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SOURCE TEST REPORT
2017 EMISSION TESTS
CASCADE STEEL ROLLING MILLS, INC.
A SCHNITZER COMPANY
STEEL SHREDDER
OAKLAND, CALIFORNIA

Prepared For:

SCHNITZER STEEL
1101 Embarcadero West
Oakland, California 94607

For Submittal To:

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
San Francisco, California

Prepared By:

MONTROSE AIR QUALITY SERVICES, LLC
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(925) 680-4300

Test Date:	June 28-29, 2017
Date Report Issued:	August 23, 2017
Project Number:	005AS-179737

REVIEW AND CERTIFICATION

All work, calculations, and other activities and tasks performed and documented in this report were carried out by me or under my direction and supervision. I hereby certify that to the best of my knowledge, MAQS operated in conformance with the requirements of the MAQS Quality Manual during this test project.

Name: Andrew Berg, QSTI Title: Client Project Manager

Sign: Date: 08/23/2017

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 and accurate and conforms to the requirements of the MAQS Quality Manual.

Name: Dan Duncan Title: QA/QC Manager

Sign: Date: 08/23/2017

Int._____

Test Report Prepared by: Patrick Switzer

SUMMARY INFORMATION

Source and Contact Information

Source Location:	Schnitzer Steel 1101 Embarcadero West Oakland, California 94607
Project Contact: Company: Telephone:	Mr. Daniel Lee Cascade Steel Rolling Mills, Inc., a Schnitzer Company (503) 434-3324
Facility No.: Condition No.:	208 46401
NST #:	NST-4538
Regulatory Agency:	Bay Area Air Quality Management District
Unit:	Shredder (S-6) and Infeed Conveyor (S-7); abated by Water Sprays (A-6) and Venturi Scrubbers (A-11 and A-12)
Purpose:	Determination of compliance with permit conditions Determination of abatement system control efficiency
Test Methods:	EPA Methods 1, 2, 3a, 4, 201A/202, 306; TO-12, TO-15 CARB Method 428

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC 2825 Verne Roberts Circle Antioch, California 94509
Certifications:	ARB Independent Tester Accredited AETB, Cert. No. 3925.01
Contact/Onsite QI: Telephone: Facsimile:	Mr. Andrew Berg Client Project Manager (925) 234-1385 (925) 680-4416
Test Dates:	June 28-29, 2017

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SECTION 1.0

INTRODUCTION

Montrose Air Quality Services, LLC (MAQS) was contracted by Cascade Steel Rolling Mills, Inc., a Schnitzer Company (Schnitzer), to perform a series of air emission tests at their facility in Oakland, California. The tests were performed to determine control efficiency of the control device serving their steel shredder. Emissions were measured before and after the control device.

The testing was conducted by Andrew Berg, Jonathan Stanton, Sang Thao, and Keoni Davis of MAQS on June 28-29, 2017. Daniel Lee of Schnitzer coordinated the testing program. The tests were conducted according to the test plan dated May 30, 2017. NST-4538 was assigned to the project. MAQS performed the tests to measure the following emission parameters:

- Control Efficiency:
  - Particulate Matter < 10 µm (gr/dscf, lb/hr, lb/ton material processed)
  - Total Particulate Matter (gr/dscf, lb/hr, lb/ton material processed)
- Compliance with Permit Conditions:
  - Particulate Matter < 2.5 µm (gr/dscf, lb/hr, lb/ton material processed)
  - Particulate Matter < 10 µm (gr/dscf, lb/hr, lb/ton material processed)
  - Total Particulate Matter (gr/dscf, lb/hr, lb/ton material processed)
  - Total POC (lb/hr and lb/ton material processed)
  - Benzene (lb/hr and lb/ton material processed)
  - Tetrachloroethylene (lb/hr and lb/ton material processed)
  - Trichloroethylene (lb/hr and lb/ton material processed)
  - Hexavalent chromium (lb/hr and lb/ton material processed)
  - PCBs (lb/hr and lb/ton material processed)
  - Cadmium (lb/hr and lb/ton material processed)
  - Lead (lb/hr and lb/ton material processed)
- Supporting Parameters:
  - O_2 and CO_2 (% by volume) for molecular weight calculations
  - Stack gas moisture content (% by volume)
  - Stack gas volumetric flow rate (dscfm)

Both qualitative and quantitative factors contribute to field measurement uncertainty and should be taken into consideration when interpreting the results contained within this report. Whenever possible, Montrose Air Quality Services, LLC (MAQS) personnel

reduce the impact of these uncertainty factors through the use of approved and validated test methods. In addition, MAQS 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.

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 MAQS. The emission test results are summarized in Tables 1-1 through 1-5.

All supporting information is included in the appendices. These include MAQS's quality assurance procedures and CARB certification for source testing, process data, gaseous emissions data, CEMS data, field data sheets, calculations and spreadsheets and equipment calibrations.

TABLE 1-1
AVERAGE RESULTS
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE
JUNE 28-29, 2017

Test No.:	Avg. Results (Inlet)	Avg. Results (Outlet)	Limit
Unit Data:			
Feed Rate, tph[1]	[redacted]	[redacted]	--
Flue Gas:			
O_2, % volume dry	21.0	21.0	--
CO_2, % volume dry	0.0	0.0	--
Flue gas temp., °F	63.2	74.4	--
Moisture, % vol.	2.3	2.9	--
Vol. flow rate, dscfm	[redacted]	[redacted]	--
Filterable $PM_{2.5}$:			
gr/dscf	--	[redacted]	--
lb/hr	--	2.6	--
lb/ton material proc'd processed	--	[redacted]	--
Filterable PM_{10}:			
gr/dscf	[redacted]	[redacted]	--
lb/hr	1.1	2.9	--
lb/ton material proc'd processed	[redacted]	[redacted]	--
Filterable PM:			
gr/dscf	[redacted]	[redacted]	--
lb/hr	1.8	3.2	--
lb/ton material proc'd processed	[redacted]	[redacted]	--
Condensable PM (Dry Impingement):			
gr/dscr	[redacted]	[redacted]	--
lb/hr	0.5	0.9	--
lb/ton material proc'd	[redacted]	[redacted]	--

1 - Feed rate of ferrous material is based on daily tonnage value and daily production hours reported by the facility.

TABLE 1-1 (Cont.)
AVERAGE RESULTS
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE
JUNE 28-29, 2017

Test No.:	Avg. Results (Inlet)	Avg. Results (Outlet)	Limit
Unit Data:			
Feed Rate, tph[1]	[redacted]	[redacted]	--
Flue Gas:			
O_2, % volume dry	21.0	21.0	--
CO_2, % volume dry	0.0	0.0	--
Flue gas temp., °F	63.2	74.4	--
Moisture, % vol.	2.3	2.9	--
Vol. flow rate, dscfm	[redacted]	[redacted]	--
Total $PM_{2.5}$:			
gr/dscf	--	[redacted]	--
lb/hr	--	3.5	--
lb/ton material proc'd processed	--	[redacted]	--
Total PM_{10}:			
gr/dscf	[redacted]	[redacted]	--
lb/hr	1.6	3.8	--
lb/ton material proc'd processed	[redacted]	[redacted]	--
Total PM:			
gr/dscf	[redacted]	[redacted]	0.01
lb/hr	2.2	4.1	--
lb/ton material proc'd processed	[redacted]	[redacted]	--

1 - Feed rate of ferrous material is based on daily tonnage value and daily production hours reported by the facility.

TABLE 1-2
STEEL SHREDDER CONTROL DEVICE EFFICIENCY
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE
JUNE 28-29, 2017

Test No.:	1-PM	2-PM	3-PM	Average
PM_{10} Destruction Efficiency, %:	NMF	NMF	NMF	NMF
Total PM Destruction Efficiency, %:	NMF	NMF	NMF	NMF

Note: Due to the high concentration of particulate matter at the outlet, calculation of control efficiency generated data that was not meaningful (NMF).

TABLE 1-3
AVERAGE RESULTS
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE
JUNE 28-29, 2017

Parameter	Average Results
Process Data:	
Feed Rate, tph[1]	[redacted]
Flue Gas:	
O_2, % volume dry	21.0
CO_2, % volume dry	0.0
Flue gas temp., °F	74.8
Moisture, % vol.	2.4
Vol. flow rate, dscfm	[redacted]
Total POC Emissions:	
lb/hr as CH_4	56.5
lb/ton material proc'd as CH_4	[redacted]
Benzene:	
lb/hr	0.29
lb/ton material proc'd	[redacted]
Tetrachloroethylene:	
lb/hr	0.007±0.007
lb/ton material proc'd	[redacted]
Trichloroethylene:	
lb/hr	2.3E-2±3E-3
lb/ton material proc'd	[redacted]
Hexavalent Chromium, Cr^{6+}:	
lb/hr	3E-3±3E-3
lb/ton material proc'd	[redacted]

1 - Feed rate of ferrous material is based on daily tonnage value and daily production hours reported by the facility.

TABLE 1-4
AVERAGE RESULTS
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE
JUNE 28-29, 2017

Parameter	Average Results
Process Data:	
Feed Rate, tph[1]	[redacted]
Flue Gas:	
O_2, % volume dry	21.0
CO_2, % volume dry	0.0
Moisture, % vol.	2.8
Vol. flow rate, dscfm	[redacted]
Cadmium:	
lb/hr	2.4E-4
lb/ton material proc'd	[redacted]
Lead:	
lb/hr	1.7E-3
lb/ton material proc'd	[redacted]

1 - Feed rate of ferrous material is based on daily tonnage value and daily production hours reported by the facility.

TABLE 1-5
AVERAGE RESULTS
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE
JUNE 29, 2017

Parameter	Average Results
Process Data:	
Feed Rate, tph[1]	[redacted]
Flue Gas:	
O_2, % volume dry	21.0
CO_2, % volume dry	0.0
Moisture, % vol.	2.8
Vol. flow rate, dscfm	[redacted]
Total PCBs:	
lb/hr	1.06E-02
lb/ton material proc'd	[redacted]

1 - Feed rate of ferrous material is based on daily tonnage value and daily production hours reported by the facility.

SECTION 2.0

SOURCE LOCATION INFORMATION

2.1 FACILITY DESCRIPTION

The Schnitzer Steel Products facility at the Port of Oakland 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 exhaust system fed by a nozzle placed at the exit of the shredder. The exhaust system ducts the collected air through a wet venturi scrubber, a demister, and two separate filtering systems before being it is emitted to atmosphere via a vertical stack.

2.2 SAMPLING LOCATION

The inlet to the abatement system consists of two horizontal ducts, each with a diameter of approximately 62". These ducts transfer gases and captured particulate matter from the drop out box to the abatement devices. Inlet sampling was conducted in the longer of the two transfer ducts, as shown in the diagram in Appendix C, item 18. Exhaust from the shredder is emitted via a vertical cylindrical duct 76.5" in diameter. The stack is equipped with two sampling ports located 90° apart from each other in the same horizontal plane. Duct dimensions were verified before testing begins. Sampling traverse points were located according to EPA Method 1.

SECTION 3.0

TEST DESCRIPTION

3.1 PROGRAM OBJECTIVES

The testing program was conducted to determine control device system efficiency and to determine emission rates of Lead (Pb), Cadmium (Cd), POC, PCBs, and Hexavalent Chromium (Cr^{+6}) at the control device exhaust.

3.2 TEST CONDITIONS

During the tests, the shredder was operated at infeed rates representative of normal, maximum capacity operations. Process parameters were controlled and monitored by Schnitzer personnel.

3.3 TEST PROGRAM SCHEDULE

The actual test program schedule is presented in Table 3-1.

TABLE 3-1
TEST PROGRAM SCHEDULE
SCHNITZER STEEL PRODUCTS
SCRAP METAL SHREDDER

Date	Activity / Parameter	Test Run	Run Duration
June 27, 2017	Mobilization, set-up	--	--
June 28, 2017	Compliance Tests - Outlet		
	O_2, CO_2	1, 2 of 3	60 minutes
	PM, PM_{10}, $PM_{2.5}$	1, 2 of 3	120 minutes
	Lead, Cadmium	1, 2 of 3	120 minutes
	POCs	1, 2, 3 of 3	120 minutes
	Velocity flow rate / moisture	1, 2, 3 of 3	120 minutes
	Compliance Tests – Inlet		
	O_2, CO_2	1 of 3	60 minutes
	PM, PM_{10}	1 of 3	120 minutes
June 29, 2017	Compliance Tests - Outlet		
	O_2, CO_2	3 of 3	60 minutes
	PM, PM_{10}, $PM_{2.5}$	3 of 3	120 minutes
	Lead, Cadmium	3 of 3	120 minutes
	O_2, CO_2	1, 2, 3	60 minutes
	PCBs	1, 2, 3	120 minutes
	Cr (VI)	1, 2, 3	120 minutes
	Velocity flow rate / moisture	1, 2, 3	120 minutes
	Compliance Tests – Inlet		
	O_2, CO_2	2, 3 of 3	60 minutes
	PM, PM_{10}	2, 3 of 3	120 minutes

3.4 TEST PROCEDURES

The test procedures used by MAQS in this testing program are summarized in Table 3-2. Additional information on specific applications or modifications to standard procedures is presented in the following sub-sections.

TABLE 3-2
TEST PROCEDURES FOR STEEL SHREDDER CONTROL DEVICE
SCHNITZER STEEL

Parameter	Measurement Principle	Reference Method
O_2	Paramagnetism	EPA 3A
CO_2	Non-dispersive infrared	EPA 3A
PM, $PM_{2.5}$, PM_{10}	Gravimetry with condensable analysis	EPA 201A/202
Total POCs	Gas chromatography	TO-12
Benzene Tetrachloroethylene Trichloroethylene	Gas chromatography	TO-15
Metals	ICPMS	EPA 29
PCBs	Gas chromatography	CARB 428
Cr (VI)	Ion Chromatograph	EPA 306
Moisture content	Impinger weight gain	EPA 4
Vol. flow rate	Pitot / temperature traverse	EPA Method 1, 2

3.4.1 Gaseous Emissions

Concentrations of the gaseous constituents of the stack gas (O_2 and CO_2) were measured using MAQS's dry extractive reference method (RM) monitor system. This system meets the requirements of EPA and CARB methods for gaseous species. Tedlar bag samples were collected at the inlet test location for O_2 and CO_2 measurements. Pertinent information regarding the performance of the methods is presented below:

- Method Deviations: None.
- Method Options: N/A.

3.4.2 PM, PM_{10}, and $PM_{2.5}$ Emissions

The concentrations and emission rates of total PM, PM_{10}, and $PM_{2.5}$ were measured using a combination of EPA Methods 201A and 202. The measurements included filterable and condensable particulate matter (CPM). The Method 201A samples were handled as described in the method. The Method 202 samples were handled as described in Method 202, including the use of "dry" impingers and the required post-test nitrogen purge. Additional information regarding the PM tests is presented below:

- Method Deviations - None
- Sample Duration - 120 minutes
- Expected Sample Volume - 70 dscf
- Analytical Laboratory - MAQS, Antioch, CA

3.4.3 Hexavalent Chromium Emissions

Concentrations of hexavalent chromium were determined using EPA Method 306. Pertinent information regarding the performance of the method is presented below:

- Method Deviations - None
- Target Analytes – Hexavalent chromium
- Sample Duration - 120 minutes
- Expected Sample Volume - 70 dscf
- Analytical Laboratory – Curtis & Tompkins, Ltd., Berkeley CA

3.4.4 Metals Emissions

Concentrations of metals were determined using EPA Method 29. Pertinent information regarding the performance of the method is presented below:

- Method Deviations - None
- Target Analytes – Lead (Pb) and Cadmium (Cd)
- Audit Sample - An audit sample was ordered through ERA and analyzed per the SSAS (Stationary Source Audit Sample program) - refer to Section 4.2.
- Sample Duration - 120 minutes
- Expected Sample Volume - 70 dscf
- Analytical Laboratory - TestAmerica, West Sacramento, CA

3.4.5 Precursor Organic Compounds Emissions

Concentrations of POC were measured using EPA Method 18. The sampling and analysis protocol of EPA Compendium Method TO-12 were used in order to provide low detection limits. Pertinent information regarding the performance of the methods is presented below:

- Method Deviations - No pre-survey samples were collected.
- Sampling Media - Samples were collected in SUMMA canisters.
- Target Analytes – Total non-methane, non-ethane hydrocarbons excluding exempt compounds as defined by BAAQMD.
- Analytical Laboratory - Atmospheric Analysis & Consulting, Inc., Ventura, CA

- Other Method Notes - Samples were collected such that a partial vacuum (i.e. at least 5 inches Hg) will remain in each canister to prevent condensation of water or POC within the canister.

3.4.6 Specific Organic Compounds Emissions

Concentrations of specific organic compounds were measured using EPA Compendium Method TO-15. Pertinent information regarding the performance of the methods is presented below:

- Sampling Media - Samples were collected in SUMMA canisters.
- Target Analytes – Benzene, tetrachloroethylene and trichloroethylene
- Analytical Laboratory - Atmospheric Analysis & Consulting, Inc., Ventura, CA
- Other Method Notes - Samples were collected such that a partial vacuum (i.e. at least 5 inches Hg) will remain in each canister to prevent condensation of water or POC within the canister.

3.4.7 Polychlorinated Biphenyl Emissions

Concentrations of polychlorinated biphenyls (PCBs) were measured using CARB Method 428. Pertinent information regarding the performance of the method is presented below:

- Method Deviations – None
- Sample Duration - 120 minutes
- Expected Sample Volume – 70 dscf
- Analytical Laboratory - Vista Analytical Laboratory, El Dorado Hills, CA

3.4.8 Emission Rates, Volumetric Flow Rates and Moisture Content

Stack gas velocities were measured using EPA Methods 1 and 2. The stack gas moisture contents were measured according to EPA Method 4. O_2 and CO_2 concentrations were obtains from the concurrent EPA Method 3A test runs. The results were used in calculation of the sampling rate factors. Emission rates were calculated from the volume flow rates and the analyte concentrations determined from the other methods run concurrently.

3.4.9 Control Efficiency

Control efficiency were based on the mass flows in and out and calculated using the following equation:

$$\% \text{ Efficiency} = \frac{(C_{in} - C_{out})}{C_{in}} * 100$$

Where C = PM (lb/hr) at the inlet and outlet

3.4.10 Process Data

Process conditions were controlled and documented by Schnitzer personnel include tons of material processed..

SECTION 4.0

QUALITY ASSURANCE AND REPORTING

4.1 SAMPLING AND ANALYTICAL QA/QC

MAQS has instituted a rigorous QA/QC program for all of its air pollution testing. The program ensures that the emission data reported are as accurate as possible. The procedures included in the cited reference methods were followed for all steps of preparation, sampling, calibration, and analysis. MAQS was responsible for preparation, calibration and cleaning of the sampling apparatus. MAQS also conducted the sampling and sample recovery, storage and shipping.

Contract laboratories conducted some of the preparation and sample analyses. The laboratories that were used are established leaders in development and performance of the reference methods for which they have been selected. Their credentials for adherence to the required quality assurance procedures are well known.

4.2 QUALITY CONTROL REQUIREMENTS

Our Quality Assurance Program Summary, located in Appendix A, provides our equipment maintenance and calibration schedule, quality control acceptance limits, and any corrective action that may be needed. For additional quality control, MAQS followed the procedures outlined below:

- All field equipment was visually inspected prior to testing and included pre-test calibration checks.
- In addition to the normal cleaning methods, all sample train glassware was cleaned in acidic cleaning solution.
- Glassware was visually inspected prior to testing.
- Preliminary stack flow and temperature measurements were taken to assure correct isokinetic sampling.
- All reagents were made fresh daily when required. A new reagent blank was retained for every new stock of reagent.
- For this test program, MAQS obtained an EPA Method 29 TNI SSAS audit sample for cadmium and lead analysis. As per the criteria set forth in the TNI SSAS program, the sample was stored, shipped and analyzed along with the emissions samples collected during the test program. The analysis results for the audit sample are reported along with the emissions results for the samples collected during the test program.

4.3 DATA REDUCTION PROCEDURES

The raw data collected during the sampling and analysis procedures were used to calculate the results of the testing program. The analysis or reduction of the data to the final results followed these steps, where appropriate to the test method:

1. Check field-sampling data for accuracy and calculate appropriate data averages (e.g., temperatures, pressures, volumes, etc.).
2. Double-check calculation of the data averages.
3. Review in-house and contract laboratory reports and ensure that appropriate and/or required QA/QC steps were followed.
4. Input field and laboratory data to established, verified computer spreadsheets for calculation of volumetric flow rates, mass emission rates or other appropriate results.
5. To verify results, perform example calculations by hand on a single test run for each emission result reported.
6. Compile summary tables of results and review all inputs.

This report includes copies of spreadsheet printouts (data input and results output) and example calculation checks. The field data sheets with average data calculations are also included. All values found to be below the detection limit of the analytical method were reported as "less than" ("<") the full detection limit value.

SECTION 5.0

DISCUSSION OF RESULTS

5.1 DETAILED DISCUSSION OF RESULTS

The emission test results are summarized in Table 1-1 through 1-5. The results of the individual test runs are presented in Tables 5-1 through 5-7.

Additional information is included in the appendices. Appendix A presents the quality assurance information, including instrument calibration data. Raw field data sheets are included in Appendix B. Appendix C presents the general and specific equations used for the emissions calculations and computer spreadsheets. Laboratory reports and chain of custody sheets for the samples are located in Appendix D. Copies of the permit are located in Appendix E.

5.2 PROBLEMS/DEVIATIONS/EXCEPTIONS

The first particulate test run conducted at the shredder inlet yielded no moisture collection in the impginer trains and no visible particulate matter on the filter. It was determined that a leak was present in the sampling train. The run was thrown out and an additional run was conducted.

Due to the high concentration of particulate matter at the outlet, calculation of control efficiency generated data that was not meaningful (NMF).

TABLE 5-1
PARTICULATE MATTER RESULTS (PM, PM_{10})
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE INLET

Test No.:	2-PM_{10}-In	3-PM_{10}-In	4-PM_{10}-In	Average
Date:	6/28/17	6/29/17	6/29/17	--
Time:	2322-0121	1826-2123	2210-0019	--
Unit Data:				
Feed Rate, tph[1]	[redacted]	[redacted]	[redacted]	[redacted]
Flue Gas:				
O_2, % volume dry	21.0	21.0	21.0	21.0
CO_2, % volume dry	0.0	0.0	0.0	0.0
Flue gas temp., °F	64.3	61.7	63.5	63.2
Moisture, % vol.	1.5	2.5	2.8	2.3
Vol. flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Filterable PM_{10}:				
gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	1.3	1.0	1.0	1.1
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Filterable PM:				
gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	1.7	1.6	2.0	1.8
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Condensable PM (Dry Impingement):				
gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	0.3	0.6	0.5	0.5
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Total PM:				
gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	2.0	2.1	2.5	2.2
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

1 - Feed rate of ferrous material is based on daily tonnage value and daily production hours reported by the facility.

TABLE 5-2
PARTICULATE MATTER RESULTS (PM, PM_{10}, $PM_{2.5}$)
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE OUTLET

Test No.:	1-PM_{10}-Out	2-PM_{10}-Out	3-PM_{10}-Out	Average
Date:	6/28/17	6/28/17	6/29/17	--
Time:	2030-2234	2322-0126	1827-2138	--
Unit Data:				
Feed Rate, tph[1]	[redacted]	[redacted]	[redacted]	[redacted]
Flue Gas:				
O_2, % volume dry	21.0	21.0	21.0	21.0
CO_2, % volume dry	0.0	0.0	0.0	0.0
Flue gas temp., °F	73.9	75.5	73.8	74.4
Moisture, % vol.	3.2	3.2	2.2	2.9
Vol. flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Filterable $PM_{2.5}$:				
gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	2.4	3.1	2.3	2.6
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Filterable PM_{10}:				
gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	2.7	3.4	2.6	2.9
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Filterable PM:				
gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	3.0	3.7	2.9	3.2
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Condensable PM (Dry Impingement):				
gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	0.9	0.9	0.9	0.9
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Total PM:				
gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
lb/hr	3.9	4.6	3.8	4.1
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

1 - Feed rate of ferrous material is based on daily tonnage value and daily production hours reported by the facility.

TABLE 5-3
SUMMARY OF RESULTS – HEXAVALENT CHROMIUM
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE OUTLET

Test No.:	1-Cr	2-Cr	3-Cr	Averages
Date:	6/29/17	6/29/17	6/29/17	--
Time:	1827-2137	2212-0015	0048-0250	--
Unit Data:				
Feed Rate, tph[1]	[redacted]	[redacted]	[redacted]	[redacted]
Flue Gas:				
O_2, % volume dry	21.0	21.0	21.0	21.0
CO_2, % volume dry	0.0	0.0	0.0	0.0
Moisture, % by volume	1.8	2.3	3.2	2.4
Flue gas temperature, °F	74.8	75.5	74.0	74.8
Vol. flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Hexavalent Chromium, Cr^{6+}:				
lb/hr	3E-3±3E-3	3E-3±3E-3	3E-3±3E-3	3E-3±3E-3
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

Note - Values found to be below the dection limit of the analytical method are reported here at one-half the detection limit ± one-half the detection limit.
1 - Feed rate of ferrous material is based on daily tonnage value and daily production hours reported by the facility.

TABLE 5-4
CADMIUM AND LEAD RESULTS
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE OUTLET

Test No.:	1-MM	2-MM	3-MM	Averages
Date:	6/28/17	6/28/17	6/29/17	--
Time:	2030-2234	2322-0127	2305-0107	--
Unit Data:				
Feed Rate, tph[1]	[redacted]	[redacted]	[redacted]	[redacted]
Flue Gas:				
O_2, % vol dry	21.0	21.0	21.0	21.0
CO_2, % vol dry	0.0	0.0	0.0	0.0
Moisture, % by vol	2.8	2.6	3.0	2.8
Vol. flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Cadmium:				
lb/hr	2.1E-4	2.9E-4	2.3E-4	2.4E-4
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Lead:				
lb/hr	1.4E-3	1.9E-3	1.8E-3	1.7E-3
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

1 - Feed rate of ferrous material is based on daily tonnage value and daily production hours reported by the facility.

TABLE 5-5
ORGANIC COMPOUNDS RESULTS
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE OUTLET

Test No.:	1-VOC	2-VOC	3-VOC	Averages
Date:	6/28/17	6/28/17	6/29/17	--
Time:	2030-2234	2322-0126	1827-2138	--
Unit Data:				
Feed Rate, tph[1]	[redacted]	[redacted]	[redacted]	[redacted]
Flue Gas:				
O_2, % vol. dry	21.0	21.0	21.0	21.0
CO_2, % vol. dry	0.0	0.0	0.0	0.0
Moisture, % by vol.	1.8	2.3	3.2	2.4
Flue gas temp, °F	74.8	75.5	74.0	74.8
Vol. flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Benzene:				
lb/hr	0.26	0.28	0.32	0.29
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Tetrachloroethylene:				
lb/hr	0.007±0.007	0.007±0.007	0.007±0.007	0.007±0.007
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Trichloroethylene:				
lb/hr	0.063	3E-3±3E-3	4E-3±4E-3	0.023±3E-3
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Total POC (TNMNEOC):				
lb/hr as CH_4	61.8	57.2	50.6	56.5
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

Note - Values found to be below the dection limit of the analytical method are reported here at one-half the detection limit ± one-half the detection limit.
1 - Feed rate of ferrous material is based on daily tonnage value and daily production hours reported by the facility.

TABLE 5-7
POLYCHLORINATED BIPHENYL (PCB) RESULTS
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE OUTLET

Test No.:	1-PCB	2-PCB	3-PCB	Averages
Date:	6/29/17	6/29/17	6/29/17	--
Time:	1827-2137	2212-0015	0048-0250	--
Unit Data:				
Feed Rate, tph[1]	[redacted]	[redacted]	[redacted]	[redacted]
Flue Gas:				
O_2, % vol. dry	21.0	21.0	21.0	21.0
CO_2, % vol. dry	0.0	0.0	0.0	0.0
Moisture, % by vol.	1.0	1.4	1.1	1.1
Flue gas temp, °F	75.7	75.0	73.9	74.9
Vol. flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Chlorobiphenyls:				
lb/hr	9.05E-04	1.10E-03	8.15E-04	9.41E-04
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Dichlorobiphenyls:				
lb/hr	3.57E-03	4.53E-03	3.33E-03	3.81E-03
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Trichlorobiphenyls:				
lb/hr	4.14E-03	5.51E-03	4.20E-03	4.62E-03
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Tetrachlorobiphenyls:				
lb/hr	8.97E-04	1.17E-03	8.40E-04	9.68E-04
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Pentachlorobiphenyls:				
lb/hr	9.65E-05	8.47E-05	8.57E-05	8.90E-05
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Hexachlorobiphenyls:				
lb/hr	2.27E-05	1.53E-05	1.40E-05	1.73E-05
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Heptachlorobiphenyls:				
lb/hr	7.50E-06	7.83E-06	3.66E-06	6.33E-06
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 5-7 (Cont.)
POLYCHLORINATED BIPHENYL (PCB) RESULTS
SCHNITZER STEEL
STEEL SHREDDER CONTROL DEVICE OUTLET

Test No.:	1-PCB	2-PCB	3-PCB	Averages
Date:	6/29/17	6/29/17	6/29/17	--
Time:	1827-2137	2212-0015	0048-0250	--
Unit Data:				
Feed Rate, tph[1]	[redacted]	[redacted]	[redacted]	[redacted]
Flue Gas:				
O_2, % vol. dry	21.0	21.0	21.0	21.0
CO_2, % vol. dry	0.0	0.0	0.0	0.0
Moisture, % by vol.	1.0	1.4	1.1	1.1
Flue gas temp, °F	75.7	75.0	73.9	74.9
Vol. flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Octachlorobiphenyls:				
lb/hr	1.69E-06	2.36E-06	1.02E-06	1.69E-06
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Nonachlorobiphenyls:				
lb/hr	2.15E-07	2.41E-07	2.13E-07	2.23E-07
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Decachlorobiphenyls:				
lb/hr	3E-8±3E-8	3.6E-08	3E-8±3E-8	3E-8±3E-8
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]
Total PCBs:				
lb/hr	9.68E-03	1.26E-02	9.42E-03	1.06E-02
lb/ton material proc'd	[redacted]	[redacted]	[redacted]	[redacted]

1 - Feed rate of ferrous material is based on daily tonnage value and daily production hours reported by the facility.

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APPENDIX A

QUALITY ASSURANCE

Appendix A.1

Quality Assurance Program Summary

QUALITY ASSURANCE PROGRAM SUMMARY AND CERTIFICATIONS

Montrose Air Quality Services, LLC (MAQS) 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. Audit Program.
8. Uncertainty of results.

Each of these areas is discussed individually below.

Quality Assurance Manual. MAQS has prepared a QA Manual according to EPA guidelines and ASTM D-7036. The manual serves to document and formalize all of MAQS'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 six QA areas discussed below.

QA Reviews. MAQS'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 B-1 and B-2.

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

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

Chain of Custody. MAQS 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, MAQS 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 MAQS employees nor cleaning crews have keys to this area.

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

1. Attendance at EPA-sponsored training courses.
2. Enrollment in EPA correspondence courses.
3. A requirement for all technicians to read, understand, and sign MAQS's QA Manual.
4. In-house training and MAQS meetings on a regular basis.
5. Maintenance of training records.
6. Administration of internal qualified individual (QI) tests for all methods performed.
7. 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. MAQS 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. MAQS 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, MAQS personnel reduce the impact of these uncertainty factors through the use of approved and validated test methods. In addition, MAQS 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 reasonable considered, but the ultimate impact of the cumulative uncertainty of this project is not fully identified within the results of this report.

TABLE B-1
SAMPLING INSTRUMENTS AND EQUIPMENT CALIBRATION SCHEDULE

Instrument Type	Frequency of Calibration	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	Cp constant (+5%) over working range; difference between average Cp for each leg must be less than 2%
Vacuum Gauges	12 months	NSIT-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

TABLE B-2
EQUIPMENT MAINTENANCE SCHEDULE
Based on Manufacturer's Specifications and MAQS's Experience

Equipment	Performance Requirement	Maintenance Interval	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 4. Check for system contamination
Sampling Lines	Sample degradation less than 2%	After each test or test series	Blow filtered air through line until dry

Appendix A.2

ARB Certification and ASTM D-7036 Accreditation

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER I-16-009

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

The Avogadro Group, LLC

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

WHEREAS, it has been determined that The Avogadro Group, LLC meets the requirements of ARB for performing ARB Test Methods 1, 2, 3, 4, 5, 8, 17, 100 (CO, CO_2, NO_X, O_2, SO_2, THC), Visible Emissions Evaluation (VEE), and U.S. Environmental Protection Agency (U S. EPA) Test Methods 18, 201A, and 202 pursuant to Cal. Code Regs., title 17, section 91200 and following, when the following conditions are met:

1. The Avogadro Group, LLC calibrates its metering system in accordance with section 5.3 of ARB Test Method 5, and establishes and maintains a log of the calibrations;

2. The Avogadro Group, LLC acquires and uses sulfuric acid in accordance with section 3.3.5 of ARB Test Method 8;

3. The Avogadro Group, LLC uses a probe constructed in accordance with section 2.1.3 of ARB Test Method 100;

4. The Avogadro Group, LLC uses noncalculating channels on its data acquisition system or a strip chart in accordance with section 2.2.8 of ARB Test Method 100;

5. The Avogadro Group, LLC includes the following information on all strip charts and/or emissions data sheets: pollutant of interest, source, analyzer range, date and time, zero offsets, and the name(s) of the person(s) operating the instruments;

6. The Avogadro Group, LLC prevents condensate from forming in the sample bag while collecting the sample in accordance with section 8.2.1.4 of U.S. EPA Test Method 18;

7 The Avogadro Group, LLC calibrates and repairs the nozzles it uses for U.S. EPA Test Method 201A in accordance with section 10.1 of U.S. EPA Test Method 5, and establishes and maintains a log of the calibrations, which shall include notes of the repairs on each nozzle;

8. The Avogadro Group acquires and uses 300 to 500 ml glass beakers as required by section 6.2.2 (c) of U.S. EPA Test Method 202;

9. The Avogadro Group acquires and uses a 0 to 100 ml glass burette in 0.1 ml graduations as required by section 6.2.2 (f) of U.S. EPA Test Method 202;

10. The person performing VEE passed ARB Compliance Training Course #100: Fundamentals of Enforcement (FOE)/VEE (Smoke School) and is currently certified to conduct VEE. Any recertification for VEE, following the initial passage of ARB's FOE, must be from a certifying body recognized by ARB at the time VEE is performed; and

WHEREAS, ARB Executive Officer, pursuant to California Health and Safety Code section 39516, issued Executive Order G-02-008, delegating to the Chief of ARB Monitoring and Laboratory Division (MLD) the authority to approve independent testers in accordance with Cal. Code Regs., title 17, section 91200 and following;

NOW, THEREFORE, I, Michael T. Benjamin, Chief of MLD, order that The Avogadro Group, LLC is granted approval from the date of execution of this order until June 30, 2018, to perform the test methods identified above subject to compliance with Cal. Code Regs., title 17, section 91200 and following.

BE IT FURTHER ORDERED that during the approved period the Executive Officer or his or her authorized representative may field audit one or more tests performed pursuant to this order for each test method identified above.

Executed at Sacramento, California this 28th day of April 2016.

Dr Michael T. Benjamin, Chief
Monitoring and Laboratory Division

State of California

Air Resources Board

Approved Independent Contractor

The Avogadro Group, LLC

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207, until June 30, 2018, for those test methods listed below:

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

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

State of California

Air Resources Board

Approved Independent Contractor

The Avogadro Group, LLC

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207, until June 30, 2018, for those test methods listed below:

U.S. EPA Test Methods 18, 201A, and 202
Visible Emissions Evaluation

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

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 organization is accredited to perform testing activities in compliance with ASTM D7036 - Standard Practice for Competence of Air Emission Testing Bodies.

Presented this 2nd day of February 2016

Senior Director of Quality and Communications
Certificate Number 3925.01
Valid to February 28, 2018

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

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

ANDREW M. BERG

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

HAZARDOUS METALS MEASUREMENT SAMPLING METHODS

ISSUED THIS 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

APPLICATION NO. 2009-334

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

ANDREW M. BERG

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

APPLICATION NO. 2009-334

005AS-179737 R1

App. #
2009-334

Source Evaluation Society
P. O. Box 12124
Research Triangle Park, NC 27709-2124

ANDREW M. BERG

Qualified Source Testing Individual

MANUAL GAS VOLUME MEASUREMENTS AND ISOKINETIC PARTICULATE SAMPLING METHODS - Effective Jan. 23, 2014 through Jan. 22, 2019 *(exam date: 1/23/14)*
MANUAL GAS SOURCE SAMPLING METHODS
- Effective May 27, 2014 through May 26, 2019 *(exam date: 5/27/14)*
GASEOUS POLLUTANTS INSTRUMENTAL SAMPLING METHODS
- Effective Jan. 23, 2014 through Jan. 22, 2019 *(exam date: 1/23/14)*
HAZARDOUS METALS MEASUREMENT SAMPLING METHODS
- Effective May 27, 2014 through May 26, 2019 *(exam date: 5/27/14)*

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

ANDREW M. BERG

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

GASEOUS POLLUTANTS INSTRUMENTAL SAMPLING METHODS

ISSUED THIS 23RD DAY OF JANUARY 2014 AND EFFECTIVE UNTIL JANUARY 22ND, 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

APPLICATION NO. 2009-334

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

ANDREW M. BERG

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

MANUAL GAS VOLUME MEASUREMENTS AND ISOKINETIC PARTICULATE SAMPLING METHODS

ISSUED THIS 23RD DAY OF JANUARY 2014 AND EFFECTIVE UNTIL JANUARY 22ND, 2019

Peter R. Westlin, QSTI/QSTO Review Board

C. David Bagwell, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

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

Theresa Lowe, QSTI/QSTO Review Board

Glenn C. England, QSTI/QSTO Review Board

APPLICATION NO. 2009-334

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

ANDREW M. BERG

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

APPLICATION NO. 2009-334

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

ANDREW M. BERG

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

HAZARDOUS METALS MEASUREMENT SAMPLING METHODS

ISSUED THIS 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

APPLICATION NO. 2009-334

MONTROSE
ENVIRONMENTAL

Qualified Individual Conformance Statement

I Andrew Berg, 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

1/9/17
Date

Appendix A.3

CEM Calibration Data

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Analyzer Configuration

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

Cylinder Information

Zero Number:		
Zero Conc:	0	0
Low Number:		
Low Conc:		
Mid Number:	ALM-065668	ALM-065668
Mid Conc:	11.52	3.966
High Number:	EB0083003	EB0083003
High Conc:	20.97	8.253
Bias Number:	ALM-065668	ALM-065668
Bias Conc:	11.52	3.966

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Calibration

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

Cylinder Concentrations

Zero:	0.000	0.000
Low:		
Mid:	11.52	3.966
High:	20.97	8.253

Calibration Readings

Zero reading:	-0.014	0.002
Low reading:	0.000	0.000
Mid reading:	11.51	3.988
High reading:	20.96	8.240

EPA Method 7E Error Calculations

Zero %Err:	<2.0	-0.067	0.024
Mid %Err:	<2.0	-0.048	0.267
High %Err:	<2.0	-0.048	-0.158

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Initial bias

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

Cylinder Concentrations

Zero:	0.000	0.000
Low:		
Mid:	11.52	3.966
High:	20.97	8.253

Calibration Readings

Zero reading:	-0.014	0.002
Low reading:	0.000	0.000
Mid reading:	11.51	3.988
High reading:	20.96	8.240

EPA Method 7E Error Calculations

Zero %Err:	<2.0	-0.067	0.024
Mid %Err:	<2.0	-0.048	0.267
High %Err:	<2.0	-0.048	-0.158

Initial Bias Data

Zero reading:		-0.069	-0.008
Span reading:		11.27	3.920
Zero % bias:	<5.0	-0.262	-0.121
Span % bias:	<5.0	-1.144	-0.824

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Calibration

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

Cylinder Concentrations

Zero:	0.000	0.000
Low:		
Mid:	11.52	3.966
High:	20.97	8.253

Calibration Readings

Zero reading:	0.007	-0.005
Low reading:	0.000	0.000
Mid reading:	11.51	3.904
High reading:	20.98	8.295

EPA Method 7E Error Calculations

Zero %Err:	<2.0	0.033	-0.061
Mid %Err:	<2.0	-0.048	-0.751
High %Err:	<2.0	0.048	0.509

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Initial bias

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

Cylinder Concentrations

Zero:	0.000	0.000
Low:		
Mid:	11.52	3.966
High:	20.97	8.253

Calibration Readings

Zero reading:	0.007	0.005
Low reading:	0.000	0.000
Mid reading:	11.51	3.904
High reading:	20.98	8.295

EPA Method 7E Error Calculations

Zero %Err:	<2.0	0.033	-0.061
Mid %Err:	<2.0	-0.048	-0.751
High %Err:	<2.0	0.048	0.509

Initial Bias Data

	Zero reading:	0.099	0.007
	Span reading:	11.32	3.920
Zero % bias:	<5.0	0.439	0.145
Span % bias:	<5.0	-0.906	0.194

Appendix A.4

Span Gas Certificates

Airgas
an Air Liquide company

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

CERTIFICATE OF BATCH ANALYSIS

Grade of Product: CEM-CAL ZERO

Part Number:	NI CZ15A	Reference Number:	153-124619381-1
Cylinder Analyzed:	CC505162	Cylinder Volume:	142.0 CF
Laboratory:	124 - Tooele - UT	Cylinder Pressure:	2000 PSIG
Analysis Date:	May 10, 2017	Valve Outlet:	580
Lot Number:	153-124619381-1		

Expiration Date: May 10, 2025

ANALYTICAL RESULTS

Component	Requested Purity	Certified Concentration
NITROGEN	99.9995 %	99.9995 %
CARBON DIOXIDE	< 1.0 PPM	< 1.0 PPM
NOx	< 0.1 PPM	< 0.1 PPM
SO2	< 0.1 PPM	< 0.1 PPM
THC	< 0.1 PPM	< 0.1 PPM
CARBON MONOXIDE	< 0.5 PPM	< 0.5 PPM

Permanent Notes: Airgas certifies that the contents of this cylinder meet the requirements of 40 CFR 72.2

Cylinders in Batch:

CC505080, CC505084, CC505085, CC505087, CC505088, CC505097, CC505098, CC505107, CC505109, CC505112, CC505114, CC505150, CC505157, CC505158, CC505159, CC505160, CC505162, CC505163

Impurities verified against analytical standards traceable to NIST by weight and/or analysis.

Signature on file
Approved for Release

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:	E03NI84E15A7419	Reference Number:	153-124598183-2
Cylinder Number:	ALM-065668	Cylinder Volume:	147.5 CF
Laboratory:	124 - Tooele - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72017	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jan 16, 2017

Expiration Date: Jan 16, 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
CARBON DIOXIDE	4.000 %	3.966 %	G1	+/- 0.9% NIST Traceable	01/16/2017
OXYGEN	11.50 %	11.52 %	G1	+/- 0.7% NIST Traceable	01/16/2017
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	97050601	SG9168816BAL	3.224 % CARBON DIOXIDE/NITROGEN	0.5	Jun 21, 2022
NTRM	98051014	SG9162888BAL	12.05 % OXYGEN/NITROGEN	0.7%	Dec 02, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA-510 SV4MEUTJ CO2	CO2 NDIR (Dixon)	Jan 12, 2017
Horiba MPA-510 X9A4UGL8 O2	O2 Paramagnetic (Dixon)	Dec 22, 2016

Triad Data Available Upon Request

Signature on file
Approved for Release

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:	E03NI70E15A7420	Reference Number:	153-124559933-19
Cylinder Number:	EB0083003	Cylinder Volume:	151.2 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72016	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jun 21, 2016

Expiration Date: Jun 21, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	8.500 %	8.253 %	G1	+/- 1.0% NIST Traceable	06/21/2016
OXYGEN	21.00 %	20.97 %	G1	+/- 1.0% NIST Traceable	06/21/2016
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060410	CC413504	7.489 % CARBON DIOXIDE/NITROGEN	0.6%	Jan 14, 2019
NTRM	09061437	CC282504	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)	May 26, 2016
Horiba MPA-510 W603MM58 O2	O2 Paramagnetic (Mason)	May 26, 2016

Triad Data Available Upon Request

Signature on file
Approved for Release

Appendix A.5

Equipment Calibration Data

MONTROSE

EPA Method 5
Meter Box Orifice Calibration, Leak Check, and Thermocouple Calibration
English Meter Box Units, English K' Factor

Meter #:	CB-03
Calibrated by:	P. Hilkene
Expires:	08/22/17

Date:	02/22/17
Barometric Pressure:	30.26 (in. Hg)

Yd:	0.981
ΔH@:	1.788

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 below
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

Theoretical Critical Vacuum:	14.27 (in. Hg)

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice	Actual – Ambient Temperature –			
dH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.33	17.00	182.547	187.862	5.315	57.0	57.0	59.0	59.0	RG-40	0.2359	16.0	57.0	57.0	57.0
0.65	12.00	187.862	193.254	5.392	59.0	59.0	62.0	62.0	RG-48	0.3469	16.0	57.0	57.0	57.0
1.00	9.00	193.254	198.491	5.237	62.0	62.0	63.0	63.0	RG-55	0.4311	16.0	57.0	57.0	57.0
1.90	7.00	198.49	203.955	5.464	63.0	63.0	65.0	65.0	RG-63	0.5968	16.0	57.0	57.0	57.0
3.40	5.00	203.955	209.213	5.258	65.0	65.0	66.0	66.0	RG-73	0.7885	16.0	57.0	57.0	57.0

— DRY GAS METER — VOLUME CORRECTED Vm(std) (cu ft)	— ORIFICE — VOLUME CORRECTED Vcr(std) (cu ft)	— ORIFICE — VOLUME NOMINAL Vcr (cu ft)
5.481	5.337	5.169
5.539	5.540	5.366
5.383	5.164	5.001
5.592	5.560	5.385
5.385	5.247	5.082

– DRY GAS METER – CALIBRATION FACTOR Yd Value (number)	Variation (number)
0.974	-0.007
1.000	0.019
0.953	-0.018
0.994	0.013
0.974	-0.007

— ORIFICE — CALIBRATION FACTOR ΔH@ Value (in H2O)	Variation (in H2O)
1.942	0.154
1.760	-0.028
1.746	-0.041
1.727	-0.061
1.765	-0.023

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 dH@, 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	0.981
Average ΔH@	1.788
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Pressure Leak Check

Test Pressure, (in H_2O):	6
Leak Rate, (in H_2O/min):	0
Pressure Range (in H_2O):	≥ 5
Leak Rate, (in H_2O/min):	0

Meter Box Thermocouple Readout Calibration

Input Temperature	Allowable* Temp. Dev.	Low	High
32	7	25	39
122	9	113	131
212	10	202	222
302	11	291	313
392	13	379	405
482	14	468	496
572	15	557	587
662	17	645	679
752	18	734	770
842	20	822	862
932	21	911	953

Stack	Probe	Filter	Exit	Aux.	Meter In / Out
32	32	32	32	32	53
121	121	121	121	121	53
213	213	213	213	213	210
304	304	304			
392	392	392			
482					
574					
666					
757					
846					
937					

Thermocouple simulator	
Make:	Omega
Model:	CL3512A
Serial Number:	721102
Cal Date:	3/2/2016

* Reading values must be within 1.5% of reference thermometer values (based on absolute temperature scale) for calibration to be acceptable.

Performed by: Name: Jose Orozco Signature: Jose Orozco Date: 2/28/17

Approved by: Name: Dan Duncan Signature: Dan Duncan Date: 2/28/17

MONTROSE ENVIRONMENTAL

EPA Method 5
Meter Box Orifice Calibration, Leak Check, and Thermocouple Calibration
English Meter Box Units, English K' Factor

Meter #:	CB-04
Calibrated by:	PH
Expires:	**08/22/17**

Date:	02/22/17
Barometric Pressure:	30.26 (in. Hg)

Yd:	0.983
ΔH@:	1.937

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 below
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

Theoretical Critical Vacuum:	14.27 (in. Hg)

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice	Actual – Ambient Temperature –			
dH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Total (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)
0.34	17.00	297.010	302.185	5.175	55.0	51.0	56.0	54.0	RG-40	0.2359	16.0	56.0	56.0	56.0
0.72	12.00	302.185	307.625	5.440	55.0	56.0	56.0	56.0	RG-48	0.3469	16.0	57.0	57.0	57.0
1.10	9.00	307.625	312.710	5.085	57.0	57.0	58.0	59.0	RG-55	0.4311	16.0	57.0	57.0	57.0
2.10	7.00	312.71	318.194	5.484	57.0	59.0	57.0	59.0	RG-63	0.5968	16.0	57.0	57.0	57.0
3.50	5.00	318.194	323.361	5.167	57.0	60.0	58.0	60.0	RG-73	0.7885	16.0	57.0	56.0	56.5

— DRY GAS METER — VOLUME CORRECTED Vm(std) (cu ft)	— ORIFICE — VOLUME CORRECTED Vor(std) (cu ft)	— ORIFICE — VOLUME NOMINAL Vor (cu ft)
5.379	5.342	5.164
5.640	5.540	5.366
5.259	5.164	5.001
5.680	5.560	5.385
5.362	5.249	5.079

– DRY GAS METER – CALIBRATION FACTOR Yd Value (number)	Variation (number)
0.993	0.010
0.982	-0.001
0.982	-0.001
0.979	-0.004
0.979	-0.004

— ORIFICE — CALIBRATION FACTOR ΔH@ Value (in H2O)	Variation (in H2O)
2.018	0.081
1.966	0.029
1.940	0.003
1.927	-0.010
1.834	-0.103

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 dH@, 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	0.983
Average ΔH@	1.937
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Pressure Leak Check

Test Pressure, (in H_2O):	6
Leak Rate, (in H_2O/min):	**0**
Pressure Range (in H_2O):	≥5
Leak Rate, (in H_2O/min):	**0**

Meter Box Thermocouple Readout Calibration

Input Temperature	Allowable* Temp. Dev.	Low	High
32	7	25	39
122	9	113	131
212	10	202	222
302	11	291	313
392	13	379	405
482	14	468	496
572	15	557	587
662	17	645	679
752	18	734	770
842	20	822	862
932	21	911	953

Stack	Probe	Filter	Exit	Aux.	Meter In / Out
29	29	29	29		29
118	119	119	119		119
210	210	210	210		210
300	300	301			
389	389	390			
479					
571					
663					
754					
844					
934					

Thermocouple simulator	
Make:	Omega
Model:	CL3512A
Serial Number:	721102
Cal Date:	3/2/2016

* Reading values must be within 1.5% of reference thermometer values (based on absolute temperature scale) for calibration to be acceptable.

Performed by: Name: Jose Ordaco Singature: Jose Ordaco Date: 2/22/17

Approved by: Name: Steve Crogham Singature: Steve Crogham Date: 3/7/17

MONTROSE
ENVIRONMENTAL

EPA Method 5
Meter Box Orifice Calibration, Leak Check, and Thermocouple Calibration
English Meter Box Units, English K' Factor

Meter #:	CB-05
Calibrated by:	PH
Expires:	**08/22/17**

Date:	02/22/17
Barometric Pressure:	30.26 (in. Hg)

Yd:	0.984
ΔH@:	1.800

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 below
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

Theoretical Critical Vacuum:	14.27 (in. Hg)

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice	Actual – Ambient Temperature –			
dH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Total (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)
0.28	17.00	268.725	273.916	5.191	52.0	52.0	53.0	53.0	RG-40	0.2359	16.0	52.0	53.0	52.5
0.64	12.00	273.916	279.334	5.418	55.0	56.0	55.0	55.0	RG-48	0.3469	16.0	55.0	55.0	55.0
1.10	9.00	279.334	284.376	5.042	55.0	55.0	56.0	56.0	RG-55	0.4311	16.0	55.0	55.0	55.0
2.00	7.00	284.376	289.929	5.553	56.0	56.0	57.0	57.0	RG-63	0.5968	16.0	55.0	55.0	55.0
3.50	5.00	292.206	297.330	5.124	56.0	60.0	58.0	61.0	RG-73	0.7885	16.0	56.0	56.0	56.0

— DRY GAS METER — VOLUME CORRECTED Vm(std) (cu ft)	——— ORIFICE ——— VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
5.410	5.360	5.147
5.622	5.551	5.355
5.235	5.174	4.991
5.767	5.570	5.374
5.317	5.252	5.077

– DRY GAS METER – CALIBRATION FACTOR Yd Value (number)	Variation (number)
0.991	0.007
0.987	0.003
0.988	0.004
0.966	-0.018
0.988	0.004

——— ORIFICE ——— CALIBRATION FACTOR ΔH@ Value (in H2O)	Variation (in H2O)
1.651	-0.150
1.743	-0.057
1.940	0.140
1.837	0.037
1.831	0.031

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 dH@, 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	0.984
Average ΔH@	1.800
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Pressure Leak Check

Test Pressure, (in H_2O):	6
Leak Rate, (in H_2O/min):	0
Pressure Range (in H_2O):	≥5
Leak Rate, (in H_2O/min):	0

Meter Box Thermocouple Readout Calibration

Input Temperature	Allowable* Temp. Dev.	Low	High
32	7	25	39
122	9	113	131
212	10	202	222
302	11	291	313
392	13	379	405
482	14	468	496
572	15	557	587
662	17	645	679
752	18	734	770
842	20	822	862
932	21	911	953

Stack	Probe	Filter	Exit	Aux.	Meter In / Out
27	29	28	27	27	27
116	117	117	116	116	117
208	208	208	208	208	208
298	299	299			
387	387	387			
476					
570					
662					
753					
843					
932					

Thermocouple simulator	
Make:	Omega
Model:	CL3512A
Serial Number:	721102
Cal Date:	3/2/2016

* Reading values must be within 1.5% of reference thermometer values (based on absolute temperature scale) for calibration to be acceptable.

Performed by: Name: Jose Orozco Singature: [signature] Date: 2/22/17

Approved by: Name: Steve Crogh Singature: [signature] Date: 3/7/17

005AS-179737-R1

MONTROSE ENVIRONMENTAL

EPA Method 5
Meter Box Orifice Calibration, Leak Check, and Thermocouple Calibration
English Meter Box Units, English K' Factor

Meter #:	CB-06
Calibrated by:	PH
Expires:	**08/22/17**

Date:	02/22/17
Barometric Pressure:	30.26 (in. Hg)

Yd:	0.983
ΔH@:	1.728

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 below
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

Theoretical Critical Vacuum:	14.27 (in. Hg)

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice	Actual – Ambient Temperature –			
dH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.30	17.00	256.150	261.465	5.315	63.0	63.0	64.0	64.0	RG-40	0.2359	16.0	55.0	55.0	55.0
0.62	12.00	250.650	256.150	5.500	62.0	62.0	63.0	63.0	RG-48	0.3469	16.0	55.0	55.0	55.0
0.98	9.00	245.525	250.650	5.125	61.0	61.0	62.0	62.0	RG-55	0.4311	16.0	55.0	55.0	55.0
2.00	7.00	239.97	245.525	5.560	59.0	59.0	61.0	61.0	RG-63	0.5968	16.0	55.0	55.0	55.0
3.25	5.00	234.830	239.965	5.135	58.0	58.0	59.0	59.0	RG-73	0.7885	16.0	55.0	55.0	55.0

-- DRY GAS METER -- VOLUME CORRECTED Vm(std) (cu ft)	—— ORIFICE —— VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
5.423	5.347	5.159
5.627	5.551	5.355
5.258	5.174	4.991
5.735	5.570	5.374
5.328	5.257	5.072

-- DRY GAS METER -- CALIBRATION FACTOR Yd Value (number)	Variation (number)
0.986	0.003
0.986	0.004
0.984	0.001
0.971	-0.012
0.987	0.004

—— ORIFICE —— CALIBRATION FACTOR ΔH@ Value (in H2O)	Variation (in H2O)
1.740	0.011
1.666	-0.062
1.708	-0.020
1.824	0.096
1.703	-0.025

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 dH@, 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	0.983
Average ΔH@	1.728
Variation of Yd's	PASS
Variation of ΔH@	PASS
Vacuum Criteria	PASS

Meter Box Pressure Leak Check

Test Pressure, (in H_2O):	6
Leak Rate, (in H_2O/min):	**0**
Pressure Range (in H_2O):	≥5
Leak Rate, (in H_2O/min):	**0**

Meter Box Thermocouple Readout Calibration

Input Temperature	Allowable* Temp. Dev.	Low	High
32	7	25	39
122	9	113	131
212	10	202	222
302	11	291	313
392	13	379	405
482	14	468	496
572	15	557	587
662	17	645	679
752	18	734	770
842	20	822	862
932	21	911	953

Stack	Probe	Filter	Exit	Aux.	Meter In / Out
34	36	34	34	34	34
123	124	123	123	124	123
215	216	215	215	215	215
305	306	306			
394	395	394			
484					
576					
668					
757					
847					
937					

Thermocouple simulator	
Make:	Omega
Model:	CL3512A
Serial Number:	721102
Cal Date:	3/2/2016

* Reading values must be within 1.5% of reference thermometer values (based on absolute temperature scale) for calibration to be acceptable.

Performed by: Name: Jose Orozco Singature: [signature] Date: 2/22/17

Approved by: Name: Steve Cooper Singature: [signature] Date: 3/7/17

MONTROSE ENVIRONMENTAL

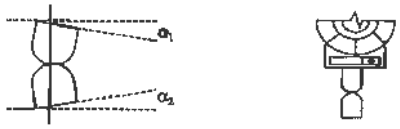
Pitot Tube Calibration Data Sheet

Calibration Date:	February 14, 2017	Performed by:	Peter Hikene	Expiration Date:	August 14, 2017
Reference Pitot Tube:	Standard	ID No.:	8	No obstructions:	Yes
Calibrated Pitot Tube:	S-type	Probe/Pitot ID No:	8-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

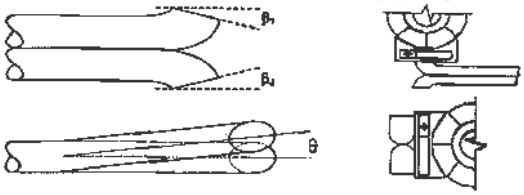
Protractor or Digital Angle Finder ID: 1-APR-OAK
Measuring Tape ID: 1-TM-OAK
Caliper ID: 14931694

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

Alignment and Tubing Dimensions

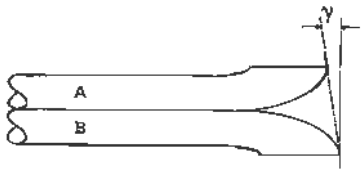


Degree indicating level position for determining α_1 and α_2.



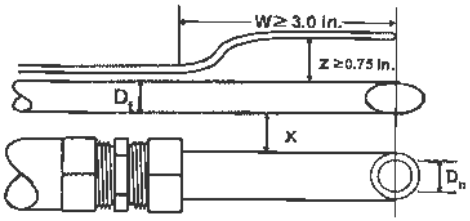
Degree indicating level position for determining θ.

α_1 $(-10° < \alpha_1 < +10°)$	1.0	
α_2 $(-10° < \alpha_2 < +10°)$	2.0	
β_1 $(-5° < \beta_1 < +5°)$	2.0	
β_2 $(-5° < \beta_2 < +5°)$	4.0	
γ	0.0	
θ	1.0	
A	1.0790	
$z = A \tan \gamma$ $(\pm 0.125")$	0.000	Pass
$w = A \tan \theta$ $(\pm 0.03125")$	0.019	Pass
D_t $(0.1875" < D_t < 0.375")$	0.3749	Pass
P_A $(1.05D_t < P_A < 1.5D_t)$	0.5230	Pass
P_B $(1.05D_t < P_B < 1.5D_t)$	0.5280	Pass
$P_A = P_B \pm 0.0625$	-0.0050	Pass

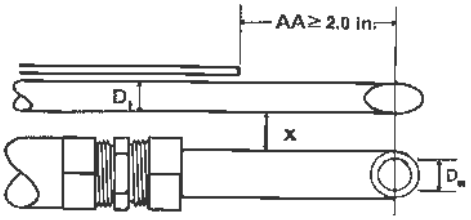


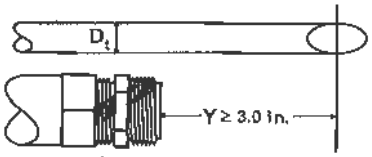
Degree indicating level position for determining γ then calculating z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")		
-or- AA (≥2.0")	2.400	Pass
X		
D_n		
X / D_n (≥ 1.5)		
Y (≥ 3.0")		
Z ≥ 0.75"		





Performed By: Jose Orozco Signature: [signature] Date: 2/28/2017

Approved By: STEVE Crayhan Signature: [signature] Date: 3/7/17

MONTROSE ENVIRONMENTAL

TEMPERATURE SENSOR CALIBRATION DATA FORM

Date	2/14/17
Calibrator	PH
Ambient Temperature, °F	56.6
Barometric Press. (in. Hg)	30.2
Thermocouple ID Number	**8-TP-8**
Digital Thermometer Number	(120352)
Reference Thermometer Serial Number	**PROBE (48829-4)**

Reference Point Number	Source	Reference Thermometer Temperature, °F	Thermocouple Temperature, °F	Temperature Difference[(a)], %	Pass/Fail
Cold	Ice Water	(####)	(####)	######## %	#VALUE!
Warm	Ambient Water	56.7	58.0	0.25 %	PASS
Hot	Hot Water	213.0	212.0	0.15 %	PASS

(a) [((Ref. Temp., °R) - (Test Thermocouple Temp., °R))/ Ref. Temp., °R]*100, where °R = °F + 460.
Temperature difference must be < 1.50 %.

Performed By: Jose Orozco Signature: [signature] Date: 2/28/17

Approved By: Dan Duncan Signature: [signature] Date: 3/1/17

MONTROSE ENVIRONMENTAL

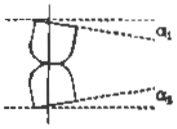
Pitot Tube Calibration Data Sheet

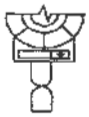
Calibration Date:	February 14, 2017	**Performed by:**	Peter Hilkene	**Expiration Date:**	August 14, 2017
Reference Pitot Tube:	Standard	**ID No.:**	129	**No obstructions:**	Yes
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	129-TP-9	**No damage:**	Yes
Probe Description:	TRAVERSE - Flow & Temp (TP)	**Effective Length (ft):**	9	**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: 14931694

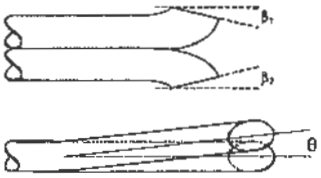
Calibration performed using the procedures of EPA Method 2, Section 10.1

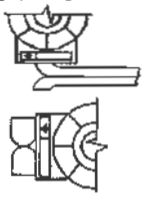
Alignment and Tubing Dimensions





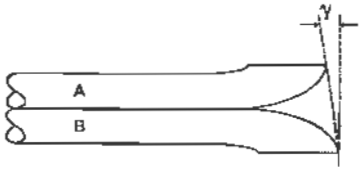
Degree indicating level position for determining α_1 and α_2.





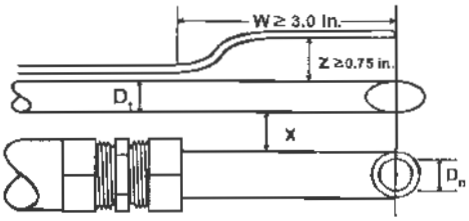
Degree indicating level position for determining θ.

α_1 $(-10° < \alpha_1 < +10°)$	1.0	
α_2 $(-10° < \alpha_2 < +10°)$	0.0	
β_1 $(-5° < \beta_1 < +5°)$	2.0	
β_2 $(-5° < \beta_2 < +5°)$	3.0	
γ	2.0	
θ	0.0	
A	0.7040	
z= A tan γ (± 0.125")	0.025	Pass
w= A tan θ (± 0.03125")	0.000	Pass
D_t (0.1875" < D_t < 0.375")	0.2610	Pass
P_A (1.05D_t < P_A < 1.5D_t)	0.3710	Pass
P_B (1.05D_t < P_B < 1.5D_t)	0.3520	Pass
$P_A = P_B \pm 0.0625$	0.0190	Pass

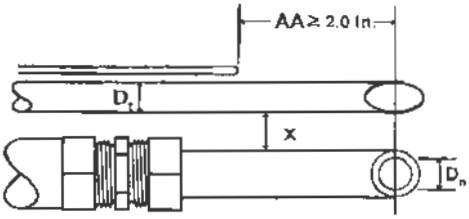


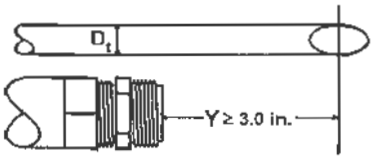
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")		
-or- AA (≥2.0")	2.000	Pass
X		
D_n		
X / D_n (≥ 1.5)		
Y (≥ 3.0")		
Z ≥ 0.75"		





Performed By: Jose Orozco Signature: Jose Orozco Date: 2/28/2017

Approved By: STEVE CROSHAW Signature: [illegible] Date: 3/7/17

MONTROSE ENVIRONMENTAL

TEMPERATURE SENSOR CALIBRATION DATA FORM

Date	2/14/17
Calibrator	PH
Ambient Temperature, °F	56.6
Barometric Press. (in. Hg)	30.2
Thermocouple ID Number	**129-TP-9**
Digital Thermometer Number	(120352)
Reference Thermometer Serial Number	**PROBE (48829-4)**

Reference Point Number	Source	Reference Thermometer Temperature, °F	Thermocouple Temperature, °F	Temperature Difference[(a)], %	Pass/Fail
Cold	Ice Water	(####)	(####)	######## %	#VALUE!
Warm	Ambient Water	55.5	58.1	0.50 %	PASS
Hot	Hot Water	213.0	210.0	0.45 %	PASS

[(a)] [((Ref. Temp., °R) - (Test Thermocouple Temp., °R))/ Ref. Temp., °R]*100, where °R = °F + 460.
Temperature difference must be < 1.50 %.

Performed By: Jose Orozco Signature: Jose Orozco Date: 2/28/17

Approved By: Dan Duncan Signature: Dan Duncan Date: 3/1/17

MONTROSE ENVIRONMENTAL

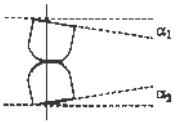
Pitot Tube Calibration Data Sheet

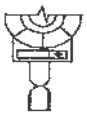
Calibration Date:	June 23, 2017	**Performed by:**	Jonathan Stanton	**Expiration Date:**	December 23, 2017
Reference Pitot Tube:	Standard	**ID No.:**	30	**No obstructions:**	Yes
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	30-SP-8	**No damage:**	Yes
Probe Description:	Self Supporting Probe (SP)	**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: 14931594

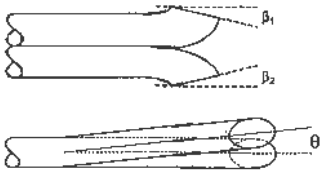
Calibration performed using the procedures of EPA Method 2, Section 10.1

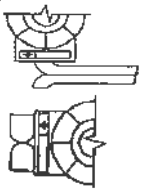
Alignment and Tubing Dimensions





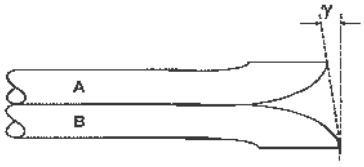
Degree indicating level position for determining α_1 and α_2.





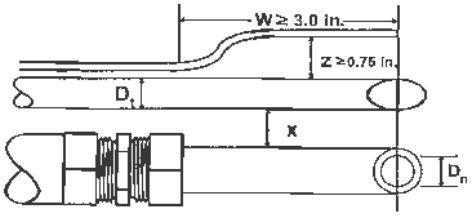
Degree indicating level position for determining θ.

α_1 $(-10° < \alpha_1 < +10°)$	1.0	
α_2 $(-10° < \alpha_2 < +10°)$	2.0	
β_1 $(-5° < \beta_1 < +5°)$	2.0	
β_2 $(-5° < \beta_2 < +5°)$	2.0	
γ	1.0	
θ	0.0	
A	0.9100	
z= A tan γ (± 0.125")	0.0159	Pass
w= A tan θ (± 0.03125")	0.0000	Pass
D_t (0.1875" < D_t < 0.375")	0.3730	Pass
P_A (1.05D_t < P_A < 1.5D_t)	0.4310	Pass
P_B (1.05D_t < P_B < 1.5D_t)	0.4800	Pass
$P_A = P_B \pm 0.0625$	-0.0490	Pass

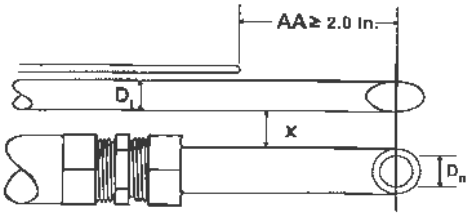


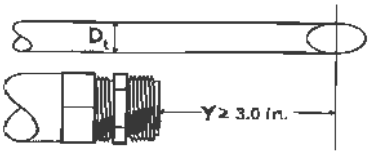
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")		
-or- AA (≥ 2.0")	2.250	Pass
X	0.800	
D_n	0.500	
X / D_n (≥ 1.5)	1.600	Pass
Y (≥ 3.0")	5.250	Pass
Z ≥ 0.75"	1.500	





Performed By: Jonathan Stanton — Signature: _____ Date: June 23, 2017

Approved By: Steve Croghan — Signature: _____ Date: June 23 2017

MONTROSE

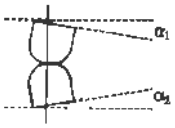
Pitot Tube Calibration Data Sheet

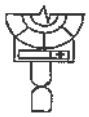
Calibration Date:	February 14, 2017	Performed by:	Peter Hilkene	Expiration Date:	August 14, 2017
Reference Pitot Tube:	Standard	ID No.:	58	No obstructions:	Yes
Calibrated Pitot Tube:	S-type	Probe/Pitot ID No:	58-SP-8	No damage:	Yes
Probe Description:	Self Supporting Probe (SP)	Effective Length (ft):	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: 14931694

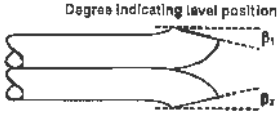
Calibration performed using the procedures of EPA Method 2, Section 10.1

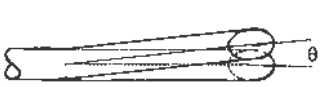
Alignment and Tubing Dimensions

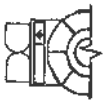




Degree indicating level position for determining α_1 and α_2.

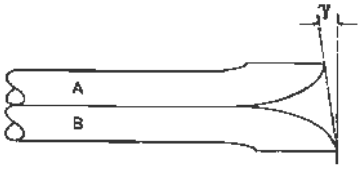






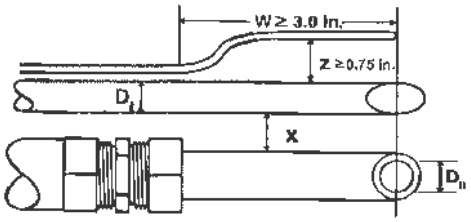
Degree indicating level position for determining θ.

α_1 $(-10° < \alpha_1 < +10°)$	0.0	
α_2 $(-10° < \alpha_2 < +10°)$	1.0	
β_1 $(-5° < \beta_1 < +5°)$	2.0	
β_2 $(-5° < \beta_2 < +5°)$	2.5	
γ	2.0	
θ	1.5	
A	0.9750	
$z = A \tan\gamma$ (± 0.125")	0.034	Pass
$w = A \tan\theta$ (± 0.03125")	0.026	Pass
D_t (0.1875" < D_t < 0.375")	0.3749	Pass
P_A ($1.05D_t < P_A < 1.5D_t$)	0.5310	Pass
P_B ($1.05D_t < P_B < 1.5D_t$)	0.4730	Pass
$P_A \approx P_B \pm 0.0625$	0.0580	Pass

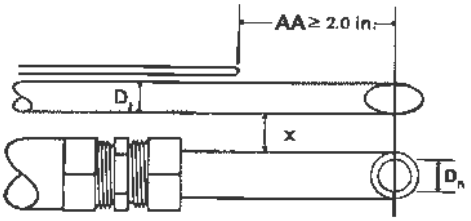


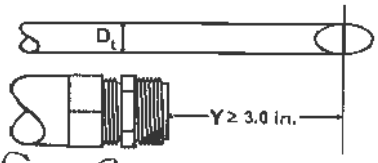
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")		
-or- AA (≥2.0")	2.300	Pass
X	0.750	
D_n	0.500	
X / D_n (≥ 1.5)	1.5	Pass
Y (≥ 3.0")	3.750	Pass
Z ≥ 0.75"		





Performed By: Jose Orozco Signature: Jose Orozco Date: 2/28/2017

Approved By: STEVE CROGHAN Signature: Steve Croghan Date: 3/7/17

MONTROSE

TEMPERATURE SENSOR CALIBRATION DATA FORM

Date	2/14/17
Calibrator	PH
Ambient Temperature, °F	56.6
Barometric Press. (in. Hg)	30.2
Thermocouple ID Number	**58-SP-8**
Digital Thermometer Number	(120352)
Reference Thermometer Serial Number	**'ROBE (48829-4)**

Reference Point Number	Source	Reference Thermometer Temperature, °F	Thermocouple Temperature, °F	Temperature Difference[(a)], %	Pass/Fail
Cold	Ice Water	(####)	(####)	######## %	#VALUE!
Warm	Ambient Water	58.9	57.7	0.23 %	PASS
Hot	Hot Water	213.0	209.5	0.52 %	PASS

[(a)] [((Ref. Temp., °R) - (Test Thermocouple Temp., °R))/ Ref. Temp., °R]*100, where °R = °F + 460.
Temperature difference must be < 1.50 %.

Performed By: Jose Orozco Signature: Jose Orozco Date: 2/28/17

Approved By: Dan Dumoan Signature: Dan Dumoan Date: 3/1/17

MONTROSE ENVIRONMENTAL

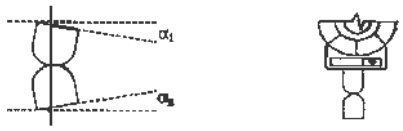
Pitot Tube Calibration Data Sheet

Calibration Date:	February 14, 2017	**Performed by:**	Peter Hilkene	**Expiration Date:**	August 14, 2017
Reference Pitot Tube:	Standard	**ID No.:**	23	**No obstructions:**	Yes
Calibrated Pitot Tube:	S-type	**Probe/Pitot ID No:**	23-NP-8	**No damage:**	Yes
Probe Description:	Nonself Supporting Probe (NP)	**Effective Length (ft):**	8	**Level and Perpendicular:**	Yes
Thermocouple calibration performed?		Yes	**Thermocouple passed calibration?**		Yes

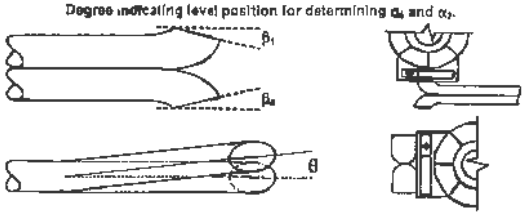
Protractor or Digital Angle Finder ID: 1-APR-OAK
Measuring Tape ID: 1 TM-OAK
Caliper ID: 14931694

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

Alignment and Tubing Dimensions

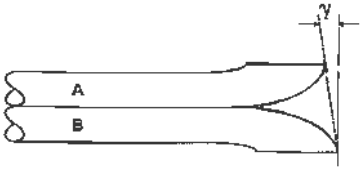


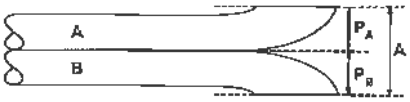
Degree indicating level position for determining α_1 and α_2.



Degree indicating level position for determining θ.

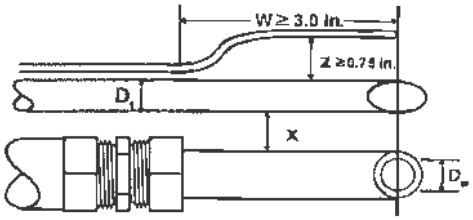
α_1 ($-10° < \alpha_1 < +10°$)	1.0	
α_2 ($-10° < \alpha_2 < +10°$)	2.0	
β_1 ($-5° < \beta_1 < +5°$)	0.0	
β_2 ($-5° < \beta_2 < +5°$)	1.0	
γ	1.0	
θ	1.0	
A	0.9750	
z= A tan γ (± 0.125")	0.017	Pass
w= A tan θ (± 0.03125")	0.017	Pass
D_t (0.1875" < D_t < 0.375")	0.3749	Pass
P_A ($1.05D_t < P_A < 1.5D_t$)	0.4000	Pass
P_B ($1.05D_t < P_B < 1.5D_t$)	0.3960	Pass
$P_A = P_B \pm 0.0625$	0.0040	Pass



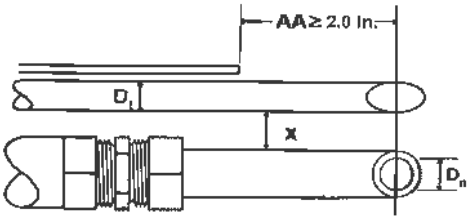


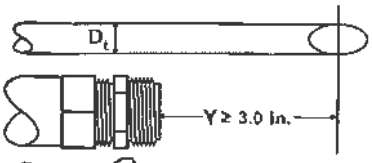
Degree indicating level position for determining γ then calculating Z.

Assembly Inter-Component Spacing Requirements



W (≥ 3.0")		
-or- AA (≥2.0")	2.250	Pass
X	0.750	
D_n	0.500	
X / D_n (≥ 1.5)	1.5	Pass
Y (≥ 3.0")	4.250	Pass
Z ≥ 0.75"		





Performed By: Jose Orozco Signature: Jose Orozco Date: 2/28/2017

Approved By: STEVE CROCKHAM Signature: Steve Crockham Date: 3/7/17

MONTROSE

TEMPERATURE SENSOR CALIBRATION DATA FORM

Date	2/14/17
Calibrator	PH
Ambient Temperature, °F	**56.6**
Barometric Press. (in. Hg)	30.2
Thermocouple ID Number	**23-NP-8**
Digital Thermometer Number	(120352)
Reference Thermometer Serial Number	**PROBE (48829-4)**

Reference Point Number	Source	Reference Thermometer Temperature, °F	Thermocouple Temperature, °F	Temperature Difference[a], %	Pass/Fail
Cold	Ice Water	(####)	(####)	######## %	#VALUE!
Warm	Ambient Water	**56.8**	57.6	0.15 %	PASS
Hot	Hot Water	204.0	200.0	0.60 %	PASS

[a] [((Ref. Temp., °R) - (Test Thermocouple Temp., °R))/ Ref. Temp., °R]*100, where °R = °F + 460.
Temperature difference must be < 1.50 %.

Performed By: Jose Orozco Signature: Jose Orozco Date: 2/28/17

Approved By: Dan Duncan Signature: Dan Duncan Date: 3/2/17

APPENDIX B

DATA SHEETS

Appendix B.1

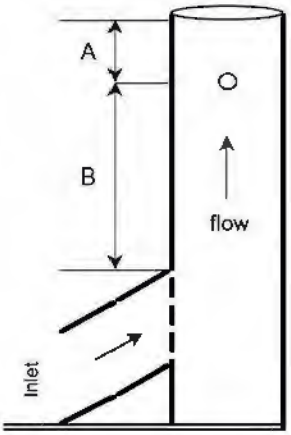
Sampling Locations

Schnitzer Steel - Outlet

TRAVERSE POINT LAYOUT (PARTICULATE)

CIRCULAR STACKS OVER 24 INCHES

Stack diameter:	[redacted]	*inches*
Upstream diameter (A):	[redacted]	*inches*
Downstream diameter (B):	[redacted]	*inches*
Port length:	6.50	*inches*
Number of ports being used:	2	*see note*
Equivalent upstream diameter (A):	3.922	*Pass*
Equivalent downstream diameter (B):	11.765	*Pass*
All points at least 1.0" from stack wall:	3.366	*Pass*
Total points:	12	
Points per port:	6	

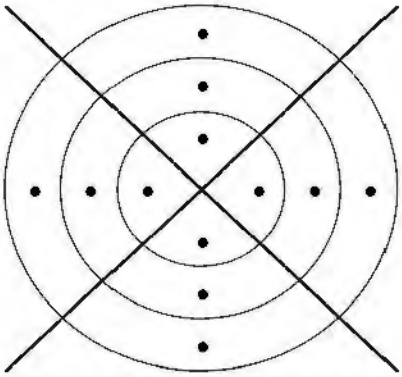


Typical vertical exhaust stack

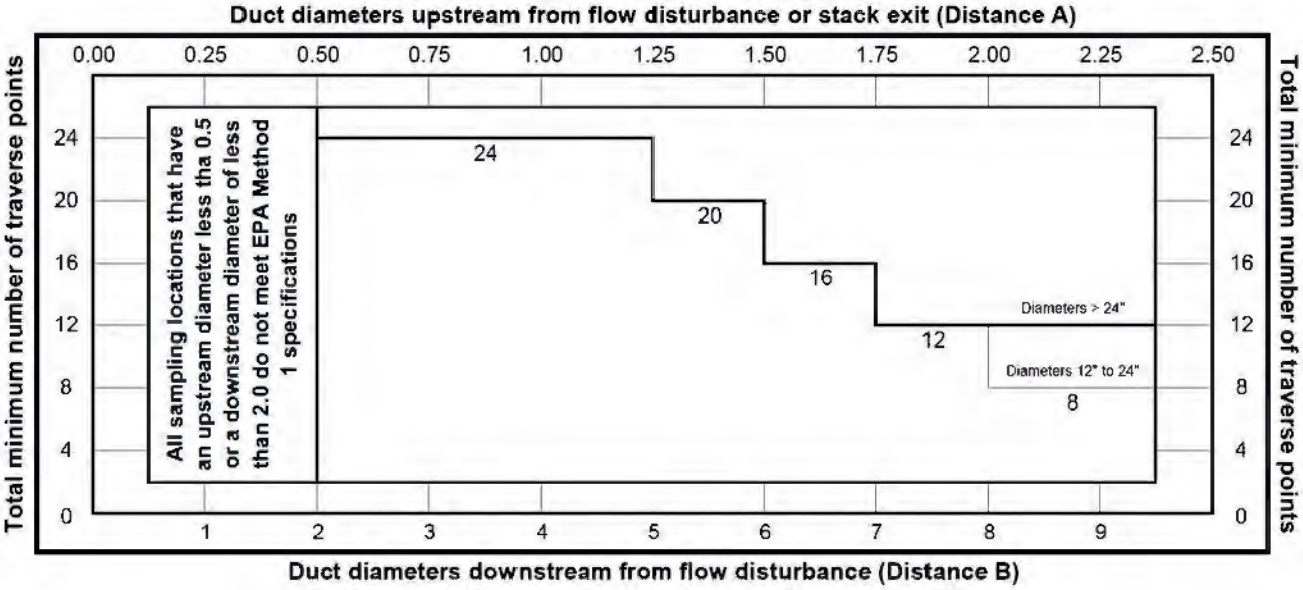
Point	% Diameter	Inside wall Distance (in)	Outside port Distance (in)
1	[redacted]	3.4	9.9
2	[redacted]	11.2	17.7
3	[redacted]	22.6	29.1
4	[redacted]	53.9	60.4
5	[redacted]	65.3	71.8
6	[redacted]	73.1	79.6
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
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

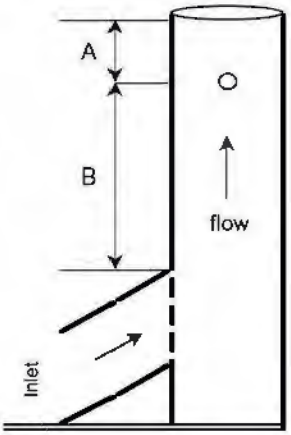


Schnitzer Steel - Inlet

TRAVERSE POINT LAYOUT (PARTICULATE)

CIRCULAR STACKS OVER 24 INCHES

Stack diameter:	[redacted]	*inches*
Upstream diameter (A):	[redacted]	*inches*
Downstream diameter (B):	[redacted]	*inches*
Port length:	6.00	*inches*
Number of ports being used:	2	*see note*
Equivalent upstream diameter (A):	0.516	*Pass*
Equivalent downstream diameter (B):	4.081	*Pass*
All points at least 1.0" from stack wall:	1.302	*Pass*
Total points:	24	
Points per port:	12	

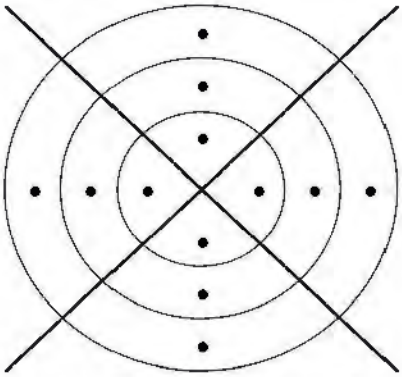


Typical vertical exhaust stack

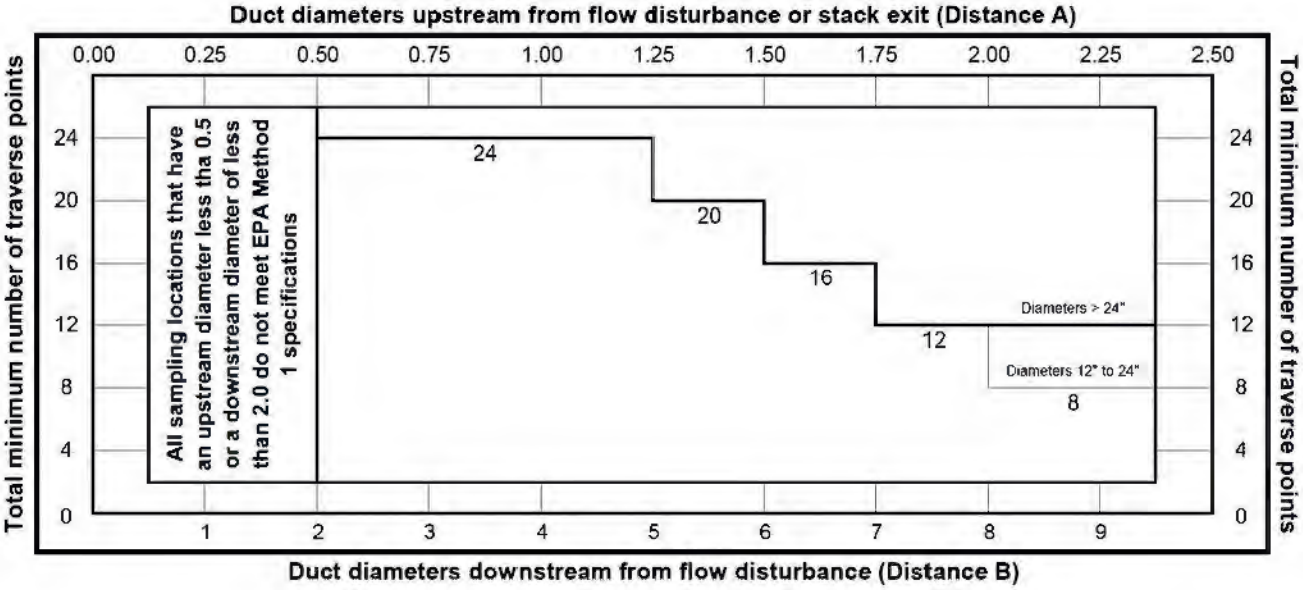
Point	% Diameter	Inside wall Distance (in)	Outside port Distance (in)
1	[redacted]	1.3	7.3
2	[redacted]	4.2	10.2
3	[redacted]	7.3	13.3
4	[redacted]	11.0	17.0
5	[redacted]	15.5	21.5
6	[redacted]	22.1	28.1
7	[redacted]	39.9	45.9
8	[redacted]	46.5	52.5
9	[redacted]	51.0	57.0
10	[redacted]	54.7	60.7
11	[redacted]	57.8	63.8
12	[redacted]	60.7	66.7

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

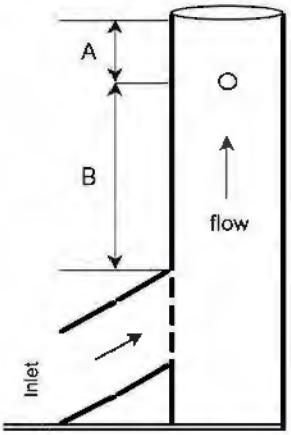


Schnitzer Steel - Inlet

TRAVERSE POINT LAYOUT (PARTICULATE)

CIRCULAR STACKS OVER 24 INCHES

Stack diameter:	[redacted]	*inches*
Upstream diameter (A):	[redacted]	*inches*
Downstream diameter (B):	[redacted]	*inches*
Port length:	6.00	*inches*
Number of ports being used:	2	*see note*
Equivalent upstream diameter (A):	16.129	*Pass*
Equivalent downstream diameter (B):	64.516	*Pass*
All points at least 1.0" from stack wall:	2.728	*Pass*
Total points:	12	
Points per port:	6	

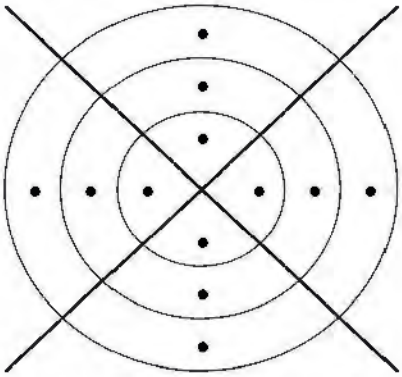


Typical vertical exhaust stack

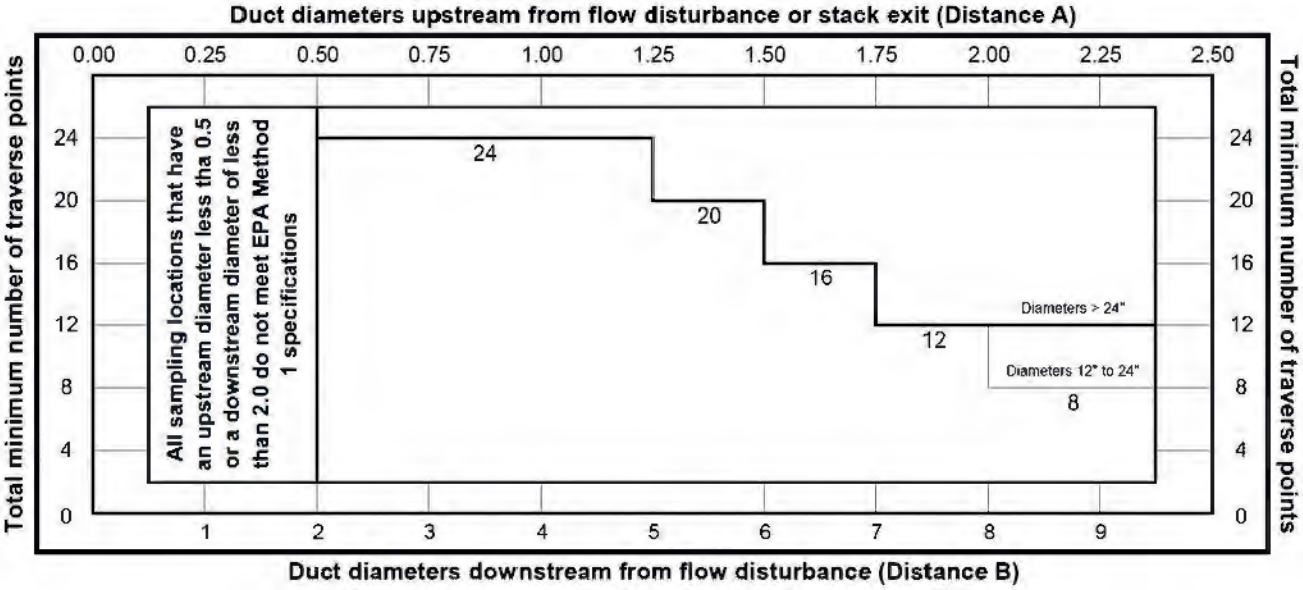
Point	% Diameter	Inside wall Distance (in)	Outside port Distance (in)
1	[redacted]	2.7	8.7
2	[redacted]	9.1	15.1
3	[redacted]	18.4	24.4
4	[redacted]	43.6	49.6
5	[redacted]	52.9	58.9
6	[redacted]	59.3	65.3
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A

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

DUCT AREA = [redacted] ft^2



Example: Location of 12 points



Appendix B.2

Plant Process Data

Date	% Availability	Unit	% Performance	Tons / Net Hr	Tons / Gross Hr	Schedule Time	Operating Time	Production Time	Down Time	No Scrap	Forece Majeure	Ferrous Tons	Waste Tons	Copped Picked (lbs)	Medium volt.KWHrs	High volt.KWHrs	Water Gallons	Density
6/30/2017	[redacted]		[redacted]		[redacted]	[redacted]	7.75	12.73	10.71	2.02	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
6/29/2017	[redacted]		[redacted]		[redacted]	[redacted]	7.75	8.75	6.42	2.33	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
6/28/2017	[redacted]		[redacted]		[redacted]	[redacted]	7.75	14.52	12.79	1.73	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Appendix B.3

MAQS CEMS Data

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 1 Average Results

20:42:00 - 21:42:00

	Name:	O2	CO2
	Make/Model:		
Jun 28 2017	20:43:00	20.56	0.021
Jun 28 2017	20:44:00	20.56	0.023
Jun 28 2017	20:45:00	20.56	0.023
Jun 28 2017	20:46:00	20.56	0.022
Jun 28 2017	20:47:00	20.56	0.022
Jun 28 2017	20:48:00	20.56	0.026
Jun 28 2017	20:49:00	20.57	0.022
Jun 28 2017	20:50:00	20.56	0.020
Jun 28 2017	20:51:00	20.56	0.023
Jun 28 2017	20:52:00	20.56	0.021
Jun 28 2017	20:53:00	20.56	0.021
Jun 28 2017	20:54:00	20.56	0.022
Jun 28 2017	20:55:00	20.56	0.021
Jun 28 2017	20:56:00	20.57	0.022
Jun 28 2017	20:57:00	20.57	0.021
Jun 28 2017	20:58:00	20.56	0.022
Jun 28 2017	20:59:00	20.57	0.022
Jun 28 2017	21:00:00	20.57	0.023
Jun 28 2017	21:01:00	20.57	0.022
Jun 28 2017	21:02:00	20.57	0.022
Jun 28 2017	21:03:00	20.56	0.023
Jun 28 2017	21:04:00	20.57	0.023
Jun 28 2017	21:05:00	20.57	0.021
Jun 28 2017	21:06:00	20.57	0.024
Jun 28 2017	21:07:00	20.57	0.024
Jun 28 2017	21:08:00	20.57	0.021
Jun 28 2017	21:09:00	20.57	0.021
Jun 28 2017	21:10:00	20.57	0.022
Jun 28 2017	21:11:00	20.56	0.022
Jun 28 2017	21:12:00	20.56	0.023
Jun 28 2017	21:13:00	20.57	0.026
Jun 28 2017	21:14:00	20.57	0.025
Jun 28 2017	21:15:00	20.57	0.025
Jun 28 2017	21:16:00	20.57	0.024
Jun 28 2017	21:17:00	20.56	0.024
Jun 28 2017	21:18:00	20.57	0.026
Jun 28 2017	21:19:00	20.56	0.026
Jun 28 2017	21:20:00	20.57	0.025
Jun 28 2017	21:21:00	20.57	0.025
Jun 28 2017	21:22:00	20.57	0.027
Jun 28 2017	21:23:00	20.57	0.025
Jun 28 2017	21:24:00	20.57	0.028
Jun 28 2017	21:25:00	20.58	0.024
Jun 28 2017	21:26:00	20.57	0.026
Jun 28 2017	21:27:00	20.57	0.025
Jun 28 2017	21:28:00	20.58	0.025
Jun 28 2017	21:29:00	20.57	0.023

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Jun 28 2017	21:30:00	20.57	0.026
Jun 28 2017	21:31:00	20.57	0.024
Jun 28 2017	21:32:00	20.57	0.024
Jun 28 2017	21:33:00	20.57	0.026
Jun 28 2017	21:34:00	20.58	0.024
Jun 28 2017	21:35:00	20.58	0.024
Jun 28 2017	21:36:00	20.57	0.024
Jun 28 2017	21:37:00	20.57	0.027
Jun 28 2017	21:38:00	20.57	0.026
Jun 28 2017	21:39:00	20.57	0.026
Jun 28 2017	21:40:00	20.58	0.026
Jun 28 2017	21:41:00	20.57	0.026
Jun 28 2017	21:42:00	20.57	0.025
	Average:	20.57	0.024
	Max:	20.58	0.028
	Min:	20.56	0.020

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 1 Post run bias
20:42:00 - 21:42:00

	Name:	O2	CO2
	Make/Model:		
	25A or 7E:	7E	7E
	Run summary data		
	Raw Avg:	20.57	0.024
	Max:	20.58	0.028
	Min:	20.56	0.020
	Cylinder Concentrations		
	Zero:	0.000	0.000
	Low:		
	Mid:	11.52	3.966
	High:	20.97	8.253
	Calibration Readings		
	Zero reading:	-0.014	0.002
	Low reading:		
	Mid reading:	11.51	3.988
	High reading:	20.96	8.240
	EPA Method 7E Error Calculations		
Zero %Err:	<2.0	-0.067	0.024
Mid %Err:	<2.0	-0.048	0.267
High %Err:	<2.0	-0.048	-0.158
	Initial Bias Data		
	Zero reading:	-0.069	-0.008
	Span reading:	11.27	3.920
Zero % bias:	<5.0	-0.262	-0.121
Span % bias:	<5.0	-1.144	-0.824
	Final Bias Data		
	Zero reading:	0.003	-0.002
	Span reading:	11.27	3.913
Zero % bias:	<5.0	0.081	-0.049
Span % bias:	<5.0	-1.145	-0.909
Zero % drift:	<3.0	0.343	0.073
Span % drift:	<3.0	0.000	0.085
	Bias Corrected Averages		
	Cor Avg:	21.00	0.029

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 2 Average Results

23:37:00 - 00:37:00

	Name:	O2	CO2
	Make/Model:		
Jun 28 2017	23:38:00	20.58	0.024
Jun 28 2017	23:39:00	20.59	0.025
Jun 28 2017	23:40:00	20.59	0.029
Jun 28 2017	23:41:00	20.59	0.027
Jun 28 2017	23:42:00	20.59	0.026
Jun 28 2017	23:43:00	20.59	0.025
Jun 28 2017	23:44:00	20.58	0.026
Jun 28 2017	23:45:00	20.59	0.026
Jun 28 2017	23:46:00	20.59	0.031
Jun 28 2017	23:47:00	20.59	0.027
Jun 28 2017	23:48:00	20.59	0.027
Jun 28 2017	23:49:00	20.59	0.028
Jun 28 2017	23:50:00	20.59	0.029
Jun 28 2017	23:51:00	20.59	0.028
Jun 28 2017	23:52:00	20.59	0.029
Jun 28 2017	23:53:00	20.60	0.028
Jun 28 2017	23:54:00	20.58	0.028
Jun 28 2017	23:55:00	20.59	0.027
Jun 28 2017	23:56:00	20.59	0.029
Jun 28 2017	23:57:00	20.59	0.028
Jun 28 2017	23:58:00	20.59	0.028
Jun 28 2017	23:59:00	20.59	0.028
Jun 29 2017	00:00:00	20.59	0.028
Jun 29 2017	00:01:00	20.58	0.030
Jun 29 2017	00:02:00	20.58	0.028
Jun 29 2017	00:03:00	20.59	0.027
Jun 29 2017	00:04:00	20.59	0.027
Jun 29 2017	00:05:00	20.60	0.028
Jun 29 2017	00:06:00	20.60	0.029
Jun 29 2017	00:07:00	20.60	0.028
Jun 29 2017	00:08:00	20.60	0.029
Jun 29 2017	00:09:00	20.60	0.029
Jun 29 2017	00:10:00	20.60	0.030
Jun 29 2017	00:11:00	20.60	0.031
Jun 29 2017	00:12:00	20.60	0.032
Jun 29 2017	00:13:00	20.59	0.031
Jun 29 2017	00:14:00	20.60	0.031
Jun 29 2017	00:15:00	20.59	0.032
Jun 29 2017	00:16:00	20.59	0.029
Jun 29 2017	00:17:00	20.59	0.028
Jun 29 2017	00:18:00	20.59	0.029
Jun 29 2017	00:19:00	20.59	0.029
Jun 29 2017	00:20:00	20.59	0.028
Jun 29 2017	00:21:00	20.59	0.033
Jun 29 2017	00:22:00	20.59	0.030
Jun 29 2017	00:23:00	20.59	0.033
Jun 29 2017	00:24:00	20.59	0.034

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Jun 29 2017	00:25:00	20.59	0.031
Jun 29 2017	00:26:00	20.59	0.031
Jun 29 2017	00:27:00	20.59	0.032
Jun 29 2017	00:28:00	20.59	0.031
Jun 29 2017	00:29:00	20.58	0.031
Jun 29 2017	00:30:00	20.59	0.030
Jun 29 2017	00:31:00	20.59	0.032
Jun 29 2017	00:32:00	20.59	0.030
Jun 29 2017	00:33:00	20.59	0.033
Jun 29 2017	00:34:00	20.61	0.033
Jun 29 2017	00:35:00	20.60	0.029
Jun 29 2017	00:36:00	20.61	0.026
Jun 29 2017	00:37:00	20.60	0.023
	Average:	20.59	0.029
	Max:	20.61	0.034
	Min:	20.58	0.023

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 2 Post run bias
23:37:00 - 00:37:00

	Name:	O2	CO2
	Make/Model:		
	25A or 7E:	7E	7E
	Run summary data		
	Raw Avg:	20.59	0.029
	Max:	20.61	0.034
	Min:	20.58	0.023
	Cylinder Concentrations		
	Zero:	0.000	0.000
	Low:		
	Mid:	11.52	3.966
	High:	20.97	8.253
	Calibration Readings		
	Zero reading:	-0.014	0.002
	Low reading:		
	Mid reading:	11.51	3.988
	High reading:	20.96	8.240
	EPA Method 7E Error Calculations		
Zero %Err:	<2.0	-0.067	0.024
Mid %Err:	<2.0	-0.048	0.267
High %Err:	<2.0	-0.048	-0.158
	Initial Bias Data		
	Zero reading:	0.003	-0.002
	Span reading:	11.27	3.913
Zero % bias:	<5.0	0.081	-0.049
Span % bias:	<5.0	-1.145	-0.909
	Final Bias Data		
	Zero reading:	-0.044	-0.007
	Span reading:	11.26	3.906
Zero % bias:	<5.0	-0.143	-0.109
Span % bias:	<5.0	-1.192	-0.994
Zero % drift:	<3.0	0.224	0.061
Span % drift:	<3.0	0.048	0.085
	Bias Corrected Averages		
	Cor Avg:	21.04	0.034

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 3 Average Results
02:15:00 - 03:03:00

	Name:	O2	CO2
	Make/Model:		
Jun 29 2017	02:16:00	20.60	0.025
Jun 29 2017	02:17:00	20.60	0.026
Jun 29 2017	02:18:00	20.60	0.025
Jun 29 2017	02:19:00	20.60	0.027
Jun 29 2017	02:20:00	20.60	0.025
Jun 29 2017	02:21:00	20.59	0.025
Jun 29 2017	02:22:00	20.59	0.026
Jun 29 2017	02:23:00	20.60	0.025
Jun 29 2017	02:24:00	20.60	0.024
Jun 29 2017	02:25:00	20.60	0.026
Jun 29 2017	02:26:00	20.60	0.025
Jun 29 2017	02:27:00	20.60	0.027
Jun 29 2017	02:28:00	20.60	0.023
Jun 29 2017	02:29:00	20.60	0.022
Jun 29 2017	02:30:00	20.60	0.022
Jun 29 2017	02:31:00	20.60	0.020
Jun 29 2017	02:32:00	20.60	0.020
Jun 29 2017	02:33:00	20.60	0.021
Jun 29 2017	02:34:00	20.60	0.020
Jun 29 2017	02:35:00	20.60	0.021
Jun 29 2017	02:36:00	20.60	0.025
Jun 29 2017	02:37:00	20.60	0.024
Jun 29 2017	02:38:00	20.59	0.023
Jun 29 2017	02:39:00	20.60	0.024
Jun 29 2017	02:40:00	20.60	0.024
Jun 29 2017	02:41:00	20.63	0.023
Jun 29 2017	02:42:00	20.62	0.024
Jun 29 2017	02:43:00	20.63	0.025
Jun 29 2017	02:44:00	20.62	0.024
Jun 29 2017	02:45:00	20.63	0.024
Jun 29 2017	02:46:00	20.62	0.025
Jun 29 2017	02:47:00	20.62	0.026
Jun 29 2017	02:48:00	20.63	0.025
Jun 29 2017	02:49:00	20.63	0.026
Jun 29 2017	02:50:00	20.63	0.026
Jun 29 2017	02:51:00	20.63	0.026
Jun 29 2017	02:52:00	20.62	0.025
Jun 29 2017	02:53:00	20.63	0.027
Jun 29 2017	02:54:00	20.63	0.026
Jun 29 2017	02:55:00	20.63	0.026
Jun 29 2017	02:56:00	20.60	0.026
Jun 29 2017	02:57:00	20.60	0.023
Jun 29 2017	02:58:00	20.60	0.025
Jun 29 2017	02:59:00	20.60	0.025
Jun 29 2017	03:00:00	20.60	0.027
Jun 29 2017	03:01:00	20.60	0.027
Jun 29 2017	03:02:00	20.60	0.025

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Jun 29 2017	03:03:00	20.61	0.025
	Average:	20.61	0.025
	Max:	20.63	0.027
	Min:	20.59	0.020

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 3 Post run bias

02:15:00 - 03:03:00

	Name:	O2	CO2
	Make/Model:		
	25A or 7E:	7E	7E
	Run summary data		
	Raw Avg:	20.61	0.025
	Max:	20.63	0.027
	Min:	20.59	0.020
	Cylinder Concentrations		
	Zero:	0.000	0.000
	Low:		
	Mid:	11.52	3.966
	High:	20.97	8.253
	Calibration Readings		
	Zero reading:	-0.014	0.002
	Low reading:		
	Mid reading:	11.51	3.988
	High reading:	20.96	8.240
	EPA Method 7E Error Calculations		
Zero %Err:	<2.0	-0.067	0.024
Mid %Err:	<2.0	-0.048	0.267
High %Err:	<2.0	-0.048	-0.158
	Initial Bias Data		
	Zero reading:	-0.044	-0.007
	Span reading:	11.26	3.906
Zero % bias:	<5.0	-0.143	-0.109
Span % bias:	<5.0	-1.192	-0.994
	Final Bias Data		
	Zero reading:	-0.086	-0.012
	Span reading:	11.28	3.918
Zero % bias:	<5.0	-0.343	-0.170
Span % bias:	<5.0	-1.097	-0.848
Zero % drift:	<3.0	0.200	0.061
Span % drift:	<3.0	0.095	0.146
	Bias Corrected Averages		
	Cor Avg:	21.01	0.035

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 4 Average Results

20:11:00 - 21:11:00

	Name:	O2	CO2
	Make/Model:		
Jun 29 2017	20:12:00	20.60	0.038
Jun 29 2017	20:13:00	20.60	0.037
Jun 29 2017	20:14:00	20.59	0.037
Jun 29 2017	20:15:00	20.59	0.037
Jun 29 2017	20:16:00	20.59	0.038
Jun 29 2017	20:17:00	20.59	0.038
Jun 29 2017	20:18:00	20.59	0.038
Jun 29 2017	20:19:00	20.59	0.037
Jun 29 2017	20:20:00	20.60	0.038
Jun 29 2017	20:21:00	20.59	0.040
Jun 29 2017	20:22:00	20.60	0.040
Jun 29 2017	20:23:00	20.60	0.039
Jun 29 2017	20:24:00	20.60	0.038
Jun 29 2017	20:25:00	20.60	0.037
Jun 29 2017	20:26:00	20.61	0.039
Jun 29 2017	20:27:00	20.62	0.042
Jun 29 2017	20:28:00	20.63	0.040
Jun 29 2017	20:29:00	20.60	0.040
Jun 29 2017	20:30:00	20.60	0.039
Jun 29 2017	20:31:00	20.60	0.039
Jun 29 2017	20:32:00	20.59	0.039
Jun 29 2017	20:33:00	20.59	0.041
Jun 29 2017	20:34:00	20.60	0.039
Jun 29 2017	20:35:00	20.60	0.040
Jun 29 2017	20:36:00	20.59	0.041
Jun 29 2017	20:37:00	20.60	0.038
Jun 29 2017	20:38:00	20.59	0.039
Jun 29 2017	20:39:00	20.59	0.043
Jun 29 2017	20:40:00	20.59	0.038
Jun 29 2017	20:41:00	20.60	0.039
Jun 29 2017	20:42:00	20.59	0.039
Jun 29 2017	20:43:00	20.59	0.038
Jun 29 2017	20:44:00	20.59	0.041
Jun 29 2017	20:45:00	20.59	0.037
Jun 29 2017	20:46:00	20.59	0.039
Jun 29 2017	20:47:00	20.59	0.040
Jun 29 2017	20:48:00	20.60	0.041
Jun 29 2017	20:49:00	20.60	0.039
Jun 29 2017	20:50:00	20.60	0.039
Jun 29 2017	20:51:00	20.59	0.041
Jun 29 2017	20:52:00	20.60	0.039
Jun 29 2017	20:53:00	20.60	0.040
Jun 29 2017	20:54:00	20.60	0.042
Jun 29 2017	20:55:00	20.59	0.042
Jun 29 2017	20:56:00	20.60	0.040
Jun 29 2017	20:57:00	20.60	0.039
Jun 29 2017	20:58:00	20.60	0.040

MAQDAQ 1.0

MONTROSE ENVIRONMENTAL

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Jun 29 2017	20:59:00	20.60	0.039
Jun 29 2017	21:00:00	20.59	0.042
Jun 29 2017	21:01:00	20.60	0.038
Jun 29 2017	21:02:00	20.60	0.041
Jun 29 2017	21:03:00	20.60	0.042
Jun 29 2017	21:04:00	20.60	0.041
Jun 29 2017	21:05:00	20.60	0.040
Jun 29 2017	21:06:00	20.60	0.039
Jun 29 2017	21:07:00	20.60	0.040
Jun 29 2017	21:08:00	20.60	0.040
Jun 29 2017	21:09:00	20.60	0.040
Jun 29 2017	21:10:00	20.60	0.044
Jun 29 2017	21:11:00	20.60	0.042
	Average:	20.60	0.040
	Max:	20.63	0.044
	Min:	20.59	0.037

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 4 Post run bias
20:11:00 - 21:11:00

Name:	O2	CO2	
Make/Model:			
25A or 7E:	7E	7E	
Run summary data			
Raw Avg:	20.60	0.040	
Max:	20.63	0.044	
Min:	20.59	0.037	
Cylinder Concentrations			
Zero:	0.000	0.000	
Low:			
Mid:	11.52	3.966	
High:	20.97	8.253	
Calibration Readings			
Zero reading:	0.007	-0.005	
Low reading:			
Mid reading:	11.51	3.904	
High reading:	20.98	8.295	
EPA Method 7E Error Calculations			
Zero %Err:	<2.0	0.033	-0.061
Mid %Err:	<2.0	-0.048	-0.751
High %Err:	<2.0	0.048	0.509
Initial Bias Data			
Zero reading:	0.099	0.007	
Span reading:	11.32	3.920	
Zero % bias:	<5.0	0.439	0.145
Span % bias:	<5.0	-0.906	0.194
Final Bias Data			
Zero reading:	0.022	0.021	
Span reading:	11.32	3.922	
Zero % bias:	<5.0	0.072	0.315
Span % bias:	<5.0	-0.906	0.218
Zero % drift:	<3.0	0.367	0.170
Span % drift:	<3.0	0.000	0.024
Bias Corrected Averages			
Cor Avg:	21.01	0.026	

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 5 Average Results
23:05:00 - 00:05:00

	Name:	O2	CO2
	Make/Model:		
Jun 29 2017	23:06:00	20.64	0.044
Jun 29 2017	23:07:00	20.64	0.044
Jun 29 2017	23:08:00	20.64	0.044
Jun 29 2017	23:09:00	20.63	0.044
Jun 29 2017	23:10:00	20.64	0.042
Jun 29 2017	23:11:00	20.64	0.045
Jun 29 2017	23:12:00	20.64	0.046
Jun 29 2017	23:13:00	20.64	0.044
Jun 29 2017	23:14:00	20.64	0.044
Jun 29 2017	23:15:00	20.64	0.045
Jun 29 2017	23:16:00	20.64	0.046
Jun 29 2017	23:17:00	20.64	0.045
Jun 29 2017	23:18:00	20.63	0.050
Jun 29 2017	23:19:00	20.64	0.049
Jun 29 2017	23:20:00	20.64	0.048
Jun 29 2017	23:21:00	20.64	0.047
Jun 29 2017	23:22:00	20.64	0.049
Jun 29 2017	23:23:00	20.64	0.048
Jun 29 2017	23:24:00	20.64	0.048
Jun 29 2017	23:25:00	20.64	0.049
Jun 29 2017	23:26:00	20.63	0.049
Jun 29 2017	23:27:00	20.64	0.049
Jun 29 2017	23:28:00	20.64	0.050
Jun 29 2017	23:29:00	20.64	0.046
Jun 29 2017	23:30:00	20.64	0.047
Jun 29 2017	23:31:00	20.64	0.047
Jun 29 2017	23:32:00	20.64	0.047
Jun 29 2017	23:33:00	20.64	0.047
Jun 29 2017	23:34:00	20.64	0.047
Jun 29 2017	23:35:00	20.64	0.047
Jun 29 2017	23:36:00	20.64	0.050
Jun 29 2017	23:37:00	20.64	0.047
Jun 29 2017	23:38:00	20.64	0.048
Jun 29 2017	23:39:00	20.64	0.047
Jun 29 2017	23:40:00	20.64	0.048
Jun 29 2017	23:41:00	20.64	0.047
Jun 29 2017	23:42:00	20.64	0.050
Jun 29 2017	23:43:00	20.64	0.048
Jun 29 2017	23:44:00	20.64	0.050
Jun 29 2017	23:45:00	20.64	0.047
Jun 29 2017	23:46:00	20.64	0.048
Jun 29 2017	23:47:00	20.64	0.048
Jun 29 2017	23:48:00	20.64	0.046
Jun 29 2017	23:49:00	20.65	0.048
Jun 29 2017	23:50:00	20.64	0.045
Jun 29 2017	23:51:00	20.64	0.043
Jun 29 2017	23:52:00	20.64	0.044

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Jun 29 2017	23:53:00	20.65	0.042
Jun 29 2017	23:54:00	20.64	0.042
Jun 29 2017	23:55:00	20.64	0.043
Jun 29 2017	23:56:00	20.65	0.042
Jun 29 2017	23:57:00	20.64	0.043
Jun 29 2017	23:58:00	20.65	0.043
Jun 29 2017	23:59:00	20.64	0.044
Jun 30 2017	00:00:00	20.65	0.041
Jun 30 2017	00:01:00	20.65	0.041
Jun 30 2017	00:02:00	20.66	0.038
Jun 30 2017	00:03:00	20.64	0.040
Jun 30 2017	00:04:00	20.64	0.041
Jun 30 2017	00:05:00	20.64	0.040
	Average:	20.64	0.046
	Max:	20.66	0.050
	Min:	20.63	0.038

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 5 Post run bias
23:05:00 - 00:05:00

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

Run summary data

	Raw Avg:	20.64	0.046
	Max:	20.66	0.050
	Min:	20.63	0.038

Cylinder Concentrations

	Zero:	0.000	0.000
	Low:		
	Mid:	11.52	3.966
	High:	20.97	8.253

Calibration Readings

	Zero reading:	0.007	-0.005
	Low reading:		
	Mid reading:	11.51	3.904
	High reading:	20.98	8.295

EPA Method 7E Error Calculations

Zero %Err:	<2.0	0.033	-0.061
Mid %Err:	<2.0	-0.048	-0.751
High %Err:	<2.0	0.048	0.509

Initial Bias Data

	Zero reading:	0.022	0.021
	Span reading:	11.32	3.922
Zero % bias:	<5.0	0.072	0.315
Span % bias:	<5.0	-0.906	0.218

Final Bias Data

	Zero reading:	0.016	0.078
	Span reading:	11.32	3.869
Zero % bias:	<5.0	0.043	1.006
Span % bias:	<5.0	-0.906	-0.424
Zero % drift:	<3.0	0.029	0.691
Span % drift:	<3.0	0.000	0.642

Bias Corrected Averages

	Cor Avg:	21.02	-0.004

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 6 Average Results
01:00:00 - 02:00:00

	Name:	O2	CO2
	Make/Model:		
Jun 30 2017	01:01:00	20.64	0.042
Jun 30 2017	01:02:00	20.64	0.040
Jun 30 2017	01:03:00	20.64	0.041
Jun 30 2017	01:04:00	20.64	0.042
Jun 30 2017	01:05:00	20.64	0.044
Jun 30 2017	01:06:00	20.64	0.043
Jun 30 2017	01:07:00	20.64	0.043
Jun 30 2017	01:08:00	20.64	0.043
Jun 30 2017	01:09:00	20.64	0.043
Jun 30 2017	01:10:00	20.63	0.045
Jun 30 2017	01:11:00	20.64	0.045
Jun 30 2017	01:12:00	20.64	0.046
Jun 30 2017	01:13:00	20.64	0.045
Jun 30 2017	01:14:00	20.64	0.045
Jun 30 2017	01:15:00	20.64	0.046
Jun 30 2017	01:16:00	20.63	0.044
Jun 30 2017	01:17:00	20.63	0.044
Jun 30 2017	01:18:00	20.63	0.043
Jun 30 2017	01:19:00	20.65	0.041
Jun 30 2017	01:20:00	20.64	0.041
Jun 30 2017	01:21:00	20.64	0.040
Jun 30 2017	01:22:00	20.64	0.042
Jun 30 2017	01:23:00	20.64	0.039
Jun 30 2017	01:24:00	20.63	0.040
Jun 30 2017	01:25:00	20.63	0.040
Jun 30 2017	01:26:00	20.63	0.040
Jun 30 2017	01:27:00	20.63	0.041
Jun 30 2017	01:28:00	20.63	0.040
Jun 30 2017	01:29:00	20.64	0.041
Jun 30 2017	01:30:00	20.64	0.041
Jun 30 2017	01:31:00	20.64	0.041
Jun 30 2017	01:32:00	20.64	0.040
Jun 30 2017	01:33:00	20.64	0.040
Jun 30 2017	01:34:00	20.64	0.041
Jun 30 2017	01:35:00	20.64	0.041
Jun 30 2017	01:36:00	20.64	0.041
Jun 30 2017	01:37:00	20.65	0.042
Jun 30 2017	01:38:00	20.64	0.043
Jun 30 2017	01:39:00	20.64	0.042
Jun 30 2017	01:40:00	20.64	0.042
Jun 30 2017	01:41:00	20.64	0.041
Jun 30 2017	01:42:00	20.64	0.042
Jun 30 2017	01:43:00	20.64	0.044
Jun 30 2017	01:44:00	20.64	0.042
Jun 30 2017	01:45:00	20.64	0.041
Jun 30 2017	01:46:00	20.65	0.042
Jun 30 2017	01:47:00	20.65	0.045

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS 179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Jun 30 2017	01:48:00	20.65	0.042
Jun 30 2017	01:49:00	20.64	0.041
Jun 30 2017	01:50:00	20.64	0.041
Jun 30 2017	01:51:00	20.64	0.042
Jun 30 2017	01:52:00	20.64	0.040
Jun 30 2017	01:53:00	20.64	0.041
Jun 30 2017	01:54:00	20.64	0.041
Jun 30 2017	01:55:00	20.64	0.042
Jun 30 2017	01:56:00	20.65	0.042
Jun 30 2017	01:57:00	20.64	0.042
Jun 30 2017	01:58:00	20.64	0.044
Jun 30 2017	01:59:00	20.65	0.042
Jun 30 2017	02:00:00	20.65	0.044
	Average:	20.64	0.042
	Max:	20.65	0.046
	Min:	20.63	0.039

MONTROSE ENVIRONMENTAL

MAQDAQ 1.0

Project Name: Schnitzer Steel	Project Number: 005AS-179737	CEMS Operator: Andrew Berg	Unit/Condition: Shredder Outlet
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(00)

Run 6 Post run bias
01:00:00 - 02:00:00

Name:		O2	CO2
Make/Model:			
25A or 7E:		7E	7E
Run summary data			
Raw Avg:		20.64	0.042
Max:		20.65	0.046
Min:		20.63	0.039
Cylinder Concentrations			
Zero:		0.000	0.000
Low:			
Mid:		11.52	3.966
High:		20.97	8.253
Calibration Readings			
Zero reading:		0.007	-0.005
Low reading:			
Mid reading:		11.51	3.904
High reading:		20.98	8.295
EPA Method 7E Error Calculations			
Zero %Err:	<2.0	0.033	-0.061
Mid %Err:	<2.0	-0.048	-0.751
High %Err:	<2.0	0.048	0.509
Initial Bias Data			
Zero reading:		0.016	0.078
Span reading:		11.32	3.869
Zero % bias:	<5.0	0.043	1.006
Span % bias:	<5.0	-0.906	-0.424
Final Bias Data			
Zero reading:		-0.099	0.006
Span reading:		11.30	3.886
Zero % bias:	<5.0	-0.506	0.133
Span % bias:	<5.0	-1.001	-0.218
Zero % drift:	<3.0	0.548	0.873
Span % drift:	<3.0	0.095	0.206
Bias Corrected Averages			
Cor Avg:		20.99	0.000

Appendix B.4

Particulate Matter Data Sheets

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel — Page ____ of ____

Source / Location: (Inlet) Outlet (circle one) — Method: 201a / 202

Run no. 1-PM-IN — Date 6/28/17 — Operator / Assistant ST — Project No. 005-AQS-174737

Equipment Identification	
Meter console ID	CB-05
Stack TC ID	
Probe/pitot ID	
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters	
Run duration, min.	120
No. of traverse pts.	6
No. of ports	1
Points per port	6
Time per point, min.	20
Probe/filter range, °F	—
Imp. outlet max., °F	68

Calibration	
Meter Yd	0.984
Meter ΔH@0.75cfm	1.800
Pitot tube Cp	0.84
Nozzle diameter, in.	0.140

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

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.97
Ambient temp., °F	67
Static (P_g), in. H_2O	-6.5
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	6.008 @ 15	6.005 @ 5
Pitot (+): in. H_2O @ in. H_2O	6 @ 3	6 @ 3
Pitot (-): in. H_2O @ in. H_2O	6 @ 3	6 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	707.1	709.4	
EMPTY	667.2	667.9	
H20	654.1	655.0	
SiO2	784.3	785.1	
Tared Line Rinse	30	0	-30
Total impinger weight gain, g			

K Factor: ΔH = 0.41 N/A x ΔP or dwell time = 20.4 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	cfm Filter	Vaccum in. Hg
1	17.25	2031	998.212	1.3		64	250		45	-	58	55	1.0
2	17.07	2054.15	1005.12	0.70		65	250		45		59	57	1.0
3	17.67	2101.15	1013.03	0.75		65	250		46		59	59	1.0
4	18.58	~~2120.0~~	1019.82	0.83		65	250		46		60	60	1.0
5	21.39	~~2147.45~~	1026.52	1.1		65	250		47		60	61	1.0
6	23.25	2232.115	1033.92	1.3		65	250		47		61	61	1.0
FD		2234.45	1043.552										

2129.0

2209.15

SAMPLE HAD NO MOISTURE OR PM ON FILTER. RAN EXTRA RUN.

Comments: 005-AQS-174737 R5 - 2147.45 6 - 2209.15

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel — Page 1 of 1

Source / Location: Inlet Outlet (circle one) — Method 201a / 202

Run no. 2-PM-IN — Date 6/28 — Operator / Assistant ST — Project No. 005-AQS-179737

Equipment Identification

Meter console ID	CB-05
Stack TC ID	
Probe/pitot ID	123-TP-8
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters

Run duration, min.	120
No. of traverse pts.	
No. of ports	
Points per port	
Time per point, min.	
Probe/filter range, °F	
Imp. outlet max., °F	

Calibration

Meter Yd	0.989
Meter ΔH@0.75cfm	1.800
Pitot tube Cp	0.84
Nozzle diameter, in.	0.140

ALT-011 TC Check

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

Ambient / Stack Gas Conditions

Baro. press., in. Hg	
Ambient temp., °F	
Static (P_g), in. H_2O	-6.5
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.015 @ 8	0.015 @ 8
Pitot (+): in H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot (-): in H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	635.4	662.1	
EMPTY	668.7	663.1	
H20	659.2	663.7	
SiO2	809.3	826.6	
Tared Line Rinse	30	0	-30
Total impinger weight gain, g			

Filter ID 7185

K Factor: ΔH = 17.41 N/A x ΔP or dwell time = 20.4 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	Gas filter	Vaccum in. Hg
1	21.45	23.22	44.715	1.15	0.41	64	250		49	-	63	53	1.5
2	17.30	23.43.45	51.46	0.72	0.41	64	250		49		64	53	1.5
3	17.45	24.01.15	57.12	0.78	0.41	65	250		50		65	53	1.5
4	18.00	24.18.0	63.01	0.78	0.41	65	250		50		66	54	1.5
5	22.30	24.36.0	69.52	1.20	0.41	64	250		51		67	55	2.0
6	22.45	24.58.30	77.51	1.25	0.41	64	250		51		67	55	2.0
FD		2521.15	86.352										

DP: 1.20

Comments:

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel — Page 1 of 1

Source / Location: (Inlet) Outlet (circle one) — Method: 201a / 202

Run no. 3-PM-IN — Date 6/29/17 — Operator / Assistant: Sammy T — Project No. 005AS-179737

Equipment Identification	
Meter console ID	CB-05
Stack TC ID	
Probe/pitot ID	129-7P-8
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters	
Run duration, min.	120
No. of traverse pts.	6
No. of ports	1
Points per port	6
Time per point, min.	20
Probe/filter range, °F	—
Imp. outlet max., °F	68

Calibration	
Meter Yd	0.984
Meter ΔH@0.75cfm	1.800
Pitot tube Cp	0.84
Nozzle diameter, in.	0.140

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

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	
Ambient temp., °F	
Static (P_g), in. H_2O	-6.5
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.015 @ 10	0.010 @ 10
Pitot (+): in. H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot (-): in. H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	633.9	596.6	
EMPTY	659.1	671.3	
H20	663.0	660.7	
SiO2	1015.0	1025.3	
#1		666.1	
Tared Line Rinse			
Total impinger weight gain, g			

K Factor: ΔH = N/A x ΔP or dwell time = 26.4 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	cfm filter	Vaccum in. Hg
1	22.30	1826	99.778	1.20	0.41	61	250		45		57	55	1.0
2	17.30	1848.30	107.71	0.74	0.41	63	250		49		58	55	1.5
3	17.30	1906.0	114.183	0.73	0.41		250						
4	17.15	1923.15		0.71	0.41		250						
1946.30 5	21.30	~~1944.30~~		1.10	0.41		250						
6	23.15	2002.0		1.30	0.41		250						
ED		2025.15											
~~4~~	~~17.15~~	~~2004~~											
~~5~~	~~21.30~~	~~2025.30~~											
~~2047.0~~ ~~6~~	~~23.15~~	~~2048.45~~											
~~ED~~		~~2110.45~~											
	~~17.30~~												
3	~~17.30~~	2004	114.183	0.73	0.41	60	250		48		60	55	1.5
4	17.15	2021.30	120.92	0.71	0.41	60	250		49		60	55	1.5
5	21.30	2038.45	126.71	1.10	0.41	62	250		49		60	56	1.5
6	23.15	2100.15	133.48	1.30	0.41	64	250		50		61	56	2.0
ED		2123.30	141.585										

Comments: 005AS-179737 ~~1946.30~~, ED - ~~2025.15~~

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel — Page 1 of 1

Source / Location: Shredder Outlet — Method: EPA 201A/2

Run no.: 4-PM-1N — Date: 6-29-12 — Operator / Assistant: Sam T. — Project No. 005AS-179737

Equipment Identification	
Meter console ID	CB-05
Stack TC ID	
Probe/pitot ID	124-10-8
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters	
Run duration, min.	120
No. of traverse pts.	~~12~~ 6
No. of ports	~~2~~ 1
Points per port	6
Time per point, min.	20
Probe/filter range, °F	—
Imp. outlet max., °F	68

Calibration	
Meter Yd	0.984
Meter ΔH@0.75cfm	1.800
Pitot tube Cp	0.84
Nozzle diameter, in.	0.140

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

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	
Ambient temp., °F	
Static (P_g), in. H_2O	-6.8
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

K Factor: ΔH = N/A x ΔP or dwell time = 20.4 x √ΔP

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.010 @ 10	0.010 @ 10
Pitot (+): in. H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot (-): in. H_2O @ in. H_2O	0 @ 3	0 @ 3
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	722.3	751.4	
EMPTY	655.4	651.6	
H_2O	656.0	664.4	
S.G.	1025.3	1050.6	
Tared Line Rinse	30	0	-30
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
1	22.45	10.10	142.593	1.25	0.41	62	250		45		59		1.5
2	17.15	10.32.45	150.848	0.72	0.41	63	250		45		60		1.5
3	17.45	1050.0	156.62	0.76	0.41	64	250		46		62		1.5
4	17.15	1107.45	163.23	0.72	0.41	64	250		47		64		1.5
5	21.30	1125.0	169.23	1.10	0.41	64	250		47		66		2.0
6	22.45	1156.30	181.08	1.25	0.41	64	250		48		67		2.0
EO		1219.15	189.454	—									

Comments:

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel — Page 1 of 1

Source / Location: Inlet Outlet (circle one) — Method 201a / 202

Run no. 1-PM-OUT — Date 6/28/17 — Operator / Assistant KD / (SS) — Project No. 005-AQS-179737

Equipment Identification	
Meter console ID	CB-03
Stack TC ID	8-TP-8
Probe/pitot ID	8-TP-8
Nozzle ID	
Imp. outlet TC ID	65N-8
Filter TC ID	202TC-14
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters	
Run duration, min.	120
No. of traverse pts.	~~24~~ 12
No. of ports	2
Points per port	~~12~~ 6
Time per point, min.	~~5~~ 10
Probe/filter range, °F	248
Imp. outlet max., °F	68

Calibration	
Meter Yd	0.981
Meter ΔH@0.75cfm	1.788
Pitot tube Cp	0.84
Nozzle diameter, in.	0.115

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

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.97
Ambient temp., °F	67
Static (P_g), in. H_2O	-0.91
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.012 @ 13	0.003 @ 6
Pitot (+): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	720.4	760.8	
EMPTY	656.2	655.7	
H20	649.0	655.1	
SiO2	968.1	979.2	
Tared Line Rinse	30	0	-30
Total impinger weight gain, g			

K Factor: ΔH = N/A x ΔP or dwell time = 7.3 x √ΔP

Filter ID 7737

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	CPM	Vacuum in. Hg
1	10.3	8:30	616.618	2.0	0.36	75	250	—	56	—	63	60	2.0
2	10.0	8:40:45	619.815	1.9	0.36	75	249	—	54	—	63	60	2.0
3	9.81	8:50:15	623.09	1.7	0.36	74	250	—	53	—	62	60	2.0
4	10.57	8:59:45	626.08	2.1	0.36	74	251	—	54	—	63	60	2.0
5	10.82	9:10:15	629.53	2.2	0.36	75	249	—	55	—	64	61	2.0
6	9.79	9:21:00	633.01	1.8	0.36	75	248	—	57	—	65	61	2.0
PC	—	9:30:45	636.195										
1	10.57	9:34	636.195	2.1	0.36	73	249	—	56	—	66	61	2.0
2	10	9:44:30	639.56	1.9	0.36	73	250	—	58	—	66	62	2.0
3	9.79	9:54:30	642.67	1.8	0.36	74	251	—	56	—	67	62	2.0
4	10.3	10:04:15	645.97	2.0	0.36	73	249	—	56	—	67	63	2.0
5	9.79	10:15	649.29	1.8	0.36	73	248	—	57	—	67	64	2.0
6	9.51	10:24:45	652.37	1.7	0.36	73	250	—	58	—	68	64	2.0
END	—	10:34:15	655.483										

Comments:

005AS-179737 R1

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel — Page ___ of ___

Source / Location: Inlet Outlet (circle one) — Method: 201a / 202

Run no. 2-PM-OUT — Date 6/28/17 — Operator / Assistant KD (JS) — Project No. 005-AQS-179737

Equipment Identification	
Meter console ID	CB-03
Stack TC ID	8-TP8
Probe/pitot ID	8-TP-8
Nozzle ID	
Imp. outlet TC ID	GSN-8
Filter TC ID	—
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters	
Run duration, min.	120
No. of traverse pts.	24
No. of ports	2
Points per port	12
Time per point, min.	5
Probe/filter range, °F	248
Imp. outlet max., °F	68

Calibration	
Meter Yd	0.981
Meter ΔH@0.75cfm	1.788
Pitot tube Cp	0.84
Nozzle diameter, in.	0.115
ALT-011 TC Check	
Std. TC ID	
Std. TC temp., °F	
Stack TC temp., °F	
Continuity check + or -	
Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.97
Ambient temp., °F	67
Static (P_g), in. H_2O	-0.88
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

K Factor: ΔH = N/A x ΔP or dwell time = 7.3 x √ΔP

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.002 @ 10	0.001 @ 5
Pitot (+): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	785.6	827.8	
EMPTY	659.9	660.6	
H20	550.5	553.0	
SiO2	807.7	819.4	
Tared Line Rinse	50	0	-30
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	CPM	Vaccum in. Hg
1	10.07	11:22	656.290	2.1	0.36	75	250	-	59	-	63	69	2.0
2	11.07	11:32:30	659.72	2.3	0.36	75	251	-	55	-	64	70	2.5
3	10.06	11:43:30	663.32	1.9	0.36	75	249	-	54	-	65	70	2.5
4	9.74	11:53:30	666.46	1.8	0.36	76	248	-	56	-	66	71	2.5
5	9.23	12:03:15	669.54	1.6	0.36	76	250	-	57	-	66	72	2.5
6	10.06	12:12:30	672.69	1.9	0.36	76	249	-	60	-	66	73	2.5
Pc	—	12:22:30	675.774	—									
1	9.79	12:27	675.774	1.8	0.36	76	250	-	61	-	66	73	2.5
2	10.32	12:36:45	678.93	2.0	0.36	76	249	-	62	-	66	74	2.5
3	10:57	12:47:15	682.09	2.1	0.36	76	248	-	62	-	66	74	2.5
4	9.51	12:57:45	685.67	1.7	0.36	75	249	-	63	-	67	74	25
5	9.79	1:07:15	688.94	1.8	0.36	75	250	-	64	-	67	73	2.5
6	9.23	1:17	692.11	1.6	0.36	75	251	-	64	-	67	73	2.5
END	—	1:26:15	695.229										

Comments:

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel
Source / Location: Inlet Outlet (circle one)
Run no. 3-PM-OUT Date 6/29/17 Operator / Assistant A
Page 1 of 1
Method 201a / 202
Project No. 005AS-179737

Equipment Identification

Meter console ID	CB-03
Stack TC ID	S-TP-8
Probe/pitot ID	S-TP-8
Nozzle ID	
Imp. outlet TC ID	GSN-8
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters

Run duration, min.	120
No. of traverse pts.	12
No. of ports	2
Points per port	6
Time per point, min.	10
Probe/filter range, °F	—
Imp. outlet max., °F	68

Calibration

Meter Yd	0.981
Meter ΔH@0.75cfm	1.788
Pitot tube Cp	0.84
Nozzle diameter, in.	0.115

ALT-011 TC Check

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

Ambient / Stack Gas Conditions

Baro. press., in. Hg	
Ambient temp., °F	
Static (P_g), in. H_2O	-0.96
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

K Factor: ΔH = N/A x ΔP or dwell time = 7.8 x √ΔP

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.004 @ 7	0.001 @ 5
Pitot (+): in. H_2O @ in. H_2O	0.0 @ 3.0	0 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	0.0 @ 3.0	0 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	706.2	740.0	
EMPTY	661.1	662.5	
H20	553.0	552.4	
SiO2	983.3	997.5	
Tared Line Rinse	30	0	-30
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	CFM 687 782	Vaccum in. Hg
1	10.57	6:27	706.374	2.1	~~0.36~~	75	151	—	60	—	62	69	1.0
2	10.82	6:37:30	709.74	2.2	0.36	73	142	—	54	—	64	69	1.0
3	10.06	6:48:15	713.21	1.9	0.36	74	147	—	55	—	64	68	1.0
4	10.32	6:58:15	716.449	~~2.0~~	~~0.36~~	~~75~~	~~150~~	~~—~~	~~57~~	~~—~~	~~65~~	~~69~~	~~1.0~~
8:05 4 5	10:06	~~7:06:30~~	716.449	1.9	0.36	76	150	—	56	—	62	70	1.0
8:15:00 5 6	10:32	~~7:18:15~~	720.11	2.0	0.36	74	150	—	56	—	61	70	1.0
8:25:15 6 PC	9.79	8:25:15	723.11	1.8	0.36	70	144		55	—	61	71	1.0
PC	—	8:35:00	726.274										
1	10.57	8:37:00	726.274	2.1	0.36	72	150	—	56	—	62	73	1.0
2	10.06	8:47:30	729.75	1.9	0.36	74	151	—	55	—	63	73	1.0
3	10.82	8:58:15	733.13	2.2	0.36	75	151	—	56	—	60	74	1.0
4	10.32	9:08:00	736.36	2.0	0.36	75	156	—	55	—	64	73	1.0
5	9.51	9:18:00	739.56	1.7	0.36	73	150	—	57	—	65	75	1.0
6	9.79	9:28:00	742.46	1.8	0.36	75	154	—	56	—	65	74	1.0
END	—	9:38:00	745.899										

Comments: ~~Post-PC~~ 6:58:15 Start Back up @ 8:05

Appendix B.5

Hexavalent Chromium Data Sheets

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel
Source / Location: Shredder Outlet
Run no. 1-Cr Date 6/29/17 Operator / Assistant SS
Page 1 of 1
Method EPA 306
Project No. 005AS-179737

Equipment Identification

Meter console ID	CB-04
Stack TC ID	
Probe/pitot ID	
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in H_2O	

Test / Sampling Parameters

Run duration, min.	120
No. of traverse pts.	12
No. of ports	2
Points per port	6
Time per point, min.	10
Probe/filter range, °F	? —
Imp. outlet max., °F	68

K Factor: ΔH = 0.61 ~~NA~~ x ΔP or dwell time = x √ΔP

Calibration

Meter Yd	0.983
Meter ΔH@0.75cfm	1.937
Pitot tube Cp	0.84
Nozzle diameter, in.	0.155

ALT-011 TC Check

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

Ambient / Stack Gas Conditions

Baro. press., in. Hg	
Ambient temp., °F	
Static (P_g), in. H_2O	-1.1
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.005 @ 15	0.003 @ 7
Pitot (+): in H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
NaOH	647.7	706.6	
NaOH	678.0	678.3	
EMPTY	544.8	548.1	
S.GEL	801.1	816.1	
Tared Line Rinse	50	0	-50
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
1	10	18:27	146.926	1.8	1.1	78	—	—	60	—	64	—	3.0
2	↓	18:37	152.13	2.0	1.2	78	—	—	57	—	62	—	3.0
3	↓	18:47	158.08	2.1	1.3	77	—	—	56	—	61	—	3.0
PAUSE 4	↓	18:57	165.943	~~1.9~~	~~1.0~~	—	—	—	—	—	—	—	—
4	↓	19:08	165.943	~~1.6~~ 1.6	~~0.97~~ 0.9	72	—	—	55	—	59	—	3.0
5	↓	19:17	171.09	1.8	1.1	72	—	—	56	—	60	—	3.0
20:25 PC 6	—	19:25	177.45	1.6	0.97	73			56		61		3.0
PC	—	20:35	182.535										
1	10	20:37	182.535	2.0	1.2	73	—	—	55	—	62	—	3.6
2	↓	20:47	188.85	2.1	1.3	74	—	—	55	—	63	—	3.5
3	↓	20:57	194.75	1.9	1.2	75	—	—	56	—	65	—	3.5
4	↓	21:07	200.01	2.0	1.2	75	—	—	57	—	67	—	3.5
5	↓	21:17	206.86	1.8	1.1	75	—	—	57	—	68	—	3.5
6	↓	21:27	212.63	1.7	1.0	75	—	—	57	—	68	—	4.0
END	—	21:37	218.735										

Comments: 005AS-179737 R1

PAUSE @ 18:57 RESTART 20:05

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel
Source / Location: Shredder Outlet
Run no. 2-C
Date 6/29/17
Operator / Assistant IS
Page 1 of 1
Method EPA 306
Project No. 005AS-179737

Equipment Identification	
Meter console ID	CB-04
Stack TC ID	30-58-8
Probe/pitot ID	30-58-8
Nozzle ID	
Imp. outlet TC ID	GSN-14
Filter TC ID	–
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters	
Run duration, min.	120
No. of traverse pts.	12
No. of ports	2
Points per port	6
Time per point, min.	10
Probe/filter range, °F	—
Imp. outlet max., °F	68

Calibration	
Meter Yd	0.983
Meter ΔH@0.75cfm	1.937
Pitot tube Cp	0.84
Nozzle diameter, in.	0.155

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

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.97
Ambient temp., °F	
Static (P_g), in. H_2O	-1.0
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

K Factor: ΔH = 0.61 ~~ΔHA~~ x ΔP or dwell time = — x √ΔP

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.004 @ 9	0.002 @ 7
Pitot (+): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
NaOH	648.4	723.9	
NaOH	671.6	674.0	
EMPTY	536.7	537.9	
S. GEL	1001.3	1007.2	
Tared Line Rinse	50	0	-50
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
1	10	22:12	219.517	1.7	1.0	75	–	–	50	–	60	–	2.5
2		22:22	225.48	1.8	1.1	75	–	–	49	–	60	–	2.5
3		22:32	231.54	2.0	1.2	76	–	–	48	–	61	–	3.0
4		22:42	236.86	1.9	1.2	75	–	–	50	–	62	–	3.0
5		22:52	242.96	2.1	1.3	75	–	–	51	–	63	–	3.0
6		23:02	248.84	1.8	1.1	76	–	–	52	–	64	–	3.0
PC	–	23:12	254.770	—									
1	10	23:15	254.770	1.6	0.97	76	–	–	52	–	65	–	3.0
2		23:25	260.82	1.8	1.1	76	–	–	53	–	66	–	3.0
3		23:35	266.99	2.1	1.3	76	–	–	53	–	66	–	3.0
4		23:45	273.47	2.2	1.3	75	–	–	54	–	67	–	3.5
5		23:55	279.03	1.9	1.2	75	–	–	54	–	67	–	3.5
6		00:05	284.97	1.8	1.1	76	–	–	55	–	68	–	3.5
END	–	00:15	291.013										

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel
Source / Location: Shredder Outlet
Run no.: 3-Cr
Date: 6/29/17
Operator / Assistant: JS
Page 1 of 1
Method: CARB 306
Project No. 005AS-179737

Equipment Identification

Meter console ID	CB-04
Stack TC ID	
Probe/pitot ID	
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Calibration

Meter Yd	0.983
Meter ΔH@0.75cfm	1.937
Pitot tube Cp	0.84
Nozzle diameter, in.	0.155

ALT-011 TC Check

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

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.003 @ 12	0.001 @ 8
Pitot (+): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Test / Sampling Parameters

Run duration, min.	120
No. of traverse pts.	12
No. of ports	2
Points per port	6
Time per point, min.	10
Probe/filter range, °F	—
Imp. outlet max., °F	68

Ambient / Stack Gas Conditions

Baro. press., in. Hg	29.97
Ambient temp., °F	67
Static (P_g), in. H_2O	-0.97
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

Impingers	Initial, g	Final, g	Difference
NaOH	651.0	734.7	
NaOH	676.0	674.3	
EMPTY	~~548.5~~	551.4	
SILICA	816.1	831.4	
#3	548.5		
Tared Line Rinse	50	0	-50
Total impinger weight gain, g			

K Factor: ΔH = 0.01 ~~N/A~~ 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		Vacuum in. Hg
1	10	00:48	291.627	1.7	1.0	75	—	—	57	—	60	—	3.0
2		00:58	297.89	1.8	1.1	75	—	—	57	—	60	—	3.0
3		1:08	303.97	2.0	1.2	74	—	—	57	—	61	—	3.0
4		1:18	310.11	1.9	1.2	74	—	—	58	—	61	—	3.5
5		1:28	316.06	2.1	1.3	73	—	—	59	—	62	—	3.5
6		1:38	321.54	1.9	1.2	74	—	—	60	—	62	—	3.5
PC	—	1:48	327.715	-									
1	10	2:50	327.715	2.0	1.2	74	—	—	60	—	63	—	3.5
2		2:00	333.61	2.1	1.3	74	—	—	60	—	63	—	4.0
3		2:10	339.49	1.9	1.2	73	—	—	59	—	61	—	4.0
4		2:20	345.54	2.0	1.2	74	—	—	59	—	60	—	4.0
5		2:30	351.89	1.7	1.0	74	—	—	58	—	59	—	4.0
6		2:40	357.67	1.8	1.1	74	—	—	58	—	59	—	4.0
END	-	2:50	363.705										

Comments:

Appendix B.6

Cadmium and Lead Data Sheets

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel — Page 1 of 1

Source / Location: Inlet (Outlet) (circle one) — Method: EPA 29

Run no. 1-MM — Date 6/28/17 — Operator / Assistant — Project No. 005AS-179737

Equipment Identification	
Meter console ID	CB-06
Stack TC ID	58-SP-8
Probe/pitot ID	58-SP-8
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters	
Run duration, min.	120
No. of traverse pts.	12
No. of ports	2
Points per port	6
Time per point, min.	10
Probe/filter range, °F	248±25
Imp. outlet max., °F	68

Calibration	
Meter Yd	0.983
Meter ΔH@0.75cfm	1.728
Pitot tube Cp	0.84
Nozzle diameter, in.	0.166

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

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.97
Ambient temp., °F	65
Static (P_g), in. H_2O	-0.90
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

K Factor: ΔH = 0.54 ~~N/A~~ x ΔP or ~~dwell time =~~ x √ΔP

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.004 @ 15	0.004 @ 5
Pitot (+): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.0	1 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	561.8	612.9	
HNO_3/H_2O_2	641.3	647.5	
HNO_3/H_2O_2	663.2	664.8	
EMPTY	513.9	514.8	
SiO_2	829.4	843.0	
Tared Line Rinse	30	30	-30
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
1	10	8:30	567.443	1.9	1.02	76	270	265	56	—	64	—	2.5
2	↓	8:40	572.61	1.9	1.02	76	260	260	54	—	66	—	3.2
3	↓	8:50	578.57	1.9	1.02	77	265	264	55	—	67	—	4
4	↓	9:00	584.84	2.0	1.08	77	267	263	55	—	66	—	4.8
5	↓	9:10	592.66	2.2	1.18	79	266	260	56	—	67	—	4.8
6	↓	9:20	599.67	2.1	1.13	79	265	260	55	—	67	—	4.9
PC	—	9:30	606.485										
1	10	9:34	606.485	1.6	0.86	77	258	256	56	—	66	—	2.5
2	↓	9:44	611.89	1.8	0.97	76	264	261	55	—	67	—	3.0
3	↓	9:54	617.59	1.7	0.91	76	263	255	56	—	67	—	4.0
4	↓	10:04	623.14	1.8	0.97	77	264	260	55	—	67	—	4.0
5	↓	10:14	628.89	1.7	0.91	76	266	260	56	—	66	—	4.1
6	↓	10:24	634.42	1.6	0.86	77	270	263	56	—	66	—	4.0
	—	10:34	640.059										

Comments:

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel
Source / Location: Inlet / Outlet (circle one)
Run no. 2-MM
Date 6/28/17
Operator / Assistant KD
Page 1 of 1
Method EPA 29
Project No. 005AS-179737

Equipment Identification

Meter console ID: CB-06
Stack TC ID: SS-SP-8
Probe/pitot ID: SS-SP-8
Nozzle ID:
Imp. outlet TC ID:
Filter TC ID:
Micromanometer ID:
Sensitivity, in. H_2O:

Test / Sampling Parameters

Run duration, min.: 120
No. of traverse pts.: 12
No. of ports: 2
Points per port: 6
Time per point, min.: 10
Probe/filter range, °F: 248±25
Imp. outlet max., °F: 68
K Factor: ΔH = 0.54 N/A x ΔP or dwell time = x √ΔP

Calibration

Meter Yd: 0.983
Meter ΔH@0.75cfm: 1.728
Pitot tube Cp: 0.84
Nozzle diameter, in.: 0.160

ALT-011 TC Check

Std. TC ID:
Std. TC temp., °F:
Stack TC temp., °F:
Continuity check + or -

Ambient / Stack Gas Conditions

Baro. press., in. Hg: 29.97
Ambient temp., °F: 67
Static (P_g), in. H_2O: ~~-6.5~~
O_2 conc., % dry vol.: ~0.90
CO_2 conc., % dry vol.:
Wet bulb temp., °F:

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.010 @ 10	0.004 @ 7
Pitot (+): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	541.6	590.7	
HNO_3/H_2O_2	660.6	666.5	
HNO_3/H_2O_2	660.1	660.7	
EMPTY	498.6	500.2	
SiO_2	885.1	902.1	
Tared Line Rinse	30		
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		Vacuum in. Hg
1	10	11:22	645.710	1.9	1.02	77	235	242	—	56	64	—	2.0
2	↓	11:32	652.43	2.0	1.08	78	257	262	—	55	65	—	3.5
3	↓	11:42	659.13	1.8	0.97	78	252	262	—	55	65	—	3.5
4	↓	11:52	665.78	2.0	1.08	76	255	264	—	56	66	—	4.0
5	↓	12:02	672.49	2.0	1.08	77	253	264	—	56	67	—	4.5
6	↓	12:12	679.02	2.2	1.18	80	260	265	—	54	67	—	4.5
PC	—	12:22	687.849										
1	10	12:27	687.849	2.0	1.08	80	263	266	—	55	66	—	3.0
2	↓	12:37	694.76	1.7	0.91	82	252	264	—	56	66	—	3.0
3	↓	12:47	701.61	1.6	0.86	81	250	265	—	56	67	—	3.5
4	↓	12:57	707.13	2.0	1.08	77	254	263	—	56	67	—	2.5
5	↓	13:07	711.84	2.3	1.24	76	253	262	—	55	66	—	3.0
6	↓	13:17	718.88	1.7	0.91	77	252	262	—	56	67	—	2.5
END	—	13:27	725.342										

Comments

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel
Source / Location: Inlet Outlet (circle one)
Run no. 3-MM Date 6/29/17 Operator / Assistant KD

Page 1 of 1
Method EPA 29
Project No. 005AS-179737

Equipment Identification

Meter console ID	CB-03
Stack TC ID	8-SP-8
Probe/pitot ID	8-SP-8
Nozzle ID	
Imp. outlet TC ID	GSN-8
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters

Run duration, min.	120
No. of traverse pts.	12
No. of ports	2
Points per port	6
Time per point, min.	10
Probe/filter range, °F	248
Imp. outlet max., °F	68

Calibration

Meter Yd	0.981
Meter ΔH@0.75cfm	1.788
Pitot tube Cp	0.84
Nozzle diameter, in.	0.160

ALT-011 TC Check

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

Ambient / Stack Gas Conditions

Baro. press., in. Hg	29.97
Ambient temp., °F	
Static (P_g), in. H_2O	-1.05
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

K Factor: ΔH = 0.54 ~~N/A~~ x ΔP or dwell time = x √ΔP

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.005 @ 10	0.002 @ 7
Pitot (+): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	545.7	599.9	
HNO_3/H_2O_2	664.7	669.1	
HNO_3/H_2O_2	665.1	666.3	
~~HNO_3/H_2O_2~~ MT	500.2	503.3	
S. GEL	KD ~~885.5~~		
	MB ~~1001.3~~		
	1001.8	1016.8	
Tared Line Rinse	30	0	-30
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
1	10	11 05	746.674	1.9	~~0.99~~ 1.02	70	268	255	59	—	60	—	2.0
2		11 15	752.14	1.8	0.97	70	266	256	57	—	62	—	2.0
3		11 25	757.67	2.0	1.08	71	266	255	57	—	60	—	2.5
4		11 35	765.38	1.8	0.97	71	267	254	58	—	62	—	2.5
5		11 45	771.51	1.7	0.91	71	267	254	59	—	62	—	2.5
6		11 55	776.88	1.8	0.97	72	268	256	58	—	61	—	3.0
PC	—	1205	782.472										
1	10	1207	782.472	2.3	1.24	74	263	254	56	—	68	—	3.0
2		1217	788.63	2.2	1.18	75	263	255	57	—	67	—	3.0
3		1227	794.85	2.0	1.08	75	265	255	58	—	66	—	3.5
4		1237	801.06	2.2	1.18	77	266	254	58	—	66	—	3.5
5		1247	807.28	2.4	1.29	76	267	255	57	—	67	—	3.0
6		1257	813.51	2.3	1.24	77	269	254	59	—	66	—	3.0
END	—	1307	819.769										

Comments:

Appendix B.7

Polychlorinated Biphenyl Data Sheets

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel — Page 1 of 1

Source / Location: Shredder Outlet — Method: CARB 428

Run no. 1-PCB — Date 6/22/17 — Operator / Assistant BS — Project No. 005AS-179737

Equipment Identification	
Meter console ID	CB-06
Stack TC ID	
Probe/pitot ID	
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters	
Run duration, min.	120
No. of traverse pts.	12
No. of ports	2
Points per port	6
Time per point, min.	10
Probe/filter range, °F	248
Imp. outlet max., °F	68

Calibration	
Meter Yd	0.983
Meter ΔH@0.75cfm	1.728
Pitot tube Cp	0.84
Nozzle diameter, in.	0.155

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

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.97
Ambient temp., °F	
Static (P_g), in. H_2O	-0.86
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

K Factor: ΔH = 0.84 N/A x ΔP or dwell time = _____ x √ΔP

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.009 @ 12	0.010 @ 6
Pitot (+): in. H_2O @ in. H_2O	6 @ 3.0	6 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	6 @ 3.0	6 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	448.9	502.1	
H_2O	641.2	640.5	
EMPTY	587.5	588.4	
SiO_2	988.7	1000.2	
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	CONDENSER	Vaccum in. Hg
1	10	18:27	744.695	2.6	1.1	78	245	249	65	—	67	70	3.5
2		18:37	750.93	2.1	1.1	77	247	248	63	—	66	67	3.5
3		18:47	757.14	1.9	1.0	77	250	251	60	—	66	68	4.0
4		18:57	763.530	2.0	1.1	—	—	—	—	—	—	67	—
~~5~~ 4		~~28:05~~	763.530	1.8	0.97	75	248	250	58	—	65	66	4.0
~~6~~ 5		~~28:15~~	769.63	1.7	0.92	74	249	251	59	—	65	64	4.0
~~PC~~ 6	—	~~28:25~~	775.72	1.9	1.0	75	247	249	60	—	65	—	4.0
PC		20:35	781.566										
1		20:37	781.566	2.2	1.2	75	246	250	62	—	65	65	4.0
2		20:47	787.93	2.0	1.1	75	248	251	61	—	66	64	4.0
3		20:57	793.34	1.9	1.0	76	250	249	59	—	66	62	4.0
4		21:07	798.26	2.0	1.1	75	251	250	58	—	67	62	4.0
5		21:17	804.98	1.9	1.0	75	249	248	57	—	67	60	4.0
6		21:27	810.68	1.7	0.92	76	248	249	56	—	67	60	4.0
END		21:37	816.414										

Comments: 005AS-179737 R1 PACSC 18:07 RECOVERY 20:05

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel — Page 1 of 1

Source / Location: Shredder Outlet — Method CARB 428

Run no. 7-PCB — Date 6/29/17 — Operator / Assistant JS — Project No. 005AS-179737

Equipment Identification

Meter console ID	CB-06
Stack TC ID	23-NP-8
Probe/pitot ID	23-NP-8
Nozzle ID	
Imp. outlet TC ID	6SN-8
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters

Run duration, min.	120
No. of traverse pts.	12
No. of ports	2
Points per port	6
Time per point, min.	10
Probe/filter range, °F	248/25
Imp. outlet max., °F	68

Calibration

Meter Yd	0.983
Meter ΔH@0.75cfm	1.726
Pitot tube Cp	0.84
Nozzle diameter, in.	0.155

ALT-011 TC Check

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

Ambient / Stack Gas Conditions

Baro. press., in. Hg	
Ambient temp., °F	
Static (P_g), in. H_2O	-0.99
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

K Factor: ΔH = 0.64 ~~N/A~~ x ΔP or dwell time = _____ x √ΔP

Equipment Checks

	Pre	Post
Meter: cfm @ in. Hg	0.011 @ 12	0.006 @ 6
Pitot (+): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	514.0	515.6	
H2O	636.2	635.2	
EMPTY	552.6	550.2	
SILICA	885.5	908.3	
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	CONDEN-SER	Vaccum in. Hg
1	10	22:12	816.881	1.7	0.91	75	244	249	53	-	70	60	3.5
2	↓	22:22	822.74	1.6	0.86	74	245	250	52	-	70	58	3.5
3	↓	22:32	828.84	1.9	1.0	75	247	251	51	-	70	55	4.0
4	↓	22:42	834.95	2.1	1.1	75	249	249	52	-	71	54	4.0
5	↓	22:52	841.03	2.0	1.1	74	247	250	53	-	71	53	4.0
6	↓	23:02	847.52	1.7	0.91	74	248	250	54	-	72	54	4.0
PC	-	23:12	852.693										
1	10	23:15	852.693	2.1	1.1	75	247	250	55	-	73	56	4.0
2	↓	23:25	858.73	1.9	1.0	75	246	249	56	-	74	57	4.0
3	↓	23:35	864.89	1.8	0.97	76	247	250	56	-	75	57	4.0
4	↓	23:45	870.96	2.0	1.1	75	248	251	57	-	75	60	4.0
5	↓	23:55	877.02	1.8	0.97	76	250	250	58	-	74	60	4.0
6	↓	00:05	883.25	1.6	0.86	76	251	250	59	-	75	60	4.0
END	-	00:15	889.523										

Comments:

MONTROSE AIR QUALITY SERVICES

SAMPLE TRAIN DATA

Project Information

Client / Facility: Schnitzer Steel — Page 1 of 1

Source / Location: Shredder Outlet — Method: CARB 428

Run no. 3-PCB — Date 6/29/17 — Operator / Assistant JS — Project No. 005AS-179737

Equipment Identification	
Meter console ID	CB-06
Stack TC ID	
Probe/pitot ID	
Nozzle ID	
Imp. outlet TC ID	
Filter TC ID	
Micromanometer ID	
Sensitivity, in. H_2O	

Test / Sampling Parameters	
Run duration, min.	120
No. of traverse pts.	12
No. of ports	2
Points per port	6
Time per point, min.	10
Probe/filter range, °F	248
Imp. outlet max., °F	68

Calibration	
Meter Yd	0.983
Meter ΔH@0.75cfm	1.9248
Pitot tube Cp	0.84
Nozzle diameter, in.	0.155

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

Ambient / Stack Gas Conditions	
Baro. press., in. Hg	29.97
Ambient temp., °F	
Static (P_g), in. H_2O	-0.97
O_2 conc., % dry vol.	
CO_2 conc., % dry vol.	
Wet bulb temp., °F	

K Factor: ΔH = 0.54 N/A x ΔP or dwell time = — x √ΔP

Equipment Checks	Pre	Post
Meter: cfm @ in. Hg	0.007 @ 11	0.005 @ 7
Pitot (+): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot (-): in. H_2O @ in. H_2O	0 @ 3.0	0 @ 3.0
Pitot visual:	aligned / damaged	aligned / damaged
Nozzle visual:	intact / damaged	intact / damaged
Other:		

Impingers	Initial, g	Final, g	Difference
EMPTY	500.9	500.9	
H_2O	647.2	644.4	
EMPTY	591.7	589.2	
SILICA	928.2	948.8	
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	CONDENSER	Vacuum in. Hg
1	10	00:48	889.651	1.7	0.92	74	244	249	54	-	70	60	3.5
2		00:58	895.75	1.6	0.86	75	245	251	52	-	71	61	3.5
3		1:08	901.33	1.9	1.0	74	246	250	49	-	72	62	4.0
4		1:18	907.43	2.1	1.1	73	245	249	48	-	72	62	4.0
5		1:28	913.56	2.0	1.1	74	246	250	49	-	73	62	4.0
6		1:38	919.27	1.8	0.97	74	247	250	50	-	73	62	4.0
PC	-	1:48	924.471										
1	10	1:50	924.471	2.1	1.1	74	246	250	50	-	72	62	4.0
2		2:00	930.38	1.6	0.86	74	245	251	50	-	72	63	4.0
3		2:10	936.12	1.5	0.81	73	247	251	49	-	71	63	4.0
4		2:20	942.67	2.2	1.2	74	249	250	50	-	70	62	4.5
5		2:30	947.77	2.0	1.1	74	250	249	51	-	70	61	4.5
6		2:40	953.45	1.9	1.0	74	247	250	51	-	69	60	4.5
END	-	2:50	958.698										

Comments:

APPENDIX C

EMISSION CALCULATIONS

Appendix C.1

General Emission Calculations

EMISSION CALCULATIONS

1. Volumetric Flow and Isokinetics

a. Standard sample gas volume, dscf

$$V_{m\,std} = \left(\frac{1}{29.92}\right)(V_m)\left[P_{bar} + \left(\frac{\Delta H}{13.6}\right)\right]\left(\frac{460 + T_{ref}}{460 + T_m}\right)(Y)$$

b. Water vapor volume, scf

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

c. Moisture content, non-dimensional

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

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)

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

f. Absolute stack pressure, in Hg

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

g. Stack velocity, ft/sec

$$V_s = (2.90)(C_p)\sqrt{(\Delta P)(T_s)}\ \sqrt{\left(\frac{29.92}{P_s}\right)\left(\frac{28.95}{MW_{wet}}\right)}$$

h. Actual stack flow rate, acfm

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

i. Standard stack gas flow rate, wscfm

$$Q_{ws} = (Q)\left(\frac{460 + T_{ref}}{460 + T_s}\right)\left(\frac{P_s}{29.92}\right)$$

j. Standard stack gas flow rate, dscfm

$$Q_{ds} = (Q)(1 - B_{ws})\left(\frac{460 + T_{ref}}{460 + T_s}\right)\left(\frac{P_s}{29.92}\right)$$

k. Percent isokinetic

$$I = \left(\frac{(17.32)(460 + T_s)(V_{m\,std})}{(1 - B_{ws})(\Theta)(V_s)(P_s)(D_n^{\,2})}\right)\left(\frac{528\ ^\circ R}{T_{ref}}\right)$$

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

$$M = (C)(10^{-6})\left(\frac{MW_s}{SV}\right)(Q_{ds})(60\ min/hr)$$

where,

SV = specific molar volume of an ideal gas:

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

$SV = 383.1\ ft^3/lb\ mole\ for\ T_{ref} = 525\ °R$ (65 °F)

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

$SV = 386.8\ ft^3/lb\ mole\ for\ T_{ref} = 530\ °R$ (70 °F)

$$SV = (379.5)\left[\frac{(460 + (T_{ref}\ °F))}{520}\right]$$ at different reference temperatures

$°R = °F + 460$ (to convert reference temperature in $°F$ to $°R$, add 460)

f. Emission rate, lb/MMBtu

$$E = (C)(10^{-6})\left(\frac{MW_s}{SV}\right)(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)$$

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

$$G = (0.01543)\left(\frac{G_m}{V_{m\,std}}\right)$$

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

$$M = (G)(Q_{ds})\left(\frac{60\ min/hr}{7000\ gr/lb}\right)$$

d. Emission rate, lb/MMBtu

$$E = (G)\left(\frac{1\ lb}{7000\ gr}\right)(F_d)\left(\frac{20.9}{20.9 - \%\,O_2}\right)$$

4. <u>Fuel Factor "F"</u>

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

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

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

$$F_{d60} = F_d\left(\frac{520^\circ R}{528^\circ R}\right)$$

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, %

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

or

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

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_s = stack area, ft^2 (πr^2), where $\pi = 3.1416$ 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
D_n = nozzle diameter, inches (inches = millimeters / 2.54 / 10)
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
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
Θ = sampling time, minutes
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_{ref} = 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

Appendix C.2

Particulate Matter Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder Inlet
A (stack area), ft^2	[redacted]
T_{ref} (reference temperature), °F	70
F_d (fuel "F" factor @ 68°F), dscf/MMBtu	8,710
F_d (fuel "F" factor @ T_{ref}), dscf/MMBtu	8,743
HHV (fuel higher heating value), Btu/scf	1,020

Test number	2-PM-IN	3-PM-IN	4-PM-IN	Average
Date	6/28/17	6/29/17	6/29/17	--
Start / Stop time	2322-0121	1826-2123	2210-0019	--
Feed Rate, tons/day	[redacted]	[redacted]	[redacted]	[redacted]
Production Time, hours				
Feed Rate, tons/hour[1]				
Meter box number	CB-06	CB-06	CB-06	--
C_p (pitot coefficient), dimensionless	0.8400	0.8400	0.8400	0.8400
Y (meter calibration factor), dimensionless	0.983	0.983	0.983	0.983
Θ (sample time), min	120.95	119.99	133.01	124.65
Nozzle diameter, in	0.140	0.140	0.140	0.140
P_{bar} (barometric pressure), in. Hg	29.97	29.97	29.97	29.97
V_m (meter box volume), acf	41.637	41.807	46.861	43.435
V_{lc} (impinger liquid volume), ml	12.9	22.4	29.0	21.4
T_m (meter temperature), °F	65.3	59.3	63.0	62.6
ΔH (meter pressure), in. H_2O	0.410	0.410	0.410	0.410
ΔP (velocity head), in. H_2O	0.9635	0.9479	0.9518	0.9544
P_g (static pressure), in. Hg	-6.50	-6.50	-6.50	-6.50
T_s (stack temperature), °F	64.3	61.7	63.5	63.2
$\%O_2$ (oxygen stack gas), % volume dry	21.04	21.01	21.02	21.02
$\%CO_2$ (carbon dioxide stack gas), % volume dry	0.034	0.026	-0.004	0.019
m_1 (F½ particulate matter catch - filter; ≤PM_{10}), mg	5.36	3.96	4.91	4.74
m_2 (F½ particulate matter catch - acetone rinse; >PM_{10}), mg	2.00	2.91	4.80	3.24
m_3 (F½ particulate matter catch - acetone rinse; ≤PM_{10}), mg	0.59	0.59	0.59	0.59
C_{tf} (total F½ particulate matter catch), mg	7.95	7.46	10.30	8.57
C_{fPM10} (PM_{10} F½ particulate matter catch), mg	5.95	4.55	5.50	5.33
m_{cpm} (B½ particulate matter catch), mg	1.24	2.65	2.86	2.25
m_n (total particulate matter catch), mg	9.19	10.11	13.16	10.82
1a $V_{m(std)}$ (standard sample volume), dscf	41.403	42.053	46.806	43.421
1b $V_{w(std)}$ (water vapor volume), scf	0.611	1.060	1.373	1.014
1c B_{ws} (moisture fraction), non-dimensional	0.0145	0.0246	0.0285	0.0225
1c B_{wc} (moisture fraction), %	1.45	2.46	2.85	2.25
1d MW_{dry} (stack gas molecular weight), dry	28.847	28.845	28.840	28.844
1e MW_{wet} (stack gas molecular weight), wet	28.689	28.578	28.531	28.600
1f P_s (absolute stack pressure), in Hg	29.492	29.492	29.492	29.492
1g V_s (stack gas velocity), ft/sec	[redacted]	[redacted]	[redacted]	[redacted]
1h Q (stack flow rate), acfm				
1i Q_{ws} (stack flow rate), wscfm				
1j Q_{ds} (stack flow rate), dscfm				
1k I (isokinetic ratio), %	98.14	101.88	102.59	100.87
μ (stack gas viscosity) new, micropoise	183.0	181.3	181.4	181.9
Q_c (cyclone flow rate), cfm	0.35	0.36	0.36	0.36
$D_{50(10)}$ (cut-off diameter), microns - **keep between 9 and 11**	11.97	11.65	11.57	11.73
C (cunningham correction factor), dimensionless	1.06	1.06	1.06	1.06
N_{re} (reynolds number), dimensionless	2,666.65	2,772.84	2,789.90	2,743.13
$D_{50(2.5)}$ (cut-off diameter), microns - **keep between 2.25 and 2.75**	2.74	2.61	2.59	2.65
3a G (PM_{10} F½ grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
3c M (PM_{10} F½ mass emissions), lb/hr	1.3	1.0	1.0	1.1
M (PM_{10} F½ mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
3a G (PM F½ grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
3c M (PM F½ mass emissions), lb/hr	1.7	1.6	2.0	1.8
M (PM F½ mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
3a G (B½ grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
3c M (B½ mass emissions), lb/hr	0.3	0.6	0.5	0.5
M (B½ mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
3a G (total grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
3c M (total mass emissions), lb/hr	2.0	2.1	2.5	2.2
M (total mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
G (total PM_{10} grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
M (total PM_{10} mass emissions), lb/hr	1.6	1.5	1.6	1.6
M (total PM_{10} mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]

1 - No hourly data available. Feed rate of ferrous material is based on daily tonnage value and assumes 24 hours/day operation.

SOURCE TEST DATA SUMMARY

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

Test number	1-PM-OUT	2-PM-OUT	3-PM-OUT	Average
Date	6/28/17	6/28/17	6/29/17	--
Start / Stop time	2030-2234	2322-0126	1827-2138	--
Feed Rate, tons/day	[redacted]	[redacted]	[redacted]	[redacted]
Production Time, hours	[redacted]	[redacted]	[redacted]	[redacted]
Feed Rate, tons/hour[1]	[redacted]	[redacted]	[redacted]	[redacted]
Meter box number	CB-03	CB-03	CB-03	--
C_p (pitot coefficient), dimensionless	0.8400	0.8400	0.8400	0.8400
Y (meter calibration factor), dimensionless	0.981	0.981	0.981	0.981
Θ (sample time), min	120.95	119.99	133.01	124.65
Nozzle diameter, in	0.115	0.115	0.115	0.115
B_{bar} (barometric pressure), in. Hg	29.97	29.97	29.97	29.97
V_m (meter box volume), scf	38.865	38.937	39.525	39.109
V_{lc} (impinger liquid volume), ml	27.100	26.700	18.900	24.2
T_m (meter temperature), °F	65.083	65.750	62.750	64.5
ΔH (meter pressure), in. H_2O	0.360	0.360	0.360	0.360
ΔP (velocity head), in. H_2O	1.913	1.878	1.964	1.9183
P_g (static pressure), in. Hg	-0.910	-0.880	-0.960	-0.92
T_s (stack temperature), °F	73.9	75.5	73.8	74.4
$\%O_2$ (oxygen stack gas), % volume dry	21.00	21.04	21.01	21.02
$\%CO_2$ (carbon dioxide stack gas), % volume dry	0.029	0.034	0.026	0.030
m_1 (F½ particulate matter catch - filter; $\leq PM_{2.5}$), mg	4.26	5.82	4.08	4.72
m_2 (F½ particulate matter catch - acetone rinse; $>PM_{10}$), mg	0.59	0.59	0.59	0.59
m_3 (F½ particulate matter catch - acetone rinse; $>PM_{2.5}$ & $\leq PM_{10}$), mg	0.59	0.59	0.59	0.59
m_4 (F½ particulate matter catch - acetone rinse; $<PM_{2.5}$), mg	0.59	0.59	0.59	0.59
C_{tf} (total F½ particulate matter catch), mg	6.03	7.59	5.85	6.49
C_{f5M10} (PM_{10} F½ particulate matter catch), mg	5.44	7.00	5.26	5.90
$C_{f5M2.5}$ ($PM_{2.5}$ F½ particulate matter catch), mg	4.85	6.41	4.67	5.31
m_{cpm} (B½ particulate matter catch), mg	1.90	1.74	1.79	1.81
m_n (total particulate matter catch), mg	7.93	9.33	7.64	8.30
1a $V_{m(std)}$ (standard sample volume), dscf	38.582	38.604	39.412	38.866
1b $V_{w(std)}$ (water vapor volume), scf	1.283	1.264	0.895	1.147
1c B_{ws} (moisture fraction), non-dimensional	0.0322	0.0317	0.0222	0.0287
1c B_{ws} (moisture fraction), %	3.22	3.17	2.22	2.87
1d MW_{dry} (stack gas molecular weight), dry	28.845	28.847	28.845	28.845
1e MW_{wet} (stack gas molecular weight), wet	28.496	28.503	28.604	28.534
1f P_s (absolute stack pressure), in Hg	29.903	29.905	29.899	29.903
1g V_s (stack gas velocity), ft/sec	[redacted]	[redacted]	[redacted]	[redacted]
1h Q (stack flow rate), acfm	[redacted]	[redacted]	[redacted]	[redacted]
1i Q_{ws} (stack flow rate), wscfm	[redacted]	[redacted]	[redacted]	[redacted]
1j Q_{ds} (stack flow rate), dscfm	[redacted]	[redacted]	[redacted]	[redacted]
1k I (isokinetic ratio), %	97.81	99.68	88.94	95.48
μ (stack gas viscosity) new, micropoise	183.5	183.9	184.5	184.0
Q_c (cyclone flow rate), cfm	0.33	0.34	0.31	0.33
$D_{50(10)}$ (cut-off diameter), microns - **keep between 9 and 11**	12.44	12.37	13.24	12.68
C (cunningham correction factor), dimensionless	1.06	1.06	1.06	1.06
N_{re} (reynolds number), dimensionless	2,506.04	2,520.77	2,300.51	2,442.44
$D_{50(2.5)}$ (cut-off diameter), microns - **keep between 2.25 and 2.75**	2.93	2.90	3.24	3.02
3a G (Total F½ grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
3c M (Total F½ mass emissions), lb/hr	3.0	3.7	2.9	3.2
M (Total F½ mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
3a G (PM_{10} F½ grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
3c M (PM_{10} F½ mass emissions), lb/hr	2.7	3.4	2.6	2.9
M (PM_{10} F½ mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
3a G ($PM_{2.5}$ F½ grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
3c M ($PM_{2.5}$ F½ mass emissions), lb/hr	2.4	3.1	2.3	2.6
M ($PM_{2.5}$ F½ mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
3a G (B½ grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
3c M (B½ mass emissions), lb/hr	0.9	0.9	0.9	0.9
M (B½ mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
3a G (total grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
3c M (total mass emissions), lb/hr	3.9	4.6	3.8	4.1
M (total mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
G (PM_{10} total grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
M (PM_{10} total mass emissions), lb/hr	3.6	4.3	3.5	3.8
M (PM_{10} total mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
G ($PM_{2.5}$ total grain loading), gr/dscf	[redacted]	[redacted]	[redacted]	[redacted]
M ($PM_{2.5}$ total mass emissions), lb/hr	3.3	4.0	3.2	3.5
M ($PM_{2.5}$ total mass emissions), lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]

1 - No hourly data available. Feed rate of ferrous material is based on daily tonnage value and assumes 24 hours/day operation.

Appendix C.3

Hexavalent Chromium Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel	*	Test Number	1-Cr
Unit / Location	Schredder Outlet	*	Date	6/29/17
Test Method	EPA 306	*	Start / Stop Time	1827-2137
		*	Feed Rate, tons/day	[redacted]
		*	Production Time, hours/day	
		*	Feed Rate, tons/hour[1]	

Meter Box Number	CB-04	*	Barometric Press (in Hg)	29.97
Meter Calibration (Yd)	0.9830	*	Meter Volume (acf)	71.809
Stack Area (square feet)	[redacted]	*	Liquid Volume (ml)	27.5
Reference Temperature (°F)	70	*	Meter Temperature (°F)	63.3
Sample Time (Minutes)	120	*	Meter Pressure (iwg)	1.138
Pitot Coefficient	0.8400	*	Velocity Head (iwg)	1.8627
Nozzle Diameter (in)	0.155	*	Static Pressure (iwg)	-1.10
Fuel Type	N/A	*	Stack Temperature (°F)	74.8
Fuel "HHV" (Btu/scf)	N/A	*	Stack O_2 (%)	21.00
Fuel "F" Factor (dscf/MMBtu)	N/A	*	Stack CO_2 (%)	0.029

a	Standard Sample Volume (dscf)	71.81
b	Water Vapor Volume (scf)	1.302
c	Moisture Fraction (nondimensional)	0.0178
d_1	Stack Gas Molecular Weight (dry)	28.845
d_2	Stack Gas Molecular Weight (wet)	28.652
e	Absolute Stack Pressure (in Hg)	29.889
f	Stack Gas Velocity (ft/sec)	[redacted]
g	Stack Flow Rate (acfm)	
h_1	Stack Flow Rate (dscfm)	
h_2	Stack Flow Rate (wscfm)	
i	Isokinetic Ratio (%)	101.2

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel	*	Test Number	2-Cr
Unit / Location	Schredder Outlet	*	Date	6/29/17
Test Method	EPA 306	*	Start / Stop Time	2212-0015
		*	Feed Rate, tons/day	[redacted]
		*	Production Time, hours/day	
		*	Feed Rate, tons/hour[1]	

Meter Box Number	CB-04	*	Barometric Press (in Hg)	29.97
Meter Calibration (Yd)	0.9830	*	Meter Volume (acf)	71.496
Stack Area (square feet)	[redacted]	*	Liquid Volume (ml)	35.0
Reference Temperature (°F)	70	*	Meter Temperature (°F)	64.1
Sample Time (Minutes)	120	*	Meter Pressure (iwg)	1.156
Pitot Coefficient	0.8400	*	Velocity Head (iwg)	1.8878
Nozzle Diameter (in)	0.155	*	Static Pressure (iwg)	-1.00
Fuel Type	N/A	*	Stack Temperature (°F)	75.5
Fuel "HHV" (Btu/scf)	N/A	*	Stack O_2 (%)	21.04
Fuel "F" Factor (dscf/MMBtu)	N/A	*	Stack CO_2 (%)	0.034

a	Standard Sample Volume (dscf)	71.39
b	Water Vapor Volume (scf)	1.657
c	Moisture Fraction (nondimensional)	0.0227
d_1	Stack Gas Molecular Weight (dry)	28.847
d_2	Stack Gas Molecular Weight (wet)	28.601
e	Absolute Stack Pressure (Hg)	29.896
f	Stack Gas Velocity (ft/sec)	[redacted]
g	Stack Flow Rate (acfm)	
h_1	Stack Flow Rate (dscfm)	
h_2	Stack Flow Rate (wscfm)	
i	Isokinetic Ratio (%)	100.5

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel	*	Test Number	3-Cr
Unit / Location	Schredder Outlet	*	Date	6/29/17
Test Method	EPA 306	*	Start / Stop Time	0048-0250
		*	Feed Rate, tons/day	[redacted]
		*	Production Time, hours/day	
		*	Feed Rate, tons/hour[1]	

Meter Box Number	CB-04	*	Barometric Press (in Hg)	29.97
Meter Calibration (Yd)	0.9830	*	Meter Volume (acf)	72.078
Stack Area (square feet)	[redacted]	*	Liquid Volume (ml)	50.2
Reference Temperature (°F)	70	*	Meter Temperature (°F)	60.9
Sample Time (Minutes)	120	*	Meter Pressure (iwg)	1.167
Pitot Coefficient	0.8400	*	Velocity Head (iwg)	1.9060
Nozzle Diameter (in)	0.155	*	Static Pressure (iwg)	-0.97
Fuel Type	N/A	*	Stack Temperature (°F)	74.0
Fuel "HHV" (Btu/scf)	N/A	*	Stack O_2 (%)	21.02
Fuel "F" Factor (dscf/MMBtu)	N/A	*	Stack CO_2 (%)	-0.004

a	Standard Sample Volume (dscf)	72.42
b	Water Vapor Volume (scf)	2.376
c	Moisture Fraction (nondimensional)	0.0318
d_1	Stack Gas Molecular Weight (dry)	28.840
d_2	Stack Gas Molecular Weight (wet)	28.496
e	Absolute Stack Pressure (Hg)	29.899
f	Stack Gas Velocity (ft/sec)	[redacted]
g	Stack Flow Rate (acfm)	
h_1	Stack Flow Rate (dscfm)	
h_2	Stack Flow Rate (wscfm)	
i	Isokinetic Ratio (%)	102.0

TOTAL AND HEXAVALENT CHROMIUM
EMISSIONS SUMMARY
Schnitzer Steel
Schredder Outlet

REFERENCE TEMP (F):	70	**TEST METHOD:**	CARB 425
DETECTION LIMIT:	0.50 ug for Total Cr 0.50 ug for Cr (VI)	**ANALYTICAL METHOD:**	IC/PCR for Cr(VI); IC/PMS for Total Cr:
		LABORATORY:	Curtis & Tompkins

Test No.	Fractions ug/L		L/sample	Blank, ug	Results ug/train	O_2, %	CO_2, %	H_2O, %	Vmstd, dscf	Qsd, dscfm	ug/m^3		lb/hr
HEXAVALENT CHROMIUM													
1-Cr-probe/impingers	ND<	50	0.425	0.5	11	21.00	0.03	1.78	71.807	[redacted]	[redacted]	ND<	3E-03
		50		**0.5**	**11**								**3E-03**
2-Cr-probe/impingers	ND<	50	0.445	0.5	11	21.04	0.03	2.27	71.395	[redacted]		ND<	3E-03
		50		**0.5**	**11**								**3E-03**
3-Cr-probe/impingers	ND<	50	0.430	0.5	11	21.02	0.00	3.18	72.415	[redacted]		ND<	3E-03
		50		**0.5**	**11**								**3E-03**
Method Blank	ND<	0.5	0.328										
										AVERAGE (Total):	[redacted]		**3E-03**

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

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

TOTAL AND HEXAVALENT CHROMIUM
EMISSIONS SUMMARY
Schnitzer Steel
Schredder Outlet

Test No.:	1-Cr	2-Cr	3-Cr				FB-Cr
Date:	6/29/17	6/29/17	6/29/17				4/11/11
Time:	1827-2137	2212-0015	0048-0250				
Material Processed, ton/hr	[redacted]	[redacted]	[redacted]				--
Flow Rate, dscfm	[redacted]	[redacted]	[redacted]	**Average**			[redacted]
Sample Volume, dscf	71.81	71.39	72.42				71.87
Temperature, °F	74.8	75.5	74.0				74.8
O_2, % volume dry	21.00	21.04	21.02				21.02
CO_2, % volume dry	0.029	0.034	-0.004				0.020
Moisture Content, %	1.780	2.268	3.177				2.41
Species	**ug/m^3**	**ug/m^3**	**ug/m^3**	**ug/m^3**	**lb/hr**	**lb/ton**	**ug/m^3**
Hexavalent Chromium, Cr^{6+}	< [redacted]	< [redacted]	< [redacted]	[redacted]	3E-03	[redacted]	< [redacted]

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

Appendix C.4

Cadmium and Lead Spreadsheets

SOURCE TEST DATA SUMMARY

Method	EPA 29
Project No	005AS-179737
Client	Schnitzer Steel
Unit / Location	Shredder Outlet
Duct area, (ft^2)	[redacted]
Reference temperature, °F	70.0

Test number	1-MM	2-MM	3-MM	Average
Date	6/28/17	6/28/17	6/29/17	--
Start / Stop time	2030-2234	2322-0127	2305-0107	--
Meter Box Number	CB-06	CB-06	CB-03	--
Meter Calibration (Y_d)	0.983	0.983	0.981	--
Sample Time (minutes)	120	120	120	--
Pitot Coefficient	0.8400	0.8400	0.8400	--
Nozzle Diameter (inches)	0.160	0.160	0.160	--
Fuel "HHV" (Btu/scf)	1,020	1,020	1,020	--
Fuel "F" Factor @ 68°F (dscf/MMBtu)	8,710	8,710	8,710	--
Fuel "F" Factor @ T_{ref} (dscf/MMBtu)	8,743	8,743	8,743	--
Feed Rate, tons/day	[redacted]	[redacted]	[redacted]	[redacted]
Production Time, hours				
Feed Rate, tons/hour1				
Barometric pressure, in Hg	29.97	29.97	29.97	29.97
Meter box volume, acf	72.616	79.632	73.095	75.114
Impinger liquid volume, ml	43.1	44.2	47.9	45.1
Meter temperature, °F	66.7	66.1	63.9	65.6
Meter pressure, (Delta H) iwg	0.994	1.041	1.094	1.043
Velocity head, (Delta P) iwg	1.8457	1.9283	2.0269	1.934
Static pressure, iwg	-0.90	-0.90	-1.05	-0.95
Stack temperature, °F	76.9	78.3	73.3	76.1
O_2, % volume dry	21.00	21.04	21.02	21.02
CO_2, % volume dry	0.03	0.03	-0.04	0.01
1a Standard sample volume, dscf	72.129	79.195	72.855	74.726
1b Water vapor volume, scf	2.040	2.092	2.267	2.133
1c Moisture fraction, nondimensional	0.0275	0.0257	0.0302	0.0278
1d Stack gas molecular weight, dry	28.845	28.847	28.834	28.842
1e Stack gas molecular weight, wet	28.546	28.568	28.507	28.541
1f Absolute stack pressure, in Hg	29.904	29.904	29.893	29.900
1g Stack gas velocity, ft/sec	[redacted]	[redacted]	[redacted]	[redacted]
1h Stack flow rate, acfm				
1i Stack Flow Rate (wscfm)				
1j Stack Flow Rate (dscfm)				
Isokinetic Ratio (%)	96.83	103.99	93.22	98.01

LAB DATA SUMMARY

Method	EPA 29
Project No.	005AS-179737
Client	Schnitzer Steel
Unit / Location	Shredder Outlet
Duct area, (ft^2)	[redacted]
Reference temperature, °F	70

Test number	1-MM		2-MM		3-MM		Average
Date	6/28/17		6/28/17		6/29/17		--
Start / Stop time	2030-2234		2322-0127		2305-0107		--
Cadmium (Cd), fh blank corrected, µg	ADL	0.57	ADL	0.75	ADL	0.59	ADL	0.64
Cadmium (Cd) bh blank corrected, µg	ADL	0.25	ADL	0.46	ADL	0.25	ADL	0.32
Cadmium (Cd) total, µg	ADL	0.82	ADL	1.21	ADL	0.84	ADL	0.95
Lead (Pb), fh blank corrected, µg	ADL	4.63	ADL	6.03	ADL	4.93	ADL	5.20
Lead (Pb) bh blank corrected, µg	ADL	0.96	ADL	1.86	ND	1.76	ADL	1.53
Lead (Pb) total, µg	ADL	5.59	ADL	7.89	DLL	6.69	ADL	6.72

RESULTS SUMMARY

Method	EPA 29
Project No	005AS-179737
Client	Schnitzer Steel
Unit / Location	Shredder Outlet
Duct area, (ft^2)	[redacted]
Reference temperature, °F	70

Test number	1-MM	2-MM	3-MM	Average
Date	6/28/17	6/28/17	6/29/17	--
Start / Stop time	2030-2234	2322-0127	2305-0107	--
O_2, % volume dry	21.00	21.04	21.02	21.02
CO_2, % volume dry	0.03	0.03	-0.04	0.01
Stack Temperature, °F	76.9	78.3	73.3	76.1
Moisture Content, % by volume	2.8	2.6	3.0	2.8
Stack Flow Rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Standard Sample Volume, dscf	72.129	79.195	72.855	74.726

Cadmium (Cd)								
lb/hr	ADL	2.13E-04	ADL	2.93E-04	ADL	2.26E-04	ADL	2.44E-04
Lb/tons of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Lead (Pb)								
lb/hr	ADL	1.45E-03	ADL	1.91E-03	DLL	1.81E-03	ADL	1.72E-03
Lb/tons of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Appendix C.5

Organic Compounds Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Schredder Outlet
Stack area, square feet	[redacted]
Pitot coefficient	0.8400
Reference temperature, °F	70

Test number	Run 1	Run 2	Run 3	Average
Date	6/28/17	6/28/17	6/29/17	--
Start / Stop time	2030-2234	2322-0126	1827-2138	--
Feed Rate, tons/day	[redacted]	[redacted]	[redacted]	[redacted]
Production Time, hours	[redacted]	[redacted]	[redacted]	[redacted]
Feed Rate, tons/hour[1]	[redacted]	[redacted]	[redacted]	[redacted]
O_2, % volume dry	21.00	21.04	21.01	21.02
CO_2, % volume dry	0.029	0.034	0.026	0.030
Benzene, MW	78.11	78.11	78.11	78.11
Tetrachloroethylene, MW	165.83	165.83	165.83	165.83
Trichloroethylene, MW	131.40	131.40	131.40	131.40
TNMNEOC, MW	16.04	16.04	16.04	16.04
Benzene, ppbvd	148	164	181	164
Tetrachloroethylene, ppbvd	*3.7*	*3.7*	*3.7*	*3.7*
Trichloroethylene, ppbvd	21.3	*2.4*	*2.4*	8.7
TNMNEOC, ppbvd	172,000	161,000	138,000	157,000
Stack flow rate, dscfm	[redacted]	[redacted]	[redacted]	[redacted]
Emissions Results				
Benzene, ppmvd	0.15	0.16	0.18	0.16
Benzene, lb/hr	0.26	0.28	0.32	0.29
Benzene, lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
Tetrachloroethylene, ppmvd	*0.002*	*0.002*	*0.002*	*0.002*
Tetrachloroethylene, lb/hr	*0.007*	*0.007*	*0.007*	*0.007*
Tetrachloroethylene, lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
Trichloroethylene, ppmvd	0.021	*0.001*	*0.001*	*0.008*
Trichloroethylene, lb/hr	0.063	*3E-03*	*4E-03*	*0.023*
Trichloroethylene, lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]
TNMNEOC, ppmvd as C	172	161	138	157
TNMNEOC, lb/hr as CH_4	61.8	57.2	50.6	56.5
TNMNEOC, lb/ton material processed	[redacted]	[redacted]	[redacted]	[redacted]

Note - Stack flow rate determined by pitot traverse from concurrent PM outlet testing.

1 - No hourly data available. Feed rate of ferrous material is based on daily tonnage value and assumes 24 hours/day operation.

Appendix C.6

Polychlorinated Biphenyl Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Regulation District	Bay Area
Reference temperature, °F	70
Reference pressure, psi	14.7

	Method Blank	1-PCB	2-PCB	3-PCB	Average
Test number					
Date	--	6/29/17	6/29/17	6/29/17	--
Start / Stop time	--	1827-2137	2212-0015	0048-0250	--
Feed Rate, tons/day	--	[redacted]	[redacted]	[redacted]	[redacted]
Production Time, hours	--				
Feed Rate, tons/hour[1]	--				
SAMPLE TRAIN DATA					
Meter box uumber/ID	--	CB-06	CB-06	CB-06	--
Nozzle diameter, inches	--	0.155	0.155	0.155	0.155
Sample time, minutes	--	120.0	120.0	120.0	120.0
Pitot coefficient	--	0.8400	0.8400	0.8400	0.8400
Meter calibration, Yd	--	0.983	0.983	0.983	0.983
Barometric pressure, in Hg	--	29.97	29.97	29.97	29.97
Meter box volume, acf	--	71.719	72.642	68.995	71.119
Impinger liquid volume, ml	--	14.90	21.00	15.30	17.07
Meter temperature, °F	--	66.0	72.5	71.3	69.9
Meter pressure, (Delta H) iwg	--	1.034	0.990	1.002	1.009
Velocity head, (Delta P) iwg	--	1.922	1.846	1.860	1.876
Static pressure, iwg	--	-0.86	-0.99	-0.97	-0.94
Stack temperature, °F	--	75.7	75.0	73.9	74.9
ANALYZER DATA					
O_2, % volume dry	--	21.0	21.0	21.0	21.0
CO_2, % volume dry	--	0.0	0.0	0.0	0.0
VOLUMETRIC FLOW RATE					
1a Standard sample volume, dscf	--	71.335	71.36	67.94	70.21
1b Water vapor volume, scf	--	0.705	0.994	0.724	0.8077
1c Moisture fraction, nondimensional	--	0.0098	0.0137	0.0105	0.0114
Moisture fraction %	--	1.0%	1.4%	1.1%	1.1%
1d Stack gas molecular weight, dry	--	28.845	28.840	28.840	28.841
1e Stack gas molecular weight, wet	--	28.738	28.691	28.725	28.718
1f Absolute stack pressure, in Hg	--	29.907	29.897	29.899	29.901
1g Stack gas velocity, ft/sec	--	[redacted]	[redacted]	[redacted]	[redacted]
1h Stack flow rate, acfm	--				
1i Stack Flow Rate (wscfm)	--				
Stack flow rate - based on pitot, dscfm	--				
Isokinetic Ratio (%)	--	98.41	100.73	95.19	98.11

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Regulation District	Bay Area
Reference temperature, °F	70
Reference pressure, psi	14.7

Test number	Method Blank	1-PCB	2-PCB	3-PCB	Average
Date	--	6/29/17	6/29/17	6/29/17	--
Start / Stop time	--	1827-2137	2212-0015	0048-0250	--
LAB RESULTS					
Chlorobiphenyls, ng	*0.025*	3,320	4,140	2,890	3,450
Dichlorobiphenyls, ng	*0.025*	13,100	17,000	11,800	13,967
Trichlorobiphenyls, ng	*0.025*	15,200	20,700	14,900	16,933
Tetrachlorobiphenyls, ng	*0.025*	3,290	4,380	2,980	3,550
Pentachlorobiphenyls, ng	*0.025*	354	318	304	325
Hexachlorobiphenyls, ng	*0.025*	83.2	57.4	49.7	63.4
Heptachlorobiphenyls, ng	*0.025*	27.5	29.4	13.0	23.3
Octachlorobiphenyls, ng	*0.025*	6.19	8.85	3.61	6.22
Nonachlorobiphenyls, ng	*0.025*	0.787	0.906	0.756	0.816
Decachlorobiphenyl, ng	*0.025*	*0.125*	0.136	*0.125*	< *0.129*
Total PCBs, ng	*0.025*	35,500	47,400	33,400	38,767
EMISSIONS					
Chlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Chlorobiphenyls, lb/hr	*< 6.84E-09*	9.05E-04	1.10E-03	8.15E-04	9.41E-04
Chlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dichlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dichlorobiphenyls, lb/hr	*< 6.84E-09*	3.57E-03	4.53E-03	3.33E-03	3.81E-03
Dichlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Trichlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Trichlorobiphenyls, lb/hr	*< 6.84E-09*	4.14E-03	5.51E-03	4.20E-03	4.62E-03
Trichlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Tetrachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Tetrachlorobiphenyls, lb/hr	*< 6.84E-09*	8.97E-04	1.17E-03	8.40E-04	9.68E-04
Tetrachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Pentachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Pentachlorobiphenyls, lb/hr	*< 6.84E-09*	9.65E-05	8.47E-05	8.57E-05	8.90E-05
Pentachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

SOURCE TEST DATA SUMMARY

Client	Schnitzer Steel
Unit / Location	Shredder
Stack area, square feet	[redacted]
Regulation District	Bay Area
Reference temperature, °F	70
Reference pressure, psi	14.7

Test number	Method Blank	1-PCB	2-PCB	3-PCB	Average
Date	--	6/29/17	6/29/17	6/29/17	--
Start / Stop time	--	1827-2137	2212-0015	0048-0250	--
Hexachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Hexachlorobiphenyls, lb/hr	*< 6.84E-09*	2.27E-05	1.53E-05	1.40E-05	1.73E-05
Hexachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Heptachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Heptachlorobiphenyls, lb/hr	*< 6.84E-09*	7.50E-06	7.83E-06	3.66E-06	6.33E-06
Heptachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Octachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Octachlorobiphenyls, lb/hr	*< 6.84E-09*	1.69E-06	2.36E-06	1.02E-06	1.69E-06
Octachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Nonachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Nonachlorobiphenyls, lb/hr	*< 6.84E-09*	2.15E-07	2.41E-07	2.13E-07	2.23E-07
Nonachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Decachlorobiphenyls, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Decachlorobiphenyls, lb/hr	*< 6.84E-09*	*< 3.41E-08*	3.62E-08	*< 3.52E-08*	*< 3.52E-08*
Decachlorobiphenyls, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total PCBs, ng/m3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total PCBs, lb/hr	*< 6.84E-09*	9.68E-03	1.26E-02	9.42E-03	1.06E-02
Total PCBs, lb/ton of material processed	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Appendix C.7

Example Calculations

EXAMPLE CALCULATIONS
HEXAVALENT CHROMIUM EMISSIONS

Project name: Schnitzer Steel **Project number:** 005AS-179737

Computed by: AVS **Calculation date:** 8/23/17

Run number: 1-Cr **Organic Compound:** Cr^{6+}

EMISSIONS DATA

Mass of measured hexavalent chromium in sample, ug/sample	11	F_t ± 11
Dry stack gas flow rate at standard conditions, dscfm	[redacted]	Q_{ds}
Standard volume of gas sampled, dscf	71.807	$V_{m,std}$
Reference Temperature, °R	530	T_r
Stack O_2, % volume dry	21.00	O_2
Molecular Weight g/gmol	51.996	MW
Process Data Feed Rate, tons	[redacted]	P_{tons}

3. HEXAVALENT CHROMIUM EMISSIONS

a. Mass emissions of hexavalent chromium, lb/hr

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

$$M = \left(\frac{11 \times [redacted]}{71.807}\right)\left(\frac{60}{454\times10^6}\right)$$

$$M = 3E^{-3} \pm 3E^{-3} \text{ lb/hr}$$

b. Mass Emissions, lb/ton

$$E = \frac{M}{P_{tons}}$$

$$E = \frac{3E^{-3}}{[redacted]}$$

$$E = [redacted]$$

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

EXAMPLE CALCULATIONS
GASEOUS EMISSIONS

Project name: Schnitzer Steel **Project number:** 005AS-179737

Computed by: PNS **Calculation date:** 8/11/17

Run number: Run 1 **Gaseous species:** Total PoC as CH4 (TNMNEOC)

EMISSIONS DATA

Reference temperature, °R	530	T_{ref} = (°F plus 460)
Concentration of gaseous species, ppmvd	172	C
Flue gas moisture content, non-dimensional	N/A	B_{ws}
Dry stack gas flow rate at standard conditions, dscfm	[redacted]	Q_{ds}
Stack O_2, % volume dry	21.00	O_2
Stack CO_2, % volume dry	0.029	CO_2
Feed rate, ton/hr	[redacted]	P_{tons}
Molecular weight of gaseous species, lb/lb mole	16.04	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)

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} at 530 °R (70 °F)

$$SV = (379.5)\left[\frac{\left((T_{ref}\ ^\circ R)\right)}{520}\right]$$ 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.

2. GASEOUS EMISSIONS

a. Mass emissions, lb/hr

$$M = (C)\,(10^{-6})\left(\frac{MW_s}{SV}\right)(Q_{ds})(60\ min/hr)$$

$$M = (172\ )\,(10^{-6})\left(\frac{16.04}{386.8}\right)([redacted])(60)$$

$M =$ 61.8 lb/hr as CH_4

b. Emission factor, lb/ton

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

$$E = \left(\frac{61.8}{[redacted]}\right)$$

$E =$ [redacted] lb/ton as CH_4

EXAMPLE CALCULATIONS
GASEOUS EMISSIONS

Project name: Schnitzer Steel **Project number:** 005AS-179737

Computed by: PWS **Calculation date:** 8/11/17

Run number: Run 1 **Gaseous species:** Benzene

EMISSIONS DATA

Reference temperature, °R	530	T_{ref} = (°F plus 460)
Concentration of gaseous species, ppmvd	0.148	C
Flue gas moisture content, non-dimensional	N/A	B_{ws}
Dry stack gas flow rate at standard conditions, dscfm	[redacted]	Q_{ds}
Stack O_2, % volume dry	21.00	O_2
Stack CO_2, % volume dry	0.029	CO_2
Feed rate, ton/hr	[redacted]	P_{tons}
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 Benzene

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} at 530 °R (70 °F)

$$SV = (379.5)\left[\frac{\left((T_{ref}\ ^{\circ}R)\right)}{520}\right]$$ 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.

2. GASEOUS EMISSIONS

a. Mass emissions, lb/hr

$$M = (C)\,(10^{-6})\left(\frac{MW_s}{SV}\right)(Q_{ds})(60\ min/hr)$$

$$M = (0.148)\,(10^{-6})\left(\frac{78.11}{386.8}\right)[redacted](60)$$

$M =$ 0.26 lb/hr

b. Emission factor, lb/ton

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

$$E = \left(\frac{0.26}{[redacted]}\right)$$

$E =$ [redacted] lb/ton

EXAMPLE CALCULATIONS
STACK GAS VOLUMETRIC FLOW RATE

Project name: Schnitzer Steel **Project number:** 005AS-179737

Computed by: PNS **Calculation date:** 8/11/17

Run number: 1-MM

SAMPLE TRAIN DATA

Meter calibration factor, Yd	0.983	Y
Stack area, square feet	31.919	A_s
Reference temperature, °R	530	T_{ref} = (°F plus 460)
Pitot Coefficient	0.84	C_p
Barometric pressure, in Hg	29.97	P_{bar}
Meter box volume, acf	72.616	V_m
Impinger liquid volume, g	43.1	V_{lc}
Meter temperature, °R	526.7	T_m = (°F plus 460)
Meter pressure, (Delta H) iwg	0.994	ΔH
Velocity head, (Delta P) iwg	1.846	ΔP
Static pressure, iwg	-0.9	P_{sg}
Stack temperature, °R	536.9	T_s = (°F plus 460)
Stack O_2, % volume dry	21.00	O_2
Stack CO_2, % volume dry	0.029	CO_2
Stack N_2, % volume dry	78.971	N_2 = (100- % O_2 - % CO_2)

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

$$V_{m\,std} = (1/29.92)(V_m)\left[P_{bar} + \left(\frac{\Delta H}{13.6}\right)\right]\left(\frac{T_{ref}}{T_m}\right)(Y)$$

$$V_{m\,std} = (1/29.92)(72.616)\left[29.97 + \left(\frac{0.994}{13.6}\right)\right]\left(\frac{530}{526.7}\right)(0.983)$$

$V_{m\,std}$ = 72.12 dscf

b. Water vapor volume, scf

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

$$V_{w\,std} = (0.04715)(43.1)\left(\frac{530}{528}\right)$$

$V_{w\,std}$ = 2.04 scf

c. Moisture content, non-dimensional

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

$$B_{ws} = \left(\frac{2.04}{(72.12 + 2.04)}\right)$$

B_{ws} = 0.0275 moisture content (multiply by 100 for % by volume)

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

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

$$MW_{dry} = [0.44\,(0.029)] + [0.32\,(21.09)] + [0.28\,(78.971)]$$

MW_{dry} = 28.845 lb/lb mole

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

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

$$MW_{wet} = [28.845\,(1 - 0.0275)] + [18\,(0.0275)]$$

MW_{wet} = 28.547 lb/lb mole

f. Absolute stack pressure, in Hg

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

$$P_s = 29.97 + \left(\frac{-0.9}{13.6}\right)$$

P_s = 29.904 in. Hg

g. Stack velocity, ft/sec

$$V_s = (2.90)(C_p)\sqrt{(\Delta P)(T_s)}\ \sqrt{\left(\frac{29.92}{P_s}\right)\left(\frac{28.95}{MW_{wet}}\right)}$$

$$V_s = (2.90)(0.84)\sqrt{(1.846)(536.9)}\ \sqrt{\left(\frac{29.92}{29.904}\right)\left(\frac{28.95}{28.547}\right)}$$

V_s = [redacted] ft/sec

h. Actual stack flow rate, acfm

$$Q = (V_s)\,(A_s)\,(60\ min/hr)$$

$$Q = (77.23)\,(31.919)\,(60)$$

Q = [redacted] acfm

i. Standard stack gas flow rate, wscfm

$$Q_{ws} = (Q)\left(\frac{T_{ref}}{T_s}\right)\left(\frac{P_s}{29.92}\right)$$

$$Q_{ws} = ([redacted])\left(\frac{530}{536.9}\right)\left(\frac{29.904}{29.92}\right)$$

Q_{ws} = [redacted] wscfm

j. Standard stack gas flow rate, dscfm

$$Q_{ds} = (Q)\,(1 - B_{ws})\left(\frac{T_{ref}}{T_s}\right)\left(\frac{P_s}{29.92}\right)$$

$$Q_{ds} = ([redacted])\,(1 - 0.0275)\left(\frac{530}{536.9}\right)\left(\frac{29.904}{29.92}\right)$$

Q_{ds} = [redacted] dscfm

EXAMPLE CALCULATIONS
METALS EMISSIONS

Project name: Schnitzer Steel **Project number:** 005AS-179737

Computed by: PNS **Calculation date:** 8/11/17

Run number: 1-MM (Pb)

EMISSIONS DATA

Mass of metal, mg (Lead)	0.00463	G_m
Dry stack gas flow rate at standard conditions, dscfm	[redacted]	Q_{ds}
Dry meter volume at standard conditions, dscf	72.129	$V_{m\,std}$
Stack O_2, % volume dry	21.00	O_2
Stack CO_2, % volume dry	0.029	CO_2
"F" factor of fuel based on O_2, dscf/MMBtu @ 0% O_2	N/A	F_d
Process Data: FEED RATE, TONS/HOUR	[redacted]	PD

3. PARTICULATE MATTER EMISSIONS

a. Grain loading, gr/dscf

$$G = (0.01543)\left(\frac{G_m}{V_{m\,std}}\right)$$

$$G = (0.01543)\left(\frac{0.00463}{72.129}\right)$$

$$G = 9.9E\text{-}7 \text{ gr/dscf}$$

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

b. Grain loading, ug/dscm

$$G_{ug} = (G_m)\left(\frac{1000\ \mu g}{1\ mg}\right)\left(\frac{1}{V_{m\ std}}\right)\left(\frac{35.31\ \text{ft}^3}{1\ \text{m}^3}\right)$$

$$G_{ug} = (9.9E^{-7})(1000)\left(\frac{35.31}{72.129}\right)$$

$G_{ug} =$ 4.85E^{-4} ug/dscm

c. Mass emission rate, lb/hr

$$M = (G)(Q_{ds})\left(\frac{60\ min/hr}{7000\ gr/lb}\right)$$

$$M = (9.9E^{-7})(\text{[redacted]})\left(\frac{60}{7000}\right)$$

$M =$ 1.20E^{-3} lb/hr

d. Emission factor, lb/MMBtu

$$E = (G)\left(\frac{1\ lb}{7000\ gr}\right)(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)$$

$$E = (\qquad)\left(\frac{1\ lb}{7000\ gr}\right)(\qquad)\left(\frac{20.9}{20.9 -}\right)$$

N/A

$E =$ _____ lb/MMBtu

e. Mass Emission rate, lb/ton material

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

$E = \left(\frac{1.20E^{-3}}{\text{[redacted]}}\right)$

$E =$ [redacted]

EXAMPLE CALCULATIONS
PARTICULATE MATTER EMISSIONS

Project name: Schnitzer Steel **Project number:** 005AS-179737

Computed by: PNS **Calculation date:** 8/11/17

Run number: 2-PM-IN

EMISSIONS DATA

Mass of collected particulate matter, mg	9.19	G_m
Dry stack gas flow rate at standard conditions, dscfm	[redacted]	Q_{ds}
Dry meter volume at standard conditions, dscf	41.403	$V_{m\,std}$
Stack O_2, % volume dry	21.04	O_2
Stack CO_2, % volume dry	0.034	CO_2
Process Data: FEED RATE, TONS/HOUR	[redacted]	PD

3. PARTICULATE MATTER EMISSIONS

a. Grain loading, gr/dscf

$$G = (0.01543)\left(\frac{G_m}{V_{m\,std}}\right)$$

$$G = (0.01543)\left(\frac{9.19}{41.403}\right)$$

G = 0.0034 gr/dscf

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

b. **Mass emission rate, lb/hr**

$$M = (G)(Q_{ds})\left(\frac{60\ min/hr}{7000\ gr/lb}\right)$$

$$M = (0.0034)([redacted])\left(\frac{60}{7000}\right)$$

M = 1.99 lb/hr

c. Mass Emission rate, lb/ton material

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

$$E = \frac{1.99}{[redacted]}$$

E = [redacted]

EXAMPLE CALCULATIONS
PARTICULATE MATTER EMISSIONS

Project name: Schnitzer Steel **Project number:** 005AS-179737

Computed by: PNS **Calculation date:** 8/11/17

Run number: 1-PM-OUT

EMISSIONS DATA

Mass of collected particulate matter, mg	7.93	G_m
Dry stack gas flow rate at standard conditions, dscfm	[redacted]	Q_{ds}
Dry meter volume at standard conditions, dscf	38.582	$V_{m\,std}$
Stack O_2, % volume dry	21.00	O_2
Stack CO_2, % volume dry	0.029	CO_2
Process Data: FEED RATE, TONS/HOUR	[redacted]	PD

3. PARTICULATE MATTER EMISSIONS

a. Grain loading, gr/dscf

$$G = (0.01543)\left(\frac{G_m}{V_{m\,std}}\right)$$

$$G = (0.01543)\left(\frac{7.93}{38.582}\right)$$

G = 0.00317 gr/dscf

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

b. Mass emission rate, lb/hr

$$M = (G)(Q_{ds})\left(\frac{60\ min/hr}{7000\ gr/lb}\right)$$

$$M = (0.00317)([redacted])\left(\frac{60}{7000}\right)$$

M = 3.92 lb/hr

c. Mass Emission rate, lb/ton of material

$$E = \frac{M}{PD}$$

$$E = \left(\frac{3.92}{[redacted]}\right)$$

E = [redacted]

EXAMPLE CALCULATIONS
TOTAL ORGANIC COMPOUND EMISSIONS

Project name: Schnitzer Steel **Project number:** 005AS-179737

Computed by: PNS **Calculation date:** 8/11/17

Run number: 1-PCB **Organic Compound:** Total PCBs

EMISSIONS DATA

Mass of measured organic compound in sample, ug/sample	35.5	F_t
Dry stack gas flow rate at standard conditions, dscfm	[redacted]	Q_{ds}
Standard volume of gas sampled, dscf	71.335	$V_{m,\,std}$
Reference Temperature, °R	530	T_r
Stack O_2, % volume dry	21.01	O_2
Molecular Weight g/gmol	—	MW

(35,500 ug)

3. TOTAL ORGANIC COMPOUND EMISSIONS

a. Mass emissions of organic compound, lb/hr

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

$$M = \left(\frac{35.5 \times [redacted]}{71.335}\right)\left(\frac{60}{454 \times 10^6}\right)$$

$$M = 9.68E^{-3}\ \text{lb/hr}$$

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

APPENDIX D

LABORATORY REPORTS

Appendix D.1

Particulate Matter Analyses

MONTROSE
AIR QUALITY SERVICES

PARTICULATE MATTER RESULTS
Client: Schnitzer Steel
Project: 179737

Test No.:		1-PM-IN	2-PM-IN	3-PM-IN	4-PM-IN
Front-Half Particulate Catch					
m_f	Filter catch, net mg	0.13	5.36	3.96	4.91
m_{a1}	> PM_{10} rinse (acetone), net mg	0.48	2.00	2.91	4.80
m_{a2}	< PM_{10} rinse (acetone), net mg	< 0.11	< 0.11	< 0.11	< 0.11
	Total filterable PM_{10} particulate matter catch, net mg	*0.24*	*5.47*	*4.07*	*5.02*
Back-Half Particulate Catch					
m_i	Aqueous rinse (ASTM Type II water), net mg	0.87	1.10	2.73	2.07
m_o	Organic rinse (hexane and acetone), net mg	0.97	0.61	0.83	1.70
	Uncorrected condensible particulate matter catch, net mg	*1.84*	*1.71*	*3.56*	*3.77*
Back-Half Blank Catch					
m_{ib}	Field blank aqueous rinse (ASTM Type II water), net mg	0.83	0.83	0.83	0.83
m_{ob}	Field blank organic rinse (hexane and acetone), net mg	0.07	0.07	0.07	0.07
m_{fb}	*Total condensible particulate matter blank catch, net mg*	*0.91*	*0.91*	*0.91*	*0.91*
m_{cpm}	*Corrected condensible particulate matter catch, net mg*	< *1.24*	< *1.24*	*2.65*	*2.86*
Total Particulate Matter Catch, net mg		**1.48**	**6.71**	**6.72**	**7.88**

Notes: The front-half acetone fractions were blank-corrected according to EPA Methods 5 / 17.
The back-half fractions were blank corrected according to EPA Method 202 Section 12.2. $m_{cpm} = m_i + m_o - (m_{ib} + m_{ob})$ (Eqs. 2 & 4)
The back-half fractions blank correction values is $(m_{ib} + m_{ob})$ or 2.0mg, whichever is lesser, according to EPA Method 202 Section 12.2.

Prepared by: Melissa Stofer
Melissa Stofer
Laboratory Assistant

Date: 7/17/17

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MONTROSE
AIR QUALITY SERVICES

PARTICULATE MATTER RESULTS
Client: Schnitzer Steel
Project: 179737

Test No.:		1-PM-OUT	2-PM-OUT	3-PM-OUT
Front-Half Particulate Catch				
m_f	Filter catch, net mg	4.26	5.82	4.08
m_{a1}	> PM_{10} rinse (acetone), net mg	0.39	< 0.11	0.23
m_{a2}	< PM_{10} rinse (acetone), net mg	< 0.11	< 0.11	< 0.11
m_{a3}	< PM_{10} rinse (acetone), net mg	0.15	0.26	0.15
	Total filterable PM_{10} particulate matter catch, net mg	*4.52*	*6.19*	*4.34*
Back-Half Particulate Catch				
m_i	Aqueous rinse (ASTM Type II water), net mg	2.27	2.07	2.23
m_o	Organic rinse (hexane and acetone), net mg	0.54	0.58	0.47
	Uncorrected condensible particulate matter catch, net mg	*2.81*	*2.65*	*2.70*
Back-Half Blank Catch				
m_{ib}	Field blank aqueous rinse (ASTM Type II water), net mg	0.83	0.83	0.83
m_{ob}	Field blank organic rinse (hexane and acetone), net mg	0.07	0.07	0.07
m_{fb}	*Total condensible particulate matter blank catch, net mg*	*0.91*	*0.91*	*0.91*
m_{cpm}	*Corrected condensible particulate matter catch, net mg*	*1.90*	*1.74*	*1.79*
Total Particulate Matter Catch, net mg		**6.42**	**7.93**	**6.13**

Notes: The front-half acetone fractions were blank-corrected according to EPA Methods 5 / 17.
The back-half fractions were blank corrected according to EPA Method 202 Section 12.2. $m_{cpm} = m_i + m_o - (m_{ib} + m_{ob})$ (Eqs. 2 & 4)
The back-half fractions blank correction values is $(m_{ib} + m_{ob})$ or 2.0mg, whichever is lesser, according to EPA Method 202 Section 12.2.

Prepared by: Melissa Stofer
Melissa Stofer
Laboratory Technician

Date: 7/17/17

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PARTICULATE MATTER RESULTS
Client: Schnitzer Steel
Project: 179737

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM	Filter	N/A	7323	Tare 1	0.08013	0.08015	--	--	--	--	--
	(F½)			Tare 2	0.08016	0.08010	--	--	--	--	--
				Tare 3	0.08015	0.08011	--	--	--	--	--
				Average	0.08015	0.08012	-0.03	N/A	N/A	N/A	N/A
1-PM-IN	Filter	N/A	7683	Tare 1	0.08732	0.08744	--	--	--	--	--
	(F½)			Tare 2	0.08727	0.08740	--	--	--	--	--
				Tare 3	0.08729	0.08742	--	--	--	--	--
				Average	0.08729	0.08742	0.13	N/A	N/A	N/A	0.13
2-PM-IN	Filter	N/A	7185	Tare 1	0.09477	0.10015	--	--	--	--	--
	(F½)			Tare 2	0.09475	0.10010	--	--	--	--	--
				Tare 3	0.09475	0.10010	--	--	--	--	--
				Average	0.09476	0.10012	5.36	N/A	N/A	N/A	5.36
3-PM-IN	Filter	N/A	7738	Tare 1	0.10095	0.10493	--	--	--	--	--
	(F½)			Tare 2	0.10093	0.10491	--	--	--	--	--
				Tare 3	0.10095	0.10488	--	--	--	--	--
				Average	0.10094	0.10491	3.96	N/A	N/A	N/A	3.96
4-PM-IN	Filter	N/A	7742	Tare 1	0.10029	0.10523	--	--	--	--	--
	(F½)			Tare 2	0.10029	0.10520	--	--	--	--	--
				Tare 3	0.1003[illegible]	0.10519	--	--	--	--	--
				Average	0.10030	0.10521	4.91	N/A	N/A	N/A	4.91

Note: The filters were not blank-corrected according to EPA Methods 5 / 17.

FB-PM	Probe/Nozzle	167.0	R125	Tare 1	2.23118	2.23177	--	--	--	--	--
	Acetone			Tare 2	2.23114	2.23172	--	--	--	--	--
	(F½)			Tare 3	2.23116	2.23175	--	--	--	--	--
	>10			Average	2.23116	2.23175	0.59	0.0004%	N/A	N/A	N/A
1-PM-IN	Probe/Nozzle	18.3	R126	Tare 1	2.28717	2.28772	--	--	--	--	--
	Acetone			Tare 2	2.28715	2.28769	--	--	--	--	--
	(F½)			Tare 3	2.28720	2.28775	--	--	--	--	--
	>10			Average	2.28717	2.28772	0.55	0.0004%	0.06	0.18	0.48
2-PM-IN	Probe/Nozzle	27.7	R127	Tare 1	2.26278	2.26489	--	--	--	--	--
	Acetone			Tare 2	2.26274	2.26487	--	--	--	--	--
	(F½)			Tare 3	2.26279	2.26484	--	--	--	--	--
	>10			Average	2.26277	2.26487	2.10	0.0004%	0.10	0.28	2.00
3-PM-IN	Probe/Nozzle	21.2	R128	Tare 1	2.27055	2.27354	--	--	--	--	--
	Acetone			Tare 2	2.27059	2.27351	--	--	--	--	--
	(F½)			Tare 3	2.27060	2.27365	--	--	--	--	--
	>10			Average	2.27058	2.27357	2.99	0.0004%	0.07	0.21	2.91
4-PM-IN	Probe/Nozzle	33.9	R129	Tare 1	2.25029	2.25516	--	--	--	--	--
	Acetone			Tare 2	2.25034	2.25517	--	--	--	--	--
	(F½)			Tare 3	2.25029	2.25535	--	--	--	--	--
	>10			Average	2.25031	2.25523	4.92	0.0004%	0.12	0.34	4.80

Note: The acetone fractions were blank-corrected according to EPA Methods 5 / 17. Blank values of greater than 0.001 percent of the weight of acetone used cannot be subtracted from the sample weight.

PARTICULATE MATTER RESULTS
Client: Schnitzer Steel
Project: 179737

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM	**Probe/Nozzle**	167.0	R125	Tare 1	2.23118	2.23177	--	--	--	--	--
	Acetone			Tare 2	2.23114	2.23172	--	--	--	--	--
	(F½)			Tare 3	2.23116	2.23175	--	--	--	--	--
	<10			**Average**	**2.23116**	**2.23175**	**0.59**	0.0004%	N/A	N/A	N/A
1-PM-IN	**Probe/Nozzle**	16.9	R133	Tare 1	2.23751	2.23760	--	--	--	--	--
	Acetone			Tare 2	2.23754	2.23760	--	--	--	--	--
	(F½)			Tare 3	2.23751	2.23760	--	--	--	--	--
	<10			**Average**	**2.23752**	**2.23760**	**0.08**	0.0004%	0.06	0.17	**0.02**
2-PM-IN	**Probe/Nozzle**	10.0	R134	Tare 1	2.24016	2.24017	--	--	--	--	--
	Acetone			Tare 2	2.24013	2.24017	--	--	--	--	--
	(F½)			Tare 3	2.24016	2.24015	--	--	--	--	--
	<10			**Average**	**2.24015**	**2.24016**	**0.01**	0.0004%	0.04	0.10	**0.00**
3-PM-IN	**Probe/Nozzle**	19.2	R135	Tare 1	2.25060	2.25067	--	--	--	--	--
	Acetone			Tare 2	2.25064	2.25061	--	--	--	--	--
	(F½)			Tare 3	2.25065	2.25067	--	--	--	--	--
	<10			**Average**	**2.25063**	**2.25065**	**0.02**	0.0004%	0.07	0.19	**0.00**
4-PM-IN	**Probe/Nozzle**	22.9	R136	Tare 1	2.24668	2.24683	--	--	--	--	--
	Acetone			Tare 2	2.24667	2.24682	--	--	--	--	--
	(F½)			Tare 3	2.24670	2.24678	--	--	--	--	--
	<10			**Average**	**2.24668**	**2.24681**	**0.13**	0.0004%	0.08	0.23	**0.05**

Note: The acetone fractions were blank-corrected according to EPA Methods 5 / 17. Blank values of greater than 0.001 percent of the weight of acetone used cannot be subtracted from the sample weight.

PARTICULATE MATTER RESULTS
Client: Schnitzer Steel
Project: 179737

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM	Filter (F½)	N/A	7323	Tare 1	0.08013	0.08015	–	–	–	–	–
				Tare 2	0.08016	0.08010	–	–	–	–	–
				Tare 3	0.08015	0.08011	–	–	–	–	–
				Average	0.08015	0.08012	-0.03	N/A	N/A	N/A	N/A
1-PM-OUT	Filter (F½)	N/A	7737	Tare 1	0.09995	0.10425	–	–	–	–	–
				Tare 2	0.09995	0.10422	–	–	–	–	–
				Tare 3	0.09999	0.10420	–	–	–	–	–
				Average	0.09996	0.10422	4.26	N/A	N/A	N/A	4.26
2-PM-OUT	Filter (F½)	N/A	7736	Tare 1	0.10010	0.10595	–	–	–	–	–
				Tare 2	0.10012	0.10595	–	–	–		–
				Tare 3	0.10012	0.10591	–	–	–		–
				Average	0.10011	0.10594	5.82	N/A	N/A	N/A	5.82
3-PM-OUT	Filter (F½)	N/A	7744	Tare 1	0.10162	0.10575	–	–	–	–	–
				Tare 2	0.10162	0.10570	–	–	–	–	–
				Tare 3	0.10166	0.10570	–	–	–	–	–
				Average	0.10163	0.10572	4.08	N/A	N/A	N/A	4.08

Note: The filters were not blank-corrected according to EPA Methods 5 / 17.

FB-PM	Probe/Nozzle Acetone (F½) >10	167.0	R125	Tare 1	2.23118	2.23177	–	–	–	–	–
				Tare 2	2.23114	2.23172	–	–	–	–	–
				Tare 3	2.23116	2.23175	–	–	–	–	–
				Average	2.2312	2.23175	0.59	0.0004%	N/A	N/A	N/A
1-PM-OUT	Probe/Nozzle Acetone (F½) >10	18.4	R130	Tare 1	2.24868	2.24911	–	–	–	–	–
				Tare 2	2.24870	2.24911	–	–	–	–	–
				Tare 3	2.24872	2.24924	–	–	–	–	–
				Average	2.24870	2.24915	0.45	0.0004%	0.06	0.18	0.39
2-PM-OUT	Probe/Nozzle Acetone (F½) >10	19.0	R131	Tare 1	2.25177	2.25168	–	–	–	–	–
				Tare 2	2.25179	2.25186	–	–	–	–	–
				Tare 3	2.25181	2.25200	–	–	–	–	–
				Average	2.25179	2.25185	0.06	0.0004%	0.07	0.19	0.00
3-PM-OUT	Probe/Nozzle Acetone (F½) >10	20.3	R132	Tare 1	2.23679	2.23691	–	–	–	–	–
				Tare 2	2.23684	2.23716		–	–	–	–
				Tare 3	2.23681	2.23727	–	–	–	–	–
				Average	2.23681	2.23711	0.30	0.0004%	0.07	0.20	0.23

Note: The acetone fractions were blank-corrected according to EPA Methods 5 / 17. Blank values of greater than 0.001 percent of the weight of acetone used cannot be subtracted from the sample weight.

PARTICULATE MATTER RESULTS
Client: Schnitzer Steel
Project: 179737

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM	Probe/Nozzle	167.0	R125	Tare 1	2.23118	2.23177	--	--	--	--	--
	Acetone			Tare 2	2.23114	2.23172	--	--	--	--	--
	(F½)			Tare 3	2.23116	2.23175	--	--	--	--	--
	<2.5			Average	2.23116	2.23175	0.59	0.0004%	N/A	N/A	N/A
1-PM-OUT	Probe/Nozzle	8.7	R140	Tare 1	2.25017	2.25028	--	--	--	--	--
	Acetone			Tare 2	2.25012	2.25028	--	--	--	--	--
	(F½)			Tare 3	2.25017	2.25025	--	--	--	--	--
	<2.5			Average	2.25015	2.25027	0.12	0.0004%	0.03	0.09	0.09
2-PM-OUT	Probe/Nozzle	19.9	R141	Tare 1	2.28604	2.28611	--	--	--	--	--
	Acetone			Tare 2	2.28599	2.28606	--	--	--	--	--
	(F½)			Tare 3	2.28602	2.28611	--	--	--	--	--
	<2.5			Average	2.28602	2.28609	0.08	0.0004%	0.07	0.20	0.01
3-PM-OUT	Probe/Nozzle	16.3	R142	Tare 1	2.24355	2.24363	--	--	--	--	--
	Acetone			Tare 2	2.24351	2.24358	--	--	--	--	--
	(F½)			Tare 3	2.24354	2.24358	--	--	--	--	--
	<2.5			Average	2.24353	2.24360	0.06	0.0004%	0.06	0.16	0.01

Note: The acetone fractions were blank-corrected according to EPA Methods 5 / 17. Blank values of greater than 0.001 percent of the weight of acetone used cannot be subtracted from the sample weight.

FB-PM	Probe/Nozzle	167.0	R125	Tare 1	2.23118	2.23177	--	--	--	--	--
	Acetone			Tare 2	2.23114	2.23172	--	--	--	--	--
	(F½)			Tare 3	2.23116	2.23175	--	--	--	--	--
	10>2.5			Average	2.2312	2.23175	0.59	0.0004%	N/A	N/A	N/A
1-PM-OUT	Probe/Nozzle	24.2	R137	Tare 1	2.27555	2.27578	--	--	--	--	--
	Acetone			Tare 2	2.27550	2.27574	--	--	--	--	--
	(F½)			Tare 3	2.27551	2.27574	--	--	--	--	--
	10>2.5			Average	2.27552	2.27575	0.23	0.0004%	0.09	0.24	0.15
2-PM-OUT	Probe/Nozzle	29.2	R138	Tare 1	2.24265	2.24294	--	--		--	--
	Acetone			Tare 2	2.24266	2.24296	--	--	-	--	--
	(F½)			Tare 3	2.24266	2.24315	--	--	--	--	--
	10>2.5			Average	2.24266	2.24302	0.36	0.0004%	0.10	0.29	0.26
3-PM-OUT	Probe/Nozzle	20.0	R139	Tare 1	2.27950	2.27975	--	--	--	--	--
	Acetone			Tare 2	2.27954	2.27975	--	--	--	--	--
	(F½)			Tare 3	2.27955	2.27974	--	--	--	--	--
	10>2.5			Average	2.27953	2.27975	0.22	0.0004%	0.07	0.20	0.15

Note: The acetone fractions were blank-corrected according to EPA Methods 5 / 17. Blank values of greater than 0.001 percent of the weight of acetone used cannot be subtracted from the sample weight.

PARTICULATE MATTER RESULTS
Client: Schnitzer Steel
Project: 179737

Test Number	Sample Fraction	Total Volume (ml)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Raw Gain Weight (mg)	Blank Residue (%)	Final Results (mg)
FB-PM	Organic Rinse (B½)	181.1	R143	Tare 1	2.25967	2.25958	--	--	--
				Tare 2	2.25966	2.25962	--	--	--
				Tare 3	2.25965	2.26000	--	--	--
				Average	**2.25966**	**2.25973**	**0.07**	0.0000%	0.07
1-PM-IN	Organic Rinse (B½)	234.4	R144	Tare 1	2.23982	2.24067	--	--	--
				Tare 2	2.23977	2.24069	--	--	--
				Tare 3	2.23979	2.24093	--	--	--
				Average	**2.23979**	**2.24076**	**0.97**	0.0000%	0.97
2-PM-IN	Organic Rinse (B½)	222.9	R145	Tare 1	2.24704	2.24749	--	--	--
				Tare 2	2.24699	2.24754	--	--	--
				Tare 3	2.24703	2.24787	--	--	--
				Average	**2.24702**	**2.24763**	**0.61**	0.0000%	0.61
3-PM-IN	Organic Rinse (B½)	202.9	R146	Tare 1	2.28668	2.28745	--	--	--
				Tare 2	2.28673	2.28743	--	--	--
				Tare 3	2.28670	2.28772	--	--	--
				Average	**2.28670**	**2.28753**	**0.83**	0.0000%	0.83
4-PM-IN	Organic Rinse (B½)	242.5	R147	Tare 1	2.25724	2.25878	--	--	--
				Tare 2	2.25720	2.25883	--	--	--
				Tare 3	2.25725	2.25919	--	--	--
				Average	**2.25723**	**2.25893**	**1.70**	0.0000%	1.70
FB-PM	Aqueous Water (B½)	211.4	14	Tare 1	68.6639	68.6647	--	--	--
				Tare 2	68.6641	68.6651	--	--	--
				Tare 3	68.6644	68.6651	--	--	--
				Average	**68.6641**	**68.6650**	**0.83**	0.0004%	0.83
1-PM-IN	Aqueous Water (B½)	208.1	408	Tare 1	70.2359	70.2369	--	--	--
				Tare 2	70.2361	70.2369	--	--	--
				Tare 3	70.2362	70.2370	--	--	--
				Average	**70.2361**	**70.2369**	**0.87**	0.0004%	0.87
2-PM-IN	Aqueous Water (B½)	201.8	412	Tare 1	72.4445	72.4457	--	--	--
				Tare 2	72.4447	72.4457	--	--	--
				Tare 3	72.4450	72.4461	--	--	--
				Average	**72.4447**	**72.4458**	**1.10**	0.0004%	1.10
3-PM-IN	Aqueous Water (B½)	189.3	1925	Tare 1	72.0990	72.1015	--	--	--
				Tare 2	72.0989	72.1019	--	--	--
				Tare 3	72.0993	72.1020	--	--	--
				Average	**72.0991**	**72.1018**	**2.73**	0.0004%	2.73
4-PM-IN	Aqueous Water (B½)	214.0	1993	Tare 1	68.1430	68.1452	--	--	--
				Tare 2	68.1430	68.1452	--	--	--
				Tare 3	68.1434	68.1452	--	--	--
				Average	**68.1431**	**68.1452**	**2.07**	0.0004%	2.07

PARTICULATE MATTER RESULTS
Client: Schnitzer Steel
Project: 179737

Test Number	Sample Fraction	Total Volume (ml)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Raw Gain Weight (mg)	Blank Residue (%)	Final Results (mg)
FB-PM	**Organic Rinse (B½)**	181.1	R143	Tare 1	2.25967	2.25958	--	--	--
				Tare 2	2.25966	2.25962	--	--	--
				Tare 3	2.25965	2.26000	--	--	--
				Average	**2.2597**	**2.25973**	**0.07**	0.0000%	0.07
1-PM-OUT	**Organic Rinse (B½)**	250.5	R148	Tare 1	2.28125	2.28161	--	--	--
				Tare 2	2.28123	2.28164	--	--	--
				Tare 3	2.28122	2.28206	--	--	--
				Average	**2.28123**	**2.28177**	**0.54**	0.0000%	0.54
2-PM-OUT	**Organic Rinse (B½)**	219.8	R149	Tare 1	2.27043	2.27088	--	--	--
				Tare 2	2.27038	2.27083	--	--	--
				Tare 3	2.27040	2.27123	--	--	--
				Average	**2.27040**	**2.27098**	**0.58**	0.0000%	0.58
3-PM-OUT	**Organic Rinse (B½)**	188.2	R150	Tare 1	2.26360	2.26378	--	--	--
				Tare 2	2.26356	2.26419	--	--	--
				Tare 3	2.26358	2.26419	--	--	--
				Average	**2.26358**	**2.26405**	**0.47**	0.0000%	0.47
FB-PM	**Aqueous Water (B½)**	211.4	14	Tare 1	68.6639	68.6647	--	--	--
				Tare 2	68.6641	68.6651	--	--	--
				Tare 3	68.6644	68.6651	--	--	--
				Average	**68.6641**	**68.6650**	**0.83**	0.0004%	0.83
1-PM-OUT	**Aqueous Water (B½)**	213.2	2005	Tare 1	70.7521	70.7542	--	--	--
				Tare 2	70.7522	70.7547	--	--	--
				Tare 3	70.7524	70.7546	--	--	--
				Average	**70.7522**	**70.7545**	**2.27**	0.0004%	2.27
2-PM-OUT	**Aqueous Water (B½)**	192.5	2062	Tare 1	71.5446	71.5466	--	--	--
				Tare 2	71.5448	71.5471	--	--	--
				Tare 3	71.5451	71.5470	--	--	--
				Average	**71.5448**	**71.5469**	**2.07**	0.0004%	2.07
3-PM-OUT	**Aqueous Water (B½)**	206.2	2084	Tare 1	68.0631	68.0654	--	--	--
				Tare 2	68.0634	68.0655	--	--	--
				Tare 3	68.0636	68.0659	--	--	--
				Average	**68.0634**	**68.0656**	**2.23**	0.0004%	2.23

PARTICULATE MATTER RESULTS
Client: Schnitzer Steel
Project: 179737

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Raw Gain Weight (mg)	Blank Residue (%)
PB-1	**Hexane Acetone**	29.6	R151	Tare 1	2.24663	2.24671	--	--
				Tare 2	2.24659	2.24669	--	--
				Tare 3	2.24661	2.24699	--	--
				Average	**2.24661**	**2.24680**	**0.19**	0.0006%
PB-1	**Water**	32.4	854	Tare 1	69.1156	69.1162	--	--
				Tare 2	69.1160	69.1167	--	--
				Tare 3	69.1158	69.1166	--	--
				Average	**69.1158**	**69.1165**	**0.70**	0.0022%
PB-IN Line	**Hexane Acetone**	96.6	R154	Tare 1	2.24634	2.24644	--	--
				Tare 2	2.24633	2.24640	--	--
				Tare 3	2.24632	2.24677	--	--
				Average	**2.24633**	**2.24654**	**0.21**	0.0002%
PB-IN Line	**Water**	54.2	1990	Tare 1	69.5844	69.5852	--	--
				Tare 2	69.5844	69.5857	--	--
				Tare 3	69.5849	69.5852	--	--
				Average	**69.5846**	**69.5854**	**0.80**	0.0015%
PB-OUT Line	**Hexane Acetone**	99.0	R155	Tare 1	2.25477	2.25512	--	--
				Tare 2	2.25474	2.25510	--	--
				Tare 3	2.25474	2.25526	--	--
				Average	**2.25475**	**2.25516**	**0.41**	0.0004%
PB-OUT Line	**Water**	24.3	2155	Tare 1	68.3765	68.3772	--	--
				Tare 2	68.3763	68.3774	--	--
				Tare 3	68.3768	68.3774	--	--
				Average	**68.3765**	**68.3773**	**0.80**	0.0033%

PARTICULATE MATTER RESULTS
Client: Schnitzer Steel
Project: 179737

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Raw Gain Weight (mg)	Blank Residue (%)
Reagent Blank	**Acetone**	152.1	R152	Tare 1	2.23879	2.23880	--	--
				Tare 2	2.23875	2.23878	--	--
				Tare 3	2.23880	2.23888	--	--
				Average	**2.23878**	**2.23882**	**0.04**	0.0000%
Reagent Blank	**Hexane**	121.1	R153	Tare 1	2.28714	2.28724	--	--
				Tare 2	2.28712	2.28719	--	--
				Tare 3	2.28710	2.28719	--	--
				Average	**2.28712**	**2.28721**	**0.09**	0.0001%
Reagent Blank	**Water**	187.6	2284	Tare 1	73.0609	73.0615	--	--
				Tare 2	73.0605	73.0619	--	--
				Tare 3	73.0610	73.0619	--	--
				Average	**73.0608**	**73.0618**	**0.97**	0.0005%

MONTROSE
AIR QUALITY SERVICES

LABORATORY NARRATIVE
EPA METHOD 201A/202
Client: Schnitzer Steel
Project: 179737

Custody

Seven sets of samples were received on June 30, 2017. Each set included a filter, probe/nozzle rinse, condensable particulate matter filter, impinger water and rinse. A set of field blanks, a set of proof blanks, and a set of reagent blanks were also received. According to the Chain of Custody, these samples were collected June 28-29, 2017. The filters were torn with loose filter pieces except 1-PM_{10}-IN which was received in good condition. All remaining samples were received in good condition with no signs of loss.

Analysis

Samples were analyzed for particulate matter using the analytical procedures in EPA Methods 201A (Determination of PM_{10} Emissions) and 202 (Determination of Condensable Particulate Matter Emissions from Stationary Sources). Samples were analyzed July 3-12, 2017 after desiccating for at least 24 hours. The results were blank corrected according to the test methods.

Front-Half Analysis

The probe/nozzle rinses appeared as light gray residues with black particulate in the probe/nozzle rinses for the Unit IN PM_{10} >10 fractions. The filters for Unit IN were dark brown in color except 1-PM_{10}-IN which appeared white. The filters for Unit OUT were light brown in color. The weight loss in the detailed laboratory report may be attributed to the loss of filter material during sampling, recovery, or sample handling.

Back-Half Analysis

The aqueous fractions appeared as white residues. The organic fractions appeared as light gray residues upon evaporation.

QC Notes

Prior to analysis, the accuracy of the balance was checked using 500 mg, 2 g, and 100 g ASTM E617-97 Class 1 Stainless Steel weights. Results below detection limits are reported as the detection limit.

2825 VERNE ROBERTS CIRCLE; ANTIOCH, CA 94509 (925) 680-4300 Main (925) 680-4416 Fax

CHAIN OF CUSTODY

Project Name & Project Number:	Project / Sample Location:	Analyses			Full 202? ☐ Yes ☐ No BAAQMD? ☐ Yes ☐ No
Schnitzer Steel - 005AS-179737	Shredder Inlet and Outlet				
Office: ☑ Antioch ☐ Bakersfield ☐ Orange ☐ Phoenix ☐ Portland ☐ Seattle ☐ Other:	P.O. Number:				Special Analysis Instr.
Send Analytical Report To: labresults@avogadrogroup.com; aberg@montrose-env.com	Sampler / PM Signature:	~~EPA 5~~ 201A	EPA 202		

Run / Sample #	Date	# of Container	Sample Fraction / Reagent				Comments
1-PM-Out	6/28/17	1	F1/2 Rinse PM>10 / Acetone	X			
1-PM-Out	6/28/17	1	F1/2 Rinse 2.5<PM<10 / Acetone	X			
1-PM-Out	6/28/17	1	F1/2 Rinse PM<2.5 / Acetone	X			
1-PM-Out	6/28/17	1	F1/2 Filter	X			
1-PM-Out	6/28/17	1	B1/2 Org / Acetone & Hexane		X		
1-PM-Out	6/28/17	1	B1/2 H2O / ASTM H2O		X		
1-PM-Out	6/28/17	1	B1/2 CPM Filter		X		
2-PM-Out	6/28/17	7	Same as 1-PM-Out	X	X		
3-PM-Out	6/29/17	7	Same as 1-PM-Out	X	X		
1-PM-In	6/28/17	6	Same as 1-PM-Out	X	X		Only PM>10 and PM<10 in the F1/2 Rinses
2-PM-In	6/28/17	6	Same as 1-PM-Out	X	X		
3-PM-In	6/29/17	6	Same as 1-PM-Out	X	X		
4-PM-In	6/29/17	6	Same as 1-PM-Out	X	X		
Total Containers		**45**					

Relinquished by: (signature)	☐ Fed Ex ☑ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time
		6/30/17	1400	Melissa Stofer	6/30/17	1400
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time

The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, CA 94509
Phone - (925) 680-4300 * Fax - (925) 680-4416

Turn Around Time: ☐ Standard ☐ Rush Date: _____

Top Page: Project Mgr. **Bottom Page:** Laboratory

CHAIN OF CUSTODY

Project Name & Project Number:	Project / Sample Location:	Analyses			Full 202? ☐ Yes ☐ No
Schnitzer Steel - 005AS-179737	Shredder Inlet and Outlet				BAAQMD? ☐ Yes ☐ No
Office: ☐ Antioch ☐ Bakersfield ☐ Orange ☐ Phoenix ☐ Portland ☐ Seattle ☐ Other:	P.O. Number:				Special Analysis Instr.
Send Analytical Report To: labresults@avogadrogroup.com; aberg@montrose-env.com	Sampler / PM Signature:				

Run / Sample #	Date	# of Container	Sample Fraction / Reagent	EPA 201A	EPA 202		Comments
Blank-PM	6/28/17	1	F1/2 Rinse / Acetone	X			
Blank-PM	6/28/17	1	F1/2 Filter	X			
Recovery Blank Org - Out / In	6/28/17	1	B1/2 Org / Acetone & Hexane		X		
Recovery Blank H2O - Out / In	6/28/17	1	B1/2 H2O / ASTM H2O		X		
Recovery Blank Filter - Out / In	6/28/17	1	B1/2 CPM Filter		X		
Proof Blank Org	6/28/17	1	B1/2 Org / Acetone & Hexane		X		
Proof Blank H2O	6/28/17	1	B1/2 H2O / ASTM H2O		X		
Reagent Blank Acetone	6/28/17	1	Acetone		X		
Reagent Blank Hexane	6/28/17	1	Hexane		X		
Reagent Blank ASTM H2O	6/28/17	1	ASTM H2O		X		
Recovery Blank Org - In	6/28/17	1	B1/2 Org / Acetone & Hexane		X		
Recovery Blank H2O - In	6/28/17	1	B1/2 H2O / ASTM H2O		X		
Recovery Blank Filter - In	6/28/17	1	B1/2 CPM Filter		X		
Line Blank - In		2	H_2O and organic				
Line Blank - Out		2	" "				
Total Containers		**13**					

Relinquished by: (signature)		Date	Time	Received by: (signature)	Date	Time
	☐ Fed Ex ☑ Sample Receiving ☐ Laboratory Fridge	6/30/17	1400	Melissa Stofer	6/30/17	1400
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time

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Appendix D.2

Hexavalent Chromium Analyses

Curtis & Tompkins, Ltd.
Analytical Laboratories, Since 1878

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

Laboratory Job Number 290329
ANALYTICAL REPORT

The Avogadro Group 2825 Verne Roberts Circle Antioch, CA 94509	Project : 005AS-179737 Location : Schnitzer Steel Level : II

Sample ID	Lab ID
1-CR	290329-001
2-CR	290329-002
3-CR	290329-003
BLANK-CR	290329-004

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature. The results contained in this report meet all requirements of NELAC and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: _____ Date: 07/11/2017

Patrick McCarthy
Project Manager
patrick.mccarthy@ctberk.com
(510) 204-2236

CA ELAP# 2896, NELAP# 4044-001

Curtis & Tompkins, Ltd.

CASE NARRATIVE

Laboratory number:	**290329**
Client:	**The Avogadro Group**
Project:	**005AS-179737**
Location:	**Schnitzer Steel**
Request Date:	**07/03/17**
Samples Received:	**07/03/17**

This data package contains sample and QC results for four water samples, requested for the above referenced project on 07/03/17. The samples were received cold and intact.

Metals (EPA 6020):
No analytical problems were encountered.

Hexavalent Chromium by Ion Chromatograph (EPA 7199):
A number of samples were diluted due to problematic matrix. No other analytical problems were encountered.

Volume Measurement (MEASURE):
No analytical problems were encountered.

Issued: July 31, 2014

290329

CHAIN OF CUSTODY

Revision Number 0

Project Name & Project Number:	Project / Sample Location:	Analyses	Full 202? ☐ Yes ☐ No
Schnitzer Steel – 005AS-179737	Shredder Outlet		BAAQMD? ☑ Yes ☐ No
Office: ☑ Antioch ☐ Bakersfield ☐ Orange ☐ Phoenix ☐ Portland ☐ Seattle ☐ Other:	P.O. Number:		Special Analysis Instr.
Send Analytical Report To: labresults@avogadrogroup.com; aberg@montrose-env.com	Sampler / PM Signature:		

Run / Sample #	Date	# of Containers	Sample Fraction / Reagent	EPA 306 (Cr and Cr(VI))			Comments
1-Cr		1	Impingers 1-3 contents and rinses	X			
2-Cr		1	Impingers 1-3 contents and rinses	X			
3-Cr		1	Impingers 1-3 contents and rinses	X			
Blank-Cr		1	Impingers 1-3 contents and rinses	X			
Total Containers		4					

Relinquished by: (signature)		Date	Time	Received by: (signature)	Date	Time
	☐ Fed Ex ☑ Sample Receiving ☐ Laboratory Fridge	7/3/17	1547	Pat Gomez CAT	7/3/17	15:47
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time

The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, CA 94509
Phone - (925) 680-4300 * Fax - (925) 680-4416

Turn Around Time: ☐ Standard ☐ Rush Date:

Top Page: Project Mgr. **Bottom Page:** Laboratory

COOLER RECEIPT CHECKLIST

Curtis & Tompkins, Ltd.

Login # 290329 Date Received 7-3-17 Number of coolers ——
Client Avogadro Group Project

Date Opened 7-3-17 By (print) MS (sign) [signature]
Date Logged in ↓ By (print) MS (sign) [signature]
Date Labelled ↓ By (print) MS (sign) [signature]

1. Did cooler come with a shipping slip (airbill, etc) YES (NO)
   Shipping info
2A. Were custody seals present? .... ☐ YES (circle) on cooler on samples ☒ NO
   How many Name Date
2B. Were custody seals intact upon arrival? YES NO (N/A)
3. Were custody papers dry and intact when received? (YES) NO
4. Were custody papers filled out properly (ink, signed, etc)? (YES) NO
5. Is the project identifiable from custody papers? (If so fill out top of form) (YES) NO
6. Indicate the packing in cooler: (if other, describe)

☐ Bubble Wrap ☐ Foam blocks ☐ Bags ☒ None
☐ Cloth material ☐ Cardboard ☐ Styrofoam ☐ Paper towels

7. Temperature documentation: * Notify PM if temperature exceeds 6°C

Type of ice used: ☐ Wet ☐ Blue/Gel ☐ None Temp(°C) 2.4

☐ Temperature blank(s) included? ☐ Thermometer# ☒ IR Gun# A

☐ Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? YES (NO)
   If YES, what time were they transferred to freezer?
9. Did all bottles arrive unbroken/unopened? (YES) NO
10. Are there any missing / extra samples? YES (NO)
11. Are samples in the appropriate containers for indicated tests? (YES) NO
12. Are sample labels present, in good condition and complete? (YES) NO
13. Do the sample labels agree with custody papers? (YES) NO
14. Was sufficient amount of sample sent for tests requested? (YES) NO
15. Are the samples appropriately preserved? YES NO (N/A)
16. Did you check preservatives for all bottles for each sample? YES NO (N/A)
17. Did you document your preservative check? (pH strip lot#) YES NO (N/A)
18. Did you change the hold time in LIMS for unpreserved VOAs? YES NO (N/A)
19. Did you change the hold time in LIMS for preserved terracores? YES NO (N/A)
20. Are bubbles > 6mm absent in VOA samples? YES NO (N/A)
21. Was the client contacted concerning this sample delivery? YES (NO)
   If YES, Who was called? By Date:

COMMENTS

Rev 13, 6/01/16

Curtis & Tompkins, Ltd.

Chromium

Lab #:	290329	Location:	Schnitzer Steel
Client:	The Avogadro Group	Prep:	METHOD
Project#:	005AS-179737	Analysis:	EPA 6020
Analyte:	Chromium	Sampled:	07/03/17
Matrix:	Air	Received:	07/03/17
Units:	ug/s	Prepared:	07/07/17
Batch#:	249463	Analyzed:	07/10/17

Field ID	Type	Lab ID	Result	RL	MDL	Diln Fac
1-CR	SAMPLE	290329-001	ND	0.50	0.11	100.0
2-CR	SAMPLE	290329-002	ND	0.50	0.11	100.0
3-CR	SAMPLE	290329-003	ND	0.50	0.11	100.0
BLANK-CR	SAMPLE	290329-004	ND	0.50	0.11	100.0
	BLANK	QC892317	ND	0.0050	0.0011	1.000

ND= Not Detected at or above MDL
RL= Reporting Limit
MDL= Method Detection Limit

Curtis & Tompkins, Ltd.

Hexavalent Chromium

Lab #:	290329	Location:	Schnitzer Steel
Client:	The Avogadro Group	Prep:	METHOD
Project#:	005AS-179737	Analysis:	EPA 7199
Matrix:	Water	Sampled:	07/03/17
Units:	ug/L	Received:	07/03/17
Batch#:	249465		

Field ID: 1-CR
Type: SAMPLE
Lab ID: 290329-001
Diln Fac: 100.0
Analyzed: 07/07/17 19:22

Analyte	Result	RL	MDL
Hexavalent Chromium	ND	50	8.0

Field ID: 2-CR
Type: SAMPLE
Lab ID: 290329-002
Diln Fac: 100.0
Analyzed: 07/07/17 19:34

Analyte	Result	RL	MDL
Hexavalent Chromium	ND	50	8.0

Field ID: 3-CR
Type: SAMPLE
Lab ID: 290329-003
Diln Fac: 100.0
Analyzed: 07/07/17 19:46

Analyte	Result	RL	MDL
Hexavalent Chromium	ND	50	8.0

Field ID: BLANK-CR
Type: SAMPLE
Lab ID: 290329-004
Diln Fac: 100.0
Analyzed: 07/07/17 19:58

Analyte	Result	RL	MDL
Hexavalent Chromium	ND	50	8.0

Type: BLANK
Lab ID: QC892322
Diln Fac: 1.000
Analyzed: 07/07/17 16:50

Analyte	Result	RL	MDL
Hexavalent Chromium	ND	0.50	0.080

ND= Not Detected at or above MDL
RL= Reporting Limit
MDL= Method Detection Limit

Curtis & Tompkins, Ltd.

Batch QC Report

Hexavalent Chromium

Lab #:	290329	Location:	Schnitzer Steel
Client:	The Avogadro Group	Prep:	METHOD
Project#:	005AS-179737	Analysis:	EPA 7199
Field ID:	ZZZZZZZZZZ	Batch#:	249465
MSS Lab ID:	290369-003	Sampled:	07/05/17 13:10
Matrix:	Water	Received:	07/06/17
Units:	ug/L		

Type: LCS Diln Fac: 1.000
Lab ID: QC892323 Analyzed: 07/07/17 17:09

Analyte	Spiked	Result	%REC	Limits
Hexavalent Chromium	10.00	10.62	106	90-110

Type: MS Diln Fac: 1.010
Lab ID: QC892324 Analyzed: 07/07/17 18:04

Analyte	MSS Result	Spiked	Result	%REC	Limits
Hexavalent Chromium	9.661	10.10	19.47	97	85-115

Type: MSD Diln Fac: 1.010
Lab ID: QC892325 Analyzed: 07/07/17 18:16

Analyte	Spiked	Result	%REC	Limits	RPD	Lim
Hexavalent Chromium	10.10	19.26	95	85-115	1	20

RPD= Relative Percent Difference

Curtis & Tompkins, Ltd.

Volume Measurement

Lab #:	290329	Location:	Schnitzer Steel
Client:	The Avogadro Group	Analysis:	MEASURE
Project#:	005AS-179737		
Analyte:	Sample Volume	Batch#:	249415
Matrix:	Water	Sampled:	07/03/17
Units:	mL	Received:	07/03/17
Diln Fac:	1.000	Analyzed:	07/06/17

Field ID	Lab ID	Result	RL
1-CR	290329-001	425	1.0
2-CR	290329-002	445	1.0
3-CR	290329-003	430	1.0
BLANK-CR	290329-004	328	1.0

RL= Reporting Limit

Appendix D.3

Cadmium and Lead Analyses

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-29616-1
Client Project/Site: Schnitzer Steel Shredder 005AS-179737

For:
MAQS - Antioch
c/o Montrose Environmental Group
2825 Verne Roberts Circle
Antioch, California 94509

Attn: Mr. Andrew Berg

Karen Dahl

Authorized for release by:
7/24/2017 1:44:23 PM

Karen Dahl, Senior Project Manager
(916)374-4384
karen.dahl@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Qualifiers

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Job ID: 320-29616-1

Laboratory: TestAmerica Sacramento

Narrative

Comments
No additional comments.

Receipt
The samples were received on 6/30/2017 2:30 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 10.1° C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Client Sample ID: 1-MM-FH — Lab Sample ID: 320-29616-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.58		0.15	0.011	ug/Sample	1		29/6020	Total/NA
Lead	4.9		0.15	0.0099	ug/Sample	1		29/6020	Total/NA

Client Sample ID: 1-MM-BH — Lab Sample ID: 320-29616-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.26		0.15	0.011	ug/Sample	1		29/6020	Total/NA
Lead	1.1	B	0.15	0.0099	ug/Sample	1		29/6020	Total/NA

Client Sample ID: 2-MM-FH — Lab Sample ID: 320-29616-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.76		0.15	0.011	ug/Sample	1		29/6020	Total/NA
Lead	6.3		0.15	0.0099	ug/Sample	1		29/6020	Total/NA

Client Sample ID: 2-MM-BH — Lab Sample ID: 320-29616-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.47		0.15	0.011	ug/Sample	1		29/6020	Total/NA
Lead	2.0	B	0.15	0.0099	ug/Sample	1		29/6020	Total/NA

Client Sample ID: 3-MM-FH — Lab Sample ID: 320-29616-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.60		0.15	0.011	ug/Sample	1		29/6020	Total/NA
Lead	5.2		0.15	0.0099	ug/Sample	1		29/6020	Total/NA

Client Sample ID: 3-MM-BH — Lab Sample ID: 320-29616-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.26		0.15	0.011	ug/Sample	1		29/6020	Total/NA
Lead	1.9	B	0.15	0.0099	ug/Sample	1		29/6020	Total/NA

Client Sample ID: BLANK - BH — Lab Sample ID: 320-29616-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.14	J B	0.15	0.0099	ug/Sample	1		29/6020	Total/NA

Client Sample ID: BLANK - FH — Lab Sample ID: 320-29616-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.27		0.15	0.0099	ug/Sample	1		29/6020	Total/NA

Client Sample ID: AUDIT 1425 — Lab Sample ID: 320-29616-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	93		0.15	0.011	ug/Sample	1		29/6020	Total/NA
Lead	73		0.15	0.0099	ug/Sample	1		29/6020	Total/NA

Client Sample ID: AUDIT 1426 — Lab Sample ID: 320-29616-11

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Client Sample ID: AUDIT 1426 (Continued)

Lab Sample ID: 320-29616-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	180		0.15	0.011	ug/Sample	1		29/6020	Total/NA
Lead	97	B	0.15	0.0099	ug/Sample	1		29/6020	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Client Sample ID: 1-MM-FH
Lab Sample ID: 320-29616-1
Matrix: Air

Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30
Sample Container: Air Train

Method: 29/6020 - Metals (ICPMS), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.58		0.15	0.011	ug/Sample		07/18/17 12:30	07/19/17 19:27	1
Lead	4.9		0.15	0.0099	ug/Sample		07/18/17 12:30	07/19/17 19:27	1

Client Sample ID: 1-MM-BH
Lab Sample ID: 320-29616-2
Matrix: Air

Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30
Sample Container: Air Train

Method: 29/6020 - Metals (ICPMS), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.26		0.15	0.011	ug/Sample		07/18/17 14:10	07/19/17 21:13	1
Lead	1.1	B	0.15	0.0099	ug/Sample		07/18/17 14:10	07/19/17 21:13	1

Client Sample ID: 2-MM-FH
Lab Sample ID: 320-29616-3
Matrix: Air

Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30
Sample Container: Air Train

Method: 29/6020 - Metals (ICPMS), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.76		0.15	0.011	ug/Sample		07/18/17 12:30	07/19/17 19:55	1
Lead	6.3		0.15	0.0099	ug/Sample		07/18/17 12:30	07/19/17 19:55	1

Client Sample ID: 2-MM-BH
Lab Sample ID: 320-29616-4
Matrix: Air

Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30
Sample Container: Air Train

Method: 29/6020 - Metals (ICPMS), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.47		0.15	0.011	ug/Sample		07/18/17 14:10	07/19/17 21:42	1
Lead	2.0	B	0.15	0.0099	ug/Sample		07/18/17 14:10	07/19/17 21:42	1

Client Sample ID: 3-MM-FH
Lab Sample ID: 320-29616-5
Matrix: Air

Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30
Sample Container: Air Train

Method: 29/6020 - Metals (ICPMS), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.60		0.15	0.011	ug/Sample		07/18/17 12:30	07/19/17 19:59	1
Lead	5.2		0.15	0.0099	ug/Sample		07/18/17 12:30	07/19/17 19:59	1

Client Sample Results

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Client Sample ID: 3-MM-BH

Lab Sample ID: 320-29616-6
Matrix: Air

Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30
Sample Container: Air Train

Method: 29/6020 - Metals (ICPMS), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.26		0.15	0.011	ug/Sample		07/18/17 14:10	07/19/17 21:45	1
Lead	1.9	B	0.15	0.0099	ug/Sample		07/18/17 14:10	07/19/17 21:45	1

Client Sample ID: BLANK - BH

Lab Sample ID: 320-29616-8
Matrix: Air

Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30
Sample Container: Air Train

Method: 29/6020 - Metals (ICPMS), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.15	0.011	ug/Sample		07/18/17 14:10	07/19/17 21:49	1
Lead	0.14	J B	0.15	0.0099	ug/Sample		07/18/17 14:10	07/19/17 21:49	1

Client Sample ID: BLANK - FH

Lab Sample ID: 320-29616-9
Matrix: Air

Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30
Sample Container: Air Train

Method: 29/6020 - Metals (ICPMS), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.15	0.011	ug/Sample		07/18/17 12:30	07/19/17 20:02	1
Lead	0.27		0.15	0.0099	ug/Sample		07/18/17 12:30	07/19/17 20:02	1

Client Sample ID: AUDIT 1425

Lab Sample ID: 320-29616-10
Matrix: Air

Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30
Sample Container: Petri/Filter

Method: 29/6020 - Metals (ICPMS), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	93		0.15	0.011	ug/Sample		07/18/17 12:30	07/19/17 20:06	1
Lead	73		0.15	0.0099	ug/Sample		07/18/17 12:30	07/19/17 20:06	1

Client Sample ID: AUDIT 1426

Lab Sample ID: 320-29616-11
Matrix: Air

Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30
Sample Container: Ampule (PT sample)

Method: 29/6020 - Metals (ICPMS), Stationary Source

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	180		0.15	0.011	ug/Sample		07/18/17 14:10	07/19/17 18:06	1
Lead	97	B	0.15	0.0099	ug/Sample		07/18/17 14:10	07/19/17 18:06	1

QC Sample Results

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Method: 29/6020 - Metals (ICPMS), Stationary Source

Lab Sample ID: MB 320-174254/1-A
Matrix: Air
Analysis Batch: 175046

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 174254

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.15	0.011	ug/Sample		07/18/17 12:30	07/19/17 19:02	1
Lead	ND		0.15	0.0099	ug/Sample		07/18/17 12:30	07/19/17 19:02	1

Lab Sample ID: LCS 320-174254/2-A
Matrix: Air
Analysis Batch: 175046

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 174254

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	30.0	28.7		ug/Sample		96	79 - 110
Lead	30.0	28.5		ug/Sample		95	86 - 110

Lab Sample ID: LCSD 320-174254/3-A
Matrix: Air
Analysis Batch: 175046

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 174254

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	30.0	28.7		ug/Sample		96	79 - 110	0	16
Lead	30.0	29.1		ug/Sample		97	86 - 110	2	15

Lab Sample ID: 320-29616-1 DU
Matrix: Air
Analysis Batch: 175046

Client Sample ID: 1-MM-FH
Prep Type: Total/NA
Prep Batch: 174254

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Cadmium	0.58		0.575		ug/Sample		0.8	20
Lead	4.9		4.86		ug/Sample		0.6	20

Lab Sample ID: MB 320-174257/1-A
Matrix: Air
Analysis Batch: 175046

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 174257

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.15	0.011	ug/Sample		07/18/17 14:10	07/19/17 20:48	1
Lead	0.0569	J	0.15	0.0099	ug/Sample		07/18/17 14:10	07/19/17 20:48	1

Lab Sample ID: LCS 320-174257/2-A
Matrix: Air
Analysis Batch: 175046

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 174257

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	30.0	28.2		ug/Sample		94	79 - 110
Lead	30.0	29.2		ug/Sample		97	86 - 110

Lab Sample ID: LCSD 320-174257/3-A
Matrix: Air
Analysis Batch: 175046

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 174257

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	30.0	27.6		ug/Sample		92	79 - 110	2	16

Method: 29/6020 - Metals (ICPMS), Stationary Source (Continued)

Lab Sample ID: LCSD 320-174257/3-A
Matrix: Air
Analysis Batch: 175046

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 174257

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	30.0	30.2		ug/Sample		101	86 - 110	3	15

Lab Sample ID: 320-29616-2 DU
Matrix: Air
Analysis Batch: 175046

Client Sample ID: 1-MM-BH
Prep Type: Total/NA
Prep Batch: 174257

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Cadmium	0.26		0.254		ug/Sample		3	20
Lead	1.1	B	1.05		ug/Sample		0.9	20

QC Association Summary

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Metals

Prep Batch: 174254

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29616-1	1-MM-FH	Total/NA	Air	Air Tain Prep	
320-29616-3	2-MM-FH	Total/NA	Air	Air Tain Prep	
320-29616-5	3-MM-FH	Total/NA	Air	Air Tain Prep	
320-29616-9	BLANK - FH	Total/NA	Air	Air Tain Prep	
320-29616-10	AUDIT 1425	Total/NA	Air	Air Tain Prep	
MB 320-174254/1-A	Method Blank	Total/NA	Air	Air Tain Prep	
LCS 320-174254/2-A	Lab Control Sample	Total/NA	Air	Air Tain Prep	
LCSD 320-174254/3-A	Lab Control Sample Dup	Total/NA	Air	Air Tain Prep	
320-29616-1 DU	1-MM-FH	Total/NA	Air	Air Tain Prep	

Prep Batch: 174257

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29616-2	1-MM-BH	Total/NA	Air	Air Train Prep	
320-29616-4	2-MM-BH	Total/NA	Air	Air Train Prep	
320-29616-6	3-MM-BH	Total/NA	Air	Air Train Prep	
320-29616-8	BLANK - BH	Total/NA	Air	Air Train Prep	
320-29616-11	AUDIT 1426	Total/NA	Air	Air Train Prep	
MB 320-174257/1-A	Method Blank	Total/NA	Air	Air Train Prep	
LCS 320-174257/2-A	Lab Control Sample	Total/NA	Air	Air Train Prep	
LCSD 320-174257/3-A	Lab Control Sample Dup	Total/NA	Air	Air Train Prep	
320-29616-2 DU	1-MM-BH	Total/NA	Air	Air Train Prep	

Analysis Batch: 175046

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-29616-1	1-MM-FH	Total/NA	Air	29/6020	174254
320-29616-2	1-MM-BH	Total/NA	Air	29/6020	174257
320-29616-3	2-MM-FH	Total/NA	Air	29/6020	174254
320-29616-4	2-MM-BH	Total/NA	Air	29/6020	174257
320-29616-5	3-MM-FH	Total/NA	Air	29/6020	174254
320-29616-6	3-MM-BH	Total/NA	Air	29/6020	174257
320-29616-8	BLANK - BH	Total/NA	Air	29/6020	174257
320-29616-9	BLANK - FH	Total/NA	Air	29/6020	174254
320-29616-10	AUDIT 1425	Total/NA	Air	29/6020	174254
320-29616-11	AUDIT 1426	Total/NA	Air	29/6020	174257
MB 320-174254/1-A	Method Blank	Total/NA	Air	29/6020	174254
MB 320-174257/1-A	Method Blank	Total/NA	Air	29/6020	174257
LCS 320-174254/2-A	Lab Control Sample	Total/NA	Air	29/6020	174254
LCS 320-174257/2-A	Lab Control Sample	Total/NA	Air	29/6020	174257
LCSD 320-174254/3-A	Lab Control Sample Dup	Total/NA	Air	29/6020	174254
LCSD 320-174257/3-A	Lab Control Sample Dup	Total/NA	Air	29/6020	174257
320-29616-1 DU	1-MM-FH	Total/NA	Air	29/6020	174254
320-29616-2 DU	1-MM-BH	Total/NA	Air	29/6020	174257

Lab Chronicle

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Client Sample ID: 1-MM-FH
Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30

Lab Sample ID: 320-29616-1
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Tain Prep			1 Sample	150 mL	174254	07/18/17 12:30	CJH	TAL SAC
Total/NA	Analysis	29/6020		1			175046	07/19/17 19:27	CJH	TAL SAC

Client Sample ID: 1-MM-BH
Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30

Lab Sample ID: 320-29616-2
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Train Prep			1 Sample	150 mL	174257	07/18/17 14:10	CJH	TAL SAC
Total/NA	Analysis	29/6020		1			175046	07/19/17 21:13	CJH	TAL SAC

Client Sample ID: 2-MM-FH
Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30

Lab Sample ID: 320-29616-3
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Tain Prep			1 Sample	150 mL	174254	07/18/17 12:30	CJH	TAL SAC
Total/NA	Analysis	29/6020		1			175046	07/19/17 19:55	CJH	TAL SAC

Client Sample ID: 2-MM-BH
Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30

Lab Sample ID: 320-29616-4
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Train Prep			1 Sample	150 mL	174257	07/18/17 14:10	CJH	TAL SAC
Total/NA	Analysis	29/6020		1			175046	07/19/17 21:42	CJH	TAL SAC

Client Sample ID: 3-MM-FH
Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30

Lab Sample ID: 320-29616-5
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Tain Prep			1 Sample	150 mL	174254	07/18/17 12:30	CJH	TAL SAC
Total/NA	Analysis	29/6020		1			175046	07/19/17 19:59	CJH	TAL SAC

Client Sample ID: 3-MM-BH
Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30

Lab Sample ID: 320-29616-6
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Train Prep			1 Sample	150 mL	174257	07/18/17 14:10	CJH	TAL SAC
Total/NA	Analysis	29/6020		1			175046	07/19/17 21:45	CJH	TAL SAC

Lab Chronicle

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Client Sample ID: BLANK - BH
Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30

Lab Sample ID: 320-29616-8
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Train Prep			1 Sample	150 mL	174257	07/18/17 14:10	CJH	TAL SAC
Total/NA	Analysis	29/6020		1			175046	07/19/17 21:49	CJH	TAL SAC

Client Sample ID: BLANK - FH
Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30

Lab Sample ID: 320-29616-9
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Tain Prep			1 Sample	150 mL	174254	07/18/17 12:30	CJH	TAL SAC
Total/NA	Analysis	29/6020		1			175046	07/19/17 20:02	CJH	TAL SAC

Client Sample ID: AUDIT 1425
Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30

Lab Sample ID: 320-29616-10
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Tain Prep			1 Sample	150 mL	174254	07/18/17 12:30	CJH	TAL SAC
Total/NA	Analysis	29/6020		1			175046	07/19/17 20:06	CJH	TAL SAC

Client Sample ID: AUDIT 1426
Date Collected: 06/28/17 00:00
Date Received: 06/30/17 14:30

Lab Sample ID: 320-29616-11
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Air Train Prep			1 Sample	150 mL	174257	07/18/17 14:10	CJH	TAL SAC
Total/NA	Analysis	29/6020		1			175046	07/19/17 18:06	CJH	TAL SAC

Laboratory References:
TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/cartifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	UST-055	12-18-17
Arizona	State Program	9	AZ0708	08-11-17
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-17
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-29-18
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-17
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-17
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	10-31-17
USDA	Federal		P330-11-00436	12-30-17
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
West Virginia (DW)	State Program	3	9930C	12-31-17
Wyoming	State Program	8	8TMS-L	01-29-17 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Method	Method Description	Protocol	Laboratory
29/6020	Metals (ICPMS), Stationary Source	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: MAQS - Antioch
Project/Site: Schnitzer Steel Shredder 005AS-179737

TestAmerica Job ID: 320-29616-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-29616-1	1-MM-FH	Air	06/28/17 00:00	06/30/17 14:30
320-29616-2	1-MM-BH	Air	06/28/17 00:00	06/30/17 14:30
320-29616-3	2-MM-FH	Air	06/28/17 00:00	06/30/17 14:30
320-29616-4	2-MM-BH	Air	06/28/17 00:00	06/30/17 14:30
320-29616-5	3-MM-FH	Air	06/28/17 00:00	06/30/17 14:30
320-29616-6	3-MM-BH	Air	06/28/17 00:00	06/30/17 14:30
320-29616-8	BLANK - BH	Air	06/28/17 00:00	06/30/17 14:30
320-29616-9	BLANK - FH	Air	06/28/17 00:00	06/30/17 14:30
320-29616-10	AUDIT 1425	Air	06/28/17 00:00	06/30/17 14:30
320-29616-11	AUDIT 1426	Air	06/28/17 00:00	06/30/17 14:30

Issued: July 31, 2014

Revision Number 0

CHAIN OF CUSTODY

Project Name & Project Number:	Project / Sample Location:	Analyses	Full 202? ☐ Yes ☐ No BAAQMD? ☐ Yes ☐ No
Schnitzer Steel – 005AS-179737	Shredder Outlet		
Office: ☑ Antioch ☐ Bakersfield ☐ Orange ☐ Phoenix ☐ Portland ☐ Seattle ☐ Other:	P.O. Number:	EPA 29	Special Analysis Instr. Cadmium and Lead
Send Analytical Report To: labresults@avogadrogroup.com; aberg@montrose-env.com	Sampler / PM Signature:		

Run / Sample #	Date	# of Containers	Sample Fraction / Reagent	EPA 29		Comments
1-MM	6/28/17	1	F1/2 Filter	X		Container 1
1-MM	6/28/17	1	F1/2 HNO3	X		Container 3
1-MM	6/28/17	1	Imps 1-3 HNO3/H2O2 w/HNO3	X		Container 4
2-MM	6/28/17	3	Same as 1-MM-NG	X		Containers 1-4
3-MM	6/29/17	3	Same as 1-MM-NG	X		Containers 1-4
Blank - HNO3	6/28/17	1	HNO3			Container 8a
Blank - HNO3 / H2O2	6/28/17	1	HNO3 / H2O2			Container 9
Blank - Filter	6/28/17	1	Three Filters			Container 12
Audit - Filter	6/28/17	1	Audit Sample			
Audit - Solution	6/28/17	1	Audit Sample			
Total Containers		14				

320-29616 Chain of Custody

Relinquished by: (signature)		Date	Time	Received by: (signature)	Date	Time
	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	6/30/17	1430		6/30/17	1430
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	6/30/17	1430	Received by: (signature)	Date	Time
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time

10.10c

The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, CA 94509
Phone - (925) 680-4300 * Fax - (925) 680-4416

Turn Around Time: ☐ Standard ☐ Rush Date:

Top Page: Project Mgr Bottom Page: Laboratory

Login Sample Receipt Checklist

Client: MAQS - Antioch

Job Number: 320-29616-1

Login Number: 29616
List Number: 1
Creator: Edman, Connor M

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ERA
A Waters Company

July 25, 2017

Andrew Berg
MAQS -Antioch
2825 Verne Roberts Circle
Antioch, CA 94509

Enclosed is your final report for ERA's Stationary Source Audit Sample (SSAS) Program. Your final report includes an evaluation of all results submitted by your laboratory to ERA.

Data Evaluation Protocols: All analytes in ERA's SSAS Program have been evaluated comparing the reported result to the acceptance limits generated using the criteria contained in the TNI SSAS Table.

For any "Not Acceptable" results, please contact your state regulator for any corrective action requirements.

Thank you for your participation in ERA's SSAS Program. If you have any questions, please contact our Proficiency Testing Department at 1-800-372-0122.

Sincerely,

Pat Larson

Patrick Larson
Quality Officer

cc: Project File Number 062317M

ERA
A Waters Company

Recipient Type	Report Recipient	Contact	Project ID
Agency	CA-Bay Area AQMD (SSAS) 939 Ellis St San Francisco, CA 94109 USA	Tim Underwood tunderwood@baaqmd.gov Phone: 415-749-4612	
Facility	Schnitzer Steel 1101 Embarcadero West Oakland, CA 978971 USA	Daniel Lee dlee@schn.com Phone: 503-434-3324	
Lab	TestAmerica Sacramento 880 Riverside Parkway West Sacramento, CA 95605 USA	Lisa Stafford QA Manager Lisa.Stafford@testamericainc.com Phone: (916) 374-4308	
Tester	MAQS -Antioch 2825 Verne Roberts Circle Antioch, CA 94509 USA	Andrew Berg aberg@avogadrogroup.com Phone: 925-234-1385	005AS-179737

ERA
A Waters Company

062317M Laboratory Exception Report

Lisa Stafford
QA Manager
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
(916) 374-4308

EPA ID: **Not Reported**
ERA Customer Number: **T999784**

Evaluation Checks

There are no values reported with < where the assigned value was greater than 0.

Not Acceptable Evaluations

There were no Not Acceptable evaluations for this study

ERA
A Waters Company

Final Report Results For Laboratory TestAmerica Sacramento

1 Mountain Pkwy • Golden, CO 80403 • 800.372.0122 • 303.431.8454 fax 303.421.0159 • www.eraqc.com

ERA
A Waters Company

SSAP Evaluation Report

Project Number: **062317M**

ERA Customer Number: **T999784**

Laboratory Name: **TestAmerica Sacramento**

Inorganic Results

1634 Table Mountain Pkwy • Golden, CO 80403 • 800.372.0122 • 303.431.8454 fax 303.421.0159 • www.eraqc.com

ERA
A Waters Company

062317M Evaluation Final Complete Report

Lisa Stafford
QA Manager
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
(916) 374-4308

EPA ID: Not Reported
ERA Customer Number: T999784

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Analyst Name
SSAP Metals on Filter Paper (cat# 1425, lot# 062317M) Study Dates: 06/23/17 - 07/25/17									
1005	Antimony	µg/Filter		27.7	20.8 - 34.6	Not Reported			
1010	Arsenic	µg/Filter		70.0	52.5 - 87.5	Not Reported			
1015	Barium	µg/Filter		29.5	22.1 - 36.9	Not Reported			
1020	Beryllium	µg/Filter		10.8	8.10 - 13.5	Not Reported			
1030	Cadmium	µg/Filter	93.4	93.6	74.9 - 112	Acceptable	EPA 29 (ICP-MS) 2000	7/19/2017	
1040	Chromium	µg/Filter		142	114 - 170	Not Reported			
1050	Cobalt	µg/Filter		16.2	12.2 - 20.2	Not Reported			
1055	Copper	µg/Filter		21.0	15.8 - 26.2	Not Reported			
1075	Lead	µg/Filter	72.9	69.5	55.6 - 83.4	Acceptable	EPA 29 (ICP-MS) 2000	7/19/2017	
1090	Manganese	µg/Filter		14.7	10.3 - 19.1	Not Reported			
1105	Nickel	µg/Filter		52.9	42.3 - 63.5	Not Reported			
1140	Selenium	µg/Filter		34.8	24.4 - 45.2	Not Reported			
1150	Silver	µg/Filter		39.4	27.6 - 51.2	Not Reported			
1165	Thallium	µg/Filter		37.8	28.4 - 47.2	Not Reported			
1190	Zinc	µg/Filter		64.2	48.2 - 80.2	Not Reported			

ERA
A Waters Company

062317M Evaluation Final Complete Report

Lisa Stafford
QA Manager
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
(916) 374-4308

EPA ID: **Not Reported**
ERA Customer Number: **T999784**

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Analyst Name
SSAP Metals in Impinger Solution (cat# 1426, lot# 062317M) Study Dates: 06/23/17 - 07/25/17									
1005	Antimony	µg/mL		2.05	1.54 - 2.56	Not Reported			
1010	Arsenic	µg/mL		2.09	1.57 - 2.61	Not Reported			
1015	Barium	µg/mL		2.36	1.77 - 2.95	Not Reported			
1020	Beryllium	µg/mL		1.19	0.892 - 1.49	Not Reported			
1030	Cadmium	µg/mL	1.21	1.24	0.992 - 1.49	Acceptable	EPA 29 (ICP-MS) 2000	7/19/2017	
1040	Chromium	µg/mL		2.31	1.85 - 2.77	Not Reported			
1050	Cobalt	µg/mL		1.68	1.26 - 2.10	Not Reported			
1055	Copper	µg/mL		2.21	1.66 - 2.76	Not Reported			
1075	Lead	µg/mL	0.646	0.634	0.476 - 0.792	Acceptable	EPA 29 (ICP-MS) 2000	7/19/2017	
1090	Manganese	µg/mL		0.766	0.574 - 0.958	Not Reported			
1105	Nickel	µg/mL		2.36	1.89 - 2.83	Not Reported			
1140	Selenium	µg/mL		2.32	1.74 - 2.90	Not Reported			
1150	Silver	µg/mL		2.06	1.54 - 2.58	Not Reported			
1165	Thallium	µg/mL		1.38	1.04 - 1.72	Not Reported			
1190	Zinc	µg/mL		2.66	2.00 - 3.32	Not Reported			

Appendix D.4

Precursor Organic Compounds Analyses

Atmospheric Analysis & Consulting, Inc.

CLIENT	: Montrose AQS
PROJECT NAME	: Schnitzer Steel - Shredder
PROJECT NO.	: 005AS-179737
AAC PROJECT NO.	: 170926
REPORT DATE	: 07/14/2017

On July 5, 2017, Atmospheric Analysis & Consulting, Inc. received three (3) Six-Liter Summa Canisters for TNMNEOC analysis by TO-12M/PAMS Protocol. Upon receipt each sample was assigned a unique Laboratory ID number as follows:

Client ID	Lab ID	Initial Pressure (mmHga)
1-POC-Out	170926-100374	280.3
2-POC-Out	170926-100375	438.0
3-POC-Out	170926-100376	372.7

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 problems were encountered during receiving, preparation, and/or analysis of these samples. The Laboratory Director or his/her designee, as verified by the following signature, has authorized release of the data contained in this hardcopy report.

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

Marcus Hueppe
Laboratory Director

This report consists of 8 pages.

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

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

CLIENT	: Montrose AQS	RECEIVING DATE	: 07/05/2017
PROJECT NUMBER	: 170926	ANALYSIS DATE	: 07/12/2017
MATRIX	: AIR	REPORT DATE	: 07/14/2017

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-Out	170926-100374	06/28/2017	07/12/2017	172000	3.71	10	743	20
2-POC-Out	170926-100375	06/28/2017	07/12/2017	161000	2.35	10	469	20
3-POC-Out	170926-100376	06/28/2017	07/12/2017	138000	2.81	10	562	20

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report
PAMS Calibration Verification Analysis

Analysis Date : 07/12/2017
Analyst : JJG

Instrument ID : MS-02
Standard ID : PS021417-06
Calibration Date : 06/03/2013

Continuing Calibration Verification

Analyte	xRF	daily RF	%RPD*
Propane	303	303	0.1

* %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	4.00	4.00	4.01	100.0	100.3	0.2

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

Marcus Hueppe
Laboratory Director

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Quality Control/Quality Assurance Report
PAMS Method Blank Analysis

Matrix : Air
Units : ppbC

Analysis Date : 07/12/2017
Report Date : 07/12/2017

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

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report
PAMS Method Blank Analysis

Matrix : Air
Units : ppbC

Analysis Date : 07/12/2017
Report Date : 07/12/2017

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

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report
PAMS Duplicate Analysis

AAC ID : 170925-100369
Matrix : Air

Analysis Date : 07/12/2017
Report Date : 07/12/2017
Units : ppbC

Analyte	Sample Analysis	Sample Duplicate Analysis	%RPD
Ethylene	183	185	1.1
Acetylene	<PQL	<PQL	0.0
Ethane	302	299	1.0
Propylene	623	628	0.8
Propane	15200	15300	0.7
Isobutane	1890	1910	1.1
1-Butene	81.7	82.6	1.1
n-Butane	3400	3400	0.0
trans-2-Butene	76.6	76.8	0.3
cis-2-Butene	65.6	65.7	0.2
Isopentane	9230	9210	0.2
1-Pentene	<PQL	<PQL	0.0
n-Pentane	3380	3370	0.3
Isoprene	<PQL	<PQL	0.0
trans-2-Pentene	421	422	0.2
cis-2-Pentene	198	199	0.5
2,2-Dimethylbutane	1440	1430	0.7
Cyclopentane	16900	16300	3.6
2,3-Dimethylbutane	1710	1670	2.4
2-Methylpentane	4850	4990	2.8
3-Methylpentane	3010	3040	1.0
1-Hexene	64.8	66.2	2.1
n-Hexane	2530	2540	0.4
Methylcyclopentane	3370	3380	0.3
2,4-Dimethylpentane	1310	1300	0.8
Benzene	1270	1270	0.0
Cyclohexane	1700	1690	0.6
2-Methylhexane	2640	2650	0.4

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report
PAMS Duplicate Analysis

AAC ID : 170925-100369
Matrix : Air

Analysis Date : 07/12/2017
Report Date : 07/12/2017
Units : ppbC

Analyte	Sample Analysis	Sample Duplicate Analysis	%RPD
2,3-Dimethylpentane	1790	1780	0.6
3-Methylhexane	2800	2800	0.0
2,2,4-Trimethylpentane	3800	3810	0.3
n-Heptane	2170	2160	0.5
Methylcyclohexane	1600	1580	1.3
2,3,4-Trimethylpentane	1930	1930	0.0
Toluene	11700	11800	0.9
2-Methylheptane	1460	1450	0.7
3-Methylheptane	1510	1520	0.7
n-Octane	1560	1550	0.6
Ethylbenzene	2560	2610	1.9
m/p-Xylenes	9750	9900	1.5
Styrene	731	740	1.2
o-Xylene	3550	3550	0.0
Nonane	962	965	0.3
Isopropylbenzene	379	383	1.0
n-Propylbenzene	706	744	5.2
m-Ethyltoluene	2670	2730	2.2
p-Ethyltoluene	1170	1200	2.5
1,3,5-Trimethylbenzene	1260	1240	1.6
o-Ethyltoluene	882	930	5.3
1,2,4-Trimethylbenzene	4100	4130	0.7
n-Decane	669	672	0.4
1,2,3-Trimethylbenzene	986	1010	2.4
m-Diethylbenzene	506	513	1.4
p-Diethylbenzene	835	836	0.1
n-Undecane	431	428	0.7
n-Dodecane	155	159	2.5
Total PAMS (ppbC)	139000	139000	0.0
TNMHC (ppbc)	216000	223000	3.2

Marcus Hueppe
Laboratory Director

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CHAIN OF CUSTODY

#170926

Project Name & Project Number:	Project / Sample Location:	Analyses			Full 202? ☐ Yes ☐ No BAAQMD? ☑ Yes ☐ No
Schnitzer Steel – 005AS-179737	Shredder				
Office: ☑ Antioch ☐ Bakersfield ☐ Orange ☐ Phoenix ☐ Portland ☐ Seattle ☐ Other:	P.O. Number:				Special Analysis Instr. TO-15 for: benzene, tetrachloroethylene, and trichloroethylene.
Send Analytical Report To: labresults@avogadrogroup.com; aberg@montrose-env.com	Sampler / PM Signature: [signature]				

Run / Sample #	Date	# of Containers	Sample Fraction / Reagent	TO-12 (NMNEHC)	TO-15		Comments
1-POC-Out 100374	6/28/17	1	Summa Canister	X	X		
2-POC-Out 100375	6/28/17	1	Summa Canister	X	X		
3-POC-Out 100376	6/28/17	1	Summa Canister	X	X		
Total Containers		3					

Relinquished by: (signature)	☑ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time
[signature]		7/3/17	1330			
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature) [signature]	Date 7/5/17	Time 0930

The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, CA 94509
Phone - (925) 680-4300 * Fax - (925) 680-4416

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Turn Around Time: ☐ Standard ☐ Rush Date:

FED EX

Top Page: Project Mgr. Bottom Page: Laboratory

Appendix D.5

Specific Organic Compounds Analyses

Atmospheric Analysis & Consulting, Inc.

CLIENT : Montrose AQS
PROJECT NAME : Schnitzer Steel - Shredder
PROJECT NUMBER : 005AS-179737
AAC PROJECT NO. : 170926
REPORT DATE : 07/13/2017

On July 5, 2017, Atmospheric Analysis & Consulting, Inc. received three (3) Six-Liter Summa Canisters for Volatile Organic Compounds 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-Out	170926-100374	280.3
2-POC-Out	170926-100375	438.0
3-POC-Out	170926-100376	372.7

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 problems were encountered during receiving, preparation, and/or analysis of these samples. The Laboratory Director or his/her designee, as verified by the following signature, has authorized release of the data contained in this hardcopy report.

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

Marcus Hueppe
Laboratory Director

This report consists of 13 pages.

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 170926
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/05/2017
DATE REPORTED : 07/13/2017

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	1-POC-Out			Sample Reporting Limit (SRL) (MRLxDF's)	2-POC-Out			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	170926-100374				170926-100375				
Date Sampled	06/28/2017				07/05/2017				
Date Analyzed	07/10/2017				07/10/2017				
Can Dilution Factor	3.71				2.35				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Chlorodifluoromethane	2940		20	37	914		20	23	0.5
Propene	158		20	74	557		20	47	1.0
Dichlorodifluoromethane	244		20	37	212		20	23	0.5
Chloromethane	<SRL	U	2.0	3.7	2.79		2.0	2.4	0.5
Dichlorotetrafluoroethane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Vinyl Chloride	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Methanol	329		2.0	37	420		20	235	5.0
1,3-Butadiene	10.7		2.0	3.7	11.7		2.0	2.4	0.5
Bromomethane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Chloroethane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Dichlorofluoromethane	9.32		2.0	3.7	11.3		2.0	2.4	0.5
Ethanol	2250		20	149	2300		100	469	2.0
Vinyl Bromide	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Acetone	1110		20	149	683		20	94	2.0
Trichlorofluoromethane	3400		20	37	4240		100	117	0.5
2-Propanol (IPA)	82.3		2.0	15	35.3		2.0	9.4	2.0
Acrylonitrile	<SRL	U	2.0	7.4	5.54		2.0	4.7	1.0
1,1-Dichloroethene	<SRL	U	2.0	3.7	2.84		2.0	2.4	0.5
Methylene Chloride (DCM)	1030		20	74	16.5		2.0	4.7	1.0
Allyl Chloride	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Carbon Disulfide	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Trichlorotrifluoroethane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
trans-1,2-Dichloroethene	11.3		2.0	3.7	50.4		20.0	23.5	0.5
1,1-Dichloroethane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Methyl Tert Butyl Ether (MTBE)	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Vinyl Acetate	<SRL	U	2.0	7.4	<SRL	U	2.0	4.7	1.0
2-Butanone (MEK)	141		20	74	69.6		20	47	1.0
cis-1,2-Dichloroethene	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Hexane	388		20	37	427		20	23	0.5
Chloroform	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Ethyl Acetate	35.4		2.0	3.7	19.0		2.0	2.4	0.5
Tetrahydrofuran	174		20	37	100		2.0	2.4	0.5
1,2-Dichloroethane	5.46		2.0	3.7	4.72		2.0	2.4	0.5
1,1,1-Trichloroethane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 170926
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/05/2017
DATE REPORTED : 07/13/2017

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	1-POC-Out			Sample Reporting Limit (SRL) (MRLxDF's)	2-POC-Out			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	170926-100374				170926-100375				
Date Sampled	06/28/2017				07/05/2017				
Date Analyzed	07/10/2017				07/10/2017				
Can Dilution Factor	3.71				2.35				
	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Benzene	148		20	37	164		20	23	0.5
Carbon Tetrachloride	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Cyclohexane	228		20	37	268		20	23	0.5
1,2-Dichloropropane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Bromodichloromethane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
1,4-Dioxane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Trichloroethene (TCE)	21.3		2.0	3.7	<SRL	U	2.0	2.4	0.5
2,2,4-Trimethylpentane	342		20	37	382		20	23	0.5
Heptane	238		20	37	287		20	23	0.5
cis-1,3-Dichloropropene	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
4-Methyl-2-pentanone (MiBK)	13.5		2.0	3.7	16.2		2.0	2.4	0.5
trans-1,3-Dichloropropene	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
1,1,2-Trichloroethane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Toluene	1110		20	37	1320		20	23	0.5
2-Hexanone (MBK)	<SRL	U	2.0	3.7	2.77		2.0	2.4	0.5
Dibromochloromethane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
1,2-Dibromoethane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Tetrachloroethene (PCE)	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Chlorobenzene	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Ethylbenzene	212		20	37	265		20	23	0.5
m & p-Xylenes	775		20	74	1050		20	47	1.0
Bromoform	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Styrene	74.7		20	37	51.3		2.0	2.4	0.5
1,1,2,2-Tetrachloroethane	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
o-Xylene	301		20	37	381		20	23	0.5
4-Ethyltoluene	74.1		20	37	94.3		20	23	0.5
1,3,5-Trimethylbenzene	87.7		20	37	118		20	23	0.5
1,2,4-Trimethylbenzene	273		20	37	358		20	23	0.5
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
1,3-Dichlorobenzene	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
1,4-Dichlorobenzene	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
1,2-Dichlorobenzene	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
1,2,4-Trichlorobenzene	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
Hexachlorobutadiene	<SRL	U	2.0	3.7	<SRL	U	2.0	2.4	0.5
BFB-Surrogate Std. % Recovery	94%				106%				70-130%

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

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 170926
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/05/2017
DATE REPORTED : 07/13/2017

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	3-POC-Out			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	170926-100376				
Date Sampled	07/05/2017				
Date Analyzed	07/10/2017				
Can Dilution Factor	2.81				
	Result	Qualifier	Analysis DF		
Chlorodifluoromethane	181		20	28	0.5
Propene	183		20	56	1.0
Dichlorodifluoromethane	30.1		2.0	2.8	0.5
Chloromethane	<SRL	U	2.0	2.8	0.5
Dichlorotetrafluoroethane	<SRL	U	2.0	2.8	0.5
Vinyl Chloride	<SRL	U	2.0	2.8	0.5
Methanol	359		20	281	5.0
1,3-Butadiene	8.59		2.0	2.8	0.5
Bromomethane	<SRL	U	2.0	2.8	0.5
Chloroethane	<SRL	U	2.0	2.8	0.5
Dichlorofluoromethane	5.53		2.0	2.8	0.5
Ethanol	2030		20	112	2.0
Vinyl Bromide	<SRL	U	2.0	2.8	0.5
Acetone	1420		20	112	2.0
Trichlorofluoromethane	2850		20	28	0.5
2-Propanol (IPA)	158		2.0	11	2.0
Acrylonitrile	<SRL	U	2.0	5.6	1.0
1,1-Dichloroethene	6.65		2.0	2.8	0.5
Methylene Chloride (DCM)	29.1		2.0	5.6	1.0
Allyl Chloride	<SRL	U	2.0	2.8	0.5
Carbon Disulfide	<SRL	U	2.0	2.8	0.5
Trichlorotrifluoroethane	<SRL	U	2.0	2.8	0.5
trans-1,2-Dichloroethene	<SRL	U	2.0	2.8	0.5
1,1-Dichloroethane	<SRL	U	2.0	2.8	0.5
Methyl Tert Butyl Ether (MTBE)	<SRL	U	2.0	2.8	0.5
Vinyl Acetate	<SRL	U	2.0	5.6	1.0
2-Butanone (MEK)	112		20	56	1.0
cis-1,2-Dichloroethene	<SRL	U	2.0	2.8	0.5
Hexane	219		20	28	0.5
Chloroform	<SRL	U	2.0	2.8	0.5
Ethyl Acetate	64.1		2.0	2.8	0.5
Tetrahydrofuran	157		20	28	0.5
1,2-Dichloroethane	<SRL	U	2.0	2.8	0.5
1,1,1-Trichloroethane	<SRL	U	2.0	2.8	0.5

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : Montrose AQS
PROJECT NO : 170926
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/05/2017
DATE REPORTED : 07/13/2017

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	3-POC-Out			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	170926-100376				
Date Sampled	07/05/2017				
Date Analyzed	07/10/2017				
Can Dilution Factor	2.81				
	Result	Qualifier	Analysis DF		
Benzene	97.2		20	28	0.5
Carbon Tetrachloride	<SRL	U	2.0	2.8	0.5
Cyclohexane	150		20	28	0.5
1,2-Dichloropropane	<SRL	U	2.0	2.8	0.5
Bromodichloromethane	<SRL	U	2.0	2.8	0.5
1,4-Dioxane	<SRL	U	2.0	2.8	0.5
Trichloroethene (TCE)	<SRL	U	2.0	2.8	0.5
2,2,4-Trimethylpentane	210		20	28	0.5
Heptane	161		20	28	0.5
cis-1,3-Dichloropropene	<SRL	U	2.0	2.8	0.5
4-Methyl-2-pentanone (MiBK)	26.0		2.0	2.8	0.5
trans-1,3-Dichloropropene	<SRL	U	2.0	2.8	0.5
1,1,2-Trichloroethane	<SRL	U	2.0	2.8	0.5
Toluene	744		20	28	0.5
2-Hexanone (MBK)	<SRL	U	2.0	2.8	0.5
Dibromochloromethane	<SRL	U	2.0	2.8	0.5
1,2-Dibromoethane	<SRL	U	2.0	2.8	0.5
Tetrachloroethene (PCE)	<SRL	U	2.0	2.8	0.5
Chlorobenzene	<SRL	U	2.0	2.8	0.5
Ethylbenzene	207		20	28	0.5
m & p-Xylenes	704		20	56	1.0
Bromoform	<SRL	U	2.0	2.8	0.5
Styrene	65.0		2.0	2.8	0.5
1,1,2,2-Tetrachloroethane	<SRL	U	2.0	2.8	0.5
o-Xylene	272		20	28	0.5
4-Ethyltoluene	72.4		2.0	2.8	0.5
1,3,5-Trimethylbenzene	87.5		2.0	2.8	0.5
1,2,4-Trimethylbenzene	236		20	28	0.5
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	2.0	2.8	0.5
1,3-Dichlorobenzene	<SRL	U	2.0	2.8	0.5
1,4-Dichlorobenzene	<SRL	U	2.0	2.8	0.5
1,2-Dichlorobenzene	<SRL	U	2.0	2.8	0.5
1,2,4-Trichlorobenzene	<SRL	U	2.0	2.8	0.5
Hexachlorobutadiene	<SRL	U	2.0	2.8	0.5
BFB-Surrogate Std. % Recovery	89%				70-130%

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

Marcus Huepe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

ANALYSIS DATE : 07/10/2017 **INSTRUMENT ID** : GC/MS-02
ANALYST : JJG **CALIBRATION STD ID** : PS041817-02

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15
Continuing Calibration Verification of the 07/05/2017 Calibration

Compounds	Conc	Daily Conc	%REC*
4-BFB (surrogate standard)	10.00	9.93	99
Chlorodifluoromethane	10.40	10.48	101
Propene	10.90	10.63	98
Dichlorodifluoromethane	10.60	10.90	103
Chloromethane	10.30	9.84	96
Dichlorotetrafluoroethane	10.00	10.39	104
Vinyl Chloride	10.10	10.20	101
Methanol	19.00	18.42	97
1,3-Butadiene	10.50	11.28	107
Bromomethane	10.00	10.41	104
Chloroethane	9.70	9.25	95
Dichlorofluoromethane	10.60	10.63	100
Ethanol	9.10	9.02	99
Vinyl Bromide	10.10	9.62	95
Acetone	10.60	11.10	105
Trichlorofluoromethane	10.40	11.07	106
2-Propanol (IPA)	10.80	10.87	101
Acrylonitrile	11.50	11.84	103
1,1-Dichloroethene	10.80	11.35	105
Methylene Chloride (DCM)	10.50	11.05	105
Allyl Chloride	11.00	10.71	97
Carbon Disulfide	10.00	10.29	103
Trichlorotrifluoroethane	10.70	10.49	98
trans-1,2-Dichloroethene	10.10	10.56	105
1,1-Dichloroethane	10.50	10.71	102
Methyl Tert Butyl Ether (MTBE)	10.60	11.25	106
Vinyl Acetate	10.80	10.93	101
2-Butanone (MEK)	10.60	10.50	99
cis-1,2-Dichloroethene	10.60	10.78	102
Hexane	10.50	10.97	104
Chloroform	10.90	11.30	104
Ethyl Acetate	10.90	10.69	98
Tetrahydrofuran	10.50	9.44	90
1,2-Dichloroethane	10.60	12.02	113
1,1,1-Trichloroethane	10.60	11.30	107

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Atmospheric Analysis & Consulting, Inc.

ANALYSIS DATE : 07/10/2017
ANALYST : JJG

INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : PS041817-02

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Continuing Calibration Verification of the 07/05/2017 Calibration

Compounds	Conc	Daily Conc	%REC*
Benzene	10.40	10.63	102
Carbon Tetrachloride	10.80	12.10	112
Cyclohexane	10.50	10.66	102
1,2-Dichloropropane	10.50	10.39	99
Bromodichloromethane	10.40	11.24	108
1,4-Dioxane	10.40	10.69	103
Trichloroethene (TCE)	10.40	11.20	108
2,2,4-Trimethylpentane	10.30	11.08	108
Heptane	10.40	11.27	108
cis-1,3-Dichloropropene	10.70	12.06	113
4-Methyl-2-pentanone (MiBK)	10.00	10.72	107
trans-1,3-Dichloropropene	10.00	11.09	111
1,1,2-Trichloroethane	10.40	10.99	106
Toluene	10.60	11.47	108
2-Hexanone (MBK)	10.80	10.78	100
Dibromochloromethane	9.90	10.89	110
1,2-Dibromoethane	10.40	11.41	110
Tetrachloroethene (PCE)	10.30	10.84	105
Chlorobenzene	10.50	10.74	102
Ethylbenzene	10.50	10.79	103
m & p-Xylenes	20.00	20.65	103
Bromoform	10.40	11.30	109
Styrene	10.30	10.17	99
1,1,2,2-Tetrachloroethane	10.40	10.29	99
o-Xylene	10.40	10.69	103
4-Ethyltoluene	10.00	10.23	102
1,3,5-Trimethylbenzene	10.00	10.44	104
1,2,4-Trimethylbenzene	9.90	9.58	97
Benzyl Chloride (a-Chlorotoluene)	9.60	9.55	99
1,3-Dichlorobenzene	9.60	8.73	91
1,4-Dichlorobenzene	9.80	9.17	94
1,2-Dichlorobenzene	9.70	9.01	93
1,2,4-Trichlorobenzene	8.80	8.18	93
Hexachlorobutadiene	9.30	8.86	95

* - %REC should be 70-130%

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

CLIENT ID	: Laboratory Control Spike	**DATE ANALYZED**	: 07/10/2017
AAC ID	: LCS/LCSD	**DATE REPORTED**	: 07/10/2017
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	10.80	11.35	11.87	105	110	4.5
Methylene Chloride (DCM)	0.0	10.50	11.05	11.22	105	107	1.5
Benzene	0.0	10.40	10.63	10.77	102	104	1.3
Trichloroethene (TCE)	0.0	10.40	11.20	10.83	108	104	3.4
Toluene	0.0	10.60	11.47	11.62	108	110	1.3
Tetrachloroethene (PCE)	0.0	10.30	10.84	11.23	105	109	3.5
Chlorobenzene	0.0	10.50	10.74	10.37	102	99	3.5
Ethylbenzene	0.0	10.50	10.79	9.86	103	94	9.0
m & p-Xylenes	0.0	20.00	20.65	20.12	103	101	2.6
o-Xylene	0.0	10.40	10.69	10.09	103	97	5.8

* Must be 70-130%

** Must be < 25%

Marcus Hueppe
Laboratory Director

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Method Blank Analysis Report

MATRIX	: AIR	ANALYSIS DATE	: 07/10/2017
UNITS	: ppbv	REPORT DATE	: 07/10/2017

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID AAC ID	Method Blank MB 071017	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

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Method Blank Analysis Report

MATRIX	: AIR	ANALYSIS DATE	: 07/10/2017
UNITS	: ppbv	REPORT DATE	: 07/10/2017

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID / AAC ID	Method Blank MB 071017	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	102%	--

RL - Reporting Limit

Marcus Hueppe
Laboratory Director

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Quality Control/Quality Assurance Report

AAC ID	: 170926-100374	**DATE ANALYZED**	: 07/10/2017
MATRIX	: Air	**DATE REPORTED**	: 07/10/2017
		UNITS	: ppbv

TO-15 Duplicate Analysis

Compound	Sample Conc	Duplicate Conc	% RPD
Chlorodifluoromethane	2940	2980	1.4
Propene	158	169	6.7
Dichlorodifluoromethane	244	247	1.2
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	2250	2260	0.4
Vinyl Bromide	<SRL	<SRL	0.0
Acetone	1110	1110	0.0
Trichlorofluoromethane	3400	3570	4.9
2-Propanol (IPA)	<SRL	<SRL	0.0
Acrylonitrile	<SRL	<SRL	0.0
1,1-Dichloroethene	<SRL	<SRL	0.0
Methylene Chloride (DCM)	1030	1020	1.0
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)	141	149	5.5
cis-1,2-Dichloroethene	<SRL	<SRL	0.0
Hexane	388	369	5.0
Chloroform	<SRL	<SRL	0.0
Ethyl Acetate	<SRL	<SRL	0.0
Tetrahydrofuran	174	188	7.7
1,2-Dichloroethane	<SRL	<SRL	0.0
1,1,1-Trichloroethane	<SRL	<SRL	0.0
Benzene	148	154	4.0
Carbon Tetrachloride	<SRL	<SRL	0.0

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

AAC ID	: 170926-100374	**DATE ANALYZED**	: 07/10/2017
MATRIX	: Air	**DATE REPORTED**	: 07/10/2017
		UNITS	: ppbv

TO-15 Duplicate Analysis

Compound	Sample Conc	Duplicate Conc	% RPD
Cyclohexane	228	213	6.8
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	342	349	2.0
Heptane	238	232	2.6
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	1110	1050	5.6
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	212	210	0.9
m & p-Xylenes	775	838	7.8
Bromoform	<SRL	<SRL	0.0
Styrene	74.7	74.5	0.3
1,1,2,2-Tetrachloroethane	<SRL	<SRL	0.0
o-Xylene	301	313	3.9
4-Ethyltoluene	74.1	75.7	2.1
1,3,5-Trimethylbenzene	87.7	90.0	2.6
1,2,4-Trimethylbenzene	273	268	1.8
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	99%	102%	3.4

SRL - Sample Reporting Limit

Marcus Hueppe
Laboratory Director

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CHAIN OF CUSTODY

#170926

Project Name & Project Number:	Project / Sample Location:	Analyses			Full 202? ☐ Yes ☐ No
Schnitzer Steel – 005AS-179737	Shredder	TO-12 (NMNEHC)	TO-15		BAAQMD? ☑ Yes ☐ No
Office: ☑ Antioch ☐ Bakersfield ☐ Orange ☐ Phoenix ☐ Portland ☐ Seattle ☐ Other:	P.O. Number:				Special Analysis Instr. TO-15 for: benzene, tetrachloroethylene, and trichloroethylene.
Send Analytical Report To: labresults@avogadrogroup.com; aberg@montrose-env.com	Sampler / PM Signature:				

Run / Sample #	Date	# of Containers	Sample Fraction / Reagent	TO-12 (NMNEHC)	TO-15		Comments
1-POC-Out 100374	6/28/17	1	Summa Canister	X	X		
2-POC-Out 100375	6/28/17	1	Summa Canister	X	X		
3-POC-Out 100376	6/28/17	1	Summa Canister	X	X		
Total Containers		3					

Relinquished by: (signature)	☑ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date 7/3/17	Time 1330	Received by: (signature)	Date	Time
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date 7/5/17	Time 0935

6.02 x 10^23

The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, CA 94509
Phone - (925) 680-4300 * Fax - (925) 680-4416

JC CANS, NO FLOW!

Turn Around Time: ☐ Standard ☐ Rush Date:

FEDEX

Top Page: Project Mgr. Bottom Page: Laboratory

Appendix D.6

Polychlorinated Biphenyl Analyses

July 24, 2017

Vista Work Order No. 1700743

Mr. Andy Berg
Montrose Environmental Company
2825 Verne Roberts Circle
Antioch, CA 94509

Dear Mr. Berg,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on July 01, 2017. This sample set was analyzed on a standard turn-around time, under your Project Name 'Schnitzer Steel -005AS-179737'.

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

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

Sincerely,

for

Martha Maier
Laboratory Director

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 1700743
Case Narrative

Sample Condition on Receipt:

Five MM5 samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology. As requested, sample "Reagent Blank" was placed on hold.

Analytical Notes:

CARB Method 428

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

Holding Times

The method holding time criteria were met for the samples.

Quality Control

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

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

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

QC Anomalies

LabNumber	SampleName	Analysis	Analyte	Flag	%Rec
1700743-01	1-PCB	CARB Method 428	13C-PCB-206	H	130
1700743-01	1-PCB	CARB Method 428	13C-PCB-208	H	131
1700743-01	1-PCB	CARB Method 428	13C-PCB-209	H	148
1700743-02	2-PCB	CARB Method 428	13C-PCB-37	H	133
1700743-02	2-PCB	CARB Method 428	13C-PCB-208	H	123
1700743-02	2-PCB	CARB Method 428	13C-PCB-209	H	138
1700743-03	3-PCB	CARB Method 428	13C-PCB-37	H	137
1700743-03	3-PCB	CARB Method 428	13C-PCB-206	H	138
1700743-03	3-PCB	CARB Method 428	13C-PCB-208	H	136
1700743-03	3-PCB	CARB Method 428	13C-PCB-209	H	153
1700743-04	Blank-PCB	CARB Method 428	13C-PCB-208	H	121
B7G0007-BLK1	B7G0007-BLK1	CARB Method 428	13C-PCB-1	H	33.3
B7G0007-BLK1	B7G0007-BLK1	CARB Method 428	13C-PCB-3	H	33.3
B7G0007-BS1	B7G0007-BS1	CARB Method 428	13C-PCB-1	H	19.4
B7G0007-BS1	B7G0007-BS1	CARB Method 428	13C-PCB-3	H	25.3
B7G0007-BS1	B7G0007-BS1	CARB Method 428	13C-PCB-4	H	37.5
B7G0007-BS1	B7G0007-BS1	CARB Method 428	13C-PCB-19	H	36.4

H = Recovery was outside laboratory acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1700743-01	1-PCB	29-Jun-17 00:00	01-Jul-17 11:09	C1A
				C1B
				C2
				C3
				C4
				C5
1700743-02	2-PCB	29-Jun-17 00:00	01-Jul-17 11:09	C1A
				C1B
				C2
				C3
				C4
				C5
1700743-03	3-PCB	29-Jun-17 00:00	01-Jul-17 11:09	C1A
				C1B
				C2
				C3
				C4
				C5
1700743-04	Blank-PCB	29-Jun-17 00:00	01-Jul-17 11:09	C1A
				C1B
				C2
				C3
				C4
				C5
1700743-05	Reagent Blank	29-Jun-17 00:00	01-Jul-17 11:09	Methanol Rinse
				Toluene Rinse
				MeCl2 Rinse
				DI Water

ANALYTICAL RESULTS

Sample ID: Method Blank CARB Method 428

Matrix: Air

QC Batch: B7G0007
Date Extracted: 05-Jul-2017 7:01

Lab Sample: B7G0007-BLK1
Date Analyzed: 14-Jul-17 14:08 Column: ZB-1

Analyte	Conc. (ng/Sample)	RL	Qualifiers
Total monoCB	ND	0.0250	
Total diCB	ND	0.0250	
Total triCB	ND	0.0250	
Total tetraCB	ND	0.0250	
Total pentaCB	ND	0.0250	
Total hexaCB	ND	0.0250	
Total heptaCB	ND	0.0250	
Total octaCB	ND	0.0250	
Total nonaCB	ND	0.0250	
DecaCB	ND	0.0250	
Total PCB	ND	0.0250	

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	33.3	40-120	H
IS	13C-PCB-3	33.3	40-120	H
IS	13C-PCB-4	52.3	40-120	
IS	13C-PCB-11	73.2	40-120	
IS	13C-PCB-9	58.4	40-120	
IS	13C-PCB-19	47.0	40-120	
IS	13C-PCB-28	73.8	40-120	
IS	13C-PCB-32	54.8	40-120	
IS	13C-PCB-37	85.6	40-120	
IS	13C-PCB-47	85.3	40-120	
IS	13C-PCB-52	84.7	40-120	
IS	13C-PCB-54	73.5	40-120	
IS	13C-PCB-70	90.0	40-120	
IS	13C-PCB-77	90.9	40-120	
IS	13C-PCB-80	94.1	40-120	
IS	13C-PCB-81	88.8	40-120	
IS	13C-PCB-95	88.9	40-120	
IS	13C-PCB-97	93.2	40-120	
IS	13C-PCB-101	93.0	40-120	
IS	13C-PCB-104	86.1	40-120	
IS	13C-PCB-105	90.1	40-120	
IS	13C-PCB-114	93.1	40-120	
IS	13C-PCB-118	95.5	40-120	
IS	13C-PCB-123	103	40-120	
IS	13C-PCB-126	83.7	40-120	
IS	13C-PCB-127	85.4	40-120	
IS	13C-PCB-138	94.7	40-120	
IS	13C-PCB-141	94.5	40-120	
IS	13C-PCB-153	96.6	40-120	
IS	13C-PCB-155	77.8	40-120	
IS	13C-PCB-156	95.8	40-120	
IS	13C-PCB-157	96.3	40-120	
IS	13C-PCB-159	97.1	40-120	
IS	13C-PCB-167	95.5	40-120	
IS	13C-PCB-169	97.8	40-120	
IS	13C-PCB-170	84.4	40-120	
IS	13C-PCB-180	85.8	40-120	

Sample ID: Method Blank CARB Method 428

Matrix: Air	QC Batch: B7G0007 Date Extracted: 05-Jul-2017 7:01	Lab Sample: B7G0007-BLK1 Date Analyzed: 14-Jul-17 14:08 Column: ZB-1

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-188	85.9	40-120	
IS	13C-PCB-189	89.0	40-120	
IS	13C-PCB-194	101	40-120	
IS	13C-PCB-202	65.4	40-120	
IS	13C-PCB-206	106	40-120	
IS	13C-PCB-208	107	40-120	
IS	13C-PCB-209	93.3	40-120	

LCL-UCL - Lower control limit - upper control limit
Results reported to RL.

RL - Reporting limit

Sample ID: OPR **CARB Method 428**

Matrix: Air

QC Batch: B7G0007
Date Extracted: 05-Jul-2017 7:01

Lab Sample: B7G0007-BS1
Date Analyzed: 14-Jul-17 09:48 Column: ZB-1

Analyte	Amt Found (ng/Sam	Spike Amt	%R	Limits
PCB-3	11.8	10.0	118	60 - 140
PCB-15	9.81	10.0	98.1	60 - 140
PCB-28	8.42	10.0	84.2	60 - 140
PCB-77	10.2	10.0	102	60 - 140
PCB-106/118	19.5	20.0	97.4	60 - 140
PCB-156	9.71	10.0	97.1	60 - 140
PCB-180	9.24	10.0	92.4	60 - 140
PCB-202	9.75	10.0	97.5	60 - 140
PCB-207	9.40	10.0	94.0	60 - 140
PCB-209	9.48	10.0	94.8	60 - 140

	Labeled Standard	%R	LCL-UCL
IS	13C-PCB-1	19.4	40 - 120
IS	13C-PCB-3	25.3	40 - 120
IS	13C-PCB-4	37.5	40 - 120
IS	13C-PCB-11	55.2	40 - 120
IS	13C-PCB-9	43.8	40 - 120
IS	13C-PCB-19	36.4	40 - 120
IS	13C-PCB-28	53.1	40 - 120
IS	13C-PCB-32	43.8	40 - 120
IS	13C-PCB-37	63.6	40 - 120
IS	13C-PCB-47	65.1	40 - 120
IS	13C-PCB-52	66.7	40 - 120
IS	13C-PCB-54	57.2	40 - 120
IS	13C-PCB-70	70.7	40 - 120
IS	13C-PCB-77	78.2	40 - 120
IS	13C-PCB-80	73.8	40 - 120
IS	13C-PCB-81	73.2	40 - 120
IS	13C-PCB-95	70.0	40 - 120
IS	13C-PCB-97	75.0	40 - 120
IS	13C-PCB-101	72.9	40 - 120
IS	13C-PCB-104	66.0	40 - 120
IS	13C-PCB-105	74.5	40 - 120
IS	13C-PCB-114	77.7	40 - 120
IS	13C-PCB-118	78.8	40 - 120
IS	13C-PCB-123	81.3	40 - 120
IS	13C-PCB-126	75.5	40 - 120
IS	13C-PCB-127	75.4	40 - 120
IS	13C-PCB-138	79.1	40 - 120
IS	13C-PCB-141	77.0	40 - 120
IS	13C-PCB-153	79.4	40 - 120
IS	13C-PCB-155	63.0	40 - 120
IS	13C-PCB-156	80.7	40 - 120
IS	13C-PCB-157	79.5	40 - 120
IS	13C-PCB-159	78.6	40 - 120
IS	13C-PCB-167	79.3	40 - 120
IS	13C-PCB-169	81.5	40 - 120
IS	13C-PCB-170	73.0	40 - 120
IS	13C-PCB-180	75.1	40 - 120
IS	13C-PCB-188	71.1	40 - 120

Sample ID: OPR

CARB Method 428

Matrix: Air	QC Batch: B7G0007 Date Extracted: 05-Jul-2017 7:01	Lab Sample: B7G0007-BS1 Date Analyzed: 14-Jul-17 09:48 Column: ZB-1

Analyte	Amt Found (ng/Sam	Spike Amt	%R	Limits

	Labeled Standard	%R	LCL-UCL
IS	13C-PCB-189	76.8	40 - 120
IS	13C-PCB-194	81.5	40 - 120
IS	13C-PCB-202	62.6	40 - 120
IS	13C-PCB-206	84.3	40 - 120
IS	13C-PCB-208	88.5	40 - 120
IS	13C-PCB-209	74.3	40 - 120

LCL-UCL - Lower control limit - upper control limit

Sample ID: 1-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel -005AS-179737
Date Collected: 29-Jun-17 0:00

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1700743-01 Date Received: 01-Jul-17 11:09
QC Batch: B7G0007 Date Extracted: 05-Jul-17 07:01
Date Analyzed: 19-Jul-17 17:27 Column: ZB-1

Analyte	Conc. (ng/Sample)	RL	Qualifiers
Total monoCB	3320	0.125	
Total diCB	13100	0.125	
Total triCB	15200	0.125	
Total tetraCB	3290	0.125	
Total pentaCB	354	0.125	
Total hexaCB	83.2	0.125	
Total heptaCB	27.5	0.125	
Total octaCB	6.19	0.125	
Total nonaCB	0.787	0.125	
DecaCB	ND	0.125	
Total PCB	35500	0.125	

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	53.9	40 - 120	D
IS	13C-PCB-3	55.7	40 - 120	D
IS	13C-PCB-4	86.4	40 - 120	D
IS	13C-PCB-11	104	40 - 120	D
IS	13C-PCB-9	95.5	40 - 120	D
IS	13C-PCB-19	73.3	40 - 120	D
IS	13C-PCB-28	90.5	40 - 120	D
IS	13C-PCB-32	78.3	40 - 120	D
IS	13C-PCB-37	117	40 - 120	D
IS	13C-PCB-47	116	40 - 120	D
IS	13C-PCB-52	104	40 - 120	D
IS	13C-PCB-54	81.6	40 - 120	D
IS	13C-PCB-70	118	40 - 120	D
IS	13C-PCB-77	105	40 - 120	D
IS	13C-PCB-80	119	40 - 120	D
IS	13C-PCB-81	112	40 - 120	D
IS	13C-PCB-95	110	40 - 120	D
IS	13C-PCB-97	105	40 - 120	D
IS	13C-PCB-101	96.1	40 - 120	D
IS	13C-PCB-104	117	40 - 120	D
IS	13C-PCB-105	84.4	40 - 120	D
IS	13C-PCB-114	90.4	40 - 120	D
IS	13C-PCB-118	94.7	40 - 120	D
IS	13C-PCB-123	98.6	40 - 120	D
IS	13C-PCB-126	79.8	40 - 120	D
IS	13C-PCB-127	85.2	40 - 120	D
IS	13C-PCB-138	99.0	40 - 120	D
IS	13C-PCB-141	105	40 - 120	D
IS	13C-PCB-153	111	40 - 120	D
IS	13C-PCB-155	79.6	40 - 120	D
IS	13C-PCB-156	111	40 - 120	D
IS	13C-PCB-157	107	40 - 120	D
IS	13C-PCB-159	107	40 - 120	D
IS	13C-PCB-167	106	40 - 120	D
IS	13C-PCB-169	99.3	40 - 120	D
IS	13C-PCB-170	104	40 - 120	D
IS	13C-PCB-180	108	40 - 120	D
IS	13C-PCB-188	104	40 - 120	D
IS	13C-PCB-189	100	40 - 120	D

Sample ID: 1-PCB

CARB Method 428

Client Data		Sample Data		Laboratory Data			
Name:	Montrose Environmental Company	Matrix:	Air Train	Lab Sample:	1700743-01	Date Received:	01-Jul-17 11:09
Project:	Schnitzer Steel -005AS-179737			QC Batch:	B7G0007	Date Extracted:	05-Jul-17 07:01
Date Collected:	29-Jun-17 0:00			Date Analyzed:	19-Jul-17 17:27	Column:	ZB-1

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-194	111	40 - 120	D
IS	13C-PCB-202	101	40 - 120	D
IS	13C-PCB-206	130	40 - 120	D, H
IS	13C-PCB-208	131	40 - 120	D, H
IS	13C-PCB-209	148	40 - 120	D, H
PS	13C-PCB-79	117	60 - 140	D
PS	13C-PCB-178	105	60 - 140	D

LCL-UCL - Lower control limit - upper control limit
Results reported to RL.

RL - Reporting limit

Sample ID: 2-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel -005AS-179737
Date Collected: 29-Jun-17 0:00

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1700743-02 Date Received: 01-Jul-17 11:09
QC Batch: B7G0007 Date Extracted: 05-Jul-17 07:01
Date Analyzed: 19-Jul-17 18:33 Column: ZB-1

Analyte	Conc. (ng/Sample)	RL	Qualifiers
Total monoCB	4140	0.125	
Total diCB	17000	0.125	
Total triCB	20700	0.125	
Total tetraCB	4380	0.125	
Total pentaCB	318	0.125	
Total hexaCB	57.4	0.125	
Total heptaCB	29.4	0.125	
Total octaCB	8.85	0.125	
Total nonaCB	0.906	0.125	
DecaCB	0.136	0.125	
Total PCB	47400	0.125	

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	51.1	40 - 120	D
IS	13C-PCB-3	50.6	40 - 120	D
IS	13C-PCB-4	82.3	40 - 120	D
IS	13C-PCB-11	95.4	40 - 120	D
IS	13C-PCB-9	89.9	40 - 120	D
IS	13C-PCB-19	57.7	40 - 120	D
IS	13C-PCB-28	96.7	40 - 120	D
IS	13C-PCB-32	65.9	40 - 120	D
IS	13C-PCB-37	133	40 - 120	D, H
IS	13C-PCB-47	106	40 - 120	D
IS	13C-PCB-52	99.2	40 - 120	D
IS	13C-PCB-54	77.3	40 - 120	D
IS	13C-PCB-70	107	40 - 120	D
IS	13C-PCB-77	98.9	40 - 120	D
IS	13C-PCB-80	113	40 - 120	D
IS	13C-PCB-81	105	40 - 120	D
IS	13C-PCB-95	106	40 - 120	D
IS	13C-PCB-97	101	40 - 120	D
IS	13C-PCB-101	95.7	40 - 120	D
IS	13C-PCB-104	111	40 - 120	D
IS	13C-PCB-105	75.1	40 - 120	D
IS	13C-PCB-114	84.1	40 - 120	D
IS	13C-PCB-118	91.8	40 - 120	D
IS	13C-PCB-123	91.6	40 - 120	D
IS	13C-PCB-126	76.1	40 - 120	D
IS	13C-PCB-127	78.9	40 - 120	D
IS	13C-PCB-138	94.0	40 - 120	D
IS	13C-PCB-141	97.3	40 - 120	D
IS	13C-PCB-153	106	40 - 120	D
IS	13C-PCB-155	77.0	40 - 120	D
IS	13C-PCB-156	103	40 - 120	D
IS	13C-PCB-157	99.2	40 - 120	D
IS	13C-PCB-159	96.2	40 - 120	D
IS	13C-PCB-167	98.5	40 - 120	D
IS	13C-PCB-169	90.5	40 - 120	D
IS	13C-PCB-170	97.0	40 - 120	D
IS	13C-PCB-180	100	40 - 120	D
IS	13C-PCB-188	99.5	40 - 120	D
IS	13C-PCB-189	92.9	40 - 120	D

Sample ID: 2-PCB

CARB Method 428

Client Data		Sample Data		Laboratory Data			
Name:	Montrose Environmental Company	Matrix:	Air Train	Lab Sample:	1700743-02	Date Received:	01-Jul-17 11:09
Project:	Schnitzer Steel -005AS-179737			QC Batch:	B7G0007	Date Extracted:	05-Jul-17 07:01
Date Collected:	29-Jun-17 0:00			Date Analyzed:	19-Jul-17 18:33	Column:	ZB-1

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-194	98.3	40 - 120	D
IS	13C-PCB-202	87.8	40 - 120	D
IS	13C-PCB-206	119	40 - 120	D
IS	13C-PCB-208	123	40 - 120	D, H
IS	13C-PCB-209	138	40 - 120	D, H
PS	13C-PCB-79	107	60 - 140	D
PS	13C-PCB-178	99.5	60 - 140	D

LCL-UCL - Lower control limit - upper control limit
Results reported to RL.

RL - Reporting limit

Sample ID: 3-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel -005AS-179737
Date Collected: 29-Jun-17 0:00

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1700743-03 Date Received: 01-Jul-17 11:09
QC Batch: B7G0007 Date Extracted: 05-Jul-17 07:01
Date Analyzed: 19-Jul-17 19:38 Column: ZB-1

Analyte	Conc. (ng/Sample)	RL	Qualifiers
Total monoCB	2890	0.125	
Total diCB	11800	0.125	
Total triCB	14900	0.125	
Total tetraCB	2980	0.125	
Total pentaCB	304	0.125	
Total hexaCB	49.7	0.125	
Total heptaCB	13.0	0.125	
Total octaCB	3.61	0.125	
Total nonaCB	0.756	0.125	
DecaCB	ND	0.125	
Total PCB	33400	0.125	

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	51.3	40 - 120	D
IS	13C-PCB-3	50.0	40 - 120	D
IS	13C-PCB-4	92.1	40 - 120	D
IS	13C-PCB-11	107	40 - 120	D
IS	13C-PCB-9	101	40 - 120	D
IS	13C-PCB-19	63.4	40 - 120	D
IS	13C-PCB-28	114	40 - 120	D
IS	13C-PCB-32	66.8	40 - 120	D
IS	13C-PCB-37	137	40 - 120	D, H
IS	13C-PCB-47	90.1	40 - 120	D
IS	13C-PCB-52	85.8	40 - 120	D
IS	13C-PCB-54	66.7	40 - 120	D
IS	13C-PCB-70	110	40 - 120	D
IS	13C-PCB-77	88.8	40 - 120	D
IS	13C-PCB-80	119	40 - 120	D
IS	13C-PCB-81	101	40 - 120	D
IS	13C-PCB-95	119	40 - 120	D
IS	13C-PCB-97	113	40 - 120	D
IS	13C-PCB-101	110	40 - 120	D
IS	13C-PCB-104	106	40 - 120	D
IS	13C-PCB-105	80.0	40 - 120	D
IS	13C-PCB-114	79.4	40 - 120	D
IS	13C-PCB-118	93.9	40 - 120	D
IS	13C-PCB-123	94.3	40 - 120	D
IS	13C-PCB-126	76.7	40 - 120	D
IS	13C-PCB-127	78.9	40 - 120	D
IS	13C-PCB-138	99.4	40 - 120	D
IS	13C-PCB-141	102	40 - 120	D
IS	13C-PCB-153	111	40 - 120	D
IS	13C-PCB-155	89.9	40 - 120	D
IS	13C-PCB-156	110	40 - 120	D
IS	13C-PCB-157	109	40 - 120	D
IS	13C-PCB-159	107	40 - 120	D
IS	13C-PCB-167	106	40 - 120	D
IS	13C-PCB-169	99.3	40 - 120	D
IS	13C-PCB-170	105	40 - 120	D
IS	13C-PCB-180	109	40 - 120	D
IS	13C-PCB-188	104	40 - 120	D
IS	13C-PCB-189	102	40 - 120	D

Sample ID: 3-PCB

CARB Method 428

Client Data		Sample Data		Laboratory Data			
Name:	Montrose Environmental Company	Matrix:	Air Train	Lab Sample:	1700743-03	Date Received:	01-Jul-17 11:09
Project:	Schnitzer Steel -005AS-179737			QC Batch:	B7G0007	Date Extracted:	05-Jul-17 07:01
Date Collected:	29-Jun-17 0:00			Date Analyzed:	19-Jul-17 19:38	Column:	ZB-1

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-194	111	40 - 120	D
IS	13C-PCB-202	92.8	40 - 120	D
IS	13C-PCB-206	138	40 - 120	D, H
IS	13C-PCB-208	136	40 - 120	D, H
IS	13C-PCB-209	153	40 - 120	D, H
PS	13C-PCB-79	115	60 - 140	D
PS	13C-PCB-178	102	60 - 140	D

LCL-UCL - Lower control limit - upper control limit
Results reported to RL.

RL - Reporting limit

Sample ID: Blank-PCB

CARB Method 428

Client Data
Name: Montrose Environmental Company
Project: Schnitzer Steel -005AS-179737
Date Collected: 29-Jun-17 0:00

Sample Data
Matrix: Air Train

Laboratory Data
Lab Sample: 1700743-04 Date Received: 01-Jul-17 11:09
QC Batch: B7G0007 Date Extracted: 05-Jul-17 07:01
Date Analyzed: 14-Jul-17 15:13 Column: ZB-1

Analyte	Conc. (ng/Sample)	RL	Qualifiers
Total monoCB	0.135	0.0250	
Total diCB	0.861	0.0250	
Total triCB	1.09	0.0250	
Total tetraCB	0.685	0.0250	
Total pentaCB	0.238	0.0250	
Total hexaCB	0.112	0.0250	
Total heptaCB	ND	0.0250	
Total octaCB	ND	0.0250	
Total nonaCB	ND	0.0250	
DecaCB	ND	0.0250	
Total PCB	3.21	0.0250	

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-1	47.1	40 - 120	
IS	13C-PCB-3	49.6	40 - 120	
IS	13C-PCB-4	66.2	40 - 120	
IS	13C-PCB-11	86.6	40 - 120	
IS	13C-PCB-9	73.5	40 - 120	
IS	13C-PCB-19	55.7	40 - 120	
IS	13C-PCB-28	88.2	40 - 120	
IS	13C-PCB-32	62.3	40 - 120	
IS	13C-PCB-37	98.2	40 - 120	
IS	13C-PCB-47	97.2	40 - 120	
IS	13C-PCB-52	97.3	40 - 120	
IS	13C-PCB-54	88.9	40 - 120	
IS	13C-PCB-70	104	40 - 120	
IS	13C-PCB-77	110	40 - 120	
IS	13C-PCB-80	100	40 - 120	
IS	13C-PCB-81	106	40 - 120	
IS	13C-PCB-95	96.4	40 - 120	
IS	13C-PCB-97	102	40 - 120	
IS	13C-PCB-101	99.5	40 - 120	
IS	13C-PCB-104	93.3	40 - 120	
IS	13C-PCB-105	96.5	40 - 120	
IS	13C-PCB-114	99.5	40 - 120	
IS	13C-PCB-118	104	40 - 120	
IS	13C-PCB-123	109	40 - 120	
IS	13C-PCB-126	90.5	40 - 120	
IS	13C-PCB-127	92.9	40 - 120	
IS	13C-PCB-138	98.5	40 - 120	
IS	13C-PCB-141	101	40 - 120	
IS	13C-PCB-153	99.4	40 - 120	
IS	13C-PCB-155	83.0	40 - 120	
IS	13C-PCB-156	104	40 - 120	
IS	13C-PCB-157	102	40 - 120	
IS	13C-PCB-159	101	40 - 120	
IS	13C-PCB-167	102	40 - 120	
IS	13C-PCB-169	104	40 - 120	
IS	13C-PCB-170	86.6	40 - 120	
IS	13C-PCB-180	89.9	40 - 120	
IS	13C-PCB-188	83.0	40 - 120	
IS	13C-PCB-189	88.9	40 - 120	

Sample ID: Blank-PCB

CARB Method 428

Client Data

Name: Montrose Environmental Company
Project: Schnitzer Steel -005AS-179737
Date Collected: 29-Jun-17 0:00

Sample Data

Matrix: Air Train

Laboratory Data

Lab Sample: 1700743-04 Date Received: 01-Jul-17 11:09
QC Batch: B7G0007 Date Extracted: 05-Jul-17 07:01
Date Analyzed: 14-Jul-17 15:13 Column: ZB-1

	Labeled Standard	%R	LCL-UCL	Qualifiers
IS	13C-PCB-194	109	40 - 120	
IS	13C-PCB-202	66.9	40 - 120	
IS	13C-PCB-206	119	40 - 120	
IS	13C-PCB-208	121	40 - 120	H
IS	13C-PCB-209	104	40 - 120	
PS	13C-PCB-79	103	60 - 140	
PS	13C-PCB-178	86.6	60 - 140	

LCL-UCL - Lower control limit - upper control limit
Results reported to RL.

RL - Reporting limit

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank.
D	Dilution
E	The associated compound concentration exceeded the calibration range of the instrument.
H	Recovery and/or RPD was outside laboratory acceptance limits.
I	Chemical Interference
J	The amount detected is below the Reporting Limit/LOQ.
M	Estimated Maximum Possible Concentration. (CA Region 2 projects only)
*	See Cover Letter
Conc.	Concentration
NA	Not applicable
ND	Not Detected
TEQ	Toxic Equivalency

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

CERTIFICATIONS

Accrediting Authority	Certificate Number
Arkansas Department of Environmental Quality	17-015-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1175673
Nevada Division of Environmental Protection	CA004132017-1
New Hampshire Environmental Accreditation Program	207716
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	013
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	8621
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

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

NELAP Accredited Test Methods

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

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

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

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

MATRIX: Solids	
Description of Test	**Method**
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

CHAIN OF CUSTODY

1700743 10.0°C

Project Name & Project Number:	Project / Sample Location:	Analyses	Full 202? ☐ Yes ☐ No BAAQMD? ☐ Yes ☐ No
Schnitzer Steel – 005AS-179737	Shredder Outlet	CARB 428	
Office: ☑ Antioch ☐ Bakersfield ☐ Orange ☐ Phoenix ☐ Portland ☐ Seattle ☐ Other:	P.O. Number:		Special Analysis Instr.
Send Analytical Report To: labresults@avogadrogroup.com; aberg@montrose-env.com	Sampler / PM Signature:		

Run / Sample #	Date	# of Containers	Sample Fraction / Reagent	CARB 428		Comments
1-PCB		1	F1/2 Filter	X		Container 1b
1-PCB		1	Sorbent Trap	X		Container 1b
1-PCB		1	F1/2 Rinse	X		Container 2
1-PCB		1	B1/2 Rinse	X		Containers 3
1-PCB		1	B1/2 Imp	X		Containers 4
1-PCB		1	B1/2 Imps 2-3	X		Container 5
2-PCB		6	Same as 1-PCB	X		Containers 1-5
3-PCB		6	Same as 1-PCB	X		Containers 1-5
Blank-PCB		6	Same as 1-PCB	X		Containers 1-5
Methanol		1	Methanol Reagent Blank			Please hold, do not analyze at this time.
Toluene		1	Toluene Reagent Blank			
MeCl2		1	MeCl2 Reagent Blank			
Water		1	Water Reagent Blank			
Total Containers		**28**				

Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time
[signature]		7/1/17	11:00			
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature)	Date	Time
Relinquished by: (signature)	☐ Fed Ex ☐ Sample Receiving ☐ Laboratory Fridge	Date	Time	Received by: (signature) [signature]	Date 07/01/17	Time 1109

The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, CA 94509
Phone - (925) 680-4300 * Fax - (925) 680-4416

Turn Around Time: ☐ Standard ☐ Rush Date:

Top Page: Project Mgr. Bottom Page: Laborato

Vista Analytical Laboratory

Sample Log-in Checklist

Vista Work Order #: 1700743 TAT Std

Samples Arrival:	Date/Time 07/01/17 1109	Initials: JBB	Location: WR-2 Shelf/Rack: NA
Logged In:	Date/Time 07/01/17 1255	Initials: JBB	Location: R1 Shelf/Rack: NA

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

Temp °C: 10.7 (uncorrected)	Time: 1121	Thermometer ID: DT-3
Temp °C: 10.0 (corrected)	Probe used: Yes ☑ No ☐	

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

If Chlorinated or Drinking Water Samples, Acceptable Preservation?						✓
Preservation Documented:	$Na_2S_2O_3$	Trizma	None	Yes	No	NA
Shipping Container	Vista	Client	Retain	Return	Dispose	

Comments: 2 unused XAD Traps / Collection date on Containers: 6/29/17

APPENDIX E

OPERATING PERMITS

Condition # 23114

S-6 & S-7 Shredder and Infeed Conveyor; abated by A-6 Water Sprays, A-2 Cyclone #2, A-3 Wet Scrubber; A-4 Dry Filter, A-9 Cyclone #3, and A-5 Mist Eliminator (until installation of enclosure and upgraded abatement system);
(A #14194; Revision 1: A #16721)

1. The owner/operator shall not exceed the scrap-in throughput limit of 720,000 tons in any calendar year at this facility.
   (basis: baseline 2005 production level of 431,471 tons/yr; cumulative increase for the incremental throughput; health risk screening analysis)

2. The owner/operator shall enclose and vent the shredder to the abatement system at all times it is operating to minimize fugitive emissions.
   (basis: TBACT)

3. The owner/operator shall abate particulate emissions from the shredder by water injection at a sufficient rate to ensure that non-metallic material exiting the unit be moist to the touch at all times, and abatement system consisting of cyclones, scrubber, filter, and demister at all times when the shredder is in operation. The PM grain loading at the exhaust outlet of the abatement system shall not exceed 0.01 gr/dscf.
   (basis: TBACT)

4. The owner/operator shall operate the Recycling Center in such a manner that particulate emissions into the atmosphere from any operation/equipment for a period or periods aggregating more than three minutes in any hour shall not cause a visible emission which is as dark or darker than No. 0.5 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree or result in fallout on adjacent property in such quantities as to cause public nuisance per District Regulation 1-301.
   (basis: Regulations 6-1-301; 1-301)

5. The owner/operator shall use water spray to minimize fugitive dust emissions from material/scrap handling and storage to comply with condition 4. The owner/operator shall pave the site truck transport roads and sweep/spray with water/other actions deemed appropriate by the District, if necessary, to minimize fugitive dust emissions from trucking activities to comply with condition 4.
   (basis: Regulations 6-1-301; 1-301)

6. The owner/operator shall not exceed a total of 26 ship calls and 63,875 truck calls per calendar year to haul in/out scrap/materials at the facility.
(basis: health risk screening analysis; CEQA review)

7. In order to demonstrate compliance with condition numbers 1 and 6, the owner/operator shall keep records of monthly and yearly throughput of materials, ship and truck calls in a District approved log. The log shall be maintained for a period of at least 24 months from the date of data entry and shall be made available to the District staff upon request for inspection.
(basis: recordkeeping)

End of Conditions

Condition # 26401

Upon installation of enclosure and upgraded abatement system for S-6:
S-6 Shredder and S-7 Infeed Conveyor; abated by A-6 Water Sprays, A-11 Venturi Scrubber, and A-12 Venturi Scrubber
(A #14194; Revision 1: A #16721; A #27762)

1. The owner/operator shall not exceed the scrap-in throughput limit of 720,000 tons in any calendar year at this facility. (Basis: Regulations 2-1-301 - baseline 2005 production level of 431,471 tons/yr - and 2-5-302 and Cumulative Increase for the incremental throughput)

2. The owner/operator shall enclose the shredder, S-6, and shall vent the shredder, at all times it is operating, to the Venturi Scrubbers, A-11 and A-12. The owner/operator shall minimize fugitive emissions from the shredder enclosure during shredder operation by (a) designing the enclosure such that the total surface area of all openings in the enclosure does not exceed 5% of the total surface area of the enclosure walls, floor, and ceiling; (b) using curtain walls or strip curtains on the inlet feed conveyor opening; and (c) ensuring that the ventilation fan is operating within its design range. The owner/operator shall demonstrate that the ventilation fan is operating within its design range by maintaining the amperage greater than [xxx, tbd by source test] amperes during shredder operation. The owner/operator shall operate each Venturi Scrubber in accordance with manufacture specifications. The owner/operator shall demonstrate this by maintaining a minimum water flow rate of [xx gallons per minute (gpm), tbd after source test] and an effective pressure differential operating range [xx to xx inches of H2O, tbd after source test]. (Basis: TBACT)

3. Based on the results of the source testing required by Part 4, the owner/operator shall propose new emission rate limits for the shredder at stack P-15. The owner/operator shall propose limits for each of the following pollutants: Precursor Organic Compounds (POC), PM_{10}, $PM_{2.5}$, benzene, hexavalent chromium, PCBs, cadmium, lead, tetrachloroethylene, and trichloroethylene. The proposed emission rate limits shall be submitted to the District within 90 days of receiving the Part 4 source test results. The District will analyze the proposed limits, notify the owner/operator of any necessary changes to these limits, and revise this condition to include the new stack limits and associated monitoring requirements for P-15. In addition, the owner/operator shall estimate the fugitive emission rates that are not captured by the new shredder enclosure. (Basis: Cumulative Increase and Regulation 2-5-302)

4. Source Testing Requirements for Parts 3 and 5:
   a. Prior to removal of the existing particulate abatement system, the owner/operator shall conduct source testing on the existing shredder abatement system that is intended to be used in conjunction with source testing in Part 4b to estimate captured emissions from the shredder and its associated systems. Particulate

emissions testing (filterable and condensable) shall be conducted at the inlet and outlet of the existing PM abatement system. In addition, the owner/operator shall estimate the fugitive emission rates that are not captured by the existing shredder enclosure.

b. Within 90 days of start-up of A-11 and A-12, the owner/operator shall conduct a District approved source test at stack P-15, while the S-6 Auto Shredder is operating at or near the maximum operating rate. The owner/operator shall record the shredder processing rate, the water application rates for the infeed conveyor and the shredder, the water flow rates and the pressure differential operating ranges at each venturi scrubber, and the ventilation fan amperage during the source test. The source test shall determine the hourly emission rate and the average emission factor (pounds of pollutant per ton of material processed by the shredder) for the following compounds: total POC, PM, benzene, tetrachloroethylene, trichloroethylene, hexavalent chromium, PCBs, cadmium, and lead, and shall determine the outlet grain loading to demonstrate compliance with Part 5. In addition, the owner/operator shall conduct PM testing at the inlet to the A-11 and A-12 Venturi Scrubbers to determine the PM removal efficiency achieved by A-11 and A-12. The owner/operator shall also establish the ventilation fan amperage range necessary to operate the venture scrubbers within the effective pressure differential ranges determined above.

c. The owner/operator shall submit a source test protocol for the post enclosure construction compliance test to the Air District's Source Test Section Manager and to the Permit Engineer at least 30 days prior to the scheduled test date. The owner/operator shall submit a source test protocol for the pre-demolition source test to the Air District's Source Test Section Manager and to the Permit Engineer as soon as possible.

d. The owner/operator shall notify the Source Test Section Manager of the scheduled test date at least 7 days prior to the scheduled test date and shall obtain District approval for all source test procedures prior to conducting any testing.

e. The owner/operator shall submit a copy of the source test report to the Source Test Section Manager within 60 days of the test date.

(Basis: Cumulative Increase and Regulation 2-5-302)

5. The owner/operator shall apply water sprays (A-6) at the shredder, S-6, and infeed conveyor, S-7, at a sufficient rate to ensure that non-metallic material exiting the sources is moist to the touch at all times of operation. The PM grain loading at the exhaust stack P-15 shall not exceed 0.01 gr/dscf. (Basis: Cumulative Increase, TBACT; and Regulation 2-5-302)

6. The owner/operator shall operate the Recycling Center in such a manner that particulate emissions into the atmosphere from any operation/equipment for a period or periods aggregating more than three minutes in any hour shall not cause a visible emission which is as dark or darker than No. 0.5 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree or result in fallout on

adjacent property in such quantities as to cause public nuisance per District Regulation 1-301. (Basis: Regulations 1-301 and 6-1-301)

7. The owner/operator shall use water spray to minimize fugitive dust emissions from material/scrap handling and storage to comply with Part 6. The owner/operator shall operate the facility at all times in accordance with its approved Emissions Minimization Plan (EMP). (Basis: Regulations 1-301, 6-1-301, and 6-4-301)

8. The owner/operator shall not exceed a total of 26 ship calls and 63,875 truck calls per calendar year to haul in/out scrap/materials at the facility. (Basis: health risk assessment for CEQA review)

9. In order to demonstrate compliance with Part 1 and 8, the owner/operator shall keep records of monthly and yearly throughput of materials, ship and truck calls in a District approved log. The log shall be maintained for a period of at least 24 months from the date of data entry and shall be made available to the District staff for inspection upon request. (Basis: Regulations 2-1-301 and 2-5-302, Cumulative Increase, CEQA)

End of Conditions