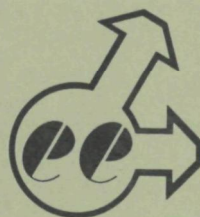


TEST NO. 71 - CI - 32
TEXAS GULF, INC.
SUPER PHOSPHORIC ACID
AURORA, NORTH CAROLINA

NOVEMBER 19, 1971



environmental engineering, inc.

2324 S. W. 34th STREET / GAINESVILLE, FLORIDA 32601 / PHONE 904 / 372-3318

TEST NO. 71 - CI - 32
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SUPER PHOSPHORIC ACID
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Test Conducted By:
Environmental Engineering, Inc.
Contract No. CPA 70 - 82

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I. INTRODUCTION

Under the direction of the Environmental Protection Agency, Environmental Engineering, Inc. conducted emission tests at the Texas Gulf, Inc. phosphate complex in Aurora, North Carolina. On November 19, 1971, three two-hour test runs were conducted on TGI's super phosphoric acid production facilities. The purpose of the tests was to obtain data for the use of both the Industrial Studies Branch and the Performance Standards Branch of the EPA.

The outlet stack of the off-gas scrubber was measured for soluble and insoluble fluorides. Grab samples of the scrubbing liquid, the process reactant, and the process product were also analyzed for fluoride content. A schematic flow diagram indicating the sampling location is given in Figure 1.

Complete test results are listed in Appendix A.

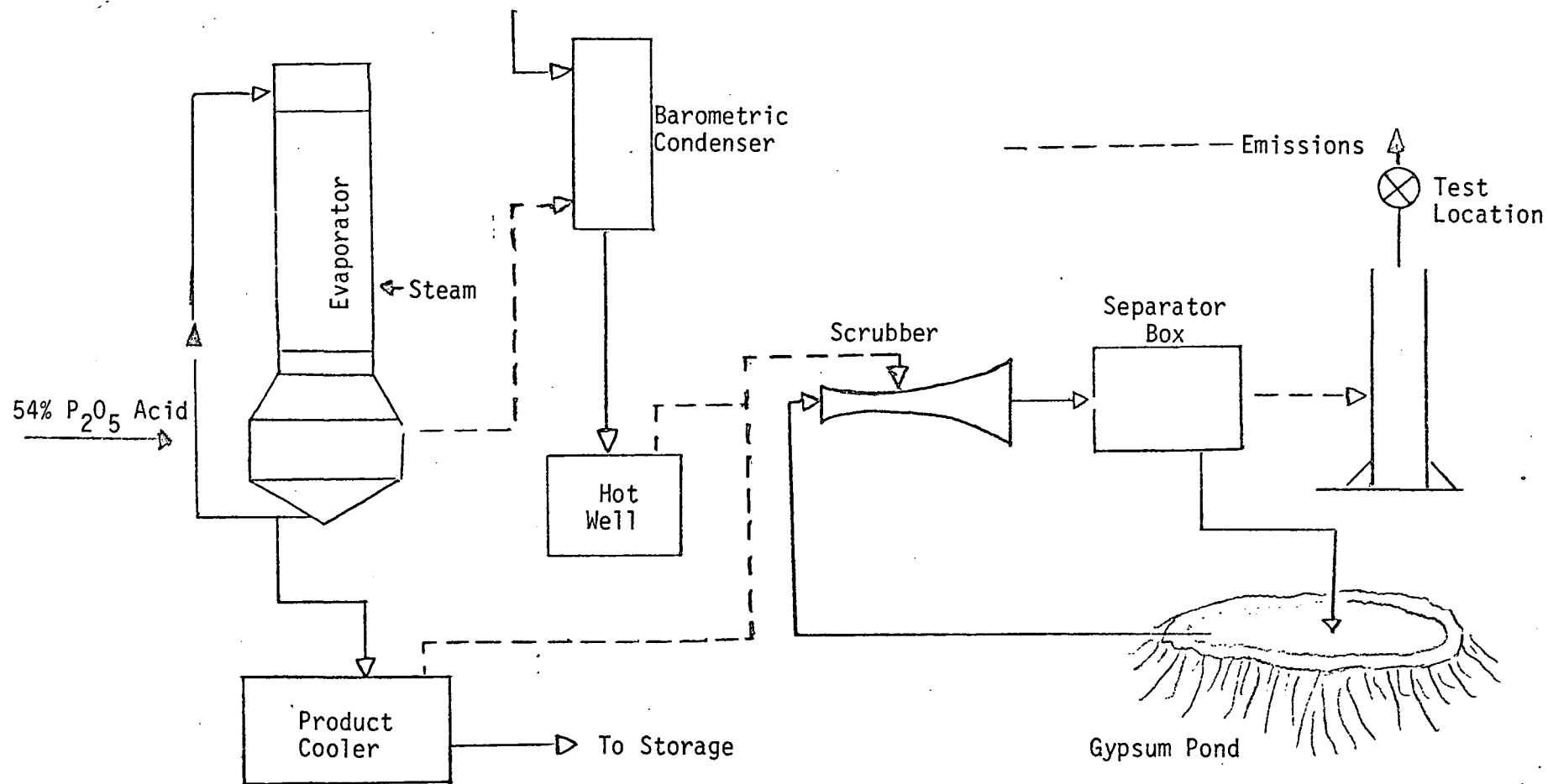


Figure 1

VACUUM EVAPORATION SUPER PHOSPHORIC ACID

II. SUMMARY OF RESULTS

The plant was operating under normal process conditions during all of the test runs.

One deviation from standard testing procedure was necessary. The velocity of the exit gas was too low to be measured by Method 2 of the Federal Register even when using a micromanometer. At the time of the tests, no other method was available. The EPA project officer decided to conduct the tests, sampling at a constant rate determined by the ΔH° of the meter box. Jerome Rom (EPA) returned to the test site at a later date to measure the stack gas velocity. At this time, he measured the gas velocity by igniting a colored smoke bomb in the stack and measuring the time required for the smoke to appear at the stack outlet. The length of the stack from the sample port to the exit was known; consequently, the stack gas velocity could be calculated. Several such tests were made, and the times from all the tests were averaged; this average time was used to calculate the gas velocity. Needless to say, this method will not give the exact velocity. However, because the process operation does not vary a great deal, this method should give an approximate value for the gas velocity during the actual fluoride tests.

A complete summary of stack gas conditions and emission levels is given in Table 1.

TABLE 1
SUMMARY OF RESULTS
FLUORIDES
TEXAS GULF, INC.
SUPER PHOSPHORIC ACID OUTLET

Run No.	1	2	3
Date	11/19/71	11/19/71	11/19/71
Barometric pressure, inches Hg	30	30	30
Stack pressure, inches Hg	30	30	30
Stack gas moisture, % volume	1.9	1.9	1.8
Average stack gas temperature, °F	72	72	71
Stack gas flow rate @ S.T.P.* , SCFM	420	420	420
Volume of gas sampled @ S.T.P.*	90.315	88.809	90.157
Fluoride, water soluble, mg	13.148	35.910	11.781
Fluoride, total, mg	13.148	35.910	11.781
Fluoride, water soluble, gr/SCF	0.002	0.006	0.002
Fluoride, total, gr/SCF	0.002	0.006	0.002
Fluoride, water soluble, gr/CF stk. cond.	0.002	0.006	0.002
Fluoride, total, gr/CF stk. cond.	0.002	0.006	0.002
Fluoride, water soluble, lb/hour	0.008	0.022	0.007
Fluoride, total, lb/hour	0.008	0.022	0.007

* Dry, 70°F., 29.92 inches Hg.

III. PROCESS DESCRIPTION

Texas Gulf, Inc. operates two super phosphoric acid (SPA) production trains at their Lee Creek, North Carolina operations. Emissions were sampled from the south production train only. Texas Gulf, Inc. produces SPA by concentrating 54 percent P_2O_5 phosphoric acid to 68-72 percent P_2O_5 .

In concentrating the acid, 54 percent P_2O_5 phosphoric acid is continuously fed to the vacuum evaporator (Figure 1). The overheads, containing fluorides and water vapor, are condensed in a barometric condenser. The barometric condenser water flows to the barometric condenser hotwell after which it is sewered to the gypsum pond. The product acid (68-72 percent P_2O_5) is continuously tapped from the evaporator and pumped to the product acid cooling tank where it is cooled before being pumped to storage.

Fluoride emissions from the barometric condenser hotwell and the product acid cooling tank are controlled by a scrubber.

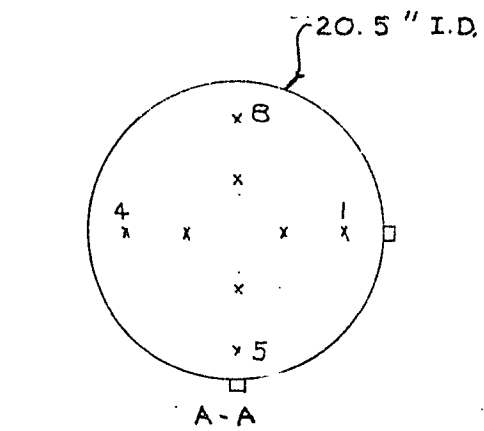
IV. PROCESS OPERATION

All three test runs were conducted on November 19, 1971. The process operated normally throughout the collection of all samples.

V. LOCATION OF SAMPLING POINTS

The sampling sites and number of traverse points were selected as per "Method I - Sample and Velocity Traverses for Stationary Sources, Part 60, Subchapter C, Chapter 1, Title 40," Federal Register, No. 247-Pt. II-1.

Figure 2 is a schematic diagram of the stack configuration near the sampling location, and the sampling points traversed during the emission tests.



SAMPLE POINT	DISTANCE FROM INSIDE WALL (INCH)
1, 5	1.25
2, 6	5.00
3, 7	15.00
4, 8	18.75

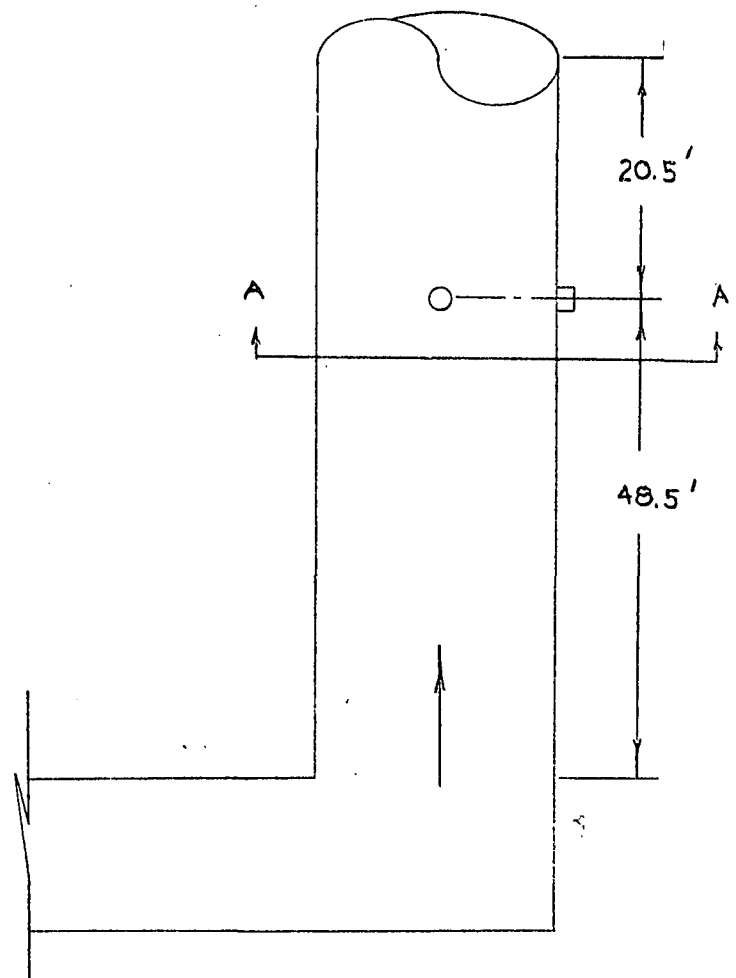


Figure 2
SAMPLE PORT LOCATION

VI. SAMPLING AND ANALYTICAL PROCEDURES

A. Preliminary Moisture Determination

The preliminary moisture content of the stack gas was found by using the wet bulb-dry bulb method as referred to in the Federal Register (Vol. 36, No. 247, Part II, December 23, 1971).

B. Preliminary Velocity Determination

Because of such a low flow rate, the velocity could not be measured as per Method 2 of the above referenced Federal Register. A micromanometer was used with an S-type pitot tube in an attempt to measure the flow; however, the flow rate was so low that this method did not work. The EPA project officer decided to perform the tests, sampling at a constant rate determined by running the sample train at the ΔH_0 of the meter box. The stack velocity was determined by Jerome Rom (EPA) at a later date. The method used consisted of igniting a smoke flare in the stack at the sample port and measuring the time required for the smoke to travel the known distance to the stack outlet. Several such tests were made, and the average time of the tests was used to calculate the velocity of the stack gas.

C. Sampling for Fluoride Emissions

The sampling procedure used for determining fluoride emissions was similar to Method 5 of the Federal Register. Other than the velocity measurement, the major difference between the two methods

was the configuration of the sampling train. The sampling train described in the Federal Register has a heated box containing the filter holder directly following the glass probe. The sampling train used in these tests contained no heated box and the filter holder was placed between the third and fourth impingers (between dry impinger and silica gel impinger) to prevent sample carry over. Figure 3 is a schematic diagram of the sampling train used.

After the selection of the sampling site and the minimum number of sampling points per Method 2 of the above referenced Federal Register, three separate test runs were performed. For each run, the required stack and sampling parameters were recorded on field data sheets. They are included in Appendix B. Readings were taken at each traverse point. As already mentioned, because of the low flow rate, it was decided to sample at the ΔH_0 of the meter box (1.62 inches H_2O). The traverse points were selected to maintain at least one inch from the inner stack wall.

After each run, the liquid volume in the first three impingers was measured volumetrically and the silica gel was reweighed. The impinger liquid, the filter, plus the water washings of the probe and other sampling train components up to the silica gel were placed into polyethylene containers. During some runs the different sample fractions were placed in separate containers, while during others all the recovered sample was placed into one container. Field data sheets are included in Appendix B.

D. Liquid and Product Grab Samples

Periodically, during each test run, grab samples of the raw materials, finished product, and scrubber liquid were taken, and the temperature and pH were determined at the site.

E. Laboratory Analysis Procedures

Water soluble fluorides were done by a sulfuric acid distillation followed by the SPADNS-ZIRCONIUM LAKE METHOD. Water insoluble fluorides were first fused with NaOH followed by a sulfuric acid distillation then by the SPADNS-ZIRCONIUM LAKE METHOD.

For more details of exact method used, see Appendix C.

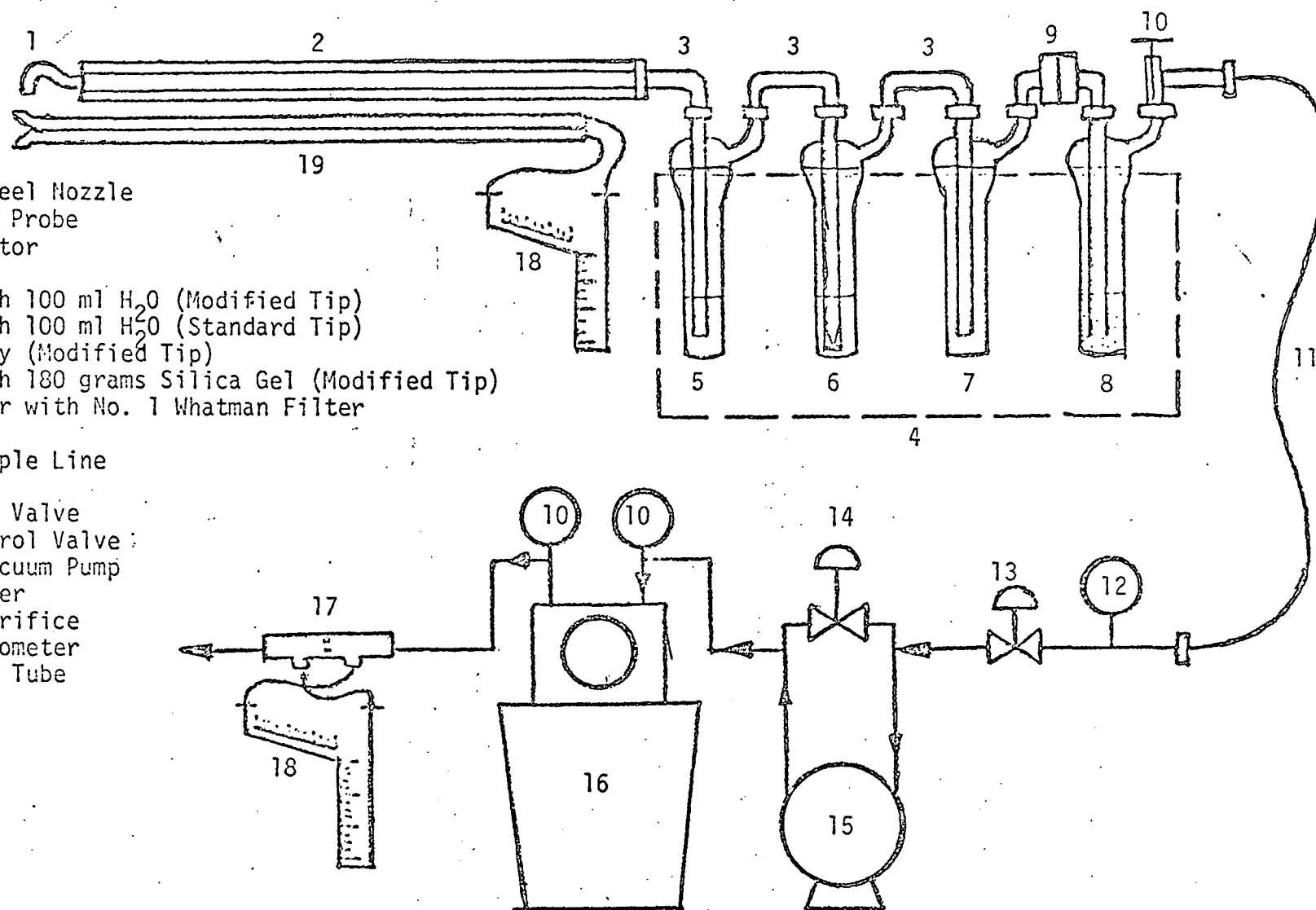


Figure 3

FLUORIDE SAMPLING TRAIN

APPENDICES

APPENDIX A

Emission Calculations and Results

E.E.I. SOURCE SAMPLING NOMENCLATURE SHEET

- PB - Barometric pressure, inches Hg
 - PS - Stack pressure, inches Hg
 - As - Stack area, sq. ft.
 - AS' - Effective area of positive stack gas flow, sq. ft.
 - NPTS - Number of traverse points where the pitot velocity head was greater than zero
 - TS - Stack temperature, °R
 - TM - Meter temperature, °R
 - \bar{H} - Average square root of velocity head, $\sqrt{\text{inches H}_2\text{O}}$
 - ΔH - Average meter orifice pressure differential, inches H₂O
 - AN - Sampling nozzle area, square feet
 - CP - S-type pitot tube correction factor
 - VM - Recorded meter volume sample, cubic feet (meter conditions)
 - VC - Condensate and silica gel increase in impingers, milliliters
 - Po - Pressure at the dry test meter orifice, $\left[\frac{PB + \Delta H}{13.6} \right]$ inches Hg
 - STP - Standard conditions, dry, 70°F, 29.92 inches Hg
- - - - -
- VWV - Conversion of condensate in milliliters to water vapor in cubic feet (STP)
 - VSTPD - Volume sampled, cubic feet (STP)
 - VT - Total water vapor volume and dry gas volume sampled, cubic feet (STP)
 - W - Moisture fraction of stack gas
 - FDA - Dry gas fraction
 - MD - Molecular weight of stack gas, lbs/lb-mole (dry conditions)
 - MS - Molecular weight of stack gas, lbs/lb-mole (stack conditions)
 - GS - Specific gravity of stack gas, referred to air
 - EA - Excess air, %
 - $\sqrt{H \times TS}$ - Average square root of velocity head times stack temperature
 - U - Stack gas velocity, feet per minute
 - QS - Stack gas flow rate, cubic feet per minute (stack conditions)
 - QD - Stack gas flow rate, cubic feet per minute (dry conditions)
 - QSTPD - Stack gas flow rate, cubic feet per minute (STP)
 - PISO - Percent isokinetic volume sampled (method described in Federal Register)
 - Time - Total sample time, minutes

EQUATIONS FOR CALCULATING FLUORIDE EMISSIONS

$$VWV = (0.0474) \times (VC)$$

$$VSTPD = (17.71 \times (VM) \times (PB + \frac{H}{13.6}) \div TM$$

$$VT = (VWV) + (VSTPD)$$

$$W = (VWV) \div (VT)$$

$$FDA = (1.0) - (W)$$

FMOIST = Assumed moisture fraction

$$MD = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 \times \% N_2) + (0.28 \times \% CO)$$

$$MS = (MD \times FDA) + (18 \times W)$$

$$GS = (MS) \div (28.99)$$

$$EA = \left[(100) \times (\% O_2 - \frac{\% CO}{2}) \right] \div \left[(0.266 \times \% N_2) - (\% O_2 - \frac{\% CO}{2}) \right]$$

$$\underline{U} = (174) \times (CP) \times (\underline{H}) \times \sqrt{(TS \times 29.92) \div (GS \times PS)}$$

$$QS = (\underline{U}) \times (AS)$$

$$QD = (QS) \times (FDA)$$

$$QSTPD = (530) \times (QD) \div (TS) \times (PS) \div (29.92)$$

$$PISO = \left[(0.00267 \times VC \times TS) + (P_o \times TS \times VM \div TM) \right] \div \left[(Time \times \underline{U} \times PS \times AN) \right]$$

Fluoride Emissions:

MG = Milligrams of fluoride from lab analysis

$$Grains/SCF = (0.01543) \times (MG) \div VSTPD$$

$$Grains/CF, Stack Cond. = (17.71) \times (PS) \times (FDA) \times (Grains/SCF) \div (TS)$$

$$Lbs/hour = (Grains/SCF) \times (0.00857) \times (QSTPD)$$

P₂O₅ Fed = Tons/hour, determined from plant data

$$Lbs/ton P_2O_5 Fed = (lbs/hour) \div (Tons/hour P_2O_5 Fed)$$

SOURCE TEST DATA

TEST NO. -

PLANT - TEXAS GULF SULFUR, AURORA, NORTH CAROLINA

SOURCE - SUPERPHOSPHORIC ACID (S. Stack)

TYPE OF PLANT - SUPER PHOSPHORIC ACID

CONTROL EQUIPMENT -

POLLUTANTS SAMPLED - FLUORIDES

1) RUN NUMBER	1	2	3
2) DATE	11/19/71	11/19/71	11/19/71
3) TIME BEGAN	10:45	13:30	17:05
4) TIME END	12:50	16:40	19:05
5) BAROMETRIC PRESSURE, IN HG	30	30	30
6) METER ORIFICE PRESSURE DROP, IN H ₂ O	1.62	1.62	1.62
7) VOL DRY GAS, METER COND, CUBIC FEET	90.243	89.238	90.254
8) AVERAGE GAS METER TEMPERATURE, DEG F	73	76	74
9) VOL DRY GAS, S.T.P., CUBIC FEET	90.315	88.809	90.157
10) TOTAL H ₂ O COLLECTED, ML	37.3	36.2	35.4
11) VOL H ₂ O VAPOR COLLECTED, S.T.P., CU FT	1.77	1.72	1.68
12) STACK GAS MOISTURE, PERCENT VOLUME	1.9	1.9	1.8
14) PERCENT CO ₂	0		
15) PERCENT O ₂	19.2		
16) PERCENT CO	0		
17) PERCENT N ₂	80.8		
19) MOLECULAR WEIGHT OF STACK GAS, DRY	28.77	28.77	28.77
20) MOLECULAR WEIGHT OF STACK GAS, STK COND	28.54	28.54	28.54
21) STACK GAS SPECIFIC GRAVITY	0.98	0.98	0.98
23) AVERAGE STACK GAS TEMPERATURE, DEG F	72	72	71
26) STACK PRESSURE, IN HG, ABSOLUTE	30	30	30
27) STACK GAS VEL, STACK COND, F.P.M.	197	197	197
28) STACK AREA, SQ FEET	2.18	2.18	2.18
29) EFFECTIVE STACK AREA, SQUARE FEET	2.18	2.18	2.18
30) STACK GAS FLOW RATE, S.T.P., SCFMD	420	420	420
31) NET TIME OF TEST, MINUTES	120	120	120
32) SAMPLING NOZZLE DIAMETER, INCHES	0.25	0.25	0.25
34) FLUORIDE - WATER SOLUBLE, MG	13.148	35.910	11.781
35) FLUORIDE - TOTAL, MG	13.148	35.910	11.781
36) FLUORIDE - WATER SOLUBLE, GR/SCF	0.002246	0.006239	0.002016
37) FLUORIDE - TOTAL, GR/SCF	0.002246	0.006239	0.002016
38) FLUORIDE - WATER SOL., GR/CF, STK CND.	0.002194	0.00606	0.001965
39) FLUORIDE - TOTAL, GR/CF, STK CND.	0.002194	0.00606	0.001965
40) FLUORIDE - WATER SOLUBLE, LB/HOUR	0.00808	0.022457	0.007256
41) FLUORIDE - TOTAL, LB/HOUR	0.00808	0.022457	0.007256

S.T.P. ↔ DRY, 70 DEGREES F, 29.92 INCHES MERCURY

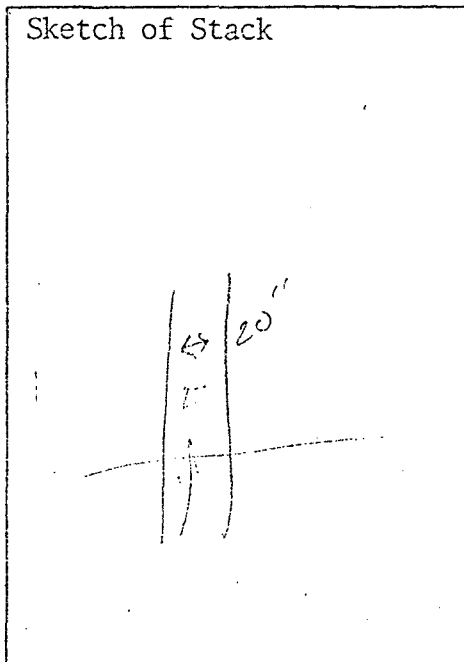
APPENDIX B

Field Data

SOURCE SAMPLING FIELD DATA SHEET

Plant TG-5 Superacid
 Sampling Location _____
 Date 11-19-71 Run No. 1
 Time Start _____ Time End _____
 Sampling Time/Point 15 min
 DB 72 °F, WB _____ °F, VF @ DP _____ "Hg
 Moisture _____ %, FDA _____, Gas Density Factor _____
 Barometric Press 30 "Hg, Stack Press 30 "Hg
 Weather Clear
 Temp. 72 °F, W/D _____, W/S _____
 Sample Box No. _____ Meter Box No. _____
 Meter & No. 1.62 Pitot Corr. Factor 0.83
 Nozzle Dia. 1/4 in., Probe Length 4 ft
 Probe Heater Setting 600°C
 Stack Dimensions: Inside Diameter 20 in
 Inside Area _____ ft²
 Height 100 ft

Sketch of Stack



Mat'l Processing Rate _____

Final Gas Meter Reading 755.070 ft³Initial Gas Meter Reading 664.827 ft³Total Condensate in Impingers 18 ml

Moisture in Silica Gel _____ gm

Silica Gel Container No. 206 Filter No. 4Orsat: CO₂ 0O₂ 14.2CO 0N₂ 85.8Excess
Air _____Test Conducted By: F. J. ...

Remarks: _____

Port and Traverse Point No.	Distance from End of Port (in)	Clock Time	Gas Meter Reading (ft ³)	Stack Velocity Head ("H ₂ O)	Meter Orifice Press. Diff. ("H ₂ O)		Stack Gas Temp. (°F)	Gas Sample Temp. @ Dry Gas Meter (°F)		Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		In	Out			
1-1	1/4	10:45	664.827		1.62	1.62	72	71	72	160	72	3.0
		10:50	668.6					71	71		64	3.2
		10:55	672.26					71	71		66	3.5
1-2	5	11:00	675.97					71	71	160	67	3.5
		11:05	777.64					71	71		67	3.8
		11:10	683.44					71	71		67	4.0
1-3	15	11:15	687.19					72	72	160	68	4.0
		11:20	690.94					72	72		68	4.1
		11:25	694.69		1.62	1.62	72	72	72		68	4.3

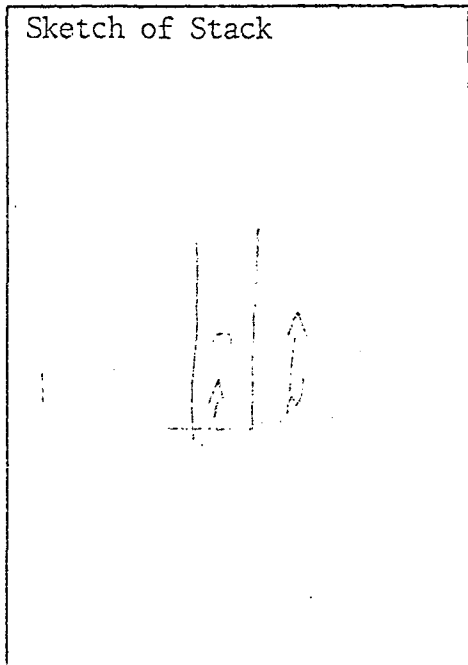
Port and Traverse Point No.	Distance from End of Port (in)	Clock Time	Gas Meter Reading (ft ³)	Stack Velocity Head ("H ₂ O)	Meter Orifice Press. Diff. ("H ₂ O)		Stack Gas Temp. (°F)	Gas Sample Temp. @ Dry Gas Meter (°F)		Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Cal.	Actual		In	Out			
1-4	18 3/4	11:30	698.41		1.62	1.62	72	72	72	152	68	4.6
		11:35	702.13					73	72		68	5.1
		11:40	705.59					73	73		68	5.2
End 1/2		11:45	709.666					73	73	175	68	5.2
2-1		11:50	709.67					73	73	175	68	5.2
		11:55	713.6					74	73		68	5.5
		12:00	717.2					74	73		68	5.5
2-2		12:05	721.1					74	73		71	5.5
		12:10	724.8					74	73		71	5.6
		12:15	728.7					74	74		70	5.6
2-3		12:20	732.3					74	74	170	70	5.6
		12:25	736.1					75	74		67	5.6
		12:30	739.9					75	74		67	5.5
2-4		12:35	743.7					75	74	172	66	5.5
		12:40	747.42					75	74		67	5.7
		12:45	751.19					75	75		67	5.7
End		12:50	755.070		1.62	1.62	72	74	75		67	5.7
			664.827		0.11		0.11	0.11				
			90.243		1.62		72	74				

90.243

SOURCE SAMPLING FIELD DATA SHEET

Plant T-6-S Super Acid
 Sampling Location _____
 Date 11/19/71 Run No. 2
 Time Start 13.30 Time End _____
 Sampling Time/Point 15 min
 DB 72 °F, WB _____ °F, VF @ DP _____ "Hg
 Moisture _____ %, FDA _____, Gas Density Factor _____
 Barometric Press 30 "Hg, Stack Press 3 "Hg
 Weather _____
 Temp. 70 °F, W/D _____, W/S _____
 Sample Box No. _____ Meter Box No. 4
 Meter AH 162 Pitot Corr. Factor 0.83
 Nozzle Dia. 1/4 in., Probe Length 4 ft
 Probe Heater Setting _____
 Stack Dimensions: Inside Diameter 20 in
 Inside Area _____ ft²
 Height 108 ft

Sketch of Stack



Mat'l Processing Rate _____

Final Gas Meter Reading 544.308 ft³Initial Gas Meter Reading 755.070 ft³Total Condensate in Impingers 1.3 ml

Moisture in Silica Gel _____ gm

Silica Gel Container No. 200 Filter No. 5

Orsat: CO₂ _____
 O₂ _____
 CO _____
 N₂ _____
 Excess Air _____

Test Conducted By: G. AllenE. JohnsonD. Falygaut

Remarks: _____

Port and Traverse Point No.	Distance from End of Port (in)	Clock Time	Gas Meter Reading (ft ³)	Stack Velocity Head ("H ₂ O)	Meter Orifice Press. Diff. ("H ₂ O)		Stack Gas Temp. (°F)	Gas Sample Temp. @ Dry Gas Meter (°F)		Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		In	Out			
1-1		1:30	755.070		1.62	1.62	72	75	76	165	72	3.3
		1:35	758.9					75.5			72	3.3
		1:40	762.6					75			72	3.3
1-2		1:45	766.5					76		172	72	3.3
		1:50	770.0					76			74	3.3
		1:55	773.7					76			72	3.2
1-3		2:00	777.4					76		160	73	3.2
		2:05	781.1					76			73	3.2
		2:10	784.7		1.62	1.62	72	76	76	148	74	3.3

[illegible]

SOURCE SAMPLING FIELD DATA SHEET

Plant Super Acid T.G.S.
 Sampling Location _____
 Date 11-19-71 Run No. 3
 Time Start 5:05 Time End _____
 Sampling Time/Point 15 min
 DB 72 °F, WB _____ °F, VF @ DP _____ "Hg
 Moisture _____ %, FDA _____, Gas Density Factor _____
 Barometric Press _____ "Hg, Stack Press _____ "Hg
 Weather DARK COLD
 Temp. _____ °F, W/D _____, W/S _____
 Sample Box No. _____ Meter Box No. 4
 Meter ΔH_2 1.62 Pitot Corr. Factor 0.83
 Nozzle Dia. 1/4 in., Probe Length 4 ft
 Probe Heater Setting _____
 Stack Dimensions: Inside Diameter 20 in
 Inside Area _____ ft²
 Height 158 ft

Sketch of Stack

Mat'l Processing Rate _____

Final Gas Meter Reading 934.562 ft³Initial Gas Meter Reading 844.308 ft³Total Condensate in Impingers 14 ml

Moisture in Silica Gel _____ gm

Silica Gel Container No. 105 Filter No. 6Orsat: CO₂ _____O₂ _____

CO _____

N₂ _____

Excess

Air _____

Test Conducted By: FaloutAllenJohnson

Remarks: _____

Port and Traverse Point No.	Distance from End of Port (in)	Clock Time	Gas Meter Reading (ft ³)	Stack Velocity Head ("H ₂ O)	Meter Orifice Press. Diff. ("H ₂ O)		Stack Gas Temp. (°F)	Gas Sample Temp. @ Dry Gas Meter (°F)		Sample Box Temp. (°F)	Last Impinger Temp. (°F)	Vacuum on Sample Train ("Hg)
					Calc.	Actual		In	Out			
1-1	X	5:05	844.3	-	1.62	1.62	72	76	76		66	2.1
		5:10	849.6	-	1.62			75	77	178	67	2.1
		5:15	851.8		1.62			75	77		67	2.1
1-2	Y	5:20	855.5		1.62			75	76		65	2.2
		5:25	857.3		1.62			74.5	76		63	2.2
		5:30	863.1		1.62			74	76	172	62	2.2
1-3	Z	5:35	866.9		1.62			74	76	160	62	2.3
		5:40	870.5		1.62			74	75		61	2.3
		5:45	874.7		1.62	1.62	72	74	75		61	2.2

[illegible]

~~90,262~~

APPENDIX C
Standard Analytical Procedures

ENVIRONMENTAL PROTECTION AGENCY

Research Triangle Park, North Carolina 27711

Reply to
Attn of:

Date: 12-21-72

Subject: Summary of Fluoride Analysis

To: R. Neulicht, EMB, IRL

This memorandum is in response to your request for a brief summary of our SPADNS-Zirconium Lake procedure for determination of fluoride in stack emission samples.

Samples received in our laboratory are filtered through fluoride free paper filters to yield water soluble and water insoluble portions. The water insoluble particulate collected on the filter is rinsed thoroughly to be sure that all water soluble fluoride is rinsed through. The water soluble fraction is distilled from sulfuric acid to a maximum temperature of 180°C. If chloride is suspected in the sample Ag_2SO_4 is added to the still. SPADNS solution is added to an aliquot of the distillate and the absorbance is read at 570 nm. The concentration of the sample is determined from a calibration curve prepared from standard fluoride solutions. It is very important that the temperature of the samples be the same as that of the standards when absorbances are recorded.

The water insoluble fraction of the sample is evaporated to dryness in the presence of a slurry of CAO, and then fused with NaOH. The fusate is dissolved with distilled water, neutralized with dilute H_2SO_4 , distilled and analyzed as described for the soluble portion.

Paper filters containing particulate are cut into small pieces, suspended in a slurry of CAO, evaporated to dryness and ashed prior to the alkali fusion and distillation.

If you have any questions about this procedure, let me know.

Howard L. Crist

Howard L. Crist
Chief, Source Sample Analysis Section
SSFAB, QAEML

cc: R. E. Lee

APPENDIX D
Project Participants

PROJECT PARTICIPANTS

Environmental Engineering, Inc.

<u>Name</u>	<u>Title</u>
John Koogler, Ph.D., P.E.	Project Director
Dennis Falgout	Project Manager
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