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ELEMENTAL PHOSPHORUS

(5)

TEST NUMBER 72-MM-04

STAUFFER CHEMICAL COMPANY

MT. PLEASANT, TENNESSEE

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MT. PLEASANT, TENNESSEE

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Contract No. 68-02-0237, Task 4

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II. INTRODUCTION

Atmospheric emissions of fluorides and phosphorus pentoxide from Stauffer Chemical Company's elemental phosphorus plant in Mt. Pleasant, Tennessee, were sampled to form a data base for New Source Performance Standards as authorized by Clean Air Act of 1970. Tests were made to determine fluoride and phosphorus pentoxide (P_2O_5) concentrations at the inlet and outlet of the venturi scrubber serving the furnace slag tapping operations. Stack gas velocities, temperatures, and moisture in addition to the carbon dioxide, oxygen, and carbon monoxide content were also measured. Table 1 summarizes the test locations, dates, and the measurements made.

At this plant, the slag tapping ports in the electric arc furnace were covered by a movable hood system which vented fumes during slag tapping through a venturi scrubber and out the stack. Stack gases were sampled before and after this scrubber as shown by points E and F in Figure 1. Scrubber water samples were also taken as designated by points G and H.

This report only presents the results of the emission tests. Process weight data are not included. This data was however, obtained by the EPA personnel participating in the test program.

TABLE 1.

SUMMARY OF EMISSION MEASUREMENTS MADE AT

STAUFFER CHEMICAL COMPANY

MT. PLEASANT, TENNESSEE

DATE 1972	TEST NO.	TEST SITE	STACK GAS PARAMETERS				EMISSIONS
			Velocity	Temp.	% H_2O	CO_2, O_2 & CO	Fluorides & P_2O_5
5/31	1	Slag Tap Scrubber Inlet	↓	↓	↓	↓	↓
5/31	1	Slag Tap Scrubber Outlet					
6/1	2	Slag Tap Scrubber Inlet					
6/1	2	Slag Tap Scrubber Outlet					
6/2	3	Slag Tap Scrubber Inlet					
6/2	3	Slag Tap Scrubber Outlet					

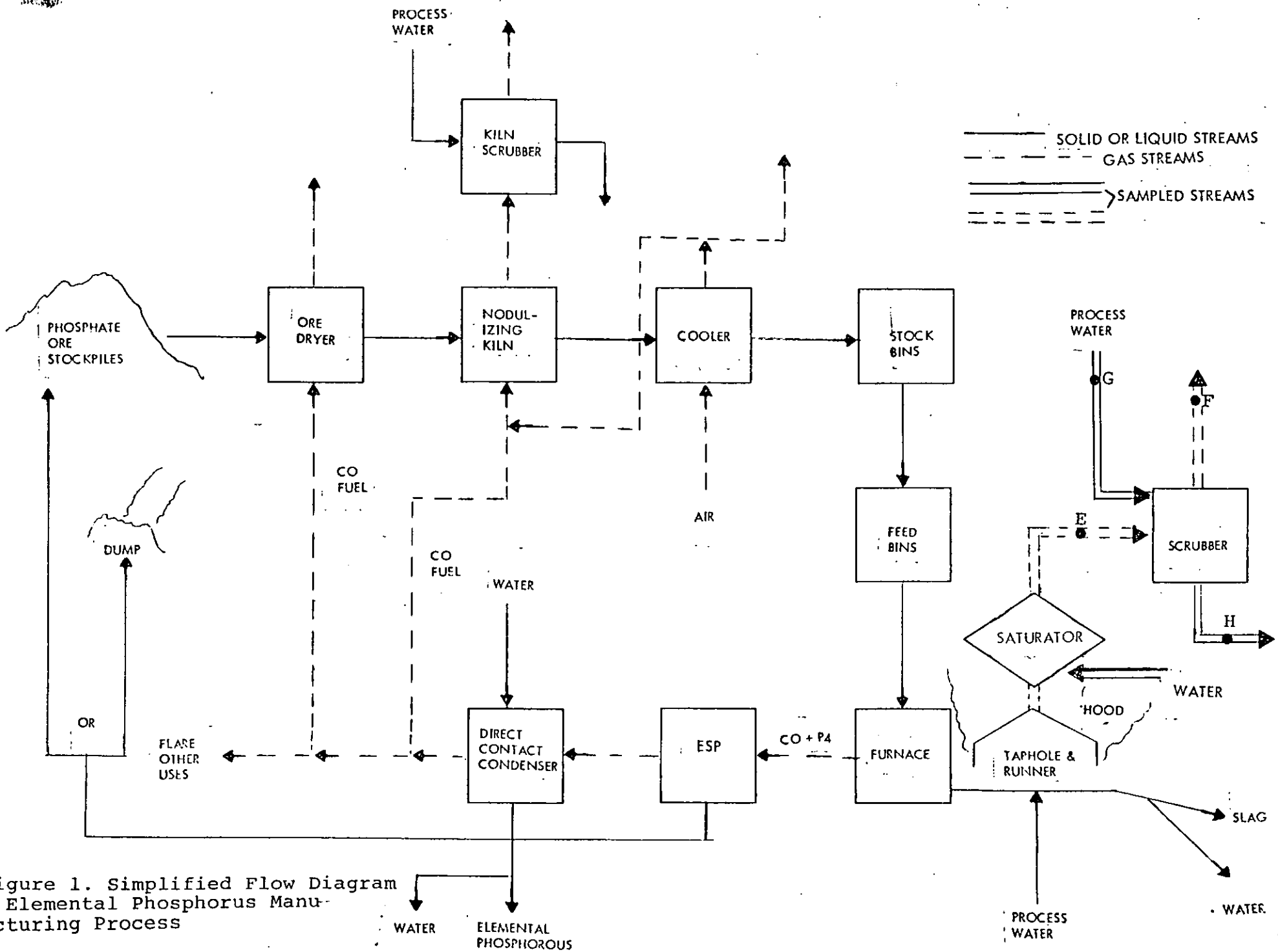


Figure 1. Simplified Flow Diagram of Elemental Phosphorus Manufacturing Process

III. SUMMARY AND DISCUSSION OF RESULTS

Slag tapping is an intermittant operation, and on the Stauffer #5 furnace the slag taps occurred approximately every 96 minutes. Each slag tap or ferrophosphorus tap lasted approximately 14 to 17 minutes. Concentrations of fluorides and P_2O_5 were determined by simultaneously traversing the ducts leading to and from the venturi scrubber. Sampling was conducted only during the tapping operations. Table 2 summarizes the data obtained at these sampling sites. Detailed sampling data are included in the Appendices. Various operational problems must be noted before interpreting the sampling results. These operational problems and their effect on the results are summarized in Table 3.

On Test #1 a fourth slag tap was necessary to obtain an hour long sample on the inlet while three taps were sufficient to obtain an hour sample on the outlet. During Test #1 there was a problem with the electrodes retracting from the furnace; this is normally caused by excess coke in the furnace. The excess coke causes an increase in emissions during the slag tapping. Also in Test #1 the venturi throat of the scrubber was discovered half-full of water due to the drain being plugged.

TABLE 2. EMISSION DATA SUMMARY
STAUFFER CHEMICAL CO. - MT. PLEASANT, TENNESSEE
SLAG TAPPING - SCRUBBER INLET AND OUTLET

TEST NO.	DATE 1972	SITE	STACK GAS PARAMETERS				EMISSIONS			
			VELOCITY FPS	TEMP. °F	MOISTURE %	VOLUME SCFM[a]	CONC. GRAINS/SCF		LBS/TAP[b]	
							F	P_2O_5	F	P_2O_5
1	5/31	Inlet	54.2	158	1.6	12,809	.0294	.0582	0.806	1.60
1	5/31	Outlet	50.1	113	2.5	13,264	.00076	.0140	0.022	0.395
2	6/1	Inlet	49.9	131	2.7	12,143	.0316	.0661	0.823	1.72
2	6/1	Outlet	48.7	111	3.4	12,877	.00103	.0160	0.028	0.442
3	6/2	Inlet	46.1	121	0.3	11,691	.0259	.0554	0.647	1.39
3	6/2	Outlet	49.7	111	3.2	13,150	.00131	.0120	0.037	0.337

[a] Standard cubic feet per minute, dry basis, corrected to 70°F and 29.92 "Hg.
[b] Based on an average slag tapping period of 15 minutes. Taps occurred every 96 minutes.

TABLE 3. FACTORS AFFECTING SAMPLING RESULTS

Fluoride Emissions	Comments
1 - Inlet	Higher emissions than normal are expected due to the excess coke in the furnace. Filter changed during latter part of run. Some entrained water suspected in probe.
2 - Inlet	No points on the vertical traverse below the duct centerline were sampled in order to avoid picking up water.
3 - Inlet	No points on the vertical traverse below the duct centerline were sampled in order to avoid picking up water.
1 - Outlet	Lower emissions than normal are expected due to the fact that the drain for the saturator was plugged and the venturi throat of the scrubber was found half-full of water.
2 - Outlet	Normal emissions as the saturator and venturi scrubber were operating normally.
3 - Outlet	Normal emissions as the saturator and venturi scrubber were operating normally.

The furnace was shut down on June 1, 1972, in the morning prior to Test #2, in order to add segments to the electrodes. The inlet sample of this test was found to contain approximately 150 mls of entrained scrubbing water from the saturator.

For Test #3, after the discovery of the 150 mls of entrained scrubbing water from Test #2, it was decided to omit the sampling points on the vertical traverse below the duct centerline. The amount of sampling time at the other points was increased proportionally.

The outlet samples were collected with no unusual occurrances. Due to the partially flooded venturi on the first test, the fluoride outlet results are unusually low.

Based on the data in Table 2 and the observations in Table 3, the following conclusions were drawn:

> Fluoride concentrations before the venturi scrubber are generally in the range of 0.026 to 0.029 grains/SCF. P_2O_5 concentrations will range from about 0.055 to 0.066 grains/SCF.

> After the scrubber, fluorides range from 0.00103 to 0.00131 grains/SCF and P_2O_5 concentrations are in the 0.012 to 0.016 grains/SCF range.

Table 4 presents the analysis of the scrubber water samples collected during the test periods. Water from the slag pit

TABLE 4. SCRUBBER WATER ANALYSES

Date 1972	Test No.	Soluble Fluorides mg/ml	Avg.	P_2O_5 mg/ml	Avg.	pH	Avg.
5/31	1 Discharge	347		0.9		3.70	
		371	380	1.0	1.0	3.60	3.50
		423		1.2		3.21	
6/1	2 Discharge	222		1.1		3.94	
		279	262	1.3	1.2	3.56	3.65
		285		1.3		3.44	
6/2	3 Discharge	244		1.0		4.03	
		236	249	1.0	1.0	4.07	4.03
		266		1.1		3.98	
5/31	Slag Pit[a]	126		0.6		6.19	
6/1	Slag Pit[a]	130	131	0.6	0.6	6.27	6.40
6/2	Slag Pit[a]	136		0.6		6.73	

a) The slag pit water is used for scrubber water make-up

was used as make-up for the scrubber. This water had an average pH of 6.4. Water from the scrubber discharge was in the 3.2 to 4.0 pH range, and had a temperature of 63-66° F.

IV. PROCESS DESCRIPTION

Elemental phosphorus is produced from phosphate rock by reduction in an electric arc furnace. Typical ores contain 10-13% phosphorus so that about 10 tons of rock must be processed per ton of phosphorus produced. Considerable quantities of coke, silica, and recycled materials are fed to the furnace with the beneficiated ore.

Prior to being fed to the furnace, the rock is agglomerated and heat-hardened in a kiln. The partially fused product is cooled and crushed to a specified size before being fed to the furnace as shown in Figure 1.

Phosphate feed is carefully proportioned with silica and coke before being transferred to feed bins directly above the furnace. The feed mixture then moves by gravity from the bins down into the furnace as the furnace feed is consumed.

The reaction within the furnace is approximated by the following equation:

$$2\ Ca_3\ (PO_4)_2 + 10\ C + 6\ SiO_2 \xrightarrow{(2300\text{-}2700°F)} P_4 + 10\ C + 6\ CaSiO_3$$

Elemental phosphorous and carbon monoxide leave the furnace as gases. Dust is removed from the stream by an electrostatic precipitator and the phosphorous vapor is later condensed out in direct-contact water condensers. Waste CO gas is used as a fuel in the kiln operation.

The non-gaseous by products-slag and ferrophos (FeP_4) are periodically tapped from the furnace. Furnace slag is tapped to open-pits and cooled with water. Ferrophos is tapped into molds and allowed to cool.

Furnace tapping operations are a source of particulate emissions in the form of P_2O_5 and coke smoke. This operation is also considered to be a major source of fluoride emissions.

At Mt. Pleasant, Stauffer has installed a fume collection and scrubbing system to control emissions from this operation. A movable hood extending over one taphole is moved into place over the hole which is being tapped and the fumes are vented to a venturi scrubber. A separate hood covers the pouring box into which ferrophos is tapped. These fume hoods are also connected to the venturi scrubber. The scrubbing system is kept acid to improve the P_2O_5 pick-up. The water system has a continuous, constant rate of water make-up and acid purge. Acid make-up is via the absorption of P_2O_5.

Make-up water to the system is not measured. Water discharges from two points in the system - a drain on the venturi scrubber throat, and a drain on the knockout chamber. The former, by visual observation, seems to drain 3-5 gpm

from the system. The latter operates through a discharge valve. Design make-up rate is 15 gpm. The discharge valve is a timer-operated 4" plug valve which opens for 30 seconds out of every 14-15 minutes. Wet discharge head is about 8 feet of water.

V. LOCATION OF SAMPLING POINTS

Figures 2 and 3 show the sampling ports and the number of sampling points at the inlet and outlet sites used to determine emissions from the slag tapping process in Mt. Pleasant, Tennessee. As shown, the inlet samples were collected at 24 points (12 along each diameter) in the 29.5 inch circular horizontal duct leading to the venturi scrubber. The inlet sampling site was less than one diameter downstream from a bend and was not a very good sampling site. However, the configurations of the vent system did not allow for a better choice.

Outlet samples were taken in the final exit stack after the fan, by traversing 12 points along each of two diameters. This site was 7.2 diameter downstream from a bend, and 1.8 diameters from the top of the stack.

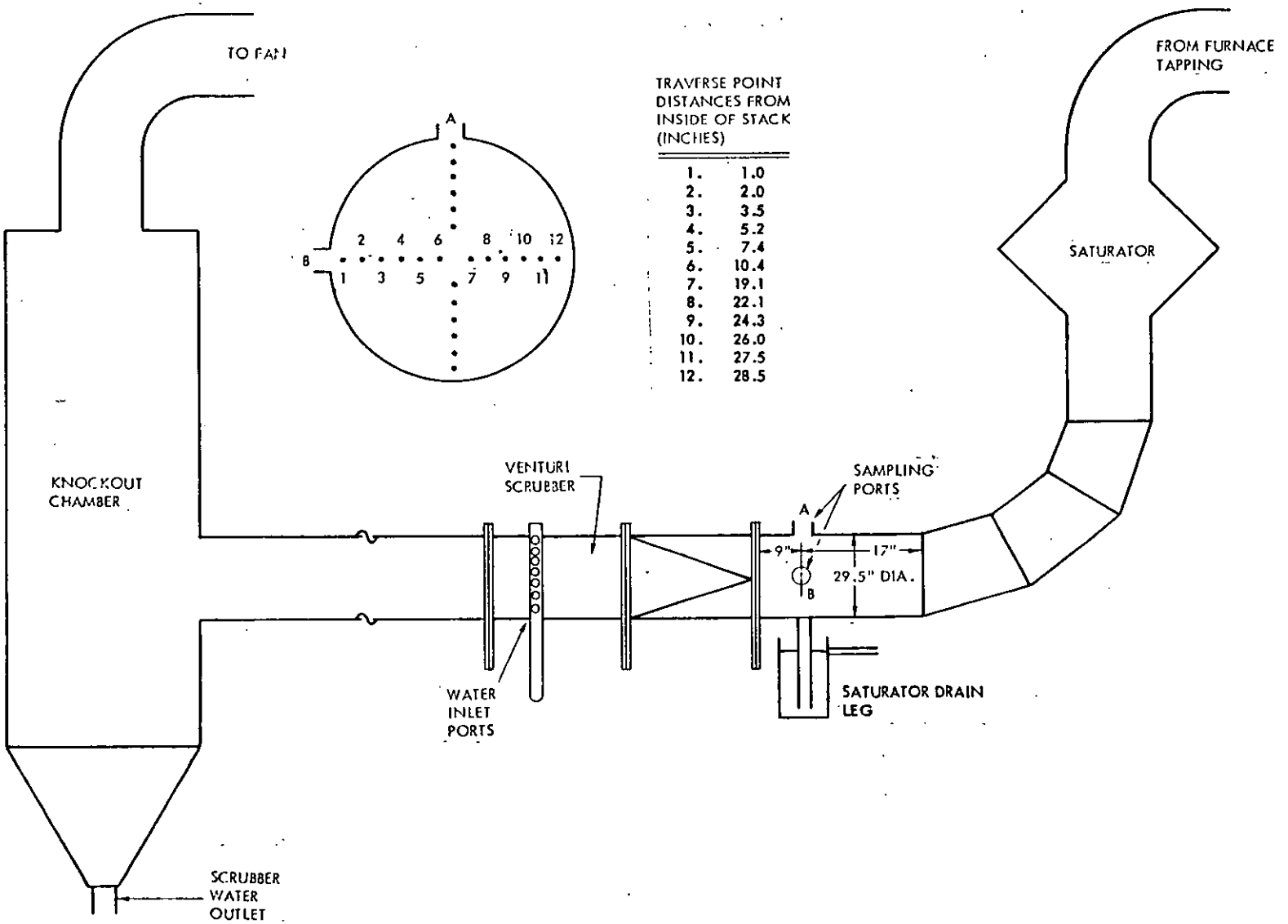
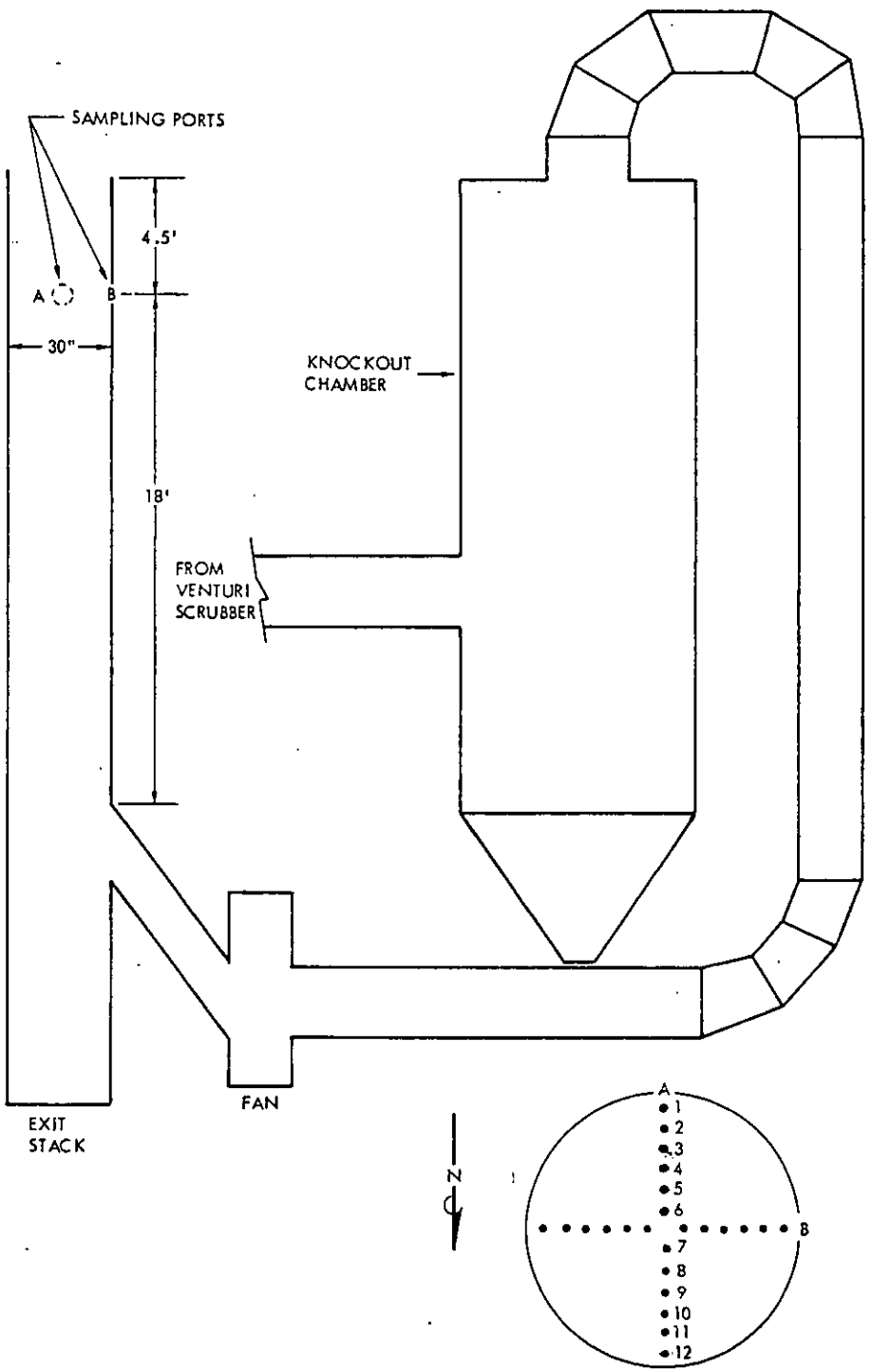


Figure 2. Slag Tap Scrubber Inlet Sampling Site
Stauffer Chemical Co., Mt. Pleasant, Tennessee



TRAVERSE POINT DISTANCE FROM INSIDE OF STACK (INCHES)	
1.	1.0
2.	2.0
3.	3.5
4.	5.3
5.	7.5
6.	10.6
7.	19.4
8.	22.5
9.	24.7
10.	26.5
11.	28.0
12.	29.0

Figure 3. Slag Tap Scrubber Outlet Sampling Site
Stauffer Chemical Co., Mt. Pleasant, Tennessee

VI. SAMPLING PROCEDURES

All sampling procedures were selected by EPA prior to field sampling. All analyses of collected samples were also performed by EPA. Field data sheets and associated velocity and sampling volume calculations are included in Appendix B.

Velocity and Gas Temperature

All gas velocities were measured with a type S pitot tube and inclined draft gage. In all cases velocities were measured at each sampling point across the stack diameter to determine an average value according to procedures described in the Federal Register[1] - Method 1. Temperatures were measured by long stem dial thermometers.

Molecular Weight

An integrated sample of the stack gases was collected during each run by pumping gas into a Mylar bag at the rate of approximately 0.5 liter per minute. This bag sample was than analyzed with an Orsat apparatus for CO_2, O_2 and CO.

Fluorides & P_2O_5

The basic train for all total fluorides and phosphorus pentoxide samples is shown in Figure 4 and consisted of three

1. Federal Register, Vol. 36, No. 247, December 23, 1971

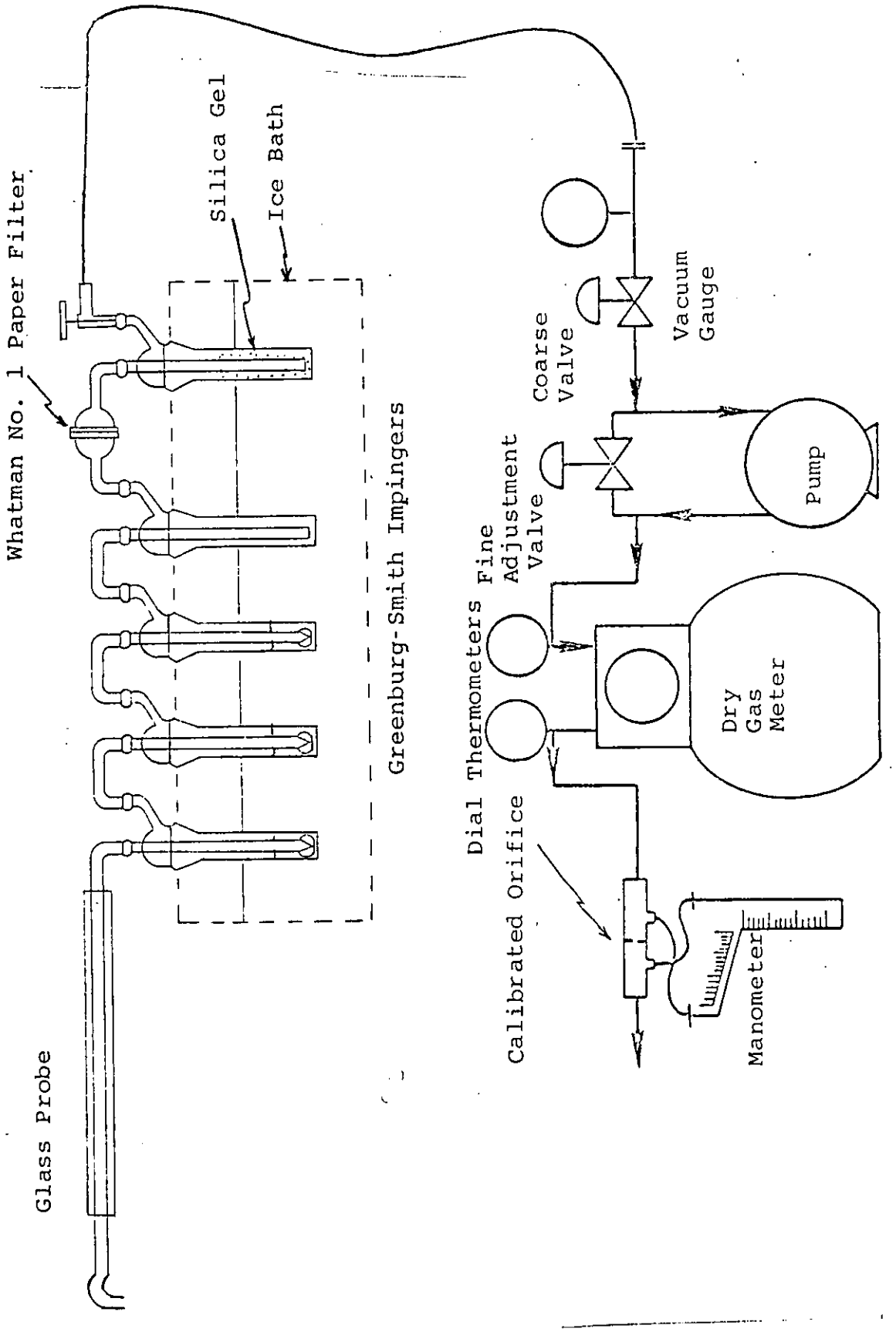


Figure 4. Fluoride and P_2O_5 Sampling Train

standard Greenburg-Smith impingers containing 100 ml each of 10% sodium hydroxide, one empty straight tip impinger, a 3" or 4" unheated Whatman No. 1 paper filter, and an impinger containing approximately 200 grams of accurately weighed silica gel. The impingers were contained in an ice-water bath. A stainless steel nozzle and unheated glass lined probe were used in all cases. A Teflon connector between the probe and first impinger was used in all tests to facilitate traversing.

In all cases sampling was conducted under isokinetic conditions by continually monitoring the velocity with a pitot tube and adjusting the sampling rate accordingly.

Sample recovery consisted of measuring the volume increase of the impinger contents and silica gel weight gain, a triple water rinse of all components from nozzle tip to filter holder, and a triple acetone rinse of all components. The impinger contents, filter, and the water rinse were combined in one glass sample jar, and the acetone rinse was placed in another sample jar.

APPENDIX A
Emission Data Summary
and Sample Calculations

TABLE A-1

Run No.		1 In	1 Out
Test Date, 1972		5-31	5-31
Sampling Time, 24 hour clock		0838-1641	0837-1510
Sampling Location		Inlet	Outlet
D_n	Sampling Nozzle Diameter, in.	0.1875	0.1875
T_t	Net Time of Test, Min.	60.0	60.0
P_b	Barometric Pressure, in. Hg Absolute	29.90	29.91
P_m	Average Orifice Pressure Drop, in. H_2O	0.67	0.65
V_m	Volume of Dry Gas Sampled at Meter Conditions, DCF	30.815	30.416
T_m	Average Gas Meter Temperature, °F	65.5	69.5
$V_{m_{std}}$	Volume of Dry Gas Sampled at Standard Conditions[a], DSCF	31.133	30.506
V_w	Total H_2O Collected in Impingers and Silica Gel, ml	10.6	16.7
$V_{w_{gas}}$	Volume of Water Vapor Collected at Standard Conditions[b], SCF	0.502	0.792
% M	% Moisture in Stack Gas, by Volume	1.59	2.53
M_d	Mole Fraction of Dry Gas	0.9841	.9747
% CO_2	Volume % Dry	0.2	.27
% O_2	Volume % Dry	20.8	21.2
% CO	Volume % Dry	0.3	0.5
% N_2	Volume % Dry	78.7	78.0
% EA	Percent Excess Air	NA	NA
MW_d	Molecular Weight of Stack Gas, Dry Basis	28.86	28.89

TABLE A-1 Continued

Run No.		1 In	1 Out
MW	Molecular Weight of Stack Gas, Wet Basis	28.69	28.61
C_p	Pitot Tube Coefficient	0.85	0.85
T_s	Average Stack Temperature, °F	158	113
N_p	Net Sampling Points	20	20
P_{st}	Static Pressure of Stack Gas, in. Hg	-.74	-0.05
P_s	Stack Gas Pressure, in. Hg Absolute	29.16	29.85
V_s	Stack Gas Velocity at Stack Conditions, fpm	3252	3006
A_s	Stack Area, $in.^2$	689.3	706.9
O_s	Dry Stack Gas Volumetric Flow Rate at Standard Conditions,[c] DSCFM	12,809	13,264
Q_a	Stack Gas Volumetric Flow Rate at Stack Conditions, ACFM	15,567	14,756
% I	Percent Isokinetic	101.1	98.1
% O	Percent Opacity		
T_c	Unit Production Rate -		
m_f	Particulate - Probe, Cyclone, and Filter, mg	NA	NA
m_t	Fluoride - Total, mg	59.27	1.5
	P_2O_5	117.4	27.5
I_c	% Impinger Catch	NA	NA
C_{an}	Particulate - Probe, Cyclone, and Filter, grains/SCF	NA	NA
C_{ao}	Fluoride - Total, grains/SCF	.0294	.000758
	P_2O_5	0.0582	0.01391

TABLE A-1 Continued

Run No.		1 In	1 Out
C_{at}	Particulate - Probe, Cyclone, and Filter, grains/ACF	NA	NA
C_{au}	Particulate - Total, grains/ACF	NA	NA
C_{aw}	Particulate - Probe, Cyclone, and Filter, lb/hr.	NA	NA
C_{ax}	Fluoride - Total, lb/~~hr.~~ 15-min. tap	0.806	0.0215
	P_2O_5	1.597	0.39528
P_{tf}	Particulate - Probe, Cyclone and Filter, lb/ton	NA	NA
P_{tt}	Particulate - Total, lb/ton	NA	NA

[a] Dry standard cubic feet at 70°F, 29.92 in. Hg.

[b] Standard conditions at 70°F, 29.92 in. Hg.

[c] Dry standard cubic feet per minute at 70°F, 29.92 in. Hg.

TABLE A-2

Run No.		2 In	2 Out
Test Date, 1972		6-1	6-1
Sampling Time, 24 hour clock		1048-1800	0955-1634
Sampling Location		Inlet	Outlet
D_n	Sampling Nozzle Diameter, in.	0.1875	0.1875
T_t	Net Time of Test, Min.	54.0	60.0
P_b	Barometric Pressure, in. Hg Absolute	29.96	30.00
P_m	Average Orifice Pressure Drop, in. H_2O	0.58	0.63
V_m	Volume of Dry Gas Sampled at Meter Conditions, DCF	26.386	30.873
T_m	Average Gas Meter Temperature, °F	76.5	80
$V_{m_{std}}$	Volume of Dry Gas Sampled at Standard Conditions[a], DSCF	26.158	30.423
V_w	Total H_2O Collected in Impingers and Silica Gel, ml	15.6	22.6
$V_{w_{gas}}$	Volume of Water Vapor Collected at Standard Conditions[b], SCF	0.739	1.071
% M	% Moisture in Stack Gas, by Volume	2.75	3.40
M_d	Mole Fraction of Dry Gas	0.9725	0.9660
% CO_2	Volume % Dry	0.13	0.15
% O_2	Volume % Dry	20.1	20.23
% CO	Volume % Dry	1.1	0.53
% N_2	Volume % Dry	76.67	79.08
% EA	Percent Excess Air	NA	NA
MW_d	Molecular Weight of Stack Gas, Dry Basis	28.82	28.83

TABLE A-2 Continued

Run No.		2 In	2 Out
MW	Molecular Weight of Stack Gas, Wet Basis	28.53	28.46
C_p	Pitot Tube Coefficient	0.85	0.85
T_s	Average Stack Temperature, °F	131	111
N_p	Net Sampling Points	15	20
P_{st}	Static Pressure of Stack Gas, in. Hg	-0.9	-0.06
P_s	Stack Gas Pressure, in. Hg Absolute	29.06	29.94
V_s	Stack Gas Velocity at Stack Conditions, fpm	2994	2922
A_s	Stack Area, $in.^2$	689.3	706.9
O_s	Dry Stack Gas Volumetric Flow Rate at Standard Conditions,[c] DSCFM	12,143	12,878
Q_a	Stack Gas Volumetric Flow Rate at Stack Conditions, ACFM	14,332	14,344
% I	Percent Isokinetic	99.5	100.7
% O	Percent Opacity		
T_c	Unit Production Rate -		
m_f	Particulate - Probe, Cyclone, and Filter, mg	NA	NA
m_t	Fluoride - Total, mg	53.60	2.03
	P_2O_5	112.0	31.6
I_c	% Impinger Catch	NA	NA
C_{an}	Particulate - Probe, Cyclone, and Filter, grains/SCF,	NA	NA
C_{ao}	Fluoride - Total, grains/SCF	0.0316	0.00103
	P_2O_5	0.06607	0.01603

TABLE A-2 Continued

Run No.		2 In	2 Out
C_{at}	Particulate - Probe, Cyclone, and Filter, grains/ACF	NA	NA
C_{au}	Particulate - Total, grains/ACF	NA	NA
C_{aw}	Particulate - Probe, Cyclone, and Filter, lb/hr.	NA	NA
C_{ax}	Fluoride - Total, lb/~~hr.~~ 15-min. tap	0.8226	0.02840
	P_2O_5	1.7189	0.4422
P_{tf}	Particulate - Probe, Cyclone and Filter, lb/ton	NA	NA
P_{tt}	Particulate - Total, lb/ton	NA	NA

[a] Dry standard cubic feet at 70°F, 29.92 in. Hg.

[b] Standard conditions at 70°F, 29.92 in. Hg.

[c] Dry standard cubic feet per minute at 70°F, 29.92 in. Hg.

TABLE A-3

Run No.		3 In	3 Out
Test Date, 1972		6-2	6-2
Sampling Time, 24 hour clock		0700-1200	0707-1203
Sampling Location		Inlet	Outlet
D_n	Sampling Nozzle Diameter, in.	0.1875	0.1875
T_t	Net Time of Test, Min.	54.0	60.0
P_b	Barometric Pressure, in. Hg Absolute	29.96	29.96
P_m	Average Orifice Pressure Drop, in. H_2O	0.59	0.65
V_m	Volume of Dry Gas Sampled at Meter Conditions, DCF	25.918	30.879
T_m	Average Gas Meter Temperature, °F	68.5	74.5
$V_{m_{std}}$	Volume of Dry Gas Sampled at Standard Conditions[a], DSCF	26.083	30.732
V_w	Total H_2O Collected in Impingers and Silica Gel, ml	1.6	21.7
$V_{w_{gas}}$	Volume of Water Vapor Collected at Standard Conditions[b], SCF	0.076	1.029
% M	% Moisture in Stack Gas, by Volume	0.29	3.24
M_d	Mole Fraction of Dry Gas	0.9971	0.9897
% CO_2	Volume % Dry	2.9	1.9
% O_2	Volume % Dry	20.7	20.1
% CO	Volume % Dry	0.4	0.6
% N_2	Volume % Dry	76.0	77.4
% EA	Percent Excess Air	NA	NA
MW_d	Molecular Weight of Stack Gas, Dry Basis	29.29	29.11

TABLE A-3 Continued

Run No.		3 IN	3 Out
MW	Molecular Weight of Stack Gas, Wet Basis	29.26	28.75
C_p	Pitot Tube Coefficient	0.85	0.85
T_s	Average Stack Temperature, °F	121	111
N_p	Net Sampling Points	15	20
P_{st}	Static Pressure of Stack Gas, in. Hg	-0.90	-0.06
P_s	Stack Gas Pressure, in. Hg Absolute	29.05	29.90
V_s	Stack Gas Velocity at Stack Conditions, fpm	2766	2982
A_s	Stack Area, $in.^2$	689.3	706.9
Q_s	Dry Stack Gas Volumetric Flow Rate at Standard Conditions,[c] DSCFM	11691	13,149
Q_a	Stack Gas Volumetric Flow Rate at Stack Conditions, ACFM	13241	14638
% I	Percent Isokinetic	103.1	99.7
% O	Percent Opacity		
T_c	Unit Production Rate -		
m_f	Particulate - Probe, Cyclone, and Filter, mg	NA	NA
m_t	Fluoride - Total, mg	43.7	2.6
	P_2O_5	93.7	23.8
I_c	% Impinger Catch	NA	NA
C_{an}	Particulate - Probe, Cyclone, and Filter, grains/SCF	NA	NA
C_{ao}	Fluoride - Total, grains/SCF	0.0258	0.001305
	P_2O_5	0.0554	0.01195

TABLE A-3 Continued

Run No.		3 IN	3 Out
C_{at}	Particulate - Probe, Cyclone, and Filter, grains/ACF	NA	NA
C_{au}	Particulate - Total, grains/ACF	NA	NA
C_{aw}	Particulate - Probe, Cyclone, and Filter, lb/hr.	NA	NA
C_{ax}	Fluoride - Total, lb/~~hr.~~ 15-min. tap	0.6475	0.03678
	P_2O_5	1.3884	0.3367
P_{tf}	Particulate - Probe, Cyclone and Filter, lb/ton	NA	NA
P_{tt}	Particulate - Total, lb/ton	NA	NA

[a] Dry standard cubic feet at 70°F, 29.92 in. Hg.

[b] Standard conditions at 70°F, 29.92 in. Hg.

[c] Dry standard cubic feet per minute at 70°F, 29.92 in. Hg.

EXAMPLE CALCULATIONS

TEST 1 - SCRUBBER OUTLET

1. Volume of dry gas sampled at standard conditions[a], DSCF

$$V_{m_{std}} = \frac{17.7 \times V_m \left(P_b + \frac{P_m}{13.6}\right)}{(T_m + 460)} = \frac{17.7 \times 30.416 \left(29.91 + \frac{0.65}{13.6}\right)}{(69.5 + 460)} = 30.5 \text{ DSCF}$$

2. Volume of water vapor at standard conditions[b], SCF

$$V_{w_{gas}} = 0.0474 \times V_w = 0.0474 \times 16.7 = 0.792 \text{ SCF}$$

3. Percent moisture in stack gas

$$\%\ M = \frac{100 \times V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}} = \frac{100 \times 0.792}{30.5 + 0.792} = 2.53$$

4. Mole fraction of dry gas

$$M_d = \frac{100 - \%\ M}{100} = \frac{100 - 2.53}{100} = 0.9747$$

5. Molecular weight of dry stack gas

$$MW_d = (\%CO_2 \times \frac{44}{100}) + (\%O_2 \times \frac{32}{100}) + \left[(\%CO + \%N_2) \times \frac{28}{100}\right] =$$

$$(0.27 \times \frac{44}{100}) + (21.2 \times \frac{32}{100}) + (78.53 \times \frac{28}{100}) = 28.89$$

6. Molecular weight of wet stack gas

$$MW = MW_d \times M_d + 18\ (1 - M_d) = 28.89 \times 0.9747 + 18\ (1 - 0.9747) = 28.61$$

7. Stack gas velocity at stack conditions, fpm[c]

$$V_s = 5128.8 \times Cp \times \sqrt{\Delta P_s \times (T_s + 460)} \left[\frac{1}{P_s \times MW}\right]^{1/2} =$$

$$5128.8 \times 0.85 \times 20.1 \left[\frac{1}{29.85 \times 28.61}\right]^{1/2} = 3000 \text{ fpm}$$

8. Stack gas volumetric flow rate at standard conditions[d], DSCFM

$$Q_s = \frac{0.123 \times V_s \times A_s \times M_d \times P_s}{(T_s + 460)} = \frac{0.123 \times 3006 \times 706.9 \times 0.9747 \times 29.85}{(113 + 460)} = 13,300 \text{ DSCFM}$$

9. Stack gas volumetric flow rate at stack conditions, ACFM

$$Q_a = \frac{.05645 \times Q_s\ (T_s + 460)}{P_s \times M_d} = \frac{.05645 \times 13,300\ (113 + 460)}{29.85 \times 0.9747} = 14,800 \text{ ACFM}$$

10. Percent isokinetic

$$\%I = \frac{1,032 \times (T_s + 460) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2} = \frac{1,032 \times (113 + 460) \times 30.5}{3006 \times 60 \times 29.85 \times 0.9747 \times (0.1875)^2} = 98$$

11. Particulate - probe, cyclone, and filter, gr/DSCF N.A.

$$C_{an} = 0.01543 \times \frac{m_f}{V_{m_{std}}} = 0.01543 \times \frac{\quad}{\quad} = \quad \text{gr/DSCF}$$

12. Fluoride - total, gr/DSCF

$$C_{ao} = 0.01543 \times \frac{m_t}{V_{m_{std}}} = 0.01543 \times \frac{1.5}{30.506} = .000758 \text{ gr/DSCF}$$

13. Particulate - probe, cyclone, and filter at stack conditions, gr/ACF N.A.

$$C_{at} = \frac{17.7 \times C_{an} \times P_s \times M_d}{(T_s + 460)} = \frac{17.7 \times \quad \times \quad \times \quad}{(\quad + 460)} = \quad \text{gr/ACF}$$

14. Fluoride - total at stack conditions, gr/ACF

$$C_{aw} = \frac{17.7 \times C_{ao} \times P_s \times M_d}{(T_s + 460)} = \frac{17.7 \times .000758 \times 29.85 \times 0.9747}{(113 + 460)} = .000681 \text{ gr/ACF}$$

15. Particulate - probe, cyclone, and filter, lb/hr N.A.

$$C_{aw} = 0.00857 \times C_{an} \times Q_s = 0.00857 \times \quad \times \quad = \quad \text{lb/hr}$$

16. Fluoride - total, lb/hr

$C_{ax} = 0.00857 \times C_{ao} \times Q_s = 0.00857 \times .00075 \times 13,300 = 0.0864$ lb/hr

17. Particulate - probe, cyclone, and filter, lb/ton feed N.A.

$P_{tf} = \frac{C_{aw}}{T_c} = \frac{\quad}{\quad} =$ lb/ton feed

18. Fluoride - total, lb/ 15 min. tap

$P_{tt} = \frac{C_{ax}}{4 \text{ taps/hr}} = \frac{0.0864}{4} = 0.0215$ lb/15 min. tap

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[a] Dry standard cubic feet at 70°F, 29.92 in. Hg.

[b] Standard conditions at 70°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.

[d] Dry standard cubic feet per minute at 70°F, 29.92 in. Hg.

APPENDIX ~~D~~ B

Field Data

This Appendix contains copies of the original field data sheets and the computer printouts used for volume and velocity calculations.

PLANT	STAUFFER CHEM., MT. PLEASANT, TENN	DATE	05/31/72
SAMPLING LOCATION	SLAG TAP-OUTLET SCRUBBER	RUN NUMBER	1

DRY MOLECULAR WEIGHT DETERMINATION

GAS	VOL. PERCENT DRY BASIS
CO2	.267
O2	21.167
CO	.533
N2	78.033
TOTAL	100.000
DRY MOLECULAR WEIGHT, LB/LB-MOLE	28.89

MOISTURE CONTENT DETERMINATION

IMPINGER MOISTURE, ML	11.0
SILICA MOISTURE, ML	5.7
TOTAL MOISTURE, ML	16.7
WATER VAPOR COLLECTED, STD. CU. FT.	.792
GAS METER VOL., CU.FT.	
GROSS TOTAL	30.416
LESS LEAKAGE CORR	.000
NET TOTAL	30.416
DRY GAS VOL. THROUGH METER, STD. CU. FT	30.506
MOISTURE CONTENT, VOL. FRACTION	.0253

STACK GAS VELOCITY AND VOLUME DETERMINATION

STACK AREA, SQ. FT.	4.909
PITOT TUBE COEFFICIENT	.85
STACK ABS.PRESS., IN.HG	29.85
STACK GAS TEMPERATURE, DEG.F	113
STACK GAS MOL. WT., WET BASIS	28.61
SQRT(VEL HD X STACK TEMP ABS)	20.1
STACK GAS VELOCITY, ACT. FPS	50.1
STACK GAS VOLUME, STD CFM,	
WET BASIS	13608.2
DRY BASIS	13264.0

ISOKINETIC VARIATION

PERCENT OF ISOKINETIC SAMPLING	98.1

PLANT: STAUFFER CHEM., MT. PLEASANT, TENN
SAMPLING LOCATION: SLAG TAP-SCRUBBER INLET
DATE: 05/31/72
RUN NUMBER: 1

DRY MOLECULAR WEIGHT DETERMINATION

GAS	VOL. PERCENT DRY BASIS
CO2	.200
O2	20.800
CO	.300
N2	78.700
TOTAL	100.000
DRY MOLECULAR WEIGHT, LB/LB-MOLE	28.86

MOISTURE CONTENT DETERMINATION

IMPINGER MOISTURE, ML	2.0
SILICA MOISTURE, ML	8.6
TOTAL MOISTURE, ML	10.6
WATER VAPOR COLLECTED, STD. CU. FT.	.502
GAS METER VOL., CU.FT.	
GROSS TOTAL	30.815
LESS LEAKAGE CORR	.000
NET TOTAL	30.815
DRY GAS VOL. THROUGH METER, STD. CU. FT	31.133
MOISTURE CONTENT, VOL. FRACTION	.0159

STACK GAS VELOCITY AND VOLUME DETERMINATION

STACK AREA, SQ. FT.	4.787
PITOT TUBE COEFFICIENT	.85
STACK ABS.PRESS., IN.HG	29.16
STACK GAS TEMPERATURE, DEG.F	158
STACK GAS MOL. WT., WET BASIS	28.69
SQRT(VEL HD X STACK TEMP ABS)	21.6
STACK GAS VELOCITY, ACT. FPS	54.2
STACK GAS VOLUME, STD CFM,	
WET BASIS	13016.0
DRY BASIS	12809.3

ISOKINETIC VARIATION

PERCENT OF ISOKINETIC SAMPLING	101.1

FIELD DATA

PLANT	STAUFFER CHEM., MT. PLEASANT, TENN	DATE	05/31/72
SAMPLING LOCATION	SLAG TAP-SCRUBBER INLET	RUN NUMBER	1
SAMPLE TYPE	FLUORIDES	PROBE LENGTH AND TYPE	3FT PYREX
OPERATOR	FM AND WRP	NOZZLE I.D.	.1875
AMBIENT TEMP.(DEG.F)	60	ASSUMED MOISTURE	5
BAR.PRESS.(IN.HG)	29.90	SAMPLE BOX NUMBER	
STATIC PRESS(IN.H2O)	-10.00	METER BOX NUMBER	3
FILTER NUMBER(S)	SEE CLEAN-UP SHEET	METER HEAD DIFF.	1.52 AT 0.75 SCFM
STACK INSIDE DIM(IN)	29.625	C FACTOR	0.81
PITOT TUBE COEFF	.85	PROBE HEATER SETTING	
		HEATER BOX SETTING	
READ AND RECORD DATA EVERY 2.5 MINUTES		REFERENCE PRESS DIFF.	

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	0838	300.050									
A-11	5.0		303.060	1.100	.95	.95	100	56	56	9.0		57
A-10	7.5		304.480	1.050	.94	.94	245	61	57	9.0		55
A-9	10.0		305.918	1.100	.95	.95	258	63	58	9.0		55
		1009	306.420	.960	.84	.84	140	61	61	8.0		60
A-8	12.5		307.750	.920	.79	.79	154	64	62	8.0		54
A-7	15.0		307.120	.670	.58	.58	165	66	62	8.0		54
A-6	17.5		310.280	.520	.46	.25	165	67	62	15.0		54
A-5	19.0		310.825					68	62			
		1245	310.912	.950	.83	.83	130	62	62	7.0		56
A-5	20.0		311.500	.950	.83	.83	130	63	62	7.0		55
A-4	22.5		312.870	.400	.35	.35	130	64	62	5.0		54
A-3	25.0		313.870	.120	.11	.11	130	65	62	5.0		54
A-2	27.5		314.740	.400	.35	.35	130	66	63	5.0		54
A-2	30.0		315.586	.400	.35	.35	130	67	63	5.0		54
B-11	32.5	1323	316.890	.850	.74	.74	175	65	65	8.0		64
B-11	35.0		318.240	.850	.74	.74	242	66	65	8.0		58
B-10	37.5		319.700	.850	.74	.74	268	69	66	10.0		58
B-9	40.0		320.740	.790	.69	.69	280	72	67	11.0		64
			320.891									
B-8	42.5		322.165	.800	.70	.70	200	68	68	8.0		57
B-7	45.0		323.500	.850	.74	.74	175	68	68	8.0		
B-6	47.5		324.756	.700	.60	.60	110	70	68	7.5		56
B-5	50.0		325.965	.660	.57	.57	80	73	69	7.5		56
B-4	52.5		327.175	.850	.73	.73	72	74	69	7.5		56
B-3	55.0		328.630	1.050	.90	.90	80	75	69	10.5		59
B-2	57.5	1636	329.721	.850	.73	.73	110	70	70	7.0		60
B-2	60.0	1641	330.865	.850	.73	.73	180	70	70	7.0		61
TOTALS	60.0		30.815									
AVERAGE					.68	.67	158	67	64	8.0		57

FIELD DATA

PLANT	STAUFFER CHEM., MT. PLEASANT, TENN	DATE	05/31/72
SAMPLING LOCATION	SLAG TAP-OUTLET SCRUBBER	RUN NUMBER	1
SAMPLE TYPE	FLUORIDES	PROBE LENGTH AND TYPE	3FT PYREX
OPERATOR	RSA AND RZ	NOZZLE I.D.	.1875
AMBIENT TEMP.(DEG.F)	90	ASSUMED MOISTURE	5
BAR.PRESS.(IN.HG)	29.91	SAMPLE BOX NUMBER	
STATIC PRESS(IN.H2O)	-.70	METER BOX NUMBER	2
FILTER NUMBER(S)	SEE CLEAN-UP SHEET	METER HEAD DIFF.	1.39
STACK INSIDE DIM(IN)	30.000	C FACTOR	0.77
PITOT TUBE COEFF	.85	PROBE HEATER SETTING	
		HEATER BOX SETTING	
READ AND RECORD DATA EVERY	2.5 MINUTES	REFERENCE PRESS DIFF.	

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	0837	92.305									
A-2	5.0		94.342	.430	.40	.40	105	60	60	6.0		56
A-3	7.5		95.861	.470	.43	.43	115	64	60	7.0		57
A-4	10.0		96.790	.550	.52	.52	115	67	61	8.0		57
A-5	12.5		97.064	.700	.65	.65	105	64	64	9.0		60
A-6	15.0		98.387	.770	.73	.73	110	70	65	13.0		51
A-7	17.5		99.066	.900	.80	.80	110	75	65	14.0		51
A-8	20.0		101.342	.920	.85	.85	115	79	65	16.0		51
A-9	22.5		102.449	.900	.80	.80	115	80	66	18.0		51
A-10	24.5		105.382	.850	.77	.77	115	80	66	18.0		52
A-10	25.0		105.382	.840	.75	.75	100	66	64	16.0		53
A-11	27.5		107.212	.820	.75	.75	105	70	65	16.0		53
A-11	30.0		108.568	.800	.73	.73	107	70	65	15.0		53
B-2	32.5		109.994	.500	.46	.46	110	70	65	13.0		54
B-2	35.0		110.723	.500	.46	.46	115	72	66	15.0		54
B-3	37.0		111.790	.700	.65	.65	115	72	66	16.0		55
B-3	37.5		111.792	.700	.63	.63	111	68	66	16.0		56
B-4	40.0		112.154	.720	.66	.66	115	72	68	15.0		55
B-5	42.5		114.730	.700			120	72	68	15.0		56
B-6	45.0		116.483	.770	.70	.70	120	78	68	17.0		58
B-7	47.5		117.763	.770	.68	.68	120	82	68	17.0		56
B-8	50.0		119.120	.730	.67	.67	120	84	69	17.0		56
B-9	52.4		120.049	.700	.65	.65	120	85	70	16.0		56
B-9	52.5		120.163	.780	.70	.70	105	70	68	13.0		57
B-10	55.0		121.249	.720	.61	.61	110	71	69	5.0		58
B-11	57.5		122.163	.700	.65	.65	115	75	70	6.0		59
B-11	60.0		122.721	.650	.60	.60	115	78	70	6.0		59
TOTALS	60.0		30.416									
AVERAGE					.65	.65	113	73	66	13.2		55

FIELD DATA

PLANT	STAUFFER CHEM., MT. PLEASANT, TENN	DATE	06/01/72
SAMPLING LOCATION	SLAG TAP SCRUBBER INLET	RUN NUMBER	2
SAMPLE TYPE	FLUORIDES	PROBE LENGTH AND TYPE	4FT PYREX
OPERATOR	FM AND JG	NOZZLE I.D.	.1875
AMBIENT TEMP.(DEG.F)	65	ASSUMED MOISTURE	5
BAR.PRESS.(IN.HG)	29.96	SAMPLE BOX NUMBER	
STATIC PRESS(IN.H2O)	-12.24	METER BOX NUMBER	
FILTER NUMBER(S)	SEE CLEAN-UP SHEET	METER HEAD DIFF.	1.52 AT 0.75 SCFM
STACK INSIDE DIM(IN)	29.625	C FACTOR	0.31
PITOT TUBE COEFF	.85	PROBE HEATER SETTING	
		HEATER BOX SETTING	
READ AND RECORD DATA EVERY 3.0 MINUTES		REFERENCE PRESS DIFF.	

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	1048	336.601									
A-6	3.0		337.840	.570	.50	.50	112	63	63	5.5		60
A-5	6.0		339.172	.520	.45	.45	145	64	63	6.5		58
A-4	9.0		340.441	.490	.43	.43	174	75	63	6.0		58
A-3	12.0		341.652	.400	.35	.35	169	77	63	6.0		59
A-2	15.0	1325	342.810	.450	.39	.39	112	71	71	6.0		62
A-2	18.0		344.078	.470	.41	.41	150	72	71	6.0		62
B-11	21.0		345.590	.750	.65	.65	168	75	72	8.5		62
B-11	24.0		347.150	.750	.65	.65	178	77	73	8.5		62
B-10	27.0	1510	348.725	.770	.67	.67	105	77	77	8.5		65
B-9	30.0		350.200	.770	.67	.67	205	79	77	6.5		64
B-8	33.0		351.759	.740	.65	.65	242	80	77	6.5		64
B-7	35.0		352.636	.710	.62	.62	145	83	77	15.0		64
B-7		1640	352.837									
B-7	36.0		353.280	.710	.62	.62	95	83	82	6.5		67
B-6	39.0		354.800	.710	.62	.62	85	84	82	7.0		66
B-5	42.0		356.280	.660	.57	.57	85	85	81	6.5		66
B-4	45.0		357.750	.670	.58	.58	92	87	81	6.5		67
B-3	48.0		359.267	.730	.64	.64	92	90	82	6.5		67
B-2	51.0	1800	361.144	.990	.84	.84	68	83	83	7.5		68
B-2	54.0		362.987	.940	.77	.77	74	85	82	8.5		65
TOTALS	54.0		26.386									
AVERAGE					.58	.58	131	78	75	7.3		63

PLANT	STAUFFER CHEM., MT. PLEASANT, TENN	DATE	06/01/72
SAMPLING LOCATION	SLAG TAP SCRUBBER INLET	RUN NUMBER	2

DRY MOLECULAR WEIGHT DETERMINATION

GAS	VOL. PERCENT DRY BASIS
CO2	.133
O2	20.066
CO	1.133
N2	78.668
TOTAL	100.000
DRY MOLECULAR WEIGHT, LB/LB-MOLE	28.82

MOISTURE CONTENT DETERMINATION

IMPINGER MOISTURE, ML	.0
SILICA MOISTURE, ML	15.6
TOTAL MOISTURE, ML	15.6
WATER VAPOR COLLECTED, STD. CU. FT.	.739
GAS METER VOL., CU.FT.	
GROSS TOTAL	26.386
LESS LEAKAGE CORR	.000
NET TOTAL	26.386
DRY GAS VOL. THROUGH METER, STD. CU. FT	26.158
MOISTURE CONTENT, VOL. FRACTION	.0275

STACK GAS VELOCITY AND VOLUME DETERMINATION

STACK AREA, SQ. FT.	4.787
PITOT TUBE COEFFICIENT	.85
STACK ABS. PRESS., IN. HG	29.06
STACK GAS TEMPERATURE, DEG. F	131
STACK GAS MOL. WT., WET BASIS	28.53
SQRT(VEL HD X STACK TEMP ABS)	19.8
STACK GAS VELOCITY, ACT. FPS	49.9
STACK GAS VOLUME, STD CFM,	
WET BASIS	12486.4
DRY BASIS	12143.1

ISOKINETIC VARIATION

PERCENT OF ISOKINETIC SAMPLING	99.5

FIELD DATA

PLANT	STAUFFER CHEM., MT. PLEASANT, TENN	DATE	06/01/72
SAMPLING LOCATION	SLAG TAP-SCRUBBER OUTLET	RUN NUMBER	2
SAMPLE TYPE	FLUORIDES	PROBE LENGTH AND TYPE	3FT TEFLON
OPERATOR	RSA AND RAZ	NOZZLE I.D.	.1875
AMBIENT TEMP.(DEG.F)	70	ASSUMED MOISTURE	5
BAR.PRESS.(IN.HG)	30.00	SAMPLE BOX NUMBER	
STATIC PRESS(IN.H2O)	-.82	METER BOX NUMBER	2
FILTER NUMBER(S)	SEE CLEAN-UP SHEET	METER HEAD DIFF.	1.39 AT 0.75 SCFM
STACK INSIDE DIM(IN)	30.000	C FACTOR	0.70
PITOT TUBE COEFF	.85	PROBE HEATER SETTING	
		HEATER BOX SETTING	
READ AND RECORD DATA EVERY 2.5 MINUTES		REFERENCE PRESS DIFF.	

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) DESIRED	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O) ACTUAL	STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F) INLET	DRY GAS METER TEMP (DEG.F) OUTLET	PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
INIT	0		122.818									76
B-2	2.5	0955	123.844	.460	.43	.43	100	74	72	5.0		60
B-2	5.0		124.933	.480	.44	.44	110	74	72	5.0		63
B-3	7.5		126.061	.450	.42	.42	115	75	72	5.0		63
B-4	9.1		126.764	.460	.43	.43	120					79
B-4	10.0	1148	127.224	.500	.46	.46	100	75	75	6.0		60
B-5	12.5		128.472	.780	.72	.72	105	75	74	8.0		58
B-6	15.0		129.910	.800	.74	.74	110	78	74	11.0		59
B-7	17.5		131.412	.950	.86	.86	110	82	75	13.0		59
B-8	20.0		132.864	.950	.86	.86	110	86	75	14.0		58
B-9	22.1		134.055	.850	.78	.78	112	86	75	12.0		80
B-9	22.5	1325	134.125	.940	.88	.88	100	80	80	13.0		60
B-10	25.0		135.824	.910	.80	.80	105	82	80	13.0		58
B-11	27.5		137.294	.730	.66	.66	110	82	78	12.0		60
B-11	30.0		138.690	.550	.50	.50	112	82	78	10.0		58
A-2	32.0		139.586	.500	.46	.46	115	82	78	9.0		78
A-2	32.5		139.771	.420	.40	.40	105	81	80	7.0		65
A-2	35.0		140.874	.430	.41	.41	110	82	80	7.0		61
A-3	37.5		141.921	.550	.51	.51	110	82	80	8.0		62
A-4	40.0		143.077	.630	.58	.58	110	82	80	8.0		58
A-5	42.5		143.784	.680	.62	.62	115	87	80	8.0		58
A-6	45.0		145.162	.700	.64	.64	115	88	80	8.0		58
A-7	45.4		145.489	.680	.62	.62	115	88	80	8.0		63
A-7	47.5	1620	146.623	.900	.82	.82	110	78	77	8.0		62
A-8	50.0		148.294	.920	.83	.83	110	84	79	9.0		56
A-9	52.5		149.694	.870	.78	.78	110	86	79	9.0		58
A-10	55.0		151.100	.700	.64	.64	110	89	80	9.0		58
A-11	57.5		152.392	.670	.61	.61	120	90	80	9.0		58
A-11	60.0		153.691	.700	.64	.64	120	91	80	10.0		
TOTALS	60.0		30.873									
AVERAGE					.63	.63	111	82	78	9.0		62

PLANT	STAUFFER CHEM., MT. PLEASANT, TENN	DATE	06/01/72
SAMPLING LOCATION	SLAG TAP-SCRUBBER OUTLET	RUN NUMBER	2

DRY MOLECULAR WEIGHT DETERMINATION

GAS	VOL. PERCENT DRY BASIS
CO2	.150
O2	20.233
CO	.533
N2	79.084
TOTAL	100.000
DRY MOLECULAR WEIGHT, LB/LB-MOLE	28.83

MOISTURE CONTENT DETERMINATION

IMPINGER MOISTURE, ML	12.0
SILICA MOISTURE, ML	10.6
TOTAL MOISTURE, ML	22.6
WATER VAPOR COLLECTED, STD. CU. FT.	1.071
GAS METER VOL., CU. FT.	
GROSS TOTAL	30.873
LESS LEAKAGE CORR	.000
NET TOTAL	30.873
DRY GAS VOL. THROUGH METER, STD. CU. FT	30.423
MOISTURE CONTENT, VOL. FRACTION	.0340

STACK GAS VELOCITY AND VOLUME DETERMINATION

STACK AREA, SQ. FT.	4.909
PITOT TUBE COEFFICIENT	.85
STACK ABS. PRESS., IN. HG	29.93
STACK GAS TEMPERATURE, DEG. F	111
STACK GAS MOL. WT., WET BASIS	28.46
SQRT(VEL HD X STACK TEMP ABS)	19.6
STACK GAS VELOCITY, ACT. FPS	48.7
STACK GAS VOLUME, STD CFM,	
WET BASIS	13330.9
DRY BASIS	12877.5

ISOKINETIC VARIATION

PERCENT OF ISOKINETIC SAMPLING	100.7

FIELD DATA

PLANT	STAUFFER CHEM., MT. PLEASANT, TENN	DATE	06/02/72
SAMPLING LOCATION	SLAG TAP-SCRUBBER INLET	RUN NUMBER	3
SAMPLE TYPE	FLUORIDES	PROBE LENGTH AND TYPE	4FT PYREX
OPERATOR	FM AND JG	NOZZLE I.D.	.1875
AMBIENT TEMP.(DEG.F)	57	ASSUMED MOISTURE	5
BAR.PRESS.(IN.HG)	29.96	SAMPLE BOX NUMBER	
STATIC PRESS(IN.H2O)	-12.25	METER BOX NUMBER	
FILTER NUMBER(S)	SEE CLEAN-UP SHEET	METER HEAD DIFF.	1.52 AT 0.75 SCFM
STACK INSIDE DIM(IN)	29.625	C FACTOR	0.81
PITOT TUBE COEFF	.85	PROBE HEATER SETTING	
		HEATER BOX SETTING	
READ AND RECORD DATA EVERY	3.0 MINUTES	REFERENCE PRESS DIFF.	

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	0700	363.124									
A-6	3.0		364.678	.650	.56	.56	145	55	54	4.0		50
A-5	6.0		366.086	.600	.52	.52	136	57	54	4.0		50
A-4	9.0		367.411	.500	.44	.44	175	60	55	4.0		51
A-3	12.0		368.633	.430	.38	.38	185	61	55	4.0		51
A-2	14.0		369.307	.300	.26	.26	118	62	55	4.0		51
A-2	15.0		369.638	.300	.26	.26	75	64	64	4.0		61
A-2	18.0		370.544	.300	.26	.26	105	66	65	4.0		60
B-11	21.0		372.115	.870	.75	.75	140	69	65	9.0		56
B-11	24.0		373.735	.850	.73	.73	152	73	66	10.0		55
B-10	27.0		375.328	.830	.72	.72	135	75	67	10.5		56
B-9	30.0		376.901	.760	.66	.66	135	79	67	11.0		59
B-8	33.0		378.471	.770	.67	.67	142	81	68	12.0		60
B-7	36.0		380.062	.780	.68	.68	158	83	69	13.0		62
			380.158									
B-6	39.0		381.580	.670	.58	.58	82	73	73	10.0		59
B-5	42.0		383.028	.650	.56	.56	95	75	73	10.0		59
B-4	45.0		384.550	.700	.60	.60	98	77	73	13.0		59
B-3	48.0		385.990	.870	.90	.90	85	79	73	8.0		59
B-2	51.0		387.520	.100	.95	.95	60	78	78	15.0		62
B-2	54.0		389.138	.750	.66	.66	70	80	78	13.0		65
TOTALS	54.0		26.014									
AVERAGE					.59	.59	121	71	66	8.6		57

PLANT — STAUFFER CHEM., MT. PLEASANT, TENN
SAMPLING LOCATION — SLAG TAP-SCRUBBER INLET
DATE — 06/02/72
RUN NUMBER — 3

DRY MOLECULAR WEIGHT DETERMINATION

GAS	VOL. PERCENT DRY BASIS
CO2	2.900
O2	20.700
CO	.366
N2	76.034
TOTAL	100.000

DRY MOLECULAR WEIGHT, LB/LB-MOLE: 29.29

MOISTURE CONTENT DETERMINATION

IMPINGER MOISTURE, ML	.0
SILICA MOISTURE, ML	1.6
TOTAL MOISTURE, ML	1.6
WATER VAPOR COLLECTED, STD. CU. FT.	.076
GAS METER VOL., CU. FT.	
GROSS TOTAL	26.014
LESS LEAKAGE CORR	.096
NET TOTAL	25.918
DRY GAS VOL. THROUGH METER, STD. CU. FT	26.083
MOISTURE CONTENT, VOL. FRACTION	.0029

STACK GAS VELOCITY AND VOLUME DETERMINATION

STACK AREA, SQ. FT.	4.787
PITOT TUBE COEFFICIENT	.85
STACK ABS. PRESS., IN. HG	29.05
STACK GAS TEMPERATURE, DEG. F	121
STACK GAS MOL. WT., WET BASIS	29.26
SQRT(VEL HD X STACK TEMP ABS)	18.5
STACK GAS VELOCITY, ACT. FPS	46.1
STACK GAS VOLUME, STD CFM, WET BASIS	11724.9
STACK GAS VOLUME, STD CFM, DRY BASIS	11690.9

ISOKINETIC VARIATION

PERCENT OF ISOKINETIC SAMPLING: 103.1

FIELD DATA

PLANT	STAUFFER CHEM., MT. PLEASANT, TENN	DATE	06/02/72
SAMPLING LOCATION	SLAG TAP-SCRUBBER-OUTLET	RUN NUMBER	3
SAMPLE TYPE	FLUORIDES	PROBE LENGTH AND TYPE	3FT TEFLON
OPERATOR	RSA AND RAZ	NOZZLE I.D.	.1875
AMBIENT TEMP.(DEG.F)	75	ASSUMED MOISTURE	5
BAR.PRESS.(IN.HG)	29.96	SAMPLE BOX NUMBER	
STATIC PRESS(IN.H2O)	-.77	METER BOX NUMBER	
FILTER NUMBER(S)	SEE CLEAN-UP SHEET	METER HEAD DIFF.	1.39 AT 0.75 SCFM
STACK INSIDE DIM(IN)	30.000	C FACTOR	0.76
PITOT TUBE COEFF	.85	PROBE HEATER SETTING	
		HEATER BOX SETTING	
READ AND RECORD DATA EVERY 2.5 MINUTES		REFERENCE PRESS DIFF.	

TRAVERSE POINT NO.	SAMPLE TIME (MIN.)	CLOCK TIME (24-HR CLOCK)	GAS METER READING (CU.FT.)	VELOCITY HEAD (IN.H2O)	ORIFICE PRESSURE DIFFERENTIAL (IN.H2O)		STACK TEMP (DEG.F)	DRY GAS METER TEMP (DEG.F)		PUMP VACUUM (IN.HG)	SAMPLE BOX TEMP (DEG.F)	IMPINGER TEMP (DEG.F)
					DESIRED	ACTUAL		INLET	OUTLET			
INIT	0	0707	153.839									
B-2	2.5		154.932	.600	.54	.54	100	51	50	6.0		56
B-2	5.0		156.294	.570	.52	.52	105	57	50	6.0		45
B-3	7.5		157.453	.650	.61	.61	110	60	50	8.0		45
B-4	10.0		158.692	.750	.72	.72	110	62	51	9.0		45
B-5	12.5		160.046	.800	.76	.76	115	62	51	10.0		46
B-6	15.0		161.317	.800	.76	.76	117	64	51	10.0		48
B-7	15.1		161.441	.800	.76	.76	118	65	52	10.0		50
B-7	17.5		162.954	.930	.83	.83	100	70	67	12.0		73
B-8	20.0		164.333	.930	.83	.83	105	76	70	9.0		63
B-9	22.5		165.681	.830	.75	.75	110	78	70	9.0		57
B-10	25.0		167.054	.750	.69	.69	112	81	70	10.0		60
B-11	27.5		168.329	.700	.64	.64	112	83	71	10.0		60
B-11	30.0		169.665	.700	.64	.64	112	60				
B-11	30.0		169.665	.700	.64	.64	112	86	71	10.0		60
A-2	32.5		170.656	.390	.36	.36	112	86	73	7.0		63
A-2	35.0		171.721	.390	.36	.36	112	87	73	7.0		64
A-3	37.1		172.617	.520	.48	.48	115	88	74	7.0		64
A-3	37.5		172.871	.590	.54	.54	105	84	82	8.0		80
A-4	40.0		173.924	.590	.54	.54	108	84	82	8.0		70
A-5	42.5		175.126	.520	.48	.48	110	84	82	8.0		61
A-6	45.0		176.529	.680	.63	.63	112	85	82	9.0		61
A-7	47.5		177.672	.800	.72	.72	120	89	82	10.0		60
A-8	50.0		179.126	.800	.72		120	90	82	10.0		60
A-9	51.8		180.173	1.000	.90	.90	120	92	82	13.0		61
A-9	52.5	1155	180.593	.900	.82	.82	111	87	85	8.0		85
A-10	55.0		182.001	.870	.78	.78	112	87	85	8.0		62
A-11	57.5		183.462	.730	.68	.68	112	89	85	8.0		62
A-11	60.0		184.718	.700	.65	.65	113	90	85	9.0		62
TOTALS	60.0		30.879									
AVERAGE					.66	.65	111	78	71	8.9		60

PLANT	STAUFFER CHEM., MT. PLEASANT, TENN	DATE	06/02/72
SAMPLING LOCATION	SLAG TAP-SCRUBBER-OUTLET	RUN NUMBER	3

DRY MOLECULAR WEIGHT DETERMINATION

GAS	VOL. PERCENT DRY BASIS
CO2	1.933
O2	20.066
CO	.600
N2	77.401
TOTAL	100.000
DRY MOLECULAR WEIGHT, LB/LB-MOLE	29.11

MOISTURE CONTENT DETERMINATION

IMPINGER MOISTURE, ML	10.0
SILICA MOISTURE, ML	11.7
TOTAL MOISTURE, ML	21.7
WATER VAPOR COLLECTED, STD. CU. FT.	1.029
GAS METER VOL., CU.FT.	
GROSS TOTAL	30.879
LESS LEAKAGE CORR	.000
NET TOTAL	30.879
DRY GAS VOL. THROUGH METER, STD. CU. FT	30.732
MOISTURE CONTENT, VOL. FRACTION	.0324

STACK GAS VELOCITY AND VOLUME DETERMINATION

STACK AREA, SQ. FT.	4.909
PITOT TUBE COEFFICIENT	.85
STACK ABS.PRESS., IN.HG	29.90
STACK GAS TEMPERATURE, DEG.F	111
STACK GAS MOL. WT., WET BASIS	28.75
SQRT(VEL HD X STACK TEMP ABS)	20.1
STACK GAS VELOCITY, ACT. FPS	49.7
STACK GAS VOLUME, STD CFM,	
WET BASIS	13589.0
DRY BASIS	13148.9

ISOKINETIC VARIATION

ERCENT OF ISOKINETIC SAMPLING	99.7

FIELD DATA

PLANT STAUFFER CHEM. - MT. PLEASANT, TENN.
DATE 31 MAY 72
SAMPLING LOCATION SLAG TAP SCRUBBER INLET
SAMPLE TYPE ~~PARTICULATE~~ FLUORIDES
RUN NUMBER 1
OPERATOR FM WRP
AMBIENT TEMPERATURE 60
BAROMETRIC PRESSURE 28.90
STATIC PRESSURE, (P_s) -10.0
FILTER NUMBER (s) SEE CLEAN-UP SHEET

A - VERTICAL

PROBE LENGTH AND TYPE 3' PYREX
NOZZLE I.D. 0.1875
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER —
METER BOX NUMBER 3
METER $\Delta H_@$ 1.52 @ 0.75 SCFM
C FACTOR 0.81
PROBE HEATER SETTING —
HEATER BOX SETTING —
REFERENCE Δp —

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 2.5 MINUTES

TAP #	TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
						DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
		0	0838	300.050									
↑ 1	A-11	5.0		303.060	1.10	0.95	0.95	100	56	56	9	—	57
	A-10	7.5		304.480	1.05	0.94	0.94	245	61	57	9	—	55
	A-9	10.0		305.918	1.10	0.95	0.95	258	63	58	9	—	55
			1009	306.420	0.96	0.84	0.84	140	61	61	8	—	60
	A-8	12.5		307.750	0.92	0.79	0.79	154	64	62	8	—	54
2	A-7	15.0		309.120	0.67	0.58	0.58	165	66	62	8	—	54
	A-6	17.5		310.280	0.52	0.46	0.25	165	67	62	15	—	54
	A-5	19.0		310.825				~130	68	62		—	
	~~A-4~~	~~20.5~~	1045	310.912	0.95	0.53	0.53	→	62	62	7	—	56
	~~A-3~~ A-5	20.0		311.500	0.95	0.53	0.53	|	63	62	7	—	55
3	~~A-2~~ A-4	22.5		312.870	0.40	0.35	0.35	|	64	62	5	—	54
	~~A-1~~ A-3	25.0		313.870	0.12	0.11	0.11	|	65	62	5	—	54
	A-2	27.5		314.740	0.40	0.35	0.35	|	66	63	5	—	54
	A-1	30.0		315.546	0.40	0.35	0.35		67	63	5	—	54
↑ 4	B-11	32.5	1323	316.890	0.85	0.74	0.74	175	65	65	8	—	64
	B-11	35.0		318.240	0.85	0.74	0.74	242	66	65	8	—	58
	B-10	37.5		319.700	0.85	0.74	0.74	268	69	66	10	—	58
↓	B-9	40.0		320.740	0.79	0.69	0.69	280	72	67	11	—	64
	~~B-8~~			320.890									
↑ 5	B-8	42.5		322.165	0.80	0.70	0.70	160	68	68	8	—	57
	B-7	45.0		323.500	0.85	0.74	0.74	175	68	68	8	—	
	B-6	47.5		324.756	0.70	0.60	0.60	110	70	68	7.5	—	56
↓	B-5	50.0		325.965	0.66	0.57	0.57	80	73	69	7.5	—	56

COMMENTS:

EPA (Dur) 235
4 72

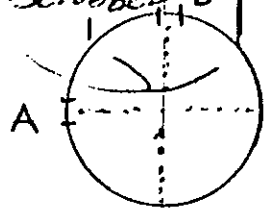
SLAG TAP No.	TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
5	A-4	52.5 ~~1630~~	327.175	0.~~86~~	0.~~73~~	0.~~73~~	72	74	69	7.5	—	56
*	A-3	55.0	328.630	1.05	0.90	0.90	80	75	69	10.5	—	59
	A-2	57.5 ~~57.2~~ 1636.0	~~328.960~~ 329.721	.85	0.73	0.73	110 ~~70~~	70	70	7	—	60
6	A-2	60.0 1641.0	330.865	.85	0.73	0.73	180	70	70	7	—	61
							T_s = 144.5					
						$\Delta H_{@}$ = .661						
						$\bar{Y}$	121.589					
TOT.		60	30.815					1733	1668			
AVG.							157.5	66.6	64	~7		

EPA (Dur) 236
4 72

* Changed filters

FIELD DATA

PLANT Stauffer Chemical - Mt Pleasant
DATE 5-31-72
SAMPLING LOCATION Slag Tap - Outlet Scrubber
SAMPLE TYPE Particulate
RUN NUMBER 1
OPERATOR RSM & RZ
AMBIENT TEMPERATURE 90°F
BAROMETRIC PRESSURE 29.91
STATIC PRESSURE, (P_s) -0.7
FILTER NUMBER (s)



SCHEMATIC OF TRAVERSE POINT LAYOUT

PROBE LENGTH AND TYPE 3' Type S
NOZZLE I.D. .187.5
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER
METER BOX NUMBER 2
METER $\Delta H_@$ 1.394
C FACTOR 0.77
PROBE HEATER SETTING — N/A
HEATER BOX SETTING — N/A
REFERENCE Δp

READ AND RECORD ALL DATA EVERY 2½ MINUTES

Tap #	TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
		0		012.305									
1	A 2	5	1352	94.342	0.43	0.40	0.40	105	60	60	6	—	56
	3	7½	8:44.5	95.861	0.47	0.43	0.43	115	64	60	07	—	57
	4	10	847.0	96.790	0.55	0.52	0.52	115	67	61	08	—	57
	5	12½											
2	5	12½	1008	97.064	.70	0.65	0.65	105	64	64	9	—	6.0
	6	15	1010.5	98.387	.77	0.73	0.73	110	70	65	13	—	51
	7	17½	1013.0	99.866	.90	0.80	0.80	110	75	65	14	—	51
	8	20	1015.5	101.342	.92	0.85	0.85	115	79	65	16	—	51
	9	22½	1018.0	102.449	.90	0.80	0.80	115	80	66	18	—	51
	10	29½	1020.0	105.382	.85	0.77	0.77	115	80	66	18	—	52
3	10	25	1145.0	105.306	.84	.75	.75	100	66	64	16	—	53
	11	27.5	1147.5	107.212	.82	.75	.75	105	70	65	16	—	53
	11	30.1	1150.0	108.568	.80	.73	.73	107	70	65	15	—	53
				109.994									
	B 02	32.5	1153.0	110.723	.50	.46	.46	110	70	65	13	—	54
	2	35.0	1158.0	111.790	.70	.65	.65	115	72	66	15	—	54
	3	37.1	1160.5		.70	.65	.65	115	72	66	16	60	55
	3	37.5	1322.0	111.792	.70	.63	.63	111	68	66	16	56	56
	4	40.0	1322.5	112.154	.72	.66	.66	115	72	68	15		55
	5	42.5	1325.0	114.730	.70			120	72	68	15		56
	6	45.0	1327.5	116.483	.77	.70	.70	120	78	68	17		58

COMMENTS: A - Pressure checked (leak) after equalizing NaOH Levels in impingers

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RV Outlet Continued

Run No 3

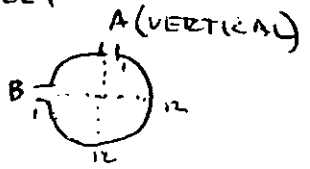
TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
7	47.5	1330.0	117.763	.77	.68	.68	120	82	68	17	—	56
8	50.0	1332.5	119.170	.73	.67	.67	120	84	69	17	—	55
9	52.4	1334.9	120.099	.70	.65	.65	120	85	70	16	—	56
~~10~~												
9	52.5	1505.0	120.163	.78	.70	.70	105	70	68	13	—	57
10	55.0	1507.5	121.249	.72	.61	.61	110	71	69	5	—	58
11	57.5	1510.0	122.163	.70	.65	.65	115	75	70	6	—	59
11	60.0	1512.5	122.721	~~.69~~ .69	.60	.60	115	78	70	6	—	59
						.660						
~~AVG~~												
TOT.	60		30.416					1899	1717			
								AVG. 73	66			

EPA (Dur) 236
4 72

* Changed filter

FIELD DATA

PLANT STAUFFER - MT. PLEASANT, TENN
DATE 1 JUNE 72
SAMPLING LOCATION SLAG TAP SCRUBBER INLET
SAMPLE TYPE FLUORIDES
RUN NUMBER 2
OPERATOR FM JG
AMBIENT TEMPERATURE 60-70
BAROMETRIC PRESSURE 29.96
STATIC PRESSURE, (P_s) -12.24
FILTER NUMBER (s) SEE CLEAN-UP SHEET



PROBE LENGTH AND TYPE 4' PYREX
NOZZLE I.D. 0.1875
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER —
METER BOX NUMBER —
METER $\Delta H_@$ 1.52 @ 0.75 SCFM
C FACTOR 0.81
PROBE HEATER SETTING —
HEATER BOX SETTING —
REFERENCE Δp —

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 3.0 MINUTES

TAP #	TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
		0 / 1148	336.601									
↑	A-6	3	337.840	0.57	0.50	0.50	112	63	63	5.5	—	60
2	A-5	6	339.172	0.52	0.45	0.45	145	64	63	6.5	—	58
	A-4	9	340.441	0.49	0.43	0.43	174	75	63	6.0	—	58
*	A-3	12	341.652	0.40	0.35	0.35	169	77	63	6.0	—	59
	A-2	15 / 1325	342.810	0.45	0.39	0.39	112	71	71	6.0	—	62
3	A-2	18	344.078	~~0.47~~	0.41	0.41	130	72	71	6.0	—	62
	B-12	21	345.590	0.75	0.65	0.65	168	75	72	8.5	—	62
*	B-11	24	347.150	0.75	0.65	0.65	178	77	73	8.5	—	62
	B-10	27 / 1510	348.725	0.77	0.67	0.67	105	77	77	8.5	—	65
4	B-9	30	350.260	0.77	0.67	0.67	205	79	77	6.5	—	64
	B-8	33	351.759	0.74	0.65	0.65	242	80	77	6.5	—	64
*	B-7	35	352.636	0.71	0.62	0.62	145	83	77	15.0	—	64
	~~B-7~~		38								—	
	B-7	1640	352.837 57	—	—	—	—	—	—	—	—	—
5	B-7	36	353.280	0.71	0.62	0.62	95	83	82	6.5	—	67
	B-6	39	354.800	0.71	0.62	0.62	85	84	82	7.0	—	66
	B-5	42	356.280	0.66	0.57	0.57	85	85	81	6.5	—	66
	B-4	45	357.750	~~0.66~~ 0.67	0.58	0.58	~~87~~ 92	87	81	6.5	—	67
	B-3	48	359.267	0.73	0.64	0.64	92	90	82	6.5	—	67
	B-2	51 / 1800	361.144	0.99	0.84	0.84	68	83	83	7.5	—	68
	B-2	54	~~362.960~~ 362.987	0.94	0.77	0.77	74	85	82	8.5	—	~~65~~
											—	
											—	

COMMENTS:

LEAKAGE 0 CFM @ 15" Hg

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GAS VELOCITY AND VOLUME DATA

Test No. 2

Location Inlet

VELOCITY TRAVERSE DATA

29 5/

Point	Position Inches[a]	Reading, Δp "H_2O	$\sqrt{\Delta p}$	T_s °F
A-6	.57	~~.75~~	.755	~~60~~ 112
A-5	.52		.721	58.145
A-4	.49		.700	58174
A-3	.40		.633	169
A-2	.45		.671	112
A-2	.47		.686	130
B-11	.75		.866	168
B-11	.75		.866	178
B-10	.77		.877	105
B-9	.77		.877	205
B-8	.74		.860	242
B-7	.71		.843	145
B-7				
B-7	.71		.843	95
B-6	.71		.843	85
B-5	.66		.812	85
B-4	.67		.819	92
B-3	.73		.854	92
B-2	.99		~~.860~~	995 68
B-2	.94		.969	74
Total		-	15.49	2476.00
Average		-	.815	130.32

a) From outside of port to sampling point.

Pitot tube 5

Manometer

Thermometer Dial

Data Recorder RSAmick

Date 6-1-72

Stack Inside Dimensions 29.675 in. $\frac{\pi d^2}{4} = \frac{3.1416 \times 29.675}{4 \times 144}$

Stack Area, A_s = 4.802 sq. ft.

Barometric Pressure, P_b = 30.00 "Hg

Stack Gage Pressure = -12.24 "H_2O

Stack Abs. Pressure, P_s = $\frac{-0.90}{13.6}$ "H_2O + P_b = 29.10 "Hg

Stack Gas Temp., T_s = 130.3 °F + 460 = 590.3 °R

Molecular Weight of Stack Gas, M_s = 29

$$V_s = 174 \sqrt{\Delta p}\ Cp \sqrt{T_s \times \frac{29.92}{P_s} \times \frac{29}{M_s}}\ \text{ft/min.}$$

$$V_s = 174 \sqrt{}(.815)(.85)\sqrt{\frac{590}{24.3}} = 2929$$

Q, Volume = 2929 ft/min. x 4.91 sq. ft. = 14391 cfm

Q_w, Standard Volume at 70°F and 29.92 "Hg (Wet Basis) =

$$Q \times \frac{530}{T_s} \times \frac{P_s}{29.92} = 17.7 \times \_\_\_\_ \times \_\_\_\_ = \_\_\_\_$$

$Q_s = Q_w \times (100-W)/100$ = _____

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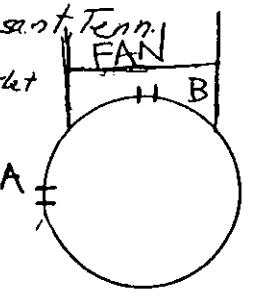
513/771-4330

FIELD DATA

PLANT Stauffer Chemical Co. Mt. Pleasant, Tenn.
DATE 6-1-72
SAMPLING LOCATION Slag Tapping Scrubber Outlet
SAMPLE TYPE Particulate
RUN NUMBER 2
OPERATOR RSA & RAZ
AMBIENT TEMPERATURE 70°F
BAROMETRIC PRESSURE 30.00
STATIC PRESSURE, (P_s) -.82 in.
FILTER NUMBER (s)



SCHEMATIC OF TRAVERSE POINT LAYOUT

PROBE LENGTH AND TYPE 3' Teflon
NOZZLE I.D. .1875 in.
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER
METER BOX NUMBER 2
METER $\Delta H_@$ 1.39 @ 0.75 cfm
C FACTOR 0.76
PROBE HEATER SETTING — N/A
HEATER BOX SETTING N/A
REFERENCE Δp

READ AND RECORD ALL DATA EVERY 2.5 MINUTES

TAP No.	TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
		0	122.818									
↑	B-2	2.5 955	123.844	.46	.43	.43	100	74	72	5	—	76
1	2	5.0	124.933	.48	.44	.44	100	74	72	5	—	60
	3	7.5	126.061	.45	.42	.42	115	75	72	5	—	63
↓	4	9.1	126.764	.46	.43	.43	120					63
↑	4	10.0 1148	127.224	.50	.46	.46	100	75	75	6	—	79
	5	12.5	128.472	.78	.72	.72	105	75	74	8	—	60
2	6	15.0	129.910	.80	.74	.74	110	78	74	11	—	58
	7	17.5	131.412	.95	.86	.86	110	82	75	13	—	59
	8	20.0	132.864	.95	.86	.86	110	86	75	14	—	59
↓	9	22.1	134.055	.85	.78	.78	112	86	75	12	—	58
↑	9	22.5 1325	134.125	.94	.88	.88	100	80	80	13	—	80
3	10	25.0	135.824	.91	.80	.80	105	82	80	13	—	60
	11	27.5	137.294	.73	.66	.66	110	82	78	12	—	58
↓	11	30.0	138.690	.55	.50	.50	112	82	78	10		60
	A-2	32.0	139.586	.50	.46	.46	115	82	78	9	—	58
	2	35.0					105					
↑	2	32.5	139.771	.42	.40	.40	110	81	80	7	—	78
4	2	35.0	140.814	.43	.41	.41	110	82	80	7	—	65
	3	37.5	141.921	.55	.51	.51	110	82	80	8	—	61
↓	4	40.0	143.077	.63	.58	.58	110	82	80	8	—	62

COMMENTS:

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TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
4 contin											
5	42.5	143.784	.68	.62	.62	115	87	80	⑦ 8 ② 8	—	58
6	45.0	145.162	.70	.64	.64	115	88	80	8	—	58
7	45.4	145.489	.68	.62	.62	115	88	80	8	—	58
7	47.5 1620	146.623	.90	.82	.82	110	78	77	8	—	63
8	50.0	148.294	.92	.83	.83	110	84	79	9	—	62
9	52.5	149.694	.87	.78	.78	110	86	79	9	—	56
10	55.0	151.100	.70	.64	.64	110	89	80	9	—	58
11	57.5	152.392	.67	.61	.61	120	90	80	9	—	58
12	60.0	153.691	.70	.64	.64	120	91	80	10	—	58
						$T_{s\,avg}$ = 110.5					

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4 72

* changed filters

FIELD DATA

PLANT STAUFFER
DATE 6/1/72
SAMPLING LOCATION SLAG TAP OUTLET
SAMPLE TYPE VELOCITY CHECK
RUN NUMBER —
OPERATOR J. WILKENS
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s)
FILTER NUMBER (s)

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

SCHEMATIC OF TRAVERSE POINT LAYOUT

-.83 - ~~Static Pressure~~ Stack

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr CLOCK) / SAMPLING TIME, min		GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
1				ΔP	ΔP							
2	.92	.70	.70	.92	.959		~100					
3	1.0	.78	.78	1.0	1.0							
4	1.0	.91		1.0	1.0							
5	1.1	.98		1.1	1.05							
6	1.2	1.1		1.2	1.095							
7	1.2	1.1		1.2	1.095							
8	1.2	1.1		1.2	1.095							
9	1.1	1.1		1.1	1.05							
10	.92	.95		.97	.959							
11	.67	.71		.67	.818							
12				.70	.836							
				.78	.853							
				.91	.954							
				.98	.990							
				1.1	1.05							
				1.1	1.05							
				1.1	1.05							
				1.1	1.05							
				.95	.974							
				.71	.843							
			Σ		[illegible]							
			~~Σ~~	Σ	19.81							

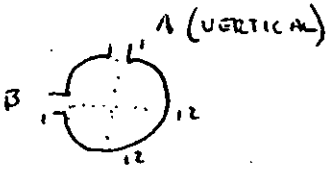
Avg 0.990

COMMENTS:

EPA (Dur) 235
4 72

FIELD DATA

PLANT STAUFFER - MT. PLEASANT
DATE 2 JUNE 72
SAMPLING LOCATION SLAG TAP INLET
SAMPLE TYPE FLUORIDES
RUN NUMBER 3
OPERATOR FM JG
AMBIENT TEMPERATURE 45-70°F
BAROMETRIC PRESSURE 29.96
STATIC PRESSURE, (P_s) -12.25
FILTER NUMBER (s) SEE CLEAN-UP SHEET



PROBE LENGTH AND TYPE 4' PYREX
NOZZLE I.D. 0.1875
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER —
METER BOX NUMBER —
METER $\Delta H_@$ 1.52 @ 0.75 SCFM
C FACTOR 0.81
PROBE HEATER SETTING —
HEATER BOX SETTING —
REFERENCE Δp —

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TAP II	TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
		0 / 07	363,124									
↑	A-6	3	364,678	0.65	0.56	0.56	145	55	54	4	N/A	50
	A-5	6	366,086	0.60	0.52	0.52	136	57	54	4		50
1	A-4	9	367,411	0.50	0.44	0.44	175	60	55	4		51
	A-3	12	368,633	0.43	0.38	0.38	185	61	55	4		51
*	A-2	14	369.307	0.30	0.26	0.26	118	62	55	4		51
	A-2	15	369,638	0.30	0.26	0.26	75	64	64	4		61
	A-2	18	370,544	0.30	0.26	0.26	105	66	65	4		60
	B-11	21	372,115	0.87	0.75	0.75	140	69	65	9		56
2	B-11	24	373,735	0.85	0.73	0.73	152	73	66	10		55
	B-10	27	375,328	0.83	0.72	0.72	135	75	67	10.5		56
	B-9	30	376,901	0.76	0.66	0.66	135	79	67	11.0		59
	B-8	33	378.471	0.77	0.67	0.67	142	81	68	12.0		60
*	~~B~~ B-7	36	380,062	0.78	0.68	0.68	158	83	69	13.0		62
		LEAK TEST										
			380,158	—	—	—	—	—	—	—		—
	B-6	39	381,580	0.67	0.58	0.58	82	73	73	10		59
3	B-5	42	383028	0.65	0.56	0.56	95	75	73	10		59
	B-4	45	384,550	0.70	0.60	0.60	98	77	73	13		59
*	B-3	48	385,990	0.87	0.90	0.90	85	79	73	8		59
	B-2	51	387,500	0.10	0.95	0.95	60	78	78	15		62
	B-2	~~54~~ 58	389,138	0.75	0.66	0.66	70	80	78	13		65
							120.581 lb.					

COMMENTS:

Note: * Isokinetic check with Outlet data. (6-2-72)

EPA (Our) 235
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LEAKAGE RATE: 0 @ 15" Hg

GAS VELOCITY AND VOLUME DATA

Test No. 3

Location Inlet of 3/99 Tap Scrubber

VELOCITY TRAVERSE DATA

Point	Position Inches[a]	Reading, Δp "H_2O	$\sqrt{\Delta p}$	T_s °F
A-6		.65	.806	145
A-5		.60	.775	136
A-4		.56	.707	175
A-3		.43	.656	185
A-2		.39	.548	118
A-1		.365	.846	75
B-11		.30	.548	105
B-11		.87	.933	140
B-10		.85	.922	152
B-9		.83	.911	135
B-8		.76	.872	135
B-7		.77	.877	142
B-6		.78	.883	158
B-5		.67	.819	87
B-4		.65	.806	95
B-3		.70	.837	98
B-2		.87	.933	85
B-1		1.10	1.05	60
		0.75	.548	70
Total		-	15.97	2291
Average		-	.805	121

a) From outside of port to sampling point.

Pitot tube 15'

Manometer

Thermometer Dial

Data Recorder ~~RSH~~ F. Meadows

Date 6-2-72

Stack Inside Dimensions 29.675 in.

Stack Area, A_s = 4.802 sq. ft.

Barometric Pressure, P_b = 29.96 "Hg

Stack Gage Pressure = -12.24 "H_2O

Stack Abs. Pressure, P_s = $\frac{-0.90}{13.6}$ "H_2O + P_b = 29.06 "Hg

Stack Gas Temp., T_s = 121 °F + 460 = 581 °R

Molecular Weight of Stack Gas, M_s = _____

$$V_s = 174 \sqrt{\Delta p}\ Cp \sqrt{T_s \times \frac{29.92}{P_s} \times \frac{29}{M_s\ 24.2}}\ \text{ft/min.}$$

$$V_s = 174\ (.805)\ (.85)\ \sqrt{581} = 2881$$

Q, Volume = _____ ft/min. x _____ sq. ft. = _____ cfm

Q_w, Standard Volume at 70°F and 29.92 "Hg (Wet Basis) =

$$Q \times \frac{530}{T_s} \times \frac{P_s}{29.92} = 17.7 \times \_\_\_\_ \times \_\_\_\_ = \_\_\_\_$$

$Q_s = Q_w \times (100-W)/100$ = _____

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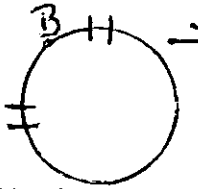
FIELD DATA

PLANT STAUFFER CHEMICAL CO. - MT. PLEASANT, TENN.
DATE 6-2-72
SAMPLING LOCATION OUTLET - SLAG TAPPING SCRUBBER
SAMPLE TYPE - PARTICULATE
RUN NUMBER 3
OPERATOR R. SAMICK & R. ZIMMER
AMBIENT TEMPERATURE 75°F
BAROMETRIC PRESSURE 29.96
STATIC PRESSURE, (P_s) -0.77
FILTER NUMBER (s)



SCHEMATIC OF TRAVERSE POINT LAYOUT

PROBE LENGTH AND TYPE 3' TEFLON
NOZZLE I.D. .30.0"
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER
METER BOX NUMBER
METER $\Delta H_@$ 1.3 @ 0.75 cfm
C FACTOR 0.76
PROBE HEATER SETTING N/A
HEATER BOX SETTING N/A
REFERENCE Δp

READ AND RECORD ALL DATA EVERY 2.5 MINUTES

TRAP No	TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
		0 / 707.5	153.839									
1	B-2	2.5 / 710	154.932	.60	.54	.54	100	51	50	6	N/A	56
	2	5.0 / 712.5	156.294	.57	.52	.52	105	57	50	6		45
	3	7.5 / 715.0	157.453	.65	.61	.61	110	60	50	8		~~44~~ 45
	4	10.0 / 717.5	158.692	.75	.72	.72	110	62	51	9		45
	5	12.5 / 720.0	160,046	.80	.76	.76	115	62	51	10		46
	6	15.0 / 722.5	161.317	.80	.76	.76	117	64	51	10		48
	7	15.1 / 722.6	161.441	.80	.76	.76	118	65	52	10		50 → 57
		START 836.0										
2	7	17.5 / ~~838.0~~	162.954	.93	.83	.83	100	70	67	12		73
	8	20.0 / 841.0	164.333	~~.93~~ .83	.83	.83	105	76	70	9		63
	9	22.5 / 843.5	165.681	.83	.75	.75	110	78	70	9		57
	10	25.0 / 846.0	167,054	.75	.69	.69	112	81	70	10		~~50~~ 60
	11	27.5 / 848.5	168:329	.70	.64	.64	112	83	71	10		60
	11	30.0 / 851.0	169.665	.70	.69	.64	112	86	71	10		60
3	A-2	32.5 / 853.5	170.656	.39	.36	.36	112	86	73	7		63
	2	35.0 / 856.0	171.721	.39	.36	.36	112	87	73	7		64
	3	37.5 / 858.1	172.617	.52	.48	.48	115	88	74	7		64 → 72
	3	37.5 / 1050	172.871	.59	.54	.54	105	84	82	8		80
	4	40.0 / 1017.5	173.924	.59	.54	.54	108	84	82	8		~~90~~ 80
	5	42.5 / 1020.0	175.124	.52 ~~.56~~	.48	.48	110	84	82	8		61
	6	45.0 / 1022.5	176.529	.68	.63	.63	112	85	82	9		61

COMMENTS:

EPA (Dur) 235
4 72

TAP No.

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
		176.529									
7	47.5	177.672	.80	.72	.72	120	89	82	10	N/A	60
8	50.0	179.126	.80	.72		120	90	82	10		60
9	~~51.0~~ 51.8	180.173*	1.00	0.90	0.90	120	92	82	13		61 → 83
~~10~~	Start 1155						~~88~~				
9	52.5	~~180.993~~	.900	.82	.82	111	87	85	8		85
10	55.0	182.001	.87	.78	.78	112	87	85	8		62
11	57.5	183.462	.73	.68	.68	112	89	85	8		62
11	60.0	184.718	.70	.65	.65	113	90	85	9		62

EPA (Dur) 236
4 72

* Filter change & leak check

DRY MOLECULAR WEIGHT DETERMINATION

PLANT STAUFFER CHEMICAL Co. - Mt. Pleasant
DATE 31 MAY 72
SAMPLING TIME (24-hr CLOCK) 836 - 1735
SAMPLING LOCATION SLAG TAPPING SCRUBBER (INLET)
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG - CONTINUOUS
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 70°F
OPERATOR R.S. AMICK & W.R. PARKER

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	0.2	0.2	0.2	0.2	0.2	0.2	0.200	44/100	0.088
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.8	20.6	21.2	21.0	21.0	20.8	20.800	32/100	6.656
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	21.0	0.2	21.5	0.3	21.4	0.4	0.300	28/100	0.084
N_2 (NET IS 100 MINUS ACTUAL CO READING)		79.0		78.5		78.6	78.700	28/100	22.036
								TOTAL	28.864

EPA (Dur) 230

DRY MOLECULAR WEIGHT DETERMINATION

PLANT STAUFFER CHEMICAL Co. Mt. Pleasant
DATE 1 JUNE 72
SAMPLING TIME (24-hr CLOCK) 1000 - 1800
SAMPLING LOCATION SLAG TAPPING INLET SCRUBBER
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG - CONTINUOUS
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 70°F
OPERATOR F MEADOWS & J.F GEIGER

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	0.1	0.1	0.1	0.1	0.2	0.2	0.133	44/100	0.058
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	20.6	20.5	19.8	19.7	20.2	20.0	20.066	32/100	6.421
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	21.2	0.6	21.2	1.4	21.6	1.4	1.133	28/100	0.031
N_2 (NET IS 100 MINUS ACTUAL CO READING)		78.8		78.8		78.4	78.666	28/100	22.026
								TOTAL	28.536

EPA (Dur) 230
A-72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT Stauffer Chemical Co.-Mt. Pleasant COMMENTS: Run 1
DATE 5-31-72
SAMPLING TIME (24-hr CLOCK) 836 - 1500
SAMPLING LOCATION ~~Outlet~~ Slag Tapping Outlet - Scrubber
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG - CONTINUOUS
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 70°F
OPERATOR W R PARKER & R J AMICK

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	.2	.2	.4	.4	.2	.2	.267	44/100	.117
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	22.1	21.9	21.0	20.6	21.2	21.0	21.167	32/100	6.773
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	22.3	0.4	21.5	0.9	21.4	0.4	0.533	28/100	0.149
N_2 (NET IS 100 MINUS ACTUAL CO READING)		77.7	~~78.5~~	78.5		78.6	78.267	28/100	21.915
								TOTAL	28.954

EPA (Dur) 230
4/72

DRY MOLECULAR WEIGHT DETERMINATION

PLANT STAUFFERS CHEMICAL Co. - Mt. Pleasant
DATE 1 JUNE 72
SAMPLING TIME (24-hr CLOCK) 1000 - 1800
SAMPLING LOCATION SLAG TAPPING SCRUBBER (OUTLET)
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG - CONTINUOUS
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 70°F.
OPERATOR R.S. AMICK & R.A. ZIMMER

COMMENTS: Run 2

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	0.1	0.1	0.0	0.0	0.2	0.2	0.150	44/100	0.066
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	19.6	19.5	20.6	20.6	20.8	20.6	20.233	32/100	6.474
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	20.6	1.0	20.8	0.2	21.2	0.4	0.533	28/100	0.149
N_2 (NET IS 100 MINUS ACTUAL CO READING)		79.4		79.2		78.8	79.133	28/100	22.157
								TOTAL	28.846

EPA (Dur) 230

DRY MOLECULAR WEIGHT DETERMINATION

PLANT STAUFFER CHEMICAL Co. - Mt. Pleasant

DATE 2JUNE72

SAMPLING TIME (24-hr CLOCK) 700-1200

SAMPLING LOCATION SLAG TAPPING SCRUBBER (INLET)

SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG-CONTINUOUS

ANALYTICAL METHOD ORSAT

AMBIENT TEMPERATURE 70°F.

OPERATOR ~~R.S. TUCK~~ + ~~R.A. FISHER~~ F. MEADOWS & J. F. GEIGER

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	2.8	2.8	3.1	3.1	2.8	2.8	2.900	44/100	1.276
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	23.6	20.8	23.8	20.7	23.4	20.6	20.700	32/100	6.624
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	24.0	0.4	24.1	0.3	23.8	0.4	0.366	28/100	0.124
N_2 (NET IS 100 MINUS ACTUAL CO READING)		76.0		75.9		76.2	76.033	28/100	21.289
								TOTAL	29.313

EPA (Dur) 230

DRY MOLECULAR WEIGHT DETERMINATION

PLANT STAUFFER CHEMICAL Co. - Mt. Pleasant
DATE 2 JUNE 72
SAMPLING TIME (24-hr CLOCK) 700 - 1200
SAMPLING LOCATION SLAG TAPPING SCRUBBER (OUTLET)
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS) BAG - CONTINUOUS
ANALYTICAL METHOD ORSAT
AMBIENT TEMPERATURE 70°F
OPERATOR ~~F. HEADEN & J. CARTER~~ R.S. AMICK & R.A. ZIMMER

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	2.0	2.0	1.8	1.8	2.0	2.0	1.933	44/100	0.850
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)	21.8	19.8	21.8	20.0	22.4	20.4	20.066	32/100	6.421
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)	22.6	0.8	22.6	0.8	22.2	0.2	0.600	28/100	0.1680
N_2 (NET IS 100 MINUS ACTUAL CO READING)		77.4		77.4		77.8	77.533	28/100	21.709
								TOTAL	29.148

EPA (Dui) 230
4/72

GAS VELOCITY AND VOLUME DATA

Test No. 1 INLET

Location STAUFFER

VELOCITY TRAVERSE DATA

Point	Position Inches[a]	Reading, Δp "H_2O	$\sqrt{\Delta p}$	T_s °F	
		1.10	33.8	100	560
		1.05	32.2	245	705
		1.10	33.1	253	713
		0.42	20.5	154	614
		0.67	25.9	165	625
		0.52	22.8	130	590
		0.45	21.2	130	590
		0.40	20.0	130	590
		0.42	20.5	130	590
		0.40	20.0	130	590
		0.65	25.5	175	635
		0.75	27.4	242	702
		0.85	29.2	268	728
		0.74	27.2	282	742
		0.60	24.5	180	640
		0.65	25.5	175	635
		0.70	26.5	180	640
		0.66	25.7	80	540
		0.55	23.5	72	532
		1.05	32.4	60	520
		0.55	23.5	32	492
		0.75	27.4	80	540
Total		-	475.3		
Average		-	21.6		

T_s + 460

Stack Inside Dimensions 29 5/8

Stack Area, A_s = 4.78 sq. ft.

Barometric Pressure, P_b = 29.91 "Hg

Stack Gage Pressure = -10 "H_2O

Stack Abs. Pressure, P_s = $\frac{-10}{13.6}$ "H_2O + P_b = 29.18 "Hg

Stack Gas Temp., T_s = _____ °F + 460 = _____ °R

Molecular Weight of Stack Gas, M_s = _____

$$V_s = 174 \sqrt{\Delta p}\ Cp \sqrt{T_s \times \frac{29.92}{P_s} \times \frac{29}{M_s}}\ \text{ft/min.}$$

V_s = 148 x 21.6 = 3201

Q, Volume = 3201 ft/min. x _____ sq. ft. = _____ cfm

Q_w, Standard Volume at 70°F and 29.92 "Hg (Wet Basis) =

$$Q \times \frac{530}{T_s} \times \frac{P_s}{29.92} = 17.7 \times \_\_\_\_ \times \_\_\_\_ = \_\_\_\_$$

$Q_s = Q_w \times (100-W)/100$ = _____

a) From outside of port to sampling point.

Pitot tube _____

Manometer _____

Thermometer _____

Data Recorder _____

Date 31 MAY 1972

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513/771-4330

GAS VELOCITY AND VOLUME DATA

Test No. 1 OUTLET
Location STAUFFER MT PLEASANT

VELOCITY TRAVERSE DATA

Point	Position Inches[a]	Reading, Δp "H_2O	$\sqrt{\Delta p}$	T_s °F
A 2		0.43	0.656	105
3		0.47	0.686	115
4		0.55	.742	115
5		0.70	0.837	105
6		0.77	.877	110
7		0.90	.949	110
8		0.92	.959	115
9		0.90	.949	115
10		0.85	.922	112
11		0.81	.900	116
B-2		0.50	.707	110
3		0.70	.837	115
4		0.72	.849	115
5		0.70	.837	120
6		0.77	.877	120
7		0.77	.877	120
8		0.73	.854	120
9		0.70-0.78	.884	120
10		0.72	.849	110
11		0.68	.825	115
Total		-		
Average		-	0842	114

a) From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Data Recorder _____

Date _____

Stack Inside Dimensions 30" ø

Stack Area, A_s = 4.91 sq. ft.

Barometric Pressure, P_b = 29.91 "Hg

Stack Gage Pressure = -0.7 "H_2O

Stack Abs. Pressure, P_s = $\frac{-0.7}{13.6}$ "H_2O + P_b = 29.86 "Hg

Stack Gas Temp., T_s = 114 °F + 460 = 574 °R

Molecular Weight of Stack Gas, M_s = _____

$$V_s = 174 \sqrt{\Delta p}\ Cp \sqrt{T_s \times \frac{29.92}{P_s} \times \frac{29}{M_s}}\ \text{ft/min.}$$

$V_s = 174 \times .842 \times .85 \sqrt{574} = 3020.7$

Q, Volume = _____ ft/min. x _____ sq. ft. = _____ cfm

Q_w, Standard Volume at 70°F and 29.92 "Hg (Wet Basis) =

$$Q \times \frac{530}{T_s} \times \frac{P_s}{29.92} = 17.7 \times \_\_\_\_ \times \_\_\_\_ = \_\_\_\_$$

$Q_s = Q_w \times (100-W)/100$ = _____

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PRELIMINARY VELOCITY TRAVERSE

PLANT SMUFFER

DATE 6/1/72

LOCATION SLAG TAP SCRUBBER INLET

STACK I.D.

BAROMETRIC PRESSURE, in. Hg

STACK GAUGE PRESSURE, in. H_2O

OPERATORS

Am

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
B-1	0.50	55
2	1.10	
3	0.78	
4	0.81	
5	0.95	
6	0.86	
7	0.84	
8	0.86	
9	0.90	
10	0.91	
11	0.94	
12	0.90	
AVERAGE		

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
A-1	0.28	55
2	0.25	
3	0.46	
4	0.60	
5	0.62	
6	0.70	
7	0.98	
8	1.05	
9	1.10	
10	1.05	
11	~~0.18~~ 0.62	
12	0.68	
AVERAGE		

GAS VELOCITY AND VOLUME DATA

Test No. 2-Outlet
Location Stauffer - Mt. Pleasant
6-1-72

VELOCITY TRAVERSE DATA

Point	Position Inches[a]	Reading, Δp "H_2O	$\sqrt{\Delta p}$	T_s °F
B-2		.46	.678	100
2		.48	.693	110
3		.45	.671	115
4		.48	.693	110
5		.78	.883	105
6		.80	.894	110
7		.95	.975	110
8		.95	.975	110
9		.98	.989	105
10		.91	.954	105
11		.73	.854	110
11		.55	.742	112
A-2		.48	.693	115
2		.42	.648	110
3		.55	.742	110
4		.63	.794	110
5		.68	.825	115
6		.70	.837	115
7		.80	.894	115
8		.92	.959	110
9		.87	.933	110
10		.70	.837	110
11		.81	.899	120
Total		-	.831	1232
Average		-	.824	11092

a) From outside of port to sampling point.

Pitot tube _____
Manometer _____
Thermometer _____

Data Recorder _____

Date _____

Stack Inside Dimensions 30" ϕ

Stack Area, A_s = 4.91 sq. ft.

Barometric Pressure, P_b = 30.00 "Hg

Stack Gage Pressure = -0.77 "H_2O

Stack Abs. Pressure, P_s = $-0.77 \frac{\text{"}H_2O}{13.6} + P_b$ = 29.95 "Hg

Stack Gas Temp., T_s = 1109 °F + 460 = ~~571~~ 570.9 °R

Molecular Weight of Stack Gas, M_s = _____

$$V_s = 174 \sqrt{\Delta p}\ Cp \sqrt{T_s \times \frac{29.92}{P_s} \times \frac{29}{M}} \text{ ft/min.}$$

$$V_s = 174 \times .824 \times 0.85 \times \sqrt{570.9 \times \frac{29.92}{29.95} \times \frac{29}{23.68}} = 2911$$

Q, Volume = 2911 ft/min. x 4.91 sq. ft. = 14293 cfm

Q_w, Standard Volume at 70°F and 29.92 "Hg (Wet Basis) =

$$Q \times \frac{530}{T_s} \times \frac{P_s}{29.92} = 17.7 \times \_\_\_\_ \times \_\_\_\_ = \_\_\_\_$$

$Q_s = Q_w \times (100-W)/100$ = _____

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513/771-4330

6-2-72
Mt. Pleasant, Tenn.

GAS VELOCITY AND VOLUME DATA

Test No. 3
Location ~~Exit~~ Outlet of Slag Tap Scrubber

VELOCITY TRAVERSE DATA

Point	Position Inches[a]	Reading, Δp "H_2O	$\sqrt{\Delta p}$	T_s °F
B-2		.60	.775	100
2		.57	.755	105
3		.65	.806	110
4		.75	.866	110
5		.80	.894	115
6		.80	.894	117
7		.86	.927	~~118~~109
8		.93	.964	~~100~~105
9		.83	.911	~~105~~110
10		.75	.866	112
11		.70	.837	112
11		.70	.837	112
A-2		.39	.625	112
2		.39	.625	112
3		.52	.721	110
4		.59	.768	108
5		.52	.721	110
6		.68	.825	112
7		.80	.894	120
8		.80	.894	120
9		.95	.975	~~120~~115
10		.87	.933	112
11		.75	.866	112
		.70	.837	113
Total			.831	
Average		- 111.38	.834	

Stack Inside Dimensions 30"
Stack Area, A_s = 4.91 sq. ft.
Barometric Pressure, P_b = 29.96 "Hg
Stack Gage Pressure = -0.80 "H_2O
Stack Abs. Pressure, P_s = $\frac{-0.8}{13.6}$ "H_2O + P_b = 29.90 "Hg
Stack Gas Temp., T_s = 111 °F + 460 = 571 °R
Molecular Weight of Stack Gas, M_s = _____

$$V_s = 174 \sqrt{\Delta p}\ Cp \sqrt{T_s \times \frac{29.92}{P_s} \times \frac{29}{M_s}}\ \text{ft/min.}$$

$$V_s = 174 \times ~~.894~~ .834 \times 0.85 \times \sqrt{\frac{29}{29.9} \times 571} = 2948$$

Q, Volume = _____ ft/min. x _____ sq. ft. = _____ cfm

Q_w, Standard Volume at 70°F and 29.92 "Hg (Wet Basis) =

$$Q \times \frac{530}{T_s} \times \frac{P_s}{29.92} = 17.7 \times \_\_\_\_ \times \_\_\_\_ = \_\_\_\_$$

$Q_s = Q_w \times (100-W)/100$ = _____

a) From outside of port to sampling point.

Pitot tube "S"
Manometer ~~Dr.~~
Thermometer Dial

Data Recorder _____
Date 6-2-72

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APPENDIX C

Laboratory Data

TABLE C-1 ANALYTICAL RESULTS

SLAG TAPPING - MT. PLEASANT, TENNESSEE

Test No.	Emissions Found[a] mg/sample					
	Fluorides[b]			P_2O_5[c]		
	Soluble	Insoluble	Total	Soluble	Insoluble	Total
1 A	58.1	1.17	59.27	117.0	0.4	117.4
1 B	1.4	0.1	1.5	27.3	0.20	27.5
2 A	52.2	1.40	53.60	112.0	<0.02	112.0
2 B	1.9	0.13	2.03	31.1	0.5	31.6
3 A	42.6	1.10	43.70	93.1	0.6	93.7
3 B	2.4	0.2	2.6	23.2	0.6	23.8

a) Water and acetone washings, impinger contents, and filter

b) Analysis by SPADNS reagent , fluorides expressed as F

c) Analysis by ammonium phosphomolybdovanadate colorimetric method

A designates the scrubber inlet site

B designates the scrubber outlet site

ANALYTICAL DATA

PLANT STAUFFER - MT. PLEASANT, TENN. COMMENTS:

DATE 1 JUNE 72

SAMPLING LOCATION SLAG TAP SCRUBBER INLET

SAMPLE TYPE FLUORIDES

RUN NUMBER 2

SAMPLE BOX NUMBER —

CLEAN-UP MAN FRANK MEADOWS

~~FRONT HALF~~ LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER — — mg

FILTER NUMBER 72-332, 72-335, 72-333, 72-334 — CONTAINER 72-000-718 (TWO) — mg

FRONT HALF SUBTOTAL _____ mg

~~BACK HALF~~ TOTAL TRAIN

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE, TEFLON CONNECTOR — CONTAINER 72-000-718 (TWO) _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE, TEFLON CONNECTOR — CONTAINER 72-000-719 _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

MOISTURE

IMPINGERS

FINAL VOLUME	300 ml	
INITIAL VOLUME	300 ml	NaOH
NET VOLUME	0 ml	

SILICA GEL

FINAL WEIGHT	247.62 g	____ g	____ g
INITIAL WEIGHT	231.99 g	____ g	____ g
NET WEIGHT	15.63 g	____ g	____ g

TOTAL MOISTURE 15.6 g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT Stauffer Chem

DATE 1 JUNE 72

SAMPLING LOCATION SLAG TAP SCRUBBER OUTLET

SAMPLE TYPE FLUORIDES

RUN NUMBER 2

SAMPLE BOX NUMBER —

CLEAN-UP MAN FRANK MEADOWS

COMMENTS:

~~FRONT HALF~~

~~ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER~~

FILTER NUMBER 72-390

72-389

LABORATORY RESULTS

CONTAINER — — mg

CONTAINER 72-000-712 (two) — mg

FRONT HALF SUBTOTAL _____ mg

~~BACK HALF~~ TOTAL TRAIN

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE TEFLON CONNECTION

ACETONE WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE, TEFLON CONNECTION

CONTAINER 72-000-712 (two) _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

CONTAINER 72-000-713 _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

MOISTURE

IMPINGERS

FINAL VOLUME 312 ml

INITIAL VOLUME 300 ml ≈ 0.4

NET VOLUME 12 ml

SILICA GEL

FINAL WEIGHT 2423.5 g _____ g _____ g

INITIAL WEIGHT 2317.8 g _____ g _____ g

NET WEIGHT 105.6 g _____ g _____ g

TOTAL MOISTURE 22.6 g

EPA (Dur) 231

ANALYTICAL DATA

PLANT STAUFFER - MT. PLEASANT

DATE 2 JUN 72

SAMPLING LOCATION SLAG TAP SCRUBBER INLET

SAMPLE TYPE FLUORIDES

RUN NUMBER 3

SAMPLE BOX NUMBER —

CLEAN-UP MAN FRANK MENDOUS

COMMENTS:

~~FRONT HALF~~

~~ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER~~

FILTER NUMBER 72-338 72-337
72-340
72-336

LABORATORY RESULTS

CONTAINER — — mg

CONTAINER 72-000-723 — mg

FRONT HALF SUBTOTAL _____ mg

~~BACK HALF~~ TOTAL TRAIN

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE, TEFLON COUNECTOR

ACETONE WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE, TEFLON COUNECTOR

CONTAINER 72-000-723 _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

CONTAINER 72-000-724 _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

MOISTURE

IMPINGERS

FINAL VOLUME	300	ml
INITIAL VOLUME	300	ml
NET VOLUME	0	ml

NaOH

SILICA GEL

FINAL WEIGHT	256.0 g	_____ g	_____ g
INITIAL WEIGHT	254.4 g	_____ g	_____ g
NET WEIGHT	1.6 g	_____ g	_____ g

TOTAL MOISTURE 1.6 g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT STAUFFER MT. PLEASANT

DATE 31 MAY 1972

SAMPLING LOCATION SLAG TAP INLET

SAMPLE TYPE FLUORIDES

RUN NUMBER 1

SAMPLE BOX NUMBER —

CLEAN-UP MAN FRANK MEADOWS

COMMENTS: NOTE!! TIP OF PROBE WAS ~~BROKEN~~ BROKEN WHEN TRAIN WAS CLEANED.

~~FRONT HALF~~

LABORATORY RESULTS

~~ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER~~

CONTAINER — — mg

FILTER NUMBER 72-327 72-330

72-328

72-329

CONTAINER 72-000-701 — mg
TWO CONTAINERS

FRONT HALF SUBTOTAL _____ mg

~~BACK HALF~~ TOTAL TRAIN

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE TEFLON CONNECTION

CONTAINER 72-000-701 (TWO) _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE, TEFLON CONNECTION

CONTAINER 72-000-702 _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

MOISTURE

IMPINGERS

FINAL VOLUME	302 ml	10% Na_2OH
INITIAL VOLUME	300 ml	
NET VOLUME	2 ml	

SILICA GEL

FINAL WEIGHT	240.0 g	____ g	____ g
INITIAL WEIGHT	231.4 g	____ g	____ g
NET WEIGHT	8.6 g	____ g	____ g

TOTAL MOISTURE 10.6 g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT STAUFFER MT. PLEASANT

DATE 31 MAY 1972

SAMPLING LOCATION SLAG TAP OUTLET

SAMPLE TYPE FLUORIDES

RUN NUMBER 1

SAMPLE BOX NUMBER —

CLEAN-UP MAN FRANK MEADOWS

COMMENTS: WATER WASH (72-000709, FIRST CONTAINER) CONTAINS APPROXIMATELY 2 CC OF ACETONE.

~~FRONT HALF~~

~~ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER~~

FILTER NUMBER 72-387

72-388

LABORATORY RESULTS

CONTAINER — — mg

CONTAINER 72-000707 — mg

FRONT HALF SUBTOTAL — mg

~~BACK HALF~~ TOTAL TRAIN

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE, TEFLON CONNECTION

ACETONE WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE, TEFLON CONNECTION

CONTAINER 72-000707(TWO) mg

ETHER-CHLOROFORM EXTRACTION mg

CONTAINER 72-000708 mg

BACK HALF SUBTOTAL mg

TOTAL WEIGHT mg

%MOISTURE

IMPINGERS

FINAL VOLUME 311 ml

INITIAL VOLUME 300 ml 10% NaOH

NET VOLUME 11 ml

SILICA GEL

FINAL WEIGHT	241.8 g	g	g
INITIAL WEIGHT	236.1 g	g	g
NET WEIGHT	5.7 g	g	g

TOTAL MOISTURE 16.7 g

EPA (Dur) 231

A77

ANALYTICAL DATA

PLANT STAUFFER - MT. PLEASANT

DATE 2 JUN 72

SAMPLING LOCATION SLAG TAP OUTLET

SAMPLE TYPE FLUORIDES

RUN NUMBER 3

SAMPLE BOX NUMBER —

CLEAN-UP MAN FRANK MEADOWS

COMMENTS:

~~FRONT HALF~~

~~ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER~~

FILTER NUMBER 72-391 _____
72-392 _____
_____ _____

LABORATORY RESULTS

CONTAINER — — mg

CONTAINER 72-000-732 — mg

FRONT HALF SUBTOTAL _____ mg

~~BACK HALF~~ TOTAL TRAIN

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE, TEFLON CONNECTOR

ACETONE WASH OF IMPINGERS, CONNECTORS, ~~AND BACK HALF OF~~ FILTER HOLDER, PROBE, TEFLON CONNECTOR

CONTAINER 72-000-732 _____ mg

ETHER-CHLOROFORM EXTRACTION ✓ mg

CONTAINER 72-000-733 _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

MOISTURE

IMPINGERS

FINAL VOLUME	310 ml		
INITIAL VOLUME	300 ml	NaOH	
NET VOLUME	10 ml		

SILICA GEL

FINAL WEIGHT	253.4 g	_____ g	_____ g
INITIAL WEIGHT	241.7 g	_____ g	_____ g
NET WEIGHT	11.7 g	_____ g	_____ g

TOTAL MOISTURE 21.7 g

EPA (Dur) 231
72

APPENDIX ~~G~~ D

TEST LOG

Stauffer Chemical Company, Mt. Pleasant, Tennessee

Personnel: EPA - John Wilkens and Bill King

Stauffer: R. Brown

PEDCo: R. Amick, R. Gerstle, J. Geiger, R. Zimmer, F. Meadows and W. Parker

State of Tennessee: Larry Langham

DATE	TIME	EVENT
5/29/72	Evening	PEDCo crew flies from Cincinnati to Nashville and drives to Columbia Holiday Inn. PEDCo van driven by R. Zimmer.
5/30/72	1100-1800	Preparation for testing slag tap scrubber operation. Plant requested 1100 arrival time.
5/31/72	630-838	Preparation for testing slag tap scrubber operation.
	838-1641	Fluoride slag tap scrubber Test No. 1.
	1311	This tap is a ferrophosphorus tap. All other taps were slag only.
	1641-2400	Clean up trains, run Orsat, perform % isokinetic calculations, and set-up for testing on 6/1/72.
	1900	R. Gerstle leaves for Cincinnati.
6/1/72	800-1048	J. Geiger joins test crew. Set up for fluoride Test No. 2.
	1048-1800	Fluoride Test No. 2.
	1800-2200	Clean-up trains, etc. and prepare for Run 3.
6/2/72	700-1155	Fluoride Test No. 3.
	1155-1600	Clean-up trains and pack truck for trip to Cincinnati.
	1700	PEDCo crew leaves for Cincinnati.

APPENDIX E. PROJECT PARTICIPANTS AND TITLES

STAUFFER CHEMICAL CO.
MT. PLEASANT, TENNESSEE

EPA (OAP)

John Wilkens - Project Officer, EMB
Bill King - Chemical Engineer, SDID

Stauffer

R. Brown - Environmental Supervisor
L. Gabris - Plant Chemist, Tarpon Springs

PEDCo

R. Gerstle, P.E. - Engineering Supervisor and Field Supervisor
R. Amick - Environmental Engineer and Field Supervisor
F. Meadows - Senior Technician
W. Parker - Senior Technician
J. Geiger - Technician
R. Zimmer - Technician

APPENDIX F. TRACE ELEMENT ANALYSIS RESULTS

The following sheets show the results of analyses for trace elements by optical emission spectroscopy (OES). From each sample the impinger contents, impinger water wash, and filter were combined. The filtrates (soluble portion) and the filters (insoluble portion) from the fluoride analyses were then analyzed separately for trace elements. The filter data are listed in Table 1 of Battelle's letter and the filtrate data are on the subsequent "Report of Analysis" forms. A blank filter was analyzed and the trace element contents are in Table 1. Blanks of the sodium hydroxide solution and water, however, were consumed in the previous fluoride and phosphorus pentoxide analyses. Therefore, the values on the "Report of Analysis" forms include any trace elements present in the impinger charge solution and water used in sample cleanup.

It should be emphasized that the OES method is intended only as a screening to determine what elements are present and their approximate concentrations. Discretion should be applied in interpreting and applying the data. Where the content of an element is listed as less than a certain value, the element may or may not be present; the true content at a minimum is zero and at a maximum is the minimum detectable limit. A number following a "less than" symbol is the minimum detectable limit.

To estimate the amount of an element in the total raw sample, apply the following:

If V = raw sample volume (ml); from "Request & Report" form

C_f = filter concentration (µg/10ml.); from "Table 1"

C_{bf} = blank filter concentration (µg/10ml.); from "Table 1"

C_s = filtrate concentration (µg/ml.); from "Report of Analysis" form

M = mass of element in total raw sample (µg)

Then $$M = \left[\frac{(C_f - C_{bf})}{10} + C_s\right] V$$

Concentrations and emission rates of the elements can be calculated by applying the flow parameters in Appendix A (Tables A-1 through A-3).

File Copy
Phosphorus Reduction

Battelle
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201
Telephone (614) 299-3151
Telex 24-5454

August 16, 1972

Dr. Robert E. Lee, Jr.
Division of Atmospheric Surveillance
Environmental Protection Agency
Research Triangle Park, North Carolina 27711

Dear Dr. Lee:

Contract No. 68-02-0447
Filter Samples 72-000-701, 72-000-707,
72-000-712, 72-000-718, 72-000-723,
72-000-732, and blank

The six filter samples plus blank, described in Mr. Lampe's letter dated July 20, 1972, have been analyzed by optical emission spectrography(OES). The results are given in Table 1, and are expressed as micrograms per total sample (≈100 ml). The volume of each sample received was 10 ± 1 ml.

Three of the samples were also analyzed using atomic absorption spectrophotometry (AAS) to determine Na, because that element was found in high concentrations by OES. The AAS results are noted in the table.

If you have any questions, please call me.

Very truly yours,

W. M. Henry, Chief
Environmental and Materials Characterization Division

WMH:ees

cc: Dr. Darryl J. von Lehmden
Mr. Robert Lampe

TABLE 1. OPTICAL EMISSION SPECTROGRAPHIC ANALYSIS OF FILTER SOLUTION SAMPLES

(Results in total µg/Total as Received sample- approximately 10 ml)

Contract No. 68-02-0447

Determinations requested - Priority 1 and 2 elements

Type of Analyses - Optical Emission Spectrography (OES) and Atomic Absorption Spectrophotometry (AAS)

	Sample Designation						
Element	72-000-701	72-000-707	72-000-712	72-000-718	72-000-723	72-000-732	Blank Filter
Be	<0.1	<0.01	<0.01	<0.2	<0.2	<0.01	<0.01
Cd	<6.	<0.5	<0.5	<12.	<13.	<0.5	<0.5
As	<12.	<1.	<1.	<23.	<25.	<1.	<1.
V	<0.1	<0.1	<0.1	<2.	<3.	<0.1	<0.1
Mn	0.1	5.	5.	2.	3.	10.	0.1
Ni	6.	5.	5.	12.	25.	8.	0.3
Sb	<6.	<0.5	<0.5	<12.	<13.	<0.5	<0.5
Cr	12.	5.	4.	46.	125.	3.	<0.1
Zn	<12.	2.	2.	<23.	<25.	4.	<1.
Cu	36.	30.	30.	70.	75.	30.	0.1
Pb	12.	10.	2.	12.	13.	5.	<0.5
Se(a)	-	-	-	-	-	-	-
B	<1.	0.3	0.2	2.	<3.	0.5	<0.1
F(a)	-	-	-	-	-	-	-
Li	60.	<3.	<3.	<70.	<75.	<3.	<3.
Ag	0.4	0.5	0.5	0.7	0.8	1.	0.03
Sn	<4.	0.5	0.5	<7.	<8.	0.4	<0.3
Fe	24.	100.	100.	46.	50.	100.	5.
Sr	<4.	<0.3	<0.3	<7.	<8.	<0.3	<0.3
Na	23,000.(b)	200.	100.	42,000.(b)	45,000.(b)	100.	3.
K	2,400.	20.	10.	4,600.	5,000.	10.	<1.
Ca	120.	30.	100.	230.	125.	150.	5.
Si	120.	100.	100.	460.	250.	100.	10.
Mg	2.	8.	5.	5.	5.	15.	1.
Bi	<1.	0.3	0.3	<2.	<3.	0.3	<0.1
Co	<1.	1.	0.1	<2.	<3.	0.1	<0.1
Ge	<4.	0.3	<0.3	<7.	<8.	<0.3	<0.3
Mo	<1.	<0.1	<0.1	<2.	0.3	<0.1	<0.1
Ti	2.	2.	3.	4.	0.5	5.	0.2
Sn	-	-	-	-	-	-	-
Te	<12.	<1.	<1.	<23.	<25.	<1.	<1.
Th	<12.	<1.	<1.	<23.	<25.	<1.	<1.
Zr	<1.	1.	0.5	<2.	<3.	0.5	<0.1
Ba	4.	1.	2.	12.	8.	3.	<0.1
Al	120.	10.	20.	230.	375.	30.	2.
P	<30.	3.	30.	<70.	<75.	100.	<3.

(a) Not detectable by technique used.

b) AAS value.

(must be filled out for each test run)

Sampling Date 72 | 5 | 31 (Yr. | Mo. | Day)

First Ident. No. Used 72-000-701

Last Ident. No. Used 72-000-706

Test No. 72-MM-04

Run No. 1-A

RCVD. 7-14-72

See Revised Report above

INDUSTRY Phosphorous Reduction (Use Table A)

UNIT PROCESS/OPERATION Elemental Phosphorus Furnace

COMPANY Stauffer Chemical Co

AIR POLLUTION CONTROL Venturi scrubber

ADDRESS Mt. Pleasant, Tennessee

FUEL USED Electricity

SAMPLING METHOD Fluorides-P&A (modified 6A #5)

INLET ☒

OUTLET ☐

GAS VOLUME SAMPLED (METER VOL. IN FT^3) 30.5 @ meter conditions

COPIES TO

P. O. 9-18 72-8

LAB. 9/19

FILED

Ident. No.	Description of Sample or Sample Fraction	Sample Wt. (Solid) mg	Sample Vol. (Liquid) ml	Analysis Requested - General Comments (approx. concentrations-possible interferences etc.)(Indicate specific analysis on backside)
72-000-701	Impinger water* and water wash and filters		1100	Fluorides, P2O5, Trace metals
702	Acetone wash		780	" " " "
703	Scrubber water (sample #1)			Fluorides, P2O5, ~~Trace metals~~, pH
704	Scrubber water (sample #2)			" " ~~" "~~ "
705	Scrubber water (sample #3)			" " ~~" "~~ "
706	Slag pit ground water			

COMMENTS: * Impinger solution was 10% NaOH

SAMPLING CONTRACTOR REECo Environmental (if applicable)

PROJECT OFFICER John A Williams

REVIEWED BY [illegible]

DATE ANALYSIS REQUESTED 30 JUNE 1972

R

Sampling Date: Yr. 72 Mo. 5 Day 31

Type of (Must be filled out for each test run)

First Ident. No. Used 72-000-707

Last Ident. No. Used 72-000-711

Test No. 72-1100-04

Run No. 1-B

RECD.

RCND. 7/7/72

INDUSTRY Phosphorous Reduction (Use Table 1)

COMPANY Stauffer Chemical Co.

LOCATION Mt. Pleasant, Tennessee

SAMPLING METHOD Fluorides-P2O5 (Modified EPA #5)

UNIT PROCESS/OPERATION Elemental Phosphorous Furnace

AIR POLLUTION CONTROL Venturi Scrubber

FUEL USED Electricity

INLET ☐

OUTLET ☒

GAS VOLUME SAMPLED 30.4 @ meter conditions (METER VOL. IN FT³)

OTHER

P. O. 9-48-72

LAB. 7/19

FILED

Plant. No.	Description of Sample or Sample Fraction	Sample Wt. (Solid) mg	Sample Vol. (Liquid) ml	Analysis Requested - General Comments (approx. concentrations-possible interferences etc.) (Indicate specific analysis on backside)
72-000-707	Impinger water* and water wash and filters		1040	Fluorides, P_2O_5, Trace metals.
708	Acetone wash		755	" " " "
709	Scrubber water (Sample #1)			" " " "
710	Scrubber water (Sample #2)			" " " " → pH
711	Scrubber water (Sample #3)			" " " " "

CONTENTS: * Impinger solution was 10% NaOH

SAMPLING CONTRACTOR PEDCo Environmental (if applicable)

PROJECT OFFICER John A. Williams

REQUEST REVIEWED BY Gene W. Smith

DATE ANALYSIS REQUESTED 30 JUNE 1972

Run standard set of ICES trace metals on all samples except [redacted]

REPORT OF ANALYSIS

Trace Elements

ppm - for solid samples

µg/ml* for Liquid Samples

Mark (X) in block to left of Ident. No. when requesting all analysis on that line

Ident. No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba	Al
72 003-707	—	<0.05	<0.5	<2.5	<0.05	<0.05	<0.1	<0.5	<0.05	<2.5	0.1	0.5	—	<0.5	—	<0.5	<0.05	<0.1	0.5	<0.1	none	13.5	9.0	90.	0.5	3.3	16.	—
705																												
706																												

Comments: *Calculated from analysis of the total amount of sample received. Almost all samples contained 10 ml when received except the acetone wash samples, which contained lesser and variable volumes (from 0 to 8 ml as noted in the next to the last column above). For purposes of the analyses, the samples containing something less than 10 ml were diluted to 10 ml, then analyzed. This is based on the assumption that these samples had evaporated.

Mark (X) for specific analysis requested (once each column)

REPORT OF ANALYSIS

Trace Elements

ppm - for solid samples

µg/ml* for Liquid Samples

Mark (X) in block to left of Ident. No. when requesting all analysis on that line

Ident. No.	Hg	Be	Cd	As	V	Mn	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Na	K	Ca	Si	Mg	Ba	Al
72 003-702	—	<0.04	<0.4	<2.	<0.04	<0.04	<0.1	<0.4	<0.1	<2.	0.2	0.7	—	0.4	—	<0.4	<0.04	<0.1	0.8	<0.1	none	40.	4.	30.	4.4	<0.2	10.	—
703																												
704																												

Comments: *Calculated from analysis of the total amount of sample received. Almost all samples contained 10 ml when received except the acetone wash samples, which contained lesser and variable volumes (from 0 to 8 ml as noted in the next to the last column above). For purposes of the analyses, the samples containing something less than 10 ml were diluted to 10 ml, then analyzed. This is based on the assumption that these samples had evaporated.

Mark (X) for specific analysis requested (once each column)

72 131

(First Issue)
No. Used 72-000-701

(Last Issue)
No. Used 72-000-705

1-A

Phosphorous Reduction
(Use Table A)

Sample No.	Description of Sample or Sample Fraction	Sample Wt. (Solid) mg	Sample Vol. (Liquid) ml	Analysis Requested - General Comments (approx. concentrations-possible interferences etc.) (Indicate specific analysis on backside)
72-000-701	Impinger water* and water wash and filters		1100	Fluorides, B_2O_3, Trace metals
702	Destine vessel		780	" " " "
703	Scrubber water (Sample #1)			Fluorides, B_2O_3, ~~Ferrocyanide~~, pH
704	Scrubber water (Sample #2)			" " " "
705	Scrubber water (Sample #3)			" " " "
706	Slag pit quench water			

REMARKS: * Impinger solution was 10% NaOH

SAMPLING CONTRACTOR: PTI's Environmental (if applicable)

PROJECT OFFICER: John A Williams

REQUEST REVIEWED BY: [signature]

DATE ANALYSIS REQUESTED: 30 June 1972

Sampling Date: Yr. 72 Mo. 6 Dy 1

First Ident. No. Used: 72-000-714

Last Ident. No. Used: 72-000-719

Test No. 72-Dun-04

Run No. 2-A

RECD.

RCRD. 7-4-72

INDUSTRY: Phosphorus Reduction (Use Table A)

UNIT PROCESS/OPERATION: Elemental Phosphorus Furnace

COMPANY: Stauffer Chemical Co

AIR POLLUTION CONTROL: Venturi scrubber

COPIES TO: P. C. 7-5-72 & 10/5

ADDRESS: Mt. Pleasant, Tennessee

FUEL USED: Electricity

INLET ☒

LAB: 3/19

SAMPLING METHOD: Fluorides-P2O5 (Modified EPA #5)

OUTLET ☐

GAS VOLUME SAMPLED (METER VOL. IN FT³): 26.4 @ meter conditions

FILE

Ident. No.	Description of Sample or Sample Fraction	Sample Wt. (Solid) mg	Sample Vol. (Liquid) ml	Analysis Requested - General Comments (approx. concentrations-possible interferences etc.) (Indicate specific analysis on backside)
72-000-718	Impinger water* & water wash and filters		795	Fluorides, P2O5, Trace metals
719	Acetone wash		535	" " " "
714	scrubber water (Sample #1)			" " " "
715	scrubber water (Sample #2)			" " " " , pH
716	scrubber water (Sample #3)			" " " " "
6217	Slag pit quench water			" "

COMMENTS: * Impinger solution was 10% NaOH

SAMPLING CONTRACTOR: PEDCo Environmental (if applicable)

PROJECT OFFICER: John S. Williams

REQUEST REVIEWED BY: [signature]

DATE ANALYSIS REQUESTED: 30 JUNE 1972

R

Sampling Date Yr. 72 Mo. 6 Day 6 | First Ident. No. Used 72-000-712 | Last Ident. No. Used 72-000-732 | Test No. [illegible] | Run No. 2-3

RECD.

RCRD. 7/4/72

INDUSTRY Phosphorous Reduction (Use Table A) | UNIT PROCESS/OPERATION Elemental Phosphorus Furnace

COMPANY Stauffer Chemical Co. | AIR POLLUTION CONTROL Venturi Scrubber

ADDRESS Mt. Pleasant, Tennessee | FUEL USED Electricity

SAMPLING METHOD Fluorides-BOC-Modified EPA#5 | INLET ☐ | OUTLET ☒ | GAS VOLUME SAMPLED (METER VOL. IN FT^3) 30.9 @ meter conditions

COPIES TO P. O. 9/8 [illegible] 9/5 (Trl) LAB. 9/9 " FILED

Ident. No.	Description of Sample or Sample Fraction	Sample Wt. (Solid) mg	Sample Vol. (Liquid) ml	Analysis Requested - General Comments (approx. concentrations-possible interferences etc.) (Indicate specific analysis on backside)
72-000-712	Impinger solution, water wash, filters		112.0	Fluorides, PO4, Trace metals
713	Acetone wash		290	" " " "
730	Scrubber water (sample #1)			" " " " , pH
731	Scrubber water (sample #2)			" " " " "
732	Scrubber water (sample #3)			" " " " "

COMMENTS: *10% NaOH

SAMPLING CONTRACTOR PEDCo Environmental (if applicable)

PROJECT OFFICER John A. Williams

REQUEST REVIEWED BY [signature]

DATE ANALYSIS REQUESTED 30 JUNE 1972

R

Run standard OES-Three Metal Series
on all samples 712, 713

ppm - for solid samples
µg/ml* for Liquid Samples

Mark (x) for specific analysis requested
Mark (X) in block to left of Ident. No. when requesting all analysis on that

Ident No.	Hg	Be	Cd	As	V	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Mn	K	Ca	Si	Mg			
72-OES-712	—	<0.05	<0.5	<2.5	<0.05	<0.1	<0.5	<0.05	<0.5	0.3	/	—	0.5	—	<0.5	<0.05	<0.1	0.5	<0.1	100.	2.5	100.	/	3	16.	—	
713	—																										

Abbreviations: 1-Ox, 2-OES, 3-OES, 4-AA, 5-AAV, 6-ICP, and 7- other. Comments: *Calculated from analysis of the total amount of sample received. Almost all samples contained 10 ml when received except the acetone wash samples, which contained lesser and variable volumes (from 0 to 6 ml) as noted in the next to the last column above). For purposes of the analyses, the samples containing something less than 10 ml were diluted to 10 ml, then analyzed. This is based on the assumption that these samples had evaporated.

Abbreviations: Use Test Number of analysis requested (shown over each column)

REPORT OF ANALYSIS
Three Elements

Run standard OES Three Metal Series
on all samples 712, 713

ppm - for solid samples
µg/ml* for Liquid Samples

Mark (x) for specific analysis requested
Mark (X) in block to left of Ident. No. when requesting all analysis on that

Ident No.	Hg	Be	Cd	As	V	Ni	Sb	Cr	Zn	Cu	Pb	Se	B	F	Li	Ag	Sn	Fe	Sr	Mn	K	Ca	Si	Mg			
72-OES-712	—	<0.05	<0.5	<2.5	<0.05	<0.1	<0.5	<0.05	<0.5	0.3	0.4	—	<0.5	—	<0.5	<0.05	<0.1	0.4	<0.1	100.	2.	100.	0.4	3	16.	—	
713	—																										

Abbreviations: 1-Ox, 2-OES, 3-OES, 4-AA, 5-AAV, 6-ICP, and 7- other. Comments: *Calculated from analysis of the total amount of sample received. Almost all samples contained 10 ml when received except the acetone wash samples, which contained lesser and variable volumes (from 0 to 6 ml) as noted in the next to the last column above). For purposes of the analyses, the samples containing something less than 10 ml were diluted to 10 ml, then analyzed. This is based on the assumption that these samples had evaporated.

Abbreviations: Use Test Number of analysis requested (shown over each column)

Nos. Used 72-000-714 | No. Used 72-000-719

2-A

Phosphorus Reduction
(Use Table A)

Samp. No.	Description of Sample or Sample Fraction	Wt. (Solid) mg	Vol. (Liquid) ml	Comments (approx. concentrations-possible interferences etc.) (Indicate specific analysis on backside)
72-000-715	Impinger water*, probewash, and filters		795	Fluorides, P2O5, Trace metals
713	Acetone wash		535	" " " "
714	Scrubber water (Sample #1)			" " " "
715	Scrubber water (Sample #2)			" " " " , pH
716	Scrubber water (Sample #3)			" " " " "
717	Slag-pit quench water			" " " " "

COMMENTS: * Impinger solution was 10% NaOH

SAMPLING CONTRACTOR PEDCo Environmental
(if applicable)

PROJECT OFFICER John [illegible]

REQUEST REVIEWED BY [illegible]

DATE ANALYSIS REQUESTED 30 JUNE 1972

Sampling Date Yr. 72 Mo. 6 Day 12

Filter Format: No. Used 72-000-723

Gas Format: No. Used 72-000-725

Test No. 72-11 C7

Run No. 3

RECD.

RCRD. 7-14-72

INDUSTRY Phosphorus Reduction (Use Table 1)

COMPANY Stauffer Chemical Co.

ADDRESS Mt. Pleasant, Tennessee

SAMPLING LOCATION Fluorides, PaO5 (Natural Gas #5)

UNIT PROCESS/OPERATION Elemental Phosphorus Furnace

AIR POLLUTION CONTROL Venturi scrubber

FUEL USED Electricity

INLET ☒

OUTLET ☐

GAS VOLUME SAMPLED (METER VOL. IN FT³) 259 @meter conditions

RES TO P. O. 9[illegible] 10/5 (TH).

LAB. [illegible]

FILED

Ident. No.	Description of Sample or Sample Fraction	Sample Wt. (Solid) gm	Sample Vol. (Liquid) ml	Analysis Requested - General Comments (approx. concentrations-possible interferences etc.) (Indicate specific analysis on backside)
72-000-723	Impinger solution + water wash, filters		800	Fluorides, PaO5, Trace metals
724	Acetone wash		415	" " " "
725	Scrubber water (Sample #1)			" " " " , pH
726	Scrubber water (Sample #2)			" " " " "
727	Scrubber water (Sample #3)			" " " " "
728	Slag pit quench water			

CONTENTS: ~10% NaOH

SAMPLING CONTRACTOR Pedco Environmental (if applicable)

PROJECT OFFICER John C. Williams

REQUEST REVIEWED BY [signature]

DATE ANALYSIS REQUESTED 30 JUNE 1972

R

X

(Must be filled out for each sample)

Sampling Date 72-6-27

First Issue: No. Used 72-000-732

Last Issue: No. Used 72-000-736

Test No. 2

Run No. 1

INDUSTRY Phosphorous Reduction (Use Table 1)

COMPANY Stauffer Chemical Co

ADDRESS Mt. Pleasant, Tennessee

SAMPLING METHOD Fluorides-Be (Modified EPA)

UNIT PROCESS/OPERATION Elemental Phosphorus Furnace

AIR POLLUTION CONTROL Venturi Scrubber

FUEL USED Electricity

INLET ☐

OUTLET ☒

GAS VOLUME SAMPLED (METER VOL. IN FT³) 30.5 @ meter conditions

Ident. No.	Description of Sample or Sample Fraction	Sample Vol. (Solid) mg.	Sample Vol. (Liquid) ml.	Analysis Requested - General Comments (approx. concentrations-possible interferences etc.) (Indicate specific analysis on back)
72-000-732	Impinger solution & water wash, filters		900	Fluorides, P2O5, Trace metals.
733	Acetone wash		350	" " " "
734	Scrubber water (Sample #1)			" " " " , pH
735	Scrubber water (Sample #2)			" " " "
736	Scrubber water (Sample #3)			

COMMENTS: * 10% NaOH

SAMPLING CONTRACTOR PEDCo Environmental (if applicable)

PROJECT OFFICER John [illegible]

REQUEST REVIEWED BY [illegible]

DATE ANALYSIS REQUESTED 30 JUNE [illegible]

I.D. Used 72-CCO-223

I.D. Used 72-CCO-228

3-4

Phosphorous Reduction
(Use Table A)

Lab. No.	Description of Sample or Sample Fraction	Sample Wt. (Solid) gm	Sample Vol. (Liquid) ml	Analysis Requested - General Comments (approx. concentrations-possible interferences etc.) (Indicate specific analysis on backside)
72-CCO-223	Evaporator bottoms, water wash, filters		800	Fluoride, P.O., Trace metals
224	Caustic wash		415	" " " "
225	Scrubber water (sample #1)			" " " " pH
226	Scrubber water (sample #2)			" " " " "
227	Scrubber water (sample #3)			" " " " "
228	Slag-pot quench water			" " " " "

COMMENTS: 2-10% NaOH

SAMPLING CONTRACTOR: PEDCo Environmental (if applicable)

PROJECT OFFICER John McSorley

REQUEST REVIEWED BY Steve O. Cox

DATE ANALYSIS REQUESTED 30 June 1972.

APPENDIX G. VISIBLE EMISSIONS RECORDS

Visible emissions from the scrubber stack and the furnace building vents were recorded during slag taps by William R. King, the EPA Project Engineer during testing. The records are unsuitable for reproduction, and a copy is on file in the office of the Emission Measurement Branch.

APPENDIX H. PROCESS MATERIALS ANALYSIS RESULTS

Five furnaces material samples were analyzed by EPA for fluorides by sulfuric acid distillation followed by the SPADNS-Zirconium Lake method. The results are given in Table H-1.

Table H-1. Fluoride Concentrations in Furnace Materials

Sample	Fluoride Concentration (mg./gm.)
Furnace Nodules	21.6
Furnace Coke	<0.06
Furnace Silica	<0.06
Furnace Ferrophosphorus	0.06
Furnace Slag	32.6