PUBLIC COPY

SOURCE TEST REPORT
2018 SOURCE EMISSION RETESTS
SCHNITZER STEEL PRODUCTS 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-452603A-RT-358 (NST-5178)**
Test Dates: **January 21-23, 2019**
Submittal Date: **March 18, 2019**

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: _____ Date: _____

Name: Robert Odell Title: VP Technical

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: _____

Name: Dan Duncan Title: Reporting Hub Manager

TABLE OF CONTENTS

SECTION **PAGE**

1.0 SUMMARY OF TEST PROGRAM AND RESULTS....5
1.1 PROGRAM OBJECTIVES....5
1.2 PROJECT CONTACTS....7
2.0 SOURCE DESCRIPTION....8
2.1 FACILITY AND SOURCE DESCRIPTION....8
2.2 SAMPLING LOCATIONS AND ACCESS....8
2.3 OPERATING CONDITIONS AND PROCESS DATA....8
3.0 TEST METHOD DETAILS....9
3.1 LIST OF TEST METHODS....9
3.1.1 EPA Method 1, Traverse Points....9
3.1.2 EPA Method 2 - Velocity and Volumetric Flow Rate....9
3.1.3 Gaseous Emissions....10
3.1.4 Moisture Content....10
3.1.5 Total Organic Carbon....10
3.1.6 Precursor Organic Compounds....10
4.0 TEST RESULTS AND OVERVIEW....11
4.1 DISCUSSION OF RESULTS....11
4.2 DEVIATIONS AND EXCEPTIONS....11
APPENDIX A CALCULATIONS....14
A.1 Moisture/Velocity Spreadsheets....15
A.2 Benzene Spreadsheets....18
A.3 Total Organic Carbon Spreadsheets....23
A.4 Example Calculations....28
A.5 General Emissions Calculations....35
APPENDIX B FIELD AND COMPUTER-GENERATED DATA....41
B.1 Sampling Locations....42
B.2 Velocity Data Sheets....44
B.3 Moisture Data Sheets....52
B.4 Reference Method Data....60
APPENDIX C LABORATORY ANALYSIS DATA....82
C.1 Benzene Analyses....83
C.2 Total Organic Carbon – EPA 25C Analyses....109
C.3 Total Organic Carbon – TO-12 Analyses....115
APPENDIX D CLIENT PROCESS DATA....130
D.1 Process Data....131
APPENDIX E QUALITY ASSURANCE/QUALITY CONTROL....133

E.1 Quality Assurance Program Summary and Equipment Calibration Schedule.....134
E.2 ASTM D-7036 Accreditation, ARB Certification, and QI Certificates 139
E.3 CEM Analyzer Calibration Data 146
E.4 Span Gas Certificates.....150
E.5 Equipment Calibration Data 156

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 Todd Smith and Pete SanJuan of Montrose on January 21-23, 2019. Daniel Lee of Schnitzer Steel coordinated the testing program. The tests as a retest due to sampling mistakes described in the test report dated December 27, 2018 and were conducted based on a partial scope of the 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)
- 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

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 Table 1-1. 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 TOC EMISSIONS
SCHNITZER STEEL
SHREDDER

Run Number:	Car Bodies Only	Light Iron
Process Data:		
Material Feed Rate, tph	[redacted]	[redacted]
Flue Gas:		
O_2, % volume dry	21.0	21.0
CO_2, % volume dry	0.2±0.2	0.2±0.2
Moisture content, % volume	1.7	2.2
Flue gas temperature °F	67.0	70.4
Volumetric flow rate, dscfm	[redacted]	[redacted]
Benzene:		
lb/hr	1.584	0.113
lb/ton material proc'd	[redacted]	[redacted]
M25A - POC (TNMNEOC):		
lb/hr as CH_4	217	110
lb/ton material proc'd	[redacted]	[redacted]
M25C - POC (TNMNEOC):		
lb/hr as CH_4	284	151
lb/ton material proc'd	[redacted]	[redacted]
MTO12 - POC (TNMNEOC):		
lb/hr as CH_4	181	69
lb/ton material proc'd	[redacted]	[redacted]

Note: Methods 25A, 25C, and TO-12 show non-methane non-ethane organic carbon results.

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
Role:	Schnitzer Steel Products Company
Company:	(503) 434-3324
Telephone:	dlee@schn.com
Email:	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:	Todd Smith	Robert Odell
Title:	Client Project Manager	Vice President, Technical
Telephone:	(925) 381-3297	(925) 680-4300x10506
Email:	tsmith@montrose-env.com	rodell@montrose-env.com

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:

- Velocity - 20 points total, 10 from each of 2 ports located 90 degrees apart from one another
- Moisture – centralized point was located and tested

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.

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
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 is 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 is used, along with an inclined manometer. The measurements are made at traverse points specified by EPA Method 1. The molecular weight of the gas stream is determined from independent measurements of O_2, CO_2, and moisture. The stack gas volumetric flow rate is 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) are 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. 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

3.1.4 Moisture Content

Moisture content is measured per EPA Method 4. Pertinent information regarding the performance of the method is presented below:

- Method Deviations: Tests will not be conducted isokinetically and did not utilize a probe heater or filter assembly.
- 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) are measured by EPA 25A using a flame ionization detector. Sample gas is 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 is maintained at 350 degrees Fahrenheit to prevent moisture from interfering with the FID.

3.1.6 Precursor Organic Compounds

Emissions of precursor organic compounds (POC) were measured using EPA 25C, TO-12, and TO-15. Sample was collected into a single canister and used for all analyses. Pertinent information regarding the performance of the methods is presented below:

- Method Deviations: Modified to follow sampling requirements of TO-15
- Target Sample Duration: 60 minutes
- Analytical Laboratory: Atmospheric Analytical & Consulting, Inc.

4.0 TEST RESULTS AND OVERVIEW

4.1 DISCUSSION OF RESULTS

The average results presented in Table 1-1. The results of individual compliance test runs performed are presented in Tables 4-1 through 4-2.

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. CEM and process data provided by the client is located in Appendix C. Appendix D presents the quality assurance information, including instrument calibration data. Additional correspondence and relevant regulatory information are located in Appendix E.

4.2 DEVIATIONS AND EXCEPTIONS

The MAQDAQ data collected on January 22, 2019 is labeled with the operating condition “all products.” We later determined that light iron was being processed during this time. No other deviations and/or exceptions were reported.

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

Run Number:	1	2	3	Average
Date:	1/21/19	1/21/19	1/21/19	--
Time:	2000-2100	2117-2217	2227-2327	--
Process Data:				
Material Feed Rate, tph	[redacted]	[redacted]	[redacted]	[redacted]
Flue Gas:				
O_2, % volume dry	21.0	21.0	20.9	21.0
CO_2, % volume dry	0.2±0.2	0.2±0.2	0.2±0.2	0.2±0.2
Moisture content, % volume	1.2	2.0	1.8	1.7
Flue gas temperature °F	67.2	67.2	66.7	67.0
Volumetric flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Benzene:				
lb/hr	1.676	1.541	1.536	1.584
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
M25A - POC (TNMNEOC):				
lb/hr as CH_4	214	195	243	217
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
M25C - POC (TNMNEOC):				
lb/hr as CH_4	247	302	302	284
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
MTO12 - POC (TNMNEOC):				
lb/hr as CH_4	171	170	202	181
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 4-2
RESULTS SUMMARY POC EMISSIONS CONTINUED
SCHNITZER STEEL
SHREDDER – LIGHT IRON

Run Number:	**4**	**5**	**6**	**Average**
Date:	1/22/19	1/22/19	1/23/19	--
Time:	1900-2000	2008-2108	1815-1915	--
Process Data:				
Material Feed Rate, tph	[redacted]	[redacted]	[redacted]	[redacted]
Flue Gas:				
O_2, % volume dry	21.0	21.0	20.9	21.0
CO_2, % volume dry	0.2±0.2	0.2±0.2	0.2±0.2	0.2±0.2
Moisture content, % volume	2.0	2.3	2.5	2.2
Flue gas temperature °F	68.3	71.2	71.8	70.4
Volumetric flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Benzene:				
lb/hr	0.083	0.168	<0.087	0.113
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
M25A - POC (TNMNEOC):				
lb/hr as CH_4	116	118	97	110
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
M25C - POC (TNMNEOC):				
lb/hr as CH_4	150	156	146	151
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
MTO12 - POC (TNMNEOC):				
lb/hr as CH_4	69	73	66	69
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

APPENDIX A
CALCULATIONS

Appendix A.1
Moisture/Velocity Spreadsheets

PUBLIC COPY

SOURCE TEST DATA SUMMARY

Client	Schnitzer Shredder
Unit / Location	Car Bodies
A (stack area), ft^2	[redacted]
T_{ref} (reference temperature), °F	70

Test number	1	2	3	Average
Date	1/21/19	1/21/19	1/21/19	--
Start / Stop time	2000-2100	2117-2217	2227-2327	--
Meter box number	CB26	CB26	CB26	--
C_p (pitot coefficient), dimensionless	0.84	0.84	0.84	0.84
Y (meter calibration factor), dimensionless	1.001	1.001	1.001	1.001
Θ (sample time), min	60	60	60	60
P_{bar} (barometric pressure), in Hg	30.27	30.27	30.27	30.27
V_m (meter box volume), acf	45.051	45.087	45.417	45.185
V_{lc} (impinger liquid volume), ml	11.9	19.9	18.4	16.7
T_m (meter temperature), °F	56.8	63.4	61.0	60.4
ΔH (meter pressure), in. H_2O	1.8	1.8	1.8	1.8
ΔP (velocity head), in. H2O	[redacted]	[redacted]	[redacted]	[redacted]
P_g (static pressure), in. Hg	[redacted]	[redacted]	[redacted]	[redacted]
T_s (stack temperature), °F	67.2	67.2	66.7	67.0
$\%O_2$ (oxygen stack gas), % volume dry	20.98	20.98	20.93	20.96
$\%CO_2$ (carbon dioxide stack gas), % volume dry	*0.46*	*0.46*	*0.46*	0.46
1a $V_{m(std)}$ (standard sample volume), dscf	46.990	46.438	46.993	46.807
1b $V_{w(std)}$ (water vapor volume), scf	0.563	0.942	0.871	0.792
1c B_{ws} (moisture fraction), non-dimensional	0.012	0.020	0.018	0.017
1d MW_{dry} (stack gas molecular weight), dry	28.912	28.912	28.910	28.912
1e MW_{wet} (stack gas molecular weight), wet	28.783	28.695	28.712	28.730
1f P_s (absolute stack pressure), in Hg	30.205	30.205	30.205	30.205
1g V_s (stack gas velocity), ft/sec	[redacted]			
1h Q (stack flow rate), acfm	[redacted]			
1i Q_{ws} (stack flow rate), wscfm	[redacted]			
1j Q_{ds} (stack flow rate), dscfm	[redacted]			

Note: Numbers in italics are calculated using the calibration limit (2%).

PUBLIC COPY

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	P-15 Light Iron
A (stack area), ft^2	[redacted]
T_{ref} (reference temperature), °F	70

Test number	4	5	6	Average
Date	1/22/19	1/22/19	1/23/19	--
Start / Stop time	1900-2000	2008-2108	1815-1915	--
Meter box number	CB26	CB26	CB26	--
C_p (pitot coefficient), dimensionless	0.84	0.84	0.84	0.84
Y (meter calibration factor), dimensionless	1.001	1.001	1.001	1.001
Θ (sample time), min	60	60	60	60
P_{bar} (barometric pressure), in Hg	30.34	30.34	30.30	30.33
V_m (meter box volume), acf	45.215	46.051	44.988	45.418
V_{lc} (impinger liquid volume), ml	20.2	23.1	24.8	22.7
T_m (meter temperature), °F	62.3	69.8	61.3	64.5
ΔH (meter pressure), in. H_2O	1.8	1.8	1.8	1.8
ΔP (velocity head), in. H2O	[redacted]	[redacted]	[redacted]	[redacted]
P_g (static pressure), in. Hg	[redacted]	[redacted]	[redacted]	[redacted]
T_s (stack temperature), °F	68.3	71.2	71.8	70.4
$\%O_2$ (oxygen stack gas), % volume dry	20.98	20.99	20.88	20.95
$\%CO_2$ (carbon dioxide stack gas), % volume dry	*0.46*	*0.46*	*0.46*	0.46
1a $V_{m(std)}$ (standard sample volume), dscf	46.772	46.963	46.570	46.768
1b $V_{w(std)}$ (water vapor volume), scf	0.956	1.093	1.174	1.074
1c B_{ws} (moisture fraction), non-dimensional	0.0200	0.0228	0.0246	0.0225
1d MW_{dry} (stack gas molecular weight), dry	28.912	28.913	28.908	28.911
1e MW_{wet} (stack gas molecular weight), wet	28.694	28.665	28.640	28.666
1f P_s (absolute stack pressure), in Hg	30.278	30.340	30.241	30.286
1g V_s (stack gas velocity), ft/sec	[redacted]			
1h Q (stack flow rate), acfm	[redacted]			
1i Q_{ws} (stack flow rate), wscfm	[redacted]			
1j Q_{ds} (stack flow rate), dscfm	[redacted]			

Note: Numbers in italics are calculated using the calibration limit (2%).

Appendix A.2
Benzene Spreadsheets

PUBLIC COPY

SOURCE TEST DATA SUMMARY

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

Test number	1	2	3	Average
Date	1/21/19	1/21/19	1/21/19	--
Start / Stop time	2000-2100	2117-2217	2227-2327	--
Feed Rate, tons/hour	[redacted]	[redacted]	[redacted]	[redacted]
SAMPLE TRAIN DATA				
Meter box number/ID	CB26	CB26	CB26	--
Sample time, minutes	60	60	60	60
Pitot coefficient	0.84	0.84	0.84	0.84
Meter calibration, Yd	1.001	1.001	1.001	1.001
Barometric pressure, in Hg	30.27	30.27	30.27	30.27
Meter box volume, acf	45.051	45.087	45.417	45.185
Impinger liquid volume, ml	11.9	19.9	18.4	16.7
Meter temperature, °F	56.8	63.4	61.0	60.4
Meter pressure, (Delta H) iwg	1.8	1.8	1.8	1.8
Velocity head, (Delta P) iwg	[redacted]	[redacted]	[redacted]	[redacted]
Static pressure, iwg	[redacted]	[redacted]	[redacted]	[redacted]
Stack temperature, °F	67.2	67.2	66.7	67.0
ANALYZER DATA				
O_2, % volume dry	20.98	20.98	20.93	20.96
CO_2, % volume dry	*0.46*	*0.46*	*0.46*	*0.46*
VOLUMETRIC FLOW RATE				
Standard sample volume, dscf	46.990	46.438	46.993	46.807
Water vapor volume, scf	0.563	0.942	0.871	0.7920
Measured moisture fraction, nondimensional	0.012	0.020	0.018	0.017
Theoretical maximum moisture fraction, nondin	0.022	0.022	0.021	0.022
Calculated Moisture Fraction (nondimensional)	0.012	0.020	0.018	0.017
Moisture fraction %	1.2%	2.0%	1.8%	1.7%
Stack gas molecular weight, dry	28.912	28.912	28.910	28.912
Stack gas molecular weight, wet	28.783	28.695	28.712	28.730
Absolute stack pressure, in Hg	30.205	30.205	30.205	30.205
Stack gas velocity, ft/sec	[redacted]			[redacted]
Stack flow rate, acfm	[redacted]			[redacted]
Stack flow rate, wscfm	[redacted]			[redacted]
Stack flow rate, dscfm - from CR runs	[redacted]			[redacted]

PUBLIC COPY

SOURCE TEST DATA SUMMARY

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

Test number	1	2	3	Average
Date	1/21/19	1/21/19	1/21/19	--
Start / Stop time	2000-2100	2117-2217	2227-2327	--
Emissions Results				
Benzene				
ppm	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	1.676	1.541	1.536	1.584
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]

Note: Numbers in italics are calculated using the calibration limit (2%).

PUBLIC COPY

SOURCE TEST DATA SUMMARY

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

Test number	4	5	6	Average
Date	1/22/19	1/22/19	1/23/19	--
Start / Stop time	1900-2000	2008-2108	1815-1915	--
Feed Rate, tons/hour	[redacted]	[redacted]	[redacted]	[redacted]
SAMPLE TRAIN DATA				
Meter box number/ID	CB26	CB26	CB26	--
Sample time, minutes	60	60	60	60
Pitot coefficient	0.84	0.84	0.84	0.84
Meter calibration, Yd	1.001	1.001	1.001	1.001
Barometric pressure, in Hg	30.34	30.34	30.30	30.33
Meter box volume, acf	45.215	46.051	44.988	45.418
Impinger liquid volume, ml	20.2	23.1	24.8	22.7
Meter temperature, °F	62.3	69.8	61.3	64.5
Meter pressure, (Delta H) iwg	1.80	1.80	1.80	1.80
Velocity head, (Delta P) iwg	[redacted]	[redacted]	[redacted]	[redacted]
Static pressure, iwg	[redacted]	[redacted]	[redacted]	[redacted]
Stack temperature, °F	68.3	71.2	71.8	70.4
ANALYZER DATA				
O_2, % volume dry	20.98	20.99	20.88	20.95
CO_2, % volume dry	*0.46*	*0.46*	*0.46*	*0.46*
VOLUMETRIC FLOW RATE				
Standard sample volume, dscf	46.772	46.963	46.570	46.768
Water vapor volume, scf	0.956	1.093	1.174	1.0744
Measured moisture fraction, nondimensional	0.020	0.023	0.025	0.022
Theoretical maximum moisture fraction, nondir	0.023	0.025	0.025	0.024
Calculated Moisture Fraction (nondimensional)	0.020	0.023	0.025	0.022
Moisture fraction %	2.0%	2.3%	2.5%	2.2%
Stack gas molecular weight, dry	28.912	28.913	28.908	28.911
Stack gas molecular weight, wet	28.694	28.665	28.640	28.666
Absolute stack pressure, in Hg	30.278	30.340	30.241	30.286
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]

PUBLIC COPY

SOURCE TEST DATA SUMMARY

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

Test number	4		5		6	Average
Date	1/22/19		1/22/19		1/23/19	--
Start / Stop time	1900-2000		2008-2108		1815-1915	--
Emissions Results						
Benzene						
ppm	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	0.083		0.168	<	0.087	<	0.113
lb/ton	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Note: Numbers in italics are calculated using the calibration limit (2%).

Appendix A.3
Total Organic Carbon Spreadsheets

PUBLIC COPY

SOURCE TEST DATA SUMMARY

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

Test number	1	2	3	Average
Date	1/21/19	1/21/19	1/21/19	--
Start / Stop time	2000-2100	2117-2217	2227-2327	--
Feed Rate, tons/hour	[redacted]		[redacted]	[redacted]
SAMPLE TRAIN DATA				
Meter box number/ID	CB26	CB26	CB26	--
Sample time, minutes	60	60	60	60
Pitot coefficient	0.84	0.84	0.84	0.84
Meter calibration, Yd	1.001	1.001	1.001	1.001
Barometric pressure, in Hg	30.27	30.27	30.27	30.27
Meter box volume, acf	45.051	45.087	45.417	45.185
Impinger liquid volume, ml	11.9	19.9	18.4	16.7
Meter temperature, °F	56.8	63.4	61.0	60.4
Meter pressure, (Delta H) iwg	1.8	1.8	1.8	1.8
Velocity head, (Delta P) iwg	[redacted]	[redacted]	[redacted]	[redacted]
Static pressure, iwg	[redacted]	[redacted]	[redacted]	[redacted]
Stack temperature, °F	67.2	67.2	66.7	67.0
ANALYZER DATA				
O_2, % volume dry	20.98	20.98	20.93	21.0
CO_2, % volume dry	*0.46*	*0.46*	*0.46*	*0.46*
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	46.990	46.438	46.993	46.807
Water vapor volume, scf	0.563	0.942	0.871	0.792
Measured moisture fraction, nondimensional	0.012	0.020	0.018	0.017
Theoretical maximum moisture fraction, nondir	0.022	0.022	0.021	0.022
Calculated Moisture Fraction (nondimensional)	0.012	0.020	0.018	0.017
Moisture fraction %	1.18%	1.99%	1.82%	1.66%
Stack gas molecular weight, dry	28.912	28.912	28.910	28.912
Stack gas molecular weight, wet	28.783	28.695	28.712	28.730
Absolute stack pressure, in Hg	30.205	30.205	30.205	30.205
Stack gas velocity, ft/sec	[redacted]			[redacted]
Stack flow rate, acfm	[redacted]			[redacted]
Stack flow rate, wscfm	[redacted]			[redacted]
Stack flow rate, dscfm - from CR runs	[redacted]			[redacted]

PUBLIC COPY

SOURCE TEST DATA SUMMARY

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

Test number	1	2	3	Average
Date	1/21/19	1/21/19	1/21/19	--
Start / Stop time	2000-2100	2117-2217	2227-2327	--
Emissions Results				
M25A: POC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	214	195	243	217
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25A: NMOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	214	195	243	217
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25A: NMNEOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	214	195	243	217
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25C: NMOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	247	302	302	284
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25C: NMNEOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	247	302	302	284
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
TO-12: NMNEOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	171	170	202	181
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]

Note: Numbers in italics are calculated using the calibration limit (2%).

PUBLIC COPY

SOURCE TEST DATA SUMMARY

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

Test number	4	5	6	Average
Date	1/22/19	1/22/19	1/23/19	--
Start / Stop time	1900-2000	2008-2108	1815-1915	--
Feed Rate, tons/hour	[redacted]	[redacted]	[redacted]	[redacted]
SAMPLE TRAIN DATA				
Meter box number/ID	CB26	CB26	CB26	--
Sample time, minutes	60	60	60	60
Pitot coefficient	0.84	0.84	0.84	0.84
Meter calibration, Yd	1.001	1.001	1.001	1.001
Barometric pressure, in Hg	30.34	30.34	30.30	30.33
Meter box volume, acf	45.215	46.051	44.988	45.418
Impinger liquid volume, ml	20.2	23.1	24.8	22.7
Meter temperature, °F	62.3	69.8	61.3	64.5
Meter pressure, (Delta H) iwg	1.80	1.80	1.80	1.80
Velocity head, (Delta P) iwg	[redacted]	[redacted]	[redacted]	[redacted]
Static pressure, iwg	[redacted]	[redacted]	[redacted]	[redacted]
Stack temperature, °F	68.3	71.2	71.8	70.4
ANALYZER DATA				
O_2, % volume dry	20.98	20.99	20.88	20.95
CO_2, % volume dry	*0.46*	*0.46*	*0.46*	*0.46*
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	46.772	46.963	46.570	46.768
Water vapor volume, scf	0.956	1.093	1.174	1.0744
Measured moisture fraction, nondimensional	0.020	0.023	0.025	0.022
Theoretical maximum moisture fraction, nondimens	0.023	0.025	0.025	0.024
Calculated Moisture Fraction (nondimensional)	0.020	0.023	0.025	0.022
Moisture fraction %	2.0%	2.3%	2.5%	2.2%
Stack gas molecular weight, dry	28.912	28.913	28.908	28.911
Stack gas molecular weight, wet	28.694	28.665	28.640	28.666
Absolute stack pressure, in Hg	30.278	30.340	30.241	30.286
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]

PUBLIC COPY

SOURCE TEST DATA SUMMARY

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

Test number	4	5	6	Average
Date	1/22/19	1/22/19	1/23/19	--
Start / Stop time	1900-2000	2008-2108	1815-1915	--
Emissions Results				
M25A: POC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	116	118	97	111
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25A: NMOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	116	118	97	111
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25A: NMNEOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	116	118	97	110
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25C: NMOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	150	156	146	151
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
M25C: NMNEOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	150	156	146	151
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]
TO-12: NMNEOC				
ppmvd as CH4	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	69	73	66	69
lb/ton	[redacted]	[redacted]	[redacted]	[redacted]

Note: Numbers in italics are calculated using the calibration limit (2%).

Appendix A.4
Example Calculations

PUBLIC COPY

EXAMPLE CALCULATIONS
STACK GAS VOLUMETRIC FLOW RATE

Project name: Schnitzer Shread Retest **Project number:** 005AS-542603A

Computed by: KCB **Calculation date:** 3/6/2019

Run number: 3-Car bodies

SAMPLE TRAIN DATA

Meter calibration factor, Y_d	1.001	Y
Stack area, square feet	[redacted]	A_s
Pitot Coefficient	0.84	C_p
Barometric pressure, in Hg	30.27	P_{bar}
Meter box volume, acf	45.417	V_m
Impinger liquid volume, g	18.4	V_{lc}
Meter temperature, °R	521	T_m = (°F plus 460)
Meter pressure, (delta H) iwg	1.8	ΔH
Velocity head, (delta P) iwg	[redacted]	
Static pressure, iwg	[redacted]	
Stack temperature, °R	526.65	T_s = (°F plus 460)
Stack O_2, % volume dry	20.93	O_2
Stack CO_2, % volume dry	0.46	CO_2
Stack N_2, % volume dry	78.61	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

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

$$V_{m\,std} = (45.417)(1.001)\frac{(530)\left[30.27 + \left(\frac{1.8}{13.6}\right)\right]}{(521)(29.92)}$$

$V_{m\,std}$ = 46.993 dscf

b. Water vapor volume, scf

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

$$V_{w\,std} = (0.04715)(18.4)\left(\frac{530}{528}\right)$$

$V_{w\,std}$ = 0.871 scf

c. Moisture content, non-dimensional

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

$$B_{ws} = \left(\frac{0.871}{46.993 + 0.871}\right)$$

B_{ws} = 0.0182 moisture content (multiply by 100 for % by volume)

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

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

$$MW_{dry} = [0.44(\ 0.46\ )] + [0.32(\ 20.93\ )] + [0.28(\ 78.61\ )]$$

MW_{dry} = 28.911 lb/lb mole

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

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

$$MW_{wet} = [\ 28.911\ (1 - 0.0182\ )] + [18(\ 0.0182\ )]$$

MW_{wet} = 28.712 lb/lb mole

f. Absolute stack pressure, in Hg

[redacted]

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]

$Q_{ds} =$

$Q_{ds} =$

PUBLIC COPY

EXAMPLE CALCULATIONS
VOC EMISSIONS

Project name: Schnitzer Steel Retest **Project number:** 005AS-542603A

Computed by: KCB **Calculation date:** 3/6/19

Run number: 1-light iron **Gaseous species:** Benzene

EMISSIONS DATA

Reference temperature, °R 530 T_{ref} = *(°F plus 460)*

Concentration of gaseous species, ppm 0.049 *C*

Dry stack gas flow rate at standard conditions, dscfm [redacted]

Feed rate, tons/hr [redacted]

Molecular weight of gaseous species, lb/lb mole 78.11 MW_s where,

MW_s = 28.01 for CO; 46.01 for NO_X as NO_2; 64.06 for SO_X as SO_2; 17.03 for NH_3; 12.01 for carbon, C; 16.04 for methane (CH_4); 78.11 for C_6H_6

Specific molar volume of an ideal gas at standard conditions, ft^3/lb mole 386.8 *SV* where,

SV = 379.5 ft^3/*lb mole for* T_{ref} at 520 °*R* (60 °F)

SV = 385.3 ft^3/*lb mole for* T_{ref} at 528 °*R* (68 °F)

SV = 386.8 ft^3/*lb mole for* T_{ref} at530 °*R* (70 °F)

$$SV = (379.5)\left[\frac{((T_{ref}\ °R))}{520}\right]$$ at different reference temperatures

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.

PUBLIC COPY

1. GASEOUS EMISSIONS

a. Mass emissions, lb/hr

[redacted]

b. Emission rate, tons/year

[redacted]

Appendix A.5
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

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

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

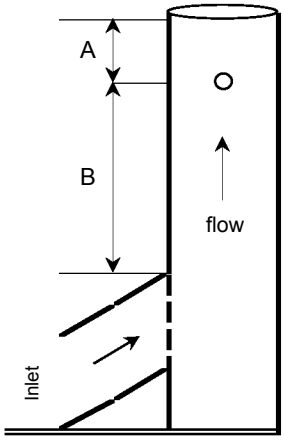
PUBLIC COPY

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**	

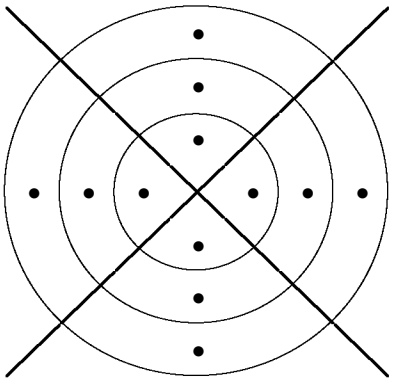


Typical vertical exhaust stack

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**

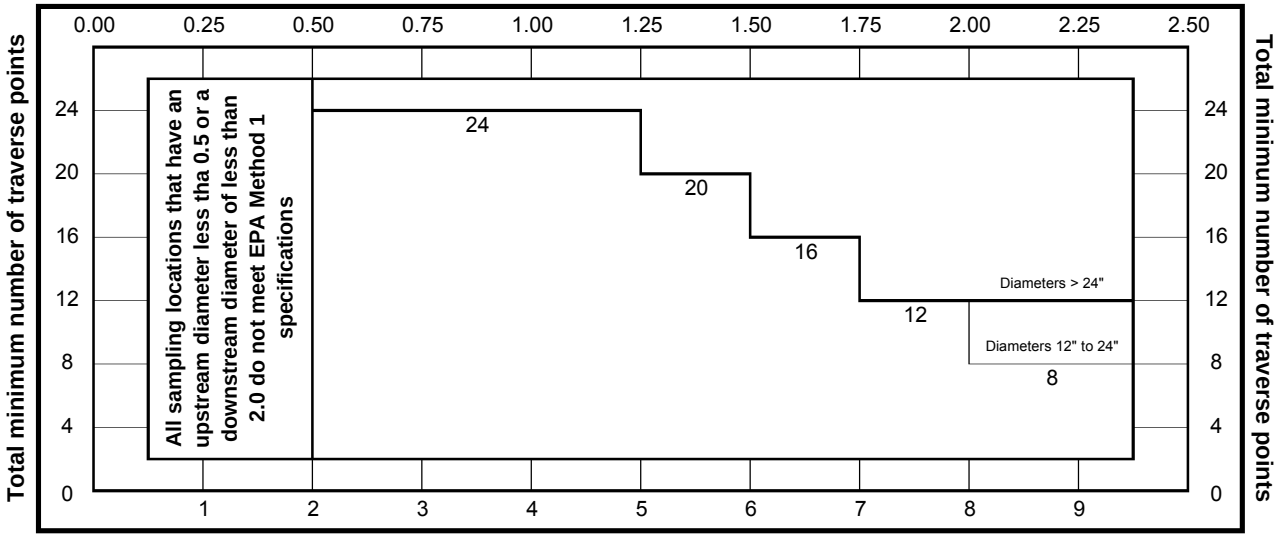
Note: No traverse point shall be within 1.0" of the stack walls (see Sections 11.3.1)

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



Example: Location of 12 points

Duct diameters upstream from flow disturbance or stack exit (Distance A)



Duct diameters downstream from flow disturbance (Distance B)

Appendix B.2
Velocity Data Sheets

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

EPA METHOD 2 - VELOCITY TRAVERSE DATA

Project Information

Client / Facility: SCHNITZER STEEL

Source / Location: SHREDDER EXH

Page 1 of 1

Method 2

Run no. | Date | Operator / Assistant | Project No.

ALT-011 TC Check		Equipment Identification		Ambient Conditions		Notes
Std. TC ID		Pitot ID	175 TP8	Baro. press., in. Hg	30.27	
Std. TC temp., °F		Pitot Cp	0.84	Ambient temp., °F	55	
Stack TC temp., °F		Manometer ID	CP26			
Continuity check + or -		Sensitivity				

Run No.	121 (5) 1			
Start Time	(5) ~~0800~~ 2000			
End Time	2100			
Pre-test pilot checks	Leak chk. + 0 @ 3.5	Leak chk. + @	Leak chk. + @	Leak chk. + @
Leak chk.: in.H_2O @ in. H_2O	- 0 @ 2.5	- @	- @	- @
Visual: circle one	Visual: aligned / damaged	Visual: aligned / damaged	Visual: aligned / damaged	Visual: aligned / damaged
Post-test pilot checks	Leak chk. + 0 @ 3.5	Leak chk. + @	Leak chk. + @	Leak chk. + @
Leak chk.: in.H_2O @ in. H_2O	- 0 @ 2.5	- @	- @	- @
Visual: circle one	Visual: aligned / damaged	Visual: aligned / damaged	Visual: aligned / damaged	Visual: aligned / damaged

Traverse Point Port	Point	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F
A	1	[redacted]	66						
	2		67						
	3		67						
	4		67						
	5		67						
	6		67						
	7		67						
	8		67						
	9		67						
	10		64						
B	1		67						
	2		68						
	3		68						
	4		68						
	5		68						
	6		68						
	7		68						
	8		68						
	9		68						
	10		66						
Static (Pg), in. H_2O		[redacted]							
Wet bulb temp., °F									

Comments:

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

EPA METHOD 2 - VELOCITY TRAVERSE DATA

Project Information

Client / Facility: SCHNITZER STEEL
Source / Location: SHREDDER EXH
Run no.: Date: Operator / Assistant: Project No.:
Page 1 of 1
Method 2

ALT-011 TC Check		Equipment Identification		Ambient Conditions		Notes
Std. TC ID		Pitot ID	175188	Baro. press., in. Hg	30.27	
Std. TC temp., °F		Pitot Cp	0.84	Ambient temp., °F	50	
Stack TC temp., °F		Manometer ID.	08264			
Continuity check + or -		Sensitivity				

Run No.	2			
Start Time	2:17			
End Time	2:27			
Pre-test pitot checks Leak chk.: in.H_2O @ in. H_2O Visual: circle one	Leak chk. + 0.0 @ 3.5 - 0.0 @ 2.5 Visual: aligned / damaged	Leak chk. + ___ @ ___ - ___ @ ___ Visual: aligned / damaged	Leak chk. + ___ @ ___ - ___ @ ___ Visual: aligned / damaged	Leak chk. + ___ @ ___ - ___ @ ___ Visual: aligned / damaged
Post-test pitot checks Leak chk.: in.H_2O @ in. H_2O Visual: circle one	Leak chk. + 0.0 @ 3.5 - 0.0 @ 2.5 Visual: aligned / damaged	Leak chk. + ___ @ ___ - ___ @ ___ Visual: aligned / damaged	Leak chk. + ___ @ ___ - ___ @ ___ Visual: aligned / damaged	Leak chk. + ___ @ ___ - ___ @ ___ Visual: aligned / damaged

Traverse Point Port	Point	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F
A	1	[redacted]	67						
	2		68						
	3		68						
	4		68						
	5		68						
	6		68						
	7		67						
	8		67						
	9		66						
	10		66						
B	1		68						
	2		68						
	3		68						
	4		68						
	5		67						
	6		67						
	7		67						
	8		66						
	9		66						
	10		65						
Static (Pg), in. H_2O		- [redacted]							
Wet bulb temp., °F									

Comments:

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

EPA METHOD 2 - VELOCITY TRAVERSE DATA

Project Information

Client / Facility: SCHNITZER STEEL
Source / Location: SHREDDER EXH
Page 1 of 1
Method 2
Run no. | Date | Operator / Assistant | Project No.

ALT-011 TC Check		Equipment Identification		Ambient Conditions		Notes
Std. TC ID		Pitot ID		Baro. press., in. Hg	30.27	
Std. TC temp., °F		Pitot Cp	0.84	Ambient temp., °F	47	
Stack TC temp., °F		Manometer ID	CB26			
Continuity check + or -		Sensitivity				

Run No.	3			
Start Time	2227			
End Time	2327			
Pre-test pitot checks Leak chk.: in.H_2O @ in. H_2O Visual: circle one	Leak chk. + 0.0 @ 3.5 - 0.0 @ 2.5 Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged
Post-test pitot checks Leak chk.: in.H_2O @ in. H_2O Visual: circle one	Leak chk. + 0.0 @ 3.5 - 0.0 @ 2.5 Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged

Traverse Point Port	Traverse Point Point	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F
A	1	[redacted]	67						
	2		67						
	3		68						
	4		67						
	5		67						
	6		67						
	7		66						
	8		67						
	9		66						
	10		65						
B	1		67						
	2		68						
	3		68						
	4		67						
	5		67						
	6		66						
	7		67						
	8		66						
	9		66						
	10		64						
Static (Pg), in. H_2O		[redacted]							
Wet bulb temp., °F									

Comments:

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

EPA METHOD 2 - VELOCITY TRAVERSE DATA

Project Information

Client / Facility: SCHNITZER STEEL
Source / Location: SHREDDER EXH, All PRODUCTS
Run no.: Date: 1/22/18 Operator / Assistant: [illegible] Project No.:
Page 1 of 1
Method 2

ALT-011 TC Check		Equipment Identification		Ambient Conditions		Notes
Std. TC ID		Pitot ID	175-10-8	Baro. press., in. Hg	30.34	All PRODUCTS
Std. TC temp., °F		Pitot Cp	0.84	Ambient temp., °F	51	
Stack TC temp., °F		Manometer ID	C326			
Continuity check + or -		Sensitivity				

Run No.	4			
Start Time	1900			
End Time	2000			
Pre-test pilot checks	Leak chk. + 0 @ 0.35"	Leak chk. + @	Leak chk. + @	Leak chk. + @
Leak chk.: in.H_2O @ in. H_2O	- 0 @ 2.5	- @	- @	- @
Visual: circle one	Visual: aligned / damaged	Visual: aligned / damaged	Visual: aligned / damaged	Visual: aligned / damaged
Post-test pilot checks	Leak chk. + 0 @ 35	Leak chk. + @	Leak chk. + @	Leak chk. + @
Leak chk.: in.H_2O @ in. H_2O	- 0 @ 2.5	- @	- @	- @
Visual: circle one	Visual: aligned / damaged	Visual: aligned / damaged	Visual: aligned / damaged	Visual: aligned / damaged

Traverse Point Port	Point	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F
A	1	[redacted]	67						
	2		67						
	3		67						
	4		67						
	5		68						
	6		67						
	7		67						
	8		67						
	9		67						
	10		66						
B	1		68						
	2		69						
	3		69						
	4		70						
	5		70						
	6		71						
	7		70						
	8		70						
	9		69						
	10		69						
Static (Pg), in. H_2O		[redacted]							
Wet bulb temp., °F									

Comments:

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

EPA METHOD 2 - VELOCITY TRAVERSE DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page 1 of 1

Source / Location: SHREDDER EXH ALL PRODUCTS — Method 2

Run no. — Date — Operator / Assistant — Project No.

ALT-011 TC Check		Equipment Identification		Ambient Conditions		Notes
Std. TC ID		Pitot ID	175-TP-8	Baro. press., in. Hg	30.34	ALL PRODUCTS
Std. TC temp., °F		Pitot Cp	0.84	Ambient temp., °F	50	
Stack TC temp., °F		Manometer ID				
Continuity check + or -		Sensitivity				

Run No.	5			
Start Time	2008			
End Time	2108			
Pre-test pitot checks Leak chk.: in. H_2O @ in. H_2O Visual: circle one	Leak chk. + 0 @ 3.5 - 0 @ 2.5 Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged
Post-test pitot checks Leak chk.: in. H_2O @ in. H_2O Visual: circle one	Leak chk. + 0 @ 3.5 - 0 @ 2.5 Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged

Traverse Point Port	Traverse Point Point	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F
A	1	[redacted]	70						
	2		70						
	3		71						
	4		71						
	5		72						
	6		72						
	7		71						
	8		72						
	9		71						
	10		70						
B	1		71						
	2		71						
	3		72						
	4		72						
	5		71						
	6		72						
	7		71						
	8		71						
	9		72						
	10		71						
Static (Pg), in. H_2O									
Wet bulb temp., °F									

Comments:

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

EPA METHOD 2 - VELOCITY TRAVERSE DATA

Project Information

Client / Facility: SCHNITZER STEEL
Source / Location: SHREDDER EXH All PRODUCTS
Run no. 6 Date 1/22/19 Operator / Assistant Project No.
Page 1 of 1
Method 2

ALT-011 TC Check	
Std. TC ID	
Std. TC temp., °F	
Stack TC temp., °F	
Continuity check + or -	

Equipment Identification	
Pitot ID	675 tp-8
Pitot Cp	0.84
Manometer ID	0326
Sensitivity	

Ambient Conditions	
Baro. press., in. Hg	30.34
Ambient temp., °F	50

Notes: All PRODUCTS

Run No.	6			
Start Time	2113			
End Time				
Pre-test pitot checks (Leak chk.: in. H_2O @ in. H_2O; Visual: circle one)	Leak chk. + 0 @ 3.5; - 0 @ 2.5; Visual: aligned / damaged	Leak chk. + @ ; - @ ; Visual: aligned / damaged	Leak chk. + @ ; - @ ; Visual: aligned / damaged	Leak chk. + @ ; - @ ; Visual: aligned / damaged
Post-test pitot checks (Leak chk.: in. H_2O @ in. H_2O; Visual: circle one)	Leak chk. + 0 @ 3.5; - 0 @ 2.5; Visual: aligned / damaged	Leak chk. + @ ; - @ ; Visual: aligned / damaged	Leak chk. + @ ; - @ ; Visual: aligned / damaged	Leak chk. + @ ; - @ ; Visual: aligned / damaged

Traverse Point Port	Traverse Point Point	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F
A	1	[redacted]	70						
	2		71						
	3		71						
	4		70						
	5		70						
	6		71						
	7		71						
	8		71						
	9		70						
	10		69						
B	1		70						
	2		69						
	3		70						
	4		71						
	5		70						
	6		70						
	7		71						
	8		71						
	9		70						
	10		70						
Static (Pg), in. H_2O		[redacted]							
Wet bulb temp., °F									

Comments:

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

EPA METHOD 2 - VELOCITY TRAVERSE DATA

Project Information

Client / Facility: Schmitzer Steel
Source / Location: Shredder exit ALL Products
Run no. 6 Date 1/23/19 Operator / Assistant B
Page 1 of 1
Method 2
Project No.

ALT-011 TC Check		Equipment Identification		Ambient Conditions		Notes
Std. TC ID		Pitot ID	175 TP 8	Baro. press., in. Hg	30.36	ALL Products
Std. TC temp., °F		Pitot Cp		Ambient temp., °F	66	
Stack TC temp., °F		Manometer ID	CB 76			
Continuity check + or -		Sensitivity				

Run No.	6 (B)			
Start Time	~~1800~~ 1815			
End Time	~~1820~~ 1945			
Pre-test pitot checks Leak chk.: in.H_2O @ in. H_2O Visual: circle one	Leak chk. + 6 @ 3.5 - 6 @ 3.5 Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged
Post-test pitot checks Leak chk.: in.H_2O @ in. H_2O Visual: circle one	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged	Leak chk. + @ - @ Visual: aligned / damaged

Traverse Point Port	Traverse Point Point	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F	ΔP inches H_2O	Stack temp. °F
A	1	[redacted]	69						
	2		70						
	3		71						
	4		71						
	5		72						
	6		72						
	7		72						
	8		71						
	9		72						
	10		72						
	1		72						
	2		73						
	3		73						
	4		72						
	5		72						
	6		72						
	7		73						
	8		72						
	9		73						
	10		72						
Static (Pg), in. H_2O		[redacted]							
Wet bulb temp., °F									

Comments:

Appendix B.3
Moisture Data Sheets

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel
Page: 1 of 1
Source / Location: Shredder
Method: 4
Run no.: 1-H2O
Date: 1-21-19
Operator / Assistant: [illegible]
Project No.:

Equipment Identification	
Meter console ID	CB26
Stack TC ID	
Probe/pitot ID	
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Calibration	
Meter Yd	1.001
Meter ΔH@0.75cfm	1.8373
Pitot tube Cp	
Nozzle diameter, in.	

ALT-011 TC Check (see bottom of page)

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

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.002 @ 15	0.002 @ 15
Pitot (+): in. H_2O @ in. H_2O	@	@
Pitot (-): in. H_2O @ in. H_2O	@	@
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
H2O	680.9	681.6	
H2O	670.0	669.6	
MT	549.0	549.1	
SG	845.0	856.5	
Tared Line Rinse			
Total impinger weight gain, g			
Filter ID			

Test / Sampling Parameters	
Run duration, min.	
No. of traverse pts.	
No. of ports	
Points per port	
Time per point, min.	
Probe/filter range, °F	
Imp. outlet max., °F	

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

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	30.27
Ambient temp., °F	35
Static (P_g), in. H_2O	
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

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
	0	2000	890.595	—	1.8	—	—	—	51	51			6
	10	2010	898.2	—	1.8	—	—	—	52	53			6
	20	2020	905.9	—	1.8	—	—	—	52	55			6
	30	2030	913.5	—	1.8	—	—	—	53	58			6
	40	2040	920.8	—	1.8	—	—	—	54	61			6
	50	2050	928.5	—	1.8	—	—	—	54	63			6
	60	2100	935.646	—	END	TEST							

ALT-011						

Comments:

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: SHNITZER STEEL
Source / Location: SHREDDER EXH
Run no.: 1-2-3
Date:
Operator / Assistant:
Project No.:
Page 1 of 1
Method:

Equipment Identification

Meter console ID:
Stack TC ID:
Probe/pitot ID:
Nozzle ID:
Imp. outlet TC ID:
Filter TC ID:
Micromanometer ID:
Sensitivity, in. H_2O

Calibration

Meter Yd: 1.001
Meter ΔH@0.75cfm: 1.8373
Pitot tube Cp:
Nozzle diameter, in.:

ALT-011 TC Check (see bottom of page)

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

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.005 @ 14	0.005 @ 14
Pitot (+): in. H_2O @ in. H_2O	@	@
Pitot (-): in. H_2O @ in. H_2O	@	@
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged

Other:

Impingers	Initial, g	Final, g	Difference
	[illegible]	[illegible]	
	[illegible]	[illegible]	
	[illegible]	[illegible]	
	[illegible]	453.6	
Tared Line Rinse			
Total impinger weight gain, g			

Filter ID:

Test / Sampling Parameters

Run duration, min.:
No. of traverse pts.:
No. of ports:
Points per port:
Time per point, min.:
Probe/filter range, °F:
Imp. outlet max., °F:

Ambient / Stack Gas Conditions

Baro. press., in. Hg: 30.27
Ambient temp., °F: 50
Static (P_g), in. H_2O:
O_2 conc., % dry vol.:
CO_2 conc., % dry vol.:
Wet bulb temp., °F:

K Factor: ΔH = 1.8 x ΔP or dwell time = x √ΔP

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
A-4	0	2017	936.068	–	1.8	–	–	–	51	60			2
	10	2027	943.7	–	1.8	–	–	–	51	62			2
	20	2037	951.4	–	1.8	–	–	–	52	64			2
	30	2047	959.2	–	1.8	–	–	–	52	64			2
	40	2057	966.9	–	1.8	–	–	–	52	66			2
	50	2107	974.1	–	1.8	–	–	–	53	67			2
	60	2117	981.155	–	END TEST								

ALT-011						

Comments:

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL
Page: 1 of 1
Source / Location: SHREDDER EXH
Method: 2
Run no.: [illegible] Date: 1/31/19 Operator / Assistant: [illegible] Project No.:

Equipment Identification

Meter console ID: 0326
Stack TC ID:
Probe/pitot ID:
Nozzle ID:
Imp. outlet TC ID:
Filter TC ID:
Micromanometer ID:
Sensitivity, in. H_2O:

Calibration

Meter Yd: 1.001
Meter ΔH@0.75cfm: 1.8373
Pitot tube Cp: —
Nozzle diameter, in.: —

ALT-011 TC Check (see bottom of page)

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

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.003 @ 13	0.003 @ 13
Pitot (+): in. H_2O @ in. H_2O	@	@
Pitot (-): in. H_2O @ in. H_2O	@	@
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged

Other:

Impingers	Initial, g	Final, g	Difference
1	[illegible]	[illegible]	
2	[illegible]	[illegible]	
MT	[illegible]	[illegible]	
SG	[illegible]	[illegible]	
Tared Line Rinse			
Total Impinger weight gain, g			

Filter ID:

Test / Sampling Parameters

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

Ambient / Stack Gas Conditions

Baro. press., in. Hg: 30.27
Ambient temp., °F: 47
Static (P_g), in. H_2O:
O_2 conc., % dry vol.:
CO_2 conc., % dry vol.:
Wet bulb temp., °F:

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
A4	0	02227	982.454		1.8	—	—	—	51	60			2
	10	2237	990.0		1.8	—	—	—	51	60			2
	20	2247	997.5		1.8	—	—	—	52	61			2
	30	2257	1005.2		1.8	—	—	—	52	61			2
	40	2307	1012.6		1.8	—	—	—	53	62			2
	50	2317	1020.3		1.8	—	—	—	53	62			2
↓	60	2327	1027.871	—	END TEST								

ALT-011						

Comments:

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL
Page 1 of 1
Source / Location: SHREDDER EXH AN PRODUCTS
Method
Run no. 4-1-20 Date 1/2/19 Operator / Assistant JS Project No.

Equipment Identification

Meter console ID: CB26
Stack TC ID
Probe/pitot ID
Nozzle ID
Imp. outlet TC ID
Filter TC ID
Micromanometer ID
Sensitivity, in. H_2O

Calibration

Meter Yd: 1.001
Meter ΔH@0.75cfm: 1.8373
Pitot tube Cp
Nozzle diameter, in.

ALT-011 TC Check (see bottom of page)

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

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.003 @ 13	0.003 @ 13
Pitot (+): in. H_2O @ in. H_2O	@	@
Pitot (-): in. H_2O @ in. H_2O	@	@
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged

Other:

Test / Sampling Parameters

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

Ambient / Stack Gas Conditions

Baro. press., in. Hg: 30.34
Ambient temp., °F: 51
Static (P_g), in. H_2O
O_2 conc., % dry vol.
CO_2 conc., % dry vol.
Wet bulb temp., °F

Impingers	Initial, g	Final, g	Difference
	673	711	
	642	656	
	771	783	
	785	793	
Tared Line Rinse			
Total impinger weight gain, g			

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
A4	0	1900	028.200	–	1.8	–	–	–	52	56	–		2
	10	1910	035.8	–	1.8	–	–	–	42	58	–		2
	20	1920	043.4	–	1.8	–	–	–	43	60	–		2
	30	1930	051.0	–	1.8	–	–	–	44	64	–		2
	40	1940	058.6	–	1.8	–	–	–	45	67	–		2
	50	1950	066.2	–	1.8	–	–	–	45	69	–		2
	60	2000	073.415	–	END TEST								

ALT-011						

Comments:

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL — Page 1 of 1

Source / Location: SHREDDER EXH ALL PRODUCTS — Method:

Run no. 5 H2O — Date 1/22/19 — Operator / Assistant [illegible] — Project No.

Equipment Identification	
Meter console ID	CB26
Stack TC ID	
Probe/pitot ID	
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Calibration	
Meter Yd	1.001
Meter ΔH@0.75cfm	1.8373
Pitot tube Cp	--
Nozzle diameter, in.	–

ALT-011 TC Check (see bottom of page)	
Std. TC ID	
Std. TC temp., °F	
Continuity Check	☐

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.006 @ 17	0.006 @ 17
Pitot (+): in. H_2O @ in. H_2O	@	@
Pitot (-): in. H_2O @ in. H_2O	@	@
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:	50	66.8

Test / Sampling Parameters	
Run duration, min.	60
No. of traverse pts.	
No. of ports	
Points per port	
Time per point, min.	
Probe/filter range, °F	
Imp. outlet max., °F	

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	30.34
Ambient temp., °F	50
Static (P_g), in. H_2O	
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

Impingers	Initial, g	Final, g	Difference
	850.0	863.6	
	660.7	660.9	
	546.7	546.9	
	853.0	862.7	
Tared Line Rinse			
Total impinger weight gain, g			

K Factor: ΔH = _____ 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
	0	2008	073.610	–	1.8	–	–	–	51	67	–		2
	10	2018	081.1	–	1.8	–	–	–	44	69	–		2
	20	2028	088.7	–	1.8	–	–	–	43	70	–		2
	30	2038	096.3	–	1.8	–	–	–	43	71	–		2
	40	2048	103.9	–	1.8	–	–	–	45	71	–		2
	50	2058	111.5	–	1.8	–	–	–	46	71	–		2
	60	2108	119.661	–	END	TEST							

ALT-011						

Comments:

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schmitzer Steel — Page 1 of 1

Source / Location: Shredder All Products — Method 4

Run no. 6-H2O — Date 1/23/19 — Operator / Assistant — Project No.

Equipment Identification	
Meter console ID	CB26
Stack TC ID	
Probe/pitot ID	
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Calibration	
Meter Yd	1.001
Meter ΔH@0.75cfm	1.3373
Pitot tube Cp	
Nozzle diameter, in.	

ALT-011 TC Check (see bottom of page)	
Std. TC ID	
Std. TC temp., °F	
Continuity Check	☐

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.001 @ 15	0.001 @ 5
Pitot (+): in. H_2O @ in. H_2O	@	@
Pitot (-): in. H_2O @ in. H_2O	@	@
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Test / Sampling Parameters	
Run duration, min.	60
No. of traverse pts.	
No. of ports	
Points per port	
Time per point, min.	
Probe/filter range, °F	
Imp. outlet max., °F	

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	30.3
Ambient temp., °F	60
Static (P_g), in. H_2O	
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

Impingers	Initial, g	Final, g	Difference
DI	660.0	674.0	
DI	680.0	681.1	
MT	520.1	520.7	
SG	827.3	836.4	
Tared Line Rinse			
Total impinger weight gain, g			

K Factor: ΔH = _____ 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
A4	0	*1800	135.007	–	1.8	–	–	–	60				2
	10	1810	142.6	–		–	–	–	60				2
	20	1820	149.9	–		–	–	–	61				2
	30	1830	157.5	–		–	–	–	61				2
	40	1840	165.1	–		–	–	–	62				2
	50	1850	172.7	–		–	–	–	62				2
	60	~~1860~~	179.995	–					63				2
		1900											
		(B)											
		*See Note Below											

ALT-011						

Comments: Run Delayed 15 min - 1815 - 1915

MAQS SampleTrainDa

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: SCHNITZER STEEL
Source / Location: SHREDDER EXH All PRODUCTS
Run no. 6 H2O
Date
Operator / Assistant
Page 1 of 1
Method
Project No.

Equipment Identification	
Meter console ID	CB26
Stack TC ID	
Probe/pitot ID	
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Calibration	
Meter Yd	1.001
Meter ΔH@0.75cfm	1.8373
Pitot tube Cp	
Nozzle diameter, in.	

ALT-011 TC Check (see bottom of page)	
Std. TC ID	
Std. TC temp., °F	
Continuity Check	☐

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.003 @ 16	0.003 @ 16
Pitot (+): in. H_2O @ in. H_2O	@	@
Pitot (-): in. H_2O @ in. H_2O	@	@
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Test / Sampling Parameters	
Run duration, min.	60
No. of traverse pts.	
No. of ports	
Points per port	
Time per point, min.	
Probe/filter range, °F	
Imp. outlet max., °F	

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	30.34
Ambient temp., °F	50
Static (P_g), in. H_2O	
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

Impingers	Initial, g	Final, g	Difference
	681.6		
	669.6		
	669.6		
	856.5		
Tared Line Rinse			
Total impinger weight gain, g			

K Factor: ΔH = _____ 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
A4	0	2113	119.855	–	1.8	–	–	4	47	67	–		4
	10	2123	127.4	–	1.8	–	–	–	46	68	–		4
STOP –	20	2133	135.0	–	1.8	–	–	–	46	69	–		4
	30			–		–	–	–			–		
	40			–		–	–	–			–		
	50			–		–	–	–			–		
	60			– END TEST									

ALT-011						

Comments:
SHREDDER DOWN @ 2133 ON @

MAQS SampleTrainDataSheet R1

Appendix B.4
Reference Method Data

PUBLIC COPY

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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 Average Results
20:00:00 - 21:00:00

	Name:	O2	CO2	THC (VO4)
	Make/Model:			
Jan 21 2019	20:01:00	20.78	0.082	109.0
Jan 21 2019	20:02:00	20.78	0.087	197.2
Jan 21 2019	20:03:00	20.77	0.084	182.1
Jan 21 2019	20:04:00	20.78	0.086	83.32
Jan 21 2019	20:05:00	20.78	0.091	95.26
Jan 21 2019	20:06:00	20.78	0.086	76.99
Jan 21 2019	20:07:00	20.79	0.079	93.71
Jan 21 2019	20:08:00	20.78	0.087	117.5
Jan 21 2019	20:09:00	20.78	0.089	85.72
Jan 21 2019	20:10:00	20.78	0.088	130.8
Jan 21 2019	20:11:00	20.78	0.084	107.6
Jan 21 2019	20:12:00	20.78	0.089	87.40
Jan 21 2019	20:13:00	20.78	0.091	69.31
Jan 21 2019	20:14:00	20.78	0.085	97.55
Jan 21 2019	20:15:00	20.78	0.082	432.7
Jan 21 2019	20:16:00	20.78	0.092	341.9
Jan 21 2019	20:17:00	20.78	0.081	216.4
Jan 21 2019	20:18:00	20.79	0.089	148.9
Jan 21 2019	20:19:00	20.78	0.088	123.8
Jan 21 2019	20:20:00	20.79	0.088	134.7
Jan 21 2019	20:21:00	20.79	0.080	104.3
Jan 21 2019	20:22:00	20.79	0.090	144.5
Jan 21 2019	20:23:00	20.79	0.084	168.5
Jan 21 2019	20:24:00	20.79	0.089	150.5
Jan 21 2019	20:25:00	20.78	0.085	133.8
Jan 21 2019	20:26:00	20.79	0.091	173.9
Jan 21 2019	20:27:00	20.78	0.089	128.9
Jan 21 2019	20:28:00	20.78	0.085	115.4
Jan 21 2019	20:29:00	20.78	0.089	221.0
Jan 21 2019	20:30:00	20.78	0.079	192.5
Jan 21 2019	20:31:00	20.79	0.077	180.3
Jan 21 2019	20:32:00	20.79	0.077	231.7
Jan 21 2019	20:33:00	20.78	0.079	125.6
Jan 21 2019	20:34:00	20.79	0.089	109.5
Jan 21 2019	20:35:00	20.79	0.089	129.4
Jan 21 2019	20:36:00	20.78	0.076	110.3
Jan 21 2019	20:37:00	20.79	0.076	152.0
Jan 21 2019	20:38:00	20.79	0.080	620.1
Jan 21 2019	20:39:00	20.79	0.075	318.7
Jan 21 2019	20:40:00	20.79	0.078	239.5
Jan 21 2019	20:41:00	20.79	0.076	276.9
Jan 21 2019	20:42:00	20.79	0.076	153.1
Jan 21 2019	20:43:00	20.79	0.076	248.0
Jan 21 2019	20:44:00	20.79	0.073	253.9
Jan 21 2019	20:45:00	20.79	0.076	274.9
Jan 21 2019	20:46:00	20.79	0.080	365.7
Jan 21 2019	20:47:00	20.80	0.080	346.2

PUBLIC COPY

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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)

Jan 21 2019	20:48:00	20.79	0.086	379.1
Jan 21 2019	20:49:00	20.80	0.090	236.1
Jan 21 2019	20:50:00	20.79	0.090	148.3
Jan 21 2019	20:51:00	20.79	0.086	144.9
Jan 21 2019	20:52:00	20.79	0.089	166.1
Jan 21 2019	20:53:00	20.80	0.089	339.3
Jan 21 2019	20:54:00	20.80	0.081	716.3
Jan 21 2019	20:55:00	20.79	0.088	222.1
Jan 21 2019	20:56:00	20.79	0.090	204.3
Jan 21 2019	20:57:00	20.80	0.089	183.9
Jan 21 2019	20:58:00	20.80	0.091	188.0
Jan 21 2019	20:59:00	20.80	0.099	211.9
Jan 21 2019	21:00:00	20.80	0.092	165.8
	Average:	20.79	0.085	198.5
	Max:	20.80	0.099	716.3
	Min:	20.77	0.073	69.31

PUBLIC COPY

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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
20:00:00 - 21:00:00

	Name:	O2	CO2	THC (VO4)
	Make/Model:			
	25A or 7E:	7E	7E	25A
Run summary data				
	Raw Avg:	20.79	0.085	198.5
	Max:	20.80	0.099	716.3
	Min:	20.77	0.073	69.31
Cylinder Concentrations				
	Zero:	0.000	0.000	0.000
	Low:			264.5
	Mid:	10.28	9.966	503.1
	High:	23.05	22.87	865.6
Calibration Readings				
	Zero reading:	0.014	0.012	0.180
	Low reading:			266.2
	Mid reading:	10.33	10.13	504.0
	High reading:	22.87	22.86	867.0
EPA Method 7E Error Calculations				
Zero %Err:	**<2.0**	0.061	0.052	N/A
Mid %Err:	**<2.0**	0.217	0.717	N/A
High %Err:	**<2.0**	-0.781	-0.044	N/A
EPA Method 25A Error Calculations				
Zero %Err:	**N/A**	N/A	N/A	0.180
Low %Err:	**5% of cyl**	N/A	N/A	1.700
Mid %Err:	**5% of cyl**	N/A	N/A	0.900
High %Err:	**N/A**	N/A	N/A	1.400
Initial Bias Data				
	Zero reading:	0.131	0.099	0.180
	Span reading:	22.79	22.59	504.0
Zero % bias:	**<5.0**	0.508	0.380	N/A
Span % bias:	**<5.0**	-0.347	-1.181	N/A
Final Bias Data				
	Zero reading:	-0.010	0.116	5.160
	Span reading:	22.88	21.98	503.0
Zero % bias:	**<5.0**	-0.104	0.455	N/A
Span % bias:	**<5.0**	0.043	-3.848	N/A
Zero % drift:	**<3.0**	0.612	0.075	N/A
Span % drift:	**<3.0**	0.390	2.667	N/A
Zero drift:	**<3.0% span**	N/A	N/A	-4.980
Span drift:	**<3.0% span**	N/A	N/A	1.000
Bias Corrected Averages				
	Cor Avg:	20.98	-0.023	198.5

PUBLIC COPY

CEM System Bias and Linearity Correction Calculations Schnitzer Steel

Run 1

PARAMETER	O_2	CO2	CRITERIA	STATUS
CALIBRATION SPAN GASES				
High Calibration Span:	23.05	22.87	Date:	1/21/19
Mid Calibration Span:	10.28	9.966	Time:	2117-2217
Low Calibration Span:	0.000	0.000	Unit:	Shredder/Car bodies only
Mid Span % of Range:	44.6	43.6		
YSTEM CALIBRATION ERROR TES				
High As Found Value:	22.87	22.860		
Mid As Found Value:	10.33	10.130		
Low As Found Value:	0.01	0.012		
High Calibration Error:	-0.781	-0.044	**< 2.0%**	**PASS**
Mid Calibration Error:	0.217	0.717	**< 2.0%**	**PASS**
Low Calibration Error:	0.061	0.052	**< 2.0%**	**PASS**
SYSTEM BIAS CHECK AND DRIFT ASSESSMENT				
	Pre-Test Bias	***Pre-Test Bias***		
Zero Value:	-0.010	0.116		
Span Value:	22.88	21.98		
	Post-Test Bias	***Post-Test Bias***		
Zero Value:	0.081	-0.021		
Span Value:	22.78	21.82		
System Final Bias, %:	0.291	-0.144	**< 5.0%**	**PASS**
System Final Span, %:	-0.390	-4.547	**< 5.0%**	**PASS**
System Bias Zero Drift, %:	0.395	0.599	**< 3.0%**	**PASS**
System Bias Span Drift, %:	0.434	0.700	**< 3.0%**	**PASS**
RAW TEST AVERAGES				
Raw Concentrations:	20.76	0.039		
% of High Calibration Span:	90.1	0.2		
Corrected Averages	**20.96**	**-0.009**		

Note: Test data should not exceed high calibration span; however, analyzer range can be set higher.

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

MAQDAQ 1.0

Project Name:	Schnitzer Steel	Project Number:		CEMS Operator:	TJS	Unit/Condition:	Shredder/ Car body 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

21:17:00-22:17:00

Name:	O2	CO2	THC (VO4)
Make/Model:			
21:18:00	~~0.181~~	~~0.059~~	157.2
21:19:00	~~0.306~~	~~0.057~~	161.9
21:20:00	~~0.159~~	~~0.045~~	157
21:21:00	~~0.119~~	~~0.044~~	122.6
21:22:00	~~0.157~~	~~0.045~~	158.9
21:23:00	~~0.219~~	~~0.045~~	124.8
21:24:00	~~0.315~~	~~0.048~~	150
21:25:00	~~0.5~~	~~0.049~~	443.2
21:26:00	~~0.176~~	~~0.044~~	167.8
21:27:00	~~0.407~~	~~0.041~~	200.7
21:28:00	~~0.176~~	~~0.039~~	146.3
21:29:00	~~0.202~~	~~0.043~~	121.3
21:30:00	~~0.193~~	~~0.04~~	147.1
21:31:00	~~0.206~~	~~0.038~~	146.9
21:32:00	~~0.778~~	~~13.16~~	199.4
21:33:00	~~-0.016~~	~~2.605~~	195.6
21:34:00	~~9.138~~	~~0.063~~	204.6
21:35:00	20.77	0.052	218.1
21:36:00	20.77	0.05	173.2
21:37:00	20.76	0.05	181.6
21:38:00	20.76	0.043	549.9
21:39:00	20.76	0.047	335.3
21:40:00	20.76	0.038	190.9
21:41:00	20.76	0.046	195.9
21:42:00	20.75	0.049	146.9
21:43:00	20.76	0.048	221.2
21:44:00	20.76	0.046	157
21:45:00	20.76	0.043	122.7
21:46:00	20.76	0.044	175.9
21:47:00	20.76	0.042	181.6
21:48:00	20.76	0.049	178.8
21:49:00	20.76	0.048	173.3
21:50:00	20.76	0.047	96.25
21:51:00	20.76	0.039	315.5
21:52:00	20.76	0.038	690.4
21:53:00	20.76	0.036	391.2
21:54:00	20.75	0.037	211.1
21:55:00	20.76	0.047	101.6
21:56:00	20.76	0.038	240.8
21:57:00	20.76	0.035	220.4
21:58:00	20.76	0.042	186.7
21:59:00	20.76	0.038	137.7
22:00:00	20.76	0.036	164.6
22:01:00	20.76	0.041	113.1
22:02:00	20.76	0.037	169.6
22:03:00	20.76	0.034	172.3
22:04:00	20.75	0.037	109.1
22:05:00	20.76	0.031	141.7
22:06:00	20.76	0.038	143.5

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

MAQDAQ 1.0

Project Name:	Schnitzer Steel	Project Number:		CEMS Operator:	TJS	Unit/Condition:	Shredder/ Car body 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

21:17:00-22:17:00

Name:	O2	CO2	THC (VO4)
Make/Model:			
22:07:00	20.76	0.037	81.3
22:08:00	20.76	0.031	101
22:09:00	20.76	0.035	118
22:10:00	20.76	0.038	172.1
22:11:00	20.76	0.031	88.27
22:12:00	20.75	0.034	56.56
22:13:00	20.75	0.03	77.2
22:14:00	20.75	0.025	56.48
22:15:00	20.74	0.026	110
22:16:00	20.75	0.028	75.83
22:17:00	20.77	0.031	91.59
Run avg	20.76	0.039	180.69
Run max	20.77	0.052	690.4
Run min	20.74	0.025	56.48

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

MAQDAQ 1.0

Project Name:	Schnitzer Steel	Project Number:		CEMS Operator:	TJS	Unit/Condition:	Shredder/ Car body 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

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

Run Summary Data

	Raw avg:	20.76	0.039	180.69					
	Max:	20.77	0.052	690.4					
	Min:	20.74	0.025	56.48					

Cylinder Concentrations

	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	10.28	9.966	503.1					
	High:	23.05	22.87	865.6					

Calibration Readings

	Zero reading:	0.014	0.012	0.180					
	Low reading:			266.2					
	Mid reading:	10.33	10.13	504.0					
	High reading:	22.87	22.86	867.0					

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.061	0.052	N/A					
Mid %Err:	**<2.0**	0.217	0.717	N/A					
High%Err:	**<2.0**	-0.781	-0.044	N/A					

EPA Method 25A Error Calculations

Zero Err:	**N/A**	N/A	N/A	0.180					
Low Err:	**5% of cyl**	N/A	N/A	1.700					
Mid Err:	**5% of cyl**	N/A	N/A	0.900					
High Err:	**N/A**	N/A	N/A	1.400					

Initial Bias Data

	Zero reading:	-0.010	0.116	5.160					
	Span reading:	22.88	21.98	503.0					
Zero % bias:	**<5.0**	-0.104	0.455	N/A					
Span % bias:	**<5.0**	0.043	-3.848	N/A					

PUBLIC COPY

Final Bias Data									
	Zero reading:	0.081	-0.021	5.680					
	Span reading:	22.78	21.82	506.5					
Zero % bias:	**<5.0**	0.291	-0.144	N/A					
Span % bias:	**<5.0**	-0.391	-4.547	N/A					
Zero % drift:	**<3.0**	0.395	0.599	N/A					
Span % drift:	**<3.0**	0.433	0.699	N/A					
Zero drift:	**<3.0% span**	N/A	N/A	-0.52					
Span drift:	**<3.0% span**	N/A	N/A	-3.5					
Bias Corrected Averages									
	Cor Avg:	20.96	-0.009	180.7					

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

MAQDAQ 1.0

Project Name:	Schnitzer Steel	Project Number:		CEMS Operator:	TJS	Unit/Condition:	Shredder/ Car body 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

22:27:00-23:27:00

Name:	O2	CO2	THC
Make/Model:			
22:28:00	20.72	0.099	455.2
22:29:00	20.71	0.074	215.8
22:30:00	20.72	0.064	128
22:31:00	20.72	0.055	86.11
22:32:00	20.72	0.046	191.2
22:33:00	20.73	0.045	139.5
22:34:00	20.72	0.054	135.8
22:35:00	20.72	0.045	138.5
22:36:00	20.73	0.037	123.5
22:37:00	20.73	0.033	233
22:38:00	20.73	0.039	214.8
22:39:00	20.73	0.037	276.7
22:40:00	20.73	0.04	229.4
22:41:00	20.73	0.032	130
22:42:00	20.73	0.033	102.1
22:43:00	20.73	0.041	115.6
22:44:00	20.73	0.037	111
22:45:00	20.73	0.039	204.3
22:46:00	20.75	0.037	412
22:47:00	20.72	0.038	266.4
22:48:00	20.73	0.03	292.8
22:49:00	20.73	0.039	285
22:50:00	20.73	0.04	167.5
22:51:00	20.72	0.04	240.1
22:52:00	20.72	0.033	206
22:53:00	20.74	0.032	110.7
22:54:00	20.72	0.04	101.3
22:55:00	20.73	0.03	364
22:56:00	20.72	0.033	232.9
22:57:00	20.72	0.04	186.3
22:58:00	20.72	0.042	127.8
22:59:00	20.73	0.035	85.47
23:00:00	20.72	0.035	149.1
23:01:00	20.73	0.036	579.8
23:02:00	20.71	0.035	626.8
23:03:00	20.72	0.038	280.9
23:04:00	20.72	0.031	195.2
23:05:00	20.73	0.036	153.4
23:06:00	20.72	0.032	371
23:07:00	20.71	0.035	588.6
23:08:00	20.72	0.03	485.4
23:09:00	20.72	0.033	361.7
23:10:00	20.72	0.03	229.3
23:11:00	20.73	0.027	142.2
23:12:00	20.72	0.027	123.7
23:13:00	20.72	0.029	140.7
23:14:00	20.73	0.03	134.8
23:15:00	20.73	0.026	134.8

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

MAQDAQ 1.0

Project Name:	Schnitzer Steel	Project Number:		CEMS Operator:	TJS	Unit/Condition:	Shredder/ Car body 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

22:27:00-23:27:00

Name:	O2	CO2	THC
Make/Model:			
23:16:00	20.72	0.025	147
23:17:00	20.72	0.026	162.6
23:18:00	20.72	0.027	192
23:19:00	20.72	0.025	241.2
23:20:00	20.72	0.031	302.2
23:21:00	20.72	0.029	135.2
23:22:00	20.72	0.023	189.9
23:23:00	20.73	0.02	205
23:24:00	20.72	0.022	269.5
23:25:00	20.72	0.033	330.8
23:26:00	20.73	0.026	202.6
23:27:00	20.73	0.021	160.3
Average:	20.72	0.036	225.7
Max:	20.75	0.099	626.8
Min:	20.71	0.020	85.5

PUBLIC COPY

MONTROSE AIR QUALITY SERVICES

MAQDAQ 1.0

Project Name:	Schnitzer Steel	Project Number:		CEMS Operator:	TJS	Unit/Condition:	Shredder/ Car body 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

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

Run Summary Data

	Raw avg:	20.72	0.036	225.7					
	Max:	20.75	0.099	626.8					
	Min:	20.71	0.020	85.5					

Cylinder Concentrations

	Zero:	0.000	0.000	0.000					
	Low:			264.5					
	Mid:	10.28	9.966	503.1					
	High:	23.05	22.87	865.6					

Calibration Readings

	Zero reading:	0.014	0.012	0.180					
	Low reading:			266.2					
	Mid reading:	10.33	10.13	504.0					
	High reading:	22.87	22.86	867.0					

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.061	0.052	N/A					
Mid %Err:	**<2.0**	0.217	0.717	N/A					
High%Err:	**<2.0**	-0.781	-0.044	N/A					

EPA Method 25A Error Calculations

Zero Err:	**N/A**	N/A	N/A	0.180					
Low Err:	**5% of cyl**	N/A	N/A	1.700					
Mid Err:	**5% of cyl**	N/A	N/A	0.900					
High Err:	**N/A**	N/A	N/A	1.400					

Initial Bias Data

	Zero reading:	0.081	-0.021	5.680					
	Span reading:	22.78	21.82	506.5					
Zero % bias:	**<5.0**	0.291	-0.144	N/A					
Span % bias:	**<5.0**	-0.391	-4.547	N/A					

Final Bias Data

	Zero reading:	0.114	-0.021	5.680					
	Span reading:	22.84	21.82	506.5					
Zero % bias:	**<5.0**	0.434	-0.144	N/A					

PUBLIC COPY

Span % bias:	**<5.0**	-0.130	-2.798	N/A					
Zero % drift:	**<3.0**	0.143	0.000	N/A					
Span % drift:	**<3.0**	0.260	1.749	N/A					
Zero drift:	**<3.0% span**	N/A	N/A	0.710					
Span drift:	**<3.0% span**	N/A	N/A	1.000					
Bias Corrected Averages									
	Cor Avg:	20.93	0.060	225.7					

PUBLIC COPY

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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 Average Results
19:00:00 - 20:00:00

	Name:	O2	CO2	THC (VO4)
	Make/Model:			
Jan 22 2019	19:01:00	20.72	0.073	101.3
Jan 22 2019	19:02:00	20.72	0.071	147.4
Jan 22 2019	19:03:00	20.72	0.073	116.0
Jan 22 2019	19:04:00	20.73	0.075	84.94
Jan 22 2019	19:05:00	20.73	0.070	88.19
Jan 22 2019	19:06:00	20.73	0.072	82.33
Jan 22 2019	19:07:00	20.73	0.073	70.95
Jan 22 2019	19:08:00	20.73	0.070	99.6
Jan 22 2019	19:09:00	20.73	0.078	126.3
Jan 22 2019	19:10:00	20.74	0.072	90.69
Jan 22 2019	19:11:00	20.74	0.074	80.44
Jan 22 2019	19:12:00	20.74	0.076	150.2
Jan 22 2019	19:13:00	20.74	0.076	126.0
Jan 22 2019	19:14:00	20.74	0.078	87.29
Jan 22 2019	19:15:00	20.74	0.086	113.4
Jan 22 2019	19:16:00	20.74	0.087	108.0
Jan 22 2019	19:17:00	20.74	0.085	167.5
Jan 22 2019	19:18:00	20.74	0.082	113.1
Jan 22 2019	19:19:00	20.74	0.083	73.95
Jan 22 2019	19:20:00	20.75	0.085	149.8
Jan 22 2019	19:21:00	20.75	0.084	116.9
Jan 22 2019	19:22:00	20.74	0.082	173.8
Jan 22 2019	19:23:00	20.75	0.085	140.2
Jan 22 2019	19:24:00	20.74	0.087	317.2
Jan 22 2019	19:25:00	20.75	0.081	127.7
Jan 22 2019	19:26:00	20.74	0.083	87.65
Jan 22 2019	19:27:00	20.75	0.086	71.54
Jan 22 2019	19:28:00	20.75	0.081	84.66
Jan 22 2019	19:29:00	20.75	0.080	89.77
Jan 22 2019	19:30:00	20.75	0.072	77.89
Jan 22 2019	19:31:00	20.75	0.083	82.69
Jan 22 2019	19:32:00	20.75	0.080	85.76
Jan 22 2019	19:33:00	20.75	0.079	177.6
Jan 22 2019	19:34:00	20.74	0.081	77.19
Jan 22 2019	19:35:00	20.74	0.084	59.99
Jan 22 2019	19:36:00	20.75	0.085	131.7
Jan 22 2019	19:37:00	20.74	0.082	104.2
Jan 22 2019	19:38:00	20.74	0.084	191.8
Jan 22 2019	19:39:00	20.74	0.078	153.5
Jan 22 2019	19:40:00	20.74	0.075	144.2
Jan 22 2019	19:41:00	20.74	0.082	107.1
Jan 22 2019	19:42:00	20.74	0.085	194.1
Jan 22 2019	19:43:00	20.74	0.085	189.3
Jan 22 2019	19:44:00	20.74	0.088	129.3
Jan 22 2019	19:45:00	20.74	0.083	93.56
Jan 22 2019	19:46:00	20.75	0.084	85.47
Jan 22 2019	19:47:00	20.75	0.087	92.58

PUBLIC COPY

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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)

Jan 22 2019	19:48:00	20.74	0.094	100.0
Jan 22 2019	19:49:00	20.75	0.084	126.1
Jan 22 2019	19:50:00	20.74	0.094	116.9
Jan 22 2019	19:51:00	20.74	0.083	72.44
Jan 22 2019	19:52:00	20.75	0.084	52.17
Jan 22 2019	19:53:00	20.75	0.080	66.69
Jan 22 2019	19:54:00	20.75	0.081	49.83
Jan 22 2019	19:55:00	20.75	0.077	48.40
Jan 22 2019	19:56:00	20.75	0.080	84.16
Jan 22 2019	19:57:00	20.75	0.087	82.09
Jan 22 2019	19:58:00	20.75	0.080	59.73
Jan 22 2019	19:59:00	20.75	0.081	47.00
Jan 22 2019	20:00:00	20.75	0.080	53.96
	Average:	20.74	0.081	108.7
	Max:	20.75	0.094	317.2
	Min:	20.72	0.070	47.00

PUBLIC COPY

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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
19:00:00 - 20:00:00

	Name:	O2	CO2	THC (VO4)
	Make/Model:			
	25A or 7E:	7E	7E	25A
Run summary data				
	Raw Avg:	20.74	0.081	108.7
	Max:	20.75	0.094	317.2
	Min:	20.72	0.070	47.00
Cylinder Concentrations				
	Zero:	0.000	0.000	0.000
	Low:			264.5
	Mid:	10.28	9.966	503.1
	High:	23.05	22.87	865.6
Calibration Readings				
	Zero reading:	0.194	0.040	3.230
	Low reading:			271.6
	Mid reading:	10.26	9.992	505.5
	High reading:	22.98	22.85	868.4
EPA Method 7E Error Calculations				
Zero %Err:	**<2.0**	0.842	0.175	N/A
Mid %Err:	**<2.0**	-0.087	0.114	N/A
High %Err:	**<2.0**	-0.304	-0.087	N/A
EPA Method 25A Error Calculations				
Zero %Err:	**N/A**	N/A	N/A	3.230
Low %Err:	**5% of cyl**	N/A	N/A	7.100
Mid %Err:	**5% of cyl**	N/A	N/A	2.400
High %Err:	**N/A**	N/A	N/A	2.800
Initial Bias Data				
	Zero reading:	-0.003	0.012	3.230
	Span reading:	22.87	22.59	505.5
Zero % bias:	**<5.0**	-0.855	-0.122	N/A
Span % bias:	**<5.0**	-0.477	-1.137	N/A
Final Bias Data				
	Zero reading:	0.388	0.038	4.790
	Span reading:	22.67	22.91	499.2
Zero % bias:	**<5.0**	0.842	-0.009	N/A
Span % bias:	**<5.0**	-1.345	0.262	N/A
Zero % drift:	**<3.0**	1.697	0.113	N/A
Span % drift:	**<3.0**	0.868	1.399	N/A
Zero drift:	**<3.0% span**	N/A	N/A	-1.560
Span drift:	**<3.0% span**	N/A	N/A	6.300
Bias Corrected Averages				
	Cor Avg:	20.98	0.056	108.7

PUBLIC COPY

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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
20:08:01 - 21:08:01

	Name:	O2	CO2	THC (VO4)
	Make/Model:			
Jan 22 2019	20:09:01	21.05	2.347	58.08
Jan 22 2019	20:10:01	20.75	0.315	48.72
Jan 22 2019	20:11:01	20.75	0.231	63.15
Jan 22 2019	20:12:01	20.75	0.194	76.73
Jan 22 2019	20:13:01	20.75	0.163	67.50
Jan 22 2019	20:14:01	20.76	0.147	61.28
Jan 22 2019	20:15:01	20.75	0.137	63.21
Jan 22 2019	20:16:01	20.76	0.131	80.27
Jan 22 2019	20:17:01	20.76	0.124	48.87
Jan 22 2019	20:18:01	20.76	0.121	96.73
Jan 22 2019	20:19:01	20.76	0.113	80.18
Jan 22 2019	20:20:01	20.76	0.108	67.37
Jan 22 2019	20:21:01	20.76	0.110	88.37
Jan 22 2019	20:22:01	20.76	0.113	86.31
Jan 22 2019	20:23:01	20.76	0.113	86.71
Jan 22 2019	20:24:01	20.76	0.112	62.58
Jan 22 2019	20:25:01	20.76	0.103	100.1
Jan 22 2019	20:26:01	20.76	0.102	111.5
Jan 22 2019	20:27:01	20.76	0.104	148.7
Jan 22 2019	20:28:01	20.76	0.105	104.2
Jan 22 2019	20:29:01	20.76	0.100	97.99
Jan 22 2019	20:30:01	20.76	0.101	93.95
Jan 22 2019	20:31:01	20.76	0.105	78.24
Jan 22 2019	20:32:01	20.76	0.103	125.5
Jan 22 2019	20:33:01	20.76	0.097	114.4
Jan 22 2019	20:34:01	20.75	0.113	149.5
Jan 22 2019	20:35:01	20.76	0.109	119.0
Jan 22 2019	20:36:01	20.76	0.101	111.3
Jan 22 2019	20:37:01	20.75	0.102	105.2
Jan 22 2019	20:38:01	20.75	0.099	88.04
Jan 22 2019	20:39:01	20.75	0.102	103.9
Jan 22 2019	20:40:01	20.75	0.103	86.17
Jan 22 2019	20:41:01	20.75	0.111	135.3
Jan 22 2019	20:42:01	20.75	0.105	91.21
Jan 22 2019	20:43:01	20.75	0.111	170.5
Jan 22 2019	20:44:01	20.75	0.108	106.6
Jan 22 2019	20:45:01	20.75	0.116	104.7
Jan 22 2019	20:46:01	20.75	0.115	92.28
Jan 22 2019	20:47:01	20.75	0.109	130.7
Jan 22 2019	20:48:01	20.76	0.113	87.89
Jan 22 2019	20:49:01	20.75	0.107	69.11
Jan 22 2019	20:50:01	20.76	0.113	87.00
Jan 22 2019	20:51:01	20.76	0.116	97.92
Jan 22 2019	20:52:01	20.76	0.109	74.88
Jan 22 2019	20:53:01	20.76	0.109	66.09
Jan 22 2019	20:54:01	20.76	0.110	60.17
Jan 22 2019	20:55:01	20.76	0.115	92.54

PUBLIC COPY

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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)

Jan 22 2019	20:56:01	20.76	0.114	109.6
Jan 22 2019	20:57:01	20.76	0.113	170.8
Jan 22 2019	20:58:01	20.77	0.116	259.6
Jan 22 2019	20:59:01	20.76	0.119	166.7
Jan 22 2019	21:00:01	20.77	0.115	168.2
Jan 22 2019	21:01:01	20.76	0.107	183.0
Jan 22 2019	21:02:01	20.77	0.117	136.3
Jan 22 2019	21:03:01	20.77	0.109	148.9
Jan 22 2019	21:04:01	20.77	0.111	135.7
Jan 22 2019	21:05:01	20.77	0.115	230.8
Jan 22 2019	21:06:01	20.77	0.114	224.6
Jan 22 2019	21:07:01	20.77	0.116	199.7
Jan 22 2019	21:08:01	20.77	0.109	120.8
	Average:	20.76	0.156	109.9
	Max:	21.05	2.347	259.6
	Min:	20.75	0.097	48.72

PUBLIC COPY

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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
20:08:01 - 21:08:01

Name:	O2	CO2	THC (VO4)
Make/Model:			
25A or 7E:	7E	7E	25A

Run summary data

Raw Avg:	20.76	0.156	109.9
Max:	21.05	2.347	259.6
Min:	20.75	0.097	48.72

Cylinder Concentrations

Zero:	0.000	0.000	0.000
Low:			264.5
Mid:	10.28	9.966	503.1
High:	23.05	22.87	865.6

Calibration Readings

Zero reading:	0.194	0.040	3.230
Low reading:			271.6
Mid reading:	10.26	9.992	505.5
High reading:	22.98	22.85	868.4

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.842	0.175	N/A
Mid %Err:	**<2.0**	-0.087	0.114	N/A
High %Err:	**<2.0**	-0.304	-0.087	N/A

EPA Method 25A Error Calculations

Zero %Err:	**N/A**	N/A	N/A	3.230
Low %Err:	**5% of cyl**	N/A	N/A	7.100
Mid %Err:	**5% of cyl**	N/A	N/A	2.400
High %Err:	**N/A**	N/A	N/A	2.800

Initial Bias Data

	Zero reading:	0.388	0.038	4.790
	Span reading:	22.67	22.91	499.2
Zero % bias:	**<5.0**	0.842	-0.009	N/A
Span % bias:	**<5.0**	-1.345	0.262	N/A

Final Bias Data

	Zero reading:	-0.078	0.092	3.630
	Span reading:	22.90	22.46	493.6
Zero % bias:	**<5.0**	-1.180	0.227	N/A
Span % bias:	**<5.0**	-0.347	-1.705	N/A
Zero % drift:	**<3.0**	2.022	0.236	N/A
Span % drift:	**<3.0**	0.998	1.967	N/A
Zero drift:	**<3.0% span**	N/A	N/A	1.160
Span drift:	**<3.0% span**	N/A	N/A	5.600

Bias Corrected Averages

	Cor Avg:	20.99	0.092	109.9

PUBLIC COPY

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/All Products
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 6 Average Results
18:15:00 - 19:26:57

	Name:	O2	CO2	THC (VO4)
	Make/Model:			
Jan 23 2019	18:16:00	20.75	0.084	90.99
Jan 23 2019	18:17:00	20.75	0.080	78.54
Jan 23 2019	18:18:00	20.76	0.082	95.60
Jan 23 2019	18:19:00	20.75	0.085	92.65
Jan 23 2019	18:20:00	20.75	0.080	73.48
Jan 23 2019	18:21:00	20.75	0.083	59.70
Jan 23 2019	18:22:00	20.76	0.083	60.14
Jan 23 2019	18:23:00	20.76	0.082	47.10
Jan 23 2019	18:24:00	20.76	0.078	45.16
Jan 23 2019	18:25:00	20.76	0.082	50.27
Jan 23 2019	18:26:00	20.76	0.088	88.06
Jan 23 2019	18:27:00	20.76	0.080	135.5
Jan 23 2019	18:28:00	20.76	0.080	123.8
Jan 23 2019	18:29:00	20.76	0.079	78.54
Jan 23 2019	18:30:00	20.76	0.084	55.90
Jan 23 2019	18:31:00	20.76	0.085	47.88
Jan 23 2019	18:32:00	20.76	0.082	23.33
Jan 23 2019	18:44:57	20.76	0.085	83.51
Jan 23 2019	18:45:57	20.76	0.092	94.78
Jan 23 2019	18:46:57	20.76	0.087	56.80
Jan 23 2019	18:47:57	20.76	0.091	37.15
Jan 23 2019	18:48:57	20.76	0.090	26.41
Jan 23 2019	18:49:57	20.76	0.085	52.86
Jan 23 2019	18:50:57	20.76	0.089	36.97
Jan 23 2019	18:51:57	20.76	0.085	34.09
Jan 23 2019	18:52:57	20.76	0.089	65.06
Jan 23 2019	18:53:57	20.76	0.087	95.46
Jan 23 2019	18:54:57	20.76	0.089	52.23
Jan 23 2019	18:55:57	20.76	0.092	46.74
Jan 23 2019	18:56:57	20.76	0.089	52.64
Jan 23 2019	18:57:57	20.76	0.090	68.82
Jan 23 2019	18:58:57	20.76	0.093	64.70
Jan 23 2019	18:59:57	20.76	0.085	95.03
Jan 23 2019	19:00:57	20.76	0.086	59.93
Jan 23 2019	19:01:57	20.76	0.093	75.83
Jan 23 2019	19:02:57	20.76	0.092	69.38
Jan 23 2019	19:03:57	20.76	0.093	62.27
Jan 23 2019	19:04:57	20.76	0.093	64.15
Jan 23 2019	19:05:57	20.75	0.088	63.60
Jan 23 2019	19:06:57	20.75	0.090	53.74
Jan 23 2019	19:07:57	20.75	0.098	44.05
Jan 23 2019	19:08:57	20.75	0.089	43.40
Jan 23 2019	19:09:57	20.75	0.087	77.21
Jan 23 2019	19:10:57	20.75	0.103	180.5
Jan 23 2019	19:11:57	20.75	0.094	106.4
Jan 23 2019	19:12:57	20.75	0.100	81.80
Jan 23 2019	19:13:57	20.75	0.095	68.06

PUBLIC COPY

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/All Products
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)

Jan 23 2019	19:14:57	20.75	0.094	72.48
Jan 23 2019	19:15:57	20.75	0.104	156.9
Jan 23 2019	19:16:57	20.75	0.097	115.4
Jan 23 2019	19:17:57	20.75	0.102	97.62
Jan 23 2019	19:18:57	20.75	0.100	85.30
Jan 23 2019	19:19:57	20.75	0.102	73.76
Jan 23 2019	19:20:57	20.75	0.097	67.31
Jan 23 2019	19:21:57	20.75	0.100	69.05
Jan 23 2019	19:22:57	20.75	0.098	321.3
Jan 23 2019	19:23:57	20.75	0.099	234.7
Jan 23 2019	19:24:57	20.74	0.104	81.82
Jan 23 2019	19:25:57	20.75	0.098	229.2
Jan 23 2019	19:26:57	20.75	0.097	584.9
	Average:	20.76	0.090	90.83
	Max:	20.76	0.104	584.9
	Min:	20.74	0.078	23.33

PUBLIC COPY

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/All Products
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 6 Post run bias
18:15:00 - 19:26:57

Name:	O2	CO2	THC (VO4)
Make/Model:			
25A or 7E:	7E	7E	25A

Run summary data			
Raw Avg:	20.76	0.090	90.83
Max:	20.76	0.104	584.9
Min:	20.74	0.078	23.33

Cylinder Concentrations			
Zero:	0.000	0.000	0.000
Low:			264.5
Mid:	10.28	9.966	503.1
High:	23.05	22.87	865.6

Calibration Readings			
Zero reading:	-0.061	0.064	1.340
Low reading:			275.6
Mid reading:	10.20	10.05	517.1
High reading:	22.91	22.81	868.1

EPA Method 7E Error Calculations				
Zero %Err:	**<2.0**	-0.265	0.280	N/A
Mid %Err:	**<2.0**	-0.347	0.367	N/A
High %Err:	**<2.0**	-0.607	-0.262	N/A

EPA Method 25A Error Calculations				
Zero %Err:	**N/A**	N/A	N/A	1.340
Low %Err:	**5% of cyl**	N/A	N/A	11.10
Mid %Err:	**5% of cyl**	N/A	N/A	14.00
High %Err:	**N/A**	N/A	N/A	2.500

Initial Bias Data				
	Zero reading:	0.311	0.268	1.340
	Span reading:	22.87	22.49	517.1
Zero % bias:	**<5.0**	1.614	0.892	N/A
Span % bias:	**<5.0**	-0.174	-1.399	N/A

Final Bias Data				
	Zero reading:	0.825	0.095	-0.180
	Span reading:	22.85	23.00	509.6
Zero % bias:	**<5.0**	3.844	0.136	N/A
Span % bias:	**<5.0**	-0.260	0.831	N/A
Zero % drift:	**<3.0**	2.230	0.756	N/A
Span % drift:	**<3.0**	0.086	2.230	N/A
Zero drift:	**<3.0% span**	N/A	N/A	1.520
Span drift:	**<3.0% span**	N/A	N/A	7.500

Bias Corrected Averages			
Cor Avg:	20.88	-0.093	90.83

APPENDIX C
LABORATORY ANALYSIS DATA

Appendix C.1
Benzene Analyses

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

CLIENT	: Montrose AQS
PROJECT NAME	: Schnitzer Steel - Shredder Exhaust Stack
PROJECT NO.	: 005AS-452603
AAC PROJECT NO.	: 190163
REPORT DATE	: 02/07/2019

On January 29, 2019, Atmospheric Analysis & Consulting, Inc. received six (6) Six-Liter Summa Canisters for Volatile Organic Compounds and TICs analysis by EPA method TO-15. Upon receipt each sample was assigned a unique Laboratory ID number as follows:

Client ID	Lab ID	Return Pressure (mmHga)
1-POC	190163-116118	438.5
2-POC	190163-116119	216.3
3-POC	190163-116120	616.6
4-POC	190163-116121	279.7
5-POC	190163-116122	240.9
6-POC	190163-116123	203.7

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.

Sucha Parmar, PhD
Technical Director

This report consists of 25 pages.

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	1-POC			Sample Reporting Limit (SRL) (MRLxDF's)	2-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116118				190163-116119				
Date Sampled	01/21/2019				01/21/2019				
Date Analyzed	02/04/2019				02/04/2019				
Can Dilution Factor	2.32				4.73				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Chlorodifluoromethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Propene	113		20	46.3	137		20	94.7	1.0
Dichlorodifluoromethane	<SRL	U	20	23.2	57.3		20	47.3	0.5
Chloromethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Dichlorotetrafluoroethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Vinyl Chloride	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Methanol	384		20	232	<SRL	U	20	473	5.0
1,3-Butadiene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Bromomethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Chloroethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Dichlorofluoromethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Ethanol	5730		100	463	9640		100	947	2.0
Vinyl Bromide	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Acetone	161		20	92.6	574		20	189	2.0
Trichlorofluoromethane	31.6		20	23.2	<SRL	U	20	47.3	0.5
2-Propanol (IPA)	<SRL	U	20	92.6	<SRL	U	20	189	2.0
Acrylonitrile	<SRL	U	20	46.3	<SRL	U	20	94.7	1.0
1,1-Dichloroethene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Methylene Chloride (DCM)	<SRL	U	20	46.3	<SRL	U	20	94.7	1.0
Allyl Chloride	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Carbon Disulfide	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Trichlorotrifluoroethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
trans-1,2-Dichloroethene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
1,1-Dichloroethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Methyl Tert Butyl Ether (MTBE)	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Vinyl Acetate	<SRL	U	20	46.3	<SRL	U	20	94.7	1.0
2-Butanone (MEK)	<SRL	U	20	46.3	<SRL	U	20	94.7	1.0
cis-1,2-Dichloroethene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Hexane	2330		100	116	2630		100	237	0.5
Chloroform	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Ethyl Acetate	55.3		20	23.2	<SRL	U	20	47.3	0.5
Tetrahydrofuran	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
1,2-Dichloroethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
1,1,1-Trichloroethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	1-POC			Sample Reporting Limit (SRL) (MRLxDF's)	2-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116118				190163-116119				
Date Sampled	01/21/2019				01/21/2019				
Date Analyzed	02/04/2019				02/04/2019				
Can Dilution Factor	2.32				4.73				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Benzene	969		100	116	897		100	237	0.5
Carbon Tetrachloride	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Cyclohexane	1810		100	116	1560		100	237	0.5
1,2-Dichloropropane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Bromodichloromethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
1,4-Dioxane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Trichloroethene (TCE)	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
2,2,4-Trimethylpentane	2550		100	116	2780		100	237	0.5
Heptane	1980		100	116	1660		100	237	0.5
cis-1,3-Dichloropropene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
4-Methyl-2-pentanone (MiBK)	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
trans-1,3-Dichloropropene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
1,1,2-Trichloroethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Toluene	6670		100	116	6370		100	237	0.5
2-Hexanone (MBK)	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Dibromochloromethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
1,2-Dibromoethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Tetrachloroethene (PCE)	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Chlorobenzene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Ethylbenzene	1390		100	115.8	1340		100	237	0.5
m & p-Xylenes	5170		100	231.5	4900		100	473	1.0
Bromoform	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Styrene	25.0		20	23.2	<SRL	U	20	47.3	0.5
1,1,2,2-Tetrachloroethane	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
o-Xylene	1920		100	116	1870		100	237	0.5
4-Ethyltoluene	474		100	116	450		100	237	0.5
1,3,5-Trimethylbenzene	521		100	116	476		100	237	0.5
1,2,4-Trimethylbenzene	1390		100	116	1330		100	237	0.5
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
1,3-Dichlorobenzene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
1,4-Dichlorobenzene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
1,2-Dichlorobenzene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
1,2,4-Trichlorobenzene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
Hexachlorobutadiene	<SRL	U	20	23.2	<SRL	U	20	47.3	0.5
BFB-Surrogate Std. % Recovery	99%				104%				70-130%

U - Compound was analyzed for, but was not detected at or above the SRL.

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	1-POC	
AAC ID	190163-116118	
Date Sampled	01/21/2019	
Date Analyzed	02/04/2019	
Can Dilution Factor	2.32	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Butane	883	80
2-Methylbutane	4560	72
Pentane	2470	91
2,2-Dimethylbutane	809	90
2,3-Dimethylbutane	1350	91
2-Methylpentane	4240	91
3-Methylpentane	2480	91
Methylcyclopentane	3030	91
2,4-Dimethylpentane	950	86
2-Methylhexane	2080	93
2,3-Dimethylpentane	1270	91
3-Methylhexane	2130	95
1,3-Dimethylcyclopentane #1	725	94
1,3-Dimethylcyclopentane #2	882	94
Methylcyclohexane	1870	97
2,5-Dimethylhexane	1010	37
2,4-Dimethylhexane	835	62
2,3,4-Trimethylpentane	948	86
2-Methylheptane	1120	91
3-Methylheptane	1030	90
Octane	780	90
1-Ethyl-3-methylbenzene	1000	95
BFB-Surrogate Std. % Recovery	99%	

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	2-POC	
AAC ID	190163-116119	
Date Sampled	01/21/2019	
Date Analyzed	02/04/2019	
Can Dilution Factor	4.73	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Butane	1150	72
2-Methylbutane	5860	80
Pentane	3000	86
2,2-Dimethylbutane	842	83
2,3-Dimethylbutane	1420	91
2-Methylpentane	4560	91
3-Methylpentane	2550	49
Methylcyclopentane	3170	91
2,4-Dimethylpentane	985	90
2-Methylhexane	1850	90
2,3-Dimethylpentane	1260	78
3-Methylhexane	1800	95
1,3-Dimethylcyclopentane	777	90
Methylcyclohexane	1610	97
2,5-Dimethylhexane	950	38
2,4-Dimethylhexane	803	87
2,3,4-Trimethylpentane	1140	86
2-Methylheptane	1130	91
3-Methylheptane	1020	91
Trimethylhexane	809	83
Octane	776	72
1-Ethyl-3-methylbenzene	1030	95
BFB-Surrogate Std. % Recovery	104%	

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	3-POC			Sample Reporting Limit (SRL) (MRLxDF's)	4-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116120				190163-116121				
Date Sampled	01/21/2019				01/22/2019				
Date Analyzed	02/04/2019				02/04/2019				
Can Dilution Factor	1.67				3.67				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Chlorodifluoromethane	59.8		20	16.7	2290		100	184	0.5
Propene	188		100	167	434		100	367	1.0
Dichlorodifluoromethane	136		20	16.7	842		100	184	0.5
Chloromethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Dichlorotetrafluoroethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Vinyl Chloride	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Methanol	1540		100	834	2680		100	1837	5.0
1,3-Butadiene	21.0		20	16.7	<SRL	U	20	36.7	0.5
Bromomethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Chloroethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Dichlorofluoromethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Ethanol	13400		500	1667	6250		100	735	2.0
Vinyl Bromide	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Acetone	1030		100	333	6720		100	735	2.0
Trichlorofluoromethane	180		100	83.4	6630		100	184	0.5
2-Propanol (IPA)	325		20	66.7	317		20	147	2.0
Acrylonitrile	<SRL	U	20	33.3	<SRL	U	20	73.5	1.0
1,1-Dichloroethene	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Methylene Chloride (DCM)	<SRL	U	20	33.3	245		20	73.5	1.0
Allyl Chloride	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Carbon Disulfide	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Trichlorotrifluoroethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
trans-1,2-Dichloroethene	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
1,1-Dichloroethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Methyl Tert Butyl Ether (MTBE)	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Vinyl Acetate	<SRL	U	20	33.3	<SRL	U	20	73.5	1.0
2-Butanone (MEK)	33.8		20	33.3	379		20	73.5	1.0
cis-1,2-Dichloroethene	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Hexane	2730		100	83.4	742		100	184	0.5
Chloroform	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Ethyl Acetate	29.8		20	16.7	83.5		20	36.7	0.5
Tetrahydrofuran	<SRL	U	20	16.7	421		20	36.7	0.5
1,2-Dichloroethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
1,1,1-Trichloroethane	<SRL	U	20	16.7	254		20	36.7	0.5

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	3-POC			Sample Reporting Limit (SRL) (MRLxDF's)	4-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116120				190163-116121				
Date Sampled	01/21/2019				01/22/2019				
Date Analyzed	02/04/2019				02/04/2019				
Can Dilution Factor	1.67				3.67				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Benzene	896		100	83.4	48.8		20	36.7	0.5
Carbon Tetrachloride	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Cyclohexane	1610		100	83.4	217		20	36.7	0.5
1,2-Dichloropropane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Bromodichloromethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
1,4-Dioxane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Trichloroethene (TCE)	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
2,2,4-Trimethylpentane	3080		100	83.4	261		20	36.7	0.5
Heptane	1800		100	83.4	225		20	36.7	0.5
cis-1,3-Dichloropropene	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
4-Methyl-2-pentanone (MiBK)	<SRL	U	20	16.7	56.9		20	36.7	0.5
trans-1,3-Dichloropropene	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
1,1,2-Trichloroethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Toluene	6030		100	83.4	1100		100	184	0.5
2-Hexanone (MBK)	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Dibromochloromethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
1,2-Dibromoethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Tetrachloroethene (PCE)	<SRL	U	20	16.7	249		20	36.7	0.5
Chlorobenzene	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Ethylbenzene	1470		100	83.4	207		20	36.7	0.5
m & p-Xylenes	5460		100	167	901		100	367	1.0
Bromoform	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Styrene	30.7		20	16.7	108		20	36.7	0.5
1,1,2,2-Tetrachloroethane	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
o-Xylene	2010		100	83.4	275		20	36.7	0.5
4-Ethyltoluene	482		100	83.4	98.6		20	36.7	0.5
1,3,5-Trimethylbenzene	562		100	83.4	113		20	36.7	0.5
1,2,4-Trimethylbenzene	1540		100	83.4	315		20	36.7	0.5
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
1,3-Dichlorobenzene	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
1,4-Dichlorobenzene	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
1,2-Dichlorobenzene	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
1,2,4-Trichlorobenzene	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
Hexachlorobutadiene	<SRL	U	20	16.7	<SRL	U	20	36.7	0.5
BFB-Surrogate Std. % Recovery	107%				96%				70-130%

U - Compound was analyzed for, but was not detected at or above the SRL.

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT	: Montrose AQS	DATE RECEIVED	: 01/29/2019
PROJECT NO	: 190163	DATE REPORTED	: 02/07/2019
MATRIX	: AIR		
UNITS	: PPB (v/v)		

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	3-POC	
AAC ID	190163-116120	
Date Sampled	01/21/2019	
Date Analyzed	02/04/2019	
Can Dilution Factor	1.67	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Norflurane	725	30
Butane	1180	72
2-Methylbutane	5890	80
Pentane	3350	91
2,2-Dimethylbutane	830	83
2,3-Dimethylbutane	1650	91
2-Methylpentane	4680	91
3-Methylpentane	2730	91
Methylcyclopentane	3370	90
2,4-Dimethylpentane	1090	91
2-Methylhexane	1950	93
2,3-Dimethylpentane	1330	91
3-Methylhexane	1850	95
1,3-Dimethylcyclopentane	788	91
Methylcyclohexane	1700	97
2,5-Dimethylhexane	1080	81
2,4-Dimethylhexane	916	68
2,3,4-Trimethylpentane	1110	90
2-Methylheptane	1020	91
3-Methylheptane	926	91
Trimethylhexane	863	90
Octane	734	74
BFB-Surrogate Std. % Recovery	107%	

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	4-POC	
AAC ID	190163-116121	
Date Sampled	01/22/2019	
Date Analyzed	02/04/2019	
Can Dilution Factor	3.67	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Norflurane	3740	91
Dimethyl ether	438	78
Isobutane	795	59
Acetaldehyde	379	86
Butane	633	86
2-Methylbutane	389	86
Unknown Compound	10200	NA
Methyl ester acetic acid	344	78
Cyclopentane	3820	86
2-Methylpentane	432	91
3-Methylpentane	600	72
Methylcyclopentane	305	90
2-Methylhexane	209	90
3-Methylhexane	241	91
1-Ethyl-3-methylbenzene	259	95
Decane	294	91
D-Limonene	245	94
Hexachloroethane	4970	95
3,5-Dimethyl-1,2,4-trithiolane	363	96
BFB-Surrogate Std. % Recovery	96%	

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	5-POC			Sample Reporting Limit (SRL) (MRLxDF's)	6-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116122				190163-116123				
Date Sampled	01/22/2019				01/23/2019				
Date Analyzed	02/04/2019				02/04/2019				
Can Dilution Factor	4.27				5.16				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Chlorodifluoromethane	1570		100	214	1400		100	258	0.5
Propene	1980		100	427	749		100	516	1.0
Dichlorodifluoromethane	673		100	214	707		100	258	0.5
Chloromethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Dichlorotetrafluoroethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Vinyl Chloride	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Methanol	834		20	427	<SRL	U	20	516	5.0
1,3-Butadiene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Bromomethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Chloroethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Dichlorofluoromethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Ethanol	4250		100	854	5360		100	1031	2.0
Vinyl Bromide	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Acetone	4680		100	854	5810		100	1031	2.0
Trichlorofluoromethane	7080		100	214	4910		100	258	0.5
2-Propanol (IPA)	335		20	171	216		20	206	2.0
Acrylonitrile	<SRL	U	20	85.4	<SRL	U	20	103	1.0
1,1-Dichloroethene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Methylene Chloride (DCM)	168		20	85.4	<SRL	U	20	103	1.0
Allyl Chloride	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Carbon Disulfide	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Trichlorotrifluoroethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
trans-1,2-Dichloroethene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
1,1-Dichloroethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Methyl Tert Butyl Ether (MTBE)	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Vinyl Acetate	<SRL	U	20	85.4	<SRL	U	20	103	1.0
2-Butanone (MEK)	1030		20	85.4	416		20	103	1.0
cis-1,2-Dichloroethene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Hexane	528		100	214	135		20	51.6	0.5
Chloroform	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Ethyl Acetate	78.0		20	42.7	<SRL	U	20	51.6	0.5
Tetrahydrofuran	2090		100	214	287		20	51.6	0.5
1,2-Dichloroethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
1,1,1-Trichloroethane	200		20	42.7	<SRL	U	20	51.6	0.5

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	5-POC			Sample Reporting Limit (SRL) (MRLxDF's)	6-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116122				190163-116123				
Date Sampled	01/22/2019				01/23/2019				
Date Analyzed	02/04/2019				02/04/2019				
Can Dilution Factor	4.27				5.16				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Benzene	98.2		20	42.7	<SRL	U	20	51.6	0.5
Carbon Tetrachloride	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Cyclohexane	175		20	42.7	83.8		20	51.6	0.5
1,2-Dichloropropane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Bromodichloromethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
1,4-Dioxane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Trichloroethene (TCE)	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
2,2,4-Trimethylpentane	115		20	42.7	103		20	51.6	0.5
Heptane	153		20	42.7	110		20	51.6	0.5
cis-1,3-Dichloropropene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
4-Methyl-2-pentanone (MiBK)	47.0		20	42.7	<SRL	U	20	51.6	0.5
trans-1,3-Dichloropropene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
1,1,2-Trichloroethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Toluene	1230		100	214	400		20	51.6	0.5
2-Hexanone (MBK)	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Dibromochloromethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
1,2-Dibromoethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Tetrachloroethene (PCE)	65.9		20	42.7	99.3		20	51.6	0.5
Chlorobenzene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Ethylbenzene	222		20	42.7	101		20	51.6	0.5
m & p-Xylenes	843		100	427	380		20	103	1.0
Bromoform	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Styrene	231		20	42.7	268		20	51.6	0.5
1,1,2,2-Tetrachloroethane	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
o-Xylene	271		20	42.7	153		20	51.6	0.5
4-Ethyltoluene	56.6		20	42.7	<SRL	U	20	51.6	0.5
1,3,5-Trimethylbenzene	71.1		20	42.7	55.2		20	51.6	0.5
1,2,4-Trimethylbenzene	187		20	42.7	160		20	51.6	0.5
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
1,3-Dichlorobenzene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
1,4-Dichlorobenzene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
1,2-Dichlorobenzene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
1,2,4-Trichlorobenzene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
Hexachlorobutadiene	<SRL	U	20	42.7	<SRL	U	20	51.6	0.5
BFB-Surrogate Std. % Recovery	102%				99%				70-130%

U - Compound was analyzed for, but was not detected at or above the SRL.

Sueha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	5-POC	
AAC ID	190163-116122	
Date Sampled	01/22/2019	
Date Analyzed	02/04/2019	
Can Dilution Factor	4.27	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Norflurane	2540	43
1,1-Difluoroethane	312	94
Dimethyl ether	340	86
Isobutane	765	64
Butane	664	72
2-Chloro-3,3,3-trifluoropropene	220	37
Unknown Compound	6650	NA
Methyl ester acetic acid	197	86
Cyclopentane	3280	86
2-Methylpentane	240	91
3-Methylpentane	185	90
Methylcyclopentane	195	86
3-Methylhexane	158	95
Butyl ester acetic acid	181	83
3-Methyloctane	207	52
Nonane	206	95
3-Methylnonane	167	87
1-Ethyl-3-methylbenzene	251	95
Decane	354	91
4-Methyldecane	177	93
Hexachloroethane	252	95
Undecane	229	94
BFB-Surrogate Std. % Recovery	102%	

TENTATIVELY IDENTIFIED COMPOUNDS

Client ID	6-POC	
AAC ID	190163-116123	
Date Sampled	01/23/2019	
Date Analyzed	02/04/2019	
Can Dilution Factor	5.16	
Compound	*PPB(V/V)*	*Spectra Identification Quality*
Difluoromethane	220	90
Norflurane	2110	49
Isobutane	446	59
Butane	357	72
Unknown Compound	6090	NA
Pentane	153	86
2,2-Dimethylbutane	107	86
1-Propanol	228	64
Cyclopentane	2890	86
2-Methylpentane	165	91
3-Methylpentane	114	47
Methylcyclopentane	109	90
2-Methylhexane	88	93
3-Methylhexane	97	83
n-Propyl acetate	93	72
Octane	95	74
1-Ethyl-3-methylbenzene	106	95
Hexachloroethane	2850	95
BFB-Surrogate Std. % Recovery	99%	

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

ANALYSIS DATE : 02/04/2019
ANALYST : JJG
INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : PS120518-02

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Continuing Calibration Verification of the 01/31/2019 Calibration

Compounds	*Conc*	*Daily Conc*	*%REC**
4-BFB (surrogate standard)	10.00	10.08	101
Chlorodifluoromethane	10.80	9.75	90
Propene	11.00	9.61	87
Dichlorodifluoromethane	10.20	9.48	93
Chloromethane	10.60	11.89	112
Dichlorotetrafluoroethane	11.00	11.71	106
Vinyl Chloride	10.40	10.30	99
Methanol	22.50	21.81	97
1,3-Butadiene	10.90	11.35	104
Bromomethane	10.30	10.48	102
Chloroethane	10.10	10.13	100
Dichlorofluoromethane	10.80	9.83	91
Ethanol	11.00	10.38	94
Vinyl Bromide	10.70	10.76	101
Acetone	10.90	10.21	94
Trichlorofluoromethane	10.10	11.78	117
2-Propanol (IPA)	11.00	12.44	113
Acrylonitrile	11.50	13.57	118
1,1-Dichloroethene	10.70	12.54	117
Methylene Chloride (DCM)	10.60	12.91	122
Allyl Chloride	10.70	10.81	101
Carbon Disulfide	10.50	12.09	115
Trichlorotrifluoroethane	10.60	12.11	114
trans-1,2-Dichloroethene	10.30	10.03	97
1,1-Dichloroethane	10.50	10.12	96
Methyl Tert Butyl Ether (MTBE)	10.80	10.68	99
Vinyl Acetate	10.90	10.25	94
2-Butanone (MEK)	10.90	9.80	90
cis-1,2-Dichloroethene	10.90	10.75	99
Hexane	10.70	9.77	91
Chloroform	10.90	10.62	97
Ethyl Acetate	10.90	10.13	93
Tetrahydrofuran	10.20	9.71	95
1,2-Dichloroethane	10.80	10.22	95
1,1,1-Trichloroethane	10.80	9.97	92

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

ANALYSIS DATE : 02/04/2019
ANALYST : JJG
INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : PS120518-02

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Continuing Calibration Verification of the 01/31/2019 Calibration

Compounds	*Conc*	*Daily Conc*	*%REC**
Benzene	10.90	10.66	98
Carbon Tetrachloride	10.60	10.87	103
Cyclohexane	10.90	11.39	104
1,2-Dichloropropane	10.80	10.60	98
Bromodichloromethane	10.90	11.21	103
1,4-Dioxane	10.90	10.48	96
Trichloroethene (TCE)	10.90	12.12	111
2,2,4-Trimethylpentane	10.70	10.61	99
Heptane	10.80	10.87	101
cis-1,3-Dichloropropene	10.60	11.12	105
4-Methyl-2-pentanone (MiBK)	10.60	10.85	102
trans-1,3-Dichloropropene	10.20	10.46	103
1,1,2-Trichloroethane	10.90	11.47	105
Toluene	11.00	11.73	107
2-Hexanone (MBK)	10.80	10.79	100
Dibromochloromethane	10.30	11.22	109
1,2-Dibromoethane	10.90	10.97	101
Tetrachloroethene (PCE)	10.90	12.07	111
Chlorobenzene	11.00	11.04	100
Ethylbenzene	10.90	10.77	99
m & p-Xylenes	21.00	21.26	101
Bromoform	10.50	10.89	104
Styrene	10.80	10.88	101
1,1,2,2-Tetrachloroethane	10.70	10.73	100
o-Xylene	10.70	10.71	100
4-Ethyltoluene	10.30	10.77	105
1,3,5-Trimethylbenzene	10.40	10.49	101
1,2,4-Trimethylbenzene	10.40	10.45	100
Benzyl Chloride (a-Chlorotoluene)	9.70	10.10	104
1,3-Dichlorobenzene	10.10	10.50	104
1,4-Dichlorobenzene	10.20	10.22	100
1,2-Dichlorobenzene	10.20	10.25	100
1,2,4-Trichlorobenzene	9.70	9.86	102
Hexachlorobutadiene	10.00	9.48	95

* - %REC should be 70-130%

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

CLIENT ID	: **Laboratory Control Spike**	**DATE ANALYZED**	: **02/04/2019**
AAC ID	: **LCS/LCSD**	**DATE REPORTED**	: **02/04/2019**
MEDIA	: **Air**	**UNITS**	: **ppbv**

TO-15 Laboratory Control Spike Recovery

Compound	Sample Conc.	Spike Added	Spike Res	Dup Spike Res	Spike % Rec *	Spike Dup % Rec *	RPD** %
1,1-Dichloroethene	0.0	10.70	12.54	12.73	117	119	1.5
Methylene Chloride (DCM)	0.0	10.60	12.91	12.85	122	121	0.5
Benzene	0.0	10.90	10.66	10.85	98	100	1.8
Trichloroethene (TCE)	0.0	10.90	12.12	11.52	111	106	5.1
Toluene	0.0	11.00	11.73	11.45	107	104	2.4
Tetrachloroethene (PCE)	0.0	10.90	12.07	11.53	111	106	4.6
Chlorobenzene	0.0	11.00	11.04	11.02	100	100	0.2
Ethylbenzene	0.0	10.90	10.77	11.22	99	103	4.1
m & p-Xylenes	0.0	21.00	21.26	22.11	101	105	3.9
o-Xylene	0.0	10.70	10.71	10.52	100	98	1.8

* Must be 70-130%

** Must be < 25%

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Method Blank Analysis Report

MATRIX	**: AIR**	**ANALYSIS DATE**	**: 02/04/2019**
UNITS	**: ppbv**	**REPORT DATE**	**: 02/04/2019**

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID / *AAC ID*	Method Blank / MB 020419	RL
Chlorodifluoromethane	<RL	0.5
Propene	<RL	1.0
Dichlorodifluoromethane	<RL	0.5
Chloromethane	<RL	0.5
Dichlorotetrafluoroethane	<RL	0.5
Vinyl Chloride	<RL	0.5
Methanol	<RL	5.0
1,3-Butadiene	<RL	0.5
Bromomethane	<RL	0.5
Chloroethane	<RL	0.5
Dichlorofluoromethane	<RL	0.5
Ethanol	<RL	2.0
Vinyl Bromide	<RL	0.5
Acetone	<RL	2.0
Trichlorofluoromethane	<RL	0.5
2-Propanol (IPA)	<RL	2.0
Acrylonitrile	<RL	1.0
1,1-Dichloroethene	<RL	0.5
Methylene Chloride (DCM)	<RL	1.0
Allyl Chloride	<RL	0.5
Carbon Disulfide	<RL	0.5
Trichlorotrifluoroethane	<RL	0.5
trans-1,2-Dichloroethene	<RL	0.5
1,1-Dichloroethane	<RL	0.5
Methyl Tert Butyl Ether (MTBE)	<RL	0.5
Vinyl Acetate	<RL	1.0
2-Butanone (MEK)	<RL	1.0
cis-1,2-Dichloroethene	<RL	0.5
Hexane	<RL	0.5
Chloroform	<RL	0.5
Ethyl Acetate	<RL	0.5
Tetrahydrofuran	<RL	0.5
1,2-Dichloroethane	<RL	0.5
1,1,1-Trichloroethane	<RL	0.5
Benzene	<RL	0.5
Carbon Tetrachloride	<RL	0.5
Cyclohexane	<RL	0.5
1,2-Dichloropropane	<RL	0.5
Bromodichloromethane	<RL	0.5
1,4-Dioxane	<RL	0.5
Trichloroethene (TCE)	<RL	0.5
2,2,4-Trimethylpentane	<RL	0.5
Heptane	<RL	0.5

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Method Blank Analysis Report

MATRIX : **AIR** **ANALYSIS DATE** : **02/04/2019**
UNITS : **ppbv** **REPORT DATE** : **02/04/2019**

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID / *AAC ID*	Method Blank MB 020419	RL
cis-1,3-Dichloropropene	<RL	0.5
4-Methyl-2-pentanone (MiBK)	<RL	0.5
trans-1,3-Dichloropropene	<RL	0.5
1,1,2-Trichloroethane	<RL	0.5
Toluene	<RL	0.5
2-Hexanone (MBK)	<RL	0.5
Dibromochloromethane	<RL	0.5
1,2-Dibromoethane	<RL	0.5
Tetrachloroethene (PCE)	<RL	0.5
Chlorobenzene	<RL	0.5
Ethylbenzene	<RL	0.5
m & p-Xylenes	<RL	1.0
Bromoform	<RL	0.5
Styrene	<RL	0.5
1,1,2,2-Tetrachloroethane	<RL	0.5
o-Xylene	<RL	0.5
4-Ethyltoluene	<RL	0.5
1,3,5-Trimethylbenzene	<RL	0.5
1,2,4-Trimethylbenzene	<RL	0.5
Benzyl Chloride (a-Chlorotoluene)	<RL	0.5
1,3-Dichlorobenzene	<RL	0.5
1,4-Dichlorobenzene	<RL	0.5
1,2-Dichlorobenzene	<RL	0.5
1,2,4-Trichlorobenzene	<RL	0.5
Hexachlorobutadiene	<RL	0.5
System Monitoring Compounds		
BFB-Surrogate Std. % Recovery	100%	--

RL - Reporting Limit

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

AAC ID	: 190159-116087	DATE ANALYZED	: 02/04/2019
MATRIX	: Air	DATE REPORTED	: 02/04/2019
		UNITS	: ppbv

TO-15 Duplicate Analysis

Compound	Sample Conc	Duplicate Conc	% RPD
Chlorodifluoromethane	<SRL	<SRL	0.0
Propene	19.4	19.7	1.5
Dichlorodifluoromethane	<SRL	<SRL	0.0
Chloromethane	<SRL	<SRL	0.0
Dichlorotetrafluoroethane	<SRL	<SRL	0.0
Vinyl Chloride	<SRL	<SRL	0.0
Methanol	<SRL	<SRL	0.0
1,3-Butadiene	<SRL	<SRL	0.0
Bromomethane	<SRL	<SRL	0.0
Chloroethane	<SRL	<SRL	0.0
Dichlorofluoromethane	<SRL	<SRL	0.0
Ethanol	<SRL	<SRL	0.0
Vinyl Bromide	<SRL	<SRL	0.0
Acetone	16.2	16.2	0.0
Trichlorofluoromethane	<SRL	<SRL	0.0
2-Propanol (IPA)	<SRL	<SRL	0.0
Acrylonitrile	7.35	8.18	10.7
1,1-Dichloroethene	<SRL	<SRL	0.0
Methylene Chloride (DCM)	<SRL	<SRL	0.0
Allyl Chloride	<SRL	<SRL	0.0
Carbon Disulfide	<SRL	<SRL	0.0
Trichlorotrifluoroethane	<SRL	<SRL	0.0
trans-1,2-Dichloroethene	<SRL	<SRL	0.0
1,1-Dichloroethane	<SRL	<SRL	0.0
Methyl Tert Butyl Ether (MTBE)	<SRL	<SRL	0.0
Vinyl Acetate	<SRL	<SRL	0.0
2-Butanone (MEK)	<SRL	<SRL	0.0
cis-1,2-Dichloroethene	<SRL	<SRL	0.0
Hexane	<SRL	<SRL	0.0
Chloroform	<SRL	<SRL	0.0
Ethyl Acetate	<SRL	<SRL	0.0
Tetrahydrofuran	<SRL	<SRL	0.0
1,2-Dichloroethane	<SRL	<SRL	0.0
1,1,1-Trichloroethane	<SRL	<SRL	0.0
Benzene	2.00	2.20	9.5
Carbon Tetrachloride	<SRL	<SRL	0.0

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

AAC ID	**: 190159-116087**	**DATE ANALYZED**	**: 02/04/2019**
MATRIX	**: Air**	**DATE REPORTED**	**: 02/04/2019**
		UNITS	**: ppbv**

TO-15 Duplicate Analysis

Compound	Sample Conc	Duplicate Conc	% RPD
Cyclohexane	<SRL	<SRL	0.0
1,2-Dichloropropane	<SRL	<SRL	0.0
Bromodichloromethane	<SRL	<SRL	0.0
1,4-Dioxane	<SRL	<SRL	0.0
Trichloroethene (TCE)	<SRL	<SRL	0.0
2,2,4-Trimethylpentane	<SRL	<SRL	0.0
Heptane	<SRL	<SRL	0.0
cis-1,3-Dichloropropene	<SRL	<SRL	0.0
4-Methyl-2-pentanone (MiBK)	<SRL	<SRL	0.0
trans-1,3-Dichloropropene	<SRL	<SRL	0.0
1,1,2-Trichloroethane	<SRL	<SRL	0.0
Toluene	<SRL	<SRL	0.0
2-Hexanone (MBK)	<SRL	<SRL	0.0
Dibromochloromethane	<SRL	<SRL	0.0
1,2-Dibromoethane	<SRL	<SRL	0.0
Tetrachloroethene (PCE)	<SRL	<SRL	0.0
Chlorobenzene	<SRL	<SRL	0.0
Ethylbenzene	<SRL	<SRL	0.0
m & p-Xylenes	<SRL	<SRL	0.0
Bromoform	<SRL	<SRL	0.0
Styrene	<SRL	<SRL	0.0
1,1,2,2-Tetrachloroethane	<SRL	<SRL	0.0
o-Xylene	<SRL	<SRL	0.0
4-Ethyltoluene	<SRL	<SRL	0.0
1,3,5-Trimethylbenzene	<SRL	<SRL	0.0
1,2,4-Trimethylbenzene	<SRL	<SRL	0.0
Benzyl Chloride (a-Chlorotoluene)	<SRL	<SRL	0.0
1,3-Dichlorobenzene	<SRL	<SRL	0.0
1,4-Dichlorobenzene	<SRL	<SRL	0.0
1,2-Dichlorobenzene	<SRL	<SRL	0.0
1,2,4-Trichlorobenzene	<SRL	<SRL	0.0
Hexachlorobutadiene	<SRL	<SRL	0.0
System Monitoring Compounds			
BFB-Surrogate Std. % Recovery	102%	96%	5.5

SRL - Sample Reporting Limit

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

ANALYSIS DATE : 02/06/2019
ANALYST : JJG
INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : PS120518-02

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Continuing Calibration Verification of the 02/05/2019 Calibration

Compounds	*Conc*	*Daily Conc*	*%REC**
4-BFB (surrogate standard)	10.00	9.77	98
Chlorodifluoromethane	10.80	10.10	94
Propene	11.00	11.09	101
Dichlorodifluoromethane	10.20	9.06	89
Chloromethane	10.60	10.44	98
Dichlorotetrafluoroethane	11.00	10.33	94
Vinyl Chloride	10.40	10.41	100
Methanol	22.50	21.17	94
1,3-Butadiene	10.90	8.64	79
Bromomethane	10.30	8.46	82
Chloroethane	10.10	10.74	106
Dichlorofluoromethane	10.80	10.44	97
Ethanol	11.00	10.88	99
Vinyl Bromide	10.70	10.99	103
Acetone	10.90	11.01	101
Trichlorofluoromethane	10.10	9.43	93
2-Propanol (IPA)	11.00	10.69	97
Acrylonitrile	11.50	11.77	102
1,1-Dichloroethene	10.70	11.09	104
Methylene Chloride (DCM)	10.60	10.66	101
Allyl Chloride	10.70	10.33	97
Carbon Disulfide	10.50	10.33	98
Trichlorotrifluoroethane	10.60	10.72	101
trans-1,2-Dichloroethene	10.30	10.31	100
1,1-Dichloroethane	10.50	10.45	100
Methyl Tert Butyl Ether (MTBE)	10.80	10.58	98
Vinyl Acetate	10.90	11.23	103
2-Butanone (MEK)	10.90	10.52	97
cis-1,2-Dichloroethene	10.90	10.90	100
Hexane	10.70	10.71	100
Chloroform	10.90	10.43	96
Ethyl Acetate	10.90	10.87	100
Tetrahydrofuran	10.20	10.18	100
1,2-Dichloroethane	10.80	10.17	94
1,1,1-Trichloroethane	10.80	10.08	93

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

ANALYSIS DATE : 02/06/2019
ANALYST : JJG
INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : PS120518-02

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Continuing Calibration Verification of the 02/05/2019 Calibration

Compounds	*Conc*	*Daily Conc*	*%REC**
Benzene	10.90	11.07	102
Carbon Tetrachloride	10.60	10.38	98
Cyclohexane	10.90	10.85	100
1,2-Dichloropropane	10.80	11.11	103
Bromodichloromethane	10.90	10.75	99
1,4-Dioxane	10.90	10.23	94
Trichloroethene (TCE)	10.90	10.84	99
2,2,4-Trimethylpentane	10.70	11.30	106
Heptane	10.80	11.15	103
cis-1,3-Dichloropropene	10.60	10.39	98
4-Methyl-2-pentanone (MiBK)	10.60	10.66	101
trans-1,3-Dichloropropene	10.20	9.88	97
1,1,2-Trichloroethane	10.90	10.64	98
Toluene	11.00	11.10	101
2-Hexanone (MBK)	10.80	10.53	98
Dibromochloromethane	10.30	9.95	97
1,2-Dibromoethane	10.90	10.64	98
Tetrachloroethene (PCE)	10.90	11.03	101
Chlorobenzene	11.00	10.40	95
Ethylbenzene	10.90	10.31	95
m & p-Xylenes	21.00	20.91	100
Bromoform	10.50	9.91	94
Styrene	10.80	10.50	97
1,1,2,2-Tetrachloroethane	10.70	9.94	93
o-Xylene	10.70	9.92	93
4-Ethyltoluene	10.30	9.91	96
1,3,5-Trimethylbenzene	10.40	10.26	99
1,2,4-Trimethylbenzene	10.40	10.13	97
Benzyl Chloride (a-Chlorotoluene)	9.70	9.40	97
1,3-Dichlorobenzene	10.10	9.57	95
1,4-Dichlorobenzene	10.20	9.33	91
1,2-Dichlorobenzene	10.20	9.33	91
1,2,4-Trichlorobenzene	9.70	7.98	82
Hexachlorobutadiene	10.00	9.21	92

* - %REC should be 70-130%

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

CLIENT ID	: **Laboratory Control Spike**	**DATE ANALYZED**	: **02/06/2019**
AAC ID	: **LCS/LCSD**	**DATE REPORTED**	: **02/06/2019**
MEDIA	: **Air**	**UNITS**	: **ppbv**

TO-15 Laboratory Control Spike Recovery

Compound	Sample Conc.	Spike Added	Spike Res	Dup Spike Res	Spike % Rec *	Spike Dup % Rec *	RPD** %
1,1-Dichloroethene	0.0	10.70	11.09	11.05	104	103	0.4
Methylene Chloride (DCM)	0.0	10.60	10.66	10.82	101	102	1.5
Benzene	0.0	10.90	11.07	10.70	102	98	3.4
Trichloroethene (TCE)	0.0	10.90	10.84	10.76	99	99	0.7
Toluene	0.0	11.00	11.10	10.44	101	95	6.1
Tetrachloroethene (PCE)	0.0	10.90	11.03	11.02	101	101	0.1
Chlorobenzene	0.0	11.00	10.40	10.45	95	95	0.5
Ethylbenzene	0.0	10.90	10.31	10.28	95	94	0.3
m & p-Xylenes	0.0	21.00	20.91	20.33	100	97	2.8
o-Xylene	0.0	10.70	9.92	9.99	93	93	0.7

* Must be 70-130%

** Must be < 25%

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Method Blank Analysis Report

MATRIX : **AIR** **ANALYSIS DATE** : **02/06/2019**
UNITS : **ppbv** **REPORT DATE** : **02/06/2019**

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID / *AAC ID*	Method Blank MB 020619	RL
Chlorodifluoromethane	<RL	0.5
Propene	<RL	1.0
Dichlorodifluoromethane	<RL	0.5
Chloromethane	<RL	0.5
Dichlorotetrafluoroethane	<RL	0.5
Vinyl Chloride	<RL	0.5
Methanol	<RL	5.0
1,3-Butadiene	<RL	0.5
Bromomethane	<RL	0.5
Chloroethane	<RL	0.5
Dichlorofluoromethane	<RL	0.5
Ethanol	<RL	2.0
Vinyl Bromide	<RL	0.5
Acetone	<RL	2.0
Trichlorofluoromethane	<RL	0.5
2-Propanol (IPA)	<RL	2.0
Acrylonitrile	<RL	1.0
1,1-Dichloroethene	<RL	0.5
Methylene Chloride (DCM)	<RL	1.0
Allyl Chloride	<RL	0.5
Carbon Disulfide	<RL	0.5
Trichlorotrifluoroethane	<RL	0.5
trans-1,2-Dichloroethene	<RL	0.5
1,1-Dichloroethane	<RL	0.5
Methyl Tert Butyl Ether (MTBE)	<RL	0.5
Vinyl Acetate	<RL	1.0
2-Butanone (MEK)	<RL	1.0
cis-1,2-Dichloroethene	<RL	0.5
Hexane	<RL	0.5
Chloroform	<RL	0.5
Ethyl Acetate	<RL	0.5
Tetrahydrofuran	<RL	0.5
1,2-Dichloroethane	<RL	0.5
1,1,1-Trichloroethane	<RL	0.5
Benzene	<RL	0.5
Carbon Tetrachloride	<RL	0.5
Cyclohexane	<RL	0.5
1,2-Dichloropropane	<RL	0.5
Bromodichloromethane	<RL	0.5
1,4-Dioxane	<RL	0.5
Trichloroethene (TCE)	<RL	0.5
2,2,4-Trimethylpentane	<RL	0.5
Heptane	<RL	0.5

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Method Blank Analysis Report

MATRIX	**: AIR**	**ANALYSIS DATE**	**: 02/06/2019**
UNITS	**: ppbv**	**REPORT DATE**	**: 02/06/2019**

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID / *AAC ID*	Method Blank / MB 020619	RL
cis-1,3-Dichloropropene	<RL	0.5
4-Methyl-2-pentanone (MiBK)	<RL	0.5
trans-1,3-Dichloropropene	<RL	0.5
1,1,2-Trichloroethane	<RL	0.5
Toluene	<RL	0.5
2-Hexanone (MBK)	<RL	0.5
Dibromochloromethane	<RL	0.5
1,2-Dibromoethane	<RL	0.5
Tetrachloroethene (PCE)	<RL	0.5
Chlorobenzene	<RL	0.5
Ethylbenzene	<RL	0.5
m & p-Xylenes	<RL	1.0
Bromoform	<RL	0.5
Styrene	<RL	0.5
1,1,2,2-Tetrachloroethane	<RL	0.5
o-Xylene	<RL	0.5
4-Ethyltoluene	<RL	0.5
1,3,5-Trimethylbenzene	<RL	0.5
1,2,4-Trimethylbenzene	<RL	0.5
Benzyl Chloride (a-Chlorotoluene)	<RL	0.5
1,3-Dichlorobenzene	<RL	0.5
1,4-Dichlorobenzene	<RL	0.5
1,2-Dichlorobenzene	<RL	0.5
1,2,4-Trichlorobenzene	<RL	0.5
Hexachlorobutadiene	<RL	0.5
System Monitoring Compounds		
BFB-Surrogate Std. % Recovery	97%	--

RL - Reporting Limit

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

AAC ID	**: 190163-116122**	**DATE ANALYZED**	**: 02/06/2019**
MATRIX	**: Air**	**DATE REPORTED**	**: 02/06/2019**
		UNITS	**: ppbv**

TO-15 Duplicate Analysis

Compound	Sample Conc	Duplicate Conc	% RPD
Chlorodifluoromethane	1570	1630	3.8
Propene	1980	1980	0.0
Dichlorodifluoromethane	673	691	2.6
Chloromethane	<SRL	<SRL	0.0
Dichlorotetrafluoroethane	<SRL	<SRL	0.0
Vinyl Chloride	<SRL	<SRL	0.0
Methanol	<SRL	<SRL	0.0
1,3-Butadiene	<SRL	<SRL	0.0
Bromomethane	<SRL	<SRL	0.0
Chloroethane	<SRL	<SRL	0.0
Dichlorofluoromethane	<SRL	<SRL	0.0
Ethanol	4250	4390	3.2
Vinyl Bromide	<SRL	<SRL	0.0
Acetone	4680	4750	1.5
Trichlorofluoromethane	7080	7340	3.6
2-Propanol (IPA)	<SRL	<SRL	0.0
Acrylonitrile	<SRL	<SRL	0.0
1,1-Dichloroethene	<SRL	<SRL	0.0
Methylene Chloride (DCM)	<SRL	<SRL	0.0
Allyl Chloride	<SRL	<SRL	0.0
Carbon Disulfide	<SRL	<SRL	0.0
Trichlorotrifluoroethane	<SRL	<SRL	0.0
trans-1,2-Dichloroethene	<SRL	<SRL	0.0
1,1-Dichloroethane	<SRL	<SRL	0.0
Methyl Tert Butyl Ether (MTBE)	<SRL	<SRL	0.0
Vinyl Acetate	<SRL	<SRL	0.0
2-Butanone (MEK)	<SRL	<SRL	0.0
cis-1,2-Dichloroethene	<SRL	<SRL	0.0
Hexane	528	535	1.3
Chloroform	<SRL	<SRL	0.0
Ethyl Acetate	<SRL	<SRL	0.0
Tetrahydrofuran	2090	2190	4.7
1,2-Dichloroethane	<SRL	<SRL	0.0
1,1,1-Trichloroethane	<SRL	<SRL	0.0
Benzene	<SRL	<SRL	0.0
Carbon Tetrachloride	<SRL	<SRL	0.0

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

AAC ID	: 190163-116122	**DATE ANALYZED**	: 02/06/2019
MATRIX	: Air	**DATE REPORTED**	: 02/06/2019
		UNITS	: ppbv

TO-15 Duplicate Analysis

Compound	Sample Conc	Duplicate Conc	% RPD
Cyclohexane	<SRL	<SRL	0.0
1,2-Dichloropropane	<SRL	<SRL	0.0
Bromodichloromethane	<SRL	<SRL	0.0
1,4-Dioxane	<SRL	<SRL	0.0
Trichloroethene (TCE)	<SRL	<SRL	0.0
2,2,4-Trimethylpentane	<SRL	<SRL	0.0
Heptane	<SRL	<SRL	0.0
cis-1,3-Dichloropropene	<SRL	<SRL	0.0
4-Methyl-2-pentanone (MiBK)	<SRL	<SRL	0.0
trans-1,3-Dichloropropene	<SRL	<SRL	0.0
1,1,2-Trichloroethane	<SRL	<SRL	0.0
Toluene	1230	1290	4.8
2-Hexanone (MBK)	<SRL	<SRL	0.0
Dibromochloromethane	<SRL	<SRL	0.0
1,2-Dibromoethane	<SRL	<SRL	0.0
Tetrachloroethene (PCE)	<SRL	<SRL	0.0
Chlorobenzene	<SRL	<SRL	0.0
Ethylbenzene	<SRL	<SRL	0.0
m & p-Xylenes	843	872	3.4
Bromoform	<SRL	<SRL	0.0
Styrene	<SRL	<SRL	0.0
1,1,2,2-Tetrachloroethane	<SRL	<SRL	0.0
o-Xylene	<SRL	<SRL	0.0
4-Ethyltoluene	<SRL	<SRL	0.0
1,3,5-Trimethylbenzene	<SRL	<SRL	0.0
1,2,4-Trimethylbenzene	<SRL	<SRL	0.0
Benzyl Chloride (a-Chlorotoluene)	<SRL	<SRL	0.0
1,3-Dichlorobenzene	<SRL	<SRL	0.0
1,4-Dichlorobenzene	<SRL	<SRL	0.0
1,2-Dichlorobenzene	<SRL	<SRL	0.0
1,2,4-Trichlorobenzene	<SRL	<SRL	0.0
Hexachlorobutadiene	<SRL	<SRL	0.0
System Monitoring Compounds			
BFB-Surrogate Std. % Recovery	96%	101%	5.4

SRL - Sample Reporting Limit

Sucha Parmar, PhD
Technical Director

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

MONTROSE AIR QUALITY SERVICES

PUBLIC COPY

CHAIN OF CUSTODY

#190163

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.: 005AS-452603	**Purchase Order No:** PO#	**Special Analysis / Reporting Instructions:** Please include speciated TO-12 results and Methane as well. 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	1/21/2019	1	(1) Summa Canister	--	116118
2-POC	1/21/2019	1	(1) Summa Canister	--	116119
3-POC	1/21/2019	1	(1) Summa Canister	--	116120
4-POC	1/22/2019	1	(1) Summa Canister	--	116121
5-POC	1/22/2019	1	(1) Summa Canister	--	116122
6-POC	1/23/2019	1	(1) Summa Canister	--	116123
Total Containers		**6**			

Relinquished by	Date	Time	Received by	Date	Time
	1/29/19	1200			
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
				1/29/19	1010

7x CANS + 3x FLOWS

FEDEX

Copy of 005AS437604 POC COC 2nd Deployment.xlsx

Appendix C.2
Total Organic Carbon – EPA 25C Analyses

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

CLIENT	:	Montrose Air Quality Services
PROJECT NAME	:	Schnitzer Steel
PROJECT NO.	:	005AS-452603
AAC PROJECT NO.	:	190163
REPORT DATE	:	02/01/2019

On January 29, 2019, 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	190163-116118	438.5
2-POC	190163-116119	216.3
3-POC	190163-116120	616.6
4-POC	190163-116121	279.7
5-POC	190163-116122	240.9
6-POC	190163-116123	203.7

This analysis is performed in accordance with AAC's Quality Manual. 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 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.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 5 pages.

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

Client : **Montrose Air Quality Services**
Project No. : **190163**
Matrix : **AIR**
Units : **ppmC**

Sampling Date : **01/21-23/2019**
Receiving Date : **01/29/2019**
Analysis Date : **01/30-31/2019**
Report Date : **02/01/2019**

EPA 25C

Reporting Limit: 30.0 ppmC		*Canister Dilution Factor*	*Analysis Dilution Factor*	TNMOC*	SRL (RL x DF's)
Client Sample ID	AAC ID				
1-POC	190163-116118	2.3	1.0	695	69.5
2-POC	190163-116119	4.7	1.0	856	142
3-POC	190163-116120	1.7	1.0	859	50.0
4-POC	190163-116121	3.7	1.0	428	110
5-POC	190163-116122	4.3	1.0	446	128
6-POC	190163-116123	5.2	1.0	420	155

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

**Total Non-Methane Organic Carbon*

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Analysis Date : 01/30/2019
Analyst : EB
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	1430936	6.8

II - TNMOC Response Factor - Method 25C

Analyte	xRF	CV RF	CV dp RF	CV tp RF	Average RF	% RPD***
Propane	1531741	1430936	1533735	1517716	1494129	2.5

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	203.7	201.5	100.1	99.1	1.0

V - Closing Calibration Verification Standard - Method 25C

Analyte	xCF	dCF	%RPD*
Propane	1531741	1498243	2.2

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

Sucha Parmar, Ph.D.
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Analysis Date : 01/31/2019
Analyst : EB
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	1486892	3.0

II - TNMOC Response Factor - Method 25C

Analyte	xRF	CV RF	CV dp RF	CV tp RF	Average RF	% RPD***
Propane	1531741	1486892	1471282	1522851	1493675	2.5

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	195.4	202.2	96.1	99.4	3.4

V - Closing Calibration Verification Standard - Method 25C

Analyte	xCF	dCF	%RPD*
Propane	1531741	1548841	1.1

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

Sucha Parmar, Ph.D.
Technical Director

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

MONTROSE AIR QUALITY SERVICES

PUBLIC COPY

CHAIN OF CUSTODY

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

#190163

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#	**Special Analysis / Reporting Instructions:** Please include speciated TO-12 results and Methane as well. 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	1/21/2019	1	(1) Summa Canister	--	116118
2-POC	1/21/2019	1	(1) Summa Canister	--	116119
3-POC	1/21/2019	1	(1) Summa Canister	--	116120
4-POC	1/22/2019	1	(1) Summa Canister	--	116121
5-POC	1/22/2019	1	(1) Summa Canister	--	116122
6-POC	1/23/2019	1	(1) Summa Canister	--	116123
Total Containers		6			

Relinquished by	Date	Time	Received by	Date	Time
	1/29/19	1200			
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
				1/29/19	1010

7x CANS + 3x FLOWS

FEDEX

Appendix C.3
Total Organic Carbon – TO-12 Analyses

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

CLIENT	: Montrose AQS
PROJECT NAME	: Schnitzer Steel - Shredder Exhaust Stack
PROJECT NO.	: 005AS-452603
AAC PROJECT NO.	: 190163
REPORT DATE	: 02/07/2019

On January 29, 2019, Atmospheric Analysis & Consulting, Inc. received six (6) Six-Liter Summa Canisters for hydrocarbons analysis (C_2-C_{12}) PAMS Protocol by GC/MS/FID. Upon receipt each sample was assigned a unique Laboratory ID number as follows:

Client ID	Lab ID	Initial Pressure (mmHga)
1-POC	190163-116118	438.5
2-POC	190163-116119	216.3
3-POC	190163-116120	616.6
4-POC	190163-116121	279.7
5-POC	190163-116122	240.9
6-POC	190163-116123	203.7

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.

Sucha Parmar, PhD
Technical Director

This report consists of 13 pages.

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

HYDROCARBONS (C2-C12) SPECIATED

Client ID	1-POC			Sample Reporting Limit (SRL) (MRLxDF's)	2-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116118				190163-116119				
Date Sampled	01/21/2019				01/21/2019				
Date Analyzed	01/30/2019				01/30/2019				
Can Dilution Factor	2.32				4.73				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Ethylene	140		100	116	<SRL	U	100	237	0.50
Acetylene	<SRL	U	100	116	<SRL	U	100	237	0.50
Ethane	135		100	116	<SRL	U	100	237	0.50
Propylene	NR	NA	100	77	NR	NA	100	158	0.33
Propane	269		100	77	455		100	158	0.33
Isobutane	529		100	58	603		100	118	0.25
1-Butene	<SRL	U	100	58	<SRL	U	100	118	0.25
n-Butane	1970		100	58	2240		100	118	0.25
trans-2-Butene	<SRL	U	100	58	<SRL	U	100	118	0.25
cis-2-Butene	<SRL	U	100	58	<SRL	U	100	118	0.25
Isopentane	7390		100	46	7810		100	95	0.20
1-Pentene	139		100	46	<SRL	U	100	95	0.20
n-Pentane	2810		100	46	2820		100	95	0.20
Isoprene	<SRL	U	100	46	<SRL	U	100	95	0.20
trans-2-Pentene	424		100	46	379		100	95	0.20
cis-2-Pentene	201		100	46	171		100	95	0.20
2,2-Dimethylbutane	721		100	39	656		100	79	0.17
Cyclopentane	508		100	46	482		100	95	0.20
2,3-Dimethylbutane	1170		100	39	1160		100	79	0.17
2-Methylpentane	3950		100	39	3710		100	79	0.17
3-Methylpentane	2500		100	39	2340		100	79	0.17
1-Hexene	<SRL	U	100	39	<SRL	U	100	79	0.17
n-Hexane	NR	NA	100	39	NR	NA	100	79	0.17
Methylcyclopentane	2820		100	39	2650		100	79	0.17
2,4-Dimethylpentane	808		100	33	902		100	68	0.14
Benzene	NR	NA	100	39	NR	NA	100	79	0.17
Cyclohexane	NR	NA	100	39	NR	NA	100	79	0.17
2-Methylhexane	1790		100	33	1770		100	68	0.14
2,3-Dimethylpentane	1160		100	33	1280		100	68	0.14
3-Methylhexane	1870		100	33	1780		100	68	0.14
2,2,4-Trimethylpentane	NR	NA	100	29	NR	NA	100	59	0.13
n-Heptane	NR	NA	100	33	NR	NA	100	68	0.14
Methylcyclohexane	1240		100	33	1200		100	68	0.14
2,3,4-Trimethylpentane	852		100	29	1010		100	59	0.13

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

HYDROCARBONS (C2-C12) SPECIATED

Client ID	1-POC			Sample Reporting Limit (SRL) (MRLxDF's)	2-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116118				190163-116119				
Date Sampled	01/21/2019				01/21/2019				
Date Analyzed	01/30/2019				01/30/2019				
Can Dilution Factor	2.32				4.73				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Toluene	NR	NA	100	33	NR	NA	100	68	0.14
2-Methylheptane	733		100	29	713		100	59	0.13
3-Methylheptane	748		100	29	657		100	59	0.13
n-Octane	645		100	29	604		100	59	0.13
Ethylbenzene	NR	NA	100	29	NR	NA	100	59	0.13
m/p-Xylenes	NR	NA	100	29	NR	NA	100	59	0.13
Styrene	NR	NA	100	29	NR	NA	100	59	0.13
o-Xylene	NR	NA	100	29	NR	NA	100	59	0.13
Nonane	245		100	26	225		100	53	0.11
Isopropylbenzene	<SRL	U	100	26	<SRL	U	100	53	0.11
n-Propylbenzene	204		100	26	194		100	53	0.11
m-Ethyltoluene	814		100	26	823		100	53	0.11
p-Ethyltoluene	NR	NA	100	26	NR	NA	100	53	0.11
1,3,5-Trimethylbenzene	NR	NA	100	26	NR	NA	100	53	0.11
o-Ethyltoluene	304		100	26	252		100	53	0.11
1,2,4-Trimethylbenzene	NR	NA	100	26	NR	NA	100	53	0.11
n-Decane	99		100	23	132		100	47	0.10
1,2,3-Trimethylbenzene	204		100	26	226		100	53	0.11
m-Diethylbenzene	66		100	23	<SRL	U	100	47	0.10
p-Diethylbenzene	172		100	23	154		100	47	0.10
n-Undecane	80		100	21	65		100	43	0.09
n-Dodecane	25		100	19	<SRL	U	100	39	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

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

HYDROCARBONS (C2-C12) SPECIATED

Client ID	3-POC			Sample Reporting Limit (SRL) (MRLxDF's)	4-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116120				190163-116121				
Date Sampled	01/21/2019				01/22/2019				
Date Analyzed	01/30/2019				01/30/2019				
Can Dilution Factor	1.67				3.67				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Ethylene	141		100	83	<SRL	U	100	184	0.50
Acetylene	<SRL	U	100	83	<SRL	U	100	184	0.50
Ethane	196		100	83	318		100	184	0.50
Propylene	NR	NA	100	56	NR	NA	100	122	0.33
Propane	437		100	56	4960		100	122	0.33
Isobutane	902		100	42	1240		100	92	0.25
1-Butene	<SRL	U	100	42	<SRL	U	100	92	0.25
n-Butane	2440		100	42	1220		100	92	0.25
trans-2-Butene	<SRL	U	100	42	<SRL	U	100	92	0.25
cis-2-Butene	<SRL	U	100	42	<SRL	U	100	92	0.25
Isopentane	9380		100	33	453		100	73	0.20
1-Pentene	150		100	33	4820		100	73	0.20
n-Pentane	3240		100	33	118		100	73	0.20
Isoprene	<SRL	U	100	33	<SRL	U	100	73	0.20
trans-2-Pentene	450		100	33	<SRL	U	100	73	0.20
cis-2-Pentene	208		100	33	<SRL	U	100	73	0.20
2,2-Dimethylbutane	666		100	28	104		100	61	0.17
Cyclopentane	542		100	33	4160		100	73	0.20
2,3-Dimethylbutane	1290		100	28	76		100	61	0.17
2-Methylpentane	4060		100	28	315		100	61	0.17
3-Methylpentane	2560		100	28	378		100	61	0.17
1-Hexene	<SRL	U	100	28	<SRL	U	100	61	0.17
n-Hexane	NR	NA	100	28	NR	NA	100	61	0.17
Methylcyclopentane	2890		100	28	236		100	61	0.17
2,4-Dimethylpentane	1030		100	24	<SRL	U	100	52	0.14
Benzene	NR	NA	100	28	NR	NA	100	61	0.17
Cyclohexane	NR	NA	100	28	NR	NA	100	61	0.17
2-Methylhexane	1860		100	24	212		100	52	0.14
2,3-Dimethylpentane	1430		100	24	93		100	52	0.14
3-Methylhexane	1930		100	24	230		100	52	0.14
2,2,4-Trimethylpentane	NR	NA	100	21	NR	NA	100	46	0.13
n-Heptane	NR	NA	100	24	NR	NA	100	52	0.14
Methylcyclohexane	1360		100	24	83		100	52	0.14
2,3,4-Trimethylpentane	1220		100	21	128		100	46	0.13

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

HYDROCARBONS (C2-C12) SPECIATED

Client ID	3-POC			Sample Reporting Limit (SRL) (MRLxDF's)	4-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116120				190163-116121				
Date Sampled	01/21/2019				01/22/2019				
Date Analyzed	01/30/2019				01/30/2019				
Can Dilution Factor	1.67				3.67				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Toluene	NR	NA	100	24	NR	NA	100	52	0.14
2-Methylheptane	785		100	21	<SRL	U	100	46	0.13
3-Methylheptane	816		100	21	49		100	46	0.13
n-Octane	707		100	21	65		100	46	0.13
Ethylbenzene	NR	NA	100	21	NR	NA	100	46	0.13
m/p-Xylenes	NR	NA	100	21	NR	NA	100	46	0.13
Styrene	NR	NA	100	21	NR	NA	100	46	0.13
o-Xylene	NR	NA	100	21	NR	NA	100	46	0.13
Nonane	283		100	19	122		100	41	0.11
Isopropylbenzene	50		100	19	<SRL	U	100	41	0.11
n-Propylbenzene	251		100	19	<SRL	U	100	41	0.11
m-Ethyltoluene	1000		100	19	204		100	41	0.11
p-Ethyltoluene	NR	NA	100	19	NR	NA	100	41	0.11
1,3,5-Trimethylbenzene	NR	NA	100	19	NR	NA	100	41	0.11
o-Ethyltoluene	328		100	19	69		100	41	0.11
1,2,4-Trimethylbenzene	NR	NA	100	19	NR	NA	100	41	0.11
n-Decane	126		100	17	151		100	37	0.10
1,2,3-Trimethylbenzene	302		100	19	74		100	41	0.11
m-Diethylbenzene	111		100	17	<SRL	U	100	37	0.10
p-Diethylbenzene	213		100	17	39		100	37	0.10
n-Undecane	112		100	15	79		100	33	0.09
n-Dodecane	31		100	14	<SRL	U	100	31	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

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

HYDROCARBONS (C2-C12) SPECIATED

Client ID	5-POC			Sample Reporting Limit (SRL) (MRLxDF's)	6-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116122				190163-116123				
Date Sampled	01/22/2019				01/23/2019				
Date Analyzed	01/30/2019				01/30/2019				
Can Dilution Factor	4.27				5.16				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Ethylene	<SRL	U	100	214	<SRL	U	100	258	0.50
Acetylene	<SRL	U	100	214	9560		100	258	0.50
Ethane	358		100	214	495		100	258	0.50
Propylene	NR	NA	100	142	NR	NA	100	172	0.33
Propane	8540		100	142	13700		100	172	0.33
Isobutane	1400		100	107	752		100	129	0.25
1-Butene	<SRL	U	100	107	<SRL	U	100	129	0.25
n-Butane	1550		100	107	819		100	129	0.25
trans-2-Butene	<SRL	U	100	107	<SRL	U	100	129	0.25
cis-2-Butene	<SRL	U	100	107	<SRL	U	100	129	0.25
Isopentane	554		100	85	633		100	103	0.20
1-Pentene	<SRL	U	100	85	<SRL	U	100	103	0.20
n-Pentane	155		100	85	219		100	103	0.20
Isoprene	<SRL	U	100	85	<SRL	U	100	103	0.20
trans-2-Pentene	<SRL	U	100	85	<SRL	U	100	103	0.20
cis-2-Pentene	<SRL	U	100	85	<SRL	U	100	103	0.20
2,2-Dimethylbutane	94		100	71	88		100	86	0.17
Cyclopentane	4400		100	85	3760		100	103	0.20
2,3-Dimethylbutane	<SRL	U	100	71	<SRL	U	100	86	0.17
2-Methylpentane	210		100	71	142		100	86	0.17
3-Methylpentane	151		100	71	173		100	86	0.17
1-Hexene	<SRL	U	100	71	<SRL	U	100	86	0.17
n-Hexane	NR	NA	100	71	NR	NA	100	86	0.17
Methylcyclopentane	183		100	71	96		100	86	0.17
2,4-Dimethylpentane	<SRL	U	100	61	<SRL	U	100	74	0.14
Benzene	NR	NA	100	71	NR	NA	100	86	0.17
Cyclohexane	NR	NA	100	71	NR	NA	100	86	0.17
2-Methylhexane	117		100	61	94		100	74	0.14
2,3-Dimethylpentane	64		100	61	<SRL	U	100	74	0.14
3-Methylhexane	155		100	61	102		100	74	0.14
2,2,4-Trimethylpentane	NR	NA	100	53	NR	NA	100	64	0.13
n-Heptane	NR	NA	100	61	NR	NA	100	74	0.14
Methylcyclohexane	79		100	61	<SRL	U	100	74	0.14
2,3,4-Trimethylpentane	67		100	53	<SRL	U	100	64	0.13

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 190163
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 01/29/2019
DATE REPORTED : 02/07/2019

HYDROCARBONS (C2-C12) SPECIATED

Client ID	5-POC			Sample Reporting Limit (SRL) (MRLxDF's)	6-POC			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	190163-116122				190163-116123				
Date Sampled	01/22/2019				01/23/2019				
Date Analyzed	01/30/2019				01/30/2019				
Can Dilution Factor	4.27				5.16				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Toluene	NR	NA	100	61	NR	NA	100	74	0.14
2-Methylheptane	<SRL	U	100	53	<SRL	U	100	64	0.13
3-Methylheptane	<SRL	U	100	53	<SRL	U	100	64	0.13
n-Octane	96		100	53	<SRL	U	100	64	0.13
Ethylbenzene	NR	NA	100	53	NR	NA	100	64	0.13
m/p-Xylenes	NR	NA	100	53	NR	NA	100	64	0.13
Styrene	NR	NA	100	53	NR	NA	100	64	0.13
o-Xylene	NR	NA	100	53	NR	NA	100	64	0.13
Nonane	162		100	47	<SRL	U	100	57	0.11
Isopropylbenzene	<SRL	U	100	47	<SRL	U	100	57	0.11
n-Propylbenzene	<SRL	U	100	47	<SRL	U	100	57	0.11
m-Ethyltoluene	69		100	47	84		100	57	0.11
p-Ethyltoluene	NR	NA	100	47	NR	NA	100	57	0.11
1,3,5-Trimethylbenzene	NR	NA	100	47	NR	NA	100	57	0.11
o-Ethyltoluene	58		100	47	<SRL	U	100	57	0.11
1,2,4-Trimethylbenzene	NR	NA	100	47	NR	NA	100	57	0.11
n-Decane	205		100	43	58		100	52	0.10
1,2,3-Trimethylbenzene	<SRL	U	100	47	<SRL	U	100	57	0.11
m-Diethylbenzene	<SRL	U	100	43	<SRL	U	100	52	0.10
p-Diethylbenzene	44		100	43	<SRL	U	100	52	0.10
n-Undecane	97		100	39	<SRL	U	100	47	0.09
n-Dodecane	<SRL	U	100	36	<SRL	U	100	43	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

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

PAMS Calibration Verification Analysis

Analysis Date : 01/30/2019
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	768	0.4

* %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	3.90	3.93	100.5	101.3	0.8

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

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

PAMS Method Blank Analysis

Matrix : Air
Units : ppbC

Analysis Date : 01/30/2019
Report Date : 01/30/2019

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

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

PAMS Method Blank Analysis

Matrix : Air
Units : ppbC

Analysis Date : 01/30/2019
Report Date : 01/30/2019

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

Sucha Parmar, PhD
Technical Director

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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report
PAMS Duplicate Analysis

AAC ID : 190159-116082
Matrix : Air

Analysis Date : 01/30/2019
Report Date : 01/30/2019
Units : ppbC

Analyte	Sample Analysis	Sample Duplicate Analysis	%RPD
Ethylene	64.2	62.7	2.4
Acetylene	9.90	9.88	0.2
Ethane	71.7	70.8	1.3
Propylene	25.3	25.3	0.0
Propane	79.9	79.8	0.1
Isobutane	6.38	6.40	0.3
1-Butene	3.27	3.39	3.6
n-Butane	7.22	7.18	0.6
trans-2-Butene	2.72	2.60	4.5
cis-2-Butene	<PQL	<PQL	0.0
Isopentane	3.89	3.96	1.8
1-Pentene	2.12	2.10	0.9
n-Pentane	17.6	17.7	0.6
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	<PQL	<PQL	0.0
1-Hexene	<PQL	<PQL	0.0
n-Hexane	1.93	1.99	3.1
Methylcyclopentane	<PQL	<PQL	0.0
2,4-Dimethylpentane	<PQL	<PQL	0.0
Benzene	2.83	2.83	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

PUBLIC COPY

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report
PAMS Duplicate Analysis

AAC ID : 190159-116082
Matrix : Air

Analysis Date : 01/30/2019
Report Date : 01/30/2019
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	2.36	2.34	0.9
Methylcyclohexane	<PQL	<PQL	0.0
2,3,4-Trimethylpentane	<PQL	<PQL	0.0
Toluene	11.9	11.8	0.8
2-Methylheptane	<PQL	<PQL	0.0
3-Methylheptane	<PQL	<PQL	0.0
n-Octane	3.80	3.78	0.5
Ethylbenzene	<PQL	<PQL	0.0
m/p-Xylenes	2.33	2.29	1.7
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)	319	317	0.6
TNMHC (ppbc)	6690	6590	1.5

Sucha Parmar, PhD
Technical Director

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

MONTROSE AIR QUALITY SERVICES

PUBLIC COPY

CHAIN OF CUSTODY

#190163

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#	**Special Analysis / Reporting Instructions:** Please include speciated TO-12 results and Methane as well. 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	1/21/2019	1	(1) Summa Canister	--	116118
2-POC	1/21/2019	1	(1) Summa Canister	--	116119
3-POC	1/21/2019	1	(1) Summa Canister	--	116120
4-POC	1/22/2019	1	(1) Summa Canister	--	116121
5-POC	1/22/2019	1	(1) Summa Canister	--	116122
6-POC	1/23/2019	1	(1) Summa Canister	--	116123
Total Containers		**6**			

Relinquished by	Date	Time	Received by	Date	Time
	1/23/19	1200			
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
				1/29/19	1010

7x CANS + 3x FLOWS

FEDEX

Copy of 005AS437604 POC COC 2nd Deployment.xlsx

PUBLIC COPY

Laboratory Analysis Report

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

CLIENT : **Montrose AQS**
PROJECT NUMBER : **190163**
MATRIX : **AIR**

RECEIVING DATE : **01/29/2019**
ANALYSIS DATE : **01/30/2019**
REPORT DATE : **02/14/2019**

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
1-POC	190163-116118	01/21/2019	01/30/2019	481000	2.32	100	4631	20
2-POC	190163-116119	01/21/2019	01/30/2019	482000	4.73	100	9466	20
3-POC	190163-116120	01/21/2019	01/30/2019	574000	1.67	100	3334	20
4-POC	190163-116121	01/22/2019	01/30/2019	196000	3.67	100	7348	20
5-POC	190163-116122	01/22/2019	01/30/2019	209000	4.27	100	8543	20
6-POC	190163-116123	01/23/2019	01/30/2019	190000	5.16	100	10311	20

Sucha Parmar, Ph.D.
Technical Director

APPENDIX D
CLIENT PROCESS DATA

Appendix D.1
Process Data

PUBLIC COPY

Jan 2019 Source Test					Fan Amps			Venturi DP (Inches WG)	
Run#, Date	Time	Run Time (minutes)	Material Feed Rate (Tons/hr)	Material output (Tons/hr)	Fan 1 (SFA3)	Fan 2 (SFA4)	Mill Water Spray Rate (GPM)	Scrubber 1 (PDIT 10)	Scrubber 2 (PDIT20)
Car Bodies Only									
Run 1 1/21/2019	*20:00-21:00*	*60*	[redacted]	[redacted]	*541*	*550*	*29*	[redacted]	[redacted]
Run 2 1/21/2019	*21:18-22:17*	*59*	[redacted]	[redacted]	538	547	34	[redacted]	[redacted]
Run 3 1/21/2019	*22:28-23:27*	*59*	[redacted]	[redacted]	*538*	*548*	*31*	[redacted]	[redacted]
	Average	***59***	[redacted]	[redacted]	***539***	***548***	***31***	[redacted]	[redacted]

Jan 2019 Source Test					Fan Amps			Venturi DP (Inches WG)	
Run#, Date	Time	Run Time (minutes)	Material Feed Rate (Tons/hr)	Material output (Tons/hr)	Fan 1 (SFA3)	Fan 2 (SFA4)	Mill Water Spray Rate (GPM)	Scrubber 1 (PDIT 10)	Scrubber 2 (PDIT20)
Light Iron Only									
Run 4 1/22/2019	*19:01-21:00*	*60*	[redacted]	[redacted]	*536*	*546*	*28*	[redacted]	[redacted]
Run 5 1/22/2019	*20:09-21:08*	*59*	[redacted]	[redacted]	*535*	*546*	*34*	[redacted]	[redacted]
Run 1/22/2019	*18:16-19:26*	*70*	[redacted]	[redacted]	*536*	*548*	*33*	[redacted]	[redacted]
	Average	***63***	[redacted]	[redacted]	***536***	***547***	***32***	[redacted]	[redacted]

APPENDIX E
QUALITY ASSURANCE/QUALITY CONTROL

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

PUBLIC COPY

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)

PUBLIC COPY

- 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.

PUBLIC COPY

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.

PUBLIC COPY

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

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

A2LA

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

PUBLIC COPY

PUBLIC COPY

MONTROSE
ENVIRONMENTAL

Qualified Individual Conformance Statement

I Todd Smith, as a QI (Qualified Individual) sign this Conformance Statement to verify that each of the test projects that I perform, and each of the test projects performed under my supervision will conform with the Montrose Air Quality Services Management System, the test methods applicable to the testing, and ASTM D 7036-04.

I realize that as a Qualified Individual I have the proper knowledge to perform these tests correctly, and that I am held to a high standard of integrity.

QI Signature

01/06/2017
Date

PUBLIC COPY

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

I Todd Smith as an employee of Montrose Air Quality Services, LLC (MAQS), sign this Quality Management System Conformance Statement to verify that I have read and understand the requirements set forth in the MAQS Quality Policy Statement and in the MAQS Quality Manual. Furthermore, I understand my role in the company as it pertains to the Quality Management System.

Employee Signature

8-3-15
Date

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

TODD J. SMITH

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 27TH DAY OF MAY 2014 AND EFFECTIVE UNTIL MAY 26TH, 2019

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

Glenn C. England, QSTI/QSTO Review Board

CERTIFICATE
ID NO.
2011-517

PUBLIC COPY

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

TODD J. SMITH

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

SUED THIS 26TH DAY OF JANUARY 2015 AND EFFECTIVE UNTIL JANUARY 25TH, 2020

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

Glenn C. England, QSTI/QSTO Review Board

CERTIFICATE
ID NO.
2011-517

PUBLIC COPY

CERTIFICATE OF COMPLETION

Todd Smith

This document certifies that this individual has passed a comprehensive examination and is now a Qualified Individual (QI) as defined in Section 8.3 of ASTM D7036-04 for the following method(s):

EPA Method TO-15

Certificate Number: 2015-011

Tate Strickler, Accreditation Director

DATE OF ISSUE: 2/11/2015

DATE OF EXPIRATION: 2/11/2020

MONTROSE ENVIRONMENTAL

PUBLIC COPY

Appendix E.3
CEM Analyzer Calibration Data

PUBLIC COPY

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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)

Analyzer Configuration

Name:	O2	CO2	THC (VO4)
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:			
Zero Conc:	0	0	0
Low Number:			CC222293
Low Conc:			264.5
Mid Number:	CC148888	CC148888	CC168703
Mid Conc:	10.28	9.966	503.1
High Number:	CC464917	CC464917	CC25564
High Conc:	23.05	22.87	865.6
Bias Number:	CC464917	CC464917	CC168703
Bias Conc:	23.05	22.87	503.1

PUBLIC COPY

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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)

Calibration

Name:	O2	CO2	THC (VO4)
Make/Model:			
25A or 7E:	7E	7E	25A

Cylinder Concentrations

Zero:	0.000	0.000	0.000
Low:			264.5
Mid:	10.28	9.966	503.1
High:	23.05	22.87	865.6

Calibration Readings

Zero reading:	0.194	0.040	3.230
Low reading:	0.000	0.000	271.6
Mid reading:	10.26	9.992	505.5
High reading:	22.98	22.85	868.4

EPA Method 7E Error Calculations

Zero %Err:	**<2.0**	0.842	0.175	N/A
Mid %Err:	**<2.0**	-0.087	0.114	N/A
High %Err:	**<2.0**	-0.304	-0.087	N/A

EPA Method 25A Error Calculations

Zero Err:	**N/A**	N/A	N/A	3.230
Low Err:	**5% of cyl**	N/A	N/A	7.100
Mid Err:	**5% of cyl**	N/A	N/A	2.400
High Err:	**N/A**	N/A	N/A	2.800

PUBLIC COPY

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number:	CEMS Operator: TJS	Unit/Condition: Shredder/Car body 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)

Initial bias

Name:	O2	CO2	THC (VO4)
Make/Model:			
25A or 7E:	7E	7E	25A

Cylinder Concentrations			
Zero:	0.000	0.000	0.000
Low:			264.5
Mid:	10.28	9.966	503.1
High:	23.05	22.87	865.6

Calibration Readings			
Zero reading:	0.194	0.040	3.230
Low reading:	0.000	0.000	271.6
Mid reading:	10.26	9.992	505.5
High reading:	22.98	22.85	868.4

EPA Method 7E Error Calculations				
Zero %Err:	**<2.0**	0.842	0.175	N/A
Mid %Err:	**<2.0**	-0.087	0.114	N/A
High %Err:	**<2.0**	-0.304	-0.087	N/A

EPA Method 25A Error Calculations				
Zero %Err:	**N/A**	N/A	N/A	3.230
Low %Err:	**5% of cyl**	N/A	N/A	7.100
Mid %Err:	**5% of cyl**	N/A	N/A	2.400
High %Err:	**N/A**	N/A	N/A	2.800

Initial Bias Data				
	Zero reading:	-0.003	0.012	N/A
	Span reading:	22.87	22.59	N/A
Zero % bias:	**<5.0**	-0.855	-0.122	N/A
Span % bias:	**<5.0**	-0.477	-1.137	N/A

Appendix E.4
Span Gas Certificates

PUBLIC COPY

Airgas
an Air Liquide company

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:	E03NI80E15A0138	Reference Number:	153-401277851-1
Cylinder Number:	CC148888	Cylinder Volume:	150.9 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Aug 14, 2018

Expiration Date: Aug 14, 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	10.00 %	9.966 %	G1	+/- 0.6% NIST Traceable	08/14/2018
OXYGEN	10.00 %	10.28 %	G1	+/- 0.7% NIST Traceable	08/14/2018
NITROGEN	Balanc				

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	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)	Aug 09, 2018
Horiba MPA-510 W603MM58 O2	O2 Paramagnetic (Mason)	Aug 09, 2018

Triad Data Available Upon Request

Signature on file

Approved for Release

PUBLIC COPY

Airgas
an Air Liquide company

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:	E03NI54E15A3808	Reference Number:	153-401277846-1
Cylinder Number:	CC464917	Cylinder Volume:	162.7 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Aug 21, 2018

Expiration Date: Aug 21, 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	23.00 %	22.87 %	G1	+/- 0.6% NIST Traceable	08/21/2018
OXYGEN	23.00 %	23.05 %	G1	+/- 0.5% NIST Traceable	08/21/2018
NITROGEN	Balanc				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060712	CC413623	16.939 % CARBON DIOXIDE/NITROGEN	0.6%	May 08, 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)	Aug 09, 2018
Horiba MPA-510 W603MM58 O2	O2 Paramagnetic (Mason)	Aug 09, 2018

Triad Data Available Upon Request

Signature on file

Approved for Release

PUBLIC COPY

Airgas
an Air Liquide company

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

Signature on file

Approved for Release

PUBLIC COPY

Airgas
an Air Liquide company

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:	48-124605140-1
Cylinder Number:	CC168703	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:	Mar 01, 2017

Expiration Date: Mar 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	503.1 PPM	G1	+/- 1.2% NIST Traceable	03/01/2017
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	Mar 01, 2017

Triad Data Available Upon Request

Signature on file

Approved for Release

PUBLIC COPY

Airgas
an Air Liquide company

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

Triad Data Available Upon Request

Signature on file

Approved for Release

Appendix E.5
Equipment Calibration Data

MONTROSE

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-24
Meter ID (if applicable):	CB-24
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:	**1.0020**
ΔH@:	**1.866**

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)
0.35	17.00	904.873	910.126	5.253	72.0	72.0	73.0	73.0	RG-40	0.2373	17.0	72.0	73.0	72.5
0.70	12.00	896.540	904.063	5.423	72.0	72.0	72.0	72.0	RG-48	0.3490	17.0	72.0	72.0	72.0
1.04	14.00	922.320	930.282	7.942	75.0	75.0	77.0	77.0	RG-55	0.4345	17.0	75.0	77.0	76.0
1.95	7.50	892.085	898.000	5.915	72.0	73.0	73.0	73.0	RG-63	0.6010	16.0	72.0	73.0	72.5
3.33	11.00	910.702	922.011	11.309	73.0	73.0	75.0	75.0	RG-73	0.7938	17.0	73.0	75.0	74.0

— SAMPLE RATE —
INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
0.35	0.308
0.70	0.453
1.04	0.562
1.95	0.780
3.33	1.029

— DRY GAS METER —
VOLUME CORRECTED

Vm(std) (cu ft)
5.216
5.395
7.848
5.897
11.280

— ORIFICE —

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
5.208	5.277
5.438	5.476
7.869	7.984
5.850	5.897
11.317	11.439

– DRY GAS METER –
CALIBRATION FACTOR Yd

Value (number)	Variation (number)
1.0038	0.002
1.0080	0.006
1.0027	0.001
0.992	-0.010
1.003	0.001

— ORIFICE —
CALIBRATION FACTOR ΔH@

Value (in H2O)	Variation (in H2O)
2.060	0.194
1.905	0.038
1.826	-0.040
1.789	-0.077
1.752	-0.115

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	1.0020
Average ΔH@	1.8663
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
32	31	31	31	31	32
71	72	73	72	73	73
122	125	122	121	120	121
256	251	250			
351	358	351			
502					
705					
901					

Thermocouple simulator	
Make:	Omega
Model:	HH911T
Serial Number:	1788
Cal Date:	4/8/2018

* 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 Signature: [signature] Date: 6/8/18

Approved by: Name: Todd Smith Signature: [signature] Date: 6/11/18

PUBLIC COPY

MONTROSE

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-24
Meter ID (if applicable):	CB-24
Orifice set ID:	Antioch
Calibrated by:	SC
Expires:	**6/6/19**

Date:	12/6/18
Location:	Antioch
No. of orifices used (min. 3)	5
Barometric pressure (in. Hg):	29.91 in. Hg
Theoretical critical vacuum	14.11 in. Hg

Yd:	**0.9894**
ΔH@:	**1.8151**

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. (R)^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)
0.99	15.00	482.053	490.384	8.331	58	58	59	59	55	0.4281	16.0	56	59	57.5
0.32	17.00	490.730	495.912	5.182	59	59	61	61	40	0.2344	16.0	59	61	60.0
0.59	12.00	496.270	501.660	5.390	61	61	63	63	48	0.3447	16.0	61	63	62.0
1.92	17.00	503.125	516.292	13.167	64	64	64	64	63	0.5820	16.0	64	64	64.0
3.45	14.00	517.000	531.353	14.353	68	68	68	68	73	0.7796	16.0	68	68	68.0

-- SAMPLE RATE --
INDICATED VS. ACTUAL

ΔH (in. H2O)	Sample Rate (scfm)
0.99	0.563
0.32	0.307
0.59	0.451
1.92	0.774
3.45	1.015

-- DRY GAS METER --
VOLUME CORRECTED

Vm(std) (cu ft)
8.514
5.262
5.456
13.320
14.464

-- ORIFICE --

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
8.443	8.281
5.227	5.151
5.415	5.357
13.150	13.060
14.207	14.217

-- DRY GAS METER --
CALIBRATION FACTOR Yd

Value (number)	Variation (number)
0.9916	0.002
0.9933	0.004
0.9925	0.003
0.987	-0.002
0.982	-0.007

-- ORIFICE --
CALIBRATION FACTOR ΔH@

Value (in H2O)	Variation (in H2O)
1.793	-0.022
1.933	0.118
1.646	-0.167
1.816	0.003
1.884	0.069

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	0.9894
Average ΔH@	1.8151
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Pressure Leak Check

Test Pressure, (in H_2O):	6	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):	15	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.*
32	7
68	8
120	9
250	11
350	12
500	14
700	17
900	20

Stack	Probe	Filter	Exit	Aux.	Meter In	Meter Out
31	31	30	31	31	31	31
67	65	66	66	66	66	66
117	118	117	118	120	120	120
249	249	249				
350	349	349				
497						
702						
902						

Thermocouple simulator	
Make/Model:	Omega CL125
Serial No.	16200736
Cal Date:	11/27/2018

Meter Thermocouple Calibration

Ref. Temp	Allowable Temp. Dev.*	Meter In	Meter Out

Reference Thermometer	
Make/Model:	
Serial No.	
Cal Date:	

* 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 CROCKETT Signature: [signature] Date: 12/12/18

Approved by: Name: STEVE CROCKETT Signature: [signature] Date: 12/12/18

PUBLIC COPY

PUBLIC COPY

MONTROSE

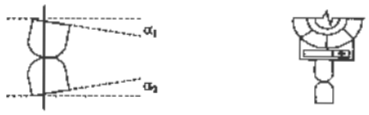
Pitot Tube Calibration Data Sheet

Calibration Date:	August 3, 2017	Performed by:	Jonathan Stanton	Expiration Date:	February 3, 2018
Reference Pitot Tube:	Standard	ID No.:	175	No obstructions:	Yes
Calibrated Pitot Tube:	S-type	Probe/Pitot ID No:	175-TP-8	No damage:	Yes
Probe Description:	TRAVERSE - Flow & Temp (TP)	Effective Length (ft):	8	Level and Perpendicular:	Yes
Thermocouple calibration performed?		Yes	Thermocouple passed calibration?		Yes

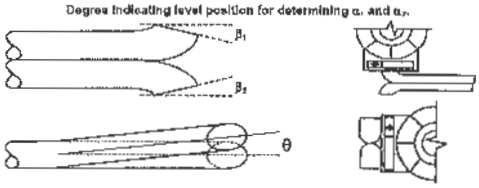
Protractor or Digital Angle Finder ID: 1-APR-OAK
Measuring Tape ID: 1-TM-OAK
Caliper ID: 160680529

Calibration performed using the procedures of EPA Method 2, Section 10.1

Alignment and Tubing Dimensions

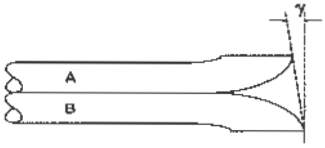


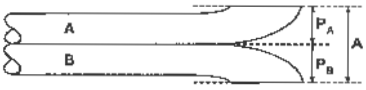
Degree indicating level position for determining α_1 and α_2.



Degree indicating level position for determining θ.

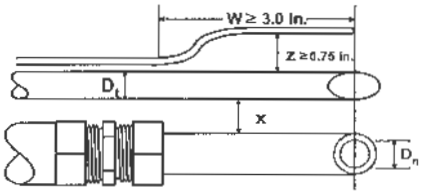
α_1 $(-10° < \alpha_1 < +10°)$	2.0	
α_2 $(-10° < \alpha_2 < +10°)$	3.0	
β_1 $(-5° < \beta_1 < +5°)$	4.0	
β_2 $(-5° < \beta_2 < +5°)$	4.0	
γ	5.0	
θ	1.0	
A	0.9440	
z= A tan γ (± 0.125")	0.0826	Pass
w= A tan θ (± 0.03125")	0.0165	Pass
D_t (0.1875" < D_t < 0.375")	0.3740	Pass
P_A (1.05D_t < P_A < 1.5D_t)	0.4350	Pass
P_B (1.05D_t < P_B < 1.5D_t)	0.4890	Pass
$P_A = P_B \pm 0.0625$	-0.0540	Pass



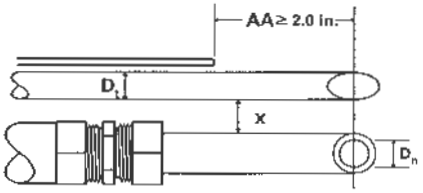


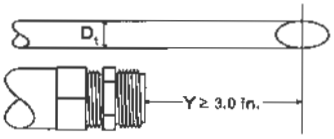
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")		
-or- AA (≥ 2.0")	2.500	Pass
X		
D_n		
X / D_n (≥ 1.5)		
Y (≥ 3.0")		
Z ≥ 0.75"		





Performed By: JONATHAN STANTON Signature: Date: 8/3/17

Approved By: STEVE CRUGHAN Signature: Date: 8/10/17

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