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Title: Source Test Report for Particulate Emissions Twin Impingement Wet Scrubber Boiler Number 6: Talisman Sugar Corporation

December 1991

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-05101

**SOURCE TEST REPORT
for
PARTICULATE EMISSIONS**

**TWIN IMPINGEMENT WET SCRUBBER
BOILER NUMBER 6**

**TALISMAN SUGAR CORPORATION
SOUTH BAY, FLORIDA**

DECEMBER 11, 1991

Prepared for:

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Prepared by:

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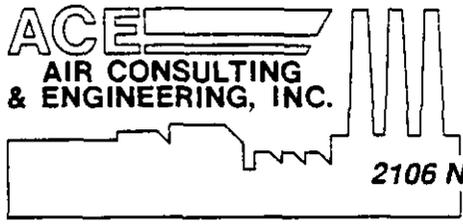
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REPORT CERTIFICATION

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.

Dagmar Neck

Dagmar Neck

1/15/1992

Date

1.0 INTRODUCTION

On December 11, 1991, Air Consulting and Engineering, Inc. (ACE), conducted particulate emission testing on the Wet Scrubber Outlet of Boiler 6 at Talisman Sugar Corporation located in South Bay, Florida.

Testing was performed to demonstrate compliance with the current Florida Department of Environmental Regulation (FDER) operating permit.

United States Environmental Protection Agency (EPA) Method 5 was utilized for the emission testing.

Mr. Ken Tucker of the FDER observed a portion of the testing.

Mr. Kleeman of Kleeman Engineering, Inc. coordinated testing and provided production data.

2.0 SUMMARY AND DISCUSSION OF RESULTS

Boiler Number 6 demonstrated compliance with the permit conditions.

Table 1 is a summary of the emission results and flue gas parameters.

Particulate emissions averaged 91.42 pounds per hour (lbs/Hr) and 0.189 pounds per million BTU (lbs/MMBTU) which is within the allowable emissions of 96.89 lbs/Hr and 0.200 lbs/MMBTU.

Complete emission summaries, field data sheets and laboratory data are presented in Appendices A, B, and C, respectively.

Production rate summaries are provided in Appendix D. This data was obtained from control room recordings of steam flow, temperature, and pressure as well as feed water temperature and pressure. Residue integrator and oil meter readings were recorded at the beginning and end of each particulate run.

Table 1 Emission Summary
 Boiler Number 6
 Talisman Sugar Corporation
 South Bay, Florida
 December 11, 1991

Run Number	Flow Rate SCFMD	Stack Temp. °F	Stack Moisture %	Particulate Emissions		Allowable Emissions	
				lbs/Hr	lbs/MMBTU	lbs/Hr	lbs/MMBTU
1	96366	158	29.8	91.20	0.187	97.47	0.200
2	98449	157	28.1	89.49	0.184	97.35	0.200
3	100143	157	28.6	93.46	0.195	95.84	0.200
AVERAGE	98319	157	28.8	91.42	0.189	96.89	0.200

$O_2 = 9.2$
 $mmBtu/hr = 484.44$

3.0 PROCESS DESCRIPTION AND OPERATION

The Number 6 Boiler at Talisman Sugar Corporation is a traveling grate stoker design used primarily for bagasse fuel firing. Supplemental oil firing was not used during the emission test series.

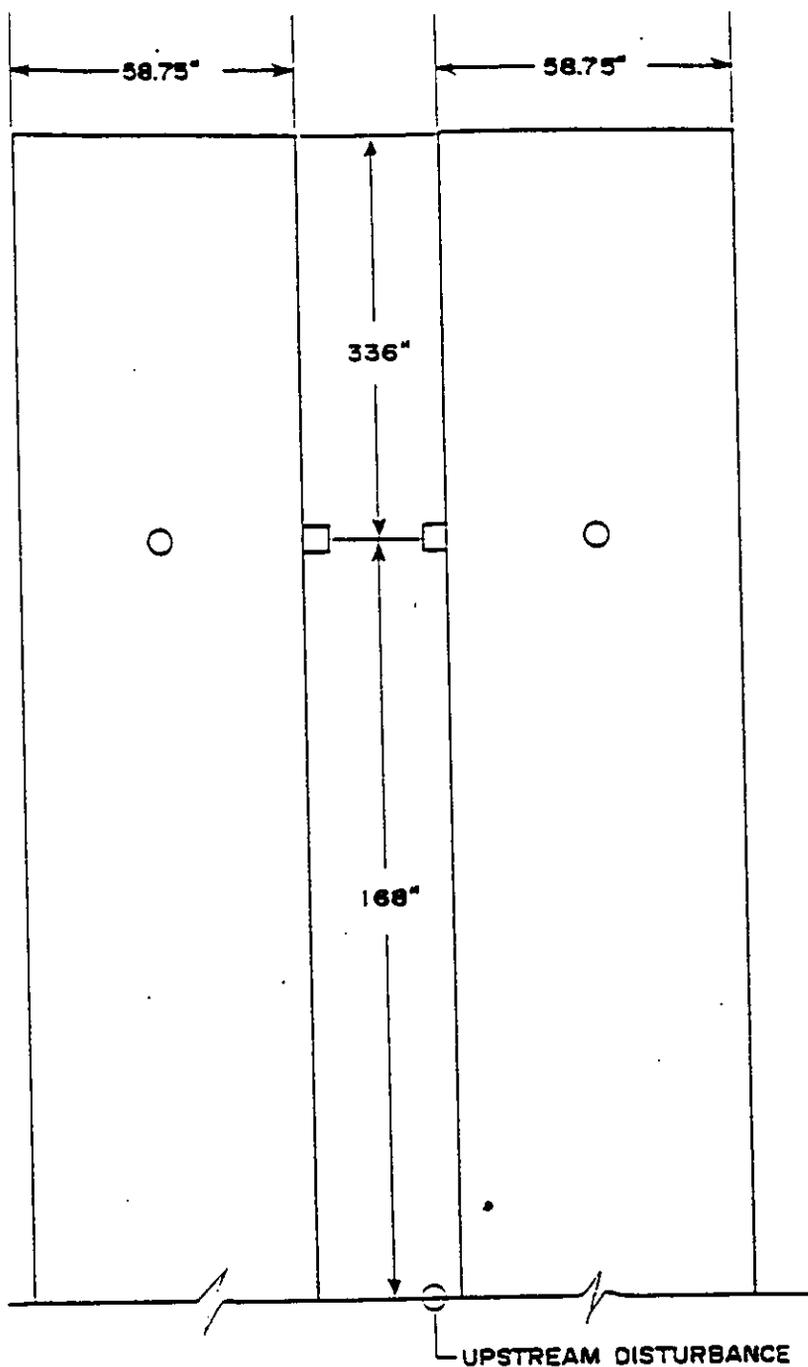
The Boiler averaged 247,819 pounds per hour (lbs/Hr) steam production over the test run period.

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, 58.75" 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 configuration of both stacks 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	3.9
3	6.9
4	10.4
5	14.7
6	20.9
7	37.9
8	44.1
9	48.3
10	51.8
11	54.8
12	57.5

NOTE: NOT TO SCALE

FIGURE I.
 SAMPLING POINT LOCATION
 BOILER NO. 6
 TALISMAN SUGAR CORPORATION
 SOUTH BAY, FLORIDA

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5.0 FIELD AND ANALYTICAL PROCEDURES

5.1 Particulate Matter Sampling and Analysis--EPA Method 5 (Glass Probe)

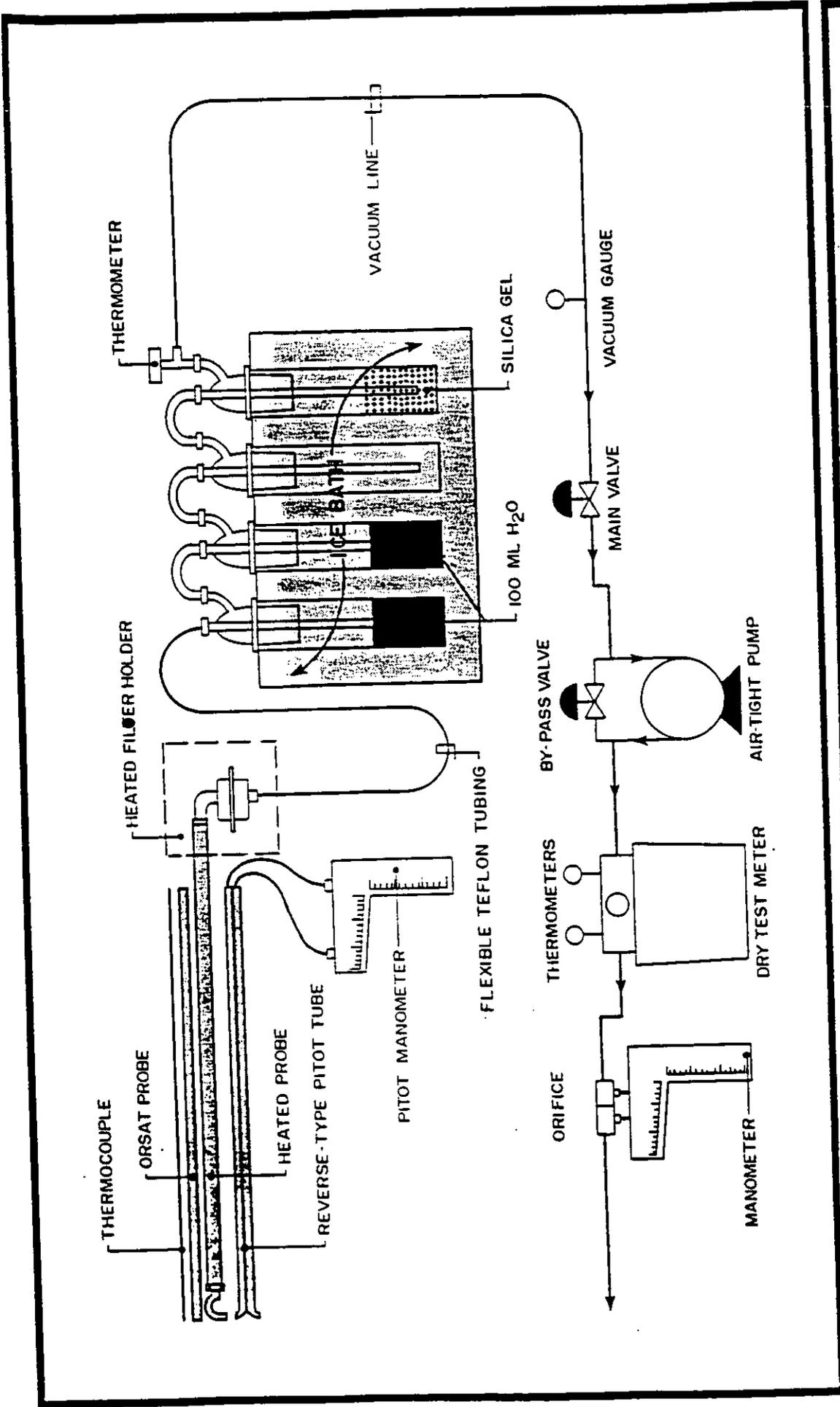
Particulate matter samples were collected by the particulate matter emission measurement method specified by the United States Environmental Protection Agency. A schematic diagram of the sampling train used is shown in Figure 2. All particulate matter captured from the nozzle to, and including, the filter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

PREPARATION OF EQUIPMENT

1. **FILTERS** - Gelman type "A" 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 weight.
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 prior to the test program. All openings on the sampling equipment were sealed while in transit to the test site.
3. **IMPINGERS** - The Greenburg-Smith impingers were cleaned with a warm soapy water solution and brushes, rinsed with distilled water and acetone, and dried. The impingers were sealed tightly during transit.

TEST PROCEDURE

Prior to performing the actual particulate matter sample runs, certain stack and stack gas parameters were measured. These preliminary measurements



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FIGURE 2
 EPA METHOD 5 SAMPLING TRAIN

included the average gas temperature, the stack gas velocity head, the stack gas moisture content, and the stack dimensions at the point where the tests were being performed. The stack gas temperature was determined by using a bi-metallic thermocouple and calibrated pyrometer. Velocity head measurements were made with calibrated type "S" pitot tube and an inclined manometer. Velocity head measurements of 0.05 inches H₂O or less were measured utilizing a micromanometer.

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 and downstream from flow disturbances.

Each particulate matter test run consisted of sampling for a specific amount of time at each traverse 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 making the test run. The stack gas temperature was also measured at each traverse point. Nomographs were used to calculate the isokinetic sampling rate at each traverse point during each test run.

The gases sampled passed through the following components: a stainless steel nozzle and glass probe; a glass fiber filter; two impingers each with 100 ml

of distilled deionized water; one impinger dry; one impinger with 200 grams of silica gel; a flexible sample line; an air-tight pump; a dry test meter; and a calibrated orifice. The second impinger had a standard tip, while the first, third, and fourth impingers had modified tips with a 0.5 inch I.D. opening.

Sample recovery was accomplished by the following procedures:

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, 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 in the stack gas and then discarded.
4. The used 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 dried at 105 degrees C for three hours, desiccated for a minimum of one hour, and weighed to the nearest 0.1 mg. A minimum of two such weighings six hours apart was made to determine constant weight.
2. The acetone from Container 2 was transferred to a tared beaker and evaporated to dryness at ambient temperature and pressure, desiccated for 24 hours, and weighed to the nearest 0.1 mg. A minimum of two such weighings six hours apart were made to determine constant weight.
3. The used silica gel in its tared container was weighed to the nearest 0.1 gram.

The total sample weight included the weight of material collected on the filter plus the weight of material collected in the nozzle, sampling probe, and front half of the filter holder.

DATA

The field data sheets, calculation sheets, and nomenclature definitions are included in the appendices of this report.

1.1

**APPENDIX A
COMPLETE EMISSION DATA
AND
SAMPLE CALCULATIONS**

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COMPLETE EMISSION DATA

PLANT: TALISMAN SUGAR CORPORATION
SOURCE: NUMBER 6 BOILER
DATE: 12-11-91

RUN NO.:	1	IMPINGER ml	350
BEGIN TIME:	1000	SILICA GEL gms.	9.0
END TIME:	1140	PERCENT O2	9.00
TOTAL RUN TIME:	96.00 min.	PERCENT CO2	11.00
BAROMETRIC PRESSURE:	30.15 "Hg	"F" FACTOR	0
STACK PRESSURE:	30.15 "Hg.		
NOZZLE DIAMETER:	.175 inches	PARTICULATE	
METER CORR. FACTOR:	1.009	-----	
FINAL METER:	187.711 cubic ft.	FILTER mg.	271.3
INITIAL METER:	147.470 cubic ft.	WASH mg.	16.0
STACK AREA:	37.651 sq. ft.		

STACK 1 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE FT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	3.700	1.924	1.350	158	68
1-2	3.300	1.817	1.650	158	68
1-3	2.300	1.517	1.150	158	68
1-4	2.000	1.414	1.000	158	69
1-5	.700	0.837	.350	158	69
1-6	.130	0.361	.070	159	69
1-7	.200	0.447	.100	157	70
1-8	.200	0.447	.100	157	70
1-9	.550	0.742	.280	157	70
1-10	1.600	1.265	.300	157	72
1-11	2.700	1.643	1.350	156	72
1-12	2.700	1.643	1.350	156	72
2-1	4.300	2.074	2.150	157	73
2-2	2.300	1.517	1.150	159	74
2-3	1.800	1.342	.900	158	74
2-4	1.800	1.342	.900	158	74
2-5	1.200	1.095	.600	160	74
2-6	.180	0.424	.090	161	76
2-7	.050	0.224	.030	161	76
2-8	.200	0.447	.100	151	77
2-9	.300	0.546	.150	158	77
2-10	1.100	1.049	.550	159	78
2-11	1.500	1.225	.750	156	78
2-12	1.200	1.095	.600	156	79
AVERAGES	1.500	1.102	0.751	158	73

EMISSION RESULTS

NOZZLE AREA(FT ²)	10.0001673		
AVG. VELOCITY HEAD	1.25 "H2O	VOL. FLOW ACFM	159349
AVG. STACK TEMP.:	158 F	VOL. FLOW SCFMD	96366
AVG. METER TEMP.:	79 F		
AVG. ORIFICE DIFFERENTIAL:---	0.70 "H2O	PARTICULATE DATA :	
METER STANDARD CUBIC FEET:---	40.155	-----	
% H2O VAPOR:	29.8	POUNDS PER HOUR:	91.201
GAS MOL. WT. DRY:	30.12	POUNDS PER SCF :	0.0000158
GAS MOL. WT. WET:	26.51	GRAINS/SCF:	0.110
% EXCESS AIR:	74.26	GRAINS/SCF @ 8% O2	0.120
AVG. STACK VEL. (FPS)-----	70.54	GRAINS/SCF @50% EA	0.128
MMBTU INPUT:	487.27	POUNDS PER MMBTU:	0.187
PERCENT ISOKINETIC :-----	97.70		

STACK 2 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIFICE DIFF.	STACK TEMP.	METER TEMP.
1-1	1.300	1.140	.650	154	80
1-2	1.300	1.140	.650	157	80
1-3	1.500	1.225	.750	158	80
1-4	1.500	1.225	.750	156	80
1-5	1.500	1.225	.750	158	82
1-6	1.400	1.183	.700	153	82
1-7	1.400	1.183	.700	155	82
1-8	1.300	1.140	.650	158	84
1-9	1.200	1.095	.600	157	84
1-10	1.100	1.049	.550	157	85
1-11	1.200	1.095	.600	158	85
1-12	1.200	1.095	.600	158	85
2-1	1.150	1.072	.580	156	87
2-2	1.150	1.072	.580	156	87
2-3	1.150	1.072	.580	156	87
2-4	1.150	1.072	.580	156	87
2-5	1.250	1.118	.630	159	88
2-6	1.350	1.162	.680	159	89
2-7	1.500	1.225	.750	158	89
2-8	1.400	1.183	.700	159	89
2-9	1.300	1.140	.650	159	89
2-10	1.200	1.095	.600	159	89
2-11	1.300	1.140	.650	160	90
2-12	1.100	1.049	.550	160	90
					76
AVERAGES	1.287	1.133	0.645	157	85

AIR CONSULTING AND ENGINEERING
COMPLETE EMISSION DATA

PLANT: TALISMAN SUGAR CORPORATION
SOURCE: NUMBER 6 BOILER
DATE: 12-11-91

RUN NO.:	2	IMPINGER ml	329
BEGIN TIME:	1250	SILICA GEL gms.	8.5
END TIME:	1429	PERCENT O2	10.30
TOTAL RUN TIME:	96.00 min.	PERCENT CO2	9.70
BAROMETRIC PRESSURE:	30.15 "Hg	"F" FACTOR	0
STACK PRESSURE:	30.15 "Hg.		
NOZZLE DIAMETER:	.175 inches	PARTICULATE	
METER CORR. FACTOR:	1.009		
FINAL METER:	229.706 cubic ft.	FILTER mg.	276.4
INITIAL METER:	167.925 cubic ft.	WASH mg.	5.1
STACK AREA:	37.651 sq. ft.		

STACK 1 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	3.500	1.871	1.750	153	85
1-2	2.400	1.549	1.200	159	85
1-3	1.500	1.225	.750	159	85
1-4	1.500	1.225	.750	158	85
1-5	1.200	1.095	.600	160	85
1-6	.150	0.387	.080	160	85
1-7	.220	0.469	.110	160	85
1-8	.270	0.520	.140	159	85
1-9	.970	0.985	.490	158	85
1-10	2.400	1.549	1.200	159	85
1-11	3.000	1.732	1.500	160	86
1-12	2.800	1.673	1.400	160	86
2-1	2.200	1.483	1.100	159	87
2-2	3.500	1.897	1.900	160	87
2-3	1.600	1.265	.800	158	87
2-4	1.600	1.265	.800	157	87
2-5	1.100	1.049	.550	160	88
2-6	.100	0.316	.050	159	88
2-7	.010	0.100	.010	159	88
2-8	.100	0.316	.050	159	88
2-9	.300	0.548	.150	158	88
2-10	1.200	1.095	.600	158	88
2-11	1.500	1.225	.750	156	88
2-12	1.100	1.049	.550	155	88
AVERAGES	1.430	1.079	0.716	158	86

EMISSION RESULTS

NOZZLE AREA(FT2)	: 0.0001673		
AVG. VELOCITY HEAD	: -----	1.25 "H2O	VOL. FLOW ACFM : 158792
AVG. STACK TEMP.:	: -----	157 F	VOL. FLOW SCFMD : 98449
AVG. METER TEMP.:	: -----	88 F	
AVG. ORIFICE DIFFERENTIAL:---		0.69 "H2O	PARTICULATE DATA :
METER STANDARD CUBIC FEET:---	40.964		
% H2O VAPOR:	: -----	26.1	POUNDS PER HOUR: 89.488
GAS MOL. WT. DRY:	: -----	29.96	POUNDS PER SCF : 0.0000151
GAS MOL. WT. WET:	: -----	26.60	GRAINS/SCF: 0.106
% EXCESS AIR:	: -----	95.19	GRAINS/SCF @ 8% O2 0.129
AVG. STACK VEL.(FPS)-----	70.29		GRAINS/SCF @50% EA 0.138
MMBTU INPUT:	486.73		POUNDS PER MMBTU: 0.184
PERCENT ISOKINETIC :-----	97.56		

STACK 2 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIFICE DIFF.	STACK TEMP.	METER TEMP.
1-1	1.500	1.225	.750	150	88
1-2	1.500	1.225	.750	156	88
1-3	1.500	1.225	.750	154	88
1-4	1.500	1.225	.750	154	88
1-5	1.500	1.225	.750	156	89
1-6	1.400	1.183	.700	153	89
1-7	1.400	1.183	.700	158	89
1-8	1.500	1.225	.750	155	90
1-9	1.300	1.140	.650	156	90
1-10	1.200	1.095	.600	158	90
1-11	1.200	1.095	.600	157	90
1-12	1.200	1.095	.600	155	90
2-1	1.200	1.095	.600	154	92
2-2	1.200	1.095	.600	152	92
2-3	1.200	1.095	.600	152	92
2-4	1.200	1.095	.600	156	92
2-5	1.300	1.140	.650	156	92
2-6	1.300	1.140	.650	156	92
2-7	1.500	1.225	.750	156	92
2-8	1.400	1.183	.700	155	92
2-9	1.300	1.140	.650	157	92
2-10	1.300	1.140	.650	157	92
2-11	1.200	1.095	.600	154	92
2-12	1.200	1.095	.600	154	92
AVERAGES	1.333	1.133	0.667	155	91

AIR CONSULTING and ENGINEERING
COMPLETE EMISSION DATA

PLANT: TALISMAN SUGAR CORPORATION
SOURCE: NUMBER 6 BOILER
DATE: 12-11-91

RUN NO.:	3	IMPINGER ml	340
BEGIN TIME:	1530	SILICA GEL gms.	7.7
END TIME:	1708	PERCENT O2	8.30
TOTAL RUN TIME:	96.00 min.	PERCENT CO2	11.70
BAROMETRIC PRESSURE:	30.15 "Hg	"F" FACTOR	0
STACK PRESSURE:	30.15 "Hg		
NOZZLE DIAMETER:	.175 inches	PARTICULATE	
METER CORR. FACTOR:	1.009		
FINAL METER:	272.175 cubic ft.	FILTER mg.	284.0
INITIAL METER:	229.922 cubic ft.	WASH mg.	7.8
STACK AREA:	37.651 sq. ft.		

Avg O2 = 9.2

STACK 1 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIF. DIFF.	STACK TEMP.	METER TEMP.
1-1	3.900	1.975	1.950	153	87
1-2	3.300	1.817	1.550	153	87
1-3	1.800	1.342	.900	153	87
1-4	1.800	1.342	.900	153	87
1-5	.700	0.837	.350	156	87
1-6	.200	0.447	.100	157	87
1-7	.200	0.447	.100	159	87
1-8	.220	0.469	.110	159	87
1-9	.650	0.806	.330	158	87
1-10	2.400	1.549	1.250	158	87
1-11	2.900	1.703	1.450	158	87
1-12	2.900	1.703	1.450	156	87
2-1	4.200	2.049	2.250	156	88
2-2	4.300	2.074	2.150	156	88
2-3	1.900	1.378	.950	156	88
2-4	1.900	1.378	.950	155	88
2-5	1.100	1.049	.550	156	89
2-6	.150	0.387	.080	156	89
2-7	.050	0.224	.030	152	89
2-8	.050	0.224	.030	151	89
2-9	.420	0.648	.210	155	90
2-10	1.200	1.095	.600	158	90
2-11	1.500	1.225	.750	153	90
2-12	1.300	1.140	.650	153	90
AVERAGES	1.627	1.138	0.823	155	88

EMISSION RESULTS

NOZZLE AREA(FT2)	10.0001673		
AVG. VELOCITY HEAD	1.31 "H2O	VOL. FLOW ACFM	162507
AVG. STACK TEMP.:	157 F	VOL. FLOW SCFMD	100143
AVG. METER TEMP.:	90 F		
AVG. ORIFICE DIFFERENTIAL:---	0.74 "H2O	PARTICULATE DATA :	
METER STANDARD CUBIC FEET:---	41,314		
% H2O VAPOR:	28.6	POUNDS PER HOUR:	93.558
GAS MOL. WT. DRY:	30.20	POUNDS PER SCF :	0.0000156
GAS MOL. WT. WET:	26.72	GRAINS/SCF:	0.109
% EXCESS AIR:	64.74	GRAINS/SCF @ 8% O2	0.112
AVG. STACK VEL.(FPS)-----	71.94	GRAINS/SCF @50% EA	0.120
MMBTU INPUT:	479.22	POUNDS PER MMBTU:	0.195
PERCENT ISOKINETIC :-----	96.73		

Avg = 484.44

STACK 2 DATA INPUTS

PORT-POINT	VELOCITY HEAD	SQUARE RT. VEL. HEAD	ORIFICE DIFF.	STACK TEMP.	METER TEMP.
1-1	1.500	1.225	.750	159	91
1-2	1.500	1.225	.750	159	91
1-3	1.500	1.225	.750	158	91
1-4	1.500	1.225	.750	158	91
1-5	1.500	1.225	.750	160	92
1-6	1.400	1.183	.700	159	92
1-7	1.400	1.183	.700	158	92
1-8	1.400	1.183	.700	159	92
1-9	1.300	1.140	.650	158	92
1-10	1.300	1.140	.650	158	92
1-11	1.200	1.095	.600	158	93
1-12	1.200	1.095	.600	158	93
2-1	1.200	1.095	.600	156	93
2-2	1.200	1.095	.600	156	93
2-3	1.100	1.049	.550	159	93
2-4	1.200	1.095	.600	160	93
2-5	1.300	1.140	.650	159	93
2-6	1.500	1.225	.750	160	94
2-7	1.400	1.183	.700	160	94
2-8	1.300	1.140	.650	160	94
2-9	1.300	1.140	.650	159	94
2-10	1.300	1.140	.650	158	94
2-11	1.200	1.095	.600	156	94
2-12	1.200	1.095	.600	156	94
AVERAGES	1.329	1.152	0.665	158	92

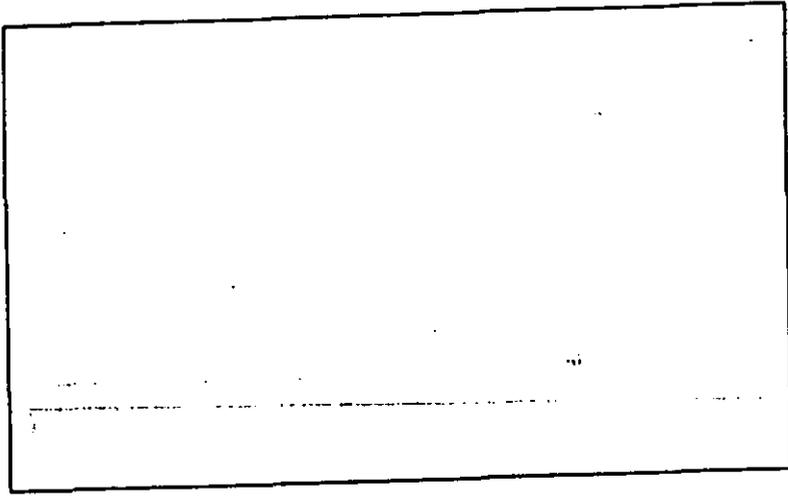
APPENDIX B
FIELD DATA SHEETS

STACK SAMPLING FIELD DATA SHEET

PLANT Talisman # Sugar Corp.
 SOURCE Boiler 6
 PLANT LOCATION South Bay EPA-5
 TYPE OF SAMPLING TRAIN _____
 TYPE OF SAMPLES _____ P.M.
 DATE 12-11-91 RUN NO. 1
 TIME START 1000 TIME END 1140
 SAMPLE TIME 2 / 48 (min./pt) = 96 Total min.
 ASSUMED MOISTURE 30 % FDA 70
 NOMOGRAPH C₁ 50 PITOT CORR. 84
 P₀ 30.15 "Hg P₁ 30.15 "Hg
 WEATHER Clear TEMP 78 °F
 METER BOX NO. 6 H 1.91 Y 1.009
 NOZZLE CAL. .175 .175 .175 = .175
 STACK DIMENSIONS 58.75 X 2
 STACK AREA 37.651 ft² EFFECTIVE _____ ft²
 STACK HEIGHT _____ ft
 STACK DIAMETER: UPSTRM. _____ DNSTRM. _____
 PORT SIZE _____ in. NIPPLE LENGTH _____ in.
 U CORD LENGTH 100
 REMARKS: _____



2106 N. W. 57th PLACE - Suites 9 & 10
 GAINESVILLE, FLORIDA 32606



MAT'L PROCESSING RATE _____
 GAS METER READINGS: FINAL 187.711 ft³
 INITIAL 147.470 ft³
 NET 40.241 ft³
 FILTER NO. 3659 IMP. VOL. GAIN 350 ml.
 SIL GEL NO. 20 WT. GAIN 9.0 ml.
 TOTAL CONDENSATE 359.0 ml.

ORSAT

	1	2	3	4	AVG.
% CO ₂	10.0	12.0			11.0
% O ₂	10.0	8.0			9.0
% CO					
% N ₂					

F₀ = _____ F₀ RANGE = _____
 ORSAT ANALYZER _____
 LEAK CHECKS _____
 PRE 0.00 cfm 15 "Hg POST 0.00 cfm 15 "Hg
 METER BOX/PUMP _____ GAS SAMPLE SYST. _____
 ORSAT BAG _____
 PITOT TUBE NO. _____ PRE-TEST OK
 POST-TEST(+) 0.00 / 15 H₂O/Sec
 POST-TEST(-) 0.00 / 15 H₂O/Sec
 PYROMETER NO. ATK3
 BOX OPERATOR South Bay PROBE HOLDER M. J. ...

PORT AND DISTANCE FROM TRVERSE POINT NUMBER	DISTANCE FROM WALL / COMMENTS	CLOCK TIME	GAS METER READING (FT ³)	STACK VELOCITY HEAD	METER ORIFICE PRESS. DIFF. ("H ₂ O)		STACK GAS TEMP (°F)	SAMPLE BOX TEMP (°F)	LAST IMPINGER TEMP (°F)	DRY GAS METER TEMP (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
					CALC.	ACTUAL					
1-1		1002	149.01	3.70	1.85	1.85	158	273	51	68	6.0
2		1004	149.95	3.30	1.65	1.65	158	272	50	68	6.0
3		1006	151.14	2.30	1.15	1.15	158	272	50	68	4.0
4		1008	152.25	2.00	1.00	1.00	158	273	50	69	4.0
5		1010	152.93	2.70	.35	.35	158	267	51	69	2.0
6		1012	153.21	1.13	.07	.07	159	260	52	69	2.0

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 ₂ O)		STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
					CALC.	ACTUAL					
1-7		1014	153.51	.20	.10	.10	157	255	58	70	2.0
8		1016	153.99	.20	.10	.10	157	257	58	70	2.0
9		1018	154.31	.55	.28	.28	157	260	54	70	3.0
10		1020	155.21	1.60	.80	.80	157	259	54	72	4.0
11		1022	156.61	2.70	1.35	1.35	156	257	53	72	6.0
12		1024	157.54	2.70	1.35	1.35	156	256	53	72	6.0
a-1		1027	159.43	4.90	2.15	2.15	157	255	51	73	9.0
2		1029	160.51	2.30	1.15	1.15	159	248	52	74	6.0
3		1031	161.65	1.80	.90	.90	158	255	54	74	5.0
4		1033	162.40	1.80	.90	.90	158	255	54	74	5.0
5		1035	163.24	1.20	.60	.60	160	255	54	74	5.0
6		1037	163.61	.18	.09	.09	161	250	57	76	2.0
7		1039	163.74	.05	.03	.03	161	250	58	76	2.0
8		1041	164.01	.20	.10	.10	161	250	60	77	2.0
9		1043	164.47	.30	.15	.15	158	256	60	77	2.0
10		1045	165.21	1.10	.55	.55	159	260	59	78	5.0
11		1047	166.22	1.50	.75	.75	156	245	58	78	6.0
12		1049	167.00	1.20	.60	.60	156	255	54	79	5.0
North											
1-1		1053	168.03	1.30	.65	.65	154	268	55	80	5.0
2		1055	168.84	1.30	.65	.65	157	268	54	80	5.0
3		1057	169.51	1.50	.75	.75	156	263	54	80	5.0
4		1058	170.42	1.50	.75	.75	156	263	54	80	6.0
5		1000	171.53	1.50	.75	.75	156	256	54	82	7.0
6		1102	172.35	1.40	.70	.70	153	256	54	82	7.0
7		1104	173.21	1.40	.70	.70	155	256	54	82	7.0



2106 N. W. 67th PLACE, SUITE 9810
GAINESVILLE, FLORIDA 32606

STACK SAMPLING FIELD DATA SHEET

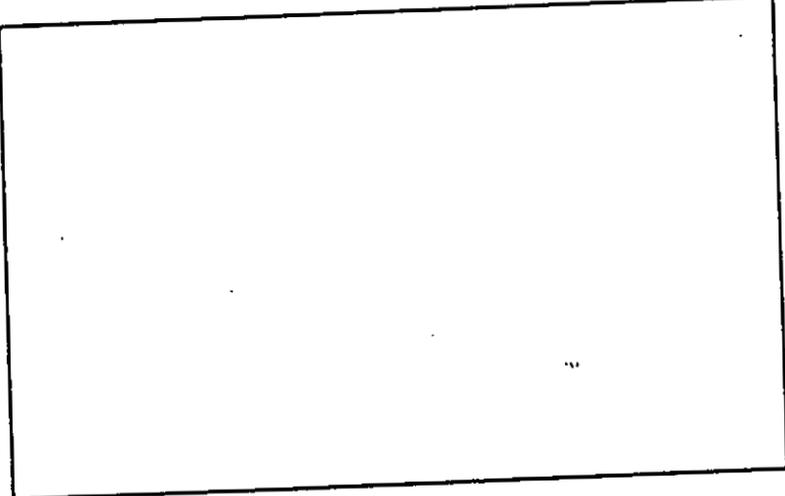
PLANT Jalisco Sugar Corporation
SOURCE Boiler # 6
PLANT LOCATION South Bay, Florida
TYPE OF SAMPLING TRAIN EPA-5
TYPE OF SAMPLES P.M.
DATE 12-11-91 RUN NO. 2
TIME START 1250 TIME END 1429
SAMPLE TIME 2 / 48 (min/pt) = 96 Total min
ASSUMED MOISTURE 30 % FDA .70
NOMOGRAPH C₁ .50 PITOT CORR. .84
P_b 30.15 "Hg P_s 30.15 "Hg
WEATHER Clear TEMP 79 °F
METER BOX NO. 6 H 1.91 Y 1.009
NOZZLE CAL. .175 .175 .175 .175
STACK DIMENSIONS 37.65 58.75 X 2
STACK AREA 87.65 ft² EFFECTIVE 142
STACK HEIGHT ft
STACK DIAMETER: UPSTRM. DNSTRM.
PORT SIZE in. NIPPLE LENGTH in.
U CORD LENGTH 100
REMARKS:

MAT'L PROCESSING RATE
GAS METER READINGS: FINAL 229.706 ft.³
INITIAL 187.925 ft.³
NET 41.781 ft.³
FILTER NO. 3658 IMP. VOL. GAIN 329 ml.
SIL GEL NO. 15 WT. GAIN 8.5 ml.
TOTAL CONDENSATE 337.5 ml.

ORSAT

	1	2	3	4	AVG.
% CO ₂	8.5	9.5	9.0	11.0	9.7
% O ₂	11.5	10.5	11.0	9.0	10.3
% CO					
% N ₂					

F₀ = F₀ RANGE =
ORSAT ANALYZER
LEAK CHECKS
PRE 0.00 cfm 15 "Hg POST 0.00 cfm 15 "Hg
METER BOX/PUMP GAS SAMPLE SYST.
ORSAT BAG PRE-TEST OK
PITOT TUBE NO. PRE-TEST OK
POST-TEST (+) 0.00 / 15 H₂O/Sec
POST-TEST (-) 0.00 / 15 H₂O/Sec
PYROMETER NO. ATK 3
BOX OPERATOR PROBE HOLDER Mc. Yackel



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 ₂ O)		STACK GAS TEMP (°F)	SAMPLE BOX TEMP (°F)	LAST IMPINGER TEMP	DRY GAS METER TEMP (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
					CALC.	ACTUAL					
1-1		1250	189.35	3.50	1.75	1.75	153	257	61	85	4.0
2		1252	190.51	2.40	1.20	1.20	159	250	56	85	4.0
3		1254	191.53	1.50	.75	.75	159	250	55	85	4.0
4		1256	192.20	1.50	.75	.75	158	250	55	85	3.0
5		1258	193.50	1.20	.60	.60	160	255	55	85	2.0
6		1300	194.00	.15	.08	.08	160	255	55	85	2.0

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 ₂ O)		STACK GAS TEMP (°F)	SAMPLE BOX TEMP (°F)	LAST IMPINGER TEMP (°F)	DRY GAS METER TEMP (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
					CALC.	ACTUAL					
7		1302	194.25	.22	.11	.11	160	260	55	85	2.0
8		1304	194.60	.27	.14	.14	159	260	54	85	2.0
9		1306	195.40	.97	.49	.49	158	260	54	85	3.0
10		1308	196.60	2.40	1.20	1.20	159	266	58	85	5.0
11		1310	197.91	3.00	1.50	1.50	160	259	58	86	6.0
12		1312	199.26	2.80	1.40	1.40	160	258	56	86	6.0
a-1		1316	199.99	2.20	1.10	1.10	159	253	57	87	5.0
2		1318	201.64	3.60	1.80	1.80	160	253	57	87	5.0
3		1320	202.65	1.60	.80	.80	158	253	57	87	5.0
4		1322	203.74	1.60	.80	.80	157	253	57	87	5.0
5		1324	204.51	1.10	.55	.55	160	231	57	87	4.0
6		1326	204.84	.10	.05	.05	159	244	56	88	2.0
7		1328	204.99	.01	.01	.01	159	244	56	88	2.0
8		1330	205.40	.10	.05	.05	159	245	56	88	2.0
9		1332	205.87	.30	.15	.15	158	245	56	88	2.0
10		1334	206.51	1.20	.60	.60	158	245	56	88	5.0
11		1336	207.70	1.50	.75	.75	156	246	56	88	5.0
12		1338	208.41	1.10	.55	.55	155	246	56	88	5.0
North											
1-1		1342	209.41	1.50	.75	.75	150	248	58	88	6.0
2		1344	210.33	1.50	.75	.75	156	248	58	88	6.0
3		1346	211.25	1.50	.75	.75	154	248	58	88	6.0
4		1348	212.04	1.50	.75	.75	154	249	58	88	6.0
5		1350	213.03	1.50	.75	.75	156	265	58	89	6.0
6		1352	213.92	1.40	.70	.70	159	266	58	89	6.0
7		1354	215.00	1.40	.70	.70	158	267	58	89	6.0



2106 N. W. 67th PLACE, SUITES 9 & 10
GAINESVILLE, FLORIDA 32606

STACK SAMPLING FIELD DATA SHEET

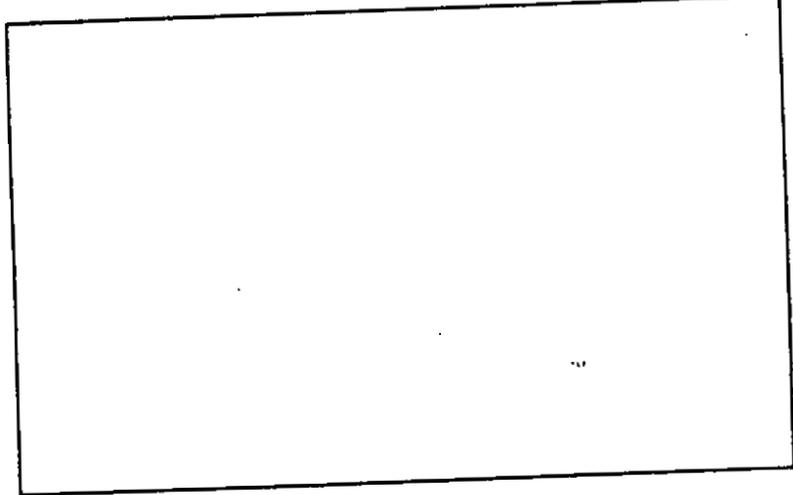
PLANT Talisman Sugar Corporation
SOURCE Boiler # 6
PLANT LOCATION South Bay, Florida
TYPE OF SAMPLING TRAIN EPA-S
TYPE OF SAMPLES P.M.
DATE 12-11-91 RUN NO. 3
TIME START 1530 TIME END 1708
SAMPLE TIME 2, 48 (min/pt) = 96 Total min
ASSUMED MOISTURE 30 % FDA 70
NOMOGRAPH C_p .50 PITOT CORR. .84
P_b 30.15 "Hg P_s 30.15 "Hg
WEATHER Clear TEMP 80 °F
METER BOX NO. 6 H 1.91 Y 1.009
NOZZLE CAL. .175 .175 .175 = .175
STACK DIMENSIONS 58.75 X 2
STACK AREA 37.651 ft² EFFECTIVE _____ ft²
STACK HEIGHT _____ ft
STACK DIAMETER: UPSTRM. _____ DNSTRM. _____
PORT SIZE _____ in. NIPPLE LENGTH _____ in.
U CORD LENGTH 100'
REMARKS: _____

MAT'L PROCESSING RATE _____
GAS METER READINGS: FINAL 272.175 ft.³
INITIAL 229.922 ft.³
NET 42.253 ft.³
FILTER NO. 3656 IMP. VOL. GAIN 340 ml.
SIL GEL NO. 129 WT. GAIN 7.7 ml.
TOTAL CONDENSATE 347.7 ml.

ORSAT

	1	2	3	4	AVG.
% CO ₂	8.5	13.0	13.5		11.7
% O ₂	11.5	7.0	6.5		8.3
% CO					
% N ₂					

F₀ = _____ F₀ RANGE = _____
ORSAT ANALYZER _____
LEAK CHECKS _____
PRE 0.00 cfm 15 "Hg POST 0.002 cfm 15 "Hg
METER BOX/PUMP _____ GAS SAMPLE SYST. _____
ORSAT BAG _____ PRE-TEST OK
PITOT TUBE NO. _____ / _____ H₂O/Sec
POST-TEST (+) _____ / _____ H₂O/Sec
POST-TEST (-) _____ / _____ H₂O/Sec
PYROMETER NO. AIK 3
BOX OPERATOR John H. ... PROBE HOLDER McFarland



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 ₂ O)		STACK GAS TEMP. (°F)	SAMPLE BOX TEMP. (°F)	LAST IMPINGER TEMP. (°F)	DRY GAS METER TEMP. (°F)	VACUUM ON SAMPLE TRAP ("Hg)
					CALC.	ACTUAL					
1-1		1532	231.31	3.90	1.95	1.95	153	240	63	87	4.0
2		1534	232.80	3.30	1.65	1.65	153	240	62	87	4.0
3		1536	233.90	1.80	.90	.90	153	240	62	87	4.0
4		1538	234.85	1.80	.90	.90	153	240	62	87	4.0
5		1540	235.71	.70	.35	.35	156	230	66	87	2.0
6		1542	236.00	.20	.10	.10	157	230	66	87	2.0

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 ₂ O)		STACK GAS TEMP (°F)	SAMPLE BOX TEMP (°F)	LAST IMPINGER TEMP (°F)	DRY GAS METER TEMP (°F)	VACUUM ON SAMPLE TRAIN ("Hg)
					CALC.	ACTUAL					
1-7		1542	236.31	.20	.10	.10	159	228	65	87	2.0
8		1544	236.70	.22	.11	.11	159	226	65	87	2.0
9		1546	237.41	.65	.33	.33	158	228	65	87	2.0
10		1548	238.42	2.50	1.25	1.25	158	229	60	87	5.0
11		1550	239.75	2.90	1.45	1.45	158	235	56	87	5.0
12		1552	241.10	2.90	1.45	1.45	156	236	55	87	5.0
2-1		1557	242.31	4.50	2.25	2.25	156	235	57	88	9.0
2		1559	243.32	4.30	2.15	2.15	156	248	56	88	9.0
3		1401	245.24	1.90	.95	.95	156	250	56	88	9.0
4		1403	246.43	1.90	.95	.95	155	250	56	89	6.0
5		1405	247.02	1.10	.55	.55	156	242	56	89	5.0
6		1407	247.33	.15	.08	.08	156	240	56	89	2.0
7		1409	247.60	.05	.03	.03	152	237	56	89	2.0
8		1411	247.83	.05	.03	.03	151	239	58	89	2.0
9		1413	248.31	.42	.21	.21	155	247	57	90	4.0
10		1415	248.21	1.20	.60	.60	153	260	58	90	4.0
11		1417	250.02	1.50	.75	.75	153	261	58	90	4.0
12		1419	251.20	1.30	.65	.65	153	261	58	90	4.0
North											
1-1		1422	252.01	1.50	.75	.75	159	268	58	91	6.0
2		1424	253.20	1.50	.75	.75	159	269	57	91	6.0
3		1426	253.79	1.50	.75	.75	158	260	57	91	6.0
4		1428	254.71	1.50	.75	.75	158	260	57	91	6.0
5		1430	255.61	1.50	.75	.75	160	261	58	92	7.0
6		1432	256.45	1.40	.70	.70	159	265	58	92	7.0
7		1434	257.34	1.40	.70	.70	158	265	58	92	7.0

1400's is incorrect, it should be 1600's for the time

APPENDIX C
LABORATORY ANALYSIS

AIR CONSULTING & ENGINEERING, inc. PARTICULATE LAB DATA

SOURCE Tahseem Sugar Co

PROBE RINSE	RUN 1	RUN 2	RUN 3	BLANK	LIQUID LEVEL
CONTAINER NUMBER	130	190	589	100	<input checked="" type="checkbox"/>
TOTAL VOLUME (ml)	130	190	149	100	
1st GROSS WEIGHT (g)	104.7100	105.2711	103.2036	107.352	DATE & TIME: 12-12-91 10:23
2nd GROSS WEIGHT (g)	104.7100	105.2711	103.2036	107.352	DATE & TIME: 12-12-91 19:15
AVERAGE GROSS WEIGHT (g)	104.7100	105.2711	103.2036	107.352	
TARE WEIGHT (g)	104.6940	105.2660	103.1960	107.3150	
SUB NET WEIGHT (g)	0.0160	0.0051	0.0076	0.0000	
ACETONE BLANK (g)	-	-	-	-	
TOTAL NET WEIGHT (mg)	16.0	5.1	7.8	0.0	

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.

TARE WEIGHT Run 2 5-11 - 105.2660

FILTER	RUN 1	RUN 2	RUN 3	BLANK	DATE & TIME
FILTER NUMBER	389	3658	3656	3150	DATE & TIME: 12-12-91 12:41
1st GROSS WEIGHT (g)	0.6955	0.7001	0.7099	0.4005	DATE & TIME: 12-12-91 19:26
2nd GROSS WEIGHT (g)	0.6955	0.7001	0.7100	0.4005	
AVERAGE GROSS WEIGHT (g)	0.6956	0.7000	0.7100	0.4005	
TARE WEIGHT (g)	0.6943	0.6989	0.7080	0.4005	
SUB NET WEIGHT (g)	0.2713	0.2764	0.2840	0.0000	
TOTAL NET WEIGHT (mg)	271.3	276.4	284.0	0.0	

TARE BALANCE CHECK

1st GROSS WEIGHT BALANCE CHECK

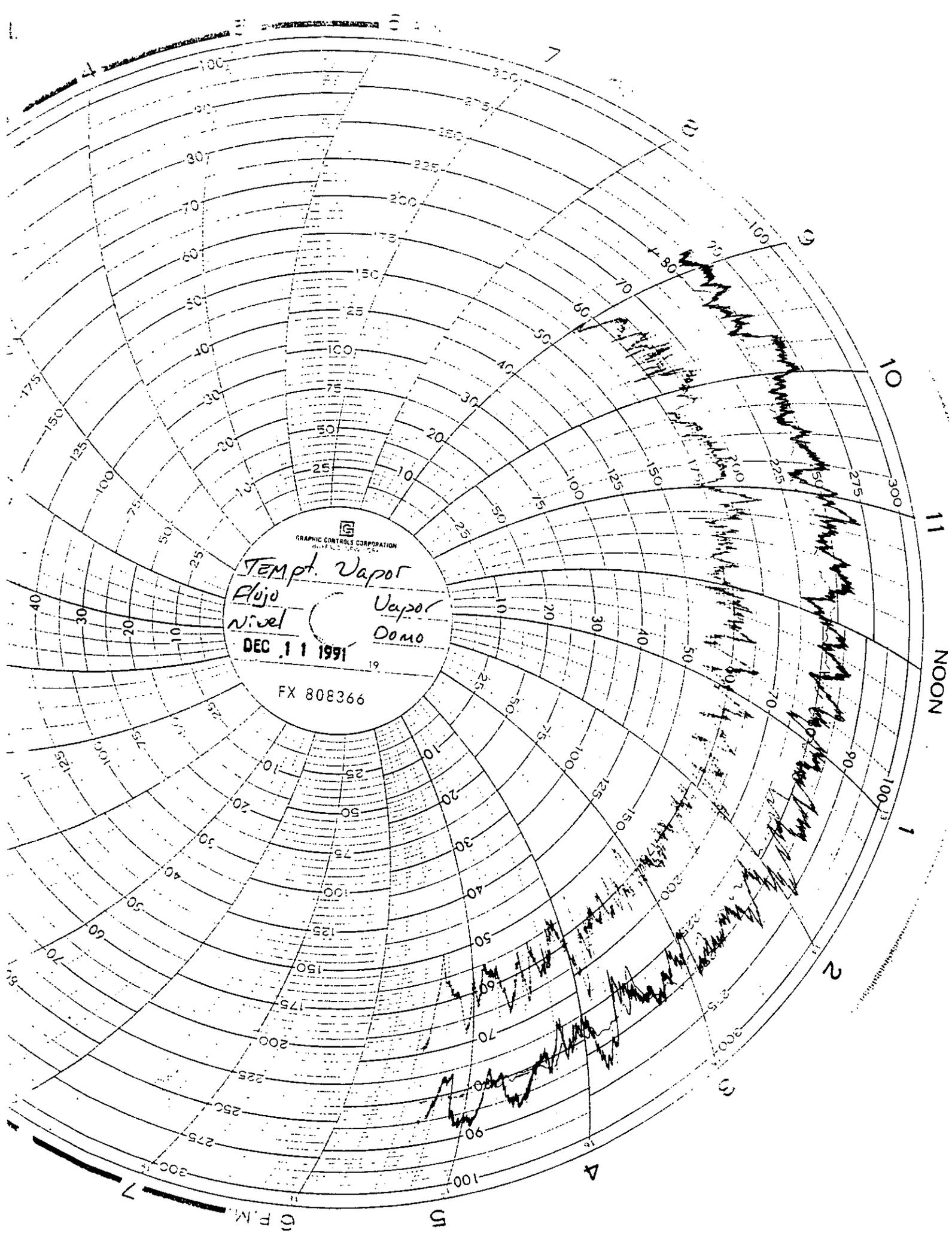
2nd GROSS WEIGHT BALANCE CHECK

SEE LAB BOOK

0 10.0g
 0.5g 100.0g
 % RH 72 DATE 12-12-91
 Signature Christy Heck

0 10.0g
 0.5g 100.0g
 % RH 68 DATE 12-12-91
 Signature Christy Heck

APPENDIX D
PRODUCTION RATE
CERTIFICATION



TEMP. Vapor
Flujo Vapor
Nivel Domo
DEC 11 1991

FX 808366

GRAPHIC CONTROLS CORPORATION
MADE IN U.S.A.

11 NOON

1

2

3

4

5

6 P.M.

7

PROCESS DATA

INSTALLATION Boiler #6

COMPANY TALISMAN SUGAR CORP.

DATE DEC. 11, 1991

TYPE OF INSTALLATION BAGASSE BOILER

TYPE OF MATERIAL PROCESSED STEAM

TYPE OF FUEL USED BAGASSE

TYPE OF POLLUTION CONTROL SYSTEM VENTURI DUAL WET SCRUBBERS PLUS DRY COLLECTOR

	NORMAL	RUN 1	RUN 2	RUN 3
SCRUBBER WATER FLOW (GPM)	<u>900</u> <u>900</u>	<u>880</u> <u>890</u>	<u>875</u> <u>895</u>	<u>890</u> <u>880</u>
PRESSURE DROP (INCHES)	<u>15</u>	<u>14.5</u>	<u>14.2</u>	<u>14.5</u>

REPORTED BY FRANK KLEEMAN

AIR CONSULTING & ENGINEERING, INC.
Complete Emission Data

```

-----
PLANT:   TALISMAN SUGAR CORPORATION           DATE:   12-11-91
LOCATION:  SOUTH BAY, FLORIDA                 RUN NUMBER   1
SOURCE:  NUMBER 6 BOILER, SCRUBBER OUTLET    TIME:       1000-1136
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TIME INTERVAL----- 96 MINUTES

OIL:

```

FINAL OIL----- N/A
BEGIN OIL----- N/A
FACTOR----- 1

```

STEAM:

```

FINAL STEAM----- 623009
BEGIN STEAM----- 622610
FACTOR----- 1000
TEMPERATURE----- 580 DEGREES F
PRESSURE----- 290 PSIG
                305 PSIA

```

FEEDWATER:

```

TEMPERATURE----- 260 DEGREES F
PRESSURE----- 380 PSIG
                395 PSIA

```

HEAT INPUT:

```

STEAM----- 1303.5 BTU/LB
FEEDWATER----- 228.6 BTU/LB
NET STEAM----- 1074.9 BTU/LB
STEAM RATE----- 249675 LB/HR
BOILER EFFICIENCY----- 55.0 %
TOTAL FUEL HEAT INPUT----- 487.37 MMBTUH
STEAM CALIBRATION FACTOR----- 1.00

OIL----- 0.00 GPH
OIL----- 150000 BTU/GAL

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TOTAL HEAT INPUT (OIL)----- 0.00 MMBTUH
TOTAL HEAT INPUT (NON-OIL)----- 487.37 MMBTUH

```

ALLOWABLES:

```

ALLOWABLE EMISSION (OIL)----- .10 LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)----- .20 LB/MMBTU

TOTAL ALLOWABLE EMISSION----- 97.47 LB/HR
TOTAL ACTUAL EMISSION----- 91.20 LB/HR

TOTAL ALLOWABLE EMISSION----- 0.200 LB/MMBTU
TOTAL ACTUAL EMISSION----- 0.187 LB/MMBTU

```


AIR CONSULTING & ENGINEERING, INC.
Complete Emission Data

```

-----
PLANT:   TALISMAN SUGAR CORPORATION           DATE:   12-11-91
LOCATION:  SOUTH BAY, FLORIDA                 RUN NUMBER   2
SOURCE:  NUMBER 6 BOILER, SCRUBBER OUTLET    TIME:      1250-1426
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TIME INTERVAL----- 96 MINUTES

OIL:

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FINAL OIL----- N/A
BEGIN OIL----- N/A
FACTOR----- 1

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STEAM:

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FINAL STEAM----- 623711
BEGIN STEAM----- 623312
FACTOR----- 1000
TEMPERATURE----- 576 DEGREES F
PRESSURE----- 273 PSIG
                288 PSIA

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FEEDWATER:

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TEMPERATURE----- 260 DEGREES F
PRESSURE----- 391 PSIG
                406 PSIA

```

HEAT INPUT:

```

STEAM----- 1302.1 BTU/LB
FEEDWATER----- 228.6 BTU/LB
NET STEAM----- 1073.5 BTU/LB
STEAM RATE----- 249375 LB/HR
BOILER EFFICIENCY----- 55.0 %
TOTAL FUEL HEAT INPUT----- 486.73 MMBTUH
STEAM CALIBRATION FACTOR----- 1.00

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OIL----- 0.00 GPH
OIL----- 150000 BTU/GAL

```

```

TOTAL HEAT INPUT (OIL)----- 0.00 MMBTUH
TOTAL HEAT INPUT (NON-OIL)----- 486.73 MMBTUH

```

ALLOWABLES:

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ALLOWABLE EMISSION (OIL)----- .10 LB/MMBTU
ALLOWABLE EMISSION (NON-OIL)----- .20 LB/MMBTU

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TOTAL ALLOWABLE EMISSION----- 97.35 LB/HR
TOTAL ACTUAL EMISSION----- 89.49 LB/HR

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TOTAL ALLOWABLE EMISSION----- 0.200 LB/MMBTU
TOTAL ACTUAL EMISSION----- 0.184 LB/MMBTU

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APPENDIX E
QUALITY ASSURANCE
AND
CHAIN OF CUSTODY

STANDARD METER CALIBRATION
Meter Number 1040616

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:

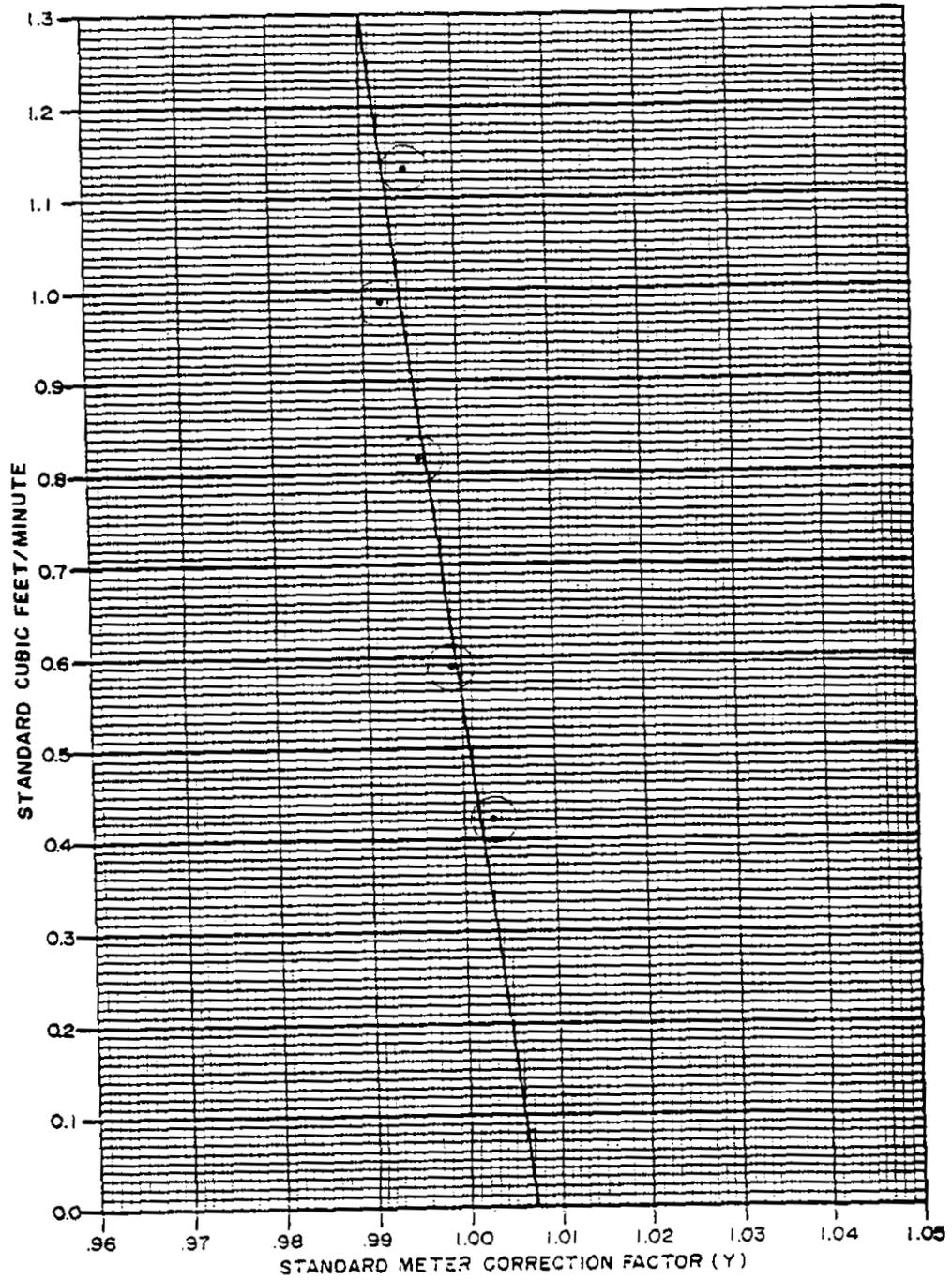
$$Y_a \times Y_s = Y$$

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 June 11, 1991, and is checked and/or recalibrated at least annually.



STANDARD METER CALIBRATION
CURVE

JUNE 11, 1991

AIR CONSULTING
and
ENGINEERING

AIR CONSULTING & ENGINEERING STANDARD METER CALIBRATION

DATE 6.13.91 LEAK CHECK 0.000 CFM at 1.0 In. Hg.

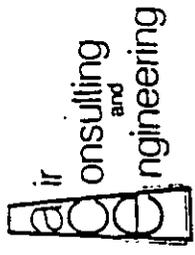
METER SERIAL NUMBER 1010616 BAROMETRIC PRESSURE 30.12 In. Hg.

STD GAS METER TEMPERATURE 71 °F / ASTM GLASS THERMOMETER TEMPERATURE 74 °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			
-1.3	-1.60	6.072	11.553	5.511	0.003	5.500	5.497	77	13	
-1.2	-1.60	1.553	7.030	5.479	5.500	10.979	5.479	75	13	
-1.3	-1.60	1.030	10.509	5.477	10.979	16.450	5.477	75	13	
-1.3	-1.96	0.853	8.143	5.290	16.801	22.127	5.323	76	9	
-1.1	-1.96	6.143	13.430	5.287	20.127	27.442	5.315	75	9	
-1.1	-1.96	3.430	8.703	5.273	27.442	32.753	5.311	75	9	
-1.4	-1.6	9.252	14.995	5.743	33.311	39.123	5.812	78	7	
-1.1	-1.6	4.995	10.713	5.718	39.123	44.909	5.786	78	7	
-1.1	-1.6	0.113	6.145	5.732	44.909	50.701	5.798	78	7	
-1.5	-2.1	6.941	12.917	5.976	51.214	57.292	6.078	78	6	
-1.5	-2.1	2.917	8.898	5.981	57.292	63.375	6.083	78	6	
-1.5	-2.1	8.898	14.873	5.975	63.375	69.452	6.077	78	6	
-1.1	-2.7	5.278	10.988	5.710	69.452	75.663	5.797	78	5	
-1.7	-2.7	0.988	6.708	5.720	75.663	81.474	5.811	78	5	
-1.7	-2.7	6.708	12.386	5.678	81.474	87.247	5.773	78	5	

CALIBRATED BY: G. F. Kabeel

Run	Y	SCFM	Y	SCFM	Y	SCFM	Y	SCFM
Run 1	1.004	0.422	0.998	0.584	0.996	0.814	0.992	0.984
Run 2	1.001	0.419	0.999	0.584	0.996	0.810	0.992	0.989
Run 3	1.003	0.419	0.999	0.582	0.996	0.812	0.992	0.988
Average	1.003	0.420	0.999	0.583	0.996	0.812	0.992	0.988



Air Consulting
and
Engineering

AIR CONSULTING & ENGINEERING ANNUAL METER CALIBRATION

DATE 10-3-91 LEAK CHECK 0.500 CFM at 15 In. Hg
 METER BOX NUMBER 6 BAROMETRIC PRESSURE 29.94 In. Hg

DRY GAS METER TEMPERATURE 82 °F / ASTM GLASS THERMOMETER TEMPERATURE 22 °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				
-08	0.5	65.936	72.128	6.192	550.514	556.690	6.176	81	82	16	16
-13	1.0	72.551	78.148	5.597	557.102	562.651	5.549	81	82	10	
-18	1.5	78.417	84.504	6.087	562.914	568.942	6.028	81	83	9	
-24	2.0	84.709	90.083	5.374	568.145	574.456	5.311	81	83	7	
-35	3.0	90.361	96.007	5.646	574.724	580.290	5.566	81	84	6	
-46	4.0	96.243	101.631	5.388	580.521	585.818	5.297	81	85	5	

DELTA H	Y _a	SCFM	Y _s	Y
1.909	1.003	0.378	1.004	1.007
1.825	1.008	0.547	1.001	1.009
1.871	1.010	0.661	1.000	1.009
1.937	1.011	0.750	0.998	1.009
1.930	1.013	0.919	0.996	1.008
1.959	1.015	1.052	0.994	1.008

CALIBRATED BY: A. F. Gabel MEAN: 1.905 1.010

POST TEST CALIBRATION

AIR CONSULTING & ENGINEERING, inc.

DATE 12-20-91 METER BOX NUMBER 6 LEAK CHECK 0.00 CFM at 12 in. Hg.
 CLIENT TALISMAN SUGAR SOURCE ALL THERMOCOUPLE NUMBER _____ PYROMETER NUMBER _____

FLIGHT SERVICE Pb 30.48 in. Hg. ACE BAROMETER Pb 30.48 in. Hg.
 ASTM GLASS THERMOMETER 150 °F / THERMOCOUPLE 150 °F ASTM GLASS THERMOMETER 68 °F / METER TEMP 68 °F

ΔHS	GAS VOLUME, STANDARD METER			GAS VOLUME, DRY GAS METER			TEMP. STANDARD METER	TEMP. OF DRY METER	TIME (Minutes)	MAX. VACUUM In. Hg.
	AVERAGE ΔHD	INITIAL	FINAL	ACTUAL ft ³	INITIAL	FINAL				
.56	.55	554.039	559.628	5.589	843.390	849.146	75	81	14	12
.51	.47	559.628	565.175	5.547	849.146	854.877	74	83	15	12
.67	.74	565.175	570.712	5.537	854.877	860.615	73	84	12	12

CALIBRATED BY: *Lee J. Antak*

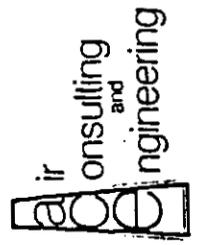
DELTA H
 1.885
 1.867
 1.935

Y_a
 0.986
 0.987
 0.985

SCFM
 0.402
 0.373
 0.466

Y_s
 1.000
 1.000
 0.999

Y
 0.986
 0.987
 0.984



air consulting and engineering

MEAN: 1.896 0.986

1.000 0.986

AIR CONSULTING & ENGINEERING, INC. PYROMETER CALIBRATION

DATE 9-4-90 PYROMETER NUMBER # 3

SOURCE (SPECIFY)	GLASS THERMOMETER WITH NBS MERCURY (°F)	PYROMETER (°F)	DEGREE DIFFERENCE	PERCENT DIFFERENCE
ICE BATH	<u>32</u>	<u>34</u>	<u>2</u>	<u>0.4</u>
AMBIENT	<u>80</u>	<u>81</u>	<u>1</u>	<u>0.2</u>
HOT OVEN	<u>268</u>	<u>264</u>	<u>4</u>	<u>0.6</u>

FDER - MAXIMUM 5° DIFFERENCE

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

CALIBRATED BY: Sup R. Rowe

AIR CONSULTING & ENGINEERING, INC.

PITOT TUBE CALIBRATION

DATE CALIBRATED 10-7-91

PITOT TUBE 59

IS PITOT TUBE ASSEMBLY LEVEL YES

ARE PITOT TUBE OPENINGS DAMAGED NO

$\alpha_1 =$ 0 ($<10^\circ$), $\alpha_2 =$ 1 ($<10^\circ$), $\beta_1 =$ 2 ($<5^\circ$), $\beta_2 =$ 1 ($<5^\circ$)

$\gamma =$ 1 $^\circ$ $\theta =$ 1 $^\circ$ $A =$ 1.165 in. = (Pa + Pb)

$z = A \sin \gamma =$ 0.017 in. $< 0.32 / < 1/8$ in.

$w = A \sin \theta =$ 0.017 in. $< 0.08 / < 1/32$ in.

P_a 0.583 in. P_b 0.582 in. D_1 .375

WAS CALIBRATION REQUIRED NO

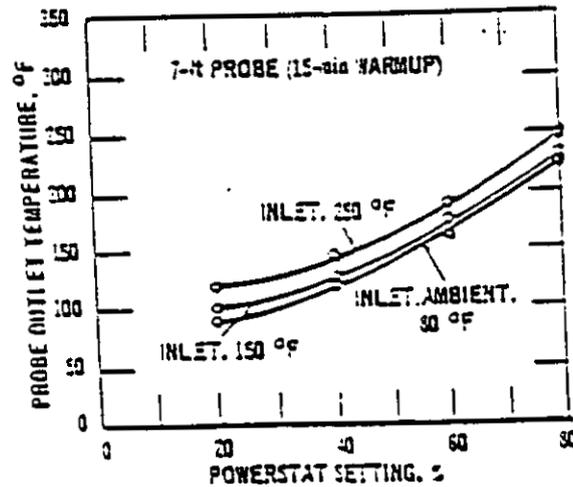
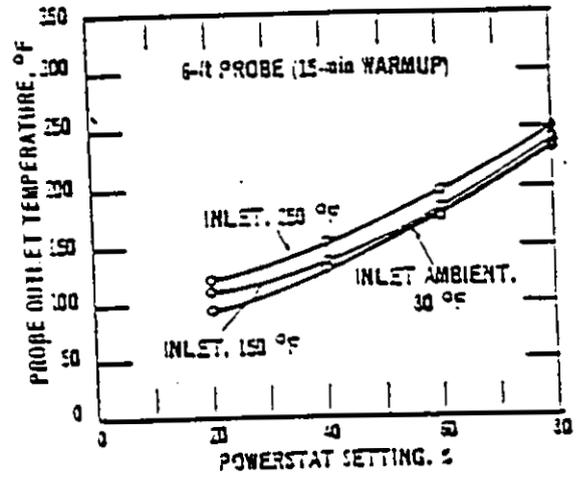
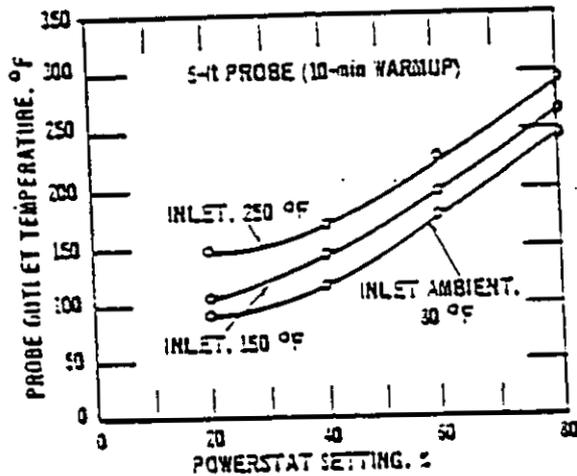
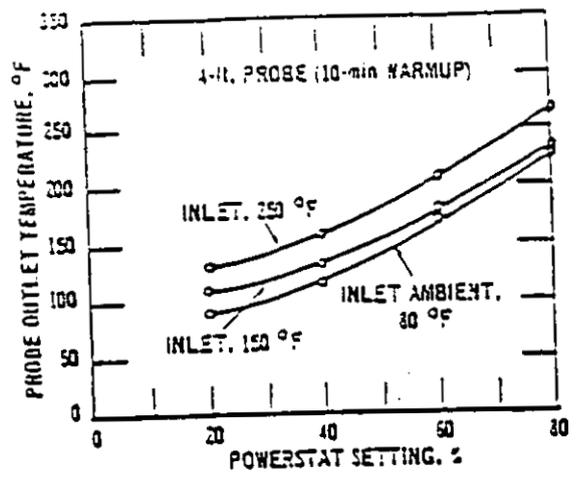
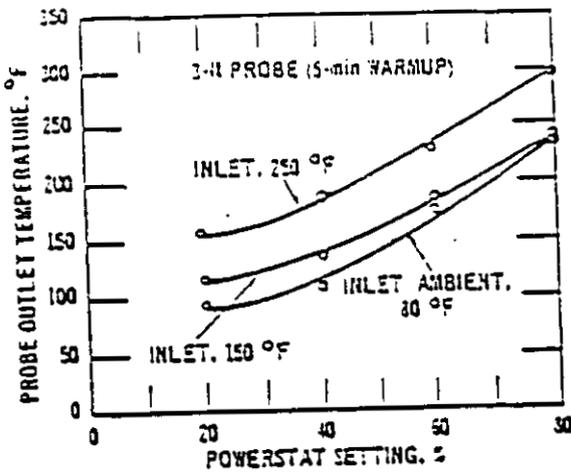
THERMOCOUPLE CALIBRATION

SOURCE (SPECIFY)	ASOM GLASS THERMOMETER WITH MERCURY (°F)	PYROMETER (°F)	DEGREE DIFFERENCE	PERCENT DIFFERENCE
ICE BATH	<u>42</u>	<u>42</u>	<u>0</u>	<u>0</u>
AMBIENT	<u>78</u>	<u>78</u>	<u>0</u>	<u>0</u>
HOT OVEN	<u>402</u>	<u>400</u>	<u>2</u>	<u>0.38</u>

FDER - MAXIMUM 5° DIFFERENCE

CALIBRATED BY: Sid Carter

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



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

Probe temperatures.

APPENDIX F
PROJECT PARTICIPANTS

PROJECT PARTICIPANTS

AIR CONSULTING AND ENGINEERING, INC.

Stephen L. Neck, P.E.
Project Manager

Early McFarland
Field Participant

Gerard Gauthreaux
Field Participant

Christy Neck
Laboratory Analysis

Dagmar Neck
Report Preparation

Candace V. Taylor
Document Production

KLEEMAN ENGINEERING

Frank Kleeman
Coordinator

FDER

Ken Tucker
Test Observer