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.

TEST RESULTS FOR FUME SUPPRESSANT CERTIFICATION

OMI INTERNATIONAL'S ZERO-MIST IN DECORATIVE CHROME PLATING TANKS

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EXECUTIVE SUMMARY

SCAQMD Rule 1169, adopted June 3, 1988 and amended September 8, 1989, requires all decorative chrome plating operations in the District to demonstrate emission reductions of 95% or stack emission rates below 0.15 mg/amp-hour as of November 1, 1989. Further reductions are required in 1990 and 1992 for facilities with substantial emissions. The Metal Finishing Association of Southern California (MFASC) offered to provide data on the efficiency of fume suppressants for preventing emissions of chromic acid mist.

SCAQMD indicated that data from such tests would be accepted if the tests were conducted in accordance with SCAQMD requirements. The extent of the emission reduction in terms of a percentage of uncontrolled tank emissions must be clearly demonstrated for each anti-mist additive by multiple tests on full scale plating tanks. Once the additive is certified by the SCAQMD, emission reductions will be acknowledged if the additive is used in accordance with the manufacturer's directions.

This report provides source test data and results on the efficiency of OMI Chemical's anti-mist additive, Zero-Mist, in controlling chromic acid emissions from decorative chrome plating tanks. After 5 days of testing a decorative chrome plating tank under uncontrolled and controlled conditions, it was found that the average efficiency of the Zero-Mist in controlling chromic acid emissions was 99.0% for total chromium and 99.6% for hexavalent chromium.

INTRODUCTION

Pacific Environmental Services, Inc., (PES), a participant in CARB's Independent Contractor Program, was contracted by OMI International, Inc., to perform source testing which would determine the efficiency of their Zero-Mist System in reducing chromic acid emissions from decorative chrome plating tanks. Three tests per day were conducted for a two day period on uncontrolled emissions from a decorative chrome plating tank, and two tests per day were conducted for a three day period on the emissions from the same plating tank with Zero-Mist added to the plating solution. Test dates were June 11 and June 12, 1990 for the uncontrolled tests and June 14, 15, and 18 for the controlled condition tests.

In order to evaluate the effectiveness of the anti-mist additive, it was necessary to have a host decorative chrome plating tank outfitted with an emission collection system. Facilities were made available by Mr. Harry W. Levy, President of Gene's Plating Works, 3498 E. 14th Street, Los Angeles, CA. Earnest McClellan, Plant Manager, provided assistance with tank operation during source testing. The sampling location for the tests was in the 12.75" I.D. tank exhaust duct for Tank #42, before the emissions passed through any air pollution control equipment. The sample location and tank diagram are shown in Figure 1.

Source tests were conducted by Mr. Mark Simon of PES, under the direction of Mr. Dean High, Vice President of PES. Mr. Merrill Hickman of SCAQMD was present during the first controlled condition test day to observe test conditions. Mr. Irving Ferrer, a Senior Process Specialist for OMI International, was present during all tests to ensure that the additive was properly administered. Mr. Ferrer measured the plating bath surface tension before every test and at the end of each test day. The appendix of this report contains the results of these measurements along with a record of all chemical additions.

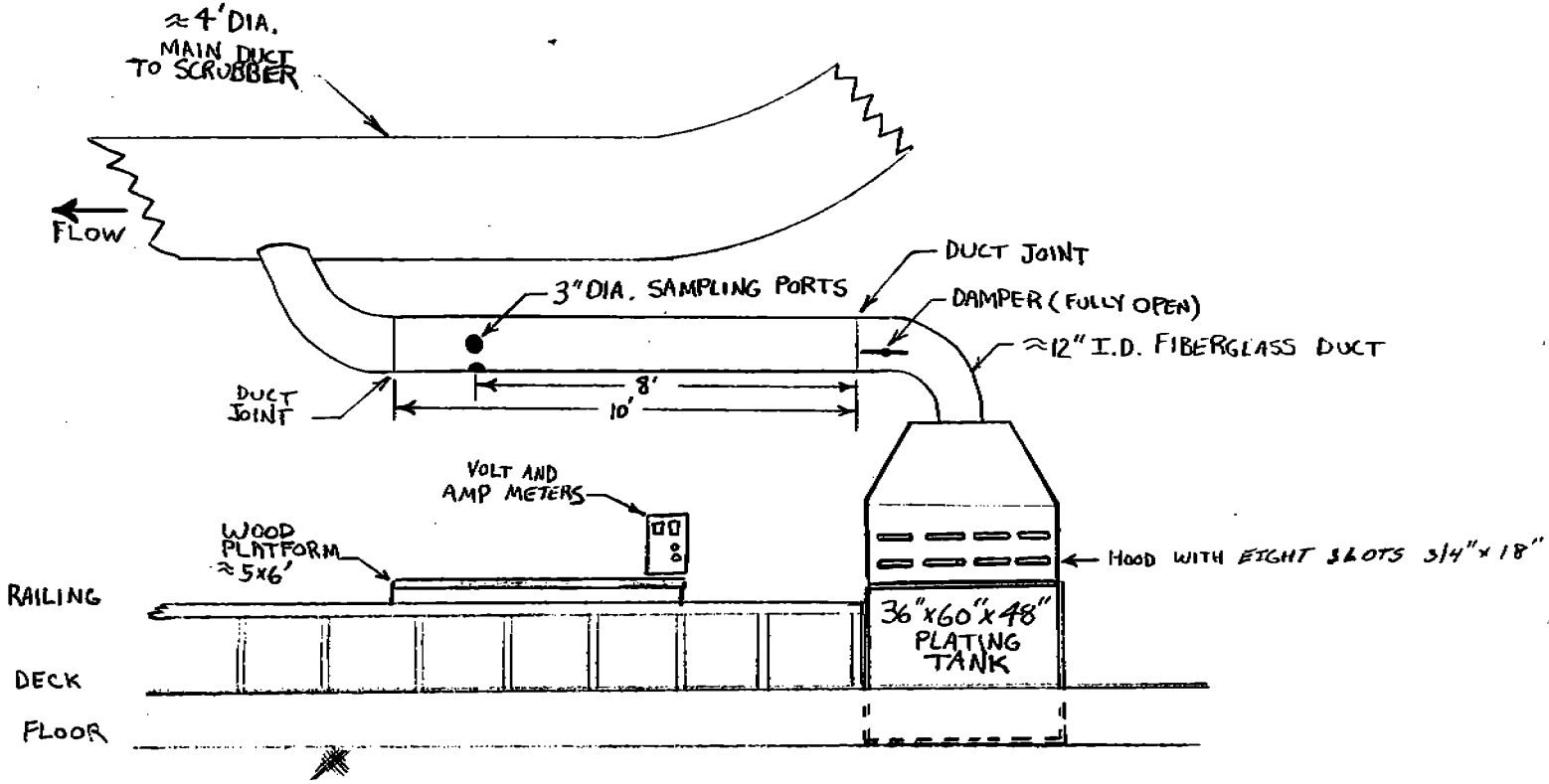


Figure 1

SAMPLING LOCATION

HWL ENTERPRISES, INC.

LOS ANGELES, CA.

PACIFIC ENVIRONMENTAL SERVICES, INC.

EQUIPMENT AND PROCESS DESCRIPTION

Gene's Plating Works, 3498 E. 14th Street, Los Angeles, CA. 90023 is a plating job shop with three decorative chrome plating lines. Tests of chromic acid emissions were performed on plating Tank #42 of the aluminum line. The dimensions of Tank #42 were 5'L x 3'W x 4'D. The tank solution was replaced one day before the tests began in order to eliminate effects of any previously added chemicals.

A smoke tube was used to check the emission collection efficiency of Tank #42 emission control system before the tests were initiated. No fugitive emissions were observed.

Two tests each were conducted using applied amperages of approximately 800, 1300, and 2300 for both uncontrolled and controlled conditions (a total of twelve tests). Voltage was 6 - 10 volts D.C.. It was supplied by a small rectifier for the low and medium load conditions and by a larger rectifier for the high load condition. Amp-hours were recorded from the amp-hour meter for the low and medium loads for use in subsequent calculations. It was discovered that the amp-hour meter was not accurate when used with the large rectifier so additional PES personnel observed and recorded the amperage setting and plating time for each wheel in order to determine the actual number of amp-hours used.

In order to obtain repeatable current consumption, identical loads were plated during the controlled and uncontrolled tests. For the low load tests, one wheel was plated at a time for a duration of 60-80 seconds. A total of 50 wheels were plated during each test. During the medium load test, an additional dummy wheel was placed in the tank and plated along with the 50 wheels. For the high load test, two additional dummy wheels and four cast aluminum wheel centers were placed in the tank and plated along with the 50 wheels.

During testing, tank temperature was maintained at 100 degrees Fahrenheit. Freeboard height was maintained at 7.5 - 10 inches for all tests. The plating bath chromic acid concentration was 23 oz/gal.

For the controlled emission tests, the fume suppressant manufacturer provided the fume suppressant. The manufacturer's representative, Irving Ferrer, installed suppressant in quantities sufficient to maintain a reduced surface tension in the plating solution (between 33 and 37 dynes/square centimeter).

A record of chemical additions and surface tension measurements is included in the Appendix as part of the test data.

The OMI Zero-Mist System consists of two components: Solid Zero-Mist HT2 Maintenance and Zero-Mist Liquid Maintenace. Once an initial charge of HT2 is added, only the Liquid Maintenance is used to replace drag out. The Zero-Mist System reduces chromic acid drag-out losses and chromic acid mist generated during the course of decorative chromium plating. Zero-Mist reduces the solution surface tension during plating and produces a foam on the surface, thus reducing the spray and mist which would either be thrown into the atmosphere, or drawn up into the exhaust hoods. The reduced surface tension also allows better drainage of racks and parts.

TESTING METHODOLOGY

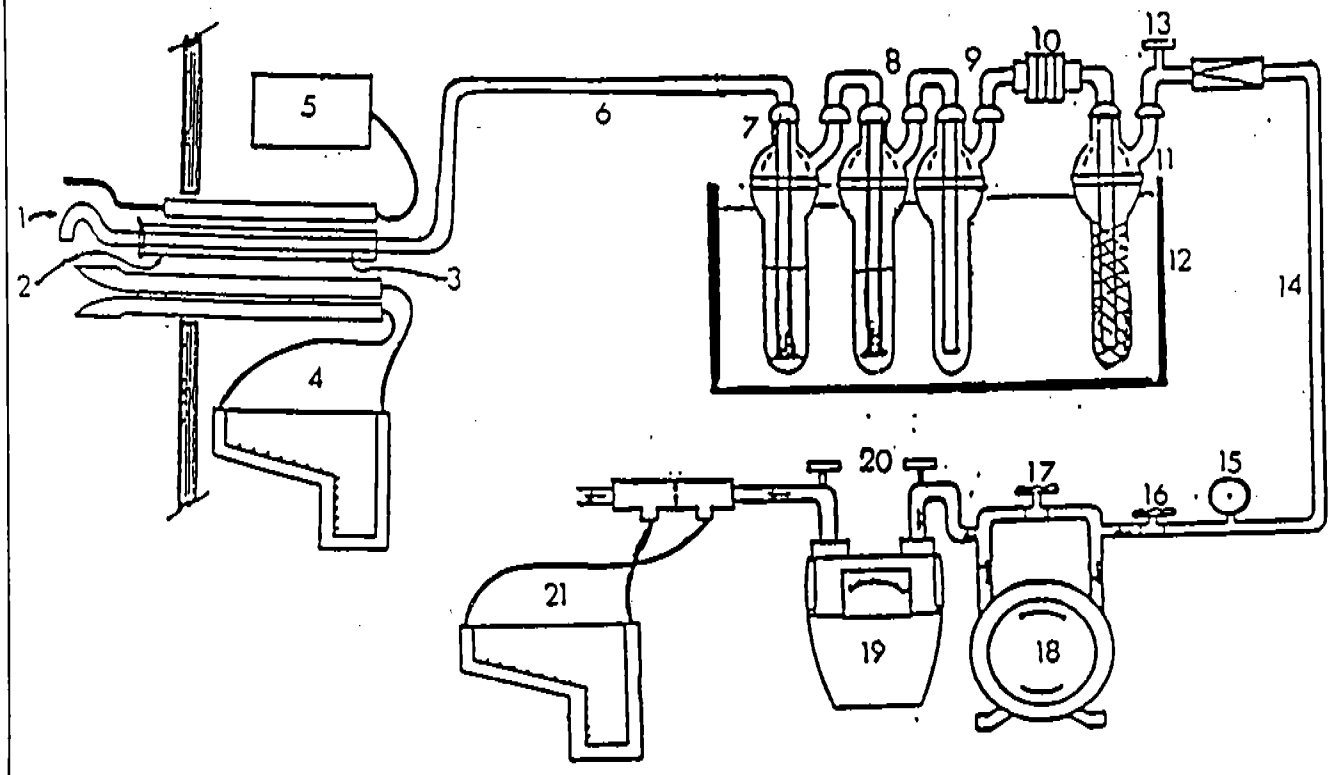
PES used CARB Method 425 for sampling the chrome emissions. Sampling locations, velocity, volumetric flow rate, and moisture content determinations were done in accordance with CARB Methods 1, 2, and 4. As specified by CARB Method 1, 12 sampling points were used.

The sample was extracted through a glass nozzle, a nonheated 20" glass-lined stainless steel probe, a 10 foot teflon hose from the probe to the first impinger, two Greenburg-Smith impingers each with 100 ml of 0.1N sodium hydroxide solution, an empty impinger, a glass filter holder, an impinger filled with silica gel, a 25 foot umbilical line, a vacuum pump, a dry gas meter, and a calibrated orifice connected to an inclined manometer (Figure 2). Teflon coated glass fiber filters with 0.3, 0.1, and 0.035 micron pore layers were used in the filter holders.

The length of each test was 120 minutes. Sample sizes ranged from 92 to 99 cubic feet. The same size nozzle was used for all tests. Field data were recorded on field data sheets during each test (see appendix). Leak checks were performed before and after each test.

The volume of the impinger solution and the weight of the silica gel was recorded before and after the tests in order to obtain the moisture content of the stack gas stream. The contents of the impingers were placed in 500 ml. polyethylene containers and the sampling train components (from the nozzle to the filter) were rinsed 3 times with a 0.1 N sodium hydroxide solution and added to the same containers. Filters were placed in other polyethylene bottles and analyzed separately. The samples were kept at 60 degrees Fahrenheit or less during and after the tests prior to the analyses in order to prevent deterioration of hexavalent chrome to total chrome.

Laboratory analyses were conducted by Thermo Analytical Laboratory in Monrovia, California. Analyses for total chrome used atomic absorption spectrophotometry and analyses for hexavalent chrome used diphenylcarbazide colorometric techniques. The detection level of the analytical procedure for hexavalent chrome, Cr 6, and total chrome, Cr T, were 0.003 and 0.001 mg/l respectively. Total chrome is easier to measure and detection levels can be reduced to lower levels than those possible for hexavalent chrome. Total chrome analyses serve as a back-up and quality control check for hexavalent chrome concentrations.



1. Glass sampling nozzle with teflon union
2. Stainless steel probe sheath
3. Glass-lined probe
4. Type S pitot tube and manometer for velocity determinations
5. Stack temperature sensor
6. 15 ft. teflon probe line with ball and socket connectors
7. Greenburg-Smith impinger with 100 ml. of 0.1 N NaOH solution
8. Greenburg-Smith impinger with 100 ml. of 0.1 N NaOH solution
9. Modified Greenburg-Smith impinger (dry)
10. Filter holder with teflon-coated glass fiber filter
11. Modified Greenburg-Smith impinger filled with 200 grams of silica gel
12. Impinger case filled with ice
13. Impinger exit gas temperature sensor
14. Umbilical line to meter box
15. Vacuum gauge
16. Coarse adjustment valve
17. Bypass valve to adjust sample volume
18. Leak free vacuum pump
19. Dry gas meter
20. Dry gas meter inlet and outlet temperature sensors
21. Orifice with manometer sample volume metering

FIGURE 2

Diagram Of Sampling Train

RESULTS OF SOURCE TESTS

Calculations were made from the field data sheets to determine sample volume, moisture content, molecular weight, velocities, and flow rates of the exhaust gas stream. Results are shown on the emission test calculation sheets (Appendix) and Table 2A-8B.

LOW LOAD

Tests OMID-1 & OMID-2, conducted on the uncontrolled tank with an average amperage of 998 showed an emissions rate of 0.778 mg/amp-hour for total chrome and 0.779 mg/amp-hour for hexavalent chrome (Table 2A and 2B).

Tests OMID-9 & OMID-10, conducted with Zero-Mist and with an average amperage of 814, showed an emissions rate of 0.011 mg/amp-hour for total chrome and 0.007 mg/amp-hour for hexavalent chrome (Table 5A and 5B).

From these results the reduction benefit of Zero-Mist for decorative plating conditions with nominal amperages of 800 was calculated. Results showed a reduction of 97.94% for total chrome and 99.10% respectively for hexavalent chrome (Table 8).

MEDIUM LOAD

Tests OMID-3 & OMID-5, conducted on the uncontrolled tank with an average amperage of 1157 showed an emissions rate of 1.617 mg/amp-hour for total chrome and 1.490 mg/amp-hour for hexavalent chrome (Table 3A and 3B).

Tests OMID-12 & OMID-13, conducted with Zero-Mist and with an average amperage of 985, showed an emissions rate of 0.010 mg/amp-hour for total chrome and 0.000 mg/amp-hour for hexavalent chrome (Table 6A and 6B).

From these results the reduction benefit of Zero-Mist for decorative plating conditions with nominal amperages of 1000 A was calculated. Results showed a reduction of 99.34% total chrome and 100.00% respectively for hexavalent chrome (Table 8).

HIGH LOAD

Tests OMID-6 & OMID-7, conducted on the uncontrolled tank with an average amperage of 2312, showed an emissions rate of 0.846 mg/amp-hour for total chrome and 0.687 mg/amp-hour for hexavalent chrome (Table 4A and 4B).

Tests OMID-15 & OMID-16, conducted with Zero-Mist and with an average amperage of 2476, showed an emissions rate of 0.003 mg/amp-hour for total chrome and 0.002 mg/amp-hour for hexavalent chrome (Table 7A and 7B).

From these results the reduction benefit of Zero-Mist for decorative plating conditions with nominal amperages of 2300 A was calculated. Results showed a reduction of 99.67% for total chrome and 99.78% for hexavalent chrome (Table 8).

SUMMARY

When Zero-Mist was used in the decorative chrome plating solution in quantities to keep the surface tension between 32.0 and 36.5 dynes/square centimeter, hexavalent chrome emissions were reduced by an average of 99.63% for plating loads between 800 and 2300 amperes.

TABLE 2A: TOTAL CHROME EMISSIONS FROM AN UNCONTROLLED DECORATIVE CHROME TANK PLATING AT LOW LOAD

TEST DATE: 6/11/90
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 900 A - During Intermittent Plating

OMID-1L Sample liquid from the impingers in the sample train for test OMID-1.
OMID-1F Sample caught on the filter in the sample train for test OMID-1.
OMID-2L Sample liquid from the impingers in the sample train for test OMID-2.
OMID-2F Sample caught on the filter in the sample train for test OMID-2.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr T (mg/l)	Impinger Catch Cr T (mg)	Filter Catch Cr T (mg)	Total Catch Cr T (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr T (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr T (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr T (mg/amp-hour)
OMID-1L	570	0.7260	0.414								
OMID-1F				0.0043							
TEST TOTAL					0.4181	87.864	0.0048	2105	601	1029	0.584
OMID-2L	665	0.9960	0.662								
OMID-2F				0.0038							
TEST TOTAL					0.6661	88.730	0.0075	2087	940	967	0.972
AVERAGE							0.0061	2096	771	998	0.778

TABLE 2B: HEXAVALENT CHROME EMISSIONS FROM AN UNCONTROLLED DECORATIVE CHROME PLATING TANK AT LOW LOAD

TEST DATE: 6/11/90
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 900 A - During Intermittent Plating

OMID-1L Sample liquid from the impingers in the sample train for test OMID-1.
OMID-1F Sample caught on the filter in the sample train for test OMID-1.
OMID-2L Sample liquid from the impingers in the sample train for test OMID-2.
OMID-2F Sample caught on the filter in the sample train for test OMID-2.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr 6 (mg/l)	Impinger Catch Cr 6 (mg)	Filter Catch Cr 6 (mg)	Total Catch Cr 6 (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr 6 (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr 6 (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
OMID-1L	570	0.8570	0.488								
OMID-1F				0.0017							
TEST TOTAL					0.4902	87.864	0.0056	2105	705	1029	0.685
OMID-2L	665	0.8970	0.597								
OMID-2F				0.0025							
TEST TOTAL					0.5990	88.730	0.0067	2087	845	967	0.874
AVERAGE							0.0062	2096	775	998	0.779

TABLE 3A: TOTAL CHROME EMISSIONS FROM AN UNCONTROLLED DECORATIVE CHROME PLATING TANK AT MEDIUM LOAD

TEST DATE: 6/11/90 and 6/12/90
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 1300 A - During Intermittent Plating

OMID-3L Sample liquid from the impingers in the sample train for test OMID-3.
OMID-3F Sample caught on the filter in the sample train for test OMID-3.
OMID-5L Sample liquid from the impingers in the sample train for test OMID-5.
OMID-5F Sample caught on the filter in the sample train for test OMID-5.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr T (mg/l)	Impinger Catch Cr T (mg)	Filter Catch Cr T (mg)	Total Catch Cr T (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr T (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr T (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr T (mg/amp-hour)
OMID-3L	500	1.1460	0.5730								
OMID-3F				0.0026							
TEST TOTAL					0.5756	86.760	0.0066	2066	822	1011	0.813
OMID-5L	695	3.1960	2.2212								
OMID-5F				0.0052							
TEST TOTAL					2.2264	89.210	0.0250	2106	3154	1303	2.420
AVERAGE							0.0158	2086	1988	1157	1.617

TABLE 3B: HEXAVALENT CHROME EMISSIONS FROM AN UNCONTROLLED DECORATIVE CHROME PLATING TANK AT MEDIUM LOAD

TEST DATE: 6/11/90 and 6/12/90
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 1300 A - During Intermittent Plating

OMID-3L Sample liquid from the impingers in the sample train for test OMID-3.
OMID-3F Sample caught on the filter in the sample train for test OMID-3.
OMID-5L Sample liquid from the impingers in the sample train for test OMID-5.
OMID-5F Sample caught on the filter in the sample train for test OMID-5.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr 6 (mg/l)	Impinger Catch Cr 6 (mg)	Filter Catch Cr 6 (mg)	Total Catch Cr 6 (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr 6 (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr 6 (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
OMID-3L OMID-3F TEST TOTAL	500	1.2970	0.6485	0.0015	0.6500	86.760	0.0075	2066	929	1011	0.919
OMID-5L OMID-5F TEST TOTAL	695	2.7270	1.8950	0.0010	1.8960	89.210	0.0213	2106	2686	1303	2.061
AVERAGE							0.0144	2086	1807	1157	1.490

TABLE 4A: TOTAL CHROME EMISSIONS FROM AN UNCONTROLLED DECORATIVE CHROME PLATING TANK AT HIGH LOAD

TEST DATE: 6/12/90
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 2300 A - During Intermittent Plating

OMID-6L Sample liquid from the impingers in the sample train for test OMID-6.
OMID-6F Sample caught on the filter in the sample train for test OMID-6.
OMID-7L Sample liquid from the impingers in the sample train for test OMID-7.
OMID-7F Sample caught on the filter in the sample train for test OMID-7.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr T (mg/l)	Impinger Catch Cr T (mg)	Filter Catch Cr T (mg)	Total Catch Cr T (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr T (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr T (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr T (mg/amp-hour)
OMID-6L	800	2.1760	1.741								
OMID-6F				0.0000							
TEST TOTAL					1.7408	90.470	0.0192	2080	2401	2227	1.078
OMID-7L	710	0.6460	0.459								
OMID-7F				0.0042							
TEST TOTAL					0.4629	89.420	0.0052	1881	584	2397	0.244
AVERAGE							0.0122	1981	1493	2312	0.661

TABLE 4B: HEXAVALENT CHROME EMISSIONS FROM AN UNCONTROLLED DECORATIVE CHROME PLATING TANK AT HIGH LOAD

TEST DATE: 6/12/90
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 2300 A - During Intermittent Plating

OMID-6L Sample liquid from the impingers in the sample train for test OMID-9.
OMID-6F Sample caught on the filter in the sample train for test OMID-9.
OMID-7L Sample liquid from the impingers in the sample train for test OMID-10.
OMID-7F Sample caught on the filter in the sample train for test OMID-10.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr 6 (mg/l)	Impinger Catch Cr 6 (mg)	Filter Catch Cr 6 (mg)	Total Catch Cr 6 (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr 6 (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr 6 (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
OMID-6L	800	1.8470	1.477								
OMID-6F				0.0009							
TEST TOTAL					1.4787	90.470	0.0163	2080	2040	2227	0.916
OMID-7L	710	0.4270	0.303								
OMID-7F				0.0053							
TEST TOTAL					0.3085	89.420	0.0034	1881	389	2397	0.162
AVERAGE							0.0099	1981	1215	2312	0.539

TABLE 5A: TOTAL CHROME EMISSIONS FROM A CONTROLLED DECORATIVE CHROME PLATING TANK AT LOW LOAD

TEST DATE: 6/14/90
POLLYBALLS: None
ADDITIVE: Yes
AMPERAGE: Nominally 900 A - During Intermittent Plating

OMID-9L Sample liquid from the impingers in the sample train for test OMID-9.
OMID-9F Sample caught on the filter in the sample train for test OMID-9.
OMID-10L Sample liquid from the impingers in the sample train for test OMID-10.
OMID-10F Sample caught on the filter in the sample train for test OMID 10.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr 6 (mg/l)	Impinger Catch Cr 6 (mg)	Filter Catch Cr 6 (mg)	Total Catch Cr 6 (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr 6 (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr 6 (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
OMID-9L	565	0.0130	0.007								
OMID-9F				0.0000							
TEST TOTAL					0.0073	92.550	0.0001	2180	10	862	0.012
OMID-10L	545	0.0090	0.005								
OMID-10F				0.0000							
TEST TOTAL					0.0049	95.200	0.0001	2248	7	765	0.009
AVERAGE							0.0001	2214	9	814	0.011

TABLE 5B: HEXAVALENT CHROME EMISSIONS FROM A CONTROLLED DECORATIVE CHROME PLATING TANK AT LOW LOAD

TEST DATE: 6/14/90
POLLYBALLS: None
ADDITIVE: Yes
AMPERAGE: Nominally 900 A - During Intermittent Plating

OMID-9L Sample liquid from the impingers in the sample train for test OMID-9.
OMID-9F Sample caught on the filter in the sample train for test OMID-9.
OMID-10L Sample liquid from the impingers in the sample train for test OMID-10.
OMID-10F Sample caught on the filter in the sample train for test OMID-10.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr 6 (mg/l)	Impinger Catch Cr 6 (mg)	Filter Catch Cr 6 (mg)	Total Catch Cr 6 (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr 6 (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr 6 (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
OMID-9L	565	0.007	0.0040								
OMID-9F				0.0000							
TEST TOTAL					0.0040	92.55	0.0000	2180	5.6	862	0.006
OMID-10L	545	0.0070	0.0038								
OMID-10F				0.0006							
TEST TOTAL					0.0044	95.200	0.0000	2248	6.3	765	0.008
AVERAGE							0.00010	2214	5.9	814	0.007

TABLE 6A: TOTAL CHROME EMISSIONS FROM A CONTROLLED DECORATIVE CHROME PLATING TANK AT MEDIUM LOAD

TEST DATE: 6/15/90
POLLYBALLS: None
ADDITIVE: Yes
AMPERAGE: Nominally 1300 A - During Intermittent Plating

OMID-12L Sample liquid from the impingers in the sample train for test OMID-12.
OMID-12F Sample caught on the filter in the sample train for test OMID-12.
OMID-13L Sample liquid from the impingers in the sample train for test OMID-13.
OMID-13F Sample caught on the filter in the sample train for test OMID-13.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr T (mg/l)	Impinger Catch Cr T (mg)	Filter Catch Cr T (mg)	Total Catch Cr T (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr T (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr T (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr T (mg/amp-hour)
OMID-12L OMID-12F TEST TOTAL	600	0.0070	0.0042	0.0021	0.0063	94.47	0.00007	2220	8.9	1062	0.008
OMID-13L OMID-13F TEST TOTAL	570	0.0120	0.0068	0.0016	0.0084	96.320	0.00009	2239	11.7	908	0.013
AVERAGE							0.00008	2230	10.3	985	0.011

TABLE 6B: HEXAVALENT CHROME EMISSIONS FROM A CONTROLLED DECORATIVE CHROME PLATING TANK AT MEDIUM LOAD

TEST DATE: 6/15/90
POLLYBALLS: None
ADDITIVE: Yes
AMPERAGE: Nominally 1300 A - During Intermittent Plating

OMID-12L Sample liquid from the impingers in the sample train for test OMID-12.
OMID-12F Sample caught on the filter in the sample train for test OMID-12.
OMID-13L Sample liquid from the impingers in the sample train for test OMID-13.
OMID-13F Sample caught on the filter in the sample train for test OMID-13.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr 6 (mg/l)	Impinger Catch Cr 6 (mg)	Filter Catch Cr 6 (mg)	Total Catch Cr 6 (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr 6 (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr 6 (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
OMID-12L OMID-12F TEST TOTAL	600	0.0000	0.0000	0.0004	0.0004	94.47	0.00000	2220	0.0	1062	0.000
OMID-13L OMID-13F TEST TOTAL	570	0.0000	0.0000	0.0000	0.0000	96.320	0.00000	2239	0.0	908	0.000
AVERAGE							0.00000	2230	0.0	985	0.000

TABLE 7A: TOTAL CHROME EMISSIONS FROM A CONTROLLED DECORATIVE CHROME PLATING TANK AT HIGH LOAD

TEST DATE: 6/18/90
POLLYBALLS: None
ADDITIVE: Yes
AMPERAGE: Nominally 2300 A - During Intermittent Plating

OMID-15L Sample liquid from the impingers in the sample train for test OMID-15.
OMID-15F Sample caught on the filter in the sample train for test OMID-15.
OMID-16L Sample liquid from the impingers in the sample train for test OMID-16.
OMID-16F Sample caught on the filter in the sample train for test OMID-16.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr T (mg/l)	Impinger Catch Cr T (mg)	Filter Catch Cr T (mg)	Total Catch Cr T (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr T (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr T (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr T (mg/amp-hour)
OMID-15L OMID-15F TEST TOTAL	750	0.0080	0.0060	0.0004	0.0064	97.36	0.00007	2265	8.9	2430	0.004
OMID-16L OMID-16F TEST TOTAL	740	0.0040	0.0030	0.0008	0.0038	97.100	0.00004	2258	5.2	2521	0.002
AVERAGE							0.00005	2262	16.8	2476	0.003

TABLE 7B: HEXAVALENT CHROME EMISSIONS FROM A CONTROLLED DECORATIVE CHROME PLATING TANK AT HIGH LOAD

TEST DATE: 6/18/90
POLLYBALLS: None
ADDITIVE: Yes
AMPERAGE: Nominally 2300 A - During Intermittent Plating

OMID-15L Sample liquid from the impingers in the sample train for test OMID-15.
OMID-15F Sample caught on the filter in the sample train for test OMID-15.
OMID-16L Sample liquid from the impingers in the sample train for test OMID-16.
OMID-16F Sample caught on the filter in the sample train for test OMID-16.

SAMPLE RUN NUMBER	SAMPLE VOLUME (ml)	Conc. Cr 6 (mg/l)	Impinger Catch Cr 6 (mg)	Filter Catch Cr 6 (mg)	Total Catch Cr 6 (mg)	SAMPLE METER VOL (dscf)	EMISSIONS Cr 6 (mg/dscf)	STACK FLOW RATE (dscfm)	ACTUAL EMISSIONS Cr 6 (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
OMID-15L	750	0.0070	0.0053								
OMID-15F				0.0000							
TEST TOTAL					0.0053	97.36	0.00005	2265	7.3	2430	0.003
OMID-16L	740	0.0000	0.0000								
OMID-16F				0.0000							
TEST TOTAL					0.0000	97.100	0.00000	2258	0.0	2521	0.000
AVERAGE							0.00003	2262	9.5	2476	0.002

TABLE 8: SUMMARY OF RESULTS AND PERCENT REDUCTION EFFICIENCY WITH OMI'S UDYLITE

TEST NUMBERS	TEST CONDITIONS	AVERAGE AMP-HOURS USED	AVERAGE EMISSIONS Cr T (mg/amp-hour)	AVERAGE EMISSIONS Cr 6 (mg/amp-hour)	REDUCTION EFFICIENCY Cr T	REDUCTION EFFICIENCY Cr 6
Low Load						
OMID-1 & OMID-2	Uncontrolled	998	0.778	0.779		
OMID-9 & OMID-10	Additive	814	0.016	0.007	97.94	99.10
Medium Load						
OMID-3 & OMID-5	Uncontrolled	1157	1.617	1.490		
OMID-12 & OMID-13	Additive	985	0.011	0.000	99.34	100.00
High Load						
OMID-6 & OMID-7	Uncontrolled	2312	0.846	0.687		
OMID-15 & OMID-16	Additive	2476	0.003	0.002	99.67	99.78
				AVERAGE	98.98	99.63

QUALITY ASSURANCE/QUALITY CONTROL

Source tests are performed to determine the types and amounts of pollutants emitted by a source. Information from this source test program may be used for obtaining permits, evaluating control equipment performance, updating emission inventories, and determining compliance with present and future emission regulations. For these purposes, reliable data are required. PES provided this reliability by using the following work practices:

Use Of Standard Test Procedures

CARB Methods 1 and 2 were utilized to determine if the existing sampling locations were acceptable. CARB Method 425 was used to determine the emission rates. A procedure must be thoroughly studied under various conditions in order to be designated as a CARB Method. Results of many executions of the procedure are compared to demonstrate accuracy and repeatability before adoption of the procedure as a source testing method.

Use Of Trained Test Personnel

Because of the complexity of typical source testing methods, testers should be trained and experienced with the test procedures in order to assure reliable results. PES personnel have had professional training and routinely conduct source tests.

Knowledge Of Source's Operation

The source testing team should have sufficient knowledge of the process to be tested in order to properly document the process parameters during the tests. Without documentation of the process parameters used, results are much less meaningful. PES has previously tested chrome platers and anodizers and is familiar with the processes.

Equipment Maintenance and Calibration

Use of properly maintained and calibrated test equipment is essential for minimizing systematic errors in results. All PES sampling devices are constructed, maintained, and calibrated as

suggested in EPA documents APTD-0576, and APTD-0581 (These are commonly accepted construction and maintenance manuals for source testing equipment). The meter box was not moved from the site during the test series. It was calibrated before and after the tests to make sure that the gas meter correction factor remained within tolerance during the tests. The transfer gas meter was professionally calibrated with an NBS traceable standard. These calibrations are included in the appendix of this report.

Thorough Record Keeping

All data relating to the operation of the sampling train was immediately recorded to ensure that it was not lost or misinterpreted. All PES field data sheets are included in the appendix of this report. The PES test team is familiar with these sheets and the information required to complete them. Any unusual occurrences in the process operation, unusual test instrument readings, or any other items that could affect the test results were also noted.

Proper Sample Handling Procedures

Inaccurate source test results can be caused by delays in retrieving samples, contamination of the samples, insufficient sample identification, tampering, and mishandling of samples. The chances of these errors are greatly increased when too many people are permitted to handle the samples. For this reason, a chain of custody procedure was used. The samples were retrieved and kept in a secure area until analyses. The samples were chilled until analyses to minimize breakdown from hexavalent to total chromium. The sample submittal/chain of custody forms were completed and submitted with all samples to document that the sample analyzed was taken under the conditions reported.

Extra care was used during sample retrieval. Clean rubber stoppers were used to cap the trains. Each sampling train was rinsed three times with 0.1 normal sodium hydroxide solution after the each test and these rinses were added to the respective sample. Disposable rubber gloves were worn during sample retrieval to help eliminate contamination. All sample volumes and weights were recorded immediately on sample recovery sheets during charging and sample recovery.

Use Of Thoroughly Cleaned Glassware

All glassware and probe lines were cleaned prior to the tests with hot tap water and then with 0.1 normal nitric acid solution. The trains then were cleaned with 0.1 N sodium hydroxide solution, laboratory grade distilled water, rinsed with laboratory grade acetone, air dried, and sealed until the tests.

Use Of Standardized Data Reduction Techniques

Data reduction was accomplished by the use of step by step calculation sheets and computer spread sheets. The calculations are systematic and easy to follow. All calculations for each source test are included in this report.

Submission Of Blank Samples

Filter and reagent samples from an unused but charged sampling train carried to the field (a train blank) were submitted to the laboratory and analyzed with the other samples to detect any possible contamination of sampling media or problems with lab analyses. The blank samples were not identified for the laboratory. Corrections were made to the measured concentrations of the collected samples in accordance with the blank train results. Table 9 of this report contains the results of the blank sample analyses.

TABLE 9: TRAIN BLANK RESULTS

TEST DATE	SAMPLE NUMBER	LIQUID Cr6	LIQUID CrT	FILTER Cr6	FILTER CrT
06-11-90	OMID-4	0.01 mg/l	<0.005 mg/l	<0.5 ug	2.5 ug
06-12-90	OMID-8	<0.003 mg/l	0.015 mg/l	<0.5 ug	1.3 ug
06-14-90	OMID-11	<0.003 mg/l	<0.001 mg/l	<0.5 ug	1.6 ug
06-15-90	OMID-14	<0.003 mg/l	<0.001 mg/l	<0.5 ug	4.3 ug
06-18-90	OMID-17	<0.003 mg/l	<0.001 mg/l	<0.5 ug	4.0 ug
Average		0.003 mg/l	0.004 mg/l	0.25 ug	3.6 ug

The field tests were conducted by Mark J. Simon. Study direction and report preparation were under the supervision of M. Dean High, Vice President of Pacific Environmental Services, Inc.

Approved: M Dean High
M. Dean High

APPENDIX

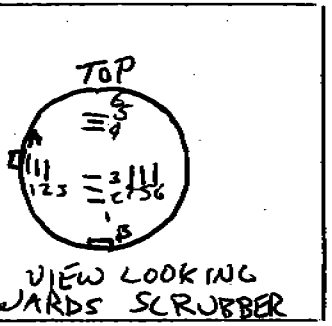
Traverse Point Locations
Genie's Plating Works

Point	Duct Diam.	Fraction		
1	12"	.044	.528	→ ½"
2	12"	.146	1.752	1¾"
3	12"	.296	3.552	3½"
4	12"	.704	8.448	8½"
5	12"	.854	10.248	10¼"
6	12"	.956	11.472	→ 11½"

FIELD DATA

# of wheels plated = 50

Plant Gene's Plating Works
Date 6-11-90
Sampling Location INLET DUCT
Sample Type CARB 425 CHROME
Run Number OMID-1
Operator SIMON
Ambient Temperature 85° F
Barometric Pressure 29,
Static Pressure (P_s) -2.2" H_2O
Filter Number(s) OMID-1F
Pretest Leak Rate = 0.006 cfm @ 10.0 in. Hg
Pretest Pitot Leak Check ✓
Pretest Orsat Leak Check N.A.
Read and Record all Data Every 10 Minutes



Schematic of Traverse Point Layout

Probe Length and Type 20" glass-lined, SS
Pitot Tube I.D. No. S-3A
Nozzle I.D. No. & Diameter 0.70
Assumed Moisture, % 1.0

Meter Box Number 7A
Meter $\Delta H_@$ 1.931
C Factor 1.20
Meter Gamma 1.033
Heater Box Setting N.A.
Reference Δp 0.60
Post Test Leak Rate = 0.006 cfm @ 10.0 in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check N.A.

Impinger Box No. 5B; Blank Box No.

Traverse Point Number	Sampling Time, (min) / Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
B1	0 / 1029	031.695	~~0.71~~	2.25	✓	88	91	89	5.5	N.A	68
B1	10 / 1038	038.9	0.57	1.85	✓	87	89	91	5.5	-	57
B2	20 / 1048	046.6	0.63	2.00	✓	87	102	93	5.0	-	62
B3	30 / 1058	053.8	0.82	2.60	✓	87	102	94	5.0	-	63
B4	40 / 1108	061.5	0.76	2.40	✓	88	103	96	6.0	-	64
B5	50 / 1118	070.0	0.71	2.25	✓	86	105	97	5.5	-	65
B6	60 / 1128	077.064	~~0.63~~	1.98	✓	88	102	98	5.0	-	64
A1	70 / 1139	084.3	0.71	2.25	✓	87	105	99	5.5	-	62
A2	80 / 1149	092.2	0.66	2.10	✓	87	106	99	5.5	-	63
A3	90 / 1159	100.1	0.76	2.40	✓	87	106	100	6.0	-	63
A4	100 / 1209	108.8	0.70	2.15	✓	87	107	100	5.5	-	62
A5	110 / 1219	116.6	0.74	2.30	✓	87	107	101	5.5	-	62
A6	120 / 1229	124.112	-	-	-	-	-	-	-	-	63
-	- / -	STOP - END OF TEST 2				-	-	-	-	-	-
	/										
	/										≤68 ✓
	/	$\bar{V}_m$ = ~~84.915~~ 92.427 ✓	92.421 ✓						MAX=6.0 ✓		
	/										
	/	$\sqrt{\Delta P}$ = .8352 ✓									
	/										
	/		ΔH = 2.21 ✓								
	/					$\bar{T}_s$ = 547 ✓					
	/						$\bar{T}_m$ = 559 ✓				

SWITCH START AT 1129

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date:

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMID-1

Sample Box Number: SB

Clean-up Man: SIMON/HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number: OMID-1F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	120.0 ml	95 ml	2 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	+20 ml	-5 ml	+2 ml
Total H_2O:			+17
Silica Gel			
Final Volume:	691.7 g	g	g
Initial Volume	675.4 g	g	g
Net Volume	+16.3 g	g	g
Total Moisture:			+33.3

Description of Impinger Catch:

Plant: GENE'S PLATING WORKS
Date: 6-11-90
Source/Sample Number: OMID-1

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H/13.6)}{T_m}\right]$

$V_{m(std)} = 17.64(92.427)(1.033)\left[\frac{(29.0) + (2.21/13.6)}{(559)}\right]$

$V_{m(std)} =$ 87.864 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 33.3 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (.04707)(1.57) scf

$V_{W(std)} =$ 1.57 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.57)}{(1.57)+(87.864)} = \frac{1.57}{89.434}$

$B_{Ws} =$ .018

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ ) + 0.320(\ \ ) + 0.280(\ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (.018)(18 - 29)$

$M_s =$ 28.80 lb/lb-mole

Plant: GENE'S PLATING WORKS
Date: 6-11-90
Source/Sample Number: OMID-1

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8352)\sqrt{\frac{(547)}{(29.16)(28.80)}}$$

$V_{s(avg)}$ = 48.40 ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (48.40)(.7854)$$

Q_s = 2280 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} =$$

$$Q_{(std)} = 17.64(2280)(1-.018)\frac{(29.16)}{(547)}$$

Q_{std} = 2185 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})}$$

$$= 0.0945\ \frac{(547)(87.864)}{(29.16)(48.40)(.00030)(120)(1-.018)}$$

%I = 91.0 %

FIELD DATA

#FWHEELS = 50

Plant Gene's Plating
Date 6-11-90
Sampling Location Scrubber Inlet Duct
Sample Type CARB 425 Chrome
Run Number OMID-2
Operator SIMON
Ambient Temperature 85°F
Barometric Pressure
Static Pressure (P_s) -2.2" H_2O
Filter Number(s) OMID-2F
Pretest Leak Rate = 0.010 cfm @ 10.0 in. Hg
Pretest Pitot Leak Check ✓
Pretest Orsat Leak Check N.A.
Read and Record all Data Every 10 Minutes

SAME AS OMID-1

Schematic of Traverse Point Layout

Probe Length and Type 20" glass-lined SS
Pitot Tube I.D. No. S-3A
Nozzle I.D. No. & Diameter 40P
Assumed Moisture, % 1.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.931
C Factor 1.15
Meter Gamma 1.033
Heater Box Setting N.A.
Reference Δp 0.60
Post Test Leak Rate = 0.01 cfm @ 10.0 in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check N.A.

Impinger Box No. ~~1B~~ 1B Blank Box No.

Traverse Point Number	Sampling Time, (min)	/ Clock Time / (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
B1	0	1252	124.536	0.76	2.40	✓	89	101	99	6.0	N.A.	57
B1	10	1302	132.5	0.60	1.85	✓	90	104	99	6.5	—	62
B2	20	1312	139.5	0.54	1.70	✓	92	106	100	5.0	—	63
B3	30	1322	146.9	0.81	2.55	✓	91	108	101	6.5	—	64
B4	40	1332	155.5	0.76	2.40	✓	91	109	102	6.0	—	66
B5	50	1342	163.6	0.69	2.15	✓	91	109	103	6.0	—	64
B6	60	1352	171.6	0.54	1.70	✓	92	106	103	5.0	—	65
A1	70	1403	178.5	0.66	2.10	✓	91	109	104	5.5	—	60
A2	80	1413	187.2	0.70	2.20	✓	87	109	104	5.5	—	60
A3	90	1423	194.0	0.76	2.40	✓	89	109	104	6.0	—	62
A4	100	1433	202.2	0.74	2.30	✓	99	110	104	6.0	—	61
A5	110	1443	210.7	0.72	2.25	✓	89	110	105		—	61
A6	120	1453	218.898	—	—	—	—	—	—	—	—	—
		/			STOP = END OF TEST							
		/	V_m= ~~86.444~~ 94.352 ✓									
		/		$\sqrt{\Delta P}$ = .8290 ✓								
		/			$\overline{\Delta H}$ = 2.17 ✓							
		/										
		/					$\overline{T_s}$ = 550 ✓					
		/						$\overline{T_m}$ = 565 ✓				
		/										

SWITCH START AT: 1353

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S RATING WORKS

Date: 11 JUNE 90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMID-2

Sample Box Number: 1B

Clean-up Man: SIMON/HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number: OMID-2F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	125 ml	90 ml	1 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	+25 ml	-10 ml	+1 ml
Total H_2O:			+16
Silica Gel			
Final Volume:	691.5 g	g	g
Initial Volume	675.1 g	g	g
Net Volume	+16.4 g	g	g
Total Moisture:			+32.4

Description of Impinger Catch:

PES

Plant: GENE'S PLATING WORKS
Date: 6-11-90
Source/Sample Number: AM1D-2

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H/13.6)}{T_m}\right]$

$V_{m(std)} = 17.64(94.352)(1.033)\left[\frac{(29.0) + (2.17/13.6)}{(565)}\right]$

$V_{m(std)} =$ 88.73 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 32.4 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (.04707)(32.4) scf

$V_{W(std)} =$ 1.52 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.52)}{(1.52)+(88.73)} = \frac{1.52}{90.25}$

$B_{Ws} =$ .017

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ ) + 0.320(\ \ ) + 0.280(\ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (.017)(18 - 29)$

$M_s =$ 28.81 lb/lb-mole

PES

Plant: GENE'S PLATING WORKS
Date: 10-11-90
Source/Sample Number: OMID - 2

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8290)\sqrt{\frac{(550)}{(29.16)(28.81)}}$$

$V_{s(avg)}$ = 48.17 ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (48.17)(.7854)$$

Q_s = 2270 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} =$$

$$Q_{(std)} = 17.64(2270)(1-.07)\frac{(29.16)}{(550)}$$

Q_{std} = 2087 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})}$$

$$= 0.0945\ \frac{(550)(88.73)}{(29.16)(48.17)(.00027)(120)(1-.07)}$$

%I = 103.1 %

FIELD DATA

Plant GENE'S PLATING WORKS
Date 6-11-90
Sampling Location SCRUBBER INLET DUCT
Sample Type CARB 425 CHROME
Run Number OMID-3
Operator SIMON
Ambient Temperature 85°F, Sunny
Barometric Pressure
Static Pressure (P_s) -2.2" H_2O
Filter Number(s) OMID-3F
Pretest Leak Rate = 0.004 cfm @ 10.0 in. Hg
Pretest Pitot Leak Check ✓
Pretest Orsat Leak Check N.A.
Read and Record all Data Every 10 Minutes

SAME AS OMID-1

Schematic of Traverse Point Layout

Probe Length and Type 20" 9kss-lined SS
Pitot Tube I.D. No. S-3A
Nozzle I.D. No. & Diameter 41P
Assumed Moisture, % 1.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.931
C Factor 1.15
Meter Gamma 1.033
Heater Box Setting N.A.
Reference Δp 0.60
Post Test Leak Rate = ___ cfm @ ___ in. Hg
Post Test Pitot Leak Check
Post Test Orsat Leak Check N.A.

Impinger Box No. 4B ; BLANK Box No:

Traverse Point Number	Sampling Time, (min) / Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
B1	0 / 1521	218.952	0.73	2.30	✓	90	100	100	5.0	—	62
B1	10 / 1531	226.7	0.66	2.10	✓	90	105	101	5.0	—	62
B2	20 / 1541	234.4	0.61	1.90	✓	89	107	101	4.5	—	63
B3	30 / 1551	241.9	0.67	2.10	✓	90	108	102	4.5	—	63
B4	40 / 1601	250.2	0.74	2.30	✓	89	108	102	5.0	—	64
B5	50 / 1611	258.4	0.81	2.50	✓	88	109	103	5.5	—	64
B6	60 / 1621	266.625	0.63	1.95	✓	90	106	103	5.0	—	63
A1	70 / 1623	273.8	0.60	1.95	✓	89	108	102	4.5	—	64
A2	80 / 1633	281.3	0.62	1.90	✓	87	108	103	4.5	—	63
A3	90 / 1643	288.5	0.67	2.10	✓	88	108	103	4.5	—	63
A4	100 / 1653	295.9	0.66	2.10	✓	88	108	103	4.5	—	63
A5	110 / 1703	304.2	0.69	2.15	✓	88	109	102	5.0	—	63
A6	120 / 1713	311.062	—	—	—	—	—	—	—	—	—
	/		STOP - END OF TEST								
	/	V_m = 85.110 ✓ 92.11 ✓									
	/	$\overline{\Delta P}$ = .8198 ✓									
	/		$\overline{\Delta H}$ = 2.10 ✓			$\overline{T_s}$ = 549 ✓		$\overline{T_m}$ = 564 ✓			
	/										
	/										
	/										
	/										

SWITCH START AT 1623 →

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S RATING WORKS

Date:

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMD-3

Sample Box Number: 4B

Clean-up Man: SIMON / HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number: OMD-3F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	94.0 ml	117.0 ml	3 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	-6 ml	+17 ml	+3 ml
Total H_2O:			+14

Silica Gel			
Final Volume:	663.6 g	g	g
Initial Volume	646.0 g	g	g
Net Volume	+17.6 g	g	g
Total Moisture:			+31.6

Description of Impinger Catch:

PES

Plant: GENE'S PLATING WORKS
Date: 6-11-90
Source/Sample Number: RMW-3

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H/13.6)}{T_m}\right]$

$V_{m(std)} = 17.64(92.11)(1.033)\left[\frac{(29.0) + (2.10/13.6)}{(564)}\right]$

$V_{m(std)} =$ 86.76 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 31.6 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (.04707)(31.6) scf

$V_{W(std)} =$ 1.48 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.48)}{(1.48)+(86.76)} = \frac{1.48}{88.24}$

$B_{Ws} =$ .017

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ ) + 0.320(\ \ ) + 0.280(\ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{ws}(18 - M_d) = (29.0) + (.017)(18 - 29)$

$M_s =$ 28.81 lb/lb-mole

Plant: GENE'S PLATING WORKS
Date: 6-11-90
Source/Sample Number: OMD-3

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8198)\sqrt{\frac{(549)}{(29.16)(28.81)}}$$

$V_{s(avg)}$ = 47.59 ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (47.59)(.7854)$$

Q_s = 2243 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} =$$

$$Q_{(std)} = 17.64(2243)(1-.017)\frac{(29.16)}{(549)}$$

Q_{std} = 2066 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})\ \Delta}$$

$$= 0.0945\ \frac{(549)(29.16)86.76}{(29.16)(47.59)(.00027)(120)(1-.017)}$$

%I = 101.8 %

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 11 JUNE 90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMID-4

Sample Box Number: 2B

Clean-up Man: SIMON / HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number: OMID-4F

Description of Filter:

MOISTURE

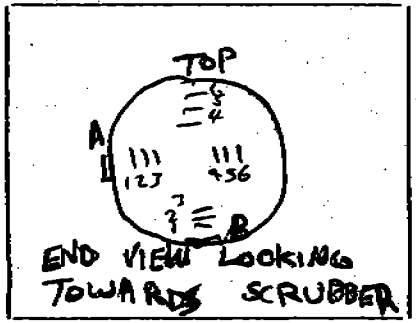
Impingers			
Final Volume:	100 ml	99 ml	ø ml
Initial Volume:	100 ml	100 ml	ø ml
Net Volume:	0 ml	-1 ml	0 ml
Total H_2O:			-1
Silica Gel			
Final Volume:	663.6 g	g	g
Initial Volume	646.0 g	g	g
Net Volume	+17.6 g	g	g
Total Moisture:			+16.6

Description of Impinger Catch:

FIELD DATA

No. of WHEELS = 50

Plant GENE'S PLATING
Date 6-12-90
Sampling Location TANK 42 INLET DUCT
Sample Type CARB 425 CHROME
Run Number OMID-5
Operator SIMON
Ambient Temperature 90°F, Sunny
Barometric Pressure
Static Pressure (P_g) −2.2" H_2O
Filter Number(s) OMID-5
Pretest Leak Rate = 0.014 cfm @ 10.5 in. Hg
Pretest Pitot Leak Check ✓
Pretest Orsat Leak Check N.A
Read and Record all Data Every 10 Minutes



Schematic of Traverse Point Layout

Probe Length and Type 20" glass-lined SS
Pitot Tube I.D. No. 5-3A
Nozzle I.D. No. & Diameter 43P
Assumed Moisture, % 1.0

Meter Box Number 1A
Meter $\Delta H_@$ ~~1.946~~ 1.931
C Factor 1.15
Meter Gamma 1.033
Heater Box Setting N.A.
Reference Δp 0.60
Post Test Leak Rate = 0.015 cfm @ 10.0 in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check N.A.

Impinger Box No. 1B ; Blank Box No. 2B

Traverse Point Number	Sampling Time, (min) / Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
B1	0 / 10:24	311.745	0.76	2.40	✓	83	87	85	5.5	N.A.	62
B1	10 / 10:39	319.752	0.56	1.75	✓	82	95	87	4.5	–	62
B2	20 / 1049	326.8	0.68	2.15	✓	79	97	89	5.0	–	64
B3	30 / 1059	334.2	0.80	2.50	✓	79	97	90	5.5	–	63
B4	40 / 1109	343.1	0.83	2.70	✓	79	99	91	6.0	–	63
B5	50 / 1114	351.6	0.80	2.50	✓	81	98	91	5.5	–	63
B6	60 / 1124	359.795	0.71	2.20	✓	83	96	92	5.0	–	64
A1	70 / 1136	367.6	0.66	2.05	✓	82	99	92	5.0	–	61
A2	80 / 1146	375.5	0.63	2.00	✓	79	99	93	5.0	–	60
A3	90 / 1156	383.1	0.65	2.00	✓	82	99	93	5.0	–	61
A4	100 / 1206	390.9	0.67	2.10	✓	83	100	94	5.0	–	61
A5	110 / 1216	398.6	0.52	1.65	✓	83	100	94	4.5	–	61
A6	120 / 1226	404.761	–	–	–	–	–	–	–	–	–
	/	→ STOP – END OF TEST									
	/	V_m = 93.015 ✓									
	/		$\overline{\sqrt{\Delta P}}$ = .8283 ✓								
	/			$\overline{\Delta H}$ = 2.17 ✓							
	/					$\overline{T_s}$ = 541 ✓					
	/						$\overline{T_m}$ = ~~550~~ 554 ✓				

SWITCH STUCK AT 1126

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 12 JUNE 90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMM 5

Sample Box Number: 1B

Clean-up Man: SIMON / HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number: OMM 5F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	95 ml	110 ml	1 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	-5 ml	+10 ml	+1 ml
Total H_2O:			+6
Silica Gel			
Final Volume:	694.7 g	g	g
Initial Volume	673.5 g	g	g
Net Volume	+21.2 g	g	g
Total Moisture:			+27.2

Description of Impinger Catch:

PACIFIC ENVIRONMENTAL SERVICES

Plant: GENE'S PLATING WORKS
Date: 6-12-90
Source/Sample Number: OMD-5

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H/13.6)}{T_m}\right]$

$V_{m(std)} = 17.64(93.015)(1.033)\left[\frac{(29.0) + (2.17/13.6)}{(554)}\right]$

$V_{m(std)} =$ 89.21 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 27.2 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (.04707)(27.2) scf

$V_{W(std)} =$ 1.28 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.28)}{(1.28)+(89.21)} = \frac{1.28}{90.49}$

$B_{Ws} =$ .014

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ \ ) + 0.320(\ \ \ ) + 0.280(\ \ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (.014)(18 - 29)$

$M_s =$ 28.85 lb/lb-mole

Plant: GENE'S PLATING WORKS
Date: 6-12-90
Source/Sample Number: OMID-5

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8283)\sqrt{\frac{(541)}{(29.16)(28.85)}}$$

$V_{s(avg)}$ = 47.69 ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (47.69)(.7854)$$

Q_s = 2247 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} =$$

$$Q_{(std)} = 17.64(2247)(1-.014)\frac{(29.16)}{(541)}$$

Q_{std} = 2106 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})}$$

$$= 0.0945\ \frac{(541)(89.21)}{(29.16)(47.69)(.00027)(120)(1-.014)}$$

%I = 102.6 %

FIELD DATA

Plant Gene's Plating Works
Date 6-12-90
Sampling Location TANK 42 DUCT
Sample Type CARB 425 CHROME
Run Number OMID-6
Operator SIMON
Ambient Temperature 80°F, Sunny
Barometric Pressure
Static Pressure (P_s) -2.2" H_2O
Filter Number(s) OMID-6F
Pretest Leak Rate = 0.015 cfm @ 10.0 in. Hg
Pretest Pitot Leak Check ✓
Pretest Orsat Leak Check N.A.
Read and Record all Data Every 10 Minutes

SAME AS OMID-5

Schematic of Traverse Point Layout

No. OF WHEELS = 50
Probe Length and Type 20" glass-lined SS
Pitot Tube I.D. No. S-3A
Nozzle I.D. No. & Diameter 40P
Assumed Moisture, % 1.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.931
C Factor 1.15
Meter Gamma 1.033
Heater Box Setting N.A.
Reference Δp 0.60
Post Test Leak Rate = ___ cfm @ ___ in. Hg
Post Test Pitot Leak Check
Post Test Orsat Leak Check N.A.

12.5A ACCORDING TO SIEVERS WATCH Impinger Box No. 5B ; Blank Box No. 2B

Traverse Point Number	Sampling Time, (min)	/ Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
B1	0	1257	404.922	0.56	1.75	✓	88	95	93	9.5	N.A.	57
B1	10	1307	411.8	0.57	1.80	✓	87	99	94	10.0	—	58
B2	20	1317	419.6	0.63	2.00	✓	87	102	95	9.0	—	58
B3	30	1327	427.0	0.84	2.65	✓	87	104	97	10 9.0	—	58
B4	40	1337	436.0	0.77	2.45	✓	87	106	98	11.0	—	59
B5	50	1347	444.1	0.77	2.45	✓	90	106	99	10.5	—	59
B6	60	1357	452.922	0.66	2.05	✓	91 90	104	100	9.0	—	61
A1	70	1407	460.6	0.68	2.00	✓	90	106	100	9.0	—	59
A2	80	1417	468.2	0.74	2.35	✓	88	107	101	10.5	—	57
A3	90	1427	475.9	0.75	2.35	✓	87	107	101	10.5	—	60
A4	100	1437	484.5	0.71	2.20	✓	89	107	101	10.0	—	61
A5	110	1447	492.8	0.73	2.25	✓	88	107	101	10.0	—	61
A6	120	1457	500.838	—	—	—	—	—	—	—	—	—
			→ STOP - END OF TEST ←									
			✓ $\sqrt{V_m}$ = 95.516	✗								
			✓ $\sqrt{\Delta P}$ = .7635 .8837									
				✓ ΔH = 2.19		✓ T_s = 548						
								✓ T_m = 565 561				

SWITCH STOPS AT 1359

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 12 JUNE 90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMID 6

Sample Box Number: SB

Clean-up Man: SIMON / HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number: OMID-6F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	150 ml	94 ml	1 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	+50 ml	-6 ml	+1 ml
Total H_2O:			+45
Silica Gel			
Final Volume:	704.2 g	g	g
Initial Volume	690.0 g	g	g
Net Volume	+14.2 g	g	g
Total Moisture:			+59.2

Description of Impinger Catch:

PES

Plant: GENE'S PLATING WORKS
Date: 6-12-96
Source/Sample Number: CMD-6

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H/13.6)}{T_m}\right]$

$V_{m(std)} = 17.64(95.516)(1-033)\left[\frac{(29) + (2.19/13.6)}{(561)}\right]$

$V_{m(std)} =$ 90.47 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 59.2 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (59.2)(.04707) scf

$V_{W(std)} =$ 2.78 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(2.78)}{(2.78)+(98.47)} = \frac{2.78}{93.25}$

$B_{Ws} =$ ~~2.79~~ .029

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ ) + 0.320(\ \ ) + 0.280(\ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18-M_d) = (29.0) + (0.029)(18-29.0)$

$M_s =$ 28.68 lb/lb-mole

Plant: GENE'S PLATING WORKS
Date: 6-12-90
Source/Sample Number: OMID-6

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8337)\sqrt{\frac{(548)}{(29.16)(28.68)}}$$

$V_{s(avg)}$ = 48.46 ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (48.46)(.7854)$$

Q_s = 2283 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} =$$

$$Q_{(std)} = 17.64(2283)(1-.029)\frac{(29.16)}{(548)}$$

Q_{std} = 2080 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})}$$

$$= 0.0945\ \frac{(548)(90.47)}{(29.16)(48.46)(.00027)(120)(1-.029)}$$

%I = 105.4 %

FIELD DATA

Plant GENE'S PLATING WORKS
Date 5-12-90
Sampling Location TANK 42 DUCT
Sample Type CARB 425 CHROME
Run Number OMID-7
Operator M. SIMON
Ambient Temperature 85°F, SUNNY
Barometric Pressure 29.60
Static Pressure (P_s) -2.2" H_2O
Filter Number(s) OMID-7F
Pretest Leak Rate =0.008 cfm @ 10.0 in. Hg
Pretest Pitot Leak Check ✓
Pretest Orsat Leak Check N.A.
Read and Record all Data Every 10 Minutes

SAME AS OMID-5

Schematic of Traverse Point Layout

NUMBER OF WHEELS PLATED = 50
Probe Length and Type 20" glass-lined SS.
Pitot Tube I.D. No. S-3A
Nozzle I.D. No. & DIAMETER 42P
Assumed Moisture, % 1.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.931
C Factor 1.15
Meter Gamma 1.033
Heater Box Setting N.A
Reference Δp 0.60
Post Test Leak Rate =0.010 cfm @ 10" in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check N.A

IMPINGER BOX No. 4B ; BLANK BOX No. 2B

Traverse Point Number	Sampling Time, (min)	Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
B1	0	1524	500.892	0.52	1.65	✓	88	99	99	5.0	N.A.	62
B1	10	1534	508.0	0.54	1.70	✓	89	102	99	5.0	-	57
B2	20	1544	514.7	0.88	2.75	✓	88	104	99	7.5	-	57
B3	30	1554	524.2	0.85	2.70	✓	86	107	100	7.0	-	58
B4	40	1604	532.6	0.68	2.15	✓	85	107	101	7.5	-	58
B5	50	1614	540.4	0.66	2.05	✓	88	107	101	5.5	-	57
B6	60	1624	548.057	0.60	1.90	✓	89	103	101	5.5	-	62
A1	70	1637	555.6	0.55	1.70	✓	89	106	101	5.0	-	61
A2	80	1647	562.4	0.63	1.95	✓	87	105	101	5.0	-	63
A3	90	1657	569.5	0.80	2.50	✓ 2.00	87	105	101	5.0	-	62
A4	100	1707	576.5	0.76	2.40	✓	85	105	101	6.5	-	61
A5	110	1717	585.7	0.74	2.35	✓	87	106	101	6.5	-	62
A6	120	1727	593.565	-	-	-	-	-	-	-	-	

SWITCH START AT: 1627

→ STOP, END OF TEST ←

✓ $\bar{V}_m$ = 92.673

✓ $\overline{\sqrt{\Delta p}}$ = .8241

✓ $\overline{\Delta H}$ = 2.15

✓ $\overline{T_s}$ = 547

✓ T_m = 562

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 12 JUNE 90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OHIO 7

Sample Box Number: 4B

Clean-up Man: SIMON / HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number: OHIO 7F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	115 ml	100 ml	2 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	+15 ml	0 ml	+2 ml
Total H_2O:			+17
Silica Gel			
Final Volume:	668.1 g	g	g
Initial Volume	653.0 g	g	g
Net Volume	+15.1 g	g	g
Total Moisture:			+32.1

Description of Impinger Catch:

PACIFIC ENVIRONMENTAL SERVICES

Plant: GENE'S PLATING WORKS
Date: 6-12-90
Source/Sample Number: GM1D-7

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H/13.6)}{T_m}\right]$

$V_{m(std)} = 17.64(92.673)(1.033)\left[\frac{(29.60) + (2.15/13.6)}{(562)}\right]$

$V_{m(std)} =$ 89.42 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 32.1 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (.04707)(32.1) scf

$V_{W(std)} =$ 1.51 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.51)}{(1.51)+(89.42)} = \frac{1.51}{90.93}$

$B_{Ws} =$ .016

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ ) + 0.320(\ \ ) + 0.280(\ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (.016)(18 - 29)$

$M_s =$ 28.8 lb/lb-mole

Plant: GENE'S PLATING WORKS
Date: 6-12-90
Source/Sample Number: OMID-7

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p\ (\sqrt{\Delta P})_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8241)\sqrt{\frac{(547)}{(29.76)(28.8)}}$$

$V_{s(avg)}$ = 47.27 ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (47.27)(.7854)$$

Q_s = 1992 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} =$$

$$Q_{(std)} = 17.64(1992)(1-.016)\frac{(29.76)}{(547)}$$

Q_{std} = 1881 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})}$$

$$= 0.0945\ \frac{(547)(1.51)89.42}{(29.76)(47.27)(.00027)(120)(1-.016)}$$

%I = 103.1 %

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 12 JUNE 90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMD 8L

Sample Box Number: 2B

Clean-up Man: SIMON / HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number: OMD 8F

Description of Filter:

MOISTURE

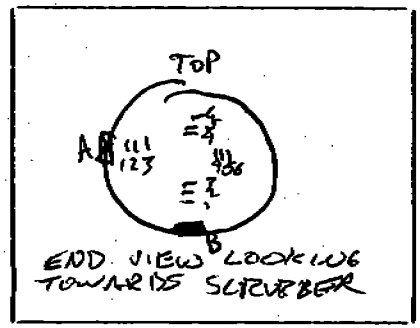
Impingers			
Final Volume:	105 ml	93 ml	ø ml
Initial Volume:	100 ml	100 ml	ø ml
Net Volume:	+5 ml	-7 ml	ø ml
Total H_2O:			-2
Silica Gel			
Final Volume:	672.4 g	g	g
Initial Volume	672.5 g	g	g
Net Volume	-0.1 g	g	g
Total Moisture:			-2.1

Description of Impinger Catch:

FIELD DATA

NO. OF WHEELS = 50

Plant GENE'S PLATING WORKS
Date 6-14-90
Sampling Location TANK 42 DUCT
Sample Type CARB METHOD 425
Run Number OMID-9
Operator SIMON
Ambient Temperature 80°F
Barometric Pressure
Static Pressure (P_s) -2.2" H_2O
Filter Number(s) OMID-9F
Pretest Leak Rate = 0.008 cfm @ 10.0 in. Hg
Pretest Pitot Leak Check O.K
Pretest Orsat Leak Check N.A.
Read and Record all Data Every 10 Minutes



Schematic of Traverse Point Layout

Probe Length and Type 20" glass lined SS
Pitot Tube I.D. No. S-3A
Nozzle I.D. No. & Diameter 43P
Assumed Moisture, % 1.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.931
C Factor 1.15
Meter Gamma 1.033
Heater Box Setting N.A
Reference Δp 0.60
Post Test Leak Rate = 0.009 cfm @ 10.0 in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check N.A

Impinger Box No. 2B ; Blank Box No: 4B

Traverse Point Number	Sampling Time, (min)	/ Clock Time / (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
B1	0	/ 1024	593.615	0.56	1.75	✓	~~[illegible]~~ 77	82	81	4.5	N.A.	68 → 49
B1	10	/ 1034	600.8	0.57	1.75	✓	~~[illegible]~~ 77	90	83	4.5	-	52
B2	20	/ 1044	607.6	0.68	2.15	✓	75	93	85	5.0	-	54
B3	30	/ 1054	615.0	0.81	2.50	✓	75	94	86	5.5	-	54
B4	40	/ 1104	623.8	0.82	2.50	✓	77	96	87	5.5	-	55
B5	50	/ 1114	632.3	0.75	2.35	✓	76	96	89	5.0	-	55
B6	60	/ 1124	640.115	0.67	2.10	✓	80	94	90	4.5	-	60
A1	70	/ 1137	647.5	0.69	2.20	✓	80	97	90	4.5	-	57
A2	80	/ 1147	654.8	0.74	2.35	✓	78	99	92	5.0	-	57
A3	90	/ 1157	663.3	0.78	2.15	✓	76	100	92	5.5	-	57
A4	100	/ 1207	671.5	0.74	2.35	✓	76	100	93	5.0	-	57
A5	110	/ 1217	680.0	0.77	2.15	✓	76	100	93	5.0	-	57
A6	120	/ 1227	687.848	—	—	—	—	—	—	—	—	—
		/			STOP	END OF TEST						
		/	*									
		/ ✓ $\bar{T}_m$ =	~~94.033~~ 86.185	94.033								
		/										
		/ ✓ $\sqrt{\Delta P}$ = .8441										
		/										
		/		✓ $\sqrt{\Delta H}$ = 2.19			*					
		/				✓ $\bar{T}_s$ =	77	✓ $\bar{T}_m$ =	551			
		/					537					
		/										

SWITCH START AT: 1127

← (MERRIL LEFT AT THIS POINT)

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 6-14-90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMID-9

Sample Box Number: 2B

Clean-up Man: SIMON/HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number:

Description of Filter:

MOISTURE

Impingers			
Final Volume:	114 ml	95 ml	1 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	+14 ml	-5 ml	+1 ml
Total H_2O:			+10
Silica Gel			
Final Volume:	676.8 g	g	g
Initial Volume	662.2 g	g	g
Net Volume	+14.6 g	g	g
Total Moisture:			+24.6

Description of Impinger Catch: CLEAR

PES

Plant: GENE'S PLATING WORKS
Date: 1-14-90
Source/Sample Number: DMID-9

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H/13.6)}{T_m}\right]$

$V_{m(std)} = 17.64(94.033)(1.033)\left[\frac{(29.6) + (2.19/13.6)}{(551)}\right]$

$V_{m(std)} =$ 92.55 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 24.6 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (.04707)(24.6) scf

$V_{W(std)} =$ 1.16 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.16)}{(1.16)+(92.55)} = \frac{1.16}{93.71}$

$B_{Ws} =$ .012

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ ) + 0.320(\ \ ) + 0.280(\ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (.012)(18 - 29.0)$

$M_s =$ 28.87 lb/lb-mole

Plant: GENE'S PLATING WORKS
Date: 6-14-90
Source/Sample Number: OMID-9

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8441)\sqrt{\frac{(537)}{(29.76)(28.87)}}$$

$V_{s(avg)}$ = 47.92 ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (47.92)(.7854)$$

Q_s = 2258 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} =$$

$$Q_{(std)} = 17.64(2258)(1-.012)\frac{(29.76)}{(537)}$$

Q_{std} = 2180 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})}$$

$$= 0.0945\ \frac{(537)(92.55)}{(29.76)(47.92)(.00027)(120)(1-.012)}$$

%I = 162.0 %

FIELD DATA

Plant Gene's Plating Works
Date 6-14-90
Sampling Location TANK 42 DUCT
Sample Type CARB 425 CHROME
Run Number OMID-10
Operator SIMON
Ambient Temperature 90°F Sunny
Barometric Pressure 29.74 "Hg
Static Pressure (P_s) -.22 "H_2O
Filter Number(s) OMID-10F
Pretest Leak Rate = 0.006 cfm @ 10 in. Hg
Pretest Pitot Leak Check O.K.
Pretest Orsat Leak Check N.A.
Read and Record all Data Every 10 Minutes

SAME AS OMID-9

Schematic of Traverse Point Layout

Probe Length and Type 20" glass lined SS
Pitot Tube I.D. No. S-3A
Nozzle I.D. No. & Diameter 40P
Assumed Moisture, % 1.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.931
C Factor 1.15
Meter Gamma 1.033
Heater Box Setting N.A.
Reference Δp 0.60
Post Test Leak Rate = 0.008 cfm @ 10 in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check N.A.

Impinger Box No. 5B ; Blank Box No. 4B

Traverse Point Number	Sampling Time, (min) / Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
B1	0 / 1257	687.935	0.59	1.80	✓	82	91	90	5.0	N.A.	62
B1	10 / 1307	695.9	0.57	1.75	✓	82	95	90	5.0	—	54
B2	20 / 1317	702.2	0.71	2.25	✓	81	96	90	6.0	—	53
B3	30 / 1327	710.1	0.81	2.55	✓	78	98	92	7.0	—	53
B4	40 / 1337	719.0	0.88	2.80	✓	79	99	92	7.5	—	53
B5	50 / 1347	727.7	0.91	2.80	✓	78	100	93	7.5	—	54
B6	60 / 1357	736.703	0.73	2.35	✓	79	98	94	5.5	—	57
A1	70 / 1400	743.6	0.73	2.35	✓	80	100	94	6.5	—	54
A2	80 / 1410	752.2	0.77	2.45	✓	79	102	95	7.0	—	54
A3	90 / 1420	760.8	0.81	2.55	✓	82	102	95	7.0	—	54
A4	100 / 1430	768.3	0.81	2.55	✓	78	103	95	7.0	—	54
A5	110 / 1440	778.2	0.77	2.45	✓	79	102	95	7.0	—	54
A6	120 / 1450	784.863	—	—	—	—	—	—	—	—	—
	/	✓		STOP	END	OF	TEST				
	/ ✓ $\bar{T}_m$ =	96.928 ✓	96.928 ✓								
	/	~~96.865~~ ✓									
	/	✓ $\sqrt{\Delta P}$ = .8685									
	/		✓ $\sqrt{\Delta H}$ = 2.50								
	/										
	/					$\bar{T}_s$ = 539					
	/						✓ $\bar{T}_m$ = 555				
	/										

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 6-14-90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMID 10

Sample Box Number: 5B

Clean-up Man: SIMON/HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number:

Description of Filter:

MOISTURE

Impingers			
Final Volume:	113 ml	92 ml	3 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	+13 ml	-8 ml	+3 ml
Total H_2O:			+8
Silica Gel			
Final Volume:	676.1 g	g	g
Initial Volume	659.8 g	g	g
Net Volume	+16.3 g	g	g
Total Moisture:			+24.3

Description of Impinger Catch: Clear

PACIFIC ENVIRONMENTAL SERVICES

Plant: GENE'S PLATING WORKS
Date: 6-14-90
Source/Sample Number: UMTD-10

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H/13.6)}{T_m}\right]$

$V_{m(std)} = 17.64(96.925)(1.033)\left[\frac{(29.74) + (2.38/13.6)}{(555)}\right]$

$V_{m(std)} =$ 95.20 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 24.3 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (.04707)(24.3) scf

$V_{W(std)} =$ 1.14 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.14)}{(1.14)+(95.20)} = \frac{1.14}{96.34}$

$B_{Ws} =$ .012

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ /\ \ ) + 0.320(\ \ /\ \ ) + 0.280(\ \ /\ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (.012)(18 - 29)$

$M_s =$ 28.8 lb/lb-mole

Plant: GENE'S PLATING WORKS
Date: 6-14-96
Source/Sample Number: OMID-10

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8685)\sqrt{\frac{(539)}{(29.9)(28.8)}}$$

$V_{s(avg)}$ = 49.34 - ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (49.34)(.7854)$$

Q_s = 2325 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} =$$

$$Q_{(std)} = 17.64(2325)(1-.012)\frac{(29.9)}{(539.)}$$

Q_{std} = 2248 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})}$$

$$= 0.0945\ \frac{(539)(95.20)}{(29.9)(49.34)(.00027)(120)(1-.012)}$$

%I = 102.6 %

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 6-14-90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMID-11 (BLANK)

Sample Box Number: 4B

Clean-up Man: SIMON / HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number:

Description of Filter:

MOISTURE

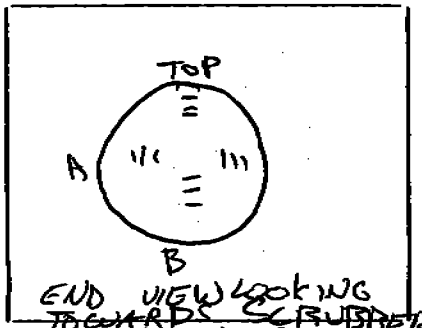
Impingers			
Final Volume:	100 ml	100 ml	0 ml
Initial Volume:	100 ml	100 ml	~~0~~ ml
Net Volume:	~~0~~ ml	~~0~~ ml	~~0~~ ml
Total H_2O:			~~0~~
Silica Gel			
Final Volume:	680.1 g	g	g
Initial Volume	680.0 g	g	g
Net Volume	+0.1 g	g	g
Total Moisture:			+0.1

Description of Impinger Catch:

FIELD DATA

No. OF WHEELS = 50

Plant GENE'S PLATING WORKS
Date 6-15-90
Sampling Location TANK 42 DUCT
Sample Type CARB 425 CHROME
Run Number OMID-12
Operator M. SIMON
Ambient Temperature 70-80°F, OVERCAST
Barometric Pressure
Static Pressure (P_s) -2.2" H2O
Filter Number(s) OMID-12F
Pretest Leak Rate = 0.009 cfm @ 10. in. Hg
Pretest Pitot Leak Check OK
Pretest Orsat Leak Check N.A.
Read and Record all Data Every 10 Minutes



Schematic of Traverse Point Layout

Probe Length and Type 20" glass - 1/mod SS
Pitot Tube I.D. No. S-3A
Nozzle I.D. No. & Diameter 41P
Assumed Moisture, % 1.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.931
C Factor 1.15
Meter Gamma 1.033
Heater Box Setting N.A.
Reference Δp 0.60
Post Test Leak Rate = 0.00 cfm @ 10.0 in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check N.A.

Impinger Box No. 4B ; Blank Box No. 5B

Traverse Point Number	Sampling Time, (min) / Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
B1	0 / 1092	785.565	0.64	2.10	✓	73	83	79	3.5	N.A.	48
B2	10 / 1052	793.9	0.62	1.95	✓	75	89	81	3.5	—	57
B2	20 / 1102	799.8	0.66	2.10	✓	73	91 93	93	4.0	—	59
B3	30 / 1112	808.0	0.92	2.90	✓	74	93	84	6.0	—	53
B4	40 / 1122	817.0	0.76	2.20	✓	73	94	86	5.0	—	53
B5	50 / 1132	825.4	0.86	2.70	✓	72	95	87	5.5	—	54
B6	60 / 1142	833.688	0.62	1.95	✓	72	93	88	4.5	—	56
A1	70 / 1153	841.1	0.65	2.10	✓	75	96	89	4.5	—	54
A2	80 / 1203	848.8	0.72	2.25	✓	72	96	89	5.0	—	55
A3	90 / 1213	857.1	0.78	2.45	✓	72	97	90	5.0	—	54
A4	100 / 1223	864.7	0.83	2.65	✓	70	96	90	5.0	—	55
A5	110 / 1233	873.6	0.85	2.65	✓	74	97	90	5.0	—	55
A6	120 / 1243	880.720	—	—	—	—	—	—	—	—	—
	/	$\bar{V}_m$ = 88.075 95.155	STOP - END OF TEST								
	/	$\sqrt{\Delta P}$ = .8592									
	/		$\sqrt{\Delta H}$ = 2.33								
	/				$\sqrt{T_s}$ = 533						
	/						T_m = 549 ✓				

STOP 1143
START PM 1143

(DOUBLE CHECKED MANOMETER ZERO) ← WAS O.K.

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 6-15-90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMID-12

Sample Box Number: 4B

Clean-up Man: SIMON / HERNANDEZ

Job Number: 4168

Comments: _____

FRONT HALF

Filter Number: _____ _____ _____

Description of Filter: _____

MOISTURE

Impingers			
Final Volume:	107 ml	95 ml	1 ml
Initial Volume:	100 ml	100 ml	∅ ml
Net Volume:	+7 ml	-5 ml	+1 ml
Total H_2O:			+3
Silica Gel			
Final Volume:	696.6 g	g	g
Initial Volume	680.0 g	g	g
Net Volume	+16.6 g	g	g
Total Moisture:			+19.6

Description of Impinger Catch: _____

PES

Plant: GENE'S PLATING WORKS
Date: 6-15-90
Source/Sample Number: OMID-12

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H/13.6)}{T_m}\right]$

$V_{m(std)} = 17.64(95.155)(1.033)\left[\frac{(29.74) + (2.33/13.6)}{(549)}\right]$

$V_{m(std)} =$ 94.47 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 19.6 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (.04707)(19.6) scf

$V_{W(std)} =$ .92 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(.92)}{(.92)+(94.47)} = \frac{.92}{95.39}$

$B_{Ws} =$ .0096

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ \ ) + 0.320(\ \ \ ) + 0.280(\ \ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (.0096)(18 - 29)$

$M_s =$ 28.9 lb/lb-mole

PES

Plant: GENE'S PLATING WORKS
Date: 6-15-90
Source/Sample Number: OMID - 12

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8529)\sqrt{\frac{(533)}{(29.9)(28.9)}}$$

$V_{s(avg)}$ = 48.1 ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (48.1)(.7854)$$

Q_s = 2266 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} =$$

$$Q_{(std)} = 17.64(2266)(1-.0896)\frac{(29.9)}{(533)}$$

Q_{std} = 2220 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})}$$

$$= 0.0945\ \frac{(533)(94.47)}{(29.9)(48.1)(.00327)(120)(1-.0896)}$$

%I = 103.1 %

FIELD DATA

Plant Gene's Plating Works
Date 6-15-90
Sampling Location TANK 42 DUCT
Sample Type CARB 425 CHROME
Run Number OMID-13
Operator M. SIMON
Ambient Temperature 70°F/overcast
Barometric Pressure
Static Pressure (P_s) -2.2" H_2O
Filter Number(s) OMID-13F
Pretest Leak Rate = 0.010 cfm @ 10. in. Hg
Pretest Pitot Leak Check ✓
Pretest Orsat Leak Check ✓ (N.A)
Read and Record all Data Every 10 Minutes

SAME AS OMID-12

Schematic of Traverse Point Layout

NO OF WHEELS = 50
Probe Length and Type 20" glass lined SS
Pitot Tube I.D. No. S-37
Nozzle I.D. No. & Diameter 43P
Assumed Moisture, % 1.0
Meter Box Number 1A
Meter $\Delta H_@$ 1.15
C Factor 1.931
Meter Gamma 1.033
Heater Box Setting N.A.
Reference Δp 0.60
Post Test Leak Rate = 0.01 cfm @ 10.5 in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check N.A.

Impinger Box No. 2B ; Blank Box No. 5B

Traverse Point Number	Sampling Time, (min)	/ Clock Time / (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F
B1	0	1301	80.922	0.64	2.00	✓	77	92	89	5.0	N.A.	55
B1	10	1311	888.3	0.63	2.00	✓	77	96	90	4.5	–	58
B2	20	1321	895.5	0.61	1.90	✓	76	97	91	4.5	–	60
B3	30	1331	903.2	0.88	~~2.75~~	✓	73	98	91	6.0	–	57
B4	40	1341	911.9	0.88	2.75	✓	78	99	92	6.0	–	60
B5	50	1351	920.2	0.79	2.50	✓	76	100	92	5.5	–	60
B6	60	1401	930.978	0.67	2.05	✓	77	99	93	5.5	–	60
A1	70	1412	937.5	0.65	2.05	✓	74	100	93	5.0	–	60
A2	80	1422	945.7	0.80	2.50	✓	75	100	93	5.0	–	60
A3	90	1432	955.9	0.83	2.60	✓	76	100	94	5.5	–	61
A4	100	1442	962.2	0.79	~~962.2~~ 2.50	✓	75	100	94	5.5	–	61
A5	110	1452	971.2	0.80	2.50	✓	75	100	93		–	61
A6	120	1502	979.007	–	–	–	–	–	–	–	–	–
				END OF TEST								
		$\bar{V}_m$ =	~~90.270~~ 98.085 ✓									
			$\sqrt{\Delta P}$ = .8623 ✓									
					$\bar{\Delta H}$ = 2.32 ✓							
							$\bar{T}_s$ = 535 ✓					
								$\bar{T}_m$ = 555 ✓				

SWITCH START AT 1402

← P.C. w/p

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 6-15-90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMID-13

Sample Box Number: 28

Clean-up Man: SIMON/HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number:

Description of Filter:

MOISTURE

Impingers			
Final Volume:	109 ml	98 ml	1 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	+9 ml	-2 ml	+1 ml
Total H_2O:			+8
Silica Gel			
Final Volume:	709.7 g	g	g
Initial Volume	692.2 g	g	g
Net Volume	+17.5 g	g	g
Total Moisture:			+25.5

Description of Impinger Catch:

PES

Plant: GENE'S PLATING WORKS
Date: 6-15-90
Source/Sample Number: OMID-13

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H/13.6)}{T_m}\right]$

$V_{m(std)} = 17.64 (98.085)(1.033)\left[\frac{(29.74) + (2.32/13.6)}{(555)}\right]$

$V_{m(std)} =$ 96.32 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 25.5 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (.04707)(25.5) scf

$V_{W(std)} =$ 1.20 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.20)}{(1.20)+(96.32)} = \frac{1.20}{97.52}$

$B_{Ws} =$ .012

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ ) + 0.320(\ \ ) + 0.280(\ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (.012)(18 - 29)$

$M_s =$ 28.8 lb/lb-mole

Plant: GENE'S PLATING WORKS
Date: 6-15-90
Source/Sample Number: OMID-13

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8623)\sqrt{\frac{(535)}{(29.9)(28.8)}}$$

$V_{s(avg)}$ = 48.8 ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (48.0)(.7854)$$

Q_s = 2299 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} =$$

$$Q_{(std)} = 17.64(2299)(1-.012)\frac{(29.9)}{(535.)}$$

Q_{std} = 2239 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})}$$

$$= 0.0945\ \frac{(535)(96.32)}{(29.9)(48.0)(.00027)(120)(1-.02)}$$

%I = 104.7 %

BAR = 29.75"

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 6-15-98

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMID 14 (Blank)

Sample Box Number: 5B

Clean-up Man: SIMON / HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number:

Description of Filter:

MOISTURE

Impingers			
Final Volume:	100 ml	99 ml	~~0~~ ml
Initial Volume:	100 ml	100 ml	~~0~~ ml
Net Volume:	~~0~~ ml	-1 ml	~~0~~ ml
Total H_2O:			-1
Silica Gel			
Final Volume:	654.6 g	g	g
Initial Volume	654.6 g	g	g
Net Volume	~~0~~ g	g	g
Total Moisture:			-1

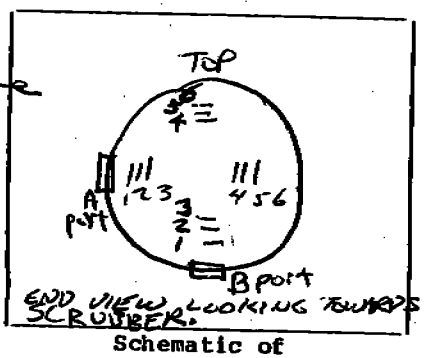
Description of Impinger Catch:

(1)

FIELD DATA

No. of wheels = 49

Plant GENE'S PLATING WORKS
Date 6-18-90
Sampling Location TANK 42 DUCT
Sample Type CARB METHOD 425 Chrome
Run Number OM10-15
Operator M. SIMON
Ambient Temperature 75°F Sunny
Barometric Pressure 29.95" Hg
Static Pressure (P_s) -2.2" H_2O
Filter Number(s) OM10-15
Pretest Leak Rate = 0.00 cfm @ 10.0 in. Hg
Pretest Pitot Leak Check ✓
Pretest Orsat Leak Check N.A.
Read and Record all Data Every 10 Minutes



Schematic of Traverse Point Layout

Probe Length and Type 20" glass lined SS
Pitot Tube I.D. No. S-3A
Nozzle I.D. No. & Diameter 43 P
Assumed Moisture, % 1.0

Meter Box Number 1A
Meter $\Delta H_@$ ~~1.946~~ 1.931
C Factor 1.15
Meter Gamma 1.033
Heater Box Setting N.A.
Reference Δp 0.60
Post Test Leak Rate = 0.00 cfm @ 10 in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check N.A.

NOTE: 7.5" Freeboard w/parts; same Impinger Summary; Impinger Box No. 2B; Blank Box No. 5B

Traverse Point Number	Sampling Time, (min) / Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Orifice Pres. Differential (ΔH) in. H_2O Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F	(END TIME) AMP-HR METER
B1	0 / 1025	977.011	0.77	~~0.77~~	2.40 ✓	80	85	83	5.5	N.A.	56	451926 (START)
B1	10 / 1035	987.9	0.71	2.25	✓	82	92	84	5.5	—	58	
B2	20 / 1045	995.1	0.75	2.35	✓	82	97	87	5.5	—	60	
B3	30 / 1055	003.3	0.90	2.80	✓	83	98	89	6.5	—	62	452192
B4	40 / 1105	011.8	0.82	2.55	✓	80	100	90	6.5	—	61	
B5	50 / 1115	020.5	0.82	2.55	✓	80	100	92	6.5	—	62	
B6	60 / 1125	029.6	0.65	2.05	✓	85	98	93	5.0	—	63	452465
A1	70 / 1138	036.7	0.69	2.15	✓	86	100	94	5.0	—	63	
A2	80 / 1148	044.4	0.71	2.25	✓	86	101	94	5.5	—	63	
A3	90 / 1158	052.2	0.81	2.55	✓	86	102	95	6.5	—	64	
A4	100 / 1208	060.9	0.79	2.50	✓	86	103	96	6.5	—	64	452730
A5	110 / 1218	069.5	0.77	2.45	✓	87	103	97	6.5	—	64	
A6	120 / 1228	077.712	—	—	—	—	—	—	—	—	—	452908 (END)
	/		STOP - END OF TEST									
	/											
	/											
	/											
	/ T_m =	98.701 ✓										
	/		$\sqrt{\Delta P}$ = 0.8743 ✓									
	/											
	/			ΔH = 2.40 ✓								
	/											
	/					$\bar{T}_s$ = 543.2 ✓	$\bar{T}_m$ = 564.7 ✓					

SWITCH START AT: 11:28

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 6-18-90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMID-15

Sample Box Number: 2B

Clean-up Man: SIMON/HERNANDEZ

Job Number: 4168

Comments: BAROMETER = 29.95" Hg

FRONT HALF

Filter Number: _____ _____ _____

Description of Filter: _____

MOISTURE

Impingers			
Final Volume:	108 ~~99~~ ml	92 ~~99~~ ml	95 ml
Initial Volume:	100 ml	100 ml	100 ml
Net Volume:	+8 ml	-8 ml	-5 ml
Total H_2O:			-5
Silica Gel			
Final Volume:	673.3 g	g	g
Initial Volume	653.5 g	g	g
Net Volume	+19.8 g	g	g
Total Moisture:			+19.8

Description of Impinger Catch: _____

PES

Plant: GENE'S PLATING WORKS
Date: 6-18-90
Source/Sample Number: DMD-15

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H/13.6)}{T_m}\right]$

$V_{m(std)} = 17.64(98.701)(1.033)\left[\frac{(29.85) + (2.40/13.6)}{(554.7)}\right]$

$V_{m(std)} =$ 97.36 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 14.8 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (.04707)(14.8) scf

$V_{W(std)} =$ .69 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(.69)}{(.69) + (97.36)} = \frac{.69}{98.05}$

$B_{Ws} =$ .007

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ ) + 0.320(\ \ ) + 0.280(\ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (.007)(18 - 29)$

$M_s =$ 28.9 lb/lb-mole

Plant: GENE'S PLATING WORKS
Date: 6-18-90
Source/Sample Number: AMID-15

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8743)\sqrt{\frac{(543.2)}{(30.0)(28.9)}}$$

$V_{s(avg)}$ = 49.7 ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (49.7)(.7854)$$

Q_s = 2342 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} = 17.64(2342)(1-.07)\frac{(30.\star)}{(543.2)}$$

Q_{std} = 2265 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})} = 0.0945\ \frac{(543.2)(97.36)}{(30.0)(49.7)(.0027)(120)(1-.07)}$$

%I = 104.2 %

FIELD DATA

NO. OF WHEELS = 49

Plant Gene's Plating Works
Date 5-18-90
Sampling Location TANK 42 DUCT
Sample Type CARB 425 CHROME
Run Number OMID-16
Operator M. SIMON
Ambient Temperature 85°F Sunny
Barometric Pressure 29.85" Hg
Static Pressure (P_s) -2.2" H_2O
Filter Number(s) OMID-16F
Pretest Leak Rate = 0.010 cfm @ 10.0 in. Hg
Pretest Pitot Leak Check ✓
Pretest Orsat Leak Check N.A.
Read and Record all Data Every 10 Minutes

SAME AS OMID-15

Schematic of Traverse Point Layout

Probe Length and Type 20" glass-lined SS
Pitot Tube I.D. No. S-3A
Nozzle I.D. No. & Diameter 41P
Assumed Moisture, % 1.0

Meter Box Number 1A31
Meter $\Delta H_@$ 1.9
C Factor 1.115
Meter Gamma 1.033
Heater Box Setting N.A.
Reference Δp 0.60
Post Test Leak Rate = 0.010 cfm @ 10.0 in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check N.A.

Impinger Box No. 4B ; Blank Box No. 5B

Traverse Point Number	Sampling Time, (min)	/ Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft^3	Velocity Head (ΔP_s) in. H_2O	Orifice Pres. Differential (ΔH) in. H_2O Desired	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg	Sample Box Temp. Filter Temp. °F	Impinger Temp. °F	
B1	0	1253	077.927	0.72	2.35	3.25	87	97	95	5.5	N.A.	59	452908 (Start)
B1	10	1303	085.1	0.60	1.85	✓	85	101	95	4.5	–	61	
B2	20	1313	093.1	0.74	X 2.35	✓	88	102	96	5.5	–	61	
B3	30	1323	101.6	0.93	2.95	✓	88	104	97	6.5	–	63	
B4	40	1333	110.3	0.84	2.65	✓	86	105	98	6.5	–	63	
B5	50	1343	119.2	0.84	2.65	✓	87	106	99	6.5	–	64	
B6	60	1353	126.937	0.90	2.80	✓	88	103	99	6.5	–	65	
A1	70	1406	135.7	0.70	2.20	✓	87	105	99	5.5	–	64	
A2	80	1416	144.3	0.74	2.35	✓	87	105	99	5.5	–	57	
A3	90	1426	152.7	0.80	2.50	✓	87	106	100	5.5	–	60	
A4	100	1436	161.1	0.82	2.60	✓	88	106	100	6.0	–	60	
A5	110	1446	169.5	0.81	2.60	✓	87	106	100	6.0	–	60	
A6	120	1456	177.439	–	–	–	–	–	–	–	–	–	453950 END
			STOP - END OF TEST										

1450 1451 POWER OUT IN PLANT (RAN EXTRA MINUTE)

SWITCH START

3T 356

ICE 453 526

$V_m = 91.573$ / 99.512 ✓

$\overline{\sqrt{\Delta P}} = .8855$ ✓

$\overline{\Delta H} = 2.48$ ✓

$\overline{T_s} = 547$ ✓

$\overline{T_m} = 561$ ✓

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: GENE'S RATING WORKS

Date: 6-18-90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: RUN 16

Sample Box Number: 4B

Clean-up Man: SIMON/HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number:

Description of Filter:

MOISTURE

Impingers			
Final Volume:	132 ml	100 ml	1 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	+32 ml	0 ml	+1 ml
Total H_2O:			+33

Silica Gel			
Final Volume:	696.8 g	g	g
Initial Volume	680.9 g	g	g
Net Volume	+15.9 g	g	g
Total Moisture:			+48.9

Description of Impinger Catch:

PES

Plant: GENEIS PLATING WORKS
Date: 6-13-90
Source/Sample Number: OMID-16

1. $V_{m(std)} = 17.64\ V_m\ Y \left[\frac{P_{bar} + (\Delta H / 13.6)}{T_m}\right]$

$V_{m(std)} = 17.64(99.512)(1.033)\left[\frac{(29.85) + (2.48/13.6)}{(561)}\right]$

$V_{m(std)} =$ 97.1 dscf

2. Volume Water Vapor Collected, Standard Conditions

$V_{lc} =$ 48.9 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc} =$ (.04707)(48.9) scf

$V_{W(std)} =$ 2.30 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(2.30)}{(2.30)+(97.1)} = \frac{2.30}{99.4}$

$B_{Ws} =$ .023

4. Molecular Weight, Stack gas

Dry Molecular Wight

$M_d = 0.440\ (\%\ CO_2) + 0.320\ (\%\ O_2) + 0.280\ (\%\ N_2 + \%\ CO)$

$M_d = 0.440(\ \ ) + 0.320(\ \ ) + 0.280(\ \ )$

$M_d =$ 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (.023)(18 - 29)$

$M_s =$ 28.7 lb/lb-mole

PES

Plant: GENE'S PLATING WORKS
Date: 6-18-90
Source/Sample Number: 16

5. Stack Gas Velocity Average

$$V_{s(avg)} = 85.49\ C_p \left(\sqrt{\Delta P}\right)_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_{s(avg)} = 85.49(.84)(.8855)\sqrt{\frac{(547)}{(30.0)(28.7)}}$$

$V_{s(avg)}$ = 50.7 ft/sec.

6. Stack Volumetric Flow Rate, Actual Conditions (Stack Temperature and Pressure)

$$Q_s = 60\ V_s\ A = 60\ (50.7)(.7854)$$

Q_s = 2389 acfm

7. Stack volumetric flow rate, standard conditions (68° F, 29.92 Hg)

$$Q_{(std)} = 17.64\ Q_s\ (1-B_{ws})\ \frac{P_s}{T_s} =$$

$$Q_{(std)} = 17.64(2389)(1-.023)\frac{(30)}{(547)}$$

Q_{std} = 2258 dscfm

8. Isokinetic Variation

$$\%I = K\ \frac{T_s\ V_{m(std)}}{P_s\ V_s\ A_n\ \theta\ (1-B_{ws})}$$

$$= 0.0945\ \frac{(547)(97.1)}{(30.0)(50.7)(.0027)(120)(1-.023)}$$

%I = 104.2 %

SAMPLE RECOVERY DATA

Plant: GENE'S PLATING WORKS

Date: 6-18-90

Sampling Location: TANK 42 DUCT

Sample Type: CARB METHOD 42

Run Number: OMNI 17 (Train Blank)

Sample Box Number: 5B

Clean-up Man: SIMON/HERNANDEZ

Job Number: 4168

Comments:

FRONT HALF

Filter Number:

Description of Filter:

MOISTURE

Impingers			
Final Volume:	100 ml	99 ml	~~0~~ ml
Initial Volume:	100 ml	100 ml	~~0~~ ml
Net Volume:	~~0~~ ml	-1 ml	~~0~~ ml
Total H_2O:			-1
Silica Gel			
Final Volume:	673.6 g	g	g
Initial Volume	673.9 g	g	g
Net Volume	-0.3 g	g	g
Total Moisture:			~~-0.3~~ -1.3

Description of Impinger Catch:

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP Gene's Plating, L.A.
TEST DATE 6-11-90
TEST NUMBER OMID1 - OMID3
TANK NUMBER 42
LENGTH 60"
WIDTH 36"
DEPTH 48"
FREEBOARD 10" W/PARTS
HOOD TYPE SLOTS ON BACK SIDE OF TANK
POLLYBALLS NONE SIZE — PERCENT COVERAGE —
ADDITIVE NONE MANUFACTURER —
AGITATION AIR NONE
ACID STRENGTH
BATH TEMP 100°F
CONTROL EQUIPMENT SCRUBBER

TANK NO. 42 TANK NO. _____

TIME	VOLTS	AMPS	AMP-HOURS	VOLTS	AMPS	AMP-HOURS
	START OMID-1					
1028	0	0	428091			
1031	7.5	1000	428104			
1058	8.0	1050	428168			
1101	7.5	1050	428211			
1120	8.5	1100	428292			
1135	7.5	1000	428340			
1152	7.5	1000	428411			
1209	7.5	1000	428494			
1230	0	0	428514			
			END TEST 1			
			START TEST 2			
1253	0	0	428517			
1305	8.0	1000	428595			
1324	7.0	800	428764			
1340	7.5	800	428899			
1401	6.9	800	429042			
1427	7.0	800	429210			
1439	7.6	850	429336			
1454	0	0	429494			
			END TEST 2			
			START TEST 3			
1520	0	0	429498			
1535	8.4	1300	429675			
1551	8.8	1225	429756			
1615	7.8	1200	429961			
1634	8.6	1160	430142			
1652	7.8	1250	430300			
1714	0	0	430509			
			END TEST 3			

ALL WHEELS EXACTLY 60 SEC FOR THIS TEST

* LARGE RECTIFIER; CUMULATIVE AH READINGS NOT CORRECT?

A.C. AMPS = 1027

$A_1 = \frac{(1027)}{60} \times 95 = 1627$ amps

$A_2 = 467$ amps

$A_3 = 1011$

LOW LOAD

LOW LOAD

LOAD

TRAIN 1 B

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP Gene's Plating Works
TEST DATE 12 June 90
TEST NUMBER OMID 5
TANK NUMBER 42
LENGTH 60"
WIDTH 36"
DEPTH 48"
FREEBOARD 10"
HOOD TYPE SLOTS ON BACK SIDE OF TANK
POLLYBALLS NONE SIZE — PERCENT COVERAGE —
ADDITIVE NONE MANUFACTURER
AGITATION AIR NONE
ACID STRENGTH
BATH TEMP 100 °F
CONTROL EQUIPMENT SCRUBBER

TANK NO. 42 TANK NO. 42 Cont'd

START OMID-5

	TIME	VOLTS	AMPS	AMP-HOURS		VOLTS	AMPS	AMP-HOURS	
(OP)	~~10:22~~	7	8.5	432956	(25)	8.0	10.50	433640	
	~~10:22~~	~~1.2~~	~~—~~	432972		6.8	8.00	433655	
(1) 10:25	10:~~20~~23	9.4	12.5	432999		8.4	10.50	433677	CRANK IT UP MID WA
	~~10:25~~	~~9.2~~	~~13.0~~	~~433022~~	11:30	9.2	13.00	433706	
(1) 10:28	10:26	9.20	13.0	433022		9.2	13.00	433735	
(1) 10:29	~~10:28~~	9.20	13.0	433052	(5)	9.2	13.00	433769	
(1) 10:31	10:30	9.20	13.0	433086	11:37	8.4	11.00	433790	
(5)	10:32	9.20	13.0	433124		8.2	11.00	433811	
(1)	10:34	9.00	12.0	433143		8.0	10.00	433830	
(1)	10:37	9.20	13.5	433172		8.0	10.00	433854	
	10:41	9.20	13.0	433194	(10)	9.4	13.00	433488	
	10:43	9.00	12.5	433228		9.0	12.0	433912	
(10)	10:45	8.00	10.0	433248	(1148)	8.0	9.00	433928	8 ea #SIDE COVERS
	10:47	9.20	13.0	433281		7.8	9.50	433950	
	10:49	7.60	10.0	433305		8.8	1200	433971	
	10:52	9.00	12.0	433324	(15)	8.8	1200	433992	
	10:55	8.80	12.0	433351		7.6	950	434011	
(15)	10:58	8.40	11.0	433371		7.8	1000	434033	
	11:00	9.00	13.0	433410		9.4	1250	434074	
	11:03	8.60	12.0	433439		9.0	1150	434096	
	11:07	8.60	11.0	433463	(20)	9.0	1150	434121	
	11:09	8.80	12.0	433483		8.6	1050	434139	
	11:11	8.20	11.0	433515		9.0	1150	434159	
(21)	11:13	8.60	12.0	433547		8.0	1050	434189	
	11:15	9.00	12.5	433563		8.4	1050	434219	
	11:17	8.00	11.0	433591	(25)	9.0	1150	434259	
(24)	11:19	9.00	13.0	433614		END TEST DATA			

E 07 12:25 pm

A_s = 1303

TRAIN 5B

CHROME PLATING OR ANODIZING PROCESS DATA

HIGH LOAD
4 CAST WHEEL CENTERS
L DUMMY WHEELS
1 PRODUCTION WHEEL

12:57 = 12:59

PLATING SHOP GENES PLATING WORKS
TEST DATE 12 JULE 90
TEST NUMBER OMID 6
TANK NUMBER 42
LENGTH 60"
WIDTH 36"
DEPTH 48"
FREEBOARD 10" W/PARTS
HOOD TYPE SLOTS ON BACK SIDE OF TANK
POLLYBALLS NONE SIZE — PERCENT COVERAGE —
ADDITIVE NONE MANUFACTURER —
AGITATION AIR NONE
ACID STRENGTH
BATH TEMP 110 °F
CONTROL EQUIPMENT SCRUBBER

TANK NO. 42 TANK NO. 42 cont'd

RUN TIME	VOLTS	AMPS	AMP-HOURS	(RUN TIME)	VOLTS	AMPS	AMP-HOURS
START OMID 6			40				
12:54-12:55	8.8	2400	~~434247~~	1:03	8.5	2250	39.37
12:56-57		2100	~~434294~~ 35	1:13	8.5	2250	45.62
12:58-59	8.5	2300	38.33	1:14	8.5	2300	47.78
:00	8.5	2300	38.33	1:05	8.5	2300	41.53
(5) 1:05 min	8.0	2150	38.82	1:00	8.5	2200	36.67
1:07	8.8	2300	42.80	1:00	8.5	2250	37.50
1:07	8.5	2400	44.67	1:37	8.5	2300	~~434843~~ 61.97
1:05	8.8	2300	41.53	1:09	8.5	2250	43.12
1:10	8.8	2400	46.67	1:07	8.5	2300	42.80
(10) 1:07	8.8	2350	~~434445~~ 43.74	1:08	8.5	2300	43.44
1:08	8.2	2150	40.61	1:06	8.5	2300	42.17
1:04	8.8	2350	41.78	1:06	8.5	2300	~~434931~~ 42.17
1:04	8.9	2350	41.78	1:07	8.5	2350	43.74
:59	8.8	2400	39.33	1:30	8.5	2200	55.00
(15) 1:10	8.8	2350	45.69	1:09	10.0	2700	51.75
1:05	8.5	2300	41.53	1:00	10.0	2700	45.00
1:08	8.5	2300	43.44	1:10	9.0	2250	43.75
1:15	8.5	2250	~~434584~~ 46.87	1:04	8.5	2250	~~435018~~ 46.00
1:03	8.5	2300	40.25	1:06	10.0	2700	49.50
(20) 1:09	8.5	2300	44.08	1:12	10.0	2600	52.00
1:09	8.5	2300	44.10	1:25	8.5	2250	53.12
1:06	8.5	2300	42.17	1:15	10.0	2700	56.25
1:11	8.5	2300	45.36	1:17	10.0	2700	57.75
1:19	8.5	2300	50.47	1:02	10.0	2700	46.50
(25) 1:09	8.5	2350	~~434712~~ 45.04	1:02	10.0	2700	~~435224~~ 46.50
			~~33.77~~		END OF TEST		
			(465 AH)				

$\sum_{n=1,50} (HR)(AMP) = 2227.39$ AMP-HR

CHROME PLATING OR ANODIZING PROCESS DATA

TRAIN # 4B

PLATING SHOP Gene's Plating Works
TEST DATE 12 June 90
TEST NUMBER OMID 7
TANK NUMBER 42
LENGTH 60"
WIDTH 36"
DEPTH 48"
FREEBOARD 10"
HOOD TYPE SLOTS ON BACK SIDE OF TANK
POLLYBALLS NONE SIZE — PERCENT COVERAGE —
ADDITIVE NONE MANUFACTURER —
AGITATION AIR NONE
ACID STRENGTH
BATH TEMP 100 °F
CONTROL EQUIPMENT SCRUBBER

ADDED BARIUM CARBONATE - to TANK 42 PRIOR TO TEST

TANK NO. 42 TANK NO. 42 Cont'd

	RUN TIME	VOLTS	AMPS	AMP-HOURS	RUN TIME	VOLTS	AMPS	AMP-HOURS
	START OMID 7							
			~~435204~~	435204				435708
(1)	1:08	9.0	2400	45.33	1:04	8.0	2400	42.67
	1:03	10.0	2650	46.37	1:05	8.1	2375	42.88
	1:05	9.0	2350	42.43	1:09	9.5	2925	56.10
V Adjusted mat*	1:06	9.0	2300	42.17	1:09	8.0	2500	47.92
in 1.0 to	1:09	9.0	3000	57.5	1:19	8.7	2725	59.80
	1:09	7.5	2300	44.10	1:07	9.2	2975	55.37
	1:05	7.5	2300	41.53	1:03	8.0	2500	43.75
	1:10	9.2	2900	56.39	1:07	9.0	2925	54.44
	1:08	9.2	2900	54.78	1:05	7.5	2300	41.53
(10)	1:09	9.2	2800	53.67	1:02	7.0	2250	38.75
	1:08	9.2	2900	* ~~435924~~ 54.78	1:05	9.2	2950	* ~~435928~~ 53.26
	1:04	8.0	2450	43.56	1:00	7.5	2375	39.58
	1:04	9.2	2975	52.89	1:02	8.5	2700	46.5
	1:13	8.0	2450	49.68	1:01	6.5	2200	37.28
(15)	1:04	9.2	2900	51.56	1:04	7.5	2325	41.33
	1:08	8.0	2925	55.25	1:01	8.7	2700	45.75
	1:08	9.2	2925	55.25	1:01	8.7	2725	46.17
	1:08	7.5	2300	43.44	1:01	8.7	2750	46.60
	1:03	9.3	2925	* ~~435589~~ 51.12	1:01	7.5	2300	38.97
(20)	1:08	9.5	2900	54.78	1:00	8.7	2675	44.58
	1:04	7.5	2225	39.56	1:00	8.6	2700	45.00
	1:04	9.0	2900	51.56	1:02	8.6	2725	46.93
	1:05	9.2	2900	52.36	1:01	8.6	2700	45.75
	1:07	9.2	2900	53.97	1:01	8.6	2650	44.90
(25)	1:11	9.2	2900	* ~~435708~~ 57.20	1:01	7.5	2350	* ~~436177~~ 39.82
				4"		END OF TEST.		

$\sum_{n=1,50} (HR)(AMP) = 2396.93$ AMP-HR

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP Gene's Plating
TEST DATE 6-19-90
TEST NUMBER OMID-9, 10, and 11
TANK NUMBER 42
LENGTH 60"
WIDTH 36"
DEPTH 48"
FREEBOARD 9"
HOOD TYPE SLOTS ON REAR OF TANK
POLLYBALLS NONE SIZE ~ PERCENT COVERAGE ~
ADDITIVE ZERO MIST MANUFACTURER OMI
AGITATION AIR NONE
ACID STRENGTH 32 oz/gal
BATH TEMP 110-112°F
CONTROL EQUIPMENT SCRUBBER & ADDITIVE

	TANK NO. 42			TANK NO.		
TIME	VOLTS	AMPS	AMP-HOURS	VOLTS	AMPS	AMP-HOURS
		START OMID-9				
1024	0	0	442849			
1035	7.8	825	442927			
1059	8.0	750	443123			
1110	7.0	750	443201		A_c = 862	
1131	7.2	800	443337			
1459	7.5	775	443523			
12239	7.0	650 800	443711	← RACK OF CENTERS		
		END OMID-9				
		START OMID-10				
1257	0	0	443711			
1306	7.5	950	443758			
1330	7.0	750	443936		A_{10} = 765	
1343	7.3	800	444028			
1430	6.5	620	444320			
1459	7.2	800	444476			
		END OMID-10				

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP Gene's Plating Works
TEST DATE 6-15-90
TEST NUMBER OMID-12 and OMID+3
TANK NUMBER 42
LENGTH 60"
WIDTH 36"
DEPTH 48"
FREEBOARD 10" w/parts
HOOD TYPE SLOT - RER
POLLYBALLS NONE SIZE — PERCENT COVERAGE —
ADDITIVE Yes MANUFACTURER OMI
AGITATION AIR NONE
ACID STRENGTH 32oz/gal
BATH TEMP 100-110°F
CONTROL EQUIPMENT Scrubber, Additive

TANK NO. 42 TANK NO. _____

TIME	VOLTS	AMPS	AMP-HOURS	VOLTS	AMPS	AMP-HOURS
1015	— WHEEL CENTERS		447 298			
		START OMID-12				
1042	0	0	447451			
1050	7.7	1250	447 511			
1102	7.8	1100	447 602			
1114	8.9	1250	447703 (CORVETTE WHEEL)		A_{12} =	1062
1135	7.3	1000	447905			
1207	8.8	1125	448235			
1244	7.0	980	448513 (SMALL WHEEL)			
		END OMID-12				
		START OMID-13				
1301	0	0	448513			
1303	7.8	1150	448528			
~~1313~~ 1321	7.0	1000	448709			
1332	6.7	675	448806 (SMALL MC WHEEL)		A_{13} =	908
1337	8.9	1150	448840			
1405	8.0	1000	449021			
1427	8.9	1050	449095			
1502	8.9	1050	449421			
		END OMID-13				

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP GENE'S PLATING WORKS
TEST DATE 6-18-90
TEST NUMBER OMID-15
TANK NUMBER 42
LENGTH 60"
WIDTH 36"
DEPTH 48"
FREEBOARD 7.5" W/PARTS
HOOD TYPE SLOT ON REAR OF TANK
POLLYBALLS NONE SIZE — PERCENT COVERAGE —
ADDITIVE YES MANUFACTURER OMI
AGITATION AIR NONE
ACID STRENGTH
BATH TEMP @ 100 °F
CONTROL EQUIPMENT ADDITIVE, SCRUBER

	TANK NO.			TANK NO.		
TIME	VOLTS	AMPS	AMP-HOURS	VOLTS	AMPS	AMP-HOURS
10:25-26	8.5	2800	46.67	1:27 7.0	2050	49.54
1:08 MIN	10.0	3100	54.25	1:06 7.5	2300	42.17
1:07 MIN	10.0	3100	57.69	1:08 9.0	2800	52.89
1:06	7.5	2400	44.00	1:08 10.0	3100	58.56
1:34	9.4	2900	75.72	1:15 7.0	2000	41.67
1:06	9.1	3050	55.92	1:07 10.0	3050	56.76
1:22	9.9	3100	75.78	1:14 7.0	2000	41.11
1:09	9.9	3000	57.50	1:10 10.5	3300	64.17
1:08	7.5	2250	42.50	1:06 10.0	2850	52.25
1:06	8.5	2400	44.00	1:10 10.0	3050	59.30
1:06	7.5	2250	41.25	1:07 7.5	2200	40.74
1:13	9.0	3050	61.85	1:15 9.5	2900	60.42
1:07	9.0	2800	52.11	1:26 8.0	2300	54.94
1:05	8.0	2450	44.34	1:06 7.0	1900	34.83
0:59	8.5	2500	40.97	1:16 8.5	2650	55.94
1:07	8.0	2500	46.53	1:07 8.0	2400	44.67
1:14	7.0	2000	41.11	1:08 7.0	2000	37.78
1:12	8.0	2450	49.00	1:06 7.0	2000	36.67
1:07	9.0	2750	51.18	1:05 9.0	2800	50.56
1:12	7.5	2200	44.00	1:06 9.0	2800	51.33
1:07	7.0	2200	40.94	1:12 7.0	2000	40.00
1:13	7.5	2200	44.61	1:06 9.5	2750	50.42
1:17	8.0	2450	52.40			
1:35	7.0	2050	54.10	END OF JOB AT		12:29
1:07	7.0	2000	37.22			
1:37	7.5	2200	59.37			
1:07	7.0	2050	38.15			

$\sum_{n=1,49}$ (HR)(AMP) = 2429.88 AMP-HR

(25) —

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP GENE'S PLATING WORKS
TEST DATE 6-18-90
TEST NUMBER OMID-16
TANK NUMBER 42
LENGTH 60"
WIDTH 36"
DEPTH 48"
FREEBOARD 7.5" W/PARTS
HOOD TYPE SLOT ON REAR OF TANK
POLLYBALLS NONE SIZE — PERCENT COVERAGE —
ADDITIVE YES MANUFACTURER OMI
AGITATION AIR NONE
ACID STRENGTH
BATH TEMP ≈ 100 °F
CONTROL EQUIPMENT ADDITIVE, SCRUBER

TANK NO.				TANK NO.			
TIME	VOLTS	AMPS	AMP-HOURS	VOLTS	AMPS	AMP-HOURS	
12:51-7:52:07	7.5	2200	48 94	1:06	9.0	2400	44.10
1:09	9.0	2050	39.29	1:16	7.5	2000	42.22
1:09	7.0	2000	38.33	1:12	10.5	2800	56.00
1:07	9.0	2700	50.25	1:09	10.5	2700	51.75
1:07	8.5	2700	50.25	1:03	10.5	2800	49.00
1:14	9.0	2900	59.61	1:10	10.0	2600	50.55
1:45	7.5	2200	64.17	1:08	10.5	2800	52.89
1:25	9.0	2600	61.39	1:10	8.5	2400	46.67
1:06	8.5	2650	48.50	1:27	7.5	2200	53.17
1:05	8.5	2600	46.94	1:12	8.0	2200	44.00
1:16	8.5	2650	55.94	1:05	7.5	2150	38.82
1:11	7.0	2000	39.44	1:13	11.0	2800	56.78
1:11	8.0	2900	57.19	1:16	10.5	2800	54.11
1:07	7.5	2100	39.00	1:07	10.5	2700	50.25
1:08	10.5	3000	56.67	1:11	8.0	2800	43.39
1:10	8.0	2050	39.86	1:15	10.5	2750	57.29
1:15	4.0	2750	57.29	1:29	7.5	2200	54.39
1:21	10.0	2800	63.70	1:11	10.5	2800	55.22
1:17	10.5	3000	64.17	1:07	10.0	2800	52.11
1:08	8.0	2200	41.56	1:07	9.5	2600	48.34
1:08	9.0	2650	50.05	1:21	10.5	2900	65.25
1:23	10.5	3100	71.47	1:24	10.5	3000	70.00
1:07	8.0	2250	41.87	1:22	9.5	2500	56.94
1:05	9.0	2700	48.75	1:07	10.5	2800	52.11
1:14	8.5	2150	44.19				
					END OF JOB AT		2:53

$\sum_{n=1,49}$ (HR)(AMP) = 2520.58 AMP-HR

JUNE 12 - 5:30 PM - ADDED 2 POUNDS ZERO MIST #12 MAINTENANCE
SURTENSION = 39. Dynes

JUNE 13 1:00 PM ADDED ONE QUART ZERO MIST LIQUID MAINTENANCE
S.T = 26 Dynes
LOW LOAD TEST

JUNE 14.	9:00 AM	ST = 33 Dynes
	10:00 AM	ST = 32 Dynes
	11:00 AM	ST = 33 Dynes
	11:30 AM	ST = 33 Dynes
	12:00 NOON	ST = 33 Dynes
	1:30 PM	ST = 33 Dynes
	2:00 PM	ST = 33 Dynes
	2:30 PM	ST = 34 Dynes

JUNE 15 MED LOAD TEST

	9:30 AM	ST 35 Dynes
	11:00 AM	ST 34.7 Dynes
	11:30 AM	ST 36.5 Dynes
	12:00 NOON	ST 36.5 Dynes
	12:30 PM	ST 34.7 Dynes

12:50 PM ADDED 500 CC Zero Mist Liquid Maintenance

	1:30 PM	ST 33.7 Dynes
	2:00 PM	ST 32.4 Dynes
	2:30 PM	ST 33.0 Dynes

JUNE 18 HIGH LOAD TEST

9:15 AM	S.T. =	35.7 Dynes
11:00 AM	S.T. =	33.7 Dynes
11:30 AM	S.T. =	32.7 Dynes
12:00 NOON	S.T. =	33.7 Dynes
12:30 PM	S.T. =	34.7 Dynes
1:00 PM	S.T. =	34.4 Dynes
1:30 PM	S.T =	33.7 Dynes.
2:30 PM	S.T. =	33.7 Dynes.

Received: 06/12/90 06/15/90 16:18:34

REPORT TO: Pacific Environmental Service
150 E. Foothill Blvd.
Arcadia, CA 91006

ATTEN: Mr. Dean High

CLIENT: PACIFIC ENVI SAMPLES: 8
COMPANY: Pacific Environmental Service
FACILITY:

WORK ID: Chrome Analysis
TAKEN: By Pacific Environ. Staff
TRANS: By Pacific Environ. Staff
TYPE: Liquid and Filters
P.O. #: Chrome Analysis
INVOICE: under separate cover

PREPARED BY: Thermo Analytical, Inc.
160 Taylor Street
Monrovia, CA 91016

ATTEN: Ms. Carole Harris
PHONE: 818-357-3247

Robert S. Ferguson
CERTIFIED BY

CONTACT: RSF

This report is for the sole and exclusive use of the client to whom it is addressed and represents only those samples herein described. Samples not destroyed in testing are retained a maximum of 30 days unless otherwise requested.

SAMPLE IDENTIFICATION

01	OMID-1L
02	OMID-2L
03	OMID-3L
04	OMID-4L
05	OMID-1F
06	OMID-2F
07	OMID-3F
08	OMID-4F

TEST CODES and NAMES used on this report

CRHEXS	Hexavalent Chromium
CRHGAA	Chromium - Air
CR HEX	Hexavalent Chromium
CR L	Chromium - Liquids
MPREPW	Metals Prep. - Liquid
VOL L	Sample Volume

Received: 06/12/90

Results by Sample

SAMPLE ID OMID-1L — SAMPLE # 01 FRACTIONS: A
Date & Time Collected not specified — Category

CR_HEX	CR_L	VOL_L
0.86 mg/L	0.73 mg/L	570 mls

SAMPLE ID OMID-2L — SAMPLE # 02 FRACTIONS: A
Date & Time Collected not specified — Category

CR_HEX	CR_L	VOL_L
0.90 mg/L	1.00 mg/L	665 mls

SAMPLE ID OMID-3L — SAMPLE # 03 FRACTIONS: A
Date & Time Collected not specified — Category

CR_HEX	CR_L	VOL_L
1.30 mg/L	1.15 mg/L	500 mls

SAMPLE ID OMID-4L — SAMPLE # 04 FRACTIONS: A
Date & Time Collected not specified — Category

CR_HEX	CR_L	VOL_L
0.01 mg/L	<0.005 mg/L	650 mls

Received: 06/12/90 Results by Sample

SAMPLE ID OMID-1F SAMPLE # 05 FRACTIONS: A
Date & Time Collected not specified Category

CRHEXS 1.9 ug/filter CRHGAA 7.9 ug/filter

SAMPLE ID OMID-2F SAMPLE # 06 FRACTIONS: A
Date & Time Collected not specified Category

CRHEXS 2.7 ug/filter CRHGAA 7.4 ug/filter

SAMPLE ID OMID-3F SAMPLE # 07 FRACTIONS: A
Date & Time Collected not specified Category

CRHEXS 1.7 ug/filter CRHGAA 6.2 ug/filter

SAMPLE ID OMID-4F SAMPLE # 08 FRACTIONS: A
Date & Time Collected not specified Category

CRHEXS <0.5 ug/filter CRHGAA 2.5 ug/filter

Received: 06/12/90 06/15/90 16:18:34

Pacific Environmental Service

Four liquids and four filters were analyzed for hexavalent and total chromium content, according to EPA Method 425. The volumes of the liquids were measured.

QC Data

Sa#	Hex Cr	Total Cr
OMID-3L	1.30 mg/L	1.15 mg/L
OMID-3L dup	1.24 mg/L	1.21 mg/L
OMID-3L spike	109. % R	108. % R

Chain of Custody Record

TMA
Thermo Analytical Inc.
TMA/ARLI
[redacted]
Post Office Box 2360
Monrovia, CA 91016
(818) 357-3247

DATE 6/12/90 PAGE 1 OF 1

CLIENT Pacific Environmental Serv.
ADDRESS 150 VE. Foothill Blvd.
Arcadia CA 91006
PROJECT Dean High
SAMPLERS (SIGNATURE)

SAMPLE NO	DATE	TIME	LOCATION	CAM Metals (17)	Pr. Pollutant Metals (13)	Hazardous Char. (Request List)	Gen. Minerals (Request List)	TPHC 418.1	Base/Neu/Acids (Organics)	Pesticides	Volatile Orgs. (601/602)	8015 Modified	Volatile Orgs. (624/8240)	Total Chrome	Hex Chrome	Volume	Sample Type	NUMBER OF CONTAINERS	Observations/ Comments
OMID-1L														X	X	X	Liquid	1	
OMID-2L														X	X	X	"	1	
OMID-3L														X	X	X	"	1	
OMID-4L														X	X	X	"	1	
OMID-1F														X	X		Filter	1	
OMID-2F														X	X		"	1	
OMID-3F														X	X		"	1	
OMID-4F																	"	1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature: Dina M. Burroughs	6/12	Signature		Signature		Signature	
Printed Name: Dina M. Burroughs	TIME 11:10	Printed Name	TIME	Printed Name	TIME	Printed Name	TIME
Company: PES 357-1993		Company		Company		Company	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY (laboratory)	DATE
Signature		Signature		Signature		Signature: [signature]	6/12/90
Printed Name	TIME	Printed Name	TIME	Printed Name	TIME	Printed Name: TMA/ARLI	TIME 11:10
Company		Company		Company		TMA, Inc./ARLI	

8 TOTAL NUMBER OF CONTAINERS

METHOD OF SHIPMENT: Cust Del

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

Received: 06/13/90 06/15/90 16:18:46

REPORT TO: Pacific Environmental Service
150 E. Foothill Blvd.
Arcadia, CA 91006

ATTEN: Mr. Dean High

CLIENT: PACIFIC ENVI SAMPLES: 8
COMPANY: Pacific Environmental Service
FACILITY:

WORK ID: 4168 Chrome Analusis
TAKEN: By Pacific Environ. Staff
TRANS: By Pacific Environ. Staff
TYPE: Liquid and filters
P.O. #: 4168
INVOICE: under seperate cover

PREPARED BY: Thermo Analytical, Inc.
160 Taylor Street
Monrovia, CA 91016

ATTEN: Ms. Carole Harris
PHONE: 818-357-3247

Robert S. Ferguson
CERTIFIED BY

CONTACT: RSF

This report is for the sole and exclusive use of the client to whom it is addressed and represents only those samples herein described. Samples not destroyed in testing are retained a maximum of 30 days unless otherwise requested.

SAMPLE IDENTIFICATION

01 OMID-5L
02 OMID-6L
03 OMID-7L
04 OMID-8L
05 OMID-5F
06 OMID-6F
07 OMID-7F
08 OMID-8F

TEST CODES and NAMES used on this report

CRHEXS	Hexavalent Chromium
CRHGAA	Chromium - Air
CR HEX	Hexavalent Chromium
CR L	Chromium - Liquids
MPREPW	Metals Prep. - Liquid
VOL L	Sample Volume

Received: 06/13/90 Results by Sample

SAMPLE ID OMID-5L SAMPLE # 01 FRACTIONS: A
Date & Time Collected 06/12/90 Category

CR_HEX	CR_L	VOL_L
2.73 mg/L	3.20 mg/L	695 mls

SAMPLE ID OMID-6L SAMPLE # 02 FRACTIONS: A
Date & Time Collected 06/12/90 Category

CR_HEX	CR_L	VOL_L
1.85 mg/L	2.18 mg/L	800 mls

SAMPLE ID OMID-7L SAMPLE # 03 FRACTIONS: A
Date & Time Collected 06/12/90 Category

CR_HEX	CR_L	VOL_L
0.43 mg/L	0.65 mg/L	710 mls

SAMPLE ID OMID-8L SAMPLE # 04 FRACTIONS: A
Date & Time Collected 06/12/90 Category

CR_HEX	CR_L	VOL_L
<0.003 mg/L	0.015 mg/L	570 mls

Received: 06/13/90 Results by Sample

SAMPLE ID OMID-5F SAMPLE # 05 FRACTIONS: A
Date & Time Collected 06/12/90 Category

CRHEXS 1.2 ug/Filter CRHGAA 8.8 ug/Filter

SAMPLE ID OMID-6F SAMPLE # 06 FRACTIONS: A
Date & Time Collected 06/12/90 Category

CRHEXS 1.1 ug/Filter CRHGAA 3.6 ug/Filter

SAMPLE ID OMID-7F SAMPLE # 07 FRACTIONS: A
Date & Time Collected 06/12/90 Category

CRHEXS 5.5 ug/Filter CRHGAA 7.8 ug/Filter

SAMPLE ID OMID-8F SAMPLE # 08 FRACTIONS: A
Date & Time Collected 06/12/90 Category

CRHEXS <0.5 ug/Filter CRHGAA 1.3 ug/Filter

Received: 06/13/90 06/15/90 16:18:46

Pacific Environmental Service

Four liquids and four filters were analyzed for hexavalent and total chromium content, according to EPA Method 425. The volumes of the liquids were measured.

Received: 06/15/90 Results by Sample

SAMPLE ID OMID-10F SAMPLE # 05 FRACTIONS: A

Date & Time Collected not specified Category _____

CRHEXS	CRHGAA
0.8 ug/filter	1.0 ug/filter

SAMPLE ID OMID-11F SAMPLE # 06 FRACTIONS: A

Date & Time Collected not specified Category _____

CRHEXS	CRHGAA
<0.5 ug/filter	2.2 ug/filter

Received: 06/18/90 06/26/90 15:31:13

REPORT TO: Pacific Environmental Service
150 E. Foothill Blvd.
Arcadia, CA 91006

ATTEN: Mr. Dean High

CLIENT: PACIFIC ENVI SAMPLES: 6
COMPANY: Pacific Environmental Service
FACILITY:

WORK ID: 4168 Chrome Analysis
TAKEN: By PES Staff
TRANS: By PES Staff
TYPE: Liquid and Filters
P.O. #: 4168 Chrome Analysis
INVOICE: under separate cover

PREPARED BY: Thermo Analytical, Inc.
160 Taylor Street
Monrovia, CA 91016

Robert S. Ferguson
CERTIFIED BY

ATTEN: Ms. Carole Harris
PHONE: 818-357-3247

CONTACT: RSF

This report is for the sole and exclusive use of the client to whom it is addressed and represents only those samples herein described. Samples not destroyed in testing are retained a maximum of 30 days unless otherwise requested.

Results reported to Mark Simon on 6/25/90.

SAMPLE IDENTIFICATION

01	OMID-12L
02	OMID-13L
03	OMID-14L
04	OMID-12F
05	OMID-13F
06	OMID-14F

TEST CODES and NAMES used on this report

CRHEXS	Hexavalent Chromium
CRHGAA	Chromium - Air
CR HEX	Hexavalent Chromium
CR L	Chromium - Liquids
MPREPW	Metals Prep. - Liquid
VOL L	Sample Volume

[redacted] TMA [redacted] REPORT [redacted] Work Order # [redacted]

Received: 06/18/90 Results by Sample

SAMPLE ID OMID-12L SAMPLE # 01 FRACTIONS: A
Date & Time Collected 06/15/90 17:00:00 Category

CR_HEX	CR_L	VOL_L
<0.003 mg/L	0.011 mg/L	600 mls

SAMPLE ID OMID-13L SAMPLE # 02 FRACTIONS: A
Date & Time Collected 06/15/90 17:00:00 Category

CR_HEX	CR_L	VOL_L
<0.003 mg/L	0.016 mg/L	570 mls

SAMPLE ID OMID-14L SAMPLE # 03 FRACTIONS: A
Date & Time Collected 06/15/90 17:00:00 Category

CR_HEX	CR_L	VOL_L
<0.003 mg/L	<0.001 mg/L	630 mls

SAMPLE ID OMID-12F SAMPLE # 04 FRACTIONS: A
Date & Time Collected 06/15/90 17:00:00 Category

CRHEXS	CRHGAA
0.6 ug/filter	5.7 ug/filter

Received: 06/18/90 Results by Sample

SAMPLE ID OMID-13F SAMPLE # 05 FRACTIONS: A
Date & Time Collected 06/15/90 17:00:00 Category

CRHEXS	<0.5	CRHGAA	5.2
	ug/filter		ug/filter

SAMPLE ID OMID-14F SAMPLE # 06 FRACTIONS: A
Date & Time Collected 06/15/90 17:00:00 Category

CRHEXS	6.1	CRHGAA	8.2
	ug/filter		ug/filter

Received: 06/18/90 06/26/90 15:31:13

Pacific Environmental Service

Three liquids and three filters were analyzed for hexavalent and total chromium content, according to EPA Method 425. The volumes of the liquids were measured.

TMA
Thermo Analytical Inc.

[redacted] Street
Post Office Box 2360
Monrovia, CA 91016
(818) 357-3247

Chain of Custody Record

DATE JUNE 18 1990 PAGE 1 OF 1

DEAN HIGH - PROJECT MGR

CLIENT PACIFIC ENVIRONMENTAL SERV.
ADDRESS 150 E. FOOTHILL BL.
ARCADIA, CA 91006
818-357-1993
PROJECT 416 8
SAMPLERS (SIGNATURE) MARK J. SIMON by

SAMPLE NO	DATE	TIME	LOCATION	CAM Metals (17)	Pr. Pollutant Metals (13)	Hazardous Char. (Request List)	Gen. Minerals (Request List)	TPHC 418.1	Base/Neu/Acids (Organics)	Pesticides	Volatile Orgs. (601/602)	8015 Modified	Volatile Orgs. (624/8240)	Parameters: Other: TOTAL CHROMIUM	HEXAVALENT CHROMIUM	VOLUME (mL)	Sample Type	NUMBER OF CONTAINERS	Observations/ Comments
OMID 12L	6.15.90	1700	TANK 42											X	X	X	LIQUID	1	
OMID 13L	6.15.90	1700	TANK 42											X	X	X	LIQUID	1	
OMID 14L	6.15.90	1700	TANK 42											X	X	X	LIQUID	1	
																		Ø	
~~OMID 12F~~	~~6.15.90~~	~~1700~~	~~TANK 42~~											~~X~~	~~X~~		~~FILTER~~	~~1~~	
OMID 13F	6.15.90	1700	TANK 42											X	X		FILTER	1	
OMID 14F	6.15.90	1700	TANK 42											X	X		FILTER	1	
OMID 14FB	6-15-90	1700	TANK 42											X	X		Filter	1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature: H. DEAN HIGH	6.18.90	Signature:		Signature:		Signature:	
Printed Name: PES	TIME: 1200	Printed Name:	TIME	Printed Name:	TIME	Printed Name:	TIME
Company:		Company:		Company:		Company:	
RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY (laboratory)	DATE
Signature: Dave U. Burroughs	6/18	Signature:		Signature:		Signature: Brian Davis	6-18-90
Printed Name: Dave Burroughs	TIME: 12:25	Printed Name:	TIME	Printed Name:	TIME	Printed Name: BRIAN DAVIS	TIME: 12:25
Company: P. E. S.		Company:		Company:		Company: TMA, Inc./ARLI	

6 TOTAL NUMBER OF CONTAINERS

METHOD OF SHIPMENT: DELIVERED PERSONALLY

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

Received: 06/19/90 06/26/90 15:31:21

REPORT TO: Pacific Environmental Service
150 E. Foothill Blvd.
Arcadia, CA 91006

ATTEN: Mr. Dean High

CLIENT: PACIFIC ENVI SAMPLES: 6
COMPANY: Pacific Environmental Service
FACILITY:

WORK ID: 4168 Chrome Analysis
TAKEN: By Pacific Environ. Staff
TRANS: By Pacific Environ. Staff
TYPE: Liquid and filters
P.O. #: 4168 Chrome Analysis
INVOICE: under separate cover

PREPARED BY: Thermo Analytical, Inc.
160 Taylor Street
Monrovia, CA 91016

Robert S. Ferguson
CERTIFIED BY

ATTEN: Ms. Carole Harris
PHONE: 818-357-3247

CONTACT: RSF

This report is for the sole and exclusive use of the client to whom it is addressed and represents only those samples herein described. Samples not destroyed in testing are retained a maximum of 30 days unless otherwise requested.

Results reported to Mark Simon on 6/25/90.

SAMPLE IDENTIFICATION

01	OMID-15L
02	OMID-16L
03	OMID-17L
04	OMID-15F
05	OMID-16F
06	OMID-17F

TEST CODES and NAMES used on this report

CRHEXS	Hexavalent Chromium
CRHGAA	Chromium - Air
CR HEX	Hexavalent Chromium
CR LF	Chromium by HGF - Liquids
MPREPW	Metals Prep. - Liquid
VOL L	Sample Volume

[redacted] TMA [redacted] REPORT [redacted] Work Order # [redacted]

Received: 06/19/90 Results by Sample

SAMPLE ID OMID-15L SAMPLE # 01 FRACTIONS: A
Date & Time Collected 06/18/90 Category

CR_HEX	CR_LF	VOL_L
0.01 mg/L	0.012 mg/L	750 mls

SAMPLE ID OMID-16L SAMPLE # 02 FRACTIONS: A
Date & Time Collected 06/18/90 Category

CR_HEX	CR_LF	VOL_L
<0.003 mg/L	0.008 mg/L	740 mls

SAMPLE ID OMID-17L SAMPLE # 03 FRACTIONS: A
Date & Time Collected 06/18/90 Category

CR_HEX	CR_LF	VOL_L
<0.003 mg/L	<0.001 mg/L	630 mls

SAMPLE ID OMID-15F SAMPLE # 04 FRACTIONS: A
Date & Time Collected 06/18/90 Category

CRHEXS	CRHGAA
<0.5 ug/filter	4.0 ug/filter

Received: 06/19/90 Results by Sample

SAMPLE ID OMID-16F SAMPLE # 05 FRACTIONS: A

Date & Time Collected 06/18/90 Category

CRHEXS <0.5 ug/filter CRHGAA 4.4 ug/filter

SAMPLE ID OMID-17F SAMPLE # 06 FRACTIONS: A

Date & Time Collected 06/18/90 Category

CRHEXS <0.5 ug/filter CRHGAA 4.3 ug/filter

Received: 06/19/90 06/26/90 15:31:21

Pacific Environmental Service

Three liquids and three filters were analyzed for hexavalent and total chromium content, according to EPA Method 425. The volumes of the liquids were measured.

QC Data

Sa#	Hex Cr	Total Cr
OMID-16L	0.01 mg/L	0.008 mg/L
OMID-16L dup	0.01 mg/L	0.009 mg/L
OMID-16L spike	-----	85. % R

Chain of Custody Record

TMA
Thermo Analytical Inc.
[redacted]0 T[redacted]et
Post Office Box 2360
Monrovia, CA 91016
(818) 357-3247

DATE June 19 1990 PAGE 1 OF 1

CLIENT Dean High Project Mgr. Pacific Environmental Serv
ADDRESS 150 E. Foothill Bl
Arcadia, CA 91006
818-357-1993
PROJECT 4168
SAMPLERS (SIGNATURE) Mark J. Simon

SAMPLE NO	DATE	TIME	LOCATION	CAM Metals (17)	Pr. Pollutant Metals (13)	Hazardous Char. (Request List)	Gen. Minerals (Request List)	TPHC 418.1	Base/Neu/Acids (Organics)	Pesticides	Volatile Orgs. (601/602)	8015 Modified	Volatile Orgs. (624/8240)	Total Chromium	Hexavalent Chrome	Volume (ML)	Sample Type	Number of Containers	Observations/ Comments
CMID 15L	6.18.90	1700	TANK 42											x	x	x	LIQUID	1	
CMID 16L	6.18.90	1700	TANK 42											x	x	x	LIQUID	1	
CMID 17L	6.18.90	1700	TANK 42											x	x	x	LIQUID	1	
CMID 15F	6.18.90	1700	TANK 42											x	x		FILTER	1	
CMID 16F	6.18.90	1700	TANK 42											x	x		FILTER	1	
CMID 17F	6.18.90	1700	TANK 42											x	x		FILTER	1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature: Siya Mukh	6/19/90	Signature		Signature		Signature	
Printed Name	TIME 0900	Printed Name	TIME	Printed Name	TIME	Printed Name	TIME
Company: P.E.S.		Company		Company		Company	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY (laboratory)	DATE
Signature		Signature		Signature		Signature: Brian Davis	6-19-90
Printed Name	TIME	Printed Name	TIME	Printed Name	TIME	Printed Name: BRIAN DAVIS	TIME 9:00 AM
Company		Company		Company		TMA, Inc./ARLI	

6 TOTAL NUMBER OF CONTAINERS

METHOD OF SHIPMENT: Delivered Personally

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: EXPECT CONCENTRATIONS NEAR DETECTION LEVELS.

PRETEST

DRY GAS METER AND ORIFICE CALIBRATION

Dry Gas Meter No. 6846739 Meter Box No. 1A Nutech Reference Dry Gas Meter No. 25507 Rockwell

Barometric Pressure 29.62 Calibration Date 4-16-90

By: Mark J. Simon

Orifice Manometer Setting H="H2O	Initial Reference DGM Reading V=ft3	Final Reference DGM Reading V=ft3	Reference Gas Volume Vr=ft3	Initial DGM Reading V=ft3	Final DGM Reading V=ft3	Test DGM Volume Vd=ft3	Temperature				Run Time Min.	Flow Rate Q=cfm	Meter Gamma	H@
							Reference DGM tr=F	Box DGM Inlet t=F	Box DGM Outlet t=F	Box DGM Average td				
0.5	719.780	731.573	11.793	754.692	766.241	11.549	72	76	75	75.5	31.8	0.36	1.027	2.056
1.0	731.892	740.164	8.272	769.558	777.645	8.087	73	82	77	79.5	14.8	0.55	1.033	1.804
2.0	740.537	760.868	20.331	778.041	798.058	20.017	73	87	80	83.5	26.9	0.74	1.031	1.959
4.0	761.000	771.760	10.760	798.524	808.742	10.218	73	90	81	85.5	9.8	1.08	1.067	1.849
6.0	772.094	782.265	10.171	809.065	819.250	10.185	73	90	82	86.0	7.8	1.28	1.008	1.965
8.0	782.925	793.652	10.727	819.669	830.117	10.448	74	93	84	88.5	7.1	1.48	1.034	1.950
												AVERAGE	1.033	1.931

POST TEST

DRY GAS METER AND ORIFICE CALIBRATION

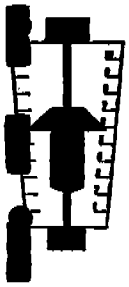
Dry Gas Meter No. 6846739 Meter Box No. 1A Reference Dry Gas Meter No. 25507 Rockwell

Barometric Pressure 29.62 Calibration Date 6-21-90

Mark J. Simo

Orifice Manometer Setting H="H2O	Initial Reference DGM Reading V=ft3	Final Reference DGM Reading V=ft3	Reference Gas Volume Vr=ft3	Initial DGM Reading V=ft3	Final DGM Reading V=ft3	Test DGM Volume Vd=ft3	Temperature				Run Time Min.	Flow Rate Q=cfm	Meter Gamma	H@
							Reference DGM tr=F	Box DGM Inlet t=F	Box DGM Outlet t=F	Box DGM Average td				
0.5	179.683	191.147	11.464	864.609	876.351	11.742	79	81	79	80	30.2	0.37	0.977	1.998
1.0	191.535	204.741	13.206	876.755	890.285	13.530	80	85	82	83.5	24.5	0.52	0.980	1.976
2.0	204.985	217.571	12.586	890.537	903.461	12.924	79	86	83	84.5	17.3	0.71	0.979	2.158
4.0	218.010	228.515	10.505	903.904	914.728	10.824	78	92	84	88	10	1.02	0.979	2.049
6.0	228.931	239.723	10.792	915.168	926.362	11.194	78	94	85	89.5	8.4	1.25	0.970	2.049
8.0	240.045	250.237	10.192	926.686	937.303	10.617	78	94	85	89.5	6.9	1.43	0.961	2.067
												AVERAGE	0.974	2.050

(TRANSFER GAS METER CALIBRATION)



Dick Munns Company

LIQUID AND GAS - FLOWMETER CALIBRATION SERVICE

Phone (213) 596-1559 • FAX (714) 827-0823 • 10571 Calle Lee--133 • Los Alamitos, CA 90720

Certificate

CUSTOMER		TYPE OF INSTRUMENT:	
PACIFIC ENVIRONMENTAL SERVICES, INC.		P.D. Meter	
		FLUID: Air @ 14.7 PSIA & 70°F.	
DATE: 4-5-90	CALIBRATION INTERVAL: 12 months	BAROMETER:	HUMIDITY:
SERIAL NO.: 25507	ASSET NO.: ——	MODEL: 190 CFH	MANUFACTURER: Rockwell
RATED ACCURACY: ± .5%	TEST UNITS: A-3 & A-54	N.B.S. NO.: M-0122 & M-2293	TEST RESULTS: ☒ AS RECEIVED ☐ ADJUSTED

INDICATED	ACTUAL		
S.C.F.M.	S.C.F.M.		
.100	.101		
.151	.150		
.259	.260		
.751	.750		
1.220	1.219		
1.810	1.812		
2.501	2.509		
3.370	3.380		

ALL TEST UNITS TRACEABLE TO THE NATIONAL BUREAU OF STANDARDS AS PER MIL-STD-45662.

TECHNICIAN	APPROVED BY
RM	S Munns