Report to

SCIENTIFIC CONTROL LABORATORIES, INC.
Chicago, Illinois

for

TOTAL CHROMIUM AIR EMISSIONS TESTING

of the

3 CHROMIUM ETCH TANKS (SVK-2) & EMISSIONS CONTROL SYSTEM STACK
BARDEN DRIVE PLANT (SRN No. N2079)

LACKS ENTERPRISES, INC.
Kentwood, Michigan

August 8, 2022

ETE

KEY PROJECT PERSONNEL

Source Contact:

Ms. Karen Baweja, Environmental Manager (616-956-7259)
kbaweja@lacksenterprises.com

Lacks Enterprises, Inc.
5460 Cascade Road SE
Grand Rapids, MI 49546

Environmental Consultant:

Mr. Jeff Zak, CEF, P.E. (773-254-2406, X26)
jzak@sclweb.com

Scientific Control Laboratories, Inc.
3158 S. Kolin Avenue
Chicago, IL 60623

Test Team Leader:

Mr. Michael Huenink (262-784-2434)
ete4mjh@wi.rr.com

Environmental Technology & Engineering Corp
13000 W. Bluemound Road
Elm Grove, WI 53122

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3 CHROMIUM ETCH TANKS (SVK-2) & EMISSIONS CONTROL SYSTEM STACK
BARDEN DRIVE PLANT (SRN No. N2079)

LACKS ENTERPRISES, INC.
Kentwood, Michigan

August 8, 2022

Michael J. Huenink
Industrial Hygienist
October 2, 2022

ENVIRONMENTAL TECHNOLOGY & ENGINEERING CORP
13000 W. Bluemound Road Elm Grove, Wisconsin 53122
Phone: (262) 784-2434

EXECUTIVE SUMMARY

On August 8, 2022, Environmental Technology & Engineering Corp (ETE) personnel visited the Lacks Enterprises, Inc. facility located at 4090 Barden Drive SE in Kentwood, Michigan (SRN No. N2079). The purpose of the visit was to perform air emissions testing for compliance demonstration with the total chromium air emissions limits for process SVK-2 which is comprised of three chromium etch tanks and their respective emissions control system. The limits were contained in a Michigan Dept. of Environmental, Great Lakes, & Energy Air Quality Division permit.

The results of the testing indicated total chromium levels well below (in compliance with) the total chromium air emissions limits as shown below:

Process Tested	Control System	Test Date	Test	Total Chromium Concentration	Total Chromium Emissions Rate
SVK-2	3 stage composite mesh pad with HEPA	8/8	1	0.00463 mg/dscm	0.000825 lb/hr
			2	0.00353 mg/dscm	0.000614 lb/hr
			3	0.00431 mg/dscm	0.000753 lb/hr
			AVG	**0.00416 mg/dscm**	**0.000731 lb/hr**
Applicable Air Emissions Limit -				**0.012 mg/dscm**	**0.0025 lb/hr**
Results % of Limit -				**34.7 %**	**29.2 %**

Notes: **mg/dscm** means milligrams of total chromium per dry standard cubic meter of exhaust

1.0 GENERAL BACKGROUND

On August 8, 2022, Environmental Technology & Engineering Corp (ETE) personnel visited the Lacks Enterprises, Inc. facility located at 4090 Barden Drive SE in Kentwood, Michigan (SRN No. N2079). The purpose of the visit was to perform air emissions testing for compliance demonstration with the total chromium air emissions limits for process SVK-2 which is comprised of three chromium etch tanks and their respective emissions control system. The limits were contained in a Michigan Dept. of Environmental, Great Lakes, & Energy Air Quality Division (EGLE-AQD) permit.

Lacks Enterprises, Inc. is an electroplating facility specializing in copper, nickel, and chromium plating for the automotive industry. The operation targeted for testing in this project involved the chromium etch process. Various sizes and shapes of plastic parts are etched in an acidic solution and then are plated with chromium. These parts are placed on bars as part of the production process; bar count is the common means to quantify production rates. There are three chromium etch tanks which comprise the operation. Emissions from the tanks are captured through a ventilation system. The exhaust gas is drawn through a common three stage composite mesh pad control system (CMP) equipped with a HEPA filter. The control system is exhausted through a single stack to atmosphere.

Lacks personnel monitored the operations and emissions control device parameters throughout the test efforts. Those detailed notes are included in Appendix A of this report. The test times and associated data are summarized as follows:

Stack Tested	Process Tested	Test	Test Period	Process Bar Count	Range of CMP Total Pressure Drops	HEPA Filter Pressure Drops
B2	SVK-2	1	08:45 - 10:46	57	0.2 - 0.7 in. H_2O	0.3 in. H_2O
		2	11:15 - 12:51, 13:31 - 13:56	63	0.2 - 0.7 in. H_2O	0.3 in. H_2O
		3	14:15 - 16:16	51	0.2 - 0.7 in. H_2O	0.3 in. H_2O

Ms. Karen Baweja of Lacks Enterprises and Mr. Jeff Zak of Scientific Control Laboratories facilitated in the coordination of the process activities and field test efforts. Mr. Trevor Drost and Ms. April Lazzaro of Michigan EGLE-AQD witnessed the test efforts and production activities. The field test efforts were performed by ETE personnel; Michael Huenink was the test team leader. The analysis for total chromium content in the sample solutions was performed by Element One, Inc. (Wilmington, NC).

2.0 RESULTS

Testing to determine total chromium "Cr" levels in the stack exhaust was performed isokinetically using EPA Methods 1 through 4 and 306. A brief description of the method is included in Section 3.0 of this report. A sketch showing the sampling port and point locations at the test location is included as Figure 2-1.

The stack flow parameters measured during testing and the weights of the total Cr collected were used to determine the emissions for each test. Three separate 120 minute tests were performed on each stack. During the second test period, test efforts were paused (40 minutes) while a material handling crane malfunction was repaired.

The chromium emission results are included as Table 2-1; the detailed isokinetic data and calculations for the runs are included in Appendix B of this report. The full analytical report is included as Appendix C of this report; however, the best results summary can be observed on page 4 of that lab report.

The results of the testing indicated total chromium levels well below (in compliance with) the total chromium air emissions limits as shown below:

Process Tested	Control System	Test Date	Test	Total Chromium Concentration	Total Chromium Emissions Rate
SVK-2	3 stage composite mesh pad with HEPA	8/8	1	0.00463 mg/dscm	0.000825 lb/hr
			2	0.00353 mg/dscm	0.000614 lb/hr
			3	0.00431 mg/dscm	0.000753 lb/hr
			AVG	**0.00416 mg/dscm**	**0.000731 lb/hr**
Applicable Air Emissions Limit -				**0.012 mg/dscm**	**0.0025 lb/hr**
Results % of Limit -				**34.7 %**	**29.2 %**

Notes: mg/dscm means milligrams of total chromium per dry standard cubic meter of exhaust

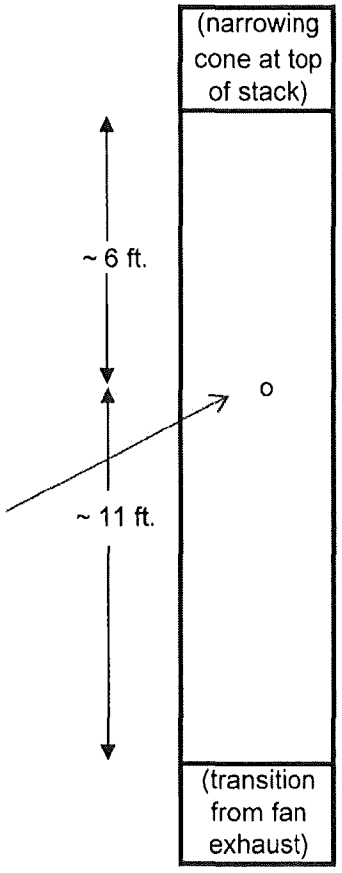
CHROMIUM ETCH PROCESS STACK (SVK-2)
LACKS ENT - BARDEN DRIVE PLANT

FIGURE 2-1

TEST POINT LOCATIONS

Point	Distance (in.) from back wall
1	1.3
2	4.0
3	7.1
4	10.6
5	15.0
6	21.4
7	38.6
8	45.0
9	49.4
10	52.9
11	56.0
12	58.7

SAMPLE PORT LOCATION



Stack Diameter: 60 inch (stack runs vertically at sampling location)

Notes: 24 isokinetic sampling points used on this round stack; 12 points along each of 2 perpendicular traverses. All other gas sampling performed at a single point in the center third of the duct.

CR TEST RESULTS

TABLE 2-1

Chromium Control System Stack (SVK-2)
Lacks Enterprises - Barden Dr Plant
08/08/22

Sample Location	Test	Sample Total Cr Amount (mg)	Standard Sample Volume (ft3)	Standard Sample Volume (dscm)	Corrected Total Cr Concen. (mg/dscm)	Standard Exhaust Flow Rate (m3/hr)	Total Cr Emission Rate (lb/hr)
SVK-2	1	0.0126	96.10	2.721	0.00463	80826	0.000825
	2	0.00934	93.55	2.649	0.00353	79020	0.000614
	3	0.0114	93.40	2.645	0.00431	79258	0.000753
				3 Test AVG -	**0.00416**	79701	**0.000731**
				Applicable Permit Limits -	**0.012**	**mg/dscm**	**0.0025** **lb/hr**

Notes: Std. Sample Vol (dscm) = Std. Sample Vol (ft3) x 0.028317
Total Cr Conc. (mg/dscm) = Sample Total Cr Amount (mg) / Std. Sample Vol. (dscm)
Emission Rate = [Conc.(mg/m3) x Exhaust Flow(mg/m3)] x [1 lb / 453600 mg]

3.0 TEST METHODS

The equipment used to sample total chromium was the Western Precipitation Division of the Joy Manufacturing Company Emission Parameter Analyzer (Method 5 sample train). Samples were collected and analyzed in accordance with procedures outlined in EPA Method 306.

The sampling train consisted of a glass probe tip, a glass lined probe, and PVC connective tubing. A series of four impingers followed in an ice bath. The first was a modified Greenburg-Smith impinger with 100 ml of 0.1 N sodium hydroxide (NaOH); the second was a Greenburg-Smith impinger with 100 ml of 0.1 N NaOH; the third was a modified Greenburg-Smith impinger dry; the fourth was also a modified Greenburg-Smith impinger containing a tared quantity of Silica Gel. The gas then passed through a vacuum pump, calibrated dry gas meter, and a calibrated orifice. A schematic drawing of the sampling train is included.

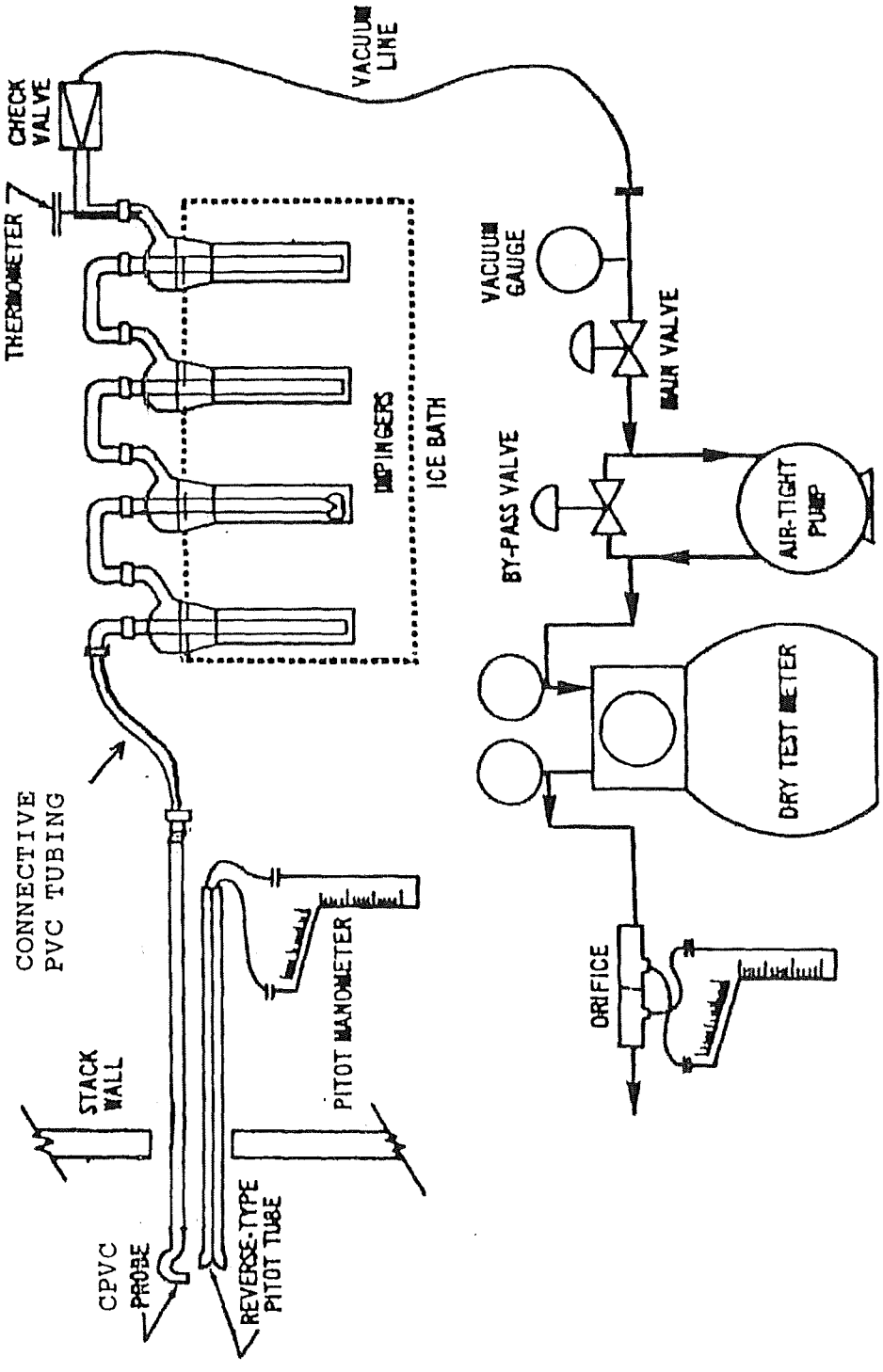
The temperatures of the stack gas stream, as well as strategic locations within the sampling devices, were monitored by RTDs and read directly from a gauge on the control unit. The initial gas stream velocity was obtained from a preliminary traverse using a Pitot tube. The initial moisture was estimated from previous tests of similar processes. This data, along with the stack temperature, was used to set a nomograph so that rapid calculations of isokinetic sampling conditions could be made.

The principle of the method was to collect the sample representative of the exhaust by adjusting the sample collection velocity to match the exhaust gas stream velocity at the point of collection. The velocity at the point of collection was measured with an "S" type Pitot tube and the collection velocity was matched to the stack gas velocity by adjusting the flow as indicated by the calibrated orifice.

To determine the molecular weight of the stack gas, samples were drawn into an Orsat analyzer and analyzed for percentage CO2, O2, CO, and N2.

At the completion of the test, the impinger contents were measured and weighed for determination of the actual moisture content of the exhaust gas stream. The impinger contents were then placed in a clean glass jar with Teflon-lined cap. The probe tip, probe, and connective tubing were then rinsed with 0.1 N NaOH (100 ml total) into the sampling train. That rinse was also placed in the sample jar. The impingers were then rinsed twice more with 0.1 N NaOH (100 ml) and the rinses were also added to the sample jar. The samples were refrigerated prior to analysis.

The sample solutions were analyzed for total Cr content by ICP-MS using the analytical methods contained in EPA Method 306. Field blanks of the sample solutions were also analyzed and all results were blank corrected. For those samples analyzed in duplicate, the average of the two results was used in the final emissions calculations.



EPA METHOD 306

TOTAL CHROMIUM EMISSIONS
SAMPLING TRAIN

4.0 CALIBRATION DATA

The probe tips, Pitot tubes, dry gas meters, and sample box orifices were calibrated prior to the testing in accordance with the procedures outlined in the Maintenance, Calibration, and Operation of Isokinetic Source-Sampling Equipment as published by the US EPA. The values obtained were:

Stack/ Test Location	Date	Control Box ID	Orifice Coeff. ($\Delta H@$)	Dry Gas Meter Coeff. (γ)	Probe Tip Diameter
SVK-2 (stack B2)	8/8	3	0.949	0.993	0.250 in.

The flow measurements were made with an S-type Pitot tube which had a verified Pitot tube coefficient (C_p) of 0.84. Prior to the sampling efforts on the stack, the "null" angles were measured for a determination of the absence or presence of cyclonic flow. All of those measurements indicated null angles in the range of 0 to 5 percent, with the average of 2.5 degrees falling well within the 20 percent criteria for acceptable sampling locations.

The dry gas meter installed in the control box was a temperature compensating meter. The correction factor (gamma) for the meter could best be described by the equations:

Box 3 $\gamma = 0.993 + [(T_M - 70) \times 0.00012]$

The most recent calibrations on the sampling equipment were performed on July 8, 2022.

The isokinetic ratios for the test runs were in the range of 96.1 to 97.0 percent, within the acceptable range of 90 to 110 percent.

The quality control data from the sample analysis is included in the detailed analytical report.

APPENDIX A

Process & Control Equipment Data

Barden Plater Source Testing
August 2022

8/30/2022

Bar Loads Processed

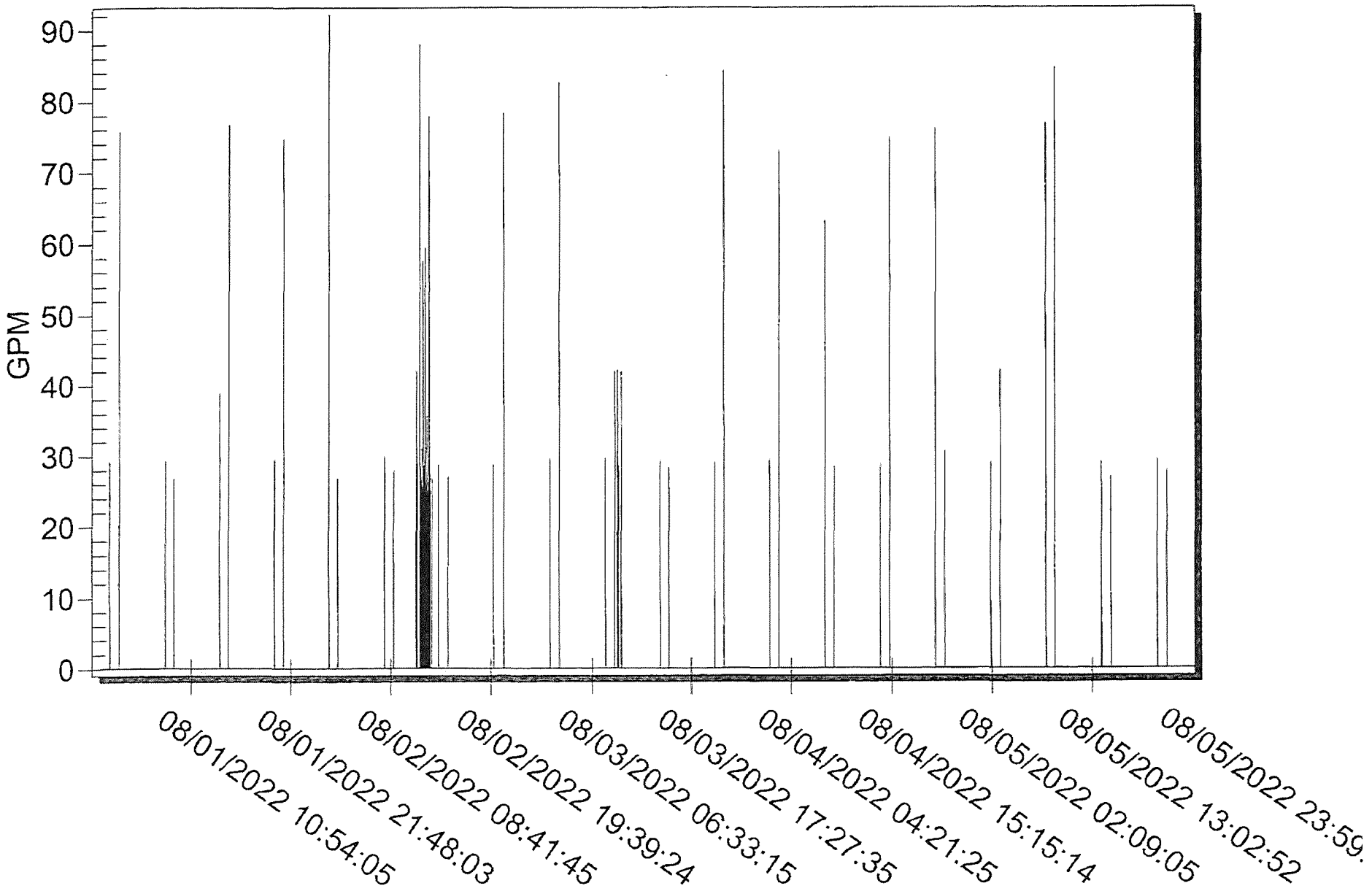
Process/Tank	Stack No.	Sample Run No.	Pollutant	Date	Time	Bar count	Surface Tension		
							Tank 1	Tank 2	Tank 3
Chrome etch	B2	#1	chromium	8/8/2022	8:45-10:46	57	48	50	50
Chrome etch	B2	#2	chromium	8/8/2022	11:15-13:56	63	48	49	49
Chrome etch	B2	#3	chromium	8/8/2022	14:15-16:16	51	47	48	48

Scrubber Pressure Drop Readings

Hour	1st Stage	2nd Stage	3rd Stage	Hepa	Overall
9:45	0.2	0.5	0.7	0.3	1.8
11:45	0.2	0.5	0.7	0.3	1.8
2:45	0.2	0.5	0.7	0.3	1.8

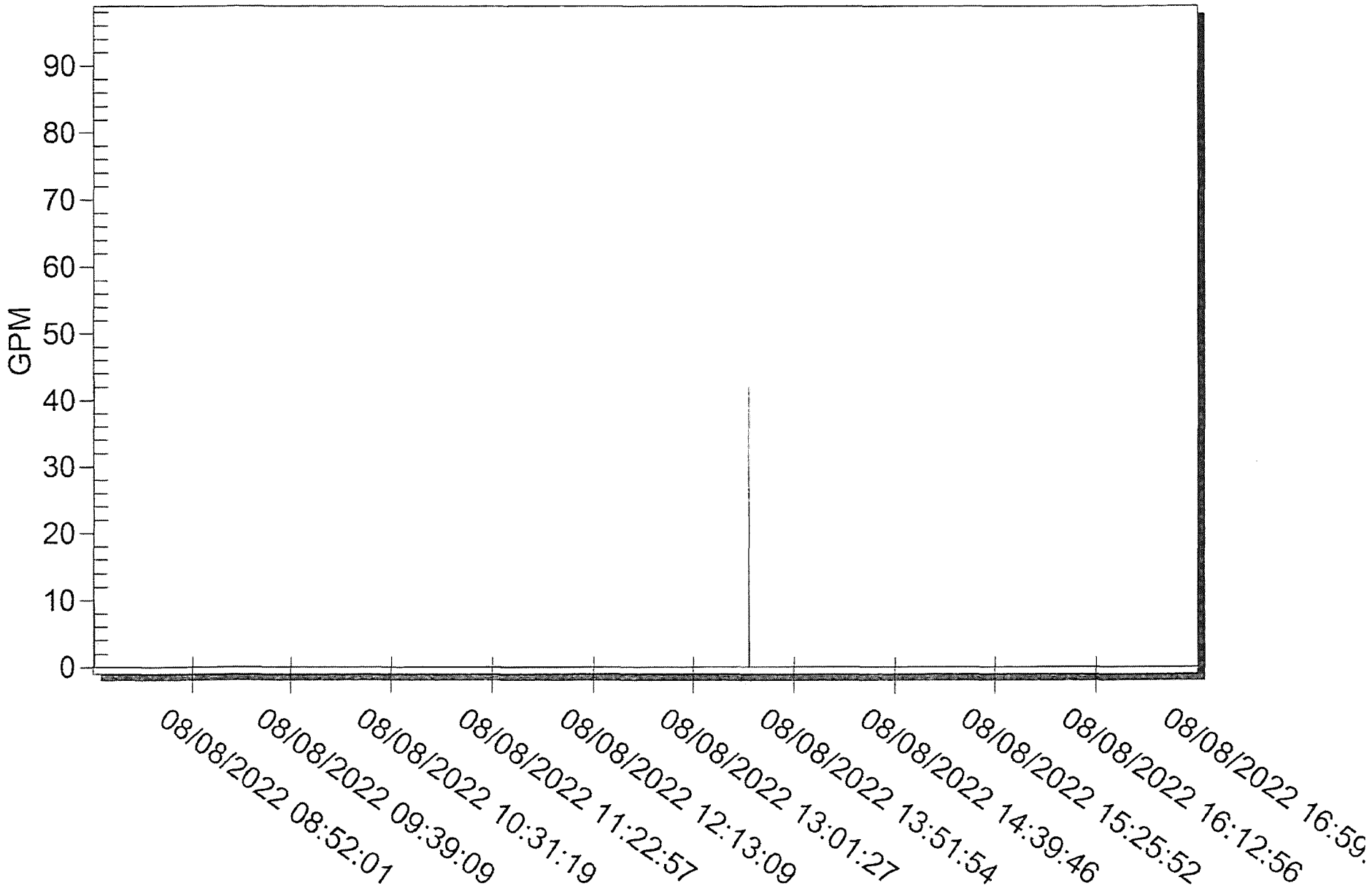
Barden Etch Scrubber B2

Washdown Frequency & Flow Rates



Barden Etch Scrubber B2

Washdown During Compliance Test



APPENDIX B

Isokinetic Data & Calculations for Cr Test Runs

LACKS ENT - BARDEN | CR STACK | 8/8/22

TEST NO.	1	
BAROMETRIC PRESSURE	29.07	IN HG
TIP DIAMETER	0.250	IN
STACK DIMENSIONS	60	IN
STACK AREA	19.635	FT2
SAMPLING TIME PER POINT	5.0	MIN
NUMBER OF POINTS	24	
METER VOLUME	99.03	FT3
PITOT COEFFICIENT	0.84	
METER COEFFICIENT	0.993	
PARTICULATE COLLECTED	0.0001	GRAMS
WATER COLLECTED	42	ML
STATIC PRESSURE	-0.15	IN H2O

ORSAT RESULTS

CO2	O2	CO	N2
0.00%	20.90%	0.00%	79.10%

TEST POINT	STACK TEMP DEG F	PITOT DEL P IN H2O	ORIFICE DEL H IN H2O	METER TEMP DEG F	STACK VELOCITY AFPS
1	86	0.43	0.86	78	38.16
2	86	0.45	0.90	80	39.03
3	86	0.46	0.92	78	39.46
4	87	0.47	0.94	80	39.93
5	87	0.47	0.94	82	39.93
6	87	0.51	1.02	82	41.59
7	85	0.65	1.30	83	46.87
8	86	0.66	1.32	87	47.27
9	87	0.67	1.34	89	47.67
10	86	0.67	1.34	92	47.63
11	87	0.64	1.28	95	46.59
12	88	0.63	1.26	97	46.27
13	87	0.55	1.10	98	43.19
14	87	0.56	1.12	99	43.58
15	86	0.59	1.18	100	44.69
16	86	0.53	1.06	102	42.36
17	87	0.42	0.84	102	37.74
18	87	0.41	0.82	103	37.29
19	86	0.55	1.10	103	43.15
20	86	0.52	1.04	103	41.96
21	86	0.53	1.06	103	42.36
22	86	0.75	1.50	104	50.39
23	87	0.83	1.66	104	53.06
24	86	0.85	1.70	105	53.65
AVERAGE	86		1.15	94	43.91

DRY STANDARD VOLUME	96.10	SCF
PERCENT WATER VAPOR	2.02	% VOL
FLOW RATE	51731	ACFM
	47567	DSCFM
	80826	M3/HR
PARTICULATE CONCENTRATION	0.0000	GR/DSCF
	0.0000	GR/ACF
PARTICULATE EMISSION RATE	0.01	LB/HR
LB PART PER 1000 LB GAS	0.0000	
ISOKINETIC PERCENT	97.0	

LACKS ENT - BARDEN | CR STACK | 8/8/22

TEST NO.	2	
BAROMETRIC PRESSURE	29.02	IN HG
TIP DIAMETER	0.250	IN
STACK DIAMETER	60	IN
STACK AREA	19.635	FT2
SAMPLING TIME PER POINT	5.0	MIN
NUMBER OF POINTS	24	
METER VOLUME	96.51	FT3
PITOT COEFFICIENT	0.84	
METER COEFFICIENT	0.993	
PARTICULATE COLLECTED	0.0001	GRAMS
WATER COLLECTED	48	ML
STATIC PRESSURE	-0.15	IN H2O

ORSAT RESULTS

CO2	O2	CO	N2
0.00%	20.90%	0.00%	79.10%

TEST POINT	STACK TEMP DEG F	PITOT DEL P IN H2O	ORIFICE DEL P IN H2O	METER TEMP DEG F	STACK VELOCITY AFPS
1	87	0.42	0.84	98	37.80
2	86	0.41	0.82	95	37.31
3	86	0.41	0.82	96	37.31
4	86	0.42	0.84	97	37.77
5	87	0.41	0.82	98	37.35
6	87	0.43	0.86	98	38.25
7	87	0.60	1.20	98	45.18
8	87	0.66	1.32	99	47.39
9	87	0.69	1.38	101	48.45
10	87	0.66	1.32	101	47.39
11	87	0.63	1.26	102	46.30
12	86	0.62	1.24	102	45.89
13	86	0.56	1.12	103	43.61
14	86	0.57	1.14	104	44.00
15	86	0.55	1.10	106	43.22
16	87	0.45	0.90	104	39.13
17	87	0.44	0.88	105	38.69
18	87	0.42	0.84	106	37.80
19	86	0.52	1.04	105	42.02
20	86	0.50	1.00	106	41.21
21	87	0.55	1.10	92	43.26
22	87	0.81	1.62	92	52.50
23	88	0.86	1.72	92	54.14
24	88	0.74	1.48	94	50.22
AVERAGE	87		1.11	100	43.17

DRY STANDARD VOLUME	93.55	SCF
PERCENT WATER VAPOR	2.36	% VOL
FLOW RATE	50864	ACFM
	46504	DSCFM
	79020	M3/HR
PARTICULATE CONCENTRATION	0.0000	GR/DSCF
	0.0000	GR/ACF
PARTICULATE EMISSION RATE	0.01	LB/HR
LB PART PER 1000 LB GAS	0.0000	
ISOKINETIC PERCENT	96.6	

LACKS ENT - BARDEN | CR STACK | 8/8/22

TEST NO.	3	
BAROMETRIC PRESSURE	29.05	IN HG
TIP DIAMETER	0.250	IN
STACK DIAMETER	60	IN
STACK AREA	19.635	FT2
SAMPLING TIME PER POINT	5.0	MIN
NUMBER OF POINTS	24	
METER VOLUME	96.26	FT3
PITOT COEFFICIENT	0.84	
METER COEFFICIENT	0.993	
PARTICULATE COLLECTED	0.0001	GRAMS
WATER COLLECTED	44	ML
STATIC PRESSURE	-0.15	IN H2O

ORSAT RESULTS

CO2	O2	CO	N2
0.00%	20.90%	0.00%	79.10%

TEST POINT	STACK TEMP DEG F	PITOT DEL P IN H2O	ORIFICE DEL P IN H2O	METER TEMP DEG F	STACK VELOCITY AFPS
1	87	0.36	0.72	92	34.97
2	87	0.40	0.80	91	36.86
3	88	0.43	0.86	92	38.25
4	88	0.45	0.90	92	39.13
5	88	0.45	0.90	92	39.13
6	87	0.46	0.92	94	39.53
7	88	0.58	1.16	96	44.42
8	87	0.68	1.36	98	48.06
9	88	0.75	1.50	99	50.52
10	88	0.68	1.36	99	48.10
11	88	0.66	1.32	98	47.39
12	88	0.64	1.28	98	46.67
13	88	0.45	0.90	101	39.13
14	88	0.46	0.92	101	39.56
15	88	0.51	1.02	101	41.66
16	88	0.44	0.88	102	38.69
17	88	0.42	0.84	102	37.80
18	88	0.41	0.82	102	37.35
19	87	0.53	1.06	103	42.43
20	87	0.57	1.14	103	44.00
21	88	0.59	1.18	103	44.81
22	88	0.78	1.56	105	51.52
23	87	0.87	1.74	107	54.36
24	87	0.85	1.70	107	53.73
AVERAGE	88		1.12	99	43.25

DRY STANDARD VOLUME	93.40	SCF
PERCENT WATER VAPOR	2.17	% VOL
FLOW RATE	50955	ACFM
	46644	DSCFM
	79258	M3/HR
PARTICULATE CONCENTRATION	0.0000	GR/DSCF
	0.0000	GR/ACF
PARTICULATE EMISSION RATE	0.01	LB/HR
LB PART PER 1000 LB GAS	0.0000	
ISOKINETIC PERCENT	96.1	

PARTICULATE SAMPLE CALCULATION FORMULA

1. **DRY MOLECULAR WEIGHT (Md)** lb/lb-mole

Md = .44*% CO2 + .32*%O2 + .28*%N2 + .28*%CO

2. **WATER VAPOR PERCENT (%H2O)**

Vw std = 0.04707*(Vf - Vi)

where: Vw std = standard cubic feet of water vapor
Vf = Final volume of impingers, ml
Vi = Initial volume of impingers, ml

%H2O = Vw std * 100/(Vm std + Vw std)

where Vm std = standard cubic feet of gas sampled

3. **WET MOLECULAR WEIGHT (Ms)** lb/lb-mole

Ms = Md*(1 - %H2O/100) + 18*%H2O/100

4. **STACK PRESSURE (Ps)** in. Hg.

Ps = Pb + Pg/13.6

where: Pb = barometric pressure (uncorrected), in. Hg
Pg = stack gauge pressure, in. H2O
13.6 = specific gravity of mercury (Hg)

5. **AVERAGE STACK VELOCITY (vs)** feet per second

Vs = Kp*Cp*DELP * (Tsavg/(Ps*Ms))^0.5

where: Kp = 85.49 unit conversion
Cp = 0.84, pitot tube calibration factor
DELP = average of square root of velocity head, in. H2O
Tsavg = average stack temperature, deg R (460+F)
Ps = stack pressure
Ms = wet molecular weight

6. **STACK GAS FLOW RATE (Qs)** std. cubic feet per minute

Qs = 60*(1 - %H2O/100)*Vs*A*(528*Ps/Tsavg/29.92)

where: A = stack area, ft2
528 = std temperature, deg R
29.92 = std pressure, in. Hg

7. **DRY GAS VOLUME (Vmstd)** dry std. cubic feet

Vm std = (GAMAC*(Pb+ DELH/13.6)/29.92) * Vm

where: GAMAC = dry gas meter calibration factor corrected for meter temperature (GAMA+(Tm-70)*.00012)
Vm = volume of dry gas metered, cubic feet
Tm = average meter temperature, degrees F
DELH = average orifice pressure drop, in.H2O

8. **PARTICULATE CONCENTRATION (cs)** grains per dry standard cubic foot

Cs = Mn * 15.43/Vm std
where: Mn = particulate captured, grams
15.43 = grains per gram

9. **EMISSION RATE (ER)** pounds per hour

PMRA = Mn*A*60/(t*An*453.6) AREA METHOD lb/hr

PMRC = Cs*Qs*60/(15.43*453.6) CONC. METHOD lb/hr

ER = (PMRA + PMRC)/2

where: An = area of sampling nozzle, square feet

10. **EMISSION CONCENTRATION (EC)** lb/1000 lb exhaust gas

EC = ER * 386700 * (1-%H2O/100)/(Qs*60*Ms)

where: 386700 = cubic feet per lb mole * 1000

11. **ISOKINETIC SAMPLING PERCENTAGE (I)**

I = PMRA/PMRC

APPENDIX C

Element One Lab Report

Environmental Technology & Engineering Corporation

13000 W. Bluemound Rd., Ste. 109
Elm Grove, WI 53122

Project ID: 4984-LACKS

Total Chromium

EPA Method 306 Analysis

Analytical Report
39142

Element One, Inc.
6319-D Carolina Beach Rd., Wilmington, NC 28412
910-793-0128 FAX: 910-792-6853 e1lab@e1lab.com

The following data for Analytical Report 39142
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:

Daphne Woodman, B.S. Chemist
August 24, 2022

Report Reviewed and Finalized by:

Ken Smith, Laboratory Director
August 24, 2022

SUMMARY OF RESULTS

Summary of Analysis

Summary of Method 306 Total Chromium Analysis

e1 Sample ID	LB-M306-R1	LB-M306-R2	LB-M306-R2	LB-M306-R3	LB-M306-Blank
	e39142-1	e39142-2	e39142-2 dup	e39142-3	e39142-4
Element	Total µg	Total µg	Total µg	Total µg	Total µg
Total Chromium	13.2	10.0	9.88	12.0	0.604

e1 Sample ID	LAC-M306-R1	LAC-M306-R2	LAC-M306-R2	LAC-M306-R3	LAC-M306-Blank
	e39142-5	e39142-6	e39142-6 dup	e39142-7	e39142-8
Element	Total µg	Total µg	Total µg	Total µg	Total µg
Total Chromium	11.0	11.7	12.2	7.12	0.531

e1 Sample ID	LAE-M306-R1	LAE-M306-R2	LAE-M306-R2	LAE-M306-R3	LAE-M306-Blank
	e39142-9	e39142-10	e39142-10 dup	e39142-11	e39142-12
Element	Total µg	Total µg	Total µg	Total µg	Total µg
Total Chromium	3.01	4.20	4.03	3.26	0.480

e1 Sample ID	PP-M306-R1	PP-M306-R2	PP-M306-R2	PP-M306-R3	PP-M306-Blank
	e39142-13	e39142-14	e39142-14 dup	e39142-15	e39142-16
Element	Total µg	Total µg	Total µg	Total µg	Total µg
Total Chromium	3.30	3.15	3.00	3.23	0.527

ANALYTICAL NARRATIVE

Element One Analytical Narrative

Client:	Environmental Tech & Engineering Corp	Element One #:	39142
Client ID:	4984-Lacks	Analyst:	DBW
Method:	M306	Dates Received:	08/17/22
Analytes:	Total Chromium	Dates Analyzed:	08/19/22

Summary of Analysis

For Total Chromium analysis, a 100mL aliquot of the Method 306 samples was acidified with trace metals grade concentrated nitric acid, digested on a hotplate, and brought back to a final volume of 100mL with ultra-pure deionized water according to method protocol. The duplicate and spike samples were prepared in the same manner as the samples with the addition of spiking solution prior to digestion. Samples were analyzed for total chromium on a PerkinElmer Nexlon 1000 ICP-MS. Results are based on the sample beginning volume received.

Detection Limits

The ICP-MS instrument reporting limit was 1.0µg/L for total chromium.

Analysis QA/QC

The Method 306 duplicate analyses relative percent difference (RPD), spike sample recovery, and second source calibration verification data are summarized in the Quality Control Section. All QA/QC data was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank values or spike recovery values. The reported results relate only to the items tested or calibrated.