Background Report Reference

AP-42 Section Number: 9.10.1.1

Background Chapter: 4

Reference Number: 2

Title: Emission Compliance Tests, Char Dust Collector #1 and #4 ACM Mill Exhaust, Domino Sugar Corporation, Chalmette Refinery, Arabi, LA

Emission Testing Service

Emission Testing Service

January 1997

DOMINO SUGAR CORPORATION
CHALMETTE REFINERY
7417 NORTH PETERS STREET
ARABI, LOUISIANA 70032

EMISSION COMPLIANCE TESTS

CHAR DUST COLLECTOR #1 and #4 ACM MILL EXHAUST

JANUARY 27-28, 1997

Testing conducted by :

E T S

EMISSION TESTING SERVICES, INC.

P.O. BOX 15075

BATON ROUGE, LOUISIANA 70895

(504) 925-8405

File : 97010

Rec'd 4/23/97

State of Louisiana

Department of Environmental Quality

M.J. "MIKE" FOSTER, JR.
GOVERNOR

J. DALE GIVENS
SECRETARY

Mr. Dallas Safreit
US EPA MD14
Research Triangle Park, North Carolina 27711

RE: Compliance Test, Domino Sugar, Louisiana

Dear Mr. Safreit:

The Louisiana Department of Environmental Quality received a request from you to forward a copy of the test report from Domino Sugar to include in your study. Enclosed in that copy. If you have any questions, please feel free to contact me at 504-765-0168.

Sincerely,

Jim Courville

Jim Courville, PE
Engineering Section

JC/eaa

EMISSION TEST REPORT CERTIFICATION

for

DOMINO SUGAR CORPORATION

CHALMETTE REFINERY

EMISSION COMPLIANCE TESTS

CHAR DUST COLLECTOR #1 and
#4 ACM MILL EXHAUST

JANUARY 27-28, 1997

Testing conducted by :

EMISSION TESTING SERVICES, INC.

I certify that I have personally examined and am familiar with the information submitted herein, and based on my inquiries of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete.

Terry King
Domino Sugar Corporation
Plant Representative

Kevin Thibodeaux
Emission Testing Services, Inc.
Project Leader

Barry Gipson
Emission Testing Services, Inc.
Manager

CONTACT REPORT--MRI Project No. 4604-04

From: Brian Shrager, Environmental Engineering Department

Date of Contact: May 8, 1997

Contacted by: Telephone

Company/Agency: Domino Sugar Corporation
7417 North Peters Street
Arabi, LA 70032-1598

Telephone Number: (504) 271-5331

Person(s) Contacted/Title
Mr. Terry King

CONTACT SUMMARY: Mr. King was initially contacted in April 1997 to obtain process data for a test report that was supplied to EPA by the State of Louisiana Department of Environmental Quality. During the initial conversation with Mr. Tom Lapp of MRI, Mr. King stated that process data are not available for one of the sources, the confectioners sugar mill, that was tested. He also stated that he may be able to track down process data for the char dust collector emission test. Mr. King left a voice mail today stating that during the emission test, 15401.1 lb/hr of char went past the char dust collector. I called Mr. King back for clarification of the process and process rate, and he stated that the process rate represents the amount of char (that has come out of the kiln) transferred from a bucket elevator to a belt conveyor. The process that was tested is basically a conveyor transfer point, and does not include any kiln emissions. The belt conveyor conveys the char back to the filters that are used in decolorization.

DOMINO SUGAR CORPORATION

CHALMETTE REFINERY

EMISSION COMPLIANCE TESTS

CHAR DUST COLLECTOR #1 and
#4 ACM MILL EXHAUST

JANUARY 27-28, 1997

TABLE of CONTENTS

LIST of TABLES

LIST of FIGURES

I. INTRODUCTION

Emission Testing Services, Inc. (ETS) was contracted by Domino Sugar Corporation to conduct emission testing at Domino Sugar Corporation's Chalmette Refinery. Emissions from the Char Dust Collector #1, source ID 028-74; and #4 ACM Mill Exhaust, source ID 016-74 were tested to determine the rate of particulate emissions. Tests were conducted to demonstrate compliance with permit number 2500-00009-03 issued by the Louisiana Department of Environmental Quality (LDEQ).

Particulate emission rates were tested using EPA Method 5. EPA Methods 1 - 4 were used to determine the number and location of sample points, and the velocity, moisture, molecular weight, and volumetric flow rate of the stack gas.

The emission test team consisted of Kevin Thibodeaux, project leader, and a test crew consisting of Ryan Deaville and Jeff Savoie. Terry King represented Domino Sugar Corporation and coordinated testing with plant operations. The LDEQ was not represented on-site during the tests.

Emission tests on the Char Dust Collector #1 were conducted on January 27, 1997. Emission tests on the #4 ACM Mill Exhaust were conducted on January 28, 1997. Three, 1-hr test runs were conducted on each source.

II. SUMMARY

Emission tests were conducted on the Char Dust Collector #1 on January 27, 1997. Results of the tests indicate that particulate emissions are in compliance with permit limits. Particulate emissions averaged 2.000 lb/hr which is lower than the permit limit of 2.2 lb/hr. Test results are presented in Table I.

The #4 ACM Mill Exhaust was tested on January 28, 1997. Results of the tests indicate that particulate emissions are not in compliance with permit limits. Particulate emissions averaged 0.449 lb/hr which exceeds the permit limit of 0.04 lb/hr. A summary of test results is presented in Table II.

During tests on the #4 ACM Mill Exhaust, test personnel noted a residue buildup on the inside walls of the stack which reduced the stack ID. This did not have an affect on the particulate emission tests. A physical obstruction blocked one test port however, which resulted in a modification of the test method. Samples were collected from only one test port with samples collected from four traverse points while traversing into the stack and then from four points while traversing out of the stack.

EPA methods were used to determine all pollutant and stack gas data. All deviations from the test methods and unusual conditions have been noted above.

TABLE I
EMISSION TEST RESULTS SUMMARY

DOMINO SUGAR CORPORATION
CHALMETTE REFINERY

CHAR DUST COLLECTOR #1
(source ID 028-74)

PARAMETER	Permit Limit Max./Avg.	RUN 1	RUN 2	RUN 3	AVERAGE
DATE		1-27-97	1-27-97	1-27-97	
TIME		1102-1205	1241-1342	1415-1517	
PARTICULATE[1]					
grain/dscf		0.00533	0.02928	0.33309	0.12257
lb/hr	2.3/2.2	0.083	0.459	5.458	2.000
STACK GAS					
Oxygen, vol%		20.9	20.9	20.9	20.9
Carbon dioxide, vol %		0.0	0.0	0.0	0.0
Temperature, F		74	74	78	75
Moisture, vol %		2.24	2.23	1.78	2.08
Velocity, ft/sec		10.13	10.26	10.72	10.37
Flow rate, acfm		1869.6	1894.3	1979.0	1914.3
dscfm		1812.5	1827.1	1911.5	1850.4

(1) Particulate samples were collected isokinetically to avoid bias due to particle size and density. The degree of which the actual sampling rate deviated from the ideal isokinetic sampling rate has been reported as a percentage of the ideal rate - 100% being ideal. The range of acceptable deviation is 90% to 110%. Sampling rates during the tests were; Run 1 - 89.43%; Run 2 - 98.92%, Run 3 - 86.57%.

TABLE II
EMISSION TEST RESULTS SUMMARY

DOMINO SUGAR CORPORATION
CHALMETTE REFINERY

#4 ACM MILL EXHAUST
(source ID 016-74)

PARAMETER	Permit Limit Max./Avg.	RUN 1	RUN 2	RUN 3	AVERAGE
DATE		1-28-97	1-28-97	1-28-97	
TIME		0907-1007	1051-1151	1228-1328	
PARTICULATE[1]					
grain/dscf		0.08978	0.02165	0.01394	0.04179
lb/hr	0.04	0.949	0.242	0.156	0.449
STACK GAS					
Oxygen, vol%		20.9	20.9	20.9	20.9
Carbon dioxide, vol %		0.0	0.0	0.0	0.0
Temperature, F		121	122	118	120
Moisture, vol %		8.47	1.67	1.69	3.94
Velocity, ft/sec		41.14	40.37	40.23	40.58
Flow rate, acfm		1484.2	1456.5	1451.5	1464.1
dscfm		1233.5	1305.2	1307.9	1282.2

(1) Particulate samples were collected isokinetically to avoid bias due to particle size and density. The degree of which the actual sampling rate deviated from the ideal isokinetic sampling rate has been reported as a percentage of the ideal rate - 100% being ideal. The range of acceptable deviation is 90% to 110%. Sampling rates during the tests were; Run 1 - 94.55%; Run 2 - 97.12%, Run 3 - 98.77%.

QUALITY ASSURANCE/ QUALITY CONTROL

Test results have been validated by following rigorous quality assurance (QA) and quality control (QC) programs. These programs ensure that the test data are representative of the source conditions by verifying the completeness, accuracy, and precision of the test data. QA/QC functions cover all aspects of the test including field testing, sampling, and analysis, sample transport and laboratory analysis, and data processing and reporting.

Emission testing at Domino Sugar Corporation included a series of QC functions. All QC functions were completed satisfactorily within the required limits.

Emission Testing Services's QA program includes participation in EPA's quarterly audits. Results of the audits, applicable to the test methods applied during testing at Domino Sugar Corporation, were within acceptable limits.

PROCESS DESCRIPTION

DOMINO SUGAR CORPORATION
CHALMETTE REFINERY

Domino Sugar Corporation's Chalmette Refinery currently produces refined granulated sugar, confectionery sugar, blackstrap molasses, and several specialty products. Raw cane sugar, received by ship, barge, truck, and rail, is stored in sheds until processed. Raw sugar is refined through the processes of affination, carbonotation, press filtration, bone char decolorization, crystallization, and centrifugation. The drying operation of countercurrent flows of hot air and sugar creates dust which is recovered by cyclonic gravimetric separation and wet scrubbing.

Powdered sugars are produced by pulverizing granulated sugar along with cornstarch (or, in the case of a specialty product, malto-dextrin) in a rotary mill. The product is collected in a modified baghouse which also acts as an emissions control device.

Boilers No. 1 and 7 are natural gas fired boilers with maximum heat inputs of 78.2 MMBtu/hr and 151.3 MMBtu/hr respectively. The High Pressure Boilers, which exhaust to atmosphere through a common stack, are five identical natural gas fired boilers having a maximum heat input of 56.9 MMBtu/hr each. During normal operation, only four of the five boilers are fired.

The Char Kilns North are 18 identical kilns, each having a maximum heat input of 1.7 MMBtu/hr. During normal operation, only 14 of the 18 kilns are fired. The Char Kilns South are 6 identical kilns, each having a maximum heat input of 1.7 MMBtu/hr. During normal operation, only 4 of the 6 kilns are fired.

Following are schematics and brief process descriptions for the Char Dust Collector #1 (Figure I) and #4 ACM Mill (Figure II).

Domino Sugar Corporation
Process Descriptions

Char Dust Collector #1

The char dust collectors are gravity collectors that are 80-95% efficient. They remove dust from bucket elevators utilized to transport char from the 1st floor of the filter to the 8th floor.

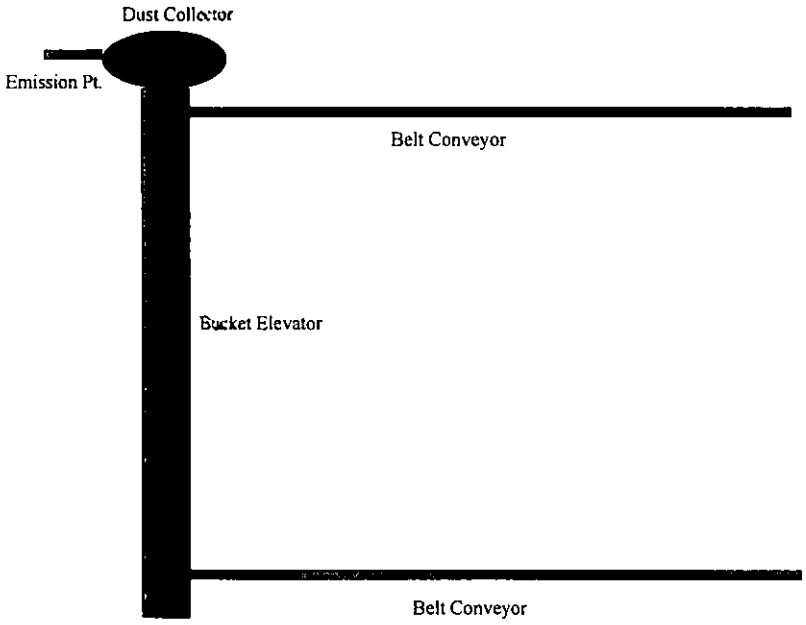


FIGURE 1

#4 ACM Mill

The ACM Mills are used to make and collect confectioner's, or powdered, sugar by employing a hammer-mill and fabric filters. The emissions are from the baghouse that collects the sugar. It is a product recovery system.

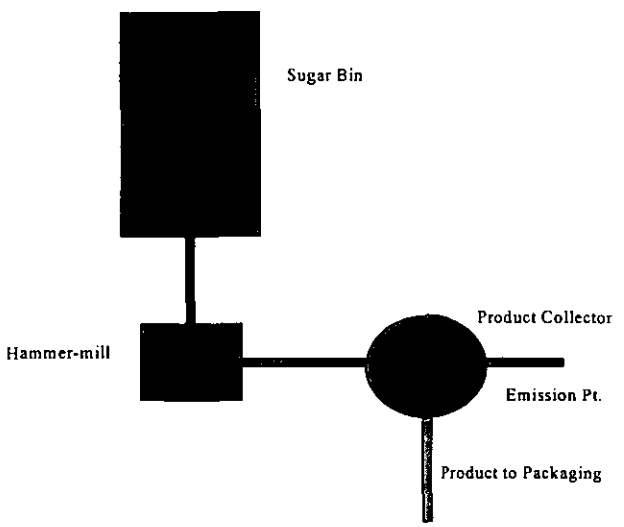


FIGURE II

III. PROCEDURE

Emissions tests were conducted following EPA methods documented in Title 40 of the Code of Federal Regulations, Part 60, Appendix A. A brief description of each method used follows.

EPA METHOD 1:
SAMPLE and VELOCITY TRAVERSES for STATIONARY SOURCES

Method 1 is applicable to stacks having a diameter greater than 12 in. The method recommends that sampling points be located 8 diameters downstream and 2 diameters upstream from the nearest flow disturbances; however, any distances greater than the minimum 2 diameters downstream and 0.5 diameters upstream are acceptable. These distances help insure the collection of a representative sample in the absence of cyclonic flow. Cyclonic flow is detected by measuring the stack gas flow Yaw angle at each test point. The average yaw angle is required to be less than 20 degrees.

The Char Dust Collector # 1 has a stack diameter of 23.75 in. The sampling point was located 3.24 stack diameters downstream and 1.16 stack diameters upstream from the nearest flow disturbances. Based on the upstream and downstream position of the sampling plane, 24 sample points were selected and laid-out on 2 perpendicular traverses (diameters) of the stack - 12 points per traverse. Access to the sample points was obtained via 2 ports through the stack wall. Cyclonic flow was not detected.

EPA METHOD 1A:
SAMPLE and VELOCITY TRAVERSES for STATIONARY SOURCES with SMALL STACKS or DUCTS

Method 1A is applicable to stacks with a diameter greater than 4 in. and less than 12 in. The method recommends that sampling points be located 8 diameters downstream and 2 diameters upstream from the nearest flow disturbances; however, any distances greater than the minimum 2 diameters downstream and 0.5 diameters upstream are acceptable. These distances help insure the collection of a representative sample in the absence of cyclonic flow. Cyclonic flow is detected by measuring the stack gas flow Yaw angle at each test point. Average yaw angle is required to be less than 20 degrees.

The #4 ACM Mill Exhaust has a stack diameter of 10.5 in. The sampling point was located 8.19 stack diameters downstream and 3.81 stack diameters upstream from the nearest flow disturbances. Based on the upstream and downstream position of the sampling plane, 8 sample points were selected and laid-out on 2 perpendicular traverses (diameters) of the stack - 4 points per traverse. Access to the sample points was obtained via 1 ports through the stack wall. The other port was physically obstructed. Tests were conducted by sampling four points in and four points out. Cyclonic flow was not detected.

EPA METHOD 2:
DETERMINATION of STACK GAS VELOCITY and VOLUMETRIC FLOW RATE (Type S pitot tube)

The average gas velocity in the stack was determined from the gas molecular weight, moisture content, and the average velocity head measured using a type S pitot tube. Volumetric flow rate was determined from the velocity and stack cross-sectional area.

EPA METHOD 3:
GAS ANALYSIS FOR CARBON DIOXIDE, OXYGEN, EXCESS AIR, and DRY MOLECULAR WEIGHT

The dry molecular weight of the stack gas was determined using an Orsat analyzer which measured the concentration of oxygen, carbon monoxide, and carbon dioxide. The remaining gas components were assumed to be nitrogen. A gas sample was removed from the centroid of the stack using a stainless steel probe fitted with a particulate filter. The probe, sample lines, and Orsat were purged sufficiently to obtain a representative grab sample for analysis.

EPA METHOD 4:
DETERMINATION of MOISTURE CONTENT in STACK GASES

A gas sample was extracted from the stack using a heated glass probe fitted with a particulate filter. Sample gas passed from the probe, through a series of four impingers immersed in an ice bath. The first two impingers contained known weights of water, the third was empty, and the fourth contained a known weight of silica gel. Any water vapor in the gas stream was condensed and trapped in the impingers.

EPA METHOD 5:
DETERMINATION of PARTICULATE EMISSIONS FROM STATIONARY SOURCES

Particulate samples were collected from the source isokinetically to insure that a representative sample of particulate was collected without bias due to particle size or density. During ideal isokinetic sampling conditions, the velocity of the gas entering the probe nozzle equals the velocity of the stack gas. The degree at which the actual sampling rate deviated from the ideal sampling rate was calculated as a percentage of the ideal isokinetic sampling rate with 100% being ideal. The range of acceptable sampling rates is 90 - 110% of the ideal isokinetic rate.

Sample gas was collected from the source using a heated probe and was transferred through a sample line to a heated glass fiber filter. The filter collected particulate and any other material which condensed at or above the filtration temperature. After filtration, the gas passed through an impinger train immersed in an ice bath. The train consisted of two impingers containing known weights of DI water, one empty impinger, and one impinger packed with a known weight of silica gel. Sample flow rate was established using a diaphragm pump and was controlled using a valve. A calibrated dry gas meter was used to determine the total gas sample volume.

After sampling, the filter was recovered from the filter holder. The front half of the filter holder and probe were washed and the washings were collected as the probe wash sample. Sample containers were labeled and sealed for shipment to the laboratory for analyses.

IV. ANALYTICAL TECHNIQUE

All sample analyses were conducted following EPA methodology. Presented below are brief descriptions of each method used.

EPA METHOD 5:
DETERMINATION of PARTICULATE EMISSIONS FROM STATIONARY SOURCES

The particulate filter was oven conditioned at 350 F and weighed before and after sampling. The filter weight gain represented the particulate catch on the filter. The probe wash sample was analyzed for total solids content by gravametric analyses. An aliquot of the sample was placed into a tared flask and evaporated to dryness. The weight of the residue, corrected for sample volume and wash blank, represented the probe wash catch.

V. CHAIN of CUSTODY

For all samples transported to the laboratory for analyses, a Chain of Custody form was prepared during the sample recovery process. The sample ID, number of samples, liquid level when applicable, name of the sample recovery supervisor, name of the person responsible for sample recovery, and the signature of the sample trustee were recorded on the form.

During all subsequent handling, the custody form accompanied the samples. As personnel relinquished responsibility for the samples, the receiving sample trustee verified the number and integrity of the samples and signed the custody form.

Upon receipt at the analytical laboratory, the lab sample trustee verified the number, type, and integrity of the samples. These data were recorded on the custody form along with the date of receipt and lab sample trustee's signature.

At the time of analyses, the laboratory analyst recorded the analyses date and the laboratory supervisors name on the custody form. The analyst signed the custody form and attached it to the analytical results.

Chain of Custody forms for samples collected during testing are presented on the following pages along with the Analytical Request forms.

ETS
EMISSION TESTING SERVICES, INC.

ANALYTICAL REQUEST FORM

Laboratory Receiving Samples Chemtex

Date Submitted/Submitted by: 1/30/97 / Ryan Deaville

CLIENT Domino Sugar

Date of Collection 1/27/97

Data Number

Source Identification Dust Collector / ACM Vent

Parameters To Be Performed Total Solids

Sample Preservative (Media) Acete Refrigerated ✓

Not Refrigerated

Total Numbers of Samples 6

Total Numbers of Blanks 1

Other Spikes, Etc.

Date Analyzed 2/4/97

Analyst S.R.KOR

Report Date 2/5/97

Report Sample Data Number B7010168

Comments

\FORM\ANALREQ

EMISSION TESTING SERVICES, INC.
CHAIN OF CUSTODY
SAMPLE RECOVERY AND INTEGRITY DATA

CLIENT Domino Sugar SOURCE ID Dust Collector

FIELD DATA CHECKS

Field Sample Recovery Supervisor: Kevin Thibodeaux

Field Person Responsible for Recovered Samples: Ryan Deville

SAMPLE NUMBER	SAMPLE I.D.	DATE OF RECOVERY	LIQUID LEVEL MARKED	STORED IN LOCKED CONTAINER
37[illegible]017[illegible]	Run - 1	Probe Wash W/Acetone	1/27/97	✓	✓
B7[illegible]017H	Run - 2	Probe Wash W/Acetone	1/27/97	✓	✓
37[illegible]0173	Run - 3	Probe Wash W/Acetone	1/27/97	✓	✓
37[illegible]017[illegible]		Mark.			

SIGNATURE OF FIELD SAMPLE TRUSTEE Ryan Deville

LABORATORY DATA CHECKS

SIGNATURE OF LAB SAMPLE TRUSTEE [signature] DATE 1-31-97 8:00AM

DATE LAB REC'D SAMPLES 1/31/97 LAB SUPERVISOR SIGNATURE AVReddy

SAMPLE I.D.	SAMPLE I.D.	DATE OF ANALYSIS	LIQUID AT MARKED LEVEL	SAMPLE IDENTIFIED
1	Run 1 Probewash	2/4/97	✓	✓
2	Run 2 Probewash	"	✓	✓
3	Run 3 Probewash	"	✓	✓
4	Blank	"	✓	✓

ANALYST SIGNATURE [signature] DATE 2/5/97

EMISSION TESTING SERVICES, INC.
CHAIN OF CUSTODY
SAMPLE RECOVERY AND INTEGRITY DATA

CLIENT Domino Sugar SOURCE ID ACM Vent

FIELD DATA CHECKS

Field Sample Recovery Supervisor: Kevin Thibodeaux

Field Person Responsible for Recovered Samples: Ryan Deaville

SAMPLE NUMBER	SAMPLE I.D.	DATE OF RECOVERY	LIQUID LEVEL MARKED	STORED IN LOCKED CONTAINER
BJ10168 Run - 1	Probe Wash W/Acetone	1/28/97	✓	✓
BJ10169 Run - 2	Probe Wash W/Acetone	1/28/97	✓	✓
BJ10170 Run - 3	Probe Wash W/Acetone	1/28/97	✓	✓

SIGNATURE OF FIELD SAMPLE TRUSTEE Ryan Deaville

LABORATORY DATA CHECKS

SIGNATURE OF LAB SAMPLE TRUSTEE [signature] DATE 1-30-97 Sick'em

DATE LAB REC'D SAMPLES 1/30/97 LAB SUPERVISOR SIGNATURE [signature] ✓

SAMPLE I.D.	SAMPLE I.D.	DATE OF ANALYSIS	LIQUID AT MARKED LEVEL	SAMPLE IDENTIFIED
1	Run 1 Probe wash	2/4/97	✓	✓
2	Run 2 Probe wash	"	✓	✓
3	Run 3 Probe wash	"	✓	✓

ANALYST SIGNATURE [signature] DATE 2/5/97

\FORMS\CHN-CUST

EMISSION TESTING SERVICES, INC.
CHAIN OF CUSTODY
SAMPLE RECOVERY AND INTEGRITY DATA

CLIENT Domino Sugar SOURCE ID Char Dust collector

FIELD DATA CHECKS

Field Sample Recovery Supervisor: Kevin Thibodeaux

Field Person Responsible for Recovered Samples: Ryan Deaville

SAMPLE NUMBER	SAMPLE I.D.	DATE OF RECOVERY	LIQUID LEVEL MARKED	STORED IN LOCKED CONTAINER
Run #1	Dust Collector	1-27-97	N/A	✓
Run #2	" "	"		
Run #3	" "	"		

SIGNATURE OF FIELD SAMPLE TRUSTEE [signature]

LABORATORY DATA CHECKS

SIGNATURE OF LAB SAMPLE TRUSTEE Fred Dowling DATE 1-30-97

DATE LAB REC'D SAMPLES 1-30-97 LAB SUPERVISOR SIGNATURE Fred Dowling

SAMPLE NUMBER	SAMPLE I.D.	DATE OF ANALYSIS	LIQUID AT MARKED LEVEL	SAMPLE IDENTIFIED
Run #1	3021 BC Collector	2-10-97		2-10-97 fp
2	3023			
3	3022			

ANALYST SIGNATURE Fred Dowling DATE 2-10-97

\FORMS\CHN-CUST

EMISSION TESTING SERVICES, INC.
CHAIN OF CUSTODY
SAMPLE RECOVERY AND INTEGRITY DATA

CLIENT Domino Sugar SOURCE ID ACM Vent

FIELD DATA CHECKS

Field Sample Recovery Supervisor: Kevin Thibodeaux

Field Person Responsible for Recovered Samples: Ryan Deaville

SAMPLE NUMBER	SAMPLE I.D.	DATE OF RECOVERY	LIQUID LEVEL MARKED	STORED IN LOCKED CONTAINER
Run #1	ACM Vent	1-28-97	N/A	✓
Run #2	" "	"	↓	↓
Run #3	" "	"		

SIGNATURE OF FIELD SAMPLE TRUSTEE [signature]

LABORATORY DATA CHECKS

SIGNATURE OF LAB SAMPLE TRUSTEE Fred Dowling DATE 1-30-97

DATE LAB REC'D SAMPLES 1-30-97 LAB SUPERVISOR SIGNATURE Fred Dowling

SAMPLE NUMBER	SAMPLE I.D.	DATE OF ANALYSIS	LIQUID AT MARKED LEVEL	SAMPLE IDENTIFIED
Run #4	3024 ACM Vent	2-10-97		✓
1	3025 "	↓		↓
2	3026 "	↓		↓
3				

ANALYST SIGNATURE Fred Dowling DATE 2-10-97

\FORMS\CHN-CUST

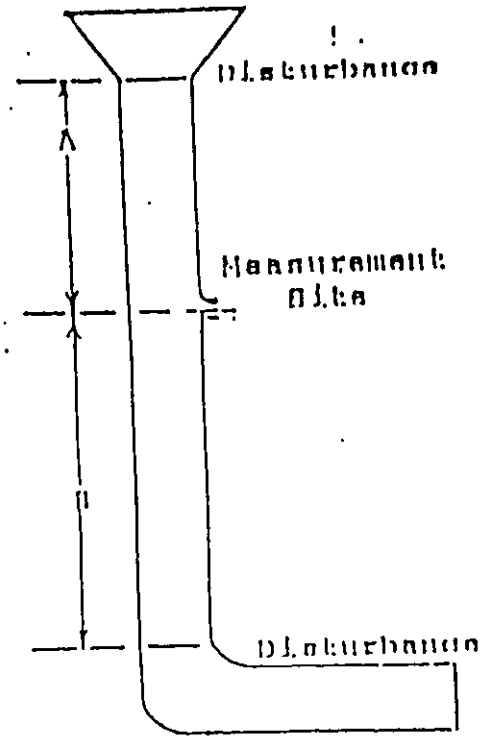
VI. TEST DATA and CALCULATIONS

All emission test field data, unit operations data, and laboratory data are presented in this section along with the associated data reduction calculations.

Data from the field data forms were manually input into a computer for data processing and calculations. Integrity of data input is maintained by using a double entry system. The computer performed all calculations and produced the calculations and results summary pages. Input data accuracy were further verified by comparison of raw field data to the computer data printed on the summary pages. Computer program integrity and calculations verification are validated by processing a known set of data. Further controls on the computer program are conducted by comparison of manual spot calculations of the raw data input to computer calculations results.

ETS

EMISSION TESTING SERVICES, INC.
Traverse Point Layout



Client Domino Sugar

Date 1/27/97

Unit Tested CHAR Dust collector #1

Location Arabi, NO. LA.

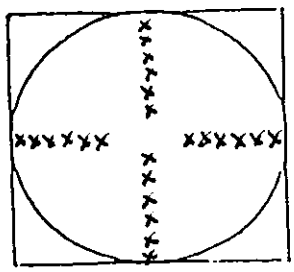
Upstream Distance (A) 27.5"

Downstream Distance (B) 77"

Inside Diameter 23.75"

Coupling Length 7.75"

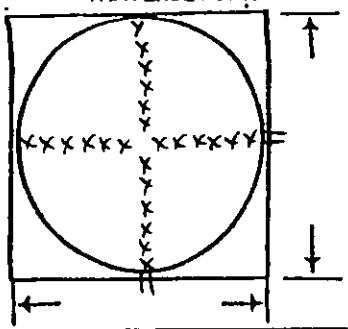
Coupling Type 3" male

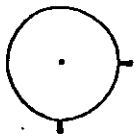


Cross Section Schematic of Stack

Traverse Point	Distance % of Diameter		Stack Diameter		Coupling Length		Traverse Points
1	0.021	X	23.75"	+	7.75"	=	8.25
2	0.067						9.34
3	0.118						10.55
4	0.177						11.95
5	0.250						13.69
6	0.356						16.20
7	0.644						23.04
8	0.750						25.56
9	0.823						27.30
10	0.882						28.70
11	0.933		6.1.1				29.91
12	0.979		23.75"		7.75"		31.00

CROSS SEC.. . NAL SCHEMATIC OF STACK
TRAVERSE POINT LAYOUT





E T S FIELD DATA, METHOD(S) 1-5

PLANT Domino Sugar
DATE 1-27-97
LOCATION Arabie, LA
OPERATOR J. Savoie
STACK NO. C. Dust Collector #1 Page 1 of 2
RUN NO. 1

SAMPLE BOX NO. BJ
METER BOX NO. 10
AMBIENT TEMPERATURE 69
BAROMETRIC PRESSURE 30.03
FILTER T[redacted] # 3021
NOZZLE DIAMETER, in. 0.4099

STACK DIAMETER, In. 23.75"
PITOT TUBE NO. P-3-1
PITOT FACTOR 0.834
METER ΔH@ 1.7089
D.G.M.C. FACTOR 1.0231
K FACTOR 23.7774
T= 12554.5004

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in.H2O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
1 on@	11:02.5	-0.005	73	.050	.223	1.200	1.178	749.200	87	89	249	50°	3.5
2	11:05		75	.040	.200	0.940	0.938	750.735	88	90	248	50	3.0
3	11:07.5		74	.035	.187	0.820	0.822		89	90	250	49	3.0
4	11:10		77	.015	.122	0.350	0.350	753.380	91	91	251	50	1.5
5	11:12.5		74	.020	.141	0.470	0.470	754.280	90	90	252	51	1.5
6	11:15		74	.020	.141	0.470	0.470	755.225	91	90	252	51	2.0
7	11:17.5		74	.025	.158	0.590	0.587	756.175	92	91	252	52	2.0
8	11:20		75	.035	.187	0.820	0.821	757.240	93	91	253	52	3.0
9	11:22.5		73	.035	.187	0.820	0.824	758.485	94	90	253	52	3.0
10	11:25		74	.040	.200	0.940	0.940	759.600	93	89	253	52	3.0
11	11:27.5		73	.040	.200	0.940	0.942	761.120	95	90	253	53	3.0
12	11:30		73	.040	.200	0.940	0.942	762.475	95	91	254	53	3.0
off@	11:32.5							763.839					
13 on@	11:35		75	.025	.158	0.585	0.585	763.840	91	88	252	54	2.5
14	11:37.5		74	.020	.141	.470	.470	764.990	89	86	253	54	2.0
15	11:40		76	.010	.100	.235	.234	765.895	90	90	252	54	1.5
AVERAGE	10min	-0.005	74		0.180	.7975		29.330	.90				

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS			15.3
FINAL	545.3	576.3	469.8	696.1
INITIAL	541.0	573.9	469.4	689.1
WEIGHT COLLECTED				

ORSAT MEASUREMENT

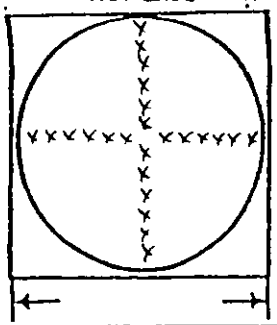
	CO2	O2	CO	N2
1	0.0	20.9		
2				
3				

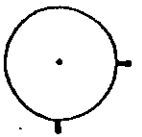
COMMENTS:

PRE-LEAK CHECK GOOD @ 0.008 CFM @ 12" Hg
POST-LEAK CHECK GOOD @ 0.005 CFM @ 10" Hg

6.1.2

CROSS SECTIONAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT





ETS FIELD DATA, METHOD(S) 1-5

PLANT Domino Sugar
DATE 1-27-97
LOCATION Arabie, LA
OPERATOR J. Savoie
STACK NO. C. Dust Collector #1
RUN NO. 81 page 2 OF 2

SAMPLE BOX NO. BJ
METER BOX NO. 10
AMBIENT TEMPERATURE 69
BAROMETRIC PRESSURE 30.03
FILTER TARE wt mg #3021
NOZZLE DIAMETER, in. 0.4099

STACK DIAMETER, in. 23.25
PITOT TUBE NO. P-3-1
PITOT FACTOR 0.834
METER Δ H@ 1.7089
D.G.M.C. FACTOR 1.0231
K FACTOR 23.7774
T→ 12554.5004

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in.H2O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	VELOCITY HEAD (√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H2O ACTUAL	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H2O DESIRED	GAS SAMPLE VOLUME (Vm), ft3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tm in), °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET (Tm out), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
16	11:42.5		74	.010	.100	.235	.235	766.795	88	85	254	55	1.5
17	11:45		73	.025	.158	.590	.588	767.255	88	86	254	56	2.5
18	11:47.5		75	.040	.200	.940	.938	768.315	91	86	254	56	3.0
19	11:50		76	.040	.200	.935	.936	769.655	92	89	253	56	3.0
20	11:52.5		73	.050	.223	1.20	1.177	771.040	93	87	254	56	3.5
21	11:55		75	.060	.244	1.40	1.407	772.525	93	87	253	57	4.0
22	11:57.5		74	.050	.223	1.15	1.175	774.195	92	87	253	57	3.5
23	12:00		75	.045	.212	1.05	1.055	775.675	92	87	253	57	3.5
24	12:02.5		75	.045	.212	1.05	1.055	777.100	92	89	253	57	3.0
off	12:05							778.530					
AVERAGE	60 min	0.005	74		0.180	.7975		29.330	90				

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS			15.3
FINAL	545.3	574.3	469.8	696.1
INITIAL	541.0	573.9	469.4	689.1
WEIGHT COLLECTED				

ORSAT MEASUREMENT

	CO2	O2	CO	N2
1	0.0	20.9		
2				
3				

COMMENTS:

PRE-LEAK CHECK GOOD @ 0.008 CFM@12" Hg
POST-LEAK CHECK GOOD @ 0.005 CFM@10" Hg

6.1.3

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : CHAR DUST COLLECTOR
Test Date : 1-27-97
Run No. : 1

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
F1 - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole

Pbar - Barometric pressure, in. Hg
Pa - Stack gas static pressure, in. H2O
Ps - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry scfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R

Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vw - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{ \frac{(Vi + Vii + Viii + Viv) R\ Tstd}{(453.6\ g/lb)\ Pstd\ MH2O} \right\} = \left\{ \frac{(\ 4.3 +\ 2.4 +\ .4 +\ 7.0)(21.85)(528)}{(453.6)(29.92)(18.02)} \right\} = .66514$$

$$Vmstd = Vm\ Y \left\{ \frac{(Pb + dH/ F1)\ Tstd}{Pstd\ \ Tm} \right\} = (29.329)(1.0231) \left\{ \frac{(30.030 +\ .7975/13.6)(528)}{(29.92)\ \ (550)} \right\} = 28.97078$$

$$Bws = \left\{ \frac{Vw}{Vw + Vmstd} \right\} = \left\{ \frac{(\ \ .66514)}{(\ \ .66514 + 28.97078)} \right\} = .0224$$

$$Md = (MCO2)(\%CO2) + (MO2)(\%O2) + (MN2)(\%N2)$$
$$= (44.01)(.000) + (32.00)(.209) + (28.01)(.791) = 28.844$$

$$Ms = Md (1 - Bws) + (MH2O\ Bws) = (28.844)(1 - .0224) + (18.02)(.0224) = 28.601$$

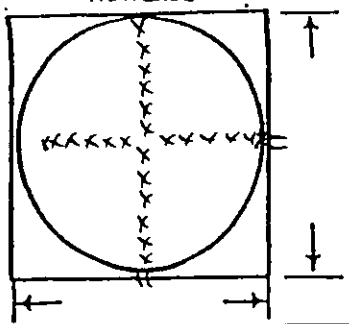
$$Vs = Kp\ Cp (dP)^{1/2} \left\{ \frac{Ts}{Ps\ Ms} \right\}^{1/2} = (85.49)(.8340)(\ \ .1801) \left\{ \frac{(\ 534)}{(30.030)(28.601)} \right\}^{1/2} = 10.1282$$

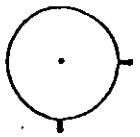
$$Acf = (60\ sec/min)(Vs\ \ A) \bullet (60)(10.1282)(\ \ 3.0765) = 1869.6$$

$$Qsd = (3600\ sec/hr)(1 - Bws)(Vs\ A) \left\{ \frac{Tstd\ Ps}{Ts\ Pstd} \right\}$$

$$= (3600)(1 - .0224)(\ 10.1282)(\ \ 3.0765) \left\{ \frac{(\ 528)(30.030)}{(\ 534\ \ )(29.92)} \right\} = 108752.8\ dscf/hr$$
$$= 1812.5\ dscf/min$$

CROSS SEC. . NAL SCHEMATIC OF STACK
TRAVERSE POINT LAYOUT





ETS FIELD DATA, METHOD(S) 1-5

PLANT Domino Sugar
DATE 1-22-97
LOCATION Arabie, LA
OPERATOR J. Savoie
STACK NO. C. Dust Collector #1 FILTER # [redacted] 3023
RUN NO. 2 page 1 of 2 NOZZLE DIAMETER, in. 0.4099

SAMPLE BOX NO. EE
METER BOX NO. 10
AMBIENT TEMPERATURE N/A
BAROMETRIC PRESSURE 30.01

STACK DIAMETER, in. 23.75
PITOT TUBE NO. P-3-1
PITOT FACTOR 0.834
METER Δ H@ 1.7089
D.G.M.C. FACTOR 1.0231
K FACTOR 28.0942

T = 15002.3166

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMP (T_s), °F	VELOCITY HEAD (ΔP_s)	($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (T_{min}), °F	OUTLET (T_{mout}), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge
1	12 41	on	71	0.015	0.122	0.420	0.423	778.800	86	84	247	55	0.8
2	1248.5		78	0.010	0.100	0.280	0.278	779.800	91	90	253	50	0.5
3	1246		75	0.010	0.100	0.280	0.273	780.535	87	83	250	49	0.5
4	1248.5		77	0.015	0.122	0.420	0.423	781.315	88	90	247	47	0.6
5	1251		78	0.035	0.187	0.990	0.975	782.210	89	85	248	47	1.0
6	1253.5		76	0.050	0.223	1.400	1.399	783.00	89	83	249	48	1.4
7	1256		78	0.060	0.244	1.700	1.673	785.185	90	88	253	49	1.8
8	1258.5		77	0.055	0.234	1.500	1.539	787.100	93	88	257	51	1.5
9	1301		79	0.045	0.212	1.300	1.252	788.730	87	86	249	50	1.2
10	1303.5		77	0.045	0.212	1.300	1.252	790.760	88	86	252	53	1.2
11	1306		77	0.070	0.264	2.00	1.955	792.000	89	87	257	52	3.0
12	1308.5		75	0.085	0.291	2.40	2.383	794.090	91	90	240	53	3.2
	1310.	off						796.178					
1	1312.5	on	77	.055	.234	1.55	1.536	796.178	86	85	244	53	2.5
2	13:15		79	.050	.223	1.40	1.391	797.915	90	86	244	54	2.0
3	13:17.5		76	.035	.187	.980	.979	799.570	91	87	245	54	2.0
AVERAGE	10 min	-0.005	77		.182	1.014		32.622		88.5			

6.1.5

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS 15.6			
FINAL	574.8	554.2	476.5	622.3
INITIAL	571.8	550.3	475.1	617.0
WEIGHT COLLECTED				
TOTAL WEIGHT				

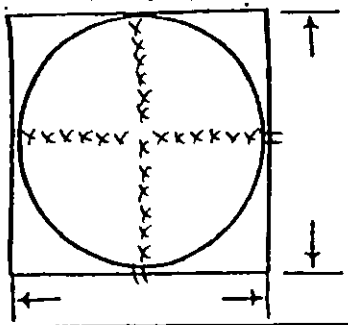
ORSAT MEASUREMENT

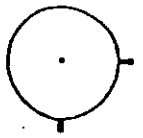
	CO_2	O_2	CO	N_2
1	0.0	20.9		
2				
3				

COMMENTS:

PRE-LEAK CHECK GOOD @ 10" Hg. - .005 CFM
POST-LEAK CHECK GOOD @ 0.001 CFM @ 10" Hg

CROSS SECTIONAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT





ETS FIELD DATA, METHOD(S) 1-5

PLANT Domino Sugar
DATE 1-27-97
LOCATION Arabie, LA
OPERATOR J. Savoie
STACK NO. C. Dust Collector #1
RUN NO. 2 page 2 OF 2

SAMPLE BOX NO. EE
METER BOX NO. 10
AMBIENT TEMPERATURE 71
BAROMETRIC PRESSURE 30.01
FILTER TARE wt mg # 3023
NOZZLE DIAMETER, in. 0.4099

STACK DIAMETER, in. 23.25
PITOT TUBE NO. P-3-1
PITOT FACTOR 0.834
METER ΔH@ 1.7089
D.G.M.C. FACTOR 1.0231
K FACTOR 28.0942

TRAVERSE POINT NUMBER	SAMPLING TIME (Θ), min.	STATIC PRESSURE (in.H2O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
4	13:20		77	.030	.173	.840	.838	801.000	89	86	245	54	2.0
5	13:22.5		75	.010	.100	.280	.280	802.300	90	87	245	54	1.0
6	13:25		77	.010	.100	.280	.279	803.050	90	87	247	54	1.0
7	13:27.5		78	.020	.141	.520	.557	803.800	90	89	247	55	1.5
8	13:30		77	.030	.173	.840	.838	804.800	90	90	248	55	2.0
9	13:32.5		77	.030	.173	.840	.838	806.075	92	91	248	55	2.0
10	13:35		78	.030	.173	.840	.836	807.375	92	91	249	56	2.0
11	13:37.5		78	.030	.173	.840	.836	808.670	91	90	249	56	2.0
12	13:40		77	.040	.200	1.10	1.117	809.975	91	90	249	56	2.0
9@	13:42.5							811.422					
AVERAGE	10 min	0.005	77		.182	1.014		32.622		88.5			

6.1.6

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS			15.6
				622.3
FINAL	576.8	554.2	476.5	638.0
INITIAL	571.8	550.3	475.1	617.0
WEIGHT COLLECTED				
TOTAL WEIGHT				

ORSAT MEASUREMENT

	CO2	O2	CO	N2
1	0.0	20.9		
2				
3				

COMMENTS:

PRE-LEAK CHECK GOOD @ 0.005 CFM@10" Hg
POST-LEAK CHECK GOOD @ 0.001 CFM@10" Hg

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : CHAR DUST COLLECTOR
Test Date : 1-27-97
Run No. : 2

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
F1 - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole

Pbar - Barometric pressure, in. Hg
Pa - Stack gas static pressure, in. H2O
Ps - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry scfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R

Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vw - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{\frac{(Vi + Vii + Viii + Viv)\ R\ Tstd}{(453.6\ g/lb)\ Pstd\ MH2O}\right\} = \left\{\frac{(5.0 + 3.9 + 1.4 + 5.3)(21.85)(528)}{(453.6)(29.92)(18.02)}\right\} = .73590$$

$$Vmstd = Vm\ Y \left\{\frac{(Pb + dH/F1)\ Tstd}{Pstd\ \ Tm}\right\} = (32.622)(1.0231)\left\{\frac{(30.010 + 1.0121/13.6)(528)}{(29.92)\ \ (549)}\right\} = 32.30350$$

$$Bws = \left\{\frac{Vw}{Vw + Vmstd}\right\} = \left\{\frac{(.73590)}{(.73590 + 32.30350)}\right\} = .0223$$

$$Md = (MCO2)(\%CO2) + (MO2)(\%O2) + (MN2)(\%N2)$$
$$= (44.01)(.000) + (32.00)(.209) + (28.01)(.791) = 28.844$$

$$Ms = Md\ (1 - Bws) + (MH2O\ Bws) = (28.844)(1 - .0223) + (18.02)(.0223) = 28.603$$

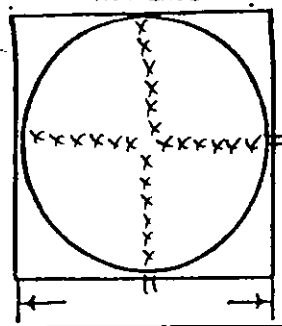
$$Vs = Kp\ Cp\ (dP)^{1/2}\left\{\frac{Ts}{Ps\ Ms}\right\}^{1/2} = (85.49)(.8340)(.1820)\left\{\frac{(537)}{(30.010)(28.603)}\right\}^{1/2} = 10.2625$$

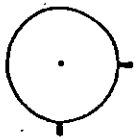
$$Acf = (60\ sec/min)(Vs\ \ A) = (60)(10.2625)(\ \ 3.0765) = 1894.3$$

$$Qsd = (3600\ sec/hr)(1 - Bws)(Vs\ A)\left\{\frac{Tstd\ Ps}{Ts\ Pstd}\right\}$$

$$= (3600)(1 - .0223)(\ 10.2625)(\ \ 3.0765)\left\{\frac{(528)(30.010)}{(\ 537\ )(29.92)}\right\} = 109627.8\ dscf/hr$$
$$= 1827.1\ dscf/min$$

CROSS SECTIONAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT





ETS FIELD DATA, METHOD(S) 1-5

PLANT Domino Sugar
DATE 1-27-97
LOCATION Arabia, LA
OPERATOR J. Savoie
STACK NO. C. Dust Collector #1
RUN NO. 3 page 1 OF 2

SAMPLE BOX NO. BJ
METER BOX NO. 10
AMBIENT TEMPERATURE 72
BAROMETRIC PRESSURE 29.98
FILTER TARE wt mg #3022
NOZZLE DIAMETER, in. 0.4099

STACK DIAMETER, in. 23.75
PITOT TUBE NO. P-3-1
PITOT FACTOR 0.834
METER Δ H@ 1.7089
D.G.M.C. FACTOR 1.0231
K FACTOR 28.1546

T→ 15119.0227

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in.H₂O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	VELOCITY HEAD (√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H₂O ACTUAL	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H₂O DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER °F	PUMP VACUUM in. Hg gauge
1 on @	14:15	-0.005	76	.020	.141	.565	.564	811.550	90	88	248	52	2.5
2	14:17.5		77	.020	.141	.565	.563	812.620	91	85	249	51	2.0
3	14:20		77	.015	.122	.420	.422	813.687	90	86	249	50	2.0
4	14:22.5		78	.010	.100	.280	.281	814.650	90	87	247	51	1.5
5	14:25		78	.010	.100	.280	.281	815.400	89	87	246	51	1.5
6	14:27.5		76	.010	.100	.280	.282	816.170	90	88	245	52	1.5
7	14:30		77	.055	.234	1.55	1.548	816.920	89	87	245	52	4.5
8	14:32.5		78	.060	.244	1.70	1.686	818.565	90	86	246	52	5.0
9	14:35		77	.075	.273	2.10	2.111	820.390	90	87	245	53	6.0
10	14:37.5		76	.070	.264	2.00	1.974	822.400	92	86	245	53	6.0
11	14:40		79	.070	.264	1.95	1.963	824.355	91	86	246	54	6.0
12	14:42.5		77	.075	.273	2.10	2.111	826.340	92	86	245	54	6.5
off @	14:45							828.279					
13 on @	14:47.5		80	.055	.234	1.55	1.539	828.279	90	89	247	53	5.0
14	14:50		79	.055	.234	1.55	1.542	830.000	91	89	249	55	5.0
15	14:52.5		78	.035	.187	.985	.983	831.755	94	90	251	55	3.5
AVERAGE	60 min	-0.005	78		.1897	1.10		34.006		90			

8.T.8 6.T.8

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS			12.9
FINAL	548.0	578.9	471.0	702.5
INITIAL	545.3	576.3	469.8	696.1
WEIGHT COLLECTED				
TOTAL WEIGHT				

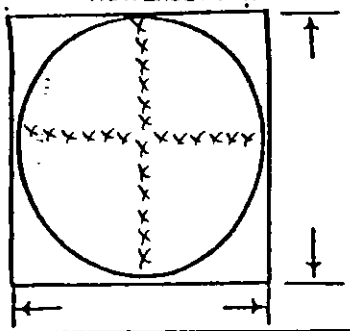
ORSAT MEASUREMENT

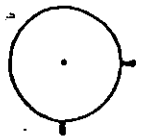
	CO₂	O₂	CO	N₂
1	0.0	20.9		
2				
3				

COMMENTS:

PRE-LEAK CHECK GOOD @ 0.000 CFM @ 11" Hg
POST-LEAK CHECK GOOD @ 0.000 CFM @ 10" Hg

CROSS SEC... NAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT





E T S FIELD DATA, METHOD(S) 1-5

PLANT Domino Sugar
DATE 1-27-97
LOCATION Arabi, LA
OPERATOR J. Savoie
STACK NO. C. Dust Collector #1
RUN NO. 3 page 2 OF 2

SAMPLE BOX NO. BJ
METER BOX NO. 10
AMBIENT TEMPERATURE 72
BAROMETRIC PRESSURE 29.98
FILTER TARE wt mg # 2022
NOZZLE DIAMETER, in. 0.4099

STACK DIAMETER, in. 23.25
PITOT TUBE NO. P-3-1
PITOT FACTOR 0.834
METER Δ H@ 1.7089
D.G.M.C. FACTOR 1.0231
K FACTOR 28.1546
T→ 15119, 0227

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in.H₂O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H₂O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
16	14:55		79	.030	.173	.840	.841	833.200	95	92	252	55	3.0
17	14:57.5		78	.026	.141	.560	.562	834.500	93	91	253	55	2.5
18	15:00		78	.020	.141	.565	.562	835.570	94	90	254	56	2.5
19	15:02.5		80	.035	.187	.980	.979	836.660	94	90	254	56	3.5
20	15:05		79	.040	.200	1.15	1.122	838.070	95	92	253	56	4.0
21	15:07.5		80	.040	.200	1.10	1.119	839.585	95	92	254	57	4.0
22	15:10		80	.040	.200	1.10	1.119	841.065	93	92	255	57	4.0
23	15:12.5		80	.035	.187	.980	.979	842.555	93	91	254	58	4.0
24	15:15		78	.045	.212	1.25	1.264	844.985	92	91	254	58	4.5
ff@	15:17.5							845.556					
AVERAGE	60 min	0.005	78		.1897	1.10		34.006	90				

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS			12.9
FINAL	548.0	578.9	471.0	702.5
INITIAL	545.3	576.3	469.8	696.1
WEIGHT COLLECTED				

ORSAT MEASUREMENT

	CO₂	O₂	CO	N₂
1	0.0	20.9		
2				
3				

COMMENTS:

PRE-LEAK CHECK GOOD @ 0.000 CFM @ 11" Hg
POST-LEAK CHECK GOOD @ 0.000 CFM @ 10" Hg

6.1.9

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : CHAR DUST COLLECTOR
Test Date : 1-27-97
Run No. : 3

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
F1 - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole

Pbar - Barometric pressure, in. Hg
Pa - Stack gas static pressure, in. H2O
Ps - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry scfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R

Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vw - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{\frac{(\ Vi + Vii + Viii + Viv\ )\ R\ Tstd}{(\ 453.6\ g/lb\ )\ Pstd\ MH2O}\right\} = \left\{\frac{(\ 2.7 + 2.6 + 1.2 + 6.4\ )(\ 21.85\ )(\ 528\ )}{(\ 453.6\ )(\ 29.92\ )(\ 18.02\ )}\right\} = .60854$$

$$Vmstd = Vm\ Y\left\{\frac{(\ Pb + dH/\ F1\ )\ Tstd}{Pstd\ \ Tm}\right\} = (\ 34.006\ )(\ 1.0231\ )\left\{\frac{(\ 29.980 + 1.1000/13.6\ )(\ 528\ )}{(\ 29.92\ )\ \ (\ 550\ )}\right\} = 33.54321$$

$$Bws = \left\{\frac{Vw}{Vw + Vmstd}\right\} = \left\{\frac{(\ \ .60854\ )}{(\ \ .60854 + 33.54321\ )}\right\} = .0178$$

$$Md = (\ MCO2\ )(\ \%CO2\ ) + (\ MO2\ )(\ \%O2\ ) + (\ MN2\ )(\ \%N2\ )$$
$$= (\ 44.01\ )(\ .000\ ) + (\ 32.00\ )(\ .209\ ) + (\ 28.01\ )(\ .791\ ) = 28.844$$

$$Ms = Md\ (\ 1 - Bws\ ) + (\ MH2O\ Bws\ ) = (\ 28.844\ )(\ 1 - .0178\ ) + (\ 18.02\ )(\ .0178\ ) = 28.651$$

$$Vs = Kp\ Cp\ (\ dP\ )^{1/2}\left\{\frac{Ts}{Ps\ Ms}\right\}^{1/2} = (\ 85.49\ )(\ .8340\ )(\ \ .1900\ )\left\{\frac{(\ 538\ )}{(\ 29.980\ )(\ 28.651\ )}\right\}^{1/2} = 10.7211$$

$$Acf = (\ 60\ sec/min\ )(\ Vs\ \ A\ ) = (\ 60\ )(\ 10.7211\ )(\ \ 3.0765\ ) = 1979.0$$

$$Qsd = (\ 3600\ sec/hr\ )(\ 1 - Bws\ )(\ Vs\ A\ )\left\{\frac{Tstd\ Ps}{Ts\ Pstd}\right\}$$

$$= (\ 3600\ )(\ 1 - .0178\ )(\ \ 10.7211\ )(\ \ 3.0765\ )\left\{\frac{(\ \ 528\ )(\ 29.980\ )}{(\ \ 538\ \ )(\ 29.92\ )}\right\} = 114688.6\ dscf/hr$$
$$= 1911.5\ dscf/min$$

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : CHAR DUST COLLECTOR
Test Date : 1-27-97
Run No. : 1

DETERMINATION OF PARTICULATE EMISSIONS

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (29.329)(1.0231) \frac{(528)}{(550.)} \frac{(30.03 + (.7975/13.6))}{(29.92)}$$

Vmstd = 28.97078

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (60)(1-Bws)}$$

$$I = \frac{(534.)(28.97078)(29.92)(100)}{528\ (10.1282)(.00091640)(60.)(30.030)\ 60\ (1 - .0224)}$$

I = 89.43

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : CHAR DUST COLLECTOR
Test Date : 1-27-97
Run No. : 1

DETERMINATION OF PARTICULATE EMISSIONS

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(7.71) -(.000)(35.0) = 7.710

---- Solids, filter ----

Mf = 2.3

---- Total Solids collected ----

Mn = Mp + Mf

= (7.710)+(2.3) = 10.010

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (10.010/ 28.97078)(0.01543)

= .00533

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (10.010)(2.2046 X 10-6)(108752.8) / (28.97078)

= .083

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : CHAR DUST COLLECTOR
Test Date : 1-27-97
Run No. : 2

DETERMINATION OF PARTICULATE EMISSIONS

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (32.622)(1.0231) \frac{(528)}{(549.)} \frac{(30.01 + (1.0121/13.6))}{(29.92)}$$

Vmstd = 32.30350

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (60)(1-Bws)}$$

$$I = \frac{(537.)(32.30350)(29.92)(100)}{528 (10.2625)(.00091640)(60.)(30.010)\ 60\ (1 - .0223)}$$

I = 98.92

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : CHAR DUST COLLECTOR
Test Date : 1-27-97
Run No. : 2

DETERMINATION OF PARTICULATE EMISSIONS

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(39.60) -(.000)(40.0) = 39.600

---- Solids, filter ----

Mf = 21.7

---- Total Solids collected ----

Mn = Mp + Mf

= (39.600)+(21.7) = 61.300

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (61.300/ 32.30350)(0.01543)

= .02928

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (61.300)(2.2046 X 10-6)(109627.8) / (32.30350)

= .459

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : CHAR DUST COLLECTOR
Test Date : 1-27-97
Run No. : 3

DETERMINATION OF PARTICULATE EMISSIONS

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (34.006)(1.0231) \frac{(528)}{(550.)} \frac{(29.98 + (1.1000/13.6))}{(29.92)}$$

Vmstd = 33.54321

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (60)(1-Bws)}$$

$$I = \frac{(538.)(33.54321)(29.92)(100)}{528 (12.1625)(.00091640)(60.)(29.980)\ 60\ (1 - .0178)}$$

I = 86.57

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : CHAR DUST COLLECTOR
Test Date : 1-27-97
Run No. : 3

DETERMINATION OF PARTICULATE EMISSIONS

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(298.80) -(.000)(90.0) = 298.800

---- Solids, filter ----

Mf = 425.3

---- Total Solids collected ----

Mn = Mp + Mf

= (298.800)+(425.3) = 724.100

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (724.100/ 33.54321)(0.01543)

= .33309

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (724.100)(2.2046 X 10-6)(114688.6) / (33.54321)

= 5.458

During sampling, particulate was collected in the probe wash and on the filter. The probe wash sample was transported to Chemtex's laboratory in Baton Rouge, Louisiana for analysis of total solids. The filter sample was transported to ETS' laboratory in Baton Rouge, Louisiana for analysis of total mass gain. Results of these analysis are presented on the following pages.

CHEMTEX
Environmental & Industrial Hygiene Services

16550 Highland Road, Baton Rouge, Louisiana 70810
(504) 752-5100 FAX (504) 753-1782

Client: **E T S Inc.**
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 2/6/97
Sample Source: Impingers
Date Collected: 1/27&28/97
Collected By: KT/RD
Date Received: 1/31/97
CHEMTEX FILE #: B7020168

RESULTS OF ANALYSIS

CLIENT: DOMINO SUGAR

Source Identification: ACM Vent & _C Dust Collector

CHEMTEX #	Sample Identification	Parameter	Sample Volume ml	Concentration mg/l	Results mg/sample
B7010168	Run-1 Probe Wash w/Acetone (1/28/97)	Total Solids	165	644	106.26
B7010169	Run-2 Probe Wash w/Acetone (1/28/97)	Total Solids	165	228	37.62
B7010170	Run-3 Probe Wash w/Acetone (1/28/97)	Total Solids	125	198	24.75
B7010171	Run-1 Probe Wash w/Acetone (1/27/97)	Total Solids	35	220	7.71
B7010172	Run-2 Probe Wash w/Acetone (1/27/97)	Total Solids	40	990	39.6
B7010173	Run-3 Probe Wash w/Acetone (1/27/97)	Total Solids	90	3,320	298.8
B7010174	Blank	Total Solids	---	< 2	-----

ACM Vent

CHAR Dust Collector

QC-Check Sample	True Value	Obtained Value
Total Solids (mg/l)	50	48/46*

* Duplicate Analysis

Parameter	Method Reference	Date Analyzed/Analysts
Total Solids	EPA Method 160.3	2/4/97 KR

Dr. C. N. Reddy, Ph.D, CIH, ASP
Director

pap/CNR

1

E T S

EMISSION TESTING SERVICES, INC.

FILTER WEIGHTS

CLIENT Domino Sugar

UNIT ID C Dust Collector TEST DATE 1-27-97

Filter Number	Sample ID	Initial Weight		Final Weight		Weight Gained
3021	Run #1	3.8417	3.8418	3.8439	3.8441	2.3
3023	#2	3.8631	3.8634	3.8655	3.8851	21.7
3022	#3	3.8056	3.8059	4.2316	4.2312	425.3

CLIENT Domino Sugar

UNIT ID ACM Vent TEST DATE 1-28-97

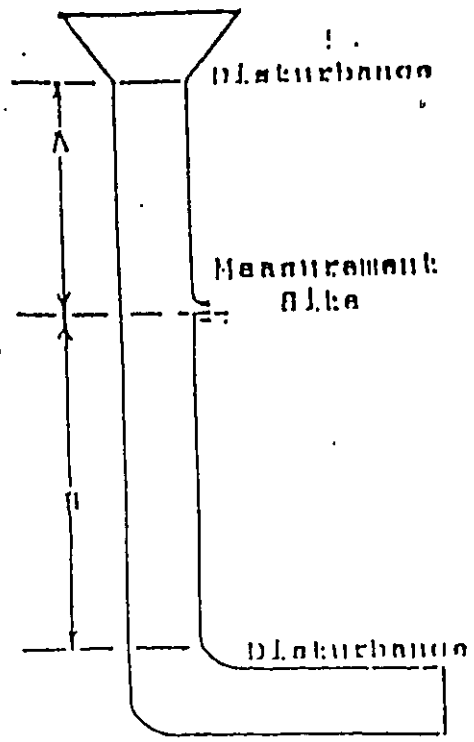
Filter Number	Sample ID	Initial Weight		Final Weight		Weight Gained
3024	Run 1	3.8850	3.8847	3.9703	3.9701	85.4
3025	2	3.8311	3.8313	3.8440	3.8439	12.6
3026	3	3.8272	3.8269	3.8350	3.8351	8.2

ANALYST Fred Bowling ANALYSIS DATE 2-10-97

FILE: C:\ETS\FORMS\FILT-PS

ETS

EMISSION TESTING SERVICES, INC.
Traverse Point Layout



Client Domino Sugar

Date 1-28-97

Unit Tested ACM Vent

Location Arabie, LA

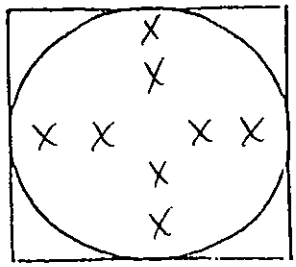
Upstream Distance (A) 40"

Downstream Distance (B) 86"

Inside Diameter 10.5 → due to build-up of materials inside pipe, (Actual ~12"-13")

Coupling Length 8.5",

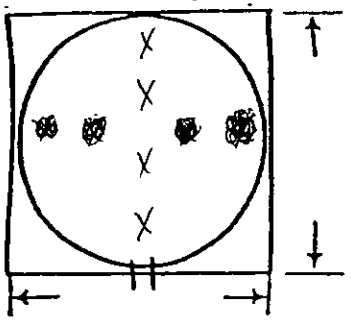
Coupling Type 3" Male

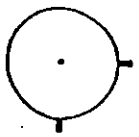


Cross Section Schematic of Stack

Traverse Point	Distance % of Diameter		Stack Diameter	Coupling Length		Traverse Points
1	.067	X	10.5	8.5	=	9.20
2	.250					11.13
3	.750					16.38
4	.933					18.30
5						
6						
7						
8						
9						
10						
11						

CROSS SECTIONAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT





ETS FIELD DATA, METHOD(S) 1-5

PLANT Domino Sugar
DATE 1-28-97
LOCATION Arabie, LA
OPERATOR J. Smoke
STACK NO. ACM Vent
RUN NO. 1

SAMPLE BOX NO. FF
METER BOX NO. 10
AMBIENT TEMPERATURE 76
BAROMETRIC PRESSURE 29.89
FILTER TARE wt mg # 3024
NOZZLE DIAMETER, in. 0.2278

STACK DIAMETER, in. 10.5
PITOT TUBE NO. P-3-1
PITOT FACTOR 0.834
METER Δ H@ 1.7089
D.G.M.C. FACTOR 1.0231
K FACTOR 2.0878
T→ 1702.6096

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in.H2O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	VELOCITY HEAD (√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H2O ACTUAL	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H2O DESIRED	GAS SAMPLE VOLUME (Vm), ft3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tmin), °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET (Tmout), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
1 on @	09:07	+.315	118	0.520	.721	1.10	1.081	879.200	88	87	259	55	2.0
2	09:14.5		122	.530	.728	1.10	1.095	883.340	89	88	257	52	2.0
3	09:22		122	.435	.659	0.90	.898	888.030	89	85	258	53	2.0
4	09:29.5		121	.420	.648	.870	.869	892.000	87	84	259	54	1.5
5	09:37		123	.490	.700	1.08	1.052	895.925	87	84	258	56	1.5
6	09:44.5		123	.510	.714	1.05	1.052	900.035	88	84	258	57	2.0
7	09:52		121	.420	.648	.870	.869	904.300	88	84	260	59	1.5
8	09:59.5		121	.510	.714	1.05	1.055	908.230	88	84	259	61	2.0
	10:07							912.475					
AVERAGE	60 min	+.315	121		.6915	.9925		33.275		86.5			

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS			19.6
FINAL	578.1	555.9	477.6	605.7
INITIAL	574.7	554.3	475.5	622.2
WEIGHT COLLECTED				
TOTAL WEIGHT				

ORSAT MEASUREMENT

	CO2	O2	CO	N2
1	0.0	20.9		
2				
3				
4				

COMMENTS:

PRE-LEAK CHECK GOOD @ 0.000CFM@11" Hg
POST-LEAK CHECK GOOD @ 0.005CFM@10" Hg
Could traverse only one port (IN & Out)

6.2.2

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : #4 ACM MILL EXHAUST
Test Date : 1-28-97
Run No. : 1

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
F1 - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole

Pbar - Barometric pressure, in. Hg
Pa - Stack gas static pressure, in. H2O
Ps - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry acfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R

Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vw - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{\frac{(Vi + Vii + Viii + Viv)\ R\ Tstd}{(453.6\ g/lb)\ Pstd\ MH2O}\right\} = \left\{\frac{(3.4 + 3.6 + 2.1 + 55.5)(21.85)(528)}{(453.6)(29.92)(18.02)}\right\} = 3.04739$$

$$Vmstd = Vm\ Y \left\{\frac{(Pb + dH/F1)\ Tstd}{Pstd\ Tm}\right\} = (33.275)(1.0231)\left\{\frac{(29.890 + .9925/13.6)(528)}{(29.92)(547)}\right\} = 32.93842$$

$$Bws = \left\{\frac{Vw}{Vw + Vmstd}\right\} = \left\{\frac{(3.04739)}{(3.04739 + 32.93842)}\right\} = .0847$$

$$Md = (MCO2)(\%CO2) + (MO2)(\%O2) + (MN2)(\%N2)$$
$$= (44.01)(.000) + (32.00)(.209) + (28.01)(.791) = 28.844$$

$$Ms = Md(1 - Bws) + (MH2O\ Bws) = (28.844)(1 - .0847) + (18.02)(.0847) = 27.927$$

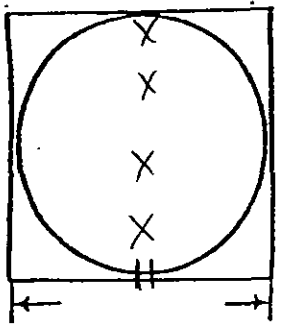
$$Vs = Kp\ Cp\ (dP)^{1/2}\left\{\frac{Ts}{Ps\ Ms}\right\}^{1/2} = (85.49)(.8340)(.6916)\left\{\frac{(581)}{(29.913)(27.927)}\right\}^{1/2} = 41.1379$$

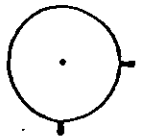
$$Acf = (60\ sec/min)(Vs\ A) = (60)(41.1379)(.6013) = 1484.2$$

$$Qsd = (3600\ sec/hr)(1 - Bws)(Vs\ A)\left\{\frac{Tstd\ Ps}{Ts\ Pstd}\right\}$$

$$= (3600)(1 - .0847)(41.1379)(.6013)\left\{\frac{(528)(29.913)}{(581)(29.92)}\right\} = 74011.7\ dscf/hr$$
$$= 1233.5\ dscf/min$$

CROSS SECTIONAL SCHEMATIC OF STACK TRAVERSE POINT LAYOUT





ETS FIELD DATA, METHOD(S) 1-5

PLANT Domino Sugar
DATE 1-28-97
LOCATION Arabi, LA
OPERATOR S. Savoie
STACK NO. ACM Vent
RUN NO. 2

SAMPLE BOX NO. B5
METER BOX NO. 10
AMBIENT TEMPERATURE 79
BAROMETRIC PRESSURE 30.03
FILTER TARE wt mg #3025
NOZZLE DIAMETER, in. .2278

STACK DIAMETER, in. 10.5
PITOT TUBE NO. P-3-1
PITOT FACTOR 0.834
METER Δ H@ 1.7089
D.G.M.C. FACTOR 1.0231
K FACTOR 2.4925

T→ 1448.1499

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in. H_2O)	STACK TEMP (T_s), °F	VELOCITY HEAD (ΔP_s)	VELOCITY HEAD ($\sqrt{\Delta P_s}$)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O ACTUAL	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H_2O DESIRED	GAS SAMPLE VOLUME (Vm), ft³	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (T_{min}), °F	GAS SAMPLE TEMPERATURE AT DRY GAS METER OUTLET (T_{mout}), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM In. Hg gauge
1 on @	10:51	+.265	122	.425	.651	1.05	1.057	916.600	86	84	254	50	2.5
2	10:58.5		122	.430	.655	1.05	1.069	920.895	90	86	255	49	2.5
3	11:06		124	.525	.724	1.30	1.301	925.175	91	86	258	51	3.0
4	11:13.5		122	.540	.734	1.35	1.343	929.955	93	87	259	52	3.0
5	11:21		121	.450	.670	1.10	1.121	934.800	92	86	257	54	3.0
6	11:28.5		123	.535	.731	1.35	1.328	939.255	92	86	258	55	3.0
7	11:36		121	.455	.674	1.15	1.134	943.700	92	87	257	56	2.5
8	11:43.5		120	.445	.667	1.10	1.111	948.280	93	86	259	61	2.5
off @	11:51							952.713					
AVERAGE	60 min	+.265	122		.688	1.18		36.113	89				

6.2.4

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS			12.9
FINAL	549.3	581.3	472.3	710.5
INITIAL	548.0	579.0	471.0	702.5
WEIGHT COLLECTED				
TOTAL WEIGHT				

ORSAT MEASUREMENT

	CO_2	O_2	CO	N_2
1	0.0	20.9		
2				
3				
4				

COMMENTS:

PRE-LEAK CHECK GOOD @ 0.010 CFM@11" Hg
POST-LEAK CHECK GOOD @ 0.008 CFM@10" Hg
Could traverse only one port. (In & Out)

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : #4 ACM MILL EXHAUST
Test Date : 1-28-97
Run No. : 2

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
Fl - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole

Pbar - Barometric pressure, in. Hg
Pg - Stack gas static pressure, in. H2O
Ps - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry scfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R

Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vw - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{\frac{(Vi + Vii + Viii + Viv)\ R\ Tstd}{(453.6\ g/lb)\ Pstd\ MH2O}\right\} = \left\{\frac{(1.3 + 2.3 + 1.3 + 8.0)(21.85)(528)}{(453.6)(29.92)(18.02)}\right\} = .60853$$

$$Vmstd = Vm\ Y \left\{\frac{(Pb + dH/Fl)\ Tstd}{Pstd\ Tm}\right\} = (36.113)(1.0231)\left\{\frac{(30.030 + 1.1812/13.6)(528)}{(29.92)(549)}\right\} = 35.79628$$

$$Bws = \left\{\frac{Vw}{Vw + Vmstd}\right\} = \left\{\frac{(.60853)}{(.60853 + 35.79628)}\right\} = .0167$$

$$Md = (MCO2)(\%CO2) + (MO2)(\%O2) + (MN2)(\%N2)$$
$$= (44.01)(.000) + (32.00)(.209) + (28.01)(.791) = 28.844$$

$$Ms = Md(1 - Bws) + (MH2O\ Bws) = (28.844)(1 - .0167) + (18.02)(.0167) = 28.663$$

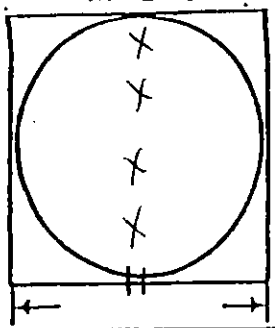
$$Vs = Kp\ Cp\ (dP)^{1/2}\left\{\frac{Ts}{Ps\ Ms}\right\}^{1/2} = (85.49)(.8340)(.6889)\left\{\frac{(582)}{(30.049)(28.663)}\right\}^{1/2} = 40.3696$$

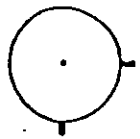
$$Acf = (60\ sec/min)(Vs\ A) = (60)(40.3696)(.6013) = 1456.5$$

$$Qsd = (3600\ sec/hr)(1 - Bws)(Vs\ A)\left\{\frac{Tstd\ Ps}{Ts\ Pstd}\right\}$$

$$= (3600)(1 - .0167)(40.3696)(.6013)\left\{\frac{(528)(30.049)}{(582)(29.92)}\right\} = 78310.7\ dscf/hr$$
$$= 1305.2\ dscf/min$$

CROSS SEC.. . NAL SCHEMATIC OF STACK
TRAVERSE POINT LAYOUT





E T S FIELD DATA, METHOD(S) 1-5

PLANT Domino Sugar
DATE 1-28-97
LOCATION Arabie, LA
OPERATOR J. Savoie
STACK NO. ACM Vent
RUN NO. 3

SAMPLE BOX NO. EE
METER BOX NO. 10
AMBIENT TEMPERATURE 69
BAROMETRIC PRESSURE 30.02
FILTER TARE wt mg # 3026
NOZZLE DIAMETER, in. 0.2278

STACK DIAMETER, in. 10.5
PITOT TUBE NO. P-3-1
PITOT FACTOR 0.834
METER Δ H@ 1.7089
D.G.M.C. FACTOR 1.0231
K FACTOR 2.4908
T→ 1449.6812

TRAVERSE POINT NUMBER	SAMPLING TIME (θ), min.	STATIC PRESSURE (in.H2O)	STACK TEMP (Ts), °F	VELOCITY HEAD (ΔPs)	(√ΔPs)	PRESSURE DIFFERENTIAL ACROSS ORIFICE METER (ΔH) in. H2O ACTUAL	DESIRED	GAS SAMPLE VOLUME (Vm), ft3	GAS SAMPLE TEMPERATURE AT DRY GAS METER INLET (Tm in), °F	OUTLET (Tm out), °F	SAMPLE BOX TEMPERATURE °F	TEMPERATURE OF GAS LEAVING CONDENSER OR LAST IMPINGER F	PUMP VACUUM in. Hg gauge
1@	12:28	+.280	121	.410	.640	1.05	1.023	952.900	86	86	249	55	2.0
2	12:35.5		120	.545	.738	1.35	1.362	957.195	87	84	252	55	2.0
3	12:43		118	.465	.681	1.15	1.160	962.110	87	83	251	56	2.0
4	12:50.5		119	.545	.738	1.35	1.364	966.875	87	82	251	56	2.0
5	12:58		117	.475	.689	1.20	1.193	971.445	86	82	250	57	2.0
6	13:05.5		116	.465	.681	1.15	1.170	976.050	86	82	253	58	2.0
7	13:13		118	.465	.681	1.15	1.166	980.530	86	83	254	58	2.0
8	13:20.5		118	.430	.655	1.10	1.078	985.000	88	83	255	59	2.0
8@	13:28							989.468					
AVERAGE	10min	+.280	118		.688	1.19		36.568	.85				

6.2.6

VOLUME OF LIQUID WATER COLLECTED	IMPINGER WEIGHTS			13.3
FINAL	579.7	598.6	478.8	633.5
INITIAL	578.1	555.9	477.6	625.7
WEIGHT COLLECTED				

ORSAT MEASUREMENT

	CO2	O2	CO	N2
1	0.0	20.9		
2				
3				

COMMENTS:

PRE-LEAK CHECK GOOD @ 0.005 CFM @ 10" Hg
POST-LEAK CHECK GOOD @ 0.005 CFM @ 10" Hg
Could traverse only one port (In & Out)

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : #4 ACM MILL EXHAUST
Test Date : 1-28-97
Run No. : 3

DETERMINATION of STACK GAS MOISTURE, MOLECULAR WEIGHT, VELOCITY, and VOLUMETRIC FLOW RATE

A - Cross-sectional area of the stack, ft3
Acf - Stack gas flow rate, actual, acfm
Bws - Stack gas moisture fraction, %/100
Cp - Pitot tube coefficient
dH - Meter orifice pressure differential, in. H2O
dP - Stack gas velocity head, in. H2O
F1 - Conversion factor, 13.6 in. H2O/ in. Hg
Kp - Pitot tube constant, 85.49
MCO2 - Molecular weight of CO2, 44.01 lb/ lb mole
Md - Stack gas molecular weight, dry lb/lb mole
MH2O - Molecular weight of water, 18.02 lb/lb mole
MN2 - Molecular weight of N2, 28.01 lb/lb mole
MO2 - Molecular weight of O2, 32.00 lb/lb mole
Ms - Stack gas molecular weight, wet lb/lb mole

Pbar - Barometric pressure, in. Hg
Ps - Stack gas static pressure, in. H2O
Ps - Stack gas absolute pressure, in. Hg
Pstd Standard absolute pressure, 29.92 in. Hg
Qsd - Stack gas volumetric flow rate, dry scfm
R - Ideal gas constant, 21.85
Tm - Meter temperature, R
Ts - Stack gas temperature, R
Tstd - Standard temperature, 528 R

Vi - Water vapor condensed, impinger 1, g
Vii - Water vapor condensed, impinger 2, g
Viii - Water vapor condensed, impinger 3, g
Viv - Water vapor condensed, impinger 4, g
Vm - Gas meter sample volume, dry ft3
Vmstd - Gas meter sample volume, dry std. ft3
Vs - Stack gas velocity, ft/sec
Vw - Total water vapor condensed, ft3
Y - Dry gas meter calibration factor
%CO2 - Stack gas CO concentration, %/100
%N2 Stack gas N2 concentration, %/100
O2 - Stack gas O2 concentration, %/100

$$Vw = \left\{\frac{(\ Vi + Vii + Viii + Viv\ )\ R\ Tstd}{(\ 453.6\ g/lb\ )\ Pstd\ MH2O}\right\} = \left\{\frac{(\ 1.6 + 2.7 + 1.2 + 7.8\ )(\ 21.85\ )(\ 528\ )}{(\ 453.6\ )(\ 29.92\ )(\ 18.02\ )}\right\} = .62740$$

$$Vmstd = Vm\ Y\left\{\frac{(\ Pb + dH/\ F1\ )\ Tstd}{Pstd\ \ Tm}\right\} = (\ 36.568\ )(\ 1.0231\ )\left\{\frac{(\ 30.020 + 1.1875/13.6\ )(\ 528\ )}{(\ 29.92\ )\ \ (\ 545\ )}\right\} = 36.48100$$

$$Bws = \left\{\frac{Vw}{Vw + Vmstd}\right\} = \left\{\frac{(\ \ .62740\ )}{(\ \ .62740 + 36.48100\ )}\right\} = .0169$$

$$Md = (\ MCO2\ )(\ \%CO2\ ) + (\ MO2\ )(\ \%O2\ ) + (\ MN2\ )(\ \%N2\ )$$
$$= (\ 44.01\ )(\ .000\ ) + (\ 32.00\ )(\ .209\ ) + (\ 28.01\ )(\ .791\ ) = 28.844$$

$$Ms = Md\ (\ 1 - Bws\ ) + (\ MH2O\ Bws\ ) = (\ 28.844\ )(\ 1 - .0169\ ) + (\ 18.02\ )(\ .0169\ ) = 28.661$$

$$Vs = Kp\ Cp\ (\ dP\ )^{1/2}\left\{\frac{Ts}{Ps\ Ms}\right\}^{1/2} = (\ 85.49\ )(\ .8340\ )(\ \ .6884\ )\left\{\frac{(\ 578\ )}{(\ 30.041\ )(\ 28.661\ )}\right\}^{1/2} = 40.2299$$

$$Acf = (\ 60\ sec/min\ )(\ Vs\ \ A\ ) = (\ 60\ )(\ 40.2299\ )(\ \ \ .6013\ ) = 1451.5$$

$$Qsd = (\ 3600\ sec/hr\ )(\ 1 - Bws\ )(\ Vs\ A\ )\left\{\frac{Tstd\ Ps}{Ts\ Pstd}\right\}$$

$$= (\ 3600\ )(\ 1 - .0169\ )(\ \ 40.2299\ )(\ \ \ .6013\ )\left\{\frac{(\ 528\ )(\ 30.041\ )}{(\ \ 578\ \ )(\ 29.92\ )}\right\} = 78473.5\ dscf/hr$$
$$= 1307.9\ dscf/min$$

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : #4 ACM MILL EXHAUST
Test Date : 1-28-97
Run No. : 1

DETERMINATION OF PARTICULATE EMISSIONS

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (33.275)(1.0231) \frac{(528)}{(547.)} \frac{(29.89 + (.9925/13.6))}{(29.92)}$$

Vmstd = 32.93842

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (60)(1-Bws)}$$

$$I = \frac{(581.)(32.93842)(29.92)(100)}{528 (41.1379)(.00028303)(60.)(29.913)\ 60\ (1 - .0847)}$$

I = 94.55

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : #4 ACM MILL EXHAUST
Test Date : 1-28-97
Run No. : 1

DETERMINATION OF PARTICULATE EMISSIONS

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(106.26) -(.000)(165.0) = 106.260

---- Solids, filter ----

Mf = 85.4

---- Total Solids collected ----

Mn = Mp + Mf

= (106.260)+(85.4) = 191.660

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (191.660/ 32.93842)(0.01543)

= .08978

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (191.660)(2.2046 X 10-6)(74011.7) / (32.93842)

= .949

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : #4 ACM MILL EXHAUST
Test Date : 1-28-97
Run No. : 2

DETERMINATION OF PARTICULATE EMISSIONS

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (\ 36.113\ )(\ 1.0231\ )\left(\frac{\ 528\ }{\ 549.\ }\right)\left(\frac{\ 30.03\ + (1.1812/13.6)}{\ 29.92\ }\right)$$

Vmstd = 35.79629

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (\ 60\ )(\ 1-Bws\ )}$$

$$I = \frac{(\ 582.\ )(\ 35.79629\ )(\ 29.92\ )(\ 100\ )}{528\ (\ 40.3696)(.00028303)(60.)(30.049)\ 60\ (1\ -\ .0167)}$$

I = 97.12

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : #4 ACM MILL EXHAUST
Test Date : 1-28-97
Run No. : 2

DETERMINATION OF PARTICULATE EMISSIONS

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(37.62) -(.000)(165.0) = 37.620

---- Solids, filter ----

Mf = 12.6

---- Total Solids collected ----

Mn = Mp + Mf

= (37.620)+(12.6) = 50.220

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (50.220/ 35.79629)(0.01543)

= .02165

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (50.220)(2.2046 X 10-6)(78310.7) / (35.79629)

= .242

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : #4 ACM MILL EXHAUST
Test Date : 1-28-97
Run No. : 3

DETERMINATION OF PARTICULATE EMISSIONS

dH - Average pressure differential, meter orifice, in-H20
Pbar - Barometric pressure at the sampling site, in Hg
Pstd - Standard absolute pressure, 29.92 in Hg
Tm - Average dry gas meter temperature, deg R
Tstd - Standard absolute temperature, 528 deg R
Vm - Volume of gas sample, actual dry ft3
Vmstd - Volume of gas sample, dry, Std. cond., DSCF
Y - Dry gas meter calibration factor

$$Vmstd = Vm\ Y \frac{Tstd}{Tm} \frac{Pbar + dH/13.6}{Pstd}$$

$$Vmstd = (36.568)(1.0231)\left(\frac{528}{545.}\right)\left(\frac{30.02 + (1.1875/13.6)}{29.92}\right)$$

Vmstd = 36.48100

An - Cross-sectional area of nozzle, ft2
Ps - Absolute stack gas pressure, in Hg
Qsd - Dry volumetric stack gas flow rate, dscf/hr
St - Total sampling time, min
Ts - Absolute stack gas temperature, deg R
Vs - Average stack gas velocity, ft/sec

----- ISOKINETIC SAMPLING RATE -----

$$I = \frac{Ts\ Vmstd\ Pstd\ 100}{Tstd\ Vs\ An\ St\ Ps\ (\ 60\ )(\ 1-Bws\ )}$$

$$I = \frac{(\ 578.\ )(\ 36.48100\ )(\ 29.92\ )(\ 100\ )}{528\ (\ 40.2299)(.00028303)(60.)(30.041)\ 60\ (1 -\ .0169)}$$

I = 98.77

E T S
Emission Testing Services, Inc.

Client : DOMINO
Source : #4 ACM MILL EXHAUST
Test Date : 1-28-97
Run No. : 3

DETERMINATION OF PARTICULATE EMISSIONS

Ep - Particulate emission rate, lb/hr
Css - Concentration of particulate, grain/DSCF
Ca -Particulate concentration, blank DI water, mg/l
Mf -Particulate catch on filter, mg
Mn -Total particulate collected, mg
Mp -particulate in probe wash, mg Vp -Volume, probe wash,ml

---- Solids, probe wash ----

Mp =(Mp)-(Ca Vp) =(24.75) -(.000)(125.0) = 24.750

---- Solids, filter ----

Mf = 8.2

---- Total Solids collected ----

Mn = Mp + Mf

= (24.750)+(8.2) = 32.950

-------- CONCENTRATION and EMISSION RATE --------

Css = (Mn/Vmstd)(0.01543 grain/mg)

= (32.950/ 36.48100)(0.01543)

= .01394

Ep = (Mn)(2.2046 X 10-6 lb/mg)(Qsd) / Vmstd

= (32.950)(2.2046 X 10-6)(78473.5) / (36.48100)

= .156

During sampling, particulate was collected in the probe wash and on the filter. The probe wash sample was transported to Chemtex's laboratory in Baton Rouge, Louisiana for analysis of total solids. The filter sample was transported to ETS' laboratory in Baton Rouge, Louisiana for analysis of total mass gain. Results of these analysis are presented on the following pages.

CHEMTEX
Environmental & Industrial Hygiene Services
16550 Highland Road, Baton Rouge, Louisiana 70810
(504) 752-5100 FAX (504) 753-1782

Client: E T S Inc.
10461 Mammoth Dr.
Baton Rouge, LA 70814

Report Date: 2/6/97
Sample Source: Impingers
Date Collected: 1/27&28/97
Collected By: KT/RD
Date Received: 1/31/97
CHEMTEX FILE #: B7020168

RESULTS OF ANALYSIS

CLIENT: DOMINO SUGAR

Source Identification: ACM Vent & BC Dust Collector

CHEMTEX #	Sample Identification	Parameter	Sample Volume ml	Concentration mg/l	Results mg/sample	
B7010168	Run-1 Probe Wash w/Acetone (1/28/97)	Total Solids	165	644	106.26	ACM Vent
B7010169	Run-2 Probe Wash w/Acetone (1/28/97)	Total Solids	165	228	37.62	
B7010170	Run-3 Probe Wash w/Acetone (1/28/97)	Total Solids	125	198	24.75	
B7010171	Run-1 Probe Wash w/Acetone (1/27/97)	Total Solids	35	220	7.71	
B7010172	Run-2 Probe Wash w/Acetone (1/27/97)	Total Solids	40	990	39.6	CHAR Dust Collector
B7010173	Run-3 Probe Wash w/Acetone (1/27/97)	Total Solids	90	3,320	298.8	
B7010174	Blank	Total Solids	---	< 2	-----	

QC-Check Sample	True Value	Obtained Value
Total Solids (mg/l)	50	48/46*

* Duplicate Analysis

Parameter	Method Reference	Date Analyzed/Analysts
Total Solids	EPA Method 160.3	2/4/97 KR

C N Reddy

Dr. C. N. Reddy, Ph.D, CIH, ASP
Director

pap/CNR

1

ETS
EMISSION TESTING SERVICES, INC.

FILTER WEIGHTS

CLIENT Domino Sugar

UNIT ID C. Dust Collector TEST DATE 1-27-97

Filter Number	Sample ID	Initial Weight		Final Weight		Weight Gained
3021	Run #1	3.F417	3.F418	3.F439	3.F441	2.3
3023	#2	3.F631	3.F634	3.F655	3.F851	21.7
3022	#3	3.P056	3.P059	4.2316	4.2312	425.3

CLIENT Domino Sugar

UNIT ID ACM Vent TEST DATE 1-28-97

Filter Number	Sample ID	Initial Weight		Final Weight		Weight Gained
3024	Run 1	3.F856	3.F847	3.9703	3.9701	85.4
3025	2	3.F811	3.P813	3.P440	3.F439	12.6
3026	3	3.P272	3.P269	3.F350	3.F351	8.2

ANALYST Fred Dowling ANALYSIS DATE 2-10-97

FILE: C:\ETS\FORMS\FILT-PS

VII. APPENDIX

The following appendices are presented as supporting documentation to the emission test report.

7.1.1 Resumes of Test Personnel

7.2.1 Test Equipment Calibrations

Kevin Thibodeaux
Sampling Specialist
Emission Testing Services, Incorporated
Baton Rouge, Louisiana

EDUCATION

U.S. EPA Round Robin sample integrity audits

Completed Emission Testing Services Air Sampling Techniques Seminar

Participates in on going Air-Pollution Training Institute Courses (APTI)

High School Graduate

CERTIFICATIONS

EPA Certified Opacity Reader (Method 9)
General Safety & Health Orientation Program
Respiratory Equipment Medical Certification
MSA Qualitative Fit Test Record

EXPERIENCE

1987 to Present - Testing Specialist for Emission Testing Services, Inc.
Performs EPA approved reference methods for compliance testing as well as other non-routine source evaluations. Responsibilities also include job preparation, equipment calibration and equipment maintenance.

Ryan Deaville
Sampling Technician Trainee
Emission Testing Services, Incorporated
Baton Rouge, Louisiana

EDUCATION

High School Graduate

CERTIFICATIONS

General Safety & Health Orientation Program
Respiratory Equipment Medical Certification
MSA Qualitative Fit Test Record

EXPERIENCE

06/96 to Present - Testing trainee technician for Emission Testing Services, Inc. Supports in performing EPA approved reference methods for compliance testing as well as other non-routine source evaluations. Responsibilities also include job preparation, equipment calibration and equipment maintenance.

Jeff M. Savoie
Sampling Technician Trainee
Emission Testing Services, Incorporated
Baton Rouge, Louisiana

EDUCATION

Louisiana State University
B.S. -- Environmental Management Systems

CERTIFICATIONS

EPA Certified Opacity Reader (Method 9)
General Safety & Health Orientation Program
Respiratory Equipment Medical Certification
MSA Qualitative Fit Test Record

EXPERIENCE

10/95 to Present - Testing trainee technician for Emission Testing Services, Inc. Supports in performing EPA approved reference methods for compliance testing as well as other non-routine source evaluations. Responsibilities also include job preparation, equipment calibration and equipment maintenance.

ETS

EMISSION TESTING SERVICE, INC.

METER BOX CALIBRATION DATA AND CALCULATION FORM
(English Units)

Leak Check Good @: .0012 ft³ Meter Box Number: 10

Barometric Pres., P_b: 30.28 in. Hg Date Calibrated: 1-16-97

Orifice Helta H Setting (ΔH) in. H_2O	Wet Test Meter Reading (V_w), ft³	Dry Gas Meter Readings			Wet Test Meter Reading (T_w), °F	Dry Gas Meter			Run Time (Ø), Min.
		Initial (V_{di}), ft³	Final (V_{df}), ft³	Total (V_{dt}), ft³		Inlet (T_{di}), °F	Outlet (T_{do}), °F	Avg (T_{da}), °F	
0.5	5	673.691	678.885	5.194	72°	102 / 104	108 / 108	105.5	12.70
1.0	5	678.985	684.07	5.185	72°	104 / 106	106 / 109	105.5	8.71
1.5	10	684.167	694.511	10.34	72°	101 / 111	107 / 108	106.7	14.75
2.0	10	694.511	704.848	10.337	72°	102 / 107	106 / 106	105.25	13.05
3.0	10	704.845	715.174	10.329	72°	102 / 108	105 / 107	105.5	10.62

ΔH In. H_2O	$\frac{\Delta H}{13.6}$ (F_1)	$Y = \frac{V_w * P_b * (T_{da} + 460)}{V_{da} * (P_b + F_1) * (t_w + 460)}$	$\Delta H@ = \frac{0.0317 * \Delta H}{P_b * (t_{da} + 460)} * \left[\frac{(T_w + 460) * Ø}{V_w}\right]^2$
0.5	.0368	1.022	1.6902
1.0	.0737	1.023	1.5900
1.5	.110	1.0266	1.7061
2.0	.147	1.0225	1.7854
3.0	.221	1.0216	1.7728
	Average	1.0231	1.7089

Y = Ratio of reading of wet test meter to dry test meter; tolurance for individual values ± 0.02 from average.

ΔH@ = Orifice pressure differential that equates to 0.75 cfm of air @ 68 °F and 29.92 inches of mercury, in. H_2O: tolerance for individual values ± 0.20 from average.

Calibrated by: Craig & Jonathan

ETS
EMISSION TESTING SERVICES, INC.

THERMOCOUPLE CALIBRATION FORM

CALIBRATED BY: Craig & Jonathan DATE: 1-16-99

METER BOX NUMBER: 10 BAROMETRIC PRESSURE: 30.53

TRIAL	THERMOMETER ICE BATH (T_f)	THERMOCOUPLE ICE BATH (TC_f)	THERMOMETER BOILING WATER (T_b)	THERMOCOUPLE BOILING WATER (TC_b)
1	30°	30°	215	214
2	30°	31°	217	216
3	30°	31°	217	216
AVG	30°	~~92°~~ 30.6	216.3	215.3

CALCULATIONS

$$\%\ \text{ERROR @ BOILING POINT} = \frac{\overline{T_b} - \overline{TC_b}}{\overline{T_b}} \times 100 = 1.0\%\ \text{error}$$

$$\%\ \text{ERROR @ FREEZING POINT} = \frac{\overline{T_f} - \overline{TC_f}}{\overline{T_f}} \times 100 = -.60\%\ \text{error}$$

OKAY IF $-1.5\% < \%\ \text{ERROR} < +1.5\%$

REFERENCE: METHOD 2 SECTION 4.3

FORMS\THERM-C5

ETS

EMISSION TESTING SERVICE, INC.

PITOT TUBE CALIBRATION FORM

Pitot Tube Number: P-3-1

Calibrated By: SAVOIE

$CP_{(std)}$: 0.99

Date Calibrated: 8-28-96

Point Number	Stardard Pitot ΔP (in. H_2O)	"S" Type Pitot ΔP, in H_2O Impact Side	Static Side
Low	0.105	0.150	0.150
Mid	0.585	0.82	0.815
High	1.10	1.55	1.55

CALCULATIONS

$$Cp_{(S)} = Cp_{(std)} \times \sqrt{\frac{\Delta P_{(std)}}{\Delta P_{(s)}}}$$

Deviation = $Cp_{(s)} - \overline{CP}$ (Impact Side or Static Side)

$$\text{Avg. Dev.} = \frac{\sum_{1}^{3} |Cp_{(s)} - CP|}{3}$$ (Impact Side or Static Side)

Impact Side $Cp_{(s)}$	Impact Side Deviation	Static Side $Cp_{(s)}$	Static Side Deviation
0.828	0.005	0.828	0.006
0.836	0.003	0.839	0.005
0.834	0.001	0.834	0.000
$\overline{Cp}$ = 0.833		$\overline{Cp}$ = 0.834	

$\lvert \overline{Cp}$ (Static Side) − $\overline{Cp}$ (Impact Side) $\rvert$	=	0.001	(Must be ≤ 0.01)
Avgerage Deviation (Impact Side)	=	0.003	(Must be ≤ 0.01)
Avgerage Deviation (Static Side)	=	0.004	(Must be ≤ 0.01)

$$Cp = \frac{\overline{Cp}\text{ (Static Side)} + \overline{Cp}\text{ (Impact Side)}}{2}$$ (Should be $0.80 \le Cp \le 0.85$) = 0.834