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/

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EMISSION TEST RESULTS FOR TOTAL CHROMIUM INLET AND OUTLET OF THE SOUTH FUME SCRUBBER MONROE AUTO EQUIPMENT HARTWELL, GEORGIA

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SECTION 1

INTRODUCTION

IEA was contracted by Monroe Auto Equipment to perform simultaneous inlet and outlet emissions testing of the South Fume Scrubber at the facility located in Hartwell, Georgia. The purpose of the testing was to demonstrate the chromium emission rate to the atmosphere and the removal efficiency of the pollution control device in the presence and absence of a fume suppressant in the plating bath.

Testing was performed on 18 - 20th of December 1991, under the direction of Dan Moorehead of Monroe Auto Equipment. Stack sampling was performed by Chris Johnson, Mark Rousseau, and Charles Duncan of Industrial and Environmental Analysts, Inc. (IEA) of Research Triangle Park, North Carolina, and Maxie Jolly of KCH Services. Total chromium analysis was performed by Research Triangle Institute. Phil Mulrine, a representative of the Environmental Protection Agency (EPA) Emission Standards Division, was onsite for the duration of the field sampling effort. He monitored the plating operation during testing and prepared the process description provided in Section 3.

A summary of the emissions results is presented in Section 2. Process operation and test conditions are summarized in Section 3. A discussion of the sampling and analytical procedures is presented in Section 4. Quality Assurance and Control procedures are itemized in Section 5. All relevant supporting data is included in the attached Appendices.

IEA extends it's appreciation to Ms. Linda Furlough of Monroe Auto Equipment's Corporate Headquarters, and Mr. Dan Moorehead and his associates at Monroe's facility in Hartwell, Georgia for their assistance and cooperation throughout the test program.

SECTION 2

SUMMARY OF RESULTS

Table 2.1 presents a summary of chromium emissions and calculated chromium removal efficiency for the South Fume Scrubber. The chromium emission rates on all six runs were below the permit limit established by the State of Georgia of 0.01 pound per hour (4.54 grams per hour). All volumetric flow rates were corrected to standard temperature and pressure (528° R and 29.92 inches Hg). Equations and example calculations are presented in Appendix A. Field sampling and recovery data is included in Appendix B. Laboratory data is included in Appendix C. Equipment calibrations and field summary logs can be found in Appendices D and E, respectively. An EPA draft procedure for hard chrome electroplating sampling is included in Appendix F. The EPA process description is included in Appendix G. Project participants are listed in Appendix H.

2.1 SOUTH SCRUBBER

Tables 2.2 and 2.3 present a data summary of the individual runs for the inlet and outlet locations respectively for the fume scrubber. A chemical fume suppressant or foam was added to the plating solution to inhibit misting. The suppressant was added before runs two (2), five (5), and six (6). The data presented in Tables 2.1 - 2.3 indicates a lower emission rate on the inlet source when the foam was added. Addition of the foam suppressant reduced the average concentration of chromium by a factor of approximately 2.5x. However, consideration must be given to the process rate (ampere-hours) when evaluating reported concentrations. Slightly lower scrubber chromium removal efficiencies for the runs with foam are attributed largely to decreased inlet concentrations. All data is separated and averaged with respect to this foam addition in the relevant tables.

Runs Without Fume Suppressant

The average inlet concentration without foam was 26.94 micrograms per dry standard cubic foot (µg/dscf), resulting in an average mass emission rate of 0.0917 pounds per hour. The average outlet concentration without foam was 0.32 µg/dscf, resulting in a mass emission rate of 0.0011 lb/hr. The scrubber efficiency was determined for each run and ranged between 98 and 99%.

Runs With Fume Suppressant

When foam was added, the average inlet concentration was 10.67 µg/dscf, resulting in a mass emission rate of 0.037 lb/hr. The average outlet concentration with a foam addition was 0.22 µg/dscf, resulting in a mass emission rate of 0.0008 lb/hr. The scrubber efficiency was determined for each run and ranged between 96 and 98%.

TABLE 2.1
SOUTH SCRUBBER INLET AND OUTLET
SUMMARY OF CHROMIUM EMISSIONS

RUN	EMISSION RATE	TOTAL CHROMIUM INLET	TOTAL CHROMIUM OUTLET	EFFICIENCY (%)
RUNS WITHOUT FOAM				
Run 1	Concentration, ug/dscf	27.57	0.24	
	Emission Rate, lb/hr	0.0920	0.0009	99.02
	Process Rate, ampere-hour/run	13592	13592	
	Emission Rate, mg/ampere-hour	6.141	0.063	
Run 3	Concentration, ug/dscf	29.87	0.34	
	Emission Rate, lb/hr	0.1041	0.0012	98.85
	Process Rate, ampere-hour/run	13610	13610	
	Emission Rate, mg/ampere-hour	6.939	0.083	
Run 4	Concentration, ug/dscf	23.37	0.38	
	Emission Rate, lb/hr	0.0792	0.0013	98.36
	Process Rate, ampere-hour/run	13619	13619	
	Emission Rate, mg/ampere-hour	5.276	0.090	
AVERAGE	**Concentration, ug/dscf**	**26.94**	**0.32**	
	Emission Rate, lb/hr	**0.0917**	**0.0011**	
RUNS WITH FOAM				
Run 2	Concentration, ug/dscf	4.88	0.15	
	Emission Rate, lb/hr	0.0162	0.0005	96.91
	Process Rate, ampere-hour/run	13603	13603	
	Emission Rate, mg/ampere-hour	1.080	0.035	
Run 5	Concentration, ug/dscf	16.85	0.19	
	Emission Rate, lb/hr	0.0579	0.0007	98.79
	Process Rate, ampere-hour/run	20199	20199	
	Emission Rate, mg/ampere-hour	2.600	0.033	
Run 6	Concentration, ug/dscf	10.27	0.33	
	Emission Rate, lb/hr	0.0365	0.0012	96.71
	Process Rate, ampere-hour/run	20355	20355	
	Emission Rate, mg/ampere-hour	1.627	0.056	
AVERAGE	**Concentration, ug/dscf**	**10.67**	**0.22**	
	Emission Rate, lb/hr	**0.0369**	**0.0008**	

TABLE 2.2
SOUTH SCRUBBER INLET
DATA SUMMARY

SYMBOL	PARAMETER	RUN 1 12/18/91 1440-1650 NO FOAM	RUN 3 12/19/91 830-1033 NO FOAM	RUN 4 12/19/91 1120-1332 NO FOAM	AVERAGE	RUN 2 12/18/91 1744-2035 WITH FOAM	RUN 5 12/19/91 1725-1930 WITH FOAM	RUN 6 12/20/91 850-1055 WITH FOAM	AVERAGE
	MEASURED DATA								
(Y)	Meter Box Y	1.008	1.008	1.008		1.008	1.008	1.008	
	Avg Delta H, inches H2O	2.65	2.75	2.64		2.65	2.69	2.76	
(Bp)	Barometric Pressure, inches Hg	30.00	30.00	30.00		30.00	30.00	30.00	
(Vm)	Meter Volume, ft^3	102.607	100.924	99.710		101.170	100.810	101.310	
(Tm)	Avg Meter Temp, deg F	61.2	40.0	46.3		53.0	46.7	48.6	
(Pg)	Static Pressure, inches H2O	-2.3	-2.3	-2.3		-2.3	-2.3	-2.3	
(Ts)	Avg Stack Temp, deg F	74.1	66.3	69.0		72.5	67.9	68.5	
(Vlc)	Water Collected, ml	32.6	29.6	31.2		17.7	28.7	29.6	
(CO2)	CO2, %	0.0	0.0	0.0		0.0	0.0	0.0	
(O2)	O2, %	20.9	20.9	20.9		20.9	20.9	20.9	
	Avg Sqrt Delta P, (inches H2O)^1/2	0.885	0.916	0.894		0.875	0.905	0.936	
(θ)	Sample Time, min	120	120	120		120	120	120	
(Dn)	Nozzle Diameter, inches	0.236	0.236	0.236		0.236	0.236	0.236	
(Ds)	Stack Diameter, inches	39.75	39.75	39.75		39.75	39.75	39.75	
(Mcr)	Total Chromium (HNO3), ug	2914.0	3238.0	2471.0		517.0	1800.0	1099.0	
	CALCULATED DATA								
(Vmstd)	Standard Meter Volume, ft^3	105.697	108.398	105.733	106.610	105.883	106.828	106.975	106.562
(Ps)	Stack Pressure, inches Hg	29.83	29.83	29.83	29.83	29.83	29.83	29.83	29.83
(%Bws)	Moisture, %	1.4	1.3	1.4	1.4	0.8	1.2	1.3	1.1
(Ms)	Molecular Weight-wet, lb/lb-mole	28.7	28.7	28.7	28.7	28.8	28.7	28.7	28.7
(Vs)	Velocity, ft/s	50.2	51.6	50.5	50.8	49.5	51.0	52.8	51.1
(As)	Stack Area, ft^2	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62
(Qa)	Volumetric flow, acfm	2.60E+04	2.67E+04	2.61E+04	2.62E+04	2.56E+04	2.64E+04	2.73E+04	2.64E+04
(Qs)	Volumetric flow, dscfm	2.52E+04	2.63E+04	2.56E+04	2.57E+04	2.51E+04	2.60E+04	2.68E+04	2.60E+04
(I)	Isokinetic Rate, %	99.1	97.4	97.6	98.0	99.8	97.3	94.2	97.1
(Tcr)	**Total Chromium Conc, ug/dscf**	**27.57**	**29.87**	**23.37**	26.94	**4.88**	**16.85**	**10.27**	10.67
(Tcr)	**Total Chromium Conc, mg/dscm**	**0.973**	**1.055**	**0.825**	0.951	**0.172**	**0.595**	**0.363**	0.377
(ER)	**Total Chromium Emission Rate, lb/hr**	**0.0920**	**0.1041**	**0.0792**	0.0917	**0.0162**	**0.0579**	**0.0365**	0.0369

TABLE 2.3
SOUTH SCRUBBER OUTLET
DATA SUMMARY

SYMBOL	PARAMETER	RUN 1 12/18/91 1440-1656 NO FOAM	RUN 3 12/19/91 830-1048 NO FOAM	RUN 4 12/19/91 1120-1336 NO FOAM	AVERAGE	RUN 2 12/18/91 1735-2038 WITH FOAM	RUN 5 12/19/91 1725-1930 WITH FOAM	RUN 6 12/20/91 850-1110 WITH FOAM	AVERAGE
	MEASURED DATA								
(Y)	Meter Box Y	0.999	0.999	0.999		0.999	0.999	0.999	
	Avg Delta H, inches H2O	1.77	1.72	1.68		1.69	1.78	1.75	
(Bp)	Barometric Pressure, inches Hg	30.00	30.00	30.00		30.00	30.00	30.00	
(Vm)	Meter Volume, ft^3	86.611	83.920	82.961		83.399	84.941	84.964	
(Tm)	Avg Meter Temp, deg F	59.8	34.6	43.2		47.6	45.8	47.0	
(Pg)	Static Pressure, inches H2O	-0.07	-0.07	-0.07		-0.07	-0.07	-0.07	
(Ts)	Avg Stack Temp, deg F	74.9	65.8	69.1		71.9	66.8	67.9	
(Vlc)	Water Collected, ml	11.8	12.8	12.2		11.2	10.7	10.5	
(CO2)	CO2, %	0.0	0.0	0.0		0.0	0.0	0.0	
(O2)	O2, %	20.9	20.9	20.9		20.9	20.9	20.9	
	Avg Sqrt Delta P, (inches H2O)^1/2	0.713	0.717	0.705		0.704	0.711	0.705	
(0)	Sample Time, min	125	125	125		125	125	125	
(Dn)	Nozzle Diameter, inches	0.238	0.238	0.238		0.238	0.238	0.238	
(Ds)	Stack Dimensions, inches	46x35.5	46x35.5	46x35.5		46x35.5	46x35.5	46x35.5	
(Mcr)	Total Chromium (HNO3), ug	21.5	31.0	33.0		12.7	17.0	29.5	
	CALCULATED DATA								
(Vmstd)	Standard Meter Volume, ft^3	88.471	90.079	87.519	88.690	87.221	89.169	88.976	88.455
(Ps)	Stack Pressure, inches Hg	29.99	29.99	29.99	29.99	29.99	29.99	29.99	29.99
(%Bws)	Moisture, %	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6
(Ms)	Molecular Weight-wet, lb/lb-mole	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
(Vs)	Velocity, ft/s	40.3	40.2	39.6	40.0	39.7	39.9	39.6	39.7
(As)	Stack Area, ft^2	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34
(Qa)	Volumetric flow, acfm	2.74E+04	2.73E+04	2.70E+04	2.72E+04	2.70E+04	2.71E+04	2.69E+04	2.70E+04
(Qs)	Volumetric flow, dscfm	2.70E+04	2.73E+04	2.68E+04	2.70E+04	2.67E+04	2.71E+04	2.68E+04	2.69E+04
(I)	Isokinetic Rate, %	96.4	96.8	95.9	96.4	96.0	96.6	97.4	96.7
(Tcr)	**Total Chromium Conc, ug/dscf**	**0.24**	**0.34**	**0.38**	0.32	**0.15**	**0.19**	**0.33**	0.22
(Tcr)	**Total Chromium Conc, mg/dscm**	**0.009**	**0.012**	**0.013**	0.011	**0.005**	**0.007**	**0.012**	0.008
(ER)	**Total Chromium Emission Rate, lb/hr**	**0.0009**	**0.0012**	**0.0013**	0.0011	**0.0005**	**0.0007**	**0.0012**	0.0008

2.2 TECHNICAL CONSIDERATIONS

The facility required several modifications to ensure representative sampling. Specifically, a new PVC stack extension was added to the blower outlet to meet the minimum criteria for distance from flow disturbances. The total chromium reported (micrograms) for the inlet and outlet on run six (6) appears to be reversed. After consulting with the contracted laboratory,Research Triangle Institute, we believe the sample bottles for run six (6) were mislabelled. The reported results have been corrected for this oversight.

Two blanks were collected and reported to be 6.44 micrograms and ND (non-detectable) for the inlet and outlet sources respectively. Therefore, the reported results were not blank corrected.

SECTION 3

PROCESS DESCRIPTION

3.1 GENERAL DESCRIPTION

Monroe Shocks in Hartwell, Georgia performs hard chromium electroplating of shock absorbers of various sizes. The electroplating line consists of a hard chromium electroplating tank along with several wash and rinse tanks. The plating line is typically operated 5 days per week and 16 hours per day.

The operator loads the shock absorber rods into a carrier at the start of the plating line. The carrier, which contains six rods, is connected to a conveyor which transports the rods from tank to tank in the plating line. The first tank in the plating line is the electrocleaner tank. The purpose of the electrocleaner is to wash the oil from the shock absorber rods. The electrocleaner tank is operated at a temperature of 160°F and at a current of 80 amperes. The next tank in the operation is a rinse tank which removes the electrocleaner from the rods. The rods are then transported to the reverse etch tank. The reverse etch tank prepares the rod surface for the electroplating step. The reverse etch is operated at a temperature of 135°F and at a current of 140 amperes. The shock absorber rods are then transported to the electroplating tank. The plating tank contains a chromic acid solution at a concentration of 240 grams per liter (32 ounces/gallon). The plating tank is equipped with heating and cooling systems and is air agitated to maintain uniform plating bath temperature and composition. The plating tank is operated at a current ranging from 3300 - 10,000 amperes depending on the length of the shock absorber rod. The tank temperature and current are maintained with electronic automatic control systems.

The chromium emissions from the plating tank are exhausted to a spectra-v 25,000 scrubber system manufactured and installed by KCH, Inc. The scrubber consists of two sets of chevron blade type baffles followed by a series of three composite mesh pads. The scrubber is designed for 800 cubic meters per minute (28,000 cubic feet per minute) which requires a fan with a 60-horsepower motor for adequate ventilation to ensure plating tank fume capture efficiency. The scrubber is operated dry but is equipped with a spray system to wash the unit when the pressure drop across the scrubber increases.

3.2 TEST CONDITIONS

Six emission test runs were conducted at the inlet and outlet of the scrubber to characterize the overall performance of the scrubber system. Three test runs were performed with the addition of a foam blanket on the plating tank solution and three test runs were operated without the foam blanket. Each test run consisted of two hours of sampling time. The plating tank current setpoint ranged from 6,800 to 10,400 amperes during the test. Since the plating tank current is directly dependent on the size of the rod being plated, the tank current was dictated by the size of the shock absorber rod being plated as defined by the plant production schedule. The pressure drop across the scrubber system did not increase during any of the test runs; therefore, no washing of the mesh pads was performed.

TEST DATA

Test Run No. 1 Date: 12/18/91 Tank Current - 6800 amperes
(No foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
1445	140	6861	6.4
1500	141	6799	6.4
1515	141	6817	6.4
1530	141	6802	6.4
1545	141	6799	6.4
1600	140	6788	6.4
1615	141	6802	6.3
1630	140	6769	6.3
1645	140	6791	6.3
Average	141	6803	6.4
Total Amp-hrs	---	13,592	

* Total Amp-hrs = Σ (tank current) x (% hour)
= Σ (6,799 amp x 0.25 hr) + (6,817 amp x 0.25 hr)...+ (6,791 amp x 0.25 hr)

Test Run No. 2 Date: 12/18/91 Tank Current - 6800 amperes
(Foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
1745	141	6828	6.4
1830	140	6821	6.4
1845	140	6769	6.4
1900	142	6846	6.5
1915	140	6824	6.5
1930	141	6748	6.4
1945	141	6755	6.4
2015	140	6795	6.3
2030	141	6842	6.3
Average	141	6804	6.4
Total Amp-hrs		13,603	

* Test stopped from 1800-1830 (Process shutdown for break)
* Added more fume supressant at 1720
* Test stopped from 2000-2010 (Process shutdwon to check plating thickness)

Test Run No. 3 Date: 12/19/91 Tank Current - 6800 amperes
(No foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
0830	141	6740	6.4
0845	141	6755	6.4
0900	140	6788	6.4
0915	140	6839	6.3
0930	141	6784	6.4
0945	142	6839	6.4
1000	141	6824	6.4
1015	140	6762	6.3
1030	140	6850	6.3
Average	141	6798	6.4
Total Amp-hrs		13,610	

Test Run No. 4 Date: 12/19/91 Tank Current - 6800 amperes
(No foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
1145	141	6828	6.4
1200	141	6850	6.3
1215	138	6791	6.3
1230	140	6747	6.3
1245	140	6799	6.3
1300	140	6810	6.4
1315	140	6838	6.3
1330	140	6813	6.4
Average	140	6810	6.3
Total Amp-hrs		13,619	

Test Run No. 5 Date: 12/19/91 Tank Current - 10300 amperes
(Foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
1645	141	10374	7.3
1730	143	10117	7.2
1745	143	10081	7.2
1800	143	10128	7.2
1815	143	10157	7.1
1830	144	10092	7.1
1845	144	10073	7.1
1900	144	10092	7.1
1915	145	10073	7.1
1930	145	10099	7.1
Average	144	10129	7.2
Total Amp-hrs		20,199	

* Test stopped form 1705-1725 (Lost power at stack)
* Changed tank current setpoint to 10100 at 1730
* Added more fume suppressant at 1720

Test Run No. 6 Date: 12/20/91 Tank Current - 10000 amperes
(Foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
0900	142	10026	7.2
0915	142	10022	7.2
0945	143	10044	7.1
1000	143	10011	7.1
1015	143	10088	7.1
1030	143	10377	7.3
1045	144	10414	7.3
1100	144	10436	7.2
Average	143	10177	7.2
Total Amp-hrs		20,355	

* Added more fume suppressant at 0940
* Added more fume suppressant at 1030
* Changed tank current setpoint to 10400 at 1030

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SECTION 4

SAMPLING AND ANALYTICAL PROCEDURES

All sampling and analytical procedures used in this test are contained in 40 CFR Part 60, Appendix A (7-1-89 Edition). Table 4.1 presents a summary of the procedures used for the test program.

The outlet stack gas sampling port location met EPA Method 1 (Sample and Velocity Traverses) criteria. The number of sampling points and sampling point locations were determined according to EPA Method 1 procedures. Figure 4.1 details the location of the sampling points tested.

EPA Method 1 criteria for the inlet sampling location could not be met due to insufficient number of diameters from the ports to the nearest downstream and upstream flow disturbances. The sampling location used was determined from best engineering judgement, and approved by the EPA field observer. Figure 4.2 details the location of the sampling points tested.

A preliminary velocity traverse was used to establish sample train operating parameters for the first total chromium test run. EPA Method 2 (Stack Gas Velocity and volumetric Flow Rate procedures were followed during each total chromium test run to measure stack gas velocity. A Type-S pitot tube was used in conjunction with an inclined oil gauge manometer to determine the individual velocity head reading at each traverse point.

Oxygen and carbon dioxide concentrations were determined according to EPA Method 3 procedures (Gas Analysis for CO_2, O_2, Excess Air, and Dry Molecular Weight). For the purposes of this assignment, IEA assumed the molecular weight of air (29.0 lbs/lb-mole).

Stack gas moisture contents were measured using the EPA Method 4 (Moisture Content of Stack Gases) procedures as part of the isokinetic chromium sample train test runs.

Analytical results were reported by a contracted laboratory, Research Triangle Institute, who determined the total chromium concentrations by ICP (Inductively Coupled Plasma). For a hard plating chrome process, a total chrome analysis is considered to represent hex-chrome. The sampling train used is illustrated in Figure 4.3. Initial and final leak check rates, recovery data, and all train operation parameters from each test run can be found on the field data sheets in Appendix B. Emission rates were calculated in pounds per hour (lb/hr). Example calculations are provided in Appendix A. An EPA draft procedure for sampling and analysis of hard chrome electroplating is provided in Appendix F.

TABLE 4.1
SUMMARY OF TEST PROCEDURES

PARAMETER	SAMPLING METHOD	ANALYTICAL INSTRUMENT
Volumetric Flow	EPA 40 CFR Part 60 App A Method 2	Pitot Tube/Inclined Manometer
Moisture	EPA 40 CFR Part 60 App A Method 4	Analytical Balance (+/- 0.1 g)
Total Chromium	Draft EPA Method for Hard Chromium Plating Operations	Inductively Coupled Plasma*

* Due to the expected low chromium concentrations on the outlet samples ICP analysis was performed in lieu of Atomic Absorption. This permitted the sampling team to conduct two hour tests.

FIGURE 4.1
SOUTH SCRUBBER OUTLET
SAMPLE POINT LOCATION

TRAVERSE POINT No.	% OF DIAMETER	INCHES FROM OUTSIDE OF DUCT
1	10	4.75
2	30	14.0
3	50	23.13
4	70	32.38
5	90	41.5

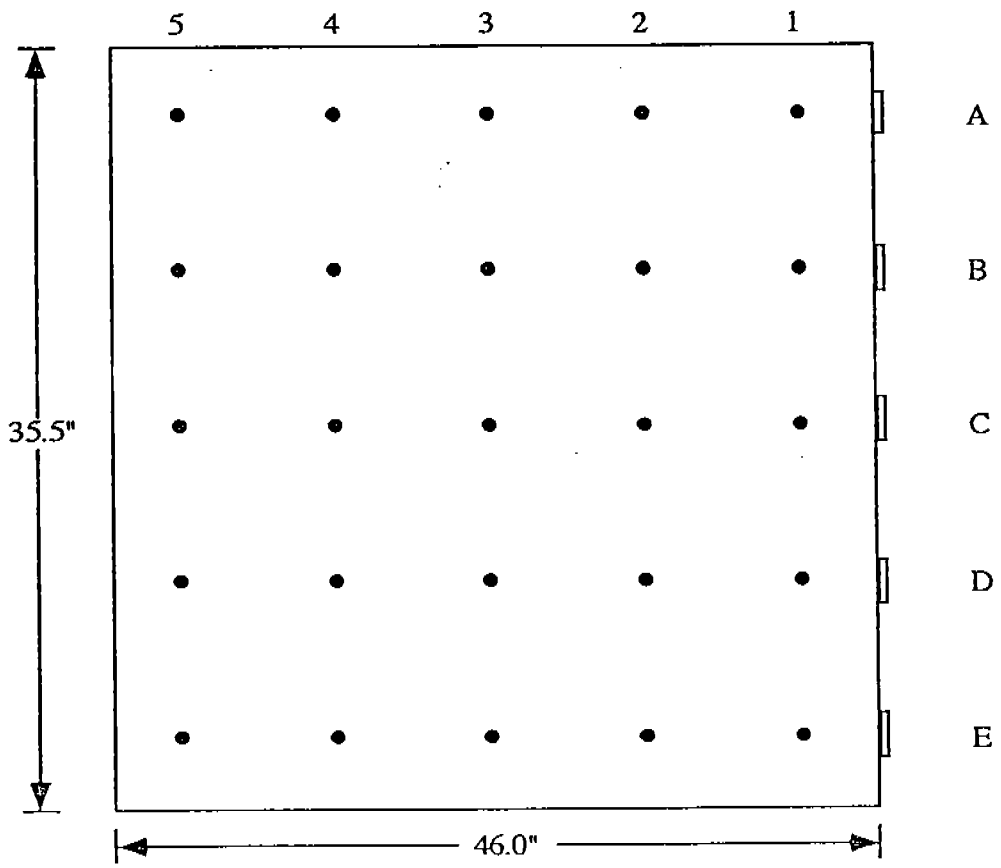


FIGURE 4.2
SOUTH SCRUBBER INLET
SAMPLE POINT LOCATION

TRAVERSE POINT No.	% OF DIAMETER	INCHES FROM OUTSIDE OF DUCT
1	2.1	1.1
2	7.6	2.8
3	11.8	4.8
4	17.7	7.2
5	25.0	10.1
6	35.6	14.3
7	64.4	25.7
8	75.0	29.9
9	82.3	32.8
10	88.2	35.2
11	93.3	37.2
12	97.9	38.9

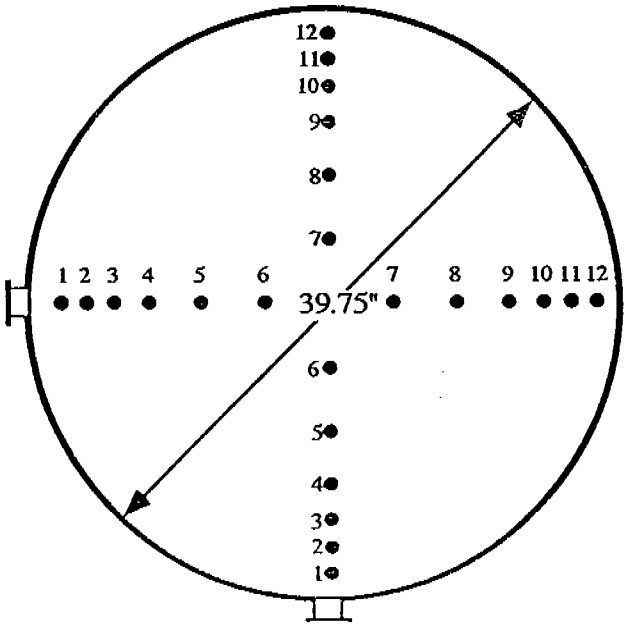
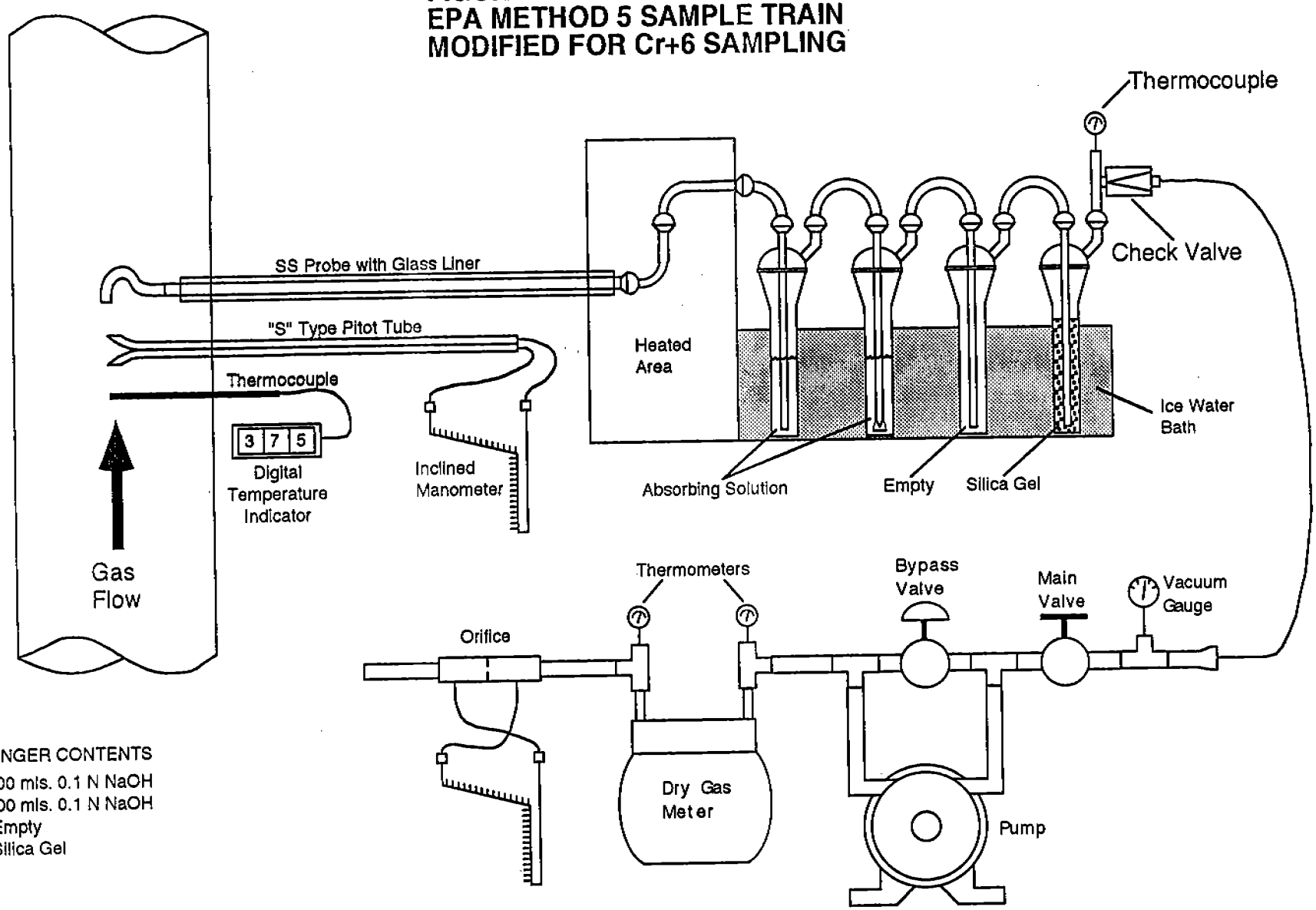


FIGURE 4.3
EPA METHOD 5 SAMPLE TRAIN MODIFIED FOR Cr+6 SAMPLING



IMPINGER CONTENTS
1. 100 mls. 0.1 N NaOH
2. 100 mls. 0.1 N NaOH
3. Empty
4. Silica Gel

SECTION 5

QA/QC PROCEDURES AND RESULTS

The objectives of a quality assurance/quality control (QA/QC) program is to assure that the precision and accuracy of all environmental data generated by IEA, Inc. are commensurate with data quality objectives (DQOs). DQOs are based on a common understanding of the intended end use(s) of the data, the measurement process, and the availability of resources. Once DQOs are established, formally or informally, QC protocol can be defined for the measurements.

The data quality objectives in this project are to provide defensible data that can be used for the determination of inlet and outlet emission rates for scrubber efficiency determination, and compliance with state emission standards. The final data users will be the Monroe Auto Equipment, the State of Georgia's Department of Natural Resources, and the Environmental Protection Agency.

Two basic concepts used in a QC program are to:

1. Control errors; and
2. Verify that the entire Sampling and Analytical (S&A) method is operating within acceptable performance limits.

Use of qualified personnel, reliable and well-maintained equipment, appropriate calibrations and standards, and close supervision of all operations are important components of the QC system. QC in this test program included the use and documentation of calibrated sampling and analytical instruments, use of EPA validated methods (EPA 40 CFR Part 60), adherence to established protocol, method blanks as a check against possible contamination, sample chain-of-custody documentation, and repeated data calculation and verification.

All of the equipment used was calibrated according to procedures outlined in the Quality Assurance Handbook for Air Pollution Measurement System, Volume III, EPA-600/4-77-027b. Actual calibration data sheets are provided in Appendix D.

5.1. BAROMETER

Barometric pressure values for the testing period were recorded from a calibrated barometer on-site and verified by phone from a local airport and were corrected for elevation to stack sample port level (0.01 inches Hg per 10 ft. elevation).

5.2 PROBE NOZZLE

The probe nozzles used in this test were calibrated initially by the manufacturer and thereafter by the field sampling crew by checking for dimension roundness. This was performed by making three separate measurements using alternative inside diameters and calculating the average. A

micrometer with a minimum tolerance of 0.001 inch was used for measuring. If a deviation of more than 0.004 inch is found between any measurements, the nozzle is either discarded or repaired and remeasured.

5.3 PITOT TUBES

Each pitot tube used in sampling meets the design specifications for type-S pitot tubes in EPA Method 2. Therefore, a maximum value baseline coefficient (C_p) of 0.84 is assigned to each pitot tube. Calibration at the manufacturer for pitot face-opening alignment included measuring the external tubing diameter (dimension D_t), the base-to-opening plane distance (dimensions P_a and P_b), and the face opening misalignment angles, with all terms as described in Figures 2-2 and 2-3 of EPA Method 2. Pitot tubes were visually inspected at the completion of the test to insure structural integrity.

5.4 CALIBRATIONS OF SECONDARY REFERENCE METER AND METERING SYSTEM

The secondary reference meter equipment arrangement for calibration is shown in Figure 5.7 of EPA Method 5. The prescribed procedures were followed. A dry spirometer with a 15 ft^3 capacity and $\pm$ 1 percent accuracy is used as the primary calibrant. The metering system's pump is operated for a minimum of 5 minutes at a flow rate of 0.35 cfm to stabilize the dry gas meter temperature. Leak checks are performed and if satisfactory, triplicate runs at each of no less than five different flow rates are performed. A calibration curve is prepared and the meter is recalibrated after 200 hours of operation or annually, whichever comes first.

The calibration set-up for the dry gas metering system using the secondary reference meter in lieu of the spirometer is given in Figure 5.5 of EPA Method 5. A leak check of the metering system before calibration was performed as shown in Figure 5.4 of EPA Method 5. The metering system's pump is operated for 5 minutes at an orifice manometer setting of 0.5 inches H_20 to heat up the pump and system to stabilize the meter inlet and outlet temperatures. Values for the orifice setting (delta H), wet test meter volume (V_w), corresponding dry test meter volume (V_d), dry test meter inlet and outlet gas temperatures (t_{di} and t_{do}), and time are recorded for the initial calibration. The ratio of the wet test meter to the dry test meter (gamma) and the orifice pressure differential that equates to 0.75 cfm at standard conditions (delta H@) are then calculated. A copy of the calibration is in Appendix D.

5.5 POST-TEST METER CALIBRATION CHECK

A post-test meter calibration was performed on the dry gas meter used during the test to check its accuracy against the pre-test calibration. This post-test calibration was made using the average orifice setting obtained during each test run and setting the vacuum at the maximum value obtained during each test run. These test runs were performed against IEA's secondary reference dry gas meter which was calibrated against a spirometer. A copy of the calibration is in Appendix D.

5.6 THERMOCOUPLES AND DIGITAL INDICATORS

Thermocouples are calibrated by comparison to an ASTM-3F mercury-in-glass thermometer at approximately 32° F (ice water), ambient temperature and approximately 212° F (boiling water). Each thermocouple is calibrated against temperature ranges to which it is typically exposed during test conditions, and they must agree within 1.5 percent (expressed in °R) of the reference thermometer throughout the entire calibration range.

Digital indicators are checked by introducing a series of millivolt signal strengths to the input and comparing the indicator reading with the actual signal strength. Acceptable calibration error must not exceed 0.5 percent when temperatures are expressed in °R.

5.7 BLANKS

Reagent blanks were provided for total chromium analysis as a check against potential sample contamination. Samples were not blank corrected.

APPENDIX A

EQUATIONS AND EXAMPLE CALCULATIONS

EPA METHOD 5 CALCULATIONS

Plant MONROE AUTO Location Sampled So. Scrubber INLET

Date 12/18/91 Run No. 1 Calc By MCR

Dry gas meter calibration factor = Y = 1.008

Volume of gas at meter conditions (ft^3) = V_m = 102.607

Average meter temperature (^oF + 460)^oR = T_m = 521.3

Barometric pressure absolute (in. Hg) = P_{bar} = 30.00

Average orifice pressure drop (in. H_2O) = ΔH = 2.55

$V_{m(std)}$ = Volume of gas sampled at the dry gas meter corrected to standard conditions (dscf)

$$V_{m(std)} = \frac{Y\ (17.64)(V_m)(P_{bar} + (\Delta H/13.6))}{(T_m)}$$

$$V_{m(std)} = \frac{(1.008)(17.64)(102.607)[(\overset{30.0}{\cancel{2.55}})+(2.55)/13.6]}{(521.3)}$$

$V_{m(std)}$ = 105.65 dscf

Total volume of water collected (mL) = V_{lc} = 32.6

$V_{wc(std)}$ = volume of water vapor at standard conditions (scf)

$V_{wc(std)} = (0.04707)(V_{lc}) = (0.04707)(32.6) =$ 1.53

Mole fraction of water vapor = B_{ws}

$$B_{ws} = \frac{V_{wc(std)}}{V_{m(std)} + V_{wc(std)}} = \frac{(1.53)}{(105.65) + (1.53)}$$

B_{ws} = 0.0143

Percent moisture = $(100)(B_{ws})$ = 100 (0.0143)

Percent moisture = 1.43 %

Mole fraction of dry gas = MF = 1 - (B_{ws}) = 1 - (0.0143)

MF = 0.986

EPA5CALC.SHT

Percent O_2 by volume dry basis = O_2 = 20.9 %
Percent CO by volume dry basis = CO = 0 %
Percent CO_2 by volume dry basis = CO_2 = 0 %

Percent N_2 by volume dry basis = 100 - (O_2 + CO + CO_2)

N_2 = 100 - [(20.9)+(0)+(0)]

N_2 = 79.1 %

Molecular weight of dry gas (lb/lb-mole) = M_d

M_d = 0.44 (CO_2) + 0.32 (O_2) + 0.28 (N_2 + CO)

M_d = 0.44 (0) + 0.32 (20.9) + 0.28 (79.1 + 0)

M_d = 28.84 lb/lb-mole

Molecular weight of wet stack gas (lb/lb-mole) = M_s

M_s = (M_d) (1 - B_{ws}) + 18 (B_{ws})

M_s = (28.84) [1 - (0.0143)] + 18 (0.0143)

M_s = 28.68 lb/lb-mole

Percent excess air (%) = % EA

$$\% \text{ EA} = \frac{(\% O_2) - [0.5 (\% CO)]}{[0.264 (\% N_2)] - (\% O_2) - [0.5 (\% CO)]} \times 100$$

$$\% \text{ EA} = \frac{(\quad) - [0.5 (\quad)]}{[0.264 (\quad)] - (\quad) - [0.5 (\quad)]} \times 100$$

% EA = _____

Average stack temperature (°F+460) = T_s = 534.3

Avg of sq root of velocity head (in $H_2O)^{1/2}$ = $\sqrt{\Delta p}$ = 0.885

Absolute pressure of stack gas (in. Hg) = P_s = 29.83
note P_s = barometric pressure (in. Hg) ± [gauge pressure (in. H_2O)/13.6]

Pitot tube coefficient, type S = C_p = 0.84

V_s = average stack gas velocity (ft/s)

$$V_s = 85.49 \times C_p \times \sqrt{\frac{T_s}{P_s \times M_s}} \times (\sqrt{\Delta p})avg$$

$$V_s = 85.49 \times (0.84) \times \sqrt{\frac{(534.3)}{(29.83) \times (28.68)}} \times (0.885)$$

V_s = 50.22 ft/s

Area of stack (ft^2) ~~39.75~~ 35.5" x 46" = A = ~~11.34~~ 8.62 (MR)

Testing time (min) = θ = 120

Volumetric gas flow rate in stack (dscfm) = Q_{sd}

$$Q_{sd} = 60 \times (1 - B_{ws}) \times V_s \times A \times (528/T_s) \times (P_s/29.92)$$

$$Q_{sd} = 60 \times (1 - 0.0143) \times (50.22) \times (\cancel{11.34}\ 8.62) \times \left(\frac{528}{534.3}\right) \times \left(\frac{29.83}{29.92}\right)$$

Q_{sd} = ~~33,183.81~~ 25,224 dscfm

Diameter of sampling nozzle (in.) = d_n = 0.236

Area of nozzle (ft^2) = A_n = 54.54E-4 $(d_n)^2$

A_n = (0.005454) (0.236 $)^2$ = 0.000304 ft^2

Isokinetic sampling rate (%) = I

$$I = \frac{100\ T_s[0.002669\ V_{lc} + (V_m\ Y/T_m)(P_{bar} + \Delta H/13.6)]}{60\ \theta\ V_s\ P_s\ A_n}$$

$$I = \frac{100\ (534.3)[0.00267(32.6)+(\cancel{106.65}\ 102.607\ (MR)(1.008)/(521.3))((30.0)+(2.55)/13.6)]}{60\ (120)(50.22)(29.83)(0.000304)}$$

I = 99.0 %

Chromium Calculations Run # 1 Inlet

Total Chromium Concentration, µg/dscf

$T_{Cr} = M_{TCr} / V_{MSTD}$

$T_{Cr} = 2914.0/105.697 = 27.57$ µg/dscf

Total Chromium Emission Rate, lb/hr

$ER_{TCr} = T_{Cr}$ (µg/dscf) x Q_{sd} (dscf/min) x 1.323×10^{-7} [(lb x min) / (µg x hour)]

$ER_{TCr} = 27.57 \times (2.52 \times 10^{4}) \times 1.323 \times 10^{-7} = 0.0199$ lb/hour

Total Chromium Emission Rate, mg/ampere-hour

E = ER_{TCr} (lb/hour) x (120 minutes / x-ampere-hours) x (1 hour/60 min) x (453.6 grams/lb) x (1000 mg/hour)

E = 0.0919 x 120/13,592 x 7,560

E = 6.134 mg/ampere-hour

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APPENDIX B

FIELD DATA AND RECOVERY SHEETS

PARTICULATE/CHLORIDE SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant: Monroe Auto

Sample Location: Inlet

Run No.: 1

Filter Number(s): N/A

Sample Date: 12-18-91

Recovery Date: 12-18-91

Recovered by: MR

MOISTURE

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	100 mL	110 mL	4 mL				743.1
Initial Volume (wt)	100 mL	100 mL	0 mL				724.5
Net Volume (wt)	0	10	4				18.6

Description of impinger water: Slight tinge yellow

5 % spent

Blue Sil gel color

Total moisture = 32.6 g

RECOVERED SAMPLE

Filter container number(s): N/A

Sealed: N/A

Description of particulate on filter: N/A

Probe rinse container no.: 1 - S - INLET — Liquid level marked/sealed: Y

NaOH blank container no.: BL - S - INLET — Liquid level marked/sealed: Y

Impinger contents container no.: 1 - S - IN — Liquid level marked/sealed: Y

N/A blank container no.: ~~NaOH~~ MR N/A — Liquid level marked/sealed: N/A

Samples stored and locked

Remarks

Relinquished by — Date

LABORATORY CUSTODY

Received by — Date

Remarks

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto	12/18/91	INLET SOUTH SCRUB.	CR +6	1-S-IN

OPERATORS	BAROM PRESS (In. Hg)	STATIC PRESS (In. H2O)	AMBIENT TEMP (F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID (In.)	PITOT TUBE Cp	PROBE LINER AND TYPE	NOZZLE I.D.	NOZZLE NO.
CJ MR	30.2	(neg) 2.3	50	N/A	39.75	0.84	4B GLASS	H.25	.236

ASSUMED MOIST. (%)	DGM BOX NO.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	ORSAT NO.	TRAIN LEAK CHECK (INITIAL) In. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) In. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M7	1.92	1.008	4T2	PT4	4T2	N/A	5	0.002	8	0.002	3.28

EPA METHOD 3
Collection Method N/A
Analysis Method

	RUN 1	RUN 2	RUN 3	AVG	AMBIENT
%O2	N/A	Room Temp (ambient) for all runs!			
%CO2					

PITOT SYSTEM LEAK CHECK INIT	PITOT SYSTEM LEAK CHECK FINAL
✓	✓

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (In. H2O)	H ORIFICE (In. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (In. Hg)
B12	0	1440	387.382	~~1.4~~ 1.1 (MC)	3.6	77	108	99	46	56	—	7.1
11	5		392.20	1.0	3.3	76	106	100	40	57	—	7.0
10	10		397.00	0.95	3.1	76	100	99	44	58	—	6.9
9	15		401.720	0.92	3.0	76	99	100	45	59	—	6.5
8	20		406.29	0.79	2.6	76	99	100	45	60	—	6
7	25		410.65	0.72	2.4	75	103	101	45	60	—	5
6	30		414.83	0.86	2.8	76	100	100	45	61	—	6
5	35		419.26	0.78	2.6	76	103	101	48	62		6
4	40		423.59	0.75	2.5	74	104	99	45	62		5
3	45		427.81	0.72	2.4	70 (CR)	108	100	45	62		5
2	50		431.09	0.88	2.9	70 (CR)	101	103	45	63		6
1	55		436.67	0.84	2.7	80 (CR)	100	100	46	63		6

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	—	—	—	—	—	—

Sheet Checked By: [signature] Date 1-7-92

EMISSION TESTING FIELD DATA

$K_F = 3.28$

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto	12/18/91	3. Scrubber Inlet	CR^{+6}	1-5-IN

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
A/2	60		440.89	1.0	3.28	76 MR	100	100	51	60	–	7
11	65		445.55	1.1	3.6	76	99	100	44	62	–	8
10	70		450.54	1.0	3.3	76	106	100	45	63	–	7
9	75		455.42	1.1	3.6	75	103	100	46	63	–	8
8	80		460.40	1.1	3.6	75	100	100	46	63	–	8
7	85		465.41	0.95	3.1	75	99	100	47	63	–	7
6	90		470.20	0.45	1.5	75	99	99	46	62	–	4
5	95		473.71	0.27	0.89	74	108	100	45	62	–	2
4	100		476.46	0.27	0.89	74	101	100	45	62	–	2
3	105		479.11	0.38	1.24	78 end	101	99	44	62	–	2
2	110		481.98	0.49	1.6	70	101	100	44	62	–	3
1	115		485.29	1.0	3.28	70	100	100	44	62	–	7
	120	1650	489.989									
	16											

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	120	102.607	0.885	2.657	74.3	61.3

2.9 % Est.

1.4

.7832 → $\sqrt{20.457}$

ml 33.6

Sheet Checked By: CJ.

Date 1-7-92

74.3
460.0
534.3

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PARTICULATE/CHLORIDE SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant: Monroe Auto Hartwell
Sample Location: So. Scrubber Inlet
Run No.: 2
Filter Number(s): N/A

Sample Date: 12/18/91
Recovery Date: 12/18/91
Recovered by: MR

MOISTURE

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	~~100~~ 100 ml	100	0				760.8
Initial Volume (wt)	100	100	0				743.1
Net Volume (wt)	0	0	0				17.7

Description of impinger water: Tinge Yellow — % spent
Blue — Sil gel color

Total moisture = 17.7 g

RECOVERED SAMPLE

Filter container number(s): N/A — Sealed: N/A
Description of particulate on filter: N/A

Probe rinse container no.: 2 - S - Inlet — Liquid level marked/sealed: Y
NaOH blank container no.: BL - S - Inlet — Liquid level marked/sealed: Y
Impinger contents container no.: 2 - S - Inlet — Liquid level marked/sealed: Y
NaOH blank container no.: N/A — Liquid level marked/sealed: N/A
Samples stored and locked
Remarks: N/A
Relinquished by — Date

LABORATORY CUSTODY

Received by: Sent to RTI — Date
Remarks

32

* with foam *

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
MONROE AUTO	12/18	INLET SO. SCRUB	CR+6	2-S-IN

OPERATORS	BAROM PRESS (in. Hg)	STATIC PRESS (in. H2O)	AMBIENT TEMP (°F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID (in.)	PITOT TUBE Cp	PROBE LINER AND TYPE	NOZZLE I.D.	NOZZLE NO.
MR	30.0	-2.3	52	N/A	39.75	0.84	4B GLASS	H25	0.236

ASSUMED MOIST. (%)	DGM BOX NO.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	ORSAT NO.	TRAIN LEAK CHECK (INITIAL) In. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) In. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M7	1.92	1.008	4T2	PT4	4I2	N/A	5	0.002	9	0.002	3.28

EPA METHOD 3
Collection Method N/A
Analysis Method

	RUN 1	RUN 2	RUN 3	AVG	AMBIENT
%O2	N/A				
%CO2					

PITOT SYSTEM LEAK CHECK INIT	FINAL
✓	✓

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (°F)	PROBE TEMP (°F)	FILTER OVEN TEMP (°F)	SIL GEL IMPINGER TEMP (°F)	DGM IN/OUT TEMP (°F)	AUX. TEMP. (°F)	SAMPLE TRAIN ACUU (in. Hg)
A 12	0	17:44	490.045	0.93	3.1	74	103	100	40	53	—	6
11	5	Stop and to process	494.61	0.98	3.2	75	102	101	38	54	—	7
10	10	Restart 18:34	499.25	1.0	3.3	75	104	99	41	55	—	7
9	15		504.04	1.1	3.6	74	99	100	37	52	-	8
8	20		508.86	1.1	3.6	74	99	100	41	53	—	8
7	25		513.82	0.96	3.2	74	109	100	42	54	—	7
6	30		518.54	0.47	1.6	74	98	100	42	54	-	4
5	35		522.18	0.30	1.0	74	99	99	41	54	—	2
4	40		524.92	0.27	0.89	73	104	99	40	53	-	2
3	45		527.63	0.29	0.96	70	101	100	40	53	—	2
2	50		530.35	0.38	1.25	70	109	101	39	53	-	2
1	55		533.51	0.26	0.85	72	101	100	39	53	—	2

18:34

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK °F	AVG DGM °F
	—	—	—	—	—	—

w/ foam

Sheet Checked By: CJ. Date 1-7-92

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WITH FOAM

EMISSION TESTING FIELD DATA

$K_p = 3.28$

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
MONROE AUTO HARTWELL	12/18	So. Scrub Inlet	Cr+6	2-S-IN

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
12	60	"	535.922	1.1	3.6	73	98	100	39	52	-	8
11	65		540.79	1.1	3.6	74	103	100	40	53	-	9
10	70		545.75	1.0	3.3	73	104	100	42	53	-	8
9	75		550.55	0.95	3.1	73	103	100	42	53	-	8
8	80		555.28	0.86	2.8	72	103	100	42	53	-	7
7	85		559.72	0.78	2.6	72	106	100	41	53	-	6
6	90		564.12	0.93	3.1	71	108	100	41	53	-	7
5	95		567.50	1.0	3.3	72	109	100	38	51	-	8
4	100		573.53	0.95	3.1	72	106	100	40	52	-	8
3	105		578.95	0.86	2.8	71	108	100	41	53	-	7
2	110		582.33	0.77	2.0	68	104	100	40	53	-	8
1	115		586.82	0.83	2.7	70	104	100	40	53	-	7
	120	20:35	591.215									

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	120	101.170	0.8745	2.75	72.6	53

Sheet Checked By: CJ. Date 1-7-92

PARTICULATE/CHLORIDE SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant: Monroe Auto · Hartwell

Sample Location: So Scrubber Inlet

Run No.: 3

Filter Number(s): N/A

Sample Date: 12/19/91

Recovery Date: 12/19/91

Recovered by: ~~12/19/91~~ MR

MOISTURE

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	105	110	4				707.2
Initial Volume (wt)	100	100	0				696.9
Net Volume (wt)	5	10	4				10.3

Description of impinger water: Slight tinge of yellow

Mix blue/white still okay to use

% spent

Sil gel color

Total moisture = 29.3 g

RECOVERED SAMPLE

Filter container number(s): NA

Sealed: N/A

Description of particulate on filter: N/A

Probe rinse container no.: 3-S-Inlet — Liquid level marked/sealed: ✓

NaOH blank container no.: BL-S-Inlet — Liquid level marked/sealed: ✓

Impinger contents container no.: 3-S-Inlet — Liquid level marked/sealed: ✓

NaOH blank container no.: N/A — Liquid level marked/sealed: N/A

Samples stored and locked

Remarks: N/A

Relinquished by: Date:

LABORATORY CUSTODY

Received by: Sent to RTI — Date:

Remarks:

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
MONROE AUTO	12/19	INLET SO. SCRUB	CRTG	3-S-INLET

OPERATORS	BAROM PRESS. (in. Hg)	STATIC PRESS (in. H2O)	AMBIENT TEMP (°F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID (in.)	PITOT TUBE Cp	PROBE NUMBER AND TYPE	NOZZLE I.D.	NOZZLE NO.
MR	30.0	-2.3	30	N/A	39.75	0.84	4B Glass	H25	0.236

ASSUMED MOIST. (%)	DGM BOX NO.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	ORSAT NO.	TRAIN LEAK CHECK (INITIAL) in. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) in. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M7	1.92	1.008	4T2	PT4	4I2	N/A	6	0.002	6	0.002	~~3.25~~ 3.12

EPA METHOD 3
Collection Method N/A
Analysis Method

	RUN 1	RUN 2	RUN 3	AVG	AMBIENT
%O2					
%CO2					

PITOT SYSTEM LEAK CHECK INIT	FINAL
✓	

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (°F)	PROBE TEMP (°F)	FILTER OVEN TEMP (°F)	SIL GEL IMPINGER TEMP (°F)	DGM IN/OUT TEMP (°F)	AUX. TEMP. (°F)	SAMPLE TRAIN ACUU (in. Hg)
A 12	0	0830	591.398	1.1	3.4	66	98	100	30	33	–	6
11	5		596.08	1.1	3.4	66	100	99	31	34	–	6
10	10		600.77	1.1	3.5	67	98	182	34	36	–	6
9	15		605.59	1.1	3.5	68	99	200	35	38	–	6
8	20		610.42	1.1	3.5	68	99	202	35	39	–	6
7	25		615.06	1.0	3.2	66	107	201	36	39	–	6
6	30		619.66	0.49	1.5	66	97	201	38	40	–	3
5	35		623.11	0.29	0.92	64	103	201	35	39	–	2
4	40		625.77	0.26	0.82	64	105	200	34	35	–	2
3	45		628.13	0.38	1.2	63	99	201	34	38	–	3
2	50		630.95	0.54	1.7	64	99	199	33	39	–	3
1	55		634.24	0.45	1.4	64	108	200	34	39	–	3

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	—	—	—	—	—	—

Sheet Checked By: [signature] Date 1-7-92

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto	12/19/91	So. Scrubber Inlet	CR+6	3-S-1N

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
B 12	60		637.400	1.1	3.5	67	101	200	36	40	-	6
11	65		642.09	1.1	3.5	67	103	200	36	39	-	6
10	70		646.88	1.0	3.2	67	101	201	38	42	-	6
9	75		651.43	1.1	3.5	67	106	200	38	42	-	6
8	80		656.25	0.98	3.1	67	100	200	39	42	-	6
7	85		661.10	0.94	3.0	67	102	201	40	43	-	6
6	90		665.84	0.84	2.7	67	99	200	40	43	-	5
5	95		669.68	0.93	2.9	67	105	200	40	43	-	5
4	100		674.25	0.96	3.0	67	100	198	40	43	-	5
3	105		678.75	1.1	3.5	68	103	200	40	43	-	6
2	110		683.22	0.98	3.1	66	104	200	41	44	-	6
1	115		687.90	0.93	2.9	67	107	199	42	43	-	5
	120	09:33	692.322									

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	120	100.924	0.9160	2.75	66.3	40

Sheet Checked By: [signature] Date 1-7-92

PARTICULATE/CHLORIDE SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant: Monroe Auto

Sample Location: Inlet So. Scrub

Run No.: 4

Filter Number(s): N/A

Sample Date: 12/19/91

Recovery Date: 12/19/91

Recovered by: MR

MOISTURE

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	100	100	2				736.4
Initial Volume (wt)	100	100	0				707.2
Net Volume (wt)	0	0	2				29.2

Description of impinger water: Clear / tinge of yellow

% spent: Spent / Δ

Sil gel color:

Total moisture = 31.2 g

RECOVERED SAMPLE

Filter container number(s): N/A

Sealed: N/A

Description of particulate on filter: N/A

Probe rinse container no.: 4-S-Inlet — Liquid level marked/sealed: Y

NaOH blank container no.: BL-S-Inlet — Liquid level marked/sealed: Y

Impinger contents container no.: 4-S-Inlet — Liquid level marked/sealed: Y

NaOH blank container no.: ~~BL-S-Inlet~~ (MR) N/A — Liquid level marked/sealed: N/A

Samples stored and locked: N/A

Remarks:

Relinquished by: Date:

LABORATORY CUSTODY

Received by: Sent to RTI — Date:

Remarks:

686.7

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EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
MONROE AUTO Hartwell	12/19/91	Inlet So. Scrubber	Cr+6	4 - 5 - INLET

OPERATORS	BAROM PRESS (in. Hg)	STATIC PRESS (in. H2O)	AMBIENT TEMP (°F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID (in.)	PITOT TUBE Cp	PROBE NUMBER AND TYPE	NOZZLE I.D.	NOZZLE NO.
MR	30.0	-2.3	30	N/A	39.75	0.84	4B GL	H25	0.236

ASSUMED MOIST. (%)	DGM BOX NO.	DGM H@	DGM CAL. FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	ORSAT NO.	TRAIN LEAK CHECK (INITIAL) in. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) in. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M7	1.92	1.008	4T2	PT4	4I2	N/A	10	0.001	10	0.001	316

EPA METHOD 3
Collection Method N/A
Analysis Method

	RUN 1	RUN 2	RUN 3	AVG	AMBIENT
%O2	N/A				
%CO2					

PITOT SYSTEM LEAK CHECK: INIT. ✓ FINAL ✓

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (°F)	PROBE TEMP (°F)	FILTER OVEN TEMP (°F)	SIL GEL IMPINGER TEMP (°F)	DGM IN/OUT TEMP (°F)	AUX. TEMP. (°F)	SAMPLE TRAIN ACUU (in. Hg)
B 12	0	1120	692.843	1.0	3.2	68	106	198	39	40	-	6
11	5		697.16	1.0	3.2	69	105	199	38	42	-	6
10	10		702.81	0.97	3.1	69	98	200	42	44	-	6
9	15		706.43	0.94	3.0	69	98	200	43	45	-	6
8	20		710.82	0.88	2.9	69	102	200	44	46	-	5
7	25		715.29	0.83	2.6	69	102	202	44	46	-	5
6	30		719.82	0.91	2.9	69	105	199	44	46	-	5
5	35		724.29	0.95	3.0	69	101	199	44	47	-	5
4	40		728.40	0.88	2.9	70	108	199	45	47	-	5
3	45		732.90	0.88	2.9	70	98	201	45	47	-	5
2	50		737.30	0.66	2.1	67	104	200	45	48	-	4
1	55		741.29	0.70	2.2	67	104	200	45	48	-	4
Page Totals	TOTAL TIME 60	1220	DGM VOLUME 745.062	AVG PORT P End	AVG PORT H	AVG STK T OF	THIS PORT.			AVG DGM T		

Sheet Checked By: CJ. Date 1-7-92

3.16

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
MONROE AUTO Northwell	12/19	So. Scrubber Inlet	C.F.G	4-5-INLET

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
A 12	60	1232	745.062	1.1	3.5	69	108	167	39	44	—	6.0
11	65		749.80	1.1	3.5	69	107	112	43	45	—	6.0
10	70		754.46	1.1	3.5	69	107	112	43	45	—	6.0
9	75		759.50	1.2	3.8	70	104	101	45	47	—	7.0
8	80		764.37	1.1	3.5	70	104	100	45	48	—	7.0
7	85		769.27	1.05	3.3	70	104	99	49	48	—	6.0
6	90		774.04	.47	1.5	70	108	99	45	48	—	3.0
5	95		777.41	.28	.88	68	105	100	44	48	—	2.0
4	100		780.01	.25	0.79	69	105	100	42	48	—	2.0
3	105		782.51	.31	0.98	69	105	101	42	47	—	2.5
2	110		785.31	0.61	1.9	69	108	100	42	48	—	3.3
1	115		788.72	0.70	2.2	69	108	100	42	49	—	4.0
	120	1332	792.559	End of Run								

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	120	99.71	0.8942	2.64	69	46.3

Sheet Checked By: [illegible]

Date 1-7-92

PARTICULATE/CHLORIDE SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant: MONROE AUTO

Sample Location: SO2 SCRUBBER INLET

Run No.: 5

Filter Number(s): N/A

Sample Date: 12/19/91

Recovery Date: 12/19/91

Recovered by: MR

MOISTURE

MR

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	100	105	2				758.6 736.[illegible]
Initial Volume (wt)	100	100	0			MR	~~666.7~~ ~~727.7~~
Net Volume (wt)	0	5	2				~~70.9~~ *

Description of impinger water: ~~Blue~~ Blue/white

20 % spent: 21.7

Sil gel color: CHECK PERCENT DUE TO WIND FACTOR

Total moisture = 29.7 g

RECOVERED SAMPLE

Filter container number(s): N/A

Sealed: N/A

Description of particulate on filter: N/A

Probe rinse container no.: 5-S-INLET — Liquid level marked/sealed: Y

NaOH blank container no.: BL-S-INLET — Liquid level marked/sealed: Y

Impinger contents container no.: 5-S-INLET — Liquid level marked/sealed: Y

NaOH blank container no.: N/A — Liquid level marked/sealed: N/A

Samples stored and locked

Remarks: N/A

Relinquished by: Date:

LABORATORY CUSTODY

Received by: Sent To RTI — Date:

Remarks:

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
MONROE AUTO, HARTWELL	12/19	So. Scrubber Inlet	Cr+6	5-5-INLET

OPERATORS	BAROM PRESS (in. Hg)	STATIC PRESS (in. H2O)	AMBIENT TEMP (F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID (in.)	PITOT TUBE Cp	PROBE NUMBER AND TYPE	NOZZLE I.D.	NOZZLE NO.
MR	30.0	-2.3	30	N/A	39.75	0.84	4B GL	0.25	0.236

ASSUMED MOIST. (%)	DGM BOX NO.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	ORSAT NO.	TRAIN LEAK CHECK (INITIAL) In. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) In. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M7	1.92	1.003	4T2	PT4	4I2	N/A	10.0	0.001	10.0	0.001	3.16

EPA METHOD 3
Collection Method N/A
Analysis Method

	RUN 1	RUN 2	RUN 3	AVG	AMBIENT
%O2					
%CO2	N/A				

PITOT SYSTEM LEAK CHECK INIT	PITOT SYSTEM LEAK CHECK FINAL

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
A 12	0	~~1635~~ 1735 (1712)	~~792.655~~ 809.358	1.1	3.5	68	107	*	35	45	–	5
11	5		313.93	1.2	3.8	69	107		35	45	–	6
10	10		818.81	1.2	3.8	68	109		39	46	–	6
9	15		823.12	1.2	3.8	69	99		41	46	–	7
8	20		828.90	1.1	3.5	68	107		44	46	–	6
7	25		833.74	1.1	3.5	69	108		47	47	–	6
6	30		836.88	0.45	1.4	69	106		49	47	–	3
5	35		842.52	0.25	0.79	69	99		52	47	–	1
4	40		844.81	0.23	0.73	69	104		55	46	–	1
3	45		847.41	0.38	1.2	69	103		56	46	–	2
2	50		849.77	0.62	2.0	68	104		52	46	–	3
1	55		853.47	0.95	1.5	68	104		51	47	–	3

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	—	—	—	—	—	—

* NOT USED
FILTER ABOVE DEW POINT

Sheet Checked By: CJ. Date 1-7-92

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
MONROE AUTO HARTWELL	12/19/91	So. Scrubber	Cr	5-5-INLET

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
B 12	60		856.574	1.1	3.5	67	98	*	42	45	-	6
11	65		861.38	1.05	3.3	67	110		42	46	-	6
10	70		866.01	1.0	3.2	68	100		42	46	-	5
9	75		870.71	0.94	3.0	68	110		43	47	-	5
8	80		875.26	0.88	2.8	69	108		43	48	-	5
7	85		879.67	0.80	2.5	69	104		42	48	-	5
6	90		884.21	0.90	2.8	68	99		42	48	-	5
5	95		886.16	0.93	2.9	68	104		42	47	-	5
4	100		891.72	0.90	2.8	67	102		42	47	-	5
3	105		896.18	0.79	2.5	65	99		42	47	-	5
2	110		901.58	0.96	3.0	65	105		42	49	-	5
1	115		905.75	0.89	2.8	66	104		42	48	-	5
	120	1930	910.168									

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	120	100.81	0.9045	[illegible].69	68	46.7

Sheet Checked By: [illegible] Date 1-7-92

PARTICULATE/CHLORIDE SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant: MONROE AUTO HARTWELL
Sample Location: INLET SO. SCRUBBER
Run No.: 6
Filter Number(s):

Sample Date: 12/19/91
Recovery Date: 12/19/91
Recovered by: MF

MOISTURE

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	100	100	5				783.2
Initial Volume (wt)	100	100	0				758.6
Net Volume (wt)	0	0	5				24.6

Description of impinger water: NaOH Clear
% spent
Sil gel color
Total moisture = 29.6 g

RECOVERED SAMPLE

Filter container number(s): N/A
Sealed: N/A
Description of particulate on filter: N/A

Probe rinse container no.: 6 - S - INLET
Liquid level marked/sealed: Y

blank container no.: BL - S - IN
Liquid level marked/sealed: Y

Impinger contents container no.: 6 - S - INLET
Liquid level marked/sealed: Y

NaOH blank container no.: N/A
Liquid level marked/sealed: N/A

Samples stored and locked
Remarks
Relinquished by: N/A
Date

LABORATORY CUSTODY

Received by: Sent to RTI
Date
Remarks

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EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto Hartwell	12/20/91	So. Scrubber Inlet	Cr^{+6}	6 - S - Inlet

OPERATORS	BAROM PRESS (in. Hg)	STATIC PRESS (in. H2O)	AMBIENT TEMP (°F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID (in.)	PITOT TUBE Cp	PROBE NUMBER AND TYPE	NOZZLE I.D.	NOZZLE NO.
MR	30.0	-2.3 (ng)	30	N/A	39.75	0.84	48 GL	0.25	0.236

ASSUMED MOIST. (%)	DGM BOX NO.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	ORSAT NO.	TRAIN LEAK CHECK (INITIAL) In. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) In. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M7	1.92	1.008	4T2	PT4	4I2	N/A	6	0.002	10	0.001	3.16

EPA METHOD 3
Collection Method: N/A
Analysis Method:

	RUN 1	RUN 2	RUN 3	AVG	AMBIENT
%O2	N/A				
%CO2					

PITOT SYSTEM LEAK CHECK: INIT ✓ FINAL

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (°F)	PROBE TEMP (°F)	FILTER OVEN TEMP (°F)	SIL GEL IMPINGER TEMP (°F)	DGM IN/OUT TEMP (°F)	AUX. TEMP. (°F)	SAMPLE TRAIN ACUU (in. Hg)
A 12	0	0850	910.293	1.2	3.8	67	99	*	35	37	–	7
11	5		915.23	1.2	3.8	67	108		38	41	–	7
10	10		920.26	1.2	3.8	67	103		44	45	–	7
9	15		925.29	1.3	4.1	68	104		46	47	–	8
8	20		930.50	1.2	3.8	67	101		48	48	–	7
7	25		935.54	1.1	3.5	67	106		48	49	–	7
6	30	ctu	940.50	0.44	1.4	67	19		48	48	–	2.0
5	35		943.65	0.19	0.60	66	105		47	46	–	1.5
4	40		945.68	0.26	0.82	68	105		41	45	–	2.0
3	45		947.00	0.39	1.2	68	102		44	46 ctu	–	2.7
2	50		950.85	0.57	1.8	68	107		44 ctu	~~44~~ 47	–	3.1
1	55		954.20	0.57	1.8	68	101		44	48	–	3.1

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK °F	AVG DGM °F
	—	—	—	—	—	—

* NO OVEN HEAT NOT NEEDED
TEMP ABOVE DEW POINT

9141

Sheet Checked By: [signature] Date 1-7-92

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EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
MONROE ATU Hartwell	12/20/91	So Scrubber Inlet	Grab	6-5-Inlet

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
B12	60	0955	957.708	1.1	3.5	69	~~45~~ 102	~~49~~ 56	45	49	—	6.0
11	65		964.11	1.1	3.5	69	107	*	43	51	-	6.0
10	70		967.23	1.05	3.3	69	101		43	51	—	6
9	75		972.42	0.98	3.1	69	105		44	52	-	6
8	80		976.66	0.91	2.9	70	103		44	52	-	6
7	85		980.19	0.83	2.6	70	103		44	52	-	5
6	90		985.82	0.90	2.8	70	106		44	52	-	5
5	95		989.80	0.87	2.7	70	108		44	52	-	5
4	100		994.10	0.84	2.7	70	107		44	52	-	5
3	105		998.43	0.82	2.6	70	106		44	52	-	5
2	110		1002.67	0.80	2.5	70	107		45	52	-	5
1	115		1006.86	0.1	3.5	70	106		44	52	-	6
	120	1055	1011.603									

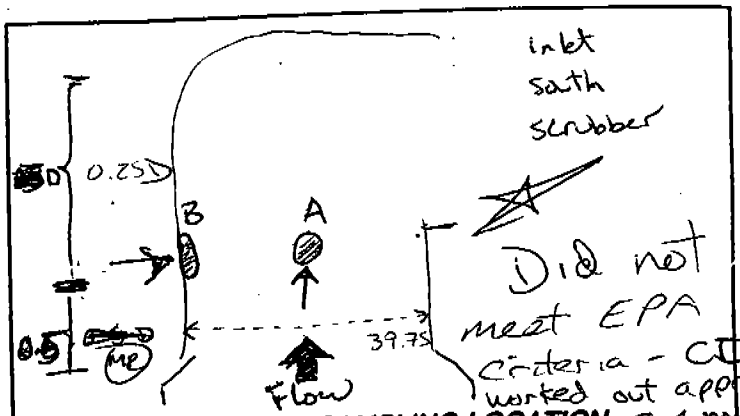
Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	120	101.310	0.9141	2.76	68.5	48.6

Heat not heard

Sheet Checked By: [signature] Date 1-7-92

EPA METHOD 1
TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Monroe Auto
CITY Hartwell STATE GA
SAMPLING LOCATION South Scrubber
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 39.75
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) 1/8
NEAREST UPSTREAM DISTURBANCE 0.25
DISTURBANCE Through Roof
NEAREST DOWNSTREAM DISTURBANCE 0.5
DISTURBANCE Bend
SAMPLER CS/CO/MP DATE 12/18

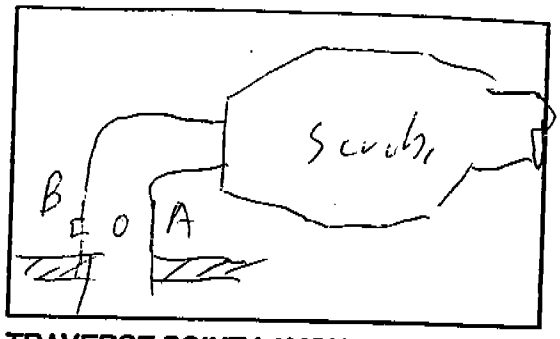


SCHEMATIC OF SAMPLING LOCATION

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 DISTANCE FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1		39.75		.125	1.1
2					2.8
3					4.8
4					7.2
5					10.1
6					14.3
7					25.7
8					29.9
9					32.8
10					35.2
11					37.2
12					38.9

PRELIMINARY VELOCITY TRAVERSE
EPA METHOD 2

PLANT/CLIENT: MONROE AUTO
SOURCE: Inlet
DATE: 12/15/91
STACK I.D. (inches): 39.75
BAROMETRIC PRESSURE (in. Hg): 30.0
STACK GAUGE PRESSURE (in. H2O): -2.3
OPERATORS: CD, CJ, MR, MJ
PITOT NO. PT4 | TYPE S | COEFF 0.84



TRAVERSE POINT LAYOUT SCHEMATIC

TRAVERSE POINT NUMBER	VELOCITY HEAD (in. H2O)	STACK TEMP (°F)
1	0.63	72 Room Air
2	0.55	
3	0.45	
4	0.22	
5	0.20	
6	0.26	
7	0.80	
8	0.95	
9	1.0	
10	1.0	
11	1.0	
12	0.95	
AVERAGE	SQRT 0.7897	72

TRAVERSE POINT NUMBER	VELOCITY HEAD (in. H2O)	STACK TEMP (°F)
1	0.70	72
2	0.80	
3	0.80	
4	0.68	
5	0.75	
6	0.78	
7	0.79	
8	0.82	
9	0.88	
10	0.95	
11	0.98	
12	1.0	
	0.9080	
AVERAGE	SQRT 0.949	72

POST PITOT LEAK CHECK PASSED [✓] [ ] FAILED

Avg 0.721

MEASUREMENT DEVICE
- MICROMETER [ ]
- 0–10" MANOMETER [✓]
- MAGNEHELIC [ ]
- OTHER [ ]

FPS 48

EXPLAIN: ACFM = 24 935

DSCFM = 23933

Then Nozz = 0.223

prevelo.wk1

236

747

48

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto Hartford CA	12/18/91	Outlet S. scrubber	CR16	1 - S - Outlet

OPERATORS	BAROM PRESS (in. Hg)	STATIC PRESS (in. H2O)	AMBIENT TEMP (F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID (in.)	PITOT TUBE Cp	PROBE NUMBER AND TYPE	NOZZLE I.D.	NOZZLE NO.
CJ	30.0	-.07	50	N/A	40 x 35.5	0.84	4 Glass	J 25	0.238

ASSUMED MOIST (%)	DGM BOX NO.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	ORSAT NO.	TRAIN LEAK CHECK (INITIAL) in. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) in. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M-1	1.913	0.999	4T1		4I1	N/A	5	0.002	3	0.000	3.38

EPA METHOD 3
Collection Method N/A
Analysis Method

	RUN 1	RUN 2	RUN 3	AVG	AMBIENT
%O2					
%CO2	Room Temp		Ambient		

PITOT SYSTEM LEAK CHECK INIT.	FINAL
✓	✓

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP (F)	SAMPLE TRAIN ACUU (in. Hg)
A-1	0	1440	913.131	0.43	1.45	75	102	109	53	53	—	2
2	5		916.28	0.40	1.35	77	99	103	40	55	—	2
3	10		919.28	0.40	1.35	76	103	105	40	56	—	2
4	15		922.31	0.41	1.39	76	102	110	40	56	—	2
5	20		925.56	0.62	2.10	76	101	105	40	57	—	3
B 1	25		929.215	0.50	1.69	75	100	115	47	58	—	2
2	30		932.61	0.28	0.95	75	101	105	42	60	—	2
3	35		935.39	0.25	0.85	75	103	110	42	61	—	2
4	40		937.93	0.35	1.18	75	102	101	42	62	—	2
5	45		940.77	0.54	1.83	76	101	101	41	63	—	2

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	—	—	—	—	—	—

PSTS
16.4894

Sheet Checked By: _____ Date _____

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EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto Hartwell GA.	12/16/91	South Scrubber Outlet	Crt6	1-5-Outlet

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (In. H2O)	H ORIFICE (In. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (In. Hg)
C-1	50		944.308	0.52	1.76	74	100	100	45	63	—	2
2	55		947.81	0.37	1.25	75	102	102	40	64	—	2
3	60		950.86	0.35	1.18	75	101	111	40	64	—	2
4	65		953.78	0.35	1.18	75	104	112	40	63	—	2
5	70		956.67	0.59	1.99	75	100	100	40	62	—	2
D-1	75		960.312	0.42	1.42	74	100	111	44	60	—	2
2	80		963.52	0.47	1.59	74	101	112	39	60	—	2
3	85		966.83	0.70	2.37	74	102	106	38	60	—	3
4	90		970.81	0.64	2.16	74	100	99	39	60	—	3
5	95		974.72	0.74	2.50	74	100	104	41	61	—	3
E-1	100		978.942	0.37	1.25	74	101	101	43	59	—	2
2	105		981.92	0.65	2.19	74	101	109	37	58	—	2
3	110		985.65	0.88	2.97	75	101	104	37	59	—	3
4	115		990.16	0.95	3.21	75	100	108	38	60	—	3
5	120		994.92	0.95	3.21	75	100	111	38	60	—	3
	125	1656	999.742									

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	125	86.6110	0.713	1.775	75	~~60.9~~ 59.76 (MR)

Sheet Checked By: _____ Date _____

PARTICULATE/CHLORIDE SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant: Monroe Auto
Sample Location: Outlet
Run No.: 1
Filter Number(s): N/A

Sample Date: 12/18/91
Recovery Date: 12/18/91
Recovered by: CJ

MOISTURE

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	100 mL	100 mL	0 mL				743.6
Initial Volume (wt)	100 mL	100 mL	0 mL				731.8
Net Volume (wt)	0 mL	0 mL	0 mL				11.8

Description of impinger water: Clear

0 % spent

Blue Sil gel color

Total moisture = 11.8 g

RECOVERED SAMPLE

Filter container number(s): N/A
Sealed: N/A
Description of particulate on filter: N/A

Probe rinse container no.: R1 - S - outlet
Liquid level marked/sealed: yes

NaOH blank container no.: R1 - Bl - S - outlet
Liquid level marked/sealed: yes

Impinger contents container no.: R1 - S - outlet
Liquid level marked/sealed: yes

N/A blank container no.: N/A
Liquid level marked/sealed: N/A

Samples stored and locked: yes

Remarks:

Relinquished by: Date:

LABORATORY CUSTODY

Received by: Date:

Remarks:

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto Hartwell GA	12/18/91	Outlet S. Scrubber	Cr +6	2 # 5 - Outlet

OPERATORS	BAROM PRESS (In. Hg)	STATIC PRESS (In. H2O)	AMBIENT TEMP (F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID (In.)	PITOT TUBE Cp	PROBE NUMBER AND TYPE	NOZZLE I.D.	NOZZLE NO.
CJ	30.00	-.07	51	N/A	40.09 x 35.5	0.84	4A Glass	J.	0.238

ASSUMED MOIST. (%)	DGM BOX NO.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	ORSAT NO.	TRAIN LEAK CHECK (INITIAL) In. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) In. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M-1	1.[illegible]	0.999	4T1		4F1	N/A	5	0.003	5	0.003	3.38 / 3.32

EPA METHOD 3
Collection Method N/A
Analysis Method

	RUN 1	RUN 2	RUN 3	AVG	AMBIENT
%O2					
%CO2		Room Temp.			

PITOT SYSTEM LEAK CHECK INIT.	FINAL
✓	✓

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (In. H2O)	H ORIFICE (In. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SILGEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (In. Hg)
A 1	0	1735	999.782	0.45	1.52	73	100	102	41	50	—	2
2	5		1003.05	0.42	1.42	73	103	105	34	51	—	2
3	10	Shut down due to break	006.18	0.41	1.38	74	100	110	34	51	—	2
4	15	1834 start	009.22	0.44	1.49	73	104	99	33	46	—	2
5	20		012.29	0.53	1.79	73	100	99	33	47	—	2
B 1	25		015.82	0.47	1.56	72	105	98	34	48	—	2
2	30		019.15	0.30	1.08	73	100	99	35	48	—	2
3	35		022.03	0.26	0.86	73	99	102	35	48	—	2
4	40		024.57	0.31	1.03	73	103	104	35	48	—	2
5	45		027.28	0.50	1.66	73	100	105	34	48	—	3

K' 3.32

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	—	—	—	—	—	—

* Foam on Run.
* Shut down due to Plant break

psts 16.226

Sheet Checked By: _____ Date _____

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
MONROE Auto Hartwell GA	02/18/91	S. Scrubber Outlet	Cr +6	2-S-outlet

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (In. H2O)	H ORIFICE (In. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (In. Hg)
C-1	50		030.552	0.45	1.49	72	101	101	35	47	—	2
2	55		033.72	0.35	1.16	72	101	104	34	48	—	2
3	60		036.53	0.35	1.16	72	101	105	34	47	—	2
4	65		039.32	0.37	1.23	72	104	104	34	47	—	2
5	70		042.88	0.56	1.86	72	104	106	34	47	—	3
D-1	75		045.274	0.46	1.53	71	100	99	35	46	—	2
2	80		048.46	0.49	1.63	70	103	99	34	47	—	2
3	85		051.73	0.61	2.03	70	101	103	34	47	—	2
4	90		055.40	0.61	2.03	70	101	104	34	48	—	2
5	95		059.12	0.61	2.03	73	101	97	33	46	—	3
E-1	100		062.43	0.49	1.63	70	103	111	33	45	—	3
2	105		066.16	0.68	2.26	70	101	110	33	46	—	3
3	110		069.89	0.85	2.82	71	100	101	33	49	—	3
4	115		074.17	0.89	2.95	71	102	100	34	48	—	3
5	120		078.67	0.83	2.76	71	99	99	34	48	—	3
	125	2038	083.181									

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	125	83.399	0.704	1.691	71.88	47.64

Sheet Checked By: _____ Date _____

PARTICULATE/CHLORIDE SAMPLE RECOVERY
AND INTEGRITY DATA SHEET

Plant: Monroe Auto
Sample Location: S. Scrubber Outlet
Run No.: 2 - S - outlet
Filter Number(s): N/A

Sample Date: 12/18/91
Recovery Date: 12/18/91
Recovered by: CJ

MOISTURE

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	100 mL	100 mL	0 mL				754.8
Initial Volume (wt)	100 mL	100 mL	0 mL				743.6
Net Volume (wt)	0 mL	0 mL	0 mL				11.2

Description of impinger water: Clear

10 % spent

Pink / blue Sil gel color

Total moisture = 11.2 g

RECOVERED SAMPLE

Filter container number(s): N/A
Sealed: N/A
Description of particulate on filter: N/A

Probe rinse container no.: R2 - S - outlet
Liquid level marked/sealed: yes

NAOH blank container no.: R2-BL-S - outlet (S)
Liquid level marked/sealed: yes

Impinger contents container no.: R2 - BL - S - outlet (S)
Liquid level marked/sealed: yes

N/A blank container no.: N/A
Liquid level marked/sealed: N/A

Samples stored and locked: yes
Remarks:
Relinquished by: Date:

LABORATORY CUSTODY

Received by: Date:
Remarks:

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EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto Hartwell GA	12/10/91	S.S Rubber Outlet	Cr+6	3-5-outlet

OPERATORS	BAROM. PRESS. (in. Hg)	STATIC PRESS. (in. H2O)	AMBIENT TEMP. (F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID. (in.)	PITOT TUBE Cp	PROBE NUMBER AND TYPE	NOZZLE I.D.	NOZZLE NO.
CJ	30.0	-.07	30	N/A	40.04 46x35.5	0.84	4 Glass	.325	0238

ASSUMED MOIST. (%)	DGM BOX NO.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	ORSAT NO.	TRAIN LEAK CHECK (INITIAL) In. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) In. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M-1	1.913	0.999	4T1		4T1	N/A	5	0.002	4	0.001	3.28

EPA METHOD 3		RUN 1	RUN 2	RUN 3	AVG	AMBIENT	PITOT SYSTEM LEAK CHECK INIT.	PITOT SYSTEM LEAK CHECK FINAL
Collection Method	N/A	%O2					✓	✓
Analysis Method		%CO2	Room	Temp				

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
A-1	0	0830	083.329	1.45	1.44	64	102	204	27	26	—	2
2	5		086.38	0.43	1.38	65	104	196	28	28	—	2
3	10		089.36	0.40	1.31	66	103	202	29	30	—	2
4	15		092.99	0.42	1.38	66	102	193	29	31	—	2
5	20		095.32	0.51	1.67	66	103	202	30	32	—	2
B-1	25		098.650	0.56	1.84	63	101	203	29	32	—	2
2	30		102.32	0.28	0.92	63	100	202	29	33	—	2
3	35		104.95	0.26	0.85	64	102	201	29	33	—	2
4	40		107.44	0.33	1.08	65	99	206	29	34	—	2
5	45		110.14	0.51	1.67	65	103	193	29	33	—	2

3.21

K' 3.29

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	—	—	—	—	—	—

Sheet Checked By: _____ Date _____

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EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto Hartwell Cut	12/19/91	S. Scrubber outlet	CR^{+6}	3-S-outlet

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
C-1	50		113.429	0.58	1.90	65	99	196	29	33	—	2
2	55		117.07	0.38	1.25	66	104	198	30	35	—	2
3	60		120.08	0.45	1.48	66	100	199	30	35	—	2
4	65		123.11	0.38	1.25	67	103	207	31	36	—	2
5	70		126.01	0.58	1.90	67	99	192	30	36	—	2
D-1	75		129.366	0.49	1.61	66	101	198	30	35	—	2
2	80		132.90	0.53	1.74	66	100	202	30	36	—	2
3	85		136.30	0.79	2.59	66	104	205	31	37	—	3
4	90		140.47	0.66	2.16	66	105	205	32	38	—	3
5	95		144.30	0.64	2.10	67	100	195	32	38	—	3
E1	100		148.016	0.40	1.31	66	100	208	32	37	—	2
2	105		150.91	0.70	2.30	67	100	196	32	38	—	3
3	110		154.69	0.92	3.02	67	103	207	32	39	—	4
4	115		159.08	0.80	2.62	67	103	192	33	40	—	3
5	120		163.34	0.70	2.30	68	103	194	34	39	—	3
	125	1048	167.249									

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	125	83.920	0.717	1.723	65.76	34.56

PSTS 16.436

Sheet Checked By: _____ Date _____

PARTICULATE/CHLORIDE SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant: Monroe Auto

Sample Location: S-Scrubber outlet

Run No.: 3

Filter Number(s): N/A

Sample Date: 12/19/91

Recovery Date: 12/19/91

Recovered by: CJ

MOISTURE

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	100 mL	100 mL	0 mL				767.6
Initial Volume (wt)	100 mL	100 mL	0 mL				754.8
Net Volume (wt)	0 mL	0 mL	0 mL				12.80

Description of impinger water: Clear

10 % spent

Sil gel color

Total moisture = 12.8 g

RECOVERED SAMPLE

Filter container number(s): N/A

Sealed: N/A

Description of particulate on filter: N/A

Probe rinse container no.: R3-S-Outlet — Liquid level marked/sealed: yes

Wash blank container no.: BL-S-outlet — Liquid level marked/sealed: yes

Impinger contents container no.: R3-S-Outlet — Liquid level marked/sealed: yes

N/A blank container no.: N/A — Liquid level marked/sealed: N/A

Samples stored and locked: yes

Remarks:

Relinquished by: Date:

LABORATORY CUSTODY

Received by: Date:

Remarks:

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EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto Manufacturing GA	12/14/92	5 Scrubber outlet	Cr +6	5 - 5 - outlet

OPERATORS	BAROM PRESS (in. Hg)	STATIC PRESS (in. H2O)	AMBIENT TEMP (F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID (in.)	PITOT TUBE Cp	PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.
LJ	30.0	-0.07	42	N/A	30.04 Wall 32.5	0.84	4A Glass	5.25	0.238

ASSUMED MOIST. (%)	DGM BOX NO.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	ORSAT NO.	TRAIN LEAK CHECK (INITIAL) in. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) in. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M-1	1.913	0.999	4T1		4I1	N/A	5	0.002	4	0.000	3.28

EPA METHOD 3
Collection Method N/A
Analysis Method

	RUN 1	RUN 2	RUN 3	AVG	AMBIENT
%O2					
%CO2	Room Temp				

PITOT SYSTEM LEAK CHECK INIT	PITOT SYSTEM LEAK CHECK FINAL
✓	✓

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
A-1	0	1120	167.368	0.43	1.41	67	99	203	38	38	—	2
2	5		170.50	0.40	1.31	64	100	205	34	39	—	2
3	10		173.38	0.38	1.28	68	103	192	33	40	—	2
4	15		176.29	0.40	1.31	69	102	210	34	41	—	2
5	20		179.29	0.53	1.74	69	99	193	35	42	—	2
B-1	25		182.618	0.52	1.71	69	104	200	35	41	—	2
2	30		185.99	0.28	0.92	68	103	197	34	42	—	2
3	35		188.66	0.23	0.75	69	102	200	35	42	—	2
4	40		191.04	0.32	1.05	69	102	203	35	42	—	2
5	45		193.61	0.54	1.77	69	104	200	35	43	—	2

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	—	—	—	—	—	—

Sheet Checked By: _____ Date _____

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto Parts OA	12/12/91	S. Scrubber outlet	CR the	4 S - outlet

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
C-1	50		197.125	0.55	1.80	70	101	207	37	42	—	2
2	55		200.62	0.35	1.15	69	102	201	36	43	—	2
3	60		203.50	0.41	1.34	69	102	199	36	44	—	2
4	65		206.43	0.35	1.15	69	99	180	36	44	—	2
5	70		208.21	0.62	2.03	69	100	135	36	44	—	2
D-1	75		212.819	0.46	1.51	69	102	100	38	42	—	2
2	80		216.03	0.48	1.57	69	99	105	36	44	—	2
3	85		219.29	0.70	2.30	69	103	113	37	44	—	3
4	90		223.29	0.67	2.20	70	103	108	39	46	—	3
5	95		227.18	0.67	2.20	70	104	104	39	46	—	3
E-1	100		231.080	0.37	1.21	69	101	101	40	45	—	2
2	105		233.98	0.65	2.13	69	99	103	38	45	—	2
3	110		237.58	0.85	2.79	70	104	112	39	46	—	3
4	115		241.76	0.85	2.79	70	100	110	40	47	—	3
5	120		246.16	0.76	2.49	71	102	100	41	48	—	3
	125	1336	250.329									

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	125	82.961	0.705	1.676	69.12	43.2

PKTS ~~1.9~~ 1.20 1.216

Sheet Checked By: _____ Date _____

PARTICULATE/CHLORIDE SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant: MONROE Auto

Sample Location: S. Scrubber outlet

Run No.: 4

Filter Number(s): N/A

Sample Date: 12-19-91

Recovery Date: 12-19-91

Recovered by: CJ.

MOISTURE

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	110 mL	100 mL	0 mL				779.8
Initial Volume (wt)	100 mL	100 mL	0 mL				767.6
Net Volume (wt)	0.10 mL	0.0 mL	0.0 mL				12.2

Description of impinger water: Clear

10 % spent

Blue/Pink Sil gel color

Total moisture = 12.2 g

RECOVERED SAMPLE

Filter container number(s): N/A

Sealed: N/A

Description of particulate on filter: N/A

Probe rinse container no.: R4 - S - Outlet — Liquid level marked/sealed: yes

NaOH blank container no.: BL - S - outlet — Liquid level marked/sealed: yes

Impinger contents container no.: R4 - S - Outlet — Liquid level marked/sealed: yes

N/A blank container no.: N/A — Liquid level marked/sealed: N/A

Samples stored and locked: yes

Remarks:

Relinquished by: Date:

LABORATORY CUSTODY

Received by: Date:

Remarks:

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EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto Harbour City	12/18/91	S. Scrubber outlet	Cr^{+6}	5-5-outlet

OPERATORS	BAROM PRESS. (In. Hg)	STATIC PRESS (In. H2O)	AMBIENT TEMP. (F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID (In)	PITOT TUBE Cp	PROBE MANUFACTURER AND TYPE	NOZZLE ID.	NOZZLE NO.
CJ	30.0	-2.3	48	N/A	35.5	0.85	N/A Glass	3.25	238

ASSUMED MOIST. (%)	DGM BOX NO.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	OHSAT NO.	TRAIN LEAK CHECK (INITIAL) In. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) In. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M-1	1.913	0.999	4T1		4T1	N/A	5	0.002	5	0.001	3.28

EPA METHOD 3			RUN 1	RUN 2	RUN 3	AVG	AMBIENT	PITOT SYSTEM LEAK CHECK INIT	PITOT SYSTEM LEAK CHECK FINAL
Collection Method	N/A	%O2						✓	✓
Analysis Method		%CO2	Room Temp						

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (In. H2O)	H ORIFICE (In. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (In. Hg)
A-1	0	1635	250.404	0.45	1.48	67	101	98	34	42	—	2
2	5		253.55	0.41	1.34	66	99	110	33	43	—	2
3	10		256.49	0.40	1.37	67	104	102	33	44	—	2
4	15		259.47	0.41	1.41	67	99	112	34	45	—	2
5	20		262.465	0.59	2.02	66	99	108	34	39	—	2
B-1	25		266.030	0.54	1.85	67	104	*	33	40	—	2
2	30		269.60	0.27	0.93	68	98	Not used temp. above	33	43	—	2
3	35		272.30	0.23	0.79	68	101		34	44	—	2
4	40		274.74	0.32	1.10	68	99		34	44	—	2
5	45		277.46	0.53	1.82	68	99		34	46	—	2

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT ΔP	AVG H	AVG STK F	AVG DGM F
	—	→	→	—	—	—

3.13

~~1.294~~ 16.320

Sheet Checked By: _____ Date _____

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
MONROE Auto Hartwell GA	12/19/91	S. Scrubber outlet	Cr^{+6}	S-8-outlet

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (in. H2O)	H ORIFICE (in. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (in. Hg)
C-1	50		280.902	0.54	1.85	67	104		34	45	—	3
2	55		284.40	0.35	1.20	67	104		34	47	—	2
3	60		287.47	0.40	1.37	67	102	*	34	47	—	2
4	65		290.53	0.35	1.20	67	101	not	34	48	—	2
5	70		293.33	0.65	2.23	67	99		34	48	—	3
D-1	75		297.295	0.50	1.72	65	99	used	33	45	—	3
2	80		300.61	0.51	1.75	65	103		32	45	—	3
3	85		304.09	0.78	2.68	66	99	Temp	33	46	—	3
4	90		307.28	0.60	2.06	67	104		34	47	—	3
5	95		311.03	0.65	2.23	68	99		35	48	—	4
E-1	100		314.936	0.39	1.34	66	100	above	34	46	—	3
2	105		318.08	0.70	2.40	66	103		33	48	—	3
3	110		322.88	0.89	3.05	66	105	dew	34	50	—	4
4	115		326.32	0.80	2.74	67	101	point	35	52	—	4
5	120		331.06	0.73	2.50	67	104		36	52	—	3
	125	1930	335.345									

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	125	84.941	0.711	1.78	66.8	45.8

* Foam On

Sheet Checked By: _____ Date _____

'E9

PARTICULATE/CHLORIDE SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant: Monroe Auto

Sample Date: 12/19/91

Sample Location: S. Scrubber Outlet

Recovery Date: 12/19/91

Run No.: 5

Recovered by: EJ

Filter Number(s): N/A

MOISTURE

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	100 mL	100 mL	0 mL				737.7
Initial Volume (wt)	100 mL	100 mL	0 mL				727.0
Net Volume (wt)	0 mL	0 mL	0 mL				10.7

Description of impinger water: Clear

5 % spent

Blue / Pink Sil gel color

Total moisture = 10.7 g

RECOVERED SAMPLE

Filter container number(s): N/A

Sealed: N/A

Description of particulate on filter: N/A

Probe rinse container no.: RS- S - Outlet — Liquid level marked/sealed: yes

Wash blank container no.: BL - S - Outlet — Liquid level marked/sealed: yes

Impinger contents container no.: RS - S - Outlet — Liquid level marked/sealed: yes

N/A blank container no.: N/A — Liquid level marked/sealed: N/A

Samples stored and locked: yes

Remarks:

Relinquished by: Date:

LABORATORY CUSTODY

Received by: Date:

Remarks:

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto Hartwell GA	12/20/91	3.5 Chamber Outlet	CR	6-5 Outlet

OPERATORS	BAROM. PRESS. (In. Hg)	STATIC PRESS. (In. H2O)	AMBIENT TEMP. (F)	FILTER TYPE & FILTER NUMBER(S)	STACK ID (In.)	PITOT TUBE Cp	PROBE LENGTH AND TYPE	NOZZLE I.D.	NOZZLE NO.
CJ	30.0	-0.07	30	N/A	40.04 46x35.5	0.84	4A Glass	.238	0238

ASSUMED MOIST. (%)	DGM BOX NO.	DGM H@	DGM CAL. FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	IMPINGER THERM NO.	ORSAT NO.	TRAIN LEAK CHECK (INITIAL) In. Hg	TRAIN LEAK CHECK (INITIAL) CFM	TRAIN LEAK CHECK (FINAL) In. Hg	TRAIN LEAK CHECK (FINAL) CFM	K FACTOR
3	M-1	1.913	0.999	4T1		4I1	N/A	5	0.002	5	0.002	3.43

EPA METHOD 3
Collection Method N/A
Analysis Method

	RUN 1	RUN 2	RUN 3	AVG	AMBIENT
%O2					
%CO2		Room Temp			

PITOT SYSTEM LEAK CHECK INIT.	FINAL
✓	✓

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (In. H2O)	H ORIFICE (In. H2O)	STACK TEMP (F)	FILTER & PROBE TEMP (F)	~~IMPINGER OUTLET TEMP~~ (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (In. Hg)
A-1	0	0850	336.164	0.43	1.47	65	Not used	102	30	32	—	2
2	5		338.87	0.40	1.37	65		100	29	35	—	3
3	10		341.87	0.38	1.30	66		100	30	37	—	3
4	15		344.81	0.48	1.37	66		100	30	40	—	3
5	20		347.88	0.58	1.99	66		100	31	43	—	3
B-1	25		351.29	0.53	1.82	66	Temp above dew point	100	32	43	—	3
2	30		354.99	0.26	0.89	66		107	31	44	—	2
3	35		357.60	0.23	0.79	67		100	31	44	—	2
4	40		360.04	0.31	1.06	67		100	31	44	—	2
5	45		362.76	0.53	1.82	67		101	31	45	—	3
	~~50~~		~~366.286~~									

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	—	—	—	—	—	—

* Foam DA

Psis 16.194

Sheet Checked By: _____ Date _____

EMISSION TESTING FIELD DATA

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Monroe Auto Hartford GA	12/19/91	S. Scrubber Outlet	Cr^{+6}	6-S-outlet

TRAV. POINT NO.	ELAPSED TEST TIME (min)	CLOCK TIME (24-hr)	GAS METER READING Vm (ft3)	P VELOCITY HEAD (In. H2O)	H ORIFICE (In. H2O)	STACK TEMP (F)	PROBE TEMP (F)	FILTER OVEN TEMP (F)	SIL GEL IMPINGER TEMP (F)	DGM IN/OUT TEMP (F)	AUX. TEMP. (F)	SAMPLE TRAIN ACUU (In. Hg)
C-1	50		366.286	0.54	1.85	67	100		32	45	—	3
2	55		369.89	0.35	1.20	67	100		31	47	—	2
3	60		372.76	0.40	1.37	69	100		32	47	—	2
4	65		375.79	0.38	1.30	69	100		32	48	—	3
5	70		378.79	0.58	1.99	69	100		32	50	—	3
D-1	75		382.411	0.45	1.54	69	100		33	49	—	3
2	80		385.67	0.48	1.65	69	100		32	51	—	3
3	85		389.07	0.75	2.57	69	100		33	52	—	4
4	90		393.35	0.61	2.09	70	100		33	53	—	4
5	95		397.07	0.67	2.30	70	100		33	53	—	4
E-1	100		401.120	0.38	1.30	69	100		34	50	—	3
2	105		404.19	0.65	2.23	70	100		33	53	—	4
3	110		408.06	0.85	2.92	70	100		34	56	—	5
4	115		412.70	0.85	2.92	70	100		35	57	—	5
5	120		416.99	0.78	2.66	70	102		35	58	—	4
	125	1110	421.128									

Not used Temp above dew point

Page Totals	TOTAL TIME	DGM VOLUME	AVG SQRT P	AVG H	AVG STK F	AVG DGM F
	125	84.964	0.705	1.752	67.9	47.0

Sheet Checked By: _____ Date _____

16/194

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PARTICULATE/CHLORIDE SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant: Monroe Auto

Sample Location: S. Scrubber outlet

Run No.: 6

Filter Number(s): N/A

Sample Date: 12/19/91

Recovery Date: 12/19/91

Recovered by: CJ

MOISTURE

Impingers	1	2	3	4	5	6	Sil Gel
Final Volume (wt)	100ml	100ml	0ml				734.0
Initial Volume (wt)	100ml	100ml	0ml				723.5
Net Volume (wt)	0ml	0ml	0ml				10.5

Description of impinger water: Clear

% spent: 5

Sil gel color: Blue/Pink

Total moisture = 10.5 g

RECOVERED SAMPLE

Filter container number(s): N/A

Sealed: N/A

Description of particulate on filter: N/A

Probe rinse container no.: R6 - S - Outlet

Liquid level marked/sealed: yes

NaOH blank container no.: BL - S - Outlet

Liquid level marked/sealed: yes

Impinger contents container no.: R6 - S - Outlet

Liquid level marked/sealed: yes

N/A blank container no.: N/A

Liquid level marked/sealed: N/A

Samples stored and locked: yes

Remarks:

Relinquished by:

Date:

LABORATORY CUSTODY

Received by:

Date:

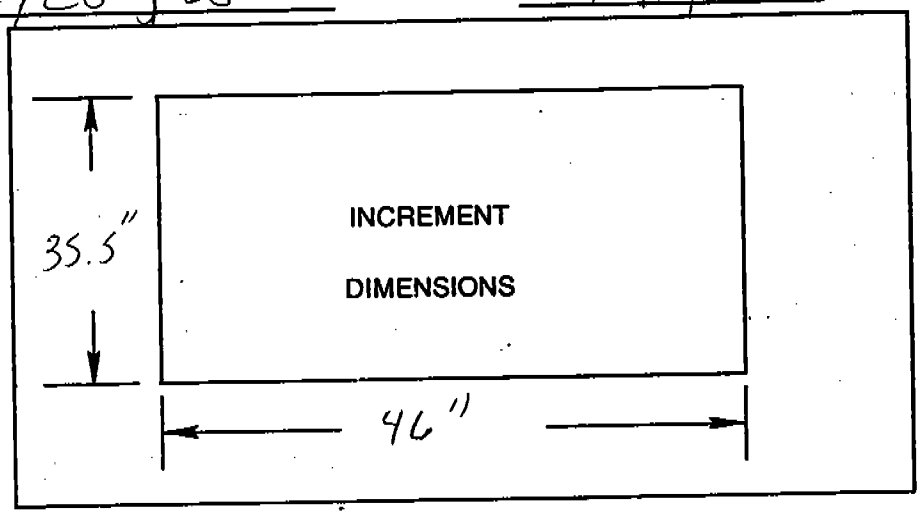
Remarks:

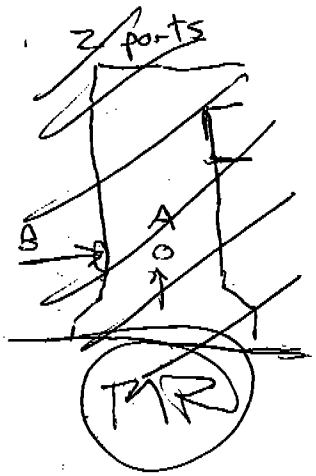
6

EPA METHOD 1
TRAVERSE POINT LOCATION FOR RECTANGULAR DUCTS

PLANT: MONROE AUTO
CITY: HARTWELL
STATE: GA
SAMPLING LOCATION: SOUTH SCRUBBER ~~OUTLET~~
INSIDE STACK DIMENSIONS: 35.5 X 46
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE (Distance B): 1/8"
EQUIVALENT STACK DIAMETER = 2 (DEPTH) (WIDTH) / (DEPTH + WIDTH) = ~~39.75~~ MD 40.07
NEAREST UPSTREAM DISTURBANCE: 0.5 D
NEAREST DOWNSTREAM DISTURBANCE: 2 D
NUMBER OF TRAVERSE POINTS: 12
ARRAY: 1 X 5
SAMPLER: MR / CD / CJ
DATE: 12/18/91

ILLUSTRATE PORT LOCATIONS AND DIMENSIONS



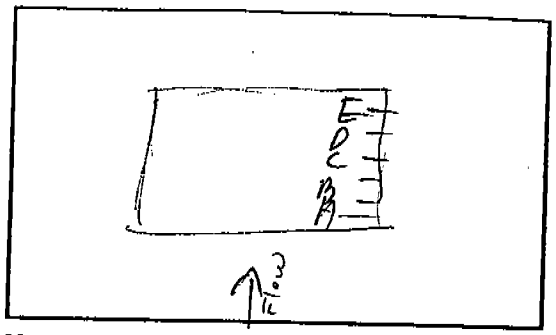


TRAVERSE POINT NUMBER	INSIDE OF NEAR WALL TO TRAVERSE POINT (Distance A)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM DISTANCES A+B)	PORT LOCATION	DISTANCE FROM EDGE OF STACK
1	4.60	1/8"	4.75	3.6	
2	13.8		14.0	10.7	
3	23.0		23.125	17.8	
4	32.2		32.3/8	24.9	
5	41.4		41.5	32.0	

epa1rect.wk1

PRELIMINARY VELOCITY TRAVERSE
EPA METHOD 2

PLANT/CLIENT: MONROE AUTO
SOURCE: OUTLET
DATE: 12/18
STACK I.D. (inches): 35.5" x 46" 11.34 ft²
BAROMETRIC PRESSURE (in. Hg): 30.00
STACK GAUGE PRESSURE (in. H2O): -0.07
OPERATORS: CJ/MR
PITOT NO. | TYPE S | COEFF 0.84



TRAVERSE POINT LAYOUT SCHEMATIC

10:50

TRAVERSE POINT NUMBER	VELOCITY HEAD (in. H2O)	STACK TEMP (°F)
A 1	0.45	74
2	0.45	
3	0.44	
4	0.42	
5	0.47	
B 1	0.42	
2	0.39	
3	0.31	
4	0.31	
5	0.44	
C 1	0.48	
2	0.43	
3	0.39	
4	0.39	
5	0.51	
AVERAGE	SQRT	

TRAVERSE POINT NUMBER	VELOCITY HEAD (in. H2O)	STACK TEMP (°F)
D 1	0.45	74
2	0.46	
3	0.65	
4	0.66	
5	0.68	
E 1	0.34	
2	0.57	
3	0.78	
4	0.82	
5	0.85	
AVERAGE	SQRT 0.702	74

POST PITOT LEAK CHECK PASSED [✓] [ ] FAILED

MEASUREMENT DEVICE
- MICROMETER [ ]
- 0–10" MANOMETER [✓]
- MAGNEHELIC [ ]
- OTHER [ ]

EXPLAIN:

AVE ΔP 0.49
FPS = 40
ACFM = 27,025
DSCFM = 25,985

ΔP of 1 = ΔH of 1.66

prevelo.wk1

68

Ther No = .244
Actual = .238

APPENDIX C

LABORATORY AND CHAIN-OF-CUSTODY DATA

RESEARCH TRIANGLE INSTITUTE

Center for Environmental Measurements and Quality Assurance

January 31, 1992

Mr. Tom Yaroch
Advanced Systems Technology, Inc.
1627 Peachtree Road, Suite 222
Atlanta, GA 30309

Dear Tom,

Enclosed are the Total Chromium analysis results as determined by ICP for the impinger samples received on January 3, 1992 for RTI Project No. 4848-02L, Advanced Systems Technology, Inc. P.O. No. 0075-003-91.

If you have any questions, please call me at 919-541-6569 or Peter Grohse at 919-541-6897.

Sincerely,

Kate K. Luk, Ph.D.

Ref: 4848-02L
cc: W. Gutknecht
P. Grohse
J. Merricks
C. Decker

RTI Project No. : 4848-02L

Samples : Impinger Samples
Company : Advanced Systems Technology (P.O. No. : 0074-003-91)
Analyte : Cr (Total)
Methods of Analysis : ICP
Samples Received : 1-3-92
Report Date : 1-31-92

Sample	Total Volume mL	Vol.(mL) Taken for Digestion	Total Cr ug/mL	Total Cr ug	Original Total Cr ug/mL
INLET- BLANK	198	120	0.0780	6.44	--
R1-S-INLET	370	120	18.9	2914	--
R2-S-INLET	325	120	3.82	517	--
R3-S-INLET	290	120	26.8	3238	--
R4-S-INLET	272	120	21.8	2471	--
R5-S-INLET	288	120	15.0	1800	--
R6-S-INLET	335	120	0.211	29.5	--
Outlet Blank	204	120	ND	ND	--
R1-S-OUTLET	318	60	0.0810	21.5	--
R2-S-OUTLET	380	100	0.0670	12.7	--
R3-S-OUTLET	258	60	0.144	31.0	--
R4-S-OUTLET	298	60	0.133	33.0	--
R5-S-OUTLET	312	100	0.109	17.0	--
R6-S-OUTLET	314	100	7.00	1099	--
TANK-1	--	1.00	1234	--	123420
TANK-2	--	1.00	1037	--	103697
TANK-3	--	1.00	1367	--	136730
TANK-4	--	1.00	1392	--	139150
TANK-5	--	1.00	1059	--	105875
TANK-6	--	1.00	1060	--	105996
Detection Limit			0.006		

ND : Non-detectable; less than detection limit
-- : Not required

For INLET- and OUTLET- Samples
Total Cr,ug = (Total Cr, ug/mL * Final dil.Vol. (50.00 mL) / Vol.(mL) Taken for Digestion) * Total Volume, mL

For TANK- Samples
Original Total Cr, ug/mL = (Total Cr, ug/mL * Final dil.Vol. (100.00 mL) / Vol. (mL) Taken for Digestion

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RTI Project No. : 4848-02L

Samples : QC for Impinger Samples
Company : Advanced Systems Technology (P.O. No. : 0074-003-91)
Analyte : Cr (Total)
Methods of Analysis : ICP
Samples Received : 1-3-92
Report Date : 1-31-92

Calibration Check Sample, ug/mL

Sample	Tot.Cr ug/mL Measured	Tot.Cr ug/mL Expected
QC	1.05	1.00
QC	1.02	1.00
QC	1.06	1.00

Results of Blank, Duplicate, and Spike Analysis

Sample	Tot. Cr ug/mL Measured	Tot. Cr ug/mL Expected	Tot. Cr % Recovery
RTI Reagent Blk	ND	--	--
TANK-4 Dup	10.7	--	--
SRM (WP481)	0.060	0.0522	105

an environmental testing company
3000 WESTON PKWY.
CARY, N.C. 27513

CHAIN OF CUSTODY RECORD

NO: 23696

REGULATORY CLASSIFICATION - PLEASE SPECIFY

☐ NPDES ☐ DRINKING WATER ☐ RCRA ☐ OTHER _____

PROJECT #	PROJECT NAME
985-002	MONROE AUTO, HARTWELL, GA

SAMPLERS: *(SIGNATURE)*

SAMPLE I.D.	DATE	TIME	COMP	GRAB	STATION LOCATION	# OF CONTAINERS	MATRIX SOIL	MATRIX WATER	REQUESTED PARAMETERS
B	12/18		✓		Outlet Blank	1			✓
1	12/18		✓		R1 - S - OUTLET	1			✓
2	12/18		✓		R2 - S - OUTLET	1			✓
3	12/19		✓		R3 - S - OUTLET	1			✓
4	12/19		✓		R4 - S - OUTLET	1			✓
5	12/19		✓		R5 - S - OUTLET	1			✓
6	12/20		✓		R6 - S - OUTLET	1			✓
B	~~12/19~~		✓		~~INLET BLANK~~				✓
	~~12/19~~				~~R1 - S - INLET~~	Next Box			
	~~12/19~~				~~R2 - S - INLET~~				
					~~R3 - S - INLET~~				

RELINQUISHED BY *(SIGNATURE)*	DATE	TIME	RECEIVED BY	DATE	TIME
[illegible]	12/20	12:00	[illegible]	1/3/92	1:35
RELINQUISHED BY *(SIGNATURE)*	**DATE**	**TIME**	**RECEIVED FOR LAB BY**	**DATE**	**TIME**

IEA QUOTE NO.	IEA RUSH NO.
PROJECT MANAGER (PLEASE PRINT)	**P.O. NO.**
CHUCK DUNCAN	

IEA REMARKS

FIELD REMARKS

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CARY, N.C. 27513

CHAIN OF CUSTODY RECORD

NO: 23697

REGULATORY CLASSIFICATION - PLEASE SPECIFY

☐ NPDES ☐ DRINKING WATER ☐ RCRA ☐ OTHER _____

PROJECT #	PROJECT NAME
9885-002	MONROE AUTO HARTWELL GA

SAMPLERS: (SIGNATURE) M Robinson

SAMPLE I.D.	DATE	TIME	COMP	GRAB	STATION LOCATION	# OF CONTAINERS	MATRIX SOIL	MATRIX WATER	Cr6+	NaOH
B	12/18		✓	✓	INLET - BLACK	1			✓	
1	12/18		✓		R1 - S - INLET	1			✓	
2	12/18		✓		R2 - S - INLET	1			✓	
3	12/19		✓		R3 - S - INLET	1			✓	
4	12/19		✓		R4 - S - INLET	1			✓	
5	12/19		✓		R5 - S - INLET	1			✓	
6	12/20		✓		R6 - S - INLET	1			✓	

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY	DATE	TIME
[illegible]	12/20/11		[illegible]	1-3-92	1:30
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY	DATE	TIME

IEA REMARKS

IEA QUOTE NO.	IEA RUSH NO.
PROJECT MANAGER (PLEASE PRINT)	P.O. NO.
CHUCK DONCAL	

FIELD REMARKS

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3000 WESTON PKWY.
CARY, N.C. 27513

CHAIN OF CUSTODY RECORD

NO: 23695

REGULATORY CLASSIFICATION - PLEASE SPECIFY

☐ NPDES ☐ DRINKING WATER ☐ RCRA ☐ OTHER _____

PROJECT #	PROJECT NAME

SAMPLERS: *(SIGNATURE)*

SAMPLE I.D.	DATE	TIME	COMP	GRAB	STATION LOCATION	# OF CONTAINERS	MATRIX SOIL	MATRIX WATER	REQUESTED PARAMETERS

RELINQUISHED BY *(SIGNATURE)*	DATE	TIME	RECEIVED BY	DATE	TIME
RELINQUISHED BY *(SIGNATURE)*	DATE	TIME	RECEIVED FOR LAB BY	DATE	TIME
	1/3/12	1:30p		1/3/12	1:30p

IEA QUOTE NO.	IEA RUSH NO.
PROJECT MANAGER (PLEASE PRINT)	**P.O. NO.**

IEA REMARKS

FIELD REMARKS

Chain of Custody

written:
12/20/91

Sample	RUN	Date
10 Plating Tank	1	12/18/91
"	2	12/18/91
"	3	12/19/91
"	4	12/19/91
"	5	12/19/91
"	6	12/20/91
"		

Sample Taken By: Phil Mulvie
Date: 12/18/91 - 12/20/91

Released By: Phil Mulvie
Date: 12/20/91
Time: 12:00 NOON

Recieved By: Mark Rouzzeau
Date: 12/20/91
Time 12:00 NOON

APPENDIX D

EQUIPMENT CALIBRATION DATA

DRY GAS METER POST-TEST CALIBRATION
USING REFERENCE METER

DATE: 12-31-91 METER BOX NO. M 1

CALIBRATOR: TOM DRAKE BAROMETRIC PRESSURE (Pb) 30.21 in. Hg

INITIAL CALIBRATION Y: 0.999 ΔH@: 1.913

PLANT: MONROE PROJECT NO.: 985-002

AVERAGE ΔH DURING TESTING: 2 MAXIMUM VACUUM 10 in. Hg

Orifice manometer setting* ΔH in. H2O	Volume reference meter Vw ft3	Volume dry gas meter Vd ft3	Temperatures: Ref Meter Tw °F	Ref Meter Avg Tw °F	Dry gas meter Td °F	Dry gas meter Avg Td °F	Test duration θ min	Vacuum setting ** in. Hg	Calibr Factor Y	ΔH@ in. H2O
2	start 258.748	435.126	start 74	74.5	start 72	73	15	10	0.993	2.007
	stop 269.910	446.343	stop 75		stop 74					
	diff 11.162	11.217								
2	start 269.910	446.343	start 75	75	start 74	75.5	15	10	0.993	2.023
	stop 281.014	457.550	stop 75		stop 77					
	diff 11.104	11.207								
2	start 281.014	457.550	start 75	75.5	start 77	77.5	15	10	0.993	2.016
	stop 292.130	468.802	stop 76		stop 78					
	diff 11.116	11.252								
								Post-test Average***	0.993	2.015

* To be the average ΔH used during test series.

** To be the highest vacuum used during test series.

*** Post-test Y must be within the range, pre-test Y +/- 5% OK? ☒

Post-test ΔH@ should be within the range of the initial or pre-test ΔH@ +/- 0.20 in. H2O. OK? ☒

$$Y = \frac{(1.006)\,(Vw)\,(Pbar)\,(Td + 460)}{(Vd)\,(Pbar + \Delta H / 13.6)\,(Tw + 460)}$$

$$\Delta H@ = \frac{(0.0317)\,(\Delta H)}{(Pbar)\,(Td + 460)} \left[\frac{(Tw + 460)\,(\theta)}{(Vw)(1.006)} \right]^2$$

$$\text{Percent difference} = \frac{(\text{Avg inital } Y) - (\text{Post-test } Y)}{(\text{Avg initial } Y)}$$

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THERMOCOUPLE DIGITAL INDICATOR
MONROE AUTO CALIBRATION DATA FORM

Date 12-31-91 Calibrator Name TOM DRAKE

Indicator No. _____ Serial No. M 1

Calibration Device No CL-300-2100 F Manufacturer OMEGA

Test Point No.	Millivolt Signal	Equivalent Temperature deg. F	Digital Indicator Temperature deg. F	Percent difference %
1		0	0	0
2		100	98	0.36
3		200	201	0.15
4		300	301	0.13
5		400	398	0.23
6		500	499	0.10
7		600	602	0.19
8		700	701	0.09
9		800	802	0.16
10		900	901	0.07

Percent difference must be less than or equal to 0.5%

Percent Difference:

$$\frac{(\text{Ref temp} + 460) - (\text{Test temp} + 460)}{(\text{Ref temp} + 460)} \times 100\% \text{ should be} < 0.5\%$$

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DRY GAS METER POST-TEST CALIBRATION
USING REFERENCE METER

DATE: 12-31-91 METER BOX NO. M 7

CALIBRATOR: TOM DRAKE BAROMETRIC PRESSURE (Pb) 30.21 in. Hg

INITIAL CALIBRATION Y: 1.008 ΔH@: 1.92

PLANT: MONROE AUTO PROJECT NO.: 985-002

AVERAGE ΔH DURING TESTING: 2 MAXIMUM VACUUM 10 in. Hg

Orifice manometer setting* ΔH in. H2O	Volume reference meter Vw ft3	Volume dry gas meter Vd ft3	Temperatures: Ref Meter Tw °F	Ref Meter Avg Tw °F	Dry gas meter Td °F	Dry gas meter Avg Td °F	Test duration θ min	Vacuum setting ** in. Hg	Calibr Factor Y	ΔH@ in. H2O
2.0	start 131.877	29.944	start 72	72.5	start 76	77.5	15	10	0.989	2.0597
	stop 142.868	41.112	stop 73		stop 79					
	diff 10.991	11.168								
2.0	start 142.868	41.112	start 73	73.5	start 78	79	15	10	0.990	2.062
	stop 153.874	52.285	stop 74		stop 80					
	diff 11.006	11.173								
2.0	start 153.874	52.285	start 74	74	start 80	80.5	15	10	0.990	2.072
	stop 164.864	63.467	stop 74		stop 81					
	diff 10.990	11.182								
								Post-test Average***	0.990	2.065

* To be the average Δ H used during test series.

** To be the highest vacuum used during test series.

*** Post-test Y must be within the range, pre-test Y +/- 5% OK? ☒

Post-test Δ H@ should be within the range of the initial or pre-test Δ H@ +/- 0.20 in. H2O. OK? ☒

$$Y = \frac{(Vw)(Pbar)(Td + 460)}{(Vd)(Pbar + \Delta H / 13.6)(Tw + 460)}$$

$$\Delta H@ = \frac{(0.0317)(\Delta H)}{(Pbar)(Td + 460)} \left[\frac{(Tw + 460)(\theta)}{(Vw)} \right]^2$$

$$\text{Percent difference} = \frac{(\text{Avg inital Y}) - (\text{Post-test Y})}{(\text{Avg initial Y})}$$

dgmptcal.wk1

THERMOCOUPLE DIGITAL INDICATOR
CALIBRATION DATA FORM

Date 12-31-91

Calibrator Name MONROE AUTO TOM DRAKE

Indicator No. ~~AA~~ OMEGA CL-300-2100F

Serial No. M-7

Calibration Device No. _____

Manufacturer OMEGA

Test Point No.	Millivolt Signal	Equivalent Temperature deg. F	Digital Indicator Temperature deg. F	Percent difference %
1		0	02	0.43
2		200	202	0.30
3		400	397	0.35
4		600	599	0.09
5		800	797	0.24
6		1000	996	0.27
7		100	100	0
8		300	301	0.013
9		500	497	0.31
10		700	697	0.026

Percent difference must be less than or equal to 0.5%

Percent Difference:

$$\frac{(\text{Ref temp} + 460) - (\text{Test temp} + 460)}{(\text{Ref temp} + 460)} \times 100\% \text{ should be} < 0.5\%$$

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NOZZLE CALIBRATION

Date 12/31/91 Calibrated by MR

Nozzle identification number	D1, in.	D2, in.	D3, in.	D, in.	Davg
J25	0.238	0.237	0.238	0.001	0.238
H25	0.235	0.236	0.236	0.001	0.236

where:

D1, D2, D3 = nozzle diameter measured on a different diameter, in.
Tolerance = measure within 0.001 in.

D = maximum difference in any two measurements, in.
Tolerance = 0.004 in.

Davg = average of D1, D2, and D3.

APPENDIX E

FIELD PROJECT SUMMARY LOGS

EMISSION TESTING
FIELD PROJECT SUMMARY LOG

CLIENT: DAN MOOREHEAD/ PROJECT NO. 985-002

PLANT: MONROE AUTO CITY: HARTWELL STATE: GA

DATE/TIME	ACTION TAKEN
12/17/91 09:30	Left IEA Field Office
16:30	Arrived at site, contact already left plant. Set up
	as much equipment as possible. Stack extension still
	needs work before sampling can take place.
18:30	Left site. Spoke with Phil Mulrine @ motel and
	coordinated time to start tomorrow. Richard
	Taylor (DNR GA) didn't get message from Chuck D. about our
	arrival time. Made no contact at plant with Mr. Taylor.
12/18/91 07:00	Arrive at site. Built up stack extension with Maxie
	Jolly of KCH. Ready to test @ 11:40. Plant
	can not begin until 13:30.
14:40	Plant ready, start RUN 1 No Foam (on plating bath) South Scrubb
16:50	End Run 1
17:44	Start Run 2 With Foam
17:55	Plant stopped RUN due to night shift "lunch" break.
18:34	Resume Run 2
20:35	END Run 2 Cleaned up/turned around trains
22:00	Left site (Delay 12/18 4 hrs)
12/19/91 0800	Arrive at site
08:30	Start Run 3 No Foam

Page 1 of 2 SIGNATURE [signature]

projsum.wk1

EMISSION TESTING
FIELD PROJECT SUMMARY LOG

CLIENT Dan Moorehead/ PROJECT NO. 985-002

PLANT Monroe Auto CITY Hartwell STATE GA

DATE/TIME		ACTION TAKEN
12/19	10:33	Stop Run 3 turn around etc
	11:40	Start Run 4 No Foam
	13:40	Stop Run 4
	13:45	Process problem not able to start Run 5 WILL start when
		plant is able
	17:25	Start Run 5 WITH FOAM Stopped due to loss of power
		(circuit breaker) Resume run 5
	19:30	END Run 5 Turnaround leak check etc
	20:45	Left Site
12/20	07:45	Arrive at site
		PROCESS NOT Ready
	08:30	START RUN 6 WITH FOAM
	10:50	STOP RUN 6
		TEAR DOWN CLEAN UP - Remove Stack extension
		Left scaffle for return trip in January
	13:15	Left site

Page 2 of 2 SIGNATURE M Ramsey

projsum.wk1

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APPENDIX F

EPA DRAFT PROCEDURE

Note "AA" Graphite will be anal. method of choice 2 ppb min. detection ~$40/sample

C F Duncan from Frank Clay Dec 10, 1991

DRAFT - 12/90

Method __ - Determination of Hexavalent Chromium Emissions from Decorative and Hard Chrome Electroplating

1. Applicability and Principle

1.1 Applicability. This method applies to the determination of hexavalent chromium (Cr^{+6}) in emissions from decorative and hard chrome electroplating operations.

1.2 Principle. Emissions are collected from the source by use of Method 5 (Appendix A, 40 CFR Part 60), with the filter omitted. The first and second impingers are charged with 0.1N sodium hydroxide. The collected samples remain in an alkaline solution until analysis, and are analyzed for Cr^{+6} by the diphenylcarbazide colorimetric method.

2. Range, Sensitivity, Precision, and Interferences

2.1 Range. A straight line response curve can be obtained in the range 5 μg Cr^{+6}/100 ml to 100 μg Cr^{+6}/100 ml. For a minimum analytical accuracy of ±10 percent, the lower limit of the range is 10 μg/100 ml. The upper limit can be extended by appropriate dilution.

2.2 Sensitivity. A minimum detection limit of 1 μg Cr^{+6}/100 ml has been observed.

2.3 Precision. To be determined.

2.4 Interference. Molybdenum, mercury and vanadium react with diphenylcarbazide to form a color; however, approximately 20 mg of these elements can be present in a sample without creating a problem. Iron produces a yellow color, but this effect is not measured photometrically at 540 nm.

3. Apparatus

3.1 Sampling Train. Same as Method 5, Section 2.1, but omit filter, and use quartz probe tip in place of stainless steel.

3.2 Sample Recovery. Same as Method 5, Section 2.2, but use 0.1N NaOH in place of acetone.

3.3 Analysis. The following equipment is needed.

3.3.1 Beakers. Borosilicate, 250-ml, with watchglass covers.

3.3.2 Volumetric Flasks. 100-ml and other appropriate volumes.

3.3.3 Pipettes. Assorted sizes, as needed.

3.3.4 Spectrophotometer. To measure absorbance at 540 nm.

4. Reagents

Unless otherwise indicated, all reagents shall conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society. Where such specifications are not available, use the best available grade.

4.1 Sampling.

4.1.1 0.1N NaOH.

4.2 Sample Recovery.

4.2.2 0.1N NaOH.

4.3 Analysis. The following reagents are required.

4.3.1 Water. Deionized distilled, meeting American Society for Testing and Materials (ASTM) specifications for type 2 reagent - ASTM Test Method D 1193-77 (incorporated by reference - see § 61.18).

4.3.2 Potassium Dichromate Stock Solution. Dissolve 141.4 mg of analytical reagent grade $K_2Cr_2O_7$ in water, and dilute to 1 liter (1 ml = 50 μg Cr^{+6}).

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4.3.3 Potassium Dichromate Standard Solution. Dilute 10.00 ml $K_2Cr_2O_7$ stock solution to 100 ml (1 ml = 5 μg Cr^{+6}) with water.

4.3.4 Sulfuric Acid, 10 Percent (v/v). Dilute 10 ml H_2SO_4 to 100 ml in water.

4.3.5 Diphenylcarbazide Solution. Dissolve 250 mg of 1, 5-diphenylcarbizide in 50 ml acetone. Store in a brown bottle. Discard when the solution becomes discolored.

5. Procedure

5.1 Sampling. Same as Method 5, Section 4.1, except omit the filter and filter holder, and place 100 ml of 0.1N NaOH in each of the first two impingers.

5.2 Sample Recovery. Measure the volume and place all liquid in the first, second, and third impingers in a labelled sample container (Container Number 1). Use 200 ml of 0.1N NaOH to rinse the probe, three impingers, and connecting glassware. Place this wash in the same container. Place the silica gel from the fourth impinger in Container Number 3.

5.3 Preservation. Analyze all samples within _____ of collection.

5.4 Reagent Blank Preparation. Place 400 ml of 0.1N NaOH in a labelled sample container (Container Number 2).

5.5 Silica Gel Weighing. Weigh the spent silica gel (Container Number 3) or silica gel plus impinger to the nearest 0.5 g using a balance. This step may be conducted in the field.

5.6 Analysis.

5.6.1 Color Development and Measurement. After stirring the sample in Container Number 1, transfer a 50-ml or smaller measured aliquot to a 100 ml volumetric flask and add sufficient water to bring the volume to approximately

80 ml. Adjust the pH to 2 ± 0.5 with 10 percent H_2SO_4, add 2.0 ml of diphenylcarbazide solution, and dilute to volume with water. Allow the solution to stand about 10 minutes for color development. For each set of samples analyzed, treat an identical aliquot of reagent blank solution from Container Number 2 in the same way. Transfer a portion of the sample to a 1-cm absorption cell, and measure the absorbance at the optimum wavelength (Section 6.2.1). Measure and subtract the reagent blank absorbance reading, if any, to obtain a net reading. If the absorbance of the sample exceeds the absorbance of the 100 μg Cr^{+6} standard as determined in Section 6.2.2, dilute the sample and the reagent blank with equal volumes of water.

5.6.2 Check for Matrix Effects on the Cr^{+6} Results. Since the analysis for Cr^{+6} by colorimetry is sensitive to the chemical composition of the sample (matrix effects), the analyst shall check at least one sample from each source using the method of additions as follows:

Obtain two equal volume aliquots of the same sample solution. The aliquots should each contain between 30 and 50 μg of Cr^{+6}. Now treat both the spiked and unspiked sample aliquots as described in Section 5.6.1.

Next, calculate the Cr^{+6} mass C_s, in μg in the aliquot of the unspiked sample solution by using the following equation:

$$C_s = C_a \frac{A_s}{A_t - A_s} \qquad \text{Eq. -1}$$

where:

C_a = Cr^{+6} in the standard solution, μg.
A_s = Absorbance of the unspiked sample solution.
A_t = Absorbance of the spiked sample solution.

Volume corrections will not be required since the solutions as analyzed have been made to the same final volume. If the results of the method of

additions procedure used on the single source sample do not agree to within 10 percent of the value obtained by the routine spectrophotometric analysis, then reanalyze all samples from the source using this method of additions procedure.

6. Calibration

6.1 Sampling Train. Perform all of the calibrations described in Method 5, Section 5.

6.2 Spectrophotometer Calibration.

6.2.1 Optimum Wavelength Determination. Calibrate the wavelength scale of the spectrophotometer every 6 months. The calibration may be accomplished by using an energy source with an intense line emission such as a mercury lamp, or by using a series of glass filters spanning the measuring range of the spectrophotometer. Calibration materials are available commercially and from the National Bureau of Standards. Specific details on the use of such materials are normally supplied by the vendor; general information about calibration techniques can be obtained from general reference books on analytical chemistry. The wavelength scale of the spectrophotometer shall read correctly with ±5 nm at all calibration points; otherwise, repair and recalibrate the spectrophotometer. Once the wavelength scale of the spectrophotometer is in proper calibration, use 540 nm as the optimum wavelength for the measurement of the absorbance of the standards and samples.

Alternatively, a scanning procedure may be employed to determine the proper measuring wavelength. If the instrument is a double-beam spectrophotometer, scan the spectrum between 530 and 550 nm using the 50 μg Cr^{+6} standard solution (Section 4.3.4) in the sample cell and a blank solution in the reference cell. If a peak does not occur, the spectrophotometer is

malfunctioning. When a peak is obtained within the 530 to 550 nm range, record and use the wavelength at which this peak occurs as the optimum wavelength for the measurement of absorbance of both the standards and the samples. For single-beam spectrophotometer, follow the scanning procedure described above, except scan the blank and standard solutions separately. For this instrument, the optimum wavelength is the wavelength at which the maximum difference in absorbance between the standard and the blank occurs.

6.2.2 Spectrophotometer Calibration. Alternative calibration procedures are allowed, provided acceptable accuracy and precision can be demonstrated. Add 0.0 ml, 1 ml, 2 ml, 5 ml, 10 ml, 15 ml, and 20 ml of the working standard solution (1 ml = 5 μg Cr^{+6}) to a series of seven 100-ml volumetric flasks. Dilute each to mark with water. Analyze these calibration standards as in Section 5.6.1. Repeat this calibration procedure on each day that samples are analyzed. Calculate the spectrophotometer calibration factor K_c as follows:

$$K_c = 5 \frac{A_1 + 2A_2 + 5A_3 + 10A_4 + 15A_5 + 20A_6}{A_1^2 + A_2^2 + A_3^2 + A_4^2 + A_5^2 + A_6^2} \qquad \text{Eq.-2}$$

where:

K_c = Calibration factor.

A_1 = Absorbance of the 5 μg Cr^{+6}/100 ml standard.

A_2 = Absorbance of the 10 μg Cr^{+6}/100 ml standard.

A_3 = Absorbance of the 25 μg Cr^{+6}/100 ml standard.

A_4 = Absorbance of the 50 μg Cr^{+6}/100 ml standard.

A_5 = Absorbance of the 75 μg Cr^{+6}/100 ml standard.

A_6 = Absorbance of the 100 μg Cr^{+6}/100 ml standard.

6.2.2.1 Spectrophotometer Calibration Quality Control. Multiply the absorbance value obtained for each standard by the K_c factor (least squares slope) to determine the distance each calibration point lies from the theoretical calibration line. These calculated concentration values shall not differ from the actual concentrations (i.e., 5, 10, 25, 50, 75, and 100 μg Cr^{+6}/100 ml) by more than __ percent for five of the six standards.

7. Emission Calculations

Carry out the calculations, retaining at least one extra decimal figure beyond that of the acquired data. Round off figures after final calculations.

7.1 Total Cr^{+6} in Sample. Calculate m, the total μg Cr^{+6} in each sample, as follows:

$$m = \frac{V_{a1} K_c AF}{V_a} \qquad \text{Eq. -3}$$

where:

V_{a1} = Volume in ml of total sample.

A = Absorbance of sample.

F = Dilution factor (required only if sample dilution was needed to to reduce the absorbance into the range of calibration).

V_a = Volume in ml of aliquot analyzed.

7.2 Average Dry Gas Meter Temperature and Average Orifice Pressure Drop. Same as Method 5, Section 6.2.

7.3 Dry Gas Volume, Volume of Water Vapor, Moisture Content. Same as Method 5, Sections 6.3, 6.4, and 6.5, respectively.

7.4 Cr^{+6} Emission Concentration. Calculate c_s (g/dscm), the Cr^{+6} concentration in the stack gas, dry basis, corrected to standard conditions, as follows:

$$c_s = (10^{-6}\ g/\mu g)[m/V_{m(std)}] \qquad \text{Eq. -4}$$

7.5 Isokinetic Variation, Acceptable Results. Same as Method 5, Sections 6.11 and 6.12, respectively.

8. Bibliography

8.1 Test Methods for Evaluating Solid Waste. U.S. Environmental Protection Agency. SW-846, 2nd Edition. July 1982.

8.2 Cox, X.B., R.W. Linton, and F.E. Butler. Determination of Chromium Speciation in Environmental Particles - A Multitechnique Study of Ferrochrome Smelter Dust. Accepted for publication in Environmental Science and Technology.

8.3 Same as in Bibliography of Method 5, Citations 2 to 5 and 7.

APPENDIX G

EPA PROCESS DESCRIPTION

PROCESS DESCRIPTION

Monroe Shocks in Hartwell, Georgia performs hard chromium electroplating of shock absorbers of various sizes. The electroplating line consists of a hard chromium electroplating tank along with several wash and rinse tanks. The plating line is typically operated 5 days per week and 16 hours per day.

The operator loads the shock absorber rods into a carrier at the start of the plating line. The carrier, which contains six rods, is connected to a conveyor which transports the rods from tank to tank in the plating line. The first tank in the plating line is the electrocleaner tank. The purpose of the electrocleaner is to wash the oil from the shock absorber rods. The electrocleaner tank is operated at a temperature of 160°F and at a current of 80 amperes. The next tank in the operation is a rinse tank which removes the electrocleaner from the rods. The rods are then transported to the reverse etch tank. The reverse etch tank prepares the rod surface for the eletroplating step. The reverse etch tank is operated at a temperature of 135°F and at a current of 130 amperes. The shock absorber rods are then transported to the electroplating tank. The plating tank contains a chromic acid solution with a concentration of 240 grams per liter (32 ounces/gallon). The plating tank is equipped with heating and cooling systems and is air agitated to maintain uniform plating bath temperature and composition. The plating tank is operated at a current ranging from 3300 – 10,000 amperes depending on the length of the shock absorber rod. The tank temperature and current are maintained with electronic automatic control systems.

The chromium emissions from the plating tank are exhausted to a Spectra-V 25,000 scrubber system manufactured and installed by ACM, Inc. The scrubber consists of two sets of chevron blade type baffles followed by a series of three composite mesh pads. The scrubber is designed for 800 cubic meters per minute (28,000 cubic feet per minute) which requires a fan with a 60-horsepower motor for adequate ventilation. The scrubber is operated dry but is equipped with a spray wash system to wash the unit when the pressure drop across the scrubber increases.

TEST CONDITIONS

Six emission test runs were conducted at the inlet and outlet of the scrubber to characterize the overall performance of the scrubber system. Three test runs were performed with the addition of a foam blanket to the plating tank and three test runs were operated without a foam blanket added to the plating tank. Each test run consisted of two hours of sampling time. The plating tank current setpoint ranged from 6800 to 10400 amperes during the test. Since the plating tank current is [illegible] dependent on the size of the rod being plated, the

plating tank current was dictated by the size of the shock absorber rod which was being plated according to the plant production schedule. The pressure drop across the scrubber system did not increase during any of the test runs.

TEST DATA

Test Run No. 1 Date: 12/18/91 Tank Current - 6800 amperes
(No foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
1445	140	6861	6.4
1500	141	6799	6.4
1515	141	6817	6.4
1530	141	6802	6.4
1545	141	6799	6.4
1600	140	6788	6.4
1615	141	6802	6.4
1630	140	6769	6.3
1645	140	6791	6.3
Average	141	6803	6.4
TOTAL AMP-HRS	—	13,592	

Test Run No. 2 Date: 12/18/91 Tank Current - 6800 amperes
(Foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
1745	141	6828	6.4
1830	140	6821	6.4
1845	140	6769	6.4
1900	142	6846	6.5
1915	140	6824	6.5
1930	141	6758	6.4
1945	141	6755	6.4
2015	140	6795	6.3
2030	141	6842	6.3
Average	141	6804	6.4
Total AMP-HRS		13,603	

* Test stopped from 1800-1830 (Process shutdown for break)

* Added more fume suppressant at 1720.

* Test stopped from 2000-2010 (Process shutdown to check plating thickness)

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Test Run No. 3 Date: 12/19/91 Tank Current - 6800 amperes
(No foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
0830	141	6740	6.4
0845	141	6755	6.4
0900	140	6788	6.4
0915	140	6839	6.3
0930	141	6784	6.4
0945	142	6839	6.4
1000	141	6824	6.4
1015	140	6762	6.3
1030	140	6850	6.3
Average	141	6798	6.4

TOTAL AMP-HRS = 13610

Test Run No. 4 Date: 12/19/91 Tank Current - 6800 amperes
(No foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
1145	141	6828	6.4
1200	141	6850	6.3
1215	138	6791	6.3
1230	140	6747	6.3
1245	140	6799	6.3
1300	140	6810	6.4
1315	140	6838	6.3
1330	140	6813	6.4
Average	140	6810	6.3

TOTAL AMP-HRS = 13,619

Test Run No. 5 Date: 12/19/91 Tank Current - 10300 amperes
(Foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
1645	141	10374	7.3
1730	143	10117	7.2
1745	143	10081	7.2
1800	143	10128	7.2
1815	143	10157	7.1
1830	144	10092	7.1
1845	144	10073	7.1
1900	144	10092	7.1
1915	145	10073	7.1
1930	145	10099	7.1
Average	144	10129	7.2

* Test stopped from 1705-1725 (Lost power at stack)

* Changed tank current setpoint to 10100 at 1730

* Added more fume suppressant at 1720.

TOTAL AMP-HRS = 20,199

Test Run No. 6 Date: 12/20/91 Tank Current - 10000 amperes
(Foam in plating tank)

Time	Tank Temperature (°F)	Tank Current (amperes)	Tank Voltage (volts)
0900	142	10026	7.2
0915	142	10022	7.2
0945	143	10044	7.1
1000	143	10011	7.1
1015	143	10088	7.1
1030	143	10377	7.3
1045	144	10414	7.3
1100	144	10436	7.2
Average	143	10177	7.2

TOTAL AMP-HRS = 20,355

* Added more fume suppressant at 0940.

* Added more fume suppressant at 1030.

* Changed tank current setpoint to 10400 at 1030

APPENDIX H

PROJECT PARTICIPANTS

Monroe Auto Equipment

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Dan Moorehead, Plant Engineer, Hartwell, GA

KCH Services

Maxie Jolly, Vice President KCH

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