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.

AP-42 Section 12.20
Reference
Report Sect. 4
Reference 73

DISTRIBUTION:

Firm
Permit Services
Enforcement
Technical Services
Source Inventory
Planning
Requester
DAPCO

BAY AREA
AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street
San Francisco, California 94109
(415) 771-6000

# SUMMARY OF SOURCE TEST RESULTS

Report No. 9
Test Date: 12
Test Times:
Run A: 1018-1114
Run B: 1143-1239
Run C: 1331-1427

## SOURCE INFORMATION

Firm Name and Address
FRANCIS PLATING OF OAKLAND
785 7th Street
Oakland, CA 94607

Firm Representative and Title
R
(No process, AQCD description; emissions below detection limit
Phone No. (4

Source:

Permit Conditions
None

Plant No. CANNOT USE
Operates 8

## BAAQMD REPRESENTATIVES

Source Test Engineers
C.McClure/G.Cowell/H. Doi

Services Division / Enforcement Division
N. Lew

quested by:
D.Hall

Operating Parameters:
Both chrome plating tanks operated continually during testing.

Applicable Regulations: 11-8-301.1

VN Recommended: NO

Source Test Results and Comments:

| METHOD: | TEST | RUN A | RUN B | RUN C | AVERAGE | LIMIT |
|---|---|---|---|---|---|---|
| ST-17 | Volume Flowrate,SDCFM | | | | 12600 | |
| | Stack Temperature, °F | 55 | 58 | 58 | 57 | |
| * | Water Content, Volume % | | | | 2 | |
| ST-35 | Total DC Amps | | | | 3000 | |
| | Hexavalent Chromium, mg/amp-hr | <.11 | <.09 | <.09 | <.10 | .15 |
| | Hexavalent Chromium, g/hr | <.33 | <.26 | <.27 | <.29 | |
| | Hexavalent Chromium, mg/m3 | <.016 | <.012 | <.012 | <.013 | |
| | Isokinetic Ratio, act/theo | .94 | .99 | .96 | | |
| ARB 425 | Hexavalent Chromium, mg/amp-hr | <.15 | <.12 | <.12 | <.13 | <.15 |
| | Isokinetic Ratio, act/theo | .98 | .98 | .98 | | |

* Determined psychrometrically

NO COMMERCIAL USE OF THESE RESULTS IS AUTHORIZED

| Source Test Team Leader | Date | Senior Source Test Engineer | Date | Approved by Source Test Manager | Date |
|---|---|---|---|---|---|
| C. McClure | 2/7/90 | K. Kunaniec | 2/7/90 | G. Karels | 2/15/90 |

Form: Summary of Source Test Results

FSSTS: ej: 15 July 88

DISTRIBUTION:

Firm
Permit Services
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Technical Services
Source Inventory
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Requester
DAPCO

BAY AREA
AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street
San Francisco, California 94109
(415) 771-6000

# SUMMARY OF SOURCE TEST RESULTS

AP-42 Section 12.20
Reference
Report Sect. 4
Reference 73

Report No. 9
Test Date: 12
Test Times:
Run A: 1018-1114
Run B: 1143-1239
Run C: 1331-1427

## SOURCE INFORMATION

Firm Name and Address
FRANCIS PLATING OF OAKLAND
785 7th Street
Oakland, CA 94607

Firm Representative and Title
Randall Lewis,
General Manager
Phone No. (415)444-5535

Source:
Chrome Plating
Tanks S-2, S-3
Plant No. 2324
Operates 8 hr/day & 260 days/yr

Permit Conditions
None

## BAAQMD REPRESENTATIVES

Source Test Engineers
C.McClure/G.Cowell/H. Doi

Permit Services Division / Enforcement Division
N. Lew

Test Requested by:
D.Hall

Operating Parameters:
Both chrome plating tanks operated continually during testing.

Applicable Regulations: 11-8-301.1

VN Recommended: NO

Source Test Results and Comments:

| METHOD: | TEST | RUN A | RUN B | RUN C | AVERAGE | LIMIT |
|---|---|---|---|---|---|---|
| ST-17 | Volume Flowrate,SDCFM | | | | 12600 | |
| | Stack Temperature, °F | 55 | 58 | 58 | 57 | |
| * | Water Content, Volume % | | | | 2 | |
| ST-35 | Total DC Amps | | | | 3000 | |
| | Hexavalent Chromium, mg/amp-hr | <.11 | <.09 | <.09 | <.10 | .15 |
| | Hexavalent Chromium, g/hr | <.33 | <.26 | <.27 | <.29 | |
| | Hexavalent Chromium, mg/m3 | <.016 | <.012 | <.012 | <.013 | |
| | Isokinetic Ratio, act/theo | .94 | .99 | .96 | | |
| ARB 425 | Hexavalent Chromium, mg/amp-hr | <.15 | <.12 | <.12 | <.13 | <.15 |
| | Isokinetic Ratio, act/theo | .98 | .98 | .98 | | |

* Determined psychrometrically

NO COMMERCIAL USE OF THESE RESULTS IS AUTHORIZED

| Source Test Team Leader | Date | Senior Source Test Engineer | Date | Approved by Source Test Manager | Date |
|---|---|---|---|---|---|
| C. McClure | 2/7/90 | K. Kunaniec | 2/7/90 | G. Karels | 2/15/90 |

Form: Summary of Source Test Results

FSSTS: ej: 15 July 88

No process, AQCD
description; emissions
below detection limit.

CANNOT USE

# REPORT OF LABORATORY ANALYSIS

**FL-2**

NAME Francis Plating of Oakland
ADDRESS 785 - 7th St.
CITY Oakland ZIP 94607
TEL (415) 444-5535 PLT # 2324
SOURCE OPERATION S-2, S-3 Chrome Tanks

LAB # 89-1342
S.T. #
BOOK
PAGE
FILM

SAMPLE DESCRIPTION 1 Bottle Labeled Probe and Nozzle Rinse

MANUFACTURER'S NAME

C. McClure — PERSON SUBMITTING SAMPLE
12 / 22 / 89 — DATE

W. Dynny — SIGNATURE OF ANALYST
1-2-90 — DATE
LAB REF # 09010-50
LAB METHOD MOP-34

Probe and Nozzle Rinse

Total Cr+6 < 8 mg
Total Cr < 10 mg

V.N. RECOMMENDED
☐ YES REG. ____ RULE ____ SEC. ____
☐ NO
☐ FURTHER EVALUATION NEEDED

LABORATORY DIRECTOR SIGNATURE
1-5-90 — DATE

RECEIVED 1/16/90 1350

B.A.A.Q.M.D. 939 ELLIS ST. SAN FRANCISCO CA 94109

# REPORT OF LABORATORY ANALYSIS

**FL-2**

NAME FRANCIS PLATING OF OAKLAND
ADDRESS 7775 - 7TH ST.
CITY OAKLAND ZIP 94607
TEL. (415) 444-5535 PLT # 2324
SOURCE OPERATION S-2, S-3 CHROME TANKS

LAB # 89-1342
S.T. #
BOOK
PAGE
FILM

SAMPLE DESCRIPTION 1 BOTTLE LABELED PROBE AND NOZZLE RINSE

MANUFACTURER'S NAME

C McCLURE
PERSON SUBMITTING SAMPLE

12 / 22 / 89
DATE

W Dunning
SIGNATURE OF ANALYST

1-2-90
DATE

LAB REF # 09010-50
LAB METHOD MOP-34

Probe and Nozzle Rinse

Total Cr +6 < 8 mg
Total Cr < 10 mg

V.N. RECOMMENDED ☐ YES REG. RULE SEC.
☐ NO
☐ FURTHER EVALUATION NEEDED

LABORATORY DIRECTOR SIGNATURE

1-5-90
DATE

RECEIVED 1/16/90 1350 DMB

B. A. A. Q. M. D. 939 ELLIS ST. SAN FRANCISCO CA 94109

# REQUEST FOR LABORATORY ANALYSIS

**FL-1**

NAME FRANCIS PLATING OF OAKLAND
ADDRESS 785 - 7TH ST.
CITY OAKLAND CA ZIP 94607
TEL. (415) 444-5535 PLT # 2324
SOURCE OPERATION (S#) S-2, S-3 CHROME TANKS

LAB # 89-1342
S.T. #
BOOK
PAGE
FILM

SAMPLE DESCRIPTION 1 - BOTTLE - LABELED - PROBE & NOZZLE RINSE - $H_2O$ + WASH MATERIAL + ACETONE

☐ TWO PART SAMPLE ☐ SPEC. SHEET ATTACHED

SAMPLE TAKEN FROM FRANCIS PLATING CO
SAMPLE TAKEN BY C. MCCLURE DATE 12/21/89 TIME 13~~00~~
SAMPLE TAKEN IN PRESENCE OF B.A.A.Q.M.D. ☒ YES ☐ NO BY US.
SAMPLE RCVD. BY W. Dyny DATE 12-22-89 TIME 10:30
SAMPLE RCVD. BY DATE TIME
CONTAINER DESCRIPTION AND MARKINGS: 1 - BOTTLE - LABELED PLT# 2324 - 12/21/89 - PROBE WASH - $H_2O$ + ACETONE.

MFG. NAME
MFG. CODE(S)

☒ COPY FL-2 TO: C. MCCLURE (OTHER THAN REQUESTOR)

☐ PRIORITY SAMPLE BY:
REASON DATE REQD.

ANALYSIS REQUESTED: ST-35 - HEXCHROME LAB METHOD 34
☐ OPERATION UNDER PERMIT CONDITION # FOR APPLIC. #
☐ OPERATION UNDER "BUBBLE"
☐ FOR INFORMATION ONLY
COMPLIANCE WITH REG. 11 RULE 8 SECTION(S) 310.1 ,
SUBSECTIONS ,

C. McClure
PERSON SUBMITTING SAMPLE

W. Dyny
PERSON RECEIVING SAMPLE FOR ANALYSIS

DATE 12 / 22 / 89 DATE 12 / 22 / 89

B. A. A. Q. M. D. 939 ELLIS ST. SAN FRANCISCO CA 94109

# REPORT OF LABORATORY ANALYSIS

**FL-2**

NAME FRANCIS PLATING OF OAKLAND INC.
ADDRESS 785 7TH ST.
CITY OAKLAND CA ZIP 94607
TEL. (415) 444-5535 PLT # 2324
SOURCE OPERATION S-2, S-3 CHROME TANKS

LAB # 89-1341
S.T. #
BOOK
PAGE
FILM

SAMPLE DESCRIPTION 3 FILTERS C-1, RUN A C-4 RUN B C-6 RUN C 7 JARS IMPINGERS (S-1, S-2)(S-3, S-4)(S-5, S-6) AND BLANK

MANUFACTURER'S NAME

C. McCLURE
PERSON SUBMITTING SAMPLE

12/21/89
DATE

W. Oyung
SIGNATURE OF ANALYST

1-2-89
DATE

LAB REF # CVD 2-24 09010-51

LAB METHOD MOP-34

| | $Cr^{+6}$, Total ug | Total Chrome, ug |
|---|---|---|
| *Impinger S-1 | <4 ug/imp | <10 ug/imp |
| S-3 | <4 ug " | <10 " " |
| S-4 | <4 ug " | <10 " " |
| LOD | 4 ug | 10 ug |
| Filter C-1 Run A | <8 ug/filter | <10 ug/filter |
| C-4 Run B | <8 " | <10 " |
| C-6 Run C | <8 " | <10 " |
| LOD | 8 ug | 10 ug |

* Analyzed 1st impingers only.

V.N. RECOMMENDED ☐ YES REG. ____ RULE ____ SEC. ____
☐ NO
☐ FURTHER EVALUATION NEEDED

LABORATORY DIRECTOR SIGNATURE

1-5-90
DATE

RECEIVED 1/16/90 1350 CMB

B. A. A. Q. M. D. 939 ELLIS ST. SAN FRANCISCO CA 94109

# REPORT OF LABORATORY ANALYSIS

**FL-2**

NAME: FRANCIS PLATING OF OAKLAND INC.
ADDRESS: 785 7TH ST.
CITY: OAKLAND CA ZIP: 94607
TEL.: (415) 444-5535 PLT #: 2324
SOURCE OPERATION: S-2, S-3 CHROME TANKS

LAB #: 89-1341
S.T. #:
BOOK:
PAGE:
FILM:

SAMPLE DESCRIPTION: 3 FILTERS C-1, RUN A C-4 RUN B -6 RUN C 7 GLASS IMPINGERS (S-1, S-2)(S-3, S-4)(S-5 & 6) AND BLANK

MANUFACTURER'S NAME:

C. McCLURE — PERSON SUBMITTING SAMPLE
12-21-88 — DATE

[illegible] — SIGNATURE OF ANALYST
1-2-89 — DATE
LAB REF #: CVD2-24 09010-51
LAB METHOD: MOP-34

| | $Cr^{+6}$, Total ug | Total Chrome, ug |
|---|---|---|
| *Impinger S-1 | <4 ug/impinger | <10 ug/impinger |
| S-3 | <4 ug " | <10 " " |
| S-4 | <4 ug " | <10 " " |
| LOD | 4 ug | 10 ug |
| Filter C-1 Run A | <8 ug/filter | <10 ug/filter |
| C-4 Run B | <8 " | <10 " |
| C-6 Run C | <8 " | <10 " |
| LOD | 8 ug | 10 ug |

* Analyzed 1st impingers only.

V.N. RECOMMENDED ☐ YES REG.____ RULE____ SEC.____
☐ NO
☐ FURTHER EVALUATION NEEDED

[illegible] — LABORATORY DIRECTOR SIGNATURE
1-5-89 — DATE

RECEIVED 1/6/90 1350 GMB

B.A.A.Q.M.D. 939 ELLIS ST. SAN FRANCISCO CA 94109

# REQUEST FOR LABORATORY ANALYSIS

**FL-1**

NAME FRANCIS PLATING OF OAKLAND INC
ADDRESS 785 - 7TH ST.
CITY OAKLAND CA ZIP 94607
TEL. 415-444-5535 PLT # 2324
SOURCE OPERATION (S#) S-2, S-3 CHROME TANKS

LAB # 89-1341
S.T. #
BOOK
PAGE
FILM

SAMPLE DESCRIPTION 3 FILTERS EXPOSED TO CHROME GAS, 7 BOTTLES 6-CONDENSATE + $H_2O$ + 1 BLANK $H_2O$.

☐ TWO PART SAMPLE ☐ SPEC. SHEET ATTACHED

SAMPLE TAKEN FROM FRANCIS PLATING OF OAKLAND
SAMPLE TAKEN BY C. MCCLURE DATE 12/21/89 TIME 1300
SAMPLE TAKEN IN PRESENCE OF B.A.A.Q.M.D. ☒ YES ☐ NO BY US.
SAMPLE RCVD. BY Cwlaing DATE 12-21-89 TIME 4:45PM
SAMPLE RCVD. BY DATE TIME
CONTAINER DESCRIPTION AND MARKINGS: 3 PLASTIC CASES W/FILTERS LABELED C-1-RUN A, C-4-RUN B, C-6 RUN C. 7 JARS - 1 IMPINGER CONDENSATE + $H_2O$ - 1 IMPINGERS S-1&2 RUN A, S-3&4 RUN B, S-5&6 RUN C. + 1-BLANK $H_2O$.
MFG. NAME
MFG. CODE(S)

☒ COPY FL-2 TO: C. MCCLURE S-507 (OTHER THAN REQUESTOR)

☐ PRIORITY SAMPLE BY:
REASON DATE REQD.

ANALYSIS REQUESTED: ST-35 BAAQMD HEX CHROME + TOTAL CHROME METHOD
☐ OPERATION UNDER PERMIT CONDITION # FOR APPLIC. #
☐ OPERATION UNDER "BUBBLE"
☐ FOR INFORMATION ONLY
COMPLIANCE WITH REG. 11 RULE 8 SECTION(S) 310.1 ,
SUBSECTIONS ,

C. McClure — PERSON SUBMITTING SAMPLE
Cwlaing — PERSON RECEIVING SAMPLE FOR ANALYSIS

DATE 12 / 21 / 89 DATE 12 / 21 / 89

B. A. A. Q. M. D. 939 ELLIS ST. SAN FRANCISCO CA 94109

H. JAMES PLATING CO.

12/21/89 & 12/27/89

PLEASE NOTE: THIS SERIES OF TESTS WERE PERFORMED SIDE BY SIDE ST-35 // ARB-425 WITH A SPECIAL DUAL PROBE AND MATCHING 6.9mm GLASS NOZZLES.

C. McCLURE
S-507

C = HEX CHROME CONCENTRATION IN ($mg/m^3$)

$$C_{mg/m^3} = \frac{(35.31)(W_{\mu g})}{1000 \cdot V_o}$$

TOTAL HEX

$$C_{mg/m^3}{}_A = \frac{(35.31)(<8\mu g)}{1000 \times 18.06}$$

$$\boxed{C_{mg/m^3}{}_A = <0.0156\ mg/m^3}$$

$$C_{mg/m^3}{}_B = \frac{(35.31)(<8\mu g)}{1000 \times 23.53}$$

$$\boxed{C_{mg/m^3}{}_B = <0.012\ mg/m^3}$$

$$C_{mg/m^3}{}_C = \frac{(35.31)(<8\mu g)}{1000 \times 22.69}$$

$$\boxed{C_{mg/m^3}{}_C = <0.012\ mg/m^3}$$

FRANCIS PLATING CO.
12/21/89
ST-35
OUTLET

$$V_{O_A} = \frac{(530)(V_m)(P_b)}{29.92\ (T_m)}$$

$$V_{O_A} = \frac{(530)(17.42)(30.14)}{29.92\ (515)}$$

$V_{O_A} = 18.06$ SDCF

$$V_{O_B} = \frac{(530)(22.83)(30.14)}{29.92\ (518)}$$

$V_{O_B} = 23.53$ SDCF

$$V_{O_C} = \frac{(530)(22.02)(30.14)}{29.92 \cdot 518}$$

$V_{O_C} = 22.69$ SDCF

HEX CHROME EMISSION RATE

FRATELLIS PLATING CO.
12/21/89
ST-35
OUTLET

$m = g/HR.$

$$m = \frac{(60)(1\times10^{-6})(W_p^{\text{TOTAL HEX WEIGHT}})(Q_{STACK})}{V_O}$$

RUN A)

$$m_A\ g/HR = \frac{(60)(1\times10^{-6})(<8\mu g)(12600)}{18.06\ SDCF}$$

$$\boxed{m_{g/HR_A} = <0.335\ g/HR}$$

RUN B)

$$m_B\ g/HR = \frac{(60)(1\times10^{-6})(<8\mu g)(12600)}{23.53\ SDCF}$$

$$\boxed{m_{B\ g/HR} = <0.257\ g/HR.}$$

RUN C)

$$m_C\ gr/HR = \frac{(60)(1\times10^{-6})(<8\mu g)(12600)}{22.69\ SDCF}$$

$$\boxed{m_{C\ gr/HR} = <0.266\ gr/HR}$$

HEX CHROME PLATING EMISSION FACTOR

FRANCIS PLATING
12/21/89
ST-35

$$M_A = \frac{1000 \cdot M}{I}$$

I = AMPERAGE AT BATH

$M_A = mg/A\text{-}HR$

M = HEX CHROME EMISSION RATE

RUN A)

$$M_A\, mg/A\text{-}HR = \frac{1000 \cdot (<0.335\, g/HR)}{3000\, AMPS}$$

$$\boxed{M_A = <0.112\, mg/A\text{-}HR}$$

RUN B)

$$M_A\, mg/A\text{-}HR = \frac{1000\, mg/g\, (<0.257\, g/HR)}{3000\, AMPS}$$

$$\boxed{M_A\, mg/A\text{-}HR = <0.086\, mg/A\text{-}HR}$$

RUN C)

$$M_A\, mg/AHR = \frac{1000\, (<.266\, g/HR)}{3000\, A}$$

$$\boxed{M_A\, mg/A\text{-}HR = <0.088\, mg/A\text{-}HR}$$

| LINCH | CLOSED | OPEN | CLOS |
|---|---|---|---|
| 21 | 22 — | 26 | 1st |

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, Calif. 94109 • 771-6000

# Source Test Data Sheet

2-MATCHED 6.9mm ?

~~66"~~ 60" TOTAL PROBE LENGTH

Source Operation
Plant: FRANKLIN PLATING CO.
Sample Type: CHROME
Process Cycle
Duct Size: 37 X 53
Duct Pressure: -.06
ASSUMED $H_2O$: 5 % - AMBIENT SCRUBBER (LIQUID)

Source Test No.
Run No.: TRAVERSE
Date: 12/13/89

8.8 1/3
6 | 53
48
50
48
2/6

Nozzle Diameter
Pitot Tube: 0.85
Gas Collector No.
Barometric Pressu
Leak Rate @ 15"Hg
TIME EACH POINT
# OF POINTS
TIME EACH RUN

Sampling Train:

| Traverse Point (T=66°F) | Dist. From inches | INITIAL TRAVERSE Duct Temp °F | h $H_2O$ | $\sqrt{h}$ | SAMPLING Traverse Point | h $H_2O$ | $V_s$ FPS | Time | METER Rate CFM | METER Temp °F | METER Volume $Ft^3$ | Vac "Hg | Sat'd Gas Temp °F | $T_s$ Duct Temp °F | REMARKS (RDTO CFH) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | .03 | | | | B1 .025 | | | | | | | | | | |
| A2 | .07 | | | | B2 .05 | | | | | | | | | | |
| A3 | .13 | | | | B3 .05 | | | | | | | | | | |
| A4 | .17 | | | | B4 .11 | | | | | | | | | | |
| A5 | .15 | | | | B5 .13 | | | | | | | | | | |
| A6 | .12 | | | | B6 .12 | | | | | | | | | | |
| 1" OFFBACK | .17 | | | | 1" OFFBACK .15 | | | | | | | | | | |
| | 0.12 | | | | 0.091 | | | | | | | | | | |
| | | | | | SAM ΔP_nozzle 0.14 | | | | | | | | | | |
| 460 / 66 / 526 | | | | | | | | | | | | | | | |

$V_s = 2.9(.85)\sqrt{(0.14)(526)} = 21.15$ FPS

$$D_n = 13.7\left[\frac{T_s + 460}{V_s(100-\%H_2O)}\right]^{1/2} = 7.00\text{ mm}$$

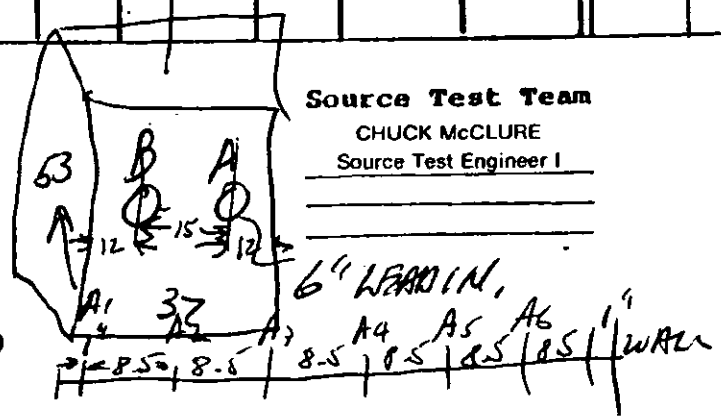
526 / 21.15 / 98

Condensate ____ gm.
$V_o$ ____
$\%H_2O$ ____
$\%CO_2$ ____
$\%CO$ ____
$\%O_2$ ____

$$Q_m = \left[(2.638 \times 10^{-3})\ (100-\%H_2O)\,D_{nm}^2\right]\frac{V_s}{T_s}$$

$$V_s = 2.9(K_p)\sqrt{T_s \cdot h_{H_2O}}$$

$$\frac{2(53)(37)}{53+37} = \text{EQ DIA}$$




Source Test Team
CHUCK McCLURE
Source Test Engineer I

FIG V-59
77a

**BAY AREA AIR QUALITY MANAGEMENT DISTRICT**
939 Ellis Street, San Francisco, Calif. 94109 • 771-6000

# Source Test Data Sheet

Source Operation: CHROME SCRUBBER
Plant: FRANCIS PLATING - OAKLAND
Sample Type: ST-35 / ARB425
Process Cycle: CHROME - HARD
Duct Size: 53 X 37" RETANGULAR
Duct Pressure: -0.6"
ASSUMED $H_2O$: 390
ST-35 - $S_1, S_2$ IMPINGERS

Source Test No.
Run No.: RUN A - PORT A
Date: 12/20/89
21

6.9mm Nozzle Diameter
0.85 Pitot Tube
AMBIENT AIR Gas Collector No.
→ 30.4 Barometric Pressure
0.00 at 18 Leak Rate @ 15"Hg
7 TIME EACH POINT
8 # OF POINTS
56 TIME EACH RUN

TRAVERSE DONE PRIOR TO TEST DAY
SAME CONDITIONS
12/13/89

Sampling Train: ARB-425 - $T_1$ - $T_2$ IMPINGERS

ST-35 — SAMPLING IMPINGERS S-1, S-2 — FILTER C-1 RUN A

| Traverse Point (B PORT ↓ $T_s$ = 55 / 55 ↓ A PORT) | Dist. From inches | INITIAL TRAVERSE Duct Temp °F | h $H_2O$ | h Th | Traverse Point | h $H_2O$ | $V_s$ FPS | Time 1018 | METER Rate CFM | Temp °F | Volume $Ft^3$ 310.42 | Vac "Hg | Sat'd Gas Temp °F | $T_s$ Duct Temp °F | ROTO CFH | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P1 .02 / .01 | | | | | P1 | .01 | 5.6 | | 0.1323 | 56 | 311.28 (31.35) | 1.5 | 35° | 55 (515) | 8.0 | 0.86 |
| P2 .04 / .02 | | | | | P2 | .02 | 7.9 | | 0.1874 | 56 | 312.68 (12.6) | 2.2 | 36 | 55 | 11.2 | 1.4 |
| P3 .10 / .03 | | | | | P3 | .03 | 9.7 | | .2292 | 56 | 314.15 (19.28) | 2.0 | 36 | 55 | 13.8 | 1.47 |
| P4 .12 / .07 | | | | | P4 | .07 | 14.8 | | .35011 | 56 | 316.75 (16.6) | 5.0 | 36 | 55 | 21.0 | 2.6 |
| P5 .13 / .09 | | | | | P5 | .09 | 16.8 | | .39699 | 56 | 319.25 (17.53) | 5.0 | 35 | 55 | 23.8 | 2.5 |
| P6 .12 / .11 | | | | | P6 | .11 | 18.5 | | .43888 | 56 | 322.46 (27.21) | 5.2 | 36 | 55 | 26.3 | 3.21 |
| P7 .12 / .10 | | | | | P7 | .10 | 17.69 | | .4185 | 56 | 325.47 (26.40) | 6.5 | 36 | 55 | 25.1 | 3.01 |
| P8 .12 / .09 | | | | | P8 | .09 | 16.8 / 13.474 | 1114 | .39699 | 56 | 327.84 (28.13) / 17.42 | 6.4 | 36 | 55 (515) | 23.8 | 2.37 / 17.42 |

$$D_n = 13.7\left[\frac{T_s + 460}{V_s(100 - \%H_2O)}\right]^{1/2} = 7.0\,mm$$

3% (6.9)²

Condensate ____ gm.
$V_o$ ____
$\%H_2O$ ____
$\%CO_2$ ____
$\%CO$ ____
$\%O_2$ ____

$$Q_m = \left[(2.638 \times 10^{-3})\ (100 - \%H_2O)\ D_{nm}^2 \frac{V_s}{T_s}\right]$$

97

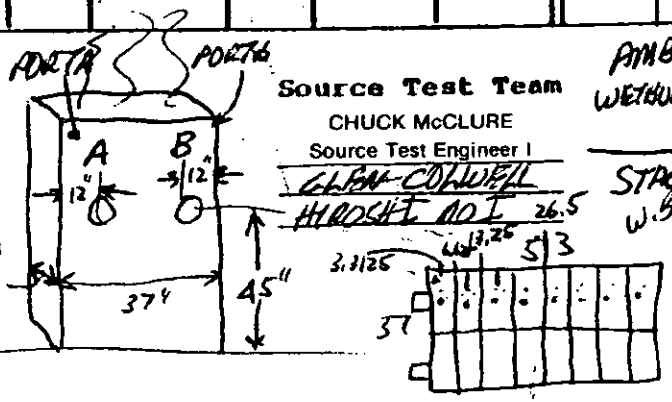
$$V_s = 2.9(k_p)\sqrt{T_s \cdot h_{H_2O}}$$

3.3 P2 16.6 P4 29.8 P6 43.1 P8
0 P1 9.9 P3 23.2 P5 36.4 P7 49.7

53

$$\frac{2(53)(37)}{53+37} = 43.5$$

FIG 10PTS V-59




Source Test Team
CHUCK McCLURE
Source Test Engineer I
GLENN COWDEN
HIROSHI NOI 26.5

AMBIENT 0930 0.9%
WET BULB 44/10.8 = 47

STACK 0935
W.B. 52/55°F
D.B. 1.2%

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, Calif. 94109 • 771-6000

# Source Test Data Sheet

Source Operation: SCRUBBER
Plant: FRANKLIN PLATING CO.
Sample Type: CHROME
Process Cycle:
Duct Size: 53X37
Duct Pressure: -0.6
ASSUMED $H_2O$: 390

Source Test No.:
Run No.: B PORT B
Date: 12/20/89 21

6.9 Nozzle Diameter
0.85 Pitot Tube
N/A Gas Collector No.
30.14 Barometric Pressure
0.001 at 20 Leak Rate @ 15"Hg
3 TIME EACH POINT
8 # OF POINTS
56 TIME EACH RUN

Sampling Train: IMPINGERS S-3, S-4

ST-35

| Traverse Point | Dist. From inches | INITIAL TRAVERSE Duct Temp °F | H $H_2O$ | $\sqrt{h}$ | SAMPLING Traverse Point | h $H_2O$ | $V_s$ FPS | Time 1143 | METER Rate CFM | METER Temp °F | METER Volume ft³ | Vac "Hg | Sat'd Gas Temp °F | $T_s$ Duct Temp °F | FILTER C-4 ROTO CFH | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 327.94 | | | | | |
| | | | | | $P_1$ | .02 | 7.9 | | .1866 | 56 | 329.23 (21.25) | 2.0 | 38 | 58 518 | 11.2 | 1.29 |
| | | | | | $P_2$ | .04 | | | | 56 | 331.01 (31.08) | 5.0 | 37 | | 16.0 | 1.78 |
| | | | | | $P_3$ | .10 | | | | 56 | 334.20 (39.93) | 8.7 | 38 | | 27.0 | 3.19 |
| | | | | | $P_4$ | .12 | | | | 56 | 337.43 (39.40) | 6.0 | 38 | | 28.0 | 3.23 |
| | | | | | $P_5$ | .13 | | | | 56 | 341.18 (40.76) | 10.0 | 38 | | 280 | 3.75 |
| | | | | | $P_6$ | .12 | | | | 56 | 344.31 (44.28) | 16.0 | 38 | | 28.5 | 3.13 |
| | | | | | $P_7$ | .12 | | | | 56 | 347.56 (47.51) | 16.0 | 38 | | 27.5 | 3.25 |
| | | | | | $P_8$ | .12 | | 1239 | | 56 | 350.97 (50.76) | 16.0 | 38 | | 27.0 | 3.21 |
| | | | | | | | 16.82 | | | | 22.83 | | | | | 22.83 |

$$D_n = 13.7\left[\frac{T_s + 460}{V_s(100-\%H_2O)}\right]^{1/2}$$

$$Q_{in} = \left[(2.638 \times 10^{-3})\ (100-\%H_2O)\,D_{AVG}^2\right]\frac{V_s}{T_s}$$

$$V_s = 2.9(K_p)\sqrt{T_s \cdot h_{H_2O}}$$

Condensate ____ gm.
$V_o$ ____
$\%H_2O$ ____
$\%CO_2$ ____
$\%CO$ ____
$\%O_2$ ____

11000A
9 VOLTS-DC.
2A.6
7'6" X
8 X 5 TARLE

Source Test Team
CHUCK McCLURE
Source Test Engineer I

2000A
5.6VDC
1 11
15 6
X34

FIG V-59
77a

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, Calif. 94109 • 771-6000

# Source Test Data Sheet

Source Operation: SCRUBBED
Plant: FRANCIS PLATING CO
Sample Type: CHROME
Process Cycle:
Duct Size: 37X53
Duct Pressure: -0.6
ASSUMED $H_2O$: 3%

Source Test No.:
Run No.: RUN C ADDB
Date: 12/20/89 21

6.9 Nozzle Diameter
DPS Pitot Tube
N/A Gas Collector No.
30.14 Barometric Pressu
0.00 at 19 Leak Rate @ 15"Hg
7 TIME EACH POINT
P # OF POINTS
56 TIME EACH RUN

Sampling Train: FILTER C-6 IMPINGERS S-5, S-6

ST-35

| Traverse Point | Dist. From inches | Initial Traverse: Duct Temp °F | Initial Traverse: h $H_2O$ | Initial Traverse: h | Traverse Point | h $H_2O$ | $V_s$ FPS | Time | Meter: Rate CFM | Meter: Temp °F | Meter: Volume $Ft^3$ 350.77 | Vac "Hg | Sat'd Gas Temp °F | $T_s$ Duct Temp °F | Roto CFM | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | P1 | .02 | 7.9 | 1331 | .1866 | 56 | 62.05 352.10 | 5.0 | 39 | 58 518 | 11.2 | 1.33 |
| | | | | | P2 | .04 | 11.2 | | .2639 | 56 | 53.95 353.94 | 5.0 | 41 | | 15.8 | 1.84 |
| | | | | | P3 | .10 | 17.7 | | .4176 | 56 | 56.56 356.60 | 9.3 | 41 | | 25 | 2.66 |
| | | | | | P4 | .12 | 19.4 | | .4571 | 56 | 59.80 360.02 | 11.0 | 41 | | 27.4 | 3.42 |
| | | | | | P5 | .13 | 20.2 | | .4787 | 56 | 63.23 363.51 | 6.0 | 41 | | 28.5 | 3.49 |
| | | | | | P6 | .12 | 19.4 | | .4571 | 56 | 66.74 366.90 | 6.0 | 41 | | 27.4 | 2.89 |
| | | | | | P7 | .12 | 19.4 | | .4571 | 56 | 69.8 369.66 | 7.0 | 41 | | 27.4 | 3.26 |
| | | | | | P8 | .12 | 19.4 | 1427 | .4571 | 56 | 72.96 372.79 | 6.0 | 41 | | 27.4 | 3.13 |
| | | | | | | | 16.85 | | | | 22.02 | | | | | 22.02 |
| | | | | | | | | | | | | | | 518 | | |

$$D_n = 13.7\left[\frac{T_s + 460}{V_s(100-\%H_2O)}\right]^{1/2}$$

$$Q_m = \left[(2.638 \times 10^{-3})\ (100-\%H_2O)D_{nm}^2\right]\frac{V_s}{T_s}$$

$$V_s = 2.9(K_p)\sqrt{T_s \cdot h_{H_2O}}$$

Condensate ____ gm.
$V_o$ ____
$\%H_2O$ ____
$\%CO_2$ ____
$\%CO$ ____
$\%O_2$ ____

Source Test Team
CHUCK McCLURE
Source Test Engineer I

FIG V-59
77a

FRANCIS PLATING CO.
12/21/89

RUN A – ST-35

OVERALL ISOKINETIC RATIO

$$R = \frac{(T_S)(V_O)(29.92)(100)}{(V_S)(T)(A_n)(P_S)(530)(60)(100-H_2O\%)}$$

$T_S$ = TEMP STACK °R
$V_O$ = METERED VOLUME $ft^3$
$V_S$ = AVERAGE STACK VELOCITY
$T$ = TIME OF RUN
$A_n$ = AREA NOZZLE $ft^2$
$P_S$ = PRESSURE IN STREAM
$H_2O\%$ = 1%

$$R = \frac{(515°R)(17.42\,ft^3)(29.92)(100)}{(13.474\,ft/sec)(56\,min)(0.0004025\,ft^2)(29.92-\frac{0.6}{13.6})(530)(60)(99)}$$

29.87

$$R_{A\,ST} = \frac{26842130}{\cancel{25499400}\ 28559329} = \cancel{1.05}\ 0.94$$

RUN A ARB425

$$R = \frac{(515)(18.089)(29.92)(100)}{(13.474)(56)(0.0004025)(29.87)(530)(60)(99)}$$

$$R_{A\,ARB} = 0.9759 = 0.98$$

RUN B – ST-35

$$R = \frac{(518)(22.83)(29.92)(100)}{(16.825)(56)(0.0004025)(29.87)(530)(60)(99)}$$

$$R_{B\,ST} = 0.99$$

-FRANCIS PLATING CO
12/21/89

RUN B ARB-425

$$R = \frac{(518)(22.51)(29.92)(100)}{(16.825)(56)(0.0004025)(29.87)(530)(60)(99)}$$

$$\boxed{R_{B_{ARB}} = 0.98}$$

RUN C ST-35

$$R = \frac{(518)(22.02)(29.92)(100)}{(16.825)(56)(0.0004025)(29.87)(530)(60)(99)}$$

$$\boxed{R_{C_{ST}} = 0.96}$$

RUN C ARB-425

$$R = \frac{(518)(22.59)(29.92)(100)}{(16.825)(56)(0.0004025)(29.87)(530)(60)(99)}$$

$$\boxed{R_{C_{ARB}} = 0.98}$$

# SOURCE TEST LAB DATA SHEET

PLANT: FRANCIS PLATING CO
SOURCE OPERATION: CHROME TANK SCRUBBER - OUTLET
SOURCE TEST NO.: ST-35
FILTER MEDIA: FILTER FOLLOWED BY $H_2O$ IMPINGERS

PAGE 1 OF 1
INITIAL CMR
TEST DATE 12/21/89

*Drying Procedure: 105 °C 24 hours before and after test, desiccated*

## FILTER DATA

| RUN NO. | FILTER NO. | TARE WEIGHT (g) | | | FINAL WEIGHT (g) | SAMPLE WEIGHT (µg) |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

## PROBE & NOZZLE RINSE DATA (total all runs)

| RUN NO. | FILTER NO. | JAR TARE WEIGHT (g) | JAR FINAL WEIGHT (g) | SAMPLE WEIGHT (µg) |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## PROBE & NOZZLE RINSE DATA (each run)

| RUN NO. | PROBE/NOZZLE NOS. | JAR TARE WEIGHT (g) | JAR FINAL WEIGHT (g) | SAMPLE WEIGHT (µg) |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## IMPINGER DATA

| SOLUTION | NO. | A TARE WEIGHT | B FILLED WEIGHT | C FINAL WEIGHT | C-A SAMPLE WEIGHT | C-B CONDENSATE WEIGHT | |
|---|---|---|---|---|---|---|---|
| $H_2O$ | S-1 | 499.3 | 599.7 | [illegible] | 102.5 | 2.1 | |
| | S-2 | 495.0 | 597.0 | [illegible] | 101.7 | -<0.3> | 1.8 |
| | S-3 | 482.3 | 583.1 | [illegible] | 104.1 | 3.3 | |
| | S-4 | 479.2 | 580.0 | [illegible] | 99.7 | -<1.1> | 2.2 |
| | S-5 | 515.8 | 616.6 | [illegible] | 103.3 | 2.5 | |
| | S-6 | 488.4 | 588.2 | [illegible] | 98.9 | -<0.9> | 1.6 |

# REPORT OF LABORATORY ANALYSIS

**FL-2**

NAME FRANCIS PLATING OF OAKLAND
ADDRESS 785 7TH ST.
CITY OAKLAND ZIP 94607
TEL. (415) 444-5535 PLT # 2324
SOURCE OPERATION S-2, S-3 CHROME TANK

LAB # 89-1343
S.T. #
BOOK
PAGE
FILM

SAMPLE DESCRIPTION 1 BOTTLE CONTAINING PROBE WASH OF 0.1 N NaOH.

MANUFACTURER'S NAME

C. MC CLURE
PERSON SUBMITTING SAMPLE

12 / 22 / 89
DATE

W. Dyung
SIGNATURE OF ANALYST

1-2-90
DATE

LAB REF # CV03-24 09010-51
LAB METHOD ARB 425

Total sample volume = 100 ml

1) $Cr^{+6}$ < 5.7 µg/100 ml wash

2) Total Cr < 10 µg/100 ml wash

LOD $Cr^{+6}$ = 5.7 µg/100 ml wash

$Cr^{+3}$ = 10 µg/100 ml wash

V.N. RECOMMENDED ☐ YES REG. ____ RULE ____ SEC. ____
☐ NO
☐ FURTHER EVALUATION NEEDED

LABORATORY DIRECTOR SIGNATURE

1-16-90
DATE

B. A. A. Q. M. D. 939 ELLIS ST. SAN FRANCISCO CA 94109

# REPORT OF LABORATORY ANALYSIS

**FL-2** 12/21/89

| | | | |
|---|---|---|---|
| NAME | FRANCIS PLATING OF OAKLAND | LAB # | 89-1343 |
| ADDRESS | 785 7TH ST. | ~~SEQ #~~ OUTLET | |
| CITY | OAKLAND ZIP 94607 | BOOK | |
| TEL. | (415) 444-5535 PLT # 2324 | PAGE | |
| SOURCE OPERATION | 3-2 S-3 CHROME TANK | FILM | |

SAMPLE DESCRIPTION 1 BOTTLE CONTAINING RINSE WASH OF 0.1 N NaOH.

MANUFACTURER'S NAME

C. MCCLURE — PERSON SUBMITTING SAMPLE

12/22/89 — DATE

W. Young — SIGNATURE OF ANALYST

1-2-90 — DATE

LAB REF # 09010-51 (SVD3-24)

LAB METHOD ARB 425

Total sample volume = 100 ml

1) $Cr^{+6}$ < 5.7 mg/100 ml wash

2) Total Cr < 10 mg/100 ml wash

LOD $Cr^{+6}$ = 5.7 mg/100 ml wash

$Cr^{+T}$ = 10 mg/100 ml wash

V.N. RECOMMENDED ☐ YES REG.____ RULE____ SEC.____

☐ NO

☐ FURTHER EVALUATION NEEDED

LABORATORY DIRECTOR SIGNATURE — 1-16-90 DATE

B. A. A. Q. M. D. 939 ELLIS ST. SAN FRANCISCO CA 94109

# REQUEST FOR LABORATORY ANALYSIS

**FL-1**

NAME FRANCIS PLATING OF OAKLAND
ADDRESS 785 - 7TH ST.
CITY OAKLAND CA ZIP 94607
TEL. (415) 444-5535 PLT # 2324
SOURCE OPERATION (S#) S-2, S-3 CHROME TANKS

LAB # 89-1343
S.T. #
BOOK
PAGE
FILM

SAMPLE DESCRIPTION 1-BOTTLE OF PROBE WASH - 0.1 N NAOH ≥ 100 ML.

☐ TWO PART SAMPLE ☐ SPEC. SHEET ATTACHED

SAMPLE TAKEN FROM FRANCIS PLATING OF OAKLAND
SAMPLE TAKEN BY C. MCCLURE DATE 12/21/89 TIME 1300
SAMPLE TAKEN IN PRESENCE OF B.A.A.Q.M.D. ☒ YES ☐ NO BYOS.
SAMPLE RCVD. BY W. Young DATE 12-22-89 TIME 10:30
SAMPLE RCVD. BY DATE TIME
CONTAINER DESCRIPTION AND MARKINGS: 1-BOTTLE CONTAINING PROBE WASH OF 0.1 N NAOH ≥ 100 ML. MARKED ARB 425.

MFG. NAME
MFG. CODE(S)

☒ COPY FL-2 TO: C. MCCLURE (OTHER THAN REQUESTOR)

☐ PRIORITY SAMPLE BY:
REASON DATE REQD.

ANALYSIS REQUESTED: ARB 425 METHOD
☐ OPERATION UNDER PERMIT CONDITION # FOR APPLIC. #
☐ OPERATION UNDER "BUBBLE"
☐ FOR INFORMATION ONLY
COMPLIANCE WITH REG. 11 RULE 8 SECTION(S) 310.1 ,
SUBSECTIONS ,

C. McClure — PERSON SUBMITTING SAMPLE
W. Young — PERSON RECEIVING SAMPLE FOR ANALYSIS

DATE 12 / 22 / 89 DATE 12 / 22 / 89

B. A. A. Q. M. D. 939 ELLIS ST. SAN FRANCISCO CA 94109

# REPORT OF LABORATORY ANALYSIS

**FL-2**

NAME FRANCIS PLATING OF OAKLAND INC.
ADDRESS 785 7TH ST.
CITY OAKLAND CA ZIP 94607
TEL. (415) 444-5535 PLT # 2324
SOURCE OPERATION S-2, S-3 CHROME TANKS

LAB # 89-1340
S.T. #
BOOK
PAGE
FILM

SAMPLE DESCRIPTION 3 FILTERS C-2, C-3, C-5
7 JARS IMP (T-1, T-2) (T-3, T-4) (T-5-T6) BLANK

MANUFACTURER'S NAME

C McCLURE
PERSON SUBMITTING SAMPLE

12 / 21 / 89
DATE

W. Young
SIGNATURE OF ANALYST

1-2-90
DATE

LAB REF # CVD-2-24 09010-57
LAB METHOD ARB 425

| Sample | Hexavalent Chrome | Total Chrome |
|---|---|---|
| 1) Run A + C2 | <11.4 µg/sample | <20 µg/sample |
| 2) Run B + C3 | <11.4 " " | <20 " " |
| 3) Run C + C-5 | <11.4 " " | <20 " " |
| LOD | 2 µg/25 ml Sample | 20 µg/sample |
| | 11.4 µg/Sample | |

V.N. RECOMMENDED ☐ YES REG. RULE SEC.
☐ NO
☐ FURTHER EVALUATION NEEDED

LABORATORY DIRECTOR SIGNATURE

1-16-90
DATE

B. A. A. Q. M. D. 939 ELLIS ST. SAN FRANCISCO CA 94109

# REPORT OF LABORATORY ANALYSIS

**FL-2**

| | |
|---|---|
| NAME | FRANCIS PLATING OF OAKLAND INC. |
| ADDRESS | 725 7TH ST. |
| CITY | OAKLAND CA ZIP 94607 |
| TEL. | (415) 444-5535 PLT # 2324 |
| SOURCE OPERATION | 2-2, 2-3 CHROME TANKS |
| SAMPLE DESCRIPTION | 3 FILTERS C-2, C-3, C-5<br>7 JARS IMP T-1, T-2 (T-3, T-4) (T-5-T6) BLANK |
| MANUFACTURER'S NAME | |

| LAB # | 89-1340 |
|---|---|
| S.T. # | |
| BOOK | |
| PAGE | |
| FILM | |

C. McCLURE — PERSON SUBMITTING SAMPLE — DATE 12/21/89

W. Young — SIGNATURE OF ANALYST — DATE 1-2-90

LAB REF # CUD-2-24 09010-51

LAB METHOD ARB 4.5

| Sample | Hexavalent chrome | Total chrome |
|---|---|---|
| 1) Prem A + C-2 | <11.4 µg/sample | <20 µg/sample |
| 2) Prem B + C-4 | <11.4 " " | <20 " " |
| 3) Prem C + C-5 | <11.4 " " | <20 " " |
| LOD | 2 µg/25ml sample | 20 µg/sample |
| | 11.4 µg/sample | |

V.N. RECOMMENDED

☐ YES REG. _____ RULE _____ SEC. _____

☐ NO

☐ FURTHER EVALUATION NEEDED

[signature] — LABORATORY DIRECTOR SIGNATURE — DATE 1-16-90

B.A.A.Q.M.D. 939 ELLIS ST. SAN FRANCISCO CA 94109

# REQUEST FOR LABORATORY ANALYSIS

**FL-1**

NAME FRANCIS PLATING OF OAKLAND, INC
ADDRESS 785 - 7TH ST.
CITY OAKLAND CA ZIP 94607
TEL. 415/444-5535 PLT # 2324
SOURCE OPERATION (S#) S-2, S-3 CHROME TANKS

LAB # 89-1340
S.T. #
BOOK
PAGE
FILM

SAMPLE DESCRIPTION 3 FILTERS EXPOSED TO CHROME GAS.
7 BOTTLES = 6 SAMPLES 1 BLANK
0.1N NAOH + CONDENSATE

☐ TWO PART SAMPLE ☐ SPEC. SHEET ATTACHED

SAMPLE TAKEN FROM FRANCIS PLATING STACK
SAMPLE TAKEN BY CHUCK MCCLURE DATE 12/21/89 TIME 1300
SAMPLE TAKEN IN PRESENCE OF B.A.A.Q.M.D. ☒ YES ☐ NO BIDS.
SAMPLE RCVD. BY [illegible] DATE 12-21-89 TIME 4:45PM
SAMPLE RCVD. BY DATE TIME
CONTAINER DESCRIPTION AND MARKINGS: 3 PLASTIC CASES WITH
EXPOSED FILTERS - LABELED C-2, C-3, C-5
7 JARS - IMPINGERS T-1, T-2, T-3, T-4, T-5, T-6, + 1-BLANK
C-2 RONA, C-3 RONB, C-5 RONC
RONA RONB RONC
MFG. NAME
MFG. CODE(S)

☒ COPY FL-2 TO: C. MCCLURE - S-507 (OTHER THAN REQUESTOR)

☐ PRIORITY SAMPLE BY:
REASON DATE REQD.

ANALYSIS REQUESTED: ARB METHOD 425
☐ OPERATION UNDER PERMIT CONDITION # FOR APPLIC. #
☐ OPERATION UNDER "BUBBLE"
☐ FOR INFORMATION ONLY
COMPLIANCE WITH REG. 11 RULE 8 SECTION(S) 310.1
SUBSECTIONS

C. McClure — PERSON SUBMITTING SAMPLE
[illegible] — PERSON RECEIVING SAMPLE FOR ANALYSIS

DATE 12, 21, 89 DATE 12, 21, 89

B. A. A. Q. M. D. 939 ELLIS ST. SAN FRANCISCO CA 94109

C = HEX CHROME CONCENTRATION (mg/m³)

FRANCIS PLATING CO
12/21/89
ARB-425
OUTLET

TOTAL HEX
$\mu g = < 11.4 \mu g$/SAMPLE

$$C\ mg/m^3 = \frac{(35.31)(W\ \mu g)}{1000 \cdot V_o}$$

RUN A)

$$C_A\ mg/m^3 = \frac{(35.31)(<11.4\ \mu g)}{1000 \cdot (18.72)}$$

$$\boxed{C_A\ mg/m^3 = < 0.021\ mg/m^3}$$

$$V_{O_A} = \frac{(530)(V_m)(P_b)}{29.92\ (T_m)}$$

$$V_{O_A} = \frac{(530)(18.089)(30.14)}{29.92\ (516)}$$

$$\boxed{V_{O_A} = 18.72\ SDCF}$$

RUN B)

$$C_B\ mg/m^3 = \frac{(35.31)(<11.4\ \mu g)}{1000 \cdot (23.29)}$$

$$\boxed{C_B\ mg/m^3 = < 0.017\ mg/m^3}$$

$$V_{O_B} = \frac{(530)(22.51)(30.14)}{29.92\ (516)}$$

$$\boxed{V_{O_B} = 23.29\ SDCF}$$

RUN C)

$$C_C\ mg/m^3 = \frac{(35.31)(<11.4\ \mu g)}{1000 \cdot (23.37)}$$

$$\boxed{C_C\ mg/m^3 = 0.017\ mg/m^3}$$

$$V_{O_C} = \frac{(530)(22.59)(30.14)}{29.92\ (516)}$$

$$\boxed{V_{O_C} = 23.37\ SDCF}$$

HEX CHROME EMISSION RATES

FRANCIS PLATING CO
12/21/89
ARB-425
OUTLET

$m = g/HR$

$$m = \frac{(60)(1\times10^{-6})(W_p\,\mu g)(Q_{STACK})}{V_O}$$

TOTAL HEX CHROME WEIGHT

RUN A)

$$m_A = \frac{(60)(1\times10^{-6})(<11.4\,\mu g)(12600)}{18.72\ SDCF}$$

$$\boxed{m_A = <0.460\ g/HR}$$

$V_{O_A} = 18.72\ SDCF$

$V_{O_B} = 23.29\ SDCF$

$V_{O_C} = 23.37\ SDCF$

RUN B)

$$m_B = \frac{(60)(1\times10^{-6})(<11.4\,\mu g)(12600)}{23.29\ SDCF}$$

$$\boxed{m_B = <0.37\ g/HR}$$

RUN C)

$$m_C = \frac{(60)(1\times10^{-6})(<11.4\,\mu g)(12600)}{23.37}$$

$$\boxed{m_C = <0.369\ g/HR}$$

HEX CHROME PLATING EMISSION FACTOR

FRANCIS PLATING CO.
12/21/89
OUTLET
ARB-425

$m_A = mg/A\text{-}HR.$

$$m_A = \frac{1000 \cdot m}{I}$$

RUN A)

$$m_A = \frac{1000(<0.460\ g/Hr)}{3000\ A}$$

$$\boxed{m_A = <0.153\ mg/A\text{-}HR}$$

RUN B)

$$m_B = \frac{1000(<0.37\ g/Hr)}{3000\ A}$$

$$\boxed{m_B = <0.123\ mg/A\text{-}HR.}$$

RUN C)

$$m_C = \frac{1000(<0.369\ g/Hr)}{3000}$$

$$\boxed{m_C = <0.123\ mg/A\text{-}HR.}$$

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, Calif. 94109 • 771-6000

# Source Test Data Sheet

Source Operation: CHROME SCRUBBER
Plant: FRANCIS PLATING-OAKLAND
Sample Type: HEX-CHROME
Process Cycle: CHROME-HARD
Duct Size: 53X37
Duct Pressure: ~~[illegible]~~ -0.6
ASSUMED $H_2O$: 3%

Source Test No.
Run No.: RUN A - PORT A
Date: 12/20/89 21

6.9mm Nozzle Diameter
0.85 Pitot Tube
AMBIENT Gas Collector No.
30.14 Barometric Pressure
0.002 @ 22 Leak Rate @ 15"Hg
7 TIME EACH POINT
8 # OF POINTS
56 TIME EACH RUN

Sampling Train: IMPINGERS $T_1$, $T_2$

ARB-425

ALTER C-2

| Traverse Point | Dist. From inches | INITIAL TRAVERSE Duct Temp °F | H $H_2O$ | $\sqrt{h}$ | Traverse Point | h $H_2O$ | $V_s$ FPS | Time 1018 | METER Rate CFM | METER Temp °F | METER Volume $Ft^3$ 160.41 | Vac "Hg | Sat'd Gas Temp °F | $T_s$ Duct Temp °F | ROTO CFH | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | $P_1$ | .01 | 5.6 | 7min | 0.1323 | 56 | 161.34 161.347 | 1.5 | 35 | 55 515 | 8 | 0.937 |
| | | | | | $P_2$ | .02 | 7.9 | 7min | .18714 | 56 | 62.66 162.665 | 2.0 | 36 | 55 | 11.2 | 1.318 |
| | | | | | $P_3$ | .03 | 9.7 | 7min | .2292 | 56 | 64.27 164.278 | 2.5 | 36 | 55 | 13.8 | 1.613 |
| | | | | | $P_4$ | .07 | 14.8 | 7min | .35011 | 56 | 66.73 166.74 | 7.0 | 37 | 55 | 21.0 | ~~2.785~~ 2.462 |
| | | | | | $P_5$ | .09 | 16.8 | 7min | .39699 | 56 | 69.52 169.525 | 9.0 | 35 | 55 | 23.8 | ~~3.195~~ 2.785 |
| | | | | | $P_6$ | .11 | 18.5 | 7min | .43888 | 56 | 72.6 172.72 | 10 | 36 | 55 | 26.3 | 3.195 |
| | | | | | $P_7$ | .10 | 17.7 | 7min | .4185 | 56 | 75.65 175.657 | 9.0 | 36 | 55 | 25.1 | 2.937 |
| | | | | | $P_8$ | .09 | 16.8 | 11A 7min | .39699 | 56 | 78.436 178.499 | 9.0 | 36 | 55 515 | 23.8 | 2.842 |
| | | | | | | | 13.474 | | | | 18.089 | | | | | 18.089 |

$$D_n = 13.7\left[\frac{T_s + 460}{V_s(100-\%H_2O)}\right]^{1/2}$$

$$Q_m = \left[(2.638 \times 10^{-3})\ (100-\%H_2O)\,D_{mm}^2\right]\frac{V_s}{T_s}$$

$$V_s = 2.9(K_p)\sqrt{T_s \cdot h_{H_2O}}$$

Condensate _____ gm.
$V_o$ _____
$\%H_2O$ _____
$\%CO_2$ _____
$\%CO$ _____
$\%O_2$ _____

Source Test Team
CHUCK McCLURE
Source Test Engineer I
GLENN COLLWELL
HIROSHI ROI

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## Source Test Data Sheet

Source Operation: HARD CHROME
Plant: FRANCIS PLATING CO.
Sample Type: CHROME
Process Cycle: CHROME SCRUBBER
Duct Size: 53X37
Duct Pressure: -0.6"
ASSUMED $H_2O$: 3%

Source Test No.:
Run No.: B PORT B
Date: 12/28/89 21

6.9mm Nozzle Diameter
0.85 Pitot Tube
MMB Gas Collector No.
30.14 Barometric Pressu
0.01@18 Leak Rate @ 15"Hg
7 TIME EACH POINT
8 # OF POINTS
56 TIME EACH RUN

Sampling Train: FILTER C-3 IMPINGERS T-3, T-4

(ARB-425)

| Traverse Point | Dist. From inches | INITIAL TRAVERSE Duct Temp °F | h $H_2O$ | $\sqrt{h}$ | Traverse Point | h $H_2O$ | $V_s$ FPS | Time 1143 | METER Rate CFM | METER Temp °F | METER Volume $Ft^3$ 178.5 | Vac "Hg | Sat'd Gas Temp °F | $T_s$ Duct Temp °F | RDTO CFH | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | $P_1$ | .02 | 7.9 | 7MM | .1866 | 56 | 79.8 179.81 | 4.0 | 38 | 58 518 | 11.2 | 1.31 |
| | | | | | $P_2$ | .04 | 11.2 | 7 | .2639 | 56 | 81.66 181.672 | 5.0 | 38 | 58 518 | 25 15.8 | 1.862 |
| | | | | | $P_3$ | .10 | 17.7 | 7 | .41725 | 56 | 84.59 184.633 | 11.0 | 38 | 58 | 25.4 | 2.961 |
| | | | | | $P_4$ | .12 | 19.4 | 7 | .4571 | 56 | 87.83 187.838 | 11.0 | 38 | 58 | 27.4 | 3.205 |
| | | | | | $P_5$ | .13 | 20.2 | 7 | .4757 | 56 | 91.16 191.165 | 11.5 | 39 | 58 | 28.54 | 3.327 |
| | | | | | $P_6$ | .12 | 19.4 | 7 | .4571 | 56 | 94.36 194.42 | 11.0 | 39 | 58 | 27.4 | 3.255 |
| | | | | | $P_7$ | .12 | 19.4 | 7 | .4571 | 56 | 97.62 197.85 | 13.5 | 38 | 58 | 27.4 | 3.43 |
| | | | | | $P_8$ | .12 | 19.4 | 1239 | .4571 | 56 | 101.05 201.01 | 13.0 | 39 | 58 518 | 27.4 | 3.16 |
| | | | | | | | 16.825 | | | | 22.51 | | | | | 22.51 |

$$Q_n = 13.7\left[\frac{T_s + 460}{V_s(100-\%H_2O)}\right]^{1/2}$$

$$Q_m = \left[(2.638 \times 10^{-3})\ (100-\%H_2O)\,D_{nzn}^2\right]\frac{V_s}{T_s}$$

$$V_s = 2.9(K_p)\sqrt{T_s \cdot h_{H_2O}}$$

Condensate _____ gm.
$V_o$ _____
$\%H_2O$ _____
$\%CO_2$ _____
$\%CO$ _____
$\%O_2$ _____

Source Test Team
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H. DOI

FIG V-59
77a

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## Source Test Data Sheet

Source Operation: CHROME PLATING CO.
Plant: FRANCIS PLATING CO.
Sample Type: CHROME - ARB425
Process Cycle: SCRUBBER
Duct Size: 37X53
Duct Pressure: -0.6"
ASSUMED $H_2O$: 3%

Source Test No.:
Run No.: RUN C PORT B
Date: 12/20/89 21

6.9 mm Nozzle Diameter
0.85 Pitot Tube
ATMB Gas Collector No.
30.14 Barometric Pressure
2.00/2.17 Leak Rate @ 15"Hg
7 TIME EACH POINT
8 # OF POINTS
56 TIME EACH RUN

Sampling Train: FILTER C-5 IMPINGERS T-5, T-6

| Traverse Point | Dist. From inches | INITIAL TRAVERSE Duct Temp °F | h $H_2O$ | $\sqrt{h}$ | ARB-425 Traverse Point | h $H_2O$ | $V_s$ FPS | Time (33) | SAMPLING METER Rate CFM | Temp °F | Volume $Ft^3$ 201.01 | Vac "Hg | Sat'd Gas Temp °F | $T_s$ Duct Temp °F | REMARKS Roto CFH | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | P1 | .02 | 7.9 | 7 | .1866 | 56 | 202.32 202.333 | 2.0 | 40 | 58 618 | 1.2 | 1.323 |
| | | | | | P2 | .04 | 11.2 | 7 | .2639 | 56 | 04.18 204.182 | 4.0 | 40 | | 15.8 | 1.849 |
| | | | | | P3 | .10 | 17.7 | 7 | .41725 | 56 | 07.10 207.11 | 9.5 | 40 | | 25.4 | 2.928 |
| | | | | | P4 | .12 | 19.4 | 7 | .4571 | 56 | 10.31 210.32 | 10.5 | 41 | | 27.4 | 3.21 |
| | | | | | P5 | .13 | 20.2 | 7 | .4757 | 56 | 13.65 214.12 | 15.0 | 41 | | 28.5 | 3.8 |
| | | | | | P6 | .12 | 19.4 | 7 | .4571 | 56 | 17.82 217.28 | 12.0 | 41 | | 27.4 | 3.16 |
| | | | | | P7 | .12 | 19.4 | 7 | .4571 | 56 | 20.48 220.415 | 11.0 | 41 | | 27.4 | 3.135 |
| | | | | | P8 | .12 | 19.4 | 1427 | .4571 | 56 | 23.61 223.60 | 11.0 | 41 | 58 518 | 27.4 | 3.185 |
| | | | | | | | 16.825 | | | | 22.59 | | | 518 | | 22.59 |

$$D_n = 13.7\left[\frac{T_s + 460}{V_s(100 - \%H_2O)}\right]^{1/2}$$

$$Q_m = \left[(2.638 \times 10^{-3})\ (100 - \%H_2O)\, D_{nun}^2\right]\frac{V_s}{T_s}$$

$$V_s = 2.9(K_p)\sqrt{T_s \cdot h_{H_2O}}$$

Condensate ____ gm.
$V_o$ ____
$\%H_2O$ ____
$\%CO_2$ ____
$\%CO$ ____
$\%O_2$ ____

RUN C
A B
O O

Source Test Team
CHUCK McCLURE
Source Test Engineer I
GLEN COLWELL
HIROSHI DOI

FIG V-59
77A

# SOURCE TEST LAB DATA SHEET

PLANT: FRANCIS PLATING CO

SOURCE OPERATION: CHROME TANK SCRUBBER - OUTLET

SOURCE TEST NO.: ARB-425

FILTER MEDIA: ~~FILTER FOLLOWED BY~~ 0.1N NaOH IMPINGERS FOLLOWED BY FILTER

PAGE 1 OF 1

INITIAL CDM

TEST DATE 12/21/89

Drying Procedure: 105 °C 24 hours before and after test, desiccated

## FILTER DATA

| RUN NO. | FILTER NO. | TARE WEIGHT (g) | | | FINAL WEIGHT (g) | SAMPLE WEIGHT (µg) |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

## PROBE & NOZZLE RINSE DATA (total all runs)

| RUN NO. | FILTER NO. | JAR TARE WEIGHT (g) | JAR FINAL WEIGHT (g) | SAMPLE WEIGHT (µg) |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## PROBE & NOZZLE RINSE DATA (each run)

| RUN NO. | PROBE/NOZZLE NOS. | JAR TARE WEIGHT (g) | JAR FINAL WEIGHT (g) | SAMPLE WEIGHT (µg) |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## IMPINGER DATA

| SOLUTION | NO. | A TARE WEIGHT | B FILLED WEIGHT | C FINAL WEIGHT | C-A SAMPLE WEIGHT | C-B CONDENSATE WEIGHT | |
|---|---|---|---|---|---|---|---|
| 0.1N NaOH | T-1 | 514.4 | 615.2 | [illegible] | 157.1 | 56.3 | 1.9 |
| | T-2 | 503.2 | 605.3 | | 47.7 | -<54.4> | |
| | T-3 | 473.0 | 574.0 | [illegible] | 102.5 | 1.5 | 1.4 |
| | T-4 | 503.3 | 607.6 | [illegible] | 104.2 | -<0.1> | |
| | T-5 | 496.3 | 598.0 | [illegible] | 103.5 | 1.8 | 1.7 |
| | T-6 | 470.1 | 572.0 | [illegible] | 101.8 | -<0.1> | |

$\frac{460}{515}$ °R

$$R_i = \frac{(T_{si})(V_{mi})}{(v_{si})(t_i)(A_n)(60)(100 - \%H_2O)} \times 100$$

where:

$R_i$ = isokinetic ratio at point i ——

$V_{mi}$ = metered volume at point i, $ft^3$ – 17.42

$v_{si}$ = stack gas velocity at point i, fps – 13.474

$t_i$ = sample time at point i, minutes 50

$A_n$ = cross-sectional area of nozzle, $ft^2$ 0.0004025 $A_n$ =

$H_2O$ = water vapor in gas stream, percent 1%

100 = conversion from percent to mole fraction

60 = conversion from seconds to minutes

10.9.1 The overall isokinetic ratio:

$$R = \frac{(T_s)(V_o)(29.92)(100)}{(V_s)(t)(A_n)(P_s)(530)(60)(100 - H_2O)}$$

? $P_{BAR} = 29.92 - \left(\frac{0.6''}{13.6}\right)$

## 11. Reporting

11.1 Results shall be reported as shown in Figure IV-55

$$R_i = \left(\frac{(515°R)(17.44\ ft^3)}{(13.474)(50)(0.0004025)(60)(99)}\right) \times 100$$

$R_i = 557$ ?

$$R = \frac{(515°R)(17.42)(29.92)(100)}{(13.474)(50)(0.0004025\ ft^2)(29.92)(530)(60)(99)}$$

$R = \frac{26842130}{25542084} = 1.05$ ok

D = 6.9mm

D = .69cm

$r = \frac{.69}{2} = 0.345$

$A = \pi(0.345cm)^2$

$A = 0.3739cm^2$

TO $ft^2$

$1cm^2 = 0.15499 in^2$

$0.3739cm^2 \times 1cm^2 = 0.15499 in^2 (0.3739)$

$0.3739cm^2 = 0.05795 in^2 = AREA_N$

$A_N = 0.05795 in^2$

$A_n = 0.05795 in^2 \cdot 1ft^2/144 in^2$

$A_n = 0.0004025 ft^2$

$144 in^2/1ft^2$

12 × 12 $144 in^2 = 1ft^2$

$(1cm)^2 = (0.3937 in)^2$

$1cm^2 = 0.15499 in^2$

~~6.9mm = D~~ ~~$r = \frac{D}{2} = \frac{6.9}{2}$~~ ~~$r = 3.45$~~ ~~$r = \frac{6.9}{2}$~~ ~~$r = 3.45$~~

~~$A = \pi r^2$~~ ~~$A = \pi(3.45)^2 mm^2$~~ ~~$A = 37.393 mm^2$~~ ~~$A = 3.7393 cm^2$~~

~~6.9mm = 0.69cm~~ ~~$A = \pi r^2$~~ ~~$A = \pi(0.69cm)^2$~~ ~~$A = 1.496 cm^2$~~

FRANCIS PLATING CO.
12/21/89
(OUTLET)

RUN A — ST-35

OVERALL ISOKINETIC RATIO

$$R = \frac{(T_S)(V_O)(29.92)(100)}{(V_S)(T)(A_n)(P_S)(530)(60)(100-H_2O\%)}$$

$T_S$ = TEMP STACK °R
$V_O$ = METERED VOLUME FT³
$V_S$ = AVERAGE STACK VELOCITY
$T$ = TIME OF RUN
$A_n$ = AREA NOZZLE FT²
$P_S$ = PRESSURE IN STACK
$H_2O\%$ = 1%

$$R = \frac{(515°R)(17.42\ ft^3)(29.92)(100)}{(13.474\ ft/sec)(56\ min)(0.0004025\ ft^2)(29.92 - \frac{0.6}{13.6})(530)(60)(99)}$$

29.87

$$R_{A\,ST} = \frac{26842130}{\cancel{25499400}\ 28559329} = \cancel{1.05}\ 0.94$$

RUN A ARB425

$$R = \frac{(515)(18.089)(29.92)(100)}{(13.474)(56)(0.0004025)(29.87)(530)(60)(99)}$$

$$R_{A\,ARB} = 0.9759 = 0.98$$

RUN B — ST-35

$$R = \frac{(518)(22.83)(29.92)(100)}{(16.825)(56)(0.0004025)(29.87)(530)(60)(99)}$$

$$R_{B\,ST} = 0.99$$

FRANCIS PLATING CO
12/21/89

RUN B ARB-425

$$R = \frac{(518)(22.51)(29.92)(100)}{(16.825)(56)(0.0004025)(29.87)(530)(60)(99)}$$

$$\boxed{R_{B_{ARB}} = 0.98}$$

RUN C ST-35

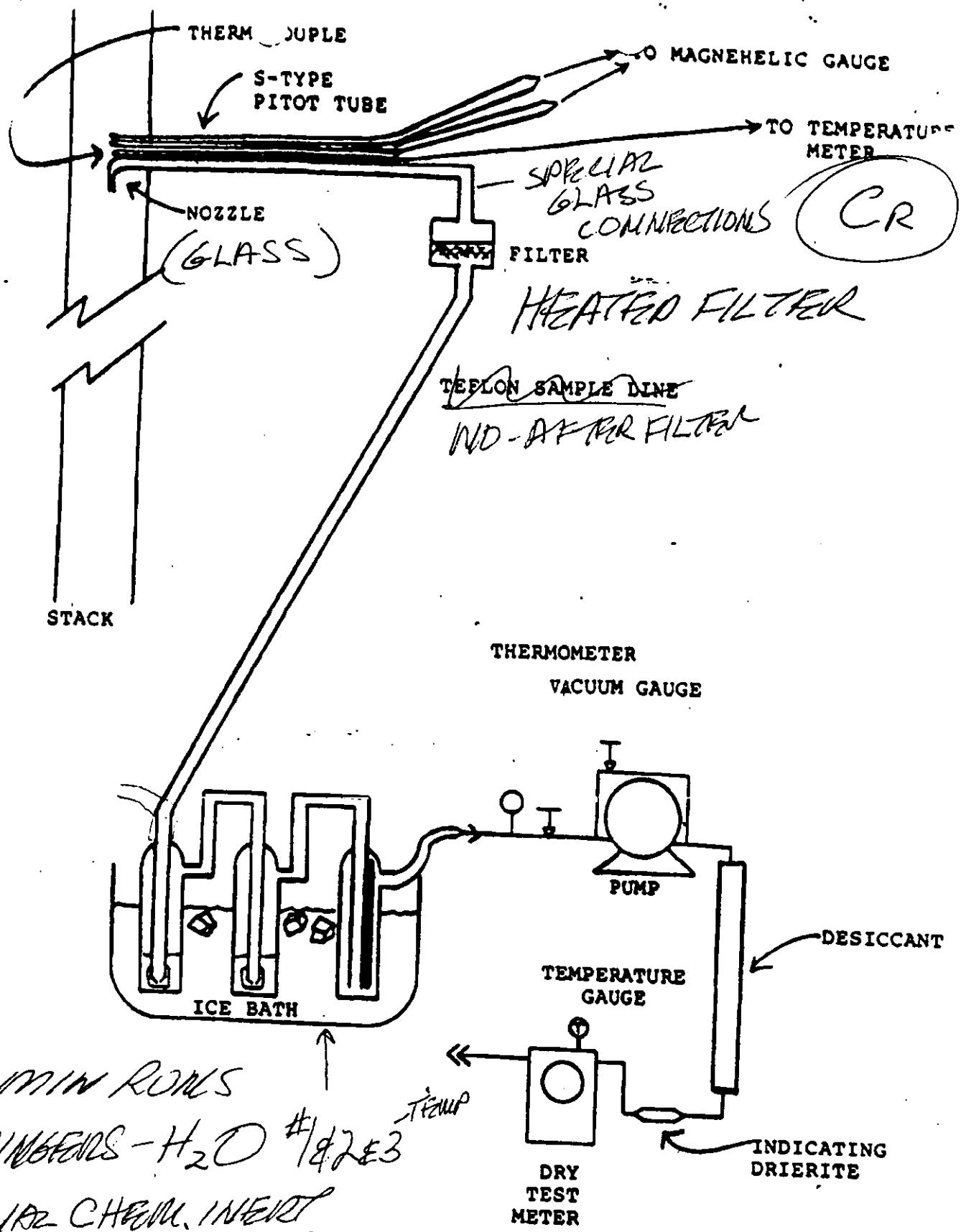
$$R = \frac{(518)(22.02)(29.92)(100)}{(16.825)(56)(0.0004025)(29.87)(530)(60)(99)}$$

$$\boxed{R_{C_{ST}} = 0.96}$$

RUN C ARB-425

$$R = \frac{(518)(22.59)(29.92)(100)}{(16.825)(56)(0.0004025)(29.87)(530)(60)(99)}$$

$$\boxed{R_{C_{ARB}} = 0.98}$$




50 MIN RUNS

IMPINGERS - $H_2O$ #1 & 2 & 3 TEMP

SPECIAL CHEM. INERT STORAGE BOTTLES FOR THE WASH PLASTIC GLASS

PALLFLEX FILTERS

**FIGURE IV-95**
**PROBE AND SAMPLE TRAIN**