Background Report Reference

AP-42 Section Number: 12.20

Background Chapter: 4

Reference Number: 53

Title: Source Test Report No. 86-0256 of Plato Products, Inc., 2120 East Allen Avenue, Glendora, CA

Truesdail Laboratories

July 1987

ELECTROPLATING

REF. 4-53

South Coast Air Quality Management District

Source Test Report 87-0256

Plato Products Inc.
2120 East Allen Avenue
Glendora, California

29 July 1987

UNACCEPTABLE

The inlet data on this report are acceptable but the outlet testing looks sloppy. There are no meter temperatures on the outlet field data sheet except for three spaces towards the bottom of the sheet which give the temperature at 106-107 degrees F. This does not agree with the temperature given on the calculation sheet in the front of the report. The static pressure for the stack is not given on the outlet sheet There are no individual stack temperatures recorded on the field data sheets, and the two temperatures given on the sheet do not average to the same temperature given on the calculation sheet.

On this particular test, the time of the test was 480 minutes. The inlet location had 24 points while the outlet had only 12. If the points are greater than 5 minutes in duration, the points should be read at least every five minutes.

The CO2 in this test looks suspiciously high. Ambient air is the source for this process and no combustion takes place. There is no mention of how this value was obtained but it appears that a decimal may have been misplaced or that something was wrong with the ORSAT if one was used.

Although the report says that this was a test of a scrubber, the drawing in the report of the sampling locations shows a filter box after the scrubber. The test is a scrubber/filter box combination and not simply just a scrubber. The filter box probably accounts for the lower flow at the outlet when compared with the inlet.

3/1/89

MEMORANDUM

SUBJECT: Acceptability of Test Reports for use as a Data Base for Chromium NESHAP

FROM: Frank R. Clay

TO: Dallas Safriet
Pollutant Characterization Section (MD-15)

I have reviewed the following four test reports and have found them unacceptable for use in the Data Base for the Chromium NESHAP. The reasons that the reports are unacceptable are also given.

The reports have been returned to Andy Smith.

cc: Andy Smith

SAMPLING SUMMARY SHEET

PLANT Plato Products LOCATION Los Angeles, Calif.

SAMPLED SOURCE Scrubber Inlet and Outlet

Run	Date	N_p	(3) Y_m	(4) ΔH	(5) P Bar.	(6) V_m	(7) T_m	(8) V_m Std.	(9) %	(10) P_{st}	17 P_s	(18) T_s	(19) VP	(20) V_w	21 $V_{w_{gas}}$	22 %M	23 M_d
Inlet	29 Jul 87	24	1.0004	0.28	29.08	216.979	60.0	214.368		-1.0	29.01	78.0		70	3.29	1.51	.985
Outlet	29 Jul 87	12	.9940	.58	29.08	291.710	106	263.287		0.0	29.08	68.0		96	4.52	1.49	.983
							60	286.574		0.0		70				1.55	.984

Run	(24) CO_2	(25) O_2	26 N_2	(27) CO	(28) ___	29 MW_d	30 MW	(31) C_p	(32) $\sqrt{\Delta P_s}(T_s + 460)$	(33) T_t	(34) D_n	35 V_s	(36) D_s	(37) Area	38 ACFM	(39) DSCFM	40 %I
Inlet	1.74	21	77.3			29.12	28.95	.846	15.0195	480	.197	37.5	16.0	1.40	3146	2943	100.2
Outlet	1.76	21	77.2			29.12	28.93	.846	12.0743	480	.250	30.1	16.0	1.40	2522	2410	93.3
						29.12	28.95		12.1025			30.2			2527	2409	101.6

$$V_m \text{ Std.} = Y_m \frac{17.64 \times V_m \left(P \text{ Bar.} + \frac{\Delta H}{13.6}\right)}{(T_m + 460)}$$

$$V_{w_{gas}} = 0.0471\ V_w$$

$$MW_d = \%CO_2 \times .44 + (\%O_2 \times .32) + (\%CO + \%N_2) \times .28 + \left(\%\text{Other} \times \frac{\text{Mol. wt.}}{100}\right)$$

$$MW = MW_d \times M_d + 18(1 - M_d)$$

$$V_s = 85.49 \times C_p \sqrt{\Delta P_s}\,(T_s + 460)\left[\frac{1}{P_s \times MW}\right]^{1/2}$$

$$\%I = \frac{0.09450 \times (T_s + 460) \times V_m \text{ Std.}}{V_s \times T_t \times P_s \times M_d \times A_n}$$

$$\%M = \frac{100 \times V_{w_{gas}}}{V_m \text{ Std.} + V_{w_{gas}}}$$

$$M_d = \frac{100 - \%M}{100}$$

$$P_s = P \text{ Bar.} \pm \frac{P_{st}}{13.6}$$

N_p = Total No. of Sampling points

Y_m = Meter Box Correction Factor

ΔH = Average Orfice Pressure Drop, inches H_2O

P Bar. = Barometric Pressure, Inches Hg, Absolute

V_m = Volume of Dry Gas at Meter Conditions, DCF

T_m = Average Meter Temperature, °F.

V_m Std. = Volume of Dry Gas at STP, DSCF[a]

% = Per Cent other gas removed before Dry Gas Meter

P_{st} = Static Pressure of Stack Gas, inches H_2O

P_s = Stack Gas Pressure, inches Hg.

T_s = Average Stack Temperature, °F

VP = Vapor Pressure of H_2O At Stack Temperature

V_w = Total H_2O Collected in Impingers and Silica Gel

$V_{w_{gas}}$ = Volumn of water vapor collected at STP, SCF[b]

%M = Per Cent Moisture by volume

M_d = Mole Fraction of Dry Gas

$\%CO_2$ = Volume % Dry

$\%O_2$ = Volume % Dry

$\%N_2$ = Volume % Dry

%CO = Volume % Dry

MW_d = Molecular Weight of Stack Gas Dry Basis

MW = Molecular Weight of Stack Gas, Wet Basis

C_p = Pitot Tube Coefficient

$\sqrt{\Delta P (T_s + 460)}$ Is determined by averaging the square root of the product of the velocity head (P) and the absolute stack temperature from each sampling point.

T_t = Net time of test in minutes

D_n = Sampling Nozzle Diameter, inches

A_n = Area of Nozzle opening, ft^2.

V_s = Stack Gas Velocity at Stack Conditions, Feet per second.

D_s = Diameter of Stack, inches

Area = Area of duct in ft^2

ACFM = Actual Cubic Feet per minute

DSCFM = Dry Standard Cubic Feet per minute

%I = Per Cent Isokinetic

[a] Dry Standard Cubic Feet @ 68°F, 29.92 in. Hg.

[b] Standard Conditions @ 68°F. 29.92 in. Hg.

SUMMARY OF EMISSIONS

PLANT _____ LOCATION _____

SAMPLED SOURCE _____

RUN	DATE	(1) V_m Std.	(2) DSCFM	FRONT HALF MILLIGRAMS PROBE	CYCLONE	FILTER	(3) TOTAL	(4) BACK HALF	5 FRONT + BACK TOTAL

CONCENTRATIONS

RUN	FRONT HALF Gr/DSCF	Mg/M^3	Lb/Hr	Kg/Hr	BACK HALF Gr/DSCF	Mg/M^3	Lb/Hr	Kg/Hr	TOTAL Gr/DSCF	Mg/M^3	Lb/Hr	Kg/Hr
	6	7	8	9	10	17	18	19	20	21	22	23

Remarks: _____

SAMPLING SUMMARY SHEET

PLANT Plato San Bern LOCATION

SAMPLED SOURCE

Run	Date	N_p	(3) Y_m	(4) ΔH	(5) P Bar.	(6) V_m	(7) T_m	(8) V_m Std.	(9) %	(10) P_{st}	17 P_s	(18) T_s	(19) VP	(20) V_w	21 $V_{w_{gas}}$	22 %M	23 M_d
1 Inlet	29JUL87	16	1.000	.75	28.84	360.80	81.0	340.067		-.76	28.78	73		63	2.97	0.86	.991
1 OUTLET	29JUL87	16	1.000	.47	28.84	293.34	86.0	273.757		+.01	28.84	68		78	3.67	1.32	.987

Run	(24) CO_2	(25) O_2	26 N_2	(27) CO	(28) ___	29 MW_d	30 MW	(31) $C_p\sqrt{\Delta P_s(T_s + 460)}$	(32)	(33) T_t	(34) D_n	35 V_s	(36) D_s	(37) Area	38 ACFM	(39) DSCFM	40 %I
1 Inlet	0.7	21.0	78.3			28.95	28.86	.84	12.5929	480	.25	31.3	16	1.40	2629	2483	116.9
1 Outlet	0.7	21.0	78.3			28.95	28.81	.84	9.7381	480	.25	24.3	16	1.40	2033	1933	120.9

$$V_m \text{ Std.} = Y_m \frac{17.64 \times V_m \left(P \text{ Bar.} + \frac{\Delta H}{13.6}\right)}{(T_m + 460)}$$

$$V_{w_{gas}} = 0.0471\ V_w$$

$$MW_d = \%CO_2 \times .44 + (\%O_2 \times .32) + (\%CO + \%N_2) \times .28 + \left(\%\text{Other} \times \frac{\text{Mol. wt.}}{100}\right)$$

$$MW = MW_d \times M_d + 18(1 - M_d)$$

$$V_s = 85.49 \times C_p \sqrt{\Delta P_s (T_s + 460)} \left[\frac{1}{P_s \times MW}\right]^{1/2}$$

$$\%I = \frac{0.09450 \times (T_s + 460) \times V_m \text{ Std.}}{V_s \times T_t \times P_s \times M_d \times A_n}$$

$$\%M = \frac{100 \times V_{w_{gas}}}{V_m \text{ Std.} + V_{w_{gas}}}$$

$$M_d = \frac{100 - \%M}{100}$$

$$P_s = P \text{ Bar.} \pm \frac{P_{st}}{13.6}$$

N_p = Total No. of Sampling points

Y_m = Meter Box Correction Factor

ΔH = Average Orfice Pressure Drop, inches H_2O

P Bar. = Barometric Pressure, Inches Hg, Absolute

V_m = Volume of Dry Gas at Meter Conditions, DCF

T_m = Average Meter Temperature, °F.

V_m Std. = Volume of Dry Gas at STP. DSCF[a]

% = Per Cent other gas removed before Dry Gas Meter

P_{st} = Static Pressure of Stack Gas, inches H_2O

P_s = Stack Gas Pressure, inches Hg.

T_s = Average Stack Temperature, °F

VP = Vapor Pressure of H_2O At Stack Temperature

V_w = Total H_2O Collected in Impingers and Silica Gel

$V_{w_{gas}}$ = Volumn of water vapor collected at STP, SCF[b]

%M = Per Cent Moisture by volume

M_d = Mole Fraction of Dry Gas

$\%CO_2$ = Volume % Dry

$\%O_2$ = Volume % Dry

$\%N_2$ = Volume % Dry

%CO = Volume % Dry

MW_d = Molecular Weight of Stack Gas Dry Basis

MW = Molecular Weight of Stack Gas, Wet Basis

C_p = Pitot Tube Coefficient

$\sqrt{\Delta P (T_s + 460)}$ Is determined by averaging the square root of the product of the velocity head (P_s) and the absolute stack temperature from each sampling point.

T_t = Net time of test in minutes

D_n = Sampling Nozzle Diameter, inches

A_n = Area of Nozzle opening, ft^2.

V_s = Stack Gas Velocity at Stack Conditions, Feet per second.

D_s = Diameter of Stack, inches

Area = Area of duct in ft^2

ACFM = Actual Cubic Feet per minute

DSCFM = Dry Standard Cubic Feet per minute

%I = Per Cent Isokinetic

[a] Dry Standard Cubic Feet @ 68°F, 29.92 in. Hg.

[b] Standard Conditions @ 60°F. 29.92 in. Hg.

SUMMARY OF EMISSIONS

PLANT _____ LOCATION _____

SAMPLED SOURCE _____

RUN	DATE	(1) V_m Std.	(2) DSCFM

	FRONT HALF MILLIGRAMS				(4)	5
				(3)		
	PROBE	CYCLONE	FILTER	TOTAL	BACK HALF	FRONT + BACK TOTAL

CONCENTRATIONS

	FRONT HALF				BACK HALF				TOTAL			
RUN	Gr/DSCF	Mg/M^3	Lb/Hr	Kg/Hr	Gr/DSCF	Mg/M^3	Lb/Hr	Kg/Hr	Gr/DSCF	Mg/M^3	Lb/Hr	Kg/Hr
	6	7	8	9	10	17	18	19	20	21	22	23

Remarks: _____

```
          XROM "METH 5"
RUN NUMBER
                    RUN
METER BOX Y?
                    RUN
DELTA H?
          .7500     RUN
BAR PRESS ?
         28.8400    RUN
METER VOL ?
        360.8000    RUN
MTR TEMP F?
         81.0000    RUN
STATIC H0H IN ?
         -.7600     RUN
STACK TEMP.
         73.0000    RUN
ML. WATER ?
                    RUN
% MOISTURE ?
          4.5400    RUN

SAT % = 2.8

IMP. % HOH = 0.0

% HOH=2.8

% CO2?
          .7000     RUN
% OXYGEN?
         21.0000    RUN

MWd =28.95
MW WET=28.64

PITOT CP ?
          .8400     RUN
SQRT PSTS ?
         12.5929    RUN
TIME MIN ?
        480.0000    RUN
NOZZLE DIA ?
          .2500     RUN
STK DIA INCH ?
         16.0000    RUN

* VOL MTR STD = 340.067
  STK PRES ABS = 28.78
  VOL H0H GAS = 0.00
  % MOISTURE = 2.84
  MOL DRY GAS = 0.972
  % NITROGEN = 78.30
  MOL WT DRY = 28.95
  MOL WT WET = 28.64
  VELOCITY FPS = 31.50
  STACK AREA = 1.40
  STACK ACFM = 2,639.
* STACK DSCFM = 2,443.
  % ISOKINETIC =  118.85

END OF FIELD DATA
Inlet
```

```
          XROM "METH 5"
RUN NUMBER
                    RUN
METER BOX Y?
                    RUN
DELTA H?
          .7500     RUN
BAR PRESS ?
         28.8400    RUN
METER VOL ?
        360.8000    RUN
MTR TEMP F?
         81.0000    RUN
STATIC H0H IN ?
          -7.0000   CLX
           -.7600   RUN
STACK TEMP.
         73.0000    RUN
ML. WATER ?
                    RUN
% MOISTURE ?
          4.5400    RUN

SAT % = 2.8

IMP. % HOH = 0.0

% HOH=2.8

% CO2?
          4.5400 STO 22
           .7000    RUN
% OXYGEN?
         21.0000    RUN

MWd =28.95
MW WET=28.45

PITOT CP ?
           .8400    RUN
SQRT PSTS ?
         12.5929    RUN
TIME MIN ?
        480.0000    RUN
NOZZLE DIA ?
           .2500    RUN
STK DIA INCH ?
          1.0000    CLX
          3.0000    CLX
         16.0000    RUN

* VOL MTR STD = 340.067
  STK PRES ABS = 28.78
  VOL H0H GAS = 0.00
  % MOISTURE = 4.54
  MOL DRY GAS = 0.955
  % NITROGEN = 78.30
  MOL WT DRY = 28.95
  MOL WT WET = 28.45
  VELOCITY FPS = 31.60
  STACK AREA = 1.40
  STACK ACFM = 2,647.
* STACK DSCFM = 2,488.
  % ISOKINETIC =  120.57

END OF FIELD DATA
Inlet
```

```
          XROM "METH 5"
RUN NUMBER
                    RUN
METER BOX Y?
                    RUN
DELTA H?
          .7500     RUN
BAR PRESS ?
         28.8400    RUN
METER VOL ?
        360.8000    RUN
MTR TEMP F?
         81.0000    RUN
STATIC H0H IN ?
          -.7600    RUN
STACK TEMP.
         73.0000    RUN
ML. WATER ?
         63.0000    RUN

SAT % = 2.8

IMP. % HOH = 0.9

% HOH=0.9

% CO2?
          .7000     RUN
% OXYGEN?
         21.0000    RUN

MWd =28.95
MW WET=28.86

PITOT CP ?
          .8400     RUN
SQRT PSTS ?
         12.5929    RUN
TIME MIN ?
        480.0000    RUN
NOZZLE DIA ?
          .2500     RUN
STK DIA INCH ?
         16.0000    RUN

* VOL MTR STD = 340.067
  STK PRES ABS = 28.78
  VOL H0H GAS = 2.97
  % MOISTURE = 0.86
  MOL DRY GAS = 0.991
  % NITROGEN = 78.30
  MOL WT DRY = 28.95
  MOL WT WET = 28.86
  VELOCITY FPS = 31.38
  STACK AREA = 1.40
  STACK ACFM = 2,629.
* STACK DSCFM = 2,483.
  % ISOKINETIC =  116.92

END OF FIELD DATA
Inlet
```

```
          XROM "METH 5"
RUN NUMBER
                    RUN
METER BOX Y?
                    RUN
DELTA H?
           .4700    RUN
BAR PRESS ?
         28.8400    RUN
METER VOL ?
        293.3400    RUN
MTR TEMP F?
         86.0000    RUN
STATIC HOH IN ?
           .0100    RUN
STACK TEMP.
         68.0000    RUN
ML. WATER ?
                    RUN
% MOISTURE ?
          2.9000    RUN


SAT % = 2.4


IMP. % HOH = 0.0

% HOH=2.4


 % CO2?
          2.9000 STD 22
           .7000    RUN
 % OXYGEN?
         21.0000    RUN

 MWd =28.95
 MW WET=28.63


 PITOT CP ?
           .8400    RUN
 SQRT PSTS ?
          9.7381    RUN
 TIME MIN ?
        480.0000    RUN
 NOZZLE DIA ?
           .2500    RUN
 STK DIA INCH ?
         16.0000    RUN

* VOL MTR STD = 273.757
  STK PRES ABS = 28.84
  VOL HOH GAS = 0.00
  % MOISTURE = 2.90
  MOL DRY GAS = 0.971
  % NITROGEN = 78.30
  MOL WT DRY = 28.95
  MOL WT WET = 28.63
  VELOCITY FPS = 24.33
  STACK AREA = 1.40
  STACK ACFM = 2,039.
* STACK DSCFM = 1,908.
  % ISOKINETIC =  122.50


END OF FIELD DATA
```

```
          XROM "METH 5"
RUN NUMBER
                    RUN
METER BOX Y?
                    RUN
DELTA H?
           .4700    RUN
BAR PRESS ?
         28.8400    RUN
METER VOL ?
        293.3400    RUN
MTR TEMP F?
         86.0000    RUN
STATIC HOH IN ?
           .0100    RUN
STACK TEMP.
         68.0000    RUN
ML. WATER ?
         78.0000    RUN


SAT % = 2.4


IMP. % HOH = 1.3

% HOH=1.3


% CO2?
           .7000    RUN
% OXYGEN?
         21.0000    RUN

MWd =28.95
MW WET=28.81


PITOT CP ?
           .8400    RUN
SQRT PSTS ?
          9.7381    RUN
TIME MIN ?
        480.0000    RUN
NOZZLE DIA ?
           .2500    RUN
STK DIA INCH ?
         16.0000    RUN

* VOL MTR STD = 273.757
  STK PRES ABS = 28.84
  VOL HOH GAS = 7.67
  % MOISTURE = 1.72
  MOL DRY GAS = 0.987
  % NITROGEN = 78.30
  MOL WT DRY = 28.95
  MOL WT WET = 28.81
  VELOCITY FPS = 24.26
  STACK AREA = 1.40
  STACK ACFM = 2,033.
* STACK DSCFM = 1,933.
  % ISOKINETIC =  120.91


END OF FIELD DATA
```

outlet Real HOH

South Coast
AIR QUALITY MANAGEMENT DISTRICT
9150 FLAIR DRIVE, EL MONTE, CA 91731 (818) 572-6200

SOURCE TEST REPORT

87-0256

CONDUCTED AT

Plato Products Inc.
2120 E. Allen Ave.
Glendora, CA

RECEIVED
SEP 05 1987
PLATO-CALIF.

EFFICIENCY OF, AND EMISSIONS FROM A SCRUBBER SERVING A HARD CHROME PLATING TANK

TESTED: July 29, 1987

ISSUED: AUG 24 1987

REPORT BY: Xuan Vu
Air Quality Engineer II

REVIEWED BY:

E. Ramirez, Senior A.Q. Engineer

R. Schneider, Supervising A.Q. Engineer

SOURCE TESTING AND MONITORING BRANCH
John Higuchi, Manager

SANFORD M. WEISS
DIRECTOR, TECHNICAL SERVICES DIVISION

F. Clay 7/27/89

Please review.

SCAQMD Report #870256

Plata Products

(Not the same as before.
Apparently they tested 2x)

For D. Safriet

A. Smith

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
9150 Flair Drive, El Monte, California 91731

Test No. 87-0256 -2- Date: 7/29/87

INTRODUCTION

(a) Firm Tested .....: Plato Products Inc.

(b) Test Location .....: 2120 E. Allen Ave., Glendora, CA

(c) Unit Tested .....: Scrubber Serving Chrome Plating Tank

(d) Test Requested by .....: Tran Vo - Engineering

(e) Reason for Test Request .: Engineering Information, Rule 40

(f) Date of Test .....: July 29, 1987

(g) Source Test Performed by : E. Genato, E. Ramirez, C. Bhatt, X. Vu

(h) Test Arranged Through ...: R. Hartman (818) 967-3821

(i) Source Test Observed by .: Tran Vo - Engineering

(j) Company I.D. No.....: 045443

(k) Permit No.....:

(l) Application No.....:

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
9150 Flair Drive, El Monte, California 91731

Test No. 87-0256 -3- Date: 7/29/87

RESULTS

Flow Rate: Scrubber Inlet 68.5 dscmm (2,418 dscfm)
Scrubber Outlet 81.9 dscmm (2,893 dscfm)

CONTAMINANT	EMISSIONS MEASURED	EMISSIONS ALLOWED	APPLICABLE RULE
HEXAVALENT CHROME			
Concentration			
-Scrubber Inlet	3.85 g/dscm (1.68×10^{-3} gr/dscf)	---	Infor.
-Scrubber Outlet	1.88 g/dscm (0.82×10^{-3} gr/dscf)	---	Infor.
Mass Rate			
-Scrubber Inlet	18.9 mg/hr (41.7×10^{-6} lb/hr)	---	Infor.
-Scrubber Outlet	7.71 mg/hr (17.0×10^{-6} lb/hr)	---	Infor.
Blank Loading	5.0 micro-grams	---	Infor.
TOTAL CHROME			
Concentration			
-Scrubber Inlet	4.18 g/dscm (1.83×10^{-3} gr/dscf)	---	Infor.
-Scrubber Outlet	2.00 g/dscm (0.88×10^{-3} gr/dscf)	---	Infor.
Mass Rate			
-Scrubber Inlet	20.6 mg/hr (45.4×10^{-6} lb/hr)	---	Infor.
-Scrubber Outlet	8.23 mg/hr (18.1×10^{-6} lb/hr)	---	Infor.
Blank Loading	1.0 micro-grams	---	Infor.
Scrubber Efficiency	59%	---	Infor.
PARTICULATE MATTER			
Concentration	4.0 mg/dscm (0.002 gr/dscf)	308 mg/dscm (0.135 gr/dscf)	404(a)
Mass Rate	0.02 kg/hr (0.04 lb/hr)	--- ---	Infor.

INTRODUCTION

On July 29, 1987, personnel from the South Coast Air Quality Management District conducted a source test on the inlet and outlet of a cross-flow sprayed water scrubber controlling the exhaust from a hard chrome plating tank operated by Plato Products, Inc. The purpose of the test was to measure any potential toxic emissions of chromium from this tank and from the scrubber.

PROCESS DESCRIPTION

This company specializes in manufacturing soldering iron tips at this location. The process starts with solid copper tips, which are degreased after machining and initially plated with iron. The iron tips are then waxed on the tip, etched with hydrochloric acid and subsequently plated with nickel and chrome on the unwax portion.

The plating bath is a mixture of chromic acid and sulfuric acid solutions kept at 130-140 °F and kept covered with polyethylene beads. The plating is accomplished at 6V and 1300 AMP DC(average). The emissions from this tank are controlled by a cross-flow sprayed water scrubber. The measured water overflow rate from the scrubber was 1.92 GPM and the water recirculation rate was approximately 75 GPM. A process schematic is shown in FIGURE 1.

SAMPLING AND ANALYTICAL PROCEDURES

GAS FLOW RATE

The gas velocities and temperatures at the outlet and the inlet to the scrubber serving the chrome plating tank (designated as chrome scrubber) were measured using a Pitot tube, Magnehelic gage, and an Omega potentiometer with a type "K" thermocouple (FIGURE 2). The gas flow rates were determined from the gas velocity, pressure, temperature, density of the gas and the cross-sectional area of the discharge stack and the inlet duct.

CHROME AND PARTICULATE SAMPLING

A traversed particulate sample was collected isokinetically for 60 minutes at the outlet of the scrubber using Method 5.2 as described in FIGURE 2.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
9150 Flair Drive, El Monte, California 91731

Two chrome samples were collected isokinetically and simultaneously for 480 minutes (8 hours) at the inlet and outlet of the scrubber employing the impingement trains set-up as shown in FIGURE 3.

The inlet was traversed sampled over 24 points at 20 minutes per point. The outlet was traversed sampled over 12 points at 40 minutes per point.

A blank chromium sampling train was brought to the test site, leak checked, and analyzed by the District Chemistry Laboratory. The results were reported in the summary page.

A sample of the plating tank solution was obtained and submitted to the District Chemistry Laboratory along with the samples for analysis of particulate matter, hexavalent chrome, and total chrome.

TEST CRITIQUE

Sampling stopped briefly during the testing period due to a power failure and resumed after the process was stabilized.

The isokinetic sampling rates of 100% were achieved for both inlet and outlet chrome tests. An isokinetic sampling rate of 99% was achieved for particulate test.

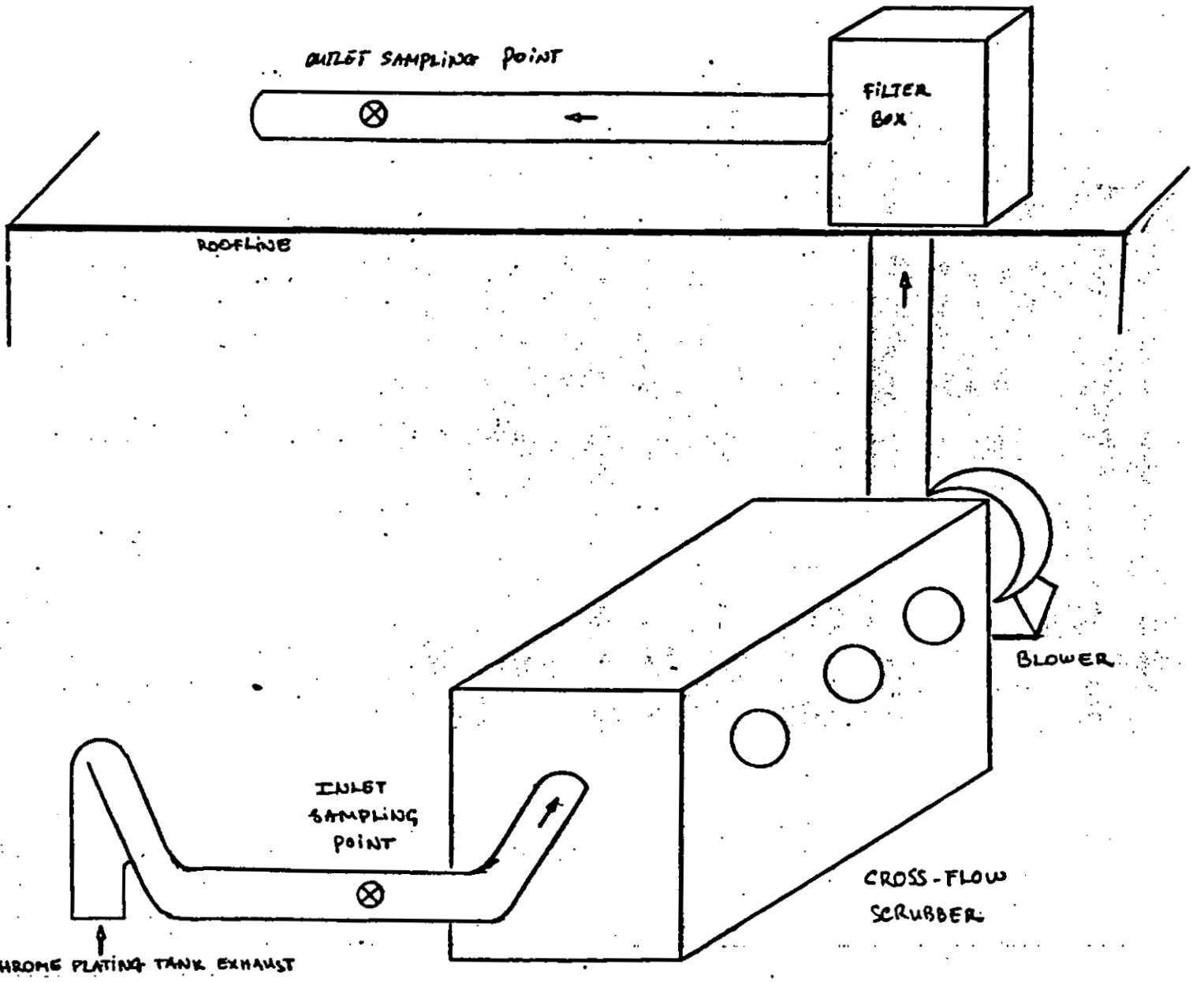
The particulate matter test results indicate comliance with District Rule 404(a).

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

st No. 87-0256 Date 7-29-87

gure No. 1 Drawn By X. Vu

PROCESS DIAGRAM



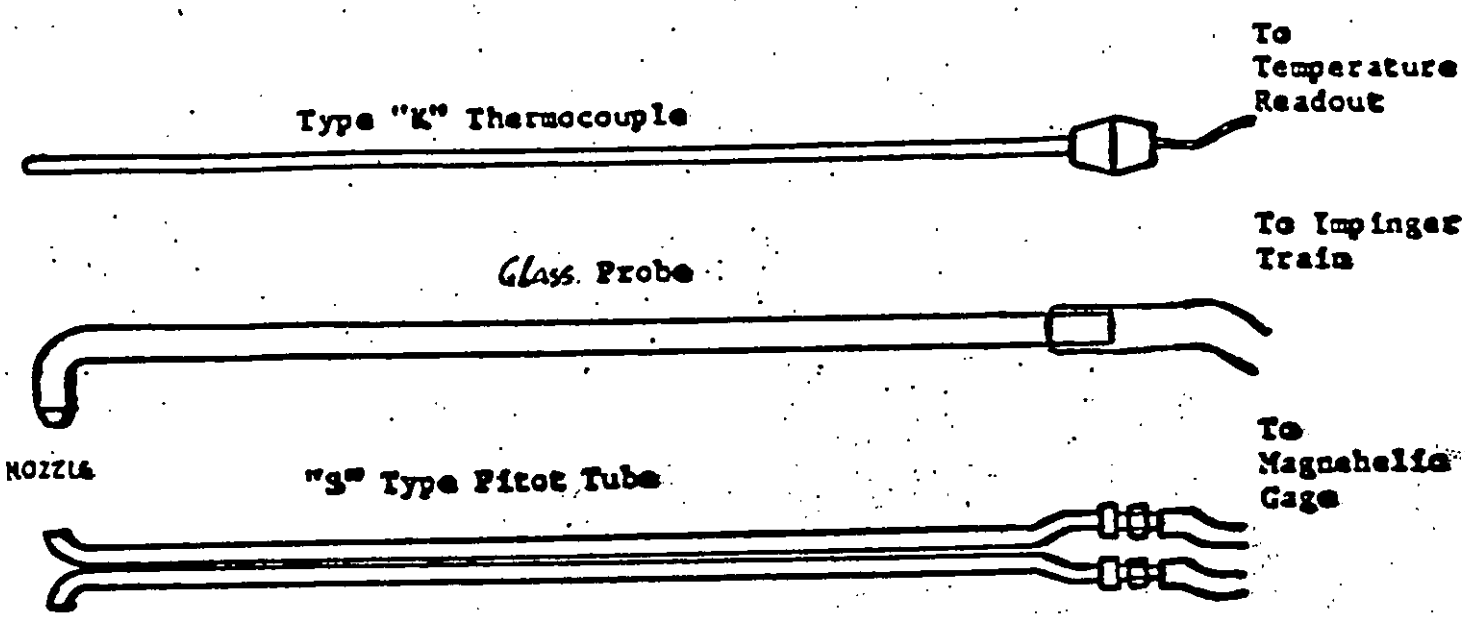
ompany PLATO PRODUCTS INC.

rocess Depicted . HARD CHROME PLATING CONTROLLED BY A SCRUBBER

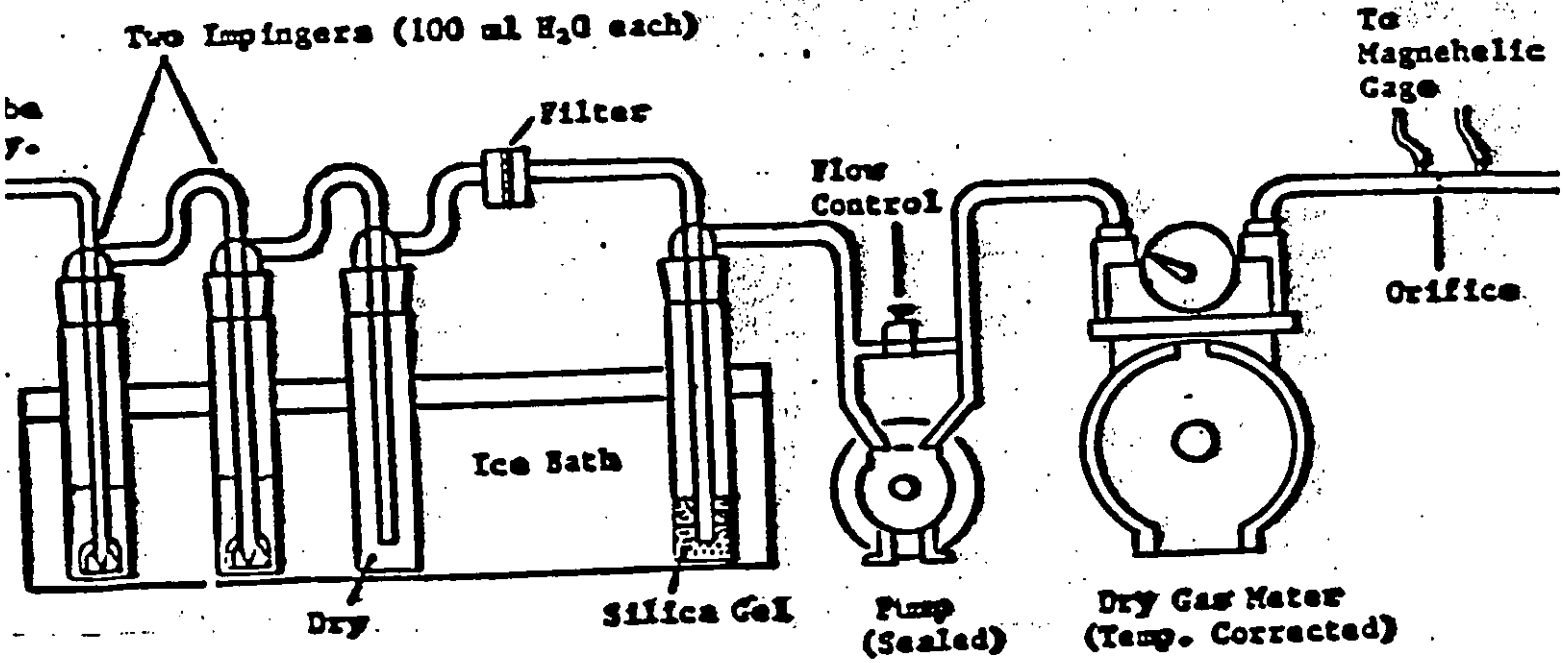
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
9150 Flair Drive, El Monte, California 91731

: No. 87-0256 Page No. 7 Date 7-29-87

re No. 2



Probe Set-up

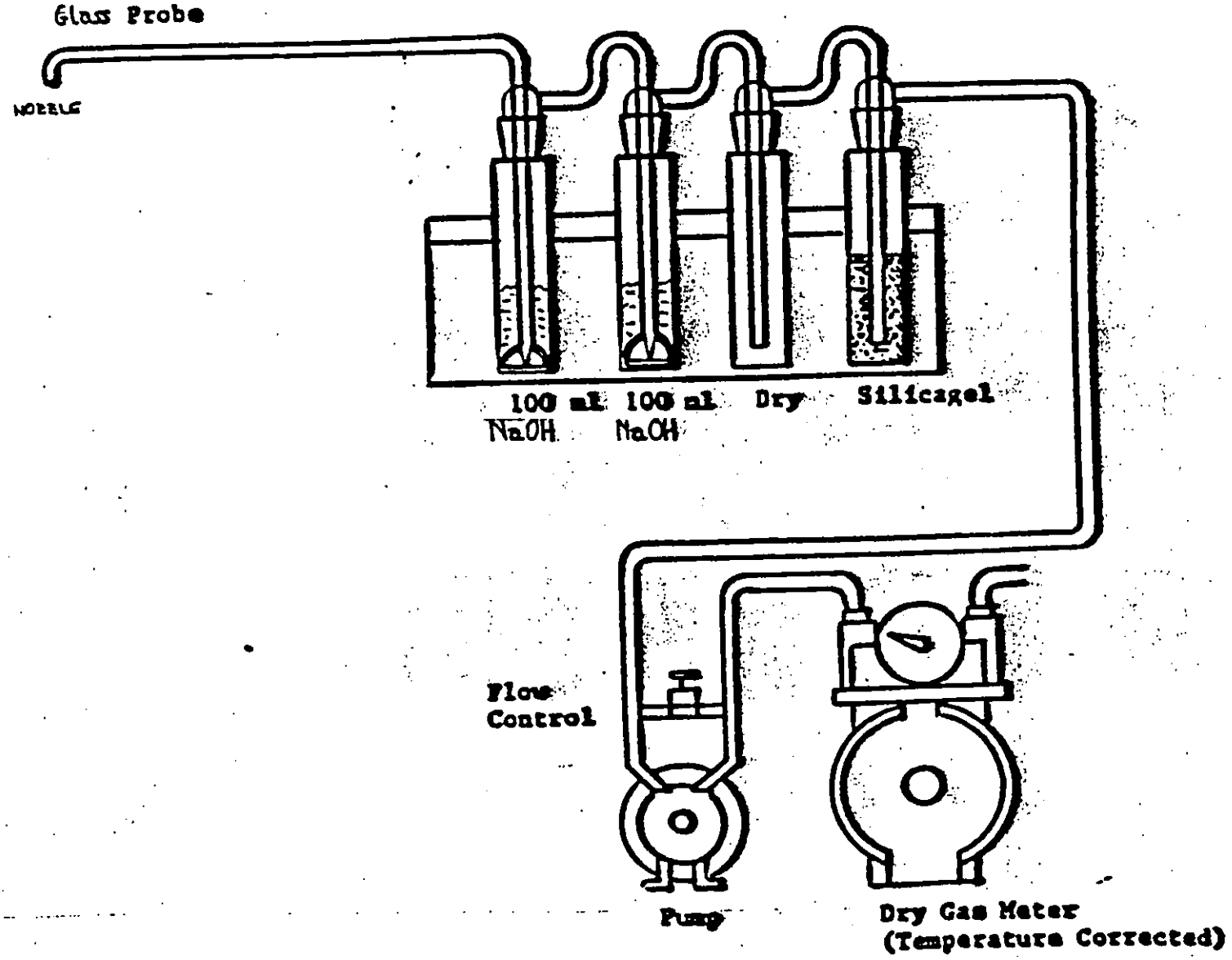


IMPINGER TRAIN SET-UP
(Wet Impingement Method)

9150 Fl[illegible] Drive, El Monte, Californ[illegible] 9173[illegible]

No. 87-0256 Page No. 8 Date 7-29-87

e No. 3



CHROME IMPINGER TRAIN SETUP

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

TECHNICAL SERVICES DIVISION

SOURCE TESTING AND MONITORING BRANCH

CALCULATION SHEET

Pages	Page
Test No. 87-0256	Date 7/29/87
Processed By Xuan Vu	Checked By ER
Sample Train CHROMIUM Scrubber Inlet	

SUMMARY

Average Traverse Velocity (Pre-Test)	--	fps
Average Reference Point Velocity (pre-test)	--	fps
Average Traverse Velocity (during test)	43.56	fps

Ave. Stack Temp.	78	°F	K. Water Vapor Condensed	70	ml
Stack Area	1.40	ft^2	L. Gas Volume Metered	216.979	dcf
Barometric Pressure	29.08	"HgA	M. Meter Temperature	60	°F
Stack Pressure	29.01	"HgA	N. Average Orifice P.	0.28	"H_2O
Pitot Corr. Factor	0.846		O. Meter Calib. Factor	1.0004	
Sampling Time	480	min.	P. % CO_2	1.74	
Nozzle Area	0.0002117	ft^2	Q. % O_2	21.0	
Magnehelic Calibration Factor				1.000	

Correct Gas Volume Metered $\frac{L \times (F + N/13.6) \times 520 \times O}{29.92 \times [M + 460]}$ ..... 211.1 dscf

PERCENT MOISTURE - GAS DENSITY

Percent Water In Gas Sample [4.64 x K/(0.0464 x K)+R] ..... 1.52 %

Average Wet Molecular Weight:
0.18S + (1 - S/100)(0.44P + 0.32Q + 0.28(100 - P - Q)) 28.95

FLOW RATE

Gas Density Correction Factor $(28.95/T)^{1/2}$	1.000	
Flue Correction Factor (A/B)	1.000	
Velocity Pressure Correction Factor $(29.92/G)^{1/2}$	1.016	
Corrected Velocity (C x H x U x V x W)$(Q')^{1/2}$	37.42	fps
Flow Rate (X x E x 60)	3135	cfm
Flow Rate (Y x G/29.92 x 520/(460+D))	2938	scfm
Flow Rate [Z x (1-S/100)]	2893	dscfm

SAMPLE CONCENTRATION - EMISSION RATE

Total Chromium	25×10^{-3} *	mg
Hexavalent Chromium	23×10^{-3} *	mg
Total Cr Concentration (0.01543 x BB/R)	1.83×10^{-4} *	gr/dscf
Total Cr Emission Rate (0.00857 x DD x AA)	45.4×10^{-4} *	lb/hr
Cr^{+6} Concentration (0.01543 x CC/R)	1.68×10^{-4} *	gr/dscf
Cr^{+6} Emission Rate (0.00857 x FF x AA)	41.7×10^{-4} *	lb/hr
Isokinetic Sampling Rate(E x R x V x 100/I x J x AA)	100	%

* Corrected for blank loading.

10.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

TECHNICAL SERVICES DIVISION .

SOURCE TESTING AND MONITORING BRANCH

CALCULATION SHEET

Pages	Page
Test No. 87-0256	Date 7/29/87
Processed By Xuan Vu	Checked By EA
Sample Train CHROMIUM Scrubber Outlet	

UMMARY

• Average Traverse Velocity (Pre-Test).....			--		fps
• Average Reference Point Velocity (pre-test).....			--		fps
• Average Traverse Velocity (during test).....			35.45		fps
• Ave. Stack Temp.....	70	°F	K. Water Vapor Condensed...	96	ml
• Stack Area.....	1.40	ft²	L. Gas Volume Metered.....	291.71	dcf
• Barometric Pressure.	29.08	"HgA	M. Meter Temperature.....	60	°F
• Stack Pressure.....	29.08	"HgA	N. Average Orifice P.....	0.58	"H_2O
• Pitot Corr. Factor..	0.846		O. Meter Calib. Factor.....	0.994	
• Sampling Time.....	480	min.	P. % CO_2.....	1.76	
• Nozzle Area.....	0.0003409	ft²	Q. % O_2.....	21.0	
• Magnehelic Calibration Factor				1.000	

• Correct Gas Volume Metered $\frac{L \times (F + N/13.6) \times 520 \times O}{29.92 \times [M + 460]}$ ..... 282.2 dscf

ERCENT MOISTURE - GAS DENSITY

• Percent Water In Gas Sample [4.64 x K/(0.0464 x K)+R]..... 1.55 %

• Average Wet Molecular Weight:
0.18S + (1 - S/100)(0.44P + 0.32Q + 0.28(100 - P - Q))..... 28.95

LOW RATE

• Gas Density Correction Factor $(28.95/T)^{1/2}$.....	1.000	
• Flue Correction Factor (A/B).....	1.000	
• Velocity Pressure Correction Factor $(29.92/B)^{1/2}$.....	1.014	
• Corrected Velocity (C x H x U x V x W)$(Q')^{1/2}$.....	30.75	fps
• Flow Rate (X x E x 60).....	2576	cfm
• Flow Rate (Y x G/29.92 x 520/(460+D)).....	2456	scfm
A. Flow Rate [Z x (1-S/100)].....	2418	dscfm

AMPLE CONCENTRATION - EMISSION RATE

B. Total Chromium	16×10^{-3} •	mg
C. Hexavalent Chromium	15×10^{-3} *	mg
D. Total Cr Concentration (0.01543 x BB/R)	0.88×10^{-4}	gr/dscf
E. Total Cr Emission Rate (0.00857 x DD x AA).....	18.1×10^{-4}	lb/hr
F. Cr^{+6} Concentration (0.01543 x CC/R)	0.82×10^{-4}	gr/dscf
G. Cr^{+6} Emission Rate (0.00857 x FF x AA).....	17.0×10^{-4}	lb/hr
H. Isokinetic Sampling Rate(E x R x V x 100/I x J x AA)...	100	%

Corrected for blank loading.

11.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

TECHNICAL SERVICES DIVISION

SOURCE TESTING AND MONITORING BRANCH

CALCULATION SHEET

Pages	Page
Test No. 87-0256	Date 7/29/87
Processed By Xuan Vu	Checked By ER
Sample Train	PARTICULATE Scrubber Outlet

UMMARY

- Average Traverse Velocity (Pre-Test)..... -- fps
- Average Reference Point Velocity (pre-test)..... -- fps
- Average Traverse Velocity (during test)..... 35.45 fps

- Avg. Stack Temp..... 65 °F
- Stack Area..... 1.40 ft²
- Barometric Pressure. 29.08 "HgA
- Stack Pressure..... 29.08 "HgA
- Pitot Corr. Factor.. 0.855
- Sampling Time..... 60 min.
- Nozzle Area..... 0.0003409ft²
- K. Water Vapor Condensed... 15 ml
- L. Gas Volume Metered..... 36.334 dcf
- M. Meter Temperature..... 60 °F
- N. Average Orifice P..... 0.60 "H_2O
- O. Meter Calib. Factor..... 0.9884
- P. % CO2..... 2.14
- Q. % O2..... 21
- Magnehelic Calibration Factor 1.000
- Correct Gas Volume Metered $\frac{L \times (F + N/13.6) \times 520 \times O}{29.92 \times [M + 460]}$ ..... 34.96 dscf

ERCENT MOISTURE - GAS DENSITY

- Percent Water In Gas Sample [4.64 x K/(0.0464 x K)+R]..... 2.08 %
- Average Wet Molecular Weight:
  0.18S + (1 - S/100)(0.44P + 0.32Q + 0.28(100 - P - Q))..... 28.95

LOW RATE

- Gas Density Correction Factor (28.95/T)$^{1/2}$ 1.000
- Flue Correction Factor (A/B)..... 1.000
- Velocity Pressure Correction Factor (29.92/G)$^{1/2}$ 1.014
- Corrected Velocity (C x H x U x V x W)(Q')$^{1/2}$ ..... 30.75 fps
- Flow Rate (X x E x 60)..... 2576 cfm
- Flow Rate (Y x G/29.92 x 520/(460+D))..... 2456 scfm
- A. Flow Rate [Z x (1-S/100)].....(From Particulate Calc.) 2400 dscfm

AMPLE CONCENTRATION - EMISSION RATE

- B. Total Particulate ..... 4 mg
- C. Solid Particulate ..... 4 mg
- D. Sample Concentration (0.01543 x BB/R)..... 0.002 gr/dscf
- E. Sample Emission Rate (0.00857 x DD x AA)..... lb/hr
- F. Solid Emission Rate (1.322 E-4 x CC x AA/R)..... 0.04 Lb/h
- G. Isokinetic Sampling Rate(E x R x V x 100/I x J x AA)..... 99

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

12:

Test No. 87-0256 Date: 4/29/87

Sampling Location: Plate scrubber outlet Sample Train Cr

TRAVERSE SOURCE TEST DATA

Pre-Test Leak Check:
Filter ____ cfm @ ____ "Hg vac
Probe 0 cfm @ 18 "Hg vac
(Pitot Tube Leak Check ✓)

Post-Test Leak Check:
Filter ____ cfm @ ____ "Hg vac
Probe 0 cfm @ 12 "Hg ✓ vac
(Pitot Tube Leak Check ____)

Time On	Time Off	Sample Point #	Gas Meter Reading (dcf)	Stack Velocity Head ("H_2O)	Stack Temp. °F	Calculated Velocity (fps)	Calculated Sampling Rate (cfm)	Calculated Orifice Δ P ("H_2O)	Probe Temp. °F	Filter Temp. °F	Meter Temp °F In	Meter Temp °F Out	Vacuum "Hg
		C	387.090	0.43	78	44.11	0.43	0.29				60	
6:35		C 1	396.80	0.45	"	45.12	0.44	0.30				"	
		2	406.40	0.49	"	47.09	0.46	0.33				"	
		3	415.75	0.50	"	47.56	0.47	0.33				"	
		4	425.40	0.49	"	47.09	0.46	0.33				"	
20 min		5	434.60	0.44	"	44.62	0.44	0.29				"	
per		6	443.76	0.37	"	40.92	0.40	0.25				"	
		7	452.75	0.37	"	40.92	0.40	0.25				"	
point		8	461.47	0.37	"	40.92	0.40	0.25				"	
		9	469.95	0.37	"	40.92	0.40	0.25				"	
		10	478.29	0.36	"	40.36	0.40	0.24				"	
		11	486.59	0.36	"	40.36	0.40	0.24				"	
	10:35	12	494.87										
			↓										
10:40		13	503.95	0.41	"	43.07	0.42	0.27				"	
		14	512.90	0.41	"	43.07	0.42	0.27				"	
		15	521.84	0.43	"	44.11	0.43	0.29				"	
		16	530.85	0.45	"	45.12	0.44	0.30				"	
		17	539.61	0.44	"	44.62	0.44	0.29	stop @			"	
		18	548.42	0.39	"	42.01	0.41	0.26	551.485			"	
		19	557.46	0.37	"	40.92	0.40	0.25	@ 1247			"	
		20	566.42	0.39	"	42.01	0.41	0.26	start @			"	
		21	575.36	0.43	"	44.11	0.43	0.29	1300			"	
		22	585.26	0.46	"	45.62	0.45	0.31				"	
		23	594.65	0.46	"	45.62	0.45	0.31				"	
	1452	24	604.064	0.45	"	45.12	0.44	0.30				"	
(Net Vol. Uncorr)				Avg.									

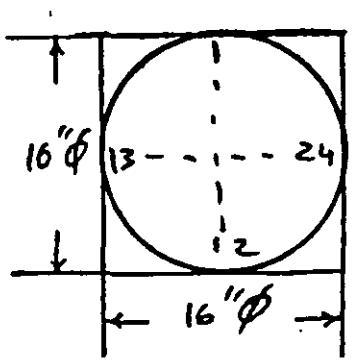
Nozzle # N/R
Nozzle Diameter ____ mm (0.197 ")
Barometric Pressure 29.08 "HgA
Static Pressure in Stack..... ____ "HgA (+⊖ 1.0 "H_2O)

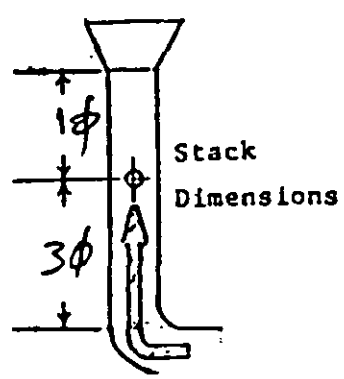
Recorded By X Vu
Pitot Factor..... 0.846

Calibration Data

Magnehelic No. 20606 (Cal: 3/11/87)
Pitot Tube No. 20402 (Cal: 1/23/87)
Potentiometer No. 20202 (Cal: 7/8/87)
Thermocouple No. 20108 (Cal: 7/8/87)
Gas Meter No. 10702 (Cal: 7-9-87)
Meter Corr. Factor: 1.0004
Pump - 2B

Type Sampling Probe Glass





```
          XROM "METH 5"
RUN NUMBER
                    RUN
METER BOX Y?
          1.0004    RUN
DELTA H?
           .2800    RUN
BAR PRESS ?
         29.0000    RUN
METER VOL ?
        216.9790    RUN
MTR TEMP F?
         60.0000    RUN
STATIC HOH IN ?
         -1.0000    RUN
STACK TEMP.
         78.0000    RUN
ML. WATER ?
         70.0000    RUN


SAT % = 3.3


IMP. % HOH = 1.5

% HOH=1.5


% CO2?
           .7000    RUN
% OXYGEN?
         21.0000    RUN

MWd =28.95
MW WET=28.79


PITOT CP ?
           .8460    RUN
SQRT PSTS ?
         15.0195    RUN
TIME MIN ?
        480.0000    RUN
NOZZLE DIA ?
           .1970    RUN
STK DIA INCH ?
         16.0000    RUN

* VOL MTR STD = 214.368
  STK PRES ABS = 29.01
  VOL HOH GAS = 3.29
  % MOISTURE = 1.51
  MOL DRY GAS = 0.985
  % NITROGEN = 78.30
  MOL WT DRY = 28.95
  MOL WT WET = 28.79
  VELOCITY FPS = 37.59
  STACK AREA = 1.40
  STACK ACFM = 3,149.
* STACK DSCFM = 2,451.
  % ISOKINETIC = 99.89


END OF FIELD DATA
```

```
          XROM "METH 5"
RUN NUMBER
                    RUN
METER BOX Y?
          1.0004    RUN
DELTA H?
           .2800    RUN
BAR PRESS ?
         29.0000    RUN
METER VOL ?
        216.9790    RUN
MTR TEMP F?
         60.0000    RUN
STATIC HOH IN ?
         -1.0000    RUN
STACK TEMP.
         78.0000    RUN
ML. WATER ?
         70.0000    RUN


SAT % = 3.3


IMP. % HOH = 1.5

% HOH=1.5


% CO2?
          1.7400    RUN
% OXYGEN?
         21.0000    RUN

MWd =29.12
MW WET=28.95


PITOT CP ?
           .8460    RUN
SQRT PSTS ?
         15.0195    RUN
TIME MIN ?
        480.0000    RUN
NOZZLE DIA ?
           .1970    RUN
STK DIA INCH ?
         16.0000    RUN

* VOL MTR STD = 214.368
  STK PRES ABS = 29.01
  VOL HOH GAS = 3.29
  % MOISTURE = 1.51
  MOL DRY GAS = 0.985
  % NITROGEN = 77.26
  MOL WT DRY = 29.12
  MOL WT WET = 28.95
  VELOCITY FPS = 37.49
  STACK AREA = 1.40
  STACK ACFM = 3,140.
* STACK DSCFM = 2,943.
  % ISOKINETIC = 100.17


END OF FIELD DATA
```

13.

7:55 Cv / 3.9 / 40 / 75

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Test No. 87-0256
Sampling Location: Outlet (PLATO)

Date: 7-29-87
Sample Train Cr-train

TRAVERSE SOURCE TEST DATA

Pre-Test Leak Check:
Filter .009 cfm @ 10 "Hg vac
Probe ______ cfm @ ______ "Hg vac
(Pitot Tube Leak Check ______)

Post-Test Leak Check:
Filter ______ cfm @ ______ "Hg vac
Probe .006 cfm @ 5 "Hg vac
(Pitot Tube Leak Check ______)

Time On (×6:35)	Time Off	Sample Point #	Gas Meter Reading (dcf) 784.363	Stack Velocity Head ("H2O)	Stack Temp. °F	Calculated Velocity (fps)	Calculated Sampling Rate (cfm)	Calculated Orifice ΔP ("H2O)	Probe Temp. °F	Filter Temp. °F TRED	Meter Temp °F In	Meter Temp °F Out	Vacuum "Hg
~~6:35~~	40	1	807.10	0.19	70	29.1	0.48	0.40					2"
7:15	80	2	832.70	0.28	65	35.2	0.58	0.59					4"
7:55	120	3	858.90	0.30		36.4	0.60	0.63		856.7			5"
8:35	160	4	884.80	0.30		36.4	0.60	0.63		882.9			5"
9:15	200	5	910.72	0.30		36.4	0.60	0.63		908.8			5"
9:55	240	6	933.246	0.25		33.2	0.55	0.53					5"
10:35													
:45													
:25	280	7	956.41	0.25	~~65~~ 70	33.4	0.56	0.52					
:05	320	8	979.50	0.28		35.3	0.59	0.58					4"
:45	360	9	1004.13	0.22		37.8	0.63	0.67	12:52	Power failure		106	4"
:25/1:4	400	10	1028.395	0.20		36.6	0.61	0.62		1008.262		106	5"
:05/2:18	440	11	1052.77	0.20		36.6	0.61	0.62	1:05	Resumed		107	5"
:45/2:58	480	12	1076.073	0.26		34.0	0.57	0.54					5"

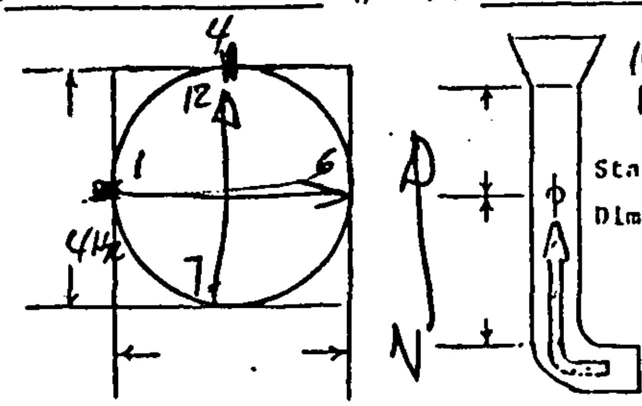
(Net Vol. Uncorr.) ______ Avg. ______

Nozzle # N/R
Nozzle Diameter ______ mm (0.25 ")
Barometric Pressure ______ "HgA
Static Pressure in Stack ______ "HgA (+/- ______ "H2O)

Recorded By EQuinto
Pitot Factor 0.846

Calibration Data	
Magnehelic No. 20627	(Cal: 3-11-87)
Pitot Tube No. 20402	(Cal: 1-23-87)
Potentiometer No. 20302	(Cal: 7-8-87)
Thermocouple No. 20108	(Cal: 7-8-87)
Gas Meter No. 20703	(Cal: 7-9-87)
Meter Corr. Factor: 0.9940	

Pump 2A



K1 = .25
K2 = .846
Stack K3 = .97
Dimensions K4 7.0
K5 = .761

Type Sampling Probe glass

```
SQRT PS..
AVE STK TEMP = 70.0000
                        RUN
METER BOX Y?
              .9940     RUN
DELTA H?
              .5800     RUN
BAR PRESS ?
            29.0800     RUN
METER VOL ?
           291.7100     RUN
MTR TEMP F?
            60.0000     RUN
STATIC MOH IN ?
                        RUN
STACK TEMP.
            70.0000     RUN
ML. WATER ?
            96.0000     RUN


SAT % = 2.5


IMP. % MOH = 1.6

% MOH=1.6


% CO2?
             1.7600     RUN
% OXYGEN?
            21.0000     RUN

MWd =29.12
MW WET=28.95


PITOT CP ?
              .8460     RUN
SQRT PSTS ?
            12.1025     RUN
TIME MIN ?
           480.0000     RUN
NOZZLE DIA ?
              .2500     RUN
STK DIA INCH ?
            16.0000     RUN

* VOL MTR STD = 286.574
  STK PRES ABS = 29.08
  VOL MOH GAS = 4.52
  % MOISTURE = 1.55
  MOL DRY GAS = 0.984
  % NITROGEN = 77.24
  MOL WT DRY = 29.12
  MOL WT WET = 28.95
  VELOCITY FPS = 30.17
  STACK AREA = 1.40
  STACK ACFM = 2,527.
* STACK DSCFM = 2,409.
  % ISOKINETIC =  101.57


END OF FIELD DATA
```

```
          XROM "METH 5"
RUN NUMBER
                        RUN
METER BOX Y?
              .9940     RUN
DELTA H?
              .5800     RUN
BAR PRESS ?
            29.0800     RUN
METER VOL ?
           291.7100     RUN
MTR TEMP F?
           106.0000     RUN
STATIC MOH IN ?
                        RUN
STACK TEMP.
            68.0000     RUN
ML. WATER ?
            96.0000     RUN


SAT % = 2.4


IMP. % MOH = 1.7

% MOH=1.7


% CO2?
             1.7600     RUN
% OXYGEN?
            21.0000     RUN

MWd =29.12
MW WET=28.93


PITOT CP ?
              .8460     RUN
SQRT PSTS ?
            12.0743     RUN
TIME MIN ?
           480.0000     RUN
NOZZLE DIA ?
              .2500     RUN
STK DIA INCH ?
            16.0000     RUN

* VOL MTR STD = 263.283
  STK PRES ABS = 29.08
  VOL MOH GAS = 4.52
  % MOISTURE = 1.69
  MOL DRY GAS = 0.983
  % NITROGEN = 77.24
  MOL WT DRY = 29.12
  MOL WT WET = 28.93
  VELOCITY FPS = 30.11
  STACK AREA = 1.40
  STACK ACFM = 2,522.
* STACK DSCFM = 2,410.
  % ISOKINETIC =  93.28
```

DA

```
DELTA P 8.
                .36     RUN
STACK TEMP?
                78.     RUN
FPS = 35.


DELTA P 9.
                .36     RUN
STACK TEMP?
                78.     RUN
FPS = 35.


DELTA P 10.
                .36     RUN
STACK TEMP?
                78.     RUN
FPS = 35.


DELTA P 11.
                .36     RUN
STACK TEMP?
                78.     RUN
FPS = 35.


DELTA P 12.
                .36     RUN
STACK TEMP?
                78.     RUN
FPS = 35.


DELTA P 13.
FPS = 38.


DELTA P 14.
FPS = 37.


DELTA P 15.
FPS = 38.


DELTA P 16.
FPS = 39.


DELTA P 17.
FPS = 39.


DELTA P 18.
FPS = 37.


DELTA P 19.
FPS = 36.


DELTA P 20.
FPS = 37.


DELTA P 21.
FPS = 38.


DELTA P 22.
FPS = 39.


DELTA P 23.
FPS = 39.


DELTA P 24.
FPS = 39.


AVE FPS = 38.
AVE FPM = 2,251.
AVE DELTA P = 0.42
STK PRS. ABS = 29.07
AVE STK TEMP = 78.
STACK ACFM = 3,143.
DSCFM = 2,937.
```

```
                XROM "METH 2"
SITE ?
                RUN
STACK DIA INCH?
          16.0000       RUN
NO TRAV PTS. ?
          24.0000       RUN
BAR PRESS ?
          29.1400       RUN
STATIC IN H0H ?
          -1.0000       RUN
% MOISTURE ?
           2.0000       RUN
PITOT CP ?
            .8460       RUN
% CO2 ?
           1.7400       RUN
% OXYGEN ?
          21.0000       RUN
% CO ?
                RUN
MOL WT OTHER ?
                RUN

MWd = 29.12
MW WET = 28.90


DELTA P 1.
                .44     RUN
STACK TEMP?
                78.     RUN
FPS = 38.


DELTA P 2.
                .45     RUN
STACK TEMP?
                78.     RUN
FPS = 39.


DELTA P 3.
                .47     RUN
STACK TEMP?
                78.     RUN
FPS = 40.


DELTA P 4.
                 .5     RUN
STACK TEMP?
                78.     RUN
FPS = 41.


DELTA P 5.
                 .5     RUN
STACK TEMP?
                78.     RUN
FPS = 41.


DELTA P 6.
                .44     RUN
STACK TEMP?
                78.     RUN
FPS = 38.


DELTA P 7.
                .37     RUN
STACK TEMP?
                78.     RUN
FPS = 35.
```

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

st No. -87-0256 Date 7-24-87

mpling Location PLATO SCRUBBER INLET

GAS VELOCITY DATA

e-Test Velocity Leak Check ✓ Post-Test Velocity Leak Check ✓

me	Trav. Point		Vel. Head ("H_2O)	Temp. (°F)	Calc. Vel. (fps)		Vel. Head ("H_2O)	Temp. (°F)	Calc. Vel. (fps)		Vel. Head ("H_2O)	Temp. (°F)	Calc. Vel. (fps)
	1		0.44	78			0.44	78			0.42	78	
	2		0.45				0.45				0.45		
	3		0.47				0.49				0.49		
	4		0.50				0.50				0.51		
	5		0.50				0.49				0.48		
	6		0.44				0.44				0.45		
	7		0.37				0.36				0.38		
	8		0.36				0.38				0.38		
	9		0.36				0.37				0.37		
	10		0.36				0.37				0.38		
	11		0.36				0.36				0.36		
	12		0.36	↓			0.35	↓			038	↓	
	13		0.42	78			0.40	78			0.40	78	
	14		0.41				041				0.41		
	15		0.44				0.42				0.43		
	16		0.46				0.44				0.45		
	17		0.45				0.42				0.44		
	18		0.40				0.36				0.41		
	19		0.38				0.37				0.37		
	20		0.40				0.39				0.39		
	21		0.42				0.44				0.42		
	22		0.46				0.46				0.45		
	23		0.45				0.46				0.46		
	24		0.45	↓			0.46	↓			0.45	↓	

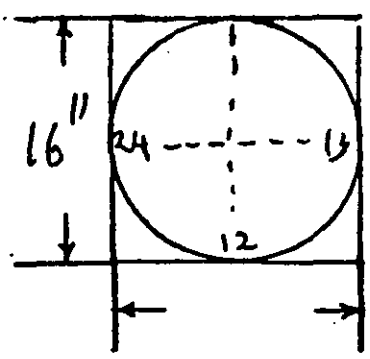
tatic Pressure in Stack _____ "HgA (+10 1.0 "H_2O) (Average)

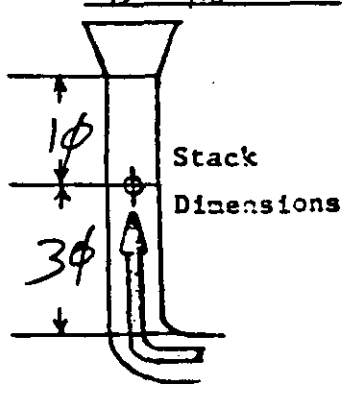
arometric Pressure..... 29.14 "HgA Pitot Factor..... 0.846

ecorded By X.Vu

Calibration Data

agnehelic No. 20606 (Cal: 3/11/87)
itot Tube No. 90402 (Cal: 1/23/87)
otentiometer No. 20702 (Cal: 7/8/87)
hermocouple No. 25108 (Cal: 7/8/87)





15.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Test No. 87-0256
Sampling Location: PLATO - (OUTLET STACK)
Date: 7-29-87
Sample Train PM

TRAVERSE SOURCE TEST DATA

Pre-Test Leak Check:
Filter 0.012 cfm @ 10 "Hg vac
Probe 0.012 cfm @ 8 "Hg vac
(Pitot Tube Leak Check ✓)

Post-Test Leak Check:
Filter ____ cfm @ ____ "Hg vac
Probe .008 cfm @ 5 "Hg vac
(Pitot Tube Leak Check —)

Time On	Time Off	Sample Point #	Gas Meter Reading (dcf)	Stack Velocity Head ("H2O)	Stack Temp. °F	Calculated Velocity (fps)	Calculated Sampling Rate (cfm)	Calculated Orifice ΔP ("H2O)	Probe Temp. °F	Filter Temp. °F	Meter Temp °F In	Meter Temp °F Out	Vacuum "Hg
7:40			670.188										
	+5	1	673.33	.25	65	33.2	0.56	.53	—		—	—	3
	10	2	678.1	.28	↓	35.2	0.59	.59					3
	15	3	679.42	.30		36.4	0.61	.63					3
8:00	20	4	682.47	.30		36.4	0.61	.63					3
	25	5	685.50	.30		36.4	0.61	.63					3
8:10	30	6	688.543	.25	↓	33.2	0.56	.53					2
8:15													
8:20	35	6 7	691.45	.25	↓	33.2	.56	.53					3
8:25	40	5 8	694.[illegible]2	.28		35.2	0.59	.59					3
8:30	45	4 9	697.325	.32		37.6	.63	.67					3
8:35	50	3 10	700.37	.30		36.4	.61	.63					3
8:40	55	2 11	703.46	.30		36.4	.61	.63					3
8:45	60	1 12	706.522	.26	↓	33.9	.57	.55					2

(Net Vol. Uncorr.) ______ Avg.

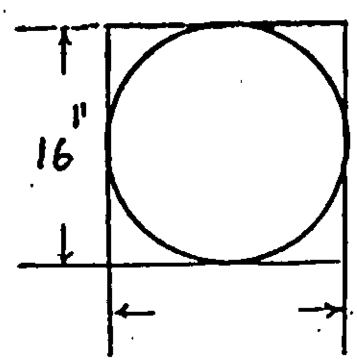
Nozzle #
Nozzle Diameter ______ mm (.250 ")
Barometric Pressure ______ "HgA
Static Pressure in Stack ______ "HgA (+/- ______ "H2O)

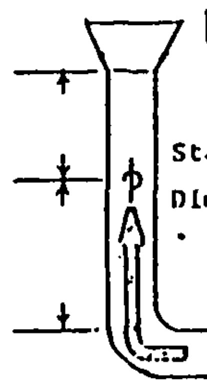
Recorded By C. S. Bhatt
Pitot Factor 0.855

Calibration Data

Magnehelic No. 20618 (Cal: 3-11-87)
Pitot Tube No. 20403 (Cal: 7-23-87)
Potentiometer No. 20302 (Cal: 7-8-87)
Thermocouple No. 20108 (Cal: 7-8-87)
Gas Meter No. 40703 (Cal: 3-17-87)
Meter Corr. Factor: 0.9884

Type Sampling Probe Glass





$K_1 = .25$
$K_2 = .855$
$K_3 = .97$
Stack $K_4 = 1$
Dimensions
$K_5 = .7$

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Test No. 87-0256 Date 7/24/87

Sampling Location ~~EBA~~ PLATO SCRUBBER OUTLET

GAS VELOCITY DATA

Pre-Test Velocity Leak Check ✓ Post-Test Velocity Leak Check

Time	Trav. Point		Vel. Head ("H_2O)	Temp. (°F)	Calc. Vel. (fps)		Vel. Head ("H_2O)	Temp (°F)	Calc. Vel. (fps)		Vel. Head ("H_2O)	Temp (°F)	Calc. Vel. (fps)
													Ry
	1		0.19	70			0.18	70			0.19	70	.25
	2		0.21	↓			0.22	↓			0.21	↓	.28
	3		0.22				0.22				0.23		.3
	4		0.22				0.22				0.22		0.3
	5		0.21				0.22				0.21		03
	6		0.20	↓			0.20	↓			0.20	↓	.25
	7		0.18	70			0.19	70			0.18	70	0.25
	8		0.21	↓			0.21	↓			0.21	↓	0.28
	9		0.22				0.22				0.22		0.32
	10		0.22				0.22				0.22		030
	11		0.22	↓			021	↓			0.21	↓	0.30
	12		0.20	↓			0.20	↓			0.20	↓	026

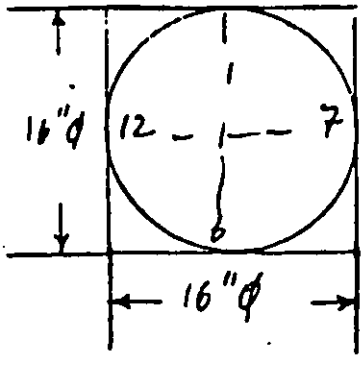
Static Pressure in Stack _____ "HgA (+/-) 0.15 "H_2O) (Average)

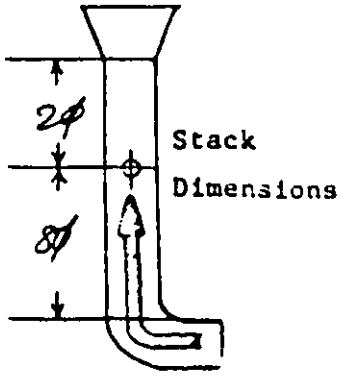
Barometric Pressure..... 29.44 "HgA Pitot Factor..... 0.846

Recorded By K Vu

Calibration Data

Magnehelic No. 20606 (Cal: 3/11/87)
Pitot Tube No. 20402 (Cal: 1/23/87)
Potentiometer No. 20302 (Cal: 7/8/87)
Thermocouple No. 20108 (Cal: 7/8/87)





17.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
9150 Flair Drive, El Monte, California 91731

RELEASED
AUG 12 1987
LAB BRANCH

TECHNICAL SERVICES DIVISION
LABORATORY SERVICES BRANCH
REPORT FOR SOURCE TEST

TO: John Higuchi, Manager
Source Testing & Monitoring

COMPANY: Plato Products
CITY: Glendora

PROCESS EQUIPMENT: Chrome Plating

CONTROL EQUIPMENT: Scrubber

LAB REPORT DATE: August 11, 1987

LABORATORY NO. 82107-11

REFERENCE NO. HMP-1-10, BMC-5-6

TEST NO. 87-0256

SOURCE TEST DATE: 7-29-87

DATE SAMPLE RECEIVED: 7-29-87

REQUESTED BY: C.S. Bhatt

SAMPLE DESCRIPTION: 2 scrubber solution bottles

ANALYSIS REQUESTED: Cr^{+6}, Total Chromium

ANALYTICAL WORK PERFORMED, METHOD OF ANALYSIS, AND RESULTS

Cr^{+6} by diphenylcarbazide colorimetric method, total chromium by atomic absorption.

	Scrubber A	Scrubber B
Cr^{+6}, µg/mL	0.221	0.219
Total chromium, µg/mL	0.221	0.217

TSD RECEIVED
AUG 13 1987
S.T. BRANCH

Approved By: [signature]
Margil W. Wadley, Ph.D.
Manager of Laboratory Services

18.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
9150 Flair Drive, El Monte, California 91731

RELEASED
AUG 11 1987
LAB BRANCH

TECHNICAL SERVICES DIVISION
LABORATORY SERVICES BRANCH
REPORT FOR SOURCE TEST

TO: John Higuchi, Manager
Source Testing & Monitoring

COMPANY: Plato Products, Inc.
CITY: Glendora

PROCESS EQUIPMENT: Chrome Plating

CONTROL EQUIPMENT: Scrubber

LAB REPORT DATE: August 11, 1987

LABORATORY NO. 82107-10

REFERENCE NO. HMP-1-10, 8MC-5-6

TEST NO. 87-0256

SOURCE TEST DATE: 7-29-87

DATE SAMPLE RECEIVED: 7-29-87

REQUESTED BY: C.S. Bhatt

SAMPLE DESCRIPTION: 3 wet impingment trains

ANALYSIS REQUESTED: Cr^{+6}, Total\Chromium, moisture gain

ANALYTICAL WORK PERFORMED, METHOD OF ANALYSIS, AND RESULTS

Cr^{+6} by diphenylcarbazide colorimetric method, total chromium by atomic absorption.

	Field Blank	Inlet	Outlet
Recieved impinger volume, mL	200	236	275
Impinger gain, mL	0	36	75
Silica Gain, g	0	34	21
Cr^{+6}, ~~µg/mL~~ µg as per	5	28	20
% recovery Joan 8/11/87 3:35P	100.7	101.3	101.3
Total chromium, ~~µg/mL~~ µg	1	26	17

Sample results are not corrected for field blank results. Field blank consists of a train prepared, leak checked, recovered and analyzed in parallel with sample trains.

Approved By: Joan F Wadley
Margil W. Wadley, Ph.D.
Manager of Laboratory Services

TSD RECEIVED
AUG 11 1987
S.T. BRANCH

Sanders

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
9150 Flair Drive, El M[illegible]e, California 91731

19.

RELEASED
AUG 18 1987
LAB BRANCH

TECHNICAL SER[illegible] DIVISION
LABORATORY SERVICES BRANCH
REPORT FOR SOURCE TEST

TO: John Higuchi, Manager
Source Testing & Monitoring

LAB REPORT DATE: August 18, 1987

LABORATORY NO. 82107-9

COMPANY: Plato Products, Inc.
CITY: Glendora

REFERENCE NO. TCH-27-12

PROCESS EQUIPMENT: Chrome Plating

TEST NO. 87-0256

SOURCE TEST DATE: 7-29-87

CONTROL EQUIPMENT: Scrubber

DATE SAMPLE RECEIVED: 7-29-87

SAMPLE DESCRIPTION: One Method 5.1 Train(s)

REQUESTED BY: C. S. Bhatt

ANALYSIS REQUESTED: Particulates & Moisture Gain

ANALYTICAL WORK PERFORMED, METHOD OF ANALYSIS, AND RESULTS
Particulates by SCAQMD Method 5.1L; Moisture gain by SCAQMD Method 4.1L

Received impinger volume, mL	208
Impinger gain, mL	8
Silica gel gain, g	7
Recovered volume, mL	900
Organic extraction residue, mg	<1
Insoluble residue, mg	1
Soluble residue, mg	3
Acid, as $H_2SO_4 \cdot 2H_2O$, mg	<1
Sulfates, as $H_2SO_4 \cdot 2H_2O$, mg	<1
Filter catch, mg	<1
Acid, as $H_2SO_4 \cdot 2H_2O$, mg	NR
Sulfates, as $H_2SO_4 \cdot 2H_2O$, mg	NR

NR) Not Requested

Approved By: [signature]
Margil W. Wadley, Ph.D.
Manager of Laboratory Services

TSD RECEIVED
AUG 18 1987
S.T. BRANCH

Truesdail Laboratories, Inc.

Source test of:

Gresham, Varner, Savage (Plate)
600 North Arrowhead Avenue
San Bernardino, California 92401

Laboratory No. 17468

UNACCEPTABLE

This report is unacceptable. The isokinetic sampling rate for both the inlet and outlet lies outside the plus or minus 10 percent that is allowable. Other discrepancies follow.

The moisture content in the stack gas is above saturation at both the inlet and outlet locations. Moisture contents given in the report cannot exist at the stack temperatures and pressures specified. The report gives a higher moisture at the scrubber inlet than at the outlet. This looks suspicious.

The report does not contain a good description of the train. There is no mention of the number of impingers or whether or not a silica gel impinger was used. The calculation of moisture in the report is strange. One of the values determined is the volume of water going through the gas meter. If the train contained a silica gel impinger, no moisture would have reached the dry gas meter. At any rate, the moisture content should not exceed saturation.

There is no meter box Y value given in the report, nor are there any dry gas meter calibration sheets. It is assumed that the train used in this report is an isokinetic train and almost identical to a Method 5 train.

It appears that the nozzles were not checked with a micrometer.

3/1/89

MEMORANDUM

SUBJECT: Acceptability of Test Reports for use as a Data Base for Chromium NESHAP

FROM: Frank R. Clay

TO: Dallas Safriet
Pollutant Characterization Section (MD-15)

I have reviewed the following four test reports and have found them unacceptable for use in the Data Base for the Chromium NESHAP. The reasons that the reports are unacceptable are also given.

The reports have been returned to Andy Smith.

cc: Andy Smith

F. Clay
Please review,
Truesdail Report #17468
Plato Products
For D. Safreit
Andy

2/22/89

TRUESDAIL LABORAT

CHEMISTS - MICROBIOLOGIST
RESEARCH - DEVELOPMENT

CLIENT Gresham, Varner,
600 N. Arrowhead
San Bernardino, (
Attention: Jame

SAMPLE Inlet & Outlet o
Line at Plato Pr

INVESTIGATION Total and Hexavalent Chromium, Lead

SEP 05 1987
PLATO-CALIF.

RESULTS

On July 29, 1987, representatives of Truesdail Laborataories, Inc. conducted tests to determine the lead, hexavalent chromium and total chromium emissions at the inlet and outlet of a scrubber serving the parts plating line at the Plato Products facility in Glendora, California. In addition, the same measurements were taken of the background air at the property line upwind of the facility (northwest corner).

For each test location, the measurements were all taken with a single sampling train by collecting an 8-hour sample by the SCAQMD wet impingement method (5.1). The sampling trains consisted of a glass sampling probe connected with Teflon tubing to a set of Greenburg-Smith impingers charged with 200 mls of distilled water and followed by a glass fiber backup filter, a vacuum pump and a dry gas meter. The scrubber samples were collected isokinetically for 30 minutes at each of 16 traverse points.

The flue gas flow rate was determined at each scrubber test location prior to sampling by measuring the average velocity head with a Standard Pitot tube and a Magnehelic differential pressure gage, and by measuring the average temperature with a Chromel-Alumel thermocouple and a Micromite potentiometer.

The sample solutions were stabilized and refrigerated upon return to the laboratories, and subsequently analyzed along with the sample filters for total chormium and lead by atomic absorption spectroscopy and for hexavalent chromium by the diphenylcarbazide colorimetric method.

The results were as follows:

TRUESDAIL LABORATORIES, INC.

PLATO PRODUCTS
Laboratory Number 17468
07-29-87

Flue Gas:	SCRUBBER Inlet	SCRUBBER Outlet
Temperature, °F	73	68
Static Pressure, in. H_2O	-0.76	+0.01
Velocity, ft/sec	37.2	28.2
Flue Dimensions, in.	16	16
Flue Area, sq. ft.	1.40	1.40
Flow Rate, ACFM	3,127	2,416
, SCFM	2,937	2,375
, DSCFM	2,805	2,325
Moisture, % by vol.	4.5	2.9
Chromium		
Sampling Time:	(06:35-14:55)	(06:35-14:52)
Sample Volume, DSCF	322.92	267.63
Concentration, ppm		
Total Cr	0.0036	0.0013
Cr^{+6}	<0.0002	<0.0003
Concentrations, mg/m^3		
Total Cr	0.0076	0.0028
Cr^{+6}	<0.00004	<0.00006
Emission Rate, lbs/hr		
Total Cr	0.00008	0.00002
Cr^{+6}	<0.000005	<0.000006
Lead:		
Sampling Time:	(06:35-14:55)	(06:35-14:52)
Sample Volume, DSCF	322.92	267.63
Concentrations		
Pb, ppm	<0.0002	<0.0003
, mg/m^3	<0.0016	<0.0022
Emission Rate, lbs/hr	<0.00002	<0.00002

TRUESDAIL LABORATORIES, INC.

PLATO PRODUCTS
Laboratory Number 17468
07-29-87

	Ambient Northwest Boundry
Chromium	
Sampling Time:	(06:38 - 15:10)
Sample Volume, DSCF	361.69
Concentration, ppm	
Total Cr	0.0003
Cr^{+6}	<0.0003
Concentrations, mg/m^3	
Total Cr	0.0007
Cr^{+6}	<0.0003
Lead:	
Sampling Time:	(06:38 - 15:10)
Sample Volume, DSCF	361.69
Concentrations	
Pb, ppm	0.0002
, mg/m^3	0.0016

Respectfully submitted,

TRUESDAIL LABORATORIES, INC.

S. Hugh Brown

S. Hugh Brown, Supervisor
Air Pollution Testing

APPENDIX

Sampling Location: PLATO

Test No.: SNUST

Static Pressure, Ps: -.76

Barometric Pressure: 29.91

Point	Vel. Head H_2O"	Temp. °F	Velocity ft/sec	Point	Vel. Head H_2O"	Temp. °F	Velocity ft/sec	Point	Vel. Head H_2O"	Temp. °F	Velocity ft/sec
1	.395	73	42.90	1	.300	72	37.35				
2	.390	73	42.63	2	.285	73	36.44				
3	.330	73	39.21	3	.260	73	34.81				
4	.290	73	36.76	4	.260	73	34.81				
5	.290	73	36.76	5	.290	73	36.76				
6	.300	73	37.39	6	.300	73	37.39				
7	.335	73	33.09	7	.350	73	40.38				
8	.195	73	30.14	8	.325	73	38.91				

A. AVERAGE VELOCITY (TRAVERSE) ft/sec 37.23

B. REFERENCE POINT VELOCITY (TRAVERSE) ft/sec

C. AVERAGE VELOCITY (REFERENCE PT.) ft/sec

D. FLUE FACTOR C/B

E. PITOT TUBE CORRECTION FACTOR STD 1.0

F. GAS DENSITY CORRECTION FACTOR

G. CORRECTED VELOCITY, AxExF, ft/sec 37.23
or, AxDxExF, ft/sec

H. AREA OF FLUE, SQ. FT. 1.40

J. AVERAGE FLUE TEMPERATURE, °F 73

K. FLOW RATE, G x H x 60, CFM 3,127

L. FLOW RATE, K x $\frac{520}{460 + J}$ x $\frac{BP + Ps/13.6}{29.9}$, SCFM 2937

E-INK

SCF - PLUSING 100GALS WATER/HR

16"

TRUESDAIL LABORATORIES, INC.

Sampling Location: INLET - PLATO
Test No.

Date: 7/29/10+
Barometric Pressure: 28.84
Nozzle Diameter: .25

Time	Gas Meter Reading cu. ft. Vm	Press. in. H_2O Pm	Temp. °F Tm	Impinger Temp. °F Ti	Sample Point	CFM	.75 .30 .74	360 cu FT 200 cu FT :30	
0750	164.70	1.0	72°	39°F	2	.84			
0805	191.50	1.0	77°	39°F	2	.84			
0735	216.25	.88	77°	42°F	3	.78			
0805	240.36	.70	80°	42°F	4	.74	1.		
0835	262.26	.70	80°	42°	5	.74			
0905	284.26	.71	80°	42°	6	.75			
0935	306.76	.58	80°	42°	7	.66			
1005	326.35	.55	80°	42°	7	.66			
1035	344.16								
1045	344.16	.70	80	39°	2	.73			
1115	364.86	.66	80°	42°	2	.73	75		
1145	385.34	.65	82	42°	3	.70			
1215	410.08	.5	84	43°	4	.70			
1245	431.44	.70	84	45°	5	.74	1250 + POWER LOST		
1325	455.64	.71	86	46°	6	.75	333.80		
1355	475.26	.90	88	46	7	.81	1300		
1425	501.05	.90	90	46	1	.81			
1455	525.50	.75	81	42					

Weight Collected: 360.80 grams

MITER# 10
TAKE #1291

MF = .97
K = .9378

C = .65
H = .84

5247
265
5512
1065

A. Total Weight _____

B. Condensate Volume, ml. 63ML

C. Condensate Vapor Volume, $0.00267 \times \frac{460 + Tm}{B.P + Pm/13.6} \times B$, cu. ft. 3.16

D. Total Sample Volume, Vm + C, cu. ft. 363.96

E. Sample Volume, $D \times \frac{520}{460 + Tm} \times \frac{B.P. + Pm/13.6}{29.9}$ (28.90) (.955) x Moisture corr., DSCF 322.92

F. Concentration, 15.43 x A/E, grains/DSCF _____

G. Stack Gas Flow Rate, DSCFM 2,805

H. Emissions, 60 x G x F/7000, lbs/hr _____

TRUESDAIL LABORATORIES, INC.

Sampling Station PLATO - INLET Date 7/30/87

WATER VAPOR AND GAS DENSITY CALCULATIONS

Percent Water Vapor in Gases

A. Gas pressure at meter, in. Hg. (absolute) 28.78

B. Vapor pressure of water at impinger temp., in. Hg. 1.066

C. Volume of metered gas, cu. ft. 360.80

D. Volume of water vapor metered, B X C/A, cu. ft. 13.36

E. Volume of water vapor condensed, cu. ft. 3.16

F. Total volume water vapor in gas sample, D + E, cu. ft. 16.52

G. Total volume of gas sample, C + E, cu. ft. 363.96

H. Percent water vapor in sampled gas, 100 x F/G 4.54

GAS DENSITY CORRECTION FACTOR

Component	Volume Percent/100	x Moisture Correction	x Mol. Wt.	= Wt./Mole Wet Basis
Water	.045	1.0	18.0	.817
Carbon Dioxide	Dry Basis	.955	44.0	
Carbon Monoxide	Dry Basis	↓	28.0	
Oxygen	Dry Basis	↓	32.0	
Nitrogen & Inerts	Dry Basis	↓	28.2	
			Average Molecular Weight	

J. Density of gas referred to air = $\frac{\text{Av. Mol. Wt.}}{28.95}$ = _____

K. Gas density correction factor = $\sqrt{\frac{1.00}{J}}$ = _____

Sampling Location: PLATO

Static Pressure, Ps: +.01

Test No.: 1 - OUTLET

Barometric Pressure: 29.84

Point	Vel. Head H_2O"	Temp. °F	Velocity ft/sec	Point	Vel. Head H_2O"	Temp. °F	Velocity ft/sec	Point	Vel. Head H_2O"	Temp. °F	Velocity ft/sec
1	.145	69	25.85	1	.120	67	23.49				
2	.190	69	29.61	2	.190	68	29.58				
3	.195	69	30.00	3	.200	68	30.35				
4	.195	69	30.00	4	.195	68	29.97				
5	.200	69	30.38	5	.190	67	29.58				
6	.200	69	30.38	6	.180	68	28.80				
7	.195	69	30.00	7	.180	67	28.80				
8	.140	69	25.42	8	.170	68	27.98				

A. AVERAGE VELOCITY (TRAVERSE) ft/sec Enclosed 28.76

B. REFERENCE POINT VELOCITY (TRAVERSE) ft/sec —

C. AVERAGE VELOCITY (REFERENCE PT.) ft/sec —

D. FLUE FACTOR C/B —

E. PITOT TUBE CORRECTION FACTOR .80

F. GAS DENSITY CORRECTION FACTOR —

G. CORRECTED VELOCITY, AxExF, ft/sec 28.76
or, AxDxExF, ft/sec —

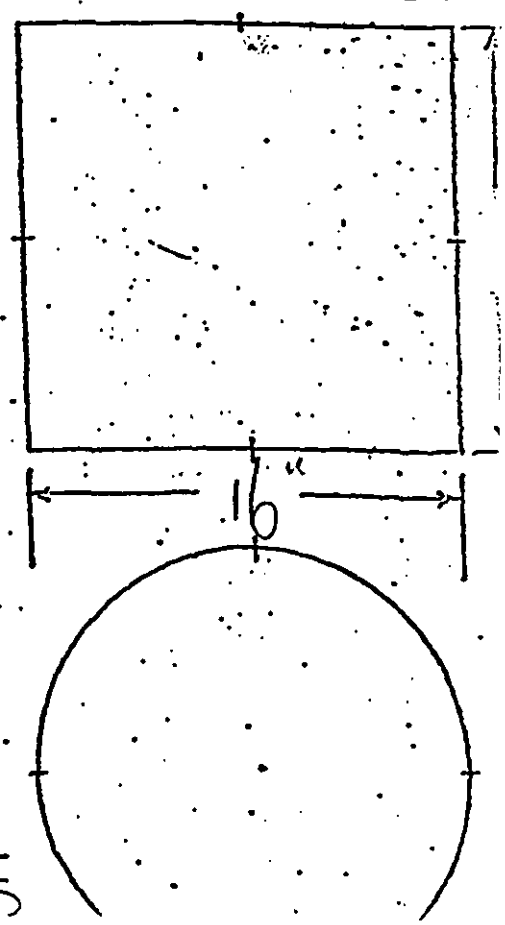
H. AREA OF FLUE, SQ. FT. 1.40

J. AVERAGE FLUE TEMPERATURE, °F 68

K. FLOW RATE, G x H x 60, CFM 2,416

L. FLOW RATE, $K \times \frac{520}{460 + J} \times \frac{BP + Ps/13.6}{29.9}$, SCFM 2375 / 2325

.979



TRUESDAIL LABORATORIES, INC.

Date: 7/29/87

Sampling Location: OUTLET-PLKD

Barometric Pressure: 28.84

Test No. 3

Nozzle Diameter: .25

Time	Gas Meter Reading cu. ft. Vm	Gas Meter Press. in. H_2O Pm	Gas Meter Temp. °F Tm	Impinger Temp. °F Ti	Sample Point	CFM			
635	803.48	.46	72°	—	2	.59			
705	821.18	.49	72°	43°	2	.59			
735	839.62	.46	76°	47°	3	.60			
805	857.98	.46	70°	48°	4	.60			
835	876.00	.47	74°	53°	5	.61			
905	894.12	.47	78°	53°	6	.61			
935	912.34	.46	82°	56°	7	.59			
1005	930.61	.46	85°	56°	7	.59			
1035	949.04			59°			CHANGE PORTS		
1041	949.09	.47	90°	—	2	.61			
1111	968.16	.47	91°	59°	2	.61			
1141	986.24	.49	93°	59°	3	.63			
1211	004.36	.48	95°	60°	4	.62			
1241	022.79	.48	96°	61°	5	.62	8	min. into point	
1312	041.44	.46	98	61	6	.60		power failure	
1352	060.30	.46	101	58°	7	.60		restart + time	
1422	079.16	.45	102	60	7	.59		Resumed	11 min.
1452	096.82			60					
Weight Collected, grams	893.34	.47	96	56					

Σ = .9359 MF = .97

L = .57

H = .60

METER = Ø06

TARE WT = .1082

A. Total Weight _____

B. Condensate Volume, ml. 78ml

C. Condensate Vapor Volume, $0.00267 \times \frac{460 + Tm}{B.P + Pm/13.6} \times B$, cu. ft. 3.94

D. Total Sample Volume, Vm + C, cu. ft. 297.28

E. Sample Volume, $D \times \frac{520}{460 + Tm} \times \frac{B.P. + Pm/13.6}{29.9} \times$ Moisture corr., DSCF 267.63 (28.87; .979)

F. Concentration, 15.43 x A/E, grains/DSCF _____

G. Stack Gas Flow Rate, DSCFM 2325

H. Emissions, 60 x G x F/7000, lbs/hr _____

TRUESDAIL LABORATORIES, INC.

CB

Sampling Station PLANT - OUTLET Date 7/31/87

WATER VAPOR AND GAS DENSITY CALCULATIONS

Percent Water Vapor in Gases

A. Gas pressure at meter, in. Hg. (absolute) 28.84

B. Vapor pressure of water at impinger temp., in. Hg. .4520

C. Volume of metered gas, cu. ft. 293.34

D. Volume of water vapor metered, B X C/A, cu. ft. 4.60

E. Volume of water vapor condensed, cu. ft. 3.94

F. Total volume water vapor in gas sample, D + E, cu. ft. 8.54

G. Total volume of gas sample, C + E, cu. ft. 297.28

H. Percent water vapor in sampled gas, 100 x F/G 2.87

GAS DENSITY CORRECTION FACTOR

Component	Volume Percent/100	x Moisture Correction	x Mol. Wt.	= Wt./Mole Wet Basis
Water	.029	1.0	18.0	
Carbon Dioxide	Dry Basis	.979	44.0	
Carbon Monoxide	Dry Basis	↓	28.0	
Oxygen	Dry Basis	↓	32.0	
Nitrogen & Inerts	Dry Basis	↓	28.2	
			Average Molecular Weight	

J. Density of gas referred to air = $\frac{\text{Av. Mol. Wt.}}{28.95}$ = _____

K. Gas density correction factor = $\sqrt{\frac{1.00}{J}}$ = _____

...ABORATORIES, INC.

Sampling Location: PLATO
Test No. AMBIENT AIR

Date: 7/27/87
Barometric Pressure: 28.84
Nozzle Diameter:

Time	Gas Meter Reading cu. ft. Vm	Gas Meter Press. in. H_2O Pm	Gas Meter Temp. °F Tm	Impinger Temp. °F Ti	Sample Point	CFM			
7:38	755.02		60°	10°					
7:08	778.72		64°	10°					
1:38	802.61		78°	10°					
3:08	826.68		78°	10°					
8:38	850.90		82°	10°					
9:08	875.24		86°	10°					
9:38	898.46		90°	10°					
10:08	923.35		93°	10°					
10:38	946.88		96°	10°					
1:08	970.70		98°	10°					
11:38	994.18		100°	11°					
12.08	1017.58		102°	10°					
12:38	1045.68		104°	10°	12:50				
1:10	1067.76		106°	10°	POWER BREAK FOR 2 MINUTES				
1:40	1090.64		107°	10°					
2:10	1114.52		107°	10°					
2:40	1138.60		107°	10°					
3:10	1157.31	.84	91°	10°					

Weight Collected 402.29 grams

METER #4 TAPE 0288

- Total Weight _____
- Condensate Volume, ml. 62 ml
- Condensate Vapor Volume, $0.00267 \times \frac{460 + Tm}{B.P + Pm/13.6} \times B$, cu. ft. 3.16
- Total Sample Volume, Vm + C, cu. ft. 405.45
- Sample Volume, $D \times \frac{520}{460 + Tm} \times \frac{B.P. + Pm/13.6}{29.9} \times$ Moisture corr., DSCF 361.69 (460)
- Concentration, 15.43 x A/E, grains/DSCF _____
- Stack Gas Flow Rate, DSCFM _____
- Emissions, 60 x G x F/7000, lbs/hr _____

TRUESDAIL LABORATORIES, INC.

Sampling Station RATO - AMBIENT Date 8/3/87

WATER VAPOR AND GAS DENSITY CALCULATIONS

Percent Water Vapor in Gases

A. Gas pressure at meter, in. Hg. (absolute) 28.90

B. Vapor pressure of water at impinger temp., in. Hg. .3626

C. Volume of metered gas, cu. ft. 402.29

D. Volume of water vapor metered, B X C/A, cu. ft. 5.05

E. Volume of water vapor condensed, cu. ft. 3.16

F. Total volume water vapor in gas sample, D + E, cu. ft. 8.21

G. Total volume of gas sample, C + E, cu. ft. 405.45

H. Percent water vapor in sampled gas, 100 x F/G 2.02

GAS DENSITY CORRECTION FACTOR

Component	Volume Percent/100 x	Moisture Correction x	Mol. Wt. =	Wt./Mole Wet Basis
Water	.020	1.0	18.0	
Carbon Dioxide	Dry Basis	.980	44.0	
Carbon Monoxide	Dry Basis	↓	28.0	
Oxygen	Dry Basis	↓	32.0	
Nitrogen & Inerts	Dry Basis	↓	28.2	
			Average Molecular Weight	

J. Density of gas referred to air = $\frac{\text{Av. Mol. Wt.}}{28.95}$ = _____

K. Gas density correction factor = $\sqrt{\frac{1.00}{J}}$ = _____

Total Cr (ppm)
- SOLUTIONS

Gresham, Varner, Savage (Plato)

TLET

.05 ppm Cr = .05 mg/l $\frac{1000 mg}{1 mg}$

$$.05 \frac{mg}{l} \times .425 l \times \frac{1 mmole\ Cr}{52 mg\ Cr} \times \frac{23.7 ml}{1 mmole\ Cr} \times \frac{1000 ul}{1 ml} \times \frac{1 DSCF}{28.32 l} \times \frac{1}{267.63 DSCF}$$

$$= .0013 \text{ ppm (v) Cr}$$

NCET

.19 ppm Cr = .19 mg/l

$$.19 \frac{mg}{l} \times .365 l \times \frac{1 mmole\ Cr}{52 mg\ Cr} \times \frac{23.7 ml}{1 mmole\ Cr} \times \frac{1000 ul}{1 ml} \times \frac{1 DSCF}{28.32 l} \times \frac{1}{322.92 DSCF}$$

$$= .0035 \text{ (v) Cr}$$

AMBIENT AIR

.02 ppm Cr = .02 mg/l

$$.2 \frac{mg}{l} \times .335 l \times \frac{1 mmole\ Cr}{52 mg\ Cr} \times \frac{23.7 ml}{1 mmole\ Cr} \times \frac{1000 ul}{1 ml} \times \frac{1 DSCF}{28.32 l} \times \frac{1}{361.69 DSCF}$$

$$= .0003 \text{ ppm (v) Cr}$$

Total Cr (ppm)
Filters
Gresham, Varner, Savage (Plato)

OUTLET

$< 1.00\ ug = .001\ mg$

$$.001\ mg \times \frac{1\ mmole\ Cr}{52\ mg\ Cr} \times \frac{23.7\ ml}{1\ mmole} \times \frac{1000\ ul}{1\ ml} \times \frac{10\ SCF}{28.32\ l} \times \frac{1}{267.63\ DSCF}$$

$$= < .0001\ ppm\ (V)\ Cr$$

INLET

$1.14\ ug = .001\ mg$

$$.001\ mg \times \frac{1\ mmole\ Cr}{52\ mg\ Cr} \times \frac{23.7\ ml}{1\ mmole} \times \frac{1000\ ul}{1\ ml} \times \frac{10\ SCF}{28.32\ l} \times \frac{1}{322.92\ DSCF}$$

$$= 0.0001\ ppm\ (V)\ Cr$$

AMBIENT AIR

$< 1.00\ ug = .001\ mg$

$$.001\ mg \times \frac{1\ mmole\ Cr}{52\ mg\ Cr} \times \frac{23.7\ ml}{1\ mmole} \times \frac{1000\ ul}{1\ ml} \times \frac{10\ SCF}{28.32\ l} \times \frac{1}{361.69\ DSCF}$$

$$= < .0001\ ppm\ (V)\ Cr$$

Total Cr (mg/m^3) $1\ m^3 = 1000\ l$

SOLUTIONS

Gresham, Varner, Savage (Plato)

OUTLET

0.05 ppm Cr = mg/l – mg/m^3

$$0.05\ \frac{mg}{l} \times 0.425\ l \times \frac{DSCF}{28.3\ l} \times \frac{1}{267.63\ DSCF} \times \frac{1000\ l}{1\ m^3}$$

mg/m^3 = **0.0028 mg/m^3 Cr**

INLET

.19 ppm Cr = .19 mg/l

$$19\ mg/l \times .365\ l \times \frac{DSCF}{28.3\ l} \times \frac{1}{322.92\ DSCF} \times \frac{1000\ l}{1\ m^3}$$

= **0.0076 mg/m^3 Cr**

AMBIENT AIR

.02 ppm Cr = .02 mg/l

$$.02\ mg/l \times .335\ l \times \frac{DSCF}{28.3\ l} \times \frac{1}{361.69\ DSCF} \times \frac{1000\ l}{1\ m^3}$$

= **.0007 mg/m^3 Cr**

Total Cr (mg/m^3)
Filters
Gresham, Varner, Savage (Plato)

OUTLET

$< 1.00\ ug = .001\ mg$

$.001\ mg \times \frac{DSCF}{28.3\ l} \times \frac{1}{267.63\ DSCF} \times \frac{1000\ l}{1\ m^3}$

$= 0.0001\ mg/m^3\ Cr$

INLET

$1.14\ ug = .001\ mg$

$.001\ mg \times \frac{DSCF}{28.3\ l} \times \frac{1}{322.92\ DSCF} \times \frac{1000\ l}{1\ m^3}$

$= 0.0001\ mg/m^3\ Cr$

AMBIENT AIR

$< 1.60\ ug = .001\ mg$

$.001\ mg \times \frac{DSCF}{28.3\ l} \times \frac{1}{361.69\ DSCF} \times \frac{1000\ l}{1\ m^3}$

$= < .0001\ mg/m^3\ Cr$

Cr^{+6} (ppm)

SOLUTIONS

Gresham, Varner, Savage (Plato)

INLET

< 0.01 ppm $Cr^{+6} = .01$ mg/l

$$.01 \frac{mg}{l} \times .425\,l \times \frac{1\,mole\,Cr}{52\,mg\,Cr} \times \frac{23.7\,ml}{1\,mmole\,Cr} \times \frac{1000\,ml}{1\,ml} \times \frac{1\,DSCF}{28.32\,l} \times \frac{1}{267.63\,DSCF}$$

$= < .0003$ ppm (v) Cr^{+6}

OUTLET

< 0.01 ppm $Cr^{+6} = .01$ mg/l

$$.01 \frac{mg}{l} \times .365\,l \times \frac{1\,mmole\,Cr}{52\,mg\,Cr} \times \frac{23.7\,ml}{1\,mmole} \times \frac{1000\,ml}{1\,ml} \times \frac{1\,DSCF}{28.32} \times \frac{1}{322.92\,DSCF}$$

$= < .0002$ ppm (v) Cr^{+6}

AMBIENT AIR

< 0.01 ppm $Cr^{+6} = .01$ mg/l

$$.01 \frac{mg}{l} \times .335\,l \times \frac{1\,mmole\,Cr}{52\,mg\,Cr} \times \frac{23.7\,ml}{1\,mmol} \times \frac{1000\,ml}{1\,ml} \times \frac{1\,DSCF}{28.32} \times \frac{1}{361.69\,DSCF}$$

$= < .0002$ ppm (v) Cr^{+6}

Cr^{+6} (ppm)

· Filters

Gresham, Varner, Savage (Plato)

INLET

< 0.01 ppm $Cr^{+6} = .01$ mg/l

$$.01 \frac{mg}{l} \times \frac{0.1}{.425 l} \times \frac{1 \text{ mole Cr}}{52 \text{ mg Cr}} \times \frac{23.7 \text{ ml}}{1 \text{ mmole Cr}} \times \frac{1000 \text{ ml}}{1 \text{ ml}} \times \frac{1 \text{ DSCF}}{28.32} \times \frac{1}{267.63 \text{ DSCF}}$$

$= < .0001$ ppm (V) Cr^{+6}

OUTLET

< 0.01 ppm $Cr^{+6} = .01$ mg/l

$$.01 \frac{mg}{l} \times \frac{0.1}{.365 l} \times \frac{1 \text{ mmole Cr}}{52 \text{ mg Cr}} \times \frac{23.7 \text{ ml}}{1 \text{ mmole}} \times \frac{1000 \text{ ml}}{1 \text{ ml}} \times \frac{1 \text{ DSCF}}{28.32} \times \frac{1}{322.92 \text{ DSCF}}$$

$= < .0001$ ppm (V) Cr^{+6}

AMBIENT AIR

< 0.01 ppm $Cr^{+6} = .01$ mg/l

$$.01 \frac{mg}{l} \times \frac{0.1}{.335 l} \times \frac{1 \text{ mmole Cr}}{52 \text{ mg Cr}} \times \frac{23.7 \text{ ml}}{1 \text{ mmole}} \times \frac{1000 \text{ ml}}{1 \text{ ml}} \times \frac{1 \text{ DSCF}}{28.32} \times \frac{1}{361.69 \text{ DSCF}}$$

$= < .0001$ ppm (V) Cr^{+6}

Cr^{+6} (mg/m^3)

SOLUTIONS:

Gresham, Varner, Savage (Plata)

OUTLET

< 0.01 ppm $Cr^{+6} = .01$ mg/l

$$.01 \text{ mg/l} \times 0.425 \text{ l} \times \frac{\text{DSCF}}{28.3} \times \frac{1}{267.63 \text{ DSCF}} \times \frac{1000 \text{ l}}{1 \text{ m}^3}$$

$$= < .0006 \text{ mg/m}^3$$

INLET

< 0.01 ppm $Cr^{+6} = .01$ mg/l

$$.01 \text{ mg/l} \times 1.365 \text{ l} \times \frac{\text{DSCF}}{28.3 \text{ l}} \times \frac{1}{322.92 \text{ DSCF}} \times \frac{1000 \text{ l}}{1 \text{ m}^3}$$

$$= < .0004 \text{ mg/m}^3$$

AMBIENT AIR

< 0.01 ppm $Cr^{+6} = .01$ mg/l

$$.01 \text{ mg/l} \times .335 \text{ l} \times \frac{\text{DSCF}}{28.3 \text{ l}} \times \frac{1}{361.69 \text{ DSCF}} \times \frac{1000 \text{ l}}{1 \text{ m}^3}$$

$$= < .0003 \text{ mg/m}^3$$

Cr^{+6} (mg/m^3)

Filters

Gresham, Varner, Savage (Plato)

OUTLET

$< 0.01 ppm\ Cr^{+6} = .01\ mg/l$

$$.01\ mg/l \times \frac{0.1}{0.425\ l} \times \frac{DSCF}{28.3\ l} \times \frac{1}{257.63\ DSCF} \times \frac{1000\ l}{1\ m^3}$$

$$= \boxed{< .0001\ mg/m^3}$$

INLET

$< 0.01 ppm\ Cr^{+6} = .01\ mg/l$

$$.01\ mg/l \times \frac{0.1}{.365\ l} \times \frac{DSCF}{28.3\ l} \times \frac{1}{322.92\ DSCF} \times \frac{1000\ l}{1\ m^3}$$

$$= \boxed{< .0001\ mg/m^3}$$

AMBIENT AIR

$< 0.01 ppm\ Cr^{+6} = .01\ mg/l$

$$.01\ mg/l \times \frac{0.1}{.335\ l} \times \frac{DSCF}{28.3\ l} \times \frac{1}{361.69\ DSCF} \times \frac{1000\ l}{1\ m^3}$$

$$= \boxed{< .0001\ mg/m^3}$$

SOLUTIONS

Pb (-PPM)

INLET

$< 0.04 \text{ PPM} = 0.04 \text{ mg/l} \sim \text{ul/l}$

$$<0.04 \frac{\text{mg}}{\ell} \times 0.365\ell \times \frac{1 \text{ mmole Pb}}{207.2 \text{ mg Pb}} \times \frac{23.7 \text{ ml}}{1 \text{ mmole}} \times \frac{1000 \text{ ul}}{1 \text{ ml}} \times \frac{\text{DSCF}}{28.3\ell} \times \frac{1}{322.92 \text{ DSCF}}$$

$$= \boxed{< 0.0002 \text{ ul/l} = \text{PPM(v) Pb}}$$

OUTLET

$< 0.04 \text{ PPM} = 0.04 \text{ mg/l} \sim \text{ul/l}$

$$<0.04 \frac{\text{mg}}{\ell} \times 0.425\ell \times \frac{1 \text{ mmole Pb}}{207.2 \text{ mg Pb}} \times \frac{23.7 \text{ ml}}{1 \text{ mmole}} \times \frac{1000 \text{ ul}}{1 \text{ ml}} \times \frac{\text{DSCF}}{28.3\ell} \times \frac{1}{267.63 \text{ DSCF}}$$

$$= \boxed{< 0.0003 \text{ ul/l} = \text{PPM(v) Pb}}$$

AMBIENT

$0.05 \text{ PPM} = 0.05 \text{ mg/l} \sim \text{ul/l}$

$$0.05 \frac{\text{mg}}{\ell} \times 0.335\ell \times \frac{1 \text{ mmole Pb}}{207.2 \text{ mg Pb}} \times \frac{23.7 \text{ ml}}{1 \text{ mmole}} \times \frac{1000 \text{ ul}}{1 \text{ ml}} \times \frac{\text{DSCF}}{28.3\ell} \times \frac{1}{361.69 \text{ DSCF}}$$

$$= \boxed{0.0002 \text{ ul/l} = \text{PPM(v) Pb}}$$

FILTERS

Pb (PPM)

INLET

$4.12\ ug = 0.00412\ mg \sim ul/l$

$$0.00412\ mg \times \frac{1\ mmole\ Pb}{207.2\ mg} \times \frac{23.7\ ml}{1\ mmole\ Pb} \times \frac{1000\ ul}{1\ ml} \times \frac{DSCF}{28.3\ l} \times \frac{1}{322.92\ DSCF}$$

$= \boxed{0.00005\ ul/l = PPM(v)\ Pb}$

OUTLET

$< 2.00\ ug = 0.002\ mg \sim ul/l$

$$< 0.002\ mg \times \frac{1\ mmole\ Pb}{207.2\ mg} \times \frac{23.7\ ml}{1\ mmole\ Pb} \times \frac{1000\ ul}{1\ ml} \times \frac{DSCF}{28.3\ l} \times \frac{1}{267.63\ DSCF}$$

$= \boxed{< 0.00003\ ul/l = PPM(v)\ Pb}$

AMBIENT

$< 2.00\ ug = 0.002\ mg \sim ul/l$

$$< 0.002\ mg \times \frac{1\ mmole\ Pb}{207.2\ mg} \times \frac{23.7\ ml}{1\ mmole\ Pb} \times \frac{1000\ ul}{1\ ml} \times \frac{DSCF}{28.3\ l} \times \frac{1}{361.69\ DSCF}$$

$\boxed{< 0.00002\ ul/l = PPM(v)\ Pb}$

SOLUTIONS

Pb - mg/m³

INLET

<0.04PPM - 0.04 mg/ℓ

$$<0.04\ \frac{mg}{\ell} \times 0.365\ \ell \times \frac{DSCF}{28.3\ \ell} \times \frac{1}{377.92\ DSCF} \times \frac{1000\ \ell}{1\ m^3}$$

= <0.0016 mg/m³ Pb

OUTLET

<0.04 PPM = 0.04 mg/ℓ

$$<0.04\ \frac{mg}{\ell} \times 0.425\ \ell \times \frac{DSCF}{28.3\ \ell} \times \frac{1}{267.63\ DSCF} \times \frac{1000\ \ell}{1\ m^3}$$

= <0.0022 mg/m³ Pb

AMBIENT

0.05PPM = 0.05 mg/ℓ

$$0.05\ \frac{mg}{\ell} \times 0.335\ \ell \times \frac{DSCF}{28.3\ \ell} \times \frac{1}{361.69\ DSCF} \times \frac{1000\ \ell}{m^3}$$

= 0.0016 mg/m³ Pb