Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

Background Report Reference

AP-42 Section Number: 12.20

Background Chapter: 4

Reference Number: 39

Title: South Coast (AQMD), Source Test Report: 86-0513

January 1987

ELECTROPLATING
REF. 4-39

South Coast Air Quality Management District

SOURCE TEST REPORT 86-0513

Standard Plating Co.
826 E. 62nd St.
Los Angeles, California

UNACCEPTABLE

Page three of the report says that velocity data were not gathered during sampling due to sample port accessibility.

Page four of the report - the section on test critique gives the isokinetic rate at 71% since a sample nozzle of smaller diameter was not available.

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

Hard

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

2/22/89

F. Clay,
Please Review
SCAQMD Test Report # 86-0513
Standard Plating

For Dallas Safriet.

Andy

HEXAVALENT CHROME EMITTED FROM A WET SCRUBBER CONTROLLING CHROME PLATING TANK #50

TESTED: November 5, 1986

ISSUED: JAN 27 1987

REPORT BY: J.R. Manker
Assistant Air Quality Engineer II

REVIEWED:

Steven Marinoff, Senior Air Quality Engineer

JOHN HIGUCHI, MANAGER
SOURCE TESTING & MONITORING BRANCH

TECHNICAL SERVICES DIVISION

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

Test No. 86-0513 Date 11/5/86

INTRODUCTION

(a) Firm Tested ..... Standard Plating Co.

(b) Test Location ..... 826 E. 62nd St., Los Angeles, CA

(c) Unit Tested ..... Scrubber Exhaust, Chrome Tank #50

(d) Test Requested by ..... S. Marinoff - Source Testing

(e) Reason for Test Request ..... Information

(f) Date of Test 11/5/86

(g) Source Test Performed by ..... S. Marinoff, R. Manker

(h) Test Arrangements Made Through ..... -

(i) Source Test Observed by ..... -

(j) Company I.D. No. 039783

(k) Permit No. ..... -

(l) Application No. ..... -

RESULTS

Flow Rate 118 dscmm (4180 dscfm)
Process Weight — kg/hr (— lbs/hr)

Contaminant	Emissions Measured	Emissions Allowed	Applicable Rule
Hexavalent Chrome (Cr^{+6}) Emission Rate:			
-Before Extraction*	0.50×10^{-3} lb/hr	-	Information
-After Extraction*	0.42×10^{-3} lb/hr	-	Information
Hexavalent Chrome (Cr^{+6}) Present in Scrubber Solution	13-16 μg/ml	-	Information

* See Test Critique

INTRODUCTION

On October 5, 1986, Source Testing and Monitoring personnel representing the South Coast Air Quality Management District (SCAQMD), performed a source test on the scrubber exhaust serving the #50 Chrome Plating Tank at Standard Plating Co., Los Angeles. Testing was performed in conjunction with the California Air Resources Board (CARB) to determine the emission rate of hexavalent chrome (Cr^{+6}) and total chrome as an on-going study of chrome testing methods.

EQUIPMENT AND PROCESS DESCRIPTION

This is a typical chrome plating operation consisting of a series of metal preparation dip tanks and chrome plating tanks. Surface mists from the electrolytic plating process are collected and exhausted to a wet scrubber control system (FIGURE 1), then expelled to the atmosphere.

PROCESS OPERATING PARAMETERS DURING SAMPLING

1. Chrome Plating Tank #50

   A. Dimensions - 44 in. diameter x 38 ft. deep
   B. Capacity - about 2700 gal.
   C. Contents

      1) Chromic Acid - 32-35 oz./gal. solution
      2) Sulfuric Acid - 0.32-0.35 oz./gal. solution

2. Scrubber make-up - about 1 gpm

SAMPLING AND ANALYTICAL PROCEDURES

Sampling for total Cr and Cr^{+6} was performed isokinetically using a 16-point sampling matrix across the square, scrubber exhaust stack, for a continuous 64 minute testing interval. The sampling equipment consisted of a standard wet impingement train with quartz glass probe and nozzle (FIGURE 2).

Prior to sampling, a 16-point velocity traverse was performed, in triplicate, using an "S" type Pitot tube, Magnehelic gage, type "K" thermocouple, and Minimite temperature unit. Velocity monitoring sampling was not performed during sampling due to sample port accessibility.

A sample bottle of scrubber solution was also collected for subsequent District Chem Lab analysis for Cr^{+6}.

Following sampling, the wet impingement train was returned to the District Chem Lab for Cr^{+6} and total Cr analysis:

1. An aliquot of the impinger solution was stabilized with the basic solution used in the extraction procedure, refrigerated for 3 days then analyzed for Cr^{+6} by DPC* analysis ("Before Extraction").

2. The remaining sample was stabilized and stored as above but analyzed using the ARB draft procedure ("After Extraction"), for Cr^{+6}.

3. An aliquot of the sample was also digested with nitric acid and analyzed by AAS**, as per ARB draft procedure, for total Cr.

TEST CRITIQUE

The isokinetic sampling rate for this test was 71% because a sample nozzle of smaller diameter was unavailable for these test conditions. This could cause the Cr^{+6} emission rate to be overstated.

Total Cr was not reported due to results inconsistent with constituent Cr^{+6} values which showed contamination and/or loss.

The results indicate that the extraction and evaporation process employed by the ARB may result in a loss of hexavalent chrome.

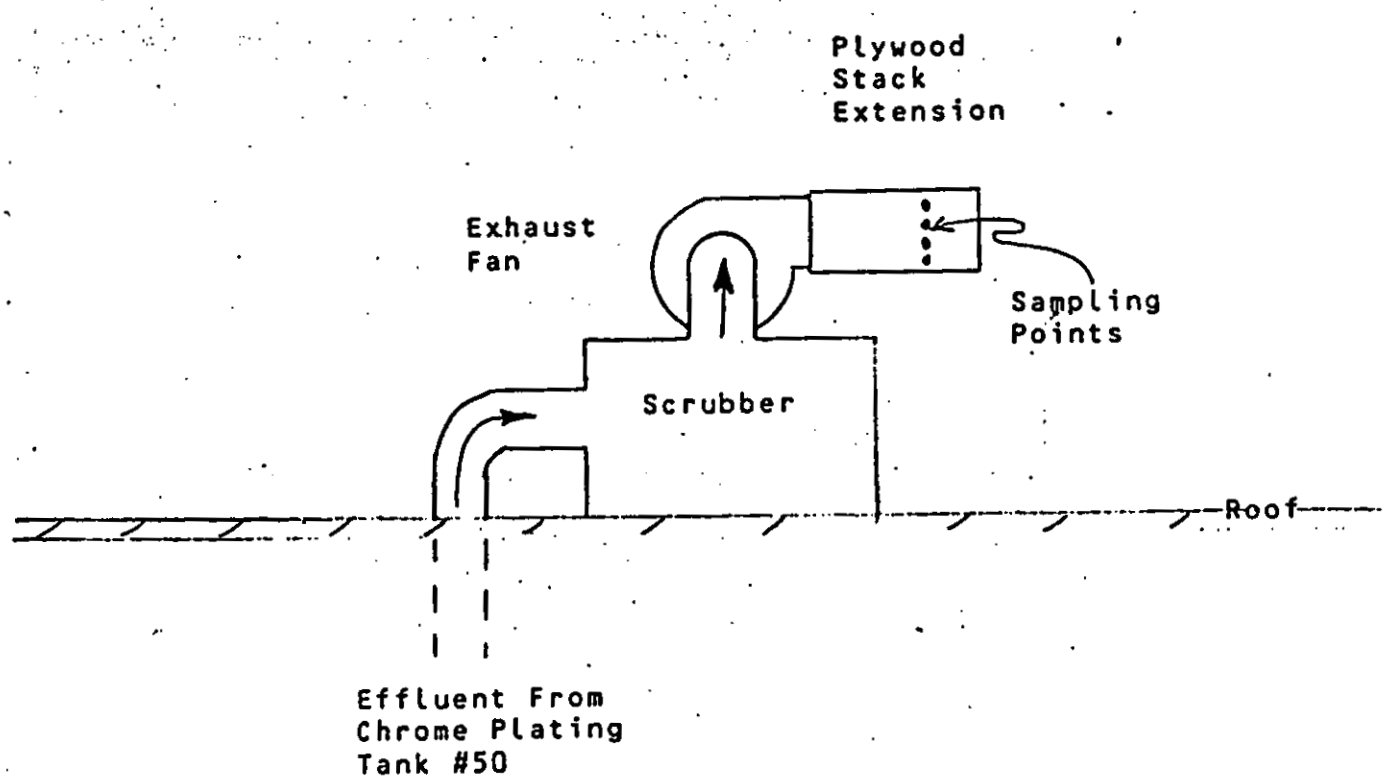
* Diphenyl Carbazide Analysis
** Atomic Absorption - Spectrographic Analysis

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Test No. 86-0513 Date 11-05-86

Figure No. 1 Drawn By JRM

PROCESS DIAGRAM



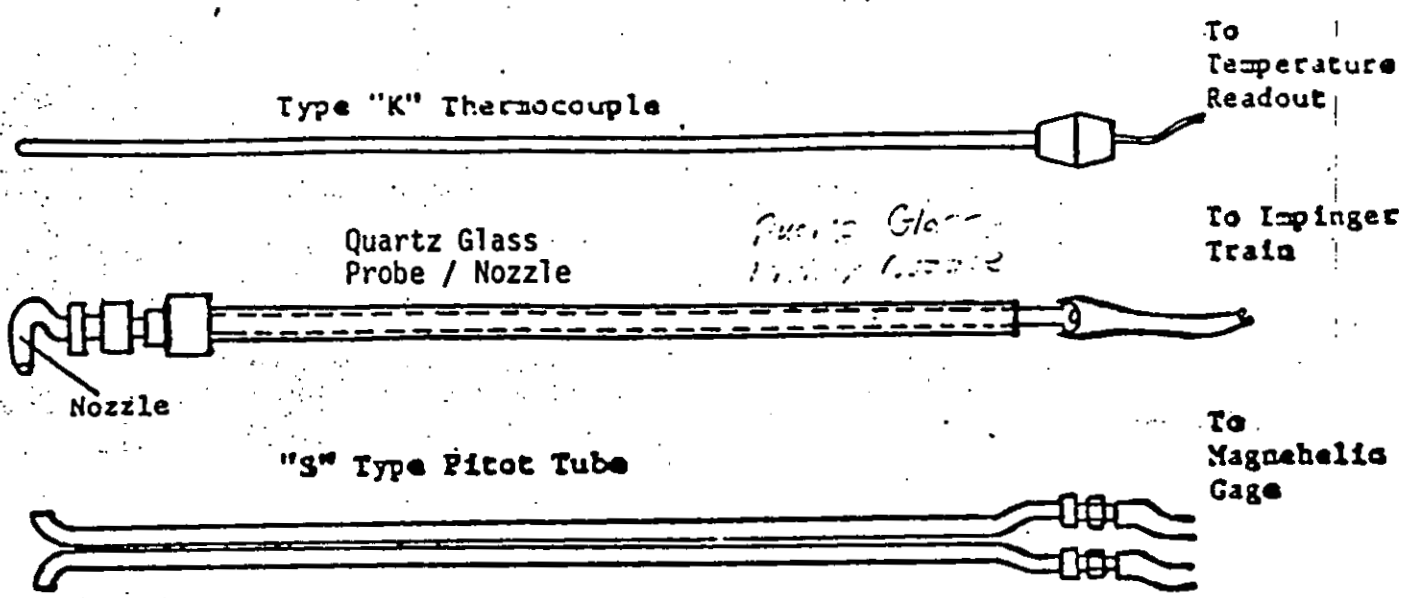
Company STANDARD PLATING COMPANY

Process Depicted Chrome Plating Tank Emission Control System

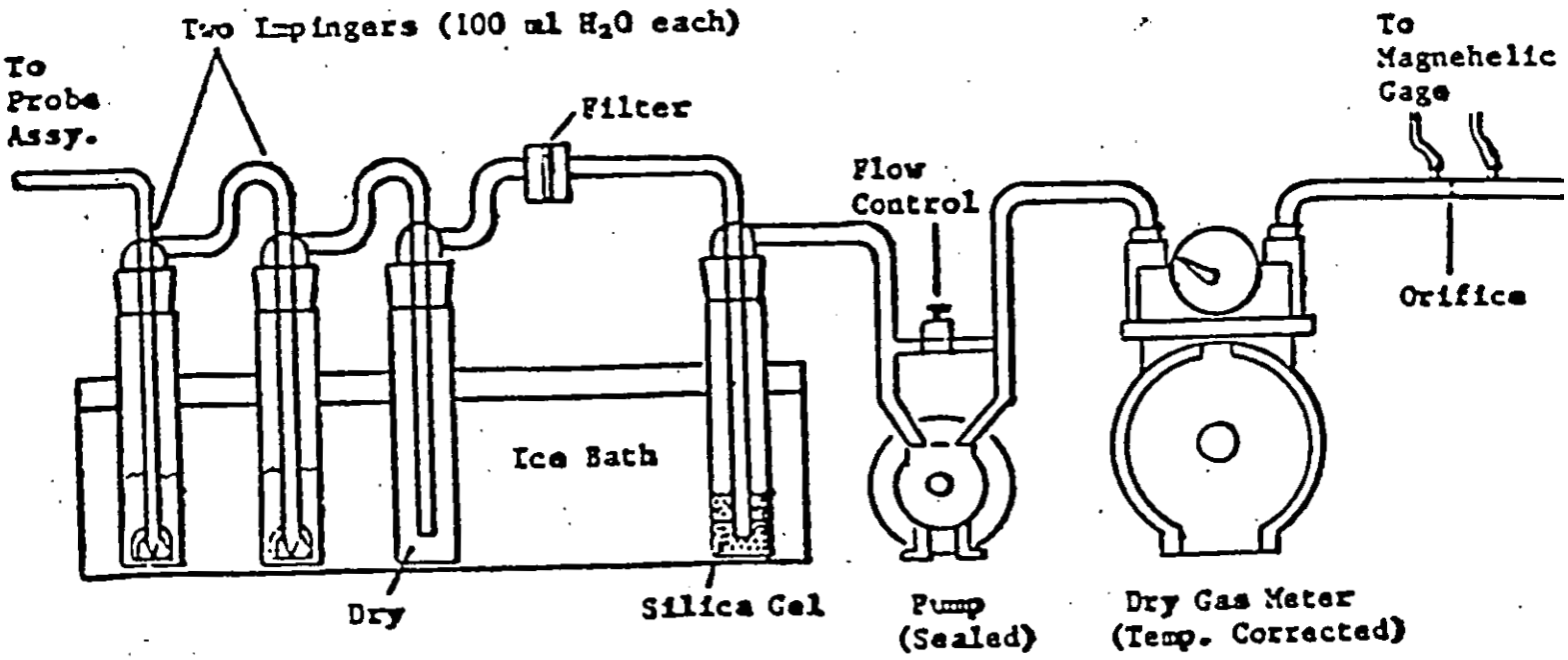
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
9150 Flair Drive, El Monte, California 91731

Test No. 86-0513 Page No. 6 Date 11-05-86

Figure No. 2



Probe Set-up



IMPINGER TRAIN SET-UP
(Wet Impingement Method)

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Test No. 86-0513

Date 11-05-86

Sampling Location Scrubber Exhaust, Tank #50

Sample Train Cr^{+6} / Cr^{TOT}

ANALYSIS (Lab Results)	Cr^{+6} (µg) BEFORE EXTRACT	AFTER EXTR.
filter blank	—	1
filter	—	2
probe + #1 impinger	35	27
#2 & #3 impingers	1	<1
TOTAL *	36	30

Calculated By [illegible]

Checked By

SOURCE TEST CALCULATIONS

SUMMARY

A. Average Traverse Velocity (Pre-Test) ..... 23.9 fps
B. Average Reference Point Velocity (Pre-Test) ..... 23.9 fps
C. Average Traverse Velocity (During Test) ..... 23.9 fps

D. Average Stack Temperature 70 °F
E. Stack Cross Sectional Area 3.67 ft^2
F. Barometric Pressure..... 30.10 "HgA
G. Gas Meter Pressure..... 30.14 "HgA
H. Static Pressure..... 30.10 "HgA
I. Pitot Correction Factor... 0.828

J. Sampling Time..... 64 min
K. Nozzle Cross-Sectional Area 0.000767 ft^2
L. Net Sample Collection..... 36/30 µg *
M. Net Solid Collection..... — mg
N. Water Vapor Condensed..... — ml
O. Gas Volume Metered..... 39.33 dcf

P. Correct Gas Volume Metered (O. x G/29.92)..... 39.62 dscf

PERCENT MOISTURE - GAS DENSITY

Q. Percent Water Vapor in Gas Sample $\left[\frac{4.64 \times N}{(0.0464 \times N) + P}\right]$ ..... 2.5 % **

R. Average Molecular Weight:

(Component)	(Volume % / 100)	x (1 - L/100)	x (Molec. Wt.)	= (Wt./Mole)
Water		1.00	18.0	
Carbon Dioxide	Dry Basis		44.0	
Carbon Monoxide	Dry Basis		28.0	
Oxygen	Dry Basis		32.0	
Nitrogen & Inerts	Dry Basis		28.2	
	assume ambient			
			(Sum)	

FLOW RATE

S. Gas Density Correction Factor $\sqrt{28.95/R}$ 1.00
T. Flue Correction Factor (A/B)..... 1.00
U. Velocity Pressure Correction Factor $\sqrt{29.92/H}$ 0.997
V. Corrected Velocity (C x I x S x T x U) ..... 19.7 fps
W. Flow Rate (V x E x 60)..... 4345 cfm
X. Flow Rate $\left(W \times \frac{H}{29.92} \times \frac{520}{460 + D}\right)$ ..... 4290 scfm
Y. Flow Rate $\left[X \times (1 - Q/100)\right]$..... 4190 dscfm

SAMPLE CONCENTRATION - EMISSION RATE

	Cr^{+6} BEFORE EXTR	Cr^{+6} AFTER EXTR	
Z. Sample Concentration (0.01543 x L/P).....	0.014×10^{-3}	0.012×10^{-3}	gr/dscf
AA. Sample Concentration (54,143 x Z/ Molec. Wt.).....			ppm (dry)
BB. Sample Emission Rate (0.00857 x Y x Z).....	0.50×10^{-3}	0.42×10^{-3}	lb/hr
CC. Solid Emission Rate $\left(\frac{1.322 \times 10^{-4} \times M \times Y}{P}\right)$			lb/hr

DD. Isokinetic Sampling Rate $\left(\frac{E \times P \times T \times 100}{J \times K \times Y}\right)$ ..... 71 %

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Test No. 86-0513 Date 11-05-86

Sampling Location Scrubber Exhaust, Tank #50

GAS VELOCITY DATA

Pre-Test Velocity Leak Check ✓

Post-Test Velocity Leak Check ✓

Time (1205)	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		0.16	70			0.17	70			0.18	70	
	2		0.22	↓			0.22	↓			0.22	↓	
	3		0.24	↓			0.22	↓			0.23	↓	
	4		0.24	↓			0.24	↓			0.23	↓	
	5		0.16	70			0.16	70			0.15	70	
	6		0.24	↓			0.24	↓			0.23	↓	
	7		0.25	↓			0.24	↓			0.25	↓	
	8		0.24	↓			0.23	↓			0.22	↓	
	9		0.07	70			0.07	70			0.07	70	
	10		0.13	↓			0.13	↓			0.13	↓	
	11		0.15	↓			0.14	↓			0.15	↓	
	12		0.10	↓			0.10	↓			0.10	↓	
	13		0.02	70			0.02	70			0.02	70	
	14		0.05	↓			0.04	↓			0.05	↓	
	15		0.03	↓			0.04	↓			0.03	↓	
	16		0.02	↓			0.02	↓			0.02	↓	

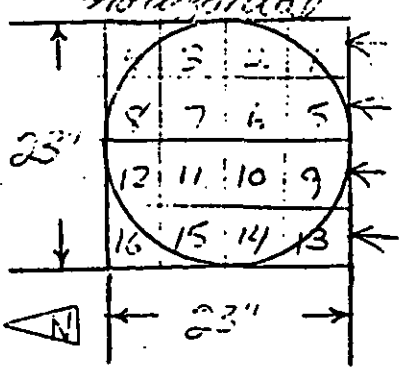
Static Pressure in Stack 30.10 "HgA (+/- 0 "H_2O) (Average)

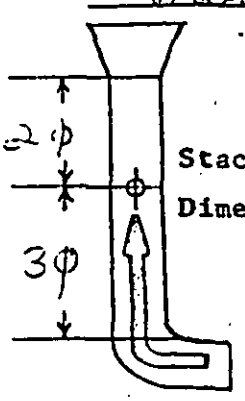
Barometric Pressure..... 30.10 "HgA Pitot Factor..... 0.828

Recorded By [illegible]

Horizontal

Calibration Data	
Magnehelic No. 30010	(Cal: [illegible])
Pitot Tube No. 50401	(Cal: 10 May 1984)
Potentiometer No. —	(Cal:)
Thermocouple No. —	(Cal:)





Stack Dimensions

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Test No. 86-0513 Date 11-05-86

Sampling Location Scrubber Exhaust, Tank #50 Sample Train

TRAVERSE SOURCE TEST DATA

Pre-Test Sample Train Leak Check 0.012 cfm @ 15 "Hg Vac (Velocity Leak Check ✓)

Post- Test Sample Train Leak Check 0 cfm @ 15 "Hg Vac (Velocity Leak Check ✓)

On Time	Off Time	Sample Point	Gas Meter Reading (cf)	Calculated Orifice ΔP ("H_2O)	Calculated Sampling Rate (cfm)	Calculated Velocity (fps)	Filter Temp. (°F)	Stack VAC. ("Hg)	Stack Temp (°F)	Stack Velocity Head ("H_2O)
(1234)			(475.079)							
+4		1	477.90	0.67	0.71	27.5		9.5	70	0.17
+8		2	481.30	0.87	0.80	31.3		10.8		0.22
+12		3	484.70	0.91	0.82	32.0		11.0		0.23
+16	(1250)	4	488.115	0.95	0.84	32.7		11.0		0.24
(1303)										
+20		5	491.05	0.63	0.69	26.7		9.8	70	0.16
+24		6	494.34	0.95	0.84	32.7		11.0		0.24
+28		7	497.70	0.99	0.86	33.4		12.0		0.25
+32	(1319)	8	501.004	0.91	0.82	32.0		11.0		0.23
(1324)										
+36		16	501.87	0.08	0.24	9.44		2.5	70	0.02
+40		15	503.01	0.12	0.30	11.6		2.5		0.03
+44		14	504.45	0.20	0.38	14.9		3.0		0.05
+48	(1340)	13	505.532	0.08	0.24	9.44		2.5		0.02
(1344)										
+52		9	507.27	0.28	0.45	17.7		4.0	70	0.07
+56		10	509.67	0.51	0.62	24.1		7.0		0.13
+60		11	512.26	0.59	0.66	25.9		8.0		0.15
+64	(1400)	12	514.407	0.39	0.54	21.1		6.0		0.10
(Net Volume, Uncorr)			39.33		(Average)	23.9	—	—	70	

Nozzle Diameter 7.94 mm (3/8 ") Recorded By - [signature]

Barometric Pressure 30.10 "HgA Pitot Factor..... 0.828

Static Pressure in Stack..... 30.10 "HgA (+/- 0 "H_2O)

Calibration Data

Magnehelic No. 30619 (Cal: [illegible])

Pitot Tube No. 50401 (Cal: 10 May 86)

Potentiometer No. — (Cal:)

Thermocouple No. — (Cal:)

Gas Meter No. 50702 (Cal: 12/22/86)

PUMP 3745

Horizontal

4	3	2	1
8	7	6	5
12	11	10	9
16	15	14	13

23" 23" 2 ϕ 3 ϕ

Stack Dimensions

Type Sampling Probe Quartz, Glass

N

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

RECEIVED
DEC 29 1986
S.T. BRANCH

LABORATORY SERVICES BRANCH
REPORT FOR SOURCE TEST

TO: John Higuchi, Manager
Source Testing & Monitoring

COMPANY: Standard Plating
Vernon

EQUIPMENT TESTED: Chrome Plating Tank
Scrubber Outlet

SAMPLE DESCRIPTION: One Hexavalent & Total Chrome Train

LAB REPORT DATE: December 22, 1986

LABORATORY NO. 83096-4,5

REFERENCE NO. MJS-8-008

TEST NO. 86-0513

SOURCE TEST DATE: 11-5-86

DATE SAMPLE RECEIVED: 11-5-86

REQUESTED BY: S. Marinoff

ANALYSIS REQUESTED: Hexavalent & Total Chrome
SPECIAL INSTRUCTION:

AMALYTICAL WORK PERFORMED, METHOD OF ANALYSIS, AND RESULTS

Hexavalent chrome by DPC & Total Chrome by AAS Furnace* NOTE: µg/ml

Sample -1-D	Cr^6 (Before Extraction)	Cr^6 (After Extraction)	TOTAL C
Filter Blank, µg	--	1	*
Filter, µg	--	2	*
Probe + #1 Impinger, µg	35	27	*
#2 + #3 Impinger, µg	1	<1	*
Std. Plating Scrubber µg/mL	13-16		*

*Results of analysis indicate contamination/loss. No further analysis possible.

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