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SOURCE TEST REPORT
2018 SOURCE EMISSION TESTS
CASCADE STEEL ROLLING MILLS, INC.
A SCHNITZER COMPANY
STEEL SHREDDER
OAKLAND, CALIFORNIA

Prepared For:

Schnitzer Steel
1101 Embarcadero West
Oakland, California 94607

For Submittal To:

Bay Area Air Quality Management District
San Francisco, California 94109

Prepared By:

Montrose Air Quality Services, LLC
2825 Verne Roberts Circle
Antioch, California 94509

Document Number:	**005AS-452603-RT-310 (NST-5178)**
Test Dates:	**October 29-31, 2018**
Submittal Date:	**December 27, 2018**

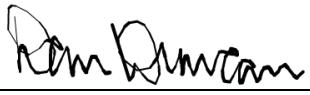
REVIEW AND CERTIFICATION

All work, calculations, and other activities and tasks performed and presented in this document were carried out by me or under my direction and supervision. I hereby certify that, to the best of my knowledge, Montrose operated in conformance with the requirements of the Montrose Quality Management System and ASTM D7036-04 during this test project.

Signature:  for RO Date: 12/27/2018

Name: Robert Odell Title: Client Project Manager

I have reviewed, technically and editorially, details calculations, results, conclusions, and other appropriate written materials contained herein. I hereby certify that, to the best of my knowledge, the presented material is authentic, accurate, and conforms to the requirements of the Montrose Quality Management System and ASTM D7036-04.

Signature:  Date: 12/27/2018

Name: Dan Duncan Title: QA/QC Manager

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1.0 SUMMARY OF TEST PROGRAM AND RESULTS

1.1 PROGRAM OBJECTIVES

Montrose Air Quality Services, LLC (Montrose) was contracted by Schnitzer Steel (Schnitzer) to perform a series of air emission tests at their facility located in Oakland, California. The tests were conducted to determine compliance with the source testing limitations of the Bay Area Air Quality Management District (BAAQMD) Permit Application No. 27762

The testing was conducted by Robert Odell, Nishad Patel, Madison Koch, and Shawn Jaworski of Montrose on October 29-31, 2018. Daniel Lee of Schnitzer Steel coordinated the testing program. The tests were conducted according to a test plan dated September 25, 2018 that was submitted to the BAAQMD and assigned NST-5178. Montrose performed the tests to measure the following emission parameters:

- Primary Parameters
  - Total POC (lb/hr and lb/ton material processed)
  - Specific TOCs (lb/hr and lb/ton material processed)
  - Hexavalent chromium (lb/hr and lb/ton material processed)
  - PCBs (lb/hr and lb/ton material processed)
- Gaseous Species as Diluent Gases
  - Oxygen and carbon dioxide (O_2 and CO_2) – % volume dry
  - Stack gas moisture content (% by volume)
  - Stack gas volumetric flow rate (dscfm)
- Facility Data
  - Feed rate of vehicles in tons per hour
  - Feed rate of light iron in tons per hour

This report presents the test results and supporting data, descriptions of the testing procedures, descriptions of the facility and sampling locations, and a summary of the quality assurance procedures used by Montrose. The average emission test results are summarized in Tables 1-1 through 1-4. Detailed results for individual test runs can be found in Section 4.0. All supporting data can be found in the appendices.

TABLE 1-1
SUMMARY OF AVERAGE HEXAVALENT CHROMIUM EMISSIONS
SCHNITZER STEEL
SHREDDER

Run Number:	Car Bodies Only	Light Iron Only
Process Data:		
Material Feed Rate, tph	[redacted]	[redacted]
Material Output, tph		
Ventilation Fan 1 Amps	519	515
Ventilation Fan 2 Amps	544	540
Mill Water Spray Flow Rate	29	28
Pres Decay – Scrubber 1, inWG	29	29
Pres Decay – Scrubber 2, inWG	24	24
Flue Gas:		
O_2, % volume dry	21.0	20.9
CO_2, % volume dry	0.03	0.03
Moisture content, % volume	2.1	2.4
Flue gas temperature °F	65.5	69.3
Volumetric flow rate, dscfm	[redacted]	[redacted]
Hexavalent Chromium, Cr^{6+}:		
ug/m^3	[redacted]	[redacted]
lb/hr	1.5E-05	1.1E-05
lb/ton material proc'd	[redacted]	[redacted]
Hexavalent Chromium, Cr^{6+} (Blank-Corrected):		
ug/m^3	[redacted]	[redacted]
lb/hr	<4.9E-06	<3.9E-06
lb/ton material proc'd	[redacted]	[redacted]

TABLE 1-2
SUMMARY OF AVERAGE TOC EMISSIONS
SCHNITZER STEEL
SHREDDER

Run Number:	Car Bodies Only	Light Iron Only
Process Data:		
Material Feed Rate, tph	[redacted]	[redacted]
Material Output, tph		
Ventilation Fan 1 Amps	519	515
Ventilation Fan 2 Amps	544	540
Mill Water Spray Flow Rate	29	28
Pres Decay – Scrubber 1, inWG	29	29
Pres Decay – Scrubber 2, inWG	24	24
Flue Gas:		
O_2, % volume dry	20.9	20.9
CO_2, % volume dry	0.03	0.03
Moisture content, % volume	2.1	2.4
Flue gas temperature °F	69.3	69.3
Volumetric flow rate, dscfm	[redacted]	[redacted]
Benzene:		
lb/hr	4.3E-02	< 7.5E-03
lb/ton material proc'd	[redacted]	[redacted]
M25A - POC (TNMNEOC):		
lb/hr as CH_4	183	86
lb/ton material proc'd	[redacted]	[redacted]
M25C - POC (TNMNEOC):[1]		
lb/hr as CH_4	6.53	< 8.21
lb/ton material proc'd	[redacted]	[redacted]
MTO12 - POC (TNMNEOC):[1]		
lb/hr as CH_4	5.50	3.69
lb/ton material proc'd	[redacted]	[redacted]

1 Based on the collected data, it is speculated that the canisters collected for M25C and MTO12 analysis had a leak as the results provided were substantially less than the method 25a test. Additionally, there were elevated results of methanol and methylene chloride in the canisters, which is suspected to have come from the ambient air inside the mobile lab as those reagents were being utilized as part of the CARB 428 recovery. A retest of these methods is anticipated to occur in early January 2019. See discussion in Section 4.2 for more information.

TABLE 1-3
SUMMARY OF AVERAGE PCB EMISSIONS
SCHNITZER STEEL
SHREDDER

Run Number:	Car Bodies Only	Light Iron Only
Process Data:		
Material Feed Rate, tph	[redacted]	[redacted]
Material Output, tph		
Ventilation Fan 1 Amps	519	515
Ventilation Fan 2 Amps	544	540
Mill Water Spray Flow Rate	29	28
Pres Decay – Scrubber 1, inWG	29	29
Pres Decay – Scrubber 2, inWG	24	24
Flue Gas:		
O_2, % volume dry	21.0	20.9
CO_2, % volume dry	0.03	0.03
Moisture content, % volume	1.6	1.1
Flue gas temperature °F	63.8	,67.5
Volumetric flow rate, dscfm	[redacted]	[redacted]
Chlorobiphenyls:		
lb/hr	1.92E-05	1.71E-03
lb/ton material proc'd	[redacted]	[redacted]
Dichlorobiphenyls:		
lb/hr	2.33E-04	8.96E-03
lb/ton material proc'd	[redacted]	[redacted]
Trichlorobiphenyls:		
lb/hr	3.94E-04	8.12E-03
lb/ton material proc'd	[redacted]	[redacted]
Tetrachlorobiphenyls:		
lb/hr	1.02E-04	1.84E-03
lb/ton material proc'd	[redacted]	[redacted]
Pentachlorobiphenyls:		
lb/hr	1.05E-05	2.71E-04
lb/ton material proc'd	[redacted]	[redacted]
Hexachlorobiphenyls:		
lb/hr	2.59E-06	8.45E-05
lb/ton material proc'd	[redacted]	[redacted]

TABLE 1-4
SUMMARY OF AVERAGE PCB EMISSIONS
SCHNITZER STEEL
SHREDDER

Run Number:	Car Bodies Only	Light Iron Only
Process Data:		
Material Feed Rate, tph	[redacted]	[redacted]
Material Output, tph		
Ventilation Fan 1 Amps	519	515
Ventilation Fan 2 Amps	544	540
Mill Water Spray Flow Rate	29	28
Pres Decay – Scrubber 1, inWG	29	29
Pres Decay – Scrubber 2, inWG	24	24
Flue Gas:		
O_2, % volume dry	21.0	20.9
CO_2, % volume dry	0.03	0.03
Moisture content, % volume	1.7	1.1
Flue gas temperature °F	63.8	,67.5
Volumetric flow rate, dscfm	[redacted]	[redacted]
Heptachlorobiphenyls:		
lb/hr	1.29E-06	1.24E-05
lb/ton material proc'd	[redacted]	[redacted]
Octachlorobiphenyls:		
lb/hr	2.83E-07	2.54E-06
lb/ton material proc'd	[redacted]	[redacted]
Nonachlorobiphenyls:		
lb/hr	< 1.76E-08	6.54E-07
lb/ton material proc'd	[redacted]	[redacted]
Decachlorobiphenyls:		
lb/hr	< 9.59E-09	7.33E-08
lb/ton material proc'd	[redacted]	[redacted]
Total PCBs:		
lb/hr	7.63E-04	2.10E-02
lb/ton material proc'd	[redacted]	[redacted]

1.2 PROJECT CONTACTS

A list of project participants is included below:

Facility Information

Source Location:	Schnitzer Steel 1101 Embarcadero West Oakland, California 94607	
Project Contact:	Mr. Daniel Lee	Mr. Daniel Lee
Role:	Cascade Steel Rolling Mills, Inc., a Schnitzer Company	Cascade Steel Rolling Mills, Inc., a Schnitzer Company
Company:	(503) 434-3324	(503) 434-3324
Telephone:	dlee@schn.com	dlee@schn.com
Email:	Schnitzer Steel	Schnitzer Steel

Agency Information

Regulatory Agency:	Bay Area Air Quality Management District
Agency Contact:	Mr. Jerry Bovee
Telephone:	(415) 749-4612
Email:	jbovee@baaqmd.gov

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC (Montrose)	
Contact:	Robert Odell	Kevin Crosby
Title:	Client Project Manager	Vice President, Technical
Telephone:	(925) 642-2776	(925) 680-4337
Email:	rodell@montrose-env.com	kcrosby@montrose-env.com

Laboratory Information

Laboratory:	Chester LabNet
City, State:	Tigard, Oregon
Analysis:	CARB 425
Laboratory:	Vista Analytical
City, State:	El Dorado Hills, California
Analysis:	CARB 428
Laboratory:	Atmospheric Analytical & Consulting
City, State:	Antioch, California
Analysis:	EPA 25C & TO-15

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D-7036 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose completed multiple functional assessments for ASTM D7036-04 which were conducted by the American Association for Laboratory Accreditation (A2LA). All testing is overseen and supervised on site by at least one Qualified Individual (QI), as defined in 40 CFR 72.2.

2.0 SOURCE DESCRIPTION

2.1 FACILITY AND SOURCE DESCRIPTION

The Schnitzer Steel facility is located at 1101 Embarcadero West, Oakland, California, 94607 at the Port of Oakland. The facility serves as a processing and loading center for scrap metal bound for marine transport. The metal shredder is composed of multiple steel alloy hammers that are rotated at speed by an electric motor and impacted against the material to be shredded. Infeed material consists primarily of automobiles that have been pre-processed to minimize the amount of hazardous fluids and non-usable metal content. A conveyor system is loaded with infeed material by manually-operated cranes, and then fed into the shredder at a known mass rate.

Water is injected into the shredder to reduce the heat generated as well as to reduce emissions of particulate matter. The emissions from the shredder are captured by an abatement system that completely encloses the shredder. The exhaust system ducts the collected air through two venturi scrubbers before being emitted to atmosphere via a vertical stack.

2.2 SAMPLING LOCATIONS AND ACCESS

Information regarding the sampling location is presented below:

Sample location ID:	P-15 Exhaust Stack
Stack exit height:	62 feet
Configuration:	Cylindrical, vertical
Dimensions:	[redacted] inches I.D.
Port locations:	Appx. 15 ft. (~[redacted] duct diameters) upstream from (below) the stack exit Appx. 37 ft. (~[redacted] duct diameters) downstream from (above) the nearest flow disturbance
Port access:	Ladder to permanent platform

Traverse point information is presented below:

- Isokinetic tests - 12 points total, 6 from each of 2 ports located 90 degrees apart from one another

2.3 OPERATING CONDITIONS AND PROCESS DATA

Emission tests were performed while the source/units and air pollution control devices were operating at the conditions required by the permit. Tests were conducted under two conditions:

- Test Condition 1: Car bodies processed only
- Test Condition 2: Light Iron processed only

Plant personnel established the test conditions and collected all applicable unit-operating data. Montrose monitored the collection of process data and provided additional data collection as necessary to document operation. Process data includes:

- Ventilation fan (Cond. 26401.) amperage
- Water Sprays (A-6) flow rate
- Water flow rate and pressure decay for each Venturi Scrubber
- Hourly material processed by the shredder (lbs or tons)
- Shredder enclosure photos

3.0 TEST METHOD DETAILS

3.1 LIST OF TEST METHODS

The test procedures for this test program are summarized in Table 3-1 below. Additional information regarding specific applications or modifications to standard procedures is presented in the following sub-sections.

TABLE 3-1
TEST PROCEDURES

Parameter	Measurement Principle	Reference Method
Volumetric flow rate	Pitot/temperature traverse	EPA 1, 2
O_2	Paramagnetism	EPA 3A
CO_2	Non-dispersive infrared	EPA 3A
Moisture	Impinger weight gain	EPA 4
TOC	Flame Ionization Detector	EPA 25A
POC	Gas chromatography	EPA 25C & TO-12
$Cr6^+$	IC/PCR	CARB 425
PCBs	Gas chromatography	CARB 428
Benzene	Gas chromatography	TO-15

3.1.1 EPA Method 1, Traverse Points

EPA Method 1 was used to assure that representative measurements of volumetric flow rate were obtained by dividing the cross-section of the stack or duct into equal areas, and then locating a traverse point within each of the equal areas. This test location met the acceptable sample location requirements and was located at least two stack or duct equivalent diameters downstream from a flow disturbance and one-half equivalent diameter upstream from a flow disturbance. An EPA Method 1 diagram is included in Appendix B.1.

- Method Deviations: None
- Method Options: None

3.1.2 EPA Method 2 - Velocity and Volumetric Flow Rate

EPA Method 2 was used to measure the gas velocity using an S-type pitot tube connected to a pressure measurement device, and to measure the gas temperature using a calibrated thermocouple connected to a thermocouple indicator. A Type S (Stausscheibe) pitot tube conforming to the geometric specifications in the test method was used, along with an inclined manometer. The measurements were made at traverse points specified by EPA Method 1. The molecular weight of the gas stream was determined from independent measurements of O_2, CO_2, and moisture. The stack gas volumetric flow rate was calculated using the measured average velocity head, the area of the duct at the measurement plane, the measured average temperature, the measured duct static pressure, the molecular weight of the gas stream, and the measured moisture.

- Method Deviations: None

- Method Options: None

3.1.3 Gaseous Emissions

Concentrations of the gaseous constituents of stack gas (O_2, CO_2) were measured using Montrose's dry extractive reference method (RM) monitor system in accordance with EPA Method 3A. This system meets the requirements of EPA methods for gaseous species. Information about the analyzers are presented in Table 3-2. Pertinent information regarding the performance of the method is presented below:

- Method Deviations: Probe was located in one position and not traversed.
- Method Options: None

TABLE 3-2
MAQS CEMS INFORMATION

Analyzer Type	Manufacturer	Model No.	Serial No.	Range
O_2	CAI	110P	S05008	25%
CO_2	Horiba	VIA-510	4326876001	10%
TOC	CAI	600 MHFID	B08025	1000 ppm (as propane)

3.1.4 Moisture Content

Moisture content was measured from EPA Methods 4 through CARB methods 425 and CARB 428. Pertinent information regarding the performance of the methods are presented below:

- Method Deviations: EPA Method 4 was utilized as part of the isokinetic CARB 425 & 428 tests.
- Method Options: N/A
- Target Duration: N/A
- Target Sample Volume: N/A

3.1.5 Total Organic Carbon

Concentrations of total organic carbon (TOC) were measured by flame ionization detector. Sample gas was transported wet through a heated sampling system maintained at least 350 degrees Fahrenheit. Pertinent information regarding the performance of the method is presented below:

- Method Deviations: None
- Method Options: Heated sampling system was maintained at 350 degrees Fahrenheit to prevent moisture from interfering with the FID.

3.1.6 Precursor Organic Compounds & Benzene

Emissions of precursor organic compounds (POC) and benzene were measured using EPA 25C, TO-12, and TO-15 respectively. Sample was collected into a single canister and use for

both analyses. Pertinent information regarding the performance of the methods is presented below:

- Method Deviations: Modified to follow sampling requirements of TO-15
- Specific TOCs include: Benzene
- Target and/or Minimum Required Sample Duration: 60 minutes
- Analytical Laboratory: Atmospheric Analytical & Consulting, Inc.

3.1.7 Hexavalent Chromium ($Cr6^{+}$)

Emissions of hexavalent chromium were measured using CARB Method 425. Pertinent information regarding the performance of the methods are presented below.

- Method Deviations: A prescreened CARB/BiCARB solution was used in lieu the NaOH reagent. This was to aid in minimizing background chromium and in maintaining a pH of 8.0 to 10.0 during the sampling. pH was measured and logged on a field recovery data sheet onsite. The analytical lab measured, recorded, and reported the pH and temperature of the samples upon receiving them.
- Method Options: Impingers 1 and 2 will be recovered together.
- Onsite Measured pH: Approximately 9
- Lab Measured pH: Approximately 9
- Lab Measured temperature: 2.1 degrees Celsius
- Lab Analysis Dates: Cr^{6+}: Nov. 5, 2018 & Total Cr: Nov. 13, 2018
- Target and/or Minimum Required Sample Duration: 60 minutes
- Minimum Required Sample Volume: 31.8 dscf
- Analytical Laboratory: Chester LabNet

3.1.8 Polychlorinated Biphenyl Emissions

Concentrations of polychlorinated biphenyls (PCBs) were measured using CARB Method 428. Pertinent information regarding the performance of the method is presented below. Please see appendix B for preliminary calculations for sample volume, duration, and anticipated concentration.

- Method Deviations – None
- Target Sample Duration - 60 minutes
- Minimum Required Sample Volume: 17.6 dscf (0.50 dscm)
- Analytical Laboratory - Vista Analytical Laboratory, El Dorado Hills, CA

4.0 TEST RESULTS AND OVERVIEW

4.1 DISCUSSION OF RESULTS

The average results presented in Tables 1-1 through 1-4. The results of individual compliance test runs performed are presented in Tables 4-1 through 4-8.

Additional information is included in the appendices. Appendix A presents the general and specific equations used for the emissions calculations and computer spreadsheets. Raw field data sheets and data acquisition printouts are included in Appendix B. Laboratory reports and chain of custody sheets for the samples are located in Appendix C. CEM and process data provided by the client is located in Appendix D. Appendix E presents the quality assurance information, including instrument calibration data. Additional correspondence and relevant regulatory information are located in Appendix F.

Both qualitative and quantitative factors contribute to field measurement uncertainty and should be taken into consideration when interpreting the results contained within this report. Whenever possible, Montrose Air Quality Services, LLC, (Montrose) personnel reduce the impact of these uncertainty factors using approved and validated test methods. In addition, Montrose personnel perform routine instrument and equipment calibrations and ensure that the calibration standards, instruments, and equipment used during test events meet, at a minimum, test method specifications as well as the specifications of our Quality Manual and ASTM D 7036-04. The limitations of the various methods, instruments, equipment, and materials utilized during this test have been reasonably considered, but the ultimate impact of the cumulative uncertainty of this project is not fully identified within the results of this report.

4.2 DEVIATIONS AND EXCEPTIONS

There were a couple problems with the canister sampling. No sample was collected during the first test run as the sample line and critical orifice had become plugged with moisture. The sample canisters were relocated to the mobile lab, branched off the method 25a sample line. Based on the collected data, it is speculated that the canisters had a leak at this junction point as the canisters collected substantially less than the method 25a test. Additionally, there were elevated results of methanol and methylene chloride in the canisters, which is suspected to have come from the ambient air inside the mobile lab as those reagents were being utilized as part of the CARB 428 recovery. A retest of these methods is anticipated to occur in early January 2019. As a direct result of this, the benzene results are significantly biased low and will also be retested in early January 2019.

Run 2 of the CARB 428 tests had unexpectedly low velocity numbers, especially compared to the CARB 425 test and run 1. So after Run 3 began, the problem was identified and corrected. There was a kink in the measurement line that was clear when the probe was out of stack for the leak checks but kinked while the probe was in stack. This resulted in low velocity readings for run 2 and partially run 3. As a results the overall sample volume was below anticipated volume but still exceeded the minimum sample volume required. Both tests are included in the average using the velocity measurements from the concurrent CARB 425 tests were used in lieu of the CARB 428 velocities for the purposes of calculating emission rates.

The laboratory analysis for the CARB 428 samples indicated that several of the analytes were ‘outside laboratory acceptance criteria’. In this case, when the laboratory finds that the recovery

is outside of range, the signal to noise ratio must be at least 10:1, otherwise the procedure would need to be repeated according to CARB 428, Section 7.8. The analysis proved that the signal to noise ratio was greater than 10:1 for each of these analytes and are therefore acceptable results. Refer to laboratory analysis provided in Appendix C.5 for detailed information.

Run 2 of all test methods and Run 5 of CARB 425 and CARB 428 test methods were paused during the test run due to a jam in the shredder. Once the jams were cleared operation and the testing resumed. The various TOC and POC testing was completed just before the shredder had jammed during Run 5 and was not paused as it was not necessary.

TABLE 4-1
RESULTS SUMMARY HEXAVALENT CHROMIUM EMISSIONS
SCHNITZER STEEL
SHREDDER – CAR BODIES

Run Number:	1-Cr	2-Cr	3-Cr	Average
Date:	10/29/18	10/29/18	10/30/18	--
Time:	2000-2109	2235-2250, 2331-0024	0045-0157	--
Process Data:				
Material Feed Rate, tph	[redacted]	[redacted]	[redacted]	[redacted]
Material Output, tph				
Ventilation Fan 1 Amps	516	521	520	519
Ventilation Fan 2 Amps	541	546	545	544
Mill Water Spray Flow Rate	28	28	30	29
Pres Decay – Scrubber 1, inWG	29	29	29	29
Pres Decay – Scrubber 2, inWG	24	23	24	24
Flue Gas:				
O_2, % volume dry	20.9	21.0	21.1	21.0
CO_2, % volume dry	0.04	0.03	0.03	0.03
Moisture content, % volume	2.1	2.0	2.1	2.1
Flue gas temperature °F	66.7	64.7	65.3	65.5
Volumetric flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Hexavalent Chromium, Cr^{6+}:				
ug/m^3	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	2.2E-05	1.4E-05	1.0E-05	1.5E-05
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Hexavalent Chromium, Cr^{6+}(Blank-Corrected):				
ug/m^3	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	6.2E-06	<4.6E-06	<3.9E-06	<4.9E-06
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-2
RESULTS SUMMARY HEXAVALENT CHROMIUM EMISSIONS
SCHNITZER STEEL
SHREDDER – LIGHT IRON

Run Number:	4-Cr	5-Cr	6-Cr	Average
Date:	10/30/18	10/30/18	10/31/18	--
Time:	2114-2224	2028-2146	0020-0120, 0153-0208	--
Process Data:				
Material Feed Rate, tph	[redacted]	[redacted]	[redacted]	[redacted]
Material Output, tph				
Ventilation Fan 1 Amps	515	516	515	515
Ventilation Fan 2 Amps	540	540	540	540
Mill Water Spray Flow Rate	28	27	28	28
Pres Decay – Scrubber 1, inWG	29	29	29	29
Pres Decay – Scrubber 2, inWG	24	24	24	24
Flue Gas:				
O_2, % volume dry	21.1	20.7	21.0	20.9
CO_2, % volume dry	0.01	0.04	0.03	0.03
Moisture content, % volume	2.4	2.3	2.4	2.4
Flue gas temperature °F	69.5	68.8	69.6	69.3
Volumetric flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Hexavalent Chromium, Cr^{6+}:				
ug/m^3	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	1.1E-05	1.2E-05	1.1E-05	1.1E-05
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Hexavalent Chromium, Cr^{6+} (Blank-Corrected):				
ug/m^3	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	<3.9E-06	<3.7E-06	<4.0E-06	<3.9E-06
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-3
RESULTS SUMMARY POC EMISSIONS
SCHNITZER STEEL
SHREDDER – CAR BODIES

Run Number:	1-TOC	2-TOC	3-TOC	Average
Date:	10/29/18	10/29/18	10/30/18	--
Time:	2000-2109	2235-2250, 2331-0024	0045-0157	--
Process Data:				
Material Feed Rate, tph	[redacted]	[redacted]	[redacted]	[redacted]
Material Output, tph				
Ventilation Fan 1 Amps	516	521	520	519
Ventilation Fan 2 Amps	541	546	545	544
Mill Water Spray Flow Rate	28	28	30	29
Pres Decay – Scrubber 1, inWG	29	29	29	29
Pres Decay – Scrubber 2, inWG	24	23	24	24
Flue Gas:				
O_2, % volume dry	21.1	20.7	21.0	20.9
CO_2, % volume dry	0.01	0.04	0.03	0.03
Moisture content, % volume	2.1	2.0	2.1	2.1
Flue gas temperature °F	69.5	68.8	69.6	69.3
Volumetric flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Benzene:				
lb/hr	N/A	3.7E-02	4.8E-02	4.3E-02
lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
M25A - POC (TNMNEOC):				
lb/hr as CH_4	N/A	212	154	183
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
M25C - POC (TNMNEOC):				
lb/hr as CH_4	N/A	5.40	7.67	6.53
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
MTO12 - POC (TNMNEOC):				
lb/hr as CH_4	N/A	4.22	6.77	5.50
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-4
RESULTS SUMMARY POC EMISSIONS
SCHNITZER STEEL
SHREDDER – LIGHT IRON

Run Number:	4-TOC	5-TOC	6-TOC	Average
Date:	10/30/18	10/30/18	10/31/18	--
Time:	2114-2214	2253-2353	0020-0120	--
Process Data:				
Material Feed Rate, tph	[redacted]	[redacted]	[redacted]	[redacted]
Material Output, tph				
Ventilation Fan 1 Amps	515	516	515	515
Ventilation Fan 2 Amps	540	540	540	540
Mill Water Spray Flow Rate	28	27	28	28
Pres Decay – Scrubber 1, inWG	29	29	29	29
Pres Decay – Scrubber 2, inWG	24	24	24	24
Flue Gas:				
O_2, % volume dry	21.1	20.7	21.0	20.9
CO_2, % volume dry	0.01	0.04	0.03	0.03
Moisture content, % volume	2.4	2.3	2.4	2.4
Flue gas temperature °F	69.5	68.8	69.6	69.3
Volumetric flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Benzene:				
lb/hr	1.4E-02	5.1E-03	< 3.5E-03	< 7.5E-03
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
M25A - POC (TNMNEOC):				
lb/hr as CH_4	81	84	93	86
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
M25C - POC (TNMNEOC):				
lb/hr as CH_4	14.5	7.98	< 2.15	< 8.21
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
MTO12 - POC (TNMNEOC):				
lb/hr as CH_4	7.15	2.66	1.24	3.69
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-5
RESULTS SUMMARY PCB EMISSIONS
SCHNITZER STEEL
SHREDDER – CAR BODIES

Run Number:	1-PCB	2-PCB	3-PCB	Average
Date:	10/29/18	10/29/18	10/30/18	--
Time:	2000-2108	2235-2250, 2331-0023	0045-0158	--
Process Data:				
Material Feed Rate, tph	[redacted]	[redacted]	[redacted]	[redacted]
Material Output, tph				
Ventilation Fan 1 Amps	516	521	520	519
Ventilation Fan 2 Amps	541	546	545	544
Mill Water Spray Flow Rate	28	28	30	29
Pres Decay – Scrubber 1, inWG	29	29	29	29
Pres Decay – Scrubber 2, inWG	24	23	24	24
Flue Gas:				
O_2, % volume dry	20.9	21.0	21.1	21.0
CO_2, % volume dry	0.04	0.03	0.03	0.03
Moisture content, % volume	1.7	1.9	1.1	1.6
Flue gas temperature °F	66.0	62.8	62.7	63.8
Volumetric flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Chlorobiphenyls:				
lb/hr	2.98E-05	1.69E-05	1.10E-05	1.92E-05
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Dichlorobiphenyls:				
lb/hr	3.23E-04	2.05E-04	1.72E-04	2.33E-04
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Trichlorobiphenyls:				
lb/hr	6.18E-04	3.32E-04	2.31E-04	3.94E-04
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Tetrachlorobiphenyls:				
lb/hr	1.48E-04	8.04E-05	7.69E-05	1.02E-04
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Pentachlorobiphenyls:				
lb/hr	1.49E-05	9.39E-06	7.36E-06	1.05E-05
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Hexachlorobiphenyls:				
lb/hr	4.63E-06	1.98E-06	1.16E-06	2.59E-06
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-6
RESULTS SUMMARY PCB EMISSIONS
SCHNITZER STEEL
SHREDDER – CAR BODIES

Run Number:	1-PCB	2-PCB	3-PCB	Average
Date:	10/29/18	10/29/18	10/30/18	--
Time:	2000-2108	2235-2250, 2331-0023	0045-0158	--
Process Data:				
Material Feed Rate, tph	[redacted]	[redacted]	[redacted]	[redacted]
Material Output, tph				
Ventilation Fan 1 Amps	516	521	520	519
Ventilation Fan 2 Amps	541	546	545	544
Mill Water Spray Flow Rate	28	28	30	29
Pres Decay – Scrubber 1, inWG	29	29	29	29
Pres Decay – Scrubber 2, inWG	24	23	24	24
Flue Gas:				
O_2, % volume dry	20.9	21.0	21.1	21.0
CO_2, % volume dry	0.04	0.03	0.03	0.03
Moisture content, % volume	1.7	1.9	1.1	1.7
Flue gas temperature °F	66.0	62.8	62.7	63.8
Volumetric flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Heptachlorobiphenyls:				
lb/hr	3.02E-06	6.75E-07	1.74E-07	1.29E-06
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Octachlorobiphenyls:				
lb/hr	7.31E-07	7.61E-08	4.13E-08	2.83E-07
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Nonachlorobiphenyls:				
lb/hr	< 1.76E-08	< 2.27E-08	< 1.26E-08	< 1.76E-08
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Decachlorobiphenyls:				
lb/hr	< 1.69E-08	< 5.52E-09	< 6.37E-09	< 9.59E-09
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Total PCBs:				
lb/hr	1.14E-03	6.44E-04	5.00E-04	7.63E-04
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-7
RESULTS SUMMARY PCB EMISSIONS
SCHNITZER STEEL
SHREDDER – LIGHT IRON

Run Number:	4-PCB	5-PCB	6-PCB	Average
Date:	10/30/18	10/30/18	10/31/18	--
Time:	2114-2224	2253-0002	0020-0117, 0153-0208	--
Process Data:				
Material Feed Rate, tph	[redacted]	[redacted]	[redacted]	[redacted]
Material Output, tph				
Ventilation Fan 1 Amps	515	516	515	515
Ventilation Fan 2 Amps	540	540	540	540
Mill Water Spray Flow Rate	28	27	28	28
Pres Decay – Scrubber 1, inWG	29	29	29	29
Pres Decay – Scrubber 2, inWG	24	24	24	24
Flue Gas:				
O_2, % volume dry	21.1	20.7	21.0	20.9
CO_2, % volume dry	0.01	0.04	0.03	0.03
Moisture content, % volume	0.9	0.6	1.7	1.1
Flue gas temperature °F	68.1	67.2	67.2	,67.5
Volumetric flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Chlorobiphenyls:				
lb/hr	1.32E-03	1.56E-03	2.23E-03	1.71E-03
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Dichlorobiphenyls:				
lb/hr	6.21E-03	8.42E-03	1.22E-02	8.96E-03
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Trichlorobiphenyls:				
lb/hr	4.86E-03	8.21E-03	1.13E-02	8.12E-03
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Tetrachlorobiphenyls:				
lb/hr	1.16E-03	2.08E-03	2.27E-03	1.84E-03
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Pentachlorobiphenyls:				
lb/hr	3.50E-04	2.95E-04	1.67E-04	2.71E-04
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Hexachlorobiphenyls:				
lb/hr	1.30E-04	9.20E-05	3.10E-05	8.45E-05
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-8
RESULTS SUMMARY PCB EMISSIONS
SCHNITZER STEEL
SHREDDER – LIGHT IRON

Run Number:	4-PCB	5-PCB	6-PCB	Average
Date:	10/30/18	10/30/18	10/31/18	--
Time:	2114-2224	2253-0002	0020-0117, 0153-0208	--
Process Data:				
Material Feed Rate, tph	[redacted]	[redacted]	[redacted]	[redacted]
Material Output, tph				
Ventilation Fan 1 Amps	515	516	515	515
Ventilation Fan 2 Amps	540	540	540	540
Mill Water Spray Flow Rate	28	27	28	28
Pres Decay – Scrubber 1, inWG	29	29	29	29
Pres Decay – Scrubber 2, inWG	24	24	24	24
Flue Gas:				
O_2, % volume dry	21.1	20.7	21.0	20.9
CO_2, % volume dry	0.01	0.04	0.03	0.03
Moisture content, % volume	0.9	0.6	1.7	1.1
Flue gas temperature °F	68.1	67.2	67.2	,67.5
Volumetric flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Heptachlorobiphenyls:				
lb/hr	1.54E-05	1.59E-05	5.85E-06	1.24E-05
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Octachlorobiphenyls:				
lb/hr	1.63E-06	4.02E-06	1.98E-06	2.54E-06
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Nonachlorobiphenyls:				
lb/hr	3.12E-07	1.17E-06	4.85E-07	6.54E-07
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Decachlorobiphenyls:				
lb/hr	3.89E-08	1.31E-07	5.03E-08	7.33E-08
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Total PCBs:				
lb/hr	1.41E-02	2.07E-02	2.82E-02	2.10E-02
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

APPENDIX A
CALCULATIONS

Appendix A.1
Hexavalent Chromium Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel	*	Test Number	1-Cr
Unit / Location	Steel Shredder	*	Date	10/29/18
Test Method	CARB 425	*	Start / Stop Time	2000-2109

Meter Box Number	CB-22	*	Barometric Press (in Hg)	30.12
Meter Calibration (Yd)	0.9890	*	Meter Volume (acf)	34.613
Stack Area (square feet)	[redacted]	*	Liquid Volume (ml)	24.2
Reference Temperature (°F)	70	*	Meter Temperature (°F)	62.1
Sample Time (Minutes)	60	*	Meter Pressure (iwg)	1.161
Pitot Coefficient	0.8400	*	Velocity Head (iwg)	1.7016
Nozzle Diameter (in)	0.160	*	Static Pressure (iwg)	-0.71
Process Feed, tph	[redacted]	*	Stack Temperature (°F)	66.7
Fuel "HHV" (Btu/scf)	N/A	*	Stack O_2 (%)	20.9
Fuel "F" Factor (dscf/MMBtu)	N/A	*	Stack CO_2 (%)	0.0

a	Standard Sample Volume (dscf)	35.08
b	Water Vapor Volume (scf)	1.145
	Measured moisture fraction, nondimensional	0.032
	Theoretical maximum moisture fraction, nondimensional	0.021
c	Calculated Moisture Fraction (nondimensional)	0.021
d_1	Stack Gas Molecular Weight (dry)	28.841
d_2	Stack Gas Molecular Weight (wet)	28.614
e	Absolute Stack Pressure (in Hg)	30.068
f	Stack Gas Velocity (ft/sec)	[redacted]
g	Stack Flow Rate (acfm)	[redacted]
h_1	Stack Flow Rate (dscfm)	[redacted]
h_2	Stack Flow Rate (wscfm)	[redacted]
i	Isokinetic Ratio (%)	96.4

SOURCE TEST DATA SUMMARY

Client.....	Schnitzer Steel	*	Test Number.....	2-Cr
Unit / Location.....	Steel Shredder	*	Date.....	10/29/18
Test Method.....	CARB 425	*	Start / Stop Time.....	2235-2250, 2331-0024

Meter Box Number.....	CB-22	*	Barometric Press (in Hg).....	30.12
Meter Calibration (Yd).....	0.9890	*	Meter Volume (acf).....	35.276
Stack Area (square feet).....	[redacted]	*	Liquid Volume (ml).....	19.1
Reference Temperature (°F)....	70	*	Meter Temperature (°F).....	61.3
Sample Time (Minutes).....	60	*	Meter Pressure (iwg).....	1.178
Pitot Coefficient	0.8400	*	Velocity Head (iwg).....	1.7261
Nozzle Diameter (in).....	0.160	*	Static Pressure (iwg).....	-0.67
Process Feed, tph.....	[redacted]	*	Stack Temperature (°F).....	64.7
Fuel "HHV" (Btu/scf)……	N/A	*	Stack O_2 (%).....	21.0
Fuel "F" Factor (dscf/MMBtu)	N/A	*	Stack CO_2 (%).....	0.0

a	Standard Sample Volume (dscf).....	35.81
b	Water Vapor Volume (scf).....	0.904
	Measured moisture fraction, nondimensional.....	0.025
	Theoretical maximum moisture fraction, nondimensional.....	0.020
c	Calculated Moisture Fraction (nondimensional).....	0.020
d_1	Stack Gas Molecular Weight (dry).....	28.845
d_2	Stack Gas Molecular Weight (wet).....	28.628
e	Absolute Stack Pressure (Hg).....	30.071
f	Stack Gas Velocity (ft/sec).....	[redacted]
g	Stack Flow Rate (acfm).....	[redacted]
h_1	Stack Flow Rate (dscfm).....	[redacted]
h_2	Stack Flow Rate (wscfm).....	[redacted]
i	Isokinetic Ratio (%).....	97.4

SOURCE TEST DATA SUMMARY

Client.....	Schnitzer Steel	*	Test Number.....	3-Cr
Unit / Location.....	Steel Shredder	*	Date.....	10/30/18
Test Method.....	CARB 425	*	Start / Stop Time.....	0045-0157

Meter Box Number.....	CB-22	*	Barometric Press (in Hg).....	30.12
Meter Calibration (Yd).....	0.9890	*	Meter Volume (acf).....	35.639
Stack Area (square feet).....	[redacted]	*	Liquid Volume (ml).....	19.4
Reference Temperature (°F)....	70	*	Meter Temperature (°F).....	64.4
Sample Time (Minutes).....	60	*	Meter Pressure (iwg).....	1.173
Pitot Coefficient	0.8400	*	Velocity Head (iwg).....	1.7187
Nozzle Diameter (in).....	0.160	*	Static Pressure (iwg).....	-0.66
Process Feed, tph.....	[redacted]	*	Stack Temperature (°F).....	65.3
Fuel "HHV" (Btu/scf)……	N/A	*	Stack O_2 (%).....	21.1
Fuel "F" Factor (dscf/MMBtu)	N/A	*	Stack CO_2 (%).....	0.0

a	Standard Sample Volume (dscf).....	35.96
b	Water Vapor Volume (scf).....	0.918
	Measured moisture fraction, nondimensional.....	0.025
	Theoretical maximum moisture fraction, nondimensional.....	0.021
c	Calculated Moisture Fraction (nondimensional).....	0.021
d_1	Stack Gas Molecular Weight (dry).....	28.847
d_2	Stack Gas Molecular Weight (wet).....	28.619
e	Absolute Stack Pressure (Hg).....	30.071
f	Stack Gas Velocity (ft/sec).....	[redacted]
g	Stack Flow Rate (acfm).....	[redacted]
h_1	Stack Flow Rate (dscfm).....	[redacted]
h_2	Stack Flow Rate (wscfm).....	[redacted]
i	Isokinetic Ratio (%).....	98.2

TOTAL AND HEXAVALENT CHROMIUM
EMISSIONS SUMMARY
Schnitzer Steel
Steel Shredder

REFERENCE TEMP (F):	70	**TEST METHOD:**	CARB 425
DETECTION LIMIT:	0.02 ug/L for Total Cr 4.0 ug/L for Cr (VI)	**ANALYTICAL METHOD:**	IC/PCR for Cr(VI); IC/PMS for Total Cr
		LABORATORY:	Curtis & Tompkins

Test No.	Fractions ug/ sample	Blank, ug	Results ug/ train	O_2, %	CO_2, %	H_2O, %	Vmstd, dscf	Qsd, dscfm	ug/m^3	lb/hr	lb/ton
HEXAVALENT CHROMIUM											
1-Cr-probe/impingers				20.89	0.04	2.10				7.94E-06	
1-Cr-impingers				20.89	0.04	2.10				1.39E-05	
										2.18E-05	
2-Cr-probe/impingers				21.03	0.03	2.00				7.24E-06	
2-Cr-impingers				21.03	0.03	2.00				6.62E-06	
										1.39E-05	
3-Cr-probe/impingers				21.07	0.03	2.10				4.87E-06	
3-Cr-impingers				21.07	0.03	2.10				5.59E-06	
										1.05E-05	
FB-Cr-probe/impingers	ND<			21.00	0.03	2.07				ND< 1.17E-05	ND<
FB-Cr-impingers				21.00	0.03	2.07				3.62E-06	
Method Blank	ND<									**1.54E-05**	
							AVERAGE (Total):			**1.54E-05**	

Per CARB 425 Non-detects are not included in the calculations

CALCULATIONS:
ug/m^3 = ug/train * 35.31/Vmstd
lb/hr = ug/train * lb/454*10^6 ug * Qsd/Vmstd * 60 min/hr

TOTAL AND HEXAVALENT CHROMIUM
EMISSIONS SUMMARY
Schnitzer Steel
Steel Shredder

Test No.:	1-Cr	2-Cr	3-Cr	**Average**	FB-Cr
Date:	10/29/18	10/29/18	10/30/18	--	10/29/18
Time:	2000-2109	2250, 2331-0024	0045-0157	--	
Flow Rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]	--
Sample Volume, dscf	35.08	35.81	35.96	35.62	--
Temperature, ºF	66.7	64.7	65.3	65.5	--
O_2, % volume dry	20.9	21.0	21.1	21.0	--
CO_2, % volume dry	0.04	0.03	0.03	0.03	--
Moisture Content, %	2.1	2.0	2.1	2.1	--
Hexavalent Chromium, Cr^{6+}					
ug/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	2.2E-05	1.4E-05	1.0E-05	1.5E-05	1.5E-05
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Note: Results have not been blank corrected.
< Species not detected at or below the detection limit.

TOTAL AND HEXAVALENT CHROMIUM (BLANK CORRECTED)

EMISSIONS SUMMARY

Schnitzer Steel

Steel Shredder

REFERENCE TEMP (F):	70	**TEST METHOD:**	CARB 425
DETECTION LIMIT:	0.02 ug/L for Total Cr	**ANALYTICAL**	IC/PCR for Cr(VI);
	4.0 ug/L for Cr (VI)	**METHOD:**	IC/PMS for Total Cr
		LABORATORY:	Curtis & Tompkins

Test No.	ug/ L	L/ sample	Blank, ug	Results ug/ train	O_2, %	CO_2, %	H_2O, %	Vmstd, dscf	Qsd, dscfm	ug/m^3	lb/hr	lb/ton
HEXAVALENT CHROMIUM												
1-Cr-probe/impingers	[redacted]	[redacted]	[redacted]	[redacted]	20.89	0.04	3.16	[redacted]				
1-Cr-impingers					20.89	0.04	3.16					
										[redacted]	**6.23E-06**	[redacted]
2-Cr-probe/impingers					21.03	0.03	2.46	[redacted]				
2-Cr-impingers					21.03	0.03	2.46					
										< [redacted]	**< 4.60E-06** <	[redacted]
3-Cr-probe/impingers					21.07	0.03	2.49	[redacted]				
3-Cr-impingers					21.07	0.03	2.49					
										< [redacted]	**< 3.91E-06** <	[redacted]
FB-Cr-probe/impingers					21.00	0.03	2.70	[redacted]				
FB-Cr-impingers					21.00	0.03	2.70					
Method Blank	ND<	[redacted]								[redacted]	**1.53E-05**	[redacted]
										AVERAGE (Total): < [redacted]	**< 4.92E-06** <	[redacted]

Per CARB 425 Non-detects are not included in the calculations

CALCULATIONS:
ug/m^3 = ug/train * 35.31/Vmstd
lb/hr = ug/train * lb/454*10^6 ug * Qsd/Vmstd * 60 min/hr

TOTAL AND HEXAVALENT CHROMIUM (BLANK CORRECTED)
EMISSIONS SUMMARY
Schnitzer Steel
Steel Shredder

Test No.:	1-Cr	2-Cr	3-Cr	**Average**
Date:	10/29/18	10/29/18	10/30/18	--
Time:	2000-2109	2250, 2331-0024	0045-0157	--
Flow Rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Sample Volume, dscf	35.08	35.81	35.96	35.62
Temperature, ºF	66.7	64.7	65.3	65.5
O_2, % volume dry	20.9	21.0	21.1	21.0
CO_2, % volume dry	0.04	0.03	0.03	0.03
Moisture Content, %	3.2	2.5	2.5	2.7
Hexavalent Chromium, Cr^{6+}				
ug/m3	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	6.2E-06 <	4.6E-06 <	3.9E-06 <	4.9E-06
lb/ton	[redacted]			[redacted]

Note: Results have been blank corrected.
< Species not detected at or below the detection limit.

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel	*	Test Number	4-Cr
Unit / Location	Steel Shredder	*	Date	10/30/18
Test Method	CARB 425	*	Start / Stop Time	2114-2224

Meter Box Number	CB-22	*	Barometric Press (in Hg)	30.09
Meter Calibration (Yd)	0.9890	*	Meter Volume (acf)	35.935
Stack Area (square feet)	[redacted]	*	Liquid Volume (ml)	23.0
Reference Temperature (°F)	70	*	Meter Temperature (°F)	62.6
Sample Time (Minutes)	60	*	Meter Pressure (iwg)	1.193
Pitot Coefficient	0.8400	*	Velocity Head (iwg)	1.6923
Nozzle Diameter (in)	0.160	*	Static Pressure (iwg)	-0.61
Process Feed, tph	[redacted]	*	Stack Temperature (°F)	69.5
Fuel "HHV" (Btu/scf)	N/A	*	Stack O_2 (%)	21.1
Fuel "F" Factor (dscf/MMBtu)	N/A	*	Stack CO_2 (%)	0.0

a	Standard Sample Volume (dscf)	36.36
b	Water Vapor Volume (scf)	1.089
	Moisture Fraction (nondimensional)	0.0291
	Theoretical maximum moisture fraction, nondimensional	0.0240
c	Calculated Moisture Fraction (nondimensional)	0.0240
d_1	Stack Gas Molecular Weight (dry)	28.844
d_2	Stack Gas Molecular Weight (wet)	28.584
e	Absolute Stack Pressure (in Hg)	30.045
f	Stack Gas Velocity (ft/sec)	[redacted]
g	Stack Flow Rate (acfm)	[redacted]
h_1	Stack Flow Rate (dscfm)	[redacted]
h_2	Stack Flow Rate (wscfm)	[redacted]
i	Isokinetic Ratio (%)	100.7

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel	*	Test Number	5-Cr
Unit / Location	Steel Shredder	*	Date	10/30/18
Test Method	CARB 425	*	Start / Stop Time	2028-2146

Meter Box Number	CB-22	*	Barometric Press (in Hg)	30.09
Meter Calibration (Yd)	0.9890	*	Meter Volume (acf)	35.503
Stack Area (square feet)	[redacted]	*	Liquid Volume (ml)	18.1
Reference Temperature (°F)	70	*	Meter Temperature (°F)	67.1
Sample Time (Minutes)	60	*	Meter Pressure (iwg)	1.161
Pitot Coefficient	0.8400	*	Velocity Head (iwg)	1.6440
Nozzle Diameter (in)	0.160	*	Static Pressure (iwg)	-0.61
Process Feed, tph	[redacted]	*	Stack Temperature (°F)	68.8
Fuel "HHV" (Btu/scf)	N/A	*	Stack O_2 (%)	20.7
Fuel "F" Factor (dscf/MMBtu)	N/A	*	Stack CO_2 (%)	0.0

a	Standard Sample Volume (dscf)	35.61
b	Water Vapor Volume (scf)	0.857
	Moisture Fraction (nondimensional)	0.0235
	Theoretical maximum moisture fraction, nondimensional	0.0230
c	Calculated Moisture Fraction (nondimensional)	0.0230
d_1	Stack Gas Molecular Weight (dry)	28.836
d_2	Stack Gas Molecular Weight (wet)	28.586
e	Absolute Stack Pressure (Hg)	30.045
f	Stack Gas Velocity (ft/sec)	[redacted]
g	Stack Flow Rate (acfm)	[redacted]
h_1	Stack Flow Rate (dscfm)	[redacted]
h_2	Stack Flow Rate (wscfm)	[redacted]
i	Isokinetic Ratio (%)	99.9

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel	*	Test Number	6-Cr
Unit / Location	Steel Shredder	*	Date	10/31/18
Test Method	CARB 425	*	Start / Stop Time	0020-0120, 0153-0208

Meter Box Number	CB-22	*	Barometric Press (in Hg)	30.09
Meter Calibration (Yd)	0.9890	*	Meter Volume (acf)	36.499
Stack Area (square feet)	[redacted]	*	Liquid Volume (ml)	21.6
Reference Temperature (°F)	70	*	Meter Temperature (°F)	66.6
Sample Time (Minutes)	60	*	Meter Pressure (iwg)	1.172
Pitot Coefficient	0.8400	*	Velocity Head (iwg)	1.6614
Nozzle Diameter (in)	0.160	*	Static Pressure (iwg)	-0.61
Process Feed, tph	[redacted]	*	Stack Temperature (°F)	69.6
Fuel "HHV" (Btu/scf)	N/A	*	Stack O_2 (%)	21.0
Fuel "F" Factor (dscf/MMBtu)	N/A	*	Stack CO_2 (%)	0.0

a	Standard Sample Volume (dscf)	36.65
b	Water Vapor Volume (scf)	1.022
	Moisture Fraction (nondimensional)	0.0271
	Theoretical maximum moisture fraction, nondimensional	0.0240
c	Calculated Moisture Fraction (nondimensional)	0.0240
d_1	Stack Gas Molecular Weight (dry)	28.845
d_2	Stack Gas Molecular Weight (wet)	28.584
e	Absolute Stack Pressure (Hg)	30.045
f	Stack Gas Velocity (ft/sec)	[redacted]
g	Stack Flow Rate (acfm)	[redacted]
h_1	Stack Flow Rate (dscfm)	[redacted]
h_2	Stack Flow Rate (wscfm)	[redacted]
i	Isokinetic Ratio (%)	102.4

TOTAL AND HEXAVALENT CHROMIUM
EMISSIONS SUMMARY
Schnitzer Steel
Steel Shredder

REFERENCE TEMP (F):	70	**TEST METHOD:**	CARB 425
DETECTION LIMIT:	0.02 ug/L for Total Cr 4.0 ug/L for Cr (VI)	**ANALYTICAL METHOD:**	IC/PCR for Cr(VI); IC/PMS for Total Cr
		LABORATORY:	Curtis & Tompkins

Test No.	Fractions ug/ sample	Blank, ug	Results ug/ train	O_2, %	CO_2, %	H_2O, %	Vmstd, dscf	Qsd, dscfm	ug/m^3	lb/hr	lb/ton
HEXAVALENT CHROMIUM											
1-Cr-probe/impingers				21.06	0.01	2.40				5.15E-06	
1-Cr-impingers				21.06	0.01	2.40				6.15E-06	
										1.13E-05	
2-Cr-probe/impingers				20.72	0.04	2.30				5.29E-06	
2-Cr-impingers				20.72	0.04	2.30				7.06E-06	
										1.24E-05	
3-Cr-probe/impingers				21.01	0.03	2.40				5.75E-06	
3-Cr-impingers				21.01	0.03	2.40				4.77E-06	
										1.05E-05	
FB-Cr-probe/impingers	ND<			20.93	0.03	2.37				ND< 1.13E-05	ND<
FB-Cr-impingers				20.93	0.03	2.37				3.49E-06	
Method Blank	ND<									**1.48E-05**	
							AVERAGE (Total):			**1.14E-05**	

Per CARB 425 Non-detects are not included in the calculations

CALCULATIONS:
ug/m^3 = ug/train * 35.31/Vmstd
lb/hr = ug/train * lb/454*10^6 ug * Qsd/Vmstd * 60 min/hr

TOTAL AND HEXAVALENT CHROMIUM
EMISSIONS SUMMARY
Schnitzer Steel
Steel Shredder

Test No.:	4-Cr	5-Cr	6-Cr	**Average**	FB-Cr
Date:	10/30/18	10/30/18	10/31/18	--	10/29/18
Time:	2114-2224	2028-2146	120, 015	--	
Flow Rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]	--
Sample Volume, dscf	36.36	35.61	36.65	36.20	--
Temperature, ºF	69.5	68.8	69.6	69.3	--
O_2, % volume dry	21.1	20.7	21.0	20.9	--
CO_2, % volume dry	0.01	0.04	0.03	0.03	--
Moisture Content, %	2.4	2.3	2.4	2.4	--
Hexavalent Chromium, Cr^{6+}					
ug/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	1.1E-05	1.2E-05	1.1E-05	1.1E-05	1.5E-05
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Note: Results have not been blank corrected.
< Species not detected at or below the detection limit.

TOTAL AND HEXAVALENT CHROMIUM (BLANK CORRECTED)
EMISSIONS SUMMARY
Schnitzer Steel
Steel Shredder

REFERENCE TEMP (F):	70	**TEST METHOD:**	CARB 425
DETECTION LIMIT:	0.02 ug/L for Total Cr 4.0 ug/L for Cr (VI)	**ANALYTICAL METHOD:**	IC/PCR for Cr(VI); IC/PMS for Total Cr
		LABORATORY:	Curtis & Tompkins

Test No.	ug/ L	L/ sample	Blank, ug	Results ug/ train	O_2, %	CO_2, %	H_2O, %	Vmstd, dscf	Qsd, dscfm	ug/m^3	lb/hr	lb/ton
HEXAVALENT CHROMIUM												
1-Cr-probe/impingers	[redacted]	[redacted]	[redacted]	[redacted]	21.06	0.01	2.91	[redacted]				
1-Cr-impingers					21.06	0.01	2.91					
										[redacted]	< **3.85E-06** <	[redacted]
2-Cr-probe/impingers					20.72	0.04	2.35	[redacted]				
2-Cr-impingers					20.72	0.04	2.35					
										[redacted]	< **3.75E-06** <	[redacted]
3-Cr-probe/impingers					21.01	0.03	2.71	[redacted]				
3-Cr-impingers					21.01	0.03	2.71					
										[redacted]	< **4.01E-06** <	[redacted]
FB-Cr-probe/impingers					20.93	0.03	2.66	[redacted]				
FB-Cr-impingers					20.93	0.03	2.66					
Method Blank											**1.48E-05**	[redacted]
AVERAGE (Total):										< [redacted]	< **3.87E-06** <	[redacted]

Per CARB 425 Non-detects are not included in the calculations

CALCULATIONS:
ug/m^3 = ug/train * 35.31/Vmstd
lb/hr = ug/train * lb/454*10^6 ug * Qsd/Vmstd * 60 min/hr

OTAL AND HEXAVALENT CHROMIUM (BLANK CORRECTE

EMISSIONS SUMMARY

Schnitzer Steel

Steel Shredder

Test No.:	4-Cr	5-Cr	6-Cr	Average
Date:	10/30/18	10/30/18	10/31/18	--
Time:	2114-2224	2028-2146	120, 015	--
Flow Rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Sample Volume, dscf	36.36	35.61	36.65	36.20
Temperature, ºF	69.5	68.8	69.6	69.3
O_2, % volume dry	21.1	20.7	21.0	20.9
CO_2, % volume dry	0.01	0.04	0.03	0.03
Moisture Content, %	2.9	2.3	2.7	2.7
Hexavalent Chromium, Cr^{6+}				
ug/m3	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	< 3.9E-06	< 3.7E-06	< 4.0E-06	< 3.9E-06
lb/ton	[redacted]			

Note: Results have been blank corrected.

< Species not detected at or below the detection limit.

Appendix A.2
Benzene Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Reference temperature, °F	70

Test number	1-TO15	2-TO15	3-TO15	Average
Date	10/29/18	10/29/18	10/30/18	--
Start / Stop time	2000-2100	2235-2251,2331-0014	0045-0145	--
Feed Rate, tons/hour	[redacted]	[redacted]	[redacted]	[redacted]
SAMPLE TRAIN DATA				
Meter box number/ID	CB-22	CB-22	CB-22	--
Sample time, minutes	60.0	60.0	60.0	60.0
Pitot coefficient	0.84	0.84	0.84	0.84
Meter calibration, Yd	0.989	0.989	0.989	0.989
Barometric pressure, in Hg	30.12	30.12	30.12	30.12
Meter box volume, acf	34.613	35.276	35.639	35.176
Impinger liquid volume, ml	24.2	19.1	19.4	20.9
Meter temperature, °F	62.1	61.3	64.4	62.6
Meter pressure, (Delta H) iwg	1.16	1.18	1.17	1.17
Velocity head, (Delta P) iwg	1.702	1.726	1.719	1.715
Static pressure, iwg	-0.71	-0.67	-0.66	-0.68
Stack temperature, °F	66.7	64.7	65.3	65.5
ANALYZER DATA				
O_2, % volume dry	20.9	21.0	21.1	21.0
CO_2, % volume dry	0.04	0.03	0.03	0.03
VOLUMETRIC FLOW RATE				
Standard sample volume, dscf	35.082	35.810	35.964	35.619
Water vapor volume, scf	1.145	0.904	0.918	0.9892
Measured moisture fraction, nondimensional	0.032	0.025	0.025	0.027
Theoretical maximum moisture fraction, nondir	0.021	0.020	0.021	0.021
Calculated Moisture Fraction (nondimensional)	0.021	0.020	0.021	0.021
Moisture fraction %	2.1%	2.0%	2.1%	2.1%
Stack gas molecular weight, dry	28.841	28.845	28.847	28.845
Stack gas molecular weight, wet	28.614	28.628	28.619	28.620
Absolute stack pressure, in Hg	30.068	30.071	30.071	30.070
Stack gas velocity, ft/sec	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, acfm	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, wscfm	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, dscfm - from CR runs	[redacted]	[redacted]	[redacted]	[redacted]

Emissions Results

SOURCE TEST DATA SUMMARY

Client				Schnitzer Steel
Unit / Location				Shredder
Stack area, square feet				[redacted]
Reference temperature, °F				70
Test number	1-TO15	2-TO15	3-TO15	Average
Date	10/29/18	10/29/18	10/30/18	--
Start / Stop time	2000-2100	2235-2251,2331-0014	0045-0145	--
Benzene				
ppm	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	N/A	0.037	0.048	0.043
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Reference temperature, °F	70

Test number	4-TO15	5-TO15	6-TO15	Average
Date	10/30/18	10/30/18	10/31/18	--
Start / Stop time	2114-2214	2253-2353	0020-0120	--
Feed Rate, tons/hour	[redacted]	[redacted]	[redacted]	[redacted]
SAMPLE TRAIN DATA				
Meter box number/ID	CB-22	CB-22	CB-22	--
Sample time, minutes	60.0	60.0	60.0	60.0
Pitot coefficient	0.84	0.84	0.84	0.84
Meter calibration, Yd	0.989	0.989	0.989	0.989
Barometric pressure, in Hg	30.09	30.09	30.09	30.09
Meter box volume, acf	35.935	35.503	36.499	35.979
Impinger liquid volume, ml	23.0	18.1	21.6	20.9
Meter temperature, °F	62.6	67.1	66.6	65.4
Meter pressure, (Delta H) iwg	1.19	1.16	1.17	1.18
Velocity head, (Delta P) iwg	1.692	1.644	1.661	1.666
Static pressure, iwg	-0.61	-0.61	-0.61	-0.61
Stack temperature, °F	69.5	68.8	69.6	69.3
ANALYZER DATA				
O_2, % volume dry	21.1	20.7	21.0	20.9
CO_2, % volume dry	0.01	0.04	0.03	0.03
VOLUMETRIC FLOW RATE				
Standard sample volume, dscf	36.357	35.607	36.645	36.203
Water vapor volume, scf	1.089	0.857	1.022	0.9892
Measured moisture fraction, nondimensional	0.029	0.023	0.027	0.027
Theoretical maximum moisture fraction, nondir	0.024	0.023	0.024	0.024
Calculated Moisture Fraction (nondimensional)	0.024	0.023	0.024	0.024
Moisture fraction %	2.4%	2.3%	2.4%	2.4%
Stack gas molecular weight, dry	28.844	28.836	28.845	28.841
Stack gas molecular weight, wet	28.584	28.586	28.584	28.585
Absolute stack pressure, in Hg	30.045	30.045	30.045	30.045
Stack gas velocity, ft/sec	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, acfm	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, wscfm	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, dscfm - from CR runs	[redacted]	[redacted]	[redacted]	[redacted]

Emissions Results

SOURCE TEST DATA SUMMARY

Client						Schnitzer Steel
Unit / Location						Shredder
Stack area, square feet						[redacted]
Reference temperature, °F						70
Test number	4-TO15	5-TO15		6-TO15		Average
Date	10/30/18	10/30/18		10/31/18		--
Start / Stop time	2114-2214	2253-2353		0020-0120		--
Benzene						
ppm	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	1.4E-02	5.1E-03	<	3.5E-03	<	7.5E-03
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Appendix A.3
Total Organic Carbon Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Reference temperature, °F	70

Test number	1-TO15	2-TO15	3-TO15	Average
Date	10/29/18	10/29/18	10/30/18	--
Start / Stop time	2000-2100	2235-2251,2331-0014	0045-0145	--
Feed Rate, tons/hour	[redacted]	[redacted]	[redacted]	[redacted]
SAMPLE TRAIN DATA				
Meter box number/ID	CB-22	CB-22	CB-22	--
Nozzle diameter, inches	0.160	0.160	0.160	0.160
Sample time, minutes	60.0	60.0	60.0	60.0
Pitot coefficient	0.84	0.84	0.84	0.84
Meter calibration, Yd	0.989	0.989	0.989	0.989
Barometric pressure, in Hg	30.12	30.12	30.12	30.12
Meter box volume, acf	34.613	35.276	35.639	35.176
Impinger liquid volume, ml	24.2	19.1	19.4	20.9
Meter temperature, °F	62.1	61.3	64.4	62.6
Meter pressure, (Delta H) iwg	1.16	1.18	1.17	1.17
Velocity head, (Delta P) iwg	1.702	1.726	1.719	1.715
Static pressure, iwg	-0.71	-0.67	-0.66	-0.68
Stack temperature, °F	66.7	64.7	65.3	65.5
ANALYZER DATA				
O_2, % volume dry	20.9	21.0	21.1	21.0
CO_2, % volume dry	0.04	0.03	0.03	0.03
THC, ppmv wet as Propane	[redacted]	[redacted]	[redacted]	[redacted]
SUMMA CANISTER DATA				
M25C:TNMOC, ppmvd as C	[redacted]	[redacted]	[redacted]	[redacted]
TO-12M: TNMNEOC, ppmvd as C	[redacted]	[redacted]	[redacted]	[redacted]
Methane, ppmvd as C	[redacted]	[redacted]	[redacted]	[redacted]
Ethane, ppmvd	[redacted]	[redacted]	[redacted]	[redacted]
VOLUMETRIC FLOW RATE				
Standard sample volume, dscf	35.082	35.810	35.964	35.619
Water vapor volume, scf	1.145	0.904	0.918	0.9892
Measured moisture fraction, nondimensional	0.032	0.025	0.025	0.027
Theoretical maximum moisture fraction, nondimens	0.021	0.020	0.021	0.021
Calculated Moisture Fraction (nondimensional)	0.021	0.020	0.021	0.021
Moisture fraction %	2.1%	2.0%	2.1%	2.1%
Stack gas molecular weight, dry	28.841	28.845	28.847	28.845
Stack gas molecular weight, wet	28.614	28.628	28.619	28.620
Absolute stack pressure, in Hg	30.068	30.071	30.071	30.070
Stack gas velocity, ft/sec	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, acfm	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, wscfm	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, dscfm - from CR runs	[redacted]	[redacted]	[redacted]	[redacted]

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Reference temperature, °F	70

Test number	1-TO15	2-TO15	3-TO15	Average
Date	10/29/18	10/29/18	10/30/18	--
Start / Stop time	2000-2100	2235-2251,2331-0014	0045-0145	--

Emissions Results

M25A: POC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	186	212	154	184
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25A: NMOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	N/A	212	154	183
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25A: NMNEOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	N/A	212	154	183
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25C: NMOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	N/A	5.40	7.68	6.54
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25C: NMNEOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	N/A	5.40	7.67	6.53
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
TO-12: NMNEOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	N/A	4.22	6.77	5.50
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Reference temperature, °F	70

Test number	4-VOC	5-VOC	6-VOC	Average
Date	10/30/18	10/30/18	10/31/18	--
Start / Stop time	2114-2214	2253-2353	0020-0120	--
Feed Rate, tons/hour	[redacted]	[redacted]	[redacted]	[redacted]
SAMPLE TRAIN DATA				
Meter box number/ID	CB-22	CB-22	CB-22	--
Sample time, minutes	60.0	60.0	60.0	60.0
Pitot coefficient	0.84	0.84	0.84	0.84
Meter calibration, Yd	0.989	0.989	0.989	0.989
Barometric pressure, in Hg	30.09	30.09	30.09	30.09
Meter box volume, acf	35.935	35.503	36.499	35.979
Impinger liquid volume, ml	23.0	18.1	21.6	20.9
Meter temperature, °F	62.6	67.1	66.6	65.4
Meter pressure, (Delta H) iwg	1.19	1.16	1.17	1.18
Velocity head, (Delta P) iwg	1.692	1.644	1.661	1.666
Static pressure, iwg	-0.61	-0.61	-0.61	-0.61
Stack temperature, °F	69.5	68.8	69.6	69.3
ANALYZER DATA				
O_2, % volume dry	21.1	20.7	21.0	20.9
CO_2, % volume dry	0.01	0.04	0.03	0.03
THC, ppmv wet as Propane	[redacted]	[redacted]	[redacted]	[redacted]
SUMMA CANISTER DATA				
M25C:TNMOC, ppmvd as C	[redacted]	[redacted]	[redacted]	[redacted]
TO-12M: TNMNEOC, ppmvd as C	[redacted]	[redacted]	[redacted]	[redacted]
Methane, ppmvd as C	< [redacted]	[redacted]	[redacted]	[redacted]
Ethane, ppmvd	[redacted]	[redacted]	[redacted]	[redacted]
VOLUMETRIC FLOW RATE				
Standard sample volume, dscf	36.357	35.607	36.645	36.203
Water vapor volume, scf	1.089	0.857	1.022	0.9892
Measured moisture fraction, nondimensional	0.029	0.023	0.027	0.027
Theoretical maximum moisture fraction, nondir	0.024	0.023	0.024	0.024
Calculated Moisture Fraction (nondimensional)	0.024	0.023	0.024	0.024
Moisture fraction %	2.4%	2.3%	2.4%	2.4%
Stack gas molecular weight, dry	28.844	28.836	28.845	28.841
Stack gas molecular weight, wet	28.584	28.586	28.584	28.585
Absolute stack pressure, in Hg	30.045	30.045	30.045	30.045
Stack gas velocity, ft/sec	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, acfm	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, wscfm	[redacted]	[redacted]	[redacted]	[redacted]
Stack flow rate, dscfm - from CR runs	[redacted]	[redacted]	[redacted]	[redacted]

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Reference temperature, °F	70

Test number	4-VOC	5-VOC	6-VOC	Average
Date	10/30/18	10/30/18	10/31/18	--
Start / Stop time	2114-2214	2253-2353	0020-0120	--

Emissions Results

M25A: POC							
ppmvd as CH4	[redacted]		[redacted]		[redacted]		[redacted]
lb/hr	81		84		93		86
lb/ton	[redacted]		[redacted]		[redacted]		[redacted]
M25A: NMOC							
ppmvd as CH4	[redacted]		[redacted]		[redacted]		[redacted]
lb/hr	81		84		93		86
lb/ton	[redacted]		[redacted]		[redacted]		[redacted]
M25A: NMNEOC							
ppmvd as CH4	[redacted]		[redacted]		[redacted]		[redacted]
lb/hr	81		84		93		86
lb/ton	[redacted]		[redacted]		[redacted]		[redacted]
M25C: NMOC							
ppmvd as CH4	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	14.55		8.01	<	2.17	<	8.24
lb/ton	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
M25C: NMNEOC							
ppmvd as CH4	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	14.5		7.98	<	2.15	<	8.21
lb/ton	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
TO-12: NMNEOC							
ppmvd as CH4	[redacted]		[redacted]		[redacted]		[redacted]
lb/hr	7.15		2.66		1.24		3.69
lb/ton	[redacted]		[redacted]		[redacted]		[redacted]

Appendix A.4
PolyChlorinated Biphenyl Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Regulation District	Bay Area
Reference temperature, °F	70

	Test number	Method Blank	1-PCB	2-PCB	3-PCB	Average
	Date	--	10/29/18	10/29/18	10/30/18	--
	Start / Stop time	--	2000-2108	2235-2250,2331-0023	0045-0158	--
	Feed Rate, tons/hour[1]	--	[redacted]	[redacted]	[redacted]	[redacted]
	SAMPLE TRAIN DATA					
	Meter box number/ID	--	CB-14	CB-14	CB-14	--
	Nozzle diameter, inches	--	0.160	0.160	0.160	0.160
	Sample time, minutes	--	60.0	60.0	60.0	60.0
	Pitot coefficient	--	0.84	0.84	0.84	0.8400
	Meter calibration, Yd	--	1.0140	1.0140	1.0140	1.0140
	Barometric pressure, in Hg	--	30.12	30.12	30.12	30.12
	Meter box volume, acf	--	34.193	27.873	30.880	30.982
	Impinger liquid volume, ml	--	12.9	14.2	7.8	11.63
	Meter temperature, °F	--	57.5	56.5	55.9	56.6
	Meter pressure, (Delta H) iwg	--	1.16	0.78	0.98	0.975
	Velocity head, (Delta P) iwg	--	1.710	1.144	1.418	1.4243
	Static pressure, iwg	--	-0.73	-0.67	-0.66	-0.69
	Stack temperature, °F	--	66.0	62.8	62.7	63.8
	ANALYZER DATA					
	O_2, % volume dry	--	20.9	21.0	21.1	21.0
	CO_2, % volume dry	--	0.04	0.03	0.03	0.03
	VOLUMETRIC FLOW RATE					
1a	Standard sample volume, dscf	--	35.852	29.252	32.460	32.521
1b	Water vapor volume, scf	--	0.611	0.672	0.369	0.5506
	Measured Moisture fraction, nondimensional	--	0.017	0.022	0.011	0.0168
	Theoretical maximum moisture fraction, nondimensional	--	0.021	0.019	0.019	0.0197
1c	Calculated Moisture Fraction (nondimensional)	--	0.017	0.019	0.011	0.0157
	Moisture fraction %	--	1.7%	1.9%	1.1%	1.6%
1d	Stack gas molecular weight, dry	--	28.841	28.845	28.847	28.845
1e	Stack gas molecular weight, wet	--	28.660	28.639	28.725	28.675
1f	Absolute stack pressure, in Hg	--	30.066	30.071	30.071	30.070
1g	Stack gas velocity, ft/sec	--	[redacted]	[redacted]	[redacted]	[redacted]
1h	Stack flow rate, acfm	--	[redacted]	[redacted]	[redacted]	[redacted]
1i	Stack Flow Rate (wscfm)	--	[redacted]	[redacted]	[redacted]	[redacted]
1j	Stack flow rate - based on pitot, dscfm	--	[redacted]	[redacted]	[redacted]	[redacted]
	Stack flow rate - baseed on pitot, dscfm (Runs 5 & 6 from Cr Tests)	--	[redacted]	[redacted]	[redacted]	[redacted]
	Isokinetic Ratio (%)	--	97.8	97.5	96.5	97.3
	LAB RESULTS					
	Chlorobiphenyls, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Dichlorobiphenyls, ng					
	Trichlorobiphenyls, ng					
	Tetrachlorobiphenyls, ng					
	Pentachlorobiphenyls, ng					
	Hexachlorobiphenyls, ng					
	Heptachlorobiphenyls, ng					
	Octachlorobiphenyls, ng					
	Nonachlorobiphenyls, ng					
	Decachlorobiphenyl, ng					
	Total PCBs, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Regulation District	Bay Area
Reference temperature, °F	70

Test number	Method Blank	1-PCB	2-PCB	3-PCB	Average
Date	--	10/29/18	10/29/18	10/30/18	--
Start / Stop time	--	2000-2108	2235-2250,2331-0023	0045-0158	--
EMISSIONS					
Chlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Chlorobiphenyls, lb/hr	< *6.97E-09*	2.98E-05	1.69E-05	1.10E-05	1.92E-05
Chlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dichlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dichlorobiphenyls, lb/hr	< *2.16E-08*	3.23E-04	2.05E-04	1.72E-04	2.33E-04
Dichlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Trichlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Trichlorobiphenyls, lb/hr	< *5.42E-09*	6.18E-04	3.32E-04	2.31E-04	3.94E-04
Trichlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Tetrachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Tetrachlorobiphenyls, lb/hr	< *7.24E-09*	1.48E-04	8.04E-05	7.69E-05	1.02E-04
Tetrachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Pentachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Pentachlorobiphenyls, lb/hr	< *1.18E-08*	1.49E-05	9.39E-06	7.36E-06	1.05E-05
Pentachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Hexachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Hexachlorobiphenyls, lb/hr	< *8.58E-09*	4.63E-06	1.98E-06	1.16E-06	2.59E-06
Hexachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Heptachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Heptachlorobiphenyls, lb/hr	< *3.89E-09*	3.02E-06	6.75E-07	1.74E-07	1.29E-06
Heptachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Octachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Octachlorobiphenyls, lb/hr	< *5.74E-09*	7.31E-07	7.61E-08	4.13E-08	2.83E-07
Octachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Nonachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Nonachlorobiphenyls, lb/hr	< *4.59E-09*	< 1.76E-08	< 2.27E-08	< 1.26E-08	< 1.76E-08
Nonachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Decachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Decachlorobiphenyls, lb/hr	< *3.07E-09*	< 1.69E-08	< 5.52E-09	< 6.37E-09	< 9.59E-09
Decachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total PCBs, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total PCBs, lb/hr	< *2.16E-08*	1.14E-03	6.44E-04	5.00E-04	7.63E-04
Total PCBs, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Regulation District	Bay Area
Reference temperature, °F	70

	Test number	Method Blank	4-PCB	5-PCB	6-PCB	Average
	Date	--	10/30/18	10/30/18	10/31/18	--
	Start / Stop time	--	2114-2224	2253-0002	0020-0117,0153-0208	--
	Feed Rate, tons/hour[1]	--	[redacted]	[redacted]	[redacted]	[redacted]
	SAMPLE TRAIN DATA					
	Meter box number/ID	--	CB-14	CB-14	CB-14	--
	Nozzle diameter, inches	--	0.160	0.160	0.160	0.160
	Sample time, minutes	--	60.0	60.0	60.0	60.0
	Pitot coefficient	--	0.84	0.84	0.84	0.8400
	Meter calibration, Yd	--	1.0140	1.0140	1.0140	1.0140
	Barometric pressure, in Hg	--	30.09	30.09	30.09	30.09
	Meter box volume, acf	--	34.019	34.121	35.220	34.453
	Impinger liquid volume, ml	--	7.1	4.9	13.6	8.53
	Meter temperature, °F	--	57.7	59.1	57.6	58.1
	Meter pressure, (Delta H) iwg	--	1.19	1.21	1.23	1.208
	Velocity head, (Delta P) iwg	--	1.693	1.717	1.742	1.7174
	Static pressure, iwg	--	-0.61	-0.61	-0.61	-0.61
	Stack temperature, °F	--	68.1	67.2	67.2	67.5
	ANALYZER DATA					
	O_2, % volume dry	--	21.1	20.7	21.0	20.9
	CO_2, % volume dry	--	0.01	0.04	0.03	0.03
	VOLUMETRIC FLOW RATE					
1a	Standard sample volume, dscf	--	35.619	35.631	36.887	36.045
1b	Water vapor volume, scf	--	0.336	0.232	0.644	0.4039
	Measured Moisture fraction, nondimensional	--	0.009	0.006	0.017	0.0110
	Theoretical maximum moisture fraction, nondimensional	--	0.023	0.022	0.022	0.0223
1c	Calculated Moisture Fraction (nondimensional)	--	0.009	0.006	0.017	0.011
	Moisture fraction %	--	0.9%	0.6%	1.7%	1.1%
1d	Stack gas molecular weight, dry	--	28.844	28.836	28.845	28.841
1e	Stack gas molecular weight, wet	--	28.743	28.765	28.659	28.722
1f	Absolute stack pressure, in Hg	--	30.045	30.045	30.045	30.045
1g	Stack gas velocity, ft/sec	--	[redacted]	[redacted]	[redacted]	[redacted]
1h	Stack flow rate, acfm	--	[redacted]	[redacted]	[redacted]	[redacted]
1i	Stack Flow Rate (wscfm)	--	[redacted]	[redacted]	[redacted]	[redacted]
	Stack flow rate - based on pitot, dscfm	--	[redacted]	[redacted]	[redacted]	[redacted]
	Isokinetic Ratio (%)	--	97.3	96.3	99.9	97.9
	LAB RESULTS					
	Chlorobiphenyls, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Dichlorobiphenyls, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Trichlorobiphenyls, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Tetrachlorobiphenyls, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Pentachlorobiphenyls, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Hexachlorobiphenyls, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Heptachlorobiphenyls, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Octachlorobiphenyls, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Nonachlorobiphenyls, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Decachlorobiphenyl, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Total PCBs, ng	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Regulation District	Bay Area
Reference temperature, °F	70

	Method Blank	4-PCB	5-PCB	6-PCB	Average
Test number	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Date	--	10/30/18	10/30/18	10/31/18	--
Start / Stop time	--	2114-2224	2253-0002	0020-0117,0153-0208	--
EMISSIONS					
Chlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Chlorobiphenyls, lb/hr	*< 6.43E-09*	1.32E-03	1.56E-03	2.23E-03	1.71E-03
Chlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dichlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dichlorobiphenyls, lb/hr	< 1.99E-08	6.21E-03	8.42E-03	1.22E-02	8.96E-03
Dichlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Trichlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Trichlorobiphenyls, lb/hr	*< 5.01E-09*	4.86E-03	8.21E-03	1.13E-02	8.12E-03
Trichlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Tetrachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Tetrachlorobiphenyls, lb/hr	*< 6.69E-09*	1.16E-03	2.08E-03	2.27E-03	1.84E-03
Tetrachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Pentachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Pentachlorobiphenyls, lb/hr	*< 1.09E-08*	3.50E-04	2.95E-04	1.67E-04	2.71E-04
Pentachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Hexachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Hexachlorobiphenyls, lb/hr	*< 7.93E-09*	1.30E-04	9.20E-05	3.10E-05	8.45E-05
Hexachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Heptachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Heptachlorobiphenyls, lb/hr	*< 3.59E-09*	1.54E-05	1.59E-05	5.85E-06	1.24E-05
Heptachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Octachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Octachlorobiphenyls, lb/hr	*< 5.30E-09*	1.63E-06	4.02E-06	1.98E-06	2.54E-06
Octachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Nonachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Nonachlorobiphenyls, lb/hr	*< 4.24E-09*	3.12E-07	1.17E-06	4.85E-07	6.54E-07
Nonachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Decachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Decachlorobiphenyls, lb/hr	*< 2.84E-09*	3.89E-08	1.31E-07	5.03E-08	7.33E-08
Decachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total PCBs, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total PCBs, lb/hr	*< 1.99E-08*	1.41E-02	2.07E-02	2.82E-02	2.10E-02
Total PCBs, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Appendix A.5
Example Calculations

EXAMPLE CALCULATIONS
STACK GAS VOLUMETRIC FLOW RATE

Project name: Schnitzer Steel **Project number:** 452603

Computed by: Katie Resch **Calculation date:** 12/18/18

Run number: 4-Cr

SAMPLE TRAIN DATA

Meter calibration factor, Y_d	0.989	Y
Stack area, square feet	[redacted]	A_s
Pitot Coefficient	0.84	C_p
Barometric pressure, in Hg	30.09	P_{bar}
Meter box volume, acf	35.935	V_m
Impinger liquid volume, g	23.0	V_{lc}
Meter temperature, °R	522.6	T_m = (°F plus 460)
Meter pressure, (delta H) iwg	1.193	ΔH
Velocity head, (delta P) iwg	1.6923	ΔP
Static pressure, iwg	-0.61	P_{sg}
Stack temperature, °R	529.5	T_s = (°F plus 460)
Stack O_2, % volume dry	21.1	O_2
Stack CO_2, % volume dry	0	CO_2
Stack N_2, % volume dry	78.9	N_2 = (100- % O_2 - % CO_2)
Nozzle area, square feet	—	$A_n = \pi \left(\frac{D_n}{2}\right)^2 \left(\frac{1\ ft}{12\ in}\right)^2$
PM sampling time, minutes	60	Θ
Reference temperature, °R	530	T_{std} (°F plus 460)

Note: The results calculated in the pages that follow may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

1. VOLUMETRIC FLOW RATE

a. Standard sample gas volume, dscf

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

$$V_{m\,std} = (35.935)(0.989)\frac{(530)\left[30.09 + \left(\frac{1.193}{13.6}\right)\right]}{(522.6)(29.92)}$$

$V_{m\,std}$ = 36.353 dscf

b. Water vapor volume, scf

$$V_{w\,std} = (0.04715)(V_{lc})\left(\frac{T_{std}}{528}\right)$$

$$V_{w\,std} = (0.04715)(23.0)\left(\frac{530}{528}\right)$$

$V_{w\,std}$ = 1.089 scf

c. Moisture content, non-dimensional

$$B_{ws} = \left(\frac{V_{w\,std}}{V_{m\,std} + V_{w\,std}}\right)$$

$$B_{ws} = \left(\frac{1.089}{36.353 + 1.089}\right)$$

B_{ws} = ~~0.0291~~ moisture content (multiply by 100 for % by volume)

used theoretical moisture

0.0240

d. Stack gas molecular weight, lb/lb mole (dry)

$MW_{dry} = [0.44(\%CO_2)] + [0.32(\%O_2)] + [0.28(\%N_2)]$

$MW_{dry} = [0.44(\ 0\ )] + [0.32(\ 21.1\ )] + [0.28(\ 78.9\ )]$

MW_{dry} = 28.844 lb/lb mole

e. Stack gas molecular weight, lb/lb mole (wet)

$MW_{wet} = [MW_{dry}(1 - B_{ws})] + [18(B_{ws})]$

$MW_{wet} = [28.844\ \ (1 - 0.0240)] + [18(\ 0.0240)]$

MW_{wet} = 28.584 lb/lb mole

f. Absolute stack pressure, in Hg

$P_s = P_{bar} + \left(\frac{P_{sg}}{13.6}\right)$

$P_s = 30.09 + \left(\frac{-0.61}{13.6}\right)$

P_s = 30.045 in. Hg

g. Stack velocity, ft/sec

$v_s =$ [redacted]

$v_s =$ [redacted]

v_s = [redacted] ft/sec

h. Actual stack flow rate, acfm

$Q =$ [redacted]

$Q =$

$Q =$

i. Standard stack gas flow rate, wscfm

$Q_{ws} =$ [redacted]

$Q_{ws} =$

$Q_{ws} =$

j. Standard stack gas flow rate, dscfm

$Q_{ds} =$ [redacted]

$Q_{ds} =$

$Q_{ds} =$

EXAMPLE CALCULATIONS
HEXAVALENT CHROMIUM EMISSIONS

Project name: Schnitzer Steel **Project number:** 452603

Computed by: Katie Resch **Calculation date:** 12/18/18

Run number: 4-Cr **Organic Compound:** Cr

EMISSIONS DATA

Mass of measured hexavalent chromium in sample, ug/sample	[redacted]	F_t
Dry stack gas flow rate at standard conditions, dscfm	[redacted]	Q_{ds}
Standard volume of gas sampled, dscf	36.36	$V_{m,\,std}$
Reference Temperature, °R	530	T_r
Stack O_2, % volume dry	21.1	O_2
Molecular Weight g/gmol	51.996	MW
Material Processed, ton/hr	[redacted]	A

3. HEXAVALENT CHROMIUM EMISSIONS

a. Mass emissions of hexavalent chromium, lb/hr

$$M = \left(\frac{F_t \times Q_{ds}}{V_{m,std}}\right)\left(\frac{1\,lb}{454\,g}\right)\left(\frac{1\,g}{10^6\,ug}\right)\left(\frac{60\,\text{min}}{hour}\right)$$

$M =$ [redacted]

$M =$ [redacted]

Note: The results calculated on this page and the pages that follow may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

b. Concentration of hexavalent chromium, ppm

$$C = \left(\frac{F_t}{V_{m,std}}\right)\left(\frac{T_r}{520}\right)\left(\frac{1\,g}{10^6\,ug}\right)\left(\frac{1\,lb}{454\,g}\right)\left(\frac{379.5\,dscf}{lb \bullet mol}\right)\left(\frac{lb \bullet mol}{MWg / gmol}\right)10^6$$

$$C = \left(\frac{\quad}{\quad}\right)\left(\frac{\quad}{520}\right)\left(\frac{379.5}{\quad \times 454}\right)$$

$C =$ _____ ppm

c. Mass emissions of hexavalent chromium, lb/ton

$E = \left(\frac{M}{A}\right)$

$E =$ [redacted]

$E =$

Note: The results calculated on this page and the pages that follow may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

EXAMPLE CALCULATIONS
TRACE SPECIES EMISSIONS

Project name: Schnitzer Steel **Project number:** 452603

Computed by: Katie Resch **Calculation date:** 12/18/18

Run number: 1 PCB TOTAL PCBs

EMISSIONS DATA

Mass of measured compound in sample, mg/sample	[redacted]	F_t (2187 ng)
Dry stack gas flow rate at standard conditions, dscfm	[redacted]	Q_{ds}
Standard volume of gas sampled, dscf	35.852	$V_{m,\,std}$
Reference Temperature, °R	530	T_r
Stack O_2, % volume dry	20.9	O_2
~~Molecular Weight g/gmol~~	~~—~~	~~MW~~
Material Processed, ton/hr	[redacted]	A

3. TRACE SPECIES EMISSIONS

a. Mass emissions, lb/hr

$M =$ [redacted]

$M =$

$M =$

Note: The results calculated on this page and the pages that follow may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

b. Concentration, ppm

$$C = \left(\frac{F_t}{V_{m,std}}\right)\left(\frac{T_r}{520}\right)\left(\frac{1\,g}{10^3\,mg}\right)\left(\frac{1\,lb}{454\,g}\right)\left(\frac{379.5\,dscf}{lb \bullet mol}\right)\left(\frac{lb \bullet mol}{MWg/gmol}\right)10^6$$

$$C = \left(\frac{\quad}{\quad}\right)\left(\frac{\quad}{520}\right)\left(\frac{1\,g}{10^3\,mg}\right)\left(\frac{379.5}{\quad \times 454}\right)10^6$$

C = _____ ppm

c. Emission rate, lb/ton

E =

E =

E =

Appendix A.6
General Emissions Calculations

EMISSION CALCULATIONS

1. Volumetric Flow and Isokinetics

a. Standard sample gas volume, dscf

$$V_{m\,std} = (V_m)(Y)\frac{(T_{std} + 460)\left(P_{bar} + \frac{\Delta H}{13.6}\right)}{(T_m + 460)(P_{std})}$$

b. Water vapor volume, scf

$$V_{w\,std} = (0.04715)(V_{lc})\left(\frac{T_{std} + 460}{528}\right)$$

c. Moisture content, non-dimensional

$$B_{ws} = \frac{V_{w\,std}}{(V_{m\,std} + V_{w\,std})}$$

d. Stack gas molecular weight, lb/lb mole (dry)

$$MW_{dry} = [0.44(\%CO_2)] + [0.32(\%O_2)] + [0.28(\%N_2)]$$

e. Stack gas molecular weight, lb/lb mole (wet)

$$MW_{wet} = \left[MW_{dry}(1 - B_{ws})\right] + [18(B_{ws})]$$

f. Absolute stack pressure, in Hg

$$P_s = P_{bar} + \left(\frac{P_{sg}}{13.6}\right)$$

g. Stack velocity, ft/sec

$$v_s = (85.49)\left(C_p\right)\left(\sqrt{\Delta P}\right)\sqrt{\frac{T_s}{(P_s)(MW_{wet})}}$$

h. Actual stack flow rate, acfm

$$Q = (v_s)(A_s)(60\ min/hr)$$

i. Standard stack gas flow rate, wscfm

$$Q_{ws} = (v_s)(A_s)(60\ min/hr)\left(\frac{T_{std} + 460}{T_s + 460}\right)\left(\frac{P_s}{P_{std}}\right)$$

j. Standard stack gas flow rate, dscfm

$$Q_{ds} = (v_s)(A_s)(60\ min/hr)(1 - B_{ws})\left(\frac{T_{std} + 460}{T_s + 460}\right)\left(\frac{P_s}{P_{std}}\right)$$

k. Percent isokinetic

$$I = \frac{(T_s)(V_{m\,std})(P_{std})(100)}{(T_{std} + 460)(v_s)(\theta)(A_n)(P_s)(60)(1 - B_{ws})}$$

2. Gaseous Emissions

a. Concentration, ppm volume wet (i.e. to calculate wet ppm from dry ppm)

$$C_w = (C)(1 - B_{ws})$$

b. Concentration, ppm @ 3% O_2 dry

$$C_3 = (C)\left[\frac{(20.9 - 3.0)}{(20.9 - \%\ O_2)}\right]$$

c. Concentration, ppm @ 12% CO_2 dry

$$C_{12} = (C)\left(\frac{12.0}{\%\ CO_2}\right)$$

d. Concentration, ppm volume dry (i.e. to calculate dry ppm from wet ppm)

$$C = \left[\frac{C_w}{(1 - B_{ws})}\right]$$

e. Mass emission rate, lb/hr

$$M = (C)(CF)(Q_{ds})(60\ min/hr)$$

where,

CF = conversion factor from ppm to lb/scf:

$$CF_{NOx} = 1.194 \times 10^{-7}\left(\frac{lb/scf}{ppm}\right)$$

$$CF_{SO2} = 1.660 \times 10^{-7}\left(\frac{lb/scf}{ppm}\right)$$

$CF_X = CF_{NOX}\left(\frac{MW_X}{MW_{NOX}}\right)$ for other compounds (x)

f. Emission rate, lb/MMBtu

$$E = (C)(CF)(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)$$

g. Mass emission rate, grams/bhp-hr

$$M_j = (M)\left(\frac{453.59\ g/lb}{J}\right)$$

3. Particulate Emissions

a. Grain loading, gr/dscf

$$G = (0.0154)\left(\frac{G_m}{V_{m\,std}}\right)$$

b. Grain loading corrected to 12% CO_2, gr/dscf @ 12% CO_2

$$G_{12} = (G)\left(\frac{12.0}{\%\ CO_2}\right)$$

c. Mass emission rate, lb/hr

$$M = (G)(Q_{ds})\left(\frac{60\ min/hr}{7{,}000\ gr/lb}\right)$$

d. Emission rate, lb/MMBtu

$$E = (G)\left(\frac{1\ lb}{7{,}000\ gr}\right)(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)$$

4. Fuel Factor "F"

a. Choice #1 – use the values for F_d provided in Method 19, Table 19-1
Choice #2 – if you have fuel ultimate and proximate analysis, calculate F_d (need fuel weight %CHONS, HHV)
Stoichiometric fuel factor at 68 °F, dscf/MMBtu at 0% O_2:

$$F_d = \frac{(10^6)[3.64(\%\ H) + 1.53(\%\ C) + 0.14(\%\ N) + 0.57(\%\ S) - 0.46(\%\ O)]}{HHV, Btu/lb}$$

b. Fuel factor at 60 °F (use if all your volumes and flows are at 60 °F)

$$F_{d\,60} = F_d\left(\frac{520°R}{528°R}\right)$$

5. Miscellaneous Equations

a. Standard stack gas flow rate, calculated from fuel flow and F factor, dscfm

Note: Q_f and HHV need to be in units of either lb/hr and Btu/lb, or scf/hr and Btu/scf. *Do not mix units!*

(calculation based on stack $\%O_2$)

$$Q_{ds} = (Q_f)(HHV)(10^{-6})(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)/(60\ min/hr)$$

or (calculation based on stack $\%CO_2$ – see EPA Method 19 for values of F_c)

$$Q_{ds} = (Q_f)(HHV)(10^{-6})(F_c)\left(\frac{100}{\%\ CO_2}\right)/(60\ min/hr)$$

b. Destruction efficiency of emission control device, %

$EFF = \left(\frac{C_{in} - C_{out}}{C_{in}}\right)(100\%)$ based on concentrations

or

$EFF = \left(\frac{M_{in} - M_{out}}{M_{in}}\right)(100\%)$ based on mass emission rates

c. Cylinder gas audit, % accuracy

$$A_c = \left(\frac{C_m - C_a}{C_a}\right)(100\%)$$

Nomenclature:

A_c	=	accuracy of CEMS during cylinder gas audit (CGA), % difference
A_n	=	nozzle area, in^2 (πr^2), where π = 3.1416 and r = radius (½ diameter) in inches
A_s	=	stack area, ft^2 (πr^2), where π = 3.1416 and r = radius (½ diameter) in feet
B_{ws}	=	flue gas moisture content (multiply by 100 for % by volume)
C	=	concentration of gaseous species, ppm volume dry
C_a	=	concentration of audit gas, ppm (for CGA, equation 5c)
C_m	=	concentration measured by CEMS, ppm (for CGA, equation 5c)
C_p	=	calibration factor for pitot tube, dimensionless
C_w	=	concentration of gaseous species, ppm volume wet
C_3	=	corrected concentration of gaseous species, ppm @ 3% O_2 dry
C_{12}	=	corrected concentration of gaseous species, ppm @ 12% CO_2 dry
E	=	mass emission rate, lb/MMBtu
EFF	=	destruction or removal efficiency of emission control device, % efficiency
F_c	=	stoichiometric “F” factor of fuel based on CO_2, dscf/MMBtu @ 100% CO_2
F_d	=	stoichiometric “F” factor of fuel based on O_2, dscf/MMBtu @ 0% O_2
G	=	particulate matter grain loading, grains/dscf
G_{12}	=	corrected particulate matter grain loading, grains/dscf @ 12% CO_2
G_m	=	mass of collected particulate matter, mg
HHV	=	higher heating value, Btu/cubic foot
I	=	% isokinetic sampling rate, %
J	=	brake horsepower, bhp
M_j	=	mass emission rate of measured species (s), g/hp-hr
M	=	mass emission rate, lb/hr
MW_{dry}	=	molecular weight of stack gas, dry basis
MW_{wet}	=	molecular weight of stack gas, wet basis
MW_s	=	molecular weight of gaseous species (s), lb/lb mole:

CO:	28.01	(can use 28)	NO_x as NO_2:	46.01	(can use 46)
SO_x as SO_2:	64.06	(can use 64)	Hydrocarbons as C:	12.01	(can use 12)
Hydrocarbons as CH_4:	16.04	(can use 16)	Hydrocarbons as C_3H_8:	44.10	(can use 44)
NH_3:	17.03	(can use 17)			

N_2	=	nitrogen content of stack gas, % volume dry
P_{bar}	=	barometric pressure, in. Hg
P_s	=	stack absolute pressure, in. Hg
P_{sg}	=	stack static pressure, inches of water, gauge (iwg)
Q	=	wet stack gas flow rate at actual conditions, acfm
Q_f	=	fuel flow rate, scfh or lb/hr (be careful of units)
Q_{ds}	=	dry stack gas flow rate at standard conditions, dscfm
Q_{ws}	=	wet stack gas flow rate at standard conditions, wscfm
SV	=	specific molar volume of an ideal gas at standard conditions, ft^3/lb mole
T_m	=	meter temperature, °R
T_{std}	=	reference temperature, °R
T_s	=	stack gas temperature, °R
v_s	=	stack gas velocity, ft/sec
V_{lc}	=	volume of liquid collected in impingers, ml
V_m	=	dry meter volume uncorrected, acf
$V_{m\ std}$	=	dry meter volume corrected to standard conditions, dscf
$V_{w\ std}$	=	volume of water vapor at standard conditions, scf
Y	=	meter calibration coefficient, dimensionless
ΔH	=	average pressure differential across meter, inches water
ΔP	=	average velocity head of stack gas, inches water
Θ	=	sampling time, minutes

APPENDIX B
FIELD AND COMPUTER-GENERATED DATA

Appendix B.1
Sampling Locations

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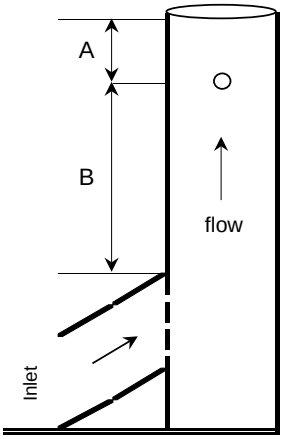
Schnitzer Steel - Outlet
TRAVERSE POINT LAYOUT (PARTICULATE)
CIRCULAR STACKS OVER 24 INCHES

Stack diameter:	[redacted]	***inches***
Upstream diameter (A):	**180.0**	***inches***
Downstream diameter (B):	**444.0**	***inches***
Port length:	**6.50**	***inches***
Number of ports being used:	**2**	***see note***
Equivalent upstream diameter (A):	[redacted]	***Pass***
Equivalent downstream diameter (B):	[redacted]	***Pass***
All points at least 1.0" from stack wall:	[redacted]	***Pass***
Total points:	**20**	
Points per port:	**10**	

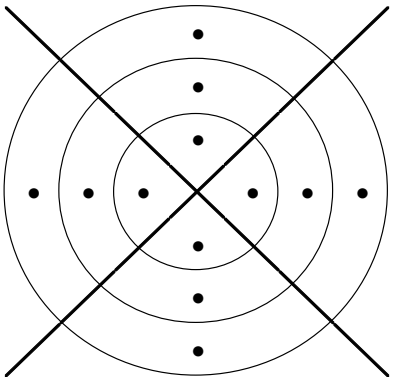


Typical vertical exhaust stack

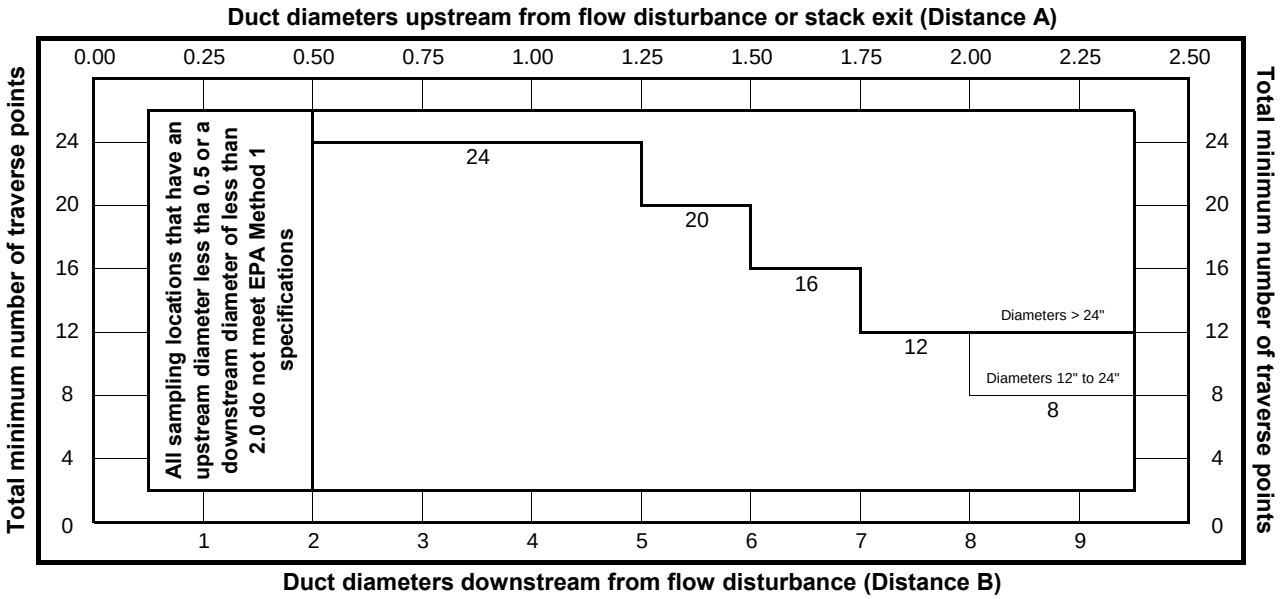
Point	% Diameter	Inside wall Distance (in)	Outside port Distance (in)
1	[redacted]	2.0	8.5
2	[redacted]	6.3	12.8
3	[redacted]	11.2	17.7
4	[redacted]	17.3	23.8
5	[redacted]	26.2	32.7
6	[redacted]	50.3	56.8
7	[redacted]	59.2	65.7
8	[redacted]	65.3	71.8
9	[redacted]	70.2	76.7
10	[redacted]	74.5	81.0
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A

Note: No traverse point shall be within 1.0" of the stack walls (see Sections 11.3.1)

DUCT AREA = [redacted] **ft^2**



Example: Location of 12 points



Appendix B.2
Hexavalent Chromium Data Sheets

MONTROSE AIR QUALITY SERVICES

SAMPLE RECOVERY DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1

Source / Location: Main Stack — Method: CARB 425

Pollutant(s): Cr — Date: 10/29 – 10/31/18 — Operator / Assistant: RO, WP, MK, SS — Project No.: 005AS-452603

Ambient Conditions (Mobile Lab)

Relative humidity, %:

Temperature, °F:

Mobile lab no.: Trailer 9

Balance Audit

Standard set ID: W-1 — Field balance ID: 21-AB-06H

Standard mass, g	500.0	500.0	500.0
Field balance mass, g	500.1	500.0	500.0

Field balance must be within 0.5g of standard weight mass

Sampling Equipment Materials

Nozzle type		quartz	✓	glass		steel		titanium		inconel	
Nozzle 1 diameters	0.160	D_1	0.160	D_2	0.160	D_3			0.160	average	
Nozzle 2 diameters		D_1		D_2		D_3				average	
Nozzle 3 diameters		D_1		D_2		D_3				average	
Probe type		heated		non-heated		air-cooled		water-cooled			
Probe liner		quartz	✓	glass		steel		Teflon®			
Front-half filter		yes	✓	no							
Size, mm		47		90		110		125			
Filter media		glass fiber		quartz fiber		Teflon®					
Support		steel		glass frit		Teflon® frit					
Gasket		Viton®		silicone		other					
Back-half filter	✓	yes		no							
Tared		yes	✓	no							
Filter media		quartz fiber		glass fiber	✓	Teflon®					

Recovery Procedure

Purge required: no / yes — gas type: — purge cyl. ID: — flow rate, lpm:

Purge start/stop times: Run 1 — Run 2 — Run 3

202 CPM filter temp., °F:

Container levels marked: ✓ yes — Sample labels complete: ✓ yes

Blanks/spikes required: ✓ reagent blanks — ✓ field blank — spike — other

Sample Observations

	Run 1	2	Run 3	4	Run 5	6	Run ___
Front-half filter appearance	✓	✓	✓	✓	✓	✓	
Condensate appearance	Clear	Clear	Clear	Clear	Clear	Clear	
Back-half filter appearance	Visible Rings	Visible Rings	Visible Rings	Visible Rings	Rings	Rings	
Condensate pH	9.0	9.0	9.0	9.0	9.0	9.0	
Trap appearance	✓	✓	✓	✓	✓	✓	

Reagent Use and Quality

Water	Type I	Type II (DI)	Other	Lot ID	
Acetone	Grade	Notes		Lot ID	
Hexane	Grade	Notes		Lot ID	
0.1N $NaHCO_3$	✓ Grade	Notes Chester lab 226.29.21		Lot ID	Chem: N313003
0.1N $NaHCO_3$	✓ Grade	Notes Chester lab 226.29.10		Lot ID	Chem N313003
1.0N $NaHCO_3$	✓ Grade	Notes Chester Lab 226.29.8		Lot ID	Chem N313003
	Grade	Notes		Lot ID	

Glassware Preparation

Impinger Cleaning Procedure: ___ Detergent and water — ___ Acetone rinse — ___ Hexane rinse

✓ Acid soak and DI rinse — ___ Triple solvent rinses (for PAH, PCDD/DF)

___ Other

If this information is not accurate for all runs, note all exceptions:

2 Filters utilized for each test run.

MONTROSE AIR QUALITY SERVICES

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SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1

Source / Location: Mai-Stack Car body — Method: CARB 425

Run no. 1-CR — Date: 10/29/18 — Operator / Assistant: MR — Project No: 005AS-452603

Equipment Identification

Meter console ID	CB-22
Stack TC ID	161-58.4
Probe/pitot ID	161-58.4
Nozzle ID	373-160.N
Imp. outlet TC ID	GSN-20
Filter TC ID	—
Micromanometer ID	CB-22
Sensitivity, in. H_2O	0.05

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248±25
Imp. outlet max., °F	MR 248 68
K Factor: ΔH =	0.68 x ΔP or dwell time = ____ x √ΔP

Calibration

Meter Yd	0.989
Meter ΔH@0.75cfm	1.850
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check (see bottom of page)

Std. TC ID	SEE RUN 3
Std. TC temp., °F	
Continuity Check	☐

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.12
Ambient temp., °F	—
Static (P_g), in. H_2O	-0.71
O_2 conc., % dry vol.	20.89
CO_2 conc., % dry vol.	0.036
Wet bulb temp., °F	—

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.004 @ 15	0.003 @ 5.0
Pitot (+): in. H_2O @ in. H_2O	✓ @ 3.9	✓ @ 3.7
Pitot (-): in. H_2O @ in. H_2O	✓ @ 3.8	✓ @ 3.4
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N NaHCO3	717.7	755.8	38.1
0.1N NaHCO3	658.6	660.4	1.6
EMPTY	562.4	561.6	(0.6)
SILICA GEL	921.8	931.9	10.1
Tared Line Rinse	25	25 Q	-25
Total impinger weight gain, g			24.2

Filter ID —

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp. °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet	Vaccum in. Hg
1	3	20:00	263.362	1.55	1.05	66	249		53		59	3.5
2	↓	20:03	265.03	1.6	1.09	67	250		47		59	3.5
3	↓	20:06	266.72	1.65	1.12	67	248		46		60	3.5
4	↓	20:09	268.45	1.65	1.12	66	247		46		60	3.5
5	↓	20:12	270.14	1.5	1.02	67	249		46		60	3.5
PC	-	20:15	271.777	—	—	—	—	—	—	—	—	—
1	3	20:17	271.777	1.7	1.16	67	250		47		61	4.0
2	↓	20:20	273.51	1.8	1.22	68	248		47		61	4.5
3	↓	20:23	275.28	1.9	1.29	65	247		48		61	MR 4.5 5.0
4	↓	20:26	277.08	1.95	1.33	65	247		49		62	5.5
5	↓	20:29	278.90	1.6	1.09	64	247		50		62	5.0
PC	-	20:32	280.624	—	—	—	—	—	—	—	—	—
1	3	20:34	280.624	1.75	1.19	59	248		51		62	6.0
2	↓	20:37	282.36	1.95	1.33	63	250		51		63	8.5
3	↓	20:40	284.11	2.1	1.43	68	247		51		63	10.5
4	↓	20:43	285.96	2.05	1.39	68	249		52		63	14.0
5	↓	20:46	287.82	1.9	1.29	68	247		52		64	17.5
PC	-	20:49	289.506	—	—	—	—	—	—	—	—	—
1	3	20:54	289.649	1.5	1.02	69	249		54		64	3.0
2	↓	20:57	291.36	1.5	1.02	69	249		53		64	3.0
3	↓	21:00	293.03	1.6	1.09	69	247		52		64	3.5
4	↓	21:03	294.74	1.55	1.05	69	249		52		65	3.0
5	↓	21:06	296.41	1.35	0.92	69	248		52		65	3.0
END	-	21:09	297.975	—	—	—	—	—	—	—	—	—

ALT-011						

Comments: Between 3rd and 4th port, changed out in train filter (because of high vacuum). Leak check = 0.0008 @ 16

MONTROSE AIR QUALITY SERVICES

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SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1

Source / Location: Exhaust Stack — Method: CARB 425

Run no. 2-CR — Date: 10/29/18 — Operator / Assistant: MK — Project No.: 005AS - 452603

Equipment Identification

Meter console ID	CB-22
Stack TC ID	161-SP-4
Probe/pitot ID	161-SP-4
Nozzle ID	373-160-A
Imp. outlet TC ID	GSN-20
Filter TC ID	—
Micromanometer ID	CB-22
Sensitivity, in. H_2O	0.05

Calibration

Meter Yd	0.989
Meter ΔH@0.75cfm	1.850
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check (see bottom of page)

Std. TC	SEE RUN 3
Std. TC temp., °F	
Continuity Check	☐

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248 ± 25
Imp. outlet max., °F	68

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.12
Ambient temp., °F	-
Static (P_g), in. H_2O	-0.67
O_2 conc., % dry vol.	21.03
CO_2 conc., % dry vol.	0.025
Wet bulb temp., °F	-

K Factor: ΔH = 0.68 x ΔP or dwell time = ____ x √ΔP

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.006 @ 15	0.003 @ 6.0
Pitot (+): in. H_2O @ in. H_2O	✓ @ 3.7	✓ @ 3.6
Pitot (-): in. H_2O @ in. H_2O	✓ @ 3.6	✓ @ 3.5
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N NaHCO3	635.4 / 634.7	671.1	35.7
0.1N NaHCO3	659.6	660.1	0.5
EMPTY	535.6	535.8	0.2
SILICA GEL	958.1	965.8	7.7
	/	/	
	/	/	
	/	/	
Tared Line Rinse	25	025	-25
Total impinger weight gain, g			19.1

Filter ID: —

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp. °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet		Vaccum in. Hg
1	3	22:35	298.721	1.55	1.05	68	247		51		60		3.0
2	↓	22:38	300.45	1.6	1.09	68	247		47		60		3.5
3		22:41	302.14	1.55	1.05	67	249		45		60		3.5
4		22:44	303.79	1.55	1.05	67	248		45		61		4.0
5	↓	22:47	305.46	1.45	0.99	67	247		45		61		4.0
PC	-	22:50	307.084										
1	3	23:31	307.084	1.75	1.19	61	249		50		59		5.0
2	↓	23:34	308.88	1.95	1.33	61	248		46		59		6.5
3		23:37	310.71	2.1	1.43	63	249		44		60		8.0
4		23:40	312.58	2.1	1.43	63	249		44		60		10.0
5	↓	23:43	314.48	2.0	1.36	63	249		44		60		12.5
PC	-	23:46	316.344										
★													
1	3	23:51	316.415	1.75	1.19	64	249		49		60		3.5
2	↓	23:54	318.25	1.9	1.29	65	248		46		61		3.5
3		23:57	320.10	1.9	1.29	64	249		46		61		3.5
4		24:00	321.95	2.0	1.36	64	248		47		62		4.0
5	↓	24:03	323.89	1.7	1.16	64	248		47		63		3.5
PC	-	24:06	325.661										
1	3	24:08	325.661	1.55	1.05	65	249		50		63		3.5
2	↓	24:11	327.35	1.6	1.09	65	248		49		63		3.5
3		24:14	329.08	1.6	1.09	65	247		48		64		3.5
4		24:17	330.78	1.65	1.12	65	250		48		64		4.0
5	↓	24:20	332.52	1.4	0.95	65	247		48		65		4.0
		24:23	334.003										

PAUSED @ PC

ALT-011						

Comments: ★ switched out in train filter between 2nd and 3rd ports.
Leak check = 0.004 @ 15 in

MONTROSE AIR QUALITY SERVICES

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SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1

Source / Location: Exhaust stack — Method: CARB 425

Run no. 3-CR — Date: 10/30/18 — Operator / Assistant: MK — Project No. 005AS-~~36~~452603

Equipment Identification

Meter console ID	CB-22
Stack TC ID	161-SP-4
Probe/pitot ID	161-SP-4
Nozzle ID	373-160-A
Imp. outlet TC ID	GEN-20
Filter TC ID	-
Micromanometer ID	CB-22
Sensitivity, in. H_2O	0.05

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248 ± 25
Imp. outlet max., °F	68

K Factor: ΔH = _____ x ΔP or dwell time = _____ x √ΔP

Calibration

Meter Yd	0.984
Meter ΔH@0.75cfm	1.850
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check (see bottom of page)

Std. TC ID	MEGH4
Std. TC temp., °F	62.1
Continuity Check	+

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.12
Ambient temp., °F	-
Static (P_g), in. H_2O	-0.66
O_2 conc., % dry vol.	21.07
CO_2 conc., % dry vol.	0.02
Wet bulb temp., °F	-

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.005 @ 15	0.004 @ 6.0
Pitot (+): in. H_2O @ in. H_2O	✓ @ 3.5	✓ @ 3.6
Pitot (-): in. H_2O @ in. H_2O	✓ @ 3.4	✓ @ 3.3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N NaHCO3	658.7	693.8	35.1
0.1N NaHCO3	651.0	651.2	0.2
EMPTY	556.3	557.3	1.0
SILICA GEL	960.3	968.4	8.1
Tared Line Rinse	25	25 @	-25
Total impinger weight gain, g			19.4

Filter ID: MR

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp. °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet		Vaccum in. Hg
1	3	0:45	334.689	1.55	1.05	66	249		56		62		3.0
2	↓	0:48	336.40	1.6	1.09	66	247		45		63		3.0
3		0:51	338.11	1.6	1.09	66	249		45		63		3.0
4		0:54	339.78	1.6	1.09	66	248		43		63		3.0
5	↓	0:57	341.47	1.4	0.95	65	249		43		63		3.0
PC	-	1:00	343.085										
1	3	1:02	343.085	1.75	1.19	66	250		45		63		3.5
2	↓	1:05	344.90	1.85	1.26	65	248		44		64		4.0
3		1:08	346.76	1.9	1.29	66	249		44		64		4.0
4		1:11	348.61	1.95	1.33	65	247		45		64		4.0
5	↓	1:14	350.50	1.8	1.22	65	248		45		65		4.0
PC	-	1:17	352.319										
#													
1	3	1:25	352.356	1.8	1.22	65	246		50		64		4.0
2	↓	1:28	354.16	1.95	1.33	65	247		47		64		4.5
3		1:31	356.03	2.1	1.43	65	247		47		65		4.5
4		1:34	358.01	2.15	1.46	65	249		46		65		4.5
5	↓	1:37	360.02	1.85	1.26	65	246		47		66		4.0
PC	-	1:40	361.837										
1	3	1:42	361.837	1.5	1.02	65	249		48		66		3.5
2	↓	1:45	363.54	1.55	1.05	65	247		48		66		3.5
3		1:48	365.23	1.6	1.09	65	247		49		66		3.5
4		1:51	366.96	1.55	1.05	64	249		49		66		3.5
5	↓	1:54	368.67	1.45	0.99	65	247		49		66		3.5
END	-	1:57	370.328										
ALT-011						62	150	-	48	-	64		
						62.3	148.4		50.0		62.7		

Comments: Changed out in-train filter std. between 2nd and 3rd ports. Leak check = 0.005@ 15 in.

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SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1

Source / Location: Shredder Exhaust Stack — Method: CARB 425

Run no.: 4-CR — Date: 10/20/18 — Operator / Assistant: MK — Project No.: 005AS-452603

Equipment Identification

Meter console ID	CB-22
Stack TC ID	161-SP-4
Probe/pitot ID	161-SP-4
Nozzle ID	373-16v-A
Imp. outlet TC ID	GSN-20
Filter TC ID	—
Micromanometer ID	CB-22
Sensitivity, in. H_2O	0.05

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248 ± 25
Imp. outlet max., °F	68
K Factor: ΔH =	0.7 x ΔP or dwell time = ____ x √ΔP

Calibration

Meter Yd	0.989
Meter ΔH@0.75cfm	1.850
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check (see bottom of page)

Std. TC ID	SEE RUN
Std. TC temp., °F	3
Continuity Check	☐

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.09
Ambient temp., °F	—
Static (P_g), in. H_2O	-0.6
O_2 conc., % dry vol.	21.0
CO_2 conc., % dry vol.	0.0
Wet bulb temp., °F	—

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.005 @ 15	0.003 @ 5.0
Pitot (+): in. H_2O @ in. H_2O	✓ @ 3.9	✓ @ 3.7
Pitot (-): in. H_2O @ in. H_2O	✓ @ 3.8	✓ @ 3.6
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N NaHCO3	719.0	758.8	39.8
0.1N NaHCO3	660.0	661.1	1.1
EMPTY	561.6	561.7	0.1
SILICA GEL	931.9	938.9	7.0
	/	/	/
Tared Line Rinse	25	25e	-25
Total impinger weight gain, g			23.0

Filter ID —

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp. °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet	Vaccum in. Hg
1	3	21:14	370.949	1.45	1.02	69	249		51		59	3.0
2	↓	21:17	372.105	1.5	1.05	70	247		46		59	3.5
3		21:20	374.34	1.55	1.09	70	247		45		59	3.5
4		21:23	376.04	1.5	1.05	71	247		45		59	3.5
5	↓	21:26	377.71	1.35	0.95	71	248		45		59	3.0
PC	—	21:29	379.320									
1	3	21:31	379.320	1.8	1.26	71	247		47		60	4.0
2	↓	21:34	381.13	1.95	1.37	71	248		45		60	4.0
3		21:37	383.02	2.1	1.47	70	249		45		61	4.5
4		21:40	384.97	2.1	1.47	70	247		45		61	4.5
5	↓	21:43	386.96	1.85	1.30	70	247		46		62	4.0
PC	—	21:46	388.860									
1	3	21:52	388.915	1.7	1.19	71	247		49		63	3.5
2	↓	21:55	390.75	1.85	1.30	70	247		47		63	3.5
3		21:58	392.61	1.95	1.37	70	248		46		63	4.0
4		22:01	394.53	2.0	1.4	69	249		46		64	4.0
5	↓	22:04	396.51	1.75	1.23	68	247		46		65	3.5
PC	—	22:07	398.389									
1	3	22:09	398.389	1.55	1.09	68	247		49		66	3.5
2	↓	22:12	400.02	1.50	1.05	68	248		48		66	3.5
3		22:15	401.79	1.55	1.09	68	248		47		67	3.5
4		22:18	403.50	1.6	1.12	67	249		47		67	3.5
5	↓	22:21	405.23	1.4	0.98	68	247		47		68	3.0
END	—	22:24	406.884									

in train

ALT-011						

Comments: changed out filter between 2nd and 3rd port.
Leak check = 0.004 @ 15 in.

MONTROSE AIR QUALITY SERVICES

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SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1

Source / Location: Main Stack Car With Tanks — Method: CARB 425

Run no. 5-CR — Date: 10/30/18 — Operator / Assistant — Project No.: 005AS-452603

Equipment Identification

Meter console ID	CB-22
Stack TC ID	161-SP-4
Probe/pitot ID	161-SP-4
Nozzle ID	332-(0.160)
Imp. outlet TC ID	GSN-20
Filter TC ID	—
Micromanometer ID	CB-22
Sensitivity, in. H_2O	0.05

Calibration

Meter Yd	0.989
Meter ΔH@0.75cfm	1.850
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check (see bottom of page)

Std. TC ID	SEE RUN
Std. TC temp., °F	
Continuity Check	☐

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248 ±25
Imp. outlet max., °F	68
K Factor: ΔH =	0.70 x ΔP or dwell time = ____ x √ΔP

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.09
Ambient temp., °F	—
Static (P_g), in. H_2O	-0.41
O_2 conc., % dry vol.	20.92
CO_2 conc., % dry vol.	0.042
Wet bulb temp., °F	—

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.003 @ 15	0.003 @ 6.0
Pitot (+): in. H_2O @ in. H_2O	✓ @ 3.4	✓ @ 3.7
Pitot (-): in. H_2O @ in. H_2O	✓ @ 3.6	✓ @ 3.9
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
0.1N NaHCO3	661.1 / 635.2	694.4	33.3
0.1N NaHCO3	651.5	652.8	1.3
EMPTY	557.3	558.0	0.7
SILICA GEL	968.4	976.2	7.8
Tared Line Rinse	25	28.5	-25
Total impinger weight gain, g			18.1

Filter ID: ____

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (488 m), ft³ 124	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp. °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet		Vaccum in. Hg
1	3	22:53	407.663	1.35	0.95	66	248		51		65		3.0
2	↓	22:56 MK	409.72 MK	1.45	1.02	66	246		49		65		3.5
3		22:59	411.38	1.5	1.05	67	249		46		65		3.5
4		23:02	413.09	1.5	1.05	68	248		44		66		3.5
5	↓	23:05	414.82	1.4	0.98	68	249		44		66		3.0
PC	-	23:08	416.461	—	—	—	—		—		—		—
1	3	23:10	416.461	1.75	1.23	69	248		45		66		4.0
2	↓	23:13	418.25	1.9	1.33	68	247		44		66		4.5
3		23:16	420.12	1.9	1.33	69	249		44		67		4.5
4		23:19	422.02	1.85	1.30	70	248		44		67		4.5
5	↓	23:22	423.90	1.8	1.26	70	249		45		67		4.0
PC	-	23:25	425.703	—	—	—	—		—		—		—
1	3	23:36	425.815	1.8	1.26	69	247		48		67		3.5
2	↓	23:33	427.69	1.95	1.37	69	248		47		67		4.0
3		23:36	429.62	2.1	1.47	69	249		45		68		4.0
4		23:39	431.61	2.1	1.47	70	247		45		68		4.0
5	↓	23:42	433.59	1.95	1.37	70	249		45		68		4.0
PC	-	23:45	435.533	—	—	—	—		—		—		—
1	3	23:47	435.533	1.35	0.95	69	249		48		68		3.0
2	↓	23:50	437.19	1.4	0.98	70	247		47		69		3.0
3		23:53	438.81	1.35	0.95	69	249		47		69		3.0
4		23:56	440.42	1.4	0.98	70	248		47		69		3.0
5	↓	23:59	442.06	1.3	0.91	69	247		47		69		3.0
END	-	24:02	443.627	—	—	—	—		—		—		—

ALT-011						

Comments: changed in-train filter between 2nd and 3rd ports.
Leak check = 0.004 @ 15

MONTROSE AIR QUALITY SERVICES

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SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1

Source / Location: Main Stack — Method: CARB 425

Run no. 6-CR — Date: 10/31/18 — Operator / Assistant: MK — Project No.: 005AS – 452603

Equipment Identification

Meter console ID	CB-22
Stack TC ID	161-SP-4
Probe/pitot ID	161-SP-4
Nozzle ID	317-160-N
Imp. outlet TC ID	05N-20
Filter TC ID	—
Micromanometer ID	CB-22
Sensitivity, in. H_2O	0.05

Calibration

Meter Yd	0.984
Meter ΔH@0.75cfm	1.850
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check (see bottom of page)

Std. TC ID	MEG #4
Std. TC temp., °F	61.2
Continuity Check	✓

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.005 @ 15	0.003 @ 5.0
Pitot (+): in. H_2O @ in. H_2O	✓ @ 3.2	✓ @ 3.1
Pitot (-): in. H_2O @ in. H_2O	✓ @ 3.4	✓ @ 3.3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248 ± 25
Imp. outlet max., °F	68

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.09
Ambient temp., °F	—
Static (P_g), in. H_2O	-0.61
O_2 conc., % dry vol.	21.01
CO_2 conc., % dry vol.	0.127
Wet bulb temp., °F	—

Impingers

	Initial, g	Final, g	Difference
0.1N NaHCO3	667 22.5	761.6	39.1
0.1N NaHCO3	661.8	662.0	0.2
EMPTY	561.7	561.8	0.1
SILICA GEL	966.5	973.7	7.2
Tared Line Rinse	25	250	-25
Total impinger weight gain, g			21.6

K Factor: ΔH = 0.70 x ΔP or dwell time = ____ x √ΔP

Filter ID —

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp. °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet	Vaccum in. Hg
1	3	12:20	444.343	1.45	1.02	69	249		51		66	3.0
2		12:23	446.04	1.4	0.98	70	248		49		66	3.0
3		12:26	447.67	1.4	0.98	70	247		47		66	3.0
4		12:29	449.28	1.45	1.02	71	248		46		67	3.0
5	↓	12:32	450.98	1.35	0.95	72	247		45		67	3.0
PC	—	12:35	452.559									
1	3	0:40	452.559	1.75	1.23	71	248		48		66	4.0
2		0:43	454.45	1.95	1.37	72	248		46		67	4.0
3		0:46	456.39	2.05	1.44	73	249		46		67	4.5
4		0:49	458.38	2.1	1.47	72	249		47		67	4.5
5	↓	0:52	460.40	1.9	1.33	71	247		48		68	4.0
PC	—	0:55	462.249									
1	3	1:05	462.913	1.75	1.23	72	248		51		67	4.0
2		1:08	464.78	1.8	1.26	71	247		49		67	4.0
3		1:11	466.67	1.9	1.33	71	246		49		68	4.0
4		1:14	468.59	1.95	1.37	70	249		48		68	4.5
5	↓	1:17	470.53	1.7	1.19	71	248		48		69	4.0
PC	—	1:20	472.371									
		PAUSE										
1	3	1:53	472.371	1.45	1.02	63	247		51		65	3.5
2		1:56	474.08	1.55	1.09	65	248		50		65	3.5
3		1:59	475.81	1.6	1.12	66	249		49		65	4.0
4		2:02	477.54	1.55	1.09	66	247		48		65	3.5
5	↓	2:05	479.25	1.35	0.95	67	247		48		65	3.0
PC	—	2:08	480.842									

ALT-011	62 ~~8~~	102	—	61	—	64	
Std.	61.0	101.1		60.3		62.2	

Comments:
Switched out in-train filter between 2nd and 3rd ports.

Leak check = 0.003 @ 15

Appendix B.3
PolyChlorinated Biphenyl Data Sheets

MONTROSE AIR QUALITY SERVICES

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SAMPLE RECOVERY DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1

Source / Location: Main Stack — Method: CARB 428

Pollutant(s): PCB — Date: 10/29 – 10/31/18 — Operator / Assistant: RO, NP, MK, SJ — Project No.: 005AS-452603

Ambient Conditions (Mobile Lab)

Relative humidity, %:

Temperature, °F:

Mobile lab no.: Trailer 9

Balance Audit

Standard set ID: W-1 — Field balance ID: ZI-AB-0AK

Standard mass, g	500.0	500.0	500.0
Field balance mass, g	500.1	500.0	500.0

Field balance must be within 0.5g of standard weight mass

Sampling Equipment Materials

Nozzle type		quartz	✓	glass		steel		titanium		inconel
39-1160-A Nozzle 1 diameters	0.160	D_1	0.160	D_2	0.160	D_3			0.160	average
Nozzle 2 diameters		D_1		D_2		D_3				average
Nozzle 3 diameters		D_1		D_2		D_3				average
Probe type	✓	heated		non-heated		air-cooled		water-cooled		
Probe liner		quartz	✓	glass		steel		Teflon®		

Front-half filter	✓	yes		no						
Size, mm		47	✓	90		110		125		
Filter media		glass fiber		quartz fiber		Teflon®	✓	Solvent Treated		
Support		steel		glass frit	✓	Teflon® frit				
Gasket	✓	Viton®		silicone		other				

Back-half filter		yes	✓	no						
Tared		yes		no						
Filter media		quartz fiber		glass fiber		Teflon®				

Recovery Procedure

Purge required: ✓ no ____ yes — gas type ____ — purge cyl. ID ____ — flow rate, lpm ____

Purge start/stop times: Run 1 ____ Run 2 ____ Run 3 ____

202 CPM filter temp., °F:

Container levels marked: ✓ yes — Sample labels complete: ✓ yes

Blanks/spikes required: 2 reagent blanks — ✓ field blank — ____ spike — ____ other

Sample Observations

	Run 1	2	Run 3	4	Run 5	6	Run ___
Front-half filter appearance	Tan	Tan	Tan	Tan	Tan	Tan	
Condensate appearance	Clear	Clear	Clear	Clear	Clear	Clear	
Back-half filter appearance							
Condensate pH							
Trap appearance	Intact	Intact	Intact	Intact	Intact	Intact	

Reagent Use and Quality

Water	Organic	X	Type I		Type II (DI)		Other	Lot ID	R000379
Acetone			Grade	Notes				Lot ID	
Hexane			Grade	Notes				Lot ID	
Methanol		—	Grade	Notes	—			Lot ID	R000040
Toulene		—	Grade	Notes	—			Lot ID	R000328
MeCl2		—	Grade	Notes	—			Lot ID	R000341
Hex		—	Grade	Notes	—			Lot ID	R000380

Glassware Preparation

Impinger Cleaning Procedure:

____ Detergent and water — ____ Acetone rinse — ____ Hexane rinse

____ Acid soak and DI rinse — ✓ Triple solvent rinses (for PAH, PCDD/DF) PCB

____ Other

If this information is not accurate for all runs, note all exceptions:

MONTROSE AIR QUALITY SERVICES

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SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL | Page: 1 of 1

Source / Location: EXHAUST | Method: CARB 428

Run no.: 1-PCB | Date: 10/29/16 | Operator / Assistant: Janusek | Project No.: 005AS-452603

Equipment Identification

Meter console ID	CB-14
Stack TC ID	162-SP-4
Probe/pitot ID	162-SP-4
Nozzle ID	39-160-A
Imp. outlet TC ID	GSN-12
Filter TC ID	OB-5
Micromanometer ID	10.1
Sensitivity, in. H_2O	CB-14

Calibration

Meter Yd	1.014
Meter ΔH@0.75cfm	1.756
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check (see bottom of page)

Std. TC ID	
Std. TC temp., °F	
Continuity Check	☐

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248±25
Imp. outlet max., °F	68
K Factor: ΔH =	0.68 x ΔP or ~~dwell time =~~ ~~x √ΔP~~

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.12
Ambient temp., °F	
Static (P_g), in. H_2O	-0.73
O_2 conc., % dry vol.	20.89
CO_2 conc., % dry vol.	0.036
Wet bulb temp., °F	

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	.008 @ 15	.006 @ 6
Pitot (+): in. H_2O @ in. H_2O	0 @ 5	0 @ 3
Pitot (-): in. H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	498.0	498.5	0.5
ORGANIC FREE H2O	648.5	647.7	(0.8)
EMPTY	548.3	548.8	0.5
SILICA GEL	954.1	966.8	12.7
Tared Line Rinse			12
Total impinger weight gain, g			12.9

Filter ID N/A

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp. °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet	Aux	Vaccum in. Hg
5	0	20:00	358.090	1.6	1.09	65	244	243	48		58	37	1.0
4	3	20:03	359.98	1.6	1.09	65	240	242	46		57	36	1.0
3	6	20:06	361.02	1.6	1.09	65	240	242	48		57	35	1.0
2	9	20:09	362.42	1.6	1.09	65	242	242	48		57	34	1.0
1	12	20:12	364.68	1.5	1.02	65	249	252	48		57	34	1.0
PC	15	20:15	366.235										
5	15	20:17	366.235	1.8	1.23	65	244	243	47		57	37	1.0
4	18	20.20	367.04	1.9	1.29	66	246	243	45		57	35	1.0
3	21	20.23	369.92	2.1	1.43	65	242	239	44		57	35	1.0
2	24	20.26	371.75	2.0	1.36	66	239	230	45		57	35	1.0
1	27	20:29	373.60	1.9	1.29	66	235	235	45		57	35	1.0
PC	30	20:32	375.434										
5	30	20:34	376.28	1.7	1.16	66	240	240	45		57	35	1.0
4	33	20:37	378.29	1.8	1.23	66	242	240	44		57	35	1.0
3	36	20:40	378.941	1.9	1.29	66	240	245	42		58	35	1.0
2	39	20:43	380.82	1.9	1.29	66	243	244	41		58	35	2.0
1	42	20:46	382.62	1.6	1.09	66	244	243	40		58	35	2.0
PC	45	20:49	384.244										
5	45	20:53	384.244	1.6	1.09	67	234	239	45		56	35	2.0
4	48	20:56	385.85	1.6	1.09	67	241	242	45		58	35	2.0
3	51	20:59	387.47	1.6	1.09	67	243	241	46		58	35	2.0
2	54	21:02	389.09	1.6	1.09	67	245	246	43		58	35	2.0
1	57	21:05	390.71	1.4	0.95	68	245	245	46		60	35	2.0
END	60	21:08	392.283										

ALT-011						

Comments:

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1

Source / Location: Exhaust Stack — Method: CARB 428

Run no. 2-PCB — Date: 10-29-18 — Operator / Assistant: Jaworski — Project No.: 005AS. 452603

Equipment Identification

Meter console ID	CB-14
Stack TC ID	160-SP4
Probe/pitot ID	160-SP4
Nozzle ID	39-160-A
Imp. outlet TC ID	GSN-12
Filter TC ID	OB-5
Micromanometer ID	#0.1
Sensitivity, in. H_2O	CB-14

Calibration

Meter Yd	1.014
Meter ΔH@0.75cfm	1.756
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check (see bottom of page)

Std. TC ID	
Std. TC temp., °F	
Continuity Check	☐

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248
Imp. outlet max., °F	≤68
K Factor: ΔH =	0.68 x ΔP or dwell time = x √ΔP

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.12
Ambient temp., °F	61
Static (P_g), in. H_2O	-.07
O_2 conc., % dry vol.	21.03
CO_2 conc., % dry vol.	0.02
Wet bulb temp., °F	—

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	.012 @ 5	.004 @ 5
Pitot (+): in. H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot (-): in. H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	500.8	501.0	0.2
ORGANIC FREE H2O	646.6	646.6	0.0
EMPTY	554.3	553.8	(0.5)
SILICA GEL	1000.7	1015.2	14.5
Tared Line Rinse			
Total impinger weight gain, g			14.2

Filter ID NA

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp. °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet	Aux	Vaccum in. Hg
S	0	22:35	392.429	.95	0.65	66	237	247	50		57	35	1.0
4	3	22:38	393.69	1.00	0.68	65	247	249	48		57	35	1.0
3	6	22:41	395.03	1.00	0.68	65	242	242	48		57	35	1.0
2	9	22:44	396.32	1.10	0.75	65	238	248	52		59	35	1.0
1	12	22:47	397.41	1.10	0.75	64	253	250	53		58	35	1.0
PC	15	22:50	399.096										
NC													
S	15	23:31	399.096	1.10	0.75	59	252	246	50		56	35	1.0
4	18	23:34	400.48	1.20	0.82	60	248	254	49		57	35	1.0
3	21	23:37	401.92	1.30	0.88	61	249	250	48		56	35	1.0
2	24	23:40	403.35	1.40	0.95	61	248	249	47		57	35	1.0
1	27	23:43	404.89	1.30	0.88	60	250	248	46		56	35	1.0
PC	30	23:46	406.359										
S	30	23:51	406.359	1.20	0.82	62	254	247	48		56	35	1.0
4	33	23:54	407.78	1.30	0.88	62	250	248	46		56	35	1.0
3	36	23:57	409.28	1.30	0.88	62	251	258	44		56	35	1.0
2	39	24:00	411.76	1.50	1.02	62	252	258	44		56	35	1.0
1	42	0:03	412.50	1.40	0.95	63	250	250	43		56	35	1.0
PC	45	0:06	413.26	0.4									
S	45	0:08	413.26	0.95	0.65	63	253	260	45		56	35	1.0
4	48	0:11	415.16	0.95	0.65	64	252	257	54		56	35	1.0
3	51	0:14	416.40	0.98	0.67	64	251	247	47		56	3.5	1.0
2	54	0:17	417.70	1.00	0.68	64	251	243	44		56	3.5	1.0
1	57	0:20	419.00	0.98	0.67	64	250	244	45		56	3.5	1.0
END	60	0:23	420.302										

ALT-011						

Comments:

MONTROSE AIR QUALITY SERVICES

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SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1

Source / Location: Main Stack — Method: CARB 428

Run no. 3-PCB — Date: 10-30-18 — Operator / Assistant: Jaworski — Project No.: 005AS-452603

Equipment Identification

Meter console ID	CB-14
Stack TC ID	162-SP-4
Probe/pitot ID	160-SP-4
Nozzle ID	39-160-A
Imp. outlet TC ID	41N-12
Filter TC ID	OB-5
Micromanometer ID	20.1
Sensitivity, in. H_2O	CB-14

Calibration

Meter Yd	1.014
Meter ΔH@0.75cfm	1.756
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check (see bottom of page)

Std. TC ID	mix #4
Std. TC temp., °F	62.1
Continuity Check	✓

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248
Imp. outlet max., °F	<68

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.12
Ambient temp., °F	59
Static (P_g), in. H_2O	-0.60
O_2 conc., % dry vol.	21
CO_2 conc., % dry vol.	0.03
Wet bulb temp., °F	—

K Factor: ΔH = 0.68 x ΔP or dwell time = ____ x √ΔP

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	.004 @ 4	0.003 @ 3.0
Pitot (+): in. H_2O @ in. H_2O	8 @ 3	0 @ 3.1
Pitot (-): in. H_2O @ in. H_2O	8 @ 3	0 @ 3.2
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	504.0	502.7	(1.3)
ORGANIC FREE H2O	650.1	648.2	(1.9)
EMPTY	558.8	558.4	(0.4)
SILICA GEL	957.5	968.9	11.4
Tared Line Rinse			
Total impinger weight gain, g			7.8

Filter ID: —

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp. °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet	Avg	Vaccum in. Hg
5	0	0:45	420.404	0.98	0.67	63	262	237	45		55	35	1.0
4	3	0:48	421.75	0.98	0.67	63	261	254	40		57	35	1.0
3	6	0:51	423.03	1.00	0.68	63	257	255	41		55	35	1.0
2	9	0:54	424.32	1.00	0.68	63	253	254	43		55	35	1.0
1	12	0:57	425.61	1.00	0.68	63	249	254	44		55	35	1.0
PC	15	1:00	426.912										
5	15	1:02	426.912	1.10	0.75	63	256	245	45		56	35	1.0
4	18	1:05	428.29	1.20	0.82	63	248	266	44		56	35	1.0
3	21	1:08	429.71	1.40	0.95	63	250	263	41		56	35	1.0
2	24	1:11	431.28	1.50	1.02	63	249	235	41		56	35	1.0
1	27	1:14	432.84	1.40	0.95	63	250	256	40		56	35	1.0
PC	30	1:17	434.42	~~1.80~~	1.22	63	251	~~252~~	~~42~~		~~55~~	~~35~~	~~1.0~~
5	30	1:27	434.42	1.80	1.22	63	251	252	42		55	35	1.0
4	33	1:30	436.10	1.90	1.29	63	247	248	39		55	35	1.0
3	36	1:33	437.90	1.90	1.29	63	249	244	43		55	35	1.0
2	39	1:36	439.64	1.90	1.29	63	250	247	38		57	35	1.0
1	42	1:39	441.40	1.70	1.16	61	250	248	37		56	35	1.0
PC	45	1:42	443.112										
5	45	1:43	443.112	1.60	1.09	62	243	246	40		6258	35	1.0
4	48	1:46	444.75	1.60	1.09	62	243	242	38		56	35	1.0
3	51	1:49	446.39	1.70	1.16	63	243	250	38		56	35	1.0
2	54	1:52	448.04	1.60	1.09	62	247	250	38		56	35	1.0
1	57	1:55	449.68	1.80	1.02	62			38		57	35	1.0
END	60	1:58	451.284										
ALT-011						63	121		42		63		
						62	122		42		62		

5 5 10-30-18

5 5 10-30-18

Comments:

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1
Source / Location: Main Stack — Method: CARB 428
Run no. 4-PCB — Date: 10-30-18 — Operator / Assistant: [illegible] — Project No.: 005AS-452603

Equipment Identification

Meter console ID	CB-14
Stack TC ID	160-SP-4
Probe/pitot ID	160-SP-4
Nozzle ID	39-160-A
Imp. outlet TC ID	GSN-12
Filter TC ID	08-5
Micromanometer ID	0.1
Sensitivity, in. H_2O	08-14

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248
Imp. outlet max., °F	<68
K Factor: ΔH =	0.7 x ΔP or dwell time = ____ x √ΔP

Calibration

Meter Yd	1.014
Meter ΔH@0.75cfm	1.756
Pitot tube Cp	0.84
Nozzle diameter, in.	

ALT-011 TC Check (see bottom of page)

Std. TC ID	
Std. TC temp., °F	
Continuity Check	☐

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.09
Ambient temp., °F	54
Static (P_g), in. H_2O	-0.41
O_2 conc., % dry vol.	21.06
CO_2 conc., % dry vol.	0.011
Wet bulb temp., °F	—

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	.006 @ 5	4 @ 6
Pitot (+): in. H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot (-): in. H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	499.4	499.8	0.4
ORGANIC FREE H2O	654.6	653.6	(1.0)
EMPTY	553.7	554.4	0.7
SILICA GEL	966.6	973.6	7.0
Tared Line Rinse			
Total impinger weight gain, g			7.1

Filter ID: —

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet	Avg	Vaccum in. Hg
5	0	21:14	451.359	1.5	1.05	66	246	243	43		55	34	1.0
4	3	21:17	453.02	1.5	1.05	78	251	243	40		64	35	1.0
3	6	21:20	454.71	1.6	1.12	67	255	245	44		59	35	1.0
2	9	21:23	456.32	1.5	1.05	67	260	243	43		55	35	1.0
1	12	21:26	457.96	1.4	0.98	69	255	244	43		56	35	1.0
PC	15	21:29	459.430										
5	15	21:31	459.430	1.7	1.19	68	265	243	42		56	35	1.0
4	18	21:34	461.11	1.9	1.33	69	267	243	43		56	35	1.0
3	21	21:37	462.86	2.0	1.40	68	270	242	41		58	35	1.0
2	24	21:40	464.67	1.9	1.33	70	267	246	40		57	35	1.0
1	27	21:43	466.50	1.7	1.19	70	270	244	41		57	35	1.0
PC	30	21:46	468.281										
5	30	21:52	468.281	1.9	1.33	69	263	244	44		57	35	1.0
4	33	21:55	470.04	2.0	1.40	68	262	243	44		57	35	1.0
3	36	21:58	471.95	2.1	1.47	68	264	241	42		57	35	1.0
2	39	22:01	473.80	2.0	1.40	67	264	243	43		58	35	1.0
1	42	22:04	475.65	1.7	1.19	68	265	241	48		58	35	1.0
PC	45	22:07	477.370										
5	45	22:09	477.370	1.6	1.12	66	266	244	44		58	35	1.0
4	48	22:12	479.21	1.6	1.12	66	268	242	44		59	35	1.0
3	51	22:15	480.70	1.5	1.05	66	267	242	44		59	35	1.0
2	54	22:18	482.29	1.6	1.12	69	268	242	45		59	35	1.0
1	57	22:21	483.87	1.3	0.91	65	238	240	44		59	35	1.0
END	60	22:24	485.378										

ALT-011

Comments:

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL | Page: 1 of 1

Source / Location: Main Stack | Method: CARB 428

Run no. 5-PCB | Date: 10-30-18 | Operator / Assistant: Sawerski | Project No.: 005AS-452603

Equipment Identification

Meter console ID	CB-14
Stack TC ID	162-SP-4
Probe/pitot ID	162-SP-4
Nozzle ID	39-160-A
Imp. outlet TC ID	45N-12
Filter TC ID	08-5
Micromanometer ID	0.1
Sensitivity, in. H_2O	CB-14

Calibration

Meter Yd	1.014
Meter ΔH@0.75cfm	1.756
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check (see bottom of page)

Std. TC ID	
Std. TC temp., °F	
Continuity Check	☐

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248
Imp. outlet max., °F	≤68

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.09
Ambient temp., °F	60
Static (P_g), in. H_2O	-0.41
O_2 conc., % dry vol.	20.72
CO_2 conc., % dry vol.	0.042
Wet bulb temp., °F	-

K Factor: ΔH = 0.7 x ΔP or dwell time = _____ x √ΔP

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	.004 @ 5	.000 @ 5
Pitot (+): in. H_2O @ in. H_2O	0 @ 3	6 @ 3
Pitot (-): in. H_2O @ in. H_2O	6 @ 3	0 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	502.0	504.5	2.5
ORGANIC FREE H2O	671.3	669.6	(2.7)
EMPTY	557.5	558.5	1.0
SILICA GEL	1015.2	1019.3	4.1
Tared Line Rinse			
Total impinger weight gain, g			4.9

Filter ID: ✓

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp. °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F inlet	Meter temp., °F outlet	Aux	Vaccum in. Hg
5	0	22:43	485.495	1.5	1.05	64	264	243	52		58	35	1.0
4	3	22:46	487.10	1.5	1.05	68	270	241	50		60	35	1.0
3	6	22:49	488.71	1.6	1.12	68	267	242	50		64	35	1.0
2	9	23:02	490.32	1.5	1.05	66	268	245	51		60	35	1.0
1	12	23:05	491.91	1.3	0.91	65	268	248	50		60	35	1.0
PC	15	23:08	493.357										
5	15	23:10	493.357	1.8	1.26	66	268	248	50		63	35	1.0
4	18	23:13	494.99	2.1	1.47	66	268	237	56		58	35	2.0
3	21	23:16	496.60	2.1	1.47	66	267	249	47		58	35	2.0
2	24	23:19	498.87	2.0	1.40	67	268	253	42		58	35	2.0
1	27	23:22	500.80	1.8	1.26	68	268	240	41		58	35	2.0
PC	30	23:25	502.574										
5	30	23:30	502.574	1.9	1.33	68	269	245	46		56	35	2.0
4	33	23:33	504.38	2.0	1.40	67	267	242	40		58	35	2.0
3	36	23:36	506.21	1.9	1.33	67	268	242	41		58	35	2.0
2	39	23:39	508.01	1.9	1.33	69	267	241	40		58	35	2.0
1	42	23:42	509.79	1.6	1.12	66	267	243	40		58	35	2.0
PC	45	23:45	511.430										
5	45	23:47	511.430	1.6	1.12	67	263	242	43		58	35	1.6
4	48	23:50	513.08	1.7	1.19	66	270	243	46		58	35	1.0
3	51	23:53	514.74	1.7	1.19	72	269	243	41		61	35	1.0
2	54	23:56	516.44	1.6	1.12	67	265	240	42		59	35	1.0
1	57	23:59	518.08	1.4	0.98	67	260	240	42		61	35	1.0
END	60	0:02	519.616										

ALT-011						

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Comments:

MONTROSE SERVICES

PUBLIC COPY

SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page: 1 of 1

Source / Location: Main Stack — Method: CARB 428

Run no. 6-PCB — Date: 10-31-18 — Operator / Assistant: Sanders — Project No.: (45-03)-452603

Equipment Identification

Meter console ID	CB-14
Stack TC ID	102-SP-4
Probe/pitot ID	102-SP-4
Nozzle ID	39-160-A
Imp. outlet TC ID	USN-10
Filter TC ID	OP-5
Micromanometer ID	20.1
Sensitivity, in. H_2O	0.01

Calibration

Meter Yd	1.014
Meter ΔH@0.75cfm	1.756
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check (see bottom of page)

Std. TC ID	mech ice
Std. TC temp., °F	61
Continuity Check	✓

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	.012 @ 5	0.008 @ 3.0
Pitot (+): in. H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot (-): in. H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Test / Sampling Parameters

Run duration, min.	60
No. of traverse pts.	20
No. of ports	4
Points per port	5
Time per point, min.	3
Probe/filter range, °F	248
Imp. outlet max., °F	≤68

Ambient / Stack Gas Conditions

Baro. press., in. Hg	30.04
Ambient temp., °F	60
Static (P_g), in. H_2O	-0.61
O_2 conc., % dry vol.	21.01
CO_2 conc., % dry vol.	0.037
Wet bulb temp., °F	–

Impingers

	Initial, g	Final, g	Difference
EMPTY	504.1	508.8	4.7
ORGANIC FREE H2O	691.5	692.0	0.5
EMPTY 559.7	558.4	560.5	0.6
SILICA GEL	968.9	976.5	7.6
Tared Line Rinse			
Total impinger weight gain, g			13.6

K Factor: ΔH = 0.7 x ΔP or dwell time = _____ x √ΔP

Filter ID —

Traverse pt. number	Sample or dwell time (Δt), min.	Clock time (24 hr)	Meter Reading (Vm), cf	ΔP in. H_2O	ΔH in. H_2O	Stack temp. °F	Probe temp. °F	Filter temp. °F	Imp. outlet °F	Meter temp., °F Inlet	Meter temp., °F outlet	Aux	Vaccum in. Hg
S	0	0:20	519.759	1.6	1.12	66	267	280	45		56	35	1.0
4	3	0:23	521.51	1.6	1.12	67	263	247	47		57	35	1.0
3	6	0:26	523.00	1.7	1.19	67	258	246	47		57	35	1.0
2	9	0:29	524.87	1.6	1.12	68	260	244	47		57	35	1.0
1	12	0:32	526.55	1.4	0.98	69	248	245	46		60	35	1.0
PC	15	0:35	528.82	~~1.5~~	~~1.~~								
S	15	0:40	528.82	1.8	1.26	69	261	243	44		62	35	1.0
4	18	0:43	529.86	1.9	1.33	69	259	243	45		58	35	1.0
3	21	0:46	531.67	2.1	1.47	71	256	243	41		58	35	2.0
2	24	0:49	533.52	2.0	1.40	70	256	244	42		57	35	2.0
1	27	0:52	535.43	1.6	1.12	70	256	243	39		57	35	2.0
PC	30	0:55	537.102										
S	30	1:05	537.102	1.9	1.33	70	257	244	48		57	35	2.0
4	33	1:08	538.88	2.1	1.47	70	256	242	41		57	35	2.0
3	36	1:11	540.79	2.1	1.47	68	257	246	40		57	35	2.0
2	39	1:14	542.69	2.1	1.47	68	259	242	39		57	35	2.0
1	42	1:17	544.65	1.9	1.33	69	258	242	40		57	35	2.0
PC	45	1:20	546.433										
S	45	1:53	546.433	1.5	1.05	61	250	242	47		55	35	1.0
4	48	1:56	548.04	1.6	1.12	62	252	241	44		61	35	1.0
3	51	1:59	549.89	1.6	1.12	63	241	241	43		61	35	1.0
2	54	2:02	551.30	1.5	1.05	63	253	242	44		55	35	1.0
1	57	2:05	552.91	1.4	0.98	64	250	241	43		56	35	1.0
END	60	2:08	554.479										
ALT-011						63	89		60		61		

SS 10-31-18

Comments:

64 87 60 62

Appendix B.4
CEM Data

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition:
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Initial bias

	Name:	O2	CO2	THC					
	Make/Model:								
	25A or 7E:	7E	7E	25A					

Cylinder Concentrations									
	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	11.57	3.938	503.2					
	High:	21.26	8.419	865.6					

Calibration Readings									
	Zero reading:	-0.005	0.011	0.060					
	Low reading:	0.000	0.000	265.6					
	Mid reading:	11.56	3.947	519.4					
	High reading:	21.26	8.416	867.4					

EPA Method 7E Error Calculations									
Zero %Err:	**<2.0**	-0.024	0.131	N/A					
Mid %Err:	**<2.0**	-0.047	0.107	N/A					
High %Err:	**<2.0**	0.000	-0.036	N/A					

EPA Method 25A Error Calculations									
Zero %Err:	**N/A**	N/A	N/A	0.060					
Low %Err:	**5% of cyl**	N/A	N/A	1.100					
Mid %Err:	**5% of cyl**	N/A	N/A	16.20					
High %Err:	**N/A**	N/A	N/A	1.800					

Initial Bias Data									
	Zero reading:	0.047	-0.012	N/A					
	Span reading:	11.37	4.000	N/A					
Zero % bias:	**<5.0**	0.245	-0.273	N/A					
Span % bias:	**<5.0**	-0.894	0.630	N/A					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition:
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 1 Average Results - RUN 1

20:00:00 - 21:00:00

	Name:	O2	CO2	THC					
	Make/Model:								
Oct 29 2018	20:01:00	20.75	0.020	87.22					
Oct 29 2018	20:02:00	20.74	0.021	487.9					
Oct 29 2018	20:03:00	20.75	0.020	195.3					
Oct 29 2018	20:04:00	20.75	0.020	106.9					
Oct 29 2018	20:05:00	20.75	0.021	111.3					
Oct 29 2018	20:06:00	20.75	0.019	126.2					
Oct 29 2018	20:07:00	20.75	0.018	86.60					
Oct 29 2018	20:08:00	20.75	0.018	194.4					
Oct 29 2018	20:09:00	20.74	0.018	380.7					
Oct 29 2018	20:10:00	20.74	0.017	412.5					
Oct 29 2018	20:11:00	20.75	0.019	232.9					
Oct 29 2018	20:12:00	20.75	0.015	140.0					
Oct 29 2018	20:13:00	20.74	0.008	693.1					
Oct 29 2018	20:14:00	20.74	0.009	293.3					
Oct 29 2018	20:15:00	20.75	0.016	179.1					
Oct 29 2018	20:16:00	20.75	0.016	147.3					
Oct 29 2018	20:17:00	20.74	0.016	120.8					
Oct 29 2018	20:18:00	20.75	0.022	113.8					
Oct 29 2018	20:19:00	20.75	0.025	110.7					
Oct 29 2018	20:20:00	20.75	0.023	142.0					
Oct 29 2018	20:21:00	20.74	0.028	131.3					
Oct 29 2018	20:22:00	20.75	0.030	117.8					
Oct 29 2018	20:23:00	20.74	0.033	115.4					
Oct 29 2018	20:24:00	20.75	0.030	131.9					
Oct 29 2018	20:25:00	20.75	0.031	101.0					
Oct 29 2018	20:26:00	20.75	0.033	141.7					
Oct 29 2018	20:27:00	20.75	0.037	220.8					
Oct 29 2018	20:28:00	20.75	0.037	107.1					
Oct 29 2018	20:29:00	20.75	0.036	80.18					
Oct 29 2018	20:30:00	20.75	0.033	90.74					
Oct 29 2018	20:31:00	20.75	0.032	54.35					
Oct 29 2018	20:32:00	20.75	0.034	52.57					
Oct 29 2018	20:33:00	20.75	0.036	73.63					
Oct 29 2018	20:34:00	20.75	0.039	118.7					
Oct 29 2018	20:35:00	20.75	0.040	89.74					
Oct 29 2018	20:36:00	20.75	0.038	95.65					
Oct 29 2018	20:37:00	20.75	0.033	103.9					
Oct 29 2018	20:38:00	20.74	0.036	260.5					
Oct 29 2018	20:39:00	20.74	0.038	155.6					
Oct 29 2018	20:40:00	20.74	0.040	121.7					
Oct 29 2018	20:41:00	20.74	0.041	163.7					
Oct 29 2018	20:42:00	20.74	0.039	193.6					
Oct 29 2018	20:43:00	20.74	0.040	136.7					
Oct 29 2018	20:44:00	20.74	0.035	154.9					
Oct 29 2018	20:45:00	20.74	0.034	152.1					
Oct 29 2018	20:46:00	20.74	0.038	129.4					
Oct 29 2018	20:47:00	20.74	0.039	140.4					

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition:
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Oct 29 2018	20:48:00	20.74	0.039	193.6					
Oct 29 2018	20:49:00	20.74	0.042	208.7					
Oct 29 2018	20:50:00	20.74	0.034	354.3					
Oct 29 2018	20:51:00	20.74	0.034	166.9					
Oct 29 2018	20:52:00	20.74	0.036	118.5					
Oct 29 2018	20:53:00	20.73	0.037	354.3					
Oct 29 2018	20:54:00	20.74	0.039	511.8					
Oct 29 2018	20:55:00	20.74	0.039	177.5					
Oct 29 2018	20:56:00	20.74	0.035	135.4					
Oct 29 2018	20:57:00	20.74	0.031	134.1					
Oct 29 2018	20:58:00	20.74	0.034	120.7					
Oct 29 2018	20:59:00	20.74	0.041	132.1					
Oct 29 2018	21:00:00	20.74	0.038	123.9					

	Average:	20.74	0.030	175.5					
	Max:	20.75	0.042	693.1					
	Min:	20.73	0.008	52.57					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Car Bodies Only
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 1 Post run bias - RUN 1

20:00:00 - 21:00:00

	Name:	O2	CO2	THC					
	Make/Model:								
	25A or 7E:	7E	7E	25A					
	Run summary data								
	Raw Avg:	20.74	0.030	175.5					
	Max:	20.75	0.042	693.1					
	Min:	20.73	0.008	52.57					
	Cylinder Concentrations								
	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	11.57	3.938	503.2					
	High:	21.26	8.419	865.6					
	Calibration Readings								
	Zero reading:	-0.005	0.011	0.060					
	Low reading:			265.6					
	Mid reading:	11.56	3.947	519.4					
	High reading:	21.26	8.416	867.4					
EPA Method 7E Error Calculations									
Zero %Err:	**<2.0**	-0.024	0.131	N/A					
Mid %Err:	**<2.0**	-0.047	0.107	N/A					
High %Err:	**<2.0**	0.000	-0.036	N/A					
EPA Method 25A Error Calculations									
Zero %Err:	**N/A**	N/A	N/A	0.060					
Low %Err:	**5% of cyl**	N/A	N/A	1.100					
Mid %Err:	**5% of cyl**	N/A	N/A	16.20					
High %Err:	**N/A**	N/A	N/A	1.800					
Initial Bias Data									
	Zero reading:	0.156	-0.028	1.040					
	Span reading:	11.58	3.916	504.7					
Zero % bias:	**<5.0**	0.757	-0.463	N/A					
Span % bias:	**<5.0**	0.094	-0.368	N/A					
Final Bias Data									
	Zero reading:	-0.005	0.016	2.960					
	Span reading:	11.46	3.945	503.7					
Zero % bias:	**<5.0**	0.000	0.059	N/A					
Span % bias:	**<5.0**	-0.470	-0.024	N/A					
Zero % drift:	**<3.0**	0.757	0.522	N/A					
Span % drift:	**<3.0**	0.564	0.344	N/A					
Zero drift:	**<3.0% span**	N/A	N/A	-2.900					
Span drift:	**<3.0% span**	N/A	N/A	15.70					
Bias Corrected Averages									
	Cor Avg:	20.89	0.036	175.5					

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Car Bodies Only
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 2 Average Results - run 2

22:35:00 - 00:14:27

	Name:	O2	CO2	THC					
	Make/Model:								
Oct 29 2018	22:36:00	20.73	0.020	186.4					
Oct 29 2018	22:37:00	20.72	0.022	178.8					
Oct 29 2018	22:38:00	20.72	0.019	129.6					
Oct 29 2018	22:39:00	20.72	0.017	191.0					
Oct 29 2018	22:40:00	20.72	0.016	194.4					
Oct 29 2018	22:41:00	20.72	0.013	175.1					
Oct 29 2018	22:42:00	20.72	0.012	238.6					
Oct 29 2018	22:43:00	20.72	0.014	144.2					
Oct 29 2018	22:44:00	20.72	0.013	157.4					
Oct 29 2018	22:45:00	20.72	0.012	160.8					
Oct 29 2018	22:46:00	20.72	0.011	131.7					
Oct 29 2018	22:47:00	20.72	0.013	155.3					
Oct 29 2018	22:48:00	20.72	0.011	221.7					
Oct 29 2018	22:49:00	20.72	0.010	237.4					
Oct 29 2018	22:50:00	20.72	0.009	209.8					
Oct 29 2018	23:30:27	20.72	0.009	147.7					
Oct 29 2018	23:31:27	20.72	0.018	142.7					
Oct 29 2018	23:32:27	20.71	0.019	414.9					
Oct 29 2018	23:33:27	20.72	0.017	278.0					
Oct 29 2018	23:34:27	20.71	0.016	184.7					
Oct 29 2018	23:35:27	20.72	0.012	150.9					
Oct 29 2018	23:36:27	20.71	0.016	132.1					
Oct 29 2018	23:37:27	20.71	0.019	124.9					
Oct 29 2018	23:38:27	20.72	0.020	135.9					
Oct 29 2018	23:39:27	20.71	0.022	153.2					
Oct 29 2018	23:40:27	20.71	0.022	163.5					
Oct 29 2018	23:41:27	20.71	0.021	127.7					
Oct 29 2018	23:42:27	20.72	0.022	100.8					
Oct 29 2018	23:43:27	20.71	0.021	116.2					
Oct 29 2018	23:44:27	20.71	0.023	354.9					
Oct 29 2018	23:45:27	20.71	0.023	677.1					
Oct 29 2018	23:46:27	20.71	0.022	244.9					
Oct 29 2018	23:47:27	20.71	0.023	167.3					
Oct 29 2018	23:48:27	20.71	0.024	148.8					
Oct 29 2018	23:49:27	20.72	0.021	150.3					
Oct 29 2018	23:50:27	20.71	0.021	141.6					
Oct 29 2018	23:51:27	20.71	0.019	119.8					
Oct 29 2018	23:52:27	20.71	0.021	98.83					
Oct 29 2018	23:53:27	20.71	0.016	122.1					
Oct 29 2018	23:54:27	20.71	0.018	142.1					
Oct 29 2018	23:55:27	20.71	0.018	504.7					
Oct 29 2018	23:56:27	20.71	0.017	688.4					
Oct 29 2018	23:57:27	20.71	0.017	224.8					
Oct 29 2018	23:58:27	20.71	0.015	264.8					
Oct 29 2018	23:59:27	20.71	0.015	372.5					
Oct 30 2018	00:00:27	20.71	0.015	145.2					
Oct 30 2018	00:01:27	20.71	0.015	131.3					

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Car Bodies Only
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Oct 30 2018	00:02:27	20.71	0.014	119.7					
Oct 30 2018	00:03:27	20.71	0.014	126.8					
Oct 30 2018	00:04:27	20.71	0.013	235.7					
Oct 30 2018	00:05:27	20.71	0.012	216.4					
Oct 30 2018	00:06:27	20.71	0.008	138.5					
Oct 30 2018	00:07:27	20.71	0.009	130.2					
Oct 30 2018	00:08:27	20.71	0.013	226.5					
Oct 30 2018	00:09:27	20.71	0.016	237.9					
Oct 30 2018	00:10:27	20.71	0.014	173.1					
Oct 30 2018	00:11:27	20.71	0.014	130.3					
Oct 30 2018	00:12:27	20.71	0.015	112.3					
Oct 30 2018	00:13:27	20.71	0.016	121.1					
Oct 30 2018	00:14:27	20.71	0.015	179.7					

	Average:	20.71	0.016	198.9					
	Max:	20.73	0.024	688.4					
	Min:	20.71	0.008	98.83					

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Car Bodies Only
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 2 Post run bias - run 2

22:35:00 - 00:14:27

	Name:	O2	CO2	THC					
	Make/Model:								
	25A or 7E:	7E	7E	25A					

Run summary data									
	Raw Avg:	20.71	0.016	198.9					
	Max:	20.73	0.024	688.4					
	Min:	20.71	0.008	98.83					

Cylinder Concentrations									
	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	11.57	3.938	503.2					
	High:	21.26	8.419	865.6					

Calibration Readings									
	Zero reading:	-0.005	0.011	0.060					
	Low reading:			265.6					
	Mid reading:	11.56	3.947	519.4					
	High reading:	21.26	8.416	867.4					

EPA Method 7E Error Calculations									
Zero %Err:	**<2.0**	-0.024	0.131	N/A					
Mid %Err:	**<2.0**	-0.047	0.107	N/A					
High %Err:	**<2.0**	0.000	-0.036	N/A					

EPA Method 25A Error Calculations									
Zero %Err:	**N/A**	N/A	N/A	0.060					
Low %Err:	**5% of cyl**	N/A	N/A	1.100					
Mid %Err:	**5% of cyl**	N/A	N/A	16.20					
High %Err:	**N/A**	N/A	N/A	1.800					

Initial Bias Data									
	Zero reading:	-0.005	0.016	2.960					
	Span reading:	11.46	3.945	503.7					
Zero % bias:	**<5.0**	0.000	0.059	N/A					
Span % bias:	**<5.0**	-0.470	-0.024	N/A					

Final Bias Data									
	Zero reading:	0.125	-0.035	13.61					
	Span reading:	11.38	3.924	503.6					
Zero % bias:	**<5.0**	0.612	-0.546	N/A					
Span % bias:	**<5.0**	-0.847	-0.273	N/A					
Zero % drift:	**<3.0**	0.611	0.605	N/A					
Span % drift:	**<3.0**	0.377	0.249	N/A					
Zero drift:	**<3.0% span**	N/A	N/A	-10.650					
Span drift:	**<3.0% span**	N/A	N/A	0.100					

Bias Corrected Averages									
	Cor Avg:	21.03	0.025	198.9					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Car Bodies Only
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 3 Average Results - run 3

00:45:00 - 01:45:00

	Name:	O2	CO2	THC					
	Make/Model:								
Oct 30 2018	00:46:00	20.71	0.016	98.29					
Oct 30 2018	00:47:00	20.71	0.013	102.9					
Oct 30 2018	00:48:00	20.71	0.008	160.9					
Oct 30 2018	00:49:00	20.71	0.008	140.0					
Oct 30 2018	00:50:00	20.71	0.009	134.4					
Oct 30 2018	00:51:00	20.71	0.014	153.3					
Oct 30 2018	00:52:00	20.71	0.019	103.9					
Oct 30 2018	00:53:00	20.71	0.014	124.3					
Oct 30 2018	00:54:00	20.71	0.017	124.8					
Oct 30 2018	00:55:00	20.71	0.022	84.06					
Oct 30 2018	00:56:00	20.70	0.025	85.60					
Oct 30 2018	00:57:00	20.70	0.027	109.9					
Oct 30 2018	00:58:00	20.71	0.024	136.5					
Oct 30 2018	00:59:00	20.71	0.026	117.0					
Oct 30 2018	01:00:00	20.71	0.028	157.6					
Oct 30 2018	01:01:00	20.70	0.031	177.6					
Oct 30 2018	01:02:00	20.70	0.029	146.8					
Oct 30 2018	01:03:00	20.71	0.031	100.9					
Oct 30 2018	01:04:00	20.70	0.031	183.1					
Oct 30 2018	01:05:00	20.70	0.031	132.1					
Oct 30 2018	01:06:00	20.70	0.029	211.1					
Oct 30 2018	01:07:00	20.70	0.030	239.0					
Oct 30 2018	01:08:00	20.70	0.028	157.5					
Oct 30 2018	01:09:00	20.70	0.027	144.4					
Oct 30 2018	01:10:00	20.70	0.027	121.2					
Oct 30 2018	01:11:00	20.70	0.026	162.0					
Oct 30 2018	01:12:00	20.70	0.020	113.9					
Oct 30 2018	01:13:00	20.70	0.017	163.4					
Oct 30 2018	01:14:00	20.70	0.020	114.2					
Oct 30 2018	01:15:00	20.70	0.022	116.4					
Oct 30 2018	01:16:00	20.70	0.026	145.8					
Oct 30 2018	01:17:00	20.70	0.021	102.4					
Oct 30 2018	01:18:00	20.70	0.023	92.03					
Oct 30 2018	01:19:00	20.71	0.030	104.8					
Oct 30 2018	01:20:00	20.71	0.027	119.0					
Oct 30 2018	01:21:00	20.71	0.030	109.2					
Oct 30 2018	01:22:00	20.71	0.033	86.49					
Oct 30 2018	01:23:00	20.70	0.036	107.1					
Oct 30 2018	01:24:00	20.70	0.036	120.8					
Oct 30 2018	01:25:00	20.71	0.033	108.2					
Oct 30 2018	01:26:00	20.70	0.036	96.00					
Oct 30 2018	01:27:00	20.70	0.038	89.97					
Oct 30 2018	01:28:00	20.70	0.037	76.21					
Oct 30 2018	01:29:00	20.70	0.038	71.46					
Oct 30 2018	01:30:00	20.70	0.040	620.8					
Oct 30 2018	01:31:00	20.70	0.038	214.8					
Oct 30 2018	01:32:00	20.70	0.036	139.5					

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Car Bodies Only
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Oct 30 2018	01:33:00	20.70	0.037	208.1					
Oct 30 2018	01:34:00	20.70	0.036	104.0					
Oct 30 2018	01:35:00	20.70	0.034	305.8					
Oct 30 2018	01:36:00	20.70	0.031	455.1					
Oct 30 2018	01:37:00	20.70	0.026	194.3					
Oct 30 2018	01:38:00	20.70	0.029	109.1					
Oct 30 2018	01:39:00	20.70	0.031	143.5					
Oct 30 2018	01:40:00	20.70	0.033	113.3					
Oct 30 2018	01:41:00	20.70	0.031	124.1					
Oct 30 2018	01:42:00	20.70	0.026	90.20					
Oct 30 2018	01:43:00	20.70	0.028	108.5					
Oct 30 2018	01:44:00	20.70	0.032	109.4					
Oct 30 2018	01:45:00	20.70	0.032	110.8					

	Average:	20.70	0.027	145.0					
	Max:	20.71	0.040	620.8					
	Min:	20.70	0.008	71.46					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Car Bodies Only
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 3 Post run bias - run 3

00:45:00 - 01:45:00

	Name:	O2	CO2	THC					
	Make/Model:								
	25A or 7E:	7E	7E	25A					

Run summary data									
	Raw Avg:	20.70	0.027	145.0					
	Max:	20.71	0.040	620.8					
	Min:	20.70	0.008	71.46					

Cylinder Concentrations									
	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	11.57	3.938	503.2					
	High:	21.26	8.419	865.6					

Calibration Readings									
	Zero reading:	-0.005	0.011	0.060					
	Low reading:			265.6					
	Mid reading:	11.56	3.947	519.4					
	High reading:	21.26	8.416	867.4					

EPA Method 7E Error Calculations									
Zero %Err:	**<2.0**	-0.024	0.131	N/A					
Mid %Err:	**<2.0**	-0.047	0.107	N/A					
High %Err:	**<2.0**	0.000	-0.036	N/A					

EPA Method 25A Error Calculations									
Zero %Err:	**N/A**	N/A	N/A	0.060					
Low %Err:	**5% of cyl**	N/A	N/A	1.100					
Mid %Err:	**5% of cyl**	N/A	N/A	16.20					
High %Err:	**N/A**	N/A	N/A	1.800					

Initial Bias Data									
	Zero reading:	0.125	-0.035	13.61					
	Span reading:	11.38	3.924	503.6					
Zero % bias:	**<5.0**	0.612	-0.546	N/A					
Span % bias:	**<5.0**	-0.847	-0.273	N/A					

Final Bias Data									
	Zero reading:	0.074	0.038	1.100					
	Span reading:	11.44	3.922	503.7					
Zero % bias:	**<5.0**	0.372	0.321	N/A					
Span % bias:	**<5.0**	-0.564	-0.297	N/A					
Zero % drift:	**<3.0**	0.239	0.867	N/A					
Span % drift:	**<3.0**	0.283	0.024	N/A					
Zero drift:	**<3.0% span**	N/A	N/A	12.51					
Span drift:	**<3.0% span**	N/A	N/A	-0.100					

Bias Corrected Averages									
	Cor Avg:	21.07	0.026	145.0					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Initial bias									
	Name:	O2	CO2	THC					
	Make/Model:								
	25A or 7E:	7E	7E	25A					

Cylinder Concentrations									
	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	11.57	3.938	503.2					
	High:	21.26	8.419	865.6					

Calibration Readings									
	Zero reading:	0.000	0.003	1.100					
	Low reading:	0.000	0.000	270.5					
	Mid reading:	11.55	3.924	506.6					
	High reading:	21.30	8.412	868.0					

EPA Method 7E Error Calculations									
Zero %Err:	**<2.0**	0.000	0.036	N/A					
Mid %Err:	**<2.0**	-0.094	-0.166	N/A					
High %Err:	**<2.0**	0.188	-0.083	N/A					

EPA Method 25A Error Calculations									
Zero %Err:	**N/A**	N/A	N/A	1.100					
Low %Err:	**5% of cyl**	N/A	N/A	6.000					
Mid %Err:	**5% of cyl**	N/A	N/A	3.400					
High %Err:	**N/A**	N/A	N/A	2.400					

Initial Bias Data									
	Zero reading:	0.226	0.004	N/A					
	Span reading:	11.42	3.973	N/A					
Zero % bias:	**<5.0**	1.063	0.012	N/A					
Span % bias:	**<5.0**	-0.611	0.582	N/A					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 1 Average Results - run 4

21:14:00 - 22:14:00

	Name:	O2	CO2	THC					
	Make/Model:								
Oct 30 2018	21:15:00	20.74	0.023	65.11					
Oct 30 2018	21:16:00	20.75	0.025	65.38					
Oct 30 2018	21:17:00	20.75	0.024	71.43					
Oct 30 2018	21:18:00	20.75	0.024	75.67					
Oct 30 2018	21:19:00	20.75	0.025	74.48					
Oct 30 2018	21:20:00	20.75	0.024	67.26					
Oct 30 2018	21:21:00	20.75	0.023	64.44					
Oct 30 2018	21:22:00	20.75	0.022	73.15					
Oct 30 2018	21:23:00	20.75	0.023	60.41					
Oct 30 2018	21:24:00	20.75	0.023	58.78					
Oct 30 2018	21:25:00	20.75	0.021	57.28					
Oct 30 2018	21:26:00	20.75	0.020	78.30					
Oct 30 2018	21:27:00	20.75	0.020	71.20					
Oct 30 2018	21:28:00	20.75	0.019	76.41					
Oct 30 2018	21:29:00	20.75	0.019	75.42					
Oct 30 2018	21:30:00	20.75	0.015	67.20					
Oct 30 2018	21:31:00	20.74	0.012	74.84					
Oct 30 2018	21:32:00	20.74	0.015	65.85					
Oct 30 2018	21:33:00	20.74	0.019	73.89					
Oct 30 2018	21:34:00	20.74	0.018	58.48					
Oct 30 2018	21:35:00	20.74	0.012	92.71					
Oct 30 2018	21:36:00	20.74	0.009	55.23					
Oct 30 2018	21:37:00	20.74	0.013	50.36					
Oct 30 2018	21:38:00	20.74	0.018	48.82					
Oct 30 2018	21:39:00	20.74	0.018	56.39					
Oct 30 2018	21:40:00	20.73	0.025	88.34					
Oct 30 2018	21:41:00	20.73	0.030	86.12					
Oct 30 2018	21:42:00	20.74	0.032	97.10					
Oct 30 2018	21:43:00	20.73	0.032	119.7					
Oct 30 2018	21:44:00	20.74	0.034	109.0					
Oct 30 2018	21:45:00	20.74	0.037	69.24					
Oct 30 2018	21:46:00	20.74	0.035	70.23					
Oct 30 2018	21:47:00	20.74	0.033	112.4					
Oct 30 2018	21:48:00	20.74	0.035	98.76					
Oct 30 2018	21:49:00	20.74	0.033	68.39					
Oct 30 2018	21:50:00	20.74	0.032	79.72					
Oct 30 2018	21:51:00	20.74	0.032	78.17					
Oct 30 2018	21:52:00	20.74	0.032	63.50					
Oct 30 2018	21:53:00	20.74	0.025	55.85					
Oct 30 2018	21:54:00	20.74	0.026	66.25					
Oct 30 2018	21:55:00	20.74	0.030	75.64					
Oct 30 2018	21:56:00	20.74	0.026	73.00					
Oct 30 2018	21:57:00	20.74	0.030	81.99					
Oct 30 2018	21:58:00	20.74	0.031	82.69					
Oct 30 2018	21:59:00	20.74	0.033	91.00					
Oct 30 2018	22:00:00	20.74	0.031	82.06					
Oct 30 2018	22:01:00	20.74	0.030	98.04					

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Oct 30 2018	22:02:00	20.74	0.032	95.69					
Oct 30 2018	22:03:00	20.74	0.036	72.74					
Oct 30 2018	22:04:00	20.73	0.036	69.23					
Oct 30 2018	22:05:00	20.74	0.035	88.35					
Oct 30 2018	22:06:00	20.74	0.033	73.55					
Oct 30 2018	22:07:00	20.74	0.035	84.11					
Oct 30 2018	22:08:00	20.74	0.038	138.4					
Oct 30 2018	22:09:00	20.74	0.039	75.18					
Oct 30 2018	22:10:00	20.74	0.040	64.91					
Oct 30 2018	22:11:00	20.74	0.039	66.32					
Oct 30 2018	22:12:00	20.74	0.040	120.6					
Oct 30 2018	22:13:00	20.74	0.039	76.61					
Oct 30 2018	22:14:00	20.74	0.038	81.22					

	Average:	20.74	0.027	77.21					
	Max:	20.75	0.040	138.4					
	Min:	20.73	0.009	48.82					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 1 Post run bias - run 4

21:14:00 - 22:14:00

	Name:	O2	CO2	THC					
	Make/Model:								
	25A or 7E:	7E	7E	25A					
	Run summary data								
	Raw Avg:	20.74	0.027	77.21					
	Max:	20.75	0.040	138.4					
	Min:	20.73	0.009	48.82					
	Cylinder Concentrations								
	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	11.57	3.938	503.2					
	High:	21.26	8.419	865.6					
	Calibration Readings								
	Zero reading:	0.000	0.003	1.100					
	Low reading:			270.5					
	Mid reading:	11.55	3.924	506.6					
	High reading:	21.30	8.412	868.0					
	EPA Method 7E Error Calculations								
Zero %Err:	**<2.0**	0.000	0.036	N/A					
Mid %Err:	**<2.0**	-0.094	-0.166	N/A					
High %Err:	**<2.0**	0.188	-0.083	N/A					
	EPA Method 25A Error Calculations								
Zero %Err:	**N/A**	N/A	N/A	1.100					
Low %Err:	**5% of cyl**	N/A	N/A	6.000					
Mid %Err:	**5% of cyl**	N/A	N/A	3.400					
High %Err:	**N/A**	N/A	N/A	2.400					
	Initial Bias Data								
	Zero reading:	0.226	0.004	1.100					
	Span reading:	11.42	3.973	506.6					
Zero % bias:	**<5.0**	1.063	0.012	N/A					
Span % bias:	**<5.0**	-0.611	0.582	N/A					
	Final Bias Data								
	Zero reading:	0.153	0.028	7.840					
	Span reading:	11.54	3.921	498.1					
Zero % bias:	**<5.0**	0.720	0.297	N/A					
Span % bias:	**<5.0**	-0.047	-0.036	N/A					
Zero % drift:	**<3.0**	0.343	0.285	N/A					
Span % drift:	**<3.0**	0.564	0.618	N/A					
Zero drift:	**<3.0% span**	N/A	N/A	-6.740					
Span drift:	**<3.0% span**	N/A	N/A	8.500					
	Bias Corrected Averages								
	Cor Avg:	21.06	0.011	77.21					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 2 Average Results - run 5

22:43:00 - 23:52:51

	Name:	O2	CO2	THC					
	Make/Model:								
Oct 30 2018	22:53:51	20.73	0.035	75.17					
Oct 30 2018	22:54:51	20.73	0.039	78.09					
Oct 30 2018	22:55:51	20.73	0.040	85.87					
Oct 30 2018	22:56:51	20.73	0.039	95.39					
Oct 30 2018	22:57:51	20.72	0.040	78.16					
Oct 30 2018	22:58:51	20.73	0.039	94.86					
Oct 30 2018	22:59:51	20.73	0.041	89.13					
Oct 30 2018	23:00:51	20.72	0.038	100.5					
Oct 30 2018	23:01:51	20.72	0.035	94.99					
Oct 30 2018	23:02:51	20.72	0.030	79.85					
Oct 30 2018	23:03:51	20.72	0.032	108.0					
Oct 30 2018	23:04:51	20.72	0.038	105.7					
Oct 30 2018	23:05:51	20.72	0.039	83.72					
Oct 30 2018	23:06:51	20.72	0.039	76.73					
Oct 30 2018	23:07:51	20.72	0.042	149.1					
Oct 30 2018	23:08:51	20.72	0.033	153.6					
Oct 30 2018	23:09:51	20.72	0.034	102.3					
Oct 30 2018	23:10:51	20.72	0.038	84.45					
Oct 30 2018	23:11:51	20.72	0.041	84.77					
Oct 30 2018	23:12:51	20.72	0.037	82.61					
Oct 30 2018	23:13:51	20.72	0.039	82.93					
Oct 30 2018	23:14:51	20.72	0.044	83.94					
Oct 30 2018	23:15:51	20.72	0.043	90.29					
Oct 30 2018	23:16:51	20.72	0.044	90.12					
Oct 30 2018	23:17:51	20.72	0.045	79.52					
Oct 30 2018	23:18:51	20.72	0.045	83.37					
Oct 30 2018	23:19:51	20.72	0.044	79.57					
Oct 30 2018	23:20:51	20.72	0.037	75.60					
Oct 30 2018	23:21:51	20.72	0.041	75.63					
Oct 30 2018	23:22:51	20.72	0.045	87.14					
Oct 30 2018	23:23:51	20.72	0.047	117.6					
Oct 30 2018	23:24:51	20.72	0.045	96.94					
Oct 30 2018	23:25:51	20.72	0.046	101.9					
Oct 30 2018	23:26:51	20.72	0.046	85.44					
Oct 30 2018	23:27:51	20.72	0.046	78.01					
Oct 30 2018	23:28:51	20.72	0.046	74.75					
Oct 30 2018	23:29:51	20.72	0.044	77.87					
Oct 30 2018	23:30:51	20.72	0.044	97.17					
Oct 30 2018	23:31:51	20.72	0.043	91.48					
Oct 30 2018	23:32:51	20.72	0.037	79.89					
Oct 30 2018	23:33:51	20.72	0.041	67.80					
Oct 30 2018	23:34:51	20.72	0.045	70.76					
Oct 30 2018	23:35:51	20.72	0.041	90.15					
Oct 30 2018	23:36:51	20.72	0.040	59.62					
Oct 30 2018	23:37:51	20.72	0.045	44.14					
Oct 30 2018	23:38:51	20.72	0.046	46.43					
Oct 30 2018	23:39:51	20.72	0.047	45.85					

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Oct 30 2018	23:40:51	20.72	0.044	47.56					
Oct 30 2018	23:41:51	20.72	0.044	49.29					
Oct 30 2018	23:42:51	20.72	0.047	79.74					
Oct 30 2018	23:43:51	20.72	0.048	83.67					
Oct 30 2018	23:44:51	20.73	0.049	63.77					
Oct 30 2018	23:45:51	20.73	0.047	53.74					
Oct 30 2018	23:46:51	20.72	0.047	64.54					
Oct 30 2018	23:47:51	20.73	0.049	67.31					
Oct 30 2018	23:48:51	20.73	0.046	62.38					
Oct 30 2018	23:49:51	20.73	0.045	77.69					
Oct 30 2018	23:50:51	20.73	0.045	48.06					
Oct 30 2018	23:51:51	20.73	0.043	39.75					
Oct 30 2018	23:52:51	20.73	0.042	47.21					

	Average:	20.72	0.042	80.69					
	Max:	20.73	0.049	153.6					
	Min:	20.72	0.030	39.75					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 2 Post run bias - run 5

22:43:00 - 23:52:51

	Name:	O2	CO2	THC					
	Make/Model:								
	25A or 7E:	7E	7E	25A					
	Run summary data								
	Raw Avg:	20.72	0.042	80.69					
	Max:	20.73	0.049	153.6					
	Min:	20.72	0.030	39.75					
	Cylinder Concentrations								
	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	11.57	3.938	503.2					
	High:	21.26	8.419	865.6					
	Calibration Readings								
	Zero reading:	0.000	0.003	1.100					
	Low reading:			270.5					
	Mid reading:	11.55	3.924	506.6					
	High reading:	21.30	8.412	868.0					
	EPA Method 7E Error Calculations								
Zero %Err:	**<2.0**	0.000	0.036	N/A					
Mid %Err:	**<2.0**	-0.094	-0.166	N/A					
High %Err:	**<2.0**	0.188	-0.083	N/A					
	EPA Method 25A Error Calculations								
Zero %Err:	**N/A**	N/A	N/A	1.100					
Low %Err:	**5% of cyl**	N/A	N/A	6.000					
Mid %Err:	**5% of cyl**	N/A	N/A	3.400					
High %Err:	**N/A**	N/A	N/A	2.400					
	Initial Bias Data								
	Zero reading:	0.153	0.028	7.840					
	Span reading:	11.54	3.921	498.1					
Zero % bias:	**<5.0**	0.720	0.297	N/A					
Span % bias:	**<5.0**	-0.047	-0.036	N/A					
	Final Bias Data								
	Zero reading:	0.171	-0.019	2.320					
	Span reading:	11.45	3.919	498.1					
Zero % bias:	**<5.0**	0.804	-0.261	N/A					
Span % bias:	**<5.0**	-0.470	-0.059	N/A					
Zero % drift:	**<3.0**	0.084	0.558	N/A					
Span % drift:	**<3.0**	0.423	0.023	N/A					
Zero drift:	**<3.0% span**	N/A	N/A	5.520					
Span drift:	**<3.0% span**	N/A	N/A	0.000					
	Bias Corrected Averages								
	Cor Avg:	20.99	0.038	80.69					

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 3 Average Results - run 6

00:20:00 - 01:20:00

	Name:	O2	CO2	THC					
	Make/Model:								
Oct 31 2018	00:21:00	20.73	0.023	56.77					
Oct 31 2018	00:22:00	20.73	0.022	62.89					
Oct 31 2018	00:23:00	20.73	0.021	87.31					
Oct 31 2018	00:24:00	20.73	0.022	85.78					
Oct 31 2018	00:25:00	20.73	0.020	92.14					
Oct 31 2018	00:26:00	20.73	0.018	97.78					
Oct 31 2018	00:27:00	20.73	0.016	111.0					
Oct 31 2018	00:28:00	20.73	0.017	119.3					
Oct 31 2018	00:29:00	20.73	0.016	92.55					
Oct 31 2018	00:30:00	20.73	0.008	94.76					
Oct 31 2018	00:31:00	20.73	0.010	79.90					
Oct 31 2018	00:32:00	20.73	0.014	75.91					
Oct 31 2018	00:33:00	20.73	0.015	110.1					
Oct 31 2018	00:34:00	20.73	0.014	91.28					
Oct 31 2018	00:35:00	20.73	0.015	96.96					
Oct 31 2018	00:36:00	20.73	0.010	96.14					
Oct 31 2018	00:37:00	20.73	0.009	103.8					
Oct 31 2018	00:38:00	20.73	0.009	96.61					
Oct 31 2018	00:39:00	20.73	0.012	100.7					
Oct 31 2018	00:40:00	20.73	0.018	77.84					
Oct 31 2018	00:41:00	20.74	0.019	107.5					
Oct 31 2018	00:42:00	20.73	0.022	80.42					
Oct 31 2018	00:43:00	20.73	0.023	71.79					
Oct 31 2018	00:44:00	20.73	0.023	66.11					
Oct 31 2018	00:45:00	20.73	0.022	102.8					
Oct 31 2018	00:46:00	20.73	0.023	60.08					
Oct 31 2018	00:47:00	20.73	0.022	73.67					
Oct 31 2018	00:48:00	20.73	0.023	65.00					
Oct 31 2018	00:49:00	20.73	0.020	70.03					
Oct 31 2018	00:50:00	20.73	0.020	81.97					
Oct 31 2018	00:51:00	20.73	0.020	74.98					
Oct 31 2018	00:52:00	20.74	0.021	82.67					
Oct 31 2018	00:53:00	20.73	0.019	132.4					
Oct 31 2018	00:54:00	20.74	0.022	82.79					
Oct 31 2018	00:55:00	20.73	0.017	78.06					
Oct 31 2018	00:56:00	20.73	0.020	97.97					
Oct 31 2018	00:57:00	20.73	0.017	95.86					
Oct 31 2018	00:58:00	20.73	0.012	94.27					
Oct 31 2018	00:59:00	20.73	0.012	97.05					
Oct 31 2018	01:00:00	20.73	0.013	90.16					
Oct 31 2018	01:01:00	20.73	0.013	92.41					
Oct 31 2018	01:02:00	20.74	0.011	77.39					
Oct 31 2018	01:03:00	20.73	0.006	74.64					
Oct 31 2018	01:04:00	20.74	0.003	93.06					
Oct 31 2018	01:05:00	20.74	0.008	106.1					
Oct 31 2018	01:06:00	20.74	0.010	114.3					
Oct 31 2018	01:07:00	20.74	0.010	105.4					

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Oct 31 2018	01:08:00	20.74	0.012	97.47					
Oct 31 2018	01:09:00	20.74	0.010	89.25					
Oct 31 2018	01:10:00	20.74	0.012	92.06					
Oct 31 2018	01:11:00	20.74	0.010	71.73					
Oct 31 2018	01:12:00	20.74	0.010	82.17					
Oct 31 2018	01:13:00	20.74	0.010	79.60					
Oct 31 2018	01:14:00	20.74	0.010	78.53					
Oct 31 2018	01:15:00	20.74	0.011	84.43					
Oct 31 2018	01:16:00	20.74	0.010	82.25					
Oct 31 2018	01:17:00	20.74	0.009	90.69					
Oct 31 2018	01:18:00	20.74	0.008	104.5					
Oct 31 2018	01:19:00	20.74	0.007	104.3					
Oct 31 2018	01:20:00	20.74	0.007	87.90					

	Average:	20.73	0.015	89.05					
	Max:	20.74	0.023	132.4					
	Min:	20.73	0.003	56.77					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Run 3 Post run bias - run 6

00:20:00 - 01:20:00

	Name:	O2	CO2	THC					
	Make/Model:								
	25A or 7E:	7E	7E	25A					
Run summary data									
	Raw Avg:	20.73	0.015	89.05					
	Max:	20.74	0.023	132.4					
	Min:	20.73	0.003	56.77					
Cylinder Concentrations									
	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	11.57	3.938	503.2					
	High:	21.26	8.419	865.6					
Calibration Readings									
	Zero reading:	0.000	0.003	1.100					
	Low reading:			270.5					
	Mid reading:	11.55	3.924	506.6					
	High reading:	21.30	8.412	868.0					
EPA Method 7E Error Calculations									
Zero %Err:	**<2.0**	0.000	0.036	N/A					
Mid %Err:	**<2.0**	-0.094	-0.166	N/A					
High %Err:	**<2.0**	0.188	-0.083	N/A					
EPA Method 25A Error Calculations									
Zero %Err:	**N/A**	N/A	N/A	1.100					
Low %Err:	**5% of cyl**	N/A	N/A	6.000					
Mid %Err:	**5% of cyl**	N/A	N/A	3.400					
High %Err:	**N/A**	N/A	N/A	2.400					
Initial Bias Data									
	Zero reading:	0.171	-0.019	2.320					
	Span reading:	11.45	3.919	498.1					
Zero % bias:	**<5.0**	0.804	-0.261	N/A					
Span % bias:	**<5.0**	-0.470	-0.059	N/A					
Final Bias Data									
	Zero reading:	0.160	-0.006	3.230					
	Span reading:	11.53	3.933	506.2					
Zero % bias:	**<5.0**	0.753	-0.107	N/A					
Span % bias:	**<5.0**	-0.094	0.107	N/A					
Zero % drift:	**<3.0**	0.051	0.154	N/A					
Span % drift:	**<3.0**	0.376	0.166	N/A					
Zero drift:	**<3.0% span**	N/A	N/A	-0.910					
Span drift:	**<3.0% span**	N/A	N/A	-8.100					
Bias Corrected Averages									
	Cor Avg:	21.01	0.027	89.05					

APPENDIX C
LABORATORY ANALYSIS DATA

Appendix C.1
Hexavalent Chromium Analyses

MONTROSE AIR QUALITY SERVICES

PROJECT: 005AS-452603
SCHNITZER STEEL

CLIENT # M039
REPORT # 18-499

SUBMITTED BY:
CHESTER LabNet
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CHESTER LabNet

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Case Narrative

Date: November 13, 2018

General Information

Client:	Montrose Air Quality Services
Client Number:	M039
Report Number:	18-499
Sample Description:	Impinger Trains, Rinses
Sample Numbers:	18-S2774 – 18-S2787

Analysis

Analytes:	Total Chromium, Hexavalent Chromium
Analytical Protocols:	CARB 425 (7/28/97 version)
Analytical Notes:	The pH of all samples was approximately 9 as measured by full range pH paper. The samples contained high concentrations of dissolved solids which caused a low recovery of the matrix spike for total Cr. For total Cr, the samples were diluted by a factor of 5 to alleviate the problem which yielded an acceptable spike recovery. The detection limit for total Cr has been raised by a factor of five to account for the dilution. No problems were encountered during the Cr VI analyses. The results have not been blank corrected.
QA/QC Review:	All of the data have been reviewed by the analysts performing the analyses and the project manager. All of the quality control and sample-specific information in this package is complete and meets or exceeds the minimum requirements for acceptability.
Comments:	If you have any questions or concerns regarding this analysis, please feel free to contact the project manager.
Disclaimer:	This report shall not be reproduced, except in full, without the written approval of the laboratory. The results only represent that of the samples as received into the laboratory.

Paul Duda 11/13/18

Project Manager Date
Paul Duda

Client: M039 - Montrose Air Quality Services
Report Number: 18-499

Lab ID: 18-S2774
Client ID: 1-Cr FH Rinses
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/29/18
Sample Volume: 90.0 mL

Analyte	µg/L Conc.	DL	µg/sample Conc.	DL
Cr VI	0.169	0.0200	0.0152	0.0018
Total Cr	< DL	4.00	< DL	0.360

Lab ID: 18-S2775
Client ID: 1-Cr Impingers 1-3
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/29/18
Sample Volume: 390. mL

Analyte	µg/L Conc.	DL	µg/sample Conc.	DL
Cr VI	0.0680	0.0200	0.0265	0.0078
Total Cr	< DL	4.00	< DL	1.56

Lab ID: 18-S2776
Client ID: 2-Cr FH Rinses
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/29/18
Sample Volume: 102. mL

Analyte	µg/L Conc.	DL	µg/sample Conc.	DL
Cr VI	0.137	0.0200	0.0140	0.0020
Total Cr	< DL	4.00	< DL	0.408

Lab ID: 18-S2777
Client ID: 2-Cr Impingers 1-3
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/29/18
Sample Volume: 345. mL

Analyte	µg/L Conc.	DL	µg/sample Conc.	DL
Cr VI	0.0370	0.0200	0.0128	0.0069
Total Cr	< DL	4.00	< DL	1.38

Lab ID: 18-S2778
Client ID: 3-Cr FH Rinses
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/30/18
Sample Volume: 102. mL

Analyte	µg/L Conc.	DL	µg/sample Conc.	DL
Cr VI	0.0930	0.0200	0.0095	0.0020
Total Cr	< DL	4.00	< DL	0.408

Client: M039 - Montrose Air Quality Services
Report Number: 18-499

Lab ID: 18-S2779
Client ID: 3-Cr Impingers 1-3
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/30/18
Sample Volume: 280. mL

	µg/L		µg/sample	
Analyte	Conc.	DL	Conc.	DL
Cr VI	0.0390	0.0200	0.0109	0.0056
Total Cr	< DL	4.00	< DL	1.12

Lab ID: 18-S2780
Client ID: 4-Cr FH Rinses
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/30/18
Sample Volume: 102. mL

	µg/L		µg/sample	
Analyte	Conc.	DL	Conc.	DL
Cr VI	0.101	0.0200	0.0103	0.0020
Total Cr	< DL	4.00	< DL	0.408

Lab ID: 18-S2781
Client ID: 4-Cr Impingers 1-3
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/30/18
Sample Volume: 285. mL

	µg/L		µg/sample	
Analyte	Conc.	DL	Conc.	DL
Cr VI	0.0430	0.0200	0.0123	0.0057
Total Cr	< DL	4.00	< DL	1.14

Lab ID: 18-S2782
Client ID: 5-Cr FH Rinses
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/30/18
Sample Volume: 102. mL

	µg/L		µg/sample	
Analyte	Conc.	DL	Conc.	DL
Cr VI	0.103	0.0200	0.0105	0.0020
Total Cr	< DL	4.00	< DL	0.408

Lab ID: 18-S2783
Client ID: 5-Cr Impingers 1-3
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/30/18
Sample Volume: 270. mL

	µg/L		µg/sample	
Analyte	Conc.	DL	Conc.	DL
Cr VI	0.0520	0.0200	0.0140	0.0054
Total Cr	< DL	4.00	< DL	1.08

Client: M039 - Montrose Air Quality Services
Report Number: 18-499

Lab ID: 18-S2784
Client ID: 6-Cr FH Rinses
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/31/18
Sample Volume: 139. mL

Analyte	µg/L Conc.	DL	µg/sample Conc.	DL
Cr VI	0.0840	0.0200	0.0117	0.0028
Total Cr	< DL	4.00	< DL	0.556

Lab ID: 18-S2785
Client ID: 6-Cr Impingers 1-3
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/31/18
Sample Volume: 270. mL

Analyte	µg/L Conc.	DL	µg/sample Conc.	DL
Cr VI	0.0360	0.0200	0.0097	0.0054
Total Cr	< DL	4.00	< DL	1.08

Lab ID: 18-S2786
Client ID: FB-Cr FH Rinses
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/29/18
Sample Volume: 39.0 mL

Analyte	µg/L Conc.	DL	µg/sample Conc.	DL
Cr VI	0.583	0.0200	0.0227	0.0008
Total Cr	< DL	4.00	< DL	0.156

Lab ID: 18-S2787
Client ID: FB-Cr Impingers 1-3
Site: Schnitzer Steel
Source: Shredder Exhaust Stack
Sample Date: 10/29/18
Sample Volume: 240. mL

Analyte	µg/L Conc.	DL	µg/sample Conc.	DL
Cr VI	0.0290	0.0200	0.0070	0.0048
Total Cr	< DL	4.00	< DL	0.960

QA/QC Report

Client Name: Montrose Air Quality Services
Project Number: M039
Analytical Technique: IC-PCR
Sample Description: CARB 425
Report Number: 18-499

Blank Data

Analyte	Sample ID	Measured Conc. µg/L	DL Conc. µg/L
Cr VI	ICB	< DL	0.020
Cr VI	CCB	< DL	0.020
Cr VI	CCB	< DL	0.020

*: Sample Media Blank (SM_Blk) concentration in µg/filter
ICB: Initial Calibration Blank CCB: Continuing Calibration Blank

Calibration QC

Analyte	Sample ID	Standard Conc. µg/L	Measured Conc. µg/L	Percent Recovery
Cr VI	ICV	1.00	1.01	101.0
Cr VI	LL-LCS	0.040	0.04	97.5
Cr VI	CCV	1.00	0.99	99.0
Cr VI	CCV	1.00	1.02	102.1

ICV: Initial Calibration Verification CCV: Continuing Calibration Verification
Calibration Verification Limits: 90% - 110% Recovery
LL-LCS Limits: 50% - 150% Recovery

Duplicate Data

Analyte	Sample ID	Sample Conc. µg/L	Duplicate Conc. µg/L	RPD
Cr VI	18-S2774	0.169	0.168	0.59
Cr VI	18-S2775	0.068	0.067	1.48 #

RPD = {(sample-duplicate)/[(sample+duplicate)/2]}x100
N/C: RPD is not calculated when sample or duplicate is below detection limit
#: per EPA CLP protocol, control limits do not apply if sample and/or duplicate concentration is less than 5x the detection limit

Laboratory Control Sample/Matrix Spike Analysis

Analyte	Sample ID	Sample Conc. µg/L	Spike Conc. µg/L	Spike Amount µg/L	Percent Recovery
Cr VI	18-S2774	0.169	1.15	1.00	98.3
Cr VI	18-S2775	0.068	1.04	1.00	97.5

*: per EPA CLP protocol, control limits do not apply if spike concentration is less than 25% of the sample concentration

QA/QC Report

Client Name: Montrose Air Quality Services
Project Number: M039
Analytical Technique: ICP - Optima 8300
Sample Description: CARB 425
Report Number: 18-499

Blank Data

Analyte	Sample ID	Measured Conc. µg/L	DL Conc. µg/L
Cr	ICB	< DL	4.00
Cr	Meth_Blk	< DL	4.00
Cr	CCB	< DL	4.00
Cr	CCB	< DL	4.00
Cr	CCB	< DL	4.00

*: Sample Media Blank (SM_Blk) concentration in µg/filter
ICB: Initial Calibration Blank CCB: Continuing Calibration Blank

Calibration QC

Analyte	Sample ID	Standard Conc. µg/L	Measured Conc. µg/L	Percent Recovery
Cr	ICV	2500	2470	98.9
Cr	LL-CCV	4.00	4.19	104.8
Cr	LL-LCS	1.50	1.60	106.3
Cr	CCV	2500	2500	100.0
Cr	CCV	2500	2500	100.1
Cr	CCV	2500	2510	100.6

ICV: Initial Calibration Verification CCV: Continuing Calibration Verification
Calibration Verification Limits: 90% - 110% Recovery
LL-CCV (Low Level CCV) Limits: 70% - 130% Recovery
LL-LCS Limits: 50% - 150% Recovery

Duplicate Data

Analyte	Sample ID	Sample Conc. µg/L	Duplicate Conc. µg/L	RPD
Cr	18-S2774	< 4	< 4	N/C #
Cr	18-S2775	< 4	< 4	N/C #

RPD = {(sample-duplicate)/[(sample+duplicate)/2]}x100
N/C: RPD is not calculated when sample or duplicate is below detection limit
Duplicate Limit: 20% RPD
#: per EPA CLP protocol, control limits do not apply if sample and/or duplicate concentration is less than 5x the detection limit

Laboratory Control Sample/Matrix Spike Analysis

Analyte	Sample ID	Sample Conc. µg/L	Spike Conc. µg/L	Spike Amount µg/L	Percent Recovery
Cr	LCS	< 0.8	2408.	2500.	96.3
Cr	18-S2776	< 4	2424.	2500.	97.0
Cr	18-S2777	< 4	2362.	2500.	94.5

LCS Limit: 80% - 120% Recovery Spike Limit: 75% - 125% Recovery
*: per EPA CLP protocol, control limits do not apply if spike concentration is less than 25% of the sample concentration

CHESTER LABNET

SOURCE SAMPLE RECEIPT CHECKLIST

Client: Montrose Air Quality Service Date: 11/21/18

Runs: 6 + Blanks Report #: 18-499

Custody Seals Inspected, If Present	NA	
Chain-of-Custody Form Inspected		
CoC present with samples?	✓	*
CoC indicate analytical methodology to be used? (eg M29 etc)	✓	!!
CoC indicate if compliance testing? (esp. M26)	Not Stated	!!
M26 samples have Thiosulfate added in field?	NA	!!
M29 indicate FH/BH separate or combined?	NA	!!
Has Form Been Signed?	✓	
Have Date and Time Custody Released Been Noted on Form?	✓	
All Sample Containers Inspected	✓	
Does Number of Samples Match Number on CoC Form?	✓	!!
Do All Sample ID Numbers Match Those on the CoC Form?	✓	!!
Did client mark sample volumes prior to shipment?	✓	*
If required by method, did client vent samples prior to shipment?	NR	
Are the Sample Containers Intact?	✓	!!
Are signs of leakage present?	NO	*
Chain-of-Custody Form Signed and Dated by CLN	✓	
Corrective Actions		
Client Contacted Due to Mismatching Sample ID Numbers		
Client Contacted Due to Broken Sample Container(s)		
Client Contacted Due to Leaking Sample Container(s)		
Client contacted for verification of methodology?	11/21/18	
Corrective Actions Documented?	JMT	
Corrective Actions Accomplished?		

*Items marked !! shall be addressed **prior to any analytical work being started**.*
*Items marked * shall be **noted in case narrative** upon reporting of results to client.*

Signed: Lisa Ball

Notes: _____

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18-499

CHAIN OF CUSTODY

MAQS Antioch
2825 Verne Roberts Circle
Antioch, CA 94509
Phone (925) 680-4300 | Fax (925) 680-4416

Client / Project: Schnitzer Steel	**Project / Sample Location:** Shredder Exhaust Stack	**Test / Analytical Method:** Carb 425
Project No.: 005AS-452603	**Purchase Order No:** PO#1027082	**Special Analysis / Reporting Instructions:**
Send Analytical Report To: Antioch QA/QC: AntiochQA-QC@montrose-env.com; rodell@montrose-env.com	**Sampler or PM Signature:**	Please hold Reagent Blanks; Do not analyze. Will only be analyzed in the event something seems wrong with the samples. Analysis for: Cr, Cr6+ Please record temp & pH upon receiving.

Run / Sample No.	Date	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
1-CR	10/29/2018	1	(1) Front-Half Rinses	0.1N NaHCO3	18S2774
1-CR	10/29/2018	1	(2) Impingers 1-3	0.1N NaHCO3	S2775
2-CR	10/29/2018	2	(1) & (2)	0.1N NaHCO3	S2776 / S2777
3-CR	10/30/2018	2	(1) & (2)	0.1N NaHCO3	S2778 / S2779
4-CR	10/30/2018	2	(1) & (2)	0.1N NaHCO3	S2780 / S2781
5-CR	10/30/2018	2	(1) & (2)	0.1N NaHCO3	S2782 / S2783
6-CR	10/31/2018	2	(1) & (2)	0.1N NaHCO3	S2784 / S2785
FB-CR	10/29/2018	2	(1) & (2)	0.1N NaHCO3	S2786 / S2787
RB-0.1N NaHCO3	10/31/2018	1	Reagent Blank	0.1N NaHCO3	Hold; Do not analyze
RB-1.0N NaHCO3	10/31/2018	1	Reagent Blank	1.0N NaHCO3	Hold; Do not analyze
Total Containers		**16**			

18S2788
S2789

Relinquished by	Date	Time	Received by	Date	Time
	11/1/18		FEDEX		
Relinquished by: FEDEX	Date	Time	Received by	Date: 11/2/18	Time: 9:50
Relinquished by	Date	Time	Received by	Date	Time

Temp 2.1°C

Report # 18-499

Page 9 of 10

RAW DATA

Available upon request

Appendix C.2
Benzene Analyses

Atmospheric Analysis & Consulting, Inc.

CLIENT	: Montrose AQS
PROJECT NAME	: Schnitzer Steel - Shredder Exhaust Stack
PROJECT NO.	: 005AS-452603
AAC PROJECT NO.	: 181713
REPORT DATE	: 11/16/2018

On November 5, 2018, Atmospheric Analysis & Consulting, Inc. received five (5) Six-Liter Summa Canisters for TNMNEOC analysis by TO-12M/PAMS Protocol. Upon receipt each sample was assigned a unique Laboratory ID number as follows:

Client ID	Lab ID	Initial Pressure (mmHga)
1-POC	181713-114523	Void
2-POC	181713-114524	744.6
3-POC	181713-114525	764.1
4-POC	181713-114526	651.2
5-POC	181713-114527	739.9
6-POC	181713-114528	514.2

Sample 1-POC (181713-114523) was voided due to no sample being collected in the canister. Sample was received at full vacuum.

All of the analyses mentioned above were performed in accordance with AAC's ISO/IEC 17025:2005 and NELAP approved Quality Assurance Plan. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. No other problems were encountered during receiving, preparation, and/or analysis of these samples. The Laboratory Director or his/her designee, as verified by the following signature, has authorized release of the data contained in this hardcopy report.

If you have any questions or require further explanation of data results, please contact the undersigned.

Marcus Hueppe
Laboratory Director

This report consists of 13 pages.

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 181713
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 11/05/2018
DATE REPORTED : 11/26/2018

HYDROCARBONS (C2-C12) SPECIATED

Client ID	2-POC			Sample Reporting Limit (SRL) (MRLxDF's)	3-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	181713-114524				181713-114525				
Date Sampled	10/29/2018				10/30/2018				
Date Analyzed	11/13/2018				11/13/2018				
Can Dilution Factor	1.37				1.33				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Ethylene	6.43		2.0	1.37	8.14		2.0	1.33	0.50
Acetylene	2.45		2.0	1.37	2.51		2.0	1.33	0.50
Ethane	6.32		2.0	1.37	10.8		2.0	1.33	0.50
Propylene	NR	NA	2.0	0.91	NR	NA	2.0	0.89	0.33
Propane	9.84		2.0	0.91	21.3		2.0	0.89	0.33
Isobutane	5.68		2.0	0.69	18.2		2.0	0.67	0.25
1-Butene	<SRL	U	2.0	0.69	<SRL	U	2.0	0.67	0.25
n-Butane	19.5		2.0	0.69	29.6		2.0	0.67	0.25
trans-2-Butene	<SRL	U	2.0	0.69	1.25		2.0	0.67	0.25
cis-2-Butene	<SRL	U	2.0	0.69	1.01		2.0	0.67	0.25
Isopentane	180	E	2.0	0.55	252	E	2.0	0.53	0.20
1-Pentene	4.13		2.0	0.55	4.69		2.0	0.53	0.20
n-Pentane	69.9		2.0	0.55	96.9		2.0	0.53	0.20
Isoprene	<SRL	U	2.0	0.55	0.88		2.0	0.53	0.20
trans-2-Pentene	9.59		2.0	0.55	12.5		2.0	0.53	0.20
cis-2-Pentene	4.81		2.0	0.55	6.06		2.0	0.53	0.20
2,2-Dimethylbutane	17.5		2.0	0.46	31.2		2.0	0.44	0.17
Cyclopentane	16.8		2.0	0.55	29.3		2.0	0.53	0.20
2,3-Dimethylbutane	29.7		2.0	0.46	43.8		2.0	0.44	0.17
2-Methylpentane	96.5	E	2.0	0.46	140	E	2.0	0.44	0.17
3-Methylpentane	63.5		2.0	0.46	89.1		2.0	0.44	0.17
1-Hexene	0.89		2.0	0.46	1.36		2.0	0.44	0.17
n-Hexane	NR	NA	2.0	0.46	NR	NA	2.0	0.44	0.17
Methylcyclopentane	67.6		2.0	0.46	90.0		2.0	0.44	0.17
2,4-Dimethylpentane	23.2		2.0	0.39	29.4		2.0	0.38	0.14
Benzene	NR	NA	2.0	0.46	NR	NA	2.0	0.44	0.17
Cyclohexane	NR	NA	2.0	0.46	NR	NA	2.0	0.44	0.17
2-Methylhexane	41.7		2.0	0.39	57.1		2.0	0.38	0.14
2,3-Dimethylpentane	38.4		2.0	0.39	40.4		2.0	0.38	0.14
3-Methylhexane	43.6		2.0	0.39	60.6		2.0	0.38	0.14
2,2,4-Trimethylpentane	NR	NA	2.0	0.34	NR	NA	2.0	0.33	0.13
n-Heptane	NR	NA	2.0	0.39	NR	NA	2.0	0.38	0.14
Methylcyclohexane	29.8		2.0	0.39	40.5		2.0	0.38	0.14
2,3,4-Trimethylpentane	20.6		2.0	0.34	31.3		2.0	0.33	0.13

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 181713
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 11/05/2018
DATE REPORTED : 11/26/2018

HYDROCARBONS (C2-C12) SPECIATED

Client ID	2-POC			Sample Reporting Limit (SRL) (MRLxDF's)	3-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	181713-114524				181713-114525				
Date Sampled	10/29/2018				10/30/2018				
Date Analyzed	11/13/2018				11/13/2018				
Can Dilution Factor	1.37				1.33				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Toluene	NR	NA	2.0	0.39	NR	NA	2.0	0.38	0.14
2-Methylheptane	11.1		2.0	0.34	19.8		2.0	0.33	0.13
3-Methylheptane	13.0		2.0	0.34	20.6		2.0	0.33	0.13
n-Octane	9.33		2.0	0.34	14.7		2.0	0.33	0.13
Ethylbenzene	NR	NA	2.0	0.34	NR	NA	2.0	0.33	0.13
m/p-Xylenes	NR	NA	2.0	0.34	NR	NA	2.0	0.33	0.13
Styrene	NR	NA	2.0	0.34	NR	NA	2.0	0.33	0.13
o-Xylene	NR	NA	2.0	0.34	NR	NA	2.0	0.33	0.13
Nonane	3.01		2.0	0.30	4.02		2.0	0.30	0.11
Isopropylbenzene	0.50		2.0	0.30	0.73		2.0	0.30	0.11
n-Propylbenzene	1.72		2.0	0.30	2.49		2.0	0.30	0.11
m-Ethyltoluene	6.03		2.0	0.30	8.87		2.0	0.30	0.11
p-Ethyltoluene	NR	NA	2.0	0.30	NR	NA	2.0	0.30	0.11
1,3,5-Trimethylbenzene	NR	NA	2.0	0.30	NR	NA	2.0	0.30	0.11
o-Ethyltoluene	1.82		2.0	0.30	3.30		2.0	0.30	0.11
1,2,4-Trimethylbenzene	NR	NA	2.0	0.30	NR	NA	2.0	0.30	0.11
n-Decane	1.49		2.0	0.27	1.25		2.0	0.27	0.10
1,2,3-Trimethylbenzene	0.88		2.0	0.30	2.06		2.0	0.30	0.11
m-Diethylbenzene	0.42		2.0	0.27	<SRL	U	2.0	0.27	0.10
p-Diethylbenzene	1.20		2.0	0.27	<SRL	U	2.0	0.27	0.10
n-Undecane	1.92		2.0	0.25	1.33		2.0	0.24	0.09
n-Dodecane	0.60		2.0	0.23	0.48		2.0	0.22	0.08

U - Compound was analyzed for, but was not detected at or above the SRL.
NR - Compound is not reported. See TO-15 results
E - Estimated concentration is above the calibration curve

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 181713
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 11/05/2018
DATE REPORTED : 11/26/2018

HYDROCARBONS (C2-C12) SPECIATED

Client ID	4-POC			Sample Reporting Limit (SRL) (MRLxDF's)	5-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	181713-114526				181713-114527				
Date Sampled	10/30/2018				10/30/2018				
Date Analyzed	11/13/2018				11/13/2018				
Can Dilution Factor	1.56				1.37				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Ethylene	13.2		2.0	1.56	9.55		2.0	1.37	0.50
Acetylene	2.20		2.0	1.56	3.03		2.0	1.37	0.50
Ethane	67.0		2.0	1.56	39.1		2.0	1.37	0.50
Propylene	NR	NA	2.0	1.04	NR	NA	2.0	0.91	0.33
Propane	1220	E	2.0	1.04	294	E	2.0	0.91	0.33
Isobutane	78.0		2.0	0.78	18.8		2.0	0.69	0.25
1-Butene	1.79		2.0	0.78	<SRL	U	2.0	0.69	0.25
n-Butane	68.3		2.0	0.78	20.9		2.0	0.69	0.25
trans-2-Butene	1.68		2.0	0.78	<SRL	U	2.0	0.69	0.25
cis-2-Butene	1.50		2.0	0.78	<SRL	U	2.0	0.69	0.25
Isopentane	50.7		2.0	0.62	16.0		2.0	0.55	0.20
1-Pentene	<SRL	U	2.0	0.62	<SRL	U	2.0	0.55	0.20
n-Pentane	19.7		2.0	0.62	5.82		2.0	0.55	0.20
Isoprene	<SRL	U	2.0	0.62	<SRL	U	2.0	0.55	0.20
trans-2-Pentene	<SRL	U	2.0	0.62	<SRL	U	2.0	0.55	0.20
cis-2-Pentene	<SRL	U	2.0	0.62	<SRL	U	2.0	0.55	0.20
2,2-Dimethylbutane	13.1		2.0	0.52	2.69		2.0	0.46	0.17
Cyclopentane	576	E	2.0	0.62	151	E	2.0	0.55	0.20
2,3-Dimethylbutane	6.57		2.0	0.52	1.71		2.0	0.46	0.17
2-Methylpentane	19.7		2.0	0.52	5.10		2.0	0.46	0.17
3-Methylpentane	13.9		2.0	0.52	2.93		2.0	0.46	0.17
1-Hexene	0.59		2.0	0.52	<SRL	U	2.0	0.46	0.17
n-Hexane	NR	NA	2.0	0.52	NR	NA	2.0	0.46	0.17
Methylcyclopentane	16.7		2.0	0.52	3.60		2.0	0.46	0.17
2,4-Dimethylpentane	5.36		2.0	0.45	1.12		2.0	0.39	0.14
Benzene	NR	NA	2.0	0.52	NR	NA	2.0	0.46	0.17
Cyclohexane	NR	NA	2.0	0.52	NR	NA	2.0	0.46	0.17
2-Methylhexane	16.1		2.0	0.45	3.28		2.0	0.39	0.14
2,3-Dimethylpentane	10.0		2.0	0.45	1.96		2.0	0.39	0.14
3-Methylhexane	18.7		2.0	0.45	3.80		2.0	0.39	0.14
2,2,4-Trimethylpentane	NR	NA	2.0	0.39	NR	NA	2.0	0.34	0.13
n-Heptane	NR	NA	2.0	0.45	NR	NA	2.0	0.39	0.14
Methylcyclohexane	19.3		2.0	0.45	2.69		2.0	0.39	0.14
2,3,4-Trimethylpentane	5.46		2.0	0.39	1.49		2.0	0.34	0.13

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 181713
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 11/05/2018
DATE REPORTED : 11/26/2018

HYDROCARBONS (C2-C12) SPECIATED

Client ID	4-POC			Sample Reporting Limit (SRL) (MRLxDF's)	5-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	181713-114526				181713-114527				
Date Sampled	10/30/2018				10/30/2018				
Date Analyzed	11/13/2018				11/13/2018				
Can Dilution Factor	1.56				1.37				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Toluene	NR	NA	2.0	0.45	NR	NA	2.0	0.39	0.14
2-Methylheptane	5.37		2.0	0.39	1.06		2.0	0.34	0.13
3-Methylheptane	4.93		2.0	0.39	1.29		2.0	0.34	0.13
n-Octane	8.49		2.0	0.39	1.61		2.0	0.34	0.13
Ethylbenzene	NR	NA	2.0	0.39	NR	NA	2.0	0.34	0.13
m/p-Xylenes	NR	NA	2.0	0.39	NR	NA	2.0	0.34	0.13
Styrene	NR	NA	2.0	0.39	NR	NA	2.0	0.34	0.13
o-Xylene	NR	NA	2.0	0.39	NR	NA	2.0	0.34	0.13
Nonane	4.63		2.0	0.35	2.06		2.0	0.30	0.11
Isopropylbenzene	0.40		2.0	0.35	<SRL	U	2.0	0.30	0.11
n-Propylbenzene	1.34		2.0	0.35	0.70		2.0	0.30	0.11
m-Ethyltoluene	3.95		2.0	0.35	2.49		2.0	0.30	0.11
p-Ethyltoluene	NR	NA	2.0	0.35	NR	NA	2.0	0.30	0.11
1,3,5-Trimethylbenzene	NR	NA	2.0	0.35	NR	NA	2.0	0.30	0.11
o-Ethyltoluene	1.39		2.0	0.35	0.89		2.0	0.30	0.11
1,2,4-Trimethylbenzene	NR	NA	2.0	0.35	NR	NA	2.0	0.30	0.11
n-Decane	1.72		2.0	0.31	1.11	E	2.0	0.27	0.10
1,2,3-Trimethylbenzene	1.17		2.0	0.35	0.77		2.0	0.30	0.11
m-Diethylbenzene	0.45		2.0	0.31	0.37		2.0	0.27	0.10
p-Diethylbenzene	0.87		2.0	0.31	0.63		2.0	0.27	0.10
n-Undecane	0.72		2.0	0.28	0.64		2.0	0.25	0.09
n-Dodecane	0.31		2.0	0.26	0.27		2.0	0.23	0.08

U - Compound was analyzed for, but was not detected at or above the SRL.
NR - Compound is not reported. See TO-15 results
E - Estimated concentration is above the calibration curve

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 181713
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 11/05/2018
DATE REPORTED : 11/26/2018

HYDROCARBONS (C2-C12) SPECIATED

Client ID	6-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	181713-114528				
Date Sampled	10/31/2018				
Date Analyzed	11/13/2018				
Can Dilution Factor	2.14				
	Result	Qualifier	Analysis DF		
Ethylene	6.85		2.0	2.14	0.50
Acetylene	4.68		2.0	2.14	0.50
Ethane	27.8		2.0	2.14	0.50
Propylene	NR	NA	2.0	1.43	0.33
Propane	19.9		2.0	1.43	0.33
Isobutane	3.45		2.0	1.07	0.25
1-Butene	<SRL	U	2.0	1.07	0.25
n-Butane	7.84		2.0	1.07	0.25
trans-2-Butene	<SRL	U	2.0	1.07	0.25
cis-2-Butene	<SRL	U	2.0	1.07	0.25
Isopentane	7.44		2.0	0.86	0.20
1-Pentene	34.1		2.0	0.86	0.20
n-Pentane	3.06		2.0	0.86	0.20
Isoprene	<SRL	U	2.0	0.86	0.20
trans-2-Pentene	<SRL	U	2.0	0.86	0.20
cis-2-Pentene	<SRL	U	2.0	0.86	0.20
2,2-Dimethylbutane	1.22		2.0	0.71	0.17
Cyclopentane	37.0		2.0	0.86	0.20
2,3-Dimethylbutane	1.08		2.0	0.71	0.17
2-Methylpentane	3.89		2.0	0.71	0.17
3-Methylpentane	2.11		2.0	0.71	0.17
1-Hexene	<SRL	U	2.0	0.71	0.17
n-Hexane	NR	NA	2.0	0.71	0.17
Methylcyclopentane	2.58		2.0	0.71	0.17
2,4-Dimethylpentane	0.80		2.0	0.61	0.14
Benzene	NR	NA	2.0	0.71	0.17
Cyclohexane	NR	NA	2.0	0.71	0.17
2-Methylhexane	1.34		2.0	0.61	0.14
2,3-Dimethylpentane	1.27		2.0	0.61	0.14
3-Methylhexane	2.14		2.0	0.61	0.14
2,2,4-Trimethylpentane	NR	NA	2.0	0.54	0.13
n-Heptane	NR	NA	2.0	0.61	0.14
Methylcyclohexane	1.22		2.0	0.61	0.14
2,3,4-Trimethylpentane	1.34		2.0	0.54	0.13

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 181713
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 11/05/2018
DATE REPORTED : 11/26/2018

HYDROCARBONS (C2-C12) SPECIATED

Client ID	6-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	181713-114528				
Date Sampled	10/31/2018				
Date Analyzed	11/13/2018				
Can Dilution Factor	2.14				
	Result	Qualifier	Analysis DF		
Toluene	NR	NA	2.0	0.61	0.14
2-Methylheptane	0.88		2.0	0.54	0.13
3-Methylheptane	0.95		2.0	0.54	0.13
n-Octane	1.19		2.0	0.54	0.13
Ethylbenzene	NR	NA	2.0	0.54	0.13
m/p-Xylenes	NR	NA	2.0	0.54	0.13
Styrene	NR	NA	2.0	0.54	0.13
o-Xylene	NR	NA	2.0	0.54	0.13
Nonane	1.32		2.0	0.48	0.11
Isopropylbenzene	<SRL	U	2.0	0.48	0.11
n-Propylbenzene	<SRL	U	2.0	0.48	0.11
m-Ethyltoluene	1.64		2.0	0.48	0.11
p-Ethyltoluene	NR	NA	2.0	0.48	0.11
1,3,5-Trimethylbenzene	NR	NA	2.0	0.48	0.11
o-Ethyltoluene	0.74		2.0	0.48	0.11
1,2,4-Trimethylbenzene	NR	NA	2.0	0.48	0.11
n-Decane	0.75		2.0	0.43	0.10
1,2,3-Trimethylbenzene	0.53		2.0	0.48	0.11
m-Diethylbenzene	<SRL	U	2.0	0.43	0.10
p-Diethylbenzene	0.46		2.0	0.43	0.10
n-Undecane	0.41		2.0	0.39	0.09
n-Dodecane	<SRL	U	2.0	0.36	0.08

U - Compound was analyzed for, but was not detected at or above the SRL.
NR - Compound is not reported. See TO-15 results

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

PAMS Calibration Verification Analysis

Analysis Date : 11/13/2018
Analyst : JJG

Instrument ID : MS-01
Standard ID : PS101818-01
Calibration Date : 10/23/2018

Continuing Calibration Verification

Analyte	xRF	daily RF	%RPD*
Propane	765	784	2.4

* %RPD must be < 10%

Laboratory Control Spike Recovery

Analyte	Sample Conc.	Spike Added	Spike Res	Spike Dup Res	Spike % Rec **	Spike Dup % Rec **	RPD*** %
Propane	0.0	3.88	3.98	4.02	102.6	103.6	1.0

** Must be 80-120%
*** Must be < 25%

Marcus Hueppe
Laboratory Director

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Quality Control/Quality Assurance Report

PAMS Method Blank Analysis

Matrix : Air
Units : ppbC

Analysis Date : 11/13/2018
Report Date : 11/13/2018

Client ID / *AAC ID*	Method Blank / PAMS BLANK	PQL
Ethylene	<PQL	1.0
Acetylene	<PQL	1.0
Ethane	<PQL	1.0
Propylene	<PQL	1.0
Propane	<PQL	1.0
Isobutane	<PQL	1.0
1-Butene	<PQL	1.0
n-Butane	<PQL	1.0
trans-2-Butene	<PQL	1.0
cis-2-Butene	<PQL	1.0
Isopentane	<PQL	1.0
1-Pentene	<PQL	1.0
n-Pentane	<PQL	1.0
Isoprene	<PQL	1.0
trans-2-Pentene	<PQL	1.0
cis-2-Pentene	<PQL	1.0
2,2-Dimethylbutane	<PQL	1.0
Cyclopentane	<PQL	1.0
2,3-Dimethylbutane	<PQL	1.0
2-Methylpentane	<PQL	1.0
3-Methylpentane	<PQL	1.0
1-Hexene	<PQL	1.0
n-Hexane	<PQL	1.0
Methylcyclopentane	<PQL	1.0
2,4-Dimethylpentane	<PQL	1.0
Benzene	<PQL	1.0
Cyclohexane	<PQL	1.0
2-Methylhexane	<PQL	1.0

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

PAMS Method Blank Analysis

Matrix : Air
Units : ppbC

Analysis Date : 11/13/2018
Report Date : 11/13/2018

Client ID / *AAC ID*	Method Blank / PAMS BLANK	PQL
2,3-Dimethylpentane	<PQL	1.0
3-Methylhexane	<PQL	1.0
2,2,4-Trimethylpentane	<PQL	1.0
n-Heptane	<PQL	1.0
Methylcyclohexane	<PQL	1.0
2,3,4-Trimethylpentane	<PQL	1.0
Toluene	<PQL	1.0
2-Methylheptane	<PQL	1.0
3-Methylheptane	<PQL	1.0
n-Octane	<PQL	1.0
Ethylbenzene	<PQL	1.0
m/p-Xylenes	<PQL	1.0
Styrene	<PQL	1.0
o-Xylene	<PQL	1.0
Nonane	<PQL	1.0
Isopropylbenzene	<PQL	1.0
n-Propylbenzene	<PQL	1.0
m-Ethyltoluene	<PQL	1.0
p-Ethyltoluene	<PQL	1.0
1,3,5-Trimethylbenzene	<PQL	1.0
o-Ethyltoluene	<PQL	1.0
1,2,4-Trimethylbenzene	<PQL	1.0
n-Decane	<PQL	1.0
1,2,3-Trimethylbenzene	<PQL	1.0
m-Diethylbenzene	<PQL	1.0
p-Diethylbenzene	<PQL	1.0
n-Undecane	<PQL	1.0
n-Dodecane	<PQL	1.0
TNMHC (ppbC)	<PQL	20

Marcus Hueppe
Laboratory Director

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Quality Control/Quality Assurance Report
PAMS Duplicate Analysis

AAC ID : 181721-114582
Matrix : Air

Analysis Date : 11/13/2018
Report Date : 11/14/2018
Units : ppbC

Analyte	Sample Analysis	Sample Duplicate Analysis	%RPD
Ethylene	4.52	4.45	1.6
Acetylene	<PQL	<PQL	0.0
Ethane	13.6	13.3	2.2
Propylene	<PQL	<PQL	0.0
Propane	<PQL	<PQL	0.0
Isobutane	<PQL	<PQL	0.0
1-Butene	<PQL	<PQL	0.0
n-Butane	<PQL	<PQL	0.0
trans-2-Butene	<PQL	<PQL	0.0
cis-2-Butene	<PQL	<PQL	0.0
Isopentane	<PQL	<PQL	0.0
1-Pentene	<PQL	<PQL	0.0
n-Pentane	<PQL	<PQL	0.0
Isoprene	<PQL	<PQL	0.0
trans-2-Pentene	<PQL	<PQL	0.0
cis-2-Pentene	<PQL	<PQL	0.0
2,2-Dimethylbutane	<PQL	<PQL	0.0
Cyclopentane	<PQL	<PQL	0.0
2,3-Dimethylbutane	<PQL	<PQL	0.0
2-Methylpentane	<PQL	<PQL	0.0
3-Methylpentane	14.2	13.9	2.1
1-Hexene	<PQL	<PQL	0.0
n-Hexane	57.1	56.9	0.4
Methylcyclopentane	12.0	11.9	0.8
2,4-Dimethylpentane	<PQL	<PQL	0.0
Benzene	<PQL	<PQL	0.0
Cyclohexane	<PQL	<PQL	0.0
2-Methylhexane	<PQL	<PQL	0.0

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report
PAMS Duplicate Analysis

AAC ID : 181721-114582
Matrix : Air

Analysis Date : 11/13/2018
Report Date : 11/14/2018
Units : ppbC

Analyte	Sample Analysis	Sample Duplicate Analysis	%RPD
2,3-Dimethylpentane	<PQL	<PQL	0.0
3-Methylhexane	<PQL	<PQL	0.0
2,2,4-Trimethylpentane	<PQL	<PQL	0.0
n-Heptane	<PQL	<PQL	0.0
Methylcyclohexane	<PQL	<PQL	0.0
2,3,4-Trimethylpentane	<PQL	<PQL	0.0
Toluene	<PQL	<PQL	0.0
2-Methylheptane	<PQL	<PQL	0.0
3-Methylheptane	<PQL	<PQL	0.0
n-Octane	<PQL	<PQL	0.0
Ethylbenzene	<PQL	<PQL	0.0
m/p-Xylenes	<PQL	<PQL	0.0
Styrene	<PQL	<PQL	0.0
o-Xylene	<PQL	<PQL	0.0
Nonane	<PQL	<PQL	0.0
Isopropylbenzene	<PQL	<PQL	0.0
n-Propylbenzene	<PQL	<PQL	0.0
m-Ethyltoluene	<PQL	<PQL	0.0
p-Ethyltoluene	<PQL	<PQL	0.0
1,3,5-Trimethylbenzene	<PQL	<PQL	0.0
o-Ethyltoluene	<PQL	<PQL	0.0
1,2,4-Trimethylbenzene	<PQL	<PQL	0.0
n-Decane	<PQL	<PQL	0.0
1,2,3-Trimethylbenzene	<PQL	<PQL	0.0
m-Diethylbenzene	<PQL	<PQL	0.0
p-Diethylbenzene	<PQL	<PQL	0.0
n-Undecane	<PQL	<PQL	0.0
n-Dodecane	<PQL	<PQL	0.0
Total PAMS (ppbC)	101	100	1.0
TNMHC (ppbc)	199	194	2.5

Marcus Hueppe
Laboratory Director

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MONTROSE
AIR QUALITY SERVICES

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#181713

MAQS Antioch
2825 Verne Roberts Circle
Antioch, CA 94509
Phone (925) 680-4300 | Fax (925) 680-4416

Client / Project: Schnitzer Steel	**Project / Sample Location:** Shredder Exhaust Stack	**Test / Analytical Method:** EPA 25c & TO-15-TICs & TO-12 PAMS
Project No.: 005AS-452603	**Purchase Order No:** PO#1027083	**Special Analysis / Reporting Instructions:** Please try to also identify: 2-methyl-2-butene, 1,3,3,3-Tetrafluoropropene [HFO-1234ze(E)], 1,1,1,2-Tetrafluoroethane [HFC-134a], and Pentafluoropropane [HFC-245fa]
Send Analytical Report To: Antioch QA/QC: AntiochQA-QC@montrose-env.com rodell@montrose-env.com	**Sampler or PM Signature:**	

Run / Sample No.	Date	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
1-POC	10/29/2018	1	(1) Summa Canister	--	114523
2-POC	10/29/2018	1	(1) Summa Canister	--	114524
3-POC	10/30/2018	1	(1) Summa Canister	--	114525
4-POC	10/30/2018	1	(1) Summa Canister	--	114526
5-POC	10/30/2018	1	(1) Summa Canister	--	114527
6-POC	10/31/2018	1	(1) Summa Canister	--	114528
Total Containers		6			

Relinquished by	Date 11/1/18	Time	Received by FEDEX	Date	Time
Relinquished by FEDEX	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date 11/5/18	Time 0900

ONE CAP MISSING (#552) 8 BAGS (2 VOIDED) + 2 FLOWS VOID

Appendix C.3
Total Organic Carbon – EPA 25C Analyses

Atmospheric Analysis & Consulting, Inc.

CLIENT	: Montrose AQS
PROJECT NAME	: Schnitzer Steel
PROJECT NO.	: 005AS-452603
AAC PROJECT NO.	: 181713
REPORT DATE	: 11/15/2018

On November 5, 2018, Atmospheric Analysis & Consulting, Inc. received six (6) Six-Liter Summa Canisters for TNMOC analysis by EPA 25C. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab No.	Return Pressure (mmHgA)
1-POC	181713-114523	VOID
2-POC	181713-114524	744.6
3-POC	181713-114525	764.1
4-POC	181713-114526	651.2
5-POC	181713-114527	739.9
6-POC	181713-114528	514.2

All of the analyses mentioned above were performed in accordance with AAC's ISO/IEC 17025:2005 and NELAP approved Quality Assurance Plan. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. Sample 1-POC (114523) was voided due to the sample canister being at full vacuum upon receipt. No other problems were encountered during receiving, preparation, and/or analysis of these samples. The Laboratory Director or his/her designee, as verified by the following signature, has authorized release of the data contained in this hardcopy report.

If you have any questions or require further explanation of data results, please contact the undersigned.

Marcus Hueppe
Laboratory Director

This report consists of 4 pages.

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

Client : Montrose AQS
Project No. : 181713
Matrix : AIR
Units : ppmC

Sampling Date : 10/29-31/2018
Receiving Date : 11/05/2018
Analysis Date : 11/07/2018
Report Date : 11/15/2018

EPA 25C

Reporting Limit: 3.0 ppmC		*Canister Dilution Factor*	*Analysis Dilution Factor*	TNMOC*	SRL (RL x DF's)
Client Sample ID	AAC ID				
2-POC	181713-114524	1.4	1.0	15.5	4.1
3-POC	181713-114525	1.3	1.0	22.1	4.0
4-POC	181713-114526	1.6	1.0	42.5	4.7
5-POC	181713-114527	1.4	1.0	23.7	4.1
6-POC	181713-114528	2.1	1.0	<SRL	6.4

Sample Reporting Limit (SRL) is equal to Reporting Limit x Analysis Dil. Fac x Canister Dil. Fac.

**Total Non-Methane Organic Carbon*

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Analysis Date : 11/07/2018
Analyst : DL
Units : ppmv

Instrument ID: GCTCA#2-FID
Calibration Date: 8/17/2018

I - Opening Calibration Verification Standard - Method 25C

Analyte	xRF	DRF	%RPD*
Propane	1531741	1573900	2.7

II - TNMOC Response Factor - Method 25C

Analyte	xRF	CV RF	CV dp RF	CV tp RF	Average RF	% RPD***
Propane	1531741	1573900	1589407	1525639	1562982	2.0

III - Method Blank - Method 25C

AAC ID	Analyte	Sample Result
MB	TNMOC	ND

IV - Laboratory Control Spike & Duplicate - Method 25C

AAC ID	Analyte	Spike Added	LCS Result	LCSD Result	LCS % Rec **	LCSD % Rec **	% RPD***
LCS/LCSD	Propane	203.4	211.1	202.6	103.8	99.6	4.1

V - Closing Calibration Verification Standard - Method 25C

Analyte	xCF	dCF	%RPD*
Propane	1531741	1525253	0.4

xCF - Average Calibration Factor from Initial Calibration Curve
dCF - Daily Calibration Factor
* Must be <15%
** Must be 90-110 %
*** Must be <20%

Marcus Hueppe
Laboratory Director

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#18713

MAQS Antioch
2825 Verne Roberts Circle
Antioch, CA 94509
Phone (925) 680-4300 | Fax (925) 680-4416

Client / Project: Schnitzer Steel	**Project / Sample Location:** Shredder Exhaust Stack	**Test / Analytical Method:** EPA 25c & TO-15-TICs & TO-12 PAMS
Project No.: 005AS-452603	**Purchase Order No:** PO#1027083	**Special Analysis / Reporting Instructions:** Please try to also identify: 2-methyl-2-butene, 1,3,3,3-Tetrafluoropropene [HFO-1234ze(E)], 1,1,1,2-Tetrafluoroethane [HFC-134a], and Pentafluoropropane [HFC-245fa]
Send Analytical Report To: Antioch QA/QC: AntiochQA-QC@montrose-env.com rodell@montrose-env.com	**Sampler or PM Signature:**	

Run / Sample No.	Date	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
1-POC	10/29/2018	1	(1) Summa Canister	--	114523
2-POC	10/29/2018	1	(1) Summa Canister	--	114524
3-POC	10/30/2018	1	(1) Summa Canister	--	114525
4-POC	10/30/2018	1	(1) Summa Canister	--	114526
5-POC	10/30/2018	1	(1) Summa Canister	--	114527
6-POC	10/31/2018	1	(1) Summa Canister	--	114528
Total Containers		6			

Relinquished by	Date 11/1/18	Time	Received by FEDEX	Date	Time
Relinquished by FEDEX	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date 11/5/18	Time 0900

ONE CAP MISSING (#552) 8 BAGS (2 VOIDED) + 2 FLOWS VOID

Appendix C.4
Total Organic Carbon – TO-12 Analyses

Atmospheric Analysis & Consulting, Inc.

CLIENT	: Montrose AQS
PROJECT NAME	: Schnitzer Steel - Shredder Exhaust Stack
PROJECT NO.	: 005AS-452603
AAC PROJECT NO.	: 181713
REPORT DATE	: 11/16/2018

On November 5, 2018, Atmospheric Analysis & Consulting, Inc. received five (5) Six-Liter Summa Canisters for TNMNEOC analysis by TO-12M/PAMS Protocol. Upon receipt each sample was assigned a unique Laboratory ID number as follows:

Client ID	Lab ID	Initial Pressure (mmHga)
1-POC	181713-114523	Void
2-POC	181713-114524	744.6
3-POC	181713-114525	764.1
4-POC	181713-114526	651.2
5-POC	181713-114527	739.9
6-POC	181713-114528	514.2

Sample 1-POC (181713-114523) was voided due to no sample being collected in the canister. Sample was received at full vacuum.

All of the analyses mentioned above were performed in accordance with AAC's ISO/IEC 17025:2005 and NELAP approved Quality Assurance Plan. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. No other problems were encountered during receiving, preparation, and/or analysis of these samples. The Laboratory Director or his/her designee, as verified by the following signature, has authorized release of the data contained in this hardcopy report.

If you have any questions or require further explanation of data results, please contact the undersigned.

Marcus Hueppe
Laboratory Director

This report consists of 8 pages.

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

TOTAL NON-METHANE NON-ETHANE ORGANIC COMPOUNDS BY PAMS PROTOCOL

CLIENT : **Montrose AQS**
PROJECT NUMBER : **181713**
MATRIX : **AIR**

RECEIVING DATE : **11/05/2018**
ANALYSIS DATE : **11/13/2018**
REPORT DATE : **11/16/2018**

Client Sample ID	AAC Sample ID	Sampling Date	Analysis Date	TNMNEOC as Carbon ppbC	Can Dilution Factor	Sample Dilution Factor	Sample RL (RL x DF's) ppbC	Method RL as Carbon ppbC
2-POC	181713-114524	10/29/2018	11/13/2018	12100	1.37	2.0	54.9	20
3-POC	181713-114525	10/30/2018	11/13/2018	19500	1.33	2.0	53.4	20
4-POC	181713-114526	10/30/2018	11/13/2018	20900	1.56	2.0	62.4	20
5-POC	181713-114527	10/30/2018	11/13/2018	7880	1.37	2.0	54.8	20
6-POC	181713-114528	10/31/2018	11/13/2018	3670	2.14	2.0	85.7	20

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

PAMS Calibration Verification Analysis

Analysis Date : 11/13/2018
Analyst : JJG

Instrument ID : MS-01
Standard ID : PS101818-01
Calibration Date : 10/23/2018

Continuing Calibration Verification

Analyte	xRF	daily RF	%RPD*
Propane	765	784	2.4

* %RPD must be < 10%

Laboratory Control Spike Recovery

Analyte	Sample Conc.	Spike Added	Spike Res	Spike Dup Res	Spike % Rec **	Spike Dup % Rec **	RPD*** %
Propane	0.0	3.88	3.98	4.02	102.6	103.6	1.0

** Must be 80-120%
*** Must be < 25%

Marcus Hueppe
Laboratory Director

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Quality Control/Quality Assurance Report

PAMS Method Blank Analysis

Matrix : Air
Units : ppbC

Analysis Date : 11/13/2018
Report Date : 11/13/2018

Client ID / *AAC ID*	Method Blank / PAMS BLANK	PQL
Ethylene	<PQL	1.0
Acetylene	<PQL	1.0
Ethane	<PQL	1.0
Propylene	<PQL	1.0
Propane	<PQL	1.0
Isobutane	<PQL	1.0
1-Butene	<PQL	1.0
n-Butane	<PQL	1.0
trans-2-Butene	<PQL	1.0
cis-2-Butene	<PQL	1.0
Isopentane	<PQL	1.0
1-Pentene	<PQL	1.0
n-Pentane	<PQL	1.0
Isoprene	<PQL	1.0
trans-2-Pentene	<PQL	1.0
cis-2-Pentene	<PQL	1.0
2,2-Dimethylbutane	<PQL	1.0
Cyclopentane	<PQL	1.0
2,3-Dimethylbutane	<PQL	1.0
2-Methylpentane	<PQL	1.0
3-Methylpentane	<PQL	1.0
1-Hexene	<PQL	1.0
n-Hexane	<PQL	1.0
Methylcyclopentane	<PQL	1.0
2,4-Dimethylpentane	<PQL	1.0
Benzene	<PQL	1.0
Cyclohexane	<PQL	1.0
2-Methylhexane	<PQL	1.0

Quality Control/Quality Assurance Report

PAMS Method Blank Analysis

Matrix : Air
Units : ppbC

Analysis Date : 11/13/2018
Report Date : 11/13/2018

Client ID / *AAC ID*	Method Blank / PAMS BLANK	PQL
2,3-Dimethylpentane	<PQL	1.0
3-Methylhexane	<PQL	1.0
2,2,4-Trimethylpentane	<PQL	1.0
n-Heptane	<PQL	1.0
Methylcyclohexane	<PQL	1.0
2,3,4-Trimethylpentane	<PQL	1.0
Toluene	<PQL	1.0
2-Methylheptane	<PQL	1.0
3-Methylheptane	<PQL	1.0
n-Octane	<PQL	1.0
Ethylbenzene	<PQL	1.0
m/p-Xylenes	<PQL	1.0
Styrene	<PQL	1.0
o-Xylene	<PQL	1.0
Nonane	<PQL	1.0
Isopropylbenzene	<PQL	1.0
n-Propylbenzene	<PQL	1.0
m-Ethyltoluene	<PQL	1.0
p-Ethyltoluene	<PQL	1.0
1,3,5-Trimethylbenzene	<PQL	1.0
o-Ethyltoluene	<PQL	1.0
1,2,4-Trimethylbenzene	<PQL	1.0
n-Decane	<PQL	1.0
1,2,3-Trimethylbenzene	<PQL	1.0
m-Diethylbenzene	<PQL	1.0
p-Diethylbenzene	<PQL	1.0
n-Undecane	<PQL	1.0
n-Dodecane	<PQL	1.0
TNMHC (ppbC)	<PQL	20

Marcus Hueppe
Laboratory Director

Quality Control/Quality Assurance Report
PAMS Duplicate Analysis

AAC ID : 181721-114582
Matrix : Air

Analysis Date : 11/13/2018
Report Date : 11/14/2018
Units : ppbC

Analyte	Sample Analysis	Sample Duplicate Analysis	%RPD
Ethylene	4.52	4.45	1.6
Acetylene	<PQL	<PQL	0.0
Ethane	13.6	13.3	2.2
Propylene	<PQL	<PQL	0.0
Propane	<PQL	<PQL	0.0
Isobutane	<PQL	<PQL	0.0
1-Butene	<PQL	<PQL	0.0
n-Butane	<PQL	<PQL	0.0
trans-2-Butene	<PQL	<PQL	0.0
cis-2-Butene	<PQL	<PQL	0.0
Isopentane	<PQL	<PQL	0.0
1-Pentene	<PQL	<PQL	0.0
n-Pentane	<PQL	<PQL	0.0
Isoprene	<PQL	<PQL	0.0
trans-2-Pentene	<PQL	<PQL	0.0
cis-2-Pentene	<PQL	<PQL	0.0
2,2-Dimethylbutane	<PQL	<PQL	0.0
Cyclopentane	<PQL	<PQL	0.0
2,3-Dimethylbutane	<PQL	<PQL	0.0
2-Methylpentane	<PQL	<PQL	0.0
3-Methylpentane	14.2	13.9	2.1
1-Hexene	<PQL	<PQL	0.0
n-Hexane	57.1	56.9	0.4
Methylcyclopentane	12.0	11.9	0.8
2,4-Dimethylpentane	<PQL	<PQL	0.0
Benzene	<PQL	<PQL	0.0
Cyclohexane	<PQL	<PQL	0.0
2-Methylhexane	<PQL	<PQL	0.0

1534 Eastman Ave., Ste. A • Ventura, • CA 93003 www.aaclab.com • (805) 650-1642

Quality Control/Quality Assurance Report
PAMS Duplicate Analysis

AAC ID : 181721-114582
Matrix : Air

Analysis Date : 11/13/2018
Report Date : 11/14/2018
Units : ppbC

Analyte	Sample Analysis	Sample Duplicate Analysis	%RPD
2,3-Dimethylpentane	<PQL	<PQL	0.0
3-Methylhexane	<PQL	<PQL	0.0
2,2,4-Trimethylpentane	<PQL	<PQL	0.0
n-Heptane	<PQL	<PQL	0.0
Methylcyclohexane	<PQL	<PQL	0.0
2,3,4-Trimethylpentane	<PQL	<PQL	0.0
Toluene	<PQL	<PQL	0.0
2-Methylheptane	<PQL	<PQL	0.0
3-Methylheptane	<PQL	<PQL	0.0
n-Octane	<PQL	<PQL	0.0
Ethylbenzene	<PQL	<PQL	0.0
m/p-Xylenes	<PQL	<PQL	0.0
Styrene	<PQL	<PQL	0.0
o-Xylene	<PQL	<PQL	0.0
Nonane	<PQL	<PQL	0.0
Isopropylbenzene	<PQL	<PQL	0.0
n-Propylbenzene	<PQL	<PQL	0.0
m-Ethyltoluene	<PQL	<PQL	0.0
p-Ethyltoluene	<PQL	<PQL	0.0
1,3,5-Trimethylbenzene	<PQL	<PQL	0.0
o-Ethyltoluene	<PQL	<PQL	0.0
1,2,4-Trimethylbenzene	<PQL	<PQL	0.0
n-Decane	<PQL	<PQL	0.0
1,2,3-Trimethylbenzene	<PQL	<PQL	0.0
m-Diethylbenzene	<PQL	<PQL	0.0
p-Diethylbenzene	<PQL	<PQL	0.0
n-Undecane	<PQL	<PQL	0.0
n-Dodecane	<PQL	<PQL	0.0
Total PAMS (ppbC)	101	100	1.0
TNMHC (ppbc)	199	194	2.5

Marcus Hueppe
Laboratory Director

CHAIN OF CUSTODY

MONTROSE AIR QUALITY SERVICES

PUBLIC COPY

#181713

MAQS Antioch
2825 Verne Roberts Circle
Antioch, CA 94509
Phone (925) 680-4300 | Fax (925) 680-4416

Client / Project:	**Project / Sample Location:**	**Test / Analytical Method:**
Schnitzer Steel	Shredder Exhaust Stack	EPA 25c & TO-15-TICs & TO-12 PAMS
Project No.:	**Purchase Order No:**	**Special Analysis / Reporting Instructions:**
005AS-452603	PO#1027083	Please try to also identify: 2-methyl-2-butene, 1,3,3,3-Tetrafluoropropene [HFO-1234ze(E)], 1,1,1,2-Tetrafluoroethane [HFC-134a], and Pentafluoropropane [HFC-245fa]
Send Analytical Report To:	**Sampler or PM Signature:**	
Antioch QA/QC: AntiochQA-QC@montrose-env.com rodell@montrose-env.com		

Run / Sample No.	Date	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
1-POC	10/29/2018	1	(1) Summa Canister	--	114523
2-POC	10/29/2018	1	(1) Summa Canister	--	114524
3-POC	10/30/2018	1	(1) Summa Canister	--	114525
4-POC	10/30/2018	1	(1) Summa Canister	--	114526
5-POC	10/30/2018	1	(1) Summa Canister	--	114527
6-POC	10/31/2018	1	(1) Summa Canister	--	114528
Total Containers		**6**			

Relinquished by	Date 11/1/16	Time	Received by FEDEX	Date	Time
Relinquished by FEDEX	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date 11/5/18	Time 0900

ONE CAP MISSING (#552) 8 CANS (2 VOIDED) + 2 FLOWS

Appendix C.5
PolyChlorinated Biphenyls Analyses

November 27, 2018

Vista Work Order No. 1803396

Mr. Robert Odell
Montrose Environmental Company
2825 Verne Roberts Circle
Antioch, CA 94509

Dear Mr. Odell,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on November 01, 2018 under your Project Name 'Schnitzer Steel 005AS-452603'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director

Vista Work Order No. 1803396
Case Narrative

Sample Condition on Receipt:

Eight MM5 samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology. As requested, the reagent blanks were placed on hold.

Analytical Notes:

CARB Method 428

These samples were extracted and analyzed for total homologue PCBs by CARB Method 428 using a ZB-1 GC column.

Holding Times

The method holding time criteria were met for the samples.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery sample (OPR) were extracted and analyzed with the preparation batch. No analytes were detected aabove the reporting limits in the Method Blank. The OPR recoveries were within the method acceptance criteria.

The labeled standard recoveries outside the acceptance criteria are listed in the table below.

QC Anomalies

LabNumber	SampleName	Analysis	Analyte	Flag	%Rec
1803396-01	1-PCB	CARB Method 428	13C-PCB-1	H	31.0
1803396-01	1-PCB	CARB Method 428	13C-PCB-3	H	30.9
1803396-01	1-PCB	CARB Method 428	13C-PCB-4	H	130
1803396-01	1-PCB	CARB Method 428	13C-PCB-209	H	133
1803396-02	2-PCB	CARB Method 428	13C-PCB-1	H	31.4
1803396-02	2-PCB	CARB Method 428	13C-PCB-3	H	29.4
1803396-02	2-PCB	CARB Method 428	13C-PCB-209	H	132
1803396-03	3-PCB	CARB Method 428	13C-PCB-3	H	39.0
1803396-04	4-PCB	CARB Method 428	13C-PCB-1	H	33.3
1803396-04	4-PCB	CARB Method 428	13C-PCB-3	H	31.3
1803396-05	5-PCB	CARB Method 428	13C-PCB-1	H	28.6
1803396-05	5-PCB	CARB Method 428	13C-PCB-3	H	30.0
1803396-06	6-PCB	CARB Method 428	13C-PCB-1	H	30.3
1803396-06	6-PCB	CARB Method 428	13C-PCB-3	H	29.4

H = Recovery was outside laboratory acceptance criteria.

TABLE OF CONTENTS

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1803396-01	1-PCB	29-Oct-18 00:00	01-Nov-18 15:16	Filter
				XAD
				FH Rinse
				BH Rinse
				IMP Rinse
				IMP Contents
1803396-02	2-PCB	29-Oct-18 00:00	01-Nov-18 15:16	Filter
				XAD
				FH Rinse
				BH Rinse
				IMP Rinse
				IMP Contents
1803396-03	3-PCB	30-Oct-18 00:00	01-Nov-18 15:16	Filter
				XAD
				FH Rinse
				BH Rinse
				IMP Rinse
				IMP Contents
1803396-04	4-PCB	30-Oct-18 00:00	01-Nov-18 15:16	Filter
				XAD
				FH Rinse
				BH Rinse
				IMP Rinse
				IMP Contents
1803396-05	5-PCB	30-Oct-18 00:00	01-Nov-18 15:16	Filter
				XAD
				FH Rinse
				BH Rinse
				IMP Rinse
				IMP Contents
1803396-06	6-PCB	31-Oct-18 00:00	01-Nov-18 15:16	Filter
				XAD
				FH Rinse
				BH Rinse
				IMP Rinse
				IMP Contents
1803396-07	FB-PCB	31-Oct-18 00:00	01-Nov-18 15:16	Filter
				XAD
				FH Rinse

Vista Project: 1803396

Client Project: Schnitzer Steel 005AS-452603

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1803396-07	FB-PCB	31-Oct-18 00:00	01-Nov-18 15:16	BH Rinse
				IMP Rinse
				IMP Contents
1803396-08	Reagent Blanks	31-Oct-18 00:00	01-Nov-18 15:16	Rinse
				Methanol Rinse
				Toluene Rinse
				MeCl2 Rinse
				Other

ANALYTICAL RESULTS

Sample ID: Method Blank

CARB Method 428

Matrix: Air

QC Batch: B8K0070
Date Extracted: 12-Nov-2018 7:33

Lab Sample: B8K0070-BLK1
Date Analyzed: 14-Nov-18 18:29 Column: ZB-1

Analyte	Conc. (ng/Sample)	DL	EMPC	Qualifiers
Total monoCB	ND	0.0125		
Total diCB	ND	0.0387		
Total triCB	ND	0.00973		
Total tetraCB	ND	0.0130		
Total pentaCB	ND	0.0211		
Total hexaCB	ND	0.0154		
Total heptaCB	ND	0.00698		
Total octaCB	ND	0.0103		
Total nonaCB	ND	0.00824		
DecaCB	ND	0.00551		
Total PCB	ND	0.0387		

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	43.8	40-120	
IS	13C-PCB-3	46.7	40-120	
IS	13C-PCB-4	65.9	40-120	
IS	13C-PCB-11	75.1	40-120	
IS	13C-PCB-9	67.6	40-120	
IS	13C-PCB-19	54.3	40-120	
IS	13C-PCB-28	67.6	40-120	
IS	13C-PCB-32	59.5	40-120	
IS	13C-PCB-37	73.7	40-120	
IS	13C-PCB-47	81.0	40-120	
IS	13C-PCB-52	87.4	40-120	
IS	13C-PCB-54	91.5	40-120	
IS	13C-PCB-70	89.0	40-120	
IS	13C-PCB-77	82.2	40-120	
IS	13C-PCB-80	87.5	40-120	
IS	13C-PCB-81	84.5	40-120	
IS	13C-PCB-95	80.6	40-120	
IS	13C-PCB-97	86.2	40-120	
IS	13C-PCB-101	86.0	40-120	
IS	13C-PCB-104	83.1	40-120	
IS	13C-PCB-105	96.7	40-120	
IS	13C-PCB-114	93.3	40-120	
IS	13C-PCB-118	87.0	40-120	
IS	13C-PCB-123	88.8	40-120	
IS	13C-PCB-126	93.4	40-120	
IS	13C-PCB-127	97.4	40-120	
IS	13C-PCB-138	89.1	40-120	
IS	13C-PCB-141	90.9	40-120	
IS	13C-PCB-153	88.3	40-120	
IS	13C-PCB-155	90.8	40-120	
IS	13C-PCB-156	91.6	40-120	
IS	13C-PCB-157	91.1	40-120	
IS	13C-PCB-159	91.5	40-120	
IS	13C-PCB-167	90.5	40-120	
IS	13C-PCB-169	87.3	40-120	
IS	13C-PCB-170	88.8	40-120	
IS	13C-PCB-180	89.6	40-120	

Sample ID: Method Blank CARB Method 428

Matrix: Air	QC Batch: B8K0070 Date Extracted: 12-Nov-2018 7:33	Lab Sample: B8K0070-BLK1 Date Analyzed: 14-Nov-18 18:29 Column: ZB-1

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-188	84.3	40 - 120	
IS	13C-PCB-189	87.7	40 - 120	
IS	13C-PCB-194	82.1	40 - 120	
IS	13C-PCB-202	89.7	40 - 120	
IS	13C-PCB-206	84.5	40 - 120	
IS	13C-PCB-208	83.7	40 - 120	
IS	13C-PCB-209	90.0	40 - 120	

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL - Lower control limit - upper control limit

Results reported to RL.

Sample ID: OPR

CARB Method 428

Matrix: Air

QC Batch: B8K0070
Date Extracted: 12-Nov-2018 7:33

Lab Sample: B8K0070-BS1
Date Analyzed: 14-Nov-18 16:19 Column: ZB-1

Analyte	Amt Found (ng/Sample)	Spike Amt	%R	Limits
PCB-3	6.00	5.00	120	60 - 140
PCB-15	5.56	5.00	111	60 - 140
PCB-28	5.81	5.00	116	60 - 140
PCB-77	5.28	5.00	106	60 - 140
PCB-106/118	9.54	10.0	95.4	60 - 140
PCB-156	5.10	5.00	102	60 - 140
PCB-180	5.10	5.00	102	60 - 140
PCB-202	5.30	5.00	106	60 - 140
PCB-207	5.04	5.00	101	60 - 140
PCB-209	5.01	5.00	100	60 - 140

	Labeled Standard	%R	LCL-UCL
IS	13C-PCB-1	50.3	40 - 120
IS	13C-PCB-3	52.3	40 - 120
IS	13C-PCB-4	74.5	40 - 120
IS	13C-PCB-11	82.3	40 - 120
IS	13C-PCB-9	77.2	40 - 120
IS	13C-PCB-19	61.0	40 - 120
IS	13C-PCB-28	73.9	40 - 120
IS	13C-PCB-32	60.8	40 - 120
IS	13C-PCB-37	80.9	40 - 120
IS	13C-PCB-47	89.9	40 - 120
IS	13C-PCB-52	94.1	40 - 120
IS	13C-PCB-54	97.6	40 - 120
IS	13C-PCB-70	96.4	40 - 120
IS	13C-PCB-77	93.7	40 - 120
IS	13C-PCB-80	96.0	40 - 120
IS	13C-PCB-81	99.2	40 - 120
IS	13C-PCB-95	89.6	40 - 120
IS	13C-PCB-97	90.5	40 - 120
IS	13C-PCB-101	90.6	40 - 120
IS	13C-PCB-104	91.6	40 - 120
IS	13C-PCB-105	108	40 - 120
IS	13C-PCB-114	108	40 - 120
IS	13C-PCB-118	95.6	40 - 120
IS	13C-PCB-123	96.4	40 - 120
IS	13C-PCB-126	106	40 - 120
IS	13C-PCB-127	105	40 - 120
IS	13C-PCB-138	94.8	40 - 120
IS	13C-PCB-141	96.3	40 - 120
IS	13C-PCB-153	95.9	40 - 120
IS	13C-PCB-155	98.4	40 - 120
IS	13C-PCB-156	98.1	40 - 120
IS	13C-PCB-157	97.3	40 - 120
IS	13C-PCB-159	98.3	40 - 120
IS	13C-PCB-167	95.9	40 - 120
IS	13C-PCB-169	95.0	40 - 120
IS	13C-PCB-170	98.0	40 - 120
IS	13C-PCB-180	95.5	40 - 120
IS	13C-PCB-188	94.9	40 - 120

Sample ID: OPR

CARB Method 428

Matrix: Air

QC Batch: B8K0070
Date Extracted: 12-Nov-2018 7:33

Lab Sample: B8K0070-BS1
Date Analyzed: 14-Nov-18 16:19 Column: ZB-1

Analyte	Amt Found (ng/Sample)	Spike Amt	%R	Limits

	Labeled Standard	%R	LCL-UCL
IS	13C-PCB-189	101	40 - 120
IS	13C-PCB-194	89.2	40 - 120
IS	13C-PCB-202	92.7	40 - 120
IS	13C-PCB-206	89.6	40 - 120
IS	13C-PCB-208	85.7	40 - 120
IS	13C-PCB-209	90.4	40 - 120

LCL-UCL - Lower control limit - upper control limit

Sample ID: 1-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel 005AS-452603
Date Collected: 10/29/2018 12:00:00AM

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1803396-01 Date Received: 11/1/2018 3:16:00PM
QC Batch: B8K0070 Date Extracted: 12-Nov-18 07:33
Date Analyzed: 14-Nov-18 20:39 Column: ZB-1

Analyte	Conc. (ng/Sample)	DL	EMPC	Qualifiers
Total monoCB	57.8			
Total diCB	627			
Total triCB	1200			
Total tetraCB	288			
Total pentaCB	28.9			
Total hexaCB	8.99			
Total heptaCB	5.87			
Total octaCB	1.42			
Total nonaCB	ND	0.0341		
DecaCB	ND	0.0328		
Total PCB	2220			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	31.0	40 - 120	H
IS	13C-PCB-3	30.9	40 - 120	H
IS	13C-PCB-4	130	40 - 120	H
IS	13C-PCB-11	87.2	40 - 120	
IS	13C-PCB-9	81.8	40 - 120	
IS	13C-PCB-19	48.1	40 - 120	
IS	13C-PCB-28	76.3	40 - 120	
IS	13C-PCB-32	59.6	40 - 120	
IS	13C-PCB-37	89.7	40 - 120	
IS	13C-PCB-47	97.6	40 - 120	
IS	13C-PCB-52	93.0	40 - 120	
IS	13C-PCB-54	86.2	40 - 120	
IS	13C-PCB-70	102	40 - 120	
IS	13C-PCB-77	90.8	40 - 120	
IS	13C-PCB-80	105	40 - 120	
IS	13C-PCB-81	90.1	40 - 120	
IS	13C-PCB-95	100	40 - 120	
IS	13C-PCB-97	99.3	40 - 120	
IS	13C-PCB-101	95.7	40 - 120	
IS	13C-PCB-104	98.2	40 - 120	
IS	13C-PCB-105	89.4	40 - 120	
IS	13C-PCB-114	98.6	40 - 120	
IS	13C-PCB-118	85.1	40 - 120	
IS	13C-PCB-123	88.2	40 - 120	
IS	13C-PCB-126	84.3	40 - 120	
IS	13C-PCB-127	91.8	40 - 120	
IS	13C-PCB-138	84.5	40 - 120	
IS	13C-PCB-141	90.1	40 - 120	
IS	13C-PCB-153	94.9	40 - 120	
IS	13C-PCB-155	97.8	40 - 120	
IS	13C-PCB-156	85.3	40 - 120	
IS	13C-PCB-157	91.8	40 - 120	
IS	13C-PCB-159	91.6	40 - 120	
IS	13C-PCB-167	87.9	40 - 120	
IS	13C-PCB-169	69.3	40 - 120	
IS	13C-PCB-170	83.1	40 - 120	
IS	13C-PCB-180	94.2	40 - 120	
IS	13C-PCB-188	98.0	40 - 120	
IS	13C-PCB-189	72.3	40 - 120	

Sample ID: 1-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel 005AS-452603
Date Collected: 10/29/2018 12:00:00AM

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1803396-01 Date Received: 11/1/2018 3:16:00PM
QC Batch: B8K0070 Date Extracted: 12-Nov-18 07:33
Date Analyzed: 14-Nov-18 20:39 Column: ZB-1

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-194	88.1	40 - 120	
IS	13C-PCB-202	74.2	40 - 120	
IS	13C-PCB-206	105	40 - 120	
IS	13C-PCB-208	95.0	40 - 120	
IS	13C-PCB-209	133	40 - 120	H
PS	13C-PCB-79	86.1	60 - 140	
PS	13C-PCB-178	84.4	60 - 140	

DL - Sample specifc estimated detection limit
EMPC - Estimated maximum possible concentration
LCL-UCL - Lower control limit - upper control limit
Results reported to RL.

Sample ID: 2-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel 005AS-452603
Date Collected: 10/29/2018 12:00:00AM

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1803396-02 Date Received: 11/1/2018 3:16:00PM
QC Batch: B8K0070 Date Extracted: 12-Nov-18 07:33
Date Analyzed: 14-Nov-18 21:44 Column: ZB-1

Analyte	Conc. (ng/Sample)	DL	EMPC	Qualifiers
Total monoCB	27.6			
Total diCB	334			
Total triCB	542			
Total tetraCB	131			
Total pentaCB	15.3			
Total hexaCB	3.23			
Total heptaCB	1.10			
Total octaCB	0.124		0.384	
Total nonaCB	ND	0.0370		
DecaCB	ND	0.00900		
Total PCB	1050			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	31.4	40 - 120	H
IS	13C-PCB-3	29.4	40 - 120	H
IS	13C-PCB-4	67.0	40 - 120	
IS	13C-PCB-11	99.2	40 - 120	
IS	13C-PCB-9	85.1	40 - 120	
IS	13C-PCB-19	48.9	40 - 120	
IS	13C-PCB-28	83.1	40 - 120	
IS	13C-PCB-32	52.0	40 - 120	
IS	13C-PCB-37	74.4	40 - 120	
IS	13C-PCB-47	95.0	40 - 120	
IS	13C-PCB-52	88.8	40 - 120	
IS	13C-PCB-54	93.4	40 - 120	
IS	13C-PCB-70	104	40 - 120	
IS	13C-PCB-77	90.7	40 - 120	
IS	13C-PCB-80	97.0	40 - 120	
IS	13C-PCB-81	99.5	40 - 120	
IS	13C-PCB-95	105	40 - 120	
IS	13C-PCB-97	100	40 - 120	
IS	13C-PCB-101	102	40 - 120	
IS	13C-PCB-104	101	40 - 120	
IS	13C-PCB-105	87.5	40 - 120	
IS	13C-PCB-114	99.8	40 - 120	
IS	13C-PCB-118	93.9	40 - 120	
IS	13C-PCB-123	93.0	40 - 120	
IS	13C-PCB-126	84.3	40 - 120	
IS	13C-PCB-127	82.7	40 - 120	
IS	13C-PCB-138	93.0	40 - 120	
IS	13C-PCB-141	95.3	40 - 120	
IS	13C-PCB-153	99.5	40 - 120	
IS	13C-PCB-155	93.2	40 - 120	
IS	13C-PCB-156	91.6	40 - 120	
IS	13C-PCB-157	101	40 - 120	
IS	13C-PCB-159	97.0	40 - 120	
IS	13C-PCB-167	92.0	40 - 120	
IS	13C-PCB-169	72.8	40 - 120	
IS	13C-PCB-170	90.7	40 - 120	
IS	13C-PCB-180	102	40 - 120	
IS	13C-PCB-188	102	40 - 120	
IS	13C-PCB-189	80.9	40 - 120	

Sample ID: 2-PCB

CARB Method 428

Client Data

Name: Montrose Environmental Company
Project: Schnitzer Steel 005AS-452603
Date Collected: 10/29/2018 12:00:00AM

Sample Data

Matrix: Air Train

Laboratory Data

Lab Sample: 1803396-02 Date Received: 11/1/2018 3:16:00PM
QC Batch: B8K0070 Date Extracted: 12-Nov-18 07:33
Date Analyzed: 14-Nov-18 21:44 Column: ZB-1

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-194	99.2	40 - 120	
IS	13C-PCB-202	77.3	40 - 120	
IS	13C-PCB-206	108	40 - 120	
IS	13C-PCB-208	99.8	40 - 120	
IS	13C-PCB-209	132	40 - 120	H
PS	13C-PCB-79	98.4	60 - 140	
PS	13C-PCB-178	101	60 - 140	

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL - Lower control limit - upper control limit

Results reported to RL.

Sample ID: 3-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel 005AS-452603
Date Collected: 10/30/2018 12:00:00AM

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1803396-03 Date Received: 11/1/2018 3:16:00PM
QC Batch: B8K0070 Date Extracted: 12-Nov-18 07:33
Date Analyzed: 15-Nov-18 05:32 Column: ZB-1

Analyte	Conc. (ng/Sample)	DL	EMPC	Qualifiers
Total monoCB	19.8			
Total diCB	311			
Total triCB	418		446	
Total tetraCB	139			
Total pentaCB	13.3			
Total hexaCB	2.10			
Total heptaCB	0.314			
Total octaCB	0.0746			
Total nonaCB	ND	0.0227		
DecaCB	ND	0.0115		
Total PCB	904			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	41.9	40 - 120	
IS	13C-PCB-3	39.0	40 - 120	H
IS	13C-PCB-4	68.9	40 - 120	
IS	13C-PCB-11	89.9	40 - 120	
IS	13C-PCB-9	84.1	40 - 120	
IS	13C-PCB-19	68.9	40 - 120	
IS	13C-PCB-28	87.2	40 - 120	
IS	13C-PCB-32	81.3	40 - 120	
IS	13C-PCB-37	99.1	40 - 120	
IS	13C-PCB-47	91.6	40 - 120	
IS	13C-PCB-52	89.8	40 - 120	
IS	13C-PCB-54	75.4	40 - 120	
IS	13C-PCB-70	94.0	40 - 120	
IS	13C-PCB-77	89.2	40 - 120	
IS	13C-PCB-80	100	40 - 120	
IS	13C-PCB-81	94.7	40 - 120	
IS	13C-PCB-95	97.9	40 - 120	
IS	13C-PCB-97	97.4	40 - 120	
IS	13C-PCB-101	94.8	40 - 120	
IS	13C-PCB-104	92.9	40 - 120	
IS	13C-PCB-105	113	40 - 120	
IS	13C-PCB-114	118	40 - 120	
IS	13C-PCB-118	91.4	40 - 120	
IS	13C-PCB-123	92.5	40 - 120	
IS	13C-PCB-126	109	40 - 120	
IS	13C-PCB-127	113	40 - 120	
IS	13C-PCB-138	87.2	40 - 120	
IS	13C-PCB-141	92.9	40 - 120	
IS	13C-PCB-153	97.0	40 - 120	
IS	13C-PCB-155	107	40 - 120	
IS	13C-PCB-156	88.8	40 - 120	
IS	13C-PCB-157	96.7	40 - 120	
IS	13C-PCB-159	94.7	40 - 120	
IS	13C-PCB-167	89.4	40 - 120	
IS	13C-PCB-169	74.7	40 - 120	
IS	13C-PCB-170	91.7	40 - 120	
IS	13C-PCB-180	99.3	40 - 120	
IS	13C-PCB-188	98.9	40 - 120	
IS	13C-PCB-189	83.9	40 - 120	

Sample ID: 3-PCB

CARB Method 428

Client Data

Name: Montrose Environmental Company
Project: Schnitzer Steel 005AS-452603
Date Collected: 10/30/2018 12:00:00AM

Sample Data

Matrix: Air Train

Laboratory Data

Lab Sample: 1803396-03 Date Received: 11/1/2018 3:16:00PM
QC Batch: B8K0070 Date Extracted: 12-Nov-18 07:33
Date Analyzed: 15-Nov-18 05:32 Column: ZB-1

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-194	93.5	40 - 120	
IS	13C-PCB-202	106	40 - 120	
IS	13C-PCB-206	95.1	40 - 120	
IS	13C-PCB-208	84.2	40 - 120	
IS	13C-PCB-209	108	40 - 120	
PS	13C-PCB-79	98.5	60 - 140	
PS	13C-PCB-178	60.7	60 - 140	

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL - Lower control limit - upper control limit

Results reported to RL.

Sample ID: 4-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel 005AS-452603
Date Collected: 10/30/2018 12:00:00AM

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1803396-04 Date Received: 11/1/2018 3:16:00PM
QC Batch: B8K0070 Date Extracted: 12-Nov-18 07:33
Date Analyzed: 15-Nov-18 06:37 Column: ZB-1
16-Nov-18 10:52 Column: ZB-1

Analyte	Conc. (ng/Sample)	DL	EMPC	Qualifiers
Total monoCB	2560			
Total diCB	12000			
Total triCB	9400			
Total tetraCB	2240			
Total pentaCB	677			
Total hexaCB	252			
Total heptaCB	29.8			
Total octaCB	3.15			
Total nonaCB	0.602			
DecaCB	0.0752			
Total PCB	27200			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	33.3	40 - 120	H
IS	13C-PCB-3	31.3	40 - 120	H
IS	13C-PCB-4	80.3	40 - 120	D
IS	13C-PCB-11	90.2	40 - 120	
IS	13C-PCB-9	83.1	40 - 120	D
IS	13C-PCB-19	58.9	40 - 120	
IS	13C-PCB-28	74.0	40 - 120	
IS	13C-PCB-32	74.2	40 - 120	D
IS	13C-PCB-37	98.7	40 - 120	
IS	13C-PCB-47	83.7	40 - 120	
IS	13C-PCB-52	79.2	40 - 120	
IS	13C-PCB-54	65.8	40 - 120	
IS	13C-PCB-70	86.6	40 - 120	
IS	13C-PCB-77	93.5	40 - 120	
IS	13C-PCB-80	92.2	40 - 120	
IS	13C-PCB-81	95.7	40 - 120	
IS	13C-PCB-95	86.2	40 - 120	
IS	13C-PCB-97	90.9	40 - 120	
IS	13C-PCB-101	90.5	40 - 120	
IS	13C-PCB-104	80.7	40 - 120	
IS	13C-PCB-105	114	40 - 120	
IS	13C-PCB-114	109	40 - 120	
IS	13C-PCB-118	96.5	40 - 120	
IS	13C-PCB-123	92.6	40 - 120	
IS	13C-PCB-126	111	40 - 120	
IS	13C-PCB-127	111	40 - 120	
IS	13C-PCB-138	89.9	40 - 120	
IS	13C-PCB-141	91.0	40 - 120	
IS	13C-PCB-153	88.4	40 - 120	
IS	13C-PCB-155	89.8	40 - 120	
IS	13C-PCB-156	99.2	40 - 120	
IS	13C-PCB-157	106	40 - 120	
IS	13C-PCB-159	99.2	40 - 120	
IS	13C-PCB-167	95.8	40 - 120	
IS	13C-PCB-169	93.2	40 - 120	
IS	13C-PCB-170	98.4	40 - 120	
IS	13C-PCB-180	96.3	40 - 120	
IS	13C-PCB-188	89.1	40 - 120	
IS	13C-PCB-189	96.4	40 - 120	

Sample ID: 4-PCB

CARB Method 428

Client Data

Name:	Montrose Environmental Company
Project:	Schnitzer Steel 005AS-452603
Date Collected:	10/30/2018 12:00:00AM

Sample Data

Matrix:	Air Train

Laboratory Data

Lab Sample:	1803396-04	Date Received:	11/1/2018 3:16:00PM
QC Batch:	B8K0070	Date Extracted:	12-Nov-18 07:33
Date Analyzed:	15-Nov-18 06:37 Column: ZB-1		
	16-Nov-18 10:52 Column: ZB-1		

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-194	90.5	40 - 120	
IS	13C-PCB-202	96.2	40 - 120	
IS	13C-PCB-206	86.9	40 - 120	
IS	13C-PCB-208	83.2	40 - 120	
IS	13C-PCB-209	91.2	40 - 120	
PS	13C-PCB-79	91.9	60 - 140	
PS	13C-PCB-178	60.6	60 - 140	

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL - Lower control limit - upper control limit

Results reported to RL.

Sample ID: 5-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel 005AS-452603
Date Collected: 10/30/2018 12:00:00AM

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1803396-05 Date Received: 11/1/2018 3:16:00PM
QC Batch: B8K0070 Date Extracted: 12-Nov-18 07:33
Date Analyzed: 15-Nov-18 07:42 Column: ZB-1
15-Nov-18 18:31 Column: ZB-1

Analyte	Conc. (ng/Sample)	DL	EMPC	Qualifiers
Total monoCB	2980			
Total diCB	16100			
Total triCB	15700			
Total tetraCB	3980			
Total pentaCB	564			
Total hexaCB	176			
Total heptaCB	30.5			
Total octaCB	7.68			
Total nonaCB	2.23			
DecaCB	0.250			
Total PCB	39500			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	28.6	40 - 120	H
IS	13C-PCB-3	30.0	40 - 120	H
IS	13C-PCB-4	72.1	40 - 120	D
IS	13C-PCB-11	85.3	40 - 120	
IS	13C-PCB-9	78.6	40 - 120	D
IS	13C-PCB-19	51.9	40 - 120	
IS	13C-PCB-28	68.4	40 - 120	
IS	13C-PCB-32	69.3	40 - 120	D
IS	13C-PCB-37	89.1	40 - 120	
IS	13C-PCB-47	68.1	40 - 120	
IS	13C-PCB-52	65.6	40 - 120	
IS	13C-PCB-54	53.9	40 - 120	
IS	13C-PCB-70	76.9	40 - 120	
IS	13C-PCB-77	86.7	40 - 120	
IS	13C-PCB-80	81.2	40 - 120	
IS	13C-PCB-81	82.9	40 - 120	
IS	13C-PCB-95	74.6	40 - 120	
IS	13C-PCB-97	81.1	40 - 120	
IS	13C-PCB-101	76.5	40 - 120	
IS	13C-PCB-104	69.1	40 - 120	
IS	13C-PCB-105	99.5	40 - 120	
IS	13C-PCB-114	97.8	40 - 120	
IS	13C-PCB-118	82.4	40 - 120	
IS	13C-PCB-123	82.6	40 - 120	
IS	13C-PCB-126	100	40 - 120	
IS	13C-PCB-127	97.2	40 - 120	
IS	13C-PCB-138	79.5	40 - 120	
IS	13C-PCB-141	79.8	40 - 120	
IS	13C-PCB-153	81.2	40 - 120	
IS	13C-PCB-155	77.3	40 - 120	
IS	13C-PCB-156	96.6	40 - 120	
IS	13C-PCB-157	97.4	40 - 120	
IS	13C-PCB-159	89.7	40 - 120	
IS	13C-PCB-167	85.4	40 - 120	
IS	13C-PCB-169	83.5	40 - 120	
IS	13C-PCB-170	87.1	40 - 120	
IS	13C-PCB-180	89.3	40 - 120	
IS	13C-PCB-188	78.6	40 - 120	
IS	13C-PCB-189	82.4	40 - 120	

Sample ID: 5-PCB

CARB Method 428

Client Data

Name:	Montrose Environmental Company
Project:	Schnitzer Steel 005AS-452603
Date Collected:	10/30/2018 12:00:00AM

Sample Data

Matrix:	Air Train

Laboratory Data

Lab Sample:	1803396-05	Date Received:	11/1/2018 3:16:00PM
QC Batch:	B8K0070	Date Extracted:	12-Nov-18 07:33
Date Analyzed:	15-Nov-18 07:42 Column: ZB-1		
	15-Nov-18 18:31 Column: ZB-1		

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-194	81.5	40 - 120	
IS	13C-PCB-202	83.2	40 - 120	
IS	13C-PCB-206	78.5	40 - 120	
IS	13C-PCB-208	73.0	40 - 120	
IS	13C-PCB-209	82.1	40 - 120	
PS	13C-PCB-79	79.3	60 - 140	
PS	13C-PCB-178	82.7	60 - 140	

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL - Lower control limit - upper control limit

Results reported to RL.

Sample ID: 6-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel 005AS-452603
Date Collected: 10/31/2018 12:00:00AM

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1803396-06 Date Received: 11/1/2018 3:16:00PM
QC Batch: B8K0070 Date Extracted: 12-Nov-18 07:33
Date Analyzed: 15-Nov-18 08:47 Column: ZB-1
15-Nov-18 19:36 Column: ZB-1

Analyte	Conc. (ng/Sample)	DL	EMPC	Qualifiers
Total monoCB	4430			
Total diCB	24300			
Total triCB	22400			
Total tetraCB	4510			
Total pentaCB	331			
Total hexaCB	61.5			
Total heptaCB	11.6			
Total octaCB	3.93			
Total nonaCB	0.963			
DecaCB	0.0997			
Total PCB	56000			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	30.3	40 - 120	H
IS	13C-PCB-3	29.4	40 - 120	H
IS	13C-PCB-4	77.9	40 - 120	D
IS	13C-PCB-11	92.8	40 - 120	
IS	13C-PCB-9	79.4	40 - 120	D
IS	13C-PCB-19	51.0	40 - 120	
IS	13C-PCB-28	70.5	40 - 120	
IS	13C-PCB-32	77.1	40 - 120	D
IS	13C-PCB-37	86.1	40 - 120	
IS	13C-PCB-47	76.6	40 - 120	
IS	13C-PCB-52	73.6	40 - 120	
IS	13C-PCB-54	58.9	40 - 120	
IS	13C-PCB-70	87.0	40 - 120	
IS	13C-PCB-77	94.8	40 - 120	
IS	13C-PCB-80	90.9	40 - 120	
IS	13C-PCB-81	95.5	40 - 120	
IS	13C-PCB-95	84.3	40 - 120	
IS	13C-PCB-97	91.7	40 - 120	
IS	13C-PCB-101	88.0	40 - 120	
IS	13C-PCB-104	73.6	40 - 120	
IS	13C-PCB-105	107	40 - 120	
IS	13C-PCB-114	106	40 - 120	
IS	13C-PCB-118	90.3	40 - 120	
IS	13C-PCB-123	94.3	40 - 120	
IS	13C-PCB-126	105	40 - 120	
IS	13C-PCB-127	102	40 - 120	
IS	13C-PCB-138	88.7	40 - 120	
IS	13C-PCB-141	87.5	40 - 120	
IS	13C-PCB-153	85.4	40 - 120	
IS	13C-PCB-155	87.4	40 - 120	
IS	13C-PCB-156	94.9	40 - 120	
IS	13C-PCB-157	113	40 - 120	
IS	13C-PCB-159	95.3	40 - 120	
IS	13C-PCB-167	94.1	40 - 120	
IS	13C-PCB-169	89.1	40 - 120	
IS	13C-PCB-170	94.0	40 - 120	
IS	13C-PCB-180	97.1	40 - 120	
IS	13C-PCB-188	84.9	40 - 120	
IS	13C-PCB-189	91.6	40 - 120	

Sample ID: 6-PCB

CARB Method 428

Client Data

Name:	Montrose Environmental Company
Project:	Schnitzer Steel 005AS-452603
Date Collected:	10/31/2018 12:00:00AM

Sample Data

Matrix:	Air Train

Laboratory Data

Lab Sample:	1803396-06	Date Received:	11/1/2018 3:16:00PM
QC Batch:	B8K0070	Date Extracted:	12-Nov-18 07:33
Date Analyzed:	15-Nov-18 08:47 Column: ZB-1		
	15-Nov-18 19:36 Column: ZB-1		

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-194	95.7	40 - 120	
IS	13C-PCB-202	92.5	40 - 120	
IS	13C-PCB-206	87.0	40 - 120	
IS	13C-PCB-208	82.3	40 - 120	
IS	13C-PCB-209	92.8	40 - 120	
PS	13C-PCB-79	98.1	60 - 140	
PS	13C-PCB-178	96.3	60 - 140	

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL - Lower control limit - upper control limit

Results reported to RL.

Sample ID: FB-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel 005AS-452603
Date Collected: 10/31/2018 12:00:00AM

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1803396-07 Date Received: 11/1/2018 3:16:00PM
QC Batch: B8K0070 Date Extracted: 12-Nov-18 07:33
Date Analyzed: 15-Nov-18 16:21 Column: ZB-1

Analyte	Conc. (ng/Sample)	DL	EMPC	Qualifiers
Total monoCB	0.110			
Total diCB	0.624			
Total triCB	0.555			
Total tetraCB	0.188		0.229	
Total pentaCB	ND	0.0269		
Total hexaCB	ND	0.00784		
Total heptaCB	ND	0.00706		
Total octaCB	ND	0.00965		
Total nonaCB	ND	0.00607		
DecaCB	ND	0.00558		
Total PCB	1.48			

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	58.6	40 - 120	
IS	13C-PCB-3	56.8	40 - 120	
IS	13C-PCB-4	70.5	40 - 120	
IS	13C-PCB-11	73.1	40 - 120	
IS	13C-PCB-9	71.7	40 - 120	
IS	13C-PCB-19	64.9	40 - 120	
IS	13C-PCB-28	77.1	40 - 120	
IS	13C-PCB-32	72.0	40 - 120	
IS	13C-PCB-37	80.2	40 - 120	
IS	13C-PCB-47	81.5	40 - 120	
IS	13C-PCB-52	81.7	40 - 120	
IS	13C-PCB-54	76.6	40 - 120	
IS	13C-PCB-70	88.2	40 - 120	
IS	13C-PCB-77	92.7	40 - 120	
IS	13C-PCB-80	88.3	40 - 120	
IS	13C-PCB-81	91.9	40 - 120	
IS	13C-PCB-95	86.1	40 - 120	
IS	13C-PCB-97	91.3	40 - 120	
IS	13C-PCB-101	89.7	40 - 120	
IS	13C-PCB-104	85.9	40 - 120	
IS	13C-PCB-105	102	40 - 120	
IS	13C-PCB-114	101	40 - 120	
IS	13C-PCB-118	98.9	40 - 120	
IS	13C-PCB-123	98.1	40 - 120	
IS	13C-PCB-126	99.2	40 - 120	
IS	13C-PCB-127	102	40 - 120	
IS	13C-PCB-138	95.5	40 - 120	
IS	13C-PCB-141	97.5	40 - 120	
IS	13C-PCB-153	94.4	40 - 120	
IS	13C-PCB-155	82.6	40 - 120	
IS	13C-PCB-156	100	40 - 120	
IS	13C-PCB-157	102	40 - 120	
IS	13C-PCB-159	98.5	40 - 120	
IS	13C-PCB-167	99.2	40 - 120	
IS	13C-PCB-169	93.9	40 - 120	
IS	13C-PCB-170	95.4	40 - 120	
IS	13C-PCB-180	99.2	40 - 120	
IS	13C-PCB-188	95.3	40 - 120	
IS	13C-PCB-189	98.4	40 - 120	

Sample ID: FB-PCB

CARB Method 428

Client Data

Name: Montrose Environmental Company
Project: Schnitzer Steel 005AS-452603
Date Collected: 10/31/2018 12:00:00AM

Sample Data

Matrix: Air Train

Laboratory Data

Lab Sample: 1803396-07 Date Received: 11/1/2018 3:16:00PM
QC Batch: B8K0070 Date Extracted: 12-Nov-18 07:33
Date Analyzed: 15-Nov-18 16:21 Column: ZB-1

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-194	94.7	40 - 120	
IS	13C-PCB-202	103	40 - 120	
IS	13C-PCB-206	106	40 - 120	
IS	13C-PCB-208	107	40 - 120	
IS	13C-PCB-209	116	40 - 120	
PS	13C-PCB-79	84.7	60 - 140	
PS	13C-PCB-178	89.3	60 - 140	

DL - Sample specifc estimated detection limit

EMPC - Estimated maximum possible concentration

LCL-UCL - Lower control limit - upper control limit

Results reported to RL.

DATA QUALIFIERS & ABBREVIATIONS

B	**This compound was also detected in the method blank**
Conc.	**Concentration**
D	**Dilution**
DL	**Detection limit**
E	**The associated compound concentration exceeded the calibration range of the instrument**
H	**Recovery and/or RPD was outside laboratory acceptance limits**
I	**Chemical Interference**
J	**The amount detected is below the Reporting Limit/LOQ**
LOD	**Limits of Detection**
LOQ	**Limits of Quantitation**
M	**Estimated Maximum Possible Concentration (CA Region 2 projects only)**
NA	**Not applicable**
ND	**Not Detected**
Q	**Ion ratio outside of 70-130% of Standard Ratio. (DOD PFAS projects only)**
TEQ	**Toxic Equivalency**
U	**Not Detected (specific projects only)**
*****	**See Cover Letter**

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	18-008-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Minnesota Department of Health	1322288
New Hampshire Environmental Accreditation Program	207717
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-009
Pennsylvania Department of Environmental Protection	014
Texas Commission on Environmental Quality	T104704189-18-8
Virginia Department of General Services	9077
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	**Method**
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	**Method**
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	**Method**
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MONTROSE AIR QUALITY SERVICES

CHAIN OF CUSTODY

MAQS Antioch
2825 Verne Roberts Circle
Antioch, CA 94509
Phone (925) 680-4300 | Fax (925) 680-4416

1803396

Client / Project: Schnitzer Steel	**Project / Sample Location:** Shredder Exhaust Stack	**Test / Analytical Method:** 14.9, 8.5, 5.7 CARB 428 PCBs
Project No.: 005AS-452603	**Purchase Order No:** PO#1027084	**Special Analysis / Reporting Instructions:**
Send Analytical Report To: Antioch QA/QC: AntiochQA-QC@montrose-env.com rodell@montrose-env.com	**Sampler or PM Signature:**	

Run / Sample No.	Date	Containers	Sample Fraction	Reagent	Lab / Sample ID No.
1-PCB	10/29/2018	1	1a - Filter	Filter	
1-PCB	10/29/2018	1	1b - XAD Trap	XAD Trap	
1-PCB	10/29/2018	1	2 - Front-Half Rinses	Methanol, Toluene, MeCl2	
1-PCB	10/29/2018	1	3 - Back-Half Rinses	Methanol, Toluene, MeCl2	
1-PCB	10/29/2018	1	4 - Impinger 1 Contents & Rinses	Methanol, Toluene, MeCl2	
1-PCB	10/29/2018	1	5 - Impingers 2 & 3 Contents	Org. Free H2O	
2-PCB	10/29/2018	6	1a, 1b, 2, 3, 4, & 5	See Above	
3-PCB	10/30/2018	6	1a, 1b, 2, 3, 4, & 5	See Above	
4-PCB	10/30/2018	6	1a, 1b, 2, 3, 4, & 5	See Above	
5-PCB	10/30/2018	6	1a, 1b, 2, 3, 4, & 5	See Above	
6-PCB	10/31/2018	6	1a, 1b, 2, 3, 4, & 5	See Above	
FB-PCB	10/29/2018	6	1a, 1b, 2, 3, 4, & 5	See Above	
RB-Methanol	10/31/2018	1	Reagent Blank	Methanol	
RB-Toluene	10/31/2018	1	Reagent Blank	Toluene	
RB-MeCl2	10/31/2018	1	Reagent Blank	MeCl2	
RB-ORG H2O	10/31/2018	1	Reagent Blank	Org. Free H2O	
Total Containers		**46**			

	Date	Time		Date	Time
Relinquished by	11/1/18	1200	Received by	11/1/18	13:30
Relinquished by	11/1/18	15:17	Received by	11/1/18	1516
Relinquished by	Date	Time	Received by	Date	Time

Vista Analytical Laboratory

Sample Log-In Checklist

Page # 1 of 6

Vista Work Order #: 1803396 TAT std

Samples Arrival:	**Date/Time** 11/1/18 1516			**Initials:** KE		**Location:** MR-2 **Shelf/Rack:** N/A	
Logged In:	**Date/Time** 11/2/18 0730			**Initials:** KE		**Location:** R-9 **Shelf/Rack:** NA	
Delivered By:	FedEx	UPS	On Trac	GSO	DHL	(Hand Delivered)	Other
Preservation:	Ice		(Blue Ice)		Dry Ice		None
Temp °C: 5.8 (uncorrected) **Temp °C:** 5.7 (corrected)	**Probe used: Y / (N)**				**Thermometer ID:** IR4		

	YES	NO	NA
Adequate Sample Volume Received?	✓		
Holding Time Acceptable?	✓		
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?			✓
Shipping Documentation Present?			✓
Airbill / Trk #			✓
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Chain of Custody / Sample Documentation Present?	✓		
COC Anomaly/Sample Acceptance Form completed?			✓
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			✓
Preservation Documented: $Na_2S_2O_3$ Trizma None Other	Yes	No	(NA)
Shipping Container: (Vista) Client (Retain) Return Dispose			

Comments: XAD/FILTER (large Vista cooler)

#1

* ALL XAD WERE LABELED BY "1,2,3,4,5,6" INSTEAD OF COC SAMPLE NUMBER 1-PCB, 2-PCB, 3PCB etc"

Vista Analytical Laboratory

Sample Log-In Checklist – Additional Information

FB 11/2/18

Page # 2 of 6
WO#: 1803396
Cooler # 3 of 3

Sample Label ID	Notes
1 2 3 4 5 6 FB FB-PCB-Cont 3 FB-PCB-Cont 2 FB-PCB-Cont 1A 4-PCB-Cont 1A 1-PCB-Cont 1A 5-PCB-Cont 1A 2-PCB-Cont 1A 6-PCB-Cont 1A 3-PCB-Cont 1A 3-PCB-Cont 3 3-PCB-Cont 4 3-PCB-Cont 5 2-PCB-Cont 3 2-PCB-Cont 4 2-PCB-Cont 5 1-PCB-Cont 3 1-PCB-Cont 4 1-PCB-Cont 5 RB-ORG-H2O FB-PCB-Cont 4 FB-PCB-Cont 5	* LARGE COOLER • SAMPLE ID WRITTEN DIRECTLY ON XAD BUBBLE WRAP IN RED • 1 UNUSED FILTER Recorded By/Date: FS 11/2/18

ID.: LR – SI | Rev No.: 1 | Rev Date: 05 October 2018 | Page: 1 of 1

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Vista Analytical Laboratory

Sample Log-In Checklist

Page # 3 of 6

Vista Work Order #: 1803396 TAT Std

Samples Arrival:	**Date/Time** 11/1/18 1516	**Initials:** KE	**Location:** WR-2 **Shelf/Rack:** NA
Logged In:	**Date/Time** 11/2/18 0730	**Initials:** KA	**Location:** R-9 **Shelf/Rack:** NA

Delivered By:	FedEx	UPS	On Trac	GSO	DHL	Hand Delivered	Other
Preservation:	Ice		Blue Ice		Dry Ice		None

Temp °C: 8.6 (uncorrected)	**Probe used: Y / N**	**Thermometer ID:** IR4
Temp °C: 8.5 (corrected)		

	YES	NO	NA
Adequate Sample Volume Received?	✓		
Holding Time Acceptable?	✓		
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?			✓
Shipping Documentation Present?			✓
Airbill / Trk #			✓
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Chain of Custody / Sample Documentation Present?	✓		
COC Anomaly/Sample Acceptance Form completed?			✓
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			✓

Preservation Documented:	$Na_2S_2O_3$	Trizma	None	Other	Yes	No	NA
Shipping Container	Vista	Client	Retain	Return	Dispose		

Comments:

CARD BOARD BOX

Vista Analytical Laboratory

Sample Log-In Checklist – Additional Information

Page # 4 of 6
WO#: 1803396
Cooler # 1 of 3

Sample Label ID	Notes
6-PCB-Cont 2 5-PCB-Cont 2 4-PCB-Cont 2 3-PCB-Cont 2 2-PCB-Cont 2 1-PCB-Cont 2	* RED Cooler UNUSED AIR TRAP RETURNED IN THIS COOLER Recorded By/Date: FS 11/2/18

Vista Analytical Laboratory

Sample Log-In Checklist

Vista Work Order #: 1803396 Page # 5 of 6 TAT Std

Samples Arrival:	**Date/Time** 11/1/18 1516		**Initials:** KE		**Location:** WR-2 **Shelf/Rack:** NA		
Logged In:	**Date/Time** 11/2/18 0730		**Initials:** KE		**Location:** ~~WR-2~~ R-9 (KE) **Shelf/Rack:** R-9		
Delivered By:	FedEx	UPS	On Trac	GSO	DHL	Hand Delivered	Other
Preservation:	Ice		Blue Ice		Dry Ice		None
Temp °C: 15.0 (uncorrected) **Temp °C:** 14.9 (corrected)			**Probe used:** Y / N		**Thermometer ID:** IR4		

	YES	NO	NA
Adequate Sample Volume Received?	✓		
Holding Time Acceptable?	✓		
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?			✓
Shipping Documentation Present?			✓
Airbill / Trk #			✓
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Chain of Custody / Sample Documentation Present?	✓		
COC Anomaly/Sample Acceptance Form completed?			✓
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			✓
Preservation Documented: $Na_2S_2O_3$ Trizma None Other	Yes	No	NA (?)
Shipping Container: Vista / Client / Retain / Return / Dispose			

Comments: SOLVENT

Vista Analytical Laboratory

Sample Log-In Checklist – Additional Information

WO#: 1803396
Cooler # 2 of 3

Sample Label ID	Notes
RB - METHANOL RB - TOLUENE RB - MeCl2 4-PCB-Cont 5 4-PCB-Cont 4 4-PCB-Cont 3 5-PCB-Cont 5 5-PCB-Cont 4 5-PCB-Cont 3 6-PCB-Cont 5 6-PCB-Cont 4 6-PCB-Cont 3	* BLUE COOLER Recorded By/Date: FS 11/2/18

APPENDIX D
CLIENT PROCESS DATA

Appendix D.1
Process Data

Oct 2018 Source Test		Run Time (minutes)	Material Feed Rate (Tons/hr)	Material output (Tons/hr)	Fan Amps		Mill Water Spray Rate (GPM)	Venturi DP (Inches WG)	
Run#, Date	Time				Fan 1 (SFA3)	Fan 2 (SFA4)		Scrubber 1 (PDIT 10)	Scrubber 2 (PDIT20)
Car Bodies Only									
Run 1 10/29/18	*2000-2109*	*69*	[redacted]	[redacted]	*516*	*541*	*28*	*29*	*24*
Run 2 10/29/18	*2235-2250*	*15*	[redacted]	[redacted]	518	544	27	29	21
	2331-0024	*53*	[redacted]	[redacted]	522	546	28	29	24
	Run 2 TWA:		[redacted]	[redacted]	*521*	*546*	*28*	*29*	*23*
Run 3 10/30/18	*0045-0157*	*72*	[redacted]	[redacted]	*520*	*545*	*30*	*29*	*24*
	Average		[redacted]	[redacted]	**519**	**544**	**29**	**29**	**24**
Light Iron Only									
Run 4 10/30/18	*2114-2224*	*70*	[redacted]	[redacted]	*515*	*540*	*28*	*29*	*24*
Run 5 10/30/18	*2253-0002*	*69*	[redacted]	[redacted]	*516*	*540*	*27*	*29*	*24*
Run 6 10/31/18	*0020-0120*	*60*	[redacted]	[redacted]	514	538	28	29	24
	0153-0208	*15*	[redacted]	[redacted]	519	546	28	29	24
	Run 6 TWA:		[redacted]	[redacted]	*515*	*540*	*28*	*29*	*24*
	Averages		[redacted]	[redacted]	**515**	**540**	**28**	**29**	**24**

APPENDIX E
QUALITY ASSURANCE/QUALITY CONTROL

Appendix E.1
Quality Assurance Program Summary and Equipment Calibration Schedule

QUALITY ASSURANCE PROGRAM SUMMARY AND CERTIFICATIONS

Montrose Air Quality Services, LLC (Montrose) ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by internal QA personnel and encompasses eight major areas:

1. Development and use of an internal QA manual
2. QA reviews of reports, laboratory work, and field testing
3. Equipment calibration and maintenance
4. Chain of custody
5. Continuous training
6. Knowledge of current test methods
7. Agency certification
8. Uncertainty of results

Each of these areas is discussed individually below.

Quality Assurance Manual. Montrose has prepared a QA Manual according to EPA guidelines and ASTM D-7036. The manual serves to document and formalize all of Montrose's QA efforts. The manual is constantly updated, and each employee involved in technical services for emission measurements is required to read, understand its contents, and sign a statement that all work they perform will conform to its practices. The manual includes details on the other seven QA areas discussed below.

QA Reviews. Montrose 's review procedure includes review of each source test report by the QA Manager or equivalent position including data input, calculations and averages, and report text. The laboratory manager or equivalent reviews all laboratory work, and the qualified individual on-site reviews all field work and data sheets.

The most important review is the one that takes place before a test program begins. The QA Manager works with testing personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of any interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

Equipment Calibration and Maintenance. The equipment used to conduct the emission measurements is maintained according to the manufacturer's instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined below. The schedules for maintenance and calibrations are given in Tables A-1 and A-2.

Quality control checks are also conducted in the field for each test program. A partial list of checks made as part of each continuous analyzer system test series is included below as an example of the field QA procedures.

- Sample acquisition and conditioning system leak check
- 3-point analyzer calibrations (all analyzers)

- Complete system calibration check ("dynamic calibration" through entire sample system)
- Periodic analyzer calibration checks are conducted at the start and end of each test run. Any change between pre- and post-test readings are recorded.
- All calibrations are conducted using EPA Protocol gases certified by the manufacturer
- Calibration and continuous analyzer performance data are fully documented, and are included in each source test report

Chain of Custody. Montrose maintains full chain of custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, Montrose documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.).

Samples are stored in a locked area to which only laboratory personnel have access. Neither other Montrose employees nor cleaning crews have keys to this area.

Training. Personnel training is essential to ensure quality testing. Montrose has formal and informal training programs which may include some or all of the following:

1. Attendance at EPA-sponsored training courses
2. A requirement for all technicians to read, understand, and sign Montrose 's QA Manual
3. In-house training and Montrose meetings on a regular basis
4. Maintenance of training records
5. Administration of internal qualified individual (QI) tests for all methods performed
6. Participation in the Qualified Source Testing Individual (QSTI) program administered by the Source Evaluation Society (SES)

Knowledge of Current Test Methods. With the constant updating of standard test methods and the wide variety of emerging test methods, it is essential that any qualified source tester keep abreast of new developments. Montrose subscribes to services which provide updates on EPA reference methods, and on EPA and local agency rules and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences.

Audit Program. Montrose participates in the TNI Stationary Source Audit Sample (SSAS) audit program for all methods for which audit samples are available.

Uncertainty of Results. Both qualitative and quantitative factors contribute to field measurement uncertainty and should be taken into consideration when interpreting the results contained within this report. Whenever possible, Montrose personnel reduce the impact of these uncertainty factors through the use of approved and validated test methods. In addition, Montrose personnel perform routine instrument and equipment calibrations and ensure that the calibration standards, instruments, and equipment used during test events meet, at a minimum, test method specifications as well as the specifications of our Quality Manual and ASTM D 7036-04.

The limitations of the various methods, instruments, equipment, and materials utilized during this test have been reasonably considered, but the ultimate impact of the cumulative uncertainty of this project is not fully identified within the results of this report.

TABLE A-1
SAMPLING INSTRUMENTS AND EQUIPMENT CALIBRATION SCHEDULE

Instrument Type	Frequency of Calibration[1]	Standard of Comparison or Method of Calibration	Acceptance Limits
Orifice Meter(large)	12 months	Calibrated dry test meter	± 2% of volume measured
Dry Gas Meter	6 months or when repaired	Calibrated dry test meter	± 2% of volume measured
Critical Orifice	6 months	Calibrated dry test meter	± 0.5% of average K’
S-Type Pitot (for use with EPA-type sampling train)	6 months	EPA Method 2	Geometric measurements within method-specified ranges
Vacuum Gauges	12 months	NIST-traceable gauge	≤ 1.0 in Hg difference
Temperature Measurement (thermocouples)	12 months	NBS mercury thermometer or NBS calibrated platinum RTD	±4 °F for <400 °F ± 1.5% for >400 °F
Temperature Readout Devices	6 months	Thermocouple simulator	± 2% full scale reading
Analytical Balance	12 months (check prior to each use)	NIST-traceable weights	± 0.5 mg of stated weight
Probe Nozzles	12 months	Nozzle diameter check	Range <± 0.10 mm for micrometer three measurements
Continuous Analyzers	Every field day, Depends upon use, frequency and performance	As specified by manufacturers’ operating manuals, EPA NBS gases and/or reference methods	Satisfy all limits specified in operating specifications

[1] The tabulated calibration frequencies are minimum standards. In certain instances, calibrations are performed more frequently.

TABLE A-2
EQUIPMENT MAINTENANCE SCHEDULE
Based on Manufacturer's Specifications and Montrose's Experience

Equipment	Performance Requirement	Maintenance Interval[2]	Corrective Action
Pumps	1. Absence of leaks 2. Ability to draw manufacturer required vacuum and flow	6 months	1. Visual inspection 2. Clean 3. Replace worn parts 4. Leak check
Flow Measuring Device	1. Free mechanical movement 2. Absence of malfunction	6 months	1. Visual inspection 2. Clean 3. Calibrate
Sampling Instruments	1. Absence of malfunction 2. Proper response to zero, span gas	As required by the manufacturer	As recommended by manufacturer
Mobile Van Sampling Systems	Absence of leaks	Depends on nature of use	1. Change filters 2. Leak check 3. Check for system contamination
Sampling Lines	Sample degradation less than 2%	After each test or test series	Blow filtered air through line until dry

[2] The tabulated maintenance intervals are minimum standards. In certain instances, maintenance is performed more frequently.

Appendix E.2
ASTM D-7036 Accreditation, ARB Certification, and QI Certificates

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STAC STACK TESTING ACCREDITATION COUNCIL

A2LA American Association for Laboratory Accreditation

Accredited Air Emission Testing Body

A2LA has accredited

MONTROSE AIR QUALITY SERVICES

In recognition of the successful completion of the joint A2LA and Stack Testing Accreditation Council (STAC) evaluation process, this laboratory is accredited to perform testing activities in compliance with ASTM D7036:2004 - Standard Practice for Competence of Air Emission Testing Bodies.

Presented this 5th day of March 2018.

President and CEO
For the Accreditation Council
Certificate Number 3925.01
Valid to February 29, 2020

This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.

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CALIFORNIA
AIR RESOURCES BOARD

January 5, 2018

Mr. Matt McCune
Montrose Air Quality Services, LLC
1631 East Saint Andrew Place
Santa Ana, California 92705

Dear Mr. McCune:

I am pleased to inform you that the California Air Resources Board (CARB) has renewed, by means of enclosed Executive Order (EO) I-18-002, Montrose Air Quality Services, LLC's approval to perform CARB Test Methods 1, 2, 3, 4, 5, 6, 8, 17, 20, and 100 (CO, CO_2, NO_x, O_2, SO_2, THC), Visible Emission Evaluation, and U.S. Environmental Protection Agency Test Methods 201A, 202, and 205. This approval is valid through June 30, 2020, during which time additional audits of Montrose Air Quality Services, LLC's testing ability may be performed. I have also enclosed two certificates of approval that expire June 30, 2020.

If you have questions or need further assistance, please contact Kathryn Gugeler at (916) 322-0221 or via email at kathryn.gugeler@arb.ca.gov, or Angus MacPherson at (916) 445-4686 or via email at angus.macpherson@arb.ca.gov.

Sincerely,

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

Enclosures (3)

cc: Angus MacPherson, Manager
Testing and Certification Section

Kathryn Gugeler
Monitoring and Laboratory Division

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER I-18-002

Approval of Independent Contractor Pursuant to California Code of Regulations, title 17, section 91207

Montrose Air Quality Services, LLC

WHEREAS, the California Air Resources Board (CARB), pursuant to California Health and Safety Code, section 41512, has established the procedures contained in California Code of Regulations, title 17, section 91200 and following, to allow the use of independent testers for compliance tests required by CARB;

WHEREAS, it has been determined that Montrose Air Quality Services, LLC meets the requirements of CARB for performing 1, 2, 3, 4, 5, 6, 8, 17, 20, and 100 (CO, CO_2, NO_x, O_2, SO_2, THC), Visible Emission Evaluation (VEE), and U.S. Environmental Protection Agency (U.S. EPA) Test Methods 201A, 202, and 205 pursuant to Cal. Code Regs., tit. 17, § 91200 and following, when the following conditions are met:

1. Montrose Air Quality Services, LLC permanently marks or engraves an identification number on the body of each of its pitot tubes in accordance with section 2.1 of CARB Test Method 2;

2. Montrose Air Quality Services, LLC calibrates its differential pressure gauges after each test series in accordance with section 2.2 of CARB Test Method 2, and establishes and maintains a log of the calibrations;

3. Montrose Air Quality Services, LLC calibrates its temperature gauges in accordance with section 4.3 of CARB Test Method 2, and establishes and maintains a log of the calibrations;

4. Montrose Air Quality Services, LLC calibrates its metering system in accordance with section 5.3 of CARB Test Method 5, and establishes and maintains a log of the calibrations;

5. Montrose Air Quality Services, LLC acquires and uses a 5-mL burette in accordance with section 2.3.3 of CARB Test Method 6 and section 4.2 of CARB Test Method 20;

6. Montrose Air Quality Services, LLC acquires and uses 300 to 500 mL glass beakers in accordance with Section 6.2.2(c) of U.S. EPA Test Method 202;

7. Montrose Air Quality Services, LLC uses desiccant in accordance with section 3.3.2 of CARB Test Methods 5 and 17, section 7.2.2 of U.S. EPA Test Method 201A, and section 7.2.4 of U.S. EPA Test Method 202;

State of California

Air Resources Board

Approved Independent Contractor

Montrose Air Quality Services, LLC

This is to certify that the company listed above has been approved by the California Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207, through June 30, 2020, for those test methods listed below:

CARB Source Test Methods:
1, 2, 3, 4, 5, 6, 8, 17, 20
100 (CO, CO_2, NO_x, O_2, SO_2, THC)

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

State of California

Air Resources Board

Approved Independent Contractor

Montrose Air Quality Services, LLC

This is to certify that the company listed above has been approved by the California Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207, through June 30, 2020, for those test methods listed below:

U.S. EPA Source Test Methods 201A, 202 and 205
Visible Emissions Evaluation

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

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SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

ROBERT M. ODELL

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

HAZARDOUS METALS MEASUREMENT SAMPLING METHODS

ISSUED THIS 18TH DAY OF MARCH, 2016 AND EFFECTIVE UNTIL MARCH 17TH, 2021

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

C. David Bagwell, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall, QSTI/QSTO Review Board

CERTIFICATE NO. 2012-642

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

ROBERT M. ODELL

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

MANUAL GAS VOLUME MEASUREMENTS AND ISOKINETIC PARTICULATE SAMPLING METHODS

ISSUED THIS 11TH DAY OF FEBRUARY 2017 AND EFFECTIVE UNTIL FEBRUARY 10TH, 2022

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2012-642

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

ROBERT M. ODELL

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

MANUAL GASEOUS POLLUTANTS SOURCE SAMPLING METHODS

ISSUED THIS 18TH DAY OF MARCH 2016 AND EFFECTIVE UNTIL MARCH 17TH, 2021

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

C. David Bagwell, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2012-642

SOURCE EVALUATION SOCIETY

SES

Qualified Source Testing Individual

LET IT BE KNOWN THAT

ROBERT M. ODELL

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

GASEOUS POLLUTANTS INSTRUMENTAL SAMPLING METHODS

ISSUED THIS 11TH DAY OF FEBRUARY 2017 AND EFFECTIVE UNTIL FEBRUARY 10TH, 2022

Peter R. Westlin, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2012-642

Appendix E.3
CEM Analyzer Calibration Data

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition:
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Analyzer Configuration

Name:	O2	CO2	THC					
Make/Model:								
25A or 7E:	7E	7E	25A					
Voltage max:	10	10	10					
Voltage offset:	0	0	0					
Range:	10	10	10					
Upscale:								
Downscale:								

Cylinder Information

Zero Number:	CC73814	CC73814	EB0083042					
Zero Conc:	0	0	0					
Low Number:			CC222293					
Low Conc:			264.5					
Mid Number:	CC154441	CC154441	CC203412					
Mid Conc:	11.57	3.938	503.2					
High Number:	EB0094194	EB0094194	CC25564					
High Conc:	21.26	8.419	865.6					
Bias Number:	CC154441	CC154441	CC203412					
Bias Conc:	11.57	3.938	503.2					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition:
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Calibration

	Name:	O2	CO2	THC					
	Make/Model:								
	25A or 7E:	7E	7E	25A					

Cylinder Concentrations									
	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	11.57	3.938	503.2					
	High:	21.26	8.419	865.6					

Calibration Readings									
	Zero reading:	-0.005	0.011	0.060					
	Low reading:	0.000	0.000	265.6					
	Mid reading:	11.56	3.947	519.4					
	High reading:	21.26	8.416	867.4					

EPA Method 7E Error Calculations									
Zero %Err:	**<2.0**	-0.024	0.131	N/A					
Mid %Err:	**<2.0**	-0.047	0.107	N/A					
High %Err:	**<2.0**	0.000	-0.036	N/A					

EPA Method 25A Error Calculations									
Zero Err:	**N/A**	N/A	N/A	0.060					
Low Err:	**5% of cyl**	N/A	N/A	1.100					
Mid Err:	**5% of cyl**	N/A	N/A	16.20					
High Err:	**N/A**	N/A	N/A	1.800					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Analyzer Configuration

Name:	O2	CO2	THC					
Make/Model:								
25A or 7E:	7E	7E	25A					
Voltage max:	10	10	10					
Voltage offset:	0	0	0					
Range:	10	10	10					
Upscale:								
Downscale:								

Cylinder Information

Zero Number:	CC73814	CC73814	EB0083042					
Zero Conc:	0	0	0					
Low Number:			CC222293					
Low Conc:			264.5					
Mid Number:	CC154441	CC154441	CC203412					
Mid Conc:	11.57	3.938	503.2					
High Number:	EB0094194	EB0094194	CC25564					
High Conc:	21.26	8.419	865.6					
Bias Number:	CC154441	CC154441	CC203412					
Bias Conc:	11.57	3.938	503.2					

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MONTROSE ENVIRONMENTAL

MAQDAQ 1.0			
Project Name: Schnitzer Steel	Project Number: 005AS-452603	CEMS Operator: RO	Unit/Condition: Light Iron
Run Length: 60	Record Interval: 6	Average Interval: 60	Triplicate Sampling: False
Traverse: False	Ports: N/A	Points per port: N/A	DAQ Device: DT9803(06)

Calibration

	Name:	O2	CO2	THC					
	Make/Model:								
	25A or 7E:	7E	7E	25A					

Cylinder Concentrations									
	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	11.57	3.938	503.2					
	High:	21.26	8.419	865.6					

Calibration Readings									
	Zero reading:	0.000	0.003	1.100					
	Low reading:	0.000	0.000	270.5					
	Mid reading:	11.55	3.924	506.6					
	High reading:	21.30	8.412	868.0					

EPA Method 7E Error Calculations									
Zero %Err:	**<2.0**	0.000	0.036	N/A					
Mid %Err:	**<2.0**	-0.094	-0.166	N/A					
High %Err:	**<2.0**	0.188	-0.083	N/A					

EPA Method 25A Error Calculations									
Zero Err:	**N/A**	N/A	N/A	1.100					
Low Err:	**5% of cyl**	N/A	N/A	6.000					
Mid Err:	**5% of cyl**	N/A	N/A	3.400					
High Err:	**N/A**	N/A	N/A	2.400					

Appendix E.4
Span Gas Certificates

Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF BATCH ANALYSIS

Grade of Product: CEM-CAL ZERO

Part Number:	NI CZ15A	Reference Number:	153-401216018-1
Cylinder Analyzed:	SG9149074BAL	Cylinder Volume:	142.0 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2000 PSIG
Analysis Date:	May 29, 2018	Valve Outlet:	580
Lot Number:	153-401216018-1		

Expiration Date: May 29, 2026

ANALYTICAL RESULTS

Component	Requested Purity	Certified Concentration
NITROGEN	99.9995 %	99.9995 %
CARBON DIOXIDE	< 1.0 PPM	0.32 PPM
NOx	< 0.1 PPM	0.02 PPM
SO2	< 0.1 PPM	<LDL 0.1 PPM
THC	< 0.1 PPM	0.08 PPM
CARBON MONOXIDE	< 0.5 PPM	0.02 PPM

Permanent Notes: Airgas certifies that the contents of this cylinder meet the requirements of 40 CFR 72.2

Cylinders in Batch:

AL-0093, ALM-032685, CC222230, CC435034, CC484549, CC494749, CC505121, CC505425, CC701890, CC73814, EB0081877, EB0081881, EB0086969, EB0088933, EB0097111, EB0097253, EB0098483, SG9102233ALB, SG9149074BAL, SG9164954BAL

Impurities verified against analytical standards traceable to NIST by weight and/or analysis.

Signature on file

Approved for Release

Airgas
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Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI84E15A7419	Reference Number:	153-401259902-1
Cylinder Number:	CC154441	Cylinder Volume:	147.5 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jul 31, 2018

Expiration Date: Jul 31, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	4.000 %	3.938 %	G1	+/- 0.7% NIST Traceable	07/31/2018
OXYGEN	11.50 %	11.57 %	G1	+/- 0.7% NIST Traceable	07/30/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	05010527	K011448	3.000 % CARBON DIOXIDE/NITROGEN	0.3%	Jun 05, 2019
NTRM	98051014	SG9162888BAL	12.05 % OXYGEN/NITROGEN	0.7%	Dec 14, 2023

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Jul 12, 2018
Horiba MPA-510 X9A4UGL8 O2	O2 Paramagnetic (Dixon)	Jul 13, 2018

Triad Data Available Upon Request

Signature on file
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Airgas Specialty Gases
Airgas USA, LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02AI99E15A0333	Reference Number:	48-401248365-1
Cylinder Number:	CC25564	Cylinder Volume:	146.3 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32018	Valve Outlet:	590
Gas Code:	PPN,BALA	Certification Date:	Jul 19, 2018

Expiration Date: Jul 19, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	850.0 PPM	865.6 PPM	G1	+/- 0.8% NIST Traceable	07/19/2018
AIR	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	15060803	CC462447	992.3 PPM PROPANE/NITROGEN	+/- 0.6%	Jul 22, 2021

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801551 C3H8	FTIR	Jul 18, 2018

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Airgas Specialty Gases
Airgas USA, LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02AI99E15A0332	Reference Number:	48-124600300-1
Cylinder Number:	CC203412	Cylinder Volume:	146.3 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32017	Valve Outlet:	590
Gas Code:	PPN,BALA	Certification Date:	Feb 01, 2017

Expiration Date: Feb 01, 2025

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	500.0 PPM	503.2 PPM	G1	+/- 0.5% NIST Traceable	02/01/2017
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	10060524	CC281414	495.3 PPM PROPANE/AIR	+/- 0.5%	Jan 06, 2022

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801551 C3H8	FTIR	Jan 25, 2017

Triad Data Available Upon Request

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Airgas Specialty Gases
Airgas USA, LLC
525 North Industrial Loop Road
Tooele, UT 84074
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI70E15A7420	Reference Number:	153-401102413-1
Cylinder Number:	EB0094194	Cylinder Volume:	151.2 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jan 18, 2018

Expiration Date: Jan 18, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	8.500 %	8.419 %	G1	+/- 0.7% NIST Traceable	01/18/2018
OXYGEN	21.00 %	21.26 %	G1	+/- 0.5% NIST Traceable	01/18/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060410	CC413504	7.489 % CARBON DIOXIDE/NITROGEN	0.6%	Jan 14, 2019
NTRM	09061433	CC282486	22.53 % OXYGEN/NITROGEN	0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Jan 09, 2018
Horiba MPA-510 X9A4UGL8 O2	O2 Paramagnetic (Dixon)	Jan 08, 2018

Triad Data Available Upon Request

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Airgas Specialty Gases
Airgas USA, LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02AI99E15A7414	Reference Number:	48-401166384-1
Cylinder Number:	CC222293	Cylinder Volume:	146.2 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32018	Valve Outlet:	590
Gas Code:	PPN,BALA	Certification Date:	Apr 02, 2018

Expiration Date: Apr 02, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	265.0 PPM	264.5 PPM	G1	+/- 0.9% NIST Traceable	04/02/2018
AIR	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	14060208	CC348942	249.2 PPM PROPANE/AIR	+/- 0.5%	Dec 12, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801551 C3H8	FTIR	Mar 06, 2018

Triad Data Available Upon Request

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Appendix E.5
Equipment Calibration Data

MONTROSE ENVIRONMENTAL

EPA Method 5

Meter Box Calibration by Calibrated Critical Orifice, Leak Check, and Thermocouple Calibration Check

English Meter Box Units, English K' Factor

Meter box ID:	CB-22
Meter ID (if applicable):	CB-22
Orifice set ID:	Antioch
Calibrated by:	SC
Expires:	**12/9/18**

Date:	6/9/18
Location:	Antioch
No. of orifices used (min. 3)	5
Barometric pressure (in. Hg):	29.89 in. Hg
Theoretical critical vacuum	14.10 in. Hg

Yd:	**0.9895**
ΔH@:	**1.850**

Meter Box Orifice Calibration

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice		-- Ambient Temperature --		
ΔH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Net (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.33	17.00	369.100	374.498	5.398	68.0	68.0	69.0	69.0	RG-40	0.2373	17.0	68.0	69.0	68.5
0.70	12.00	337.084	342.613	5.529	64.0	64.0	65.0	65.0	RG-48	0.3490	17.0	64.0	65.0	64.5
1.06	9.00	361.558	366.687	5.129	68.0	68.0	69.0	69.0	RG-55	0.4345	17.0	68.0	69.0	68.5
1.95	9.00	375.152	382.191	7.039	69.0	69.0	70.0	70.0	RG-63	0.6010	17.0	69.0	69.0	69.0
3.30	6.00	355.101	361.231	6.130	67.0	67.0	68.0	68.0	RG-73	0.7938	17.0	67.0	68.0	67.5

— SAMPLE RATE —
INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
0.33	0.309
0.70	0.455
1.06	0.565
1.95	0.781
3.30	1.033

— DRY GAS METER —
VOLUME CORRECTED

Vm(std) (cu ft)
5.390
5.568
5.130
7.043
6.177

——— ORIFICE ———

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
5.245	5.257
5.466	5.437
5.084	5.096
7.029	7.053
6.198	6.201

– DRY GAS METER –
CALIBRATION FACTOR Yd

Value (number)	Variation (number)
0.9732	-0.016
0.9817	-0.008
0.9910	0.002
0.998	0.009
1.003	0.014

——— ORIFICE ———
CALIBRATION FACTOR ΔH@

Value (in H2O)	Variation (in H2O)
1.946	0.096
1.909	0.059
1.865	0.015
1.791	-0.059
1.739	-0.111

For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.02.

For Orifice Calibration Factor ΔH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/-0.2.

QA Criteria:	
Average Yd	0.9895
Average ΔH@	1.8499
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Pressure Leak Check

Test Pressure, (in H_2O):	7	Should be 5-7 in. H_2O
Leak Rate, (in H_2O/min):	0	Must be zero (manometer level stable for 1 minute)

Meter Box Vacuum Leak Check

Test Vacuum, (in. Hg):	25	Coarse adjust valve fully open, fine adjust fully closed, sample inlet plugged
Leak Rate, (cfm):	0	Must be zero (meter dial stable for 1 minute)

Meter Box Thermocouple Readout Calibration Check

Input Temperature	Allowable Temp. Dev.*	Low	High
30	7	23	37
70	8	62	78
120	9	111	129
250	11	239	261
350	12	338	362
500	14	486	514
700	17	683	717
900	20	880	920

Stack	Probe	Filter	Exit	Aux.	Meter In / Out
24	24	24	24	25	31
63	63	63	63	63	64
114	114	113	114	114	115
246	246	245			
345	345	345			
493					
696					
896					

Thermocouple simulator	
Make:	Omega
Model:	HH911T
Serial Number	1788
Cal Date:	4/6/2018

* Reading values must be within 1.5% of reference thermometer values (based on absolute temperature scale) for calibration to be acceptable.

Performed by: Name: STEVE CROCKER Singature Date: 6/11/18

Approved by: Name: Todd Smith Singature Date: 6/11/18

MONTROSE ENVIRONMENTAL

EPA Method 5

Meter Box Calibration by Calibrated Critical Orifice, Leak Check, and Thermocouple Calibration Check

English Meter Box Units, English K' Factor

Meter box ID:	CB-14
Meter ID (if applicable):	CB-14
Orifice set ID:	Antioch
Calibrated by:	SC
Expires:	**12/8/18**

Date:	6/8/18
Location:	Antioch
No. of orifices used (min. 3)	5
Barometric pressure (in. Hg):	29.95 in. Hg
Theoretical critical vacuum	14.13 in. Hg

Yd:	**1.0140**
ΔH@:	**1.756**

Meter Box Orifice Calibration

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice		-- Ambient Temperature --		
ΔH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Net (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.30	17.00	415.272	420.570	5.298	76.0	76.0	76.0	76.0	RG-40	0.2373	17.0	76.0	76.0	76.0
0.66	12.00	409.707	415.184	5.477	75.0	75.0	75.0	75.0	RG-48	0.3490	17.0	75.0	75.0	75.0
1.05	12.00	401.150	407.857	6.707	72.0	72.0	74.0	74.0	RG-55	0.4345	17.0	72.0	74.0	73.0
1.90	7.00	421.043	426.402	5.359	76.0	76.0	77.0	77.0	RG-63	0.6010	17.0	76.0	77.0	76.5
3.10	6.00	426.837	432.869	6.032	77.0	77.0	77.0	77.0	RG-73	0.7938	17.0	77.0	77.0	77.0

--- SAMPLE RATE ---
INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
0.30	0.307
0.66	0.452
1.05	0.564
1.90	0.777
3.10	1.026

— DRY GAS METER —
VOLUME CORRECTED

Vm(std) (cu ft)
5.226
5.417
6.665
5.302
5.980

——— ORIFICE ———

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
5.219	5.295
5.423	5.491
6.764	6.824
5.440	5.524
6.156	6.257

– DRY GAS METER –
CALIBRATION FACTOR Yd

Value (number)	Variation (number)
0.9986	-0.015
1.0010	-0.013
1.0148	0.001
1.026	0.012
1.029	0.015

——— ORIFICE ———
CALIBRATION FACTOR ΔH@

Value (in H2O)	Variation (in H2O)
1.766	0.010
1.796	0.040
1.843	0.088
1.743	-0.012
1.631	-0.125

For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/-0.02.

For Orifice Calibration Factor ΔH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/-0.2.

QA Criteria:	
Average Yd	1.0140
Average ΔH@	1.7558
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Pressure Leak Check

Test Pressure, (in H_2O):	7	Should be 5-7 in. H_2O
Leak Rate, (in H_2O/min):	0	Must be zero (manometer level stable for 1 minute)

Meter Box Vacuum Leak Check

Test Vacuum, (in. Hg):	25	Coarse adjust valve fully open, fine adjust fully closed, sample inlet plugged
Leak Rate, (cfm):	0	Must be zero (meter dial stable for 1 minute)

Meter Box Thermocouple Readout Calibration Check

Input Temperature	Allowable Temp. Dev.*	Low	High
30	7	23	37
70	8	62	78
120	9	111	129
250	11	239	261
350	12	338	362
500	14	486	514
700	17	683	717
900	20	880	920

Stack	Probe	Filter	Exit	Aux.	Meter In / Out
24	23	25	23	23	31
63	63	64	63	65	71
112	112	112	112	112	120
244	244	244			
343	343	343			
491					
694					
894					

Thermocouple simulator	
Make:	Omega
Model:	HH911T
Serial Number	1788
Cal Date:	4/6/2018

* Reading values must be within 1.5% of reference thermometer values (based on absolute temperature scale) for calibration to be acceptable.

Performed by: Name: STEVE CROGHAN Singature: S. Gr Date: 6/11/18

Approved by: Name: Todd Smith Singature: Date: 6/11/18

MONTROSE

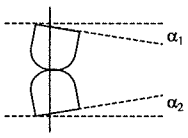
Pitot Tube Calibration Data Sheet

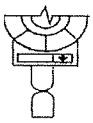
Calibration Date:	12/7/2018	**Performed by:**	RV	**Expiration Date:**	June 7, 2019
		ID No.:	161	**No obstructions:**	YES
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	161-NP-3	**No damage:**	YES
Probe Description:	NP	**Effective Length (ft):**	3	**Level and Perpendicular:**	YES
Thermocouple calibration performed?	Yes	**Thermocouple passed calibration?**			YES

Protractor or Digital Angle Finder ID: 1-DPR-OAK
Measuring Tape ID: 1-TM-OAK
Caliper ID: CC#A114

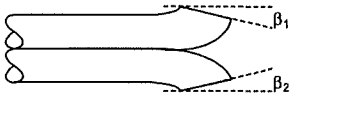
Calibration performed using the procedures of EPA Method 2, Section 10.1

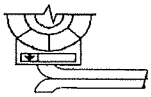
Alignment and Tubing Dimensions

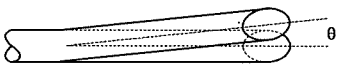


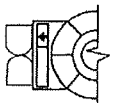


Degree indicating level position for determining α_1 and α_2.



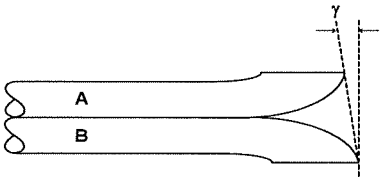


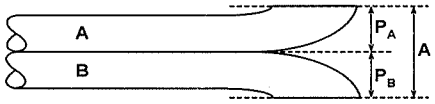




Degree indicating level position for determining θ.

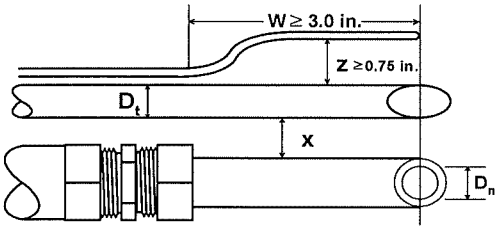
α_1 $(-10° < \alpha_1 < +10°)$	5	
α_2 $(-10° < \alpha_2 < +10°)$	5	
β_1 $(-5° < \beta_1 < +5°)$	-1	
β_2 $(-5° < \beta_2 < +5°)$	2	
γ	0	
θ	0	
A	0.8680	
z= A tan γ (± 0.125")	-0.0015	Pass
w= A tan θ (± 0.03125")	-0.0045	Pass
D_t (0.1875" < D_t < 0.375")	0.3490	Pass
P_A ($1.05D_t < P_A < 1.5D_t$)	0.4620	Pass
P_B ($1.05D_t < P_B < 1.5D_t$)	0.4430	Pass
$\lvert P_A - P_B \rvert \leq 0.0625$	0.0190	Pass

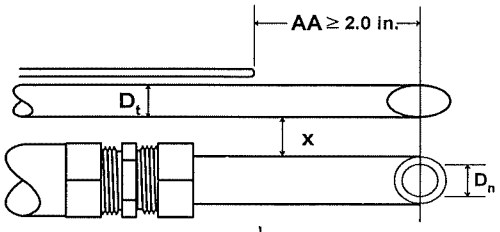




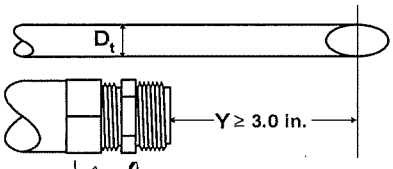
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements





W (≥ 3.0")	7.000	Pass	Offset TC only
-or- AA (≥ 2.0")			Setback TC only
X	0.878		
D_n	0.500		
X / D_n (≥ 1.5)	1.756	Pass	
Y (≥ 3.0")	4.500	Pass	
Z ≥ 0.75"	1.198	Pass	Offset TC only



Performed By: Ryan Vogler
Approved By: Steve Crowson

Signature: Ryan Vogler
Signature: S Cr

Date: 12/12/18
Date: 12/12/18

MONTROSE

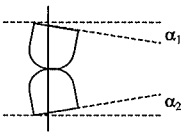
Pitot Tube Calibration Data Sheet

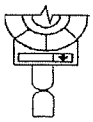
Calibration Date:	12/7/2018	**Performed by:**	RV	**Expiration Date:**	June 7, 2019
		ID No.:	162	**No obstructions:**	YES
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	162-NP-3	**No damage:**	YES
Probe Description:	NP	**Effective Length (ft):**	3	**Level and Perpendicular:**	YES
Thermocouple calibration performed?		Yes	**Thermocouple passed calibration?**		YES

Protractor or Digital Angle Finder ID: 1-DPR-OAK
Measuring Tape ID: 1-TM-OAK
Caliper ID: CC#A114

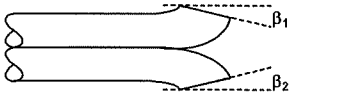
Calibration performed using the procedures of EPA Method 2, Section 10.1

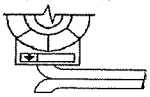
Alignment and Tubing Dimensions

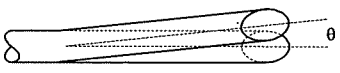


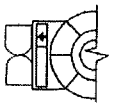


Degree indicating level position for determining α_1 and α_2.



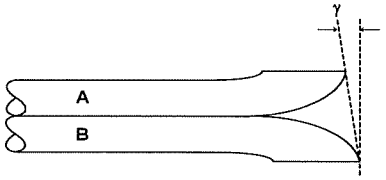


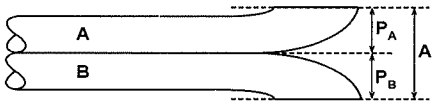




Degree indicating level position for determining θ.

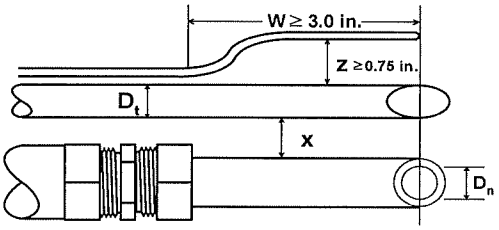
α_1 ($-10° < \alpha_1 < +10°$)	-4	
α_2 ($-10° < \alpha_2 < +10°$)	4	
β_1 ($-5° < \beta_1 < +5°$)	-3	
β_2 ($-5° < \beta_2 < +5°$)	1	
γ	1	
θ	-1	
A	0.9120	
z= A tan γ (± 0.125")	0.0159	Pass
w= A tan θ (± 0.03125")	-0.0159	Pass
D_t (0.1875" < D_t < 0.375")	0.3490	Pass
P_A ($1.05D_t < P_A < 1.5D_t$)	0.4370	Pass
P_B ($1.05D_t < P_B < 1.5D_t$)	0.4710	Pass
$\lvert P_A - P_B \rvert \leq 0.0625$	-0.0340	Pass

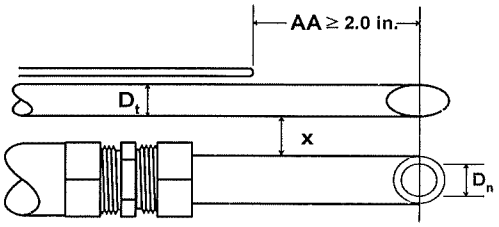




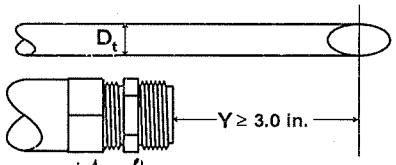
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements





W (≥ 3.0")	7.000	Pass	Offset TC only
-or- AA (≥ 2.0")			Setback TC only
X	0.903		
D_n	0.500		
X / D_n (≥ 1.5)	1.806	Pass	
Y (≥ 3.0")	4.500	Pass	
Z ≥ 0.75"	1.522	Pass	Offset TC only



Performed By: Ryan Vogler
Approved By: Steve Crocker

Signature: Ryan Vogler
Signature:

Date: 12/12/18
Date: 12/12/18

APPENDIX F
MISCELLANEOUS INFORMATION

Appendix F.1
Permit Excerpts

Condition # 23114

S-6 & S-7 Shredder and Infeed Conveyor; abated by A-6 Water Sprays, A-2 Cyclone #2, A-3 Wet Scrubber; A-4 Dry Filter, A-9 Cyclone #3, and A-5 Mist Eliminator (until installation of enclosure and upgraded abatement system);
(A #14194; Revision 1: A #16721)

1. The owner/operator shall not exceed the scrap-in throughput limit of 720,000 tons in any calendar year at this facility.
   (basis: baseline 2005 production level of 431,471 tons/yr; cumulative increase for the incremental throughput; health risk screening analysis)

2. The owner/operator shall enclose and vent the shredder to the abatement system at all times it is operating to minimize fugitive emissions.
   (basis: TBACT)

3. The owner/operator shall abate particulate emissions from the shredder by water injection at a sufficient rate to ensure that non-metallic material exiting the unit be moist to the touch at all times, and abatement system consisting of cyclones, scrubber, filter, and demister at all times when the shredder is in operation. The PM grain loading at the exhaust outlet of the abatement system shall not exceed 0.01 gr/dscf.
   (basis: TBACT)

4. The owner/operator shall operate the Recycling Center in such a manner that particulate emissions into the atmosphere from any operation/equipment for a period or periods aggregating more than three minutes in any hour shall not cause a visible emission which is as dark or darker than No. 0.5 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree or result in fallout on adjacent property in such quantities as to cause public nuisance per District Regulation 1-301.
   (basis: Regulations 6-1-301; 1-301)

5. The owner/operator shall use water spray to minimize fugitive dust emissions from material/scrap handling and storage to comply with condition 4. The owner/operator shall pave the site truck transport roads and sweep/spray with water/other actions deemed appropriate by the District, if necessary, to minimize fugitive dust emissions from trucking activities to comply with condition 4.
   (basis: Regulations 6-1-301; 1-301)

6. The owner/operator shall not exceed a total of 26 ship calls and 63,875 truck calls per calendar year to haul in/out scrap/materials at the facility.
(basis: health risk screening analysis; CEQA review)

7. In order to demonstrate compliance with condition numbers 1 and 6, the owner/operator shall keep records of monthly and yearly throughput of materials, ship and truck calls in a District approved log. The log shall be maintained for a period of at least 24 months from the date of data entry and shall be made available to the District staff upon request for inspection.
(basis: recordkeeping)

End of Conditions

Condition # 26401

Upon installation of enclosure and upgraded abatement system for S-6:
S-6 Shredder and S-7 Infeed Conveyor; abated by A-6 Water Sprays, A-11 Venturi Scrubber, and A-12 Venturi Scrubber
(A #14194; Revision 1: A #16721; A #27762)

1. The owner/operator shall not exceed the scrap-in throughput limit of 720,000 tons in any calendar year at this facility. (Basis: Regulations 2-1-301 - baseline 2005 production level of 431,471 tons/yr - and 2-5-302 and Cumulative Increase for the incremental throughput)

2. The owner/operator shall enclose the shredder, S-6, and shall vent the shredder, at all times it is operating, to the Venturi Scrubbers, A-11 and A-12. The owner/operator shall minimize fugitive emissions from the shredder enclosure during shredder operation by (a) designing the enclosure such that the total surface area of all openings in the enclosure does not exceed 5% of the total surface area of the enclosure walls, floor, and ceiling; (b) using curtain walls or strip curtains on the inlet feed conveyor opening; and (c) ensuring that the ventilation fan is operating within its design range. The owner/operator shall demonstrate that the ventilation fan is operating within its design range by maintaining the amperage greater than [xxx, tbd by source test] amperes during shredder operation. The owner/operator shall operate each Venturi Scrubber in accordance with manufacture specifications. The owner/operator shall demonstrate this by maintaining a minimum water flow rate of [xx gallons per minute (gpm), tbd after source test] and an effective pressure differential operating range [xx to xx inches of H2O, tbd after source test]. (Basis: TBACT)

3. Based on the results of the source testing required by Part 4, the owner/operator shall propose new emission rate limits for the shredder at stack P-15. The owner/operator shall propose limits for each of the following pollutants: Precursor Organic Compounds (POC), PM_{10}, $PM_{2.5}$, benzene, hexavalent chromium, PCBs, cadmium, lead, tetrachloroethylene, and trichloroethylene. The proposed emission rate limits shall be submitted to the District within 90 days of receiving the Part 4 source test results. The District will analyze the proposed limits, notify the owner/operator of any necessary changes to these limits, and revise this condition to include the new stack limits and associated monitoring requirements for P-15. In addition, the owner/operator shall estimate the fugitive emission rates that are not captured by the new shredder enclosure. (Basis: Cumulative Increase and Regulation 2-5-302)

4. Source Testing Requirements for Parts 3 and 5:
   a. Prior to removal of the existing particulate abatement system, the owner/operator shall conduct source testing on the existing shredder abatement system that is intended to be used in conjunction with source testing in Part 4b to estimate captured emissions from the shredder and its associated systems. Particulate

emissions testing (filterable and condensable) shall be conducted at the inlet and outlet of the existing PM abatement system. In addition, the owner/operator shall estimate the fugitive emission rates that are not captured by the existing shredder enclosure.

b. Within 90 days of start-up of A-11 and A-12, the owner/operator shall conduct a District approved source test at stack P-15, while the S-6 Auto Shredder is operating at or near the maximum operating rate. The owner/operator shall record the shredder processing rate, the water application rates for the infeed conveyor and the shredder, the water flow rates and the pressure differential operating ranges at each venturi scrubber, and the ventilation fan amperage during the source test. The source test shall determine the hourly emission rate and the average emission factor (pounds of pollutant per ton of material processed by the shredder) for the following compounds: total POC, PM, benzene, tetrachloroethylene, trichloroethylene, hexavalent chromium, PCBs, cadmium, and lead, and shall determine the outlet grain loading to demonstrate compliance with Part 5. In addition, the owner/operator shall conduct PM testing at the inlet to the A-11 and A-12 Venturi Scrubbers to determine the PM removal efficiency achieved by A-11 and A-12. The owner/operator shall also establish the ventilation fan amperage range necessary to operate the venture scrubbers within the effective pressure differential ranges determined above.

c. The owner/operator shall submit a source test protocol for the post enclosure construction compliance test to the Air District's Source Test Section Manager and to the Permit Engineer at least 30 days prior to the scheduled test date. The owner/operator shall submit a source test protocol for the pre-demolition source test to the Air District's Source Test Section Manager and to the Permit Engineer as soon as possible.

d. The owner/operator shall notify the Source Test Section Manager of the scheduled test date at least 7 days prior to the scheduled test date and shall obtain District approval for all source test procedures prior to conducting any testing.

e. The owner/operator shall submit a copy of the source test report to the Source Test Section Manager within 60 days of the test date.

(Basis: Cumulative Increase and Regulation 2-5-302)

5. The owner/operator shall apply water sprays (A-6) at the shredder, S-6, and infeed conveyor, S-7, at a sufficient rate to ensure that non-metallic material exiting the sources is moist to the touch at all times of operation. The PM grain loading at the exhaust stack P-15 shall not exceed 0.01 gr/dscf. (Basis: Cumulative Increase, TBACT; and Regulation 2-5-302)

6. The owner/operator shall operate the Recycling Center in such a manner that particulate emissions into the atmosphere from any operation/equipment for a period or periods aggregating more than three minutes in any hour shall not cause a visible emission which is as dark or darker than No. 0.5 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree or result in fallout on

adjacent property in such quantities as to cause public nuisance per District Regulation 1-301. (Basis: Regulations 1-301 and 6-1-301)

7. The owner/operator shall use water spray to minimize fugitive dust emissions from material/scrap handling and storage to comply with Part 6. The owner/operator shall operate the facility at all times in accordance with its approved Emissions Minimization Plan (EMP). (Basis: Regulations 1-301, 6-1-301, and 6-4-301)

8. The owner/operator shall not exceed a total of 26 ship calls and 63,875 truck calls per calendar year to haul in/out scrap/materials at the facility. (Basis: health risk assessment for CEQA review)

9. In order to demonstrate compliance with Part 1 and 8, the owner/operator shall keep records of monthly and yearly throughput of materials, ship and truck calls in a District approved log. The log shall be maintained for a period of at least 24 months from the date of data entry and shall be made available to the District staff for inspection upon request. (Basis: Regulations 2-1-301 and 2-5-302, Cumulative Increase, CEQA)

End of Conditions

THIS IS THE LAST PAGE OF THIS DOCUMENT

If you have any questions, please contact one of the following individuals by email or phone.

Name: Mr. Robert Odell
Title: Client Project Manager
Region: Northwest
Email: rodell@montrose-env.com
Phone: 925-642-2776

Name: Mr. Kevin Crosby
Title: Vice President, Technical
Region: Northwest
Email: kcrosby@montrose-env.com
Phone: 925-680-4337