532	480	300	60	10 52	2	
E3 3	.13	.3605	3877.5	.7003	760	530	250	300	60	10 54	3	
E4 4	.13	.3605	3878.9	.7001	760	530	250	300	60	10 56	4	
E5 5	.12	.3464	3880.2	.6409	760	530	250	300	60	10:58	5	
E6 6	.09	.3000	3881.4	.4844	750	535	250	300	60	11:00	6	11:05 .4224 1.029
F1 7	0.14	.374	3883.0	.7495	750	535	180	300	60	07	7	5 60
F2 8	0.12	.3464	3884.0	.6412	750	535	230	300	60	09	8	
F3 9	0.12	.3464	3885.5	.6627	750	535	260	300	60	11	9	
F4 10	.13	.3605	3886.9	.7230	750	535	250	300	60	13	10	
F5 11	.13	.3605	3887.5	.7004	750	535	250	300	60	15	11	
F6 12	.11	.3316	3890.0	.5830	750	535	250	300	60	17	12	100.14
13											13	
14											14	
15											15	
16											16	
17											17	
18											18	
19											19	
20											20	
21											21	
22											22	
23											23	
24											24	
25		.4105		.9922	753	531					25	AVERAGE
26			57.0		°R	°R					26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)	154	154	-0-	712.5
PRETEST WATER (ml)	150	150	-0-	704.0
TOTAL WATER (ml)	4	4	-0-	8.5

16.5

FILTER IDENTIFICATION		% CO_2 0.042	(44)·(.9659)	1.9212
BAROMETRIC PRESSURE		% O_2 2.16	(32)·(.9659)	5. 0458
AMBIENT DRY BULB		% CO	(28)·( )	0.0000
AMBIENT WET BULB		% N_2 79.8	(28)·( )	22.0210
		% H_2O (Line 9)	(18)·( )	0.261
			M_s =	29.15

STACK CROSS SECTION

COMMENTS:

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle	7.4667×10^{-4}	0
A_s	ft^2	Cross-sectional area of the stack	30.0	1
P_s	"HgABS	Absolute pressure in the stack	27.96	2
P_m	"HgABS	Absolute pressure at the dry gas meter	28.03	3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions	57.0	4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$	531	5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)	53.3	6
V_{lc}	ml	Total volume of liquid collected in impinger train	16.5	7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$	0.7821	8
B_{wo}	%	$V_{wc}/V_{wc} + V_{mc}(100)$	1.45 %	9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$	54.09	10
V_{ds}	ft^3	Sample volume wet basis stack conditions	82.23	11
M_W	#/MOL	Molecular weight of wet stack gas	29.15	12
V_s	ft/sec	Average stack velocity	25.79	13
V_n	ft/sec	Average gas velocity in probe nozzle	25.49	14
I	%	$V_n/V_s(100)$	98.84	15
q_s	cfm	Actual volumetric flow in the stack	46,425	16
Q_{sc}	cfh	Stack volumetric at STP - dry basis	1805,574	17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3	6.69×10^{-3}	18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$	1.725	19
E_{spm}	#/hr	Allowable emission rate		20
M_n	mg	Total Particulate	23.1	21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

JOB NUMBER 76-0020
DRAWN BY JHS 6/4/76
Stuever 4/21/78

STUEVER and ASSOCIATES
CONSULTING ENGINEERS
OKLAHOMA CITY, OKLAHOMA USA

CLIENT MIDWEST CARBIDE CORP
PRYOR, OKLA.

Stack Test Data and Calculations

SCALE None
SHEET 2 of 2
Form 6-4-76 JHS

LINE	ΔP	$\sqrt{\Delta P}$	Meter Volume	ΔH	T_s	T_t	T_d	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
	DATE: 4/18/78	RUN NO. 5	PORT IDENTIFICATION:	TEST METHOD: 5	NOZZLE DIAMETER: .370 in.	STACK DIAMETER: 64X80 in.						[illegible] OK
			3892.0							12:47:	0	
0	"H_2O			"H_2O	°R	°R	°F	°F	°F			
A E1 1	.34	.5831	3894.3	2.0516	740	535	120	240	60	12:49	1	
A E2 2	.35	.5916	3898.5	2.1180	740	535	160	240	50	51	2	
A E3 3	.32	.5656	3899.9	1.9364	740	535	180	250	50	53	3	
A E4 4	.32	.5656	3901.3	1.9364	740	535	220	250	50	55	4	53.28
A E5 5	.30	.5477	3903.3	1.7910	740	535	220	260	50	57	5	101.3167
A E6 6	.18	.4242	3904.9	1.0195	740	535	240	290	55	12:59	6	13.3 .5463 1.8027
B1 7	0.23	.4795	3906.4	1.3302	740	535	240	290	55	05	7	
B2 8	.22	.4690	3908.3	1.3318	740	535	200	270	60	13:07	8	
B3 9	.18	.4242	3910.0	1.0554	740	535	240	300	60	13:09	9	
B4 10	.18	.4242	3912.1	1.0195	740	535	240	300	60	13:11	10	
B5 11	.20	.4472	3913.5	1.1957	740	535	240	300	60	13:13	11	10.42
B6 12	.19	.4358	3915.4	1.0824	740	535	240	300	60	13:15	12	15.2 .4956 1.3364
C1 13	.15	.3872	3917.0	.9322	740	535	240	300	60	13:24	13	
C2 14	.17	.4123	3918.6	.9578	740	535	240	300	50	13:26	14	
C3 15	.15	.3872	3920.2	.8347	740	535	240	300	50	3:28	15	
C4 16	.15	.3872	3921.9	.8347	740	535	240	300	50	13:30	16	
C5 17	.16	.400	3923.3	.8961	740	535	240	[illegible]	50	13:32	17	
C6 18	.09	.3000	3924.6	.4761	740	535	240	300	50	13:34	18	101.2 1.943 .4573 1.1995
D1 19	.14	.3741	3925.8	.7738	740	535	140	300	60	13 45	19	
D2 20	.15	.3872	3927.1	.8347	740	535	210	300	60	13:47	20	
D3 21	.16	.4000	3928.4	.8955	750	535	220	300	55	13:49	21	99
D4 22	.13	.3605	3929.6	.7123	750	535	220	300	55	13:51	22	
D5 23	.13	.3605	3931.0	.7119	750	535	220	300	55	13:53	23	
D6 24	0.09	.3000	3932.4	.4950	750	535	220	300	55	13:55	24	9.21 .4339 1.0831
25		.4333		1.0831	741.6	535					25	AVERAGE
26			40.4		°R	°R	-			48min	26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)	152	154	-0-	703.5
PRETEST WATER (ml)	152	150	-0-	694.0
TOTAL WATER (ml)	-0-	4	-0-	9.5
FILTER IDENTIFICATION	#116 .2479	% CO_2 4.3	(44)·(.0[illegible])	1.5264
BAROMETRIC PRESSURE	27.94	% O_2	(32)·(.[illegible])	5.1601
AMBIENT DRY BULB		% CO	(28)·( )	
AMBIENT WET BULB		% N_2	(28)·(.[illegible])	22.0548
		% H_2O (Line 9)	(18)·(.[illegible])	[illegible]
			M_s =	29.18

13.5

STACK CROSS SECTION

COMMENTS:

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle		0
A_s	ft^2	Cross-sectional area of the stack		1
P_s	"HgABS	Absolute pressure in the stack		2
P_m	"HgABS	Absolute pressure at the dry gas meter		3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions		4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$		5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)		6
V_{lc}	ml	Total volume of liquid collected in impinger train		7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$		8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$		9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$		10
V_{ds}	ft^3	Sample volume wet basis stack conditions		11
MW	#/MOL	Molecular weight of wet stack gas		12
V_s	ft/sec	Average stack velocity		13
V_n	ft/sec	Average gas velocity in probe nozzle		14
I	%	$V_n/V_s(100)$		15
q_s	cfm	Actual volumetric flow in the stack		16
Q_{sc}	cfh	Stack volumetric at STP - dry basis		17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3		18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$		19
E_{apm}	#/hr	Allowable emission rate		20
				21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

JOB NUMBER 76-0020	STUEVER and ASSOCIATES CONSULTING ENGINEERS OKLAHOMA CITY, OKLAHOMA USA
DRAWN BY JHS 6/4/76	
Stuever 4/4/78	CLIENT MIDWEST CARBIDE CORP PRYOR, OKLA
REVISION	DRAWING TITLE Stack Test Data and Calculations
SCALE None	DRAWING NUMBER Form 6-4-76 JHS
SHEET 1 of 2	

DATE: 4/18/78	RUN NO. 5	PORT IDENTIFICATION:	TEST METHOD: 5	NOZZLE DIAMETER: .370 in.	STACK DIAMETER: 54x50 in.	.7647

LINE	ΔP	$\sqrt{\Delta P}$	Meter Volume	ΔH	T_s	T_m	T_o	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		3892.0	"H_2O	°R	°R	°F	°F	°F	14:13:	0	
E-1 1	.15	.3873	[illegible]	[illegible]	750	535	70	[illegible]	[illegible]	14:05	1	[illegible]
E-2 2	.15	.3872	3935.4	[illegible]	750	535	210	300	60	14:07	2	
E-3 3	.15	.3872	3936.7	.8315	750	535	230	290	50	14:09	3	
E-4 4	.14	.3741	3939.3	.7705	750	535	230	300	50	14:11	4	
E-5 5	.13	.3605	3939.1	.7100	750	535	230	300	50	14:13	5	
E-6 6	.10	.3162	3941.8	.5130	750	535	230	300	50	14:15	6	[illegible] .9205 [illegible]
F-1 7	.11	.3316	3943.3	.5906	750	535	230	305	50	14:23	7	
F-2 8	.12	.3464	3944.9	.6496	750	535	230	300	50	14:25	8	
F-3 9	.12	.3464	3946.3	.6494	750	535	240	300	55	14:27	9	
F-4 10	.14	.3741	3947.7	.7691	750	535	240	300	55	14:29	10	101.70
F-5 11	.13	.3605	3949.2	.7099	750	535	240	300	55	14:31	11	101.83
F-6 12	.11	.3316	3950.5	.5898	750	535	240	300	55	14:33	12	[illegible] Vac ck-ok
13											13	
14											14	
15											15	
16											16	
17											17	
18											18	
19											19	
20											20	
21											21	
22											22	
23											23	
24											24	
25		0.4088		0.9567	744.4	535					25	AVERAGE
26			58.5		°R	°R					26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)				
PRETEST WATER (ml)				
TOTAL WATER (ml)				

FILTER IDENTIFICATION		% CO_2	(44)·( )	.
BAROMETRIC PRESSURE		% O_2	(32)·( )	.
AMBIENT DRY BULB		% CO	(28)·( )	.
AMBIENT WET BULB		% N_2	(28)·( )	.
		% H_2O (Line 9)	(18)·( )	.
			Mw =	

COMMENTS:

STACK CROSS SECTION

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle	7.46673×10^{-4}	0
A_s	ft^2	Cross-sectional area of the stack	30.0	1
P_s	"HgABS	Absolute pressure in the stack	27.94	2
P_m	"HgABS	Absolute pressure at the dry gas meter	28.01	3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions	58.5	4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$	535	5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)	54.25	6
V_{lc}	ml	Total volume of liquid collected in impinger train	13.5	7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$	0.640	8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$	1.17%	9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$	54.894	10
V_{ds}	ft^3	Sample volume wet basis stack conditions	82.56	11
MW	#/#MOL	Molecular weight of wet stack gas	29.18	12
V_s	ft/sec	Average stack velocity	25.53	13
V_n	ft/sec	Average gas velocity in probe nozzle	25.59	14
I	%	$V_n/V_s(100)$	100.24	15
q_s	cfm	Actual volumetric flow in the stack	45959	16
Q_{sc}	cfh	Stack volumetric at STP - dry basis	1,811,951	17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft³	0.00603	18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$	1.561	19
E_{apm}	#/hr	Allowable emission rate		20
Mn	Mg	Total Particulate	21.2	21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

Job number 76-0020	STUEVER and ASSOCIATES CONSULTING ENGINEERS OKLAHOMA CITY, OKLAHOMA USA
Drawn by JHS 6/4/76	
Stuever 4/21/78	Client MIDWEST CARBIDE CORP PRYOR, OKLA
Revision	Drawing title Stack Test Data and Calculations
Scale None	
Sheet 2 of 2	Form 6-4-76 JHS

DATE: 4/18/78	RUN NO. 6	PORT IDENTIFICATION:	TEST METHOD: 5	NOZZLE DIAMETER: .370 in.	STACK DIAMETER: 54X80 in.							
LINE	ΔP	√ΔP	Meter Volume	ΔH	T_s	T_m	T_c	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		3951.0	"H_2O	°F	°F	°F	°F	°F	15:59	0	Vac Ck OK
A1 1	.30	.5477	3953.2	1.390	750	530	90	240	60	16:00	1	104.35
A2 2	.21	.4582	3955.0	1.180	760	530	150	250	50	16:02	2	
A3 3	.32	.5656	3956.9	1.870	760	530	170	260	50	16:04	3	
A4 4	.27	.5196	3958.9	1.549	760	530	180	260	50	16:06	4	97.62
A5 5	.23	.4795	3961.0	1.3021	750	530	190	270	50	16:08	5	
A6 6	.21	.4582	3962.8	1.1771	760	530	200	280	50	16:10	6	101.62 16.15 .5048 1.4730
B1 7	.18	.4242	3964.2	0.9951	750	530	180	300	55	16:17	7	
B2 8	.20	.4472	3965.8	1.1184	750	530	210	300	55	16:19	8	
B3 9	.18	.4242	3967.7	.9968	750	530	220	300	55	16:21	9	
B4 10	.13	.3605	3969.4	.6976	750	530	220	300	55	16:23	10	
B5 11	.13	.3605	3970.8	.6980	750	530	230	300	50	16:25	11	102.8
B6 12	.22	.4690	3972.2	1.2449	750	530	230	300	50	16:27	12	99.99 16.31 .4575 1.2157
C1 13	.13	.3605	3973.6	.6986	750	530	230	300	50	16:33	13	
C2 14	.17	.4123	3975.0	.9384	750	530	230	300	55	16:35	14	99.55
C3 15	.12	.3464	3976.5	.6403	750	530	240	300	55	16:37	15	
C4 16	.14	.3741	3978.0	.7585	750	530	240	300	55	16:39	16	
C5 17	.14	.3741	3979.6	.7586	750	530	240	300	55	16:41	17	
C6 18	.15	.3872	3981.2	.8185	750	530	240	300	55	16:43	18	101. 16.51 .4316 1.1189
D1 19	.13	.3605	3983.7	.6996	750	530	170	300	60	16:53	19	
D2 20	.13	.3605	3984.1	.6997	750	530	240	300	50	16:55	20	
D3 21	.14	.3741	3985.5	.7591	750	530	240	300	55	16:57	21	101
D4 22	.13	.3605	3987.0	.6998	750	530	240	300	55	16:59	22	
D5 23	.15	.3872	3988.5	.8191	750	530	240	300	55	17:01	23	
D6 24	.11	.3316	3989.7	.5726	750	530	240	300	55	17:03	24	101. .4143 1.0167
25		.4143		1.6167	751	530					25	AVERAGE
26			38.7		°R	°R					26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)	150	154	-0-	711.5
PRETEST WATER (ml)	150	148	-0-	703.5
TOTAL WATER (ml)	-0-	6	-0-	8.0
FILTER IDENTIFICATION	#117 .7458	% CO_2 4.0	(44)·( )	.
BAROMETRIC PRESSURE	27.90	% O_2 16.1	(32)·( )	.
AMBIENT DRY BULB		% CO	(28)·( )	.
AMBIENT WET BULB		% N_2 79.9	(28)·( )	.
		% H_2O (Line 9)	(18)·( )	.
			Mw =	

14.0

COMMENTS:

STACK CROSS SECTION

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle		0
A_s	ft^2	Cross-sectional area of the stack		1
P_s	"HgABS	Absolute pressure in the stack		2
P_m	"HgABS	Absolute pressure at the dry gas meter		3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions		4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$		5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)		6
V_{lc}	ml	Total volume of liquid collected in impinger train		7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$		8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$		9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$		10
V_{ds}	ft^3	Sample volume wet basis stack conditions		11
MW	#/MOL	Molecular weight of wet stack gas		12
V_s	ft/sec	Average stack velocity		13
V_n	ft/sec	Average gas velocity in probe nozzle		14
I	%	$V_n/V_s(100)$		15
q_s	cfm	Actual volumetric flow in the stack		16
Q_{sc}	cfh	Stack volumetric at STP - dry basis		17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3		18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$		19
E_{apa}	#/hr	Allowable emission rate		20
				21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

Job number 76-0020
Drawn by JHS 6/4/76
App. Stuever 4/21/78

STUEVER and ASSOCIATES
CONSULTING ENGINEERS
OKLAHOMA CITY, OKLAHOMA USA

Client: MIDWEST CARBIDE CORP PRYOR, OKLA.

Stack Test Data and Calculations

Scale None
Sheet 1 of 2
Form 6-4-76 JHS

DATE: 4/18/78 | RUN NO. 6 | PORT IDENTIFICATION: | TEST METHOD: 5 | NOZZLE DIAMETER: .370 in. | STACK DIAMETER: 54 X 80 in. | 0.7647

LINE	ΔP	√ΔP	Meter Volume	ΔH	T_s	T_{gm}	T_d	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		3951.0	"H_2O	°R	°R	°F	°F	°F	17:08:	0	
E-1 1	.13	.3605	3990.9	.7001	750	530	190	300	60	17:10	1	100.5V
E-2 2	.13	.3605	3992.2	.7001	750	530	190	300	60	17:12	2	100.25
E-3 3	.15	.3872	3993.6	.8194	750	530	260	300	55	17:14	3	
E-4 4	.13	.3605	3995.0	.7002	750	530	260	300	55	17:16	4	
E-5 5	.11	.3316	3996.5	.5929	750	530	260	300	55	17:18	5	
E-6 6	.12	.3464	3997.9	.6414	750	530	260	300	55	17:20	6	100.68 .4030 17:26 .9515
F-1 7	.11	.3316	3999.4	.5929	750	530	260	300	55	17:28	7	
F-2 8	.15	.3872	4000.8	.8197	750	530	260	300	55	17:30	8	
F-3 9	.10	.3162	4002.2	.5250	750	530	260	300	55	17:32	9	
F-4 10	.13	.3605	4003.5	.7005	750	530	260	300	55	17:34	10	
F-5 11	.15	.3872	4004.8	.8198	750	530	260	300	55	17:36	11	
F-6 12	.12	.3464	4006.4	.6416	750	530	260	300	55	17:38	12	Vac ck OK 10.09
13											13	
14											14	
15											15	
16											16	
17											17	
18											18	
19											19	
20											20	
21											21	
22											22	
23											23	
24											24	
25		0.3950		0.9065	751	530					25	AVERAGE
26			55.4		°R	°R				72 min	26	TOTAL

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle	7.46673 x 10⁻⁴	0
A_s	ft^2	Cross-sectional area of the stack	30.0	1
P_s	"HgABS	Absolute pressure in the stack	27.90	2
P_m	"HgABS	Absolute pressure at the dry gas meter	27.97	3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions	55.4	4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$	530	5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)	51.78	6
V_{lc}	ml	Total volume of liquid collected in impinger train	14.0	7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$	0.6636	8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$	1.27 %	9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$	52.45	10
V_{ds}	ft^3	Sample volume wet basis stack conditions	79.70	11
MW	#/MOL	Molecular weight of wet stack gas	29.14	12
V_s	ft/sec	Average stack velocity	24.81	13
V_n	ft/sec	Average gas velocity in probe nozzle	24.71	14
I	%	$V_n/V_s(100)$	99.6%	15
Q_s	cfm	Actual volumetric flow in the stack	44,668	16
Q_{sc}	cfh	Stack volumetric at STP - dry basis	1,741,294	17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3	0.00724	18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$	1.801	19
E_{apm}	#/hr	Allowable emission rate		20
Mn	mg	Total Particulate	24.3	21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)				
PRETEST WATER (ml)				
TOTAL WATER (ml)				
FILTER IDENTIFICATION		% CO_2 0.040	(44)·(.9873)	1.7376
BAROMETRIC PRESSURE		% O_2 0.161	(32)·(.9873)	5.0866
AMBIENT DRY BULB		% CO 0.0	(28)·(.9873)	0.0
AMBIENT WET BULB		% N_2 0.799	(28)·(.9873)	22.0879
		% H_2O (Line 9)	(18)·(.0127)	.2286
			Ms =	29.1407

STACK CROSS SECTION

COMMENTS:

JOB NUMBER 76-0020 | DRAWN BY JHS 6/4/76 | APP. Stuever 4/4/78

STUEVER and ASSOCIATES
CONSULTING ENGINEERS
OKLAHOMA CITY, OKLAHOMA USA

CLIENT MIDWEST CARBIDE CO.
PRYOR, OKLA

DRAWING TITLE Stack Test Data and Calculations

SCALE None | SHEET 2 of 2 | Form 6-4-76

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle		0
A_s	ft^2	Cross-sectional area of the stack		1
P_s	"HgABS	Absolute pressure in the stack		2
P_m	"HgABS	Absolute pressure at the dry gas meter		3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions		4
T_m	^oR	Absolute temperature at meter $(Ti + To/2)$		5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)		6
V_{lc}	ml	Total volume of liquid collected in impinger train		7
V_{wc}	ft^3	Volume of water collected at STP $(Vwl = Vlc(0.0474))$		8
B_{wo}	%	$V_{wc}/V_{wc} + V_{mc}(100)$		9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$		10
V_{ds}	ft^3	Sample volume wet basis stack conditions		11
MW	#/MOL	Molecular weight of wet stack gas		12
V_s	ft/sec	Average stack velocity		13
V_n	ft/sec	Average gas velocity in probe nozzle		14
I	%	$V_n/V_s(100)$		15
q_s	cfm	Actual volumetric flow in the stack		16
Q_{sc}	cfh	Stack volumetric at STP - dry basis		17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3		18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$		19
E_{spm}	#/hr	Allowable emission rate		20
				21
				22
				23

Std. temp. 530^oR
Std. press. 29.92"HgABS

JOB NUMBER 76-0020	STUEVER and ASSOCIATES CONSULTING ENGINEERS OKLAHOMA CITY, OKLAHOMA USA
DRAWN BY JHS 6/4/76	CLIENT MIDWEST CARBIDE CORP PRYOR, OKLA
APP Stuever 4/21/78	DRAWING TITLE Stack Test Data and Calculations
REVISION	SCALE None
	SHEET 1 OF 2 — DRAWING NUMBER Form 6-4-76 JHS

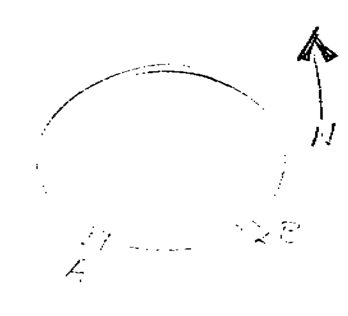
DATE: 4/19/78 | RUN NO. 7 | PORT IDENTIFICATION: B | TEST METHOD: 5 | NOZZLE DIAMETER: .242 in. | STACK DIAMETER: 65 in. ∅ | 0?647

LINE	ΔP	$\sqrt{\Delta P}$	Meter Volume	ΔH	T_s	T_m	T_d'	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		4007.0	"H_2O	°R	°R	°F	°F	°F	11 A?:	0	
1	.70	.8[illegible]	40[illegible].6	.7[illegible]	740	525	250	300	70	50	1	
2	.68	.8246	4039.9	[illegible]	740	525	250	300	70	52	2	
3	0.65	.90[illegible]	4041.0	[illegible]	740	525	250	300	70	54	3	
4	.77	.8794	4042.5	.7850	740	525	250	300	70	56	4	
5	.67	.8185	4043.8	.6[illegible]	740	525	250	300	70	58	5	
6	.79	.8888	4045.3	.8076	740	525	250	300	70	12:00	6	
7	.64	.8000	4046.8	[illegible]	740	525	250	300	70	02	7	
8	.73	.8544	4048.3	.7460	740	525	250	300	70	04	8	
9	.60	.7745	4049.7	.6[illegible]	740	525	250	300	70	06	9	
10	.62	.7874	4051.1	.6189	740	525	250	300	70	08	10	
11	.59	.7681	4052.5	.5961	740	525	250	300	70	10	11	
12	.62	.7874	4055.9	.6190	740	530	250	300	70	12	12	[illegible]
13	.45	.6707	4056.0	.4[illegible]	740	530	250	300	70	14	13	
14	.50	.7071	4056.1	.4877	740	530	250	300	70	16	14	[illegible]
15	.45	.6708	4057.2	.4353	740	530	250	300	70	18	15	
16	.37	.6082	4058.4	.3509	750	530	250	300	70	20	16	
17	.62	.7874	4059.7	.6186	750	530	250	300	70	22	17	
18	.64	.8000	4060.9	.6406	740	530	250	300	70	24	18	
19	.62	.7874	406?.5	.6187	740	530	250	300	70	26	19	
20	.61	.7810	4064.0	.6011	740	530	250	300	70	28	20	
21	.50	.7071	4065.4	.4885	740	530	250	300	70	30	21	103.7??
22	.54	.7348	4066.6	.5316	740	530	250	300	70	32	22	
23	.60	0.7746	4067.9	.5959	740	530	250	300	70	34	23	
24	.65	.8062	406?.?	.6519	740	530	250	300	70	36	24	[illegible]
25		0.7786		.6138	741	523					25	AVERAGE
26		$\sqrt{"H_2O}$	61.5	"H_2O	°R	°R				96 MIN	26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)				
PRETEST WATER (ml)				
TOTAL WATER (ml)				

FILTER IDENTIFICATION		% CO_2 0.042	(44)·(.????)	1.9208
BAROMETRIC PRESSURE		% O_2 6.159	(32)·(.????)	5.0132
AMBIENT DRY BULB		% CO	(28)·(.????)	0.0
AMBIENT WET BULB		% N_2 ?.7??	(28)·(.????)	2?.6???
		% H_2O (Line 9)	(18)·(.????)	.2?4?
			M_s =	2?.14

COMMENTS:



STACK CROSS SECTION

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle	3.19417×10^{-4}	0
A_s	ft^2	Cross-sectional area of the stack	23.043	1
P_s	"HgABS	Absolute pressure in the stack	29.23	2
P_m	"HgABS	Absolute pressure at the dry gas meter	28.30	3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions	61.5	4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$	523	5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)	58.96	6
V_{lc}	ml	Total volume of liquid collected in impinger train	18.6	7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$	0.882	8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$	1.473%	9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$	59.84	10
V_{ds}	ft^3	Sample volume wet basis stack conditions	9?.92	11
MW	#/MOL	Molecular weight of wet stack gas	29.14	12
V_s	ft/sec	Average stack velocity	49.19	13
V_n	ft/sec	Average gas velocity in probe nozzle	49.96	14
I	%	$V_n/V_s(100)$	101.6%	15
q_s	cfm	Actual volumetric flow in the stack	68,012	16
Q_{sc}	cfh	Stack volumetric at STP - dry basis	3617,273	17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3	0.00283	18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$	1.058	19
E_{apm}	#/hr	Allowable emission rate		20
M_n	mg	Total Particulate	10.8	21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

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STUEVER and ASSOCIATES
CONSULTING ENGINEERS
OKLAHOMA CITY, OKLAHOMA USA

JOB NUMBER 76-0020
DRAWN BY JHS 6/4/76
Stueber 4/21/78
CLIENT MIDWEST CARBIDE CORP PRYOR, OKLA
DRAWING TITLE Stack Test Data and Calculations
SCALE None
SHEET 2 of 2
Form 6-4-76 JHS

DATE: 4/19/78 | RUN NO. 8 | PORT IDENTIFICATION: BA | TEST METHOD: 5 | NOZZLE DIAMETER: 0.242 in. | STACK DIAMETER: 65 in.

LINE	ΔP	$\sqrt{\Delta P}$	Meter Volume	ΔH	T_s	T_m	T_6	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		4070.0	"H_2O	°R	°R	°F	°F	°F	13:40:	0	Vm Ck
1	.58	.7615		.5780	740	530	180	200	55	42	1	
2	.60	.7745		.5911	760	[illegible]	150	200	55	44	2	
3	.50	.7071	4074.0	.4926	750	[illegible]	150	200	55	46	3	
4	.65	.8062	4075.3	.6155	750	[illegible]	150	200	55	48	4	
5	.60	.7745	4076.6	.5911	750	[illegible]	[illegible]	[illegible]	[illegible]	50	5	15.2
6	.60	.7745	4078.0	.5911	750	530	160	210	55	52	6	
7	.58	.7615	4079.1	.5695	750	[illegible]	180	240	55	54	7	
8	.60	.7745	4080.3	.5911	750	[illegible]	[illegible]	[illegible]	[illegible]	56	8	
9	.62	.7874	4081.6	.6138	790	540	190	250	60	58	9	
10	.63	.7937	4082.9	.6255	740	[illegible]	[illegible]	250	60	14 00	10	
11	.59	.7681	4084.2	.5826	740	[illegible]	210	290	60	14 02	11	
12	.66	.8124	4085.4	.6596	740	540	210	290	60	04	12	
13	.58	.7615	4086.9	.5727	740	540	210	280	60	06	13	
14	.46	.6782	4088.0	.4442	740	540	210	280	60	08	14	
15	.43	.6557	4089.2	.4123	750	540	240	290	60	10	15	
16	.47	.6855	4090.4	.4541	760	540	240	290	60	12	16	101
17	.46	.6782	4091.6	.4433	750	540	250	300	60	14	17	101.95
18	.80	.8944	4093.1	.8136	760	540	250	200	60	16	18	
19	.71	.8426	4094.5	.7135	750	540	250	300	60	18	19	
20	.82	.9055	4096.0	.8363	740	540	250	300	60	20	20	
21	.72	.8485	4097.5	.7253	740	540	250	300	60	22	21	
22	.68	.8246	4098.9	.6810	750	540	250	300	60	24	22	101.79
23	.70	.8366	4100.4	.7029	750	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	23	
24	.68	.8246	4101.6	.6809	750	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	24	[illegible].38
25		.7805		.6085	749.5	[illegible]					25	AVERAGE
26			31.6		°R	°R					26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)	150	156	-0-	651.5
PRETEST WATER (ml)	150	150	-0-	638.9
TOTAL WATER (ml)	-0-	6	-0-	12.6
FILTER IDENTIFICATION	4/19 17483	% CO_2 4.2	(44)·(.042)	1.8216
BAROMETRIC PRESSURE	28.26	% O_2 15.9	(32)·(.159)	5.0152
AMBIENT DRY BULB		% CO	(28)·( )	
AMBIENT WET BULB		% N_2 79.9	(28)·(.799)	22.4521
Stack Press	-14"H_2O	% H_2O (Line 9)	(18)·([illegible])	[illegible]
			M_s =	29.[illegible]3

18.6

COMMENTS:

STACK CROSS SECTION

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle		0
A_s	ft^2	Cross-sectional area of the stack		1
P_s	"HgABS	Absolute pressure in the stack		2
P_m	"HgABS	Absolute pressure at the dry gas meter		3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions		4
T_m	°R	Absolute temperature at meter $(T_i + T_o/2)$		5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)		6
V_{lc}	ml	Total volume of liquid collected in impinger train		7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$		8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$		9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$		10
V_{ds}	ft^3	Sample volume wet basis stack conditions		11
MW	#/MOL	Molecular weight of wet stack gas		12
V_s	ft/sec	Average stack velocity		13
V_n	ft/sec	Average gas velocity in probe nozzle		14
I	%	$V_n/V_s(100)$		15
q_s	cfm	Actual volumetric flow in the stack		16
Q_{sc}	cfh	Stack volumetric at STP - dry basis		17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3		18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$		19
E_{apa}	#/hr	Allowable emission rate		20
				21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

Job number 76-0020
Drawn by: JHS 6/4/76
Stuever 4/22/78

STUEVER and ASSOCIATES
CONSULTING ENGINEERS
OKLAHOMA CITY, OKLAHOMA USA

Client: MIDWEST CARBIDE CORP.
PRYOR, OKLA

Drawing title: Stack Test Data and Calculations

Scale: None | Sheet 1 of 2 | Form 6-4-76 JHS

DATE: 4/19/78	RUN NO.: B	PORT IDENTIFICATION: B	TEST METHOD: 5	NOZZLE DIAMETER: 0.242 in.	STACK DIAMETER: 65 in.

LINE	ΔP	$\sqrt{\Delta P}$	Meter Volume	ΔH	T_s	T_{th}	T_o	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		4070.0	"H_2O	°R	°R	°F	°F	°F	14:40:	0	
1	.76	.9717	4103.0	.7402	750	540	260	300	70	42	1	101.15
2	.86	.9273	4104.7	.8910	750	540	260	300	70	44	2	
3	.76	.8717	4106.	.7694	740	540	260	[illegible]	70	46	3	
4	.82	.9055		.8367	740	540	260	[illegible]	70	50	4	
5	.82	.9055	4109.4	.8366	740	540	260	[illegible]	70	52	5	
6	.78	.8831	4111.9	.7922	740	540	260	[illegible]	[illegible]	56	6	
7	.72	.8495	4112.3	.7284	750	540	[illegible]	[illegible]	[illegible]	58	7	
8	.92	.9591	4113.8	.9425	750	540	[illegible]	[illegible]	[illegible]	15 00	8	
9	.90	.9486	4115.5	.9267	750	540	260	300	[illegible]	02	9	
10	.79	.9997	4118.0	.8029	750	540	[illegible]	300	[illegible]	04	10	
11	.75	.8660	4118.6	.7575	750	540	260	300	70	06	11	
12	.82	.9055	4120.0	.8365	750	540	260	300	70	08	12	
13	.56	.7483	4121.5	.5409	750	540	260	300	70	10	13	101.17
14	.56	.7483	4122.7	.5409	750	540	260	300	70	12	14	
15	.41	.6403	4123.7	.3903	750	540	260	300	70	14	15	
16	.50	.7071	4124.9	.4954	750	540	260	300	70	16	16	
17	.40	.6334	4126.0	.3791	750	540	260	300	70	18	17	
18	.64	.8000	4127.2	.6216	750	540	260	300	70	20	18	
19	.62	.7874	4129.7	.6147	750	540	260	300	70	22	19	
20	.74	.8602	4130.0	.7466	750	540	260	300	[illegible]	24	20	
21	.63	.7937	4131.3	.6255	750	540	260	300	70	26	21	
22	.58	.7615	4132.4	.5711	750	540	260	300	70	28	22	
23	.72	.9455	4133.7	.7203	750	540	260	300	70	30	23	
24	.69	.8246	4135.0	.6962	750	540	260	300	70	15:32	24	100.77
25		.8055		.6469	748	538.3					25	AVERAGE
26			65.0		°R	°R				96 min	26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)				
PRETEST WATER (ml)				
TOTAL WATER (ml)				

FILTER IDENTIFICATION		% CO_2	(44)·( )	.
BAROMETRIC PRESSURE		% O_2	(32)·( )	.
AMBIENT DRY BULB		% CO	(28)·( )	.
AMBIENT WET BULB		% N_2	(28)·( )	.
		% H_2O (Line 9)	(18)·( )	.
			M_s =	

STACK CROSS SECTION

COMMENTS:

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle	3.19417×10^{-4}	0
A_s	ft^2	Cross-sectional area of the stack	23.043	1
P_s	"HgABS	Absolute pressure in the stack	27.23	2
P_m	"HgABS	Absolute pressure at the dry gas meter	28.30	3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions	65.0	4
T_m	°R	Absolute temperature at meter $(Ti + To/2)$	538	5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)	60.58	6
V_{lc}	ml	Total volume of liquid collected in impinger train	18.6	7
V_{wc}	ft^3	Volume of water collected at STP $(Vwl = Vlc(0.0474))$	0.8816	8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$	1.43 %	9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$	61.46	10
V_{ds}	ft^3	Sample volume wet basis stack conditions	95.32	11
MW	#/#MOL	Molecular weight of wet stack gas	29.15	12
V_s	ft/sec	Average stack velocity	51.12	13
V_n	ft/sec	Average gas velocity in probe nozzle	51.81	14
I	%	$V_n/V_s(100)$	101.3 %	15
q_s	cfm	Actual volumetric flow in the stack	70,677	16
Q_{sc}	cfh	Stack volumetric at STP - dry basis	2,695,488	17
C_s	gr/ft^3	Concentration of particulate matter per dry stan ft^3	0.00357	18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$	1.373	19
E_{apa}	#/hr	Allowable emission rate		20
Mn	mg	Total particulate	14	21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

JOB NUMBER 76-0020	STUEVER and ASSOCIATES CONSULTING ENGINEERS OKLAHOMA CITY, OKLAHOMA USA
DRAWN BY JHS 6/4/76	CLIENT MIDWEST CARBIDE CORP PRYOR, OKLA.
Stuever 4/22/78	DRAWING TITLE Stack Test Data and Calculations
SCALE None	Form 6-4-76 JHS
SHEET 2 of 2	

LINE	ΔP	√ΔP	Meter Volume	ΔH	T_s	T_{m_1}	T_d	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
DATE: 2/19/78	RUN NO. 9	PORT IDENTIFICATION: A		TEST METHOD: 5			NOZZLE DIAMETER: 0.242 in.		STACK DIAMETER: 65 in Ø			
0	"H_2O		4138.0	"H_2O	°F	°R	°F	°F	°F	1643:	0	Vac CK OK
1	.32	.4795	4139.0	.3806	760	530	180	280	70	45	1	
2	.42	.6480	4140.6	.3969	770	530	180	280	70	47	2	
3	.38	.6161	4141.6	.3485	775	530	180	280	70	49	3	
4	.42	.6480	4142.4	.3897	770	530	180	280	70	51	4	
5	.38	.6164	4143.0	.3491	760	530	200	300	70	53	5	
6	.52	.7211	4143.8	.4936	760	530	200	300	70	55	6	35.7
7	.50	.7071	4144.9	.4744	750	530	200	300	70	57	7	
8	.44	.6633	4146.1	.4122	750	530	200	300	70	59	8	47.5
9	.38	.6164	4147.3	.3524	750	530	210	300	70	17 01	9	9.7
10	.54	.7348	4148.5	.5193	750	530	210	300	70	03	10	
11	.40	.6324	4149.6	.3738	750	530	210	300	70	05	11	
12	.50	.7071	4150.8	.4782	750	530	210	300	70	07	12	
13	.42	.6480	4151.9	.3952	750	530	210	300	70	09	13	
14	.44	.6633	4153.0	.9150	760	530	220	300	70	11	14	105.41
15	.34	.5830	4154.1	.3131	760	530	220	300	70	13	15	
16	.30	.5477	4155.2	.2728	760	530	220	300	70	15	16	62.9
17	.56	.7483	4156.3	.5417	760	530	240	300	70	17	17	
18	.58	.7615	4157.4	.5629	760	530	240	300	70	19	18	101.2
19	.48	.6928	4158.6	.4571	760	530	240	300	70	21	19	
20	.50	.7071	4159.9	.4780	760	530	240	300	70	23	20	102.1
21	.46	.6782	4161.1	.4361	760	530	240	300	70	25	21	
22	.56	.7483	4162.3	.5413	760	530	240	300	70	27	22	
23	.58	.7615	4163.6	.5623	760	530	240	300	70	29	23	
24	.62	.7874	4164.5	.6052	760	530	240	300	70	17 31	24	
25		.6716		.4357	757.6	530					25	AVERAGE
26			26.5		[illegible]	[illegible]				48 min	26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)	151	157	-0-	661.8
PRETEST WATER (ml)	150	150	-0-	651.5
TOTAL WATER (ml)	1	7	-0-	10.3

18.3

FILTER IDENTIFICATION	#120	% CO_2	(44)·( )	1.441
BAROMETRIC PRESSURE	28.26	% O_2	(32)·( )	5.001
AMBIENT DRY BULB		% CO	(28)·( )	
AMBIENT WET BULB		% N_2	(28)·( )	22.1355
STACK PRESS	-14" H_2O	% H_2O (Line 9)	(18)·( )	1.746
			Mₐ =	

STACK CROSS SECTION

COMMENTS:

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle		0
A_s	ft^2	Cross-sectional area of the stack		1
P_s	"HgABS	Absolute pressure in the stack		2
P_m	"HgABS	Absolute pressure at the dry gas meter		3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions		4
T_m	°R	Absolute temperature at meter $(T_1 + T_0/2)$		5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)		6
V_{lc}	ml	Total volume of liquid collected in impinger train		7
V_{wc}	ft^3	Volume of water collected at STP $(V_{wl} = V_{lc}(0.0474))$		8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$		9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$		10
V_{ds}	ft^3	Sample volume wet basis stack conditions		11
MW	#/#MOL	Molecular weight of wet stack gas		12
V_s	ft/sec	Average stack velocity		13
V_n	ft/sec	Average gas velocity in probe nozzle		14
I	%	$V_n/V_s(100)$		15
q_s	cfm	Actual volumetric flow in the stack		16
Q_{sc}	cfh	Stack volumetric at STP - dry basis		17
C_s	gr/ft^3	Concentration of particulate matter per dry stsm ft^3		18
P_{mrc}	#/hr	Pollutant emission rate: $C_s(Q_{sc})/7000$		19
E_{apm}	#/hr	Allowable emission rate		20
				21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

JOB NUMBER 76-0020	STUEVER and ASSOCIATES CONSULTING ENGINEERS OKLAHOMA CITY, OKLAHOMA USA
DRAWN BY: JHS 6/4/76	
APP: Stuever 4/22/78	CLIENT MIDWEST CARBIDE CORP PRYOR, OKLA
	DRAWING TITLE Stack Test Data and Calculations
SCALE None	SHEET 1 OF 2 Form 6-4-76 JHS

DATE: 4/19/78	RUN NO. 9	PORT IDENTIFICATION: B		TEST METHOD: 5			NOZZLE DIAMETER: 0.242 in.		STACK DIAMETER: 65 in. ∅		0.7647
LINE	ΔP	$\sqrt{\Delta P}$	Meter Volume	ΔH	T_s	T_m	T_c	T_{box}	T_{out}	Time hr:min:sec	LINE	Test Remarks
0	"H_2O		4138.0	"H_2O	°R	°R	°F	°F	°F	17:39:	0	
1	.66	.8124	4166.2	.6475	780	520	250	300	70	41	1	102.1
2	.58	.7615	4167.6	.5611	780	530	250	300	70	43	2	
3	.70	.8366	4168.9	.6882	780	530	250	300	70	45	3	
4	.60	.7745	4170.1	.5814	775	530	250	300	70	47	4	
5	.70	.8366	4171.4	.6894	770	530	250	300	70	49	5	
6	.60	.7745	4172.6	.5812	760	530	250	300	70	51	6	101.59
7	.74	.8602	4174.0	.7319	760	530	250	300	70	53	7	
8	.56	.7483	4175.4	.5391	750	530	250	300	70	55	8	101.9
9	.72	.8485	4176.6	.7109	750	530	250	300	70	57	9	
10	.62	.7874	4177.9	.6032	760	530	250	300	70	59	10	
11	.64	.8000	4179.3	.6246	760	530	250	300	70	18 01	11	101.57
12	.48	.6928	4180.7	.4553	760	530	250	300	70	03	12	
13	.54	.7348	4181.9	.5183	760	530	250	300	70	05	13	
14	.56	.7483	4183.1	.5394	760	530	250	300	70	07	14	
15	.57	.7549	4184.4	.5500	760	530	250	300	70	09	15	104.52
16	.50	.7071	4185.6	.4768	760	530	250	300	70	11	16	
17	.50	.7071	4186.7	.4768	760	530	250	300	70	13	17	
18	.74	.8602	4187.9	.7336	760	530	250	300	70	15	18	
19	.70	.8366	4189.3	.6901	760	530	250	300	70	17	19	
20	.60	.7745	4190.7	.5826	760	530	250	300	70	19	20	101.52
21	.70	.8366	4192.1	.6901	760	530	250	300	70	21	21	
22	.64	.8000	4193.5	.6254	760	530	250	300	70	23	22	
23	.66	.8124	4194.9	.6469	760	530	250	300	70	25	23	101.79
24	.68	.8246	4196.4	.6685	760	530	250	300	70	27	24	Vm CK OK
25		.7302		.5342	760	530					25	AVERAGE
26			58.4		°R	°R				96 MIN	26	TOTAL

IMPINGER NO.	1	2	3	4 (Silgel)
POST TEST WATER (ml)				
PRETEST WATER (ml)				
TOTAL WATER (ml)				

FILTER IDENTIFICATION	-	% CO_2	(44)·( )	.
BAROMETRIC PRESSURE		% O_2	(32)·( )	.
AMBIENT DRY BULB		% CO	(28)·( )	.
AMBIENT WET BULB		% N_2	(28)·( )	.
		% H_2O (Line 9)	(18)·( )	.
				Mw =

STACK CROSS SECTION

COMMENTS:

CALCULATED DATA

Symbol	Units	Description	Results	LINE
A_n	ft^2	Cross-sectional area of the probe nozzle	3.1941×10^{-4}	0
A_s	ft^2	Cross-sectional area of the stack	23.043	1
P_s	"HgABS	Absolute pressure in the stack	27.23	2
P_m	"HgABS	Absolute pressure at the dry gas meter	28.30	3
V_{md}	ft^3	Dry gas volume thru meter at meter conditions	58.4	4
T_m	°R	Absolute temperature at meter $(Ti + To/2)$	530.0	5
V_{mc}	ft^3	Dry gas volume thru meter at standard temperature and pressure (STP)	55.23	6
V_{lc}	ml	Total volume of liquid collected in impinger train	18.3	7
V_{wc}	ft^3	Volume of water collected at STP $(Vw) = Vlc(0.0474)$	0.8674	8
B_{wo}	%	$V_{wc}/V_{wc}+V_{mc}(100)$	1.546%	9
V_{dc}	ft^3	Sample volume wet basis STP $(V_{wc} + V_{mc})$	56.10	10
V_{ds}	ft^3	Sample volume wet basis stack conditions	88.90	11
MW	#/MOL	Molecular weight of wet stack gas	29.07	12
V_s	ft/sec	Average stack velocity	46.77	13
V_n	ft/sec	Average gas velocity in probe nozzle	48.05	14
I	%	$V_n/V_s(100)$	107.7%	15
q_s	cfm	Actual volumetric flow in the stack	64,663	16
Q_{sc}	cfh	Stack volumetric at STP - dry basis	2,424,225	17
C_s	gr/ft^3	Concentration of particulate matter per dry atm ft^3	3.60×10^{-3}	18
P_{mrc}	#/hr	Pollutant emission rate: $Cs(Qsc)/7000$	1.248	19
E_{apm}	#/hr	Allowable emission rate		20
Mn	mg	Total Particulate	12.9	21
				22
				23

Std. temp. 530°R
Std. press. 29.92"HgABS

JOB NUMBER 76-0020	STUEVER and ASSOCIATES CONSULTING ENGINEERS OKLAHOMA CITY, OKLAHOMA USA
DRAWN BY JHS 6/4/76	
Stuever 4/22/78	CLIENT MIDWEST CARBIDE CORP PRYOR, OKLA
	DRAWING TITLE Stack Test Data and Calculations
SCALE None	Form 6-4-76 JHS
SHEET 2 of 2	

APPENDIX B

Process Information and Data

Midwest Carbide Corporation

SALES AGENTS
SHAWINIGAN PRODUCTS CORPORATION
111 CHARLOTTE PLACE
ENGLEWOOD CLIFFS, NEW JERSEY

PRYOR DIVISION
P. O. BOX 518
PRYOR, OKLAHOMA 74361

MANUFACTURERS
OF
SHAWINIGAN CARBIDE

SHAWINIGAN

April 21, 1978

RECEIVED
APR 22 1978
STUEVER & ASSOCIATES
CONSULTING ENGINEERS

Mr. Joe Stuever
Stuever and Associates
5815 Melton Drive
Oklahoma City, OK 73132

Dear Joe:

Attaching process description and calculations reference our test for compliance.

Please review and make any recommendations you feel are appropriate on what should be furnished in report to E.P.A.

Sincerely,

Merril L. Stott
Plant Manager

MLS:bjm

Enclosures

DESCRIPTION OF PROCESS

Midwest Carbide Corporation
Pryor, Oklahoma Plant

The process involves an electric furnace operation for production of calcium carbide.

A weighed ratio of pebble lime and petroleum coke is charged into a circular three-phase furnace and heated to produce calcium carbide. This is in a molten stage as it is tapped from the furnace at periodic intervals, solidifies and is then crushed and sized.

Emissions from the charge bed are collected by three baghouse collectors and these are composed of two Fuller plenum pulse and one Wheelabrator shaker collectors.

The dust particulate collected by the baghouse is composed basically of lime and free carbon. This material has been certified by Oklahoma State University as suitable for use as agricultural lime. It is blended into our furnace charge and consumed.

The rating of an electric furnace is denoted by the electrical KW input. Our Pryor furnace has a maximum transformer rating of 18.5 MW. The normal maximum operating level is 15.0 - 15.5 MW and this was the actual operating level of the process during the tests.

Merril L. Stott

Merril L. Stott
Plant Manager

MLS:bjm

LOG - PROCESS OPERATIONS

Tests involved the three-day period of April 17 through April 19, 1978.

The four basic items that are a part of the process weight input are:

1. Lime ($CaO = \pm 96\%$)
2. Petroleum Coke (F.C. = $\pm$ 87%)
3. Electrodes consumed in electrical process
4. Fine mix material that is blended

Items No. 1 and No. 2 (lime and coke) are pre-weighed in specific ratios and conveyed into the furnace. Flux (lime) is also pre-weighed and charged as a portion of the process weight.

CALCULATIONS:

$$\text{Lime \& Coke Charged} = \frac{\text{Total Ft. Belt/8 Hr. Shift} = \text{Ft. Belt/Charge}}{\text{(No. Taps)(2 Charges/Tap)}}$$

1. (Number charges during testing cycle)(lbs./Ft. belt of Lime)

   \+

   (Number charges during testing cycle)(lbs./Ft. belt of Coke)

   Equals total lbs. of mixed charge for test cycle.

2. Flux added (lime) = lbs. indicated on production sheet during interval of test cycle.

3. Addition of weights in items No. 1 and No. 2 result in total furnace charge.

4. Electrode consumption = inches slipped (consumed) during test cycle X 72.6 lbs./inch X hours of test cycle = lbs. of electrode.

5. Fine mix material blended = (total hours of feed time on 3 electrodes)(614 lbs./hour of feed) = lbs. of fine mix blended per test cycle.

Log - Process Operations
Page 2

6. Addition of items Numbers 3, 4 and 5 give the total process weight per test cycle.

ACTUAL PROCESS WEIGHT DATA:

Date	Test Time Start	Test Time End	Elapsed Hours	Process Weight (Lbs.) Lime	Coke	Elect.	Fines	Total
4/17/78	1:04 p.m.	11:06 p.m.	10.0 Hours	80,920	58,425	2,147	14,729	156,221
4/18/78	9:31 a.m.	5:38 p.m.	8.1 Hours	67,200	48,085	1,695	7,036	124,016
4/19/78	10:16 a.m.	6:35 p.m.	8.3 Hours	67,080	51,481	1,436	9,652	129,649

PROCESS WEIGHT PER HOUR:

4/17/78 = $\frac{156{,}221 \text{ lbs.}}{(10.0 \text{ Hr. Test})(2{,}000 \text{ lbs./ton})}$ = 7.81 tons per hour

4/18/78 = $\frac{124{,}016 \text{ lbs.}}{(8.1 \text{ Hr. Test})(2{,}000 \text{ lbs./ton}}$ = 7.66 tons per hour

4/19/78 = $\frac{129{,}649 \text{ lbs.}}{(8.3 \text{ Hrs.})(2{,}000 \text{ lbs./ton}}$ = 7.81 tons per hour

Average = 7.76 tons per hour

APPENDIX C

Calibrations

PROBE CALIBRATION

UNIT: Joy Probe - 6 ft (effective)

CALIBRATED BY: Stuever & Associates
Consulting Engineers
Oklahoma City, Oklahoma

CALIBRATED ON: April 8, 1978

Probe coefficient based on:

$$Cp = Cpstd \sqrt{\frac{Pstd}{Ptest}} \quad ; \; Cpstd = 0.99$$

1. Manometer connections upstream (3/8" nozzle): $Cp = 0.7645$
2. Manometer connections downstream (3/8" nozzle): $Cp = 0.7665$
3. Manometer connections upstream (¼" nozzle): $Cp = 0.7647$
4. Manometer connections downstream (¼" nozzle): $Cp = 0.7673$

Certified by:

Joseph H. Stuever, P.E.

Joseph H. Stuever, P.E.

REGISTERED PROFESSIONAL ENGINEER
JHS
JOSEPH H.
STUEVER
8125
5-5-78
OKLAHOMA

GAS METER CALIBRATION

UNIT: Emission Parameter Analyzer, Joy Manufacturing Company.

Model EPA-2

CALIBRATED ON: April 8, 1978

CALIBRATED AGAINST: 5 cubic foot, gas prover S/N 1365

CALIBRATED BY: Stuever & Associates
Consulting Engineers
Oklahoma City, Oklahoma

Gas meter volume corrected to standard conditions:	4.7133 ft^3
Prover volume corrected to standard conditions:	4.7237 ft^3
Variation:	.0104 ft^3

Gas meter volume is accurate within ± 0.00208 ft^3 of meter reading per cubic foot indicated on the meter.

Certified by:

Joseph H. Stuever, P.E.

Joseph H. Stuever, P.E.

REGISTERED PROFESSIONAL ENGINEER
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JOSEPH H.
STUEVER
8125
5-5-78
OKLAHOMA

FLOW RATE ORIFICE CALIBRATION
(ΔH versus gas flow)

UNIT: Joy Analyser Sampling Unit

OWNED BY: Stuever & Associates
Consulting Engineers
Oklahoma City, Oklahoma

CALIBRATED ON: April 8, 1978

The delta-H or pressure drop across the flow rate measuring orifice has been tested in order to establish a curve depicting flow rate versus delta-H. This curve is shown in the attached plate, and the curve equation is stated. In practice this curve is part of our computer control system which replaces the nomographs used by others. The curve shown has been corrected to standard temperature and pressure. The following table represents test points (corrected to STP) which were used to establish this curve.

0.25" H_2O	0.42 cfm
0.50" H_2O	0.56 cfm
1.00" H_2O	0.73 cfm
2.00" H_2O	1.05 cfm
3.00" H_2O	1.25 cfm
4.00 H_2O	1.42 cfm

The final analysis indicates that this curve as programed into the computer must result in achieving isokinetic conditions from the test. Its accuracy or inaccuracy is immaterial if it results in achieving isokinetic conditions.

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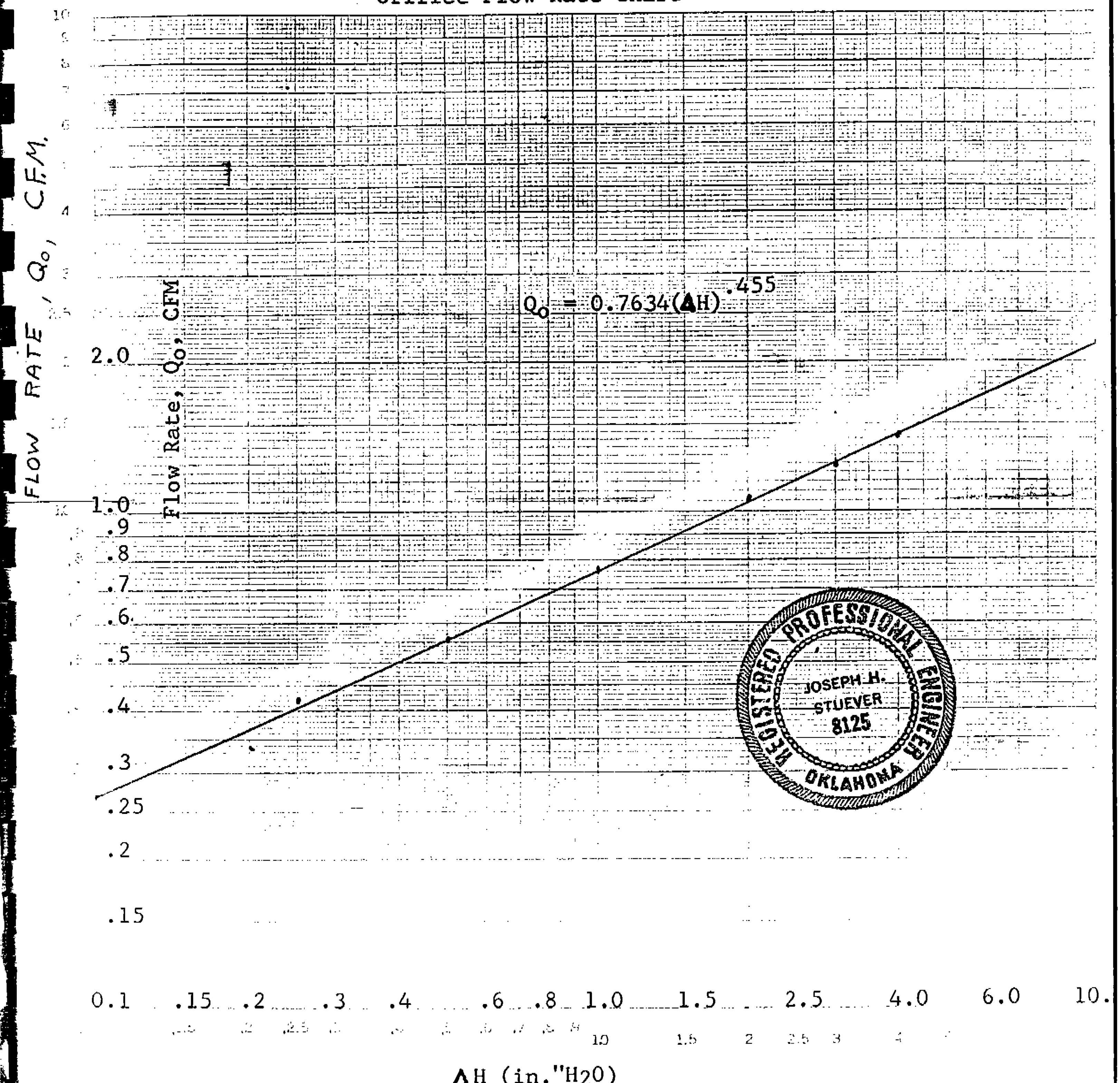
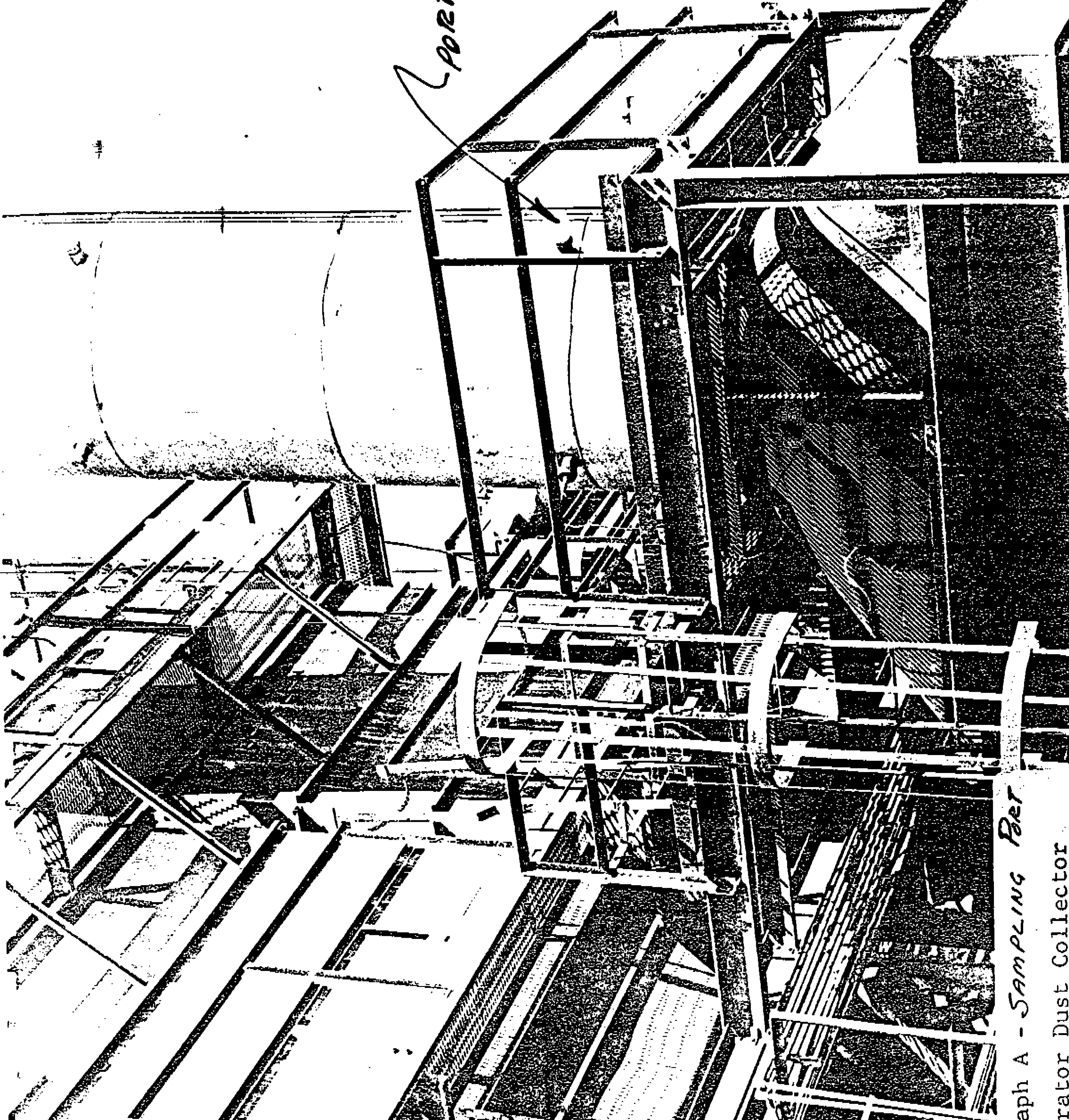
EPA STACK SAMPLER UNIT

Orifice Flow Rate Chart



APPENDIX D

Stack Diagrams and Photographs



Photograph A - SAMPLING PORT

Wheelabrator Dust Collector

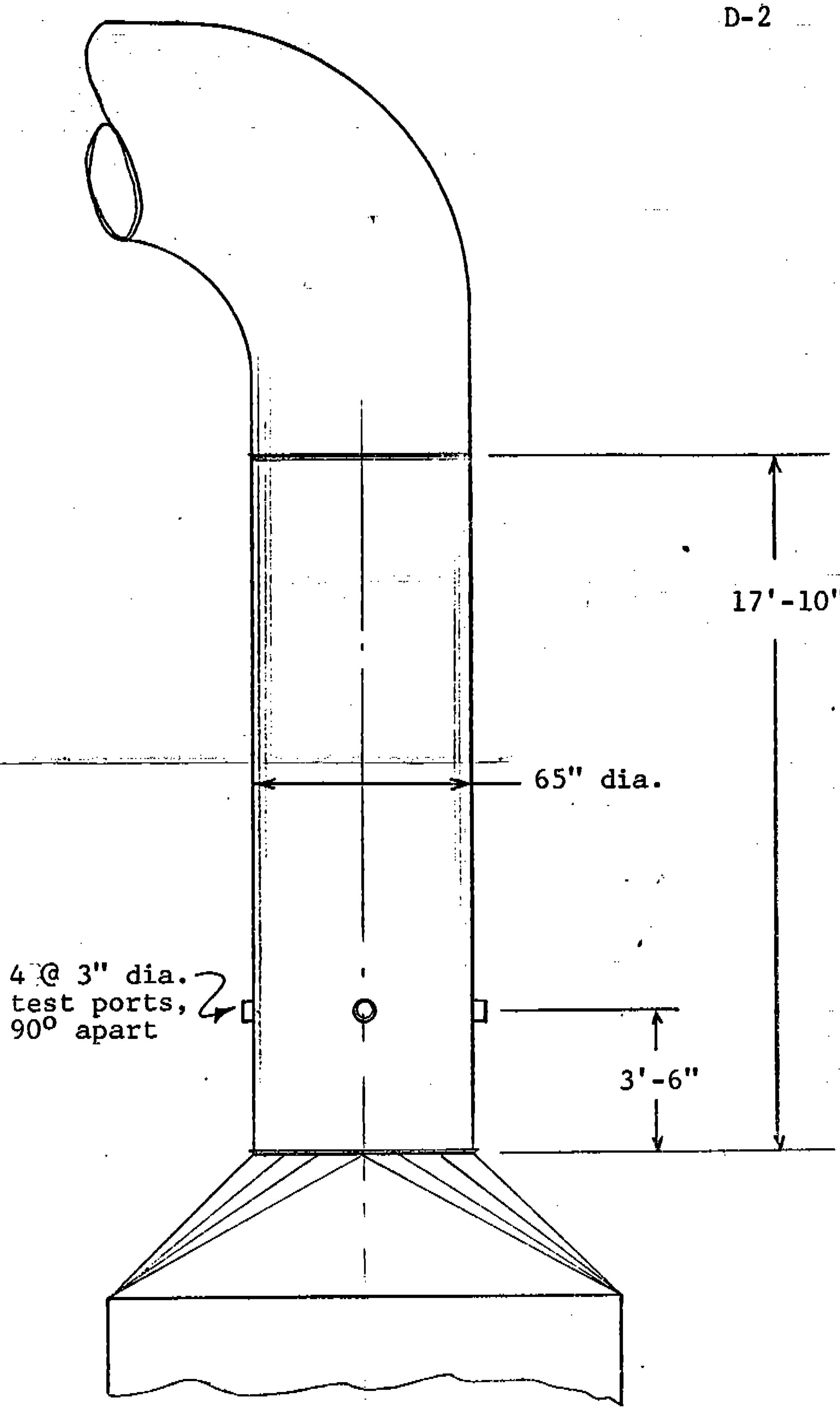


Figure 2.1.1.1

Test Ports - Wheelabrator Shaker Dust Collector

Stuever & Associates CONSULTING ENGINEERS
5815 Melton Drive - Oklahoma City, Oklahoma 73132 - 405-721-1171

APPENDIX E

SAMPLE CALCULATIONS

TYPICAL CALCULATIONS Run #1

Client: Midwest Carbide Date: 4-21-77

I. Calculate Pm, absolute pressure at meter:

$$P_m = P_{bar} + \frac{\Delta h_{avg}}{13.6} = 27.92 + \frac{0.1608}{13.6} = \underline{27.92} \text{ " Hg.}$$

II. Calculate Tm, absolute temperature at meter:

$$T_m = \frac{T_i + T_o}{2} = \underline{530}\ ^oR$$

III. Calculate Vmc, volume through meter @ STP:

$$V_{mc} = V_{md}\left(\frac{T_{std}}{T_m} \cdot \frac{P_m}{P_{std}}\right) = 42.3 \left(\frac{530}{530} \cdot \frac{27.93}{29.92}\right) = \underline{39.47}\ ft^3.$$

IV. Calculate Vwc, volume water @ STP:

$$V_{wc} = 0.0474(V_{lc}) = 0.0474(17.5) = \underline{0.83}\ ft^3.$$

V. Calculate Bwo, % water:

$$B_{wo} = \frac{V_{wc}}{V_{wc} + V_{mc}} \times 100 = \frac{0.83}{39.47 + 0.83} \times 100 = \underline{2.06}\ \%.$$

VI. Calculate MW, molecular weight:

$$MW = 44(\%CO_2)\left(1 - \frac{B_{wo}}{100}\right) + 32(\%O_2)\left(1 - \frac{B_{wo}}{100}\right) + 28(\%CO)\left(1 - \frac{B_{wo}}{100}\right) + 28(\%N_2)\left(1 - \frac{B_{wo}}{100}\right) + 18\left(\frac{B_{wo}}{100}\right)$$

$$MW = 44(0.024)\left(1 - \frac{2}{100}\right) + 32(0.184)\left(1 - \frac{2}{100}\right) + 28(0)\left(1 - \frac{}{100}\right) + 28(.792)\left(1 - \frac{2}{100}\right) + 18\left(\frac{2}{100}\right) = \underline{29.01}\ \#/\#mole.$$

VII. Calculate Vdc, sample volume, wet basis STP:

$$Vdc = (Vwc + Vmc) = (39.47 + 0.83) = \underline{40.30}\ ft^3.$$

VIII. Calculate Vds, sample volume, wet basis, stack cond.:

$$Vds = Vdc\left(\frac{Tstack}{Tstd} \cdot \frac{Pstd}{Ps}\right) = 40.30\left(\frac{756}{530} \cdot \frac{29.92}{27.92}\right) = \underline{61.6}\ ft^3.$$

IX. Calculate Vs, average stack velocity:

$$Vs = Kp \cdot Cp \cdot \sqrt{\Delta Pavg} \cdot \sqrt{\frac{Ts}{PsMw}} = 85.48 \times 0.7647 \times 0.4652 \times$$

$$\sqrt{\frac{756}{29.01 \times 27.92}} = \underline{29.38}\ ft/sec.$$

X. Calculate qs, actual volumetric flow in stack:

$$qs = Vs \times As \times 60 = 29.38 \times 30 \times 60 = \underline{52,881}\ cfm.$$

XI. Calculate Vn, average gas velocity in nozzle:

$$Vn = \frac{Vds}{An \times Time \times 60} = \frac{61.6}{3.19417 \times 10^{-4} \times 108 \times 60} = \underline{29.76}\ ft/sec.$$

XII. Calculate I, isokinetic ratio:

$$I = Vn/Vs \times 100 = \frac{29.76}{29.38} \times 100 = \underline{101.3}\ \%.$$

XIII. Calculate Qsc, stack volumetric at STP:

$$Qsc = qs\left(1 - \frac{Bwo}{100}\right)\left(\frac{Tstd}{Ts} \cdot \frac{Ps}{Pstd}\right) \times 60$$

$$Qsc = \left(1 - \frac{2}{100}\right)\left(\frac{530}{756} \cdot \frac{27.92}{29.92}\right) \times 60 = \underline{2,019576}\ cfh.$$

XIV. Calculate Cs,

$$Cs = .0154 \times \left(\frac{Mn}{Vmc}\right) = .0154 \times \left(\frac{36.9}{39.47}\right) = \underline{0.0144}\ gr/ft^3.$$

XV. Calculate pollution emission rate:

$$\frac{Cs\ gr/ft^3 \cdot Qsc}{7000} = \#/hr;\ \frac{0.0144 \times 2,019576}{7000} = \underline{4.16}\ \#/hr.$$

RADIAN
CORPORATION

February 16, 1983

Ms. Kathy Petelo
Oklahoma State Department of Health
Air Quality Service
P. O. Box 53551
Oklahoma City, Oklahoma 73152

Dear Ms. Petelo:

Enclosed is payment of $7.80 for the received test report on particulate emissions from the Midwest Carbide plant in Pryor, Oklahoma. The emissions data will be most helpful to us in our review of the AP-42 emission factors for calcium carbide manufacturing.

Thank you for your prompt response to our request.

Sincerely,

Karen K. Fidler

Karen K. Fidler
Environmental Engineer

KKF:hgr

Enclosure