MEMORANDUM OF UNDERSTANDING
REGARDING BEST OPERATIONAL START-UP PRACTICES
FOR SULFURIC ACID PLANTS

4/3/95

The parties jointly agree: for the purposes of Rule 17-2.250, the foregoing practices constitute "best operational practices" for the start-up of sulfuric acid plants.

The Department will not seek to incorporate these practices into permits for existing facilities during the first 18 months after implementation. After the expiration of this 18-month period, which is a typical catalyst cycle, the Department may seek to modify the permits, in accordance with Rule 17-4.080 and other applicable laws, to incorporate appropriate site-specific start-up procedures as enforceable permit conditions.

These Sulfuric Acid Plant Best Operation Start-Up Practices will be made available in the control room at all times.

Since these specific procedures are undergoing evaluation, the Department will not consider these practices to be the only means of demonstrating best operating procedures. If a company chooses to use another method, it will be its responsibility to demonstrate that it constitutes best operational practices in accordance with 17-2.250, F.A.C.

BEST OPERATIONAL START-UP PRACTICES FOR SULFURIC ACID PLANTS

1. Only one sulfuric acid plant at a facility should be started up and burning sulfur at a time. There are times when it will be acceptable for more than one sulfuric acid plant to be in the start-up mode at the same time, provided the following condition is met. It is not acceptable to initiate sulfur burning at one sulfuric acid plant when another plant at the same facility is emitting SO_2 at a rate in excess of the emission limits imposed by the permit or rule, as determined by the CEMs emission rates for the immediately preceding 20 minutes.

2. A plant start-up must be at the lowest practicable operating rate, not to exceed 70 percent of the designated operating rate, until the SO_2 monitor indicates compliance. Because production rate is difficult to measure during start-up, if a more appropriate indicator (such as blower pressure, furnace temperature, gas strength, blower speed, number of sulfur guns operating, etc.) can be documented, tested and validated, the Department will accept this in lieu of directly documenting the operating rate. Implementation requires the development of a suitable list of surrogate parameters to demonstrate and document the reduced operating rate on a plant-by-plant basis. Documentation that the plant is conducting start-up at the reduced rate is the responsibility of the owner or operator.

3. Sulfuric acid plants are authorized to emit excess emissions from start-up for a period of three consecutive hours provided best operational practices, in accordance with this agreement, to minimize emissions are followed. No plant shall be operated (with sulfur as fuel) out of compliance for more than three consecutive hours. Thereafter, the plant shall be shut down. The plant shall be shut down (cease burning sulfur) if, as indicated by the continuous emission monitoring system, the plant is not in compliance within three hours of start-up. Restart may occur as soon as practicable following any needed repairs or adjustments, provided the corrective action is taken and properly documented.

4. Cold Start-Up Procedures.

a. Converter.

(1) The inlet and outlet temperature at the first two masses of catalyst shall be sufficiently high to provide immediate ignition when SO_2 enters the masses. In no event shall the inlet temperature to the first mass be less than 800°F or the outlet temperature to the first two masses be less than 700°F.

These temperatures are the desired temperatures at the time the use of auxiliary fuel is terminated.

(2) The gas stream entering the converter shall contain SO_2 at a level less than normal, and sufficiently low to promote catalytic conversion to SO_3.

b. Absorbing Towers.

The concentration, temperature and flow of circulating acid shall be as near to normal conditions as reasonably can be achieved. In no event shall the concentration be less than 96 percent H_2SO_4.

5. Warm Restart.

a. Converter.

The inlet and outlet temperatures of the first two catalyst masses should be sufficiently high to ensure conversion. One of the following three conditions must be met:

(1) The first two catalyst masses inlet and outlet temperatures must be at a minimum of 700°F; or

(2) Two of the four inlet and outlet temperatures must be greater than or equal to 800°F; or

(3) The inlet temperature of the first catalyst must be greater than or equal to 600°F and the outlet temperature greater than or equal to 800°F. Also, the inlet and outlet temperatures of the second catalyst must be greater than or equal to 700°F.

Failure to meet one of the above conditions, requires use of cold start-up procedures.

To allow for technological improvements or individual plant conditions, alternative conditions will be considered by the Department in appropriate cases.

b. Absorbing Towers.

The concentration, temperature and flow of circulating acid shall be as near to normal conditions as reasonably can be achieved. In no event shall the concentration be less than 96 percent H_2SO_4.

Steve Smallwood 10-10-89

Steve Smallwood, P.E. / Date
Director, Division of Air
Resources Management
Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Date

U.S. Agri-Chemicals
President

12/4/89

Date

REK 12/4/89

PHOSPHORIC ACID "A" TRAIN.

STACK 17

APRIL 2, 1985

5/17/85

William,
Here is the
P_2O_5 Emission
Test data you
need.
Regards

USS
Agri-Chemicals
Division of United States Steel Corporation

MAIL: P. O. BOX 150
BARTOW, FLORIDA 33830
813 - 533-0471

PROCESS RATE STATEMENT FOR EMISSION TEST

Date APRIL 2, 1985

Process PHOSPHORIC ACID, STACK 17

Location FT. MEADE, FLA.

Permit Number A053-69840

Start of Test	End of Test	Production Rate, Tons P_2O_5/day
3:17 PM	4:22 PM	696.7
4:40 PM	5:45 PM	696.7
6:08 PM	7:13 PM	696.7

I certify that the above statement is true to the best of my knowledge.

Signature Eugene Williams

Title Environmental Tech.

Date 4/26/85

GROUP : 94 POLLUTION TEST 2-APR-85 16:00:01

TAG	DESCRIPTOR	MV	SP	OUTPUT	STATUS
WQ101	A ROCKTOTAL	1.796 TPM		0.0 TONS	
FQ201	AH2SO4TOTAL	178.0 GPM		0.0 TONS	
WQ151	B ROCKTOTAL	1.561 TPM		0.0 TONS	
FQ251	BH2SO4TOTAL	168.0 GPM		0.0 TONS	

Run 1 A Train

R E Hall

GROUP : 94 POLLUTION TEST 2-APR-85 17:00:01

TAG	DESCRIPTOR	MV	SP	OUTPUT	STATUS
WQ101	A ROCKTOTAL	1.795 TPM		107.7 TONS	
FQ201	AH2SO4TOTAL	178.8 GPM		80.0 TONS	
WQ151	B ROCKTOTAL	1.497 TPM		91.9 TONS	
FQ251	BH2SO4TOTAL	174.6 GPM		76.5 TONS	

hour	Rock Ton	H_2SO_4 Ton
1700	107.7	80.0
1600	0.0	0.0
	107.7	80.0

Rock Consumption For 1 hr. 107.7 Ton

500 Rock P_2O_5 31.06 %

Rock Moisture 13.3 %

Production For 1 hour =

$107.7 \times .3106 \times (1 - .133) = 29.0026$ Ton P_2O_5 / Hr.

Run #2 A-Train

RC Hold

GROUP : 94 POLLUTION TEST 2-APR-85 18:00:01

TAG	DESCRIPTOR	MV	SP	OUTPUT	STATUS
WQ101	A ROCKTOTAL	1.796 TPM		215.5 TONS	
FQ201	AH2SO4TOTAL	183.4 GPM		161.1 TONS	
WQ151	B ROCKTOTAL	1.497 TPM		181.8 TONS	
FQ251	BH2SO4TOTAL	176.9 GPM		155.5 TONS	

Rock Ton

1800 215.5

1700 107.7

107.8

Rock Consumption for 1 hour 107.8 Ton

Rock P_2O_5 31.06 %

Rock Moisture 13.3 %

Production For 1 hr. =

$107.8 \times .3106 \times (1 - .133) = 29.0294$ Ton P_2O_5/hr

Run #3 A-Train

RECEIVED

GROUP : 94 POLLUTION TEST 2-APR-85 19:00:01

TAG	DESCRIPTOR	MV	SP	OUTPUT	STATUS
WQ101	A ROCKTOTAL	1.798 TPM		323.4 TONS	
FQ201	AH2SO4TOTAL	182.3 GPM		243.4 TONS	
WQ151	B ROCKTOTAL	1.536 TPM		273.8 TONS	
FQ251	BH2SO4TOTAL	178.6 GPM		235.2 TONS	

hr.	Rock	H_2SO_4
1900	323.4	243.4
1800	215.5	161.1
	107.9 Ton/hr	82.3 Ton/hr

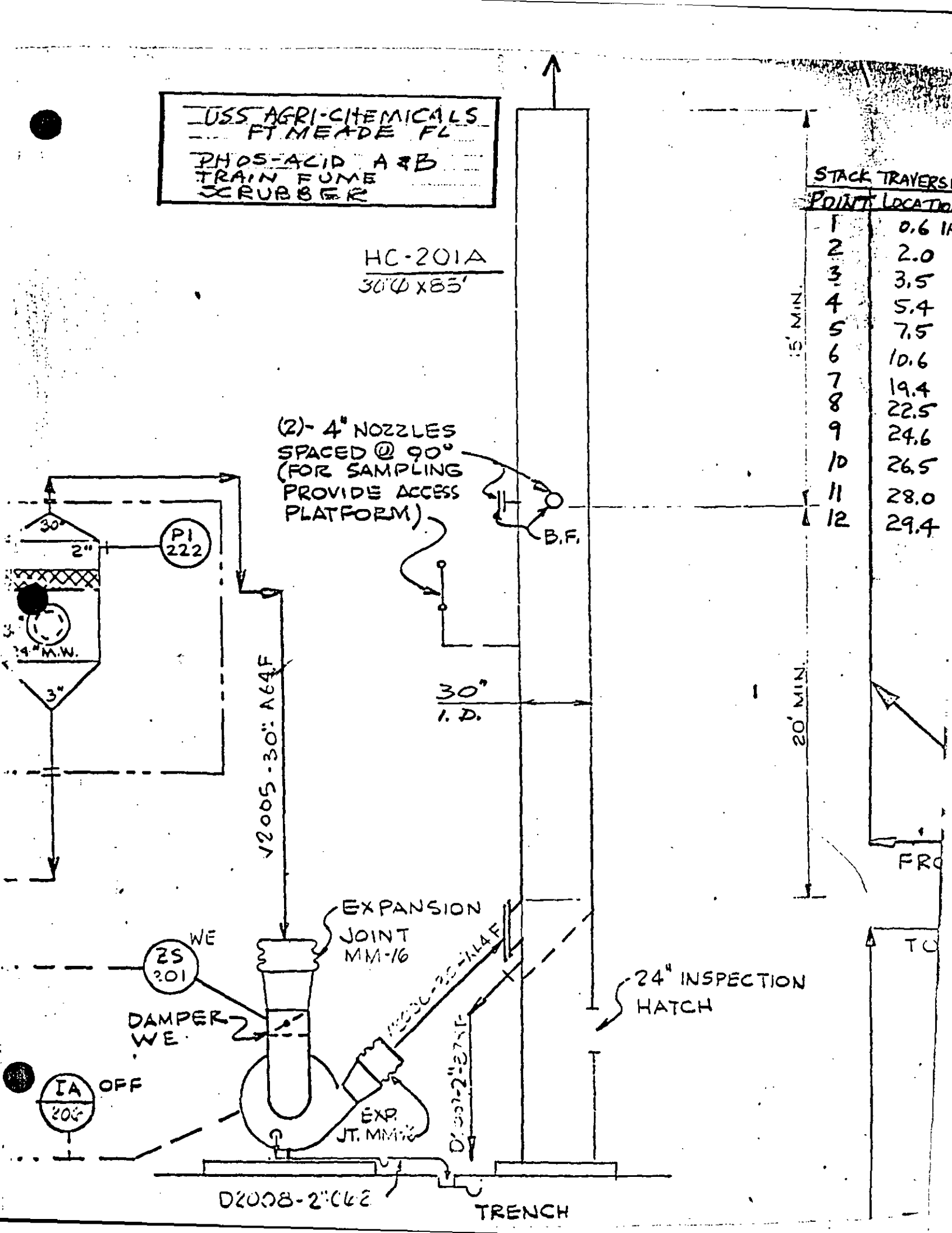
Rock Consumption 107.9 Ton hr.

Rock P_2O_5 = 31.06 %

Rock Moisture ~ 13.3 %

Production For 1 hour =

$107.9 \times .3106 \times (1.0 - .133) = 29.0564$ Tons P_2O_5/hour


USS AGRI-CHEMICALS
FT MEADE FL
PHOS-ACID A & B
TRAIN FUME
SCRUBBER
HC-201A
30'Ø X 85'
STACK TRAVERSE
POINT LOCATION
1 0.6
2 2.0
3 3.5
4 5.4
5 7.5
6 10.6
7 19.4
8 22.5
9 24.6
10 26.5
11 28.0
12 29.4
15' MIN.
20' MIN.
(2)- 4" NOZZLES SPACED @ 90° (FOR SAMPLING PROVIDE ACCESS PLATFORM)
B.F.
30" I. D.
30"
2"
PI 222
4" M.W.
3"
V2005-30"-A64F
EXPANSION JOINT MM-16
WE
ZS 201
DAMPER WE
IA 204
OFF
EXP. JT. MM-16
24" INSPECTION HATCH
D2008-2"-C62
TRENCH
FRO
TO

NOZZLE CALIBRATION

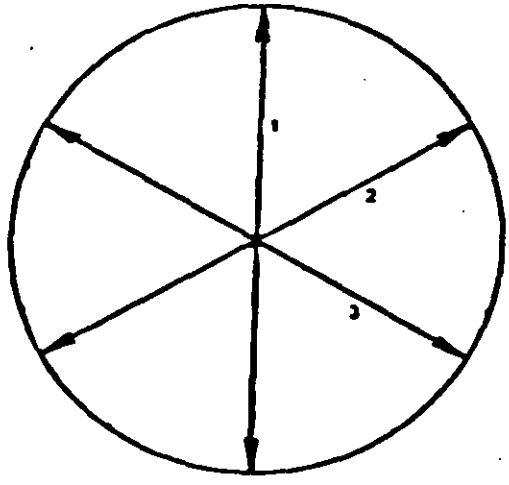
Nozzle 1056 -3849 Date 4-285

Measurement No.	Inside Diameter (inches)
1	.271
2	.271
3	.271

Average .271

Area of Nozzle .000400 Ft^2

Calibrated by: Robert E. Hall



Nozzle X-section

USS AGRI-CHEMICALS, PLANT
EMISSION TEST CONSTANTS AND APPARATUS CHECKS
SOURCE: PHOSPHORIC ACID "A" TRAIN STACK #1 PERMIT # A053-69839

		RUN #	1	2	3
			4-2-85	4-2-85	4-2-85
			3:17PM	4:40PM	6:08PM
			4:22PM	5:45PM	7:13PM
	STACK DIAMETER, INCHES		30.0	→	→
	STACK AREA, FT^2		4.909	→	→
	SAMPLE BOX NO.		31D 639C	→	→
	METER NO.		100 2990	→	→
Y	METER CORRECTION FACTOR		0.9917	→	→
	PITOT TUBE SERIAL NO.		SC #6192	→	→
	PITOT TUBE PRESS TEST "H$_2$O		7.3	6.5	5.7
	" " " " TIME		150 SEC	→	→
	" " " " LEAK		0.0	0.0	0.0
Cp	PITOT TUBE C.P.		0.84	→	→
	SAMPLE PROBE LENGTH, INCHES		39.0	→	→
	PROBE SERIAL NO.		SC-6192	→	→
	PROBE LINER MATERIAL		STAINLESS STEEL	→	→
	PROBE HEATER SETTING		5.0	→	→
	NOZZLE SERIAL NO.		1056-3849	→	→
A_d	NOZZLE DIA INCH		0.271	→	→
A_N	NOZZLE AREA FT^2		0.0004	→	→
	METER & TRAIN LEAK TEST				
	PRESSURE, IN-HG		10.0	8.0	8.0
	VOL LEAK TEST ELAPED TIME		1.0 MIN	1.0 MIN.	1.0 MIN.
	VOL LEAK FT^3		0.007	0.006	0.012
	CYCLONIC CONDITIONS IN STACK				
	POST TEST, METER CALIB. CHECK				
n	NUMBER OF TRAVERSE POINTS IN STACK DIAMETER				24.0
θ_d	SAMPLE TIME EACH POINT, MIN		2.5	→	→
θ	SAMPLE TIME FOR RUN, MIN		60.0	→	→
M_d	MOL WGT OF DRY STACK GAS - 29.0				
T_{std}	528°R				
P_{std}	29.92 IN MERCURY				

DATA CERTIFIED BY: E. W. Dillard DATE: 4/26/85

USS AGRI-CHEMICALS, PLANT:
EMISSION TEST FOR:
SOURCE: PHOSPHORIC ACID "B" TRAIN PERMIT: #A053-69839

	STACK 17	RUN #	1	2	3
		DATE	4-2-85	4-2-85	4-285
		START TIME	3:17PM	4:40PM	6:08PM
		END TIME	4:22PM	5:45PM	7:13PM
	PRODUCTION RATE: TONS P_2O_5/day		696.1	→	→
V_m	VOL DRY GAS SAMPLED, METER FT^3		59.9	56.1	54.1
$V_{m\,STD}$	" STD COND.		53.96	53.4	50.58
P_B	BAROMETER, INCHES-HG.		29.95	29.95	29.95
P_s	STACK PRESS, INCHES-HG.		0.0	0.0	0.0
ΔH	ORIFICE ΔH INCHES-H_2O		2.58	2.42	2.4
T_m	METER TEMP AVG °R		552	554	564
T_s	STACK TEMP, AVG. °R		554	554	555
V_l	VOL OF WATER COLLECTED, ML		31.1	29.6	31.6
V_w	WATER VOL, FT^3		1.4664	1.3956	1.4899
B_{ws}	WATER, MOL PERCENT		2.67	2.55	2.4
$\sqrt{\Delta P}$	STACK VELOCITY HEAD, $\sqrt{IN\text{-}H_2O}$		0.7302	0.7055	0.7081
V_s	STACK VELOCITY		42.09	40.66	40.87
Q_s	STACK FLOW RATE ACFM		12397	11975	12037
Q_{STD}	STACK FLOW RATE DSCFM		11511	11133	11135
I	ISOKINETIC SAMPLING COND. %		95.5	98.7	93.4
θ	TOTAL SAMPLE TIME, MIN		60.0	60.0	60.0
M_s	STACK GAS MOL WGT AT CONDITIONS		28.71	28.72	
M_d	STACK GAS MOL WGT DRY COND.		29.0	→	→
	FUEL TYPE				
	CONSUMPTION THERMS/T-PROD				
	EMISSIONS - TYPE: FLUORIDE				
	MG COLLECTED		2.7	2.41	2.73
	MG/SCF		0.0505	0.0451	0.054
	LB/HR Day		1.844	1.593	1.907
	LB/TON P_2O_5		0.0026	0.0023	0.0027

DATA CERTIFIED BY: E. Williams DATE: 4/26/85

Made in U.S.A.

Date 4-2-85
By R E Thiel
A Team PAB

Moisture Collected

Run #	Impinger A-1	A-2	A-3	A-4	Total Collect
1	669.1 644.2 24.9 6.2 31.1	654.7 650.4 4.3 1.9 6.2	456.4 455.5 0.9	646.4 645.4 1.0	31.1
Run #	B-1	B-2	B-3	B-4	Total Collect
2	673.8 648.5 25.3 4.3 29.6	698.9 697.1 1.8 2.5 4.3	455.1 453.9 1.2	668.9 667.6 1.3	29.6
Run #	C-1	C-2	C-3	C-4	Total Collect
3	686.2 659.0 27.2 4.4 31.6	661.4 659.3 2.1 2.3 4.4	454.6 453.3 1.3	647.0 645.0 2.0	31.6

ANALYTICAL WORK SHEET

DATE: 4-2-85
BY : R.E. Hall

ANALYSIS: Fluoride
PLANT : FT. Meade
STACK : PAD. A Train

RUN

1	2.70	mg F/ℓ × 1ℓ = 2.7 mg F
2	2.41	mg F/ℓ × 1ℓ = 2.41 mg F
3	2.73	mg F/ℓ × 1ℓ = 2.73 mg F
STANDARD	1.0	mg F/ℓ
STANDARD	10.0	mg F/ℓ

RUN

1	53.46	SCF	.0505	mg F/SCF
2	53.4	SCF	.0451	mg F/SCF
3	50.58	SCF	.0540	mg F/SCF

RUN

1 $\frac{(.0505)(11,511)(60)(24)}{(454)(1000)} = 1.8438$ LBS. F/DAY

2 $\frac{(.0451)(11,133)(60)(24)}{(454)(1000)} = 1.5926$ LBS. F/DAY

3 $\frac{(.054)(11,135)(60)(24)}{(454)(1000)} = 1.9072$ LBS. F/DAY

RUN

1	$\frac{1.8438 \div 24}{29.0026 \text{ Ton } P_2O_5/\text{hr}} =$	0.0026	LB. F/TON P_2O_5
2	$\frac{1.5926 \div 24}{29.0294 \text{ Ton } P_2O_5/\text{hr}} =$	0.0023	LB. F/TON P_2O_5
3	$\frac{1.9072 \div 24}{29.0564 \text{ Ton } P_2O_5/\text{hr}} =$	0.0027	LB. F/TON P_2O_5

Plant PHOSPHORIC ACID
City MEADE
Location A-TRAIN STACK 17
Operator E. WILLIAMS
Date 4-2-85
Run number —1

Sheet 1 of
Filter number N/A
leak rate TRAIN, 0.007 @ 10" Hg
LEAK RATE TRAIN, 0.006 @ 10" Hg

E. Williams 4/2/85

"H_2O LEAK TIME
PITOT LEAK TEST - 7.3 0.0 15 SEC.
REFERENCE ΔP - 0.38

Traverse point number	Sampling time, (θ), min	3:17 PM Clock time, (24 h)	Vacuum, (in.) Hg	Stack temperature (T_s), (°F)	Velocity head (ΔP_s), (in.) H_2O	Pressure differential across orifice meter (ΔH), (in.) H_2O	895.7 Gas sample volume (V_m), (ft^3)$_m$	Gas sample temperature at dry gas meter		Temperature of gas leaving condenser or last impinger, (°F)	Filter temp (°F)
								Inlet, (°F)	Outlet, (°F)		
1	2.5	3:19.5	4.0	93	.42	2.05	897.5	85	85	57	
2	"	22.0	4.3	93	.46	2.25	899.7	85	84	57	
3	"	24.5	4.7	94	.54	2.6	902.1	86	85	57	
4	"	27.0	4.7	94	.55	2.65	904.5	86	85	57	
5	"	29.5	5.2	94	.60	2.9	906.8	87	85	57	
6	"	32.0	5.3	94	.60	2.9	909.2	88	86	57	
7	"	34.5	5.3	94	.60	2.9	911.5	89	86	57	
8	"	37.0	5.3	94	.55	2.65	913.9	89	87	57	
9	"	39.5	5.3	94	.55	2.65	916.2	90	87	57	
10	"	42.0	4.8	94	.52	2.45	918.5	91	88	57	
11	"	44.5	4.8	94	.52	2.45	920.8	91	89	57	
12	"	47.0	4.4	94	.47	2.25	923.0	91	89	57	
0		3:52 PM					923.0				
1	2.5	54.5	4.0	93	.40	1.95	925.0	92	91	57	
2	"	57.0	4.4	93	.48	2.35	927.3	93	91	57	
3	"	59.5	4.8	93	.55	2.65	929.7	94	91	58	
4	"	4:02.0	5.2	94	.58	2.8	932.2	95	92	58	
5	"	04.5	5.4	94	.60	2.9	934.7	96	92	58	
6	"	07.0	5.5	94	.62	3.0	937.2	96	93	58	
7	"	09.5	5.5	94	.62	3.0	939.7	97	94	58	
8	"	12.0	5.0	94	.55	2.65	942.2	98	94	57	
9	"	14.5	5.0	94	.55	2.65	944.6	99	95	57	
10	"	17.0	5.0	94	.55	2.65	947.0	100	96	57	
11	"	19.5	4.8	94	.50	2.4	949.3	101	96	57	
12	"	22.0	4.3	94	.46	2.25	951.6	102	97	57	
	Total 60		Max 5.4	Avg 94	17.5256 0.7302	61.95 2.58	Total 55.9	Avg 93	Avg 90	Max 58	

RUN NO. 1
STACK NO, 17

STACK SAMPLING CALCULATIONS

DATE: 4/2/85
BY: EW

Meter Pressure

$P_m = 29.95 + \frac{2.58}{13.6} = 30.14$

Volume of Gas Sampled

$V_{m(std)} = \frac{55.9 \times 0.9917 \times 528 \times 30.14}{552 \times 29.92} = 53.4644$

16500.8

Moisture Content

$V_{w(std)} = 31.1\ (0.04715) = 1.4664$

$B_{ws} = \frac{1.4664}{1.4664 + 53.4644} = 0.0267 \sim 2.67$

54.9308

Stack Gas Molecular Weight

$M_s = 29(.9733) + 18(.0267) = 28.7063$

28.2257 + .4806

Stack Gas Pressure

$P_s = 29.95 + \frac{0.0}{13.6} = 29.95$

Stack Gas Velocity

$V_s = 85.49(0.84)(0.7302)\sqrt{\frac{.8027}{\frac{554}{29.95 \times 28.7063}}} = 42.091$

859.75

Isokinetic Variation

$\%I = \frac{(0.09450)(554)(53.46)}{(29.95)(42.091)(0.000398)(60)(.9733)} = 95.52$

Stack Gas Flowrate

$Q = 60(A_s)(V_s) = (60)(4.909)(42.091) = 12,397$

$Q_{std} = \frac{(12397)(528)(29.95)(.9733)}{(554)(29.92)} = 11,511$

16,575.68

Plant PHOSPHORIC ACID
City [redacted]MEADE
Location A-TRAIN STACK #1
Operator E. WILLIAMS
Date 4-2-85
Run number 2

Sheet 1 of [redacted]
Filter number N/A
leak rate TRAIN, 0.005 @ 8" Hg
LEAK RATE TRAIN, 0.006 @ 8" Hg

"H_2O LEAK TIME
PITOT LEAK TEST 6.5 0.0 15 SEC.
REFERENCE ΔP = 0.38

Traverse point number	Sampling time, (θ), min	4:40 PM Clock time, (24 h)	Vacuum, (in.) Hg	Stack temperature (T_s), (°F)	Velocity head (ΔP_s), (in.) H_2O	Pressure differential across orifice meter (ΔH), (in.) H_2O	951.602 Gas sample volume (V_m), (ft^3)$_m$	Gas sample temperature at dry gas meter		Temperature of gas leaving condenser or last impinger, (°F)	Filter temp (°F)
								Inlet, (°F)	Outlet, (°F)		
1	2.5	4:42.5	4.0	93	.32	1.55	953.5	103	102	58	
2	"	45.0	4.8	93	.38	1.85	955.6	104	102	58	
3	"	47.5	4.8	93	.38	1.85	957.7	105	102	58	
4	"	50.0	5.0	94	.42	2.05	959.9	106	103	58	
5	"	52.5	5.8	94	.48	2.35	962.3	106	103	57	
6	"	55.0	5.8	94	.48	2.35	964.7	107	103	57	
7	"	57.5	6.0	94	.55	2.65	967.2	108	104	57	
8	"	5:00.0	6.4	94	.60	2.9	969.7	109	104	57	
9	"	02.5	6.4	94	.60	2.9	972.3	109	105	57	
10	"	05.0	6.4	93	.60	2.9	974.9	110	106	58	
11	"	07.5	6.0	93	.55	2.65	977.4	110	106	58	
12	"	10.0	5.3	93	.47	2.25	979.8	111	107	58	
0		5:15 PM					979.8				
1	2.5	17.5	5.0	93	.40	1.95	982.0	109	107	58	
2	"	20.0	5.2	94	.45	2.2	984.3	109	108	58	
3	"	22.5	5.8	94	.52	2.45	986.5	110	108	58	
4	"	25.0	6.0	94	.54	2.6	988.8	110	109	58	
5	"	27.5	6.3	94	.58	2.8	991.2	110	109	59	
6	"	30.0	6.3	94	.58	2.8	993.7	111	109	59	
7	"	32.5	6.3	94	.58	2.8	996.1	111	109	59	
8	"	35.0	6.1	94	.54	2.6	998.5	112	110	59	
9	"	37.5	6.1	94	.54	2.6	1000.9	112	110	59	
10	"	40.0	5.8	94	.50	2.4	1003.2	113	110	59	
11	"	42.5	5.8	94	.50	2.4	1005.5	113	111	59	
12	"	45.0	5.5	94	.46	2.25	1007.7	114	111	58	
	Total 60		Max 6.4	Avg 94	16.731 0.7055	58.1 2.42	Total 56.1	Avg 109	Avg 107	Max 59	

RUN NO. 2 STACK SAMPLING CALCULATIONS DATE: 4/2/85
STACK NO. 17 A Train BY: EW

Meter Pressure

$P_m = 29.95 + \frac{2.42}{13.5} = 30.13$

Volume of Gas Sampled

$V_{m(std)} = \frac{56.1 \times 0.9917 \times 528 \times 30.13}{554 \times 29.92} = 53.4$

16575.7

Moisture Content

$V_{w(std)} = 29.6\,(0.04715) = 1.3956$

$B_{ws} = \frac{1.3956}{1.3956 + 53.4} = 0.0255 \sim 2.55\%$

54.7956

Stack Gas Molecular Weight

$M_s = 29(.9745) + 18(.0255) = 28.7195$

28.2605 + .459

Stack Gas Pressure

$P_s = 29.95 + \frac{0.0}{13.6} = 29.95$

Stack Gas Velocity

$V_s = 85.49(0.84)(0.7055)\sqrt{\frac{.8025}{\frac{554}{29.95 \times 28.7195}}} = 40.6571$

860.149

Isokinetic Variation

$\%I = \frac{(0.09450)(554)(53.4)}{(29.95)(40.6571)(0.000398)(60)(.9745)} = 98.66$

Stack Gas Flowrate

$Q = 60(A_s)(V_s) = (60)(4.909)(40.6571) = 11,975$

$Q_{std} = \frac{(11,975)(528)(29.95)(.9745)}{(554)(29.92)} = 11,133$

16575.7

Plant PHOSPHORIC ACID
City FT. MEADE
Location A-TRAIN STACK 17
Operator E. WILLIAMS
Date 4-2-85
Run number 3

Sheet 1 of
Filter number N/A
leak rate TRAIN, 0.012 @ 8" Hg
LEAK RATE TRAIN, 0.011 @ 8" Hg

C. Williams 4/2/85

"H_2O LEAK TIME
PITOT LEAK TEST- S.T 0.0 15 SEC.
REFERENCE ΔP - 0.38

Traverse point number	Sampling time, (θ), min	6:08PM Clock time, (24 h)	Vacuum, (in.) Hg	Stack temperature (T_s), (°F)	Velocity head (ΔP_s), (in.) H_2O	Pressure differential across orifice meter (ΔH), (in.) H_2O	1007.703 Gas sample volume (V_m), (ft^3)$_m$	Gas sample temperature at dry gas meter		Temperature of gas leaving condenser or last impinger, (°F)	Filter temp (°F)
								Inlet, (°F)	Outlet, (°F)		
1	2.5	6:10.5	4.1	94	.40	1.95	1009.5	103	102	58	
2	"	13.0	4.4	94	.45	2.2	1011.8	104	102	58	
3	"	15.5	4.4	94	.55	2.2	1014.1	104	102	58	
4	"	18.0	4.4	94	.55	2.2	1016.4	105	103	58	
5	"	20.5	4.8	94	.60	2.9	1018.8	101	103	58	
6	"	23.0	4.8	95	.60	2.9	1021.2	106	104	57	
7	"	25.5	5.0	95	.62	3.0	1023.7	107	104	57	
8	"	28.0	4.3	95	.56	2.7	1026.1	107	105	57	
9	"	30.5	4.3	95	.56	2.7	1028.5	107	105	57	
10	"	33.0	4.2	95	.52	2.45	1030.7	108	106	58	
11	"	35.5	4.2	95	.52	2.45	1032.9	107	105	58	
12	"	38.0	4.0	95	.45	2.2	1035.2	107	105	58	
0		6:44PM					1035.2				
1	2.5	46.5	3.5	94	.30	1.45	1037.0	107	106	58	
2	"	49.0	4.0	94	.38	1.85	1039.0	107	106	59	
3	"	51.5	4.2	95	.38	1.85	1040.9	106	106	59	
4	"	53.0	4.6	95	.40	1.95	1042.9	106	105	59	
5	"	55.5	5.1	95	.47	2.25	1045.2	105	104	59	
6	"	58.0	5.1	95	.47	2.25	1047.5	104	103	59	
7	"	7:00.5	5.4	95	.55	2.65	1049.8	103	102	59	
8	"	03.0	5.5	95	.60	2.9	1052.3	102	101	59	
9	"	05.5	5.5	95	.60	2.9	1054.6	102	101	59	
10	"	08.0	5.5	95	.60	2.9	1057.1	102	100	59	
11	"	10.5	5.2	95	.54	2.6	1059.5	101	99	58	
12	"	13.0	5.0	95	.46	2.25	1061.8	100	98	58	
	Total 60		Max 5.5	Avg 95	16.9955 / 0.7081	57.65 / 2.40	Total 54.1	Avg 105	Avg 103	Max 59	

RUN NO. 3 STACK SAMPLING CALCULATIONS DATE: 4/2/85
STACK NO. 12 A Train BY: EW

Meter Pressure

$P_m = 29.95 + \frac{2.4}{13.5} = 30.13$

Volume of Gas Sampled

$V_{m(std)} = \frac{541 \times 0.9917 \times 528 \times 30.13}{564 \times 29.92} = 50.58$

16874.9

Moisture Content

$V_{w(std)} = 31.6\,(0.04715) = 1.4899$

$B_{ws} = \frac{1.4899}{1.4899 + 50.5789} = 0.0286 \sim 2.86\%$

52.0688

Stack Gas Molecular Weight

$M_s = 29(.9714) + 18(.0286) = 28.6854$

28.1706 + .5148

Stack Gas Pressure

$P_s = 29.95 + \frac{0.0}{13.6} = 29.95$

Stack Gas Velocity

$V_s = 85.49(0.84)(0.7081)\sqrt{\frac{.8037}{555}} = 40.868$

2995×28.6854

859,1277

Isokinetic Variation

$\%I = \frac{(0.09450)(555)(50.58)}{(29.95)(40.868)(.000398)(60)(.9714)} = 93.43$

Stack Gas Flowrate

$Q = 60(A_s)(V_s) = (60)(4.909)(40.868) = 12,037$

$Q_{std} = \frac{(12,037)(528)(29.95)(.9714)}{(555)(29.92)} = 11,135$

16605.6

PHOSPHORIC ACID "B" TRAIN

STACK 18

APRIL 2, 1985

USS
Agri-Chemicals
Division of United States Steel Corporation

MAIL: P. O. BOX 150
BARTOW, FLORIDA 33830
813 - 533-0471

PROCESS RATE STATEMENT FOR EMISSION TEST

Date APRIL 2, 1985

Process PHOSPHORIC ACID, STACK 18

Location FT. MEADE, FLA.

Permit Number A053-69839

Start of Test	End of Test	Production Rate, TONS P_2O_5/DAY
10:28 AM	11:34 AM	722.4
11:48 AM	12:53 PM	632.4
1:10 PM	2:14 PM	616.8

I certify that the above statement is true to the best of my knowledge.

Signature Eugene Williams

Title Environmental Tech.

Date 4/26/85

Run #1 B. Train

GROUP : 94 POLLUTION TEST 2-APR-85 10:00:01

TAG	DESCRIPTOR	MV	SP	OUTPUT	STATUS
WQ101	A ROCKTOTAL	2.057 TPM		248.1 TONS	
FQ201	AH2SO4TOTAL	212.1 GPM		190.9 TONS	
WQ151	B ROCKTOTAL	1.847 TPM		224.4 TONS	
FQ251	BH2SO4TOTAL	209.3 GPM		189.9 TONS	

B Train

		Rock ton	Acid
10:28 AM	11:00 AM	335.2	283.8
11:34 AM	10:00 AM	-224.4	189.9
		110.8	93.9 % H_2SO_4

12:00	446.0	
11:00 AM	335.2	
	110.8	
Acid	377.3	
	283.8	
	93.5	

Rock Consumption = 110.8 Ton Hr.

Rock P_2O_5 = 31.44 %

Rock Moisture = 13.6 %

Production For 1 hour =

110.8 × .3144 × 1.0 - .136 = 30.098 Ton P_2O_5/hr.

GROUP' : 94 POLLUTION TEST 2-APR-85 11:00:01

TAG	DESCRIPTOR	MV	SP	OUTPUT	STATUS
WQ101	A ROCKTOTAL	2.059 TPM		371.6 TONS	
FQ201	AH2SO4TOTAL	206.7 GPM		285.4 TONS	
WQ151	B ROCKTOTAL	1.846 TPM		335.2 TONS	
FQ251	BH2SO4TOTAL	208.2 GPM		283.8 TONS	

Run #2 B- Train R E Hall

GROUP : 94 POLLUTION TEST 2-APR-85 12:00:01

TAG	DESCRIPTOR	MV	SP	OUTPUT	STATUS
WQ101	A ROCKTOTAL	2.059 TPM		495.1 TONS	
FQ201	AH2SO4TOTAL	207.6 GPM		378.8 TONS	
WQ151	B ROCKTOTAL	1.847 TPM		446.0 TONS	
FQ251	BH2SO4TOTAL	206.8 GPM		377.3 TONS	

hr	Rock	H_2SO_4
1300	643.0	459.8
1200	446.0	377.3
	97.0	82.5

Rock Consumption = 97.0 Ton Hr.

Rock P_2O_5 = 31.44 %

Rock Moisture = 13.6 %

Production For 1 hour =

$97.0 \times .3144 \times 1.0 - .136 = 26.3492$ ~~30.4968~~ Ton P_2O_5/hr

GROUP : 94 POLLUTION TEST 2-APR-85 13:00:01

TAG	DESCRIPTOR	MV	SP	OUTPUT	STATUS
WQ101	A ROCKTOTAL	1.797 TPM		606.1 TONS	
FQ201	AH2SO4TOTAL	180.5 GPM		462.4 TONS	
WQ151	B ROCKTOTAL	1.585 TPM		543.0 TONS	
FQ251	BH2SO4TOTAL	177.2 GPM		459.8 TONS	

Run #3 B Train

R.E. Hall

GROUP : 94 POLLUTION TEST 2-APR-85 14:00:01

TAG	DESCRIPTOR	MV	SP	OUTPUT	STATUS
WQ101	A ROCKTOTAL	1.797 TPM		713.9 TONS	
FQ201	AH2SO4TOTAL	178.7 GPM		543.9 TONS	
WQ151	B ROCKTOTAL	1.560 TPM		637.6 TONS	
FQ251	BH2SO4TOTAL	175.3 GPM		539.5 TONS	

	Rock	H_2SO_4
1400	637.6	539.5
1300	- 543.0	- 459.8
	94.6	79.7

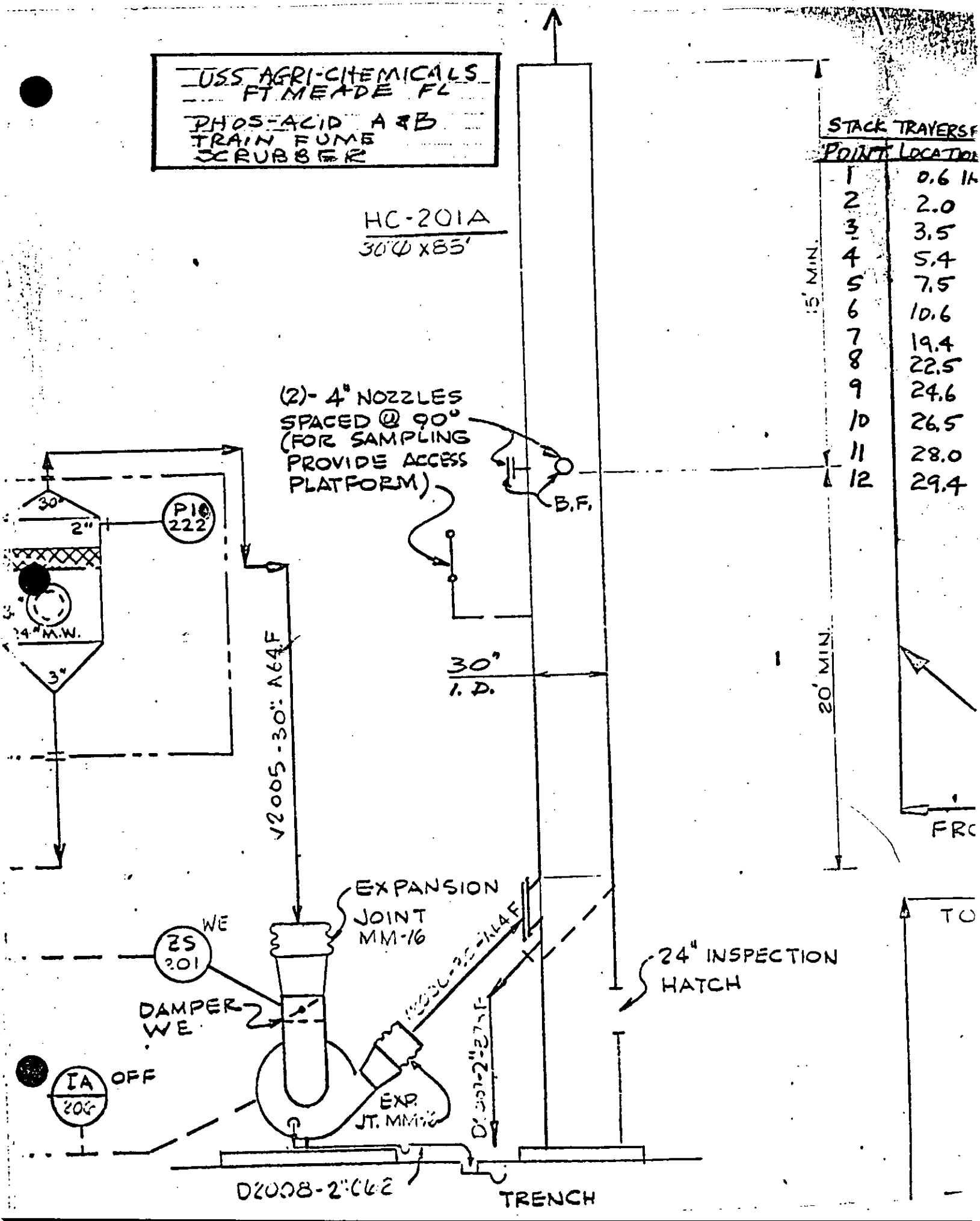
Rock Consumption For 1 hour 94.6 Ton

Rock P_2O_5 31.44%

Rock Moisture 13.6%

Production For 1 hour =

$94.6 \times .3144 \times 1 - .136 = 25.6973$ Ton P_2O_5/hr.


USS AGRI-CHEMICALS
FT MEADE FL
PHOS-ACID A & B
TRAIN FUME
SCRUBBER
HC-201A
30'Ø x 85'
STACK TRAVERSE
POINT LOCATION
1 0.6 IN
2 2.0
3 3.5
4 5.4
5 7.5
6 10.6
7 19.4
8 22.5
9 24.6
10 26.5
11 28.0
12 29.4
15' MIN.
20' MIN.
(2)- 4" NOZZLES SPACED @ 90° (FOR SAMPLING PROVIDE ACCESS PLATFORM)
B.F.
30"
I. D.
30"
2"
PI 222
24" M.W.
3"
V2005-30"-A64F
EXPANSION JOINT MM-16
WE
ZS 201
DAMPER WE
IA 206
OFF
EXP. JT. MM-16
D2008-2"-C6E
TRENCH
24" INSPECTION HATCH
FRO
TO

NOZZLE CALIBRATION

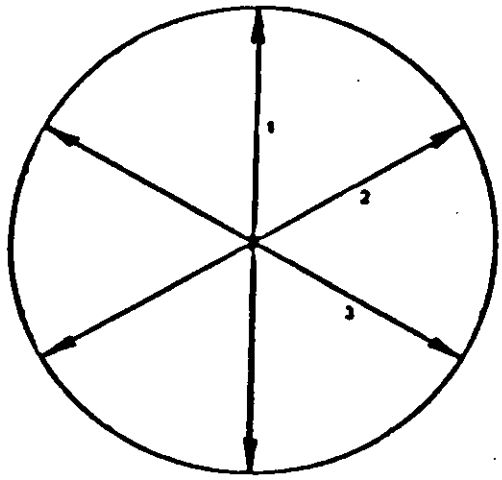
Nozzle 1056-3849 Date 4-2-85

Measurement No.	Inside Diameter (inches)
1	.271
2	.271
3	.271

Average .271

Area of Nozzle 0.000400 Ft^2

Calibrated by: Robert E. Hall



Nozzle X-section

USS AGRI-CHEMICALS, PLANT
EMISSION TEST CONSTANTS AND APPARATUS CHECKS
SOURCE: PHOSPHORIC ACID "B" TRAIN STACK #8 PERMIT # A053-6984O

		RUN # 1	2	3
		4-2-85	4-2-85	4-2-85
	STACK DIAMETER, INCHES	30.0	→	→
	STACK AREA, FT²	4.909	→	→
	SAMPLE BOX NO.	31D639C	→	→
	METER NO.	1002490	→	→
Y	METER CORRECTION FACTOR	0.9917	→	→
	PITOT TUBE SERIAL NO.	SC-6192	→	→
	PITOT TUBE PRESS TEST "H2O	6.0	7.3	5.4
	" " " " TIME	15.0 SEC.	→	→
	" " " " LEAK	0.0	0.0	→
Cp	PITOT TUBE C.P.	0.84	→	→
	SAMPLE PROBE LENGTH, INCHES	37.0	→	→
	PROBE SERIAL NO.	SC-6192	→	→
	PROBE LINER MATERIAL	STAINLESS STEEL	→	→
	PROBE HEATER SETTING	5.0	→	→
	NOZZLE SERIAL NO.	N256-3849	→	→
Ad	NOZZLE DIA INCH	0.271	→	→
An	NOZZLE AREA FT²	0.0004	→	→
	METER & TRAIN LEAK TEST			
	PRESSURE, IN-HG	8.0	8.0	8.0
	VOL LEAK TEST ELAPED TIME	1.0 MIN	1.0 MIN.	1.0 MIN.
	VOL LEAK FT³	0.01	0.01	0.012
	CYCLONIC CONDITIONS IN STACK			
	POST TEST, METER CALIB. CHECK			
n	NUMBER OF TRAVERSE POINTS IN STACK DIAMETER			24.0
θt	SAMPLE TIME EACH POINT, MIN	2.5	→	→
θ	SAMPLE TIME FOR RUN, MIN	60.0	→	→
Md	MOL WGT OF DRY STACK GAS - 29.0			
Tstd	528°R			
Pstd	29.92 IN MERCURY			

DATA CERTIFIED BY: E. Williams DATE: 4/26/85

USS AGRI-CHEMICALS, PLANT:
EMISSION TEST FOR: FLUORIDE
SOURCE: PHOSPHORIC ACID "B" TRAIN PERMIT: #4053-69840
STACK 18

		RUN #	1	2	3
		DATE	4-2-85	4-2-85	4-2-85
		START TIME	10:28 AM		
		END TIME	11:34 AM		
	PRODUCTION RATE: TONS P_2O_5/DAY		722.4	632.4	616.8
V_m	VOL DRY GAS SAMPLED, METER FT^3		51.3	51.9	52.4
$V_{m\,STD}$	" STD COND.		49.55	48.66	49.13
P_B	BAROMETER, INCHES-HG.		29.95	29.95	29.95
P_S	STACK PRESS, INCHES-HG.		0.0	0.0	0.0
ΔH	ORIFICE ΔH INCHES-H_2O		2.16	2.16	2.18
T_m	METER TEMP AVG °R		546	562	562
T_S	STACK TEMP, AVG. °R		552	552	553
V_L	VOL OF WATER COLLECTED, ML		34.3	30.5	33.3
V_W	WATER VOL, FT^3		1.6172	1.4381	1.5701
B_{WS}	WATER, MOL PERCENT		3.16	2.87	3.1
$\sqrt{\Delta P}$	STACK VELOCITY HEAD, $\sqrt{IN\text{-}H_2O}$		0.6658	0.668	0.6703
V_S	STACK VELOCITY		38.35	38.45	38.64
Q_S	STACK FLOW RATE ACFM		11296	11326	11380
Q_{STD}	STACK FLOW RATE DSCFM		10474	10533	10539
I	ISOKINETIC SAMPLING COND. %		97.3	95.0	95.9
θ	TOTAL SAMPLE TIME, MIN		60.0	60.0	60.0
M_S	STACK GAS MOL WGT AT CONDITIONS		28.69		
M_d	STACK GAS MOL WGT DRY COND.		29.0	29.0	29.0
	FUEL TYPE				
	CONSUMPTION THERMS/T-PROD				
	EMISSIONS - TYPE FLUORIDE				
	MG COLLECTED		1.1	0.98	0.94
	MG/SCF		0.0222	0.0201	0.0191
	LB/HR Day		0.738	0.672	0.639
	LB/TON P_2O_5		0.001	0.0011	0.001

DATA CERTIFIED BY: E. Williams DATE: 4/26/85

Made in U.S.A.

ANALYTICAL WORK SHEET

DATE: 4-2-85
BY : A. E. Hall

ANALYSIS: Fluoride
PLANT : FT. Meade
STACK : P.A.D. B Train

RUN

1	1.1	mg F/ℓ × 1ℓ = 1.1 mg F
2	.98	mg F/ℓ × 1ℓ = 0.98 mg F
3	.94	mg F/ℓ × 1ℓ = 0.94 mg F
STANDARD	1.0	mg F/ℓ
STANDARD	10.0	mg F/ℓ

RUN

1	49.55	SCF	0.0222	mg F/SCF
2	48.66	SCF	0.0201	mg F/SCF
3	49.13	SCF	0.0191	mg F/SCF

RUN

1 $\frac{(0.0222)(10474)(60)(24)}{(454)(1000)} = 0.7375$ LBS. F/DAY

2 $\frac{(0.0201)(10533)(60)(24)}{(454)(1000)} = 0.6715$ LBS. F/DAY

3 $\frac{(0.0191)(10539)(60)(24)}{(454)(1000)} = 0.6385$ LBS. F/DAY

RUN

1 $\frac{0.7375 \div 24^{hr}}{30.1 \text{ Ton P}_2\text{O}_5\text{/hr}} =$ 0.0010 LB. F/TON P_2O_5

2 $\frac{0.6715 \div 24}{26.35 \text{ Ton P}_2\text{O}_5\text{/hr}} =$ 0.0011 LB. F/TON P_2O_5

3 $\frac{0.6385 \div 24}{25.7 \text{ Ton P}_2\text{O}_5\text{/hr}} =$ 0.0010 LB. F/TON P_2O_5

DATE 4-1-85

BY D.E. Hall

Moisture Collected

Run #	Impinger A-1	A-2	A-3	A-4	TOTAL Collect
	670.3 644.4 25.9 5.4 34.3	639.7 635.0 4.7 3.7 8.4	457.3 455.9 1.4	649.7 647.4 2.3	34.3
Run #	B-1	B-2	B-3	B-4	TOTAL Collect
	670.7 646.1 24.6 5.9 30.5	699.4 696.1 3.3 2.6 5.9	454.5 453.6 0.9	667.9 666.2 1.7	30.5
Run #	C-1	C-2	C-3	C-4	TOTAL Collect
	675.8 649.8 26.0 7.3 33.3	665.1 661.5 3.6 3.7 7.3	454.1 453.4 0.7	703.5 700.5 3.0	33.3

Plant PHOSPHORIC ACID
City [redacted] MEADE
Location B-TRAIN, STACK 18
Operator E. WILLIAMS
Date 4-2-85
Run number — 1

Sheet 1 of
Filter number N/A
leak rate TRAIN, 0.008 @ 8" Hg
LEAK RATE TRAIN, 0.011 @ 8" Hg

C. Williams 4/2/85

"H_2O LEAK TIME
PITOT LEAK TEST - 6.0 0.0 15 SEC.
REFERENCE ΔP - 0.39

Traverse point number	Sampling time, (θ), min	10:28AM Clock time, (24 h)	Vacuum, (in.) Hg	Stack temperature (T_s), (°F)	Velocity head (ΔP_s), (in.) H_2O	Pressure differential across orifice meter (ΔH), (in.) H_2O	740.0 Gas sample volume (V_m), (ft^3)^m	Gas sample temperature at dry gas meter: Inlet, (°F)	Gas sample temperature at dry gas meter: Outlet, (°F)	Temperature of gas leaving condenser or last impinger, (°F)	Filter temp (°F)
1	2.5	10:30.5	3.2	90	.32	1.55	741.8	78	78	56	
2	"	33.0	3.7	90	.40	1.95	743.7	79	78	56	
3	"	35.5	4.0	90	.48	2.35	745.9	80	78	56	
4	"	38.0	4.0	92	.52	2.45	748.2	80	78	56	
5	"	40.5	4.2	92	.54	2.6	750.5	81	78	56	
6	"	43.0	4.2	92	.54	2.6	752.8	82	79	56	
7	"	45.5	4.1	92	.50	2.4	755.1	83	79	57	
8	"	48.0	4.0	92	.46	2.25	757.3	83	80	57	
9	"	50.5	4.0	92	.46	2.25	759.5	84	81	57	
10	"	53.0	3.8	92	.42	2.0	761.6	85	81	57	
11	"	55.5	3.8	92	.40	1.95	763.6	86	82	57	
12	"	58.0	3.2	92	.30	1.45	765.4	87	83	57	
0		11:04AM					765.4				
1	2.5	06.5	3.0	90	.28	1.37	767.1	88	87	57	
2	"	09.0	3.5	91	.36	1.75	769.0	89	87	57	
3	"	11.5	3.8	91	.40	1.95	771.1	89	87	57	
4	"	14.0	4.0	92	.46	2.25	773.3	90	87	57	
5	"	16.5	4.0	92	.48	2.35	775.5	91	88	57	
6	"	19.0	4.0	92	.50	2.4	777.8	91	88	57	
7	"	21.5	4.0	92	.52	2.45	780.1	92	89	57	
8	"	24.0	4.0	92	.52	2.45	782.4	93	89	57	
9	"	26.5	4.0	92	.52	2.45	784.7	94	90	57	
10	"	29.0	4.0	92	.48	2.35	787.0	94	90	57	
11	"	31.5	4.0	91	.46	2.25	789.2	95	91	57	
12	"	34.0	3.8	91	.40	1.95	791.3	95	91	57	
	Total 60		Max 4.0	Avg 92	15.9802 / 0.6658	51.77 / 2.16	Total 51.3	Avg 87	Avg 84	Max 57	

RUN NO. 1
STACK NO, 18

STACK SAMPLING CALCULATIONS

DATE: 4-2-85
BY: EW

Meter Pressure

$P_m = 29.95 + \frac{2.16}{13.6} = 30.11$

Volume of Gas Sampled

$V_{m(std)} = \frac{51.3 \times 0.9917 \times 528 \times 30.11}{546 \times 29.92} = 49.55$

16321,4

Moisture Content

$V_{w(std)} = 34.3\ (0.04715) = 1.6172$

$B_{ws} = \frac{1.6172}{1.6172 + 49.55} = 0.0316 \sim 3.16\%$

51.1719

Stack Gas Molecular Weight

$M_s = 29(1-.0316) + 18(0.0316) = 28.65$

.9684

$28.0836 + 0.5689$

Stack Gas Pressure

$P_s = 29.95 + \frac{0.0}{13.6} = 29.95$

Stack Gas Velocity

$V_s = 85.49(0.84)(0.6658)\sqrt{\frac{552}{29.95 \times 28.65}} = 38.35$

0.8020

858.1

Isokinetic Variation

$\%I = \frac{(0.09450)(552)(49.55)}{(29.95)(38.35)(0.000398)(60)(.9684)} = 97.3\%$

26.56

Stack Gas Flowrate

$Q = 60(A_s)(V_s) = (60)(4.909)(38.35) = 11296$

$Q_{std} = \frac{(11296)(528)(29.95)(.9684)}{(552)(29.92)} = 10,474$

16515,8

City HYDROCHLORIC ACID
Location MEADE
Operator B-TRAIN, STACK 18
Date E. WILLIAMS
Run number 4-2-85
-2

Sheet 1
Filter number N/A
leak rate TRAIN, 0.010 @ 8" Hg
LEAK RATE TRAIN, 0.009 @ 8" Hg

E. Williams 4/2/85

"H_2O LEAK TIME
PITOT LEAK TEST - 7.3 0.0 15 SEC.
REFERENCE ΔP - 0.38

Traverse point number	Sampling time, (θ), min	11:48 AM Clock time, (24 h)	Vacuum, (in.) Hg	Stack temperature (T_s), (°F)	Velocity head (ΔP_s), (in.) H_2O	Pressure differential across orifice meter (ΔH), (in.) H_2O	791.303 Gas sample volume (V_m), (ft^3)	Gas sample temperature at dry gas meter		Temperature of gas leaving condenser or last impinger, (°F)	Filter temp (°F)
								Inlet, (°F)	Outlet, (°F)		
1	2.5	11:50.5	3.7	91	.30	1.45	793.1	96	96	58	
2	"	53.0	4.6	91	.42	2.0	795.2	97	96	58	
3	"	55.5	5.1	92	.48	2.35	797.4	97	96	58	
4	"	58.0	5.3	92	.52	2.45	799.7	98	96	58	
5	"	12:00.5	6.0	92	.55	2.65	802.1	99	97	58	
6	"	03.0	6.0	92	.55	2.65	804.5	100	97	58	
7	"	05.5	5.5	92	.52	2.45	806.7	101	97	58	
8	"	08.0	5.0	92	.46	2.25	809.0	101	98	58	
9	"	10.5	5.0	92	.46	2.25	811.2	102	98	58	
10	"	13.0	4.8	92	.42	2.0	813.3	103	99	58	
11	"	15.5	4.5	92	.40	1.95	815.3	103	99	58	
12	"	18.0	3.7	92	.30	1.45	817.1	104	99	58	
0		12:23 PM					817.1				
1	2.5	25.5	3.7	92	.30	1.45	818.9	103	101	58	
2	"	28.0	4.0	92	.37	1.8	820.9	104	101	58	
3	"	30.5	4.5	92	.40	1.95	822.9	105	101	58	
4	"	33.0	5.0	92	.45	2.2	825.0	106	102	59	
5	"	35.5	5.2	92	.48	2.35	827.4	106	102	59	
6	"	38.0	5.2	92	.50	2.4	829.6	107	103	59	
7	"	40.5	5.4	92	.52	2.45	831.9	107	103	59	
8	"	43.0	5.4	92	.52	2.45	834.3	108	104	59	
9	"	45.5	5.4	92	.52	2.45	836.6	108	104	59	
10	"	48.0	5.4	92	.50	2.4	838.9	109	104	59	
11	"	50.5	5.0	92	.45	2.2	841.1	109	105	58	
12	"	53.0	4.8	92	.40	1.95	843.2	109	105	58	
	Total 60		Max 6.0	Avg 92	16.0317 / 0.668	51.95 / 2.16	Total 51.9	Avg 103	Avg 100	Max 59	

RUN NO. 2
STACK NO. 18

STACK SAMPLING CALCULATIONS

DATE: 4/2/85
BY: EW

Meter Pressure

$P_m = 29.95 + \frac{2.16}{13.6} = 30.11$

Volume of Gas Sampled

$V_{m(std)} = \frac{51.9 \times 0.9917 \times 528 \times 30.11}{562 \times 29.92} = 48.66$

16815

Moisture Content

$V_{w(std)} = 30.5(0.04715) = 1.4381$

$B_{ws} = \frac{1.4381}{1.4381 + 48.6626} = 0.0287 \sim 2.87\%$

50.1007

Stack Gas Molecular Weight

$M_s = 29(1-.0287) + 18(.0287) = 28.68$

.9713

28.1677 + 0.5167

Stack Gas Pressure

$P_s = 29.95 + \frac{0.0}{13.6} = 29.95$

Stack Gas Velocity

$V_s = 85.49(0.84)(0.668)\sqrt{\frac{552}{29.95 \times 28.68}} = 38.45$

0.8016

859.1

Isokinetic Variation

$\%I = \frac{(0.09450)(552)(48.66)}{(29.95)(38.45)(0.000398)(60)(.9713)} = 95.0\%$

26.71

Stack Gas Flowrate

$Q = 60(A_s)(V_s) = (60)(4.909)(38.45) = 11,326$

$Q_{std} = \frac{(11326)(528)(29.95)(.9713)}{(552)(29.92)} = 10,533$

16515.8

Plant PHOSPHORIC ACID
City MEADE
Location B-TRAIN, STACK 18
Operator E. WILLIAMS
Date 4-2-85
Run number 3

Sheet 1
Filter number N/A
leak rate TRAIN, 0.012 @ 8" Hg
LEAK RATE TRAIN, 0.011 @ 8" Hg

E. Williams 4/2/85

"H_2O LEAK TIME
PITOT LEAK TEST - 5.4 0.0 15 SEC.
REFERENCE ΔP - 0.38

Traverse point number	Sampling time, (θ), min	1:10PM Clock time, (24 h)	Vacuum, (in.) Hg	Stack temperature (T_s), (°F)	Velocity head (ΔP_s), (in.) H_2O	Pressure differential across orifice meter (ΔH), (in.) H_2O	843.203 Gas sample volume (V_m), (ft^3)^m	Gas sample temperature at dry gas meter		Temperature of gas leaving condenser or last impinger, (°F)	Filter temp (°F)
								Inlet, (°F)	Outlet, (°F)		
1	2.5	1:12.5	3.5	93	.30	1.45	845.0	97	97	57	
2	"	15.0	4.2	93	.44	2.15	847.2	100	97	57	
3	"	17.5	4.8	93	.50	2.4	849.5	100	97	57	
4	"	20.0	4.8	93	.50	2.4	851.8	101	97	57	
5	"	22.5	5.0	93	.54	2.6	854.1	101	98	57	
6	"	25.0	5.0	93	.54	2.6	856.6	103	99	57	
7	"	27.5	4.8	93	.52	2.5	858.9	104	99	56	
8	"	30.0	4.5	93	.47	2.25	861.1	104	100	56	
9	"	32.5	4.5	93	.47	2.25	863.3	105	101	56	
10	"	35.0	4.0	93	.42	2.0	865.4	105	102	56	
11	"	37.5	4.0	93	.40	1.95	867.5	105	102	56	
12	"	40.0	3.5	93	.28	1.37	869.2	106	103	56	
0		1:44PM					869.2				
1	2.5	46.5	3.7	92	.32	1.55	871.0	103	100	57	
2	"	49.0	4.0	92	.38	1.85	873.0	103	100	57	
3	"	51.5	4.1	92	.42	2.0	875.1	104	100	57	
4	"	54.0	4.5	93	.46	2.25	877.3	104	101	57	
5	"	56.5	4.8	93	.48	2.35	879.7	105	101	57	
6	"	59.0	5.0	93	.52	2.5	882.0	106	102	57	
7	"	2:01.5	5.0	93	.52	2.5	884.3	106	102	57	
8	"	04.0	5.0	93	.52	2.5	886.6	105	102	57	
9	"	06.5	4.8	93	.50	2.4	888.9	105	101	57	
10	"	09.0	4.8	93	.50	2.4	891.3	104	101	57	
11	"	11.5	4.5	93	.44	2.15	893.5	104	100	57	
12	"	14.0	4.1	93	.42	2.0	895.6	103	100	57	
	Total 60		Max 5.0	Avg 93	16.0871 0.6703	52.37 2.18	Total 52.4	Avg 103	Avg 100	Max 57	

RUN NO. 3
STACK NO. 18

STACK SAMPLING CALCULATIONS

DATE: 4/2/85
BY: EW

Meter Pressure

$P_m = 29.95 + \frac{2.18}{13.6} = 30.11$

Volume of Gas Sampled

$V_{m(std)} = \frac{52.4 \times 0.9917 \times 528 \times 30.11}{562 \times 29.92} = 49.13$

16815

Moisture Content

$V_{w(std)} = 33.3(0.04715) = 1.5701$

$B_{ws} = \frac{1.5701}{1.5701 + 49.1314} = 0.031 \sim 3.1\%$

50.7015

Stack Gas Molecular Weight

$M_s = 29(1 - .031) + 18(.031) = 28.66$

.969
28.101 + .5574

Stack Gas Pressure

$P_s = 29.95 + \frac{0.0}{13.6} = 29.95$

Stack Gas Velocity

$V_s = 85.49(0.84)(0.6703)\sqrt{\frac{0.8027}{29.95 \times 28.66}} = 38.64$

553
858.3

Isokinetic Variation

$\%I = \frac{(0.09450)(553)(49.13)}{(29.95)(38.64)(0.003398)(60)(0.969)} = 95.9\%$

26.78

Stack Gas Flowrate

$Q = 60(A_s)(V_s) = (60)(4.909)(38.64) = 11{,}380$

$Q_{std} = \frac{(11380)(528)(29.95)(0.969)}{(553)(29.92)} = 10539$

16545.8

PHOSPHORIC ACID TANK FARM
STACK 19
APRIL 8, 1985

USS
Agri-Chemicals
Division of United States Steel Corporation

MAIL: P. O. BOX 150
BARTOW, FLORIDA 33830
813 - 533-0471

PROCESS RATE STATEMENT FOR EMISSION TEST

Date 4-8-1985

Process PAD TANK Farm Storage

Location Ft. Meade, Fla. 33841

Permit Number A053-69842

Start of Test	End of Test	Production Rate
11:08 AM	12:12 PM	1373 Tons P_2O_5/DAY
12:32 PM	1:36 PM	1373
2:00 PM	3:05 PM	1373

I certify that the above statement is true to the best of my knowledge.

Signature Robert E. Hall

Title Environmental Analyst

Date 4-20-85

8-APR-85 15:46:53

GROUP 66 ROCK GRINDING TOTALS
ROCK GRINDING TOTALS

MV	*1.908 TPH	*132.2 GPM	*1.597 TPH	*107.8 GPM
SP				
OUT	891.0 TONS	61.1 M GAL	741.0 TONS	49.6 M GAL
100	*******	*******	*******	*******
75				
50				
25				
0	*******	*******	*******	*******
TAG	WQ101	FQ101	WQ151	FQ151
STATUS	*AUTO	*AUTO	*AUTO	*AUTO
	A ROCK TOTAL	A H2O TOTAL	B ROCK TOTAL	B H2O TOTAL
	1	2	4	5

9% Rock Moisture

A Train

7.78 hrs. = 891.0 Ton Rock

B Train

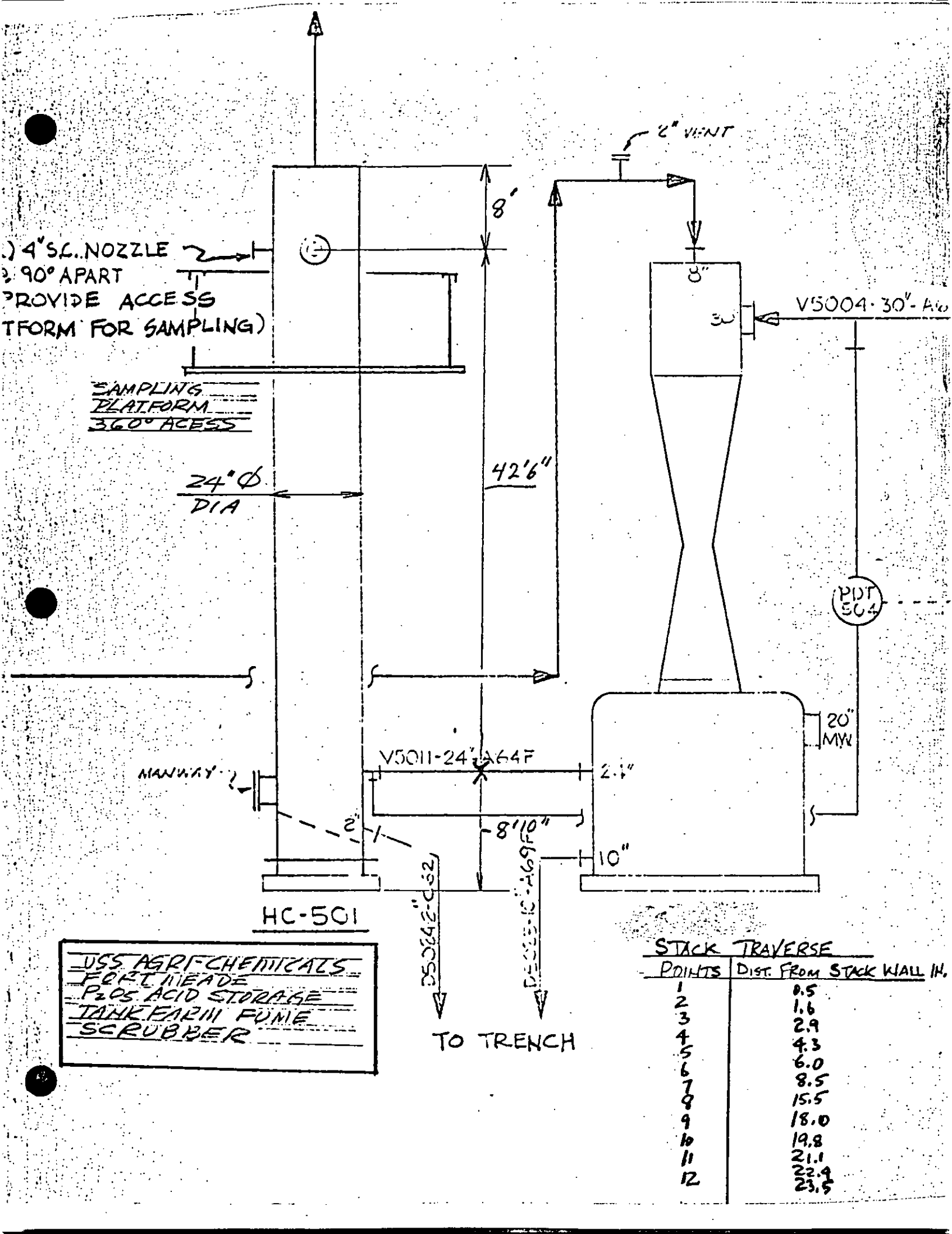
741.0 Ton Rock

Ton Hr

114.52 × .2998 × (1.0 − .09) = 95.24 × .2998 × (1.0 − .09) =

31.243 Ton P_2O_5 A Train + 25.98 Ton P_2O_5/Hr = 57.223 Ton P_2O_5/hr Total

57.223 × 24 = 1373.35 Ton P_2O_5/Day



STACK TRAVERSE

POINTS	DIST. FROM STACK WALL IN.
1	0.5
2	1.6
3	2.9
4	4.3
5	6.0
6	8.5
7	15.5
8	18.0
9	19.8
10	21.1
11	22.4
12	23.5

NOZZLE CALIBRATION

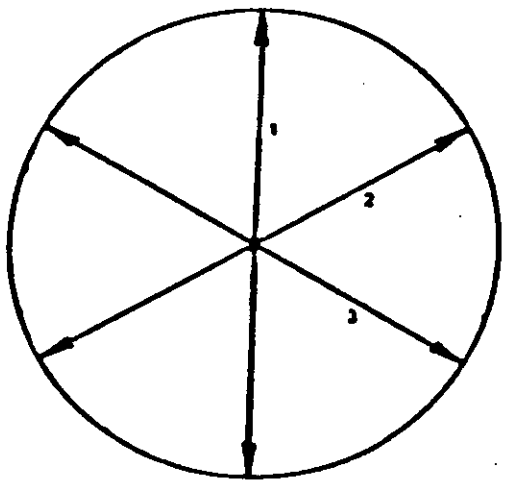
Nozzle SN - 1056-3899 Date 9/8/85

Measurement No.	Inside Diameter (inches)
1	0.273
2	0.273
3	0.273

Average 0.273

Area of Nozzle 0.000406 Ft^2

Calibrated by: E. Williams



Nozzle X-section

USS AGRI-CHEMICALS, PLANT
EMISSION TEST CONSTANTS AND APPARATUS CHECKS
SOURCE: PAD Tank Farm PERMIT A053-6984Z

	RUN #	1	2	3
		4-8-85	4-8-85	4-8-85
		11:08 AM	12:32 PM	1:00 PM
		12:12 PM	1:36 PM	3:05 PM
	STACK DIAMETER, INCHES	24.0	→	→
	STACK AREA, FT²	3.14	→	→
	SAMPLE BOX NO.	31D639C	→	→
	METER NO.	1002490	→	→
Y	METER CORRECTION FACTOR	.9917	→	→
	PITOT TUBE SERIAL NO.	SC-6192	→	→
	PITOT TUBE PRESS TEST H2O	8.3	5.7	6.4
	" " " " Time-SEC	15 sec	15 sec	15.5 sec
	~~IN~~ LEAK	0	0	0
Cp	PITOT TUBE C.P.	.84	→	→
	SAMPLE PROBE LENGTH, Inches	39.0	→	→
	PROBE SERIAL NO.	613	→	→
	PROBE LINER MATERIAL	stainless	steel	→
	PROBE HEATER SETTING	0.0	0.0	0.0
	NOZZLE SERIAL NO.	1056-3899	→	→
Ad	NOZZLE DIA INCH	.273	→	→
An	NOZZLE AREA FT²	.000406	→	→
	METER & TRAIN LEAK TEST			
	PRESSURE, IN-HG	10.0	8.0	8.0
	VOL LEAK TEST ELAPED TIME	1.0 min	1.0 min	1.0 min
	VOL LEAK FT³	.008	.007	.009
	CYCLONIC CONDITIONS IN STACK			
	POST TEST, METER CALIB. CHECK			
n	NUMBER OF TRAVERSE POINTS IN STACK DIAMETER			24
θd	SAMPLE TIME EACH POINT, MIN	2.5	2.5	2.5
θ	SAMPLE TIME FOR RUN, MIN	60.0	60.0	60.0
Md	MOL WGT OF DRY STACK GAS - 29.0			
Tstd	528°R			
Pstd	29.92 IN MERCURY			

DATA CERTIFIED BY Robert E. Hall DATE 4-24-85

Made in U.S.A.

USS AGRI-CHEMICALS, PLANT:
EMISSION TEST FOR: Fluoride
SOURCE: PAD Tank Farm PERMIT: A053-69842

		RUN #	1	2	3
		DATE	4-8-85	4-8-85	4-8-85
		START TIME	11:08 AM	12:32 PM	2:00 PM
		END TIME	12:12 PM	1:36 PM	3:05 PM
	PRODUCTION RATE Ton Prod/Hr		57.22	57.22	57.22
V_m	VOL DRY GAS SAMPLED, METER FT^3		41.7	43.1	41.4
$V_{m\,STD}$	" STD COND.		39.49	39.88	38.41
P_B	BAROMETER, INCHES-HG.		30.12	30.12	30.12
P_S	STACK PRESS, INCHES-HG.		0.0	0.0	0.0
ΔH	ORIFICE ΔH INCHES-H_2O		1.37	1.37	1.3
T_m	METER TEMP AVG °R		559.0	572	570.
T_S	STACK TEMP, AVG °R		547.0	547	547
V_l	VOL OF WATER COLLECTED, ML		28.6	31.3	30.4
V_w	WATER VOL, FT^3		.7242	.7849	.7915
B_{WS}	WATER, MOL PERCENT		3.30	3.57	3.60
$\sqrt{\Delta P}$	STACK VELOCITY HEAD, $\sqrt{IN\text{-}H_2O}$		.4667	.4677	.4630
V_S	STACK VELOCITY FT Sec		26.69	26.76	26.49
Q_S	STACK FLOW RATE ACFM		5028	5042	4991
Q_{STD}	STACK FLOW RATE DSCFM		4725	4745	4675
I	ISOKINETIC SAMPLING COND. %		107.7	108.9	105.9
Θ	TOTAL SAMPLE TIME, MIN		60	60.0	60.0
M_S	STACK GAS MOL WGT AT CONDITIONS		28.64	28.61	28.6
M_d	STACK GAS MOL WGT DRY COND.		29.0	29.0	29.0
	FUEL TYPE				
	CONSUMPTION THERMS/T-PROD				
	EMISSIONS - TYPE - FLUORIDES				
	MG COLLECTED		0.93	0.99	0.91
	M.G./SCF		.0236	.0248	.0237
	LB/HR		.0147	.0155	.0146
	F-LB/TON P_2O_5		.0003	.0003	.0003

DATA CERTIFIED BY Robert E. Hall DATE 4-20-85

Made in U.S.A.

Date 4-8-85

By R E Hall

Moisture Collected

PAD TANK Farm

Run #	Impinger A-1	A-2	A-3	A-4	TOTAL Collect
	659.9 636.9 23.0 5.6 28.6	641.7 638.2 3.5 2.1 5.6	456.5 455.8 0.7	644.4 643.0 1.4	28.6
Run #	B-1	B-2	B-3	B-4	TOTAL Collect
	663.8 637.7 26.1 5.2 31.3	699.5 696.0 3.5 1.7 5.2	454.5 454.1 0.4	664.7 663.4 1.3	31.3
Run #	C-1	C-2	C-3	C-4	TOTAL Collect
3	675.6 650.1 25.5 4.9 30.4	666.2 663.2 3.0 1.9 4.9	454.1 453.6 0.5	699.4 698.0 1.4	30.4

ANALYTICAL WORK SHEET

DATE: 4-8-85
BY: R.E. Hall

ANALYSIS: Fluoride
PLANT: PAD. FT. Meade
STACK: Tank Farm # 19

RUN #1

1 3.85	0.93	mg F/l	x 1l = 0.93 mg F
2 3.74	0.99	mg F/l	x 1l = 0.99 mg F
3 3.78	0.91	mg F/l	x 1l = 0.91 mg F
STANDARD	1.0	mg F/l	
STANDARD	10.0	mg F/l	

RUN

1	39.49	SCF	0.0236	mg F/SCF
2	39.88	SCF	0.0248	mg F/SCF
3	38.41	SCF	0.0237	mg F/SCF

RUN

1 $\frac{(0.0236)(4725)(60)(24)}{(454)(1000)} = 0.3537$ LBS. F/DAY

2 $\frac{(0.0248)(4725)(60)(24)}{(454)(1000)} = 0.3717$ LBS. F/DAY

3 $\frac{(0.0237)(4675)(60)(24)}{(454)(1000)} = 0.3514$ LBS. F/DAY

RUN 1373 TON-P_2O_5/DAY PRODUCTION

1	$\frac{.3537}{1373.35}$ =	0.0003	LB. F/TON P_2O_5
2	$\frac{.3717}{1373.35}$ =	0.0003	LB. F/TON P_2O_5
3	$\frac{.3514}{1373.35}$ =	0.0003	LB. F/TON P_2O_5

Plant PHOSPHORIC ACID
City MEADE
Location TANK FARM STACK 19
Operator E. WILLIAMS
Date 4-8-85
Run number 1

Sheet 1 of
Filter number N/A
leak rate TRAIN, 0.010 @ 10" Hg
LEAK RATE TRAIN, 0.008 @ 10" Hg

E. Williams 4/8/85

"H_2O LEAK TIME
PITOT LEAK TEST 8.3 0.0 15SEC.
REFERENCE ΔP - 0.30

Traverse point number	Sampling time, (θ), min	11:08AM Clock time, (24 h)	Vacuum, (in.) Hg	Stack temperature (T_s), (°F)	Velocity head (ΔP_s), (in.) H_2O	Pressure differential across orifice meter (ΔH), (in.) H_2O	412.6 Gas sample volume (V_m), (ft^3)$_m$	Gas sample temperature at dry gas meter		Temperature of gas leaving condenser or last impinger, (°F)	Filter temp (°F)
								Inlet, (°F)	Outlet, (°F)		
1	2.5	11:10.5	2.5	87	.13	.80	414.0	87	86	58	
2	"	13.0	2.8	87	.17	1.04	415.5	89	86	58	
3	"	15.5	3.0	87	.20	1.25	417.2	90	86	58	
4	"	18.0	3.1	87	.22	1.35	418.9	91	87	58	
5	"	20.5	3.1	87	.24	1.5	420.7	92	87	58	
6	"	23.0	3.2	87	.26	1.60	422.6	95	89	58	
7	"	25.5	3.2	87	.28	1.75	424.5	97	90	59	
8	"	28.0	3.2	87	.28	1.75	426.5	98	91	59	
9	"	30.5	3.2	87	.28	1.75	428.5	100	93	59	
10	"	33.0	3.0	87	.25	1.55	430.4	101	94	59	
11	"	35.5	3.0	87	.25	1.55	432.2	101	95	59	
12	"	38.0	3.0	87	.21	1.30	433.9	102	97	59	
0		11:42AM					433.9				
1	2.5	44.5	2.5	87	.12	.75	435.2	101	99	60	
2	"	47.0	2.7	87	.15	.92	436.7	103	99	60	
3	"	49.5	2.8	87	.18	1.10	438.2	105	100	60	
4	"	52.0	3.0	87	.20	1.25	440.0	105	101	60	
5	"	54.5	3.0	87	.22	1.35	441.7	106	102	60	
6	"	57.0	3.1	87	.24	1.5	443.5	107	103	59	
7	"	59.5	3.1	87	.26	1.6	445.5	108	103	59	
8	"	12:02.0	3.1	87	.26	1.6	447.3	108	104	59	
9	"	04.5	3.1	87	.26	1.6	449.2	109	104	59	
10	"	07.0	3.0	87	.24	1.5	451.0	110	105	59	
11	"	09.5	2.9	87	.21	1.3	452.7	110	106	59	
12	"	12.0	2.7	87	.18	1.1	454.3	111	106	60	
	Total 60		Max 3.2	Avg 87	11.2009 0.4667	1.37	Total 41.7	Avg 101	Avg 96	Max 60	

RUN NO. 1 STACK SAMPLING CALCULATIONS DATE: 4/8/85
STACK NO. 19 BY: EW

Meter Pressure

$P_m = 30.12 + \frac{1.37}{13.6} = 30.22$

Volume of Gas Sampled

$V_{m(std)} = \frac{91.7 \times 0.9917 \times 528 \times 30.22}{559 \times 29.92} = 39.49$

16710.3

Moisture Content

$V_{w(std)} = 28.6(0.04715) = 1.3485$

$B_{ws} = \frac{1.3485}{1.3485 + 39.4876} = 0.0330 \sim 3.30\%$

40.8361

Stack Gas Molecular Weight

$M_s = 29(1.033^{.967}) + 18(0.033) = 28.64$

28.043 + 0.5944

Stack Gas Pressure

$P_s = 30.12 + \frac{0.0}{13.6} = 30.12$

Stack Gas Velocity

$V_s = 85.49(0.84)(0.4667)\sqrt{\frac{0.7963}{\frac{547}{30.12 \times 28.6}}} = 26.69$

862.6

Isokinetic Variation

$\%I = \frac{(0.09450)(547)(39.49)}{(30.12)(26.69)(0.000405)(60)(0.967)} = 107.7\%$

18.95

Stack Gas Flowrate

$Q = 60(A_s)(V_s) = (60)(3.14)(26.69) = 5028$

$Q_{std} = \frac{(5028)(528)(30.12)(0.967)}{(547)(29.92)} = 4725$

16366.2

Plant PHOSPHORIC ACID
City [redacted] MEADE
Location TANK FARM STACK 19
Operator E. WILLIAMS
Date 4-8-85
Run number -2

Sheet 1 of [redacted]
Filter number N/A
leak rate TRAIN, 0.008 @ 8" Hg
LEAK RATE TRAIN, 0.007 @ 8" Hg

E. Williams 4/8/85

PITOT LEAK TEST - 5.7 "H_2O LEAK TIME 0.0 15 SEC,
REFERENCE ΔP - 0.3

Traverse point number	Sampling time, (θ), min	12:32PM Clock time, (24 h)	Vacuum, (in.) Hg	Stack temperature (T_s), (°F)	Velocity head (ΔP_s), (in.) H_2O	Pressure differential across orifice meter (ΔH), (in.) H_2O	454.301 Gas sample volume (V_m), (ft^3)$_m$	Gas sample temperature at dry gas meter: Inlet, (°F)	Gas sample temperature at dry gas meter: Outlet, (°F)	Temperature of gas leaving condenser or last impinger, (°F)	Filter (
1	2.5	34.5	3.0	87	.12	.75	455.7	109	107	59	
2	"	37.0	3.4	87	.16	.98	457.2	110	108	59	
3	"	39.5	3.5	87	.18	1.10	458.8	110	108	59	
4	"	42.0	4.0	87	.20	1.25	460.5	111	108	59	
5	"	44.5	4.2	87	.22	1.35	462.3	111	108	59	
6	"	47.0	4.5	87	.24	1.5	964.1	112	108	60	
7	"	49.5	4.7	87	.26	1.6	966.0	113	109	60	
8	"	52.0	4.7	87	.26	1.6	467.9	113	110	60	
9	"	54.5	4.7	87	.26	1.6	969.8	114	110	60	
10	"	57.0	4.7	87	.24	1.5	471.6	114	110	60	
11	"	59.5	4.2	87	.22	1.35	473.4	114	110	60	
12	"	1:02.0	4.0	87	.20	1.25	975.1	114	110	60	
0		1:06PM					475.1				
1	2.5	08.5	3.0	87	.12	.75	476.5	110	110	60	
2	"	11.0	3.6	87	.18	1.1	478.1	111	110	60	
3	"	13.5	4.1	87	.20	1.25	980.4	111	110	61	
4	"	16.0	4.3	87	.22	1.35	482.6	112	110	61	
5	"	18.5	4.5	87	.24	1.5	484.8	113	111	61	
6	"	21.0	4.5	87	.25	1.55	486.9	114	111	61	
7	"	23.5	4.8	87	.26	1.6	488.8	114	112	61	
8	"	26.0	5.1	87	.28	1.75	490.6	115	112	60	
9	"	28.5	5.1	87	.28	1.75	492.5	115	112	60	
10	"	31.0	5.1	87	.28	1.75	494.2	116	113	60	
11	"	33.5	4.7	87	.24	1.5	496.0	116	113	60	
12	"	36.0	4.2	87	.20	1.25	497.4	116	113	60	
	Total 60		Max 5.1	Avg 87	11.2240 / 0.4677	1.37	Total 43.1	Avg 113	Avg 110	Max 61	

RUN NO. 2 STACK SAMPLING CALCULATIONS DATE: 4/8/85
STACK NO. 19 BY: EWL

Meter Pressure

$P_m = 30.12 + \frac{1.37}{13.6} = 30.22$

Volume of Gas Sampled

$V_{m(std)} = \frac{43.1 \times 0.9917 \times 528 \times 30.22}{512 \times 29.92} = 39.88$

17101.2

Moisture Content

$V_{w(std)} = 31.3\ (0.04715) = 1.4759$

$B_{ws} = \frac{1.4758}{1.4758 + 39.8804} = 0.0357 \sim 3.57\%$

41.3562

Stack Gas Molecular Weight

$M_s = 29(1-.0357) + 18(.0357) = 28.61$

27.9647 + 0.6423

Stack Gas Pressure

$P_s = 30.12 + \frac{0.0}{13.6} = 30.12$

Stack Gas Velocity

$V_s = 85.49(0.84)(0.4677)\sqrt{\frac{547}{30.12 \times 28.61}} = 26.76$

0.7968

861.6

Isokinetic Variation

$\%I = \frac{(0.09450)(547)(39.88)}{(30.12)(26.76)(0.000406)(60)(.9643)} = 108.9\%$

18.93

Stack Gas Flowrate

$Q = 60(A_s)(V_s) = (60)(3.14)(26.76) = 5042$

$Q_{std} = \frac{(5042)(528)(30.12)(0.9643)}{(547)(2992)} = 4725$

City FT MEADE
Location TANK FARM STACK 19
Operator E. WILLIAMS
Date 4-8-85
Run number 3

Sheet 1 of
Filter number N/A
leak rate TRAIN, 0.008 @ 8" Hg
LEAK RATE TRAIN, 0.009 @ 8" Hg

E. Williams 4/8/85

"H_2O LEAK TIME 15 SEC.
PITOT LEAK TEST - L4 0.0
REFERENCE ΔP - 0.3

Traverse point number	Sampling time, (θ), min	2:00 PM Clock time, (24 h)	Vacuum, (in.) Hg	Stack temperature (T_s), (°F)	Velocity head (ΔP_s), (in.) H_2O	Pressure differential across orifice meter (ΔH), (in.) H_2O	998.601 Gas sample volume (V_m), (ft^3)	Gas sample temperature at dry gas meter		Temperature of gas leaving condenser or last impinger, (°F)	Fil ten (
								Inlet, (°F)	Outlet, (°F)		
1	2.5	2:02.5	3.9	86	.12	.75	999.9	103	102	60	
2	"	05.0	4.4	86	.18	1.1	501.4	104	102	60	
3	"	07.5	4.5	87	.20	1.25	503.1	105	102	60	
4	"	10.0	4.7	87	.22	1.35	509.9	107	103	59	
5	"	12.5	4.9	87	.24	1.5	506.7	107	103	59	
6	"	15.0	4.9	87	.26	1.6	508.6	108	104	59	
7	"	17.5	4.9	87	.27	1.7	510.5	109	104	59	
8	"	20.0	5.0	87	.28	1.75	512.0	110	105	59	
9	"	22.5	5.0	87	.28	1.75	514.0	110	106	59	
10	"	25.0	4.8	87	.26	1.6	515.9	111	107	59	
11	"	27.5	4.8	87	.24	1.5	517.7	111	107	60	
12	"	30.0	4.5	87	.20	1.25	519.4	112	109	60	
0		2:35 PM					519.4				
1	2.5	37.5	4.0	87	.12	.75	520.7	111	110	61	
2	"	40.0	4.2	87	.14	.85	522.1	113	110	61	
3	"	42.5	4.5	87	.18	1.1	523.6	114	110	61	
4	"	45.0	4.6	87	.20	1.25	525.4	114	111	61	
5	"	47.5	4.6	87	.20	1.25	527.2	115	112	60	
6	"	50.0	5.0	87	.24	1.5	529.0	116	113	60	
7	"	52.5	5.0	87	.24	1.5	530.8	117	114	60	
8	"	55.0	5.1	87	.26	1.6	532.7	117	115	60	
9	"	57.5	5.1	87	.26	1.6	534.6	118	115	60	
10	"	3:00.0	5.1	87	.24	1.5	536.3	118	116	60	
11	"	02.5	4.7	87	.20	1.25	538.5	119	116	61	
12	"	05.0	4.5	87	.18	1.1	540.0	119	117	61	
	Total 60		Max 5.1	Avg 87	1.1119 0.463	1.3	Total 41.4	Avg 112	Avg 109	Max 61	

RUN NO. 3
STACK NO. 19

STACK SAMPLING CALCULATIONS

DATE: 4/8/85
BY: EW

Meter Pressure

$P_m = 30.12 + \frac{1.3}{13.5} = 30.22$

Volume of Gas Sampled

$V_{m(std)} = \frac{41.4 \times 0.9917 \times 528 \times 30.22}{570 \times 29.92} = 38.41$

17054.4

Moisture Content

$V_{w(std)} = 30.4(0.04715) = 1.4334$

$B_{ws} = \frac{1.4334}{1.4334 + 38.4125} = 0.036 \sim 3.60\%$

39.8459

Stack Gas Molecular Weight

$M_s = 29(1-.036) + 18(0.036) = 28.6$

.964

27.956 + 0.6475

Stack Gas Pressure

$P_s = 30.12 + \frac{0.0}{13.6} = 30.12$

Stack Gas Velocity

$V_s = 85.49(0.84)(0.963)\sqrt{\frac{0.7968}{\frac{547}{30.12 \times 28.6}}} = 26.49$

861.5

Isokinetic Variation

$\%I = \frac{(0.09450)(547)(39.41)}{(30.12)(26.49)(0.000406)(60)(0.964)} = 105.9\%$

18.74

Stack Gas Flowrate

$Q = 60(A_s)(V_s) = (60)(3.14)(26.49) = 4991$

$Q_{std} = \frac{(4991)(528)(30.12)(0.964)}{(547)(29.92)} = 4,675$

16366.2