Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

Texasgulf Inc.
an elf aquitaine company

P.O. Box 48
Aurora, North Carolina 27806

W.A. Schimming
Manager
Environmental Affairs
(919) 322-8239

September 17, 1992

Mr. Jim Mulligan
Regional Supervisor
Division of Environmental Management
N. C. Department of EHNR
P. O. Box 2188
Washington, NC 27889

Re: **Texasgulf Inc.**
Permit No. 2331R10
Calciner No. 6

Dear Jim:

As per the requirements of Air Quality Permit No. 2331R10, Specific Conditions and Limitations No. 7, the No. 6 Calciner was compliance tested for sulfur dioxide on August 5 and 6, 1992. A copy of the compliance test results are attached for your review.

If I may provide any additional information on this subject, please let me know.

Sincerely,

W. A. Schimming

WAS/re

Enclosure

pc: Mike Aldridge - DEM, Raleigh (w/encl)
H. M. Breza (w/encl)
J. M. Waters (w/encl)
J. C. Carrere (w/encl)
00-12-000 (w/o encl)
15-09-022 (w/encl)

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SOURCE PERFORMANCE TEST

CALCINER NO. 6

TEXASGULF INC.

PHOSPHATE OPERATIONS

AURORA, NC

AUGUST 5 AND 6, 1992

PREPARED BY:

JOHN C. CARRERE, JR.
ENV. DATA COORDINATOR

REVIEWED BY:

JIMMY A. HARDY
SR. ENV. TECHNICIAN

REVIEWED BY:

MIKE L. ASBY
ENV. LAB SUPERVISOR

REVIEWED BY:

BRAD A. PEACOCK
SR. ENV. ENGINEER

File: EC-15-09-022

Summary

On August 5 and 6, 1992, sampling and analyses were conducted to determine the sulfur dioxide emission rate using E.P.A. Method 6, at Calciner No. 6. The sampling was conducted to satisfy (in part) Air Quality Permit No. 2331R10 which specifies annual testing of one (1) Calciner for sulfur dioxide.

The DEM was advised of the sampling dates and chose not to have an observer present during the testing.

The results of this series of runs show the sulfur dioxide emission rate to be 0.0132 pounds per million BTUs of heat input. The allowable sulfur dioxide emission rate, as set forth in the permit, is 0.75 pounds of sulfur dioxide per million BTUs of heat input. Three stack samples were taken.

Performing the stack sampling were Senior Environmental Technicians Jimmy Hardy and Phillip Forest. Senior Environmental Technician Jack Taylor performed the workdown and analyses.

TEXASGULF INC. PHOSPHATE OPERATIONS

Calculations

1) Mg SO2/DSCF = (32.03 x A x B X C) / (D x E)

2) Mg SO2/TSCF = (32.03 x A x B x C) / (F x E)

3) Lbs. SO2/Day = (H x I x 0.003175)

4) Dry Rock Feed Rate, TPH = K x (100 - L)/100

5) Dry Fuel Consumption Rate, TPH = (O / ((100 + N) /100) x M) / 2000

6) Dry Fuel Heat Content, BTUs/Lb Fuel = ((Q / 100) x S) + ((R / 100) x T)

7) Heat Input Rate, mm BTUs/Hr. = P x U x 2000 / 1,000,000

8) Lbs SO2 / MMBTU = J / (V x 24)

Where:
A = Mls of titrant used
B = Normality of titrant (Ba(Cl04)2
C = Liquid sample volume
D = Gas volume STP
E = Aliquot of sample used
F = Gas Volume TSCF
G = Mg SO2/DSCF
H = Mg SO2/TSCF
I = Stack Volumetric Flow Rate FT3/Min
J = Lbs SO2/Day
K = Rock Feed Rate, TPH
L = % Moisture
M = Dry Rock Feed Rate, TPH
N = % Loss on ignition
O = Dry Fuel Requirement, Lb Fuel/Ton Calcine Rock
P = Dry Fuel Consumption Rate, TPH
Q = % Coal in Dry Fuel
R = % Coke in Dry Fuel
S = Coal Heat Content, BTUs/Lb Coal
T = Coke Heat Content, BTUs/Lb Coke
U = Dry Fuel Heat Content, BTUs/Lb Fuel
V = Heat Input Rate, mm BTUs/Hr

TEXASGULF INC. PHOSPHATE OPERATIONS

Test Summary – No. 6 Calciner

Sulfur Dioxide Emission Rate Test	08/05/92	08/06/92	08/06/92
	Run 1	Run 2	Run 3
Stack Volume Flow Rate, TSCFM	57,860	59,800	59,845
Sample Volume, DSCF	46.841	47.152	46.807
SO2 Concentration, mg/DSCF	0.1036	0.1012	0.1020
SO2 Concentration, mg/TSCF	0.0754	0.0773	0.0746
SO2 Emission Rate, Lbs./Day	13.86	14.68	14.18
Heat Input MMBTUs/Hr	45.5	44.6	44.6
SO2 Emission Rate Lbs/MMBTUs	0.0127	0.0137	0.0132
Dry Rock Feed Rate, TPH	86.4	85.0	85.0
Average Heat Input MMBTUs/Hr		44.9	
Allowable Heat Input mm BTUs/Hr		54.8	
Average SO2 Emission Rate, Lbs/MMBTUs		0.0132	
Allowable SO2 Emission Rate, Lbs/MMBTUs		0.7500	

Texasgulf Inc. memo

an elf aquitaine company

Date: 09/16/92

To: Mill Superintendent

From: Environmental Affairs

Subject: Sulfur Dioxide Emission Rate
Calciner #6 Run 1

Sample Date	Production Rate, TPD	Time
08/05/92	2073	13:25

Mg SO2/SCF	Stack Volume STD FT3/Min
0.104 Dry 0.075 Total	57860

SO2 Lbs/Day	SO2 Lbs/mm BTUs
13.860	0.0127

M. R. Oxley

Supervisor, Environmental Laboratory

File: ec-15-09-022

The Calciners are limited by permit to 0.75 pounds of SO2/MMBTUS of heat input.

TEXASGULF INC.

Sulfur Dioxide Emission Rate		Rpt. Date	09/14/92
Run 1		Smple Date	08/05/92
Calciner #6		Smple Time	13:25

Barometric Pressure	30.19	Initial Dry Gas Mtr	840.301
Stack Static Pressure	-0.52	Final Dry Gas Mtr	885.398
Stack Diameter	72	Dry Gas Factor	0.9926
Nozzle Diameter	0.2298	Dry Mole Wt Stk Gas	29.564
Pitot Tube Corr	0.84	Stack Pressure	30.15
Sampling Time in Minutes	60	Feed Rate, TPH	96
Heat Rate Input, MMBTUs/Hr.	45.5	Feed Rate Dry, TPH	86

		Stk oF	Delta P	Delta H	oF In	oF Out
Pt	1	158	0.55	1.80	98	93
Pt	2	162	0.60	1.80	104	94
Pt	3	159	0.70	1.75	106	95
Pt	4	164	0.70	1.75	107	96
Pt	5	165	0.60	1.70	108	98
Pt	6	161	0.50	1.70	108	98
Pt	7	162	0.30	1.70	109	99
Pt	8	163	0.25	1.70	109	99
Pt	9	160	0.28	1.70	110	100
Pt	10	160	0.32	1.70	110	100
Pt	11	162	0.36	1.70	110	100
Pt	12	163	0.38	1.70	110	100
Pt	13	158	0.25			
Pt	14	161	0.25			
Pt	15	162	0.27			
Pt	16	162	0.27			
Pt	17	163	0.29			
Pt	18	164	0.30			
Pt	19	164	0.38			
Pt	20	164	0.38			
Pt	21	165	0.40			
Pt	22	165	0.44			
Pt	23	165	0.48			
Pt	24	165	0.50			
Averages		162	0.4063	1.73	107	98

Stack oR	622	Average Meter Temp oR	511

Gas Volume Collected	45.097
Corrected Gas Volume	44.763
Gas Volume STP	46.841

Page 2
Calciner #6
Run 1

Impinger Volumes/Weights

	No.1 (mls)	No. 2 (mls)	No.3 (mls)	No. 4 (g) (silica gel)
Initial	150	150	150	621.65
Final	334	257	203	649.06

Totals mls of water collected	344
Increase in grams of silica gel	27.41
Total Gas Volume	64.326
Bws	0.2718
One - Bws	0.7282
Wet Molecular Weight of Stack Gas	26.42
Stack Pressure	30.152
Stack Velocity FPS	39.894
Stack Volumetric Flow Rate STD Ft3/Min	57860

SO2 Calculations

Liquid Sample Volume, mls	500
Normality of Titrant	0.010101
Aliquot	10
Mls of Titrant used	0.30
Mg SO2/DSCF	0.1036
Mg SO2/TSCF	0.0754
Lbs SO2/Day	13.86
Lbs SO2/mm BTUs	0.0127

Texasgulf Inc. memo

an elf aquitaine company

Date: 09/16/92

To: Mill Superintendent

From: Environmental Affairs

Subject: Sulfur Dioxide Emission Rate
Calciner #6 Run 2

Sample Date	Production Rate, TPD	Time
08/06/92	2033	10:45

Mg SO2/SCF	Stack Volume STD FT3/Min
0.101 Dry 0.077 Total	59800

SO2 Lbs/Day	SO2 Lbs/mm BTUs
14.683	0.0137

M. R. Ashby

Supervisor, Environmental Laboratory

File: ec-15-09-022

The Calciners are limited by permit to 0.75 pounds of SO2/MMBTUS of heat input.

TEXASGULF INC.

Sulfur Dioxide Emission Rate		Rpt. Date	09/14/92
Run 2		Smple Date	08/06/92
Calciner #6		Smple Time	10:45

Barometric Pressure	30.29	Initial Dry Gas Mtr	904.001
Stack Static Pressure	-0.45	Final Dry Gas Mtr	949.020
Stack Diameter	72	Dry Gas Factor	0.9926
Nozzle Diameter	0.2346	Dry Mole Wt Stk Gas	29.564
Pitot Tube Corr	0.84	Stack Pressure	30.26
Sampling Time in Minutes	60	Feed Rate, TPH	95
Heat Rate Input, MMBTUs/Hr.	44.6	Feed Rate Dry, TPH	85

		Stk oF	Delta P	Delta H	oF In	oF Out
Pt	1	158	0.25	1.75	106	90
Pt	2	161	0.28	1.75	106	90
Pt	3	161	0.27	1.70	105	91
Pt	4	162	0.30	1.70	105	92
Pt	5	162	0.28	1.70	103	93
Pt	6	161	0.35	1.70	100	93
Pt	7	161	0.40	1.75	100	93
Pt	8	161	0.40	1.75	100	93
Pt	9	159	0.38	1.75	101	93
Pt	10	161	0.50	1.75	100	94
Pt	11	161	0.52	1.75	100	95
Pt	12	162	0.54	1.80	100	95
Pt	13	157	0.55			
Pt	14	160	0.70			
Pt	15	159	0.70			
Pt	16	159	0.78			
Pt	17	160	0.68			
Pt	18	161	0.60			
Pt	19	158	0.30			
Pt	20	160	0.28			
Pt	21	161	0.34			
Pt	22	161	0.35			
Pt	23	161	0.38			
Pt	24	162	0.40			
Averages		160	0.4388	1.74	102	93

Stack oR	620	Average Meter Temp oR	509

Gas Volume Collected	45.019
Corrected Gas Volume	44.686
Gas Volume STP	47.152

Calciner #6
Run 2

Impinger Volumes/Weights

	No.1 (mls)	No. 2 (mls)	No.3 (mls)	No. 4 (g) (silica gel)
Initial	150	150	150	653.98
Final	303	240	187	683.21

Totals mls of water collected	280
Increase in grams of silica gel	29.23
Total Gas Volume	61.710
Bws	0.2359
One - Bws	0.7641
Wet Molecular Weight of Stack Gas	26.84
Stack Pressure	30.257
Stack Velocity FPS	40.956
Stack Volumetric Flow Rate STD Ft3/Min	59800

SO2 Calculations

Liquid Sample Volume, mls	500
Normality of Titrant	0.010101
Aliquot	10
Mls of Titrant used	0.295
Mg SO2/DSCF	0.1012
Mg SO2/TSCF	0.0773
Lbs SO2/Day	14.68
Lbs SO2/mm BTUs	0.0137

Texasgulf Inc. memo

an elf aquitaine company

Date: 09/16/92

To: Mill Superintendent

From: Envi Environmental Affairs

Subject: Sulfu Sulfur Dioxide Emission Rate
Calciner #6 Run 3

Sample Date	Production Rate, TPD	Time
08/06/92	2033	12:25

Mg SO2/SCF	Stack Volume STD FT3/Min
0.102 Dry 0.075 Total	59845

SO2 Lbs/Day	SO2 Lbs/mm BTUs
14.179	0.0132

M.R. Osby

Supervisor, Environmental Laboratory

File: ec-15-09-022

The Calciners are limited by permit to 0.75 pounds of SO2/MMBTUS of heat input.

TEXASGULF INC.

Sulfur Dioxide Emission Rate		Rpt. Date	09/14/92
Run 3		Smple Date	08/06/92
Calciner #6		Smple Time	12:25

Barometric Pressure	30.30	Initial Dry Gas Mtr	954.000
Stack Static Pressure	-0.45	Final Dry Gas Mtr	998.999
Stack Diameter	72	Dry Gas Factor	0.9926
Nozzle Diameter	0.2298	Dry Mole Wt Stk Gas	29.564
Pitot Tube Corr	0.84	Stack Pressure	30.27
Sampling Time in Minutes	60	Feed Rate, TPH	95
Heat Rate Input, MMBTUs/Hr.	44.6	Feed Rate Dry, TPH	85

		Stk oF	Delta P	Delta H	oF In	oF Out
Pt	1	157	0.24	1.75	105	89
Pt	2	161	0.24	1.75	110	91
Pt	3	162	0.25	1.80	112	93
Pt	4	163	0.26	1.75	112	93
Pt	5	165	0.30	1.75	113	94
Pt	6	165	0.35	1.75	113	96
Pt	7	164	0.40	1.75	115	96
Pt	8	163	0.40	1.70	116	98
Pt	9	165	0.42	1.70	117	99
Pt	10	165	0.48	1.70	117	99
Pt	11	164	0.52	1.70	117	101
Pt	12	165	0.52	1.70	118	101
Pt	13	157	0.55			
Pt	14	160	0.70			
Pt	15	159	0.70			
Pt	16	159	0.78			
Pt	17	160	0.68			
Pt	18	161	0.60			
Pt	19	158	0.30			
Pt	20	160	0.28			
Pt	21	161	0.34			
Pt	22	161	0.35			
Pt	23	161	0.38			
Pt	24	162	0.40			
Averages		162	0.4350	1.73	114	96

Stack oR	622	Average Meter Temp oR	512

Gas Volume Collected	44.999
Corrected Gas Volume	44.666
Gas Volume STP	46.807

Calciner #6
Run 3

Impinger Volumes/Weights

	No.1 (mls)	No. 2 (mls)	No.3 (mls)	No. 4 (g) (silica gel)
Initial	150	150	150	689.85
Final	343	253	193	715.06

Totals mls of water collected	339
Increase in grams of silica gel	25.21
Total Gas Volume	63.952
Bws	0.2681
One - Bws	0.7319
Wet Molecular Weight of Stack Gas	26.46
Stack Pressure	30.267
Stack Velocity FPS	41.053
Stack Volumetric Flow Rate STD Ft3/Min	59845

SO2 Calculations

Liquid Sample Volume, mls	500
Normality of Titrant	0.010101
Aliquot	10
Mls of Titrant used	0.295
Mg SO2/DSCF	0.1020
Mg SO2/TSCF	0.0746
Lbs SO2/Day	14.18
Lbs SO2/mm BTUs	0.0132

RAW DATA

Box #1

SO_2 STACK SAMPLE WORKSHEET

DATE: 8-5-92

PLANT: CALCINER # 6

TIME: _____

WET FEED RATE _____ DRY _____ T

STACK TEMP.: _____ °F

PRODUCTION RATE: _____ T

AVG. METER TEMP.: _____ °F

BAROMETRIC PRESSURE: _____ "H

GAS VOL. COLLECTED: _____ ACF

DRY GAS VOLUME: _____ SC

STACK VOLUME: _____ SCFM

TOTAL GAS VOLUME: _____ SC

SO_2 ANALYSIS

SAMPLE VOLUME	~~200~~ 500
ALIQUOT	10
TITRANT	.30 .30 .30
mg SO_2/DRY SCF	
mg SO_2/SCF TOTAL	
LB. SO_2/HR.	
LB. SO_2/DAY	
LB. $SO_2/10^6$ BTU	

$$\text{DRY GAS VOL. STP} = (\text{GAS VOL. COLLECTED}) \left(\frac{528^\circ R}{\text{METER TEMP.}}\right) \left(\frac{\text{BAROMETRIC PRESSURE} + \Delta H/13.6}{29.92\text{"Hg}}\right) (Y)$$

TOTAL GAS VOL. STP = DRY GAS VOL. STP + (mls H_2O COLLECTED X 0.04707) + (Δ H SILICA GEL WT. X 0.04715)

$$\text{mg } SO_2/\text{SCF} = (32.03) \times \frac{(\text{VOL. TITRANT})\ (N)\ (\text{SAMPLE VOLUME})}{(\text{GAS SAMPLE VOLUME, STP})\ (\text{ALIQUOT})}$$

LBS. SO_2/DAY = (mg SO_2 /TOTAL SCF) X (STACK VOLUME) X (.0032)

$$\text{LBS. } SO_2/10^6 \text{ BTU} = \frac{(\text{LBS. } SO_2/\text{DAY})}{(\text{TPD PRODUCTION})\ (.462)}$$

GEL. WT. 621.65 g BEFORE

GEL. WT. 649.04 g AFTER

Δ _____ ml

IMPINGERS

	1st	2nd	3rd
START	150	150	150
FINISH	206 + 128	139 + 118	203
Δ ml H_2O			

mls of H_2O

TOTAL mls H_2O COLLECTED: _____

Box #1

TEXASGULF INC. PHOSPHATE OPERATIONS

CONSOLE WORKSHEET

Plant CALCINER #6 SO_2 Date 8-5-92 Time 1325 Run #1 (SO_2)

Mtr Box #4 Meter H@ 1.7226 K Factor NA Barometric 30.19

Assmd Moist 33.90 Nozzle Dia. 0.2298 Dry Gas X 0.9926 Console Oper P.A. FOREST

PT	Smple Min.	Head Delta P	Orifice Delta H	Meter Ft3 840.301	Meter In oF	Meter Out oF	Stack oF	Hot Box oF	Imp. oF	Vacuum "Hg
1	5	0.55	1.80	844.1	98	93	158	240		15.7
2	10	0.60	1.80	847.9	104	94	162	245	68	16.5
3	15	0.70	1.75	851.7	106	95	159	250	70	16.7
4	20	0.70	1.75	855.5	107	96	164	240	70	17.0
5	25	0.60	1.70	859.3	108	98	165	235	72	16.8
6	30	0.50	1.70	863.0	108	98	161	225	72	16.0
7	35	0.30	1.70	866.7	109	99	162	235	72	16.8
8	40	0.25	1.70	870.4	109	99	163	240	71	16.9
9	45	0.28	1.70	874.2	110	100	160	235	70	16.1
10	50	0.32	1.70	878.0	110	100	160	225	72	16.0
11	55	0.36	1.70	881.7	110	100	162	225	72	16.0
12	60	0.38	1.70	885.398	110	100	163	225	72	16.0
13 1		0.25					158			
14 2		0.25					161			
15 3		0.27					162			
16 4		0.27					162			
17 5		0.29					163			
18 6		0.30					164			
19 7		0.38					164			
20 8		0.38					164			
21 9		0.40					165			
22 10		0.44					165			
23 11		0.48					165			
24 12		0.50					165			
Total										
Avg				45.097						

TOP 14.25

0.752 ft3/min

Probe and Sample Box Operator J.A. HARDY

Pre Leak Check At 8.2 "Hg = 0.011 C.F.M. Post Leak Check At 17.1 "Hg 0.008 C.F.M.

Pitot Leak Check Red ✓@0.68 Green ✓ @0.74

$K = (846.72 \times D_1^4 \times H@ \times Cp^2 \times (1 - Bws)^2 \times (M_d / M_s) \times (P_s / P_m) \times (T_m oR / T_s oR))$

_____ = (846.72 x ( ) x ( ) x ( ) x ( ) x ( ) x (/) x (/) x (/)

TGEA021.WR1

BOX #2

SO_2 STACK SAMPLE WORKSHEET

DATE: 8-6-92

PLANT: CALCINER # 6

TIME: _____

WET FEED RATE _____ DRY _____

STACK TEMP.: _____ °F

PRODUCTION RATE: _____

AVG. METER TEMP.: _____ °F

BAROMETRIC PRESSURE: _____ "

GAS VOL. COLLECTED: _____ ACF

DRY GAS VOLUME: _____ S

STACK VOLUME: _____ SCFM

TOTAL GAS VOLUME: _____ S

SO_2 ANALYSIS

SAMPLE VOLUME	500
ALIQUOT	10
TITRANT	.31 .28. (.295)
mg SO_2/DRY SCF	
mg SO_2/SCF TOTAL	
LB. SO_2/HR.	
LB. SO_2/DAY	
LB. $SO_2/10^6$ BTU	

DRY GAS VOL. STP = (GAS VOL. COLLECTED) $\left(\frac{528^\circ R}{\text{METER TEMP.}}\right)\left(\frac{\text{BAROMETRIC PRESSURE} + \Delta H/13.6}{29.92\text{"Hg}}\right)$ (Y)

TOTAL GAS VOL. STP = DRY GAS VOL. STP + (mls H_2O COLLECTED X 0.04707) + (Δ H SILICA GEL WT. X 0.04715)

mg SO_2/SCF = (32.03) X $\frac{\text{(VOL. TITRANT) (N) (SAMPLE VOLUME)}}{\text{(GAS SAMPLE VOLUME, STP) (ALIQUOT)}}$

LBS. SO_2/DAY = (mg SO_2 /TOTAL SCF) X (STACK VOLUME) X (.0032)

LBS. $SO_2/10^6$ BTU = $\frac{\text{(LBS. SO}_2\text{/DAY)}}{\text{(TPD PRODUCTION) (.462)}}$

GEL. WT. 653.98 g BEFORE

GEL. WT. 683.21 g AFTER

Δ _____ ml

IMPINGERS

	1st	2nd	3rd
START	150	150	150
FINISH	215 + 88	240	187
Δ ml H_2O			

mls of H20

TOTAL mls H_2O COLLECTED: _____

= Box #2

TEXASGULF INC. PHOSPHATE OPERATIONS

CONSOLE WORKSHEET

Plant CALCINER #6 SO_2 Date 8-6-92 Time 1045 Run #2 (2nd SO_2 RUN)

Mtr Box #4 Meter H@ 1.7226 K Factor NA Barometric 30.29

Assmd Moist 33 % Nozzle Dia. 0.2346 Dry Gas X 0.9926 Console Oper P.A. FOREST

STATIC PRESSURE = -0.45

PT	Smple Min.	Head Delta P	Orifice Delta H	Meter Ft3 904.001	Meter In oF	Meter Out oF	Stack oF	Hot Box oF	Imp. oF	Vacuum "Hg
1	5	0.25	1.75	907.8	106	90	158	225		14.4
2	10	0.28	1.75	911.5	106	90	161	225	56	14.5
3	15	0.27	1.70	915.2	105	91	161	215	59	15.0
4	20	0.30	1.70	918.9	105	92	162	225	60	15.4
5	25	0.28	1.70	922.6	103	93	162	235	62	17.0
6	30	0.35	1.70	926.4	100	93	161	235	66	19.0
7	35	0.40	1.75	930.1	100	93	161	235	64	19.5
8	40	0.40	1.75	933.9	100	93	161	240	64	19.4
9	45	0.38	1.75	937.7	101	93	159	240	65	19.2
10	50	0.50	1.75	941.4	100	94	161	230	65	19.3
11	55	0.52	1.75	945.2	100	95	161	235	66	19.5
12	60	0.54	1.80	949.020	100	95	162	235	68	19.5
13		0.55					157			
14		0.70					160			
15		0.70					159			
16		0.78					159			
17		0.68					160			
18		0.60					161			
19		0.30					158			
20		0.28					160			
21		0.34					161			
22		0.35					161			
23		0.38					161			
24		0.40					162			
Total				45.019						
Avg				0.750 ft^3/min						

NW AXIS

STOP 1145

SW AXIS

Probe and Sample Box Operator J. H. TAYLOR

Pre Leak Check At 10.4 "Hg = 0.017 C.F.M. Post Leak Check At 20.1 "Hg 0.005 C.F.M.

Pitot Leak Check Red ✓@ 0.50 Green ✓@ 0.90

$K = (846.72 \times D_n^4 \times H@ \times Cp^2 \times (1 - Bws)^2 \times (M_d / M_s) \times (P_s / P_m) \times (T_m oR / T_s oR))$

_____ = (846.72 x ( ) x ( ) x ( ) x ( ) x ( ) x (/) x (/) x (/)

TGEA021.WR1

Box #3

SO_2 STACK SAMPLE WORKSHEET

DATE: 8-6-92

PLANT: CALCINER #6

TIME: _____

WET FEED RATE _____ DRY _____ T

STACK TEMP.: _____ °F

PRODUCTION RATE: _____ T

AVG. METER TEMP.: _____ °F

BAROMETRIC PRESSURE: _____ "H

GAS VOL. COLLECTED: _____ ACF

DRY GAS VOLUME: _____ SC

STACK VOLUME: _____ SCFM

TOTAL GAS VOLUME: _____ SC

SO_2 ANALYSIS

SAMPLE VOLUME	500
ALIQUOT	10
TITRANT	.30 .29 .295
mg SO_2/DRY SCF	
mg SO_2/SCF TOTAL	
LB. SO_2/HR.	
LB. SO_2/DAY	
LB. $SO_2/10^6$ BTU	

$$\text{DRY GAS VOL. STP} = (\text{GAS VOL. COLLECTED}) \left(\frac{528^\circ R}{\text{METER TEMP.}}\right)\left(\frac{\text{BAROMETRIC PRESSURE} + \Delta H/13.6}{29.92''Hg}\right)(Y)$$

TOTAL GAS VOL. STP = DRY GAS VOL. STP + (mls H_2O COLLECTED X 0.04707) + (Δ H SILICA GEL WT. X 0.04715)

$$\text{mg } SO_2/SCF = (32.03) \times \frac{(\text{VOL. TITRANT})\ (N)\ (\text{SAMPLE VOLUME})}{(\text{GAS SAMPLE VOLUME, STP})\ (\text{ALIQUOT})}$$

LBS. SO_2/DAY = (mg SO_2 /TOTAL SCF) X (STACK VOLUME) X (.0032)

$$\text{LBS. } SO_2/10^6 \text{ BTU} = \frac{(\text{LBS. } SO_2/\text{DAY})}{(\text{TPD PRODUCTION})\ (.462)}$$

GEL. WT. 689.85 g BEFORE

GEL. WT. 715.06 g AFTER

Δ _____ ml

IMPINGERS

	1st	2nd	3rd
START	150	150	150
FINISH	207+ 136	253	193
Δ ml H_2O			

mls of H_2O

TOTAL mls H_2O COLLECTED: _____

Box #3

TEXASGULF INC. PHOSPHATE OPERATIONS

CONSOLE WORKSHEET

Plant CALCINER #6 SO2 Date 8-6-92 Time 1225 Run #3

Mtr Box #4 Meter H@ 1.7226 K Factor NA Barometric 30.30

Assmd Moist 33% Nozzle Dia. 0.2298 Dry Gas X 0.9926 Console Oper P.A. FOREST

PT	Smple Min.	Head Delta P	Orifice Delta H	Meter Ft3 954,000	Meter In oF	Meter Out oF	Stack oF	Hot Box oF	Imp. oF	Vacuum "Hg
1	5	0.24	1.75	957.7	105	89	157	225		10.3
2	10	0.24	1.75	961.4	110	91	161	235	55	10.5
3	15	0.25	1.80	965.2	112	93	162	250	57	11.3
4	20	0.26	1.75	968.9	112	93	163	250	59	11.9
5	25	0.30	1.75	972.7	113	94	165	260	60	12.0
6	30	0.35	1.75	976.5	113	96	165	235	60	12.0
7	35	0.40	1.75	980.3	115	96	164	240	60	11.8
8	40	0.40	1.70	984.1	116	98	163	250	60	11.5
9	45	0.42	1.70	987.8	117	99	165	230	61	11.3
10	50	0.48	1.70	991.5	117	99	165	235	62	11.1
11	55	0.52	1.70	995.3	117	101	164	245	64	11.8
12	60	0.52	1.70	998.999	118	101	165	245	66	11.5
13		0.55					157			
14		0.70					160			
15		0.70					159			
16		0.78					159			
17		0.68					160			
18		0.60					161			
19		0.30					158			
20		0.28					160			
21		0.34					161			
22		0.35					161			
23		0.38					161			
24		0.40		44.999			162			
Total				~~[illegible]~~						
Avg				0.750	ft3/min					

W PORT

STOP 1325

W PORT

Probe and Sample Box Operator J. H. TAYLOR

Pre Leak Check At 9.5 "Hg = 0.005 C.F.M. Post Leak Check At 14.5 "Hg 0.007 C.F.M.

Pitot Leak Check Red ✓ @ 0.84 Green ✓ @ 0.70

$K = (846.72 \times D_n^4 \times H@ \times Cp^2 \times (1 - Bws)^2 \times (M_d / M_s) \times (P_s / P_m) \times (T_m oR / T_s oR))$

_____ = (846.72 x ( ) x ( ) x ( ) x ( ) x ( ) x (/) x (/) x (/)

TGEA021.WR1

Cyclonic Flow Test

Plant Calciner #6 Technician(s) JH + JT

Date 5-22-91 Time 1400

Northwest Port

Point #	Delta P	Angle Alpha
1	.50	6
2	.50	12
3	.55	7
4	.50	3
5	.40	1
6	.36	2
7	.34	0
8	.38	0
9	.30	0
10	.25	8
11	.18	9
12	.12	23
Average		over

Average absolute Alpha must not be greater than 20 degrees.

Cyclonic Flow Test

Plant Calciner Technician(s) JH & JT

Date 5-22-91 Time 1400

Southwest port

Point #	Delta P	Angle Alpha
1	.70	10
2	.90	1
3	1.10	0
4	1.00	0
5	.80	0
6	.60	0
7	.28	6
8	.22	1
9	.25	5
10	.25	8
11	.30	9
12	.30	7
Average		4.9

Average absolute Alpha must not be greater than 20 degrees.

Orsat Analyses

Date 8-3-92 Plant CAL #6 Techniican JHARP

Pb / Stack Temp / Ambient Temp /

Dry Bulb Temp / Wet Bulb Temp /

Stack Static Press / Stack Press /

		CO2	O2	CO+N
Run 1	Burette Reading	6.0	21.0	~~[illegible]~~
	Percent	6.0	15.0	79.0
Run 2	Burette Reading	6.0	21.2	—
	Percent	6.0	15.2	78.8
Run 3	Burette Reading	6.0	21.1	—
	Percent	6.0	15.1	78.9

No leak for 5 minutes

Ps = (Static Press/13.6) + Pb

V.P.= S.V.P. - ((3.67*10^-4) * (Ps) * (Td - Tw) * ((1 + (Tw-32)/1571))

Bws = V.P./Ps

Md = ((0.44 * %CO2) + (0.32 * %O2) + (0.28 * %CO+N)) (6.0, 15.1, 78.9)

Ms = ((Md * (1-Bws)) + ((18 * Bws))

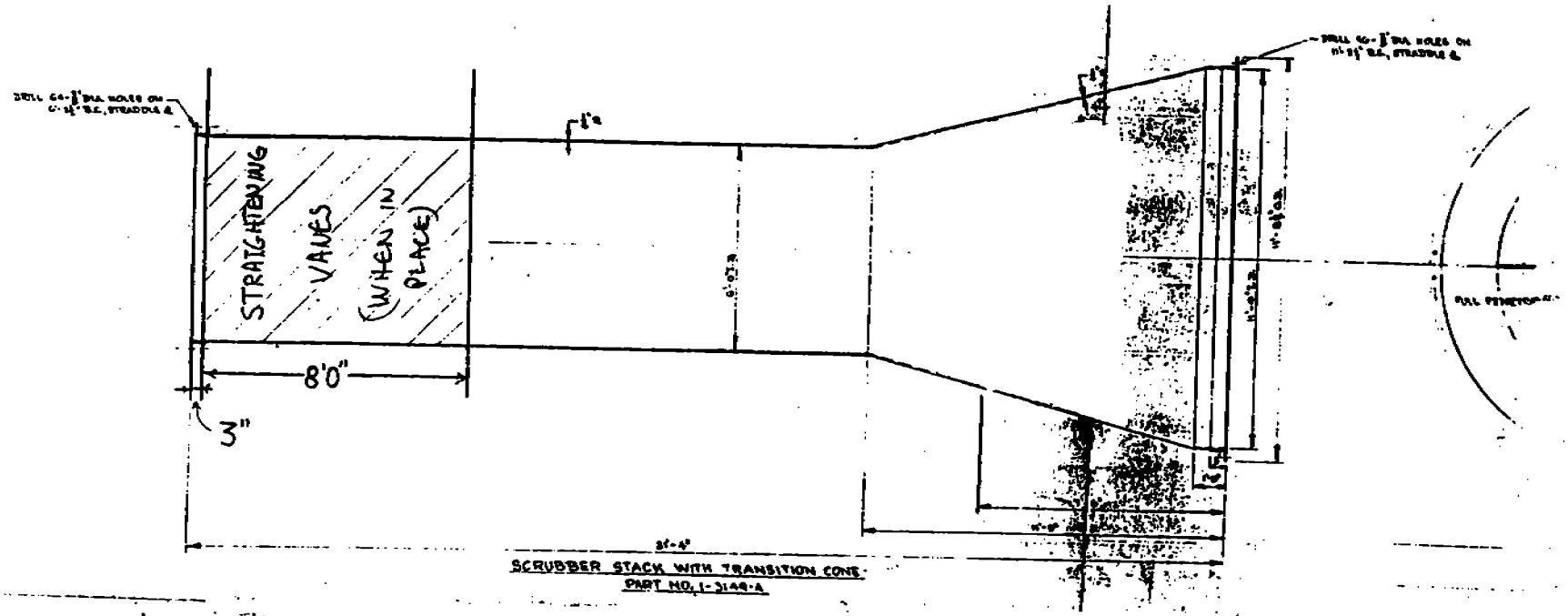
V.P.= /

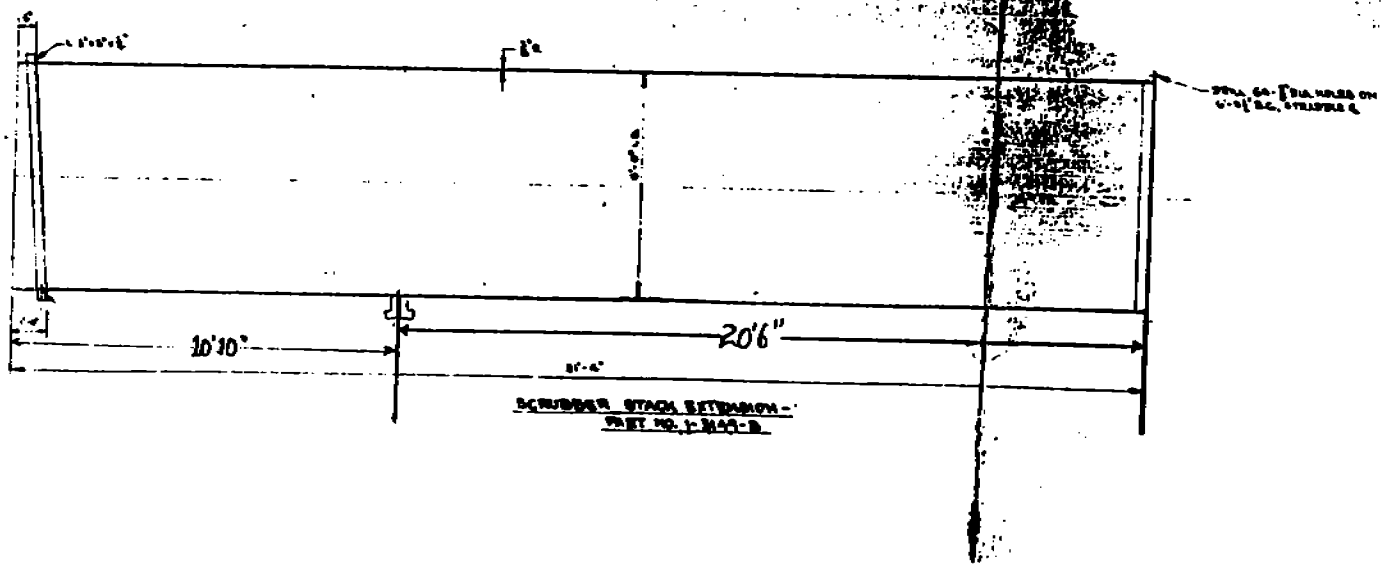
Bws = /

Md = 29.564

Ms = /

NUMBER SIX
SCRUBBER STACK





SO2 AUDIT

TEXASGULF INC. PHOSPHATE OPERATIONS

SO2 AUDIT SAMPLE

Technician Jack H. Taylor

	Titr.	Result
EPA Sample No. C 8654	4.39 ml Ba(ClO4)2	676.3 mg/dscm
EPA Sample No. C 8153	10.75 ml Ba(ClO4)2	1656.9 mg/dscm

PRODUCTION DATA

NUMBER 6 CALCINER----AUGUST 5, 1992

$$\frac{96 \text{ tons feed}}{\text{hour}} \rightarrow (96)\frac{(100\% - \%\ H_2O)}{100} = \frac{\text{Tons dry feed}}{\text{hour}}$$

$$\frac{(96 \text{ t feed})}{\text{hour}}\frac{(100 - 10.04)}{100} = (96)\ (0.8996) = \frac{86.4 \text{ t dry feed}}{\text{hour}}$$

Loss on Ignition is calculated each month from assays. In July it was 7.41%.

(So) Coal usage is based on consumption per ton calcine and is $\frac{37.5\# \text{ coal}}{\text{ton calcine}}$ *for a YTD figure.*

Calculate coal usage based on Dry Feed:

Take coal usage $\frac{(37.5\# \text{ coal})}{\text{ton calcine}}$ $\frac{(1 \text{ ton calcine})}{(1.0741 \text{ tons dry feed})}$ =

$\frac{34.91\# \text{ coal}}{(1 \text{ ton dry feed})}$ *or at* $\frac{86.4 \text{ tons dry feed}}{\text{hour}}$ =

$\frac{(34.91\# \text{ coal})}{\text{ton dry feed}}\frac{(86.4 \text{ tons dry feed})}{\text{hour}} = \frac{3{,}016.22\# \text{ coal}}{\text{hour}}$

or $\frac{1.508 \text{ tons coal}}{\text{hour}}$

August 21, 1992 *ojc*

B.T.U. INPUT CALCULATION

In August, 1992 the dry fuel mix was 75.4% coke and 24.6% coal.

The average Year-to-date B.T.U. value for dry coke is 15,554 B.T.U.'s per pound.

The average Year-to-date B.T.U. value for dry coal is 13,642 B.T.U.'s per pound.

$$(.754)(15{,}554) = 11{,}728$$
$$(.246)(13{,}642) = \underline{3{,}356}$$

TOTAL = *15,084 B.T.U.'s per pound of dry fuel.*

$$\frac{(3{,}016.2 \text{ lbs. dry fuel})}{(\text{hour})}(15{,}084) =$$

45.5 x 10^6 B.T.U.'s per hour

ojc 9/3/92

NUMBER 6 CALCINER----AUGUST 6, 1992

$$\frac{95 \text{ tons feed}}{\text{hour}} \rightarrow (95)\frac{(100\% - \%\ H_2O)}{100} = \frac{\text{Tons dry feed}}{\text{hour}}$$

$$\frac{(95 \text{ t feed})}{\text{hour}}\frac{(100 - 10.84)}{100} = (95)\ (0.8916) = \frac{84.7 \text{ t dry feed}}{\text{hour}}$$

Loss on Ignition is calculated each month from assays. In July it was 7.41%.

(So) Coal usage is based on consumption per ton calcine and is $\frac{37.5\# \text{ coal}}{\text{ton calcine}}$ for a YTD figure.

Calculate coal usage based on Dry Feed:

Take coal usage $\frac{(37.5\# \text{ coal})}{\text{ton calcine}}$ $\frac{(1 \text{ ton calcine})}{(1.0741 \text{ tons dry feed})}$ =

$\frac{34.91\# \text{ coal}}{(1 \text{ ton dry feed})}$ or at $\frac{84.7 \text{ tons dry feed}}{\text{hour}}$ =

$$\frac{(34.91\# \text{ coal})}{\text{ton dry feed}}\frac{(84.7 \text{ tons dry feed})}{\text{hour}} = \frac{2{,}956.88\# \text{ coal}}{\text{hour}}$$

or $\frac{1.478 \text{ tons coal}}{\text{hour}}$

August 21, 1992 ojc

B.T.U. INPUT CALCULATION

In August, 1992 the dry fuel mix was 75.4% coke and 24.6% coal.

The average Year-to-date B.T.U. value for dry coke is 15,554 B.T.U.'s per pound.

The average Year-to-date B.T.U. value for dry coal is 13,642 B.T.U.'s per pound.

$$(.754)(15{,}554) = 11{,}728$$
$$(.246)(13{,}642) = \underline{3{,}356}$$

TOTAL = 15,084 B.T.U.'s per pound of dry fuel.

$$\frac{(2{,}956.9 \text{ lbs. dry fuel})}{(\text{hour})}(15{,}084) =$$

44.6 x 10^6 B.T.U.'s per hour

ojc 9/3/92

CALIBRATIONS

TEXASGULF INC. PHOSPHATE OPERATIONS

Console Calibration

07/13/92		Console	4
Technician Jack Taylor		Number of Runs	8
Barometric Pressure	30.12	Test Meter Factor	0.9986
Test Meter No.	699357		
Delta H Setting	0.25	Meter Pressure	30.14
Test Meter Initial	830.800		
Test Meter Final	835.806	Test Dry Gas Volume	5.006
Console Meter Inital	230.500		
Console Meter Final	235.812	Console Dry Gas Volume	5.312
Test Meter oF In	72		
Test Meter oF Out	71	Test Average oR	531.5
Console Meter oF In	98		
Console Meter oF Out	84	Console Average oR	551
Total Time In Mins.	17.95	Corr Test Meter Vol	5.00
Delta Ha=	1.7393	y Factor=	0.9750
Delta H Setting	0.50	Meter Pressure	30.16
Test Meter Initial	836.000		
Test Meter Final	841.006	Test Dry Gas Volume	5.006
Console Meter Inital	236.200		
Console Meter Final	241.504	Console Dry Gas Volume	5.304
Test Meter oF In	72		
Test Meter oF Out	71	Test Average oR	531.5
Console Meter oF In	101		
Console Meter oF Out	86	Console Average oR	553.5
Total Time In Mins.	12.73	Corr Test Meter Vol	5.00
Delta Ha=	1.7416	y Factor=	0.9803
Delta H Setting	0.75	Meter Pressure	30.18
Test Meter Initial	841.201		
Test Meter Final	846.210	Test Dry Gas Volume	5.009
Console Meter Inital	241.800		
Console Meter Final	247.100	Console Dry Gas Volume	5.3
Test Meter oF In	72		
Test Meter oF Out	71	Test Average oR	531.5
Console Meter oF In	104		
Console Meter oF Out	87	Console Average oR	555.5
Total Time In Mins.	10.37	Corr Test Meter Vol	5.00
Delta Ha=	1.7253	y Factor=	0.9846

Page 2
Console Calibration
07/13/92

Delta H Setting	1.00	Meter Pressure	30.19
Test Meter Initial	846.400		
Test Meter Final	851.412	Test Dry Gas Volume	5.012
Console Meter Inital	247.500		
Console Meter Final	252.763	Console Dry Gas Volume	5.263
Test Meter oF In	71		
Test Meter oF Out	70	Test Average oR	530.5
Console Meter oF In	106		
Console Meter oF Out	87	Console Average oR	556.5
Total Time In Mins.	8.95	Corr Test Meter Vol	5.00
Delta Ha=	1.7020	y Factor=	0.9952

Delta H Setting	1.25	Meter Pressure	30.21
Test Meter Initial	851.900		
Test Meter Final	861.908	Test Dry Gas Volume	10.008
Console Meter Inital	253.600		
Console Meter Final	264.094	Console Dry Gas Volume	10.494
Test Meter oF In	71		
Test Meter oF Out	70	Test Average oR	530.5
Console Meter oF In	108		
Console Meter oF Out	88	Console Average oR	558
Total Time In Mins.	16.07	Corr Test Meter Vol	9.99
Delta Ha=	1.7156	y Factor=	0.9987

Delta H Setting	1.50	Meter Pressure	30.23
Test Meter Initial	862.300		
Test Meter Final	872.306	Test Dry Gas Volume	10.006
Console Meter Inital	264.700		
Console Meter Final	275.159	Console Dry Gas Volume	10.459
Test Meter oF In	72		
Test Meter oF Out	71	Test Average oR	531.5
Console Meter oF In	109		
Console Meter oF Out	89	Console Average oR	559
Total Time In Mins.	14.67	Corr Test Meter Vol	9.99
Delta Ha=	1.7197	y Factor=	1.0011

Page 3
Console Calibration
13-Jul-92

Delta H Setting	1.75	Meter Pressure	30.25
Test Meter Initial	873.000		
Test Meter Final	883.000	Test Dry Gas Volume	10
Console Meter Inital	276.100		
Console Meter Final	286.406	Console Dry Gas Volume	10.306
Test Meter oF In	72		
Test Meter oF Out	71	Test Average oR	531.5
Console Meter oF In	100		
Console Meter oF Out	83	Console Average oR	551.5
Total Time In Mins.	13.48	Corr Test Meter Vol	9.99
Delta Ha=	1.7191	y Factor=	1.0011
Delta H Setting	2.00	Meter Pressure	30.27
Test Meter Initial	883.300		
Test Meter Final	893.326	Test Dry Gas Volume	10.026
Console Meter Inital	286.900		
Console Meter Final	297.256	Console Dry Gas Volume	10.356
Test Meter oF In	72		
Test Meter oF Out	71	Test Average oR	531.5
Console Meter oF In	105		
Console Meter oF Out	85	Console Average oR	555
Total Time In Mins.	12.68	Corr Test Meter Vol	10.01
Delta Ha=	1.7185	y Factor=	1.0046
Average Delta Ha=	1.7226	Average y Factor=	0.9926

TEXASGULF INC. PHOSPHATE OPERATIONS

Temperature Calibrations

Console 4 Date 7-13-92

Technician JT

Instrument		Indicator oF	Actual oF	Difference oF
Dry Gas Meter In (Must agree: +/- 5.4 oF)	A	32	33.4	1.4
	B	69	71.2	3.2
	C	170	172.3	2.3
Dry Gas Meter Out (Must agree: +/- 5.4 oF)	A	32	33.8	1.8
	B	69	71.2	2.2
	C	176	175.6	0.4
Impinger Thermometer # 1 (Must agree: +/- 2 oF)	A	34	32.6	1.6
	B	73	75.0	2.0
	C	156	156.4	0.4
Impinger Thermometer # 2 (Must agree: +/- 2 oF)	A	34	32.4	1.4
	B	74	75.0	1.0
	C	154	156.0	2.0
Impinger Thermometer # 3 (Must agree: +/- 2 oF)	A	34	33.5	1.5
	B	76	74.6	1.4
	C	158	156.2	1.8
HotBox Thermometer # 1 (Must agree: +/- 5.4 oF)	A	75	75.7	0.7
	B	172	172.8	0.8
	C	300	302.5	2.5
HotBox Thermometer # 2 (Must agree: +/- 5.4 oF)	A	74	75.6	1.6
	B	164	165.6	1.6
	C	298	302.5	4.5
HotBox Thermometer # 3 (Must agree: +/- 5.4 oF)	A	70	72.0	2.0
	B	165	164.6	0.6
	C	281	285.0	4.0

TGEA025.WR1 06/13/91

TEXASGULF INC. PHOSPHATE OPERATIONS

Temperature Calibrations

Date 7-14-92

Technician ST

Instrument		Indicator oF	Actual oF	Difference %
Stack Thermocouple Assy # 3	A	72	73.0	1.4
(Must agree: +/- 1.5 %)	A	72	72.7	1.0
	A	72	72.4	0.6
	B	137	138.6	1.2
	B	134	135.4	1.0
	B	132	133.0	0.8
	C	213	213.5	0.2
	C	215	214.0	0.5
	C	212	209.5	1.2
Stack Thermocouple Assy # 6	A	71	72.0	1.4
(Must agree: +/- 1.5 %)	A	71	72.1	1.5
	A	71	72.0	1.4
	B	146	148.0	1.4
	B	145	146.8	1.2
	B	143	144.5	1.0
	C	222	223.5	0.7
	C	219	221	0.9
	C	216	218.5	1.1
Stack Thermocouple Assy # _____	A			
(Must agree: +/- 1.5 %)	A			
	A			
	B			
	B			
	B			
	C			
	C			
	C			
Probe Heater Assy # 3		212°F @ .75 CFM		
Probe Heater Assy # 6		212°F @ .75 CFM		
Probe Heater Assy # ____				

TGEA026.WR1 06/13/91

[redacted] Calibration

Date 7-12-92 Tech JT

Delta H Magnehelic

Leak Check @ .74 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	.74	.73	1
-	.31	.32	1

Leak Check @ .99 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	.99	.99	0
-	1.02	1.02	0

Leak Check @ 1.84 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	1.84	1.85	1
-	.85	1.85	0

Delta P Magnehelic

Leak Check @ .39 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	.31	.32	1
-	.39	.40	1

Leak Check @ .92 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	1.09	1.09	0
-	.92	.93	1

Leak Check @ 1.71 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	1.80	1.79	0
-	1.71	1.70	1

TEXASGULF INC. PHOSPHATE OPERATIONS

Temperature Calibrations

Date 8 11 92

Technician JT

Instrument		Indicator oF	Actual oF	Difference %
Stack Thermocouple Assy # 3	A	72	73.0	1.4
(Must agree: +/- 1.5 %)	A	72	73.1	1.5
	A	72	73.0	1.4
	B	146	145.4	0.4
	B	143	143.2	0.1
	B	146	139.5	0.4
	C	238	239.5	0.6
	C	231	233.0	0.9
	C	224	222.0	0.9
Stack Thermocouple Assy # 6	A	72	73.1	1.5
(Must agree: +/- 1.5 %)	A	72	73.0	1.4
	A	72	72.8	1.0
	B	145	144.8	0.1
	B	143	142.3	0.5
	B	141	140.0	0.7
	C	240	239.5	0.2
	C	235	232.5	1.1
	C	230	229.5	0.2
Stack Thermocouple Assy # _____	A			
(Must agree: +/- 1.5 %)	A			
	A			
	B			
	B			
	B			
	C			
	C			
	C			
Probe Heater Assy # 3		317 °F @	.75 CFM	
Probe Heater Assy # 6		317 °F @	.75 CFM	
Probe Heater Assy # _____				

TGEA026.WR1 06/13/91

Pre-Calibration

Date 8:10:92 Tech JT

Delta H Magnehelic

Leak Check @ .42 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	.42	.42	0
−	.36	.36	0

Leak Check @ .93 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	.93	.94	1
−	1.00	1.00	0

Leak Check @ 1.80 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	1.80	1.82	2
−	1.81	1.83	2

Delta P Magnehelic

Leak Check @ .32 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	.41	.41	0
−	.32	.32	0

Leak Check @ .92 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	.99	.98	1
−	.92	.92	0

Leak Check @ 1.83 " H20 for 3 minutes.

	Gauge	Manometer	Delta
+	1.74	1.76	2
−	1.83	1.81	2

TEXASGULF INC. PHOSPHATE OPERATIONS

Temperature Calibrations

Console 4 Date 8.10.92

Technician JT

Instrument		Indicator oF	Actual oF	Difference oF
Dry Gas Meter In (Must agree: +/- 5.4 oF)	A	32	33.6	1.6
	B	69	70.8	1.8
	C	229	225.5	3.5
Dry Gas Meter Out (Must agree: +/- 5.4 oF)	A	33	33.4	0.4
	B	69	70.8	1.8
	C	228	224.0	4.0
Impinger Thermometer # 1 (Must agree: +/- 2 oF)	A	36	34.1	1.9
	B	74	72.4	1.6
	C	150	151.2	1.2
Impinger Thermometer # 2 (Must agree: +/- 2 oF)	A	34	34.1	0.1
	B	72	72.2	0.2
	C	149	150.8	1.8
Impinger Thermometer # 3 (Must agree: +/- 2 oF)	A	36	34.1	1.9
	B	73	72.1	0.9
	C	150	150.2	0.2
HotBox Thermometer # 1 (Must agree: +/- 5.4 oF)	A	74	75.4	1.4
	B	162	164.7	2.7
	C	270	267.5	2.5
HotBox Thermometer # 2 (Must agree: +/- 5.4 oF)	A	72	75.6	3.6
	B	144	147.6	3.6
	C	266	264.5	1.5
HotBox Thermometer # 3 (Must agree: +/- 5.4 oF)	A	75	75.6	0.6
	B	140	145.2	5.2
	C	265	264.0	0

TGEA025.WR1 06/13/91

TEXASGULF INC. PHOSPHATE OPERATIONS

Console Calibration

08/10/92		Console	4
Technician Jack Taylor		Number of Runs	8
Barometric Pressure	30.09	Test Meter Factor	0.9986
Test Meter No.	699357		
Delta H Setting	0.25	Meter Pressure	30.11
Rechecked 8/11/92			
Test Meter Initial	996.100		
Test Meter Final	1001.102	Test Dry Gas Volume	5.002
Console Meter Inital	108.800		
Console Meter Final	114.091	Console Dry Gas Volume	5.291
Test Meter oF In	73		
Test Meter oF Out	72	Test Average oR	532.5
Console Meter oF In	96		
Console Meter oF Out	84	Console Average oR	550
Total Time In Mins.	17.58	Corr Test Meter Vol	4.99
Delta Ha=	1.6820	y Factor=	0.9745
Delta H Setting	0.50	Meter Pressure	30.13
Test Meter Initial	910.700		
Test Meter Final	915.705	Test Dry Gas Volume	5.005
Console Meter Inital	18.100		
Console Meter Final	23.388	Console Dry Gas Volume	5.288
Test Meter oF In	71		
Test Meter oF Out	70	Test Average oR	530.5
Console Meter oF In	103		
Console Meter oF Out	85	Console Average oR	554
Total Time In Mins.	12.62	Corr Test Meter Vol	5.00
Delta Ha=	1.7061	y Factor=	0.9858
Delta H Setting	0.75	Meter Pressure	30.15
Test Meter Initial	916.000		
Test Meter Final	921.005	Test Dry Gas Volume	5.005
Console Meter Inital	23.900		
Console Meter Final	29.211	Console Dry Gas Volume	5.311
Test Meter oF In	71		
Test Meter oF Out	70	Test Average oR	530.5
Console Meter oF In	105		
Console Meter oF Out	87	Console Average oR	556
Total Time In Mins.	10.30	Corr Test Meter Vol	5.00
Delta Ha=	1.6985	y Factor=	0.9845

Page 2
Console Calibration
08/10/92

Delta H Setting	1.00	Meter Pressure	30.16
Rechecked 8/11/92			
Test Meter Initial	1.400		
Test Meter Final	6.404	Test Dry Gas Volume	5.004
Console Meter Inital	114.700		
Console Meter Final	119.923	Console Dry Gas Volume	5.223
Test Meter oF In	73		
Test Meter oF Out	73	Test Average oR	533
Console Meter oF In	107		
Console Meter oF Out	87	Console Average oR	557
Total Time In Mins.	8.82	Corr Test Meter Vol	5.00
Delta Ha=	1.6740	y Factor=	0.9974
Delta H Setting	1.25	Meter Pressure	30.18
Test Meter Initial	926.700		
Test Meter Final	936.712	Test Dry Gas Volume	10.012
Console Meter Inital	35.600		
Console Meter Final	46.149	Console Dry Gas Volume	10.549
Test Meter oF In	72		
Test Meter oF Out	70	Test Average oR	531
Console Meter oF In	105		
Console Meter oF Out	89	Console Average oR	557
Total Time In Mins.	16.00	Corr Test Meter Vol	10.00
Delta Ha=	1.7072	y Factor=	0.9911
Delta H Setting	1.50	Meter Pressure	30.20
Test Meter Initial	937.000		
Test Meter Final	947.309	Test Dry Gas Volume	10.309
Console Meter Inital	46.700		
Console Meter Final	57.546	Console Dry Gas Volume	10.846
Test Meter oF In	72		
Test Meter oF Out	70	Test Average oR	531
Console Meter oF In	102		
Console Meter oF Out	89	Console Average oR	555.5
Total Time In Mins.	15.08	Corr Test Meter Vol	10.29
Delta Ha=	1.7212	y Factor=	0.9893

Page 3
Console Calibration
10-Aug-92

Delta H Setting	1.75	Meter Pressure	30.22
Test Meter Initial	948.000		
Test Meter Final	958.011	Test Dry Gas Volume	10.011
Console Meter Inital	58.500		
Console Meter Final	69.003	Console Dry Gas Volume	10.503
Test Meter oF In	71		
Test Meter oF Out	70	Test Average oR	530.5
Console Meter oF In	108		
Console Meter oF Out	90	Console Average oR	559
Total Time In Mins.	13.57	Corr Test Meter Vol	10.00
Delta Ha=	1.7102	y Factor=	0.9987
Delta H Setting	2.00	Meter Pressure	30.24
Test Meter Initial	958.400		
Test Meter Final	968.399	Test Dry Gas Volume	9.999
Console Meter Inital	69.700		
Console Meter Final	80.152	Console Dry Gas Volume	10.452
Test Meter oF In	72		
Test Meter oF Out	70	Test Average oR	531
Console Meter oF In	110		
Console Meter oF Out	90	Console Average oR	560
Total Time In Mins.	12.72	Corr Test Meter Vol	9.99
Delta Ha=	1.7217	y Factor=	1.0026
Average Delta Ha=	1.7026	Average y Factor=	0.9905

DATE: 2-25-92

Propanol Peroxide Check

LOT# 911194

Absorbance @ 352 nm = .000

JT

STANDARDIZATION OF BARIUM PERCHLORATE

Date: 8-7-92

1) Prepare 0.01N $Ba(CLO_4)_2$ by weighing 1.95 grams of $Ba(ClO_4)_2 \cdot 3\ H_2O$ and dissolve in 200 ml of deionized water. Bring to a liter volume with 2-propanol.

2) Obtain ACS certified Sulfuric Acid in the concentration range of 0.02N.

3) Pipette 20 ml of certified H_2SO_4 to a casserole dish and add 80 ml of 100% 2-propanol. Add 2 drops of Thorin indicator and titrate with the $Ba(ClO_4)_2$ solution. Repeat titrations twice for a total of three titrations.

Titrations $Ba(ClO_4)_2$	19.80	1st Run
	19.80	2nd Run
	19.80	3rd Run
	19.80	Average

4) Determine exact normality of $Ba(ClO_4)_2$ by:

$$\frac{(\text{Normality of } H_2SO_4) \times (\text{mls of } H_2SO_4)}{\text{mls of } Ba(ClO_4)_2)}$$

.02 ~~18~~ 10 19.80

Normality $Ba(ClO_4)_2$ .010101

Revised 03/19/90