MOSTARDI-PLATT ASSOCIATES, INC.
Environmental Contract Engineering Services
1077 Entry Drive
Bensenville, IL 60106
(708) 860-5900

CID, Chicago

Rating = B

process data.

GASEOUS EMISSION STUDIES
PERFORMED FOR
WASTE MANAGEMENT OF NORTH AMERICA
AT THE
CID FACILITY
CENTAUR TURBINE STACK 3
CHICAGO, ILLINOIS
FEBRUARY 16, 1990

PROJECT NO. 94709
DATE SUBMITTED: APRIL 4, 1990

MOSTARDI-PLATT ASSOCIATES, INC.

TABLE OF CONTENTS

MOSTARDI-PLATT
ASSOCIATES, INC.

CERTIFICATION SHEET

Having supervised and worked on the test program described in this report, and having written this report, I hereby certify the data, information and results in this report to be accurate and true according to the methods and procedures used.

MOSTARDI-PLATT ASSOCIATES, INC.

Graziano M. Gozzi
Project Supervisor

MOSTARDI-PLATT ASSOCIATES, INC.
Environmental Contract Engineering Services
1077 Entry Drive
Bensenville, IL 60106
(708) 860-5900

GASEOUS EMISSION STUDIES PERFORMED FOR WASTE MANAGEMENT OF NORTH AMERICA, INC. AT THE CID FACILITY CENTAUR TURBINE STACK 3 CHICAGO, ILLINOIS FEBRUARY 16, 1990

INTRODUCTION

A gaseous emission test was performed by MOSTARDI-PLATT ASSOCIATES, INC. on the stack of the No. 3 Centaur Turbine at Waste Management CID Landfill in Chicago, Illinois, on February 16, 1990. The tests were authorized by and performed for Waste Management.

The purpose of this test program was to determine the total gaseous non-methane organic (TGNMO) emission rates during normal operating conditions. Tests were performed at the outlet stack.

The tests were conducted by Messrs. L. Campo, T. Kalisz, and G. M. Gozzi of MPA. Mr. J. Gentile and Mr. J. Greenwell provided assistance and coordinated plant operating conditions during the test program.

SUMMARY OF RESULTS

During the test program three (3) TGNMO test runs were performed on the outlet of the No. 3 Centaur Turbine. The average concentration of TGNMO expressed as ppm hexane at 3% Oxygen was 31.4. The average emission rate, expressed as carbon was 2.73 lbs/hr. Tests are summarized on page 8.

DISCUSSION OF RESULTS

No problems were encountered with the test equipment or the process operation during sampling.

TEST METHODS AND PROCEDURES

The test program was comprised of the following tests and analyses:

1. For the determination of volumetric flow rates, EPA Methods 1 and 2 were utilized, 40CFR Part 60, Appendix A.

2. For the determination of dry molecular weight (O_2 and CO_2 Measurement) EPA Method 3 was utilized, 40CFR, Part 60, Appendix A.

3. For the determination of moisture content, EPA Method 4 was utilized, 40CFR, Part 60, Appendix A.

4. For the sampling of total gaseous non-methane organics, (TGNMO), modified EPA Method 25, 40CFR, Part 60, Appendix A was utilized.

Total Gaseous Non-Methane Organics (M25)

The Method 25 sample collection train meets the requirements for stack sampling of volatile organic compound (VOC) set forth by the United States Environmental Protection Agency (USEPA). In particular, it meets the requirements of USEPA Reference Method 25, "Determination of Total Gaseous Nonmethane Organic Emissions as Carbon" 40CFR Part 60, Appendix A. This method applies to the measurement of volatile organic compounds (VOC) and total Gaseous Non-Methane Organics (TGNMO). With this method, an emission sample is withdrawn from the stack at a constant rate through a heated probe and filter and a chilled condensate trap

by means of an evacuated sample tank. For these tests the condensate trap was chilled with ice water instead of dry ice because of the high level of CO_2 in the stack gas. TGNMO are determined by combining the analytical results obtained from independent analysis of the condensate trap and sample tank fractions. After sampling is completed, the organic contents of the condensate trap are oxidized to carbon dioxide (CO_2) which is quantitatively collected in an evacuated vessel; then a portion of the CO_2 is reduced to methane (CH_4) and measured by an FID. The organic content of the sample tank fraction is measured by injecting a portion of the sample into a gas chromatographic column to separate the NMO from CO, CO_2, and CH_4; the NMO are oxidized to CO_2, reduced to CH_4 and measured by an FID. In this manner, the variable response of the FID associated with different types of organics is eliminated.

The sampling system consists of a heated probe and filter system, condensate trap, flow control system, and sample tank. The analytical system consists of two major sub-systems: an oxidation system for the recovery and conditioning of the condensate trap contents and an NMO analyzer. The NMO analyzer is a GC with backflush capability for NMO analysis and is equipped with an oxidation catalyst, reduction catalyst, and FID. The system for the recovery and conditioning of the organics captured in the condensate trap consists of a heat source,

oxidation catalyst, nondispersive infrared (NDIR) analyzer and an intermediate collection vessel.

Method 25 is used to determined the concentration of the organics in the gas stream. In order to determine the emission rate the stack gas velocity and volumetric flow rate are determined using reference Method 2.

Volumetric Flow Rate

Volumetric flow rate determinations were performed as described in Methods 1 and 2. 20 sampling points using 2 ports were traversed.

Velocity pressures were determined with calibrated Stausscheibe-type pitot tubes with inclined manometers. All temperatures were measured using calibrated thermocouples with potentiometers and resistance thermometer detectors (RTD's).

Drawings depicting the sampling test point locations and the sampling trains along with pertinent calibrations can be found appended.

Diluent Determination

Method 3 test procedure (multi-point integrated sampling) was used to determine the carbon dioxide and oxygen concentrations. Each sample was extracted at a constant sampling rate at the same sampling points as, and during the course of, volumetric flow determination. Mandatory leak checks were performed on the sampling apparatus immediately after sampling.

An Orsat gas absorption analyzer was used to analyze each sample in triplicate. To ensure complete absorption several passes of the sample were made through each absorbent until constant readings were obtained. The Orsat analyzer was also checked for leaks after each run. This method defines the results to be on the dry basis in percent by volume.

Moisture Determination

A Method 4 test procedure was used to determine moisture. The impinger train consisted of four modified Greenburg-Smith impingers. The first two impingers contained a known volume of water, the third impinger was empty, and the fourth impinger contained a known amount of silica gel. The entire impinger train was placed in an ice bath to maintain the sampled gas passing through the silica gel impinger outlet below 68°F in order to increase the accuracy of the sampled dry gas volume measured.

Each sample was extracted through a heated stainless steel-lined probe loosely packed with glass wool at the tip at a constant sampling rate of approximately 0.75 cubic feet per minute which was maintained during sampling. An adequate volume was drawn to ensure accuracy. After each run a leak check of the sampling train was performed at a vacuum greater than the sampling vacuum to determine if any leakage had occurred during sampling. A leakage rate not in excess of 4 percent of the average sampling rate would have been acceptable. Following the

leak check, the impingers were removed from the ice bath and the volume of the moisture condensed was measured to the nearest milliliter and recorded. The silica gel was removed and the weight increase was recorded to the nearest 0.5 grams.

QUALITY ASSURANCE PROCEDURES

MPA recognizes the previously described reference methods to be very technique-oriented and attempts to minimize all factors which can increase error by implementing its Quality Assurance Program into every segment of its testing activities.

Shelf life of chemicals prepared at the MPA laboratory or at the job site does not exceed that specified in the above mentioned methods; and, those reagents having a shelf life of one week were prepared daily at the job site. When on-site analyses are required, all reagent standardizations are performed by the same person performing the analyses.

Dry test meters and wet test meters were calibrated according to methods described in the Quality Assurance Handbook, Sections 3.3.2, 3.4.2 and 3.5.2. Percent error for the wet test meter according to the methods measured the test sample volumes to within 2 percent at the flow rate and conditions encountered during sampling.

A copy of the sample analysis sheets are appended in this report. An explanation of the nomenclature and calculations is included. Also appended are calibration data and copies of the

raw field data sheets. All raw data are kept on file at the MPA offices in Bensenville, Illinois.

ACKNOWLEDGMENTS

MOSTARDI-PLATT ASSOCIATES, INC. would like to thank J. Gentile and J. Greenwell for their assistance in completing this test program.

MOSTARDI-PLATT ASSOCIATES, INC.

Graziano N. Gozzi
Project Supervisor

GMG/mms/vfl

MOSTARDI-PLATT ASSOCIATES, INC.

WASTE MANAGEMENT OF NORTH AMERICA, INC.
CID LANDFILL
CHICAGO, ILLINOIS
CENTAUR TURBINE STACK 3
FEBRUARY 16, 1990

TOTAL GASEOUS NONMETHANE ORGANICS (TGNMO)
EMISSION TEST RESULTS SUMMARY

Concentration (ppm)

Test No.	Time	TGNMO as Carbon	TGNMO as Hexane	$\%O_2$	TGNMO as Hexane Corrected to $3\%O_2$
1	1105-1205	47	6.56	16.6	27.3
2	1225-1325	46	6.42		26.7
3	1345-1445	69	9.63		40.1
				Average	31.4

$$\text{TGNMO (as hexane)} = \text{TGNMO (as carbon)} \times \frac{\text{Mol.wt Carbon}}{\text{Mol.wt Hexane}}$$

$$= \text{TGNMO} \times \frac{12}{86}$$

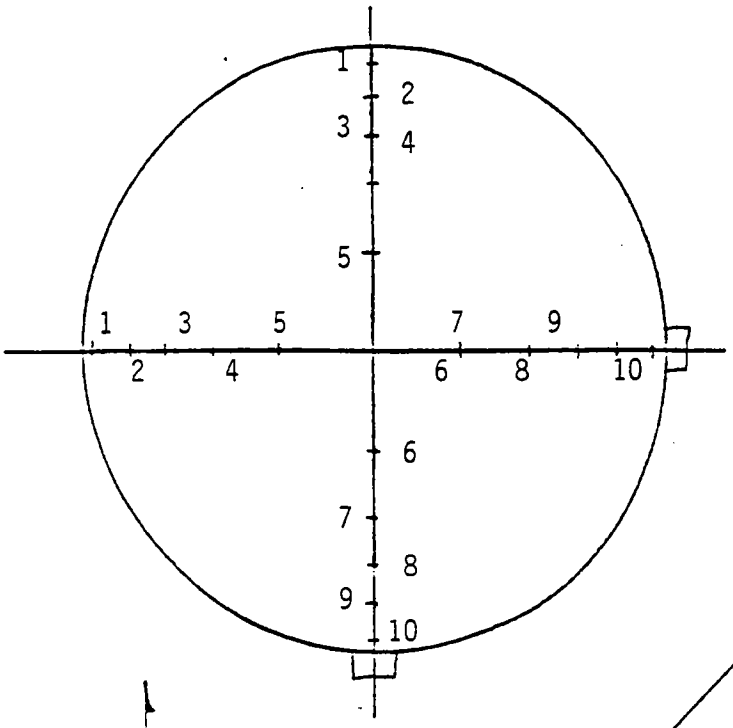
$$\text{TGNMO (as hexane) Corrected to 3\% Air} = \text{TGNMO (as hexane)} \times \frac{(20.9 - 3)}{(20.9 - \%O_2)}$$

Emission Rate lbs/hr as Carbon

Test No.	Mass Concentration (mg/m^3)	Air Flow (DSCFM)	Emission Rate (lbs/hr)
1	24	27055	2.43
2	23		2.33
3	34		3.44
		Average	2.73

$$\text{EMISSIONS (lbs/hr)} = \frac{\text{Conc } (mg/m^3)}{1000\ l/m^3} \times \frac{6.24 \times 10^{-5}\ \text{lbs/DSCF}}{mg/l} \times \text{DSCFM} \times \frac{60\ \text{min}}{\text{hr}}$$

APPENDIX



Compass Direction

(percent of stack diameter from inside wall to traverse point)

Traverse point number on a diameter	2	4	6	8	10	12	14	16	18	20	22	24
1					2.5	1.8						
2					8.2	5.9	4.2					
3				2.3	14.6	10.5	7.7	5.9				
4				10.5	22.6	16.1	12.5	9.9	8.2			
5			4.4	19.4	34.2	25.0	19.4	15.3	12.6	10.6		
6			14.7	32.3	65.8	75.0	29.9	23.6	19.4	16.3	14.1	
7		6.7	29.5	67.7	77.4	82.3	70.1	34.2	28.0	23.7	20.5	18.0
8		25.0	70.5	80.6	85.4	88.2	85.9	65.8	36.6	30.6	26.3	23.1
9		75.0	85.3	89.5	91.8	93.3	92.2	89.4	85.4	69.4	32.4	28.5
10	93.3	95.6	96.7	97.5	97.9	98.2	98.4	98.6	98.7	98.8	98.9	99.0

Number of traverse points on a diameter

DISTURBANCE

MEASUREMENT SITE

DISTURBANCE

JOB: Waste Management CID Chicago, IL

DATE: February 16, 1990

TEST NO. All

DUCT NO. Centaur Turbine Stack 3

DUCT DIA. 3 ft. 4 ins.

DUCT AREA 8.727 ft^2

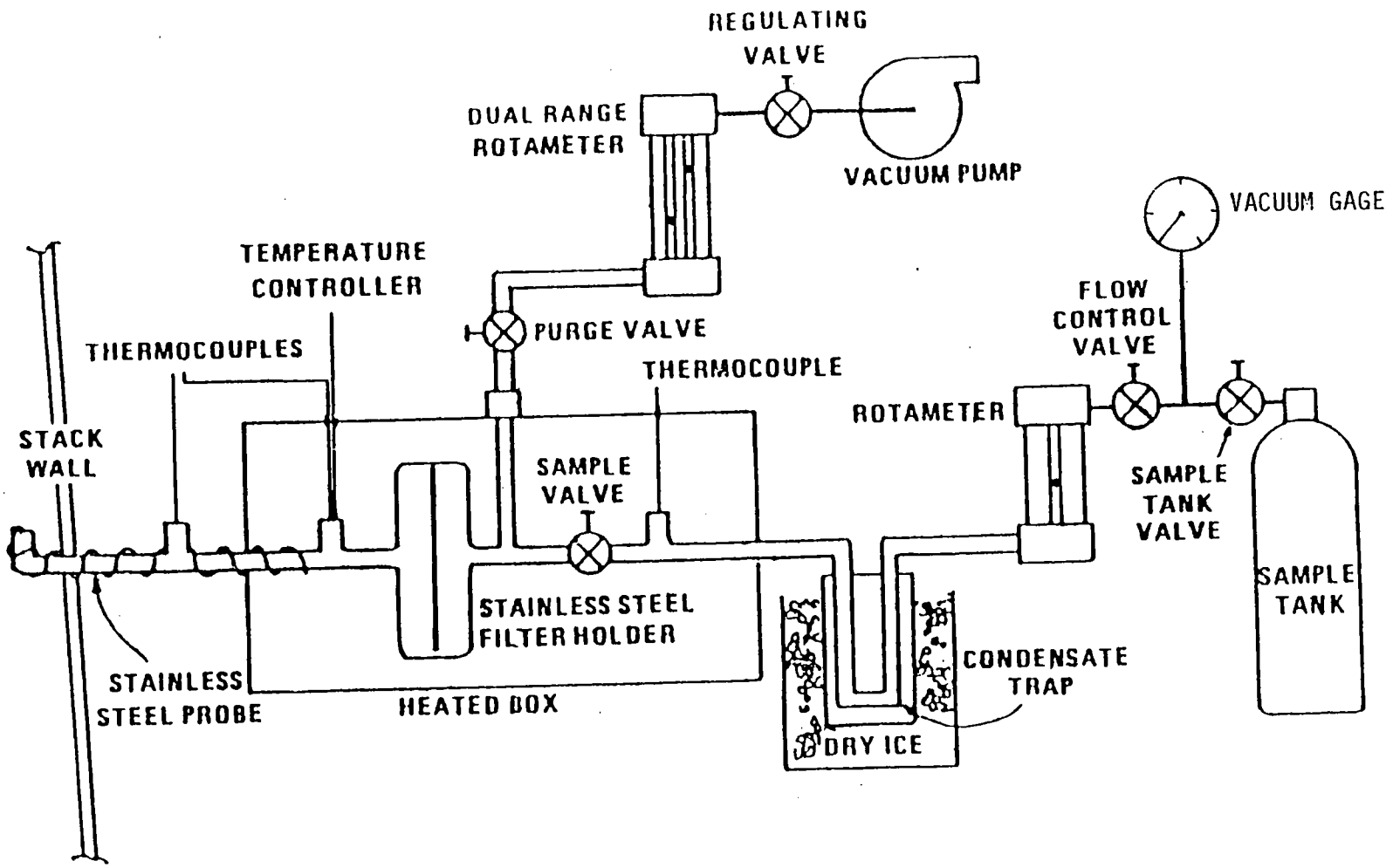
NO. POINTS ACROSS DIA. 10

MOSTARDI-PLATT ASSOCIATES, INC.

EQUAL AREA TRAVERSE

FOR ROUND DUCTS

SCALE:	DRAWN	APPROVED
None	R. E. Zylstra	



METHOD 25 - TGNMO SAMPLING TRAIN

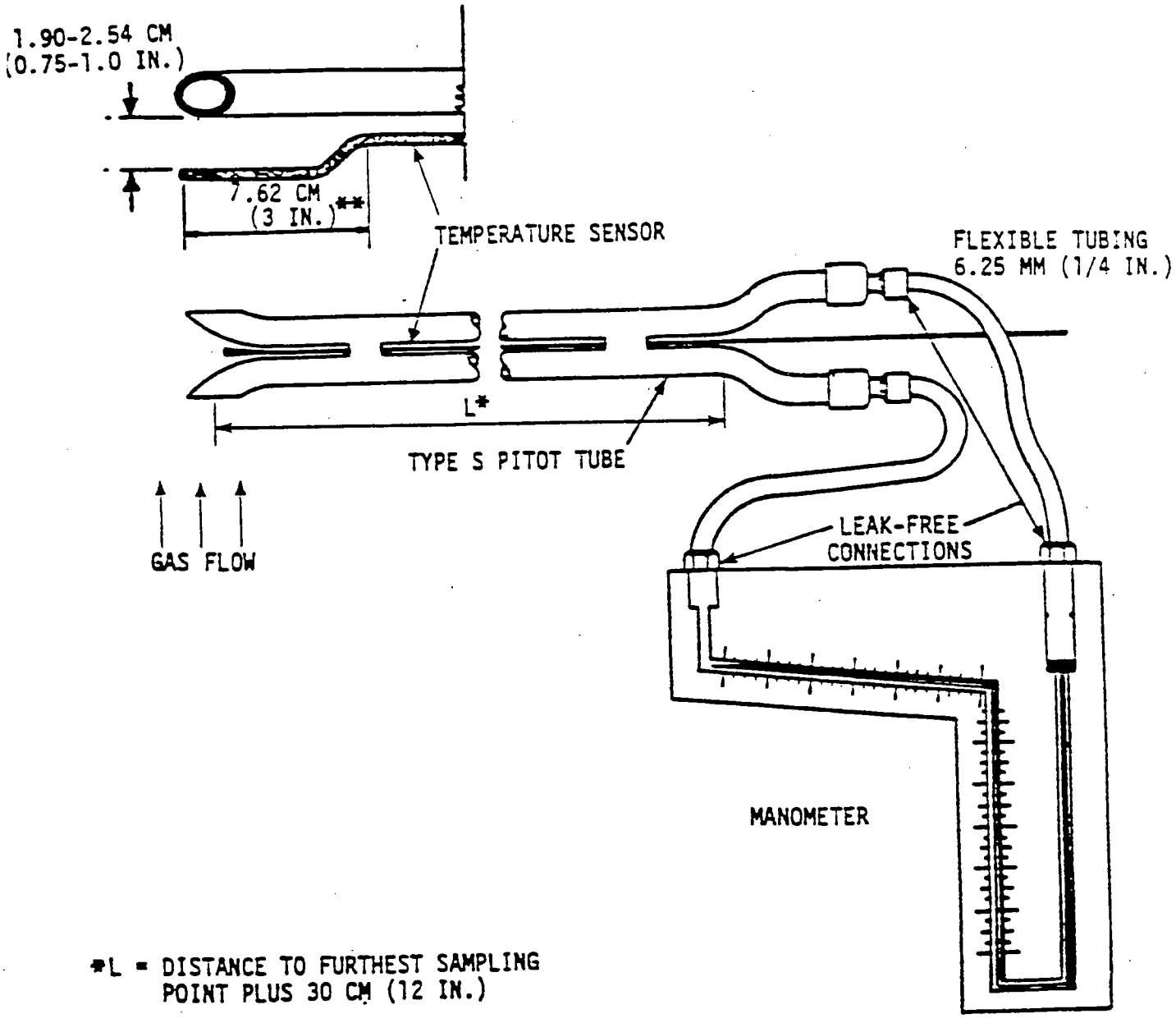
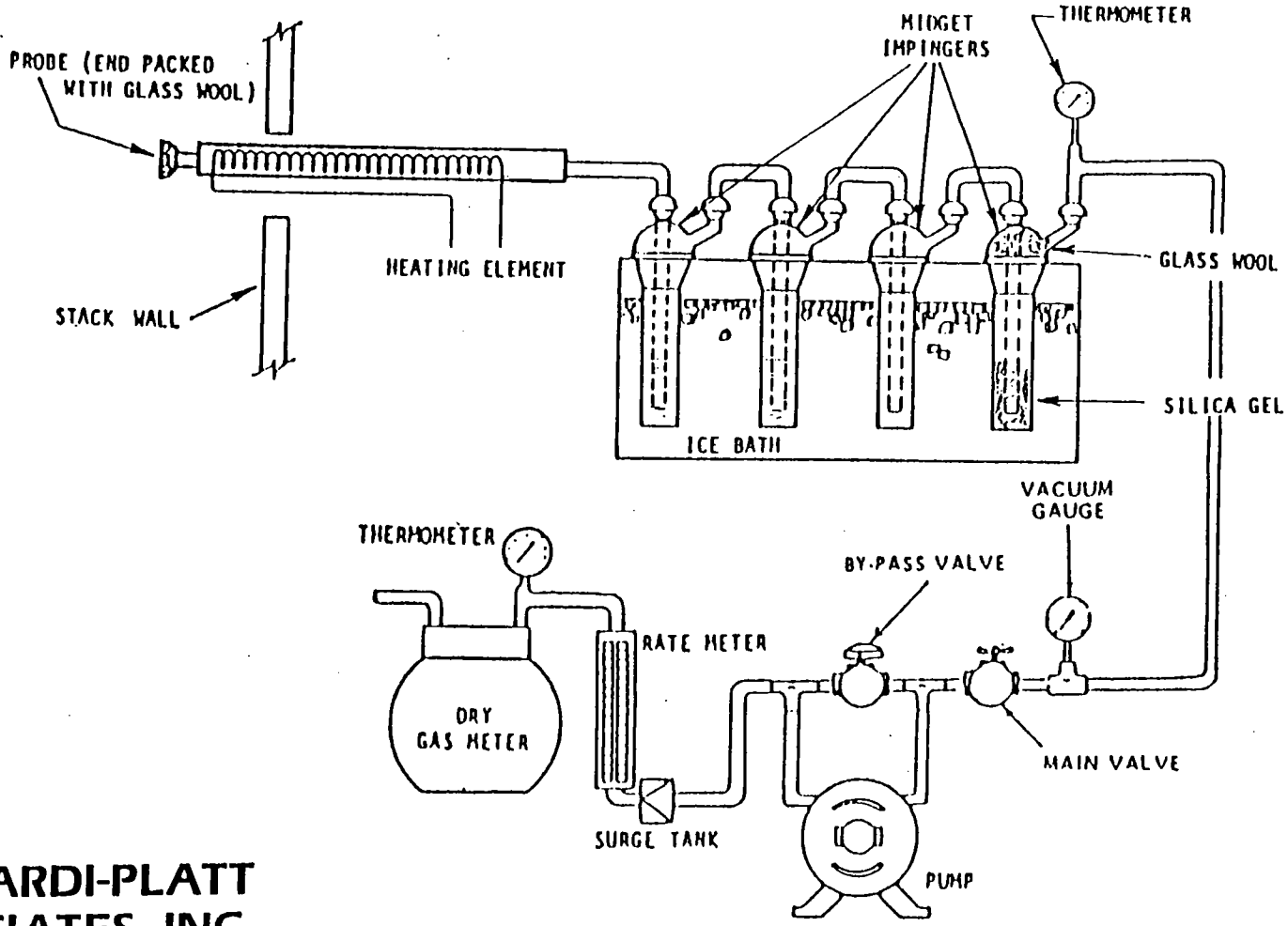


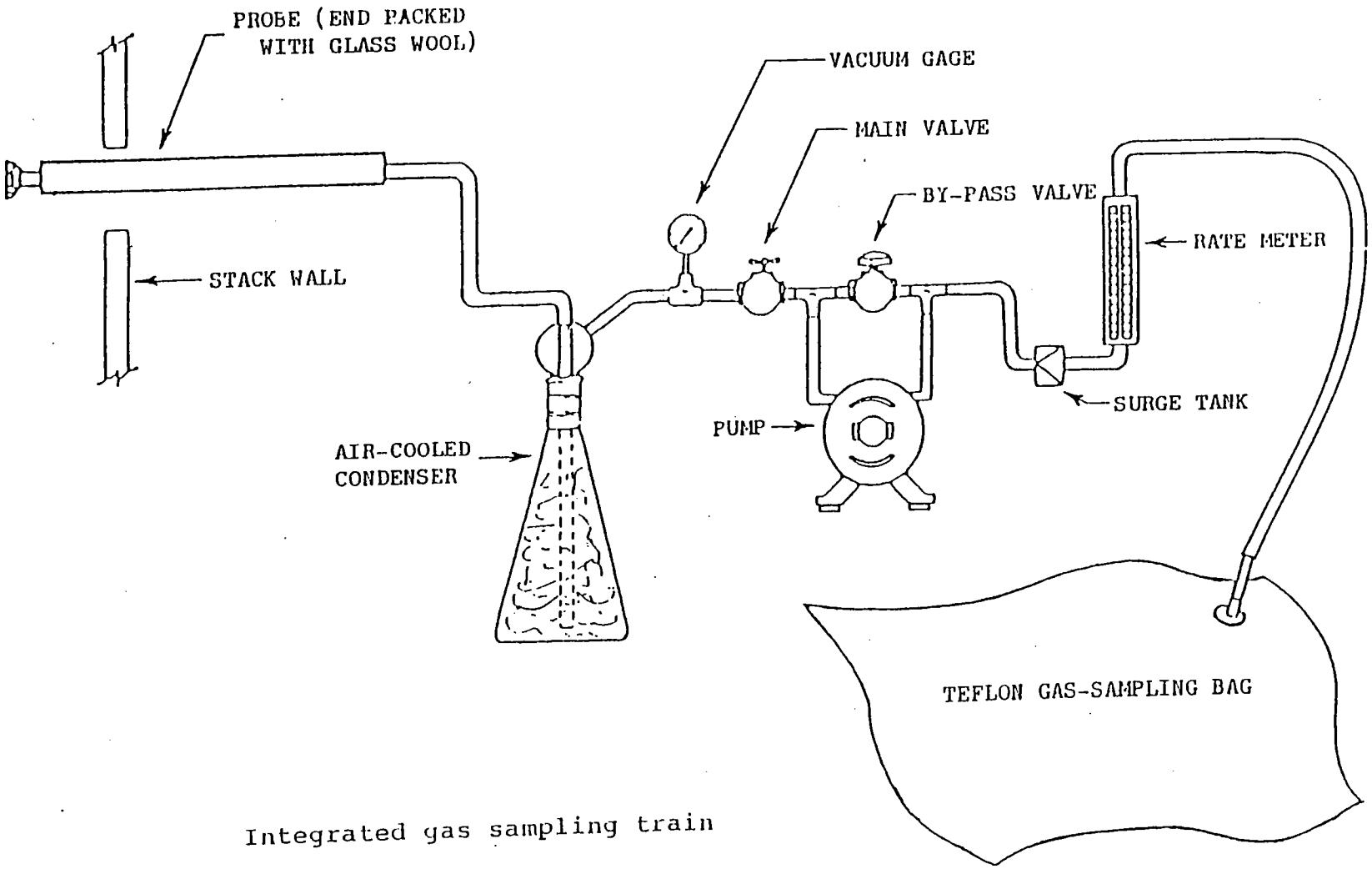
Figure 1.1 Type S pitot tube-manometer assembly.



MOSTARDI-PLATT ASSOCIATES, INC.

Moisture sampling train.

MOSTARDI-PLATT
ASSOCIATES, INC.



Integrated gas sampling train

NOMENCLATURE - TGNMO

Where:

B_a = Measured NMO blank value for NMO analyzer, ppm C.

B_t = Measured CO_2 blank value for condensate recovery and conditioning system carrier gas, ppm CO_2.

C = Total gaseous non-methane organic (TGNMO) concentration of the effluent, ppm C equivalent.

C_c = Calculated condensible organic (condensate trap) concentration of the effluent, ppm C equivalent.

C_{cm} = Measured concentration (NMO analyzer) for the condensate trap (intermediate collection vessel), ppm CO_2.

C_t = Calculated noncondensible organic concentration (sample tank) of the effluent, ppm C equivalent.

C_{tm} = Measured concentration (NMO analyzer) for the sample tank, ppm NMO.

L = Volume of Liquid injected, microliters

M = Molecular weight of the liquid injected, g/g-mole.

M_c = Total gaseous non-methane organic (TGNMO) mass concentration of the effluent, mg C/dscm.

N = Carbon number of the liquid compound injected (N=7 for toluene, N=6 for hexane).

P_f = Final pressure of the intermediate collection vessel, mm Hg absolute.

P_{ti} = Gas sample tank pressure prior to sampling, mm Hg absolute.

P_t = Gas sample tank pressure after sampling, but prior to pressurizing, mm Hg absolute.

P_{tf} = Final gas sample tank pressure after pressurizing, mm Hg absolute.

T_f = Final temperature of intermediate collection vessel, ^oK.

T_{ti} = Sample tank temperature prior to sampling, ^oK.

T_t = Sample tank temperature at completion of sampling, ^oK.

T_{tf} = Sample tank temperature after pressurizing ^oK.

V = Sample tank volume, cm.

V_v = Intermediate collection vessel volume, cm.

V_s = Gas volume sampled, dscm.

n = Number of data points.

q = Total number of analyzer injections of intermediate collection vessel during analysis (where k=injection number, 1 ...q).

r = Total number of analyzer injections of sample tank during analysis (where j-injection number, 1...r).

x_i = Individual measurements.

X = Mean value.

p = Density of liquid injected, g/cc.

CALCULATION FORMULAE
TGNMO

Calculations

Note: All equations are written using absolute pressure; absolute pressures are determined by adding the measured barometric pressure to the measured gauge pressure.

Sample Volume. For each test run, calculate the gas volume sampled:

$$V_s = 0.386\ V \left(\frac{P_t}{T_t} - \frac{P_{ti}}{T_{ti}} \right)$$

Noncondensible Organics. For each sample tank, determine the concentration of nonmethane organics (ppm C):

$$C_t = \left[\frac{\frac{P_{tf}}{T_{tf}}}{\frac{P_t}{T_t} \quad \frac{P_{ti}}{T_{ti}}} \right] \left[\frac{1}{r} \sum_{j=1}^{r} C_{tm_j} - B_a \right]$$

Condensible Organics. For each condensate trap determine the concentration of organics (ppm C):

$$C_c = 0.386\ \frac{V_v}{V_s} \frac{P_f}{T_f} \left[\frac{1}{q} \sum_{k=1}^{q} C_{cm_k} - B_t \right]$$

Total Gaseous Nonmethane Organics (TGNMO). To determine the TGNMO concentration for each test run, use the following equation:

$$C = C_t + C_c$$

Total Gaseous Nonmethane Organics (TGNMO) Mass Concentration. To determine the TGNMO mass concentration as carbon for each test run, use the following equation:

$$M_c = 0.498\ C$$

Percent Recovery. To calculate the percent recovery for the liquid injections to the condensate recovery and conditioning system use the following equation:

$$\text{percent recovery} = 1.6\ \frac{M}{L} \frac{V_v}{p} \frac{P_f}{T_f} \frac{C_{cm}}{N}$$

Relative Standard Deviation.

$$RDS = \frac{100}{\bar{x}} \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$$

SUMMARY OF RESULTS CALCULATIONS

$$Vm\ std = 17.64 \times Vm \times \left[\frac{P_b + \frac{\Delta H}{13.6}}{(460 + Tm)}\right] \times Yd$$

$Vw\ std = 0.0471 \times Vlc$ $\qquad$ Vlc = water + silica net

$$Bwo = \frac{Vw\ std}{(Vw\ std + Vm\ std)}$$

$$Md = (.44 \times \%CO_2) + (0.32 \times \%O_2) + [0.28 \times (100 - \%CO_2 - \%O_2)]$$

$$Ms = Md \times (1 - Bwo) + (18 \times Bwo)$$

$$Vs = \sqrt{\frac{(Ts + 460)}{Ms \times Ps}} \times \sqrt{\Delta P} \times Cp \times 85.49$$ $\qquad$ Cp = pitot correction

$$Acfm = Vs \times Area\ (of\ stack\ or\ duct) \times 60$$

$$Dscfm = Acfm \times 17.64 \times \left[\frac{Ps}{(460 + Ts)}\right] \times (1 - Bwo)$$

RESEARCH TRIANGLE LABORATORIES

prepared for

MOSTARDI-PLATT ASSOCIATES, INC.

prepared by

RESEARCH TRIANGLE LABORATORIES, INC.

Gene Mull
Chemist

John Y. Morimoto, Ph.D.
Chemist

RTL ID # 90-126
March 1, 1990

1612 Carpenter Fletcher Road • Durham, North Carolina 27713 • (919) 544-5775 • FAX: (919) 544-3770
A Member of the Andersen Technology Group

RESEARCH TRIANGLE LABORATORIES, INC.

METHOD 25 TABLE OF RESULTS

Name: Mostardi-Platt Associates,Inc. ID #90-33-126 Date: 2/28/90

Sample Number	Sample Description	Concentrations (ppmC) CO+CH4	CO2	Noncondensibles	Condensibles	TGNMO	Mass Conc. (mgC/cu.m)
1	CID #3-1	0	45458	0	47	47	24
2	CID #3-2	0	43631	0	46	46	23
3	CID #3-3	0	38640	0	69	69	34

RESEARCH TRIANGLE LABORATORIES, INC.

COMMENTS ON THE ANALYSES

Report #90-33-126

All Samples: As requested the CO2 flush was performed with the trap in ice water, rather than the usual dry ice: The traps were kept under dry ice until just prior to analysis when they were allowed to warm at room temperature for about ten minutes and then placed in an ice-water bath. Also as requested, the CO2 flush was allowed to proceed for the full ten minutes even though the CO2 NDIR reading was zero throughout the procedure.

RESEARCH TRIANGLE LABORATORIES, INC.

METHOD 25 EXPERIMENTAL PROCEDURE

Calibration

A propane calibration gas mixture of 82 ppm CO, 68 ppm CH_4, 2.07% CO_2, and 75 ppm propane is injected via a 1-mL sampling loop into the analyzer. The injections are repeated until three integrated areas indicate reasonable agreement. A 1.18% CO_2 standard is run daily with the same requirement. The average daily response factors must agree within 5% of the RF(CO_2) and the RF(NMO) from the initial performance check.

Daily Performance Checks are performed at the beginning of each work day. Calibrations are performed daily or between customer sets of samples, whichever comes first. Additionally, a System Background Check is performed between each set of samples. Duplicate injections of 1.0% CO_2 are made after the final sample each day.

Response factors (average integrated area/concentration in ppmC) are calculated daily from the initial triplicate injections.

Analysis

Each trap is stored under dry ice until just prior to analysis and is flushed of CO_2 by passing zero air through it at -78 °C and via the CO_2 NDIR to the sample tank. Flushing is continued until no NDIR response is noted. The trap is baked at 200 °C with zero air flushing through the trap and via the oxidation catalyst and the NDIR into the collection vessel. Collection is continued until no NDIR response is noted. The trap is transferred to an oven set at 350 °C and baking is continued for 30 minutes. This ensures the cleanliness of the trap for a subsequent sampling. The trap is taken out of the oven and allowed to cool; it is then capped and stored for shipment.

The sample tank is analyzed by injecting an aliquot via a 1-mL sample loop into the GC column, which is held at 85 °C to elute the CO+CH_4 and then the CO_2 which is passed to the oxidation catalyst, reduction catalyst, and FID. The column is then backflushed at 195 °C to elute the organic fraction. The collection vessel is analyzed identically. In both cases, triplicate injections are made. The sample tank is pumped for 5 minutes (to less than 5 mmHg) and air is then allowed in via a paper fiber filter; this procedure is repeated. The tank is pumped 10 minutes and allowed to stand overnight. The tank is then connected to a pressure gauge to test for leaks (maximum permissible leak rate = 10 mmHg/day). If the tank passes the leak test, it is filled with zero air to slightly greater than atmospheric pressure and stored for shipment.

Calculations

Calculations are done in accord with EPA Method 25 procedures. A sample calculation is provided using client/RTL data.

RESEARCH TRIANGLE LABORATORIES, INC.

METHOD 25 SAMPLE CALCULATION

Note: All pressure values have been converted when necessary to mm Hg and all temperature values to Kelvin.

Name: Mostardi-Platt Associates,Inc. ID #90-33-126 Date: 2/28/90

Sample # 1 CID #3-1

D A T A

Tank 6144:
Volume (cu.m) = 0.005837

	Pressure (mm Hg)	Temp.(K)
Presampling	0.0	291.5
Postsampling	442.0	287.6
Final	1107.0	301.2

Trap PT

Collection Vessel:
Volume (cu.m) = 0.005975

	Pressure (mm Hg)	Temp.(K)
Final	1065.0	302.2

Calibration Data:

	CO2	Backflush
Response Factor (area units/ppmC)	87.0	91.6
Blank (ppmC)	0.0	
Blank Area (area units)		0

Areas:

CO + CH4	0	0	0
CO2	1,655,400	1,652,800	1,651,900
Noncondensibles	0	0	0
Condensibles	2,019	1,795	1,458

C A L C U L A T I O N S

Measured Concentrations, corrected for blank:

Cm(CO+CH4) = Area(CO+CH4)/RF(CO2)
= 0 / 87.0 = 0.0
= 0 / 87.0 = 0.0
= 0 / 87.0 = 0.0

Cm(CO2) = Area(CO2)/RF(CO2)
= 1655400 / 87.0 = 19027.6
= 1652800 / 87.0 = 18997.7
= 1651900 / 87.0 = 18987.4

Cm(Noncondensibles) = [Area(Noncondensibles) - Blank Area(NMO)]/RF(NMO)
= (0 - 0)/ 91.6 = 0.0
= (0 - 0)/ 91.6 = 0.0
= (0 - 0)/ 91.6 = 0.0

Cm(Condensibles) = Area(Condensibles)/RF(CO2) - Blank(CO2)
= 2019 / 87.0 - 0.0 = 23.2
= 1795 / 87.0 - 0.0 = 20.6
= 1458 / 87.0 - 0.0 = 16.8

Pressure-Temperature Ratio, Q(i) = P(i)/T(i):

postsampling tank: Q(1) = 441.96 / 287.5945 = 1.536747
presampling tank: Q(2) = 0 / 291.4833 = 0
final tank: Q(3) = 1107 / 301.15 = 3.675909
final CV: Q(4) = 1065 / 302.15 = 3.52474

Volume Sampled (dscm) = 0.3857 x Tank Volume x [Q(1)-Q(2)]
= 0.3857 x .005837 x [1.5367 - 0.0000]
= 0.003460

Averages and % Relative Standard Deviations (%RSD) of Cm's are calculated.
(%RSD of C = %RSD of Cm)

Calculated Concentrations:

C(CO+CH4) = Q(3)/[Q(1)-Q(2)] x Cm(CO+CH4)
= 3.6759/(1.5367 - 0.0000) x 0.0 = 0.0

C(CO2) = Q(3)/[Q(1)-Q(2)] x Cm(CO2)
= 3.6759/(1.5367 - 0.0000) x 19004.2 = 45458.2

C(Noncondensibles) = Q(3)/[Q(1)-Q(2)] x Cm(Noncondensibles)
= 3.6759/(1.5367 - 0.0000) x 0.0 = 0.0

C(Condensibles)
= Volume(CV)/Volume(Tank) x Q(4)/[Q(1)-Q(2)] x Cm(Condensibles)
= 0.005975/0.005837 x 3.5247/(1.5367 - 0.0000) x 20.2 = 47.4

Total Gaseous Non-Methane Organics(TGNMO)=C(Noncondensibles)+C(Condensibles)
= 0.0 + 47.4
= 47.4

Mass Concentration = 0.4993 x TGNMO
= 0.4993 x 47.4 = 23.7

RESEARCH TRIANGLE LABORATORIES, INC.

METHOD 25 SAMPLE QA/QC DATA & CALIBRATION CHECK/A

5.1.1 Carrier Gas and Auxiliary Oxygen Blank (1/3/90)

$CO + CH_4 + CO_2 + NMO = 0$ ppm Requirement: < 5 ppm

5.1.2 Catalyst Efficiency Check (1/4/90)

$CO_2 = 9982$ ppmC Requirement: $CO_2 = 10000 \pm 200$ ppmC

5.1.3 System Performance Check (1/4/90)

	Average Percent Recovery	%RSD
50 uL hexane/decane	107.6/103.6	0.1/0.5
10 uL hexane/decane	102.1/103.2	0.5/0.9
Requirement	100 ± 10%	< 5

5.2.1 Oxidation Catalyst Efficiency Check (1/5/90)

FID Response with Reduction Catalyst Out = 0.25%

Requirement < 1%

5.2.2 Reduction Catalyst Efficiency Check (1/5/90)

Response of CO_2 with Oxidation Catalyst and Reduction Catalyst operative was 100.3% of response with catalyst out.

Requirement 100 ± 5%

5.2.3 Analyzer Linearity Check and NMO Calibration (1/2/90)

$\overline{RF}$ values agree within 2.5% Requirement: within 2.5%
%RSD values for triplicates < 2% " < 2%
except Propane 4th Dilution (22 ppmc) %RSD = 2.4%

(deviation by Gene Mull, Manager and Joseph Adamovic, Laboratory Manager)

$\frac{RF(NMO)}{RF(CO_2)} = 1.015$ Requirement: $\frac{RF(NMO)}{RF(CO_2)} = 1.0 \pm 0.1$

5.2.4 System Performance Check (1/5/90)

	Measured Value	Expected Value	Requirement
Propane Mix	75.0 ppm	75.0 ppm	± 5%
Hexane	33.1 ppm	51.8 ppm Fail	± 5%
Toluene	27.2 ppm	60.5 ppm Fail	± 5%
Methanol	120.7 ppm	92.7 ppm Fail	± 5%

Analyzer A could not pass this section since calibration gases (Methanol, Toluene and Hexane) had gone bad. Cer-

tified standards were ordered and are scheduled for analysis upon receipt.

Analyzer A passed Section 5.2.4 only for Propane Mix, which is our current calibration gas, thus O.K. (known to to be accurate).

5.3 NMO Analyzer Daily Calibration

Triplicate injections of a mixture containing propane and high-level CO_2 are made at the beginning of each set of samples or every 24 hours, whichever comes first.

Requirements: $DRF(NMO) = RF(NMO) \pm 5\%$
$DRF(CO_2) = RF(CO_2) \pm 5\%$

RESEARCH TRIANGLE LABORATORIES, INC.

METHOD 25 DATA REPORT

Name: Mostardi-Platt Associates,Inc. ID #90-33-126 Date: 2/28/90

Sample # 1 CID #3-1

TANK 6144:
Volume (cu.m) = 0.005837

TRAP PT

COLLECTION VESSEL:
Volume (cu.m) = 0.005975

	Pressure (mm Hg)	Temp.(K)		Pressure (mm Hg)	Temp.(K)
Presampling	0.0	291.5			
Postsampling	442.0	287.6			
Final	1107.0	301.2	Final	1065.0	302.2

Volume Sampled (dscm) = 0.003460

Calibration Data:

	CO2	Backflush
Response Factor (area units/ppmC)	87.0	91.6
Blank (ppmC)	0.0	
Blank Area (area units)		0

Areas:

CO + CH4	0	0	0
CO2	1,655,400	1,652,800	1,651,900
Noncondensibles	0	0	0
Condensibles	2,019	1,795	1,458

Concentrations (ppmC):		%RSD
CO + CH4	0.0000	0.0000
CO2	45458.2000	0.1099
Noncondensibles	0.0000	0.0000
Condensibles	47.4250	16.0693
TGNMO	47.4250	

(= 23.6793 mgC/cu.m)

RESEARCH TRIANGLE LABORATORIES, INC.

METHOD 25 DATA REPORT

Name: Mostardi-Platt Associates,Inc. ID #90-33-126 Date: 2/28/90

Sample # 2 CID #3-2

TANK 6158:
Volume (cu.m) = 0.005758

TRAP PX

COLLECTION VESSEL:
Volume (cu.m) = 0.005777

	Pressure (mm Hg)	Temp.(K)		Pressure (mm Hg)	Temp.(K)
Presampling	0.0	291.5			
Postsampling	502.9	287.6			
Final	1055.0	302.2	Final	1050.0	302.2

Volume Sampled (dscm) = 0.003884

Calibration Data:

	CO2	Backflush
Response Factor (area units/ppmC)	87.0	91.6
Blank (ppmC)	0.0	
Blank Area (area units)		0

Areas:

CO + CH4	0	0	0
CO2	1,900,700	1,901,400	1,901,200
Noncondensibles	0	0	0
Condensibles	2,131	1,907	2,019

Concentrations (ppmC):		%RSD
CO + CH4	0.0000	0.0000
CO2	43631.2000	0.0190
Noncondensibles	0.0000	0.0000
Condensibles	46.2696	5.5473
TGNMO	46.2696	

(= 23.1024 mgC/cu.m)

RESEARCH TRIANGLE LABORATORIES, INC.

METHOD 25 DATA REPORT

Name: Mostardi-Platt Associates,Inc. ID #90-33-126 Date: 2/28/90

Sample # 3 CID #3-3

TANK 6149:
Volume (cu.m) = 0.005821

	Pressure (mm Hg)	Temp.(K)
Presampling	0.0	291.5
Postsampling	472.4	287.6
Final	1110.0	302.2

TRAP ST

COLLECTION VESSEL:
Volume (cu.m) = 0.005835

	Pressure (mm Hg)	Temp.(K)
Final	1089.0	302.2

Volume Sampled (dscm) = 0.003688

Calibration Data:

	CO2	Backflush
Response Factor (area units/ppmC)	87.0	91.6
Blank (ppmC)	0.0	
Blank Area (area units)		0

Areas:

CO + CH4	0	0	0
CO2	1,501,500	1,501,900	1,506,200
Noncondensibles	0	0	0
Condensibles	3,024	2,731	2,438

Concentrations (ppmC):

		%RSD
CO + CH4	0.0000	0.0000
CO2	38639.5200	0.1733
Noncondensibles	0.0000	0.0000
Condensibles	69.0375	10.7287
TGNMO	69.0375	

(= 34.4704 mgC/cu.m)

METER BOX CALIBRATION DATA

Dry Gas Meter No. E-8 Date 1-29-90 Calibrated By L. CAMPO
Standard Meter No. 6806272 Yr =0.9910 Barometric Pressure, in. Hg (Pb): 29.77 - 0.65 = 29.12

Run No	Orifice Setting, in. H_2O Chg(H)	Gas Volume, ft^3 Standard Meter (V_r)	Gas Volume, ft^3 Dry Gas Meter (V_d)	Pressure in. H_2O Meter (P_r)	Meter Temperature, ^oF Standard (t_r)	Meter Temperature, ^oF Dry Gas Meter Inlet (t_{di})	Meter Temperature, ^oF Dry Gas Meter Outlet (t_{do})	Meter Temperature, ^oF Dry Gas Meter Avg (t_d)	Time min.	Time sec.	Y	Chg(H@) in. H_2O
1	0.20	26.105 21.560 4.545	16.750 12.180 4.570	0.00	74	79	77	77.8	19	54	0.992	2.254
2	0.45	32.765 26.540 6.225	23.499 17.190 6.309	0.00	74	82	81	81.3	16	14	0.990	1.787
3	0.65	45.509 32.978 12.531	36.479 23.702 12.777	0.00	74	84	84	84.0	27	31	0.988	1.821
4	0.90	57.074 45.855 11.219	48.278 36.821 11.457	0.00	74	85	84	84.3	20	51	0.987	1.805
5	1.30	69.725 57.731 11.994	61.166 48.940 12.226	0.00	74	85	84	84.5	18	21	0.988	1.766
6	1.90	78.710 70.500 8.210	70.305 61.946 8.359	0.00	74	85	84	84.5	10	24	0.988	1.770
								AVERAGE			0.989	1.867

RESEARCH TRIANGLE LABORATORIES, INC.

METHOD 25 SAMPLING DATA

Company: Mostardi-Platt
Person to contact: G.M. Gozzi
Telephone: (708) 860-5900
Send report to: G.M. Gozzi

For RTL use:
Batch ID: 88-___-___
File Name: _____

DO NOT use the vacuum gauge of the sampling unit to record the tank vacuum.

RUN # 3-1 002171A/002171B TANK # 6144 TRAP # RT PT

RUN DESCRIPTION CID #3 (Limit to 20 characters)

	Tank Vacuum mmHg / in.Hg	Barometric Pressure mmHg / in.Hg	Absolute Pressure mmHg / in.Hg	Temperature degrees C / (F)
Pre-test	29.20	29.20		65
Post-test	11.8	29.20		58

RUN # 3-2 002172A/002172B TANK # 6158 TRAP # PX

RUN DESCRIPTION CID #3

	Tank Vacuum mmHg / in.Hg	Barometric Pressure mmHg / in.Hg	Absolute Pressure mmHg / in.Hg	Temperature degrees C / (F)
Pre-test	29.20	~~29.20~~ 29.20		65
Post-test	9.4	29.20		58

RUN # 3-3 002173A/002173B TANK # 6149 TRAP # ST

RUN DESCRIPTION CID #

	Tank Vacuum mmHg / in.Hg	Barometric Pressure mmHg / in.Hg	Absolute Pressure mmHg / in.Hg	Temperature degrees C / (F)
Pre-test	~~29.32~~ 29.20	~~29.32~~ 29.20		65
Post-test	10.6	29.20		58

RUN # _____ TANK # _____ TRAP # _____

RUN DESCRIPTION _____

	Tank Vacuum mmHg / in.Hg	Barometric Pressure mmHg / in.Hg	Absolute Pressure mmHg / in.Hg	Temperature degrees C / F
Pre-test				
Post-test				

PRETEST TANK LEAK CHECK
METHOD 25

PROJECT: WM CID #3 Test / Recount + Final
DATE: 2-16-90
BAROMETRIC PRESSURE = ("Hg) 29.2
AMBIENT TEMP °F:

Test #

Tank #	Time	Initial Vacuum "Hg	Time	Final Vacuum "Hg	Leak Check
(1) 6144	1411	16.6 / 13.1 / 23.7 B_b = 29.2		29.2	
6158/Px	1412	29.5			
6149		29.5			
167		29.5			
116		29.5			

NOTE: - All lines to the manometer must be evacuated prior to taking the final tank vacuum readings.

- Minimum time of leak check 1 hour

TGNMO FIELD DATA
(Method 25)

Project CID WASTE MGT. Date 2-16-90

Client CID Regulator Number 3

Process CENTAUR TURBINE Tank Number(s) 6144 Trap Numbers PT

Operator [illegible] ____ ____

Sample Location [illegible] ____ ____

Test Run Number 1-SITE Stack Temperature °F ____

	Pre-Test	Post-Test	
Barometric Pressure Inches Hg	29.2		
Tank Leak Check Inches Hg/10 min	✓		
Tank Vacuum Inches Hg	29.2		(>5)
Sample Train Leak Check CM/10 min	✓		
Ambient Temperature °F			

SAMPLE TIME (5 min. intervals)	GAUGE VACUUM inches Hg	FLOWMETER SETTING	COMMENTS
1105	29.0	42	
1110	27.5	42	
1115	26.5	42	
1120	25.0	48	
1125	24.0	48	
1130	22.5	52	
1135	21.0	52	
1140	20.0	52	
1145	18.5	58	
1150	17.0	58	
1155	15.25	62	
1200	13.5	60	
1205	12.0	60	

tgnmofld.dat (gg)

TGNMO FIELD DATA
(Method 25)

Project CID WASTE MGT Date 2-16-90
Client CID Regulator Number 3
Process ROTARY TURBINE Tank Number(s) 6158 Trap Numbers PX
Operator A. CAMPO ____ ____
Sample Location STACK - OUTLET #2 ____ ____
Test Run Number 2-TWO Stack Temperature °F ____

	Pre-Test	Post-Test	
Barometric Pressure Inches Hg	29.20		
Tank Leak Check Inches Hg/10 min	✓		
Tank Vacuum Inches Hg	29.20		(>5)
Sample Train Leak Check CM/10 min	✓		
Ambient Temperature °F			

SAMPLE TIME (5 min. intervals)	GAUGE VACUUM inches Hg	FLOWMETER SETTING	COMMENTS
1225	29.0	5	
1230	27.5	5	
1235	26.5	5	
1240	24.5	5	
1245	23.5	5	
1250	22.0	6	
1255	20.0	6	
1300	18.5	6	
1305	17.0	6	
1310	15.0	6	
1315	13.5	6	
1320	11.5	6	
1325	10.0	6	

tgnmofld.dat (gg)

TGNMO FIELD DATA
(Method 25)

Project C1D WASTE MGT. Date 2-16-90

Client C1D Regulator Number E-3

Process COMBUSTION / TURBINE Tank Number(s) 614 Trap Numbers ST

Operator A. (AND) ____ ____

Sample Location STACK - OUTLET #3 ____ ____

Test Run Number 3 - THREE Stack Temperature °F ____

	Pre-Test	Post-Test	
Barometric Pressure Inches Hg	29.2		
Tank Leak Check Inches Hg/10 min	V		
Tank Vacuum Inches Hg	20.5		(>5)
Sample Train Leak Check CM/10 min	V		
Ambient Temperature °F			

SAMPLE TIME (5 min. intervals)	GAUGE VACUUM inches Hg	FLOWMETER SETTING	COMMENTS
1315	29.0	58	
1350	27.5	58	
1355	25.5	58	
1400	24.0	58	
1405	22.5	58	
1410	21.0	58	
1415	19.5	58	
1420	18.0	58	
1425	16.5	58	
1430	15.0	58	
1435	13.5	58	
1440	12.5	58	
1445	11.5	58	

tgnmofld.dat (gg)

MOSTARDI-PLATT ASSOCIATES, INC.

RUN #1 - RESULTS SUMMARY

WASTE MANAGEMENT
CID CHICAGO
2/16/90
OUTLET - STACK 3

PARTICULATE CONCENTRATION @STACK COND., Cacf=	0.0000 GR/ACF
PARTICULATE CONCENTRATION @DRY STAND. COND., Cs =	0.0000 GR/SCFD
PARTICULATE CONCENTRATION =	0.00 Lbs/hr
PARTICULATE CONCENTRATION (O_2BASIS) =	0.000 Lbs/MBtu
BAROMETRIC PRESSURE Pb =	29.20 in. Hg.
AVERAGE FLUE GAS PRESSURE Ps =	29.20 in. Hg.
AVERAGE FLUE GAS TEMPERATURE, Ts =	1237^{0}R
AVERAGE METER TEMPERATURE, Tm =	525^{0}R
TOTAL METER VOLUME, Vm =	46.92 cu. ft.
TOTAL METER VOLUME @STAND. COND. Vm(STD) =	45.541 cu. ft.
TOTAL WATER VAPOR @STAND. COND., Vw(STD) =	1.82 cu. ft.
WATER VAPOR IN GAS STREAM PROPORTION BY VOLUME,Bws =	0.038
AVERAGE CARBON DIOXIDE CONTENT OF GAS, CO_2 =	3.10 %
AVERAGE OXYGEN CONTENT OF GAS, O_2 =	16.70 %
AVERAGE NITROGEN CONTENT OF GAS, N_2 =	80.20 %
MOISTURE CORRECTION FACTOR =	0.962
AVERAGE GAS VELOCITY, Vs =	129.54 ft/sec
AVERAGE GAS VOLUMETRIC FLOW RATE, STACK COND. =	67,813 ACFM
AVERAGE GAS VOLUMETRIC FLOW RATE, STAND. COND. =	27,168 DSCFM
AVERAGE GAS VOLUMETRIC FLOW RATE, STAND. COND. =	1,630,068 DSCFH
PERCENT EXCESS AIR =	373.37 %
MOLECULAR WEIGHT OF THE STACK GAS, DRY BASIS, Md =	29.1640
MOLECULAR WEIGHT OF THE STACK GAS, WET BASIS, Ms =	28.7346
STACK GAS SPECIFIC GRAVITY (AIR = 1,000) =	0.993
ISOKINETIC VARIANCE, IKV =	0.00

*STANDARD CONDITIONS = 68^{0}F, 29.92 in. Hg.

MOSTARDI-PLATT ASSOCIATES, INC.

RUN #2 - RESULTS SUMMARY

WASTE MANAGEMENT
CID CHICAGO
2/16/90
OUTLET - STACK 3

PARTICULATE CONCENTRATION @STACK COND., Cacf=	0.0000 GR/ACF
PARTICULATE CONCENTRATION @DRY STAND. COND., Cs =	0.0000 GR/SCFD
PARTICULATE CONCENTRATION =	0.00 Lbs/hr
PARTICULATE CONCENTRATION (O_2BASIS) =	0.000 Lbs/MBtu
BAROMETRIC PRESSURE Pb =	29.20 in. Hg.
AVERAGE FLUE GAS PRESSURE Ps =	29.20 in. Hg.
AVERAGE FLUE GAS TEMPERATURE, Ts =	1228^{0}R
AVERAGE METER TEMPERATURE, Tm =	523^{0}R
TOTAL METER VOLUME, Vm =	39.61 cu. ft.
TOTAL METER VOLUME @STAND. COND. Vm(STD) =	38.599 cu. ft.
TOTAL WATER VAPOR @STAND. COND., Vw(STD) =	1.79 cu. ft.
WATER VAPOR IN GAS STREAM PROPORTION BY VOLUME,Bws =	0.044
AVERAGE CARBON DIOXIDE CONTENT OF GAS, CO_2 =	3.30 %
AVERAGE OXYGEN CONTENT OF GAS, O_2 =	16.40 %
AVERAGE NITROGEN CONTENT OF GAS, N_2 =	80.30 %
MOISTURE CORRECTION FACTOR =	0.956
AVERAGE GAS VELOCITY, Vs =	128.34 ft/sec
AVERAGE GAS VOLUMETRIC FLOW RATE, STACK COND. =	67,187 ACFM
AVERAGE GAS VOLUMETRIC FLOW RATE, STAND. COND. =	26,941 DSCFM
AVERAGE GAS VOLUMETRIC FLOW RATE, STAND. COND. =	1,616,490 DSCFH
PERCENT EXCESS AIR =	341.72 %
MOLECULAR WEIGHT OF THE STACK GAS, DRY BASIS, Md =	29.1840
MOLECULAR WEIGHT OF THE STACK GAS, WET BASIS, Ms =	28.6874
STACK GAS SPECIFIC GRAVITY (AIR = 1,000) =	0.991
ISOKINETIC VARIANCE, IKV =	0.00

*STANDARD CONDITIONS = 68^{0}F, 29.92 in. Hg.

PITOT TRAVERSE DATA

MOSTARDI-PLATT ASSOCIATES, INC.

Project WASTE MANAGEMENT

Location C.I.D. CENTRAVE TURBINE STACK 3

Date 2-16-90 Traverse No. 1 Time 1000 - 1030

Point No.	p	$\sqrt{p}$	t_s	a	Point No.	p	$\sqrt{p}$	t_s	a
1-1	1.72	1.311	780						
2	2.05	1.432	790						
3	2.90	1.703	805						
4	2.70	1.643	800						
5	2.75	1.658	800						
6	2.85	1.688	800						
7	2.70	1.643	790						
8	2.55	1.597	790						
9	2.45	1.565	790						
10	2.50	1.581	785						
		-15.821-	-7930-						
2-1	1.85	1.360	760						
2	1.90	1.378	760						
3	1.95	1.396	765						
4	2.05	1.432	780						
5	2.15	1.466	780						
6	2.70	1.643	780						
7	2.00	1.414	760						
8	1.95	1.396	740						
9	1.55	1.245	740						
10	1.35	1.162	740						
		13.892	7605						
	Ave	1.4857	776.75						

P_{bar} 29.2 "Hg Static 0.0 "H_2O P_g _____ "Hg P_s 29.2 "Hg C_p 0.84

0.44 x _____ = _____ t_s 776.8 °F T_s 1236.8 °R Pot. No. 11

0.32 x _____ = _____ Dimensions 3' 4" DIA 3.333

0.28 x _____ = _____ B_{ws} _____ 1 - B_{ws} _____ $\sqrt{p}$ Flue Area 8.727 ft^2

(_____ x _____) + (18 x _____ B_{ws}) = _____ (M_w)

$v_s = 85.49 \times$ ____ $C_p \times \sqrt{\frac{1236.8\ (T_s)}{P_s \times M_w}} \times 1.4857\sqrt{p}$ = _____ ft/sec

Q_{acfm} = _____ (V_s) x 8.727 (flue area) x 60 = _____ acfm

Data Taken By _____

PITOT TRAVERSE DATA

MOSTARDI-PLATT ASSOCIATES, INC.

Project Waste Management

Location CID Centrum turbine Stack 3

Date 2-16-90 Traverse No. 2 Time 1455

Point No.	p	$\sqrt{p}$	t_s	a	Point No.	p	$\sqrt{p}$	t_s	a
1-1	1.35		725						
2	1.55		730						
3	2.15		760						
4	2.45		790						
5	2.60		810						
6	2.70		815						
7	2.75		810						
8	2.70		800						
9	2.65		795						
10	2.50		782						
2-1	1.70		735						
2	1.90		745						
3	2.15		760						
4	2.15		780						
5	2.35		780						
6	2.55		775						
7	2.10		775						
8	2.10		735						
9	1.95		730						
10	1.80		730						

P_{bar} _____ "Hg Static _____ "H_2O P_g _____ "Hg P_s _____ "Hg C_p _____

0.44 x _____ = _____ t_s _____ °F T_s _____ °R Pot. No. _____

0.32 x _____ = _____ Dimensions _____

0.28 x _____ = _____ B_{ws} _____ 1 - B_{ws} _____ $\sqrt{p}$ Flue Area _____ ft^2

(_____ x _____) + (18 x _____ B_{ws}) = _____ (M_w)

$$v_s = 85.49 \times \_\_\_\_ C_p \times \sqrt{\frac{\_\_\_\_\_ (T_s)}{P_s \times M_w}} \times \_\_\_\_\_ \sqrt{p} = \_\_\_\_\_ \text{ft/sec}$$

$$Q_{acfm} = \_\_\_\_\_ (V_s) \times \_\_\_\_\_ (\text{flue area}) \times 60 = \_\_\_\_\_ \text{acfm}$$

Data Taken By G.

mostardi-platt associates, inc

~~METHOD 6~~ - FIELD DATA SHEET
~~SULFUR DIOXIDE~~ and MOISTURE

Project: WASTE MANAGEMENT Date: 2-16-90

Sampling Location: CID - CENTAUR STACK 3

Source Condition: FULL LOAD

Dry Gas Meter # E8 Y = 0.989

Test(Run) No. 1 Barometric Pressure (P_{bar}) _____ in.Hg Orsat Analysis

Gas Temperature _____ °F Static Pressure _____ in.H_2O _____ %CO_2 _____ %O_2

Clock Time 24hr	Meter Volume (V_m) ft^3	Meter Gauge Pressure (ΔH) in.H_2O	Meter Temp. (t_m) °F	Impgr. Outlet Temp. °F	Pump Vacuum in.Hg
11:05	95.455	.73	65°		
11:15	99.68	.72	65°		
11:25	104.32	.72	65°		
11:35	109.25	.72	65°		
11:45	113.05	.72	65°		
11:55	119.26	.72	66°		
~~12:05~~	123.57	.72	66°		
~~[illegible]~~		—	—	—	—
AVG			(T_m)		°R

V_{soln} _____ V_a _____ N _____

$V_t - V_{tb}$ _____ $V_{m(std)}$ _____

_____ lbs SO_2/dscf _____ ppm(dry)

232 2067 grams (W_f) _____ ppm(wet)

200 200 grams (W_i) B_{ws} = _____

32 67 grams $1 - B_{ws}$ = _____

x 0.04715 = _____ ft^3[$V_{w(std)}$]

$$V_{m(std)} = 17.64\ V_m\ Y\ \frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}$$

$$\text{lbs } SO_2/\text{dscf} = \frac{7.061 \times 10^{-5}}{V_{m(std)}} \times (V_t - V_{tb}) \times N \times \frac{V_{soln}}{V_a}$$

$$\text{ppm } SO_2(\text{dry}) = 6.015 \times 10^6 \times \text{lbs } SO_2/\text{dscf} \qquad B_{ws} = \frac{V_{w(std)}}{V_{w(std)} + V_{m(std)}}$$

Comments:

Leak Check: cc/min @ in.Hg

Test(Run) ~~No.~~ Barometric Pressure (P_{bar}) _____ in.Hg Orsat Analysis

Gas ~~Temperature~~ _____ °F Static Pressure _____ in.H_2O 3.1 %CO_2 16.7 %O_2

Clock Time 24hr	Meter Volume (V_m) ft^3	Meter Gauge Pressure (ΔH) in.H_2O	Meter Temp. (t_m) °F	Impgr. Outlet Temp. °F	Pump Vacuum in.Hg
12:15	128.495	.72	65°		
12:25	133.155	.72	65°		
12:35	138.24	.72	65°		
12:45	142.37	.72	65°		
		—	—	—	—
AVG 46.915			65 (T_m)		°R

V_{soln} _____ V_a _____ N _____

$V_t - V_{tb}$ _____ $V_{m(std)}$ _____

_____ lbs SO_2/dscf _____ ppm(dry)

_____ grams (W_f) _____ ppm(wet)

- _____ grams (W_i) B_{ws} = _____

_____ grams $1 - B_{ws}$ = _____

x 0.04715 = _____ ft^3[$V_{w(std)}$]

Comments:

Leak Check: cc/min @ in.Hg

Samples Transferred to Lab By:

_____, Date _____

Operator _____

mostardi-platt associates, inc

METHOD 6 - FIELD DATA SHEET
SULFUR DIOXIDE and MOISTURE

Project: WASTE MANAGEMENT Date: 2-16-90

Sampling Location: CID CENTAUR STACK 3

Source Condition: FULL LOAD

Dry Gas Meter # E8 Y = _____

Test(Run) No. 2 Barometric Pressure (P_{bar}) _____ in.Hg Orsat Analysis

Gas Temperature _____ °F Static Pressure _____ in.H_2O _____ %CO_2 _____ %O_2

Clock Time 24hr	Meter Volume (V_m) ft^3	Meter Gauge Pressure (ΔH) in.H_2O	Meter Temp. (t_m) °F	Impgr. Outlet Temp. °F	Pump Vacuum in.Hg
1300	42.618	0.75	50°		
13:10	47.790	0.75	65°		
13:20	52.555	0.75	64°		
13:30	57.59	0.74	65°		
13:40	62.89	0.74	66°		
13:50	67.78	0.75	65°		
14:00	72.32	0.75	65°		
		—	—	—	—
AVG			(T_m)		°R

V_{soln} _____ V_a _____ N _____

$V_t - V_{tb}$ _____ $V_{m(std)}$ _____

_____ lbs SO_2/dscf _____ ppm(dry)

231 207.1 grams (W_f) _____ ppm(wet)

200 200 grams (W_i) B_{ws} = _____

31 7.1 grams $1 - B_{ws}$ = _____

38 x 0.04715 = _____ $ft^3[V_{w(std)}]$

$$V_{m(std)} = 17.64\ V_m\ Y\ \frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}$$

$$\text{lbs } SO_2/\text{dscf} = \frac{7.061 \times 10^{-5}}{V_{m(std)}} \times (V_t - V_{tb}) \times \frac{V_{soln}}{V_a}$$

$$\text{ppm } SO_2(\text{dry}) = 6.015 \times 10^6 \times \text{lbs } SO_2/\text{dscf} \qquad B_{ws} = \frac{V_{w(std)}}{V_{w(std)} + V_{m(std)}}$$

Comments:

Leak Check: cc/min @ in.Hg

Test(Run) No. ~~Barometric Pressure~~ (P_{bar}) _____ in.Hg Orsat Analysis

Gas Temperature _____ °F Static Pressure _____ in.H_2O 3.3 %CO_2 16.4 %O_2

Clock Time 24hr	Meter Volume (V_m) ft^3	Meter Gauge Pressure (ΔH) in.H_2O	Meter Temp. (t_m) °F	Impgr. Outlet Temp. °F	Pump Vacuum in.Hg
14:10	77.38	0.75	65°		
1420	82.23	0.75	65°		
		—	—	—	—
AVG	39.612		63 (T_m)		°R

V_{soln} _____ V_a _____ N _____

$V_t - V_{tb}$ _____ $V_{m(std)}$ _____

_____ lbs SO_2/dscf _____ ppm(dry)

_____ grams (W_f) _____ ppm(wet)

- _____ grams (W_i) B_{ws} = _____

_____ grams $1 - B_{ws}$ = _____

x 0.04715 = _____ $ft^3[V_{w(std)}]$

Comments:

Leak Check: cc/min @ in.Hg

Samples Transferred to Lab By:

_____, Date _____

Operator _____