Background Report Reference

AP-42 Section Number: 12.20

Background Chapter: 4

Reference Number: 89

Title: Compliance Test Procedure, Pacific Hard Chrome, Tests Conducted July 18-19, 1991

Chemical Data Management Systems

June 1991

AP-42 Section 12.20
Reference
Report Sect. 4
Reference 89

PACIFIC HARD CHROME

Compliance Test Procedure Pacific Hard Chrome

Tests Conducted July 18-19, 1991

Chemical Data Management
11750 Dublin Blvd
Suite 201
Dublin, California

June, 1991

AP-42 Section 12.20
Reference
Report Sect. 4
Reference 89

PACIFIC HARD CHROME

Compliance Test Procedure Pacific Hard Chrome

Tests Conducted July 18-19, 1991

Chemical Data Management
11750 Dublin Blvd
Suite 201
Dublin, California

June, 1991

EXECUTIVE SUMMARY

Pacific Hard Chrome of Oakland, California is required by permit conditions issued under Regulation 11, Rule 8 to conduct a source compliance test. The results are to be reported to the Bay Area Air Quality Management District located in San Francisco. The company has a single chrome tank whose process gases exhaust first through a series of scrubbers and then two 34 foot stacks. Dual stacks and dual scrubbers exist at the facility. During plating operations, the tank is covered with floating polypropylene chips to aid in reducing emissions.

The tests were conducted by Chemical Data Management Systems of Dublin, California. The test methods being used were developed under the direction of the California Air Resources Board (CARB) and are referred to as CARB Method 425.

The enclosed sampling protocol provides a detection level for either hexavalent or total chromium is approximately 0.0000035 mg/amp hr. Pacific Hard Chrome is permitted to emit 0.03 mg/amp hr of hexavalent chromium. The three tests yielded:

Test	Total Chrome mg/amp hr	Hex Chrome mg/amp-hr	
1	0.0127	0.0078	61.4% IS HEX.
2	0.0194	0.0043	22.2% IS HEX.
3	0.0073	0.0073	100% IS HEX.
Average	**0.0131**	**0.0065**	49.6% IS HEX

Since there are two identical stacks it may be appropriate to double these values to determine the actual total emissions from the plating tank. Doubling would result in an average value of 0.013 mg/amp-hr.

Most of the set-up, vacuum checks and sample collection was observed by Chuck McClure and Hiroshi Doi of the Bay Area Air Quality Management District.

SOURCE TEST PLAN SUMMARY

Company Information

Company Name	Pacific Hard Chrome
Contact	Duane German
Address	1305 S. 51st Street
City, State	Richmond, CA 94804
UTM coordinates	559300, 4196200
Phone	(415) 232-5100

Source Information

Type of Unit	Single tank, S1 Dual stacks
Purpose	Chrome plating of industrial parts

Testing Firm Information

Company Name	Chemical Data Management Systems
Contact	Tim Lundell, Ed Lewis
Address	11750 Dublin Blvd.
City, State	Dublin, Ca 94568
Phone	(415) 551-7310

Testing Information

Procedure Used	Triplicate, CARB Method 425 Total and Hexavalent Chromium Emissions at the scrubber outlet

Stack Description

Stack Height	34 feet
Stack Diameter	14 inches
Sampling Ports	2 sampling ports located 90 degrees apart which comply with the 2 and 8 rule
Sampling Platform	Roof level

Traverse Points - Traverse 1

Point Number	% of Diameter	Inches From Edge
1	6.7	0.94
2	25	3.5
3	75	7.88
4	93.3	13.06

Traverse Points - Traverse 2

Point Number	% of Diameter	Inches From Edge
5	6.7	0.9
6	25	3.5
7	75	7.9
8	93.3	13.1

Stack Gas Conditions (actuals)

Stack Temperature	ambient
Static Pressure	-0.12 inches of H_2O
Gas Velocity	24.230 ft/sec
Stack Area	$(3.14)(14/2)^2(1/144) = 1.07$ ft^2
Volume Flow Rate	91,612 cu ft/hour
Water Vapor	2%
Oxygen	20.9%
Carbon Dioxide	0.0%
Barometric Pressure	29.9
Molecular Weight Air	29.0
Nozzle Diameter/Area	0.238 inches / 0.000341 ft^2
Sample Volume	36.16,35.48,37.45 ft^3
Applied Amperage	4760,5033,5093
Time at Each Point	10 minutes
Total Sample Time	80 minutes / 1.3 hr
Total Charge per Run	4760,5033,5093
Process Cycle	100%

Tank Conditions

The test blanks consisted of shafts ranging from 2 to 5 feet in length and 3 to 6 inches in diameter. The tank surface was covered with approximately 4 inches of polypropylene chips which act as a suppressant.

Source Test Constituent and Methods

Contaminant	Sampling Method	Analytical Method
Total chromium	CARB 425	AA Graphite Furnace
Hexavalent chromium	CARB 425	diphenylcarbazide colorimetric analysis

Detection Limit Calculation

Lab Detection Limit is 2 nanograms per each of two fractions

(4 ng)(1 mg/10^6 ng))/34.37 ft^3 * (80,892 ft^3/hr)(1.3 hr)= 0.012 mg

0.012 mg/3500 amp-hr = 0.0000035 mg/amp hr 3.5×10^{-6} mg/AMP-HR.

Exceptions

Approved EPA or CARB sampling methods will be followed with the following exceptions:

None.

HEX SAT LOD = 1 µg

$\therefore \frac{1\,\mu g}{1000\,\mu g/mg} \times \frac{1542\,SCFM}{39.99\ (V_{O\,TOTAL})} \times \frac{60\,MIN/HR}{3500\,AMPS} \times 1.33\,HRS = .0009\,mg/AMP\text{-}HR$

Q_O

< M.D.L. — OK!

Stack Test Protocol

Following is the protocol that will be used for chrome stack testing at various facilities. The protocol is based on the California Air Resources Board Method 425.

The procedure is used to either provide engineering data to the operators and to provide compliance data to the District. Consequently, three sample trains are run.

Tank Process Conditions

1. To provide consistent results a standard test dummy or standard parts are supplied by the plating company. The test object is to be positioned in the middle of the tank. If multiple tanks are connected to the same ventilation system then multiple objects will be used. If all plating work is similar (rolls) then production pieces may be used as test pieces.

2. Tank temperature is to be consistent with normal plating practices.

3. Typical amperage will be applied to the tank(s) during the test period.

Test Protocol:

1. The purpose of this test is to determine the emissions of hexavalent and total chromium per amp-hour of plating based on specific plating tank process conditions.

2. The test method is based on the CARB Method 425.

3. CARB Methods 1 through 4 or the equivalent are used to determine stack gas velocity, dry molecular weight, and moisture content.

4. Isokinetic sampling is used. Air flow is calculated from pressure drops measured using a Dwyer Microtector Portable Electronic Point Gage and a 5/16" standard Pitot tube of appropriate length.

5. The sample train (see attached drawing) components are made of glass or Teflon and a glass fiber filter. Neither the probe or the filter are heated since duct temperatures are near ambient.

6. Three sets of three impingers are used. For each set the first two impingers contain 100 milliliters each of 0.1N sodium hydroxide (NaOH). The third impinger is empty, except for a thermocouple.

7. An 11 centimeter diameter Teflon coated glass-fiber filter sits between the second and third impingers.

8. A drying column is used to dry the air after it leaves the third impinger.

9. Flow through the impingers is measured using a Dwyer Series RM Flowmeter. Flow is created using a Dayton Speedaire Oil-less Vacuum Pump. Volume is measured using a Rockwell Test Meter S-275. Temperature is measured using Ashcroft Bi-Metal Dial Thermometers. Barometric readings are obtained from the weather service of the local airport.

10. After collecting the samples, each sample train is capped and transported to the laboratory. No field cleaning of the train is done. The laboratory that is used is DataLab of San Jose (408-943-1889). They are approved by various Bay Area regulatory agencies and have received state certification under the new state certification plan. Their resume is available upon request.

11. Train rinse is performed using 0.1N NaOH. The filter is acid digested.

12. Determination of hexavalent chromium is done colorimetrically. Minimum detection level is 2 parts per billion (2 ppb).

13. Total chromium will be determined by digesting the sample in concentrated nitric acid followed by atomic absorption spectroscopy using a graphite furnace (GFAAS). Minimum detection level is 2 parts per billion (2 ppb).

QAQC

1. The sample train is rinsed at the laboratory with nitric acid, filled with the appropriate solutions, capped or sealed and transported to the test site.

2. Samples are analyzed within 48 hours of arrival at the laboratory.

3. The lab runs analyses on the probe rinse, the impinger solutions and the filter separately and then adds the results together.

4. During analyses, the samples are under the control of one technician.

5. Chain of Custody forms are used and are attached.

6. Components of the sample train that require calibration are returned to the supplier/manufacturer:

Yearly or,
If they are inconsistent with other readings or
If error is suspected

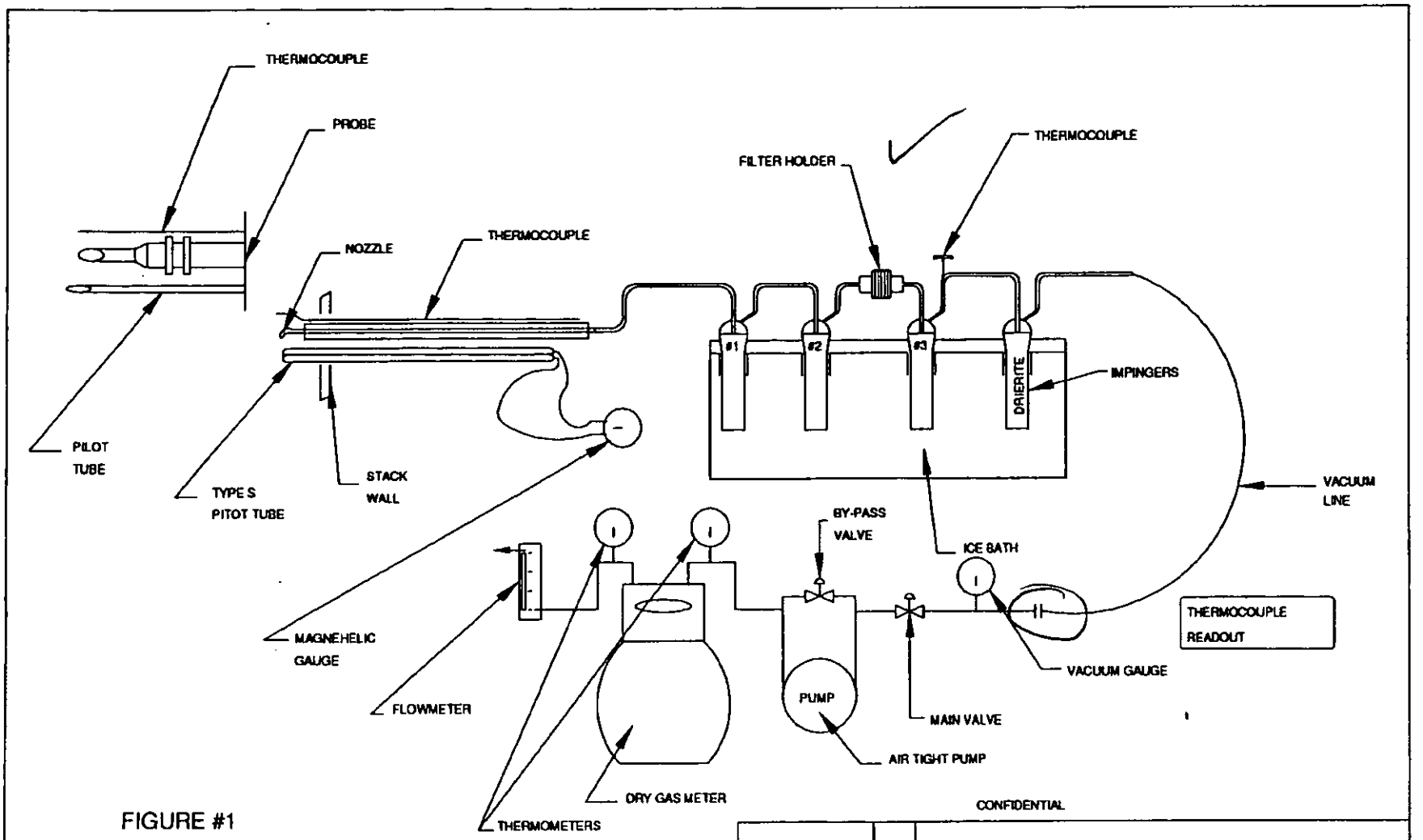


FIGURE #1

CONFIDENTIAL

SAMPLE TRAIN - #2

DATE	LTR	DESCRIPTION
08-12-91		

C.D.M.S. T & M PRODUCTS 11750 DUBLIN BLVD., STE 201 DUBLIN, CA 94568 (415) 551-7310

SAMPL2A1
G THOMSON

COMPANY NAME Pacific Hard Chrome

STACK NAME Stack #1 - Test 1

TEST DATE 7/18/91

POSITION	TIME	POINT PRESSURE	VACUUM PRESSURE	METER CU FT	SET NOZZLE SCFH	STACK TEMP C	METER INLET TEMP F	METER OUTLET F	AIR/ICE TEMP C
1	5:20PM/0	.22	.22	654.355	23.35	26	70	70	26/19.6
2	10	.31	.22		27.72	26	74	72	26/18.2
3	20	.31	.33		27.63	24	75	72	24.5/17.8
4	30	.32	.33		28.11	24.8	78	72	23.3/17.3
5	40	.21	.30		22.80	25.5	78	72	25/19
6	50	.31	.34		27.64	24.2	76	72	23.8/18.2
7	60	.31	.34		27.65	24.4	75	71	23.4/17.7
8	70	.36	.34		29.78	24.2	77	70	22.9/17.2
FINISH		.294-.542		651.00	0.00	24.9°C			21.8/17.2

$V_{std} = 3070$

537°R

AVG NOZZLE VOLUME 26.81

NOZZLE AREA SQ FT	STACK AREA SQ FT	LENGTH OF TEST MINUTES	VOLUME RATIO STP	SAMPLE SIZE CU FT	TOTAL CR mg	AMPERAGE	MG CR PER AMP HR
0.000309	1.07	80	3,417	36.16	0.0177	3570	0.0127
NOZZLE DIA INCHES	**STACK DIA INCHES**	**MINUTES PER POINT**	**STP VOL-STACK CU FT**	**METER START CU FT**	**HEX CR mg**	**AMP HOUR**	**MG HEX CR PER AMP HR**
0.238	14	10	91,612	614.836	0.0108	4760	0.0078
S TUBE Cp	**LENGTH INCHES**	**NO OF POINTS**	**AVG STACK VOL CU FT**	**METER FINISH CU FT**			**LBS HEX CR PER HR**
0.840		8	93,201	651.00			0.00000002
BAROMETRIC PRESSURE	**WIDTH INCHES**	**STATIC PRESSURE**	**VELOCITY FT/SEC**	**STP VOL-NOZ CU FT**	**STP VOL PER HR**	**EST ANNUAL AMP HR**	**LBS HEX CR ANNUAL-EST**
29.9		-0.12	24.230	35.75	26.81	13,780,416	0.24

Prepared by Chemical Data Management Systems

August 11, 1991

First Run
5:20 Start Stack #1

COMPANY ME: Pacific Alloy Chrome
STACK NAME: Stack #1
TEST DATE: 7/19/91
STATIC PRESSURE:

POSITION TIME	TIME	POINT PRESSURE	Vac ~~Delta~~ Pressure	Meter 6	SET NOZZLE SCFH	STACK TEMP	METER IN TEMP	METER OUT TEMP	AIR/ICE TEMP	Vac
0	0:00	.22	0	614836	24.0	26	70°	70°	196/26	
1.0	10:00	.22	2.0	618.80	24.0	26	74°	72°	18.2/26	
3.5	20:00	.33	2.6	623.91	29.0	24	75	72°	129/245	-
7.9	30:00	.23	2.0	627.84	29.5	24.8	78°	72°	173/233	+ 47
13.0	40:00	.30	2.0	632.65	28.0	25.5	78°	72°	19/25	
1.0	50:00	.34	2.0	636.97	24.1	24.2	76	72°	18.2/23.8	+4.0
3.5	60:00	.34	2.2	641.1	29.9	24.4	75°	72°	17.1/23.4	+5.0
7.9	70:00	.34	2.5	646.12	29.9	24.2	77°	71°	17.5/22.7	+5.0
13.0	80:00	.34	2.5	651.00	29.9	24.2	75°	70°	172/218	+5.0

AVERAGES

NOZZLE AREA SQ. FEET	STACK AREA SQ. FEET	LENGTH OF TEST MINUTES	VOLUME RATIO STP	SAMPLE SIZE CU. FEET	TOTAL CR	AMPERAGE	MG CR PER AMP HR
		80					
NOZZLE DIA INCHES	**STACK DIA INCHES**	**MINUTES PER POINT**	**STP VOL-STK CU. FT**	**STP VOL-NOZ CU. FT**	**HEX CR**	**AMP HOUR**	**MG HEX CR PER AMP HR**
.238		10					
S TUBE VALUE	**LENGTH INCHES**	**NO OF POINTS**	**AVG STACK VOLUME**	**STP VOL PER HOUR**			**POUNDS HEX CR PER HR**
.84		8					
BAROMETRIC PRESSURE	**WIDTH INCHES**		**VELOCITY FT/SEC**			**ANNUAL PLATING HOURS**	**POUNDS HEX CR ANNUAL**
29.9							

Prepared by Chemical Data Management Systems

TESTED BY Tim Lundell BAAQMD
Ed Lewis
Chuck McClure Hydrosim ? & IN ATTENDANCE

Datalab, Inc.

Lab.Report: 20903
Date: July 23, 1991

Chemical Data Management Systems
Attn: Mr. Tim Lundell
11750 Dublin Blvd., Suite 201
Dublin, CA 94568

Subject: Chromium Conversion Stack Test
Samples Received: July 19, 1991

The following results were obtained from the glassware sample train

Sample #1

Initial Weight of Desiccant	461.305 g
Final Weight of Desiccant	462.411 g
Change in Weight	1.106 g
Total Cr collected from sample train	0.0177 mg
Hexavalent Cr collected from sample train	0.0108 mg

Datalab, Inc.

Holly Ham

HH:bb
0815A

#1

DATALAB, INC.
2171 Del Franco St.
SAN JOSE, CA 95131
(408) 943-1000

CHAIN OF CUSTODY RECORD

SAMPLERS (Signature)

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: Water Comp.	SAMPLE TYPE: Water Grab	SAMPLE TYPE: Air	FCO. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
	PACIFIC HARD CHROME								TOTAL AND
	SAMPLE TRAIN # 1								HEX CR

Relinquished by: (Signature) R.L Lull 7/19/91	Received by: (Signature) A Haug	Date/Time 7/19/91 1:00 PM
Relinquished by: (Signature)	Relinquished by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Received by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
Dispatched by: (Signature)	Date/Time	Received for Laboratory by: Date/Time
Method of Shipment: CARRIED IN TIM LUNDELL'S CAR		

Distribution: Orig.-Accompany Shipment
1 Copy-Survey Coordinator Field Files

COMPANY NAME Pacific Hard Chrome

STACK NAME Stack #1 - Test 2

TEST DATE 7/19/91

POSITION	TIME	POINT PRESSURE	VACUUM PRESSURE	METER CU FT	SET NOZZLE SCFH	STACK TEMP C	METER INLET TEMP F	METER OUTLET F	AIR/ICE TEMP C
					✓				
1	1:15PM/0	.22	.2	654.355	23.07	18.7	76	73	20.2/14.3
2	10	.31	.2		27.41	19.4	78	73	19.5/13.8
3	20	.31	.21		27.44	19.9	78	72	19.4/13.9
4	30	.32	.21		27.91	20.6	78	73	19.4/13.8
5	40	.21	.21		22.61	20.7	77	70	19.3/14.9
6	50	.31	.20		27.45	20.1	76	72	19.8/14.0
7	60	.31	.20		27.48	20.8	78	72	21.0/12.4
8	70	.36	.23	✓	29.60	20.6	78	72	
FINISH	2:40/80			689.838			78		

AVG NOZZLE VOLUME 26.24

NOZZLE AREA SQ FT	STACK AREA SQ FT	LENGTH OF TEST MINUTES	VOLUME RATIO STP	SAMPLE SIZE CU FT	TOTAL CR mg	AMPERAGE	MG CR PER AMP HR
0.000309	1.07	80.0	3,520	35.48	.0277	3775	0.0194
NOZZLE DIA INCHES	**STACK DIA INCHES**	**MINUTES PER POINT**	**STP VOL-STACK CU FT**	**METER START CU FT**	**HEX CR mg**	**AMP HOUR**	**MG HEX CR PER AMP HR**
0.238	14	10	92,356	654.355	.0062	5033	0.0043
S TUBE Cp	**LENGTH INCHES**	**NO OF POINTS**	**AVG STACK VOL CU FT**	**METER FINISH CU FT**			**LBS HEX CR PER HR**
0.840		8	92,450	689.838			0.00000001
BAROMETRIC PRESSURE	**WIDTH INCHES**	**STATIC PRESSURE**	**VELOCITY FT/SEC**	**STP VOL-NOZ CU FT**	**STP VOL PER HR**	**EST ANNUAL AMP HR**	**LBS HEX CR ANNUAL-EST**
29.9		-0.12	24.035	34.99	26.24	13,780,416	0.13

Prepared by Chemical Data Management Systems

August 11, 1991

2nd Run

STACK #1

B ⊗ A

COMPANY NAME: Pac Hard Chrome

STACK NAME: Stack #1

TEST DATE: 7/18/91

STATIC PRESSURE:

POSITION TIME	TIME 1:15 p	POINT PRESSURE	Vac ~~Delta~~ Pressure	Meter	SET NOZZLE SCFH	STACK TEMP	METER IN TEMP	METER OUT TEMP	AIR/ICE TEMP	
Start	0:00	.22	.20	654.355	23.8	19.7	76°			
				658.3						
1.0	10:00	.31	.20	662.6	28.3	19.4	78°	73°	20.4/13.3	
3.5	20:00	.31	.21	662.9 662.51	28.4	19.9	78°	73°	17.5/13.8	47
7.9	30:00	.32	.21	667.2 666.95	28.9	20.6	78°	72	19.4/13.9	48
13.0	40:00	.21	.21	672.0 671.6	23.4	20.7	78	73°	19.4/13.8	
1.0	50:00	.31	.26	675.5 675.5	28.4	20.1	76°	70°	19.3/14.9	3.9
3.5	60:00	.31	.20	680.2 680.2	28.4	20.8	78°	72°	19.8/14.0	47
7.9	70:00	.36	.23	684.9 684.9	30.6	20.6	78°	72°	21.0/12.4	47
13.0	80:00			689.838			78°	72°		
	2:46 p									

AVERAGES

NOZZLE AREA SQ. FEET	STACK AREA SQ. FEET	LENGTH OF TEST MINUTES	VOLUME RATIO STP	SAMPLE SIZE CU. FEET	TOTAL CR	AMPERAGE	MG CR PER AMP HR
		80					
NOZZLE DIA INCHES	**STACK DIA INCHES**	**MINUTES PER POINT**	**STP VOL-STK CU. FT**	**STP VOL-NOZ CU. FT**	**HEX CR**	**AMP HOUR**	**MG HEX CR PER AMP HR**
.238		10					
S TUBE VALUE	**LENGTH INCHES**	**NO OF POINTS**	**AVG STACK VOLUME**	**STP VOL PER HOUR**			**POUNDS HEX CR PER HR**
.94		8					
BAROMETRIC PRESSURE	**WIDTH INCHES**		**VELOCITY FT/SEC**			**ANNUAL PLATING HOURS**	**POUNDS HEX CR ANNUAL**
29.9							

Prepared by Chemical Data Management Systems

leak test .001 at 3 lb Lt Lewellyn

Datalab, Inc.

Lab.Report: 20904
Date: July 23, 1991

Chemical Data Management Systems
Attn: Mr. Tim Lundell
11750 Dublin Blvd., Suite 201
Dublin, CA 94568

Subject: Chromium Conversion Stack Test
Samples Received: July 20, 1991

The following results were obtained from the glassware sample train

Sample #2

Initial Weight of Desiccant	458.612 g
Final Weight of Desiccant	459.916 g
Change in Weight	1.304 g
Total Cr collected from sample train	0.0277 mg
Hexavalent Cr collected from sample train	0.0062 mg

Datalab, Inc.

Holly Ham

HH:bb
0816A

2171 Del Franco Street, San Jose, CA 95131

H2

DATALAB, INC.
2171 Del Franco St.
SAN JOSE, CA 95131
(400) 943-2000

CHAIN OF CUSTODY RECORD

SAMPLERS (Signature)

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: Water Comp.	SAMPLE TYPE: Water Grab.	SAMPLE TYPE: Air	ECO. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
	PACIFIC AGRI CHROME								TOTAL CHROME & HEX CR
	SAMPLE TRAIN # 2								

Relinquished by: (Signature) G.R. Cull 7/20/91	Received by: (Signature) H Hess	Date/Time 7-20-91 9 AM
Relinquished by: (Signature)	Relinquished by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Received by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
Dispatched by: (Signature) Date/Time	Received for Laboratory by:	Date/Time
Method of Shipment: CARRIED IN TIM LUNDELL'S CAR		

Distribution: Orig.–Accompany Shipment
1 Copy–Survey Coordinator Field Files

COMPANY NAME Pacific Hard Chrome

STACK NAME Stack #1 - Test 3

TEST DATE 7/19/91

POSITION	TIME	POINT PRESSURE	VACUUM PRESSURE	METER CU FT	SET NOZZLE SCFH	STACK TEMP C	METER INLET TEMP F	METER OUTLET F	AIR/ICE TEMP C
1	3:50/0	.21	2.0	691.418	22.79	25.3	78	72	22.7
2	10	.32	2.0		28.09	24.3	76	72	22.7
3	20	.34	2.1		28.94	24.1	78	72	12.4/23.2
4	30	.31	2.3		27.61	23.6	78	72	11.7/23
5	40	.21	2.1		22.73	23.8	78	72	10.8/23.4
6	50	.32	2.1		27.98	22.1	76	72	11.9/22.1
7	60	.32	2.1		28.00	22.6	76	72	11.5/22.6
8	70	.35	2.0		29.29	22.6	76	72	11.1/22.4
FINISH	80			728.865					

$\frac{80}{60} = 1.333$

check this 10

AVG NOZZLE VOLUME 27.71

NOZZLE AREA SQ FT	STACK AREA SQ FT	LENGTH OF TEST MINUTES	VOLUME RATIO STP	SAMPLE SIZE CU FT	TOTAL CR mg	AMPERAGE	MG CR PER AMP HR
0.000309	1.07	80	3,335	37.45	.0112	3820 x1.333	0.0073
NOZZLE DIA INCHES	**STACK DIA INCHES**	**MINUTES PER POINT**	**STP VOL-STACK CU FT**	**METER START CU FT**	**HEX CR mg**	**AMP HOUR**	**MG HEX CR PER AMP HR**
0.238	14	10	92,402	691.418	.0111	5093	0.0073
S TUBE Cp	**LENGTH INCHES**	**NO OF POINTS**	**AVG STACK VOL CU FT**	**METER FINISH CU FT**			**LBS HEX CR PER HR**
0.840		8	93,583	728.865			0.00000002
BAROMETRIC PRESSURE	**WIDTH INCHES**	**STATIC PRESSURE**	**VELOCITY FT/SEC**	**STP VOL-NOZ CU FT**	**STP VOL PER HR**	**EST ANNUAL AMP HR**	**LBS HEX CR ANNUAL-EST**
29.9		-0.12	24.329	36.94	27.71	13,780,416	0.22

37.06? close

Prepared by Chemical Data Management Systems

August 11, 1991

Run #3 420 500
3,200 1,235
3100 1,975

COMPANY NAME: Pacific Hard Chrome
STACK NAME: Stack #1
TEST DATE: 7/19/91
STATIC PRESSURE:

	POSITION TIME	TIME	POINT PRESSURE	Delta Pressure	Meter	SET NOZZLE SCFH	STACK TEMP	METER IN TEMP	METER OUT TEMP	AIR/ICE TEMP	
		0:00	.21		691.418					227/81	
	1.0	10:00	.21	2.0	695.3/695.46	236	25.3	78°	72°	227 8.1	
A	3.5	20:00	.32	2.0	700.3/700	29.0	24.3	76°	72°	12.4/23	4.8
	7.9	30:00	.34	2.1	705/705.14	29.9	24.1	78°	72	11.7/23	5.8
	13.0	40:00	.31	2.3	709.4/710.12	28.6	23.6	78	72	10.8/23.4	4.8
	1.0	50:00	.21	2.1	713.8/714.37	23.5	23.8	78°	72°	11.9/22.1	4.8
B	3.5	60:00	.32	2.1	718.1/719.01	29.0	22.1	76	72°	10.9/22.6	4.8
	7.9	70:00	.32	2.1	723.5/723.62	29.0	22.6	76°	72°	11.1/22.4	5
	13.6	80:00	.35	2.0	728.8/728.865	30.3	22.6	76°	72°		

AVERAGES

NOZZLE AREA SQ. FEET	STACK AREA SQ. FEET	LENGTH OF TEST MINUTES: 80	VOLUME RATIO STP	SAMPLE SIZE CU. FEET	TOTAL CR	AMPERAGE	MG CR PER AMP HR
NOZZLE DIA INCHES: .238	STACK DIA INCHES	MINUTES PER POINT: 10	STP VOL-STK CU. FT	STP VOL-NOZ CU. FT	HEX CR	AMP HOUR	MG HEX CR PER AMP HR
S TUBE VALUE: .84	LENGTH INCHES	NO OF POINTS: 8	AVG STACK VOLUME	STP VOL PER HOUR	9' from bed bdy, to top of stack		POUNDS HEX CR PER HR
BAROMETRIC PRESSURE: 29.9	WIDTH INCHES		VELOCITY FT/SEC			ANNUAL PLATING HOURS	POUNDS HEX CR ANNUAL

Prepared by Chemical Data Management Systems

Pre Leak Check .00?
.00?

Datalab, Inc.

Lab.Report: 20905
Date: July 23, 1991

Chemical Data Management Systems
Attn: Mr. Tim Lundell
11750 Dublin Blvd., Suite 201
Dublin, CA 94568

Subject: Chromium Conversion Stack Test
Samples Received: July 20, 1991

The following results were obtained from the glassware sample train

Sample #3

Initial Weight of Desiccant	459.609 g
Final Weight of Desiccant	460.411 g
Change in Weight	0.802 g
Total Cr collected from sample train	0.0112 mg
Hexavalent Cr collected from sample train	0.0111 mg

Datalab, Inc.

Holly Ham

HH:bb
0817A

2171 Del Franco Street, San Jose, CA 95131
[408] 943-1888 • [408] 943-0190 (Fax)

#3

DATALAB, INC.
2171 Del Franco St.
SAN JOSE, CA 95131
(400) 943-1000

CHAIN OF CUSTODY RECORD

SAMPLERS (Signature)

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: Water Comp.	SAMPLE TYPE: Water Grab.	SAMPLE TYPE: Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
	PACIFIC H.C.								TOTAL & HEX CHROME
	SAMPLE TRAIN #3								

Relinquished by: (Signature) G.R.L. 7/20/91	Received by: (Signature) H Heer	Date/Time 7.20.91 9 AM
Relinquished by: (Signature)	Relinquished by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Received by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
Dispatched by: (Signature)	Date/Time / Received for Laboratory by:	Date/Time

Method of Shipment: TIM LUNDELL DELIVERED VIA CAR

Distribution: Orig.–Accompany Shipment
1 Copy–Survey Coordinator Field Files

END

PACIFIC HARD CHROME

1305 SOUTH 51st STREET - P. O. BOX 5089 — RICHMOND, CA 94805
PHONE (415) 232-5100

7-18-91	TEST 1	TOTAL AMPS	3,570
7-19-91	TEST 2	" "	3,775
7-19-91	TEST 3	" "	3,820

Field Name	Field Type	Formula / Entry Option
Stack Diameter	Number	
Nozzle Diameter	Number	
AVG STACK PRESSURE	Calculation (Number)	= average (PRESSURE BY POINT)
BAROMETRIC PRESSURE	Number	
AVG METER TEMP	Calculation (Number)	= (average (METER INLET TEMP) + average (METER OUTLET TEMP)) / 2
AVG STACK TEMP	Calculation (Number)	= average (STACK TEMP)
AVG BATH TEMP	Calculation (Number)	= average (BATH TEMP)
AVG AIR TEMP	Calculation (Number)	= average (AIR TEMP)
AVG STACK VELOCITY	Calculation (Number)	= (85.49) * S TUBE VALUE * ((AVG STACK PRESSURE * AVG STACK RANKIN) / (ABSOLUTE STACK PRESSURE Ps * 46.51)) ^ .5
AVG NOZZLE VOLUME	Calculation (Number)	= STP VOLUME * 60 / LENGTH OF TEST
TOTAL CR FOUND	Number	
HEX CR FOUND	Number	
AIR SAMPLE SIZE	Calculation (Number)	= METER FINISH-METER START
AMPERAGE	Number	
LENGTH OF TEST	Number	
MINUTES PER POINT	Number	
NUMBER OF POINTS	Number	
PRESSURE BY POINT	Number	Repeating field with 15 repetitions.
POSITION	Number	Repeating field with 15 repetitions.
SET NOZZLE SCFH	Calculation (Number)	= 85.49*EXTEND(S TUBE VALUE) * (((PRESSURE BY POINT * STACK TEMP RANKIN) / (EXTEND(ABSOLUTE STACK PRESSURE Ps) * 46.51)) ^ .5) * 3600 * EXTEND(NOZZLE AREA)
STACK AREA	Calculation (Number)	= (3.14 * (Stack Diameter / 2) ^ 2 / 144) + RECTANGLE AREA
NOZZLE AREA	Calculation (Number)	= 3.14 * ((Nozzle Diameter / 2) ^ 2) / 144
METER INLET TEMP	Number	Repeating field with 15 repetitions.
METER OUTLET TEMP	Number	Repeating field with 15 repetitions.
STACK TEMP	Number	Repeating field with 15 repetitions.
CHROME PER AMP HR	Calculation (Number)	= (TOTAL CR FOUND * 60/LENGTH OF TEST* VOLUME RATIO) / AMPERAGE
AIR TEMP	Number	Repeating field with 15 repetitions.
BATH TEMP	Number	Repeating field with 15 repetitions.
VOLUME RATIO	Calculation (Number)	= STP STACK VOLUME PER HR /(STP VOL PER HOUR)
METER AVG RANKIN	Calculation (Number)	= ((METER INLET TEMP + METER OUTLET TEMP) / 2)*(9 / 5) + 460
STACK TEMP RANKIN	Calculation (Number)	= STACK TEMP * (9/5) + 32 + 460

Field Name	Field Type	Formula / Entry Option
AVG STACK RANKIN	Calculation (Number)	= average (STACK TEMP RANKIN)
S TUBE VALUE	Number	
AVG STACK VOLUME	Calculation (Number)	= AVG STACK VELOCITY * 3600 * STACK AREA
RECTANGLE AREA	Calculation (Number)	= LENGTH * WIDTH / 144
LENGTH	Number	
WIDTH	Number	
STP VOLUME	Calculation (Number)	= AIR SAMPLE SIZE * 528 / (AVG METER TEMP + 460) * BAROMETF
Cr PER HOUR	Calculation (Number)	= TOTAL CR FOUND * 60 / LENGTH OF TEST
Cr RATIO	Calculation (Number)	= Cr PER HOUR * VOLUME RATIO
COMPANY NAME	Text	
STACK NAME	Text	
DATE	Calculation (Date)	= today
Test Date	Date	
AMP HR	Calculation (Number)	= AMPERAGE * LENGTH OF TEST / 60
HEX CR PER AMP HOUR	Calculation (Number)	= (HEX CR FOUND * 60 /LENGTH OF TEST* VOLUME RATIO) / AMPE
LBS HEX CR PER AMP HR	Calculation (Number)	= HEX CR PER AMP HOUR / 454000
STP VOL PER HOUR	Calculation (Number)	= STP VOLUME * 60 / LENGTH OF TEST
STP STACK VOLUME PER HR	Calculation (Number)	= AVG STACK VOLUME * 528 / AVG STACK RANKIN * BAROMETRIC PRESSURE / 29.92
ANNUAL PLATING HOURS	Number	
ANNUAL HEX CR EMITTED IN POUNDS	Calculation (Number)	= ANNUAL PLATING HOURS * LBS HEX CR PER AMP HR
Delta Pressure	Number	Repeating field with 12 repetitions.
Time	Number	Repeating field with 12 repetitions.
Meter	Number	Repeating field with 12 repetitions.
STATIC PRESSURE	Number	
METER START	Number	
METER FINISH	Number	
ABSOLUTE STACK PRESSURE Ps	Calculation (Number)	= BAROMETRIC PRESSURE + STATIC PRESSURE

$17.71 = \frac{70^{\circ}F}{\text{at } 29.92"Hg}$

$\leftarrow 70^{\circ}$

$V_b = \frac{V_m \cdot 528 \cdot P_b}{T_m \cdot 29.94}$

$V_b = \frac{17.63\ V_m\ P_b}{T_m}$

COMPANY NAME _____ STACK NAME _____

TEST DATE _____

POSITION	TIME	POINT PRESSURE	VACUUM PRESSURE	METER CU FT	SET NOZZLE SCFH	STACK TEMP C	METER INLET TEMP F	METER OUTLET F	AIR/ICE TEMP C

AVG NOZZLE VOLUME _____

NOZZLE AREA SQ FT	STACK AREA SQ FT	LENGTH OF TEST MINUTES	VOLUME RATIO STP	SAMPLE SIZE CU FT	TOTAL CR mg	AMPERAGE	MG CR PER AMP HR
NOZZLE DIA INCHES	STACK DIA INCHES	MINUTES PER POINT	STP VOL-STACK CU FT	METER START CU FT	HEX CR mg	AMP HOUR	MG HEX CR PER AMP HR
S TUBE Cp	LENGTH INCHES	NO OF POINTS	AVG STACK VOL CU FT	METER FINISH CU FT			LBS HEX CR PER HR
BAROMETRIC PRESSURE	WIDTH INCHES	STATIC PRESSURE	VELOCITY FT/SEC	STP VOL-NOZ CU FT	STP VOL PER HR	EST ANNUAL AMP HR	LBS HEX CR ANNUAL-EST

Prepared by Chemical Data Management Systems

Valley Meter Co.
4533 Orange Grove Ave.
Sacramento, Ca. 95841
Marilyn & Jack Kenyon
(916) 971-9379

ROCKWELL S-275 S/N 6848207 TESTED 6/19/91 WITH THE FOLLOWING RESULTS.

INCOMING TESTS.
CFH - AIR 9" W.C. AMB. TEMP. 72°F

207	FAST .5%
175	FAST .75%
80	FAST .5%
35	FAST 1.0%
10	FAST 1.0%

AFTER CALIBRATION

CFH	
207	0
175	0
80	0
35	0
10	FAST .125%

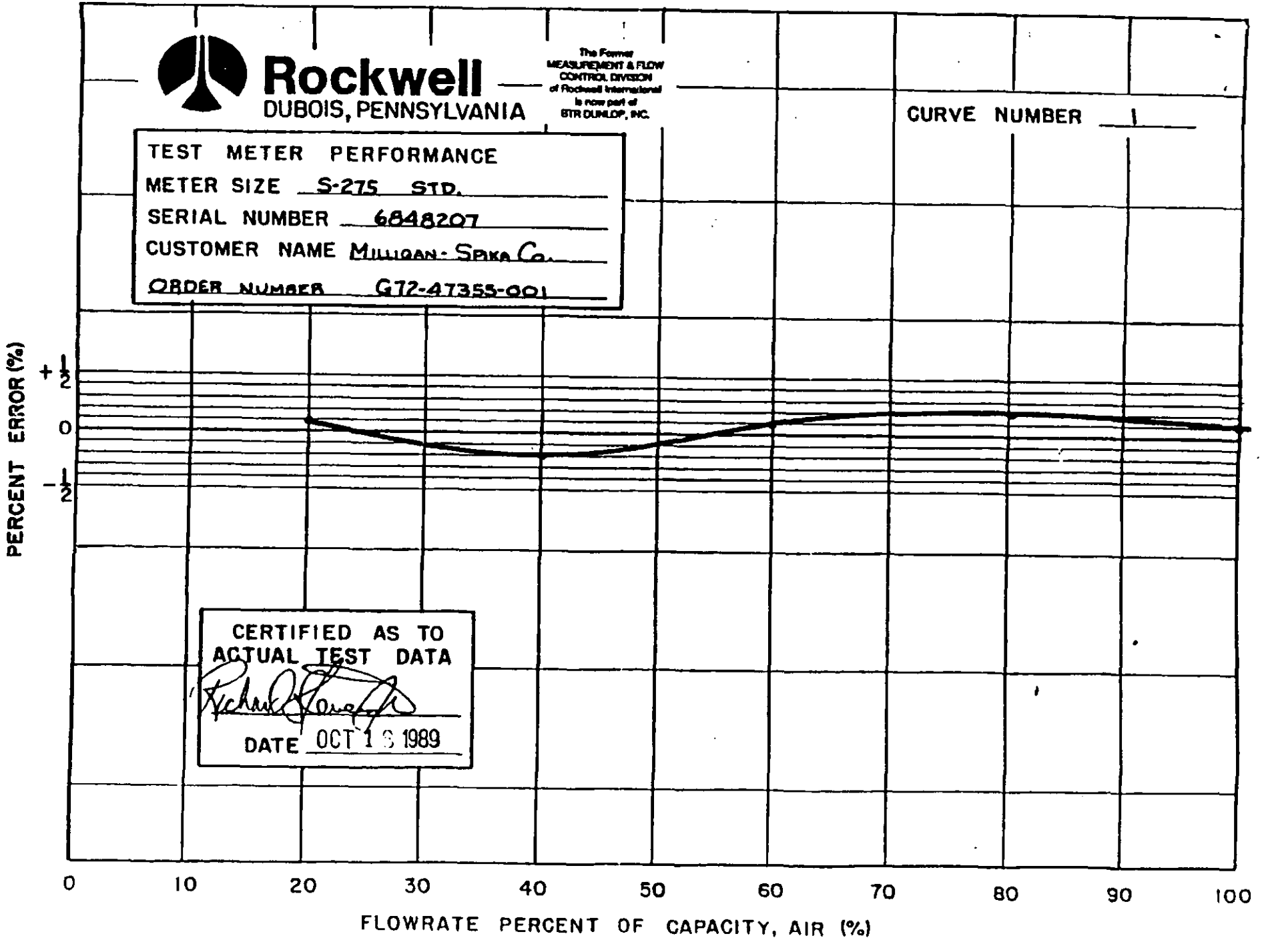
7 % OFF STANDARD OR METER

HOW WET TEST WITH NBS STANDARD

WHAT STANDARD

60 ↔ 10

JACK KENYON
Jack Kenyon
LIC. # 141072


Rockwell
DUBOIS, PENNSYLVANIA
The Former MEASUREMENT & FLOW CONTROL DIVISION of Rockwell International is now part of BTR DUNLOP, INC.
CURVE NUMBER 1
TEST METER PERFORMANCE
METER SIZE S-275 STD.
SERIAL NUMBER 6848207
CUSTOMER NAME MILLIGAN-SPIKA Co.
ORDER NUMBER G72-47355-001
CERTIFIED AS TO ACTUAL TEST DATA
DATE OCT 16 1989
PERCENT ERROR (%)
+½
0
-½
0
10
20
30
40
50
60
70
80
90
100
FLOWRATE PERCENT OF CAPACITY, AIR (%)

DATALAB, INC.
2171 Del Franco St.
SAN JOSE, CA 95131
(408) 943-1888

CHAIN OF CUSTODY RECORD

				SAMPLERS (Signature)					
STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE			SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
				Water		Air			
				Comp.	Grab.				

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Relinquished by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Received by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time
Dispatched by: (Signature) Date/Time	Received for Laboratory by:	Date/Time
Method of Shipment:		

Distribution: Orig.–Accompany Shipment
1 Copy–Survey Coordinator Field Files

Field Name	Field Type	Formula / Entry Option
AVG STACK RANKIN	Calculation (Number)	= average (STACK TEMP RANKIN)
S TUBE VALUE	Number	
AVG STACK VOLUME	Calculation (Number)	= AVG STACK VELOCITY * 3600 * STACK AREA
RECTANGLE AREA	Calculation (Number)	= LENGTH * WIDTH / 144
LENGTH	Number	
WIDTH	Number	
STP VOLUME	Calculation (Number)	= AIR SAMPLE SIZE * 528 / (AVG METER TEMP + 460) * BAROMETRIC PRESSURE / 29.94
Cr PER HOUR	Calculation (Number)	= TOTAL CR FOUND * 60 / LENGTH OF TEST
Cr RATIO	Calculation (Number)	= Cr PER HOUR * VOLUME RATIO
COMPANY NAME	Text	
STACK NAME	Text	
DATE	Calculation (Date)	= today
Test Date	Date	
AMP HR	Calculation (Number)	= AMPERAGE * LENGTH OF TEST / 60
HEX CR PER AMP HOUR	Calculation (Number)	= (HEX CR FOUND * 60 /LENGTH OF TEST* VOLUME RATIO) / AMPERAGE
LBS HEX CR PER AMP HR	Calculation (Number)	= HEX CR PER AMP HOUR / 454000
STP VOL PER HOUR	Calculation (Number)	= STP VOLUME * 60 / LENGTH OF TEST
STP STACK VOLUME PER HR	Calculation (Number)	= AVG STACK VOLUME * 528 / AVG STACK RANKIN * BAROMETRIC PRESSURE / 29.92
ANNUAL PLATING HOURS	Number	
ANNUAL HEX CR EMITTED IN POUNDS	Calculation (Number)	= ANNUAL PLATING HOURS * LBS HEX CR PER AMP HR
Delta Pressure	Number	Repeating field with 12 repetitions.
Time	Number	Repeating field with 12 repetitions.
Meter	Number	Repeating field with 12 repetitions.
STATIC PRESSURE	Number	
METER START	Number	
METER FINISH	Number	
ABSOLUTE STACK PRESSURE Ps	Calculation (Number)	= BAROMETRIC PRESSURE + STATIC PRESSURE

Source category: Electroplating
Plant name : Pacific Hard Chrome
Process : Hard chromium electroplating

Filename: REF_4-89.WQ1
Location: Oakland, CA
Test date: July 18-19, 1991

Date: 04/17/96
Ref. No.: 4-89
Process rate basis: production

Source	Type of control	Pollutant	Run No.	Test Method	Samp. time, min	Isokinetic, %	Gas volume, DSCF	Volum. flow rate, DSCFM	Mass, ug	Concen., gr/DSCF	Emission rate, lb/hr	Process rate, A-hr	Emission factor mg/A-hr	Emission factor gr/A-hr	Rat.
Electroplating tank	PBS/PC	Total Cr	1	CARB 425	80		35.75	1,527	17.7	7.64E-06	0.00010	4,760	0.013	0.00020	
		Total Cr	2		80		34.99	1,539	27.7	1.22E-05	0.00016	5,033	0.019	0.00030	
		Total Cr	3		80		36.94	1,540	11.2	4.68E-06	6.2E-05	5,093	0.0073	0.00011	
												Average	0.013	0.00020	C
	PBS/PC	Cr+6	1	CARB 425	80	0.0	35.75	1,527	10.8	4.66E-06	6.1E-05	4,760	0.0078	0.00012	
		Cr+6	2		80	0.0	34.99	1,539	6.2	2.73E-06	3.6E-05	5,033	0.0043	6.7E-05	
		Cr+6	3		80	0.0	36.94	1,540	11.1	4.64E-06	6.1E-05	5,093	0.0073	0.00011	
												Average	0.0065	0.00010	NR

Basis for rating: Test not fully documented; only one of two parallel stacks tested; Cr+6 by colorimetry; all runs below quant. limit.
Problems noted:
Other notes: Emissions controlled with unspecified scrubber (assumed to be a packed bed scrubber) and floating polypropylene chips.
Emissions exhausted to two scrubbers in parallels; testing was conducted at the outlet of one of the scrubbers.