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.

AP-42 Section Number: 1.8

Reference Number: 15

Title: Source Test Report for Particulate Emissions Twin Impingement Wet Scrubber Number 5 Boiler: Talisman Sugar Corporation

February 1991

SOURCE TEST REPORT
for
PARTICULATE EMISSIONS

TWIN IMPINGEMENT WET SCRUBBERS
NUMBER 5 BOILER

TALISMAN SUGAR CORPORATION
SOUTH BAY, FLORIDA

FEBRUARY 5,1991

PREPARED FOR:
TALISMAN SUGAR CORPORATION
SOUTH BAY, FLORIDA

PREPARED BY:
AIR CONSULTING and ENGINEERING, INC.
2106 N.W. 67th PLACE
SUITE 4
GAINESVILLE, FLORIDA
32607
14642 FLAMINGO DRIVE
WEST PALM BEACH,FLORIDA
33470

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air consulting and engineering, Inc.

REPORT CERTIFICATION

To the best of my knowledge, all applicable field and analytical procedures comply with Florida Department of Environmental Regulation requirements and all test data and plant operating data are true and correct.

Stephen L. Neck

Stephen L. Neck, P.E.

State of Florida
Registration No. 20020

March 10, 1991

Date

SEAL

2106 N.W. 67th Place, Suite 4 • Gainesville, Florida 32606 • (904) 335-1889

1.0 INTRODUCTION

Personnel from Air Consulting and Engineering,INC.(ACEI) performed annual source emission compliance testing for the TALISMAN SUGAR CORPORATION (TSC) on February 5, 1991. Testing was performed at the TSC Sugar Mill Number 5 Boiler wet scrubber outlet.

Testing was designed to fulfill "specific conditions" of the current Florida Department of Environmental Regulation (FDER) operating permit.

Three United States Environmental Protection Agency (USEPA) Method 5 particulate matter (PM) test runs were conducted while the plant was documented to be operating within 10% of permitted production.

Mr. Angelo Archbold of TSC served as test coordinator. Mr. Frank Kleeman, P.E. of Kleeman Engineering certified production rates.

Mr. Ken Tucker of the Florida Department of Environmental Regulation and Mr. Ajaya Satyal of the Palm Beach County Health Department witnessed most of the testing period.

2.0 SUMMARY and DISCUSSION of RESULTS

Results of the emission testing are provided in Table 1. Complete emission data are located in the report appendices.

The source was found to be operating within full compliance of permit conditions. Stack emissions averaged 70.534 pounds per hour (LB/HR) and 0.276 pounds per million btu(LB/MMBTU) heat input against a "process rate" basis allowable emission of 0.300 LB/MMBTU. Permit conditions limit emissions to 0.10 LB/MMBTU from oil and 0.300 LB/MMBTU from bagasse firing. No oil was used during compliance testing.

Production rate summaries are provided in Appendix A. These data were taken from control room recordings of steam flow, temperature, and pressure as well as feedwater temperature and pressure(Appendix E). Steam integrator readings were recorded at the beginning and end of each particulate test run by Mr Frank Kleeman.

TABLE 1
EMISSION SUMMARY
TALISMAN SUGAR CORPORATION
NUMBER 5 BOILER-SOUTH BAY, FLORIDA
FEBRUARY 5, 1991

RUN NUMBER	TIME	ACTUAL EMISSIONS		ALLOWABLE EMISSIONS	
		LB/HR	LB/MMBTU	LB/HR	LB/MMBTU
1	0735-0914 39	60.335	0.233	77.63	0.300
2	1025-1205 40	78.835	0.305	77.50	0.300
3	1331-1510 34	72.433	0.289	75.29	0.300
AVERAGES	---------	70.534	0.276	76.81	0.300

Avg: 34

3.0 PROCESS DESCRIPTION AND OPERATION

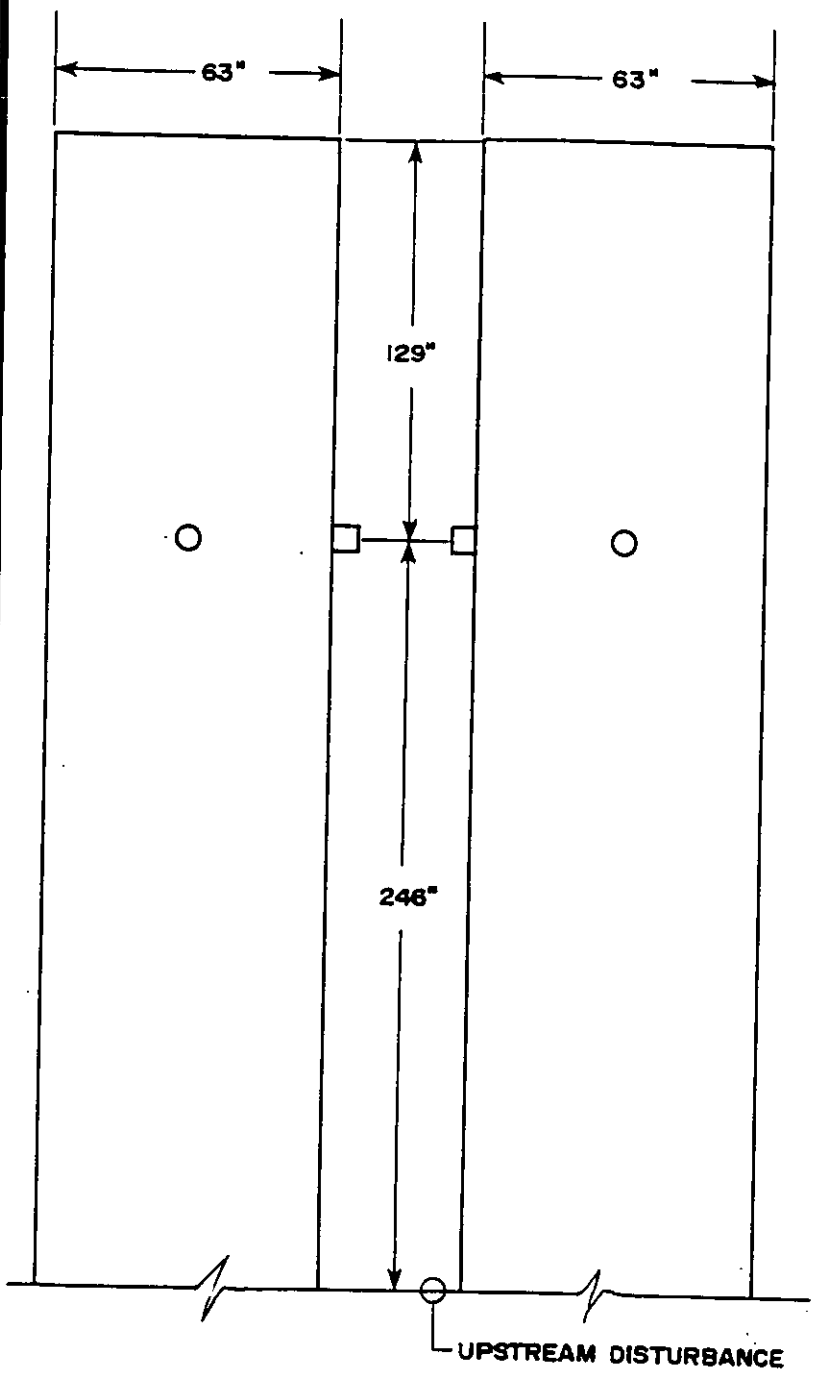
The Number 5 Boiler at the Talisman Sugar Corporation's South Bay plant is a traveling grate stoker design used primarily for bagasse fuel firing. Supplemental oil firing was not used during the emission test series. The boiler averaged 132521 pounds per hour steam production over the three run test period.

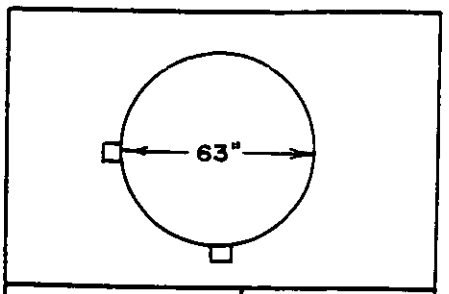
Oil meters, steam integrators, and other production monitoring devices were rigorously calibrated prior to the production season.

4.0 SAMPLING POINT LOCATION

The sampling point location is a dual wet scrubber outlet stack, 63" in diameter (both stacks are identical). Each stack has two sampling ports spaced 90 degrees apart. The ports are located 336" from an upstream disturbance and 168" from the outlet.

Forty-eight test points were sampled for each test run. The traverse were located as shown in Figure 1. The stack configuration is such that there is no reason to evaluate the presence of cyclonic flow.





TRAVERSE POINT NUMBER	INCHES INSIDE STACK WALL
1	1.3
2	4.2
3	7.4
4	11.2
5	15.8
6	22.4
7	40.6
8	47.3
9	51.8
10	55.6
11	58.8
12	61.7

NOTE: NOT TO SCALE

FIGURE 1.
SAMPLING POINT LOCATION
BOILER NO. 5
TALISMAN SUGAR CORPORATION
SOUTH BAY, FLORIDA

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5.0 FIELD and ANALYTICAL PROCEDURES- USEPA METHOD 5

Particulate matter samples were collected by the emission measurement method specified by the United States Environmental Protection Agency. A schematic diagram of the sampling train used is provided in Figure 2. All particulate matter captured from the nozzle to and including the filter was included in the calculation of the emission rate of particulate matter.

PREPARATION OF EQUIPMENT

1. FILTERS- Gelman type "A" glass fiber filters were placed in a drying oven for two hours at 105 degrees C, removed and placed in a standard desiccator containing indicating silica gel, allowed to cool for two hours, and weighed to the nearest 0.1 mg. The filters were then re-desiccated for a minimum of six hours and weighed to a constant weight (less than 0.5 mg change from previous weighing). The average of the two constant weights was used as the tare value.

2. NOZZLE, FILTER HOLDER, AND SAMPLING PROBE - The nozzle, filter holder, and sampling probe were washed vigorously with soapy water and brushes, rinsed with distilled water and acetone, and dried pror to the test program. All openings on the equipment were sealed while in transit to the test site.

3. IMPINGERS - The Greenburg-Smith impingers were cleaned, rinsed, and dried as in 2. The impingers were also sealed during transit.

TEST PROCEDURE

Prior to performing the actual particulate matter sample runs, certain stack and stack gas parameters were measured. These preliminary measurements included the average gas temperature, the stack gas velocity head, the stack gas moisture content, and the dimensions at the point where the tests were to be performed. The stack temperature was determined using a bi-metallic thermocouple and calibrated

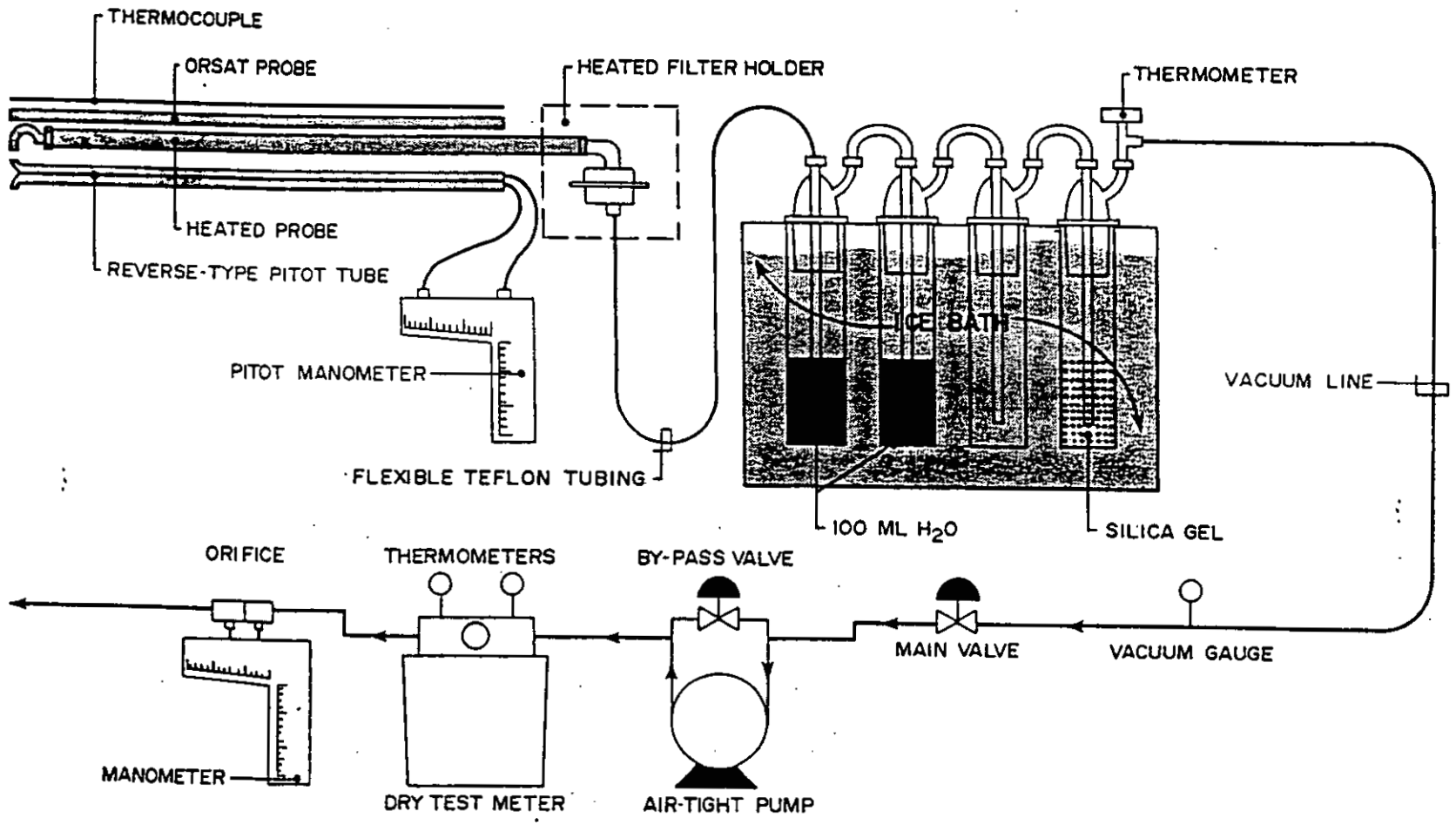

FIGURE 2
EPA METHOD 5 SAMPLING TRAIN

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pyrometer. Velocity head measurements were made with a calibrated type "s" pitot tube and an inclined manometer. Velocity head measurements of 0.05 inches H2O or less were measured using a micromonometer.

The sampling traverse points were selected so that a representative sample could be extracted from the gas stream. The traverse points were located in the center of equal areas, the number of which were dependent upon the distance upstream or downstream from flow disturbances.USEPA Methods 1 and 2 were utilized for this task.

Each particulate matter test run consisted of sampling for a specific amount of time at each point. The type "s" pitot tube was connected to the sampling probe so that an instantaneous velocity head measurement could be made at each traverse point while conducting the test run. The stack gas temperature was also measured at each traverse point. Together with assumed moisture and orsat knowledge as well as known nozzle area, calculations of "isokinetic" (equal energy or velocity) were quickly made and effected for each traverse point during the test run.

The gases sampled passed through the following components: a stainless steel nozzle and glass probe; a glass fiber filter; two impingers charged with 100 ml of distilled water each; one dry impinger; one impinger with 200 grams of silica gel desiccant; a flexible length of tubing; a leak free pump; a calibrated dry gas meter: and, finally, a calibrated flow orifice.

Sample recovery was accomplished in the following manner:

1. The pre-tared filter was removed from its holder and placed in Container 1 and sealed. (This is usually performed in the lab).
2. All sample-exposed surfaces prior to the filter were washed with acetone and placed in Container 2. The container was then sealed and the liquid level marked.
3. The volume of water from the first three impingers was measured for the purpose of calculating the moisture content of the stack gases, then discarded.

4. The silica gel from the fourth impinger was transferred to the original tared container and sealed.

LABORATORY ANALYSIS

The three sample containers from each sample run were analyzed according to the following procedures:

1. The filter was either dried for two hours at 105 degrees C or desiccated for 24 hours at ambient temperature. Following desiccation, the filter was weighed to the nearest 0.1 mg. A minimum of two such weighings six hours apart were made with a variance of less than 0.5 mg.

2. The acetone from Container 2 was transferred to a tared beaker, evaporated to dryness, and weighed in the same manner as above.

3. The used silica gel in its tared container was weighed to the nearest 0.1 gram.

The total sample weight included the weight gains from Sample Containers 1 and 2.

DATA

All relevent field and lab data sheets as well as emission calculations are provided in the report appendices.

APPENDIX A

COMPLETE EMISSION DATA

AND

SAMPLE CALCULATIONS

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Complete Emission Data

PLANT:	TALISMAN SUGAR CORPORATION	DATE:	2-5-91
LOCATION:	SOUTH BAY, FLORIDA	RUN NUMBER	1
SOURCE:	NUMBER 5 BOILER, SCRUBBER OUTLET	TIME:	0735-0914

TIME INTERVAL	96	MINUTES
OIL:		
FINAL OIL	0	
BEGIN OIL	0	
FACTOR	1	
STEAM:		
FINAL STEAM	748922	
BEGIN STEAM	746781	
FACTOR	100	
TEMPERATURE	544	DEGREES F
PRESSURE	299	PSIG
	314	PSIA
FEEDWATER:		
TEMPERATURE	252	DEGREES F
PRESSURE	450	PSIG
	465	PSIA
HEAT INPUT:		
STEAM	1282.1	BTU/LB
FEEDWATER	218.5	BTU/LB
NET STEAM	1063.6	BTU/LB
STEAM RATE	133813	LB/HR
BOILER EFFICIENCY	55.0	%
TOTAL FUEL HEAT INPUT	258.77	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	0.00	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	0.00	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	258.77	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.30	LB/MMBTU
TOTAL ALLOWABLE EMISSION	77.63	LB/HR
TOTAL ACTUAL EMISSION	60.33	LB/HR
TOTAL ALLOWABLE EMISSION	0.300	LB/MMBTU
TOTAL ACTUAL EMISSION	0.233	LB/MMBTU

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COMPLETE EMISSION DATA

PLANT: TALISMAN SUGAR CORPORATION
SOURCE: NUMBER 5 BOILER
DATE: 2-5-91

RUN NO.:	1	IMPINGER ml	325
BEGIN TIME:	0735	SILICA GEL gms.	6.7
END TIME:	0914	PERCENT O2	14.40
TOTAL RUN TIME:	96.00 min.	PERCENT CO2	5.70
BAROMETRIC PRESSURE:	30.15 "Hg	"F" FACTOR	0
STACK PRESSURE:	30.14 "Hg.		
NOZZLE DIAMETER:	.225 inches	PARTICULATE	
METER CORR. FACTOR:	.994		
FINAL METER:	841.903 cubic ft.	FILTER mg.	249.7
INITIAL METER:	809.700 cubic ft.	WASH mg.	23.9
STACK AREA:	43.300 sq. ft.		

STACK 1 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	.490	0.700	.600	153	64
1-2	.450	0.671	.550	153	64
1-3	.430	0.656	.530	153	64
1-4	.340	0.583	.420	157	64
1-5	.330	0.574	.410	158	64
1-6	.220	0.469	.270	158	64
1-7	.230	0.480	.280	159	65
1-8	.300	0.548	.420	158	65
1-9	.340	0.583	.390	156	66
1-10	.360	0.600	.500	156	66
1-11	.280	0.529	.390	154	66
1-12	.260	0.510	.360	99	66
2-1	.130	0.361	.180	122	67
2-2	.140	0.374	.200	158	67
2-3	.200	0.447	.280	158	68
2-4	.190	0.436	.270	159	68
2-5	.190	0.436	.270	159	68
2-6	.230	0.480	.320	159	69
2-7	.230	0.480	.320	156	69
2-8	.310	0.557	.430	160	70
2-9	.400	0.632	.560	160	70
2-10	.450	0.671	.630	131	71
2-11	.580	0.762	.810	160	71
2-12	.600	0.775	.840	160	72
AVERAGES	0.320	0.555	0.426	152	67

EMISSION RESULTS

NOZZLE AREA(FT2)	:0.0002765		
AVG. VELOCITY HEAD	:--------	0.32 "H2O	VOL. FLOW ACFM : 92302
AVG. STACK TEMP.:	--------	156 F	VOL. FLOW SCFMD : 53394
AVG. METER TEMP.:	--------	72 F	
AVG. ORIFICE DIFFERENTIAL:	---	0.45 "H2O	PARTICULATE DATA :
METER STANDARD CUBIC FEET:	---	32.027	
% H2O VAPOR:	:--------	33.0	POUNDS PER HOUR: 60.335
GAS MOL. WT. DRY:	--------	29.49	POUNDS PER SCF : 0.0000188
GAS MOL. WT. WET:	--------	25.70	GRAINS/SCF: 0.132
% EXCESS AIR:	--------	215.13	GRAINS/SCF @ 8% O2 0.262
AVG. STACK VEL.(FPS)	--------	35.53	GRAINS/SCF @50% EA 0.277
MMBTU INPUT:	--------	258.77	POUNDS PER MMBTU: 0.233
PERCENT ISOKINETIC :	--------	97.85	

NUMBER 5 BOILER-RUN 1 (cont).

STACK 2 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIFICE DIFF.	STACK TEMP.	METER TEMP.
1-1	.180	0.424	.250	162	73
1-2	.200	0.447	.280	162	73
1-3	.210	0.458	.290	162	74
1-4	.220	0.469	.310	162	74
1-5	.220	0.469	.310	162	74
1-6	.200	0.447	.280	160	75
1-7	.320	0.566	.370	162	75
1-8	.430	0.656	.600	162	76
1-9	.610	0.781	.850	163	76
1-10	.750	0.866	1.050	159	77
1-11	.610	0.781	.850	159	77
1-12	.540	0.735	.760	158	78
2-1	.180	0.424	.250	161	78
2-2	.150	0.387	.210	162	79
2-3	.250	0.500	.350	162	79
2-4	.210	0.458	.290	163	80
2-5	.220	0.469	.310	163	80
2-6	.170	0.412	.240	163	80
2-7	.220	0.469	.310	163	81
2-8	.430	0.656	.600	164	81
2-9	.500	0.707	.700	163	81
2-10	.550	0.742	.770	162	81
2-11	.510	0.714	.710	160	81
2-12	.350	0.592	.490	127	82
AVERAGES	0.343	0.568	0.476	160	78

SAMPLE CALCULATIONS - RUN 1

NOZZLE AREA (FT.2)	(Dn/12)!2x3.1416/4	0.000276
AVG.VELOCITY HEAD:	(AVG.SQ.RT.)!2	35.54
METER STND. FT3:	(Mf-Mi)xMCFx(AVG.ORF.DIFF./ 13.6))/29.92)x(528/(Tm+460))	32.049
PERCENT H2O:	((IMP+SG)x(((IMP+SG)x.0474)+ SCF)x100	
Mw DRY:	((O2%x.32)+CO2%x.44)+(100-(O2%+CO2)x.28	29.49
Mw WET:	(Mw DRYx(1-%H2O/100))+%H2Ox.18	25.70
% EXCESS AIR:	%O2/(((100-(%O2+%CO2))x.264)-%O2)* 100	215.13
STACK VEL.(FPS):	85.49x.84x(AVG.SQ.RT.VEL.HD.)x((Ts +460)/(PsxMwWET))!.5	35.54
% ISOKINETIC:	((Ts+460)xSCFx2992)/(528xFPSxTIMEx An xPs x 60x(1-%O2/100)	97.95
VOL. FLOW (ACFM):	FPS x 60 x As	92334
STND. FLOW(SCFMD):	ACFMx528/(Ts+460)x(1-%H2O/100)x (Ps/29.92)	53450
PARTICULATE LB/HR:	PROBE+FILTER mg./453600 x (SCFMD/ SCF) x 60	60.358
PARTICULATE LB/SCF):	PROBE+FILTER mg./453600 /SCF	0.0000188
GRAINS/SCF:	LB/SCF x 7000	0.1317
GR/SCF @ 8% O2:	(12.9/(20.9-%O2))x GR/SCF	0.2615
GR/SCF @ 50% E.A.:	GR/SCF x ((100+ %E.A.)/150)	0.2768
LB/MMBTU:	(LB/HR)/(LB/MMBTUH)	0.233
LB/MMBTU "F" FACTOR:	LB/SCF x "F" FACTOR x (20.9 /20.9-%O2)	0.000

AIR CONSULTING & ENGINEERING,INC.
Complete Emission Data

PLANT:	TALISMAN SUGAR CORPORATION	DATE:	2-5-91
LOCATION:	SOUTH BAY, FLORIDA	RUN NUMBER	2
SOURCE:	NUMBER 5 BOILER, SCRUBBER OUTLET	TIME:	1025-1205

TIME INTERVAL	96	MINUTES
OIL:		
FINAL OIL	0	
BEGIN OIL	0	
FACTOR	1	
STEAM:		
FINAL STEAM	752741	
BEGIN STEAM	750602	
FACTOR	100	
TEMPERATURE	541	DEGREES F
PRESSURE	290	PSIG
	305	PSIA
FEEDWATER:		
TEMPERATURE	252	DEGREES F
PRESSURE	450	PSIG
	465	PSIA
HEAT INPUT:		
STEAM	1281.2	BTU/LB
FEEDWATER	218.4	BTU/LB
NET STEAM	1062.8	BTU/LB
STEAM RATE	133688	LB/HR
BOILER EFFICIENCY	55.0	%
TOTAL FUEL HEAT INPUT	258.33	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	0.00	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	0.00	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	258.33	MMBTUH
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.30	LB/MMBTU
TOTAL ALLOWABLE EMISSION	77.50	LB/HR
TOTAL ACTUAL EMISSION	78.83	LB/HR
TOTAL ALLOWABLE EMISSION	0.300	LB/MMBTU
TOTAL ACTUAL EMISSION	0.305	LB/MMBTU

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COMPLETE EMISSION DATA

PLANT: TALISMAN SUGAR CORPORATION
SOURCE: NUMBER 5 BOILER
DATE: 2-5-91

RUN NO.:	2	IMPINGER ml	375
BEGIN TIME:	1025	SILICA GEL gms.	5.6
END TIME:	1205	PERCENT O2	13.50
TOTAL RUN TIME:	96.00 min.	PERCENT CO2	6.20
BAROMETRIC PRESSURE:	30.15 "Hg	"F" FACTOR	0
STACK PRESSURE:	30.14 "Hg.		
NOZZLE DIAMETER:	.225 inches	PARTICULATE	
METER CORR. FACTOR:	.994		
FINAL METER:	877.192 cubic ft.	FILTER mg.	316.7
INITIAL METER:	842.100 cubic ft.	WASH mg.	37.8
STACK AREA:	43.300 sq. ft.		

STACK 1 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	.640	0.800	.960	160	80
1-2	.680	0.825	1.020	159	80
1-3	.620	0.787	.930	160	80
1-4	.610	0.781	.920	160	81
1-5	.350	0.592	.520	161	81
1-6	.350	0.592	.520	159	81
1-7	.320	0.566	.480	161	81
1-8	.350	0.592	.530	161	82
1-9	.350	0.592	.530	161	82
1-10	.200	0.447	.300	161	82
1-11	.300	0.548	.450	162	82
1-12	.430	0.656	.650	161	83
2-1	.150	0.387	.230	162	83
2-2	.150	0.387	.230	158	83
2-3	.200	0.447	.300	167	84
2-4	.190	0.436	.290	161	84
2-5	.120	0.346	.180	161	85
2-6	.230	0.480	.350	160	85
2-7	.290	0.539	.440	160	85
2-8	.420	0.648	.630	162	85
2-9	.580	0.762	.870	161	86
2-10	.770	0.877	1.160	161	85
2-11	.750	0.866	1.130	161	85
2-12	.510	0.714	.770	161	86
AVERAGES	0.398	0.611	0.600	161	83

EMISSION RESULTS

NOZZLE AREA(FT2)	:0.0002765			
AVG. VELOCITY HEAD	:--------	0.36 "H2O	VOL. FLOW ACFM :	102394
AVG. STACK TEMP.:	--------	161 F	VOL. FLOW SCFMD :	57319
AVG. METER TEMP.:	--------	85 F		
AVG. ORIFICE DIFFERENTIAL:	---	0.57 "H2O	PARTICULATE DATA :	
METER STANDARD CUBIC FEET:	---	34.094		
% H2O VAPOR:	:--------	34.7	POUNDS PER HOUR:	78.835
GAS MOL. WT. DRY:	--------	29.53	POUNDS PER SCF :	0.0000229
GAS MOL. WT. WET:	--------	25.54	GRAINS/SCF:	0.160
% EXCESS AIR:	--------	175.34	GRAINS/SCF @ 8% O2	0.280
AVG. STACK VEL.(FPS)	--------	39.41	GRAINS/SCF @50% EA	0.295
MMBTU INPUT:	--------	258.33	POUNDS PER MMBTU:	0.305
PERCENT ISOKINETIC :	--------	97.03		

NUMBER 5 BOILER-RUN 2 (cont.)

STACK 2 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIFICE DIFF.	STACK TEMP.	METER TEMP.
1-1	.200	0.447	.280	162	86
1-2	.220	0.469	.310	162	86
1-3	.220	0.469	.310	162	86
1-4	.240	0.490	.340	160	86
1-5	.230	0.480	.320	158	86
1-6	.230	0.480	.320	162	86
1-7	.340	0.583	.480	162	86
1-8	.600	0.775	.840	163	87
1-9	.740	0.860	1.040	165	87
1-10	.870	0.933	1.220	153	87
1-11	.850	0.922	1.190	152	87
1-12	.850	0.922	1.190	192	88
2-1	.180	0.424	.250	163	88
2-2	.100	0.316	.140	161	88
2-3	.120	0.346	.170	163	88
2-4	.160	0.400	.220	163	88
2-5	.160	0.400	.220	163	88
2-6	.130	0.361	.180	163	88
2-7	.280	0.529	.390	163	88
2-8	.490	0.700	.680	161	88
2-9	.550	0.742	.640	162	88
2-10	.590	0.768	.830	162	88
2-11	.520	0.721	.730	160	88
2-12	.440	0.663	.620	124	88
AVERAGES	0.388	0.592	0.538	161	87

AIR CONSULTING & ENGINEERING,INC.
Complete Emission Data

PLANT:	TALISMAN SUGAR CORPORATION	DATE:	2-5-91
LOCATION:	SOUTH BAY, FLORIDA	RUN NUMBER	3
SOURCE:	NUMBER 5 BOILER, SCRUBBER OUTLET	TIME:	1331-1510

TIME INTERVAL	96	MINUTES
OIL:		
FINAL OIL	0	
BEGIN OIL	0	
FACTOR	1	
STEAM:		
FINAL STEAM	756796	
BEGIN STEAM	754715	
FACTOR	100	
TEMPERATURE	540	DEGREES F
PRESSURE	298	PSIG
	313	PSIA
FEEDWATER:		
TEMPERATURE	252	DEGREES F
PRESSURE	450	PSIG
	465	PSIA
HEAT INPUT:		
STEAM	1279.7	BTU/LB
FEEDWATER	218.4	BTU/LB
NET STEAM	1061.2	BTU/LB
STEAM RATE	130063	LB/HR
BOILER EFFICIENCY	55.0	%
TOTAL FUEL HEAT INPUT	250.95	MMBTUH
STEAM CALIBRATION FACTOR	1.00	
OIL	0.00	GPH
OIL	150000	BTU/GAL
TOTAL HEAT INPUT (OIL)	0.00	MMBTUH
TOTAL HEAT INPUT (NON-OIL)	250.95	MMBTUH Avg = 256
ALLOWABLES:		
ALLOWABLE EMISSION (OIL)	.10	LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)	.30	LB/MMBTU
TOTAL ALLOWABLE EMISSION	75.29	LB/HR
TOTAL ACTUAL EMISSION	72.43	LB/HR
TOTAL ALLOWABLE EMISSION	0.300	LB/MMBTU
TOTAL ACTUAL EMISSION	0.289	LB/MMBTU

AIR CONSULTING and ENGINEERING
COMPLETE EMISSION DATA

PLANT: TALISMAN SUGAR CORPORATION
SOURCE: NUMBER 5 BOILER
DATE: 2-5-91

RUN NO.:	3	IMPINGER ml	400
BEGIN TIME:	1331	SILICA GEL gms.	7.1
END TIME:	1510	PERCENT O2	14.50 Avg=14.1
TOTAL RUN TIME:	96.00 min.	PERCENT CO2	5.60
BAROMETRIC PRESSURE:	30.15 "Hg	"F" FACTOR	0
STACK PRESSURE:	30.14 "Hg.		
NOZZLE DIAMETER:	.225 inches	PARTICULATE	
METER CORR. FACTOR:	.994		
FINAL METER:	913.457 cubic ft.	FILTER mg.	316.4
INITIAL METER:	877.500 cubic ft.	WASH mg.	37.7
STACK AREA:	43.300 sq. ft.		

STACK 1 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	.600	0.775	.840	160	81
1-2	.620	0.787	.870	160	81
1-3	.550	0.742	.770	160	81
1-4	.450	0.671	.630	161	81
1-5	.320	0.566	.450	161	81
1-6	.230	0.480	.320	161	82
1-7	.220	0.469	.310	162	82
1-8	.330	0.574	.460	163	82
1-9	.390	0.624	.550	163	82
1-10	.430	0.656	.600	162	82
1-11	.350	0.592	.490	162	83
1-12	.290	0.539	.410	162	84
2-1	.140	0.374	.200	162	84
2-2	.150	0.387	.210	159	84
2-3	.170	0.412	.240	162	84
2-4	.160	0.400	.220	161	84
2-5	.200	0.447	.280	162	85
2-6	.180	0.424	.250	158	85
2-7	.180	0.424	.250	158	85
2-8	.320	0.566	.450	162	85
2-9	.520	0.721	.730	163	86
2-10	.610	0.781	.850	162	86
2-11	.630	0.794	.880	161	86
2-12	.600	0.775	.840	162	87
AVERAGES	0.360	0.582	0.504	161	83

EMISSION RESULTS

NOZZLE AREA(FT2)	:0.0002765		
AVG. VELOCITY HEAD	:--------	0.35 "H2O	VOL. FLOW ACFM : 97991
AVG. STACK TEMP.:	--------	162 F	VOL. FLOW SCFMD : 53883 Avg= 54,865
AVG. METER TEMP.:	--------	87 F	
AVG. ORIFICE DIFFERENTIAL:	---	0.56 "H2O	PARTICULATE DATA :
METER STANDARD CUBIC FEET:	---	34.844	
% H2O VAPOR:	:--------	35.7	POUNDS PER HOUR: 72.433
GAS MOL. WT. DRY:	--------	29.48	POUNDS PER SCF : 0.0000224
GAS MOL. WT. WET:	--------	25.38	GRAINS/SCF: 0.157
% EXCESS AIR:	--------	219.91	GRAINS/SCF @ 8% O2 0.316
AVG. STACK VEL.(FPS)	--------	37.72	GRAINS/SCF @50% EA 0.334
MMBTU INPUT:	--------	250.95	POUNDS PER MMBTU: 0.289
PERCENT ISOKINETIC :	--------	105.48	

NUMBER 5 BOILER-RUN 3 (cont.)

STACK 2 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIFICE DIFF.	STACK TEMP.	METER TEMP.
1-1	.200	0.447	.280	162	87
1-2	.260	0.510	.360	162	87
1-3	.310	0.557	.430	162	88
1-4	.340	0.583	.480	162	88
1-5	.300	0.548	.420	164	88
1-6	.130	0.361	.180	163	88
1-7	.360	0.600	.500	163	88
1-8	.690	0.831	.970	164	88
1-9	.710	0.843	.990	164	89
1-10	.870	0.933	1.220	163	89
1-11	.890	0.943	1.250	163	89
1-12	.760	0.872	1.060	160	90
2-1	.130	0.361	.180	163	91
2-2	.200	0.447	.280	163	91
2-3	.260	0.510	.360	162	91
2-4	.100	0.316	.140	163	91
2-5	.320	0.566	.450	163	91
2-6	.250	0.500	.350	163	91
2-7	.400	0.632	.560	163	91
2-8	.630	0.794	.880	163	91
2-9	.740	0.860	1.040	163	91
2-10	.750	0.866	1.050	163	91
2-11	.530	0.728	.740	163	91
2-12		0.000			
AVERAGES	0.440	0.609	0.616	163	90

Avg = 160

APPENDIX B

FIELD DATA SHEETS

STACK SAMPLING FIELD DATA SHEET

ACE AIR CONSULTING & ENGINEERING, INC.
2106 N. W. 67th PLACE · Suites 9 & 10
GAINESVILLE, FLORIDA · 32606

~~[illegible]~~ KS

#5 BOILER TEST ID 1-C
PAGE 1 OF 3

PLANT TALISMAN SUGAR CORP.
SOURCE NO. 5 BOILER
PLANT LOCATION SOUTH BAY, FL.
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES PARTICULATE
DATE 2/5/91 RUN NO. 1-C
TIME START 0735 TIME END 0914
SAMPLE TIME 48 / 2 (min/pt) = 96 Total min
ASSUMED MOISTURE 33 % FDA .67
NOMOGRAPH C_s 1.23 PITOT CORR. .84
P_b 30.15 "Hg P_s 30.14 "Hg
WEATHER CLEAR TEMP. 65 °F
METER BOX NO. 1 H 2.05 Y 0.994
NOZZLE CAL. ~~.195~~ .195 .195 = .225/.225/.225 = .225
STACK DIMENSIONS 63"
STACK AREA ~~43.295~~ ft.² EFFECTIVE 43.300 ft.²
STACK HEIGHT ft.
STACK DIAMETER: UPSTRM. ✓ DNSTRM. ✓
PORT SIZE in. NIPPLE LENGTH in.
U CORD LENGTH 125'
REMARKS:

A_N = .0002074

SAMP. PTS
1.3
4.2
7.4
11.2
15.8
22.4
40.6
47.3
51.8
55.6
58.8
61.7

TS1C.WKS (P_M)
TS1B.WKS (B)

1.23
33 ft³ @ .6 → 1.16

MAT'L PROCESSING RATE
GAS METER READINGS: FINAL 841.903 ft.³
INITIAL 809.700 ft.³
NET 32.203 ft.³
FILTER NO. ~~3082~~ 3092 IMP. VOL. GAIN 325 ml.
SIL GEL NO. 54 WT. GAIN 6.7 ml.
TOTAL CONDENSATE ml.

ORSAT

	1	2	3	4	AVG.
% CO_2					5.7
% O_2					14.4
% CO					
% N_2					

F_O = F_O RANGE =
ORSAT ANALYZER HODGE

LEAK CHECKS
PRE 0.00 cfm 15 "Hg POST 0.00 cfm 14 "Hg
METER BOX/PUMP ✓ GAS SAMPLE SYST. ✓
ORSAT BAG ✓
PITOT TUBE NO. 70 PRE-TEST OK
POST-TEST(+) 8.2 / 15 H_2O/Sec
POST-TEST(−) 4.1 / 15 H_2O/Sec
PYROMETER NO.
BOX OPERATOR HODGE PROBE HOLDER G. THREAUX

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (FT.³)	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. F	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
1-1		0737	810.53	.49	~~.50~~ .60	.60	153	266	48	64	3.5
2	15.0	0739	0811.31	.45	.55	.55	153	265	48	64	3.5
3		0741	812.07	.43	.53	.53	153	265	48	64	3.5
4		0743	812.71	.34	.42	.42	157	266	47	64	3.0
5	15.5	0745	813.45	.33	.41	.41	158	267	47	64	3.5
6		0747	813.93	.22	.27	.27	158	268	48	64	3.0

.534

ACE AIR CONSULTING & ENGINEERING, INC.

1.16
809.7

#4 BOILER TEST ID 1-C

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft.^{3})	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
		(4.24	/ 4.23)	(.609)							
2-1	C_F = 1.4	0749	814.47	.23	.28	.28	159	268	46	65	3.0
2		0751	815.11	.30	.42	.42	158	271	46	65	3.5
9	13.5	0753	815.73	.34	.39	.39	156	268	46	66	4.5
10		0755	816.45	.36	.50	.50	156	268	46	66	4.5
11	16.0	0757	817.10	.28	.39	.39	154	269	46	66	4.5
12		0759	817.70	.26	.36	.36	99	265	46	66	4.0
	100 →	(8.01	/ 8.00)	(.542)							
2-1		0802	818.18	.13	.18	.18	122	268	47	67	3.0
2		0804	818.67	.14	.20	.20	158	269	47	67	3.0
3	16.4	0806	819.16	.20	.28	.28	158	269	47	68	3.5
4		0808	819.70	.19	.27	.27	159	268	47	68	3.5
5		0810	820.21	.19	.27	.27	159	268	47	68	3.5
6		0812	820.80	.23	.32	.32	159	254	46	69	4.0
	101 →	(10.95	/ 11.11)	(.422)				256			
7		0814	821.40	.23	.32	.32	156	268	46	69	4.0
8	13.3	0816	822.00	.31	.43	.43	160	257	46	70	4.5
9		0818	822.80	.40	.56	.56	160	257	46	70	5.0
10	13.9	0820	823.58	.45	.63	.63	131	269	46	71	6.0
11		0822	824.50	.58	.81	.81	160	268	46	71	7.0
12		0824	825.40	.60	.84	.84	160	268	46	72	7.0
	102 →	(15.44	/ 15.7	(.446)							
1-1		0827	825.93	.18	.25	.25	162	272	46	73	5.0
2	~~C_F = 1.0~~	0829	826.48	.20	.28	.28	162	272	47	73	5.0
3		0831	827.04	.21	.29	.29	162	272	48	74	5.0
4		0833	827.60	.22	.31	.31	162	272	48	74	5.0
5		0835	828.15	.22	.31	.31	162	272	48	74	.50

ACE AIR CONSULTING & ENGINEERING, INC.

1.16 / 869.7

#5 BOILER

TEST ID 1-C

PAGE 3 OF 3

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft.^{3})	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	METER ORIFICE PRESS. DIFF. ("H_2O) ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
6	13.3	0837	828.71	.20	.28	.28	160	271	48	75	5.5
	102 →	(18.60	19.01)	(.453)							
7		0839	829.35	.32	.37	.37	162	269	48	75	6.0
8		0841	830.12	.43	.60	.60	162	269	48	76	7.5
9	13.0	0843	831.04	.61	.85	.85	163	268	47	76	9.0
10		0845	~~831.11~~ 832.06	.75	1.05	1.05	159	268	48	77	11.0
11		0847	833.03	.61	.85	.85	159	280	48	77	10.0
12		0849	833.89	.54	.76	.76	158	268	48	78	9.5
	102 →	(23.68	24.19)	(.731)							
1		0852	834.47	.18	.25	.25	161	272	50	78	5.5
2	14.0	0854	~~834.85~~	.15	.21	.21	162	272	51	79	6.0
3		0856	835.50	.25	.35	.35	162	270	51	79	7.5
4		0858	836.08	.21	.29	.29	163	270	51	80	7.0
5		0900	836.65	.22	.31	.31	163	256	51	80	7.0
6		0902	837.22	.17	.24	.24	163	256	51	80	
		(26.76	27.52)	(.442)							
7	12.5	0904	837.81	.22	.31	.31	163	267	51	81	10.0
8		0906	838.55	.43	.60	.60	164	268	51	81	10.5
9		0908	839.40	.50	.70	.70	163	272	51	81	11.0
10		0910	840.33	.55	.77	.77	162	272	51	81	11.0
11		0912	841.15	.51	.71	.71	160	268	50	82	11.0
12		0914	841.963	.35	.49	.49	127	270	51	82	10.0
				(.417)							
		(.560)(.84)(174)($\sqrt{.616}$) =			(2653.72)(43.3) =		(889.039)(528/532)(167) =			5911 SCFMD	8.08
	V_{std} =	(.2861 / 31.961) =									
		453.6	(.0001936 / .0001863)		(5344.7)(60) = 59.75 (cuft)		1bs/Hr				

59.622 2610.32

STACK SAMPLING FIELD DATA SHEET

ACE AIR CONSULTING & ENGINEERING, INC.
2106 N. W. 67th PLACE · Suites 9 & 10
GAINESVILLE, FLORIDA · 32606

BOILER #5

TEST ID 2-C
PAGE 2 OF 3

PLANT TALISMAN SUGAR CORP.
SOURCE NO. 5 BOILER
PLANT LOCATION SOUTH BAY, FL.
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES PART.
DATE 2/5/91 RUN NO. 2-C
TIME START 1025 TIME END 1205
SAMPLE TIME 48 / 2 (min/pt) = 96 Total min
ASSUMED MOISTURE 33 % FDA .67
NOMOGRAPH C_f 1.5 PITOT CORR. .84
P_b 30.15 "Hg P_s (-.18 (30.14) "Hg
WEATHER CLEAR TEMP. 70's °F
METER BOX NO. 1 H 2.05 Y 0.994
NOZZLE CAL. .225 .225 .225 = .225
STACK DIMENSIONS 63" (2)
STACK AREA 43.300 ft.² EFFECTIVE 43.300 ft.²
STACK HEIGHT ____ ft.
STACK DIAMETER: UPSTRM. ✓ DNSTRM. ✓
PORT SIZE ____ in. NIPPLE LENGTH ____ in.
U CORD LENGTH 125'
REMARKS: AJAYA K. SATYAL - HRS
KEN TUCKER
(JAY) HERN - HRS

~~TS1C~~
TS2C.WKS (P_M)
TS2B.WKS (BOILER)

70/10/7/10/7/11/10

MAT'L PROCESSING RATE ____
GAS METER READINGS: FINAL 877.192 ft.³
INITIAL 842.100 ft.³
NET 35.092 ft.³
FILTER NO. 3093 IMP. VOL. GAIN 375 ml.
SIL GEL NO. 36 WT. GAIN 5.6 ml.
TOTAL CONDENSATE ____ ml.

ORSAT

	1	2	3	4	AVG.
% CO_2					66
% O_2					13.5
% CO					
% N_2					

F_O = ____ F_O RANGE = ____
ORSAT ANALYZER HODGE

LEAK CHECKS
PRE 0.00 cfm 16 "Hg POST 0.00 cfm 24 "Hg
METER BOX/PUMP ✓ GAS SAMPLE SYST. ✓
ORSAT BAG ✓
PITOT TUBE NO. 70 PRE-TEST OK
POST-TEST(+) 4.3 / 15 H_2O/Sec
POST-TEST(-) 3.9 / H_2O/Sec
PYROMETER NO. 1
BOX OPERATOR HODGE PROBE HOLDER G-THREAX

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (FT.³)	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. F	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
1-1		1027	843.23	.64	.96	.96	160	272	49	80	4.0
2		1029	844.14	.68	1.02	1.02	159	266	42	80	5.0
3		1031	845.24	.62	.93	.93	160	261	40	80	6.0
4		1033	846.15	.61	.92	.92	160	261	40	81	6.0
5		1035	846.95	.35	.52	.52	161	261	40	81	4.0
6		1037	847.71	.35	.525	.52	159	261	40	81	4.0

ACE AIR CONSULTING & ENGINEERING, INC.

1.16 / 842.1

Boiler #5

TEST ID 2-C

PAGE 2 OF 3

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft.^{3})	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	METER ORIFICE PRESS. DIFF. ("H_2O) ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
		(	( )	(.729)							
7		1039	848.43	.32	.48	.48	161	271	40	81	7.5
8	13.0	1041	849.11	.35	.53	.53	161	270	40	82	6.5
9		1043	849.90	.35	.53	.53	161	272	40	82	6.5
10		1045	850.53	.20	.30	.30	161	275	40	82	4.0
11	13.5	1047	851.23	.30	.45	.45	162	272	41	82	4.5
12		1049	852.05	.43	.65	.65	161	270	41	83	5.5
				(.567)							
2-1		1052	852.50	.15	.23	.23	162	263	41	83	4.0
2		1054	853.00	.15	.23	.23	158	263	41	83	4.0
3		1056	853.50	.20	.30	.30	167	264	42	84	4.0
4	13.0	1058	854.12	.19	.29	.29	161	262	42	84	4.5
5		1100	854.63	.12	.18	.18	161	268	42	85	4.0
6		1102	855.30	.23	.35	.35	160	265	42	85	5.0
		(11.90	/ 13.2)	~~.29~~ (.414)							
7		1104	855.90	.29	.44	.44	160	267	40	85	7.0
8		1106	856.72	.42	.63	.63	162	265	40	85	7.0
9	13.5	1108	857.70	.58	.87	.87	161	249	40	86	8.0
10		1110	858.82	.77	1.16	1.16	161	270	40	85	10.0
11		1112	859.94	.75	1.13	1.13	161	269	40	85	10.0
12		1114	860.84	.51	.77	.77	161	268	41	86	8.0
		(17.01	/ 18.74)	(.734)							
1-1	↳ 1117	861.34	.20	.28	.28	162	268	42	86	5.5
2	13.0	1119	861.08	.22	.31	.31	162	258	42	86	6.5
3		1121	862.60	.22	.31	.31	162	258	42	86	6.5
4		1123	863.20	.24	.34	.34	160	264	42	86	6.5
5		1125	863.80	.23	.32	.32	158	268	42	86	6.5

ACE AIR CONSULTING & ENGINEERING, INC.

1.16 / 842.1

Boiler #5

TEST ID 2-C

PAGE 3 OF 3

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft.³)	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
6		1127	864.42	.23	.32	.32	162	269	42	86	7.0
~~7~~	116	(20.30	22.32)	(.472)							
7		1129	865.05	.34	.48	.48	162	271	42	86	7.5
~~2~~ 1 8	15.0	1131	865.95	.60	.84	.84	163	264	42	87	10.0
~~2~~ 9		1133	867.92	.74	1.04	1.04	165	263	41	87	11.0
~~3~~ 10		1135	868.95	.87	1.22	1.22	153	269	42	87	12.0
~~4~~ 11		1137	869.21	.85	1.19	1.19	152	269	42	87	12.0
~~5~~ 12		1139	870.00	.85	1.19	1.19	192	267	42	88	12.0
~~6~~	107	(26.09	27.9)	(.832)							
2 1		1143	870.42	.18	.25	.25	163	269	44	88	5.5
~~7~~ 2		1145	870.86	.10	.14	.14	161	267	44	88	6.0
~~8~~ 3		1147	871.31	.12	.17	.17	163	268	44	88	6.0
~~9~~ 4		1149	871.75	.16	.22	.22	163	269	44	88	6.0
~~10~~ 5		1151	872.24	.16	.22	.22	163	278	44	88	7.0
~~11~~ 6		1153	872.71	.13	.18	.18	163	268	44	88	7.0
	107	(28.70	30.61)	(.375)							
7		1155	873.31	.28	.39	.39	163	275	44	88	9.0
8		1157	873.99	.49	.69	.68	161	272	44	88	9.0
9		1159	874.65	.55	.64	.64	162	271	43	88	9.0
10		1201	875.53	.59	.83	.83	162	261	43	88	12.0
11		1203	876.41	.52	.73	.73	160	264	43	88	12.0
12		1205	877.192	.44	.62	.62	124	265	43	88	10.5
											@61422.2
		(60)(.84)(174)(√621) = (2185.37)(43.300) = (94626.65)(528/545)( ) =									
	V_{STD} →	(33.997/453.6) = ( )( )(60) =									

STACK SAMPLING FIELD DATA SHEET

ACE AIR CONSULTING & ENGINEERING, INC.
2106 N. W. 67th PLACE · Suites 9 & 10
GAINESVILLE, FLORIDA · 32606

BOILER #5 TEST ID 3
PAGE 1 OF 3

PLANT TALISMAN SUGAR CORP.
SOURCE #5 BOILER
PLANT LOCATION SOUTH BAY, FL.
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES PART.
DATE 2/5/91 RUN NO. 3
TIME START 1331 TIME END 1510
SAMPLE TIME 48.2 (min/pt) = 96 Total min
ASSUMED MOISTURE 35 % FDA .65
NOMOGRAPH C_f 1.4 PITOT CORR. .84
P_b 30.15 "Hg P_s 30.14 "Hg
WEATHER CLEAR TEMP. 80's °F
METER BOX NO. 1 H 2.05 Y 0.994
NOZZLE CAL. .225 .225 .225 .225
STACK DIMENSIONS 63"
STACK AREA 43.300 ft² EFFECTIVE 43.300 ft²
STACK HEIGHT ____ ft.
STACK DIAMETER: UPSTRM. ✓ DNSTRM. ✓
PORT SIZE ____ in. NIPPLE LENGTH ____ in.
U CORD LENGTH 125'
REMARKS:

TS3C.WKS (P_n)
TS3B.WKS (Boiler)

MAT'L PROCESSING RATE ____
GAS METER READINGS: FINAL 913.457 ft³
INITIAL 877.500 ft³
NET 35.957 ft³
FILTER NO. 3289 IMP. VOL. GAIN 400 ml.
SIL GEL NO. 5 WT. GAIN 7.1 ml.
TOTAL CONDENSATE 407.1 ml.

ORSAT

	1	2	3	4	AVG.
% CO_2					5.6
% O_2					14.5
% CO					
% N_2					

F_O = ____ F_O RANGE = ____
ORSAT ANALYZER HOLGE

LEAK CHECKS
PRE 0.00 cfm 16 "Hg POST 0.00 cfm 20 "Hg
METER BOX/PUMP ✓ GAS SAMPLE SYST. ✓
ORSAT BAG ✓
PITOT TUBE NO. 70 PRE-TEST OK
POST-TEST(+) 4.7 / 15 H_2O/Sec
POST-TEST(−) 3.9 / 15 H_2O/Sec
PYROMETER NO. 1
BOX OPERATOR HOLGE PROBE HOLDER G THIRCALX

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (FT.³)	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. F	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
1-1		1333	—	.60	.84	.84	160	263	53	81	4.0
2		1335	879.45	.62	.87	.87	160	270	48	81	4.0
3		1337	880.35	.55	.77	.77	160	270	48	81	4.0
4		1339	881.15	.45	.63	.63	161	272	48	81	4.0
5		1341	881.85	.32	.45	.45	161	268	48	81	3.5
6		1343	882.45	.23	.32	.32	161	266	48	82	3.5

ACE AIR CONSULTING & ENGINEERING, INC.

BOILER #5

877.5

TEST ID 3-C

PAGE 2 OF 3

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft.^{3})	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H_2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
		(	/)	(.670)							
7		1346	882.95	.22	.31	.31	162	272	48	82	4.0
8	15.0	1348	883.57	.33	.46	.46	163	272	49	82	4.0
9		1350	884.31	.39	.55	.55	163	274	48	82	5.0
10	15.5	1352	885.11	.43	.60	.60	162	272	48	82	5.0
11		1354	885.82	.35	.49	.49	162	270	47	83	5.0
12		1356	886.590	.29	.41	.41	162	271	47	84	5.0
		(	/)	(.576)							
2-1		1358	887.00	.14	.20	.20	162	270	47	84	4.0
2		1400	887.47	.15	.21	.21	159	270	47	84	4.0
3	15.3	1402	887.95	.17	.24	.24	162	277	49	84	4.0
4	14.5	1404	888.46	.16	.22	.22	161	255	49	84	4.0
5		1406	888.89	.20	.28	.28	162	276	49	85	4.5
6		1408	889.51	.18	.25	.25	158	270	49	85	5.0
		(	/)	(.468)							
7		1410	890.05	.18	.25	.25	158	270	49	85	5.0
8		1412	890.63	.32	.45	.45	162	270	49	85	5.0
9	15.1	1414	891.50	.52	.73	.73	163	270	49	86	5.5
10		1416	892.50	.61	.85	.85	162	270	49	86	8.0
11	15.0	1418	893.50	.63	.88	.88	161	268	46	86	8.5
12		1420	894.42	.60	.84	.84	162	260	46	87	8.5
		(16.22	/ 16.92)	(.677)							
1-1		1423	894.93	.20	.28	.28	162	260	48	87	5.0
2	14.0	1425	895.56	.26	.36	.36	162	261	49	87	6.0
3		1427	896.23	.31	.43	.43	162	260	49	88	7.5
4	12.5	1429	896.95	.34	.48	.48	162	261	50	88	7.5
5		1431	897.61	.30	.42	.42	164	261	50	88	7.0

ACE AIR CONSULTING & ENGINEERING, INC.

Boiler #5

TEST ID 3-C

PAGE 3 OF 3

PORT AND TRAVERSE POINT NUMBER	DISTANCE FROM INSIDE STACK WALL /COMMENTS	CLOCK TIME	GAS METER READING (ft.3) 898.23	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H2O) CALC.	ACTUAL	STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
6		1433	~~881.85~~	.13	.18	.18	163	249	49	88	3.0
	16	(19.71	/20.73)	(.561)							
7		1435	898.93	.36	.50	.50	163	272	49	88	8.0
8	15.5	1437	899.93	.69	.97	.97	164	270	49	88	10.0
9		1439	901.01	.71	.99	.99	164	271	49	89	11.0
10		1441	902.22	.87	1.22	1.22	163	271	49	89	13.0
11		1443	903.21	.89	1.25	1.25	165	272	50	89	13.0
12		1445	904.24	.76	1.06	1.06	160	269	50	90	12.0
		(	/26.74)	(.837)							
21		1448	904.82	.13	.182	.18	163	272	49	91	6.5
2	13.0	1450	905.34	.20	.28	.28	163	274	50	91	7.5
3		1452	905.93	.26	.36	.36	162	270	50	91	8.5
4		1454	906.42	.10	.14	.14	163	260	50	91	7.0
5		1456	907.15	.32	.45	.45	163	259	49	91	9.5
6		1458	907.77	.25	.35	.35	163	260	49	91	8.5
7		1500	908.55	.40	.56	.56	163	242	50	91	10.0
8		1502	909.48	.63	.88	.88	163	241	48	91	12.5
9		1504	910.55	.74	1.04	1.04	163	271	49	91	14.0
10		1506	911.55	.75	1.05	1.05	163	271	50	91	14.5
11		1508	912.54	.66	.92	.92	163	272	50	91	14.0
12		1510	913.457	.53	.74	.74	163	271	50	91	13.5

Patterson Lumber
Newberry SC Greenwood

APPENDIX C

LABORATORY ANALYSES

AIR CONSULTING & ENGINEERING, inc. — PARTICULATE LAB DATA

SOURCE TALISMAN SUGAR CORP. - #5 BOILER

PROBE RINSE	RUN 1	RUN 1	RUN 2	BLANK	
CONTAINER NUMBER	S-20	S-11	S-22	SEE PAGE	
TOTAL VOLUME (ml)	175	225	205	2	LIQUID LEVEL ✓
1st GROSS WEIGHT (g)	101.0917	105.2702	103.6469		DATE & TIME: 2/6/91 11:[illegible]
2nd GROSS WEIGHT (g)	101.0922	105.2707	103.6474		DATE & TIME: 2/6/91 1700
AVERAGE GROSS WEIGHT (g)	101.0920	105.2705	103.6472		
TARE WEIGHT (g)	101.0808	105.2578	103.6310		
SUB NET WEIGHT (g)	0.0112	0.0127	0.0162		
ACETONE BLANK (g)	-	-	-		
TOTAL NET WEIGHT (mg)	11.2	12.7	16.2		

NOTE: In no case should a blank residue >0.01 mg/g or 0.001% of the weight of acetone used be subtracted from the sample weight.

FILTER	RUN 1	RUN 2	RUN 3	BLANK	
FILTER NUMBER	3092	3093	3089	3063	
1st GROSS WEIGHT (g)	0.6582	0.7242	0.7286	0.4054	DATE & TIME: [illegible]
2nd GROSS WEIGHT (g)	0.6577	0.7240	0.7282	0.4054	DATE & TIME: 2/6/91 [illegible]
AVERAGE GROSS WEIGHT (g)	0.6580	0.7241	0.7284	0.4054	
TARE WEIGHT (g)	0.4083	0.4074	0.4120	0.4054	
SUB NET WEIGHT (g)	0.2497	0.3167	0.3164	0.0000	
TOTAL NET WEIGHT (mg)	249.7	316.7	316.4	0.0	

TARE BALANCE CHECK

SEE LAB BOOK

1st GROSS WEIGHT BALANCE CHECK

0 ✓ 10.0g ✓
0.5 g ✓ 100.0g ✓
%RH 55 DATE 2/6/91
Signature C. [illegible]

2nd GROSS WEIGHT BALANCE CHECK

0 ✓ 10.0g ✓
0.5g ✓ 100.0g ✓
%RH 51 DATE 2/6/91
Signature C. [illegible]

AIR CONSULTING & ENGINEERING, inc. PARTICULATE LAB DATA

SOURCE TAUSMAN SUGAR CORP. - #5 BOILER

PROBE RINSE	RUN 2	RUN 3	RUN 3	BLANK	
CONTAINER NUMBER	S-27	S-30	S-32	S-23	
TOTAL VOLUME (ml)	200	160	150	90	LIQUID LEVEL ✓
1st GROSS WEIGHT (g)	104.8408	100.9715	104.7418	103.0890	DATE & TIME:
2nd GROSS WEIGHT (g)	104.8413	100.9720	104.7423	103.0893	DATE & TIME:
AVERAGE GROSS WEIGHT (g)	104.8413	100.9718	104.7421	103.0892	
TARE WEIGHT (g)	104.8197	100.9521	104.7241	103.0810	
SUB NET WEIGHT (g)	0.0216	0.0197	0.0180	0.0002	
ACETONE BLANK (g)	–	–	–	–	
TOTAL NET WEIGHT (mg)	21.6	19.7	18.0	0.2	

NOTE: In no case should a blank residue >0.01 mg/g or 0.001% of the weight of acetone used be subtracted from the sample weight.

FILTER	RUN	RUN	RUN	BLANK	
FILTER NUMBER					
1st GROSS WEIGHT (g)					DATE & TIME:
2nd GROSS WEIGHT (g)					DATE & TIME:
AVERAGE GROSS WEIGHT (g)					
TARE WEIGHT (g)					
SUB NET WEIGHT (g)					
TOTAL NET WEIGHT (mg)					

TARE BALANCE CHECK

SEE LAB BOOK

1st GROSS WEIGHT BALANCE CHECK

0 _____ 10.0 g _____

0.5 g _____ 100.0 g _____

% RH _____ DATE _____

Signature _____

2nd GROSS WEIGHT BALANCE CHECK

0 _____ 10.0 g _____

0.5 g _____ 100.0 g _____

% RH _____ DATE _____

Signature _____

APPENDIX D

QUALITY ASSURANCE

AND

CHAIN OF CUSTODY

AIR CONSULTING AND ENGINEERING, Inc.

SAMPLE RECOVERY AND CHAIN OF CUSTODY

PLANT NAME TALISMAN SUGAR CORP. TEST DATE 2/5/91

SOURCE NAME #5 BOILER SAMPLE RECOVERED BY C. HODGE

TYPE OF SAMPLE PART. PARTICULATE ANALYSES BY C. HODGE

SAMPLE RECOVERY

RUN NO.	CONTAINER NO.	LIQUID LEVEL MARKED	COLOR	COMMENTS
1/1	1	✓✓	DK	
1	3092	-	GREY	
2/2	1	✓✓	DK	
2	3093	-	GREY	
3/3	1	✓✓	DK	
3	3089	-	GREY	
ACETONE / WATER BLANK (CIRCLE)	5-23	✓	CLEAR	
FILTER BLANK	3063	-	WH.	

SILICA GEL

RUN NO.	CONTAINER NO.	FINAL WT. (g)	INIT. WT. (g)	NET WT. (g)	COLOR
1	54	206.7	200.0	6.7	PINK
2	36	205.6	200.0	5.6	"
3	5	207.1	200.0	7.1	"
			200.0		
			200.0		
			200.0		
			200.0		
			200.0		

AIR CONSULTING & ENGINEERING, inc. POST TEST CALIBRATION

DATE 2-11-91 METER BOX NUMBER 1 LEAK CHECK 0.000 CFM at 29 in. Hg.

CLIENT U.S. SUGAR / TALISMAN SOURCE VARIOUS THERMOCOUPLE NUMBER 36/160/ PYROMETER NUMBER ~~64~~ 1

FLIGHT SERVICE Pb 30.11 in. Hg. ACE BAROMETER Pb 30.1 in. Hg.

ASTM GLASS THERMOMETER 160/160 °F / THERMOCOUPLE 160/160 °F ASTM GLASS THERMOMETER 64 °F / METER TEMP 64 °F

ΔHS	AVERAGE ΔHD	GAS VOLUME, STANDARD METER			GAS VOLUME, DRY GAS METER			TEMP. STANDARD METER	TEMP. OF DRY METER	TIME (Minutes)	MAX. VACUUM In. Hg.
		INITIAL	FINAL	ACTUAL ft^3	INITIAL	FINAL	ACTUAL ft^3				
-.5	2.1	513.835	508.00	5.835	193.300	199.452	6.152	~~64~~ 59 ~~66~~ 59	64 66	8	21
-.5	2.1	513.835	522.560	8.725	199.817	209.013	9.196	59 59	66 68	12	21
-.5	2.1	522.560	513.835	7.993	209.013	217.471	8.458	59 59	68 70	11	21

CALIBRATED BY: Stephen L. Neal

RUN NUMBER	SCFM	STANDARD M.C.F.	DELTA Ha	M.C.F.
1	0.75	1.005	2.135	0.959
2	0.74	1.005	2.140	0.963
3	0.74	1.005	2.135	0.963
AVERAGES	0.74	1.005	2.137	0.962

air consulting and engineering

STANDARD METER CALIBRATION

Air Consulting and Engineering, Inc. (ACE) uses a dry gas meter for the calibration standard. This meter has been calibrated against a wet test meter in triplicate. This data was used to generate a standard meter calibration curve (see next page). Field meter calibrations are corrected to this curve using the following formula:

$$Y_a \times Y_s = Y$$

Y_a = actual ratio of field meter to standard meter

Y_s = ratio of standard meter to wet test meter at a given flow rate (from Calibration Curve)

Y = corrected ratio of field meter

The dry standard meter was calibrated on April 26, 1990, and is checked and/or recalibrated at least annually.

AIR CONSULTING & ENGINEERING — STANDARD METER CALIBRATION

DATE 4-26-90 LEAK CHECK 0.0 CFM at 0.0 In. Hg.

METER BOX NUMBER STD #691751 BAROMETRIC PRESSURE 30.30 In. Hg.

STD GAS METER TEMPERATURE 70 °F/ ASTM GLASS THERMOMETER TEMPERATURE 70 °F

WET ΔH	STD ΔH	GAS VOLUME, WET TEST METER			GAS VOLUME, STD GAS METER			TEMP. WET TEST METER (°F)	TEMP. OF STD. METER (°F)	TIME (Minutes)
		INITIAL	FINAL	ACTUAL ft^3	INITIAL	FINAL	ACTUAL ft^3			
-0.2	-1.1	4.020	9.842	5.822	243.643	249.457	5.814	70	70	13
-0.2	-1.1	9.842	15.577	5.735	249.457	255.194	5.737	70.5	71	13
-0.2	-1.1	5.577	11.240	5.663	255.194	260.872	5.678	70.5	71	13
-0.4	-1.8	2.026	7.602	5.576	261.665	267.296	5.631	70.5	72	9
-0.4	-1.8	7.602	13.171	5.569	267.296	272.923	5.627	70.5	72	9
-0.4	-1.8	3.171	8.734	5.563	272.923	278.539	5.616	70.5	72	9
-0.5	-2.2	9.112	14.275	5.163	278.914	284.153	5.239	70.5	72	7
-0.5	-2.2	4.275	9.434	5.159	284.153	289.386	5.233	70.5	72	7
-0.5	-2.2	9.434	14.600	5.166	289.386	294.632	5.246	70.5	72	7
-0.6	-3.1	5.182	10.663	5.481	295.233	300.834	5.601	70.5	72	6
-0.6	-3.1	0.663	6.124	5.461	300.834	306.424	5.590	70.5	72	6
-0.6	-3.1	6.124	11.579	5.455	306.424	311.997	5.573	70.5	72	6
-0.7	-3.7	2.185	7.422	5.237	312.617	317.993	5.376	70.5	71	5
-0.7	-3.7	7.422	12.658	5.236	317.993	323.366	5.373	70.5	71	5
-0.7	-3.7	2.658	7.888	5.230	323.366	328.737	5.371	70.5	71	5

CALIBRATED BY: George F. Gabb

	Y	SCFM	Y	SCFM	Y	SCFM	Y	SCFM	Y	SCFM
Run 1	1.004	0.452	0.996	0.624	0.993	0.743	0.987	0.920	0.983	1.055
Run 2	1.002	0.444	0.995	0.623	0.993	0.742	0.986	0.917	0.983	1.055
Run 3	1.000	0.439	0.996	0.622	0.992	0.743	0.988	0.916	0.983	1.053
Average	1.002	0.445	0.996	0.623	0.993	0.743	0.987	0.918	0.983	1.054

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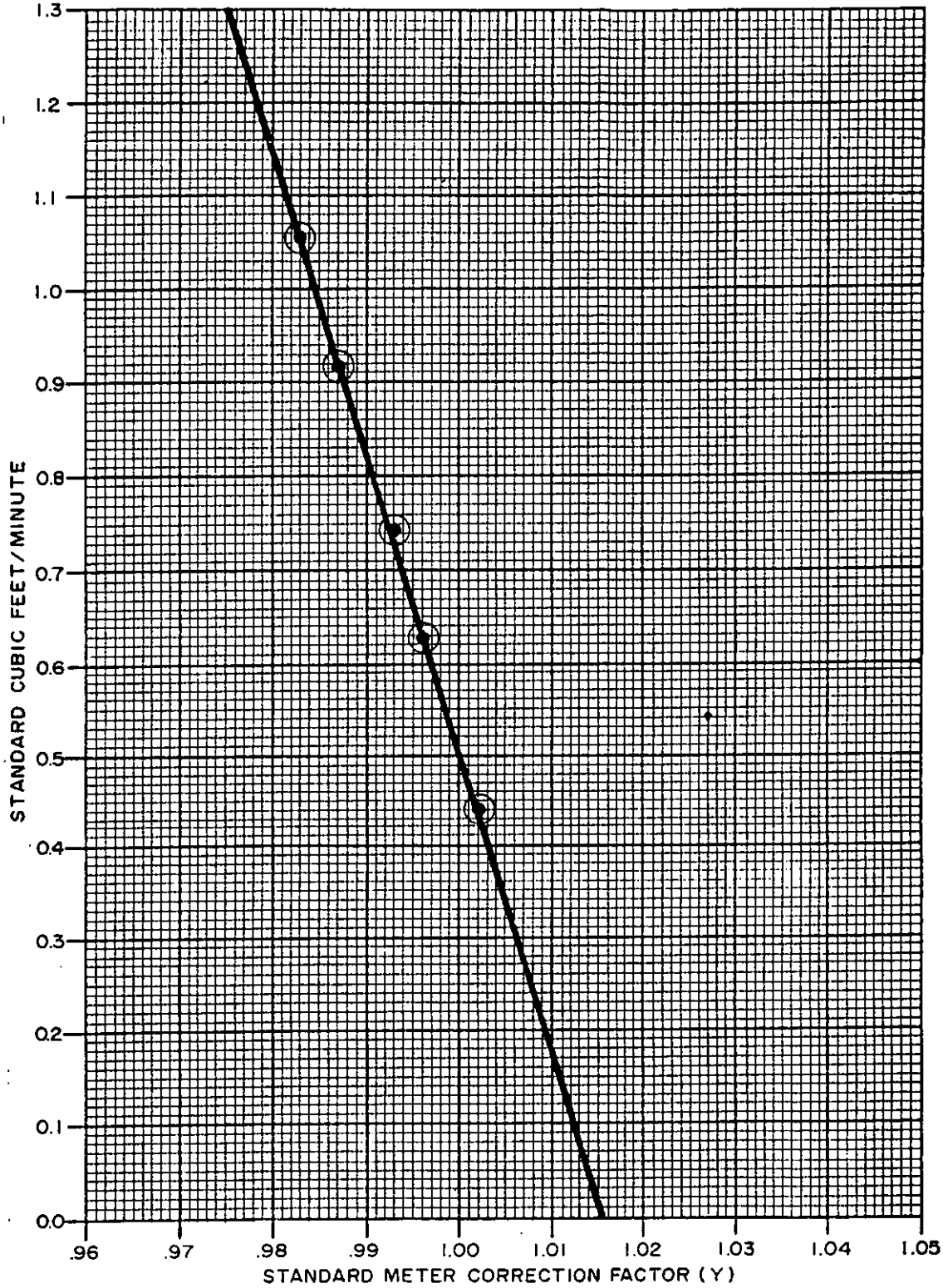


STANDARD METER CALIBRATION CURVE

APRIL 26, 1990

AIR CONSULTING and ENGINEERING

AIR CONSULTING & ENGINEERING — ANNUAL METER CALIBRATION

DATE 6-7-90 LEAK CHECK 0.000 CFM at 12 in. Hg.

METER BOX NUMBER 1 BAROMETRIC PRESSURE 30.02 in. Hg.

DRY GAS METER TEMPERATURE 89 °F/ASTM GLASS THERMOMETER TEMPERATURE 90 °F

ΔHS	AVERAGE ΔHD	GAS VOLUME, STANDARD METER			GAS VOLUME, DRY GAS METER			TEMP. STD. METER	TEMP. OF DRY METER	TIME (Minutes)	TIMER
		INITIAL	FINAL	ACTUAL ft^3	INITIAL	FINAL	ACTUAL ft^3				
-.07	0.5	206.539	214.496	7.957	719.311	727.244	7.933	85	85	21	21
-.15	1.25	215.308	221.239	5.931	728.042	733.952	5.910	85	86	10	
-.22	2.0	221.610	227.578	5.968	734.320	740.265	5.945	85	87	8	
-.32	2.75	228.029	233.291	5.262	740.708	745.940	5.232	86	88	6	
-.40	3.5	233.668	239.592	5.924	746.315	752.205	5.890	87	90	6	
-.50	4.25	240.117	245.527	5.410	752.724	758.112	5.388	87	91	5	

	DELTA H	Ya	SCFM	Ys	Y
	2.004	1.002	0.368	1.004	1.006
	2.041	1.002	0.577	0.998	1.000
	2.061	1.003	0.725	0.993	0.996
	2.054	1.003	0.851	0.989	0.992
	2.063	1.003	0.956	0.985	0.988
	2.082	1.001	1.048	0.983	0.984
MEAN:	2.051	1.002		0.992	0.994

CALIBRATED BY: H. F. Gabel

air consulting and engineering

PITOT TUBE CALIBRATION MEASUREMENTS

DATE CALIBRATED 4-9-90 PITOT TUBE 70

Pitot tube assembly level? ✓ Yes _____ No

Pitot tube openings damaged? _____ Yes (explain below) ✓ No

α_1 = 2 ° (<10°), α_2 = 0 ° (<10°), β_1 = 2 ° (<5°),

β_2 = 1 ° (<5°)

γ = 3 °, θ = 3 °, A = 0.869 in. = (Pa + Pb)

z = A sin γ = 0.045 in.; <0.32 / <1/8 in.

w = A sin θ = 0.045 in.; <0.08 / <1/32 in.

P_a .460 in. P_b .409 in. D_t = .375

Calibration required? _____ Yes ✓ No

THERMOCOUPLE CALIBRATION

Date 4-9-90 Thermocouple No. 70

Source (Specify)	ASTM Glass Thermometer With Mercury (°F)	Pyrometer (°F)	Degree Difference	% Difference
Ambient	72	72	0	0.00
Ice Bath	36	38	2	0.38
Oven	311	310	1	0.19

FDER - Maximum 5° difference

EPA $\left[\frac{(\text{Ref. temp. } ^\circ F + 460) - (\text{Pyrometer temp. } ^\circ F + 460)}{\text{Ref. temp. } ^\circ F + 460}\right] 100 \leq 1.5\%$

Calibrated by S. L. Carter

AIR CONSULTING & ENGINEERING, INC. PYROMETER CALIBRATION

DATE 7-10-90

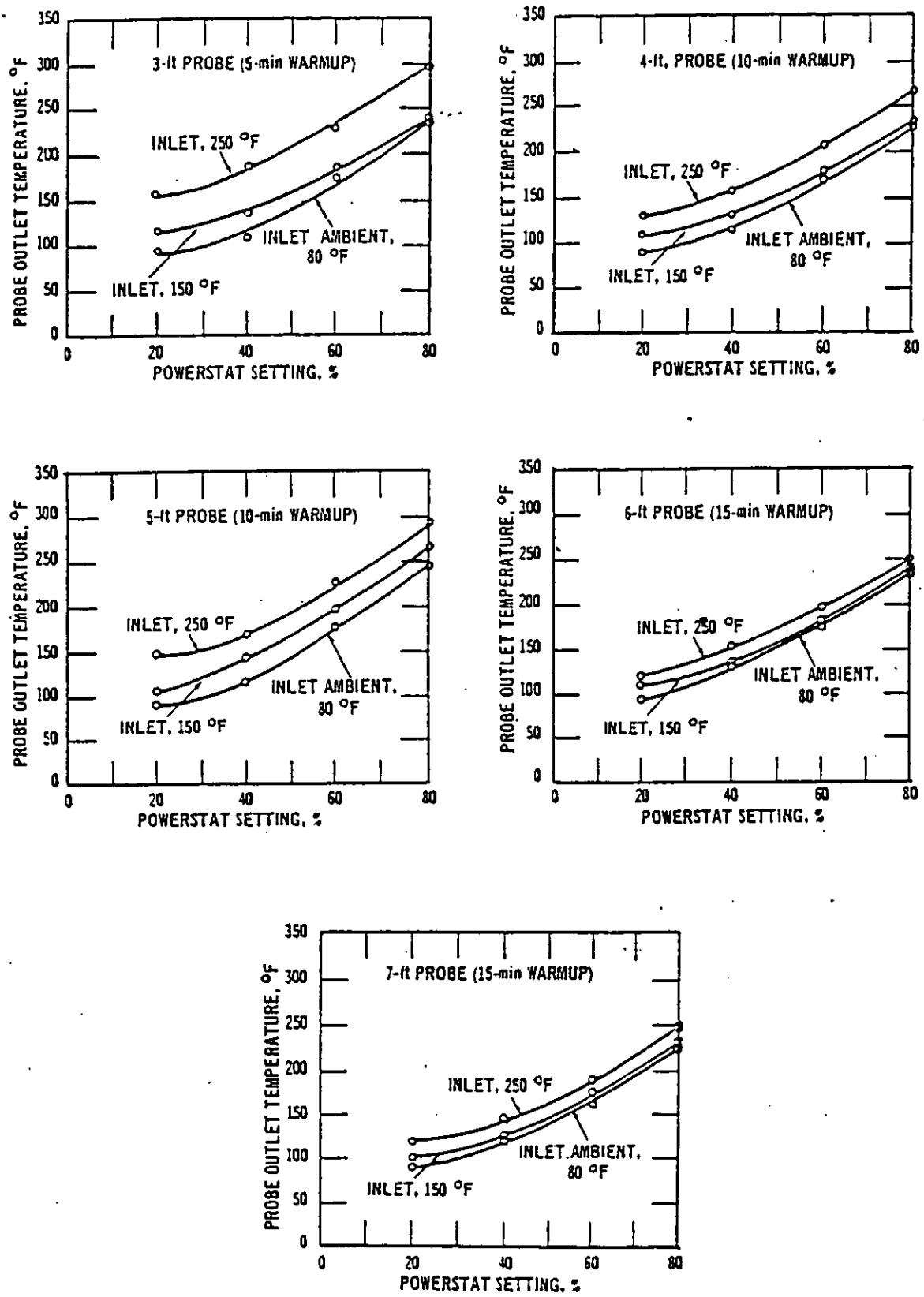
PYROMETER NUMBER METER BOX #1

SOURCE (SPECIFY)	GLASS THERMOMETER WITH NBS MERCURY (°F)	PYROMETER (°F)	DEGREE DIFFERENCE	PERCENT DIFFERENCE
ICE BATH	32°	33°	1	.2%
AMBIENT	94°	96°	2	.4%
HOT OVEN	800°	800°	0	0

FDER - MAXIMUM 5° DIFFERENCE

EPA $\left[\frac{(\text{REF. TEMP. °F} + 460°) - (\text{PYROMETER TEMP. °F} + 460°)}{\text{REF. TEMP. °F} + 460°}\right] 100 \leq 1.5\%$

CALIBRATED BY: Larry Watts



NOTE: Flow rate held constant at 0.75; 50% change in flow rate has little effect on probe temperature.

Probe temperatures.

APPENDIX E

PRODUCTION RATE CERTIFICATION

BOILER DATA SHEET

COMPANY TALISMAN SUGAR REPORTED BY FRANK KLEEMAN

DATE FEB. 5 1991

INTEGRATOR FACTOR X100 BOILER NO. 5

FUEL OIL USED NO OIL

	TIME	INTEGRATOR X100	LOG SCALE STEAM FLOW X1500	PRESSURE	TEMP.	FEED WATER TEMP.	PRESSURE
RUN 1	7:32	746781	90	295	543	252	450
	8:02	7448	90	300	544	252	450
	8:32	8116	89	300	544	252	450
	9:08	8923	90	300	544	252	450
1.6 HRS.	96 MIN.	2141		299	544	252	450 AVG.
		$\frac{2141 \times 100}{1.6}$ =	133,810	LBS/HR	(133,813)		
RUN 2	10:25	50602	90	295	541	252	450
	10:55	1285	90	300	543	252	450
	11:25	1958	88	290	540	252	450
	12:01	2741	89	275	538	252	450
1.6 HRS.	96 MIN.	2139		290	541	252	450 AVG
		$\frac{2139 \times 100}{1.6}$ =	133,700	LBS/HR	(133,688)		
RUN 3	1:28	754715	87	295	540	252	450
	1:58	5354	88	300	541	252	450
	2:28	6001	87	300	540	252	450
	3:04	6796	86	295	540	252	450
1.6 HRS.	96 MIN.	2081		298	540	252	450 AVG
		$\frac{2081 \times 100}{1.6}$ =	130,600	LBS/HR.	(130,063)		

PROCESS DATA INSTALLATION BOILER #5

COMPANY TALISMAN SUGAR

DATE FEB. 5, 1991

TYPE OF INSTALLATION BAGASSE BOILER

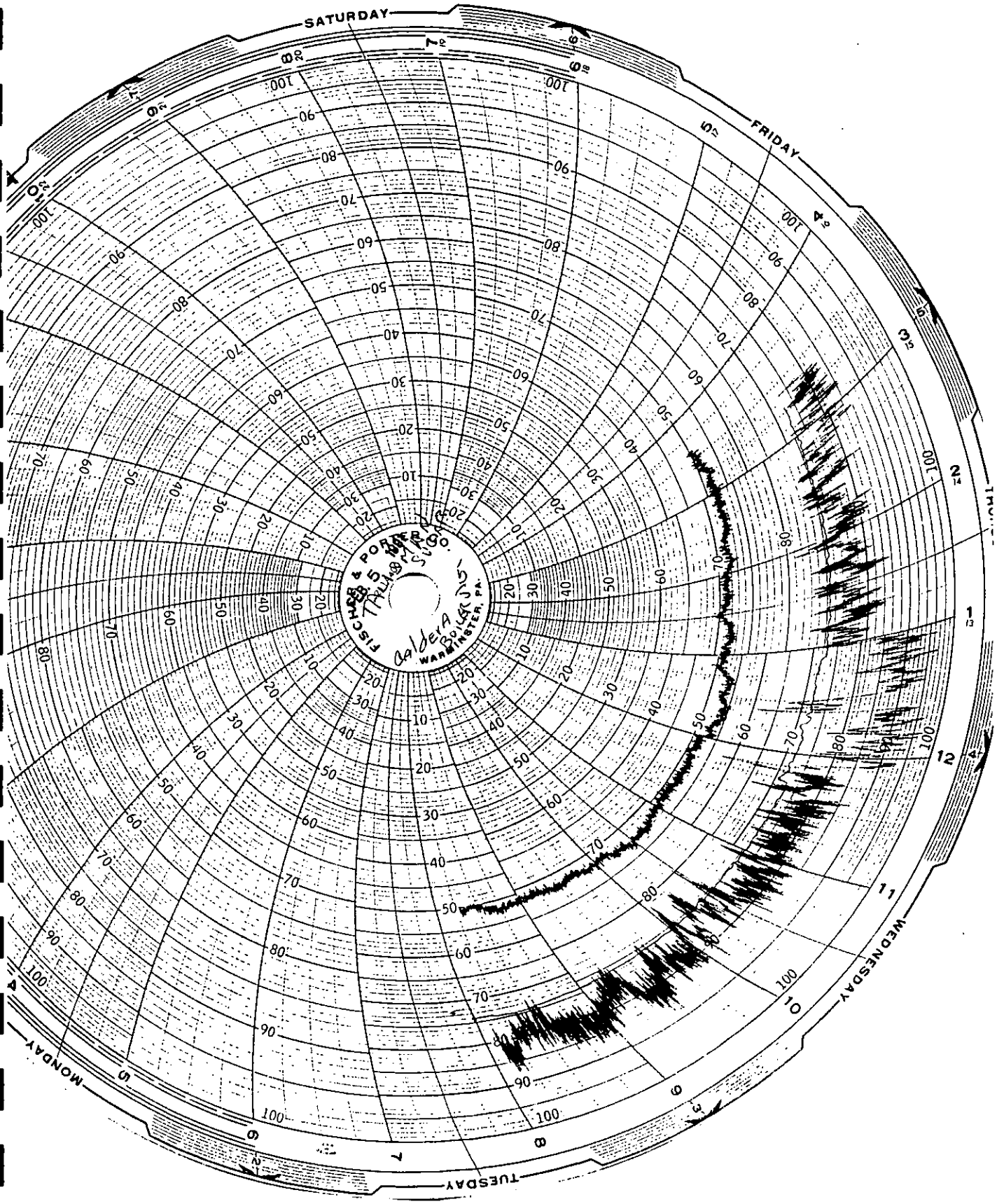
TYPE OF MATERIAL PROCESSED STEAM

TYPE OF FUEL USED BAGASSE

TYPE OF POLLUTION CONTROL SYSTEM DRY COLLECTOR + DUAL VENTURI SCRUBBERS

	NORMAL	RUN 1	RUN 2	RUN 3
SCRUBBER WATER FLOW (GPM)	1200	1200	1200	1200
PRESSURE DROP (INCHES)	12	11.0	11.5	12.0

REPORTED BY FRANK KLEEMAN


SATURDAY
FRIDAY
WEDNESDAY
TUESDAY
MONDAY
FISCHER & PORTER CO.
WARMINSTER, PA.

APPENDIX F

PROJECT PARTICIPANTS

PROJECT PARTICIPANTS

ACEI:

STEPHEN L. NECK,P.E.	REPORT REVIEW
J. COLLEEN HODGE	FIELD TESTING REPORT PREPARATION
GERARD GAUTHREAUX	FIELD TESTING

TSC:

ANGELO ARCHBOLD	TEST COORDINATOR
FRANK KLEEMAN, P.E.	PRODUCTION RATE VERIFICATION

FL. DEPT. OF ENVIRONMENTAL REGULATION

KEN TUCKER	TEST OBSERVER

PALM BEACH COUNTY HEALTH DEPT.

AJAYA SATYAL	TEST OBSERVER

Ref 2

Kleeman Engineering, Inc.
4300 N.W. 44th Street • Fort Lauderdale, Florida 33319
CHEMICAL & ENVIRONMENTAL ENGINEERS
305/733-5067

RECEIVED
MAR 27 1991
Division of Environmental Engineering
PALM BEACH COUNTY
HEALTH DEPARTMENT

March 12, 1991

Fla. Dept. of Environmental Regulation
2269 Bay St.
Ft. Myers, FL 33901-2896

Attention: Mr. David Knowles, P.E.

Re: Talisman Sugar Corp. - Belle Glade
Particulate Emissions Compliance Stack Tests
Boilers #4, 5 and 6

Dear Mr. Knowles:

Enclosed are the test reports for the referenced compliance stack tests which were performed at Talisman Sugar Corp. between February 1 and 11, 1991.

You will note that the test results indicate that these facilities were in compliance with the applicable emission standards.

Sincerely,

Frank Kleeman

Frank S. Kleeman, P.E.

Enclosures: 3

cc: Palm Beach County Health Dept.
Talisman Sugar Corp.

DATE 4.9.91 FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
PARTICULATE STACK TEST VERIFICATION
DER METHOD 5

FACILITY NAME: TALISMAN APIS #

COMPANY CONDUCTING TEST: KLEEMANS TEST DATE FEB 5 1991

SOURCE DESCRIPTION: BOILER NO.5

STACK TEST DATA SUMMATION

		RUN1	RUN2	RUN3
1.H2O	(VOL.MEAS.),ML	325	375	400
2.H2O	(MASS MEAS.),GM	6.7	5.6	7.1
3.M'N	PARTICULATE WEIGHT, GM	.2736	.3545	.3541
4.V'M	VOLUME METERED,CF	32.203	35.092	35.957
5.Y	DRY GAS MTR. CALIB.FCTR.	.994	.994	.994
6.RDP	AVG SQR D.P-SAMPLING	.55	.611	.582
7.DH	AVG DELTA H,IN.H2O	.426	.6	.504
8.T'M	AVG MTR. TEMP,DEG.F	67	83	83
9.T'S	AVG STACK TEMP,DEG.F	152	161	161
10.P'S	STACK PRESS,''HG(ABS)	30.14	30.14	30.14
11.P'B	BAROMETRIC PRESS,''HG	30.15	30.15	30.15
13.D'N	ACTUAL NOZZLE DIAM,IN	.225	.225	.225
14.T	ACTUAL SAMPLE TIME,MIN	96	96	96
15.C'P	PITOT TUBE COEFFICIENT	.84	.84	.84
23.S/T	VALUE:SAMPLE PTS/TOT PTS	1	1	1

RUN	VOLUME SAMPLED DSCF	MOISTURE CONTENT PERCENT	STACK VEL FPS	FLOW RATE DSCF/H	PERCENT ISO-KINETIC	ACTUAL EMISS LB/HR	ACTUAL EMISS LB/MBTU	ALLOW EMISS LB/MBTU
1	32.34	26.39	34.36	3,424,670	92.57	63.87	0.249	0.300
2	34.21	32.81	39.01	3,498,334	95.88	79.90	0.312	0.300
3	35.05	32.81	37.16	3,332,292	103.12	74.21	0.290	0.300
MEAN	33.87	30.67	36.84	3,418,432	97.19	72.66	0.284	0.300

SUMMARY

`GENERAL:

REVIEWED BY AS
ACTUAL A 'S = 43.3 SQ FT
LAMINAR FLOW ASSUMED (<10 DEG YAW) (OR <20 DER)
ACTUAL EMISS BASED ON HEAT INPUT = 256 MBTU/HR
ALL REQUIRED LEAK TESTS ACCEPTABLE
ASSUMED M 'D=30.0 (COMBUSTION GASES)

COMMENT.....

RUN 1 :

ACTUAL A 'N = .0002761 SQ FT
OVERSATURATED CONDITIONS: SATURATION MOISTURE ASSUMED/GIVEN PG.1

COMMENT.....

RUN 2 :

ACTUAL A 'N = .0002761 SQ FT
OVERSATURATED CONDITIONS: SATURATION MOISTURE ASSUMED/GIVEN PG.1

COMMENT.....

RUN 3 :

ACTUAL A 'N = .0002761 SQ FT
OVERSATURATED CONDITIONS: SATURATION MOISTURE ASSUMED/GIVEN PG.1

COMMENT.....

63" Dia
Area 43.3
02/05/91

#5 Talisman
ACE Kleeman

INPUT SHEET - REV:09/10/90 - PAGE 2 OF 2

ENTER THE FOLLOWING:

		RUN1	RUN2	RUN3
1. H2O	COLLECTED (ONLY VOL.MEASURED),ML:	325	375	400
2. H2O	COLLECTED (WEIGHED PART ONLY),GM:	6.7	5.6	7.1
3. M'N	PARTICULATE WEIGHT, GM:	.2736	.3545	.3541
4. V'M	VOLUME METERED, CF:	32.203	35.092	35.957
5. Y	DRY GAS METER CAL FACTOR:	.994	.994	.994
6. RDP	AVG SQR DELTA P (WHEN SAMPLING):	.55	.611	.582
7. DH	AVG DELTA H, IN H2O:	.426	.6	.504
8. T'M	AVG METER TEMP, DEG F:	67	83	83
9. T'S	AVG STACK TEMP, DEG F:	152	161	161
10. P'S*	STACK PRESS, *IN ....(.....):	30.14	30.14	30.14
11. P'B	BAROMETRIC PRESS, IN HG:	30.15	30.15	30.15
13. D'N	ACTUAL NOZZLE DIAMETER, IN.:	.225	.225	.225
14. T	ACTUAL SAMPLE TIME, MIN:	96	96	96
15. C'P	PITOT TUBE COEFFICIENT:	.84	.84	.84

OPTION ENTRIES: Heat Input 258.77 258.3 250.95

17. ORSAT/FYRITE - %CO2:	.....	.....	.....
18. ORSAT/FYRITE - %O2:	.....	.....	.....
28. ORSAT/FYRITE (FOR C'S @ 50%E.A.)-%CO:	.....	.....	.....
19. SPECIFIC M'D ENTRIES:	.....	.....	.....
20. CYCLONIC (10-20 DEG) - AVG COS(YAW):	.....	.....	.....
26. CYC.(>20) - AVG(SQR D.P X COS(YAW)):	.....	.....	.....
21. PROCESS WT SOURCE - T/HR:	.....	.....	.....
22. LB/TON REGULATED - T/HR:	.....	.....	.....
27. LB/* REGULATED (* AS DEFINED) - */HR:	.....	.....	.....
23. LAMBDA(CC(20)-VAL(SAMPLE PTS/TOT PTS):	.....	.....	.....