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

M&T CHEMICAL'S FUMETROL 101 IN HARD CHROME PLATING TANKS

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EXECUTIVE SUMMARY

SCAQMD Rule 1169, adopted June 3, 1988 and amended September 8, 1989, requires all hard 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) has offered to provide data on the efficiency of fume suppressants for preventing emissions of chromic acid mists.

SCAQMD has indicated that data from such tests would be accepted if the tests are 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, the 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 M&T Chemical's anti-mist additive, Fumetrol 101, in controlling chromic acid emissions from hard chrome plating tanks. After 6 days of testing a hard chrome plating tank under uncontrolled and controlled conditions, it was found that the average efficiency of Fumetrol 101 with polyballs in controlling chromic acid emissions was 97.2%.

INTRODUCTION

Pacific Environmental Services (PES), a participant in CARB's Independent Contractor Program, was contracted by M&T Chemical Company to perform source testing to determine the efficiency of M&T's Fumetrol 101 in reducing chromic acid emissions from hard chrome plating tanks. Two tests per day were conducted for a three day period on uncontrolled emissions from a hard chrome plating tank, and two tests per day were conducted for a three day period on the emissions from the same plating tank with 1" Polyballs and Fumetrol 101 added to the plating solution. Test dates were October 18-20, 1989 for the uncontrolled tests and October 23-25, 1989 for the tests with polyballs and Fumetrol 101.

In order to evaluate the effectiveness of the anti-mist additive Fumetrol 101, it was necessary to have a host hard chrome plating tank outfitted with an emission collection system. Facilities were made available by Size Control Plating Company in La Puente, CA. Mr. Clarence Todden, President, provided assistance with tank operation during source testing. The sampling location for the tests was in the 14" I.D. tank exhaust duct for Tank #1, 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 M.J. Simon and S.G. Parks of PES, under the direction of M.D. High, Vice President of PES. Martin Kay of SCAQMD was present during the first and fourth day of testing to observe test conditions. Sam Oguntulu of SCAQMD was present during all days of testing to observe test conditions. Tessie Guiala of M&T Chemical was present during the first day of testing and during the days of controlled tank testing to make the additions of Fumetrol 101 to the plating solution. Lerinda Smith of Milhorn Chemical and Supply Company was present for the first and fourth day of testing.

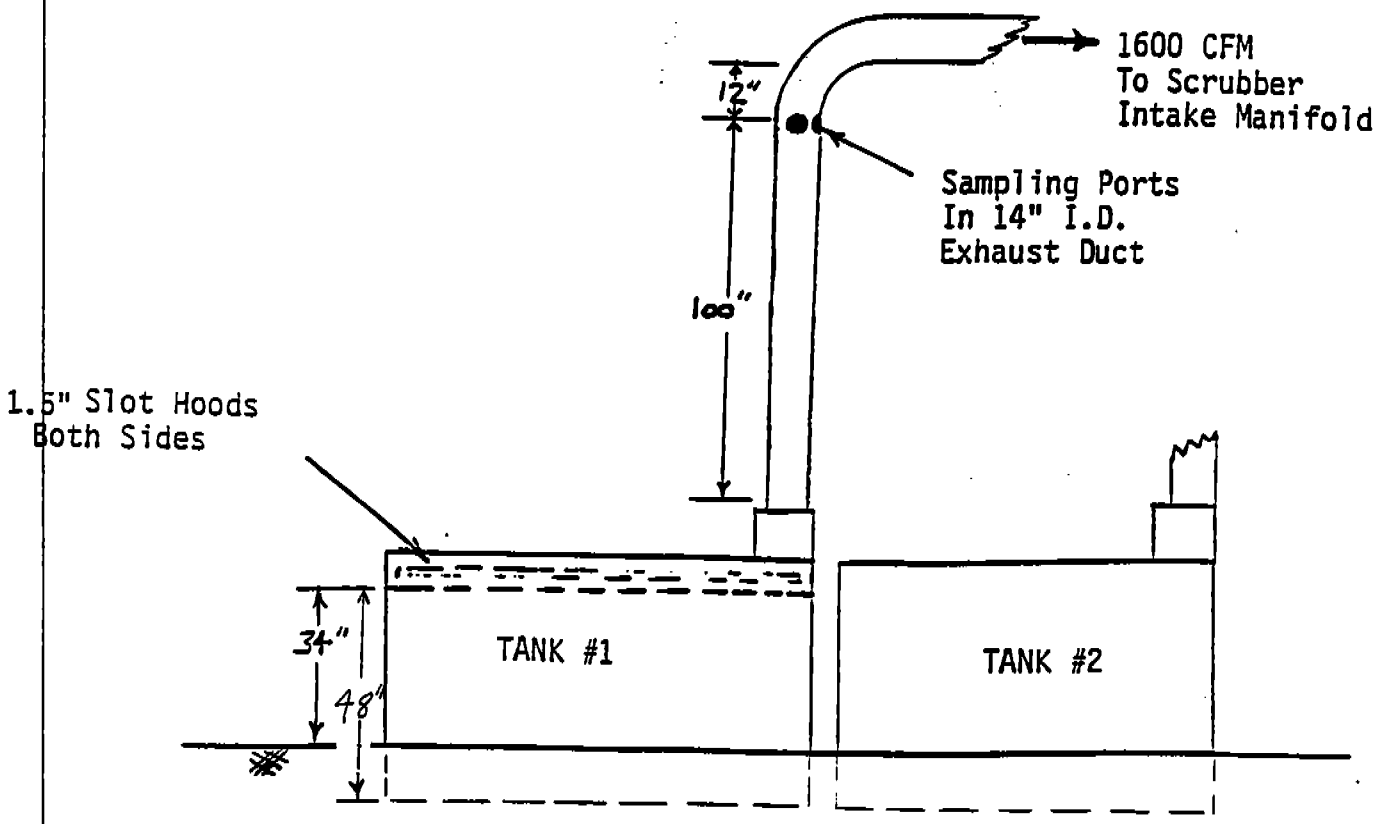

FIGURE 1

Tank #1 Sampling Location
Size Control Plating Co.
La Puente, CA.

EQUIPMENT AND PROCESS DESCRIPTION

Size Control Plating Company, 13349 Temple Avenue La Puente, CA 91746, is engaged in the business of hard chrome plating. Tests of chromic acid emissions were performed on hard chrome plating Tank #1. The dimensions of Tank #1 were 59"L x 31"W x 48"D.

Before the tests were initiated a smoke tube was used to check the collection efficiency of the Tank #1 emission collection system. No fugitive emissions were observed at this time.

Two tests each were conducted using applied amperages of approximately 800, 1600, and 2400 for both uncontrolled and controlled conditions (a total of twelve tests). Voltage was 5.0 - 6.25 volts D.C.. It was supplied by rectifier 17 for the low and medium load conditions and rectifiers 16 and 17 for the high load condition. In order to obtain repeatable current consumptions, 1, 2, or 3 identical dummy loads were plated. These dummy loads consisted of 2.75" I.D., 24" long steel cylinders. The cylinders were sized so that about 2 amps/square inch was applied to conduct plating on the inside of the cylinders. Each cylinder used 400 amps for plating so the tank was loaded with 2,4, or 6 cylinders for the low, medium, or high load condition. The cylinders were placed (vertically) in the exact same positions for the uncontrolled and controlled tests. This plating generated a flow of solution through the cylinder and up to the tank surface. The SCAQMD agreed that 100% coverage of the plating surface was most difficult to obtain under these conditions.

Air agitation was not used during any tests. The plating bath chromic acid concentration was 35-36 oz./gallon. Tank temperature was maintained at 128-133 degrees Fahrenheit. Three heat exchangers in the tank were used as necessary to ensure that the temperature for each test did not change by more than 3 degrees Fahrenheit. Freeboard height was maintained at about 6" for all tests. The tank was not used for any plating (except for test purposes) during the test days. A summary of process conditions is shown in Table 1.

TABLE 1: SUMMARY OF PROCESS CONDITIONS

TEST NUMBER	FUMETROL 101	POLYBALLS	APPLIED AMPERAGE	APPLIED VOLTAGE	STACK FLOW RATE (dscfm)
HMT-1	NO	NO	807	5.2	1664
HMT-2	NO	NO	820	5.0	1564
HMT-3	NO	NO	1633	6.0	1633
HMT-4	NO	NO	1634	6.0	1634
HMT-5	NO	NO	2473	5.5	1631
HMT-6	NO	NO	2448	5.5	1690
HMT-7	YES	YES	845	5.0	1689
HMT-8	YES	YES	846	5.0	1631
HMT-9	YES	YES	1671	6.25	1639
HMT-10	YES	YES	1670	6.25	1674
HMT-11	YES	YES	2472	6.0	1677
HMT-12	YES	YES	2440	6.0	1663

TEMPERATURE: 130 ± 3° F
CHROMIC ACID CONCENTRATION: 35-36 Oz/Gallon
FREEBOARD HEIGHT: 6"

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For the controlled emission tests, the fume suppressant manufacturer provided the fume suppressant. The manufacturer's representative, Tessie Guiala, installed suppressant in quantities sufficient to maintain 100% coverage of the plating solution surface. A record of chemical additions and manufacturer's test observations is included in the Appendix as part of the test data.

Additions to the tank prior to the six controlled tests are summarized below:

Test No. 7	1800 ml	initial charge
Test No. 8	2100 ml	
Test No. 9	600 ml	
Test No. 10	600 ml	
Test No. 11	1200 ml	
Test No. 12	600 ml	

Fumetrol 101 is designed to produce a foam blanket from tank edge to tank edge. This foam cover inhibits spray and misting and scrubs the chromic acid mist from the gases that bubble to the surface. Fumetrol 101 is designed not to cause pitting of the plated parts or to affect the chemical balance of the plating solution.

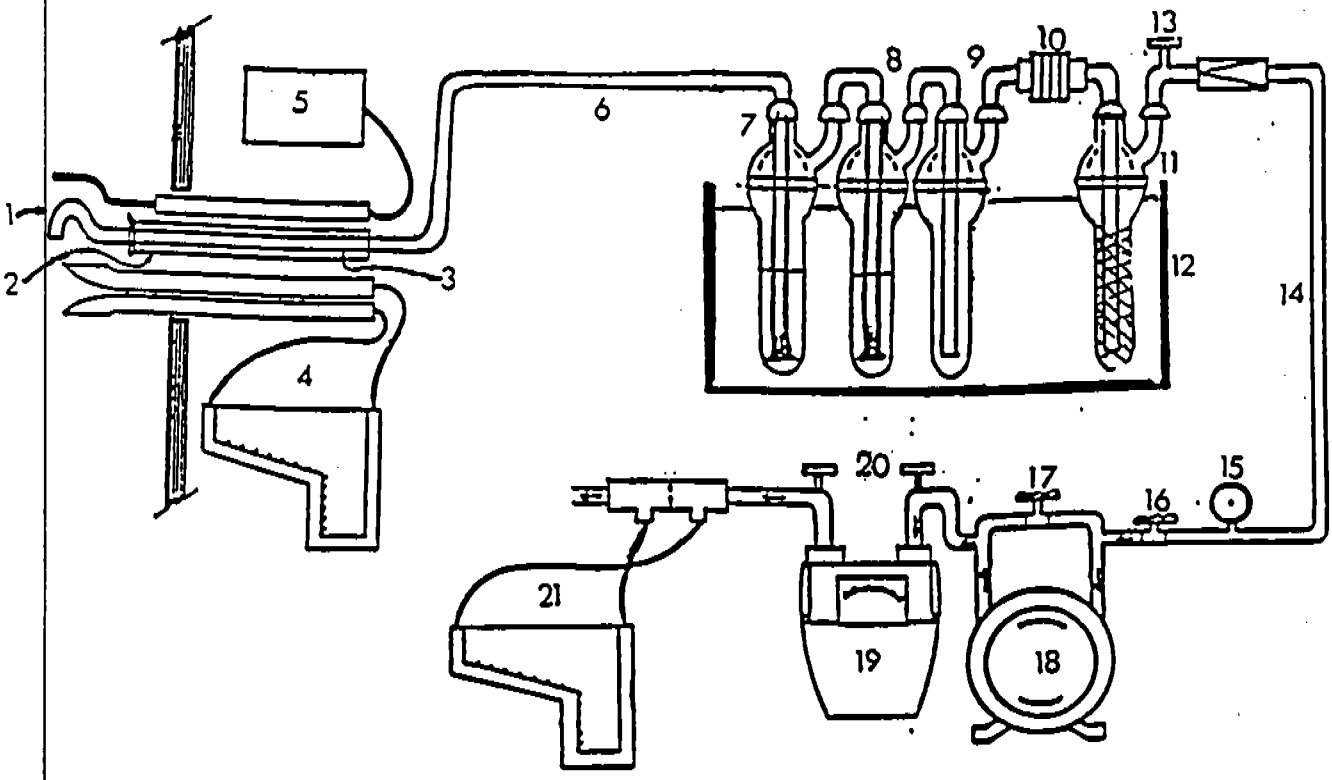
TESTING METHODOLOGY

PES used the proposed test method of CARB Method 425, dated July 7th, 1989, for sampling the chrome emissions. Sampling locations, velocities, volumetric flow rate, and moisture content determinations were done in accordance with CARB Methods 1, 2, and 4. As specified by CARB Method 1, 20 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 3). 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 60 minutes. Sample sizes ranged from 45 to 68 cubic feet depending on the nozzle size used and the measured stack gas velocities. Field data were recorded on field data sheets (Appendix) during each test. 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 from the impingers to the nozzle was 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.



1. Glass sampling nozzle
2. Stainless steel probe sheath
3. Glass lined probe
4. Type S pitot tube and manometer for ΔP readings
5. Stack temperature sensor
6. 10 ft. teflon probe line with ball and socket connectors
7. Greenburg-Smith impinger with 100 ml. of .1 N NaOH solution
8. Greenburg-Smith impinger with 100 ml. of .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. By-pass valve to adjust ΔH
18. Leak free vacuum pump
19. Dry gas meter
20. Dry gas meter inlet and outlet temperature sensors
21. Orifice meter with manometer for ΔH readings

FIGURE 2
Diagram Of Sampling Train

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.

RESULTS OF SOURCE TESTS

Calculations were made from the field data sheets to determine sample volume, moisture content, molecular weight, velocities, flow rates of the exhaust gas stream. The isokinetic variations for all tests were between 97 and 107%. Results are shown on the emission test calculation sheets (Appendix).

LOW LOAD

Test HMT-1, conducted on the uncontrolled tank with an average amperage of 807 showed an emissions rate of 6.41 mg/amp-hour for total chrome and 4.74 mg/amp-hour for hexavalent chrome. Test HMT-2, conducted on the uncontrolled tank with an average amperage of 820 showed an emissions rate of 9.76 mg/amp-hour for total chrome and 7.5 mg/amp-hour for hexavalent chrome. The average emission rate for the two uncontrolled tests HMT-1 and HMT-2, with a nominal applied amperage of 800, was 8.09 mg/amp-hour for total chrome and 6.12 mg/amp-hour for hexavalent chrome (Table 1A and 1B).

Test HMT-7, conducted with a 100% coverage of the plating solution surface by polyballs and Fumetrol 101 and an average amperage of 845, showed an emissions rate of 0.30 mg/amp-hour for total chrome and 0.26 mg/amp-hour for hexavalent chrome. Test HMT-8, conducted on the tank, with a 100% coverage of polyballs and Fumetrol 101 and an average amperage of 846, showed an emissions rate of 0.21 mg/amp-hour for total chrome and 0.14 mg/amp-hour for hexavalent chrome. The average emission rate for the two controlled tests, HMT-7 and HMT-8, with a nominal applied amperage of 800, was 0.25 mg/amp-hour for total chrome and 0.20 mg/amp-hour for hexavalent chrome (Table 4A and 4B).

From these results the reduction benefit of polyballs and Fumetrol 101, for plating conditions with nominal amperages of 800 was calculated. Results showed a reduction of 96.9% for total chrome and 96.7% for hexavalent chrome (Table 7).

MEDIUM LOAD

Test HMT-3, conducted on the uncontrolled tank with an average amperage of 1633 showed an emissions rate of 4.47 mg/amp-hour for total chrome and 3.49 mg/amp-hour for hexavalent chrome. Test HMT-4, conducted on the uncontrolled tank with an average amperage of 1525 showed an emissions rate of 11.92 mg/amp-hour for total chrome and 11.72 mg/amp-hour for hexavalent chrome. The average emission rate for the two uncontrolled tests HMT-3 and HMT-4, with a nominal applied amperage of 1600, was 8.20 mg/amp-hour for total chrome and 7.61 mg/amp-hour for hexavalent chrome (Tables 2A and 2B).

Test HMT-9, conducted with a 100% coverage of polyballs and Fumetrol 101 on the plating surface and an average amperage of 1671, showed an emissions rate of 0.16 mg/amp-hour for total chrome and 0.14 mg/amp-hour for hexavalent chrome. Test HMT-10, conducted with a 100% coverage of polyballs and Fumetrol 101 and an average amperage of 1670, showed an emissions rate of 0.13 mg/amp-hour for total chrome and 0.10 mg/amp-hour for hexavalent chrome. The average emission rate for the two controlled tests, HMT-9 and HMT-10, with a nominal applied amperage of 1600, was 0.14 mg/amp-hour for total chrome and 0.12 mg/amp-hour for hexavalent chrome (Tables 5A and 5B).

From these results the reduction benefit of polyballs and Fumetrol 101, for plating conditions with nominal amperages of 1600 was calculated. Results showed a reduction of 98.3% for total chrome and 98.4% for hexavalent chrome (Table 7).

HIGH LOAD

Test HMT-5, conducted on the uncontrolled tank with an average amperage of 2473, showed an emissions rate of 4.49 mg/amp-hour for total chrome and 4.17 mg/amp-hour for hexavalent chrome. Test HMT-6, conducted on the uncontrolled tank with an average amperage of 2448 showed an emissions rate of 5.34 mg/amp-hour for total chrome and 4.28 mg/amp-hour for hexavalent chrome. The average emission rate for the two uncontrolled tests HMT-5 and HMT-6, with a nominal applied amperage of 1600, was 4.92 mg/amp-hour for total chrome and 4.22 mg/amp-hour for hexavalent chrome (Tables 3A and 3B).

Test HMT-11, conducted with a 100% coverage of polyballs and Fumetrol 101 and an average amperage of 2472, showed an emissions rate of 0.18 mg/amp-hour for total chrome and 0.14 mg/amp-hour for hexavalent chrome. Test HMT-12, conducted with a 100% coverage of polyballs and Fumetrol 101 and an average amperage of 2440, showed an emissions rate of 0.18 mg/amp-hour for total chrome and 0.15 mg/amp-hour for hexavalent chrome. The average emission rate for the two controlled tests, HMT-11 and HMT-12, with a nominal applied amperage of 2400, was 0.18 mg/amp-hour for total chrome and 0.14 mg/amp-hour for hexavalent chrome (Tables 6A and 6B).

From these results the reduction benefit of polyballs and Fumetrol 101, for plating conditions with nominal amperages of 2400 was calculated. Results showed a reduction of 96.4% for total chrome and 96.6% for hexavalent chrome (Table 7).

GENERAL OBSERVATIONS

Comparison of paired tests taken under nearly identical operating conditions on the same day showed that emission rates of the chromic acid mist vary considerably (1-51%) for uncontrolled tanks. By contrast, emission rates were more consistent from the plating tanks after control (1-29%) which, in this case, was the use of polyballs and Fumetrol 101. Longer sampling periods would probably have smoothed out some of the variations.

Hexavalent chrome measurements as a percent of the total chrome measured in the collected samples were fairly consistent on all 12 tests ranging from 74 to 98 percent with an average of 82 percent (Table 8). There was no significant difference between the ratios of hexavalent chrome to total chrome on the controlled versus uncontrolled tanks.

The chromic acid mist reduction benefit of the polyballs and Fumetrol 101 as measured by hexavalent chrome was very consistent at all three loads - low, medium and high - showing 96.7, 98.4, and 96.6 percent reductions respectively. The average was 97.2 percent. The reduction benefit as measured by total chrome also showed an average of 97.2 percent.

TABLE 1A: TOTAL CHROME EMISSIONS FROM AN UNCONTROLLED HARD CHROME PLATING TANK AT LOW LOAD

TEST DATE: 10/18/89
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 800 A

HMT-1-L Sample liquid from the impingers in the sample train for test HMT-1.
HMT-1-F Sample caught on the filter in the sample train for test HMT-1.
HMT-2-L Sample liquid from the impingers in the sample train for test HMT-2.
HMT-2-F Sample caught on the filter in the sample train for test HMT-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)
HMT-1-L	820	4.33	3.5506								
HMT-1-F				0.0021							
TEST TOTAL					3.5527	68.530	0.0518	1664	5175.86	807	6.414
HMT-2-L	810	4.68	3.7908								
HMT-2-F				0.0044							
TEST TOTAL					3.7952	44.498	0.0853	1564	8003.54	820	9.760
AVERAGE							0.0686	1614	6589.70	814	8.087

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TABLE 1B: HEXAVALENT CHROME EMISSIONS FROM AN UNCONTROLLED HARD CHROME PLATING TANK AT LOW LOAD

TEST DATE: 10/18/89
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 800 A

HMT-1-L Sample liquid from the impingers in the sample train for test HMT-1.
HMT-1-F Sample caught on the filter in the sample train for test HMT-1.
HMT-2-L Sample liquid from the impingers in the sample train for test HMT-2.
HMT-2-F Sample caught on the filter in the sample train for test HMT-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 T (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
HMT-1-L	620	3.2	2.624								
HMT-1-F				0.0032							
TEST TOTAL					2.6272	68.530	0.0383	1664	3827.52	807	4.743
HMT-2-L	810	3.6	2.916								
HMT-2-F				0.0010							
TEST TOTAL					2.917	44.498	0.0656	1564	6151.54	820	7.502
AVERAGE							0.0519	1614	4989.53	814	6.122

TABLE 2A: TOTAL CHROME EMISSIONS FROM AN UNCONTROLLED HARD CHROME PLATING TANK AT MEDIUM LOAD

TEST DATE: 10/19/89
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 1600 A

HMT-3L Sample liquid from the impingers in the sample train for test HMT-1.
HMT-3F Sample caught on the filter in the sample train for test HMT-1.
HMT-4L Sample liquid from the impingers in the sample train for test HMT-2.
HMT-4F Sample caught on the filter in the sample train for test HMT-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)
HMT-3L	810	4.21	3.4101								
HMT-3F				0.0133							
TEST TOTAL					3.4234	45.934	0.0745	1633	7302.32	1633	4.472
HMT-4L	670	12.7	8.509								
HMT-4F				0.0170							
TEST TOTAL					8.526	45.972	0.1855	1634	18182.57	1525	11.923
AVERAGE							0.1300	1634	12742.44	1579	8.197

TABLE 2B: HEXAVALENT CHROME EMISSIONS FROM AN UNCONTROLLED HARD CHROME PLATING TANK AT MEDIUM LOAD

TEST DATE: 10/19/89
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 1600 A

HMT-3L Sample liquid from the impingers in the sample train for test HMT-1.
HMT-3F Sample caught on the filter in the sample train for test HMT-1.
HMT-4L Sample liquid from the impingers in the sample train for test HMT-2.
HMT-4F Sample caught on the filter in the sample train for test HMT-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 T (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
HMT-3L	810	3.3	2.673								
HMT-3F				0.0022							
TEST TOTAL					2.6752	45.934	0.0582	1633	5706.36	1633	3.494
HMT-4L	670	12.5	8.375								
HMT-4F				0.0046							
TEST TOTAL					8.3796	45.972	0.1823	1634	17870.36	1525	11.718
AVERAGE							0.1203	1634	11788.36	1579	7.606

TABLE 3A: TOTAL CHROME EMISSIONS FROM AN UNCONTROLLED HARD CHROME PLATING TANK AT HIGH LOAD

TEST DATE: 10/20/89
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 2400 A

HMT-5L Sample liquid from the impingers in the sample train for test HMT-1.
HMT-5F Sample caught on the filter in the sample train for test HMT-1.
HMT-6L Sample liquid from the impingers in the sample train for test HMT-2.
HMT-6F Sample caught on the filter in the sample train for test HMT-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)
HMT-5L	740	6.92	5.1208								
HMT-5F				0.0733							
TEST TOTAL					5.1941	45.782	0.1135	1631	11102.50	2473	4.489
HMT-6L	765	11.6	8.874								
HMT-6F				0.0122							
TEST TOTAL					8.8862	68.894	0.1290	1690	13078.94	2448	5.343
AVERAGE							0.1212	1661	12090.72	2461	4.916

TABLE 3B: HEXAVALENT CHROME EMISSIONS FROM AN UNCONTROLLED HARD CHROME PLATING TANK AT HIGH LOAD

TEST DATE: 10/20/89
POLLYBALLS: None
ADDITIVE: None
AMPERAGE: Nominally 2400 A

HMT-5L Sample liquid from the impingers in the sample train for test HMT-1.
HMT-5F Sample caught on the filter in the sample train for test HMT-1.
HMT-6L Sample liquid from the impingers in the sample train for test HMT-2.
HMT-6F Sample caught on the filter in the sample train for test HMT-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 T (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
HMT-5L	740	6.5	4.81								
HMT-5F				0.0086							
TEST TOTAL					4.8186	45.782	0.1053	1631	10299.86	2473	4.165
HMT-6L	765	9.3	7.1145								
HMT-6F				0.0086							
TEST TOTAL					7.1231	68.894	0.1034	1690	10483.97	2448	4.283
AVERAGE							0.1043	1661	10391.91	2461	4.224

TABLE 4A: TOTAL CHROME EMISSIONS FROM A CONTROLLED HARD CHROME PLATING TANK AT LOW LOAD

TEST DATE: 10/23/89
POLLYBALLS: Yes - 100% Surface Coverage
ADDITIVE: Fumetrol 101 - 100% Surface Coverage
AMPERAGE: Nominally 800 A

HMT-7-L Sample liquid from the impingers in the sample train for test HMT-1.
HMT-7-F Sample caught on the filter in the sample train for test HMT-1.
HMT-8-L Sample liquid from the impingers in the sample train for test HMT-2.
HMT-8-F Sample caught on the filter in the sample train for test HMT-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)
HMT-7-L	685	0.161	0.110285								
HMT-7-F				0.0030							
TEST TOTAL					0.114065	46.371	0.0025	1689	249.38	845	0.295
HMT-8-L	675	0.113	0.076275								
HMT-8-F				0.0052							
TEST TOTAL					0.081455	45.198	0.0018	1631	176.36	846	0.208
AVERAGE							0.0021	1660	212.82	846	0.252

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TABLE 46: HEXAVALENT CHROME EMISSIONS FROM A CONTROLLED HARD CHROME PLATING TANK AT LOW LOAD

TEST DATE: 10/23/89
POLLYBALLS: Yes - 100% Surface Coverage
ADDITIVE: Fametrol 101 - 100% Surface Coverage
AMPERAGE: Nominally 800 A

HMT-7-L Sample liquid from the impingers in the sample train for test HMT-1.
HMT-7-F Sample caught on the filter in the sample train for test HMT-1.
HMT-8-L Sample liquid from the impingers in the sample train for test HMT-2.
HMT-8-F Sample caught on the filter in the sample train for test HMT-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 T (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
HMT-7-L	685	0.14	0.0959								
HMT-7-F				0.0048							
TEST TOTAL					0.1007	46.371	0.0022	1689	220.07	845	0.260
HMT-8-L	675	0.08	0.054								
HMT-8-F				0.0024							
TEST TOTAL					0.0564	45.196	0.0012	1631	122.11	846	0.144
AVERAGE							0.0017	1660	171.09	846	0.202

TABLE 5A: TOTAL CHROME EMISSIONS FROM A CONTROLLED HARD CHROME PLATING TANK AT MEDIUM LOAD

TEST DATE: 10/24/89
POLLYBALLS: Yes - 100% Surface Coverage
ADDITIVE: Fumetrol 101 - 100% Surface Coverage
AMPERAGE: Nominally 1600 A

HMT-9-L Sample liquid from the impingers in the sample train for test HMT-1.
HMT-9-F Sample caught on the filter in the sample train for test HMT-1.
HMT-10-L Sample liquid from the impingers in the sample train for test HMT-2.
HMT-10-F Sample caught on the filter in the sample train for test HMT-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)
HMT-9-L	640	0.19	0.1216								
HMT-9-F				0.0051							
TEST TOTAL					0.12674	46.161	0.0027	1639	270.00	1671	0.162
HMT-10-L	540	0.181	0.09774								
HMT-10-F				0.0045							
TEST TOTAL					0.10224	49.074	0.0021	1674	209.26	1670	0.125
AVERAGE							0.0024	1657	239.63	1671	0.143

PACIFIC ENVIRONMENTAL SERVICES, INC.

TABLE 5B: HEXAVALENT CHROME EMISSIONS FROM A CONTROLLED HARD CHROME PLATING TANK AT MEDIUM LOAD

TEST DATES: 10/24/89
POLLYBALLS: Yes - 100% Surface Coverage
ADDITIVE: Fumetrol 101 - 100% Surface Coverage
AMPERAGE: Nominally 1600 A

HMT-9-L Sample liquid from the impingers in the sample train for test HMT-1.
HMT-9-F Sample caught on the filter in the sample train for test HMT-1.
HMT-10-L Sample liquid from the impingers in the sample train for test HMT-2.
HMT-10-F Sample caught on the filter in the sample train for test HMT-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 T (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
HMT-9-L	640	0.16	0.1024								
HMT-9-F				0.0094							
TEST TOTAL					0.1118	46.161	0.0024	1639	238.18	1671	0.143
HMT-10-L	540	0.14	0.0756								
HMT-10-F				0.0064							
TEST TOTAL					0.082	49.074	0.0017	1674	167.83	1670	0.100
AVERAGE							0.0020	1657	203.00	1671	0.122

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TABLE 6A: TOTAL CHROME EMISSIONS FROM A CONTROLLED HARD CHROME PLATING TANK AT HIGH LOAD

TEST DATE: 10/25/89
POLLYBALLS: Yes - 100% Surface Coverage
ADDITIVE: Fumetrol 101 - 100% Surface Coverage
AMPERAGE: Nominally 2400 A

HMT-11-L Sample liquid from the impingers in the sample train for test HMT-1.
HMT-11-F Sample caught on the filter in the sample train for test HMT-1.
HMT-12-L Sample liquid from the impingers in the sample train for test HMT-2.
HMT-12-F Sample caught on the filter in the sample train for test HMT-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)
HMT-11-L	580	0.322	0.18676								
HMT-11-F				0.0146							
TEST TOTAL					0.20136	46.026	0.0044	1677	440.19	2472	0.178
HMT-12-L	620	0.308	0.19096								
HMT-12-F				0.0056							
TEST TOTAL					0.19656	44.540	0.0044	1663	440.34	2440	0.180
AVERAGE							0.0044	1670	440.26	2456	0.179

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TABLE 6B: HEXAVALENT CHROME EMISSIONS FROM A CONTROLLED HARD CHROME PLATING TANK AT HIGH LOAD

TEST DATE: 10/25/89
POLLYBALLS: Yes - 100% Surface Coverage
ADDITIVE: Fumetrol 101 - 100% Surface Coverage
AMPERAGE: Nominally 2400 A

HNT-11-L Sample liquid from the impingers in the sample train for test HNT-1.
HNT-11-F Sample caught on the filter in the sample train for test HNT-1.
HNT-12-L Sample liquid from the impingers in the sample train for test HNT-2.
HNT-12-F Sample caught on the filter in the sample train for test HNT-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 T (mg/hour)	AVERAGE AMPERAGE (amps)	EMISSIONS Cr 6 (mg/amp-hour)
HNT-11-L	580	0.26	0.1508								
HNT-11-F				0.0072							
TEST TOTAL					0.158	46.028	0.0034	1677	345.40	2472	0.140
HNT-12-L	620	0.26	0.1612								
HNT-12-F				0.0000							
TEST TOTAL					0.1612	44.540	0.0036	1663	361.13	2440	0.148
AVERAGE							0.0035	1670	353.26	2456	0.144

TABLE 7:
REDUCTION OF CHROMIUM EMISSIONS FROM A HARD CHROME PLATING TANK THROUGH USE OF POLYBALLS AND M&T CHEMICALS, INC., FUMETROL 101

TEST NUMBERS	AVERAGE AMPERAGE	AVERAGE EMISSIONS Cr T (mg/amp-hour)	AVERAGE EMISSIONS Cr 6 (mg/amp-hour)	REDUCTION EFFICIENCY Cr T	REDUCTION EFFICIENCY Cr 6
HMT-1 & HMT-2	814	8.087	6.122	96.9	96.7
HMT-7 & HMT-8	846	0.252	0.202		
HMT-3 & HMT-4	1579	8.197	7.606	98.3	98.4
HMT-9 & HMT-10	1671	0.143	0.122		
HMT-5 & HMT-6	2461	4.916	4.224	96.4	96.6
HMT-11 & HMT-12	2456	0.179	0.144		
AVERAGE REDUCTION				97.2	97.2

TABLE 8:
FRACTION OF THE TOTAL CHROME
MEASURED AS HEXAVALENT CHROME

TEST NUMBER	MG/TEST CrT	MG/TEST Cr6	PERCENT Cr6
HMT-1	3.5527	2.6272	74
HMT-2	3.7952	2.9170	77
HMT-3	3.4234	2.6752	78
HMT-4	8.5260	8.3796	98
HMT-5	5.1941	4.8186	93
HMT-6	8.8862	7.1231	80
HMT-7	0.1141	0.1007	88
HMT-8	0.0815	0.0564	69
HMT-9	0.1267	0.1118	88
HMT-10	0.1022	0.0820	80
HMT-11	0.2014	0.1580	78
HMT-12	0.1966	0.1612	82
Average			82

QUALITY ASSURANCE/QUALITY CONTROL

All sampling devices were constructed and calibrated as maintained as specified in EPA reference Methods 2 and 5 of 40 CFR 60, APTD-0576, and APTD-0581. 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.

To ensure that the sampling trains were clean for each day of testing, all glassware and probe lines were cleaned with 0.1 normal nitric acid solution, 0.1 normal sodium hydroxide solution, distilled water, and acetone. The sampling trains were then capped until the next tests.

To demonstrate that the sampling trains remained free from contamination, a field train blank was run for each day of testing. An extra sampling train was taken to the site each day and placed near the actual sampling train. The sample from the field train blank was retrieved along with samples from the trains used for the tests. Results showed that the amount of hexavalent chrome in the trains was always below detectable amounts and that the amount of total chrome was always below 0.010 mg/liter for the liquid sample and below 1.6 micrograms for filter sample (Table 9).

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.

TABLE 9: FIELD TRAIN BLANK RESULTS

TEST DATE	LIQUID Cr6	LIQUID CrT	FILTER Cr6	FILTER CrT
10-18-89	<0.003 mg/l	0.002 mg/l	<0.5 ug	1.6 ug
10-19-89	<0.003 mg/l	0.010 mg/l	<0.5 ug	1.4 ug
10-20-89	<0.003 mg/l	0.006 mg/l	<0.5 ug	1.6 ug
10-23-89	<0.003 mg/l	0.005 mg/l	<0.5 ug	0.5 ug
10-24-89	<0.003 mg/l	0.009 mg/l	<0.5 ug	1.0 ug
10-25-89	<0.003 mg/l	0.004 mg/l	<0.5 ug	<0.2 ug

The field tests were conducted by M.J. Simon and S.G. Parks. 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 LOCATION FOR CIRCULAR DUCTS

PLANT SIZE CONTROL PLATING
DATE 10-17-89
SAMPLING LOCATION TANK 1 INLET
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) ≈14"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) ≈0
STACK I.D., (DISTANCE A - DISTANCE B) 14"
NEAREST UPSTREAM DISTURBANCE 100"
NEAREST DOWNSTREAM DISTURBANCE 12"
CALCULATOR M. SIMON

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	.026	14"	.364	≈0	½"
2	.082	14	1.148	0	1⅛"
3	.146	14	2.044	0	2"
4	.226	14	3.164	0	3⅛"
5	.342	14	4.788	0	4¾"
6	.658	14	9.212	0	9¼"
7	.774	14	10.836	0	10⅞"
8	.854	14	11.956	0	12"
9	.918	14	12.852	0	12⅞"
10	.974	14	13.636	0	13½"

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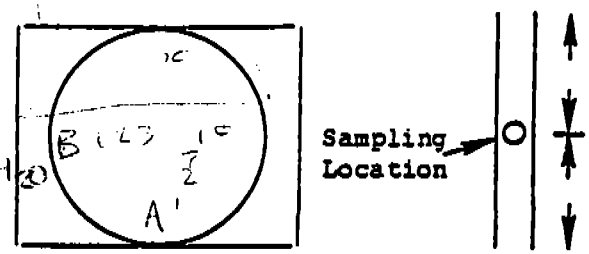
PRELIMINARY VELOCITY TRAVERSE

Plant: Site Control
Date: 10-17-97
Location: Tank 2 Stack
Stack I.D.: 14.0"
Barometric Pressure, in. Hg: 29.91" Hg
Stack Gauge Pressure, in. H_2O: -0.54" H_2O
Operators: Simon/Parks
Pitot Tube I.D. Number: S-3A
Temperature Readout I.D.: N/A
Pitot Tube Leak Check: ✓



Schematic of Traverse Point Layout

Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null	Traverse Point Number	Velocity Head (Δp_s) in. H_2O	Stack Temp. (T_s), °F	Cyclonic Flow Check ° from Null
A1	0.10						
A2	0.11						
A3	0.13						
A4	0.14						
A5	0.17						
A6	0.20						
A7	0.21						
A8	0.22						
A9	0.21						
A10	0.18						
B1	0.08						
B2	0.12						
B3	0.13						
B4	0.16						
B5	0.16						
B6	0.18						
B7	0.20						
B8	0.21						
B9	0.21						
B10	0.18						
Average				Average			

PES

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP: Size Control
TEST DATE: 10-18-89
TEST NUMBER: HMT-1 and 2
TANK NUMBER: 1
LENGTH: 58"
WIDTH: 31"
DEPTH: 48"
FREEBOARD: 6"
HOOD TYPE: SLOT 2 SIDES
POLLYBALLS: NO SIZE: NO PERCENT COVERAGE: 0
ADDITIVE: NO MANUFACTURER: NO PRODUCT:
AGITATION AIR: NO
ACID STRENGTH: 33/gal 100:1 sulfate
BATH TEMP: 128°F - 130, 130
CONTROL EQUIPMENT: SCRUBBER after test ports

RECTIFIER NO. 17 RECTIFIER NO. _____

TIME	VOLTS	AMPS	AMP-HOURS	VOLTS	AMPS	AMP-HOURS
912	5.2	800	6344007			
927	5.2	800	6344187			
937	5.1	760	6344348			
940	5.2	750	6344408			
956	5.2	770	6344588			
1010	5.2	770	6344771			
1015	5.2	770	6344854			
	END	of HMT-1				
	START	HMT-2				
1207	5.2	800	6345163			
1223	5.0	800	6345388			
1237	5.0	790	6345569			
1258	5.0	800	6345853			
1312	5.0	810	6346051			

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP SIZE CONTROL
TEST DATE 10-19-89
TEST NUMBER HMT-4 HMT-3
TANK NUMBER 1
LENGTH 58"
WIDTH 31"
DEPTH 48"
FREEBOARD 6"
HOOD TYPE SLOT BOTH SIDES
POLLYBALLS NONE SIZE NONE PERCENT COVERAGE 0
ADDITIVE NONE MANUFACTURER PRODUCT
AGITATION AIR NONE
ACID STRENGTH 33 oz/gal.
BATH TEMP 130°F 130°F
CONTROL EQUIPMENT Scrubber after test part

RECTIFIER NO. 17 RECTIFIER NO.

TIME	VOLTS	AMPS	AMP-HOURS	VOLTS	AMPS	AMP-HOURS
TEST HMT-3 START						
1030	6.0	1650	6366257			
1037	6.0	1575	6366425			
1045	6.0	1575	6366619			
1053	6.0	1650	6366569			
1100	6.0	1650	6367111			
1105	6.0	1650	6367207			
1120	6.0	1600	6367623			
1125	6.0	1550	6367777			
1135	6.0	1550	6368029			
TEST HMT-3 END						
TEST HMT-4 START						
1218	6.0	1575	6369160			
1229	6.0	1550	6369432			
1236	6.0	1550	6369609			
1244	6.0	1550	6369821			
1249	6.0	1550	6369956			
1255	6.0	1525	6387010			
1305	6.0	1575	6387362			
1314	6.0	1500	6387578			
1324	6.0	1525	6387839			
TEST HMT-4 END						

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP: SIZE CONTROL
TEST DATE: 10-20-89
TEST NUMBER: HMT-5 & HMT-6
TANK NUMBER: 1
LENGTH: 58"
WIDTH: 31"
DEPTH: 48"
FREEBOARD: 6"
HOOD TYPE: SLOT BOTH SIDES
POLLYBALLS: NONE SIZE: 0 PERCENT COVERAGE:
ADDITIVE: NONE MANUFACTURER: NONE PRODUCT: NONE
AGITATION AIR: NONE
ACID STRENGTH: 33 oz/gal
BATH TEMP: 129°F → 131°F
CONTROL EQUIPMENT: SCRUBBER AFTER SAMPLING LOCATION

	RECTIFIER NO. 16			RECTIFIER NO. 17		
TIME	VOLTS	AMPS	AMP-HOURS	VOLTS	AMPS	AMP-HOURS
HMT-5	START					
1048	5.4	1200	4757019	5.5	1200	6372324
1056	5.5	1150	4757202	5.5	1200	6372508
1105	5.4	1200	4757383	5.5	1200	6372675
1111	5.4	1225	4757503	5.5	1200	6372791
1117	5.4	1225	4757639	5.5	1200	6372933
1121	5.4	1225	4757716	5.5	1200	6373006
1130	5.4	1225	4757893	5.5	1200	6373166
1141	5.4	1225	4758160	5.5	1150	6373419
1152	5.4	1225	4758360	5.5	1180	6373621
HMT-5	END					
HMT-6	START					
1248	5.4	1225	4759647	5.5	1200	6374860
1300	5.4	1250	4759840	5.5	1200	6375058
1310	5.4	1250	4760155	5.5	1200	6375335
1322	5.4	1250	4760313	5.5	1200	6375493
		ABORTED	TEST			
	HMT-6	START				
1410	5.4	1225	4761399	5.5	1225	6376550
1425	5.4	1250	4761648	5.5	1225	6376753
1435	5.4	1250	4761872	5.5	1225	6377005
1445	5.4	1250	4762073	5.5	1225	6377207
1447	5.4	1250	4762130	5.5	1250	6377257
1457	5.5	1260	4762365	5.5	1250	6377487
1507	5.5	1250	4762555	5.5	1250	6377666
1518	5.5	1250	4762804	5.5	1250	6377919

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP: SIZE CONTROL
TEST DATE: 10-23-89 HMT8
TEST NUMBER: HMT-7
TANK NUMBER: 7
LENGTH: 59"
WIDTH: 31"
DEPTH: 48"
FREEBOARD: 5½"
HOOD TYPE: SLOT BOTH SIDES
POLLYBALLS: 1" SIZE 100% PERCENT COVERAGE 100%
ADDITIVE: FUMETROL 101 MANUFACTURER M&T Chemical PRODUCT FUMETROL 101
100% coverage
¾ recommended dosage
AGITATION AIR: NONE
ACID STRENGTH: 55 oz/gal
BATH TEMP: 130°F both
CONTROL EQUIPMENT: SCRUBBER AFTER SAMPLING
LOCATION

TIME	VOLTS	AMPS	AMP-HOURS	VOLTS	AMPS	AMP-HOURS
	RECTIFIER NO. 17			RECTIFIER NO. —		
	START	(7) HMT-7				
1045	5.0	775	6380484			
1053	5.0	775	6380599			
1103	5.0	775	6380730			
1112	5.0	775	6380849			
1115	5.0	775	6380903			
1118	5.0	775	6380947			
1128	5.0	775	6381107			
1129	5.0	775	6381192			
1136	5.0	800	6381275			
1142	5.0	800	6381351			
1147	5.0	800	6381385			
1149	5.0	(4) HMT-7				
	END					
	START HMT-8					
1413	5.0	800	6383350			
1423	5.0	800	6383490			
1435	5.0	800	6383666			
1444	5.0	800	6383776			
1446	5.0	800	6383814			
1457	5.0	820	6383971			
1507	5.0	820	6384120			
1516	5.0	800	6384238			

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP: SIZE CONTROL
TEST DATE: 10-24-89
TEST NUMBER: HMT-9 & HMT-10
TANK NUMBER: 1
LENGTH: 59"
WIDTH: 31"
DEPTH: 46
FREEBOARD: 5" to Foam
HOOD TYPE: SLOT BOTH SIDES
POLLYBALLS: YES SIZE 11" PERCENT COVERAGE 100
ADDITIVE: YES MANUFACTURER MGT Chem. PRODUCT Fumetrol 101
AGITATION AIR: NO
ACID STRENGTH: 330z/gal
BATH TEMP: 133°F both
CONTROL EQUIPMENT: Scrubbers after sampling Lock.

	RECTIFIER NO. 17			RECTIFIER NO. —		
TIME	VOLTS	AMPS	AMP-HOURS	VOLTS	AMPS	AMP-HOURS
	START HMT-9					
0949	6.25	1600	6388226			
0956	6.25	1600	6388435			
1005	6.25	1600	6388700			
1016	6.25	1600	6388976			
1019	6.25	1600	6389076			
1023	6.25	1600	6389184			
1032	6.25	1600	6389406			
1045	6.25	1600	6389757			
1050	6.25	1600	6389893			
1059	6.25	1600	6390036			
	END TEST HMT-9					
	START HMT-10					
1131	6.25	1550	6390990			
1139	6.25	1575	6391230			
1151	6.25	1575	6391560			
1206	6.25	1575	6391944			
1215	6.25	1575	6392189			
1224	6.25	1575	6392430			
1236	6.25	1575	6392799			
		END OF	HMT-10			

CHROME PLATING OR ANODIZING PROCESS DATA

PLATING SHOP: SIZE CONTROL
TEST DATE: ~~10-28-89~~ 10-25-89
TEST NUMBER: HMT-11 and HMT-12
TANK NUMBER: 1
LENGTH: 59"
WIDTH: 31
DEPTH: 48
FREEBOARD: 5.5" To Top of Fan
HOOD TYPE: Slot both sides (2" slot height)
POLLYBALLS: Yes — SIZE 1" — PERCENT COVERAGE 100
ADDITIVE: Yes — MANUFACTURER Mgt Chem — PRODUCT Fumetrol 101
AGITATION AIR: No
ACID STRENGTH: 33 oz/gal
BATH TEMP: 131°F both
CONTROL EQUIPMENT: Scrubber after test location
2 Tank heat exchangers + 1 Stock heat exchanger

	RECTIFIER NO. ~~17~~ 16			RECTIFIER NO. ~~18~~ 17		
TIME	VOLTS	AMPS	AMP-HOURS	VOLTS	AMPS	AMP-HOURS
	START	HMT-11				
1055	6.0	1275	4786656	6.0	1200	641181
1105	6.0	1275	4786882	6.0	1100	641200
1115	6.0	1275	4787066	6.0	1200	641217
1123	6.0	1275	4787242	6.0	1200	641237
1126	6.0	1275	4787330	6.0	1200	641246
1130	6.0	1250	4787405	6.0	1200	641262
1139	6.0	1250	4785587	6.0	1200	641265
1147	6.0	1250	4787771	6.0	1200	641282
1156	6.0	1275	4887963	6.0	1175	641301
1202	6.0	1275	4881	6.0	1200	641313
	END	HMT-11				
	START	HMT-12				
1305	6.0	1250	4789465	6.0	1075	641323
1313	6.0	1250	4789633	6.0	1100	641474
1321	6.0	1250	4789786	6.0	1100	641513
1331	6.0	1250	4790000	6.0	1100	641580
1338	6.0	1250	4790150	6.0	1100	641630
1342	6.0	1250	4790285	6.0	1100	641675
1345	6.0	1250	4790325	6.0	1100	641723
1352	6.0	1250	4790484	6.0	1100	641797
1400	6.0	1250	4790680	6.0	1100	641889
1406	6.0	1250	4790800	6.0	1100	641972
1411	6.0	1250	4790920	6.0	1100	641590
1417	6.0	1250	4791036	6.0	1100	641680
	END	HMT-12				6"

T.G. - M&T

Fumetol addition

3/4 charge - 1800 mls — 9:15 → First Testing

600 mls — 1:35

500 mls — 1:40

500 mls — 1:50

500 mls — 2:00 → 2nd Testing

Total 3900 mls ~ 163.6% Charge

(100% charge - 2403 mls) based on manufacturers recommendation

Testing done - based on 100% coverage

Frank:

FUMETROL 101 ADDITIONS

10/24/89 2nd day Medium load

1/4 charge (600 mls) — 9:50
1/4 charge (600 mls) — 11:05

} Both 100% foam coverage

10/25/89 3rd day High load

1/2 charge (1200 mls) — 10:35
1/4 charge (600 mls) — 1:00

} "

SALES ENG:

TYPE OF SOLN: Hard Chrome

NAME: Size Control Plating

TANK No.: 1

USE:

GALLONS: 375

ATTN: Clarence Todden

TEL:

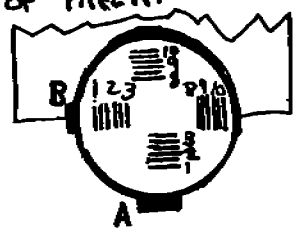
RATING:

DATE COMPLETED	CONTROL OZ-GAL.									SERVICE		
	oz/gal CrO_3	oz/gal SO_4	Ratio							TEST	FINDINGS	RECOMMENDATION
10/18/89	35.11	0.22	159.6/1		Make-up					During ~~service~~ ratio to: 100/1	add 1/4 gal H_2SO_4	
10/20/89	36.35	0.27	135/1	After	③ uncontrolled test low - medium - high load						~~add 19 pt of H_2SO_4~~	
10/24/89	36.35	0.25	145/1	After	② ICI testing low - medium load							

FIELD DATA

Plant: SIZE CONTROL - LA PUENTE, CA.
Date: 10-18-89
Sampling Location: TANK 1 INLET
Sample Type: CARB METHOD 425 CHROME
Run Number: HMT-1
Operator: SIMON
Ambient Temperature: 70°F
Barometric Pressure: 30.05
Static Pressure (P_s): -0.55" H_2O
Filter Number(s): HMT-1F
Pretest Leak Rate = 0.009 cfm @ 13.5 in. Hg
Pretest Pitot Leak Check: OK
Pretest Orsat Leak Check: Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type: 18" glass-lined SS
Pitot Tube I.D. No.: 1S
Nozzle I.D.: 0.1P D=0.365"
Assumed Moisture, %: 1.0
Meter Box Number: 1A
Meter $\Delta H_@$: 1.846
C Factor: 1.15
Meter Gamma: 1.011
Reference Δp: 0.090
Post Test Leak Rate = 0.012 cfm @ 13.5 in. Hg
Post Test Pitot Leak Check: OK
Post Test Orsat Leak Check: Not Applicable
Impinger Box No.: 1B

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 (5)	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F (6)	Dry Gas Meter Temp. Outlet ($T_{m_{out}}$) °F (7)	Pump Vacuum in. Hg		Impinger Temp. °F (4)
A1	0	0911	318.150	0.185	3.80	✓	75	75	74	8.0		61
A1	3	0914	321.0	0.210	3.00	✓	74	79	73	10.5		48
A2	6	0917	324.8	0.290	4.90	✓	74	83	73	10.5		52
A2	9	0920	327.7	0.19	3.90	✓	73	86	74	8.5		55
A3	12	0923	331.0	0.15	3.10	✓	73	87	75	9.0		57
A4	15	0926	333.8	0.22	4.50	✓	73	88	76	9.5		58
A5	18	0929	337.3	0.27	5.50	✓	74	90	77	12.0		58
A6	21	0932	341.0	0.23	4.70	✓	73	90	78	10.50		59
A7	24	0935	344.5	0.24	4.90	✗	74	91	79	9.50		60
A8	27	0938	347.4	0.23	4.70	✓	74	91	79	9.50		60
A9	30	0941	350.174	0.21	4.4	✓	77	93	81	9.0		62
A10	33	0944	354.0	0.22	4.5	✓	77	92	81	10.0		57
B1	36	0950	357.6	0.23	4.70	✓	79	93	81	10.0		57
B2	39	0953	361.3	0.21	4.30	✓	77	94	82	9.5		61
B3	42	0956	365.2	0.21	4.5	✓	78	94	82	9.5		61
B4	45	0959	369.5	0.25	5.2	✓	77	95	83	11.0		62
B5	48	1002	372.0	0.25	5.2	✓	77	96	84	11.0		63
B6	51	1005	375.5	0.24	4.90	✓	77	97	85	11.0		64
B7	54	1008	379.0	0.25	5.2	✓	78	97	85	11.0		64
B8	57	1011	382.6	0.23	4.8	✓	78	97	86	10.5		65
B9	60	1014	387.302		STOP - END OF TEST							
B10												
			Vm = 69.152		ΔH = 4.7		Ts = 535.6	Tm = 547				
				ΔP =								

SWITCH START AT 0944

PACIFIC ENVIRONMENTAL SERVICES, INC.

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SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING CO. - LA PUENTE, CA.

Date: 10-18-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-1

Sample Box Number: 1B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-1F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	1065 ml	102 ml	0 ml
Initial Volume:	100 ml	100 ml	~~0~~ 2 ml
Net Volume:	5 ml	2 ml	~~0~~ 2 ml
Total H_2O:	9		
Silica Gel			
Final Volume:	739.7 g	g	g
Initial Volume	722.5 g	g	g
Net Volume	17.2 g	g	26.2 g
Total Moisture:			

Description of Impinger Catch: 1st impinger had slight yellow tint.

Plant: Size Control
Date: 11-18-89
Source/Sample Number: HMT-1

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

$V_{m(std)} = 17.64(69.150)(1.011)\left[\frac{(30.05) + (4.7/13.6)}{(547)}\right]$

$V_{m(std)}$ = 68.530 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 26.2 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 1.23 scf

$V_{W(std)}$ = 1.23 scf

3. Percent Moisture, by volume

$B_{ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.23)}{(1.23)+(68.53)} = 0.018$

B_{ws} = 1.8%

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{ws}(18 - M_d) = (29.0) + (0.018)(18 - 29.0)$

M_s = 28.80 lb/lb-mole

Plant: Size Control
Date: 10/15/89
Source/Sample Number: HMT-1

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4726)\sqrt{\frac{(535.6)}{(30.01)(28.80)}}$$

$V_{s(avg)}$ = 26.72 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\ (26.72)(1.07)$$

Q_s = 1714 acfm

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

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

$$Q_{(std)} = 17.64(1714)(1-0.08)\frac{(30.01)}{(535.6)}$$

Q_{std} = 1664 dscfm

8. Isokinetic Variation

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

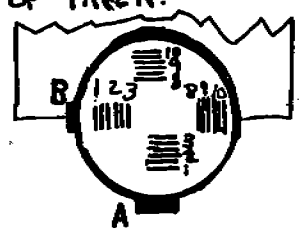
$$= 0.0945\ \frac{(535.6)(65.530)}{(30.01)(26.72)(0.0036)(60)(1-0.08)}$$

%I = 101.0 %

FIELD DATA

Plant SIZE CONTROL - LA PUENTE, CA.
Date 10-18-89
Sampling Location TANK 1 INLET
Sample Type CARB METHOD 425 CHROME
Run Number HMT-2
Operator SIMON
Ambient Temperature 80 °F
Barometric Pressure 30.05
Static Pressure (P_s) -0.58" H2O
Filter Number(s) HMT-2F
Pretest Leak Rate = 0.014 cfm @ 15.0 in. Hg
Pretest Pitot Leak Check O.K.
Pretest Orsat Leak Check Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type 18" glass-lined SS
Pitot Tube I.D. No. 15
Nozzle I.D. 04P d=0.300
Assumed Moisture, % 1.0

Meter Box Number IA Nutech
Meter $\Delta H_@$ 1.846
C Factor 1.15
Meter Gamma 1.011

Reference Δp 0.185
Post Test Leak Rate = 0.010 cfm @ 15.0 in. Hg
Post Test Pitot Leak Check
Post Test Orsat Leak Check Not Applicable
Impinger Box No. 2B

Traverse Point Number	Sampling Time, (min)	/ Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H2O	Orifice Pres. Differential (ΔH) in. H2O 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		Impinger Temp. °F
							5	6	7			4
A1	0	1207	387.543	0.198	1.90	✓	92	86	87	5.0		59
A2	3	1210	390.0	0.30	3.0	✗	93	90	86	7.0		54
A2	6	1213	392.3	0.19	1.90	✓	90	92	87	5.0		54
A3	9	1216	394.6	0.17	1.75	✓	89	~~87~~ 94	87	4.5		55
A4	12	1219	396.9	0.19	1.90	✓	90	95	88	5.0		58
A5	15	1222	399.1	0.22	2.20	✓	90	97	89	5.5		59
A6	18	1225	401.4	0.24	2.45	✓	90	98	89	5.5		60
A7	21	1228	403.6	0.24	2.45	✓	91	100	90	5.5		60
A8	24	1231	406.1	0.22	2.20	✓	91	101	91	5.0		61
A9	27	1234	408.5	0.20	2.05	✓	91	101	92	5.0		62
A10	30	1237	410.908	0.17	1.75	✓	94	96	93	4.5		68
SWITCH START AT 1242 → B1	33	1245	413.1	0.18	1.85	✓	94	94	101	4.5		60
B2	36	1248	415.3	0.19	1.95	✓	94	94	102	4.5		60
B3	39	1251	417.8	0.18	1.85	✓	91	95	103	4.5		61
B4	42	1254	420.1	0.19	1.95	✓	91	95	104	5.0		62
B5	45	1257	422.0	0.21	2.15	✓	92	95	104	5.0		62
B6	48	1300	424.1	0.22	2.25	✓	92	96	105	5.0		62
B7	51	1303	426.0	0.22	2.25	✓	92	96	105	5.0		63
B8	54	1306	428.5	0.19	1.90	✓	92	97	106	4.5		63
B9	57	1309	431.5	0.19	1.90	✓	92	97	106	4.5		63
B10	60	1312	433.442		STOP - END OF TEST							
				ΔH Ave = 2.08 ✓						MAX = 7.0 ✓		568 ✓
	θ = 60		45.899 = V_m				T_s = 55	1.6	T_{m_a} = 555.6			
			Ave √ΔP = 0.457 ✓									

PACIFIC ENVIRONMENTAL SERVICES, INC.

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SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING Co. - LA PUENTE, CA.

Date: 10-18-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-2

Sample Box Number: 2B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-2F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	110 ml	100 ml	0 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	10 ml	0 ml	0 ml
Total H_2O:			10
Silica Gel			
Final Volume:	730.3 g	g	g
Initial Volume	221.0 g	g	g
Net Volume	9.3 g	g	g
Total Moisture:			19.3

Description of Impinger Catch: 1st impinger had slight yellow tint.

Plant: Size Control
Date: 10-18-89
Source/Sample Number: HMT-2

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

$V_{m(std)} = 17.64(45.899)(1.011)\left[\frac{(30.05) + (2.08/13.6)}{(565.6)}\right]$

$V_{m(std)}$ = 44.478 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 19.3 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 0.908 scf

$V_{W(std)}$ = 0.909 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(0.908)}{(0.909)+(44.478)} = 0.020$

B_{Ws} = 2.0%

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (0.02)(18 - 29.0)$

M_s = 28.78 lb/lb-mole

Plant: Size Control
Date: 10-18-89
Source/Sample Number: HMT-2

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4517)\sqrt{\frac{(551.6)}{(30.01)(28.76)}}$$

$V_{s(avg)}$ = 25.92 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\ (25.92)(1.07)$$

Q_s = 1663 acfm

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

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

$$Q_{(std)} = 17.64(1663)(1-0.02)\frac{(30.01)}{(5)}$$

Q_{std} = 1564 dscfm

8. Isokinetic Variation

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

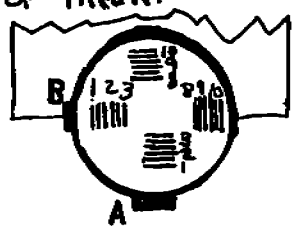
$$= 0.0945\ \frac{(551.6)(44.498)}{(30.01)(25.92)(0.00490)(60)(1-0.02)}$$

%I = 103.3 %

FIELD DATA

Plant SIZE CONTROL - LA PUENTE, CA.
Date 10-19-81
Sampling Location TANK 1 INLET
Sample Type CARB METHOD 425 CHROME
Run Number HMT-3
Operator SIMON
Ambient Temperature 70°F
Barometric Pressure 29.98" Hg
Static Pressure (P_s) -0.54" H_2O
Filter Number(s) HMT-3F
Pretest Leak Rate = 0.012 cfm @ 15.0 in. Hg
Pretest Pitot Leak Check O.K.
Pretest Orsat Leak Check Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type 18" glass-lined SS
Pitot Tube I.D. No. 1S
Nozzle I.D. 03P d = 0.299"
Assumed Moisture, % 2.0

Meter Box Number 1A Norech
Meter $\Delta H_@$ 1.54
C Factor 1.15
Meter Gamma 1.011

Reference Δp 0.190
Post Test Leak Rate = 0.010 cfm @ 15.0 in. Hg
Post Test Pitot Leak Check O.K.
Post Test Orsat Leak Check Not Applicable
Impinger Box No. 3B

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		Impinger Temp. °F
A1	0	1030	433.714	0.22	2.15	✓	88	79	77	7.0		56
A2	3	1033	436.1	0.23	2.25	✓	82	82	77	7.5		49
A2	6	1036	438.4	0.19	1.84	✓	82	85	78	6.5		48
A3	9	1039	440.6	0.20	1.95	✓	83	87	79	6.0		50
A4	12	1042	442.7	0.21	2.05	✓	84	88	79	6.5		51
A5	15	1045	445.0	0.20	1.95	✓	85	90	80	6.0		54
A6	18	1048	447.3	0.23	2.25	✓	85	92	81	7.5		54
A7	21	1051	449.4	0.25	2.45	✓	86	92	82	8.0		55
A8	24	1054	452.0	0.26	2.55	✓	86	94	83	8.5		55
A9	27	1057	454.6	0.25	2.45	✓	86	95	83	8.0		56
A10	30	1100	457.05	0.24	2.35	✓	86	93	83	7.5		58
SWITCH START AT 1105 → B1	33	1108	459.5	0.25	2.45	✓	86	94	85	8.0		57
B2	36	1111	462.1	0.20	1.95	✓	86	96	86	6.0		54
B3	39	1114	464.0	0.21	2.05	✓	85	96	87	6.5		55
B4	42	1117	466.5	0.22	2.15	✓	85	97	87	7.0		56
B5	45	1120	469.0	0.23	2.25	✓	86	97	88	7.5		56
B6	48	1123	471.1	0.22	2.15	✓	86	98	88	7.0		57
B7	51	1126	473.8	0.23	2.25	✓	86	98	88	7.5		57
B8	54	1129	476.2	0.20	1.95	✓	87	98	88	6.0		58
B9	57	1132	478.0	0.20	1.95	✓	87	99	89	6.0		58
B10	60	1135	480.544		STOP - END OF TEST							
		/										
		/	V_m = 46.830		ΔH = 2.17		$\bar{T}_s$ = 85.1 + 460	$\bar{T}_m$ = 548.0				
		/										

$\sqrt{\Delta P}$ = 0.4707

PACIFIC ENVIRONMENTAL SERVICES, INC.

SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING CO. - LA PUENTE, CA.

Date: 10-19-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-3

Sample Box Number: 3B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-3F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	110 ml	104 ml	0 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	10 ml	4 ml	0 ml
Total H_2O:			14
Silica Gel			
Final Volume:	784.7 g	g	g
Initial Volume	775.4 g	g	g
Net Volume	9.3 g	g	23.8 g
Total Moisture:			

Description of Impinger Catch: 1st impinger had yellow tint

Plant: Size Control
Date: 10-19-89
Source/Sample Number: UNIT-3

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

$V_{m(std)} = 17.64(46.530)(1.011)\left[\frac{(29.98) + (2.17/13.6)}{(548)}\right]$

$V_{m(std)}$ = 45.934 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 23.3 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 1.096 scf

$V_{W(std)}$ = 1.096 scf

3. Percent Moisture, by volume

$B_{ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.096)}{(1.096)+(45.934)} = 0.023$

B_{ws} = 2.3%

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{ws}(18 - M_d) = (29.0) + (0.023)(18 - 29.0)$

M_s = 28.75 lb/lb-mole

Plant: SIZE Control
Date: 10-19-89
Source/Sample Number: HMT-3

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4707)\sqrt{\frac{(545.1)}{(29.73)(29.94)}}$$

$V_{s(avg)}$ = 26.90 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\ (26.9)(1.07)$$

Q_s = 1725 acfm

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

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

$$Q_{(std)} = 17.64(1725)(1-0.023)\frac{(29.94)}{(545.1)}$$

Q_{std} = 1633 dscfm

8. Isokinetic Variation

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

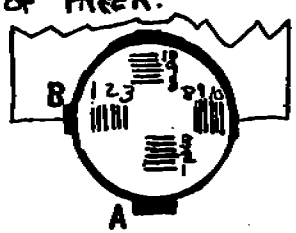
$$= 0.0945\ \frac{(545.1)(45.934)}{(29.94)(26.9)(0.00476)(60)(1-0.023)}$$

%I = 107.8 %

FIELD DATA

Plant SIZE CONTROL - LA PUENTE, CA.
Date 10-19-89
Sampling Location TANK 1 INLET
Sample Type CARB METHOD 425 CHROME
Run Number HMT-4
Operator SIMON
Ambient Temperature 80°F
Barometric Pressure 29.98" Hg
Static Pressure (P_s) -.53" H_2O
Filter Number(s) HMT-4F
Pretest Leak Rate = 0.006 cfm @ 15 in. Hg
Pretest Pitot Leak Check OK
Pretest Orsat Leak Check Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type 18" glass-lined SS
Pitot Tube I.D. No. 15
Nozzle I.D. 15P d = 0.300"
Assumed Moisture, % 2.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.846
C Factor 1.15
Meter Gamma 1.011

Reference Δp 0.190
Post Test Leak Rate = 0.006 cfm @ 15 in. Hg
Post Test Pitot Leak Check OK.
Post Test Orsat Leak Check Not Applicable
Impinger 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	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg		Impinger Temp. °F
A1	0	1219	481.148	0.22	2.15	✓	90	91	90	4.50		65
A2	3	1222	483.5	0.22	2.15	✓	90	95	91	4.5		62
A2	6	1225	485.9	0.20	1.95	✓	90	96	91	4.0		62
A3	9	1228	488.3	0.21	2.05	✓	90	97	91	4.0		63
A4	12	1231	490.4	0.22	2.15	✓	91	99	92	4.5		64
A5	15	1234	492.8	0.23	2.25	✓	91	100	93	4.5		64
A6	18	1237	495.2	0.24	2.35	✓	91	101	93	5.0		64
A7	21	1240	497.8	0.26	2.55	✓	91	102	94	5.0		63
A8	24	1243	500.2	0.24	2.35	✓	92	103	94	5.0		62
A9	27	1246	502.9	0.24	2.35	✓	92	104	94	5.0		62
A10	30	1249	505.282	0.22	2.15	✓	92	102	96	4.5		63
B1	33	1257	507.9	0.22	2.15	✓	92	102	96	4.5		62
B2	36	1300	510.1	0.21	2.05	✓	92	103	96	4.0		62
B3	39	1303	512.5	0.22	2.15	✓	91	104	97	4.5		62
B4	42	1306	515.1	0.23	2.25	✓	92	105	97	~~5.0~~ 4.5		64
B5	45	1309	517.4	0.23	2.25	✓	91	105	98	4.5		64
B6	48	1312	519.7	0.24	2.35	✓	92	106	98	4.5		65
B7	51	1316	522.2	0.23	2.25	✓	92	106	98	4.5		64
B8	54	1319	524.5	0.21	2.05	✓	92	107	98	4.0		65
B9	57	1321	526.6	0.20	1.95	✓	92	107	99	4.0		65
B10	60	1324	528.263		STOP - END OF TEST							
								$\bar{T}_m$ = 561.9				
			V_m = 48.09			$\bar{T}_s$	551.3					
					ΔH = 2.2							

ΔH = 0.473

SWITCH START AT 1254

PACIFIC ENVIRONMENTAL SERVICES, INC.

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SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING CO. - LA PUENTE, CA.

Date: 10-19-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-4

Sample Box Number: 4B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-4F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	112 ml	100 ml	0 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	12 ml	0 ml	0 ml
Total H_2O:			12

Silica Gel			
Final Volume:	770.2 g	g	g
Initial Volume	759.2 g	g	g
Net Volume	11.0 g	g	g
Total Moisture:			23.4

Description of Impinger Catch:

Plant: Size Control
Date: 10-19-89
Source/Sample Number: UNIT-4

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

$V_{m(std)} = 17.64(48.055)(1.011)\left[\frac{(29.98) + (2.2/13.6)}{(561.9)}\right]$

$V_{m(std)}$ = 45.972 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 23.0 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 1.082 scf

$V_{W(std)}$ = 1.083 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.083)}{(1.083)+(45.972)} = 0.023$

B_{Ws} = 2.3%

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (0.023)(18 - 29.0)$

M_s = 28.75 lb/lb-mole

Plant: Size Control
Date: 10-19-84
Source/Sample Number: HM 7-4

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4736)\sqrt{\frac{(551.3)}{(29.94)(28.75)}}$$

$V_{s(avg)}$ = 27.22 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\ (27.22)(1.07\ ft^2)$$

Q_s = 1746 acfm

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

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

$$Q_{(std)} = 17.64(1746)(1-0.023)\frac{(29.94)}{(551.3)}$$

Q_{std} = 1634 dscfm

8. Isokinetic Variation

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

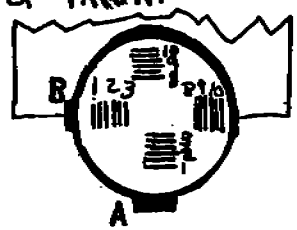
$$= 0.0945\ \frac{(551.3)(45.972)}{(29.94)(27.22)(0.00349)(60)(1-0.023)}$$

%I = 102.1 %

FIELD DATA

Plant SIZE CONTROL - LA PUENTE, CA.
Date 10-20-89
Sampling Location TANK 1 INLET
Sample Type CARB METHOD 425 CHROME
Run Number HMT-5
Operator SIMON
Ambient Temperature 72
Barometric Pressure 30.08
Static Pressure (P_s) -0.52 "H_2O
Filter Number(s) HMT-5
Pretest Leak Rate = 0.006 cfm @ 15 in. Hg
Pretest Pitot Leak Check O.K.
Pretest Orsat Leak Check Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type 18" glass-lined SS
Pitot Tube I.D. No. 15
Nozzle I.D. OAP d = 0.300"
Assumed Moisture, % 2.0
Meter Box Number 1A NUTECH
Meter $\Delta H_@$ 1.846
C Factor 1.150
Meter Gamma 1.011
Reference Δp 0.19
Post Test Leak Rate = 0.010 cfm @ 15 in. Hg
Post Test Pitot Leak Check O.K.
Post Test Orsat Leak Check Not Applicable
Impinger Box No. 1B

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		Impinger Temp. °F
A1	0	1048	530.138	0.14	1.35	✓	76	73	72	5.5		56
A1	3	1051	532.0	0.15	1.45	✓	76	73	72	5.5		48
A2	6	1054	534.1	0.18	1.75	✓	75	75	72	6.0		48
A3	9	1057	536.0	0.19	1.85	✓	75	76	73	6.0		48
A4	12	1100	538.0	0.21	2.05	✓	75	79	73	7.0		49
A5	15	1103	540.3	0.24	2.35	✓	75	81	74	8.0		52
A6	18	1106	542.8	0.24	2.35	✓	76	82	74	8.0		53
A7	21	1109	545.1	0.26	2.55	✓	76	84	75	9.0		54
A8	24	1112	547.6		2.45	✓	77	85	76	9.0		56
A9	27	1115	550.1	0.21	2.05	✓	77	86	76	7.0		56
A10	30	1118	552.36	0.21	2.05	✓	77	83	78	7.0		64
SWITCH START AT 1122 → B1	33	1125	554.6	0.22	2.15	✓	77	85	78	7.5		58
B2	36	1128	556.9	0.21	2.05	✓	77	87	79	7.0		57
B3	39	1131	559.2	0.23	2.30	✓	78	88	79	8.0		58
B4	42	1134	561.5	0.22	2.15	✓	78	89	80	8.0		59
B5	45	1137	563.8	0.24	2.35	✓	78	89	80	8.0		60
B6	48	1140	566.6	0.24	2.35	✓	78	90	81	8.0		60
B7	51	1143	568.8	0.25	2.45	✓	77	90	81	8.5		61
B8	54	1146	570.9	0.22	2.15	✓	77	91	82	8.0		62
B9	57	1149	573.6	0.22	2.15	✓	78	91	82	8.0		62
B10	60	1152	576.034		STOP - END OF TEST							
		/										
		/	V_m = 46.896		ΔH = 2.18		$\bar{T}_s$ = 336.7	$\bar{T}_m$ =	540.3			
		/		$\bar{\Delta P}$ = 0.164								

PACIFIC ENVIRONMENTAL SERVICES, INC.

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SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING CO. - LA PUENTE, CA.

Date: 10-20-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-5

Sample Box Number: 1B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-5F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	106 ml	100 ml	0 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	6 ml	0 ml	0 ml
Total H_2O:			6
Silica Gel			
Final Volume:	827.6 g	g	g
Initial Volume	815.2 g	g	g
Net Volume	12.4 g	g	g
Total Moisture:			18.4

Description of Impinger Catch:

PES

SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING Co. - LA PUENTE, CA.

Date: ~~10-15-89~~ 10-20-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-20TB

Sample Box Number: 2B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-20BF

Description of Filter:

MOISTURE

Impingers			
Final Volume:	100 ml	100 ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	0 ml	0 ml	ml
Total H_2O:			(0)

Silica Gel			
Final Volume:	790.0 g	g	g
Initial Volume	789.6 g	g	g
Net Volume	0.4 g	g	g
Total Moisture:			(0.4)

Description of Impinger Catch:

Plant: Size Control
Date: 10-20-89
Source/Sample Number: HMT-5

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

$V_{m(std)} = 17.64(45.866)(1.011)\left[\frac{(30.08) + (2.18/13.6)}{(540.3)}\right]$

$V_{m(std)}$ = 45.782 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 18.4 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 0.866 scf

$V_{W(std)}$ = 0.866 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(0.866)}{(0.866)+(45.782)} = 0.019$

B_{Ws} = 0.019 = 1.9%

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (0.019)(18 - 29.0)$

M_s = 28.79 lb/lb-mole

Plant: SIZE CONTROL
Date: 10-20-89
Source/Sample Number: HMT-5

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4640)\sqrt{\frac{(536.7)}{(30.04)(28.79)}}$$

$V_{s(avg)}$ = 26.25 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\ (26.25)(1.069)$$

Q_s = 1684 acfm

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

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

$$Q_{(std)} = 17.64(1684)(1-0.019)\frac{(30.04)}{(536.7)}$$

Q_{std} = 1631 dscfm

8. Isokinetic Variation

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

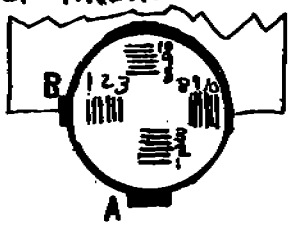
$$= 0.0945\ \frac{(536.7)(45.782)}{(30.04)(26.25)(0.00490)(60)(1-0.019)}$$

%I = 101.9 %

FIELD DATA

Plant SIZE CONTROL - LA PUENTE, CA.
Date 10/30/89
Sampling Location TANK 1 INLET
Sample Type CARB METHOD 425 CHROME
Run Number HMT-6B
Operator PARKS
Ambient Temperature 72°F
Barometric Pressure 30.08
Static Pressure (P_s) -0.55"
Filter Number(s) HMT-6
Pretest Leak Rate = 0.00 cfm @ 15.0 in. Hg
Pretest Pitot Leak Check O.K.
Pretest Orsat Leak Check Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type 18" glass-lined SS
Pitot Tube I.D. No. TA15
Nozzle I.D. OBP 0.370
Assumed Moisture, % 2.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.846
C Factor 1.15
Meter Gamma 1.011

Reference Δp 0.090
Post Test Leak Rate = 0.000 cfm @ 15 in. Hg
Post Test Pitot Leak Check ✓
Post Test Orsat Leak Check Not Applicable
Impinger 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		Impinger Temp. °F
A1	0 / 1412	602.107	0.28	5.60	✓	78	82	80	8.5		52
A1	3 / 1417	606.1	0.18	3.6	✓	78	86	80	6.5		48
A2	6 / 1420	609.1	0.16	3.3	✓	78	87	81	6.0		51
A3	9 / 1423	612.2	0.21	4.3	✓	77	88	81	8.0		55
A4	12 / 1426	615.7	0.21	4.3	✓	78	89	81	8.0		56
A5	15 / 1429	618.9	0.24	4.9	✓	78	90	81	8.2		55
A6	18 / 1432	622.2	0.26	5.35	✓	78	92	82	9.0		56
A7	21 / 1435	625.6	0.26	5.35	✓	79	93	83	9.0		58
A8	24 / 1438	629.0	0.25	5.1	✓	78	93	83	9.0		58
A9	27 / 1441	633.6	0.25	5.1	✓	78	93	84	9.0		60
A10	30 / 1444	636.753	0.29	5.9	✓	79	89	84	10.0		61
B1	33 / 1448	641.1	0.24	4.9	✓	78	93	84	8.6		59
B2	36 / 1451	644.7	0.20	4.1	✓	77	93	84	7.2		61
B3	39 / 1457	647.5	0.22	4.6	✓	77	93	85	7.9		61
B4	42 / 1500	650.3	0.22	4.5	✓	77	93	85	7.9		61
B5	45 / 1503	654.0	0.24	4.9	✓	77	94	85	8.6		61
B6	48 / 1506	657.7	0.25	5.1	✓	78	94	85	8.8		62
B7	51 / 1509	661.5	0.24	4.9	✓	78	94	85	8.6		63
B8	54 / 1512	665.6	0.23	4.7	✓	78	95	86	8.3		63
B9	57 / 1515	668.8	0.23	4.7	✓	78	95	86	8.3		63
B10	60 / 1518	671.513		STOP - END OF TEST							
	/										
	/	V_m = 69.476		ΔH = 4.77		$\bar{T}_s$ = 77.9		$\bar{T}_m$ = 547.3			
	/										

SWITCH START AT 1448

PACIFIC ENVIRONMENTAL SERVICES, INC.

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SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING Co. - LA PUENTE, CA.

Date: 10-20-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-6

Sample Box Number: 4B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments: Clean sampling train was used after first HMT-6 test was aborted. Filter from aborted HMT-6 run was used again for this test however.

FRONT HALF

Filter Number: HMT-6F

Description of Filter: Slight yellow stain

MOISTURE

Impingers			
Final Volume:	112 ml	112 ml	0 ml
Initial Volume:	100 ml	100 ml	0 ml
Net Volume:	12 ml	12 ml	0 ml
Total H_2O:			24
Silica Gel			
Final Volume:	776.2 g	g	g
Initial Volume	770 g	g	g
Net Volume	6.2 g	g	g
Total Moisture:			30.2

Description of Impinger Catch:

Plant: Size Control
Date: 10-20-89
Source/Sample Number: HMT-6

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

$V_{m(std)} = 17.64(69.478)(1.011)\left[\frac{(30.08) + (4.77/13.6)}{(547.3)}\right]$

$V_{m(std)}$ = 68.894 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 30.4 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 1.431 scf

$V_{W(std)}$ = 1.431 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.431)}{(1.431)+(68.894)} = .020$

B_{Ws} = 2%

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (0.020)(18 - 29.0)$

M_s = 28.78 lb/lb-mole

Plant: Size Control
Date: 10-20-89
Source/Sample Number: HMT-6

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4816)\sqrt{\frac{(537.9)}{(28.78)(30.04)}}$$

$V_{s(avg)}$ = 27.28 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\left(27.28\right)\left(\left(\frac{49}{144}\right)\pi\right)$$

Q_s = 1750 acfm

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

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

$$Q_{(std)} = 17.64(1756)(1-0.02)\frac{(30.04)}{(537.9)}$$

Q_{std} = 1690 dscfm

8. Isokinetic Variation

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

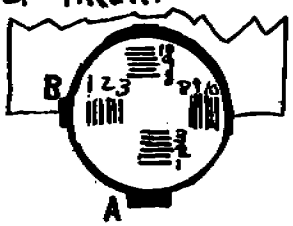
$$= 0.0945\ \frac{(537.9)(68.394)}{(30.04)(27.28)(0.000746)(60)(1-0.02)}$$

%I = 97.3 %

FIELD DATA

Plant SIZE CONTROL - LA PUENTE, CA.
Date 10-23-89
Sampling Location TANK 1 INLET
Sample Type CARB METHOD 425 CHROME
Run Number HMT-7
Operator SIMON
Ambient Temperature 80°F
Barometric Pressure 30.21
Static Pressure (P_s) -0.54" H_2O
Filter Number(s) HMT-7F
Pretest Leak Rate = 0.010 cfm @ 13.5 in. Hg
Pretest Pitot Leak Check OK
Pretest Orsat Leak Check Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type 18" glass-lined SS
Pitot Tube I.D. No. S-1A
Nozzle I.D. 14P d=0.300
Assumed Moisture, % 2.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.846
C Factor 1.15
Meter Gamma 1.011

Reference Δp 0.0195
Post Test Leak Rate = 0.012 cfm @ 13 in. Hg
Post Test Pitot Leak Check OK
Post Test Orsat Leak Check Not Applicable
Impinger 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	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg		Impinger Temp. °F
A1	0	10:45	672.592	0.27	2.50	✓	75	74	74	8.0		71
A1	3	10:48	675.3	0.26	2.45	✓	73	75	73	8.0		65
A2	6	1051	677.8	0.19	1.80	✓	74	77	74	6.0		61
A3	9	1054	679.8	0.21	1.95	✓	73	78	74	6.0		62
A4	12	1057	682.2	0.22	2.05	✓	74	81	75	5.5		61
A5	15	1100	684.4	0.21	1.95	✓	74	83	76	6.0		60
A6	18	1103	686.9	0.26	2.45	✓	75	84	76	7.5		59
A7	21	1106	689.1	0.25	2.35	✓	75	85	77	7.5		58
A8	24	1109	691.6	0.26	2.45	✓	75	86	77	7.5		59
A9	27	1112	693.9	0.24	2.25	✓	74	87	78	7.0		59
A10	30	1115	696.062	0.32	3.0	✓	77	82	79	8.5		63
B1	33	1122	698.9	0.19	1.85	✓	75	88	79	5.5		56
B2	36	1125	701.4	0.20	1.9	✓	75	88	80	6.0		58
B3	39	1128	703.5	0.22	2.05	✓	75	89	80	6.0		59
B4	42	1131	705.6	0.23	2.15	✓	75	89	80	6.5		58
B5	45	1134	708.1	0.22	2.05	✓	75	90	81	6.5		59
B6	48	1137	710.3	0.22	2.05	✓	76	91	82	6.5		60
B7	51	1140	712.5	0.21	1.95	✓	76	91	82	6.5		60
B8	54	1143	714.7	0.22	2.05	✓	76	91	82	6.5		60
B9	57	1146	716.5	0.19	1.85	✓	75	91	83	5.5		60
B10	60	1149	718.997		STOP - END OF TEST							
		T_m =	46.371		ΔH@ 2.16	T_s =	534.9	T_m =	541.6			
				$\overline{\Delta P_s}$ = 0.473								

SWITCH START AT 1119

PACIFIC ENVIRONMENTAL SERVICES, INC.

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SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING CO. - LA PUENTE, CA.

Date: 10-23-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-7

Sample Box Number: 4B

Clean-up Man: SIMONI/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-7F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	102 ml	100 ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	ml	ml	ml
Total H_2O:	(2)		
Silica Gel			
Final Volume:	739.0 g	g	g
Initial Volume	724.0 g	g	g
Net Volume	(15) g	g	(17.0) g
Total Moisture:			

Description of Impinger Catch:

Plant: Size Control
Date: 10-23-89
Source/Sample Number: HMT-7

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

$V_{m(std)} = 17.64(46.371)(1.011)\left[\frac{(30.21) + (.216/13.6)}{(541.6)}\right]$

$V_{m(std)}$ = 46.371 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 17 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 0.80 scf

$V_{W(std)}$ = 0.80 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(0.80)}{(0.80) + (46.371)} = 0.017$

B_{Ws} = 1.7 %

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (0.017)(18 - 29.0)$

M_s = 28.81 lb/lb-mole

Plant: Size Control
Date: 10-29-84
Source/Sample Number: HMT-7

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4780)\sqrt{\frac{(534.9)}{(28.81)(30.17)}}$$

$V_{s(avg)}$ = 26.93 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\ (26.93)(1.069)$$

Q_s = 1727 acfm

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

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

$$Q_{(std)} = 17.64(1727)(1-0.017)\frac{(30.17)}{(534.9)}$$

Q_{std} = 1689 dscfm

8. Isokinetic Variation

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

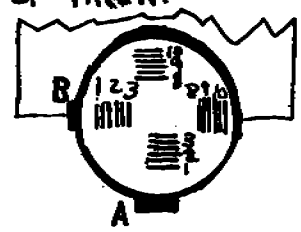
$$= 0.0945\ \frac{(534.9)(46.371)}{(30.17)(26.93)(0.00449)(60)(1-0.017)}$$

%I = 99.6 %

FIELD DATA

Plant SIZE CONTROL - LA PUENTE, CA.
Date 10-23-88
Sampling Location TANK 1 INLET
Sample Type CARB METHOD 425 CHROME
Run Number HMT-8
Operator SIMON/PARKS
Ambient Temperature 87°F
Barometric Pressure 30.21 "Hg
Static Pressure (P_s) -.54" H_2O
Filter Number(s) HMT-8F
Pretest Leak Rate = 0.006 cfm @ 15.5 in. Hg
Pretest Pitot Leak Check OK
Pretest Orsat Leak Check Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type 18" glass-lined SS
Pitot Tube I.D. No. 3-1A
Nozzle I.D. 03P ø0.299
Assumed Moisture, % 2.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.846
C Factor 1.15
Meter Gamma 1.011

Reference Δp 0.195
Post Test Leak Rate = 0.003 cfm @ 13 in. Hg
Post Test Pitot Leak Check OK
Post Test Orsat Leak Check Not Applicable
Impinger Box No. 1B
FIELD BLANK = 3B

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		Impinger Temp. °F
A1	0	1413	719.418	0.21	1.95	✓	77	80	79	5.5		67
A1	3	1416	721.5	0.20	1.90	✓	79	80	79	5.5		52
A2	6	1419	723.7	0.19	1.80	✓	78	82	79	5.5		50
A3	9	1421	725.8	0.20	1.90	✓	79	84	80	5.5		51
A4	12	1424	728.0	0.21	1.95	✓	78	85	81	5.5		52
A5	15	1429	730.3	0.24	2.25	✓	78	87	81	6.5		55
A6	18	1430	732.8	0.26	2.40	✓	79	89	82	7.0		56
A7	21	1433	735.4	0.25	2.30	✓	79	92	81	7.0		56
A8	24	1436	737.6	0.25	2.30	✓	79	91	83	7.0		58
A9	27	1439	740.0	0.19	1.80	✓	79	92	83	5.5		58
SWITCH START AT HA7 → A10	30	1442	742.264	0.22	2.10	✓	81	88	84	6.0		66
B1	33	1450	744.4	0.22	2.10	✓	81	92	85	6.0		57
B2	36	1453	746.8	0.21	1.95	✓	80	93	85	6.0		56
B3	39	1456	DID NOT OBSERVE	0.22	2.10	✓	80	94	86	6.0		58
B4	42	1459	751.5	0.22	2.10	✓	80	95	86	6.0		58
B5	45	1502	753.8	0.22	2.10	✓	80	95	86	6.0		59
B6	48	1505	755.9	0.23	2.15	✓	80	95	87	6.0		59
B7	51	1508	758.5	0.22	2.10	✓	80	96	88	6.0		59
B8	54	1511	760.9	0.21	1.95	✓	80	96	88	6.0		59
B9	57	1514	763.2	0.19	1.80	✓	80	96	87	5.5		59
B10	60	1517	765.089	—	STOP - END OF TEST							
		/										
		/			$\overline{\Delta H}$=2.15		$\overline{T_s}$=77.3		$\overline{T_m}$= 546.9			
		/	V_m 45.641	$\overline{P_s}$ = 0.4669								

PACIFIC ENVIRONMENTAL SERVICES, INC.

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SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING CO. - LA PUENTE, CA

Date: 10-23-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 (chrome)

Run Number: HMT-8

Sample Box Number: 1B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-8F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	100 ml	100 ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	ml	ml	ml
Total H_2O:	0	0	0
Silica Gel			
Final Volume:	755.2 g	g	g
Initial Volume	729.8 g	g	g
Net Volume	g	g	g
Total Moisture:			25.4

Description of Impinger Catch:

PES

SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING Co. - LA PUENTE, CA.

Date: 10-23-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-23TB

Sample Box Number: 3B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-23 FB

Description of Filter: Clean

MOISTURE

Impingers			
Final Volume:	100 ml	100 ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	ml	ml	ml
Total H_2O:			0
Silica Gel			
Final Volume:	752.6 g	g	g
Initial Volume	755.7 g	g	g
Net Volume	g	g	g
Total Moisture:			3.1

Description of Impinger Catch: Clear

Plant: Size Control
Date: 10-22-89
Source/Sample Number: HMT-8

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

$V_{m(std)} = 17.64(45.641)(1.011)\left[\frac{(30.21) + (2.15/13.6)}{(546.9)}\right]$

$V_{m(std)}$ = 45.198 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 25.4 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 1.19 scf

$V_{W(std)}$ = 1.19 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.19)}{(1.19)+(45.198)} = 0.025$

B_{Ws} = 0.025

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (29.0) + (0.025)(18 - 29.0)$

M_s = 28.73 lb/lb-mole

Plant: Size Control
Date: 10-23-87
Source/Sample Number: HMT-8

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4664)\sqrt{\frac{(539.3)}{(30.17)(28.73)}}$$

$V_{s(avg)}$ = 26.42 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\ (26.42)(1.069)$$

Q_s = 1695 acfm

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

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

$$Q_{(std)} = 17.64(1695)(1-0.035)\frac{(30.17)}{(539.3)}$$

Q_{std} = 1631 dscfm

8. Isokinetic Variation

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

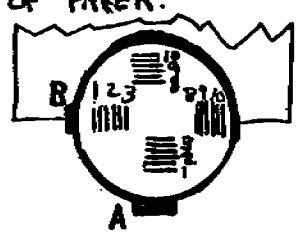
$$= 0.0945\ \frac{(539.3)(45.198)}{(30.17)(26.42)(0.0004574)(60)(1-0.035)}$$

%I = 101.3 %

FIELD DATA

Plant SIZE CONTROL - LA PUENTE, CA.
Date 10-24-89
Sampling Location TANK 1 INLET
Sample Type CARB METHOD 425 CHROME
Run Number HMT-9
Operator SIMON
Ambient Temperature 80°F
Barometric Pressure 31.10" Hg
Static Pressure (P_s) -5.3" H_2O
Filter Number(s) HMT-9F
Pretest Leak Rate = 0.012 cfm @ 15.0 in. Hg
Pretest Pitot Leak Check O.K
Pretest Orsat Leak Check Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type 18" glass-lined SS
Pitot Tube I.D. No. S-1A
Nozzle I.D. 04P d=0.300
Assumed Moisture, % 2.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.846
C Factor 1.15
Meter Gamma 1.011

Reference Δp 0.195
Post Test Leak Rate = 0.016 cfm @ 15.0 in. Hg
Post Test Pitot Leak Check O.K.
Post Test Orsat Leak Check Not Applicable
Impinger Box No. 3B
Blank's Imp. Box = 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		Impinger Temp. °F
A1	0	0949	765.408	0.19	1.60	✓	71	68	68	5.10		50
A1	3	0952		0.19	1.65	✓	71	70	68	5.5		43
A2	6	0955	769.6	0.20	1.90	✓	71	71	68	5.5		43
A3	9	0958	771.6	0.20	1.90	✓	73	74	69	5.5		46
A4	12	1001	773.8	0.21	2.0	✓	72	76	70	6.0		48
A5	15	1004	776.1	0.21	2.0	✓	72	78	70	6.0		49
A6	18	1007	778.2	0.21	2.0	✓	73	79	71	6.0		50
A7	21	1010	780.4	0.24	2.25	✓	72	80	72	6.5		50
A8	24	1013	782.6	0.26	2.45	✓	71	81	72	7.0		50
A9	27	1016	785.3	0.21	2.0	✓	75	83	73	6.0		51
SWITCH START AT 1024 → A10	30	1019	787.397	0.19	1.85	✓	75	79	74	5.0		57
B1	33	1022 1022	789.9	0.20	1.90	✓	74	83	75	5.5		50
B2	36	1025 1025	791.8	0.21	2.0	✓	75	84	76	5.5		51
B3	39	1028 1028	793.9	0.21	2.0	✓	74	85	76	5.5		51
B4	42	1031 1031	796.2	0.20	1.90	✓	74	86	76	5.5		52
B5	45	1034 1034	798.1	0.22	2.10	✓	74	87	78	6.5		53
B6	48	1037 1037	801.0	0.24	2.30	✓	74	88	78	6.5		53
B7	51	1040 1040	803.1	0.23	2.15	✓	74	88	79	6.5		53
B8	54	1043 1043	805.3	0.22	2.10	✓	74	89	79	6.5		54
B9	57	1046 1046	807.6	0.20	1.90	✓	74	90	79	6.5		54
B10	60	1049 1049	809.906	—	STOP - END OF TEST —							
			$\bar{V}_m$ = 44.498		$\Delta H@$ = 1.81		$\bar{T}_s$ = 533.7	$\bar{T}_m$ = 532.2				
				$\bar{\Delta p}$ = 0.4659								

PACIFIC ENVIRONMENTAL SERVICES, INC.

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SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING CO. - LA PUENTE, CA.

Date: 10-24-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-9

Sample Box Number: 3B

Clean-up Man: SIMONI/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-9F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	112 ml	104 ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	12 ml	14 ml	ml
Total H_2O:	~~12~~		(16
Silica Gel			
Final Volume:	720.9 g	g	g
Initial Volume	713.2 g	g	g
Net Volume	(7.7) g	g	g
Total Moisture:			(23.7)

Description of Impinger Catch:

PES

Plant: Size Control
Date: 10-24-89
Source/Sample Number: HMT-9

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

$V_{m(std)} = 17.64(44.498)(1.011)\left[\frac{(31.10) + (2.01/13.6)}{(537.2)}\right]$

$V_{m(std)}$ = 46.161 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 23.7 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 1.11 scf

$V_{W(std)}$ = 1.11 scf

3. Percent Moisture, by volume

$B_{ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.11)}{(1.11)+(46.161)} = 0.023$

B_{ws} = 2.3%

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{ws}(18 - M_d) = (29.0) + (0.023)(18 - 29.0)$

M_s = 28.75 lb/lb-mole

Plant: Size Control
Date: 10-24-81
Source/Sample Number: HMT-9

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4589)\sqrt{\frac{(533.2)}{(31.06)(28.75)}}$$

$V_{s(avg)}$ = 25.46 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\ (25.46)(1.069)$$

Q_s = 1633 acfm

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

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

$$Q_{(std)} = 17.64(1633)(1-0.023)\frac{(31.06)}{(533.2)}$$

Q_{std} = 16.39 dscfm

8. Isokinetic Variation

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

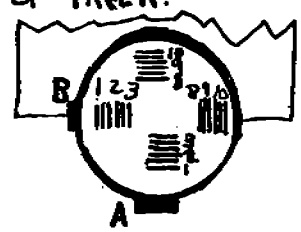
$$= 0.0945\ \frac{(533.2)(46.161)}{(31.06)(25.46)(0.022901)(60)(1-0.023)}$$

%I = 102.2 %

FIELD DATA

Plant: SIZE CONTROL - LA PUENTE, CA.
Date: 11-24-88
Sampling Location: TANK 1 INLET
Sample Type: CARB METHOD 425 CHROME
Run Number: HMT-10
Operator: SIMON
Ambient Temperature: 80°F
Barometric Pressure: 31.10 "Hg
Static Pressure (P_s): -5.3 "H_2O
Filter Number(s): HMT-10F
Pretest Leak Rate = 0.010 cfm @ 15.0 in. Hg
Pretest Pitot Leak Check: OK
Pretest Orsat Leak Check: Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type: 18" glass-lined SS
Pitot Tube I.D. No.: S-1A
Nozzle I.D.: 14P
Assumed Moisture, %: 2.0

Meter Box Number: 1A
Meter $\Delta H_@$: 1.896
C Factor: 1.15
Meter Gamma: 1.011

Reference Δp: 0.195
Post Test Leak Rate = 0.010 cfm @ 15.0 in. Hg
Post Test Pitot Leak Check: O.K.
Post Test Orsat Leak Check: Not Applicable
Impinger 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	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg		Impinger Temp. °F
A1	0	1131	810.309	0.20	1.90	✓	74	80	79	4.0		59
A1	3	1134	812.4	0.20	1.90	✓	74	80	79	4.0		54
A2	6	1137	814.8	0.21	2.00	✓	75	83	80	4.5		51
A3	9	1140	816.9	0.21	2.00	✓	77	85	80	4.5		52
A4	12	1143	819.0	0.20	1.90	✓	76	86	80	4.0		54
A5	15	1146	821.1	0.21	2.00	✓	77	88	81	4.5		55
A6	18	1149	823.5	0.23	2.20	✓	78	89	82	5.0		55
A7	21	1152	825.9	0.24	2.25	✓	78	90	82	5.0		56
A8	24	1155	828.1	0.25	2.35	✓	77	90	82	5.5		56
A9	27	1158	831.0	0.25	2.35	✓	77	92	83	5.5		57
A10	30	1201	~~833.12~~	0.27	2.50	✓	~~80~~ 80	89 92	~~84~~ 83	5.5		59
B1	33	1209	837.7	0.20	1.90	✓	79	81	83	4.5		56
B2	36	1212	840.1	0.22	2.05	✓	81	93	85	4.5		55
B3	39	1215	842.3	0.22	2.05	✓	81	94	85	4.5		55
B4	42	1218	844.4	0.23	2.10	✓	81	94	86	4.5		56
B5	45	1221	846.8	0.24	2.25	✓	82	95	86	5.0		57
B6	48	1224	849.0	0.23	2.10	✓	82	96	87	4.5		57
B7	51	1227	852.0	0.24	2.25	✓	82	96	87	5.0		58
B8	54	1230	854.2	0.22	2.05	✓	82	97	88	4.5		58
B9	57	1233	856.1	0.21	2.00	✓	81	97	88	4.5		58
B10	60	1236	858.469	—	STOP - END OF TEST							
					$\bar{H}$ 2.06		$\bar{T}_s$ 538.11	$\bar{T}_m$ = 547				

SWITCH START AT 1206

PACIFIC ENVIRONMENTAL SERVICES, INC.

PES

SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING Co. - LA PUENTE, CA.

Date: 10-24-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-10

Sample Box Number: 4B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-10F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	104 ml	106 ml	ml
Initial Volume:	102 ml	100 ml	ml
Net Volume:	2 ml	6 ml	ml
Total H_2O:	(8)		
Silica Gel			
Final Volume:	266.5 g	g	g
Initial Volume	752.0 g	g	g
Net Volume	(14.5) g	g	g
Total Moisture:			(22.5)

Description of Impinger Catch: Clear

PES

SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING CO. - LA PUENTE, CA.

Date: 10-24-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-24TB

Sample Box Number: 2B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-24FB

Description of Filter:

MOISTURE

Impingers			
Final Volume:	100 ml	100 ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	ml	ml	ml
Total H_2O:			
Silica Gel			
Final Volume:	746.3 g	g	g
Initial Volume	746.2 g	g	g
Net Volume	0.1 g	g	g
Total Moisture:			(0.1)

Description of Impinger Catch:

Plant: Size Control
Date: 10-24-89
Source/Sample Number: HMT-10

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

$V_{m(std)} = 17.64(48.161)(1.011)\left[\frac{(31.1) + (2.08/13.6)}{(547)}\right]$

$V_{m(std)}$ = 49.074 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 225 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 1.06 scf

$V_{W(std)}$ = 1.06 scf

3. Percent Moisture, by volume

$B_{Ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(1.06)}{(1.06)+(49.704)} = 0.021$

B_{Ws} = 2.1%

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{Ws}(18 - M_d) = (\quad) + (0.021)(18 - 29.0)$

M_s = 28.77 lb/lb-mole

Plant: Size Control
Date: 10-24-89
Source/Sample Number: HMT-10

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4698)\sqrt{\frac{(538.1)}{(31.06)(28.77)}}$$

$V_{s(avg)}$ = 26.12 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\ (26.12)(1.069)$$

Q_s = 1679 acfm

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

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

$$Q_{(std)} = 17.64(1679)(1-0.021)\frac{(31.06)}{(538.1)}$$

Q_{std} = 1674 dscfm

8. Isokinetic Variation

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

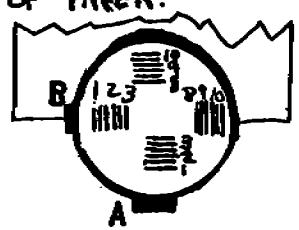
$$= 0.0945\ \frac{(538.1)(49.074)}{(31.06)(26.12)(.00440)(60)(1-0.021)}$$

%I = 106.7 %

FIELD DATA

Plant SIZE CONTROL - LA PUENTE, CA.
Date 10-25-89
Sampling Location TANK 1 INLET
Sample Type CARB METHOD 425 CHROME
Run Number HMT-11
Operator SIMON
Ambient Temperature 75-80°F
Barometric Pressure 29.95 "Hg
Static Pressure (P_s) -5.9" H2O
Filter Number(s) HMT-11F
Pretest Leak Rate = 0.012 cfm @ 15.0 in. Hg
Pretest Pitot Leak Check OK
Pretest Orsat Leak Check Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type 18" glass-lined SS
Pitot Tube I.D. No. S-1A
Nozzle I.D. c39 d=0.299
Assumed Moisture, % 2.0

Meter Box Number 1A
Meter $\Delta H_@$ 1.846
C Factor 1.15
Meter Gamma 1.011

Reference Δp 0.195
Post Test Leak Rate = 0.016 cfm @ 15.5 in. Hg
Post Test Pitot Leak Check
Post Test Orsat Leak Check Not Applicable
Impinger Box No. 1B
Blank 2B

Traverse Point Number	Sampling Time, (min)	/ Clock Time (24-hour clock)	Gas Meter Reading (V_m) ft³	Velocity Head (ΔP_s) in. H2O	Orifice Pres. Differential (ΔH) in. H2O 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		Impinger Temp. °F
A1	0	1056	858.731	0.19	1.80	✓	71	69	69	5.0		57
A2	3	1059	861.0	0.21	2.00	✓	72	71	69	5.0		47
A2	6	1102	863.1	0.20	1.90	✓	72	72	69	5.0		46
A3	9	1105	865.4	0.21	2.00	✓	72	74	69	5.0		47
A4	12	1107	867.5	0.21	2.00	✓	73	77	70	5.0		50
A5	15	1110	869.9	0.24	2.25	✓	74	80	72	5.5		52
A6	18	1113	872.2	0.24	2.25	✓	74	81	72	5.5		53
A7	21	1116	874.8	0.26	2.45	✓	74	83	73	6.0		54
A8	24	1119	877.0	0.26	2.45	✓	74	84	74	6.0		55
A9	27	1122	879.6	0.25	2.40	✓	75	85	75	6.0		55
A10	30	1125	881.852	0.24	2.25	✓	75	80	76	5.5		61
SWITCH START AT 1231 → B1	33	1234	884.3	0.25	2.40	✓	75	84	76	5.5		55
B2	36	1237	886.9	0.20	1.90	✓	75	86	79	5.0		53
B3	39	1240	888.9	0.20	1.90	✓	76	87	77	5.0		54
B4	42	1243	891.1	0.21	2.00	✓	75	87	78	5.0		55
B5	45	1246	893.2	0.22	2.05	✓	74	88	79	5.0		56
B6	48	1249	895.6	0.24	2.25	✓	75	89	79	5.0		56
B7	51	1252	898.0	0.23	2.15	✓	75	89	80	5.0		55
B8	54	1255	900.3	0.22	2.05	✓	75	89	80	5.0		56
B9	57	1258	902.5	0.22	2.05	✓	75	90	81	5.0		56
B10	60	1301	904.9	—	STOP - END OF TEST							
			V_m = 46.163		ΔH = 2.13		T_s = 534	T_m = 538.5				

ΔP = 0.4738

PACIFIC ENVIRONMENTAL SERVICES, INC.

PES

SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING Co. - LA PUENTE, CA.

Date: 10-25-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-11

Sample Box Number: 1B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-11F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	100 ml	100 ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	ml	ml	ml
Total H_2O:			
Silica Gel			
Final Volume:	760.5 g	g	g
Initial Volume	750.0 g	g	g
Net Volume	g	g	g
Total Moisture:			10.8

Description of Impinger Catch: Clear

PES

Plant: Size Control
Date: 10-25-89
Source/Sample Number: HMT-11

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

$V_{m(std)} = 17.64(46.163)(1.011)\left[\frac{(29.95) + (2.13/13.6)}{(538.5)}\right]$

$V_{m(std)}$ = 46.028 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 10.5 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 0.494 scf

$V_{W(std)}$ = 0.494 scf

3. Percent Moisture, by volume

$B_{ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(0.494)}{(0.494) + (46.028)} = 0.011$

B_{ws} = 1.1 %

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{ws}(18 - M_d) = (29.0) + (0.011)(18 - 29.0)$

M_s = 28.89 lb/lb-mole

Plant: Size Control
Date: 10-26-89
Source/Sample Number: HMT-11

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4738)\sqrt{\frac{(534)}{(28.88)(29.91)}}$$

$V_{s(avg)}$ = 26.75 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\ (26.75)(1.069)$$

Q_s = 1716 acfm

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

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

$$Q_{(std)} = 17.64(1716)(1-0.011)\frac{(29.91)}{(534)}$$

Q_{std} = 1677 dscfm

8. Isokinetic Variation

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

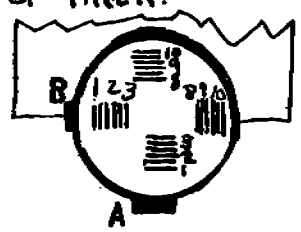
$$= 0.0945\ \frac{(534)(46.028)}{(29.91)(26.75)(0.00476)(60)(1-0.011)}$$

%I = 100.3 %

FIELD DATA

Plant SIZE CONTROL - LA PUENTE CA.
Date 10-25-89
Sampling Location TANK 1 INLET
Sample Type CARB METHOD 425 CHROME
Run Number HMT-12
Operator SIMON
Ambient Temperature 80°F
Barometric Pressure 29.95" Hg
Static Pressure (P_s) -5.3" H_2O
Filter Number(s) HMT-12F
Pretest Leak Rate = 0.010 cfm @ 15.0 in. Hg
Pretest Pitot Leak Check OK
Pretest Orsat Leak Check Not Applicable
Read and Record all Data Every 3 Minutes

TOP VIEW - FLOW IS OUT OF PAPER.



Schematic of Traverse Point Layout

Probe Length and Type 18" glass lined SS
Pitot Tube I.D. No. S-1A
Nozzle I.D. 04P d=0.300"
Assumed Moisture, % 2.0

Meter Box Number 1A NUTECH
Meter $\Delta H_@$ 1.846
C Factor 1.18
Meter Gamma 1.006

Reference Δp 0.195
Post Test Leak Rate = .019 cfm @ 15.0 in. Hg
Post Test Pitot Leak Check OK
Post Test Orsat Leak Check Not Applicable
Impinger 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	Actual	Stack Temp. (T_s) °F	Dry Gas Meter Temp. Inlet ($T_{m_{in}}$) °F	Outlet ($T_{m_{out}}$) °F	Pump Vacuum in. Hg		Impinger Temp. °F
A1	0 / 1306	905.115	0.24	2.25	2.00	75	78	79	20.0		53
A2	3 / 1309	907.1	0.24	2.20	2.10	75	79	79	22.0		51
A2	6 / 1312	909.3	0.21	2.00	✓	77	78	80	5.0		52
A3	9 / 1320	911.4	0.21	2.00	✓	78	79	80	5.0		54
A4	12 / 1323	913.8	0.22	2.05	✓	77	81	80	5.0		57
A5	15 / 1326	916.2	0.21	2.00	✓	76	83	80	5.0		58
A6	18 / 1329	918.3	0.22	2.05	✓	80	84	81	5.0		58
A7	21 / 1332	921.0	0.24	2.25	✓	80	85	81	5.5		59
A8	24 / 1335	923.7	0.26	2.45	✓	81	85	81	6.0		59
A9	27 / 1338	926.3	0.26	2.45	✓	81	85	82	6.0		60
SWITCH START AT 1346 A10	30 / 1341	928.9	0.25	2.40	✓	80	86	82	6.0		61
B1	33 / 1349	931.1	0.23	2.15	✓	78	86	82	5.5		59
B2	36 / 1352	933.4	0.22	2.05	✓	78	87	82	5.0		58
B3	39 / 1355	935.7	0.22	2.05	✓	77	87	82	5.0		60
B4	42 / 1358	937.9	0.21	2.00	✓	76	86	82	5.0		60
B5	45 / 1401	940.1	0.21	2.00	✓	77	87	83	5.0		60
B6	48 / 1404	942.2	0.22	2.05	✓	77	87	82	5.0		60
B7	51 / 1407	944.4	0.23	2.15	✓	77	88	83	5.5		60
B8	54 / 1410	946.6	0.21	2.00	✓	80	88	83	5.0		60
B9	57 / 1413	948.8	0.19	1.80	✓	80	88	83	4.5		60
B10	60 / 1416	~~949.136~~	—	STOP - END OF TEST							
	/	950.136									
	/		ΔP=		T_s	538					
	/	V_m= 45.021	0.4739	0.19							

VACUUM TOO HIGH WET FRIT STOP 1309
CHANGED FRIT AND FILTER START 1314
LEAK CHECK 0.011 at 15" H_2O

PACIFIC ENVIRONMENTAL SERVICES, INC.

PES

SAMPLE RECOVERY DATA

Plant: SIZE CONTROL PLATING CO. - LA PUENTE, CA.

Date: 10-25-89

Sampling Location: TANK 1 INLET DUCT

Sample Type: CARB METHOD 425 - Chrome

Run Number: HMT-12

Sample Box Number: 4B

Clean-up Man: SIMON/PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: HMT-12F

Description of Filter:

MOISTURE

Impingers			
Final Volume:	100 ml	100 ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	ml	ml	ml
Total H_2O:	0		
Silica Gel			
Final Volume:	781.4 g	g	g
Initial Volume	766.4 g	g	g
Net Volume	15 g	g	g
Total Moisture:			15

Description of Impinger Catch: Clear

PES

SAMPLE RECOVERY DATA

Plant: Size Control

Date: 10-25-89

Sampling Location: Inlet

Sample Type: HMT-25-TB - CHROME

Run Number: HMT-25TB

Sample Box Number: 2B

Clean-up Man: PARKS

Job Number: 3922

Comments:

FRONT HALF

Filter Number: _____ _____ _____

Description of Filter:

MOISTURE

Impingers

Final Volume:	100 ml	100 ml	ml
Initial Volume:	100 ml	100 ml	ml
Net Volume:	ml	ml	ml
Total H_2O:			

Silica Gel

Final Volume:	738.4 g	g	g
Initial Volume	738.4 g	g	g
Net Volume	g	g	g
Total Moisture:			

Description of Impinger Catch: Clear

PES

Plant: SI2E Control
Date: 10-25-89
Source/Sample Number: HWT-12

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

$V_{m(std)} = 17.64(45.021)(1.011)\left[\frac{(29.95) + (2.19/13.6)}{(542.8)}\right]$

$V_{m(std)}$ = 44.540 dscf

2. Volume Water Vapor Collected, Standard Conditions

V_{lc} = 15 condensate from impingers and Silica Gel

$V_{W(std)} = .04707\ V_{lc}$ = 0.706 scf

$V_{W(std)}$ = 0.706 scf

3. Percent Moisture, by volume

$B_{ws} = \frac{V_{W(std)}}{V_{W\ std} + V_{m\ (std)}} = \frac{(0.706)}{(0.706)+(44.540)} = 0.016$

B_{ws} = 1.6 %

4. Molecular Weight, Stack gas

Dry Molecular Wight

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

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

M_d = 29.0 lb/lb-mole

$M_s = M_d + B_{ws}(18 - M_d) = (29.0) + (0.016)(18 - 29.0)$

M_s = 28.82 lb/lb-mole

Plant: SIZE CONTROL
Date: 10-25-89
Source/Sample Number: HMT-12

5. Stack Gas Velocity Average

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

$$V_{s(avg)} = 85.49(0.84)(0.4734)\sqrt{\frac{(538)}{(28.52)(29.91)}}$$

$V_{s(avg)}$ = 26.86 ft/sec.

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

$$Q_s = 60\ V_s\ A = 60\ (26.86)(1.069)$$

Q_s = 1723 acfm

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

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

$$Q_{(std)} = 17.64(1723)(1-0.016)\frac{(29.91)}{(538)}$$

Q_{std} = 1663 dscfm

8. Isokinetic Variation

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

$$= 0.0945\ \frac{(538)(44.540)}{(29.91)(26.86)(0.00409)(60)(1-0.016)}$$

%I = 97.3 %

Chain of Custody Record

Thermo Analytical Inc.
100 Taylor Street
Post Office Box 2360
Monrovia, CA 91016
(818) 357-3247

DATE 10-18-89 PAGE 1 OF 1

CLIENT PACIFIC ENVIRONMENTAL
ADDRESS 818 357-1993

PROJECT 3922
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 Chromium	Volume	Sample Type	NUMBER OF CONTAINERS	Observations/ Comments
HMT-1L	10-18		S.C.											X	X	X	Liquid	2	
HMT-1F	↓													X	X		Filter	1	
HMT-2L														X	X	X	Liquid	2	
MMT-2F														X	X		Filter	1	
HMT-18BF														X	X		Filter	1	
HMT-18BL	↓													X	X		Liquid	1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY	DATE
Mark Simon	10/18						
Signature: Mark J. Simon	TIME	Signature	TIME	Signature	TIME	Signature	TIME
Printed Name: P.E.S.		Printed Name		Printed Name		Printed Name	
Company		Company		Company		Company	
RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY (laboratory)	DATE
						Brian Davis	10/18/89
Signature	TIME	Signature	TIME	Signature	TIME	Signature: BRIAN DAVIS	TIME
Printed Name		Printed Name		Printed Name		Printed Name: TMA, Inc./ARLI	4:01 PM
Company		Company		Company			

TOTAL NUMBER OF CONTAINERS: 8

METHOD OF SHIPMENT: Delivered Personally

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: Expect Medium Concentrations of Chrome

TMA
The Analytical Inc.

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

Chain of Custody Record

DATE 10-19-89 PAGE 1 OF 1

CLIENT Pacific Environmental
ADDRESS (818) 357-1993.

PROJECT 3922
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	Hexavalent Chrome	Volume	Sample Type	NUMBER OF CONTAINERS	Observations/ Comments
HMT-3L	10/19/89		S.C.											X	X	X	Liquid	2	
HMT-3F														X	X		Filter	1	
HMT-4L														X	X	X	Liquid	2	
HMT-4F														X	X		Filter	1	
HMT-19BL														X	X		Liquid	1	
HMT-19BF														X	X		Filter	1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature: Scott Parks	10/19/89	Signature: Brian Davis	10/19/89	Signature:		Signature:	
Printed Name: Scott Parks	TIME	Printed Name: BRIAN DAVIS	TIME 4:15 PM	Printed Name:	TIME	Printed Name:	TIME
Company: P.E.S.		Company: TMA/ARLI		Company:		Company:	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY (laboratory)	DATE
Signature:		Signature:		Signature:		Signature:	
Printed Name:	TIME	Printed Name:	TIME	Printed Name:	TIME	Printed Name: TMA, Inc./ARLI	TIME
Company:		Company:		Company:			

TOTAL NUMBER OF CONTAINERS: 8

METHOD OF SHIPMENT: Delivered Personally

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: Expect Medium Concentrations

Chain of Custody Record

TMA Therm. Analytical Inc.
1 Taylor Street
Post Office Box 2360
Monrovia, CA 91016
(818) 357-3247

DATE 10-20-89 PAGE 1 OF 1

CLIENT Pacific Environmental
ADDRESS (818) 357-1993
PROJECT 3922
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	Hexavalent Chrome	Volume	Sample Type	NUMBER OF CONTAINERS	Observations/ Comments
HMT-5L	10/20/89	4:45	SC											X	X	X	Liquid	2	
HMT-5F														X	X		Filter	1	
HMT-6L														X	X	X	Liquid	2	
HMT-6F														X	X		Filter	1	
HMT-20BF														X	X		Filter	1	
HMT-20TBF														X	X	X	Liquid	2	
																		9	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature: Scott D. Parks	10/20/89	Signature: Brian Davis	10/20/89	Signature:		Signature:	
Printed Name: Scott Parks	TIME	Printed Name: BRIAN DAVIS	TIME 4:45 PM	Printed Name:	TIME	Printed Name:	TIME
Company: P.E.S		Company: TMA/ARLI		Company:		Company:	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY (laboratory)	DATE
Signature:		Signature:		Signature:		Signature:	
Printed Name:	TIME	Printed Name:	TIME	Printed Name:	TIME	Printed Name: TMA, Inc./ARLI	TIME
Company:		Company:		Company:			

TOTAL NUMBER OF CONTAINERS: 9

METHOD OF SHIPMENT: Delivered Personally

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: Expect Medium Concentrations

Chain of Custody Record

TMA Ther. Analytical Inc.

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

DATE 10/23/89 PAGE 1 OF 1

CLIENT PES
ADDRESS 818 357-1993

PROJECT 3922
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)				Sample Type	NUMBER OF CONTAINERS	Observations/ Comments
HMT-7L	10-23																Liquid	2	
HMT-7F	//																Filter	1	
HMT-8L	//																Liquid	2	
HMT-8F	//																Filter	1	
HMT-23FB	//																Filter	1	
HMT-23TB	//																Liquid	2	

Parameters | Other

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature: Scott A Parks		Signature: Brian Davis	10/23/89	Signature:		Signature:	
Printed Name: Scott Parks	TIME	Printed Name: BRIAN DAVIS	TIME 4:57 PM	Printed Name:	TIME	Printed Name:	TIME
Company: PES		Company: TMA/ARLI		Company:		Company:	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY (laboratory)	DATE
Signature:		Signature:		Signature:		Signature:	
Printed Name:	TIME	Printed Name:	TIME	Printed Name:	TIME	Printed Name: TMA, Inc./ARLI	TIME
Company:		Company:		Company:			

9 TOTAL NUMBER OF CONTAINERS

METHOD OF SHIPMENT: Delivered Personally

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

TMA
Thermo Analytical Inc.

TMA ARLI
160 Taylor Street
Post Office Box 2360
Monrovia, CA 91016
(818) 357-3247

Chain of Custody Record

DATE 10-24-89 PAGE 1 OF 1

CLIENT PES
ADDRESS 818 357-1993

PROJECT 3922
SAMPLERS (SIGNATURE) Mark J. Simon

SAMPLE NO	DATE	TIME	LOCATION	CAM METALS (18)	PR. POLLUTANT METALS (13)	GENERAL MINERALS	OIL & GREASE	PETROLEUM HYDROCARBONS	BASE/NEU/ACIDS (ORGANICS)	PESTICIDES	VOLATILE ORGANICS (601/602)	VOLATILE ORGANICS (624)	TOC	Total Chrome	Hexavalent Chrome	Volume				NUMBER OF CONTAINERS	OBSERVATIONS/ COMMENTS
HMT-9L	10-24													X	X	X				2	
HMT-9F														X	X					1	
HMT-10L														X	X	X				2	
HMT-10F														X	X					1	
HMT-24FB														X	X					1	
HMT-24TB														X	X					1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature: Mark J. Simon	10/24	Signature: Brian Davis		Signature		Signature	
Printed Name: Mark J. Simon	TIME	Printed Name: BRIAN DAVIS	TIME	Printed Name	TIME	Printed Name	TIME
Company: PES		Company: TMA/ARLI		Company		Company	
RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY (laboratory)	DATE
Signature		Signature		Signature		Signature	
Printed Name	TIME	Printed Name	TIME	Printed Name	TIME	Printed Name: TMA, Inc./ARLI	TIME
		Company		Company			

TOTAL NUMBER OF CONTAINERS: 8

METHOD OF SHIPMENT: Delivered Personally

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: Expect Medium To Low Concentrations.

TMA Thermo Analytical Inc.

160 Tudor Street
Post Office Box 2360
Monrovia, CA 91016
(818) 357-3247

CHAIN OF CUSTODY RECORD

DATE 10-25-89 PAGE 1 OF 1

CLIENT Pacific Environmental
ADDRESS (818) 357-1997
PROJECT 3922
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 Chromium	Hexavalent Chromium	Volume	Sample Type	NUMBER OF CONTAINERS	Observations/ Comments
HMT-11L	10-25-89													X	X	X	Liquid	2	
HMT-11F														X	X		Filter	1	
HMT-12L														X	X	X	Liquid	2	
HMT-12F														X	X		Filter	1	
HMT-25TB														X	X	X	Liquid	2	
HMT-25AF														X	X		Filter	1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature: Scott Pubs	10/25/89	Signature: Brian Davis	10/25/89	Signature:		Signature:	
Printed Name: P.E.S.	TIME 4:30	Printed Name: BRIAN DAVIS	TIME 4:30 PM	Printed Name:	TIME	Printed Name:	TIME
Company:		Company: TMA/ARLI		Company:		Company:	

RELINQUISHED BY	DATE	RECEIVED BY	DATE	RELINQUISHED BY	DATE	RECEIVED BY (laboratory)	DATE
Signature:		Signature:		Signature:		Signature:	
Printed Name:	TIME	Printed Name:	TIME	Printed Name:	TIME	Printed Name: TMA, Inc./ARLI	TIME
Company:		Company:		Company:			

TOTAL NUMBER OF CONTAINERS: 9

METHOD OF SHIPMENT: Delivered Personally

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: Expect medium to low concentrations of chromium

Pacific Environmental Service

Three liquids and three filters were analyzed for hexavalent and total chromium content, according to EPA method 425. The volumes of two liquids were measured. Please see the enclosed tables for the results.

R[redacted]v[redacted]10[redacted]/89[redacted] [redacted]/[redacted]89[redacted]15[redacted]

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: Chromium analysis
TAKEN: By Pacific Environ. staff
TRANS: By Pacific Environ. staff
TYPE: Liquids & filters
P.O. #: 3922
INVOICE: under separate cover

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

ATTEN:
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.

Verbal results given to Scott on 10/20/89.

SAMPLE IDENTIFICATION

01 HMT-1L
02 HMT-2L
03 HMT-1F
04 HMT-2F
05 HMT-18BF
06 HMT-18BL

TEST CODES and NAMES used on this report

CRHEXS	Hexavalent Chromium
CRHGAA	Chromium - Air
CR HEX	Hexavalent Chromium
CR L	Chromium - Liquids
VOL L	Sample Volume

Received: 10/18/89 Results by Sample

SAMPLE ID HMT-1L SAMPLE # 01 FRACTIONS: A
Date & Time Collected 10/18/89 Category

CR_HEX 3.2 mg/L CR_L 4.33 mg/L VOL_L 820 mls

SAMPLE ID HMT-2L SAMPLE # 02 FRACTIONS: A
Date & Time Collected 10/18/89 Category

CR_HEX 3.6 mg/L CR_L 4.68 mg/L VOL_L 810 mls

SAMPLE ID HMT-1F SAMPLE # 03 FRACTIONS: A
Date & Time Collected 10/18/89 Category

CRHEXS 3.2 ug/filter CRHGAA 2.1 Total ug

SAMPLE ID HMT-2F SAMPLE # 04 FRACTIONS: A
Date & Time Collected 10/18/89 Category

CRHEXS 1.0 ug/filter CRHGAA 4.4 Total ug

Received: 10/18/89 Results by Sample

SAMPLE ID HMT-18BF SAMPLE # 05 FRACTIONS: A

Date & Time Collected 10/18/89 Category

CRHEXS <0.5 ug/filter CRHGAA 1.6 Total ug

SAMPLE ID HMT-18BL SAMPLE # 06 FRACTIONS: A

Date & Time Collected 10/18/89 Category

CR_HEX <0.003 mg/L CR_L 0.002 mg/L

Received: 10/17/89 10/27/89 07:05:33

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: 3922-Chrome Analysis
TAKEN: By Pacific Environ. staff
TRANS: By Pacific Environ. staff
TYPE: Liquids and filters
P.O. #: 3922
INVOICE: under separate cover

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

ATTEN:
PHONE: 818-357-3247

Robert S. Ferguson
CERTIFIED BY

CONTACT: RSF

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Verbal results to Mark Simon on 10/25/89.

SAMPLE IDENTIFICATION

01	HMT-3L
02	HMT-3F
03	HMT-4L
04	HMT-4F
05	HMT-19BL
06	HMT-19BF

TEST CODES and NAMES used on this report

CRHEXS	Hexavalent Chromium
CRHGAA	Chromium - Air
CR HEX	Hexavalent Chromium
CR L	Chromium - Liquids
CR LF	Chromium by HGF - Liquids
VOL L	Sample Volume

Received: 10/19/89

Results by Sample

SAMPLE ID HMT-3L

SAMPLE # 01 FRACTIONS: A

Date & Time Collected 10/19/89 Category

CR_HEX 3.3 mg/L CR_L 4.21 mg/L VOL_L 810 mls

SAMPLE ID HMT-3F

SAMPLE # 02 FRACTIONS: A

Date & Time Collected 10/19/89 Category

CRHEXS 2.2 ug/filter CRHGAA 13.3 Total ug

SAMPLE ID HMT-4L

SAMPLE # 03 FRACTIONS: A

Date & Time Collected 10/19/89 Category

CR_HEX 12.5 mg/L CR_LF 12.7 mg/L VOL_L 670 mls

SAMPLE ID HMT-4F

SAMPLE # 04 FRACTIONS: A

Date & Time Collected 10/19/89 Category

CRHEXS 4.0 ug/filter CRHGAA 17.0 ug/filter

Received: 10/19/89

Results by Sample

SAMPLE ID HMT-19BL

SAMPLE # 05 FRACTIONS: A

Date & Time Collected 10/19/89 Category

CR_HEX <0.003 mg/L CR_LF 0.010 mg/L

SAMPLE ID HMT-19BF

SAMPLE # 06 FRACTIONS: A

Date & Time Collected 10/19/89 Category

CRHEXS <0.5 ug/filter CRHGAA 1.4 ug/filter

Received: 10/20/89 10/27/89 09:04:57

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 3922 - Chrome analysis
TAKEN By Pacific Science staff
TRANS By Pacific Science staff
TYPE Liquid and filters
P.O. # 3922
INVOICE under separate cover

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

Robert S. Ferguson
CERTIFIED BY

ATTEN
PHONE 818-357-3247

CONTACT RSF

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Verbal results to Mark Simon on 10/25/89.

SAMPLE IDENTIFICATION

1 HMT-5L
2 HMT-6L
3 HMT-20TB
4 HMT-5F
5 HMT-6F
6 HMT-20BF

TEST CODES and NAMES used on this report

CRHEXS	Hexavalent Chromium
CRHGAA	Chromium - Air
CR HEX	Hexavalent Chromium
CR L	Chromium - Liquids
VOL L	Sample Volume

Received: 10/20/87 Results by Sample

SAMPLE ID HMT-5L SAMPLE # 01 FRACTIONS: A
Date & Time Collected 10/20/89 Category

CR_HEX 6.5 mg/L CR_L 6.92 mg/L VOL_L 740 mls

SAMPLE ID HMT-6L SAMPLE # 02 FRACTIONS: A
Date & Time Collected 10/20/89 Category

CR_HEX 9.3 mg/L CR_L 11.6 mg/L VOL_L 765 mls

SAMPLE ID HMT-20TB SAMPLE # 03 FRACTIONS: A
Date & Time Collected 10/20/89 Category

CR_HEX <0.003 mg/L CR_L 0.006 mg/L VOL_L 695 mls

SAMPLE ID HMT-5F SAMPLE # 04 FRACTIONS: A
Date & Time Collected 10/20/89 Category

CRHEXS 8.6 ug/filter CRHGAA 73.3 ug/filter

Received: 10/20/89

Results by Sample

SAMPLE ID HMT-6F

SAMPLE # 05 FRACTIONS: A

Date & Time Collected 10/20/89 Category

CRHEXS 8.6 ug/filter CRHGAA 12.2 ug/filter

SAMPLE ID HMT-20BF

SAMPLE # 06 FRACTIONS: A

Date & Time Collected 10/20/89 Category

CRHEXS <0.5 ug/filter CRHGAA 1.6 ug/filter

Received: 10/24/87 10/27/87 15:38:32

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 Chrome Analysis
TAKEN By Pacific Environ. staff
TRANS By Pacific Environ. staff
TYPE Liquid and Filters
P.O. # 3922
INVOICE under separate cover

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

ATTEN
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

1 HMT-7L
2 HMT-8L
3 HMT-23TB
4 HMT-7F
5 HMT-8F
6 HMT-23FB

TEST CODES and NAMES used on this report

CRHEXS	Hexavalent Chromium
CRHGAA	Chromium - Air
CR HEX	Hexavalent Chromium
CR LF	Chromium by HGF - Liquids
VOL L	Sample Volume

Received: 10/24/89 Results by Sample

SAMPLE ID HMT-7L SAMPLE # 01 FRACTIONS: A
Date & Time Collected 10/23/89 Category

CR_HEX 0.14 mg/L CR_LF 0.161 mg/L VOL_L 685 mls

SAMPLE ID HMT-8L SAMPLE # 02 FRACTIONS: A
Date & Time Collected 10/23/89 Category

CR_HEX 0.08 mg/L CR_LF 0.113 mg/L VOL_L 675 mls

SAMPLE ID HMT-23TB SAMPLE # 03 FRACTIONS: A
Date & Time Collected 10/23/89 Category

CR_HEX <0.003 mg/L CR_LF 0.005 mg/L VOL_L NA mls

SAMPLE ID HMT-7F SAMPLE # 04 FRACTIONS: A
Date & Time Collected 10/23/89 Category

CRHEXS 4.8 ug/filter CRHGAA 3.78 Total ug

Received: 10/24/07 Results by Sample

SAMPLE ID HMT-8F SAMPLE # 05 FRACTIONS: A
Date & Time Collected 10/23/89 Category

CRHEXS 2.4 ug/filter CRHGAA 5.18 Total ug

SAMPLE ID HMT-23FB SAMPLE # 06 FRACTIONS: A
Date & Time Collected 10/23/89 Category

CRHEXS <0.5 ug/filter CRHGAA 0.51 Total ug

ceived: 10/24/89 10/27/89 15:38:42

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
ACILITY

WORK ID Chrome Analysis
TAKEN By Pacific Environ. staff
TRANS By Pacific Environ. staff
TYPE Liquid and Filters
P.O. # 3922
INVOICE under separate cover

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

ATTEN
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

1 HMT-9L
2 HMT-10L
3 HMT-24TB
4 HMT-9F
5 HMT-10F
6 HMT-24FB

TEST CODES and NAMES used on this report

CRHEXS	Hexavalent Chromium
CRHGAA	Chromium - Air
CR HEX	Hexavalent Chromium
CR LF	Chromium by HGF - Liquids
VOL L	Sample Volume

Received: 10/24/89 Results by Sample

SAMPLE ID HMT-9L SAMPLE # 01 FRACTIONS: A
Date & Time Collected 10/24/89 Category

CR_HEX 0.16 mg/L CR_LF 0.190 mg/L VOL_L 640 mls

SAMPLE ID HMT-10L SAMPLE # 02 FRACTIONS: A
Date & Time Collected 10/24/89 Category

CR_HEX 0.14 mg/L CR_LF 0.181 mg/L VOL_L 540 mls

SAMPLE ID HMT-24TB SAMPLE # 03 FRACTIONS: A
Date & Time Collected 10/24/89 Category

CR_HEX <0.003 mg/L CR_LF 0.009 mg/L VOL_L NA mls

SAMPLE ID HMT-9F SAMPLE # 04 FRACTIONS: A
Date & Time Collected 10/24/89 Category

CRHEXS 9.4 ug/filter CRHGAA 5.14 Total ug

Received: 10/24/87 Results by Sample

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

Date & Time Collected 10/24/89 Category

CRHEXS 6.4 ug/filter CRHGAA 4.50 Total ug

SAMPLE ID HMT-24FB SAMPLE # 06 FRACTIONS: A

Date & Time Collected 10/24/89 Category

CRHEXS <0.5 ug/filter CRHGAA 0.96 Total ug

Received: 10/25/89 10/31/89 07:28:08

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 Chromium Analysis
TAKEN By Pacific Environ. staff
TRANS By Pacific Environ. staff
TYPE Liquid and filters
P.O. # 3922
INVOICE under separate cover

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

Robert S. Ferguson
CERTIFIED BY

ATTEN
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.

SAMPLE IDENTIFICATION

1 HMT-11L
2 HMT-12L
3 HMT-25TB
4 HMT-11F
5 HMT-12F
6 HMT-25FB

TEST CODES and NAMES used on this report

CRHEXS	Hexavalent Chromium
CRHGAA	Chromium - Air
CR HEX	Hexavalent Chromium
CR LF	Chromium by HGF - Liquids
VOL L	Sample Volume

Received: 10/25/89

Results by Sample

SAMPLE ID HMT-11L SAMPLE # 01 FRACTIONS: A
Date & Time Collected 10/25/89 Category

CR_HEX 0.26 mg/L CR_LF 0.322 mg/L VOL_L 580 mls

SAMPLE ID HMT-12L SAMPLE # 02 FRACTIONS: A
Date & Time Collected 10/25/89 Category

CR_HEX 0.26 mg/L CR_LF 0.308 mg/L VOL_L 620 mls

SAMPLE ID HMT-25TB SAMPLE # 03 FRACTIONS: A
Date & Time Collected 10/25/89 Category

CR_HEX <0.003 mg/L CR_LF 0.004 mg/L VOL_L NA mls

SAMPLE ID HMT-11F SAMPLE # 04 FRACTIONS: A
Date & Time Collected 10/25/89 Category

CRHEXS 7.2 ug/filter CRHGAA 14.6 Total ug

Received: 10/25/89

Results by Sample

SAMPLE ID HMT-12F

SAMPLE # 05 FRACTIONS: A

Date & Time Collected 10/25/89 Category

CRHEXS <0.5 ug/filter CRHGAA 5.6 Total ug

SAMPLE ID HMT-25FB

SAMPLE # 06 FRACTIONS: A

Date & Time Collected 10/25/89 Category

CRHEXS <0.5 ug/filter CRHGAA <0.2 Total ug

POSTTEST DRY GAS METER CALIBRATION DATA FORM

Date 10-2-89 Meter box number 1A

Barometric pressure, P_b = 29.57 in. Hg Dry gas meter number 6846739 Pretest Y 1.011

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F	Time (Θ), min	Vacuum setting, in. Hg	Y_i	Y_i $\frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right) (t_w + 460)}$
1.0	10.101	10.029	74	78	75	76.5	18	6.5"	1.009	
3.0	10.369	10.336	76	88	79	83.5	14.1	6.0"	1.012	
5.0	10.139	10.131	76	90	81	85.5	10.8	6.5"	1.011	
									Y =	1.011

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d.

V_w = Gas volume passing through the meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in H_2O.

Y_i = Ratio of accuracy of test meter to dry gas meter for each run.

Y = Average ratio of accuracy of test meter to dry gas meter for all three runs; tolerance = pretest Y $\pm$0.05Y

P_b = Barometric pressure, in. Hg.

Θ = Time of calibration run, min.

PACIFIC ENVIRONMENTAL SERVICES, INC.

POSTTEST DRY GAS METER CALIBRATION DATA FORM

Date 10-26-89 Meter box number 1A

Barometric pressure, P_b = 29.72" in. Hg Dry gas meter number TG.U1 Pretest Y 1.011

Orifice manometer setting, (ΔH), in. H_2O	Gas volume: test meter (V_w), ft^3	Gas volume: Dry gas meter (V_d), ft^3	Temperature: test meter (t_w), °F	Temperature: Dry gas meter: Inlet (t_{d_i}), °F	Temperature: Dry gas meter: Outlet (t_{d_o}), °F	Temperature: Dry gas meter: Average[a] (t_d), °F	Time (θ), min	Vacuum setting, in. Hg	Y_i	$Y_i \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$
1.0	924.273 - 913.972 = 10.301	979.835 - 969.346 = 10.489	75	84	80	82	19.5	5"	0.993	
3.0	934.535 - 924.273 = 10.262	990.102 - 979.826 = 10.277	75	88	87	84.5	11.7	5"	1.009	
5.0	945.206 - 934.535 = 10.671	1000.675 - 990.102 = 10.573	76	90	82	86	9	5"	1.016	
									Y =	1.006

[a] If there is only one thermometer on the dry gas meter, record the temperature under t_d.

V_w = Gas volume passing through the meter, ft^3.

V_d = Gas volume passing through the dry gas meter, ft^3.

t_w = Temperature of the gas in the test meter, °F.

t_{d_i} = Temperature of the inlet gas of the dry gas meter, °F.

t_{d_o} = Temperature of the outlet gas of the dry gas meter, °F.

t_d = Average temperature of the gas in the dry gas meter, obtained by the average of t_{d_i} and t_{d_o}, °F.

ΔH = Pressure differential across orifice, in H_2O.

Y_i = Ratio of accuracy of test meter to dry gas meter for each run.

Y = Average ratio of accuracy of test meter to dry gas meter for all three runs; tolerance = pretest Y ±0.05Y

P_b = Barometric pressure, in. Hg.

θ = Time of calibration run, min.

PACIFIC ENVIRONMENTAL SERVICES, INC.

Dick Munns Company

LIQUID AND GAS - FLOWMETER CALIBRATION SERVICE

Phone (213) 596-1559 10571 Calle Lee – 133 Los Alamitos, CA 90720

(Transfer Gas Meter Calibration)

Certificate

DATE 2-8-89

SUBMITTED FOR CALIBRATION BY Pacific Environmental Services, Inc.

TYPE OF INSTRUMENT PD Meter

SERIAL NO. 25507

MODEL NO. 190 CFH

MFGR. Rockwell

RATED ACCURACY ± .5%

CALIBRATION INTERVAL 12 months

INDICATED	ACTUAL	REMARKS
S.C.F.M.	S.C.F.M.	
.100	.100	
.160	.158	
.285	.285	Air @ 14.7 PSIA & 70°F.
.716	.718	
1.305	1.306	
1.768	1.769	
2.060	2.062	
3.220	3.235	

CALIBRATED BY COMPARISON WITH THE FOLLOWING STANDARDS

Test units A-3 & A-54. N.B.S. Traceability #M-2055 & M-2293.

As per MIL-STD-45662.

ALL INSTRUMENTS USED TO ACCOMPLISH ABOVE CALIBRATION HAVE DIRECT TRACEABILITY TO THE NATIONAL BUREAU OF STANDARDS, WASHINGTON, D. C.

CALIBRATION BY RM APPROVED BY S Munns